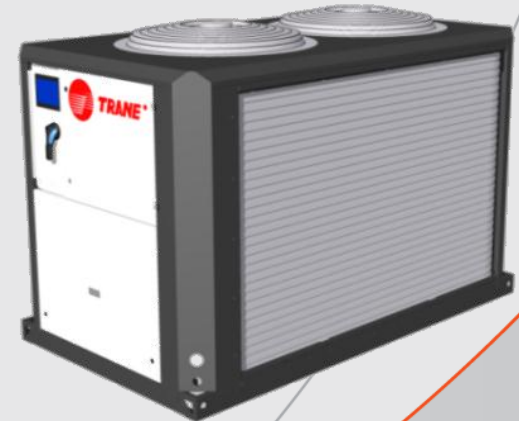# TRANE®

CONQUEST

Release #1b – Since March 2015

- **Partial Heat Recovery (PHR)**
- **External Protection Grill**
- **High Efficiency (HE)**
- **Smart Flow Control (VPF)**
- **High External Static Pressure (HESP)**
- **Smart Plant Control**
- **Supplemental Heat**
- **E Coating**
- **New software minor release (R1.4004)**

Ingersoll Rand.

PARTIAL HEAT RECOVERY (PHR)

Scope :

- *Heat Recovery on CGAX/CXAX Release #1a (Sizes : 15-60T)*
- *Recover capacity in cooling*
- *Partial Heat Recovery without fan speed management*
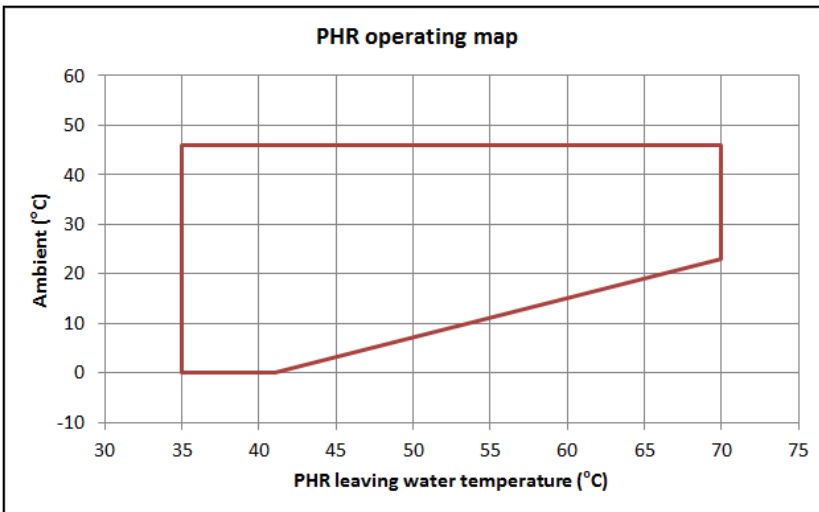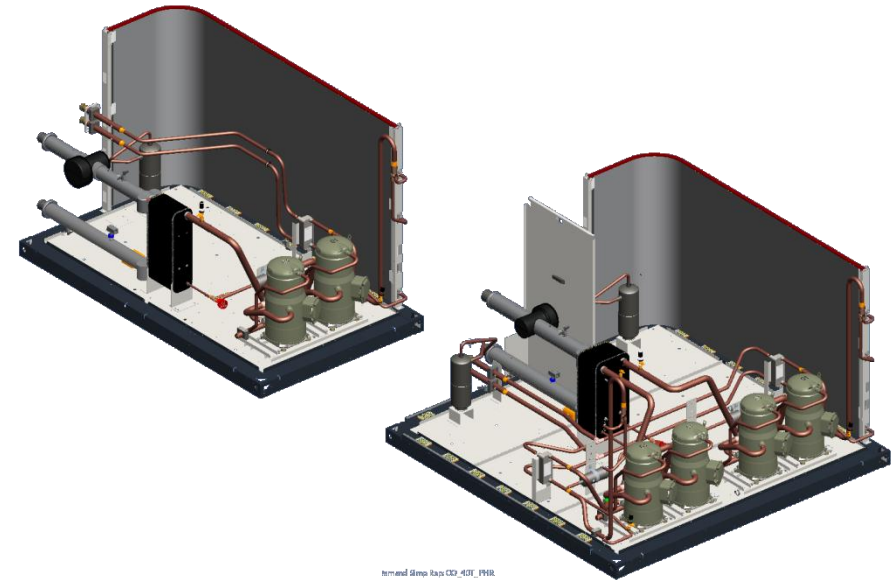
Specifications :

- *Capacity : 20% of Eurovent declared capacity*
  - *PHR EWT = 40° C / PHR LWT = 45° C @ Full load Eurovent conditions :
    OAT=35° C / LWTE=7° C / EWTE=12° C – average water pressure drop = 45kPa*
- *Water connections : threaded connections*
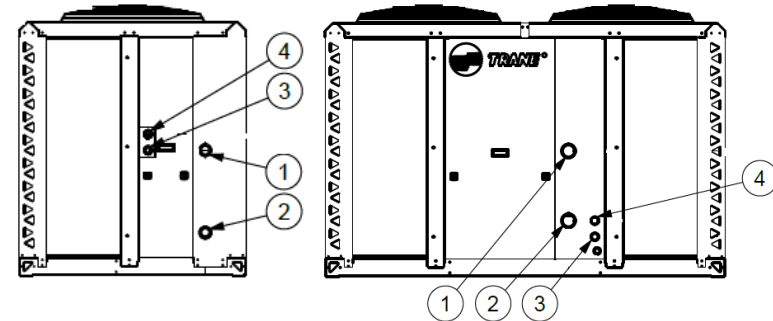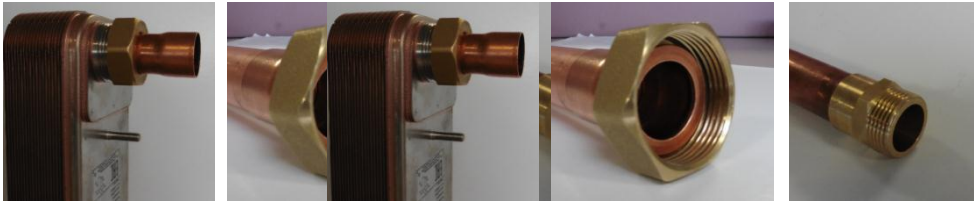
• Integrated Features:

- *Integrated water temperature sensors.*
- *Water Drain Valve and Air bleed*
- *No freeze protection.*
- *No insulation on recovery water side.*
- *Water connections on side of the unit*

PARTIAL HEAT RECOVERY (PHR)

PHR water side

PHR

4WV

CMP1

CMP2

CONDENSER COIL

EVAP. BPHE

Evaporator water side

FILTER

Sight Glass

EXV

SLHX

RECEIVER

PHR operating map

Ambient (°C) vs PHR leaving water temperature (°C)
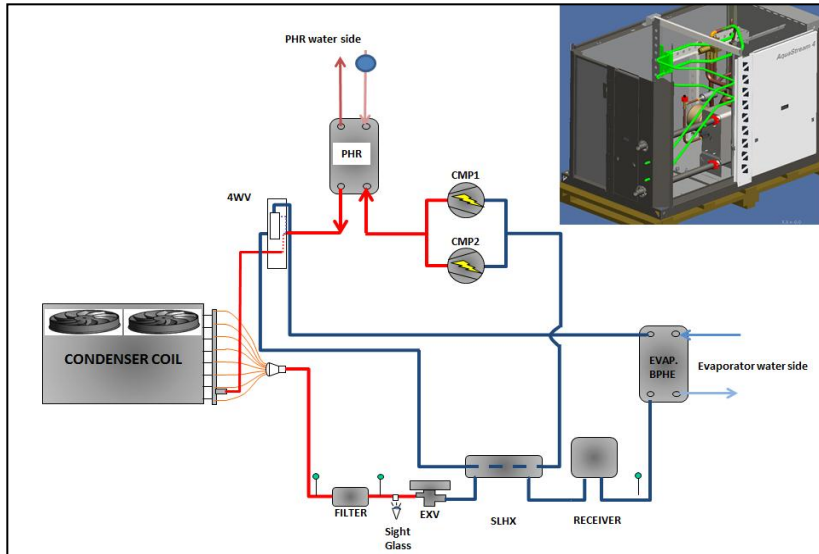
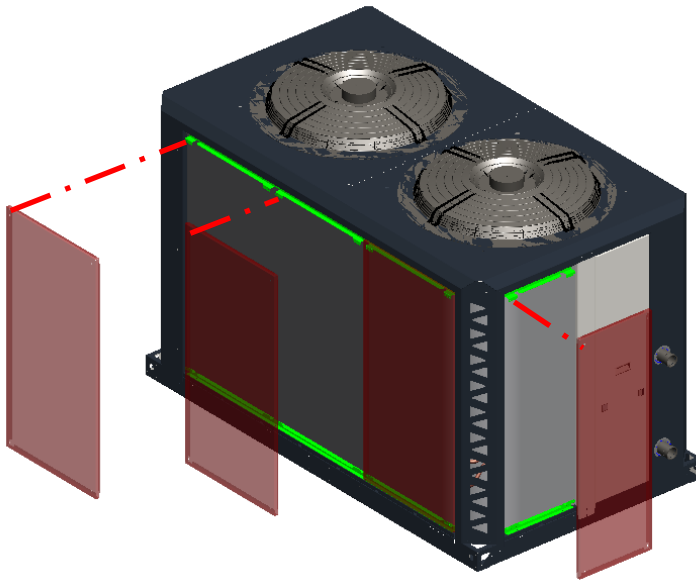### *Note :*

- *data published in IRIS are for units with a fixed Delta T = 5° C.*

- *Duplex unit are equipped with 2 brazed plate heat exchanger for PARTIAL HEAT RECOVERY.*

- *Same selection than Simplex unit.*

The PHR can recover capacity even @ low mass flow rate until discharge

Condenser Guard Grill

Scope _:_

- _Develop condenser guard grill for CGAX & CXAX_

Notes :

- _Grill shall protect the coil from the hail_
- _Grill shall prevent any user from injury that can be causes by contact with fins._
- _Grill shall limit coil clogging due to dust and other external objects._
- _To prevent corrosion the coil will be made of galvanized steel + painted_
- _The guard Grill can be mounted on customer site._
- _Grill are available in option in the MNBR._
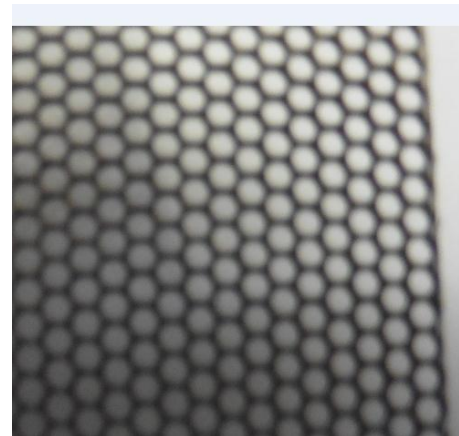
Protection against dust, hail and damage / Easy to clean

HIGH EFFICIENCY (HE)

Scope :
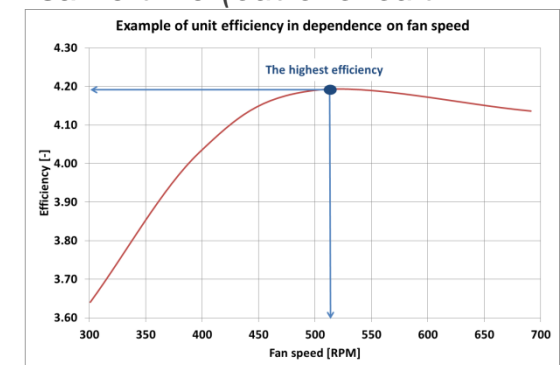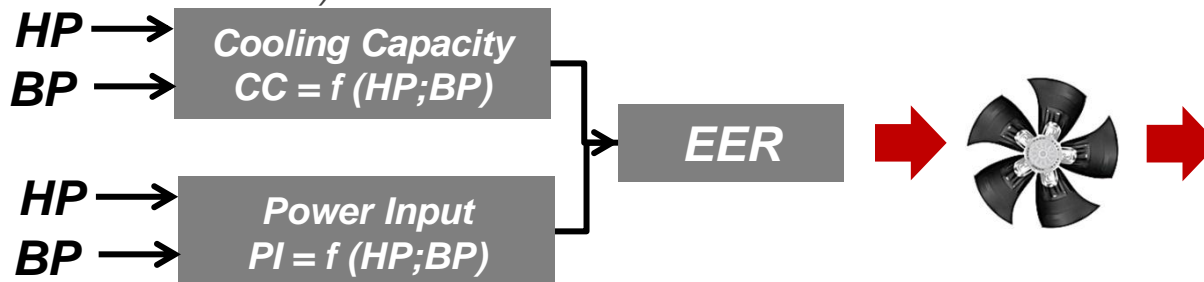
- *Improvement of SCOP/SEER/ESEER of CGAX/CXAX Release #1a (Sizes : 15-60T)*
- *This option will only improve "PART LOAD EFFICIENCY"*

Specifications :

- *Features will b optional → Digit 12=2*
- *100% of EC Fan motors on condenser*
- *Fan speed of all the fans will be changed in the same time.*
- *Disallowed rules :*
  - *High Efficiency Units available in Standard Noise & Low Noise*
  - *Compatible with High External Static Pressure Fan option (HESP)*

Control Strategy:

- *Manage in real time the capacity and power input to be @ the best eff% point for all running conditions.*
- *All fans will be driven by 0-20mA in same time*
- *Each fan has is own start/stop order but they are all driven in same time (out of circuit start)*

HP →
BP → Cooling Capacity CC = f (HP;BP)

HP →
BP → Power Input PI = f (HP;BP)

EER

Example of unit efficiency in dependence on fan speed

The highest efficiency

Notes : Better sound power level @ part load

Better to run 2 fans at lower speed but 1 fan at full speed for same airflow

HIGH EXTERNAL STATIC PRESSURE(HESP)

Scope :

- Condenser fans with additional static pressure.
- CGAX/CXAX Release #1a (Sizes : 15-60T).

Performances:

- Available static pressure : 90-100Pa
- Acoustic impact vs SN unit= +4dB (Measured without external static pressure)
- No impact on unit Cooling capacity with 100Pa of additional pressure drop.
- EER/ESEER/… Reduced with 100Pa

Geometry :

- 100% of EC Fan motors on condenser
- Nominal fan speed is set @ 915rpm
- HESP option is managed as acoustic option and to limit impact on noise level only fan above deck mounted will be used (same as LN units).
- Disallowed rules :
    - Option available only LN fan configuration
    - Compatible with High Seasonal Efficiency (HSE)

Speed can be adjust on customer site to fit with his requirements :

Need to change motor setting (each fan).

Access to EBM fan parameter via Modbus connection.

VARIABLE PRIMARY FLOW (VPF)

Scope :

- Improve customer installation Efficiency by using an adaptive water flow according the customer heating or cooling load

- $\frac{V1}{V2} = \frac{SP1^2}{SP2^2} = \frac{PI1^3}{PI2^3}$ → if speed is reduced by 2 – Power input is divided by 8

Specifications :

- Features will be optional → Digit 36

- Impact on unit design :
    - Add either differential pressure sensor or 2 water temperatures sensor.
    - Pump selection remain the same than today
    - A variable speed drive to be added into the control box.

- 2 or 3 options of variable water flow :
    - Manual flow adjustment
    - Constant delta T
    - Constant delta P

Difference between Fix and VPF
2 pressure sensors + 1 inverter on the pump
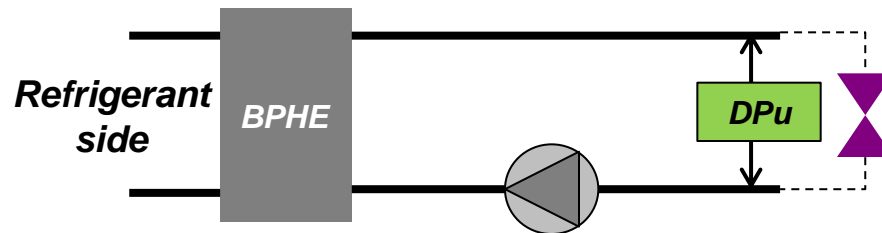
VARIABLE PRIMARY FLOW (VPF)

VPF Constant delta T :

Principle :
- → If 1 CMP switch off then DT decrease → pump speed decrease.
- → If 1 CMP switch On then DT increase → pump speed increase
- → Min pump speed = 30Hz
- → Require 3 ways valve on customer side

VPF Constant delta P :

Customer shall prevent evaporator freezing by implemented a solution to guarantee a minimum water flow through the evaporator.

Principle :
- → If DPu increase → Pump speed decrease
- → If Dpu Decrease → Pump speed increase
- → If DPe < Min DPe by pass valve start to open to maintain min flow rate in BPHE to avoid evaporator freezing.
- → Min pump speed = 30Hz

Application requirement:
Need to have a bypass valve at the end of the loop to assure minimum flow for the pump
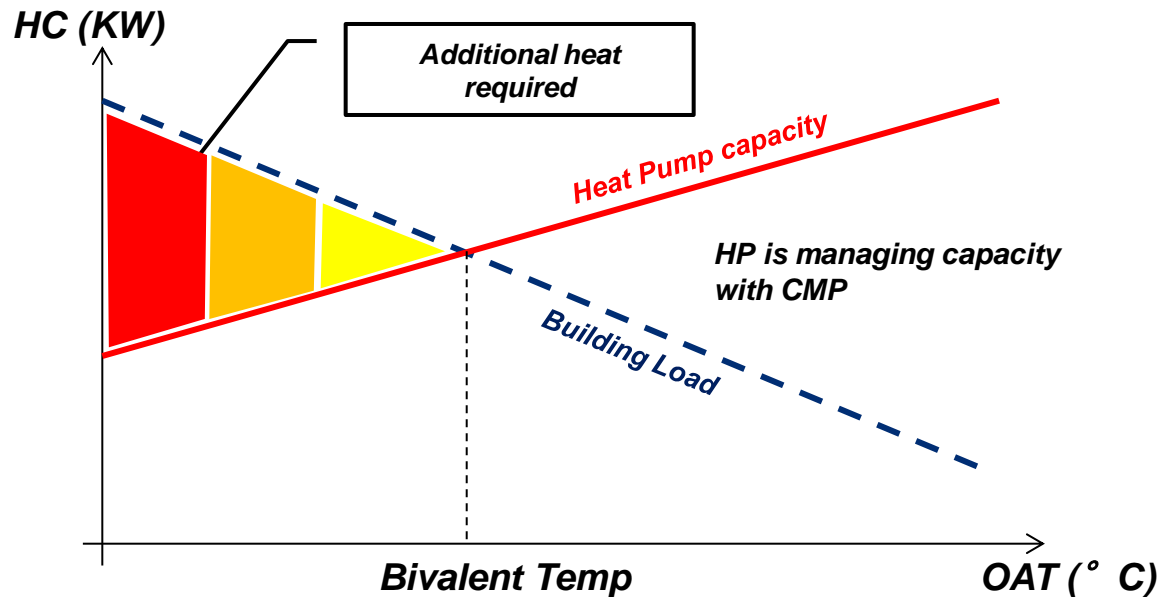
SUPPLEMENTAL HEAT

Scope :

- Produce additional capacity with electric heater when the Heat Pump can't achieve requested capacity
- Only available in on Heat Pump units and enable only in heating mode.
- Trane delivery = Software only (No hardware either in the control box)
- 3 digitals output available (Configurable from 1 to 3) and can be enable or disable.
- Heaters remain energized during defrosting and start only when all **"Available compressors"** are used
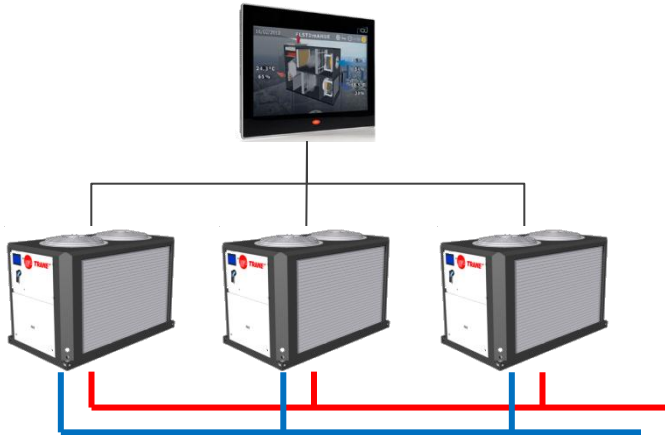
Principle :

HC (KW)

Additional heat required

Heat Pump capacity

HP is managing capacity with CMP

Building Load

Bivalent Temp

OAT (°C)

CXAX remains the main source of heating

But coordinate with other heating sources

Optional Control Features

Smart Plant Control :

Scope :
- _Will be available on PGD Touch Screen only._
- _Need to install installation water temperature inlet and outlet._
- _No priority and time balance will be applied to start compressors_

Customer will be able to manage up to 3 units with only 1 user interface

E Coating

MCHE CORROSION PROTECTION

- Despite the good performances obtained during the testing phase of the MCHE coils, and the fact, that all aluminum coils will not risk of galvanic corrosion, still there are some environments where bare aluminum (like standard MCHE) are not able to provide an expected product life.
- Among those environments, coastal areas, heavy polluted industrial areas, oil & chemicals plants. To address these corrosive environments, a MCHE coating will be necessary.

Severity of environmental factors →

Coastal Environment	Inland	Distance from Coast			Coastline
	Unit to Coast	Direction of Prevailing Winds			Coast to unit
	None	Corrosion on other equipment			Severe
Al-Fin/Copper-Tube	X	B-Epoxy	B-Epoxy	B-Epoxy	OTHER
Microchannel coil	X	X	e-coat	e-coat	e-coat

Industrial Environment	Low	Chemical agent Concentration			High
	None	Corrosion on other equipment		Severe corrosion	
Al-Fin/Copper-Tube	X	B-Epoxy	B-Epoxy	B-Epoxy	OTHER
Microchannel coil	X	X	e-coat	e-coat	e-coat

Combined Coastal/Industrial Environment	Inland	Distance from Coast			Coastline
	Unit to Coast	Direction of Prevailing Winds			Coast to unit
	Low	Chemical agent Concentration			High
	None	Corrosion on other equipment			Severe
Al-Fin/Copper-Tube	X	B-Epoxy	B-Epoxy	B-Epoxy	OTHER
Microchannel coil	X	e-coat	e-coat	e-coat	e-coat

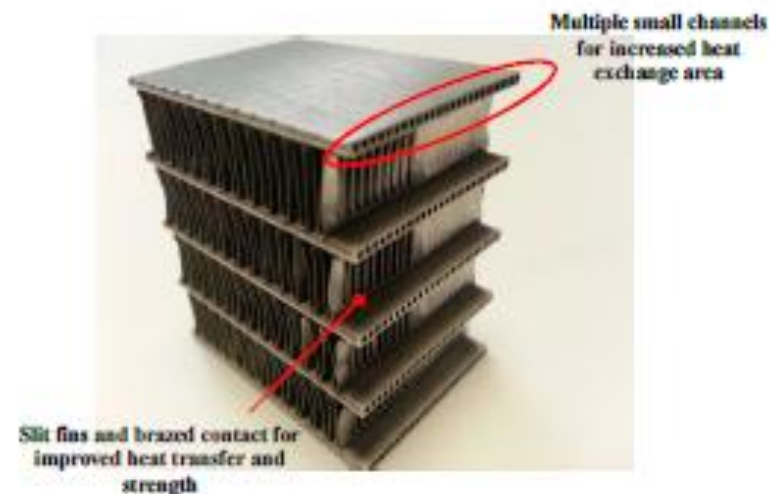| Urban Environment	Low	Pollution levels / Population density			High
	None	Corrosion on other equipment			Severe
Al-Fin/Copper-Tube	X	B-Epoxy	B-Epoxy	B-Epoxy	OTHER
Microchannel coil	X	X	X	e-coat	e-coat

Notes

"X" : Applicable (Standard Coil)

"B-Epoxy" : Black epoxy protection required

"OTHER" : example = impregnated polyurethane coating with periodic on field re-treatment,
Chemical agent includes all acid, Chlorin, Sodium, Ethyl, Coal and Petroleum compound

Concrete dust emission must here be considered as a chemical agent

Multiple small channels for increased heat exchange area

Slit fins and brazed contact for improved heat transfer and strength

Application guide available to explain which coating to use

New software minor release (R1.4004)

With new software version:
- EXV management:
  - Synchronization control improved (to avoid starting compressor with EXV closed at unit power up)
- Communications issues fixed. Lontalk, Bacnet and Modbus.
- Minor display details fixed on Deluxe Touch Display.

- Program build of CH535 and Deluxe touch display is available on E/C sharepoint :

  - CH535 :
  http://extranet-sharepoint.ingerrand.com/trane/ElectricalControlsEngineering/Softwares/Forms/AllItems.aspx?RootFolder=%2Ftrane%2FElectricalControlsEngineering%2FSoftwares%2FConquest%20Software%20Files%2Fsw%201%2E4%20Official%20Release&View=%7bED39F963%2dCB8A%2d440B%2dB1C1%2dDA726C3F031C%7d

  - Deluxe display :
  http://extranet-sharepoint.ingerrand.com/trane/ElectricalControlsEngineering/Softwares/Forms/AllItems.aspx?RootFolder=%2ftrane%2fElectricalControlsEngineering%2fSoftwares%2fConquest%20Software%20Files%2fsw%201%2e4%20Official%20Release%2fDeluxe%20Display&FolderCTID=&View=%7bED39F963%2dCB8A%2d440B%2dB1C1%2dDA726C3F031C%7d

It is not a mandatory retrofit if unit is running with R1.4 version