

Contherm guide to Fault finding GP Refrigeration Systems

This guide has been compiled to aid in troubleshooting GP/Cooled Waterbath refrigeration problems in the field. When a Contherm GP cabinet or Cooled Waterbath fails to cool as expected a number of checks should be made to ascertain the cause of the problem.

Check that the temperature set point is set as expected.

Check that the timer is set to run the cabinet ([:]).

On a GP Oven/Incubator ENSURE that the INTERNAL circulating fan is running.

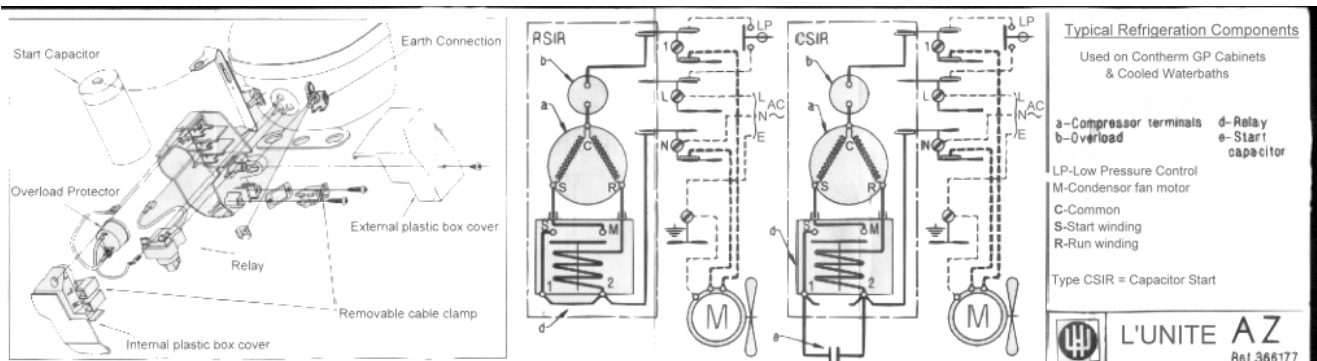
On a GP cabinet you can set the user Hi-Limit to fully anticlockwise – this will prevent the heater from holding the temperature up, if the cabinet/bath now starts to cool the fault may lie within the control circuit board.

Check that the DEFROST solenoid (if fitted – NB: NOT fitted to waterbaths) is not permanently energised, if the solenoid ‘chatters’ or is being pulsed on & off at short intervals, the cabinet may be configured as a ‘standard’ incubator instead of a ‘cooled’ incubator. (To configure as a ‘cooled’ unit, PRESS & HOLD the ‘TEMP’ & ‘TIME’ buttons together during the initial 8888’s startup sequence – ZP20/ZP21 only).

If the compressor fan motor is running but there is no cooling, check to see if the refrigeration compressor is operating (you should be able to feel the vibration and it will get hot). – If the refrigeration cooling fan motor is not running check the cutout thermostat inside the cabinet top cover. (see note below).

NOTE: On most GP systems (with a ZP19/ZP20 PCB) a refrigeration CUTOUT thermostat is wired in series with the power to the refrigeration compressor system, this thermostat is usually set to switch the compressor and its cooling fan motor OFF if the cabinet/bath temperature is above +40oC. If the current temperature of the cabinet/bath is higher than +40oC the compressor & fan motor will not start until the system has cooled. This CUTOUT is NOT usually present on systems with the latest ZP21 PCB because the maximum allowable temperature setting is only +50°C.

If there is power to the compressor, and the compressor is not running – check the overload, starting relay and motor windings. If the compressor is a CSIR model check the starting capacitor. See a TYPICAL diagram below for compressor components (some components will differ with different refrigeration plant).



If the compressor and its cooling fan motor are running but there is no internal cooling, check that the cabinet internal circulating fan is operating, that the fridge evaporator (cooling coil located behind the false back) is not fully ICED UP, and check the system for refrigeration leaks.

To check the Overload: remove all power from the cabinet. Remove the overload from the compressor plastic box. Check that there is continuity between the overload terminals (ie a short circuit). If the overload is open circuit it is faulty.

To check the starting Relay: remove all power from the cabinet. Remove the relay from the compressor plastic box. When the relay is in its normal (upright) position the two contacts will not be connected (contacts ‘S’ & ‘M’ in the diagram), when the relay is inverted (turned upside down) you should feel & hear a slight ‘clunk’, and the two contacts should now be connected. If it works as above check the relay coil for continuity (between points ‘M’ & ‘2’ on the relay diagram). If this all checks out the relay is OK. (Some relays may be marked differently).

To check the compressor motor windings: remove all power from the cabinet. Remove all connections from the compressor motor windings. Measure the resistance from the motor 'C' terminal to the 'R' terminal (the 'run' winding) it should have a low resistance. Measure the resistance from the 'C' terminal to the 'S' terminal (the Start winding) it should have a slightly higher resistance. Measure the resistance from the 'S' terminal to the 'R' terminal it should measure the combined resistance of the two windings.

Check the insulation from the 'C' terminal to the metal casing (earth). This should be checked with an insulation tester at 500V DC. There must be a least $2M\Omega$ between the terminals and ground (earth).

If the either of the compressor motor windings is open circuit OR the compressor has an insulation fault to earth the compressor is faulty and should be replaced.

To check the starting capacitor (If fitted): On some models the compressor motor is a 'capacitor start' model, and it would then be necessary to also check that the starting capacitor is OK. The best way to check is by substituting a known good capacitor of the SAME CAPACITY and VOLTAGE RATING.

Some cabinets may be fitted with a refrigeration 'Evaporator Pressure Regulator' valve mounted on the outside rear wall of the chamber, this valve if fitted may be set to 'limit' the lowest achievable temperature of the refrigeration system (typically set to allow operation to $+15^{\circ}\text{C}$) so that better performance can be achieved (I.E. NO defrost required, and less drying effect) when working at BOD temperatures (I.E $+20^{\circ}\text{C}$).

An Evaporator Pressure Regulator (EVP) valve is attached about $\frac{1}{2}$ way up the back of the cabinet, a 'Crankcase Pressure Regulator' valve is usually attached just above the refrigeration compressor. - The Crankcase Pressure Regulator does NOT affect the lowest temperature the cabinet can achieve (unless it is faulty).

Refrigerant Gas Charge

The refrigeration system is normally charged with a suitable refrigerant (see manual - typically R134a), by stopping the internal circulating fan motor and charging until a 'full coil of frost' is obtained after about 30 minutes. To check the frosting the internal top cover and rear duct must be removed thus exposing the refrigeration system cooling coil (evaporator) to view. The frost line should cover the complete evaporator including the internal 'surge pot' and may just be seen exiting the rear wall of the chamber but should not reach the compressor dome, this ensures that a correct charge is in the system.

Replacing a refrigeration Compressor

If the need to replace the refrigeration compressor arises, the operating manual should be consulted to ensure the correct type is fitted. A replacement compressor should come complete with NEW electrics, do NOT be tempted to re-use the old components with the replacement system.