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IEA HEAT PUMP CONFERENCE

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MAYEKAWA Europe nv/sa DOC.2011-221 R2

The introduction of two stage NH₃ high temperature heat pump system utilizing condensed heat from conventional refrigeration

**ENERGY AND COST SAVING WITH AMMONIA
OVERCOMPRESSION HEAT PUMPS**

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NH3 heat pumps

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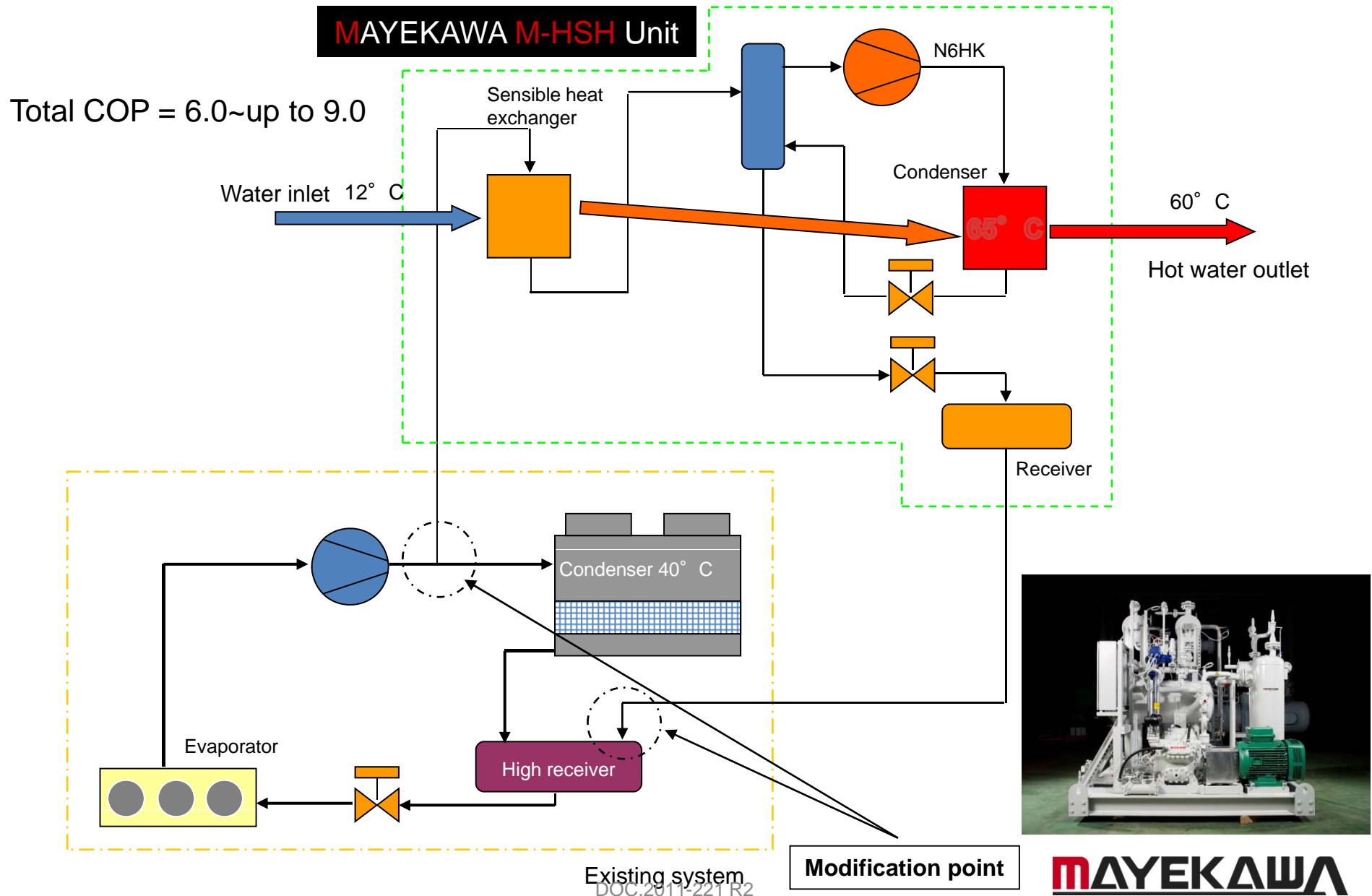
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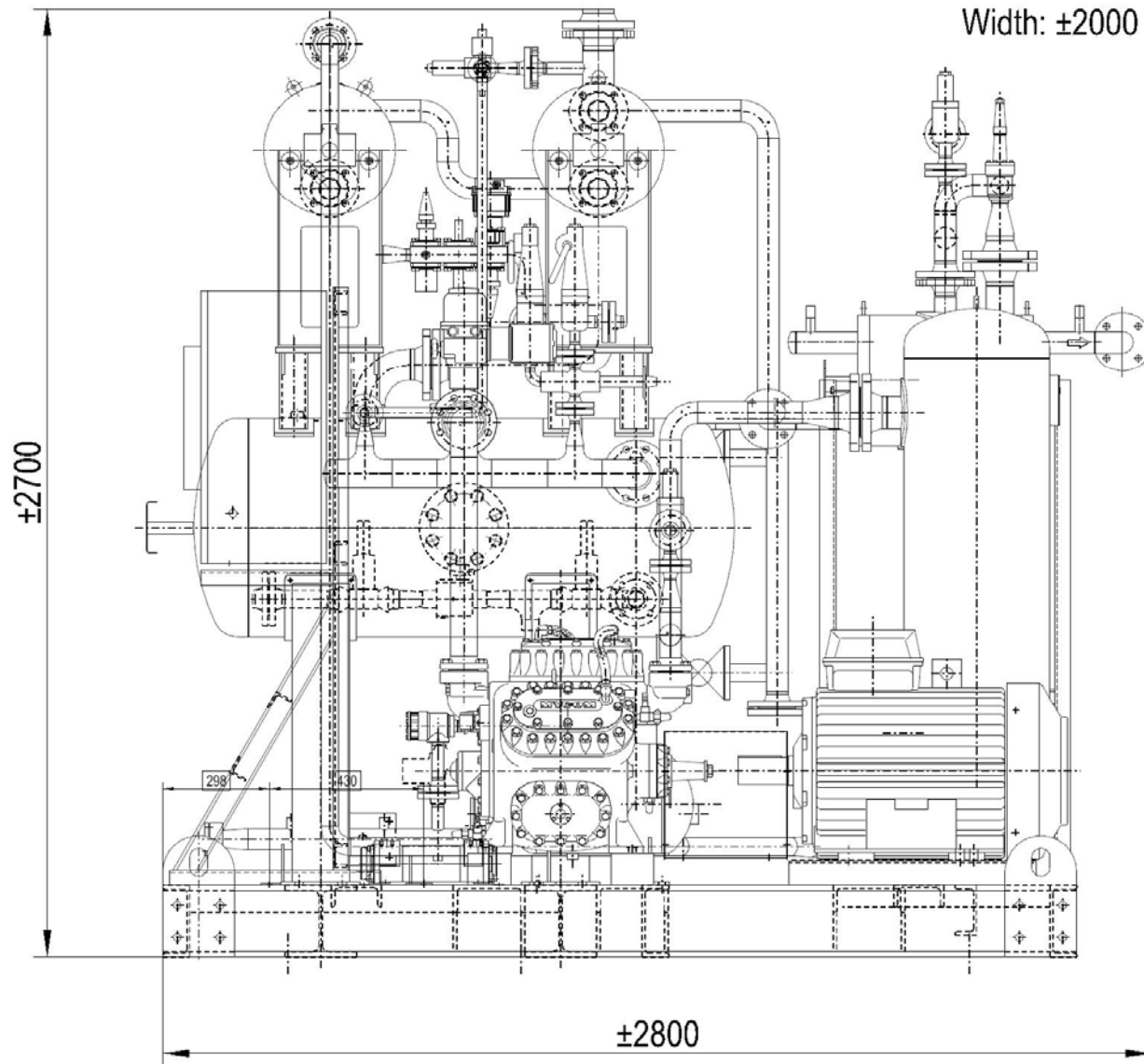
OVERCOMPRESSION HEAT PUMP

High stage heat pump unit



Two stage heat pump unit

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High stage heat pump unit (Meat production)



Thermal stratification tank



COSTS		STEAM	HP SUMMER	HP WINTER	reduction
Heating capacity	kW/day	5581	5581	5581	
Steam load (latent heat 0.6395kW/kg)	Kg/day	8727			
Heating capacity/hr	kW		406	305	
Running time/day	hr		13.7	18.3	
Operating days	days	300	115	250	
Yearly heating capacity	mWh	1.674	640	1.396	
Energy per year		2.618 (ton) (steam)	65.698 (kW, 41.7kW/hr)	191.235 (kW, 41.8kW/hr)	
Energy cost	€	91.342 (34.89€/ton)	4.599 (0.07 €/kWh)	13.386 (0.07 €/kWh)	-83%
Installation cost (excl.watersystem)	€			186.000	
Yearly running cost saving	€			73.357	
Payback time	years			Approx.2.6	
CO2 emmision CO2 emmision factor	t CO2/yr	81,19 0.0485 t/mWh	5,45 0.083 t/mWh	15,87	-59,87 t CO2/y -74%