

# UPFLOW AIR DELIVERY CHILLED WATER ROOM UNITS MUC

# **INSTRUCTION MANUAL**

Study this manual carefully before using the room unit and keep it in a safe place for future reference.

# SAFETY NOTE

This equipment is designed to be safe in use for the purpose intended provided it is installed, operated and maintained in accordance with the instructions contained in this manual. They should therefore be studied in advance by any person wishing to install, use or service the equipment.

The equipment contains electrical components at mains voltage as well as rotating machinery such as fans. It should therefore normally be isolated from the power supply before it is opened up.

Any service and maintenance operations requiring access to the inside of the equipment while it is in operation should be carried out by an appropriately qualified or experienced person who is fully aware of the necessary precautions.

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### QUICK GUIDE

ATTENTION: the description of the Control System and the operating logic of the unit is contained in the Control System Instruction Manual.

#### **START--UP OF THE UNIT**

- Connect power to the electrical panel of the unit: close the main isolator, close the circuit FAN/AUXILIARY of the auxiliary circuit, switch on the power supply and check that the yellow LED lights up as follows:
  - -- "LINE" on mP3 Control Panel;
- -- "~ SYSTEM ON" on mP1 or mP2 Control Panels.
- Open the shut- off valves on the chilled water circuit.
- Check that the chilled water is circulating.

- Start--up the unit by pressing button I on the control panel: after a moment the fans will start and the 'SYSTEM ON" green LED on the control panel will come on.
- If an alarm condition arises, displayed on the control panel by the "ALARM" red LED and accompanied by an audible warning, consult the control panel instruction manual.

#### NON STARTING OF THE UNIT

If the unit doesn't start, check that:

- 1) power is on to the electrical panel and to the auxiliary circuit transformer;
- 2) the automatic breaker FAN/AUXILIARY on the electrical panel is set;

3) the fuse of the 24V auxiliary circuit is not blown; in the

#### **INSUFFICIENT COOLING**

(see also para. FAULT FINDING GUIDE)

If the ambient temperature is too high after 30 minutes from the starting--up of the unit, verify that chilled water is flowing at the design temperature and check that:

1) the air filters are not clogged;

2) the air flow is not obstructed (see para. AIR DISTRIBUTION);

3)the room temperature set point is correct (see control

case of units with mP1 or mP2 control panel, check the fuse on the interface board (see specific instruction book); 4) the connectors of the control panel are correctly inserted; 5) the yellow LED labelled either:

- -- "LINE" on mP3 Control Panel;
- -- "~ SYSTEM ON" on mP1 or mP2 Control Panel; is on.

panel instruction manual);

4) the fans are rotating in the correct direction;

5) the three--way valve is operating properly (see para. 3--WAY VALVE AND SERVOMOTOR);

6) the heat load is not above the design value.

N.B.: in the case of a unit malfunction, call a qualified service engineer.

N.B.: Manual starting and stopping operations are

deactivated in room units equipped with mP1/mP2 control

panel if the microprocessor has been programmed either for

remote control or for time controlled start/stop (see

#### STOPPING THE UNIT

PERIODIC MAINTENANCE

panel.

- Stop the unit by pressing push buttonO on the control panel: after a moment all the components of the unit will stop and the "SYSTEM ON" green LED on the control panel will go off;
- For long shutdown periods it is advisable to disconnect the power supply and to open the isolator on the electrical

• Check that the noise of the unit is normal;

mP1/mP2 Instruction Manual).

- Check the free flow of condensate to the main drain;
- Check the tension of the fan belts (see para. FAN BELT TENSION).

#### (see also para. PREVENTIVE MAINTENANCE)

- Check that the room conditions displayed on the control panel are normal;
- Check periodically that the air filters are not clogged; change the filters when the specific alarm comes on;

### **GENERAL CHARACTERISTICS**

The following general characteristics are relevant to standard units and may change in case of special or modified versions.

			MUC0610	MUC0710	MUC0910	MUC1210	MUC1710	MUC2310	MUC2510	
Belt driven fans	Number			1		2	2	1		
Number of motors				1		2	2	3		
Fan motor (Standard speed)	Number of poles Nominal power (each)	kW	4 0.75	4 1.1	4 1.5	4 1.1	4 1.5			
Fan motor (Reduced speed)	Number of poles Nominal power (each)	kW	0.	1 55	4 0.75	4 0.55	4 0.75			
Fan motor (Low speed)	Number of poles4Nominal power (each)kW0.55									
Motorfans (Direct drive version)	Number Number of poles Nominal speed Nominal power (each)	rpm kW	1 6 900 0.55	1 6 900 0.55	1 6 900 0.74	2 6 900 0.55	2 6 900 0.74	3 6 900 0.74		
Air filters	Number Dimensions (h=100)	mm	1 500x500	1 625x500	2 700x625	2 625x500	2 625x625	3 625x	625	
Chilled water 3way v	valve		3⁄4"	1"	11	/4"	11	/2"	2"	
Electric heaters	Total capacity Number of elements Number of stages	kW	6 3 3	6 3 3	9 3 3	12 6 3	18 6 3			
Humidifier	Nom. steam production Nom. absorbed power	kg/h kW		4.5 9 3.3 6.6						
Hot water valve	(upon	request)		3/	4	1"				
Dehumidification valve	e (upon	request)		1" 1½"						

## **IDENTIFICATION PLATE**

The unit identification plate is placed in the electrical panel compartment and gives the following information:

- --Unit serial number;
- --Current and power absorption;
- --Set point of instruments.

--Unit model;

### **DIMENSIONS AND WEIGHTS**



#### TRANSPORT AND PREPARATION

#### **RECEIPT OF THE UNIT**

On receiving the unit, check that it is complete and in perfect condition; **immediately notify the carrier in writing of any damage** that might be have been caused in transit.

#### SITE TRANSPORT AND STORAGE

The unit **should not be turned on its back or upside--down**, **or exposed to atmospheric agents**, and should be carried as near as possible to the place where it is going to be installed before removing the cardboard packing and the pallet.

The unit can be lifted:

--with a fork--lift, placing the forks in the appropriate slots of the pallet;

--by the application of belts passed under the unit, making sure that the belts do not create pressure on the upper rim of the unit.

The unit must be stored, preferably in its packing, under cover and protected from excessive humidity (< 90% R.H.) and temperature (<  $50^{\circ}$ C).

#### POSITIONING

The unit is light in weight and can be placed directly on a raised floor where a hole has been previously made as indicated in fig. 3 to allow the installation of the water and electrical connections; **apply a flexible gasket** to the perimeter of the base to avoid air leakages and transmission of vibrations.

The unit must be perfectly levelled with a **maximum difference of 5 mm** between the base extremities: an imperfect levelling could cause the overflow of condensed water from the condensate tray.

ATTENTION: the unit must be installed indoors and in a non--aggressive atmosphere.

#### **BASE FRAME**

To allow positioning of the unit before installing the raised floor and to dampen any vibrations, it is advisable to use a base frame, available as optional extra, whose dimensions are shown in fig. 4.

The height of the standard base frames, shown as X<sub>3</sub>, is

#### BASE SECTION

In installation where there is no access floor, an enclosed base section is recommended to accommodate piping and electrical connections.

This is available as an optional accessory with a removable front inspection panel.

adjustable between 200 and 600 mm; higher types are available upon request.

Place a flexible gasket, at least 5 mm thick, between the panels of the raised floor and the frame, which should also be insulated from the metal floor substructure.

The dimensions are shown in fig. 5: dimension  $X_4$  is 200 mm as standard (higher bases are available on request).

The air conditioner should be fixed onto the base section by means of screws at the time of installation and the necessary holes in the rear or sides panels of the base for the passage of tubes and cables should be cut at the same time.

#### **OPERATIONAL SPACE**

To allow easy maintenance of the unit it is necessary to leave some free space at the front (see dimension  $\mathbf{D}$  in the drawing 2); lateral access is not required.

N.B.: lateral access would only be necessary in the unlikely

event of replacement of the cooling coil or the fan assembly;); in this case, if there is no room at the sides, the operation can be carried out by partially turning or moving the unit forward.

#### **AIR DISTRIBUTION**

The high air flow of these units should not be discharged directly into the conditioned space but distributed by an appropriate system of ductwork connected to the top of the air conditioner.

Since the capacity of the unit will suffer if the air flow is reduced, it is necessary to ensure that the static discharged pressure of the air at the outlet of the unit is adequate to overcome the losses in the distribution system (ductwork, suspended ceiling, grilles, registers, etc.). Therefore, when the static pressure required is greater than 50kPa, the belt driven fan option should be specified.

Alternatively, the conditioned air can be supplied directly into the space by means of a discharge plenum with a front face discharge grille. This solution is available as an optional accessory but is not the ideal solution when a low noise level is important: therefore direct drive fans at low speed are recommended in this case.





#### CONTROL PANEL

For

The unit is delivered with the control panel packed separately to prevent any damage during transport.

right--hand side of the unit, inside the fan compartment protecting panel.

para.

see

CONNECTION OF CONTROL PANEL".

"MOUNTING

AND

The packing containing the control panel is placed on the

# CONNECTION TO SUPPLY DUCTWORK

mounting

This unit is designed to supply conditioned air into ductwork or, via a suitable extension hood, into a suspended ceiling. The flange detail (see fig. 7) for the connection of the ductwork or extension hood to the top of the unit is shown in detail  $\overline{G}$ .

In the drawing in fig. 1 are the overall dimensions of the optional discharge plenum. The height  $X_1$ , has to be specified at the time of order and may be anywhere between 300 and 950 mm.

(A higher plenum than this can be supplied to special order).

### ACCESS TO THE UNIT

#### **OPENING AND REMOVAL OF PANELS**

The unit is accessible on all sides by removing the covering panels (see fig. 7).

#### FRONT PANELS

Front panel removal does not require the use of tools.

The main panel  $\overline{A}$  is hinged and opens on release of handle  $\overline{B}$  when pressed at the indicated point; this operation also frees the panel on the left side  $\overline{C}$  (not in models MUC0610 and MUC0710).

The locking pressure of the panel can be adjusted by means

of the screw in the internal catch.

The remaining panels (not in models MUC0610, MUC0710 and MUC0910) are engaged at the bottom and held to the front of the unit by spring--loaded catches; for removal, pull the top edge of the panel forward to release the catches (operation 1) and lift (operation 2). Do the opposite for assembly.

#### SIDE PANELS

They are both fixed with five internal screws as follows:

- --three screws D distributed on the front side uprights, accessible after removal of the front panels;
- --two screws E on the backside uprights; the screws are marked with the symbol shown in fig. 8 and accessible at the bottom of the filter compartment (with the filters removed) and at the end of the fan compartment.



#### **REAR PANELS**

The rear panels are fixed with screws on each side.

	MUC													
	0610	0610 0710 0910 1210 1710 2310 25												
I	3⁄4"	1"	11	4"	<b>1</b> ½"	"								
U	3⁄4"	1"	11/4" 11/4" 2"											
С	Ø25													
F	Ø6													
D	Ø21													
I <sub>1</sub>	110													
I <sub>2</sub>				230										
I <sub>3</sub>	180	195	20	)5	215	240								
U1		31	10		330	37	75							
U <sub>3</sub>	290	285	30	)5	325	38	30							
C <sub>1</sub>		12	20		75									
<b>C</b> <sub>2</sub>		65	95		14	10								
D <sub>1</sub>	70			10	00									
$D_2$	120	110	200	720	770	90	00							



FIG. 9



	MUC													
	0610	0710	0910	1210	1710	2310	2510							
Α	110													
С	295			31	0									

### WATER CONNECTIONS

#### CHILLED WATER CONNECTIONS

Check the chilled water pipe sizes and the circulating pump characteristics: an insufficient water flow affects the performance of the unit.

Connect the unit to the piping system making sure that chilled water flows into the unit through the lower connection and comes out from side connection (see fig. 9, resp. points)

and  $\boxed{U}$  ); seal the holes where the pipes pass through the base of the unit in order to avoid by--pass of air.

It is recommended to use:

- --flexible hoses to avoid the transmission of vibrations;
- --3 piece unions, close to the connections, to permit possible removal of the unit;
- --shut--off valves to isolate the unit from the water circuit: if possible use full flow ball valves to minimize the water pressure drop.

Insulate all the chilled water pipes with closed cell insulating material (e.g. Armaflex or equivalent) to avoid condensation; insulation must allow access to valves and joints.

#### CONDENSATE DRAIN CONNECTIONS

The condensate drain tray and -- in units type H, complete with humidifier -- the humidifier drain connection must be connected to the drains of the building using a 25 mm internal diameter plastic or rubber pipe resistant to 100  $^{\circ}$ C.

The discharge pipe, provided with a syphon to avoid unpleasant odours and sloping with a minimum gradient of 1%, should be inserted in the appropriate connection shown

#### **CONNECTION OF THE HUMIDIFIER**

The humidifier feed valve (see fig. 9, point  $\mathbf{F}$ ) must be connected to the building water main using the 6 mm internal diameter flexible plastic pipe supplied with the unit.

The feed water characteristics should comply with the following values:

Characteristic	Minimum	Maximum
Feed water pressure	1 bar	10 bar
Electrical conductivity at 25°C	125 μS/cm	1250 μS/cm
Impurity size		0.1mm

in fig. 9, point C.

If used, the condensate pump (optional extra) should be placed at a level lower than the discharge connection; the pump head pressure must be sufficient to deliver the condensate to the drain.

N.B.: ensure that local drainage regulations are complied with.

It is recommended to install a shut--off valve and a mechanical filter with a mesh size less than 50  $\mu$ m.

#### Do not use demineralized or softened water.

The drain pipe should be connected as indicated in the previous paragraph.

Further details regarding the humidifier are contained in the mP1/mP2 or in the mP3 control system instruction manual.

N.B.: ensure that local water regulations are complied with.

### **CONNECTION TO FRESH AIR INTAKE**

#### (optional extra)

Connect the intake of the fresh air filter (see fig. 10) to the nearest external air inlet with a flexible hose (100 mm minimum diameter) following the shortest and straightest path. Secure the hose to the fresh air intake with a fastening collar.

#### **ELECTRICAL CONNECTIONS**

A correct electrical connection, carried out accurately and in compliance with local regulations, is extremely important in order to prevent accidents and to ensure a long trouble--free operation.



#### **POWER CONNECTION**

Before working on the electrical parts of the unit, make sure that the power is off and that the isolator on the electrical panel is open (position "O").

After checking that the mains voltage corresponds to the nominal data of the unit (voltage, phases, frequency) shown on the protective cover of the electrical panel, pass the electrical supply cable through the hole in the bottom of the unit and up to the main isolator **IG** on the electrical panel (see fig. 11).

Fix the ends of the supply cable wires to the upper terminals of the isolator in the electrical compartment; tighten up the terminal screws.

#### MOUNTING AND CONNECTION OF CONTROL PANEL

The control panel should be placed in the hole (in the two holes in the case of mP3+hP3 system) on the front left panel.

Fasten the control panel(s) into position following the instructions enclosed in packing and insert the cable

connectors in the respective slots without forcing them (see also the control panel instruction manual).

ATTENTION: the connection of the control panel must always be carried out when the power is off (isolator on the electrical panel in position "O").

#### ACCESS TO THE ELECTRICAL PANEL

The power section of the electrical panel, at mains voltage, is protected by a plastic cover. To remove it:

- --turn off the isolator to release the handle blocking the hatch;
- --unscrew the four fixing screws.

#### **INSTRUMENT AND ALARMS**

The unit is equipped with the following instruments (see fig. 12):

- -- Room temperature and humidity sensor STU; made up of:
  - a) a NTC sensor on the mP3 unit, plus a humidity sensor on the hP3 panel (if fitted);
  - b) a single combined sensor in the units equipped with mP1/mP2 panels.
- --Air flow sensor FS -- differential pressure switch in the electrical panel;
- -- **Clogged filters sensor PFS** -- differential pressure switch in the electrical panel;
- --Electrical heaters safety thermostat TSR -- in the fan compartment with access to manual reset push--button without removal of the internal panel.

The following optional instruments can be connected to every room unit (see the control panel instruction manual):

- -- Under floor flooding detector consisting of:
  - a) **SAS instrument** inserted in the appropriate socket of the electrical panel (see fig. 12);
- b) **RAS sensor** (or sensors, connected in parallel) to be placed at the points to be monitored;
- --High/low room temperature sensors ATA and BTA: to be installed close to the room unit;
- --High/low room humidity sensors AUA and BUA: to be installed close to the room unit;
- -- Fire and smoke sensors SFF: to be installed in the ambient or in the raised floor cavity, in a low air--speed zone.

The following optional instruments can be connected to units with mP1 or mP2 panels (see mP1/mP2 instruction manual):

- --External air temperature sensor (for reading only): to be installed outdoor -- in the shade;
- --Chilled water temperature sensor (for reading, for the "intelligent dehumidification" cycle and for high chilled water temperature): to be inserted in a pocket on the chilled water supply pipe to the unit;
- --Hot water temperature sensor (for reading and control of hot water reheating): to be inserted in a pocket on the hot water supply pipe to the unit;
- --Air discharge temperature sensor (for reading and control of the room unit cooling capacity as a function of the discharge temperature): to be placed downstream of the fan outlet;
- --Chilled water flow sensor (for lack of chilled water flow alarm): flow switch to be inserted in the chilled water piping.



#### **REMOTE CONTROL**

Every unit is equipped with a volt--free contact for remote signalling of any alarm condition.

Further information on remote control possibilities is also contained in the manuals: INTERCONNECTION OF UNITS WITH mP3 CONTROL and INTERCONNECTION OF UNITS WITH mP1 or mP2 CONTROL.

The mP3 control panel is capable of being connected to a remote control and monitoring system. It can:

- --be started and stopped from a remote control system by the addition of an optional extra ancillary relay **R1** which must be fitted as shown in fig 13.
- --transmit to a remote location a general alarm signal by means of the changeover relay with which the control panel is equipped as standard.

For more details on the above, check the unit wiring diagram and the control panel Instruction Manual.



#### ELECTRICAL DATA

			COMPONENTS														COMPLETE ROOM UNIT			OPTIONAL FANS									
		ŀ	BELT DRIVEN FANS MOTORS (a) Standard speed				BELT DRIVEN FANS MOTORS (a) Reduced speed				BELT DRIVEN FANS MOTORS (a) Low speed					ELECTRIC E HEATERS H		ELECTRODE HUMIDIFIER		ROOM UNIT VERSION C	ROOM UNIT VERSION T	ROOM UNIT VERSION D	room Unit Version H	F	DIRE FANS	CT DF MOTC	≀IVEN )RS (a	a)	
MODEL	VOLTAGE	No.	kW	OA	FLA	LRA	No.	kW	OA	FLA	LRA	No.	kW	OA	FLA	LRA	kW	OA	kW	OA	OA (c)	OA (c)	OA (c)	OA (c)	No.	kW	OA	FLA	LRA
MUC0610	380/3 415/3	1	0.75	1.8	2.0	11.0	1	0.55	1.3	1.4	6.2	1	0.55	1.3	1.4	6.2	6.0 7.2	9.1 10.0	3.3 3.6	5.0 5.0	1.8	10.9 11.8	6.8	15.9 16.8	1 (b)	0.55	5.0	5.5	8.7
MUC0710	380/3 415/3	1	1.1	2.6	2.9	13.1	1	0.55	1.3	1.4	6.2	1	0.55	1.3	1.4	6.2	6.0 7.2	9.1 10.0	3.3 3.6	5.0 5.0	2.6	11.7 12.6	7.6	16.7 17.6	1 (b)	0.55	5.0	5.5	8.7
MUC0910	380/3 415/3	1	1.5	3.3	3.7	18.5	1	0.75	1.8	2.0	11.0	1	0.55	1.3	1.4	6.2	9.0 10.7	13.7 14.9	3.3 3.6	5.0 5.0	3.3	17.0 18.2	8.3	22.0 23.2	1 (b)	0.74	5.9	7.1	11.0
MUC1210	380/3 415/3	2	1.1	2.6	2.9	13.1	2	0.55	1.3	1.4	6.2	2	0.55	1.3	1.4	6.2	12.0 14.3	18.2 19.8	6.6 7.2	10.0 10.0	5.2	23.4 25.0	15.2	33.4 35.0	2 (b)	0.55	5.0	5.5	8.7
MUC1710	380/3 415/3	2	1.5	3.3	3.7	18.5	2	0.75	1.8	2.0	11.0	2	0.55	1.3	1.4	6.2	18 21.5	27.3 29.9	6.6 7.2	10.0 10.0	6.6	33.9 36.5	16.6	43.9 46.5	2 (b)	0.74	5.9	7.1	11.0
MUC2310	380/3 415/3	3	1.5	3.3	3.7	18.5	3	0.75	1.8	2.0	11.0	3	0.55	1.3	1.4	6.2	18 21.5	27.3 29.9	6.6 7.2	10.0 10.0	9.9	37.2 39.8	19.9	47.2 49.8	3 (b)	0.74	5.9	7.1	11.0
MUC2510	380/3 415/3	3	1.5	3.3	3.7	18.5	3	0.75	1.8	2.0	11.0	3	0.55	1.3	1.4	6.2	18 21.5	27.3 29.9	6.6 7.2	10.0 10.0	9.9	37.2 39.8	19.9	47.2 49.8	3 (b)	0.74	5.9	7.1	11.0

#### LEGEND

kW: nominal power; OA: nominal operating current; FLA: full load current;

LRA: locked rotor current.

#### NOTES

(a): data referred to each piece;
(b): single phase at 220V or 240V;
(c): max current of the most loaded phase at nominal operating condition.

### **RECOMMENDED SIZES OF POWER SUPPLY CABLES AND LINE FUSES**

	ROOM UNIT	VERSION C	ROOM UNIT	VERSION T	ROOM UNIT	VERSION D	ROOM UNIT VERSION H			
MODEL	LINE	FUSES (a)	LINE	FUSES (a)	LINE	FUSES (a)	LINE	FUSES (a)		
MUC0610	3x1.5+1.5PE	30A	3x1.5+1.5PE	30A	3x1.5+1.5PE	30A	3x2.5+2.5PE	30A		
MUC0710	3x1.5+1.5PE	30A	3x1.5+1.5PE	30A	3x1.5+1.5PE	30A	3x2.5+2.5PE	30A		
MUC0910	3x1.5+1.5PE	30A	3x2.5+2.5PE	30A	3x1.5+1.5PE	30A	3x2.5+2.5PE	30A		
MUC1210	3x1.5+1.5PE	30A	3x4+4PE	40A	3x2.5+2.5PE	30A	3x6+6PE	50A		
MUC1710	3x1.5+1.5PE	30A	3x6+6PE	50A	3x2.5+2.5PE	30A	3x16+16PE	80A		
MUC2310	3x1.5+1.5PE	30A	3x6+6PE	50A	3x2.5+2.5PE	30A	3x16+16PE	80A		
MUC2510	3x1.5+1.5PE	30A	3x6+6PE	50A	3x2.5+2.5PE	30A	3x16+16PE	80A		

NOTES (a): supply line back- -up protection suitable for I<sub>sc</sub> up to 50kA