Petra Engineering Industries Co.Ltd.

Sequence Of Operation

PETRA Package Unit

Used Sensors

1-Supply air temperature sensor.

2-Outside air temperature sensor.

3-Return air temperature sensor.

4-Defrost air sensors.

Protections

1-High and low pressure switches: these switches give protection for the compressors from low suction pressure or high discharge pressure.

2-Internal thermal protection for the motors (TMP).

3-Circuit breaker for all compressors.

Petra Engineering Industries Co.Ltd.

Sequence Of Operation

Unit start-up

User can be able to start the system by one of the following:

1-Manually from controller LCD.

2-Remotly by digital input signal (hard wired: from BMS).

3-Schedule function.

4-Through BMS system(optional).

5-Through extended keypad (optional).

System start-up

While starting up the system ,the unit will turn on. After that ,the controller will check the status if there is alarm or not .After confirming the healthy status of the unit, the controller gives command for command supply fan motor. Compressors will start after the supply fan start, based on the setpoint the controller will decide the running compressors.

Unit's operations modes

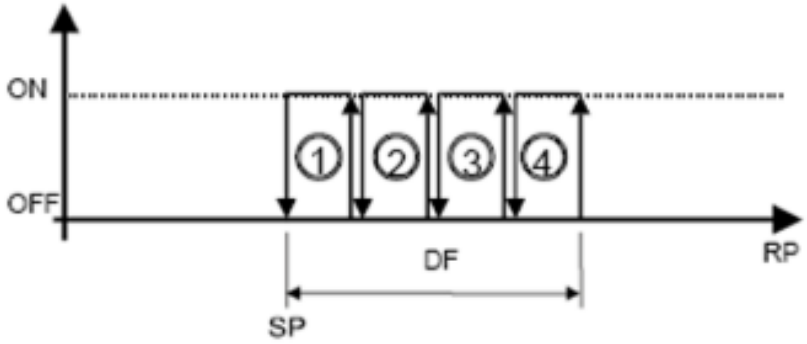
Cooling Mode:

The compressor (s) start/stop command is a function of supply air temperature. Once set point (SP) has been established for supply air temperature, the action taken by the controller to bring the system as near to the set point as possible will be proportional to the systems distance from set point.

Once a proportional band(DF) has been established around the set point, the controller will produce the most limited action at the set point whilst controller performance will increase No. of required compressor by one as supply air temp deviates more and more from its target. if supply air temperature increase to the: SP+DF, all compressors will be ON.

Petra Engineering Industries Co.Ltd.

Sequence Of Operation



Heat pump Mode:

Heat pump mode will be enabled if heat/cool switch closed (provided by other).Then controller will start the supply fan motor then start the compressors to achieve the heating set point.

Electric heaters are provided as supplementary to heat pump operation.

Defrost Mode:

if defrost air temp became below specific degree, e.g. (-2c) and condenser coil differential pressure became above adjusted setpoint, then unit will go to defrost cycle in which 4-way valve will reverse and compressors will work for at least minimum time (3 min) until defrost air temp become above setpoint, e.g.(10c) to remove the ice on condenser coil. After that the unit will return back to heat pump mode.

Compressors timing

-Compressor start delay time after main fan start: the compressor can be switched on if the time has elapsed since the main fan started.

-Minimum compressor off-time: makes sure that the compressor, once switched off, stays off for a time before being switched back on.

-Minimum compressor on-time: this time makes sure that the compressor, once switched on, stays on for a time before being switched off again (if an alarm is activated, the compressor is switched off regardless, even if the above mentioned time has not elapsed).

Sequence Of Operation

-Time between starts by a single compressor: this time makes sure, once a compressor is started, that time elapses before the same compressor can be started again (limits demand peaks per hour).

-Time between starts by different compressors: this time makes sure that a time elapses before different compressors.

Exhaust fan speed control

The VFD will measure the building static pressure and will modulate the exhaust/return fan speed to maintain a building static pressure set point of 0.005 inch WC (adj.).

The exhaust/return fan will be controlled by building Static Pressure Transducer (- 0.250) to (+ 0.250) inch WC (installed and supplied by Petra is connected directly to the VFD).

Note: Static pressure tubing provided by contractor to be located in ductwork where required.

Condenser Fans

The Condenser fans will be switched on upon compressors cut in. Part of the condenser fans will still on as long as one of the compressors are on. The other part will be switched on as long as outside air temperature is above 15 deg.

Unit options

Inverter compressor fresh

In the cooling mode, as the supply Air Temperature rises above the Set point, the VFD Compressor will stage on and modulate to control to the Set point.

If additional cooling is required, the VFD Compressor continues to modulate up to its maximum capacity.

To stage up the extra compressor(s), the supply AIR TEMPERATURE needs to be above the Set point and the VFD Compressor needs to be at 100%

Sequence Of Operation

Then second compressor is enabled & VFD compressor will go to minimum capacity and modulate up as needed.

To stage down the extra compressor(s), the supply AIR TEMPERATURE needs to be below the Set point and the VFD Compressor needs to be at 0% for a period of time equal to the Stage Down Delay.

For compressors to stage down, Minimum Run Times must be satisfied as well as Stage Down Delays (adjustable). The VFD compressor is always the last compressor to be deactivated.

Fire Alarm

If fire alarm signal present(Normally closed signal coming from fire alarm panel) the unit is allowed to start, if the signal is missing then the unit will be stopped.

Speed regulator

The Condenser fans will be switched on upon compressors cut in.The speed regulator will regulate the condenser speed to achieve the required head pressure.The Condenser fans will be switched on upon compressors cut in.The speed regulator will regulate the condenser speed to achieve the required head pressure.

Extended Keypad(PGD)

The unit can be equipped with extended keypad to be installed at suitable place at site.Through this keypad , user can do the following:

1-Start/Stop the unit.

2-Change Unit setpoint.

3-Check all alarms and reset them.

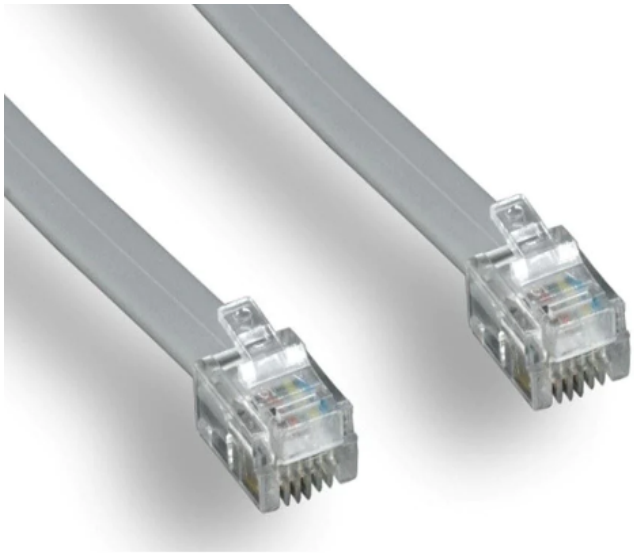
4-Check all sensors readings.

The keypad is supplied with 1.5m cable as standard from the factory.Anyway, the maximum cable distance is 50mtr and the cable type is Telephone-RJ12.

Petra Engineering Industries Co.Ltd.

Sequence Of Operation

Extended Keypad(PGD)



Telephone cable(RJ-12)

Filter switch

The filter switch is installed across the filter media to detect the differentail pressure before and after the filter.If the differential value gets above specific setpoint then the switch will trigger and give indication (volt free contact)for client .

Alarm Management

When any alarm occurs, remote relay will be energized & the alarm symbol will be blinking on the controller LCD.