Heating experiment by the prototype machine
"Neo-Air" Next-generation air-conditioning system for EV

Technical data (measured at Fukaya lab/ETE Ltd. on Feb. 9, 2018)

1. Features of this heat pump system as a heating machine for EV

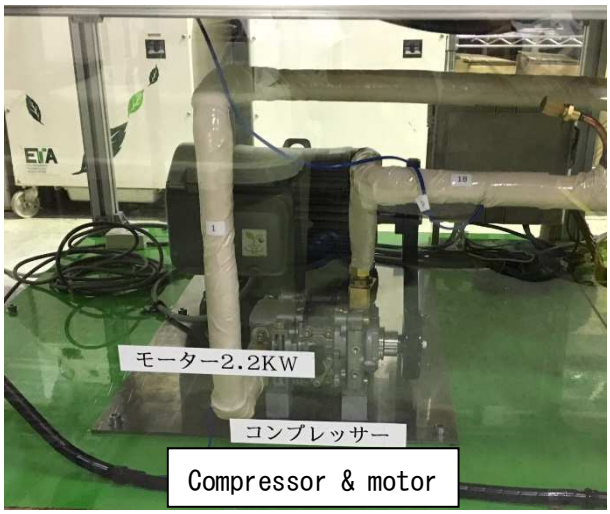
Two-stage coil with small diameter and medium diameter works as an expansion valve and an evaporator.

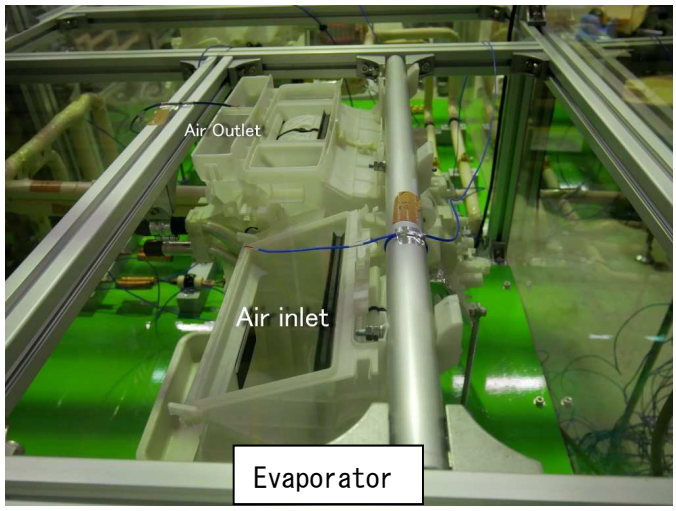
2. Equipment specifications

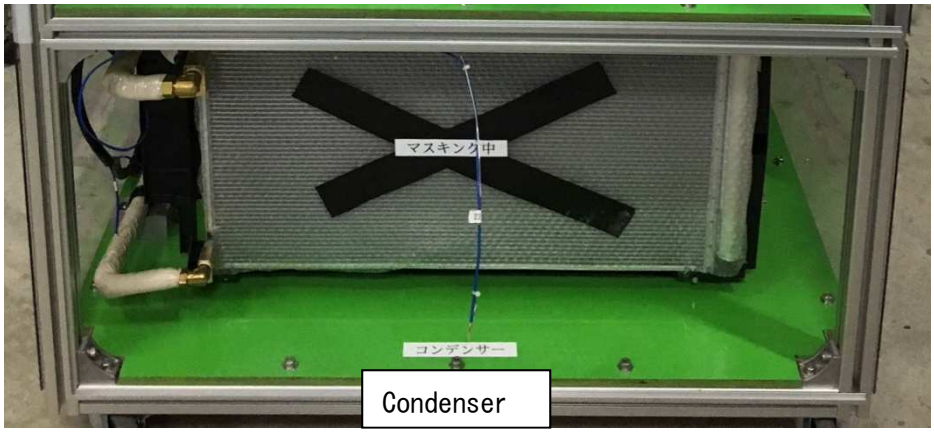
1) Power (2.2kW motor)　2) Compressor (scroll type)　3) Refrigerant (R134a)

4) The evaporator *of Toyota - Aqua and the condenser **of Toyota - Vitz

Note1）*&** These function names are for cooing. In the case of heating, the roles are reversed.







Note2) In order to suppress the function of heat exchange, the surface of the condenser is masked.

3. Data during heating

Compressor inlet		Compressor outlet		Airflow of evaporator		Compressor		Ambient
Pressure	Temp.	Pressure	Temp.	Inlet.	Outlet	Rotation	Power	Temp.
0.22MPa	12.5℃	1.0MPa	101.8℃	27.4℃	42.0℃	950rpm	1.45kW	10.6℃

Note3) Pressure unit is gage pressure.

At the compressor outlet pressure 1.0 MPa, the refrigerant gas temperature reached 101.8 ℃. As a result, the blowout air temperature was 42.0℃ and the achieved temperature difference from the air suction port was 14.6℃. Motor power was 1.45kW（Power factor 0.738）.

4. Power reduction rate obtained from theoretical calculations

Calculate energy saving effect of this system by comparing operation data and calculated value

In order to bring the compressed R134a gas temperature to 101.8 ℃ with an adiabatic efficiency of 0.7 from the point of 0.32 MPa abs 12.5℃, it is necessary to compress to 2.37 MPa abs.

The test result was 1.1 MPa abs that is lower about 1.3 MPa than the calculated value.
The ratio of the pressure difference is (1.1 - 0.32) / (2.37 - 0.32) = 0.38.
This indicates that the power of the compressor will be reduced to less than half of the normal heat pump.