

## ENERGY EFFICIENCY: ROOM AIR CONDITIONERS

### Recommendation

Air conditioning units are one of the biggest energy consumers in the ICRC's premises. Recent technological developments have brought a shift from conventional air conditioners to inverter air conditioners. The inverter technology is the latest advancement concerning the electromotor of compressors. An inverter is used to regulate the speed of the compressor motor in order to adjust the temperature. The regulated speed allows the unit to maintain the temperature without having to power down its motor. This means an inverter air conditioning unit is 30-50% more energy-efficient than non-inverter ones. Installing inverter-based air conditioners is not only for saving money but also benefits our environment by reducing carbon emissions. We thus recommend a review of your installed air conditioning systems and plan for gradual upgrade to the more efficient air conditioners.

### Benefits of switching to INVERTER air conditioners

#### Energy efficiency

Inverter technology is designed to save 30-50% of electricity consumption over a regular air conditioner. The motor of the inverter compressor has a variable speed which makes it to operate either at full or minimum speed. With this technology, the compressor is always on, but draws less power or more power for a short period depending on the temperature of the incoming air and the level set in the thermostat. A sensor in the inverter adjusts the power according to the temperature in the room, lowering the electrical consumption and saving energy.

#### Shorter return on investment

Due to the sophisticated operational method of the inverter, its compressor does not work at its full capacity all the time. When the speed is lower, the needed energy is lower too and you pay less money for electricity. On the other hand, the normal AC units works differently. In a conventional air conditioner, the compressor is either off or on. When it is on, it works at full capacity and consumes the full electricity it is designed to consume. When the thermostat reaches the temperature level set in the AC, the compressor stops and the fan (in AC) continues to operate. When the thermostat senses that the temperature has increased, the compressor starts again.

#### Quieter operation

As the compressor motor of the inverter air conditioner does not turn on and off all the time, but keeps working at low power, the operation is quieter.

#### Longer lifetime

The technology of the inverters not only makes cooling and heating more efficient, but it also makes the AC's life longer. Since the air conditioner does not turn on and off all the time, there is less breakdown and less maintenance of switchgear is required.

### What to consider before switching to INVERTER air conditioners

#### Refrigerants

The air conditioners contain refrigerant inside the copper coils which is either in gaseous or liquid form. It readily absorbs heat from the environment and can provide refrigeration or air conditioning when combined with other components such as compressors and evaporators.

Some refrigerant gases have high global warming potential (GWP) and are harmful to the ozone layer and therefore proper selection and handling is necessary to prevent any damage to the environment. It is important to choose air conditioning units with refrigerants that have lowest GWP and no potential to deplete the ozone layer.

Refrigerant	GWP	ODP*	Remarks
R22	1810	Medium	This refrigerant has been phased out since January 2020
R32	675	Nil	Favourable refrigerant gas to use
R134a	1430	Nil	This refrigerant is undergoing a gradual phase-down process in several countries because of its high GWP
R290	3	Nil	Highly flammable and therefore proper handling required.
R410	2088	Nil	More energy efficient than R22 but has very high GWP
R600	3	Nil	Highly flammable and therefore proper handling required.
R1234yf	4	Nil	More environmentally friendly, is being used as a replacement of R134a

\*ODP = Ozone Depletion Potential

## Cost

The upfront cost for an inverter-based AC unit is more than that of non-inverter type. However, due to the high efficiency of the inverter-based AC's, their return on investment is much shorter due to higher energy savings. Moreover, they are eco-friendlier than non-inverter AC's.

## Cooling Tips

- Close all doors and windows – This will stop non air-conditioned air, whether hot or cold, from flowing into the room, as well as stop your air conditioner from running for longer.
- Keep the area you're cooling to a minimum – You can do this by closing the doors of other rooms that don't require cooling.
- Adjust the temperature accordingly depending on the season.
- Use the economy mode – This will reduce energy usage by maintaining moderate temperatures in the right conditions.
- If you have a central cooling system, use the zoning options – This will allow air to flow to only certain areas of the building being used.
- Where possible, use portable or ceiling fans – These can be used together with your air conditioner to spread the air faster and more efficiently throughout the office or areas being cooled.
- Turn off other internal heat sources when not in use – These include lights, computers and printers. They can add to the heating load, so turn them off when not in use.
- Use energy-efficient lighting and office equipment – They will not emit as much heat as less-efficient products. For lighting, use LED bulbs.
- Only use it when needed – The air conditioner should only run when you're using the room.

## Where to buy Inverter-based air conditioners

When purchasing an inverter-based air conditioning unit, some of the crucial factors to keep in mind are: excellent cooling capabilities, higher efficiencies and prolonged lifespan. Avoid purchasing cheap and low-quality equipment which could compromise these factors. Some of the good and known brands worldwide are: Daikin, Samsung, LG, Toshiba, Fujitsu, Hitachi, among others. If the local market doesn't offer you the good quality inverter-based air conditioners, make your order through GVA log purchasing services (especially when buying many units).

For more advice or questions on Inverter-based air conditioning systems kindly don't hesitate to contact:

- **ECC team** (Environment and Climate change)
- **GVA LOG Purch Engineering services**
- **Your local WatHab engineer**