



Designing a Heat Pump/Chiller Machine (basic and medium motor switching)

Example architecture and bill of materials

Designing a Heat Pump / Chiller Machine :

Basic and medium motor switching solution

Example architecture and bill of materials

Chillers are the most common machine in HVAC and – with heat pumps – are using the classical refrigeration cycle to transform energy from air, ground or water to produce cold or heat respectively and can be air-cooled or water-cooled.

They Improve comfort and air quality of the environment in offices & buildings by introducing fresh air into the space and sending stale air outside.

The design is based upon the following simple set of optimized, fit for purpose HVAC parts:

- Harmony HMI
- BMS Ready HVAC PLC M172
- iEM3 Power Meter
- Harmony pushbuttons, selectors and pilot lights
- Compact NSX100F circuit breakers
- TeSys Deca & Giga contactors
- TMS sensors and for temperature, humidity

In this example the motors are controlled using a contactor centric solution.

The motor selected for the scroll and screw compressors are respectively 15 kW and 110kW.

The motor used for the pump is a 11kW and fans are 15kW motors.

Key differentiators of Heat Pump or Chiller

- Simple economic, reliable and robust architecture allowing a flexible and scalable design
- Improve HVAC equipment efficiencies, increase comfort, lower energy consumption, reduce costs of ownership while ensuring compliance with regulations.
- Reduce time to market using a unique free HVAC software, libraries and function blocks.
- Easy installation, simplified on-site commissioning and maintenance
- Fully automated IoT ready solution, integrated to building management and remote operation systems

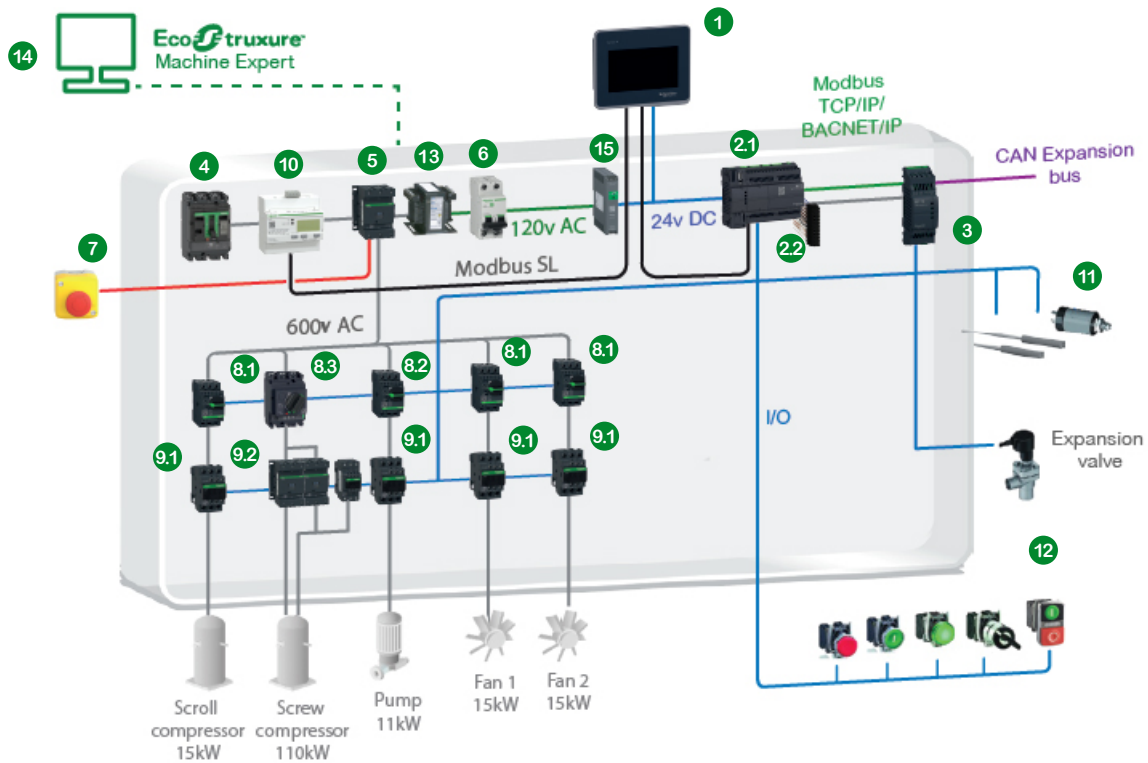
Designing a Heat Pump / Chiller Machine : Basic and medium motor switching solution

Example architecture and bill of materials

Why choose Schneider for a Heat Pump or Chiller?

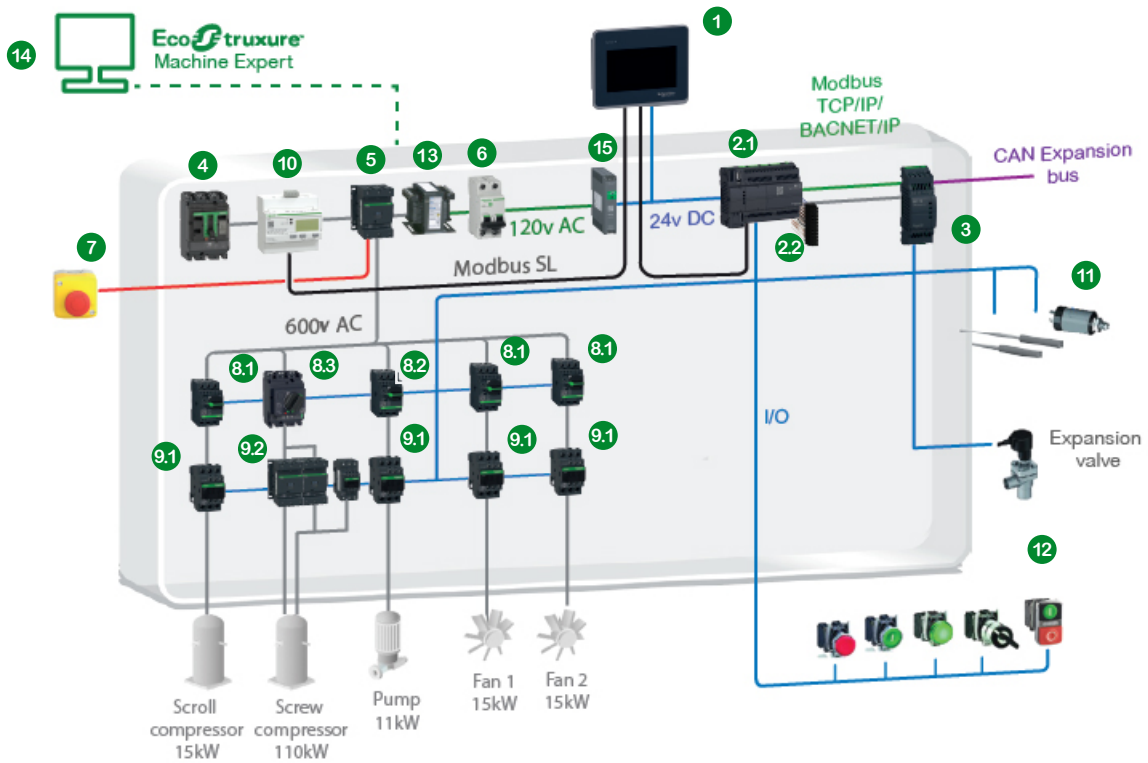
- Technical features of this architecture
- Peace of mind integration and communication with a complete and optimized HVAC offers portfolio with logic controllers, valves, sensors and probes for T°, humidity and pressure, Power meters... all giving inputs to controller
- A unique HVAC specialized free software platform with EcoStructure Machine Expert – HVAC offers easy navigation in few clicks and simplifies each of the steps in machine design, integration, commissioning and maintenance
- Dedicated libraries and “ready to use” and pre-configured application function blocks (AFBs) simplify each of the steps in machine design and communication, Fan management, Floating high-pressure control with variable-speed drives, Compressor management, Drive communication control, Energy management, PID
- Multiple BMS (Building Management System) connectivity, embedded or as an option
- Easy maintenance and efficient Services with build-in diagnostic
- Multi-standard components available worldwide
- Long lifespan in tough HVAC application thanks to the HVAC dedicated reliable and robust Schneider Electric parts Schneider Electric parts

Chiller Machine with Basic Motor Switching



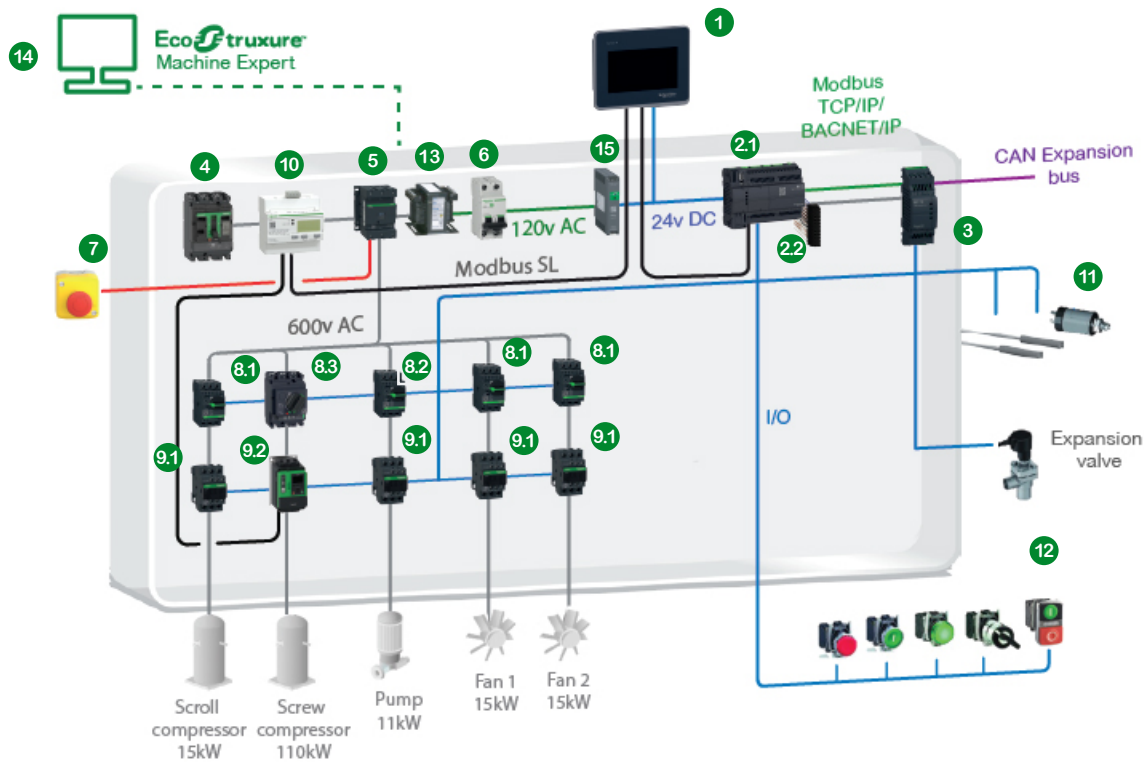
Product	#	Part Number	Descriptions	Qty
Harmony ST6 – Touch screen panel	①	HMIST6200	Small Touch screen panel to supervise the system 4"W color display, 1COM (RS-232C or RS-485), 1Ethernet, USB host & device, 24V DC	1
Modicon M1730 – Logic controller	②.1	TM172ODM42R	24V AC/DC, 42 I/Os (12AI, 6 AO, 12 DI, 12 DO) with possibility for extension, Build-in display, 1 CAN, 1 USB, 2 Modbus/Bacnet MS/TP. Use programming EcoStruxure Machine Expert – HVAC software with ready to use assets and HVAC Libraries for chillers	1
Modicon M173 LV Connector	②.2	TM173ACB1M	LV Connector - 1m cable	1
Modicon M172 – EEV Driver	③	TM172EVEV1U	24V AC/DC 9W or 12VA, CAN bus, Electronic Expansion Valve Driver, unipolar	1
ComPacT NSX100F – Circuit breaker, MA trip unit	④	C10F3MA100	3 poles 3-phases, 100A, Magnetic motor protection, 10kA, 600V AC	1
TeSys Giga – LC1G Contactor	⑤	LC1G265EHEN	3-pole contactors, 217A, 200 hp at 575/600 V 60 Hz	1
Multi9 C60N	⑥	M9F42103	1 pole - 3A - Curve C - 120V AC, 14kA mini circuit breaker 3 pole - 16A	1
Harmony XALK – Control station plastic, yellow cover	⑦	XALK178E	Control station, yellow cover with 1 emergency switching off function – 1 NO + 1 NC	1
TeSys Power GV2P and GV5P – Motor circuit breaker	⑧.1	GV2P32	3 pole AC-3, 32A – Thermal & magnetic motor circuit breaker, rotary handle	3
	⑧.2	GV2P22	3 pole AC-3, 25A – Thermal & magnetic motor circuit breaker, rotary handle	1
	⑧.3	GV5P220F	3 pole AC-3, 220A – Thermal & magnetic motor circuit breaker, rotary handle	1

Chiller Machine with Basic Motor Switching



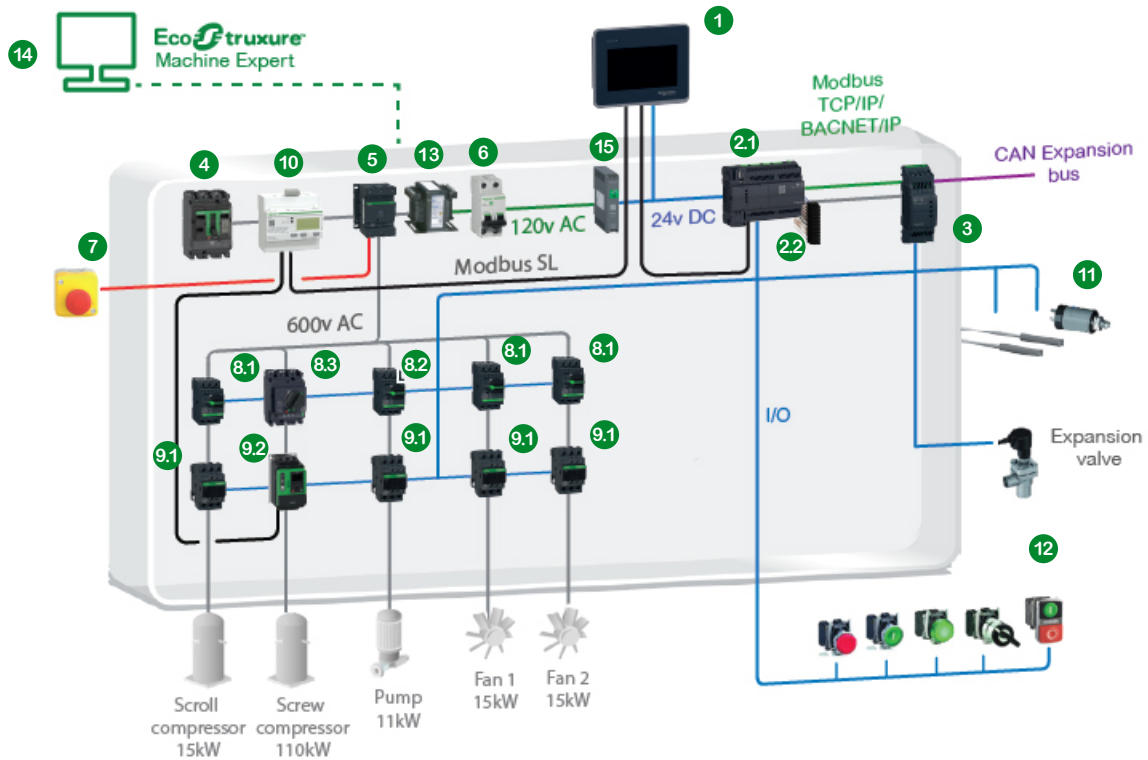
Product	#	Part Number	Descriptions	Qty
TeSys Deca – LC1D Contactor	9.1	LC1D32F7	3 pole AC-3, 25 hp at 575/600 V AC 50/60 Hz for 3 phase motor, 32A contactor, 1NO + 1NC auxiliary contacts, 110V AC coil	1
TeSys Deca – LC3D Star-Delta starter	9.2	TeSys Assembly	3 pole AC-3, 125 hp at 575/600 V 60 Hz, Star-delta components, 110V AC coil (2 x LC1D150AEHE + 1 x LC1D115AEHE + LAD9150SD17 Wiring Sets + NSYSDR200 Mounting Rail + LAD5CM Mechanical Interlock).	1
Acti9 – EM3500 series - Energy Meter	10	METSEEM3550	The EM3500 series meters provide the essential measurement capabilities (for example, current, voltage and energy)	1
		METSECTLV10010U	Current transformer	1
Temperature and Humidity Sensors	11	TM1STNTXXX	Temperature NTC, PT1000	X
		TM1SHXXX	Humidity Sensors, 4-20mA	X
Harmony XB4 – Metal push buttons, Flush mounting	12	XB4FA3311	Ø 22 mm green pushbutton with “I” marking, flush mounting, 1NO contact	1
		XB4FL4322	Ø 22 mm red pushbutton with “O” marking, flush mounting, 1NC contact Note: For standard mounting, use XB4BA3311 and XB4BA4322	1
Harmony XB4 (alternative)		Alternative	Ø 22 mm double-headed pushbutton with 1 green “I” marking button + 1 red “O” making projecting button + 1 central pilot light white, 1NO + 1NC contacts	1
Transformer	13	9070T50	Type T, 50VA, 1 phase, 240x480V primary, 120V secondary, 55C rise	1
EcoStruxure Machine Expert Software (free license)	14	NA	Simplify machine programming & commissioning using a single environment. Free online download	1
Regulated Power Supply	15	ABLS1A24031	100-240V AC, 24V 3.1 A, single phase, Optimized	1

Chiller Machine with Medium Motor Switching



Product	#	Part Number	Descriptions	Qty
Harmony ST6 – Touch screen panel	1	HMIST6200	Small Touch screen panel to supervise the system 4" W color display, 1COM (RS-232C or RS-485), 1Ethernet, USB host & device, 24V DC	1
Modicon M1730 – Logic controller	2.1	TM172ODM42R	24V AC/DC, 42 I/Os (12AI, 6 AO, 12 DI, 12 DO) with possibility for extension, Build-in display, 1 CAN, 1 USB, 2 Modbus/Bacnet MS/TP. Use programming EcoStruxure Machine Expert – HVAC software with ready to use assets and HVAC Libraries for chillers	1
Modicon M173 LV Connector	2.2	TM173ACB1M	LV Connector - 1m cable	1
Modicon M172 – EEV Driver	3	TM172EVEV1U	24V AC/DC 9W or 12VA, CAN bus, Electronic Expansion Valve Driver, unipolar	1
ComPacT NSX100F – Circuit breaker, MA trip unit	4	C10F3MA100	3 poles 3-phases, 100A, Magnetic motor protection, 10kA, 600V AC	1
TeSys Giga – LC1G Contactor	5	LC1G265EHEN	3-pole contactors, 217A, 200 hp at 575/600 V 60 Hz	1
Multi9 C60N	6	M9F42103	1 pole - 3A - Curve C - 120V AC, 14kA mini circuit breaker 3 pole - 16A	1
Harmony XALK – Control station plastic, yellow cover	7	XALK178E	Control station, yellow cover with 1 emergency switching off function – 1 NO + 1 NC	1
TeSys Power GV2P and GV5P – Motor circuit breaker	8.1	GV2P32	3 pole AC-3, 32A – Thermal & magnetic motor circuit breaker, rotary handle	3
	8.2	GV2P22	3 pole AC-3, 25A – Thermal & magnetic motor circuit breaker, rotary handle	1
	8.3	GV5P220F	3 pole AC-3, 220A – Thermal & magnetic motor circuit breaker, rotary handle	1

Chiller Machine with Medium Motor Switching



Product	#	Part Number	Descriptions	Qty
TeSys Deca – LC1D Contactor	9.1	LC1D32F7	3 pole AC-3, 25 hp at 575/600 V AC 50/60 Hz for 3 phase motor, 32A contactor, 1NO + 1NC auxiliary contacts, 110V AC coil	3
Altivar ATS490 Soft Starter	9.2	ATS490C11Y	110A, 208 to 690V AC, control supply 110 to 230V AC	1
Acti9 – EM3500 series - Energy Meter	10	METSEEM3550	The EM3500 series meters provide the essential measurement capabilities (for example, current, voltage and energy)	1
		METSECTLV10010U	Current transformer	1
Temperature and Humidity Sensors	11	TM1STNTXXX	Temperature NTC, PT1000	X
		TM1SHXXX	Humidity Sensors, 4-20mA	X
Harmony XB4 – Metal push buttons, Flush mounting	12	XB4FA3311	Ø 22 mm green pushbutton with “I” marking, flush mounting, 1NO contact	1
		XB4FL4322	Ø 22 mm red pushbutton with “O” marking, flush mounting, 1NC contact Note: For standard mounting, use XB4BA3311 and XB4BA4322	1
Harmony XB4 (alternative)		Alternative	Ø 22 mm double-headed pushbutton with 1 green “I” marking button + 1 red “O” making projecting button + 1 central pilot light white, 1NO + 1NC contacts	1
Transformer	13	9070T50	Type T, 50VA, 1 phase, 240x480V primary, 120V secondary, 55C rise	1
EcoStruxure Machine Expert Software (free license)	14	NA	Simplify machine programming & commissioning using a single environment. Free online download	1
Regulated Power Supply	15	ABLS1A24031	100-240V AC, 24V 3.1 A, single phase, Optimized	1