



**CONDENSERLESS WATER CHILLER
FOR INDOOR INSTALLATION WITH
REMOTE CONDENSER**

IT CAN BE COUPLED WITH REMOTE
CONDENSER CLIVET SERIES GEM

MDE-3

2.160-2.180-2.200-2.220-2.250-

2.280-2.300-2.320-2.340-2.360-2.390-2.420-2.450-

2.480-3.480-3.500-3.520-3.540-3.570-3.600-3.630

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(DIFFERENTIAL PRESSURE SWITCH / FLOW
SWITCH)

GENERAL

ALL THE EQUIPMENT MUST BE COMMISSIONED BY AUTHORISED SERVICE CENTRES.
THIS SERVICE IS LIMITED TO START-UP OF THE UNIT ONLY AND NOT THE CONNECTIONS OR INSTALLATION OF THE SYSTEM

PRELIMINARY CHECKS

BEFORE PERFORMING ANY TYPES OF CHECKS, MAKE SURE THAT THE UNIT IS PROPERLY INSTALLED AND CONNECTED.

PRELIMINARY CHECKS: ELECTRICAL SYSTEM

CAUTION: Before performing the checks described below, make sure that the unit's electrical power line is disconnected at the source. Check that the isolator device is padlocked or that the handle has been applied with a special sign caution against operation. Before performing the electrical connections, check that no voltage is present using a voltmeter or phase indicator.

CHECKS TO BE PERFORMED WITH ELECTRICAL POWER DISCONNECTED:

- Check that the cross-section of the electrical power cables is suitable for the load of the entire unit (see the section on electrical connections in the manual).
- Check that the unit has been earthed (see the section on electrical connections in the manual).
- Check that the screws that fasten the wires to the electrical components in the panel are tight, to ensure adequate electrical contact (during handling and transport vibrations may have loosened the screws).

At this point, the unit can be electrically powered by closing the isolator device installed upstream of the power line.

CAUTION: Before performing this operation, check that all the cut-out devices on the unit have been reset.

- Place the handle of the unit's mains isolator device / circuit-breaker in the on position.
- Check that the electronic board / display on the terminal turn on (after a few seconds)
- Check that the unit is off (see the section on "Control" in the manual)

CHECKS TO BE PERFORMED WITH ELECTRICAL POWER CONNECTED:

- Check the value of the mains voltage supplied to the unit, which must fall within the following limits:
230 +/- 6%, single-phase units
400 +/- 6%, three-phase units
- Check the unbalance of the phases. This must be lower than a maximum value of 2.5% (see calculation example).

Calculation example:

$$L1 - L2 = 398$$

$$L2 - L3 = 405$$

$$L3 - L1 = 395$$

The average of the values measured is calculated as follows:

$$(398+405+395)/3=399.3$$

The maximum deviation from the average is thus:

$$405-395=10V$$

The unbalance is thus:

$$(10/399.3) \times 100 = 2.5\% \text{ (non acceptable)}$$

If compressor crankcase heaters are present, when starting the unit for the first time and after each extended shut-down, the heaters that heat the compressor crankcase oil should be operated for at least 8 hours before starting the compressor.



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CAUTION: IF THE CRANKCASE HEATERS ARE PRESENT, DO NOT START THE COMPRESSOR WITH THE CRANKCASE OIL BELOW OPERATING TEMPERATURE. (THE TEMPERATURE OF THE COMPRESSOR CASING ON THE LOWER SIDE MUST BE AT LEAST 10°C HIGHER THAN THE OUTSIDE TEMPERATURE).

The units are activated according to the phases described below:

1 - Close the circuit breakers or the isolating switch on the unit.

2 - The unit will not start operating until the operating mode is selected on the keypad, therefore, as seen in the diagram, the crankcase heater will be powered only for the time required to allow the compressor to reach the desired temperature.

PRELIMINARY CHECKS: REFRIGERANT CIRCUIT

- Visually check the refrigerant circuit. Any oil leaks may have been caused during transport.
- Check that the refrigerant circuits are pressurised (using the pressure gauges on the machine, or test pressure gauges).

PRELIMINARY CHECKS: WATER SYSTEM

- Check that the water circuit has been filled and pressurised. The pressure value near the unit with the system off must be at least around 50KPa greater than atmospheric pressure. (If the unit is connected to a pumping unit, see the Pumping unit manual).
- Check that the water connections are correct (see the section on "Water connections").
- Check that there is no air in the circuit. If required, bleed it using the vent valves in the system.
- Check that the temperature of the fluid is less than or equal to the max value allowed according to the information provided in the "General" section under the heading "Operating limits".
- Check that the shut-off valves in the circuit are in the "OPEN" position.
- Check that the circulating pump is operating and that the flow-rate is at least sufficient to ensure that the WATER DIFFERENTIAL PRESSURE SWITCH or FLOW SWITCH are NOT activated
- Check that the weight of the water connections is suitably supported by the outside of the unit. There must be no stress on the exchanger connections.

N.B: The water flow alarms are only measured if the control system requires the operation of the pump. When the unit is OFF the alarm (no flow) is not shown. This can only be tested when the unit is started.

START-UP

After having carefully performed the operations described above, the unit can be started.

Open all the taps in the refrigerant circuit (if present).

Check the values of the various accessible parameters, referring to the "Control" section in this manual.

Reset any alarms using the ON OFF / ALARM button.

CAUTION

Scroll compressors rotate in one direction only. If it is reversed, the compressor will not be damaged, however noise will increase and pumping will be affected. After a few minutes the compressor will be shut-by the thermal cut-off device. In this case, disconnect power and reverse 2 phases on the power supply to the machine. Also check the correct direction of rotation of the fans (if present). Do not operate the compressor too long with reverse rotation. Starting it more than 2-3 times in this condition may damage it).

To check that the direction of rotation is correct, simply measure the condensing and inlet pressures. The pressure must change quite noticeably.

N.B.: The phase monitor is available as an option.

ELECTRICAL CHECKS

- Check the power supply voltage, as described previously.
- Check the power input of the compressor,
- Check the power input of the fans
- Check the correct direction of rotation of the fans.
- Check, with the compressor off, the power input of the crankcase heaters (if present)

CHECKING THE COMPRESSOR DISCHARGE TEMPERATURE

For a correct analysis of the system, also check the compressor discharge temperature, which at the indicated superheating and subcooling values must be around 30/40 degrees higher than the condensing temperature.

- After a short period of operation, check the oil level in each compressor (where the inspection glass is present) and the presence of bubbles in the liquid line.

- Check the unit's operating pressure in running conditions, using the pressure gauges connected

- The low pressure must stabilise at a value corresponding to a saturated temperature of around 4-6°C below the exchanger outlet water temperature.

- The high pressure must stabilise at a value corresponding to a saturated temperature of around 15-20°C higher than exchanger coil inlet air temperature.

These are typical values that are valid for standard operating conditions (flow-rate and water temperature, outside air temperature near rated conditions).

N.B.: The saturated temperature is the temperature read on the pressure gauge corresponding to the pressure measured and the type of refrigerant

REFRIGERANT CIRCUIT CHECKS

- Perform a final check for refrigerant leaks on the tap fittings and pressure test points in the system.

WATER SYSTEM CHECKS

WATER FLOW-RATE:

- Check that the difference between the water inlet and internal exchanger outlet temperature is related to the capacity, according to the formula :

refrigeration capacity (kW) x 860 = Dt (°C) x flow-rate (L/h)

The reference Dt is of 5°C with unit at full load; differences higher than ±1 °C must be considered very carefully.

The refrigeration capacity is defined in the tables on "Cooling Performance" in the TECHNICAL BULLETIN, according to:

- unit size
- external exchanger air inlet temperature
- internal exchanger fluid outlet temperature

N.B.

THE WATER FLOW-RATE AT THE EXCHANGER MUST REMAIN CONSTANT, IRRESPECTIVE OF THE THERMAL LOAD AND THE UTILITIES CONNECTED INTERNAL EXCHANGER PRESSURE DROPS:

Determine the water flow-rate, as follows:

Measure the existing pressure difference between the exchanger inlet and outlet, and calculate the flow-rate as shown under the section "Water/aerualic connections" in the graph "Exchanger/evaporator pressure drop, water side" (the working point must not be off the graph).

The pressure can be measured more easily by installing the pressure gauges "M" shown in the same section on the water connection diagram.

CHECKS ON SAFETY DEVICES, WATER SIDE (DIFFERENTIAL PRESSURE SWITCH / FLOW SWITCH)

Slowly close the ball valve installed downstream from the exchanger, until the pressure switch is activated and the unit shuts-down as a consequence.

Open the ball valve again, and check that the unit is correctly enabled for operation.

NOTE:

The checks on the differential pressure switch / flow switch safety devices must be carried out with extreme care, without ever completely cutting off the flow of water (risk of frost on the exchanger).

CLEANING THE IMPURITIES COLLECTOR (optional filter)

The dirtying of the filter causes always the reduced flow-rate of the fluid and possible machine operating problems.

When the unit is started for the first time, impurities in the system water may collect in the filter, causing the symptoms described above. Restore correct operation by cleaning the filter.

REDUCED LOAD OPERATION

The units are equipped with partialization steps and they can, therefore, operate with reduced loads.

Nevertheless, a constant and long operation of reduced loading with frequent stops and start-ups of the compressor/s can cause serious damage for the lack of oil return.

The above-described operations should be considered OUTSIDE the norm.

In the event of failure in the compressors, since the unit operates with the above-mentioned conditions, the guarantee WILL NOT BE VALID and Clivet spa can not be held responsible for it.

Periodically check the average times of operations and the frequency of the compressors pick ups: the minimum thermal load should be enough to ask the operation of a compressor for at least ten minutes.

In the event of average times close to this limit, take the proper corrective actions.