FTE2.0 - COMMISSIONING WITH DANFOSS CONTROLLER

Rev.	Date	Modification
1	27/06/22	Modification in chap. 2 – chap. 3 – chap. 6. Added CONCEPT ELECTRICAL LAYOUT at the end of document
0	22/03/18	

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1. CONCEPT ELECTRICAL LAYOUT OF FTE2.0

Connection between PACK controller & FTE2.0 controller to the Supervisor with LON-RS485 cable

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2. HOW IMPORT FTE2.0 (AND GATEWAY) IN AK-SM 850A (NEW VERSION)

Choose a USB formatted as FAT32;

Unzip the folder "Epta_FTE_R01" and copy in the USB the following files (not integrated in folder!): (***CONTACT SYSTEM ENGINEERING FOR "Epta_FTE_R01"***)
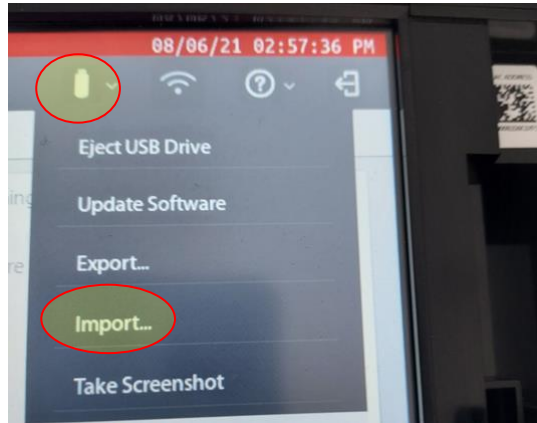
- *MC540000.ed3;*
- *MC540000.epk;*
- *MC970000.ed3* FILE;
- *MC970000.epk;*
- *device.ls3*

Connect the USB key to the 850A and import the files:
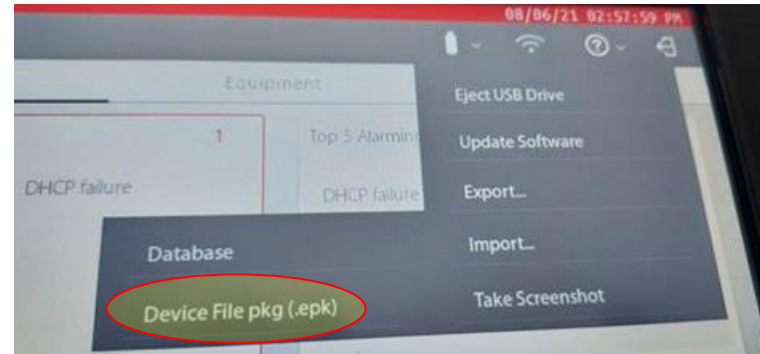
a. Insert the USB key in A-SM800A;

b. Select "Import";

c. Select "Device file pkg (.epk)";

d. The epk files, **if outside any folder**, are automatically identified and proposed. ATTENTION: If the files are inside a folder they are not identified, it is not allowed to navigate within the folders of the USB.

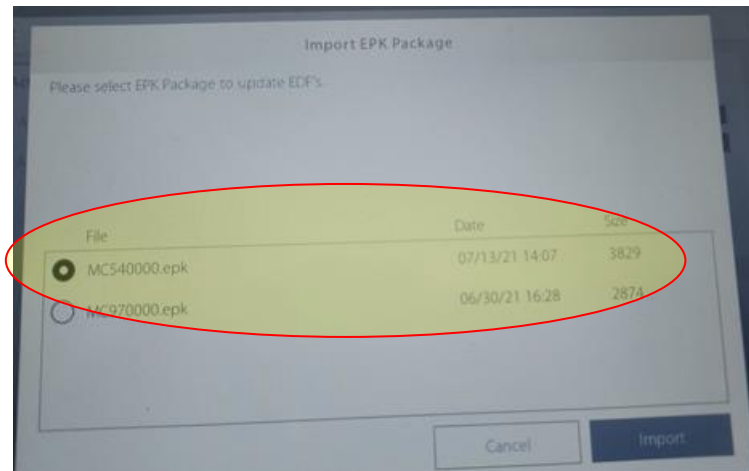The RMT is software is NOT available with AK-SM 800A.

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b. Select "Import"

c. Select "Device File pkg (.epk)

d. The epk files, if outside the folder, are automatically identified and proposed

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In **AK-SM 850** add two addresses (for FTE2.0 and for multigateway) into the AK-PC782 controller. Associate the files as follow:

    a. *MC970000.ed3* for FTE2.0 controller

    b. *MC540000.ed3* for MULTIGATEWAY controller.

       ATTENTION! The multigateway device COULD BE VISIBLE ONLY IF THE **AK-SM 800 Series** IS ALSO ENABLE FOR A/C (is not mandatory to have visible also this controller, not problem if the supervisor is not available for air conditioning).

Scan the line. The association between controllers and addresses should be generated.

In AK-SM, to re-name the FTE controller: **Configuration** tab → **Control** tab → **Refrigeration** tab →**Controllers** tab: in Suction MT line configure the FTE2.0 device with the software EPTA1-0100 MC970000.

Check in the Networks Nodes the scan Status:

IN CASE OF FLOOD EVAP WITH DI, CONNECT THE CABLE WHEN EVERYTHING IS PROPERLY SET IN THE CONTROLLERS (SEE CAP. 5)!!!

3. HOW IMPORT FTE2.0 (AND GATEWAY) IN AK-SM 850 (OLD VERSION)

Make the connections as previous concept layout

Connect the **AK-SM 850** to the **RTM**

Check in the **AK-SM 850** the IP Address of the store (Tab "Configuration" → tab "Com." → "Master IP Address".

Save in your laptop the folder "Epta_FTE_R01" with the files (*):
      c. *MC540000.ed3*,
      d. *MC970000.ed3*,
      e. *device.ls3*

In **RMT** open in local path the folder "Epta_FTE_R01".

Copy the *MC540000.ed3* file in the remote path "edf".

Copy the *MC970000.ed3* file in the remote path "edf".

    → (*) ***CONTACT SYSTEM ENGINEERING DEPT. FOR THE "Epta_FTE_R01".***

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For the *device.ls3* file:

    i.   Download *device.ls3* file version from REMOTE PATH to your laptop and open it

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ii.   Open *device.ls3* from the folder "Epta_FTE_R01"

iii. Copy rows

```
MC540000 MGTW          8   0   24 0400 MC540000.ed3 |Multigateway
MC970000 EPTA1         1   0   24 0100 MC970000.ed3 |FTE
```

from *device.ls3* (at point iii.) to *device.ls3* (at point ii.)

iv.   Update the new *device.ls3* file, with the added rows, into the REMOTE path

v.   Wait 1 minute
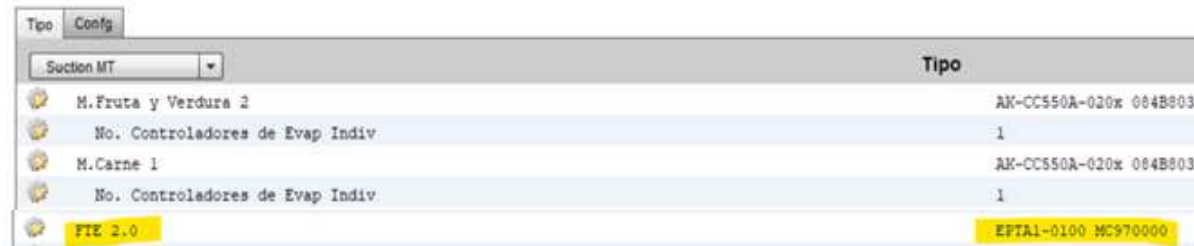
Reset the unit from **RMT**: tab "Tool" → Reset Unit.

In **AK-SM 850** add two addresses (for FTE2.0 and for multigateway) into the AK-PC782 controller. Associate the files as follow:

a.   *MC970000.ed3* for FTE2.0 controller

b.   *MC540000.ed3* for MULTIGATEWAY controller.

ATTENTION! The multigateway device COULD BE VISIBLE ONLY IF THE **AK-SM 800 Series** IS ALSO ENABLE FOR A/C (is not mandatory to have visible also this controller, not problem if the supervisor is not available for air conditioning).

Scan the line. The association between controllers and addresses should be generated.

In AK-SM, to re-name the FTE controller: **Configuration** tab → **Control** tab → **Refrigeration** tab →**Controllers** tab: in Suction MT line configure the FTE2.0 device with the software EPTA1-0100 MC970000.

Check in the Networks Nodes the scan Status:

Todos los Nod	Controladores	Modulos E/S	Otros Nodos

| 2 | MC970000 | EPTA1-0100 | 01.00 | Modbus |
| 3 | 084B8030 | AK-CC550A-020x | 02.0x | Lon |

IN CASE OF FLOOD EVAP WITH DI, CONNECT THE CABLE WHEN EVERYTHING IS PROPERLY SET IN THE CONTROLLERS (SEE CAP. 5)!!!

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4. ASSOCIATE LOADS TO PACKS (LT & MT) WITH AK-PC781

a. From supervisor follow the steps:

Configuration → Wizard → Layout

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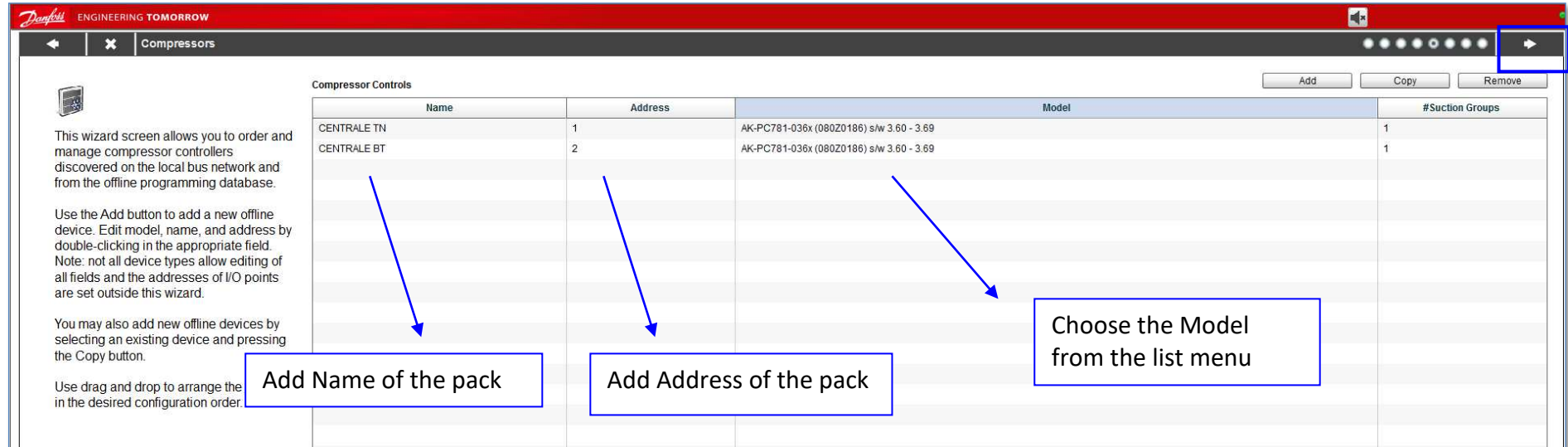
Filename: SE-TS032R01_FTE2.0-
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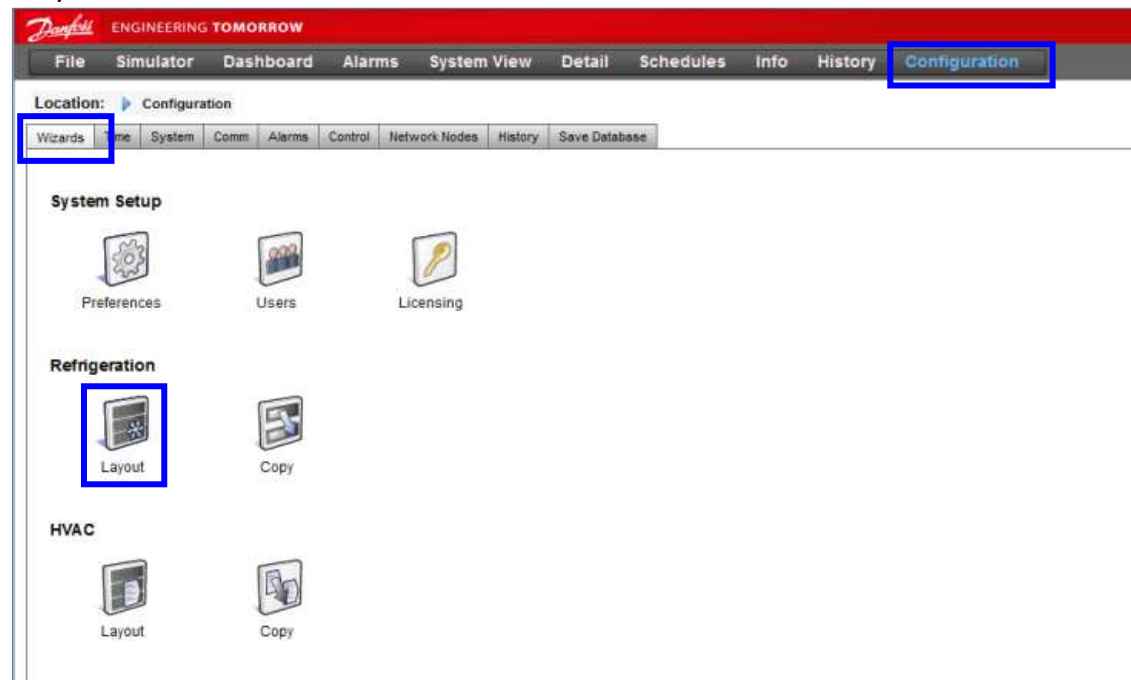
b. Enable the line where loads are associated. Go on:
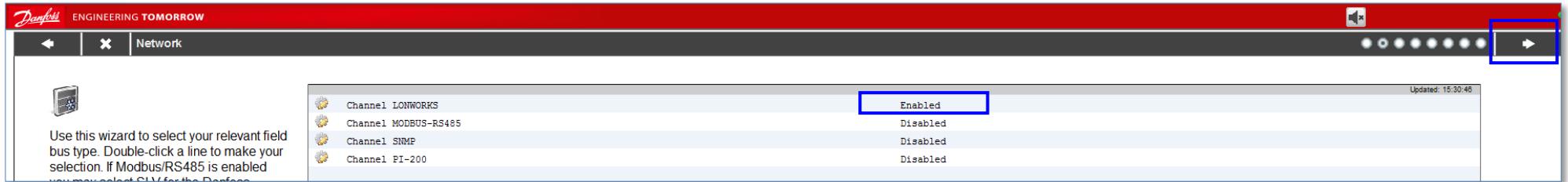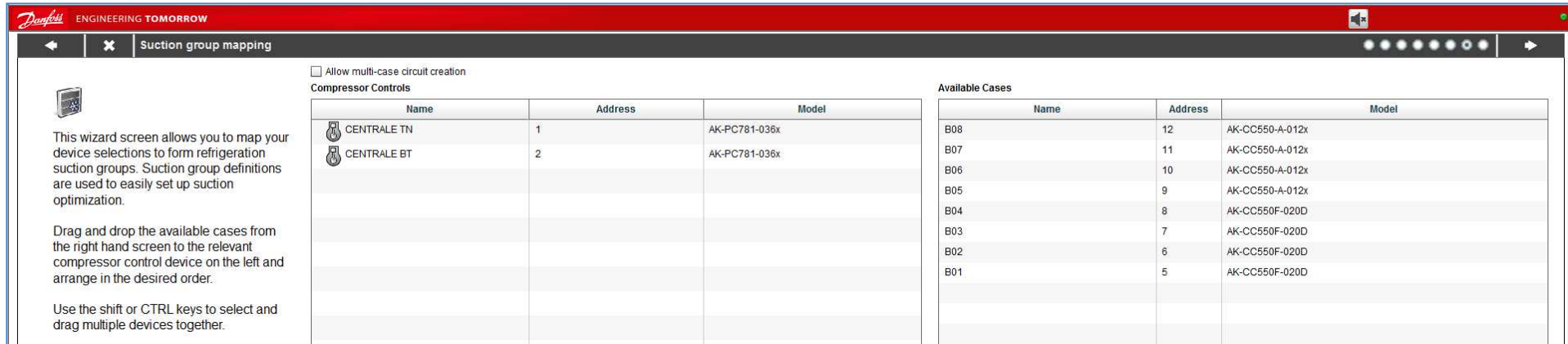
Add the pack (one for Low Temperature and one for Medium Temperature) as indicated here. Go on:

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c. Add loads (cabinets and coldrooms) as above (Name, Address, Model). Go on:

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d. Link MT loads to MT pack, link LT loads to LT pack:

With drag and drop:

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e. Click on Finish:

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5. ASSOCIATE LOADS TO PACKS (LT & MT) WITH <u>AK-PC782A (double suction level)</u>

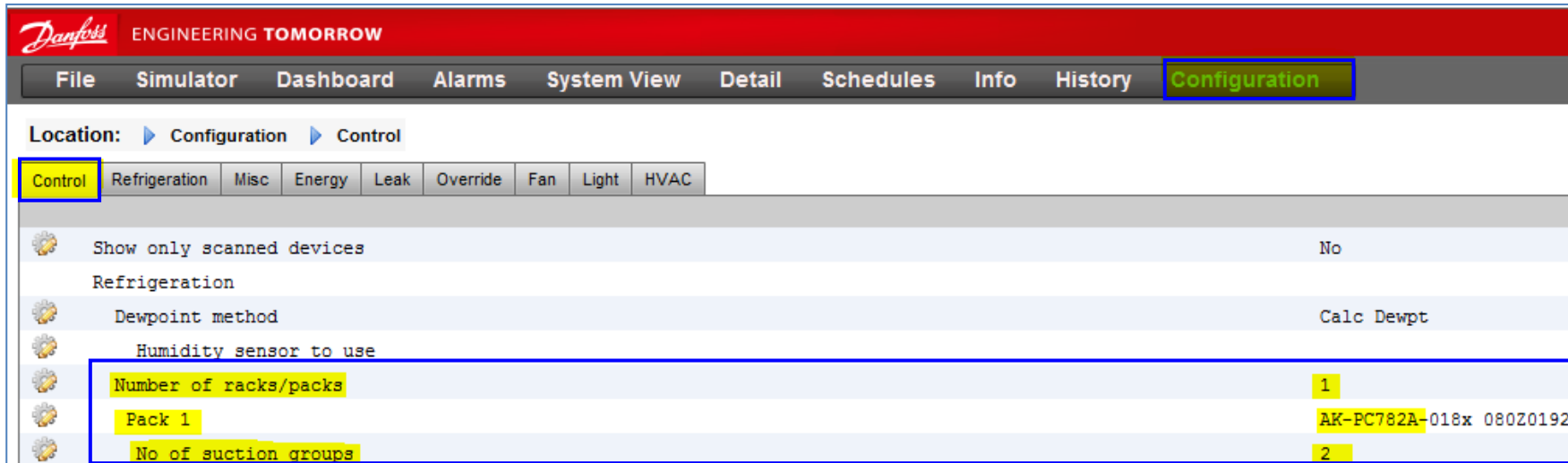   a. <u>DO NOT CONFIGURE THE LOADS WITH WIZARD BUT FOLLOW THE INSTRUCTION BELOW</u>

    b. From supervisor follow the steps:

Configuration → Control: set

        "*Number of rack/packs***"** = 1
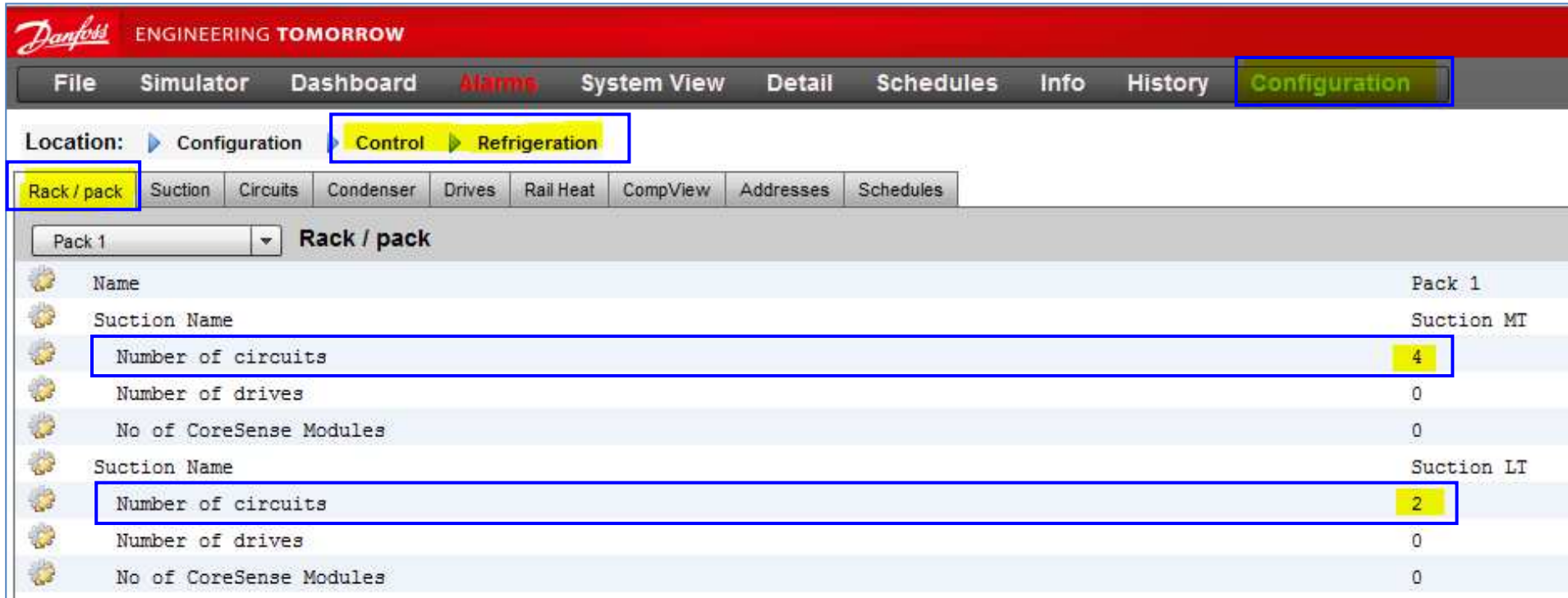
        "Pack 1" = AK-PC782A-xxx

        "No of suction groups" = 2

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c. **Configuration → Control → Refrigeration → Rack/pack**

Insert the number of circuits (loads) per each suction level

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d. Configuration → Control → Refrigeration → Circuits
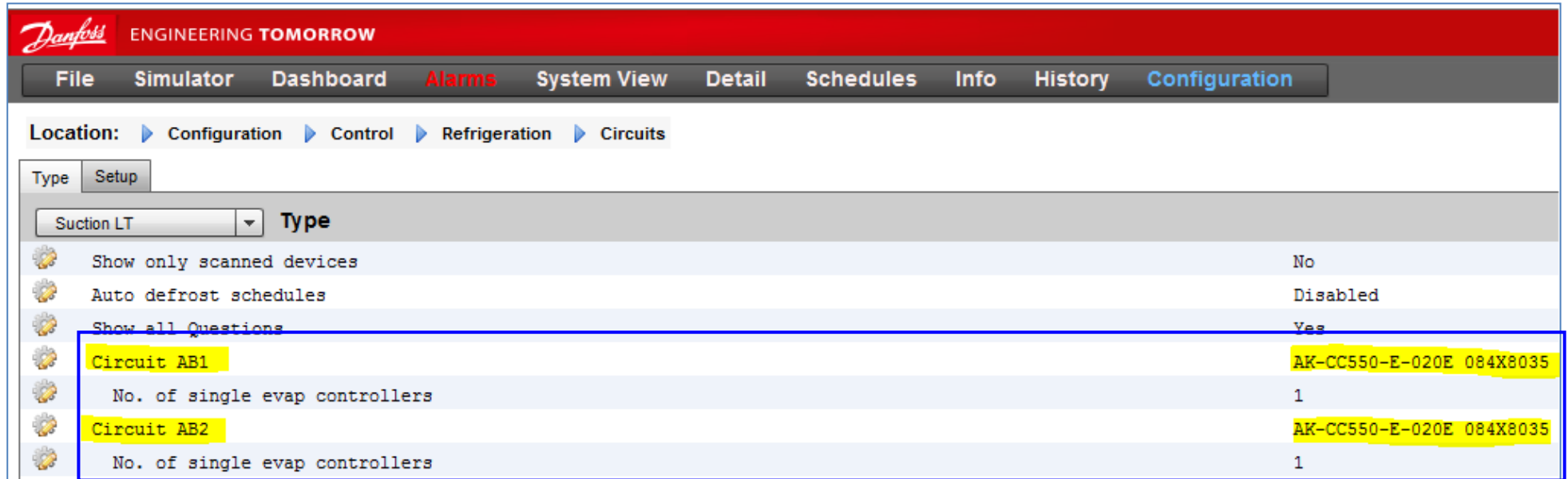
Associate the kind of controller for each circuit (=load). Double click on "*None*" and choose the controller from list

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Repeat it for Suction LT

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e. **Configuration → Control → Refrigeration → Addresses → Controllers**

Associate <u>name and address for each circuit</u> (=load) AND associate the <u>address for the Pack</u>.

- For name: double click on "Circuit AA1 AK-CC550-x-xxxx"
- For addresses: double click on "0"
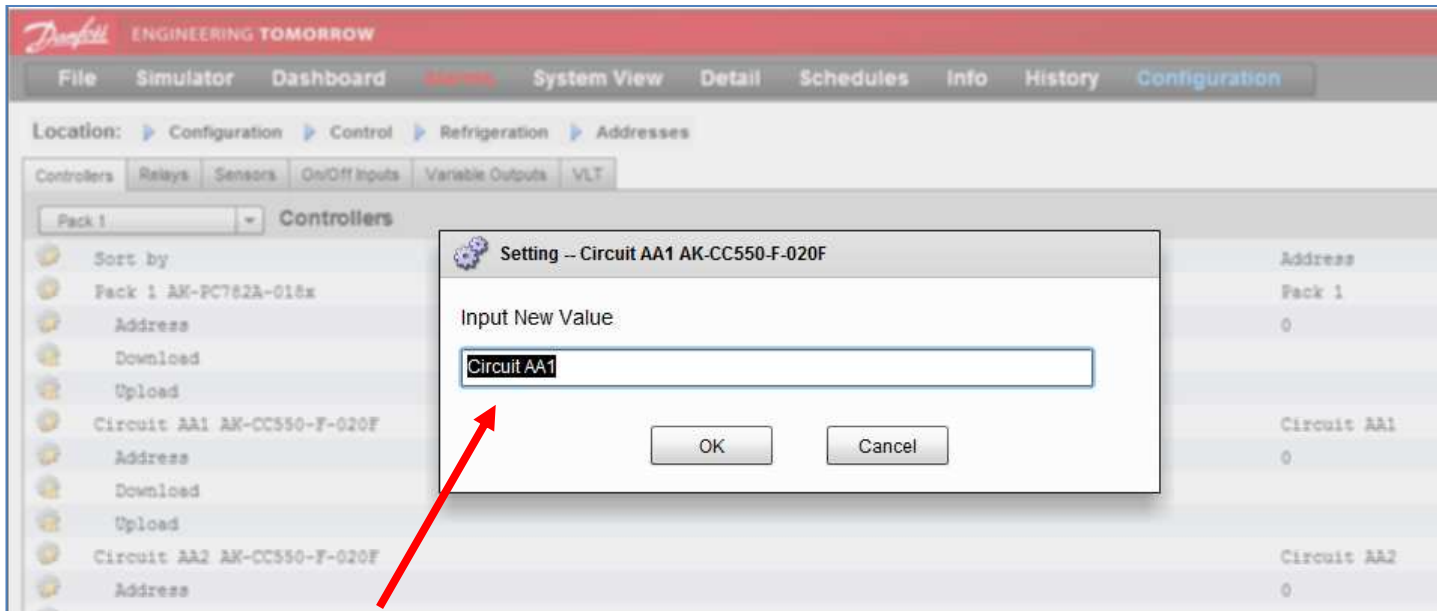
6. FTE COMMISSIONING IN FIELD

This part must be done in field with the FTE mechanically excluded (by-passed) from the system and empty (void):

1. Verify the Danfoss pack controller version: 1.8 or higher.

2. In menu "Receiver control" of the pack controller, change the parameter "Min delta P MT" at the value of 3-5 bar instead of 10bar:

3. Verify the status of the system, which specific focus on:
   a. Verify the oil level inside the oil reservoir;
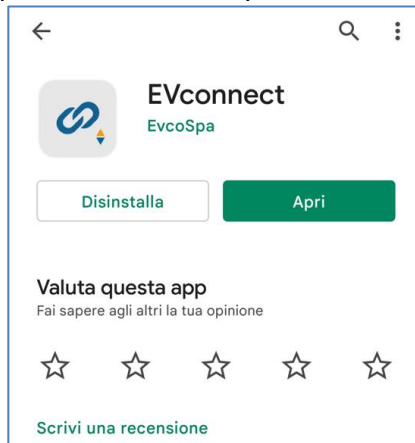   b. Verify the level of the liquid receiver;
   c. Verify the alarm on the system;
   d. Verify that the pressure switch for the LT compressor (discharge pressure) is pre-set at 38bar (+ 4,3 °C).

4. Switch ON the FTE2.0 controller.

5. It is possible to change the parameters in EVCO controller from <u>Supervisor</u> and from <u>App</u>.

   The App is available in Play Store as well as in AppStore:

   In case of connection through App, switch on the bluetooth and connect to EVLINK#
   Enter with the password: **5371**

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In case of connection through Supervisor, change the parameter *ModbusProtection = 5371*
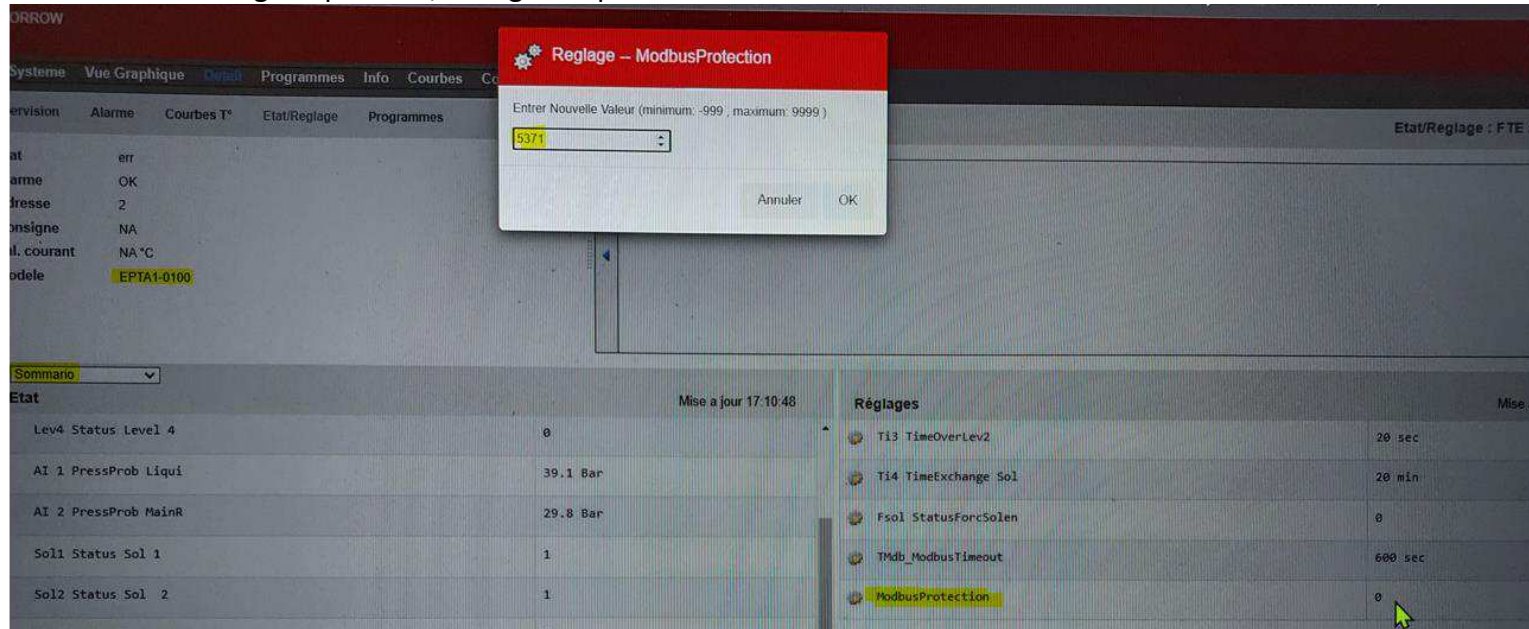
6. Check/Modify the following parameter in App or from Supervisor:
   a. If present, check if the probe AI2 is enable in the FTE2.0 controller: **A2En = 1**;
   b. Enable se advanced function of FTE2.0: **AdEn = 1**;
   c. Change the value of **Pday**:
      i. = 4015 means infinite contract with EPTA SERVICE;
      ii. = between 1 and 4014 means the exact number of contract days with EPTA SERVICE;
      iii. = 0 means no contract with EPTA SERVICE;

7. Put in pressure the receiver proceeding as follow:
   a. Open valve 1a;
   b. Then open valve 2a and at the same time close valve 3a before start the overfeeding;
   c. Put in pressure the FTE (only from gas line). Open slowly the valve to avoid dry ice formation;
   d. Excite the solenoid valves to break the void also in the liquid line between 2L and the solenoids.

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8. After breaking the void, verify the value of pressure probe to be sure that there are not leakages through the check valves (if installed) or the ball valves (closed position). The value that can be expected is the value of the suction pressure read in the pack main controller (the same pressure level of the suction line shall be expected, if not verify the check-valve of the FTE for leakage);
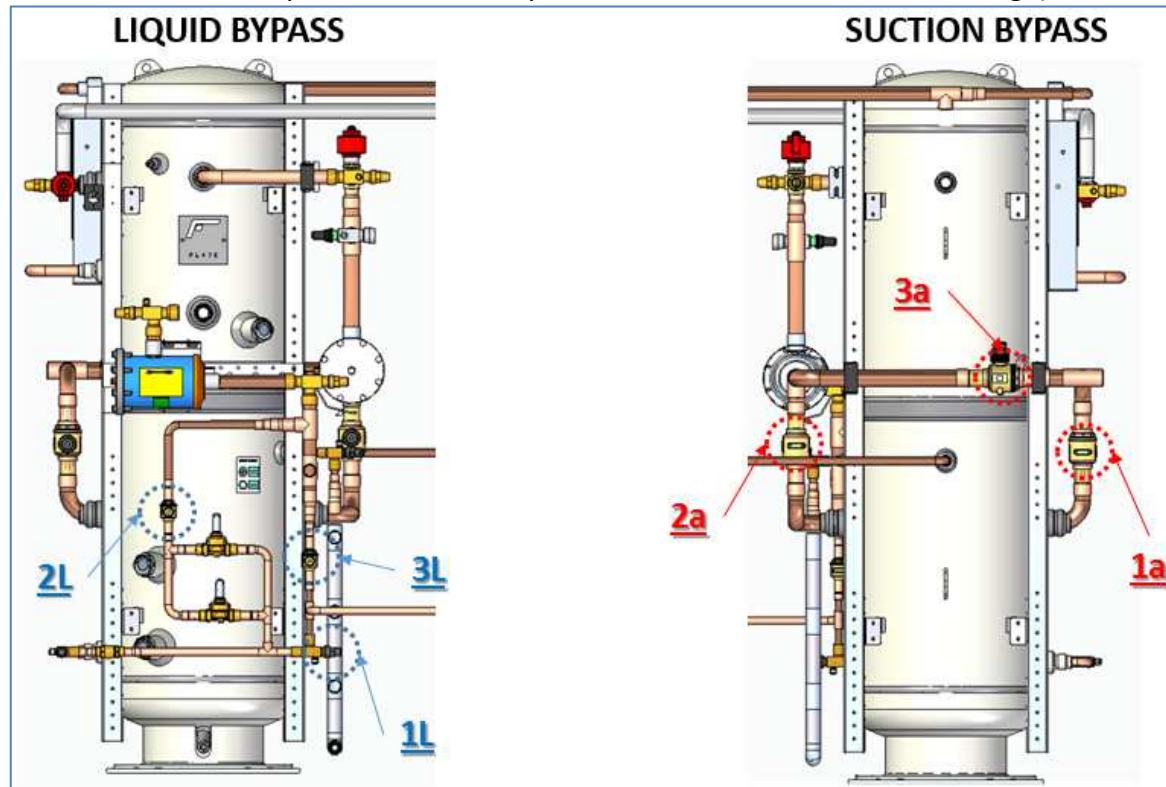
Layout concept with by-pass for FTE2.0 connection

Layout concept with by-pass for FTE2.0 connection

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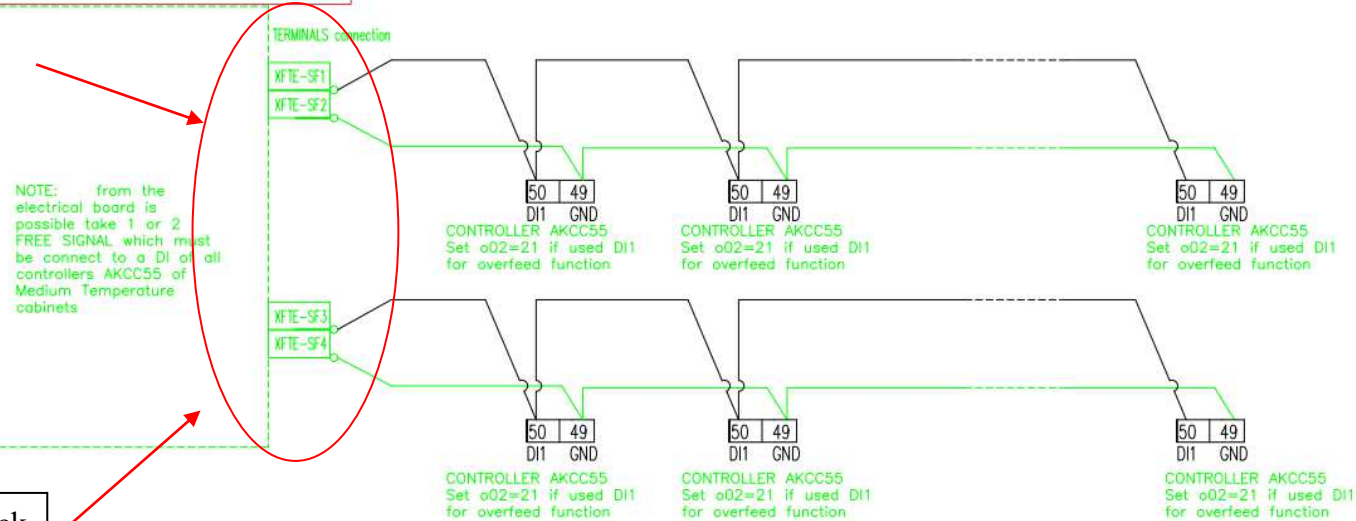Checked: Mazzola D.

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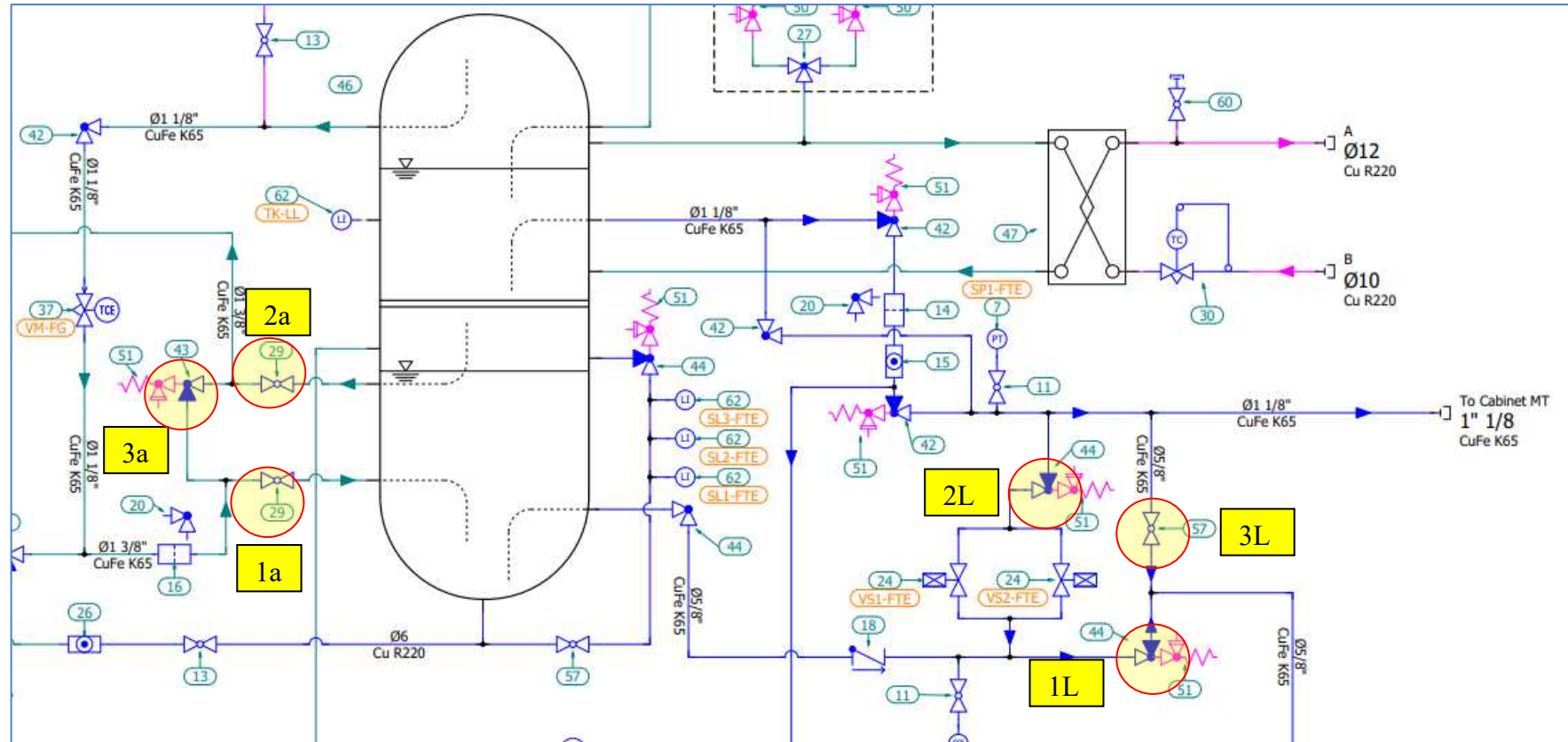
9. Electrically disconnect the solenoids (closed), open valve 2L and verify the value of pressure probe to be sure that there are not leakages through the solenoids (the same pressure level of the suction line shall be expected, if not check the solenoid valves).

10. Open 1L and 2L and then close 3L (not vice versa).

11. Follow the operations from supervisor as explained in next points
    a. **5. MASTER CONTROL** (page 22) – *if FLOOD EVAP is managed with this function and not with DI, otherwise ignore this cap.*;
    b. **6. Po OPTIMIZATION** (page 25);
    c. **7. SETTING PARAMETERS FOR FLOODED OPERATION MODE IN MT CONTROLERS** (page 27).

12. In case of **FLOOD EVAP WITH DI, CONNECT THE CABLE NOW**:

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CONNECTIONS SIGNAL FROM PACK ELECTRICAL BOARD AND CONTROLLERS OF MEDIUM CABINETS TEMPERATURE CABINETS FOR MANAGING OF OVERFEED FUNCTION

Note: For Digital Input DI of controllers, in general pay attention IF THE SIGNAL IS TO BE RECEIVED BY SEVERAL CONTROLLERS IT IS IMPORTANT THAT ALL CONNECTIONS ARE MOUNTED THE SAME WAY (DI to DI and GND to GND)

FTE ELECTTICAL BOARD

TERMINALS connection

XFTE-SF1
XFTE-SF2

NOTE: from the electrical board is possible take 1 or 2 FREE SIGNAL which must be connect to a DI of all controllers AKCC55 of Medium Temperature cabinets

| 50 | 49 |
| DI1 | GND |
CONTROLLER AKCC55
Set o02=21 if used DI1
for overfeed function

| 50 | 49 |
| DI1 | GND |
CONTROLLER AKCC55
Set o02=21 if used DI1
for overfeed function

| 50 | 49 |
| DI1 | GND |
CONTROLLER AKCC55
Set o02=21 if used DI1
for overfeed function

XFTE-SF3
XFTE-SF4

| 50 | 49 |
| DI1 | GND |
CONTROLLER AKCC55
Set o02=21 if used DI1
for overfeed function

| 50 | 49 |
| DI1 | GND |
CONTROLLER AKCC55
Set o02=21 if used DI1
for overfeed function

| 50 | 49 |
| DI1 | GND |
CONTROLLER AKCC55
Set o02=21 if used DI1
for overfeed function

ABOUT CONTROLLER AKCC55:
Set o02=21 if used DI1 (50−49)
Set o37=21 if used DI2 (61−60)

Check the switch in the pack or FTE electrical board.

Change of superheat with Digital Input

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13. For each MT loads (cabinet and cold rooms) change the parameter MOP (maximum operating pressure) threshold to +1°C (Injection Control menu):

14. Gradually charge the system with additional refrigerant:
    a. Wait the low liquid sensor or the sight glass of the receiver highlight the fact that there is no liquid;
    b. Start to add refrigerant: start with 10kg each 10 minutes (for the max of one cylinder);
    c. Wait 30 minutes and check the status of the FTE liquid sensor:
        i. If MLL is activated, stop adding refrigerant;
        ii. Otherwise check the LLL on the receiver: if refrigerant is missing, adds more refrigerant.

Repeat the procedure until this equilibrium is obtained: the receiver doesn't show low liquid alarm and the level of liquid is between 30% and 50%.

As general rules it must be expected an additional refrigerant charge between 30% and 50% of the volume of the FTE.

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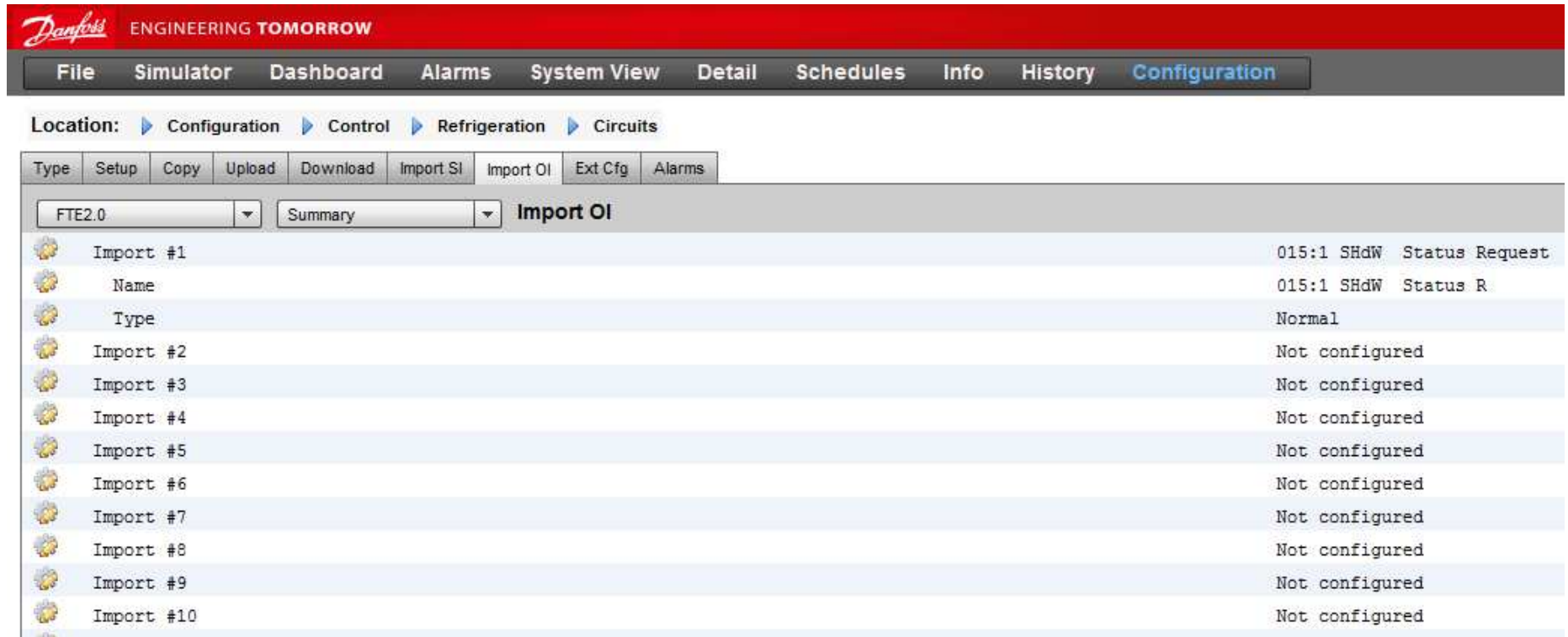© *EPTA GROUP – ALL RIGHTS RESERVED*

15. With the FTE activated and running:

- Increase the main liquid receiver pressure set-point to 36bar (or up to 37bar if receiver pressure is smooth and stable);
- Schedule of the defrost must be done taking into account the MT and LT loads:
    - o   LT defrost must not be scheduled after a MT defrost;
- Increase the liquid injection set-point (AKV intervention) values from 20K to 30K;
- Reduce the parameter of the hot gas injection (suggested value: 5K with 3K differential);
- Check the oil level in the reservoir and eventually add oil to the system if missing. It is suggested to verify the status of the oil reservoir after one week.

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7. MASTER CONTROL

The MT loads can switch in "Flooded Operation Mode" thanks to the implementation of that schedule

    a. Configure the OI for the Master Control function. The input is the request of decrease the SH from FTE2.0 controller:
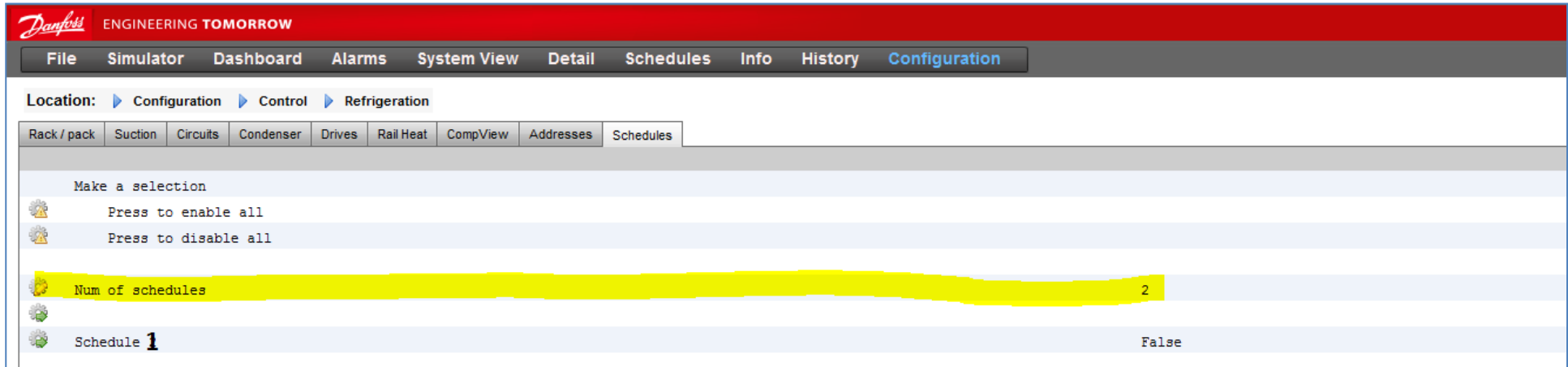
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b. Add + 1 schedule (to the already existing number), as following:
Configuration → Control → Refrigeration → Schedules
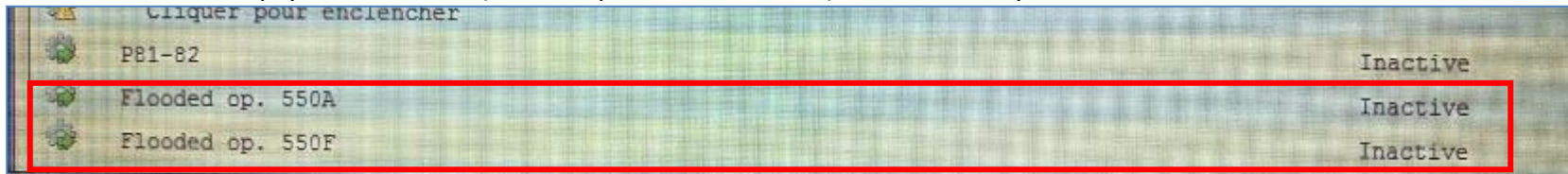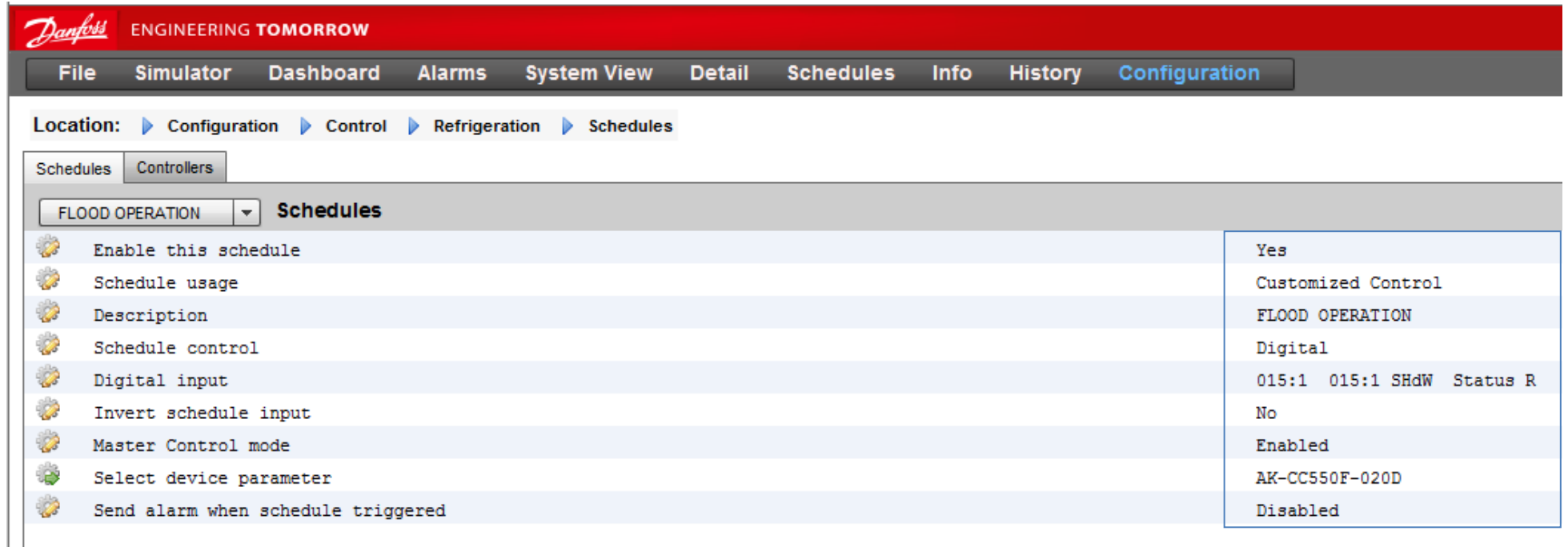

The new schedule to configure will appear, as highlighted.

In case of different tipsy of controllers (for example 550A and 550F) it is mandatory schedules different rules:

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c. Click on new schedule created and choose the values as following from the list menu:

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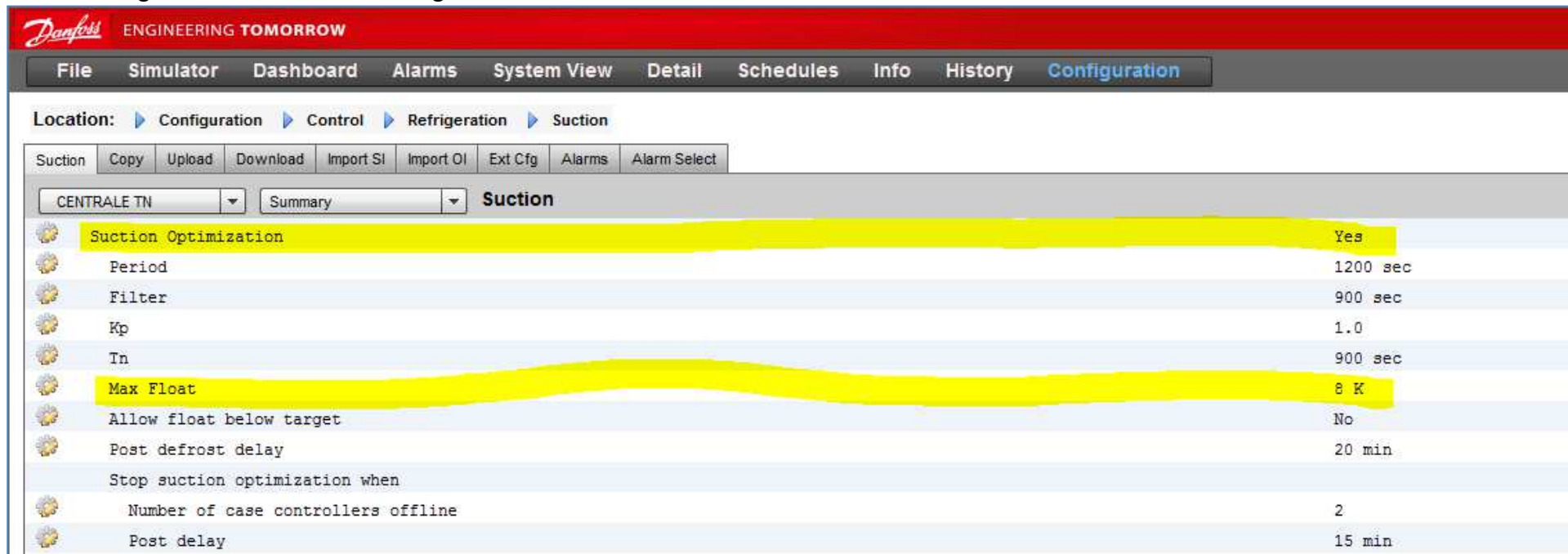d. Flag the controllers of MT cabinets and coldrooms:
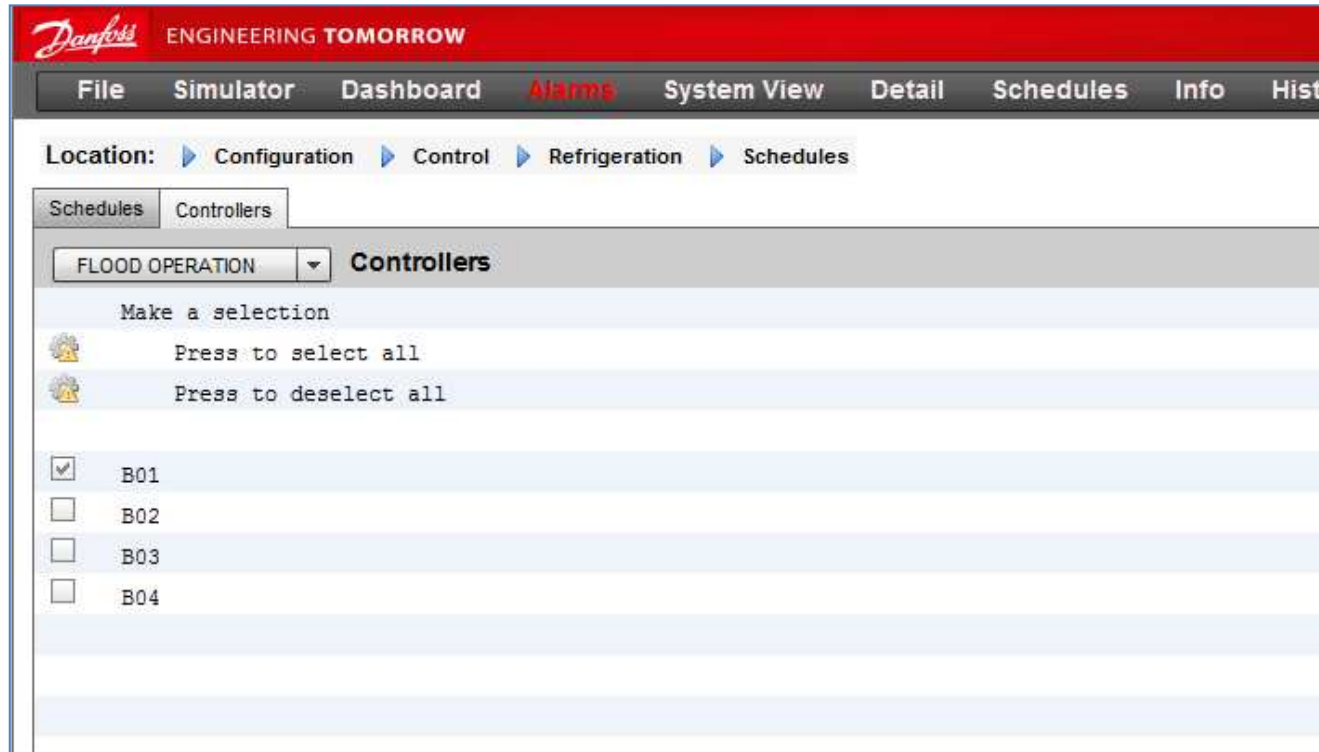
8. Po OPTIMIZATION

The following instructions permits to enable the floating suction.

      a. In the menu below change the parameters highlighted:

Configuration → Control → Refrigeration → Suction
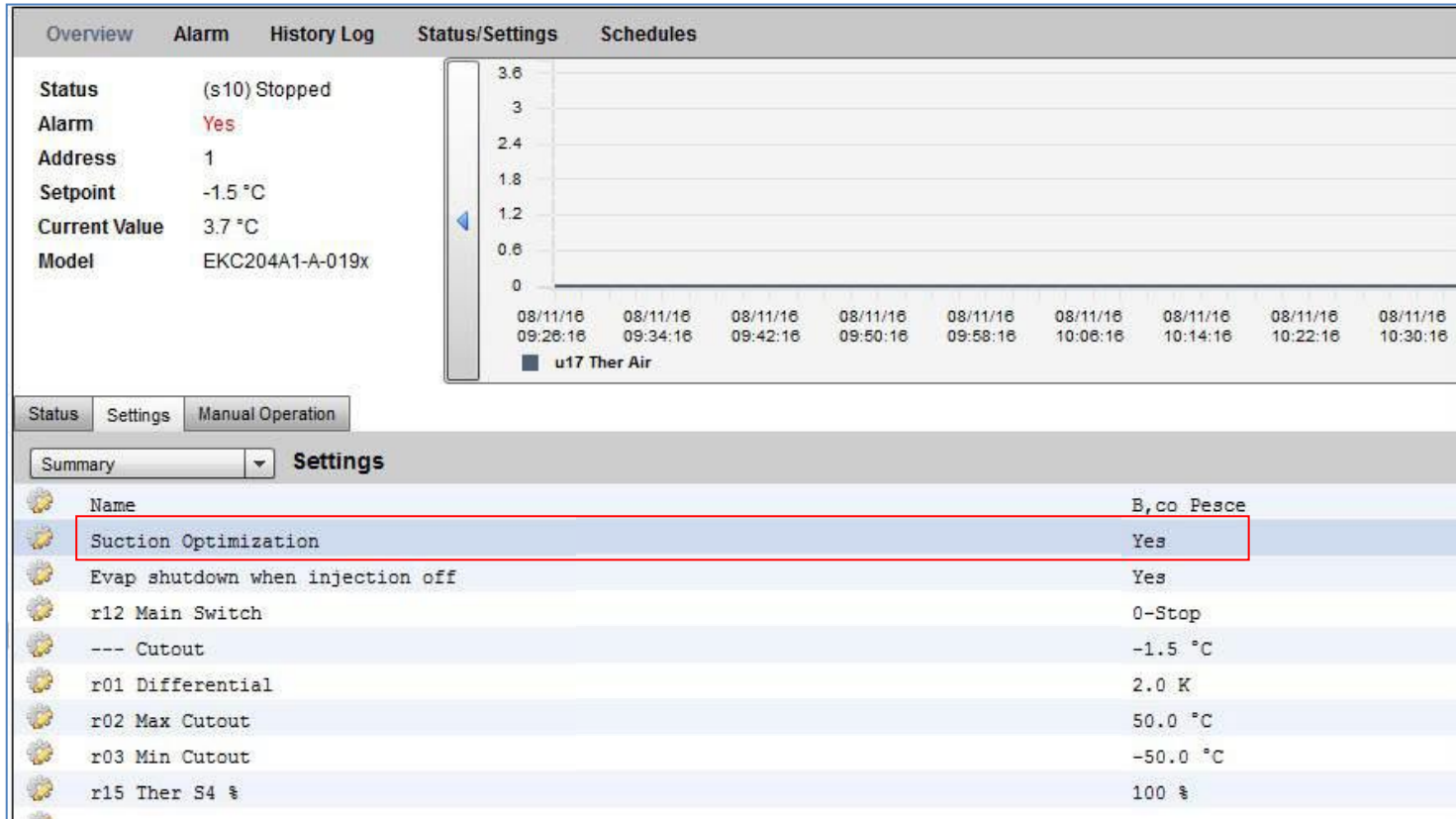
"Max Float" indicates the interval on which the suction floats acts.

b. All the controllers linked to the pack, with suction float activated, will be automatically configured for Po Optimization. If it is neces-sary, it is possible to exclude some controllers by this function.

In tab "Settings" of the menu of controller, set "No" from the menu list for the function "Suction Optimization".

9. SETTING PARAMETERS FOR FLOODED OPERATION MODE IN MT CONTROLLERS 550

a. It is possible copy the parameters from one controller to the whole group of MT controller:

Configuration → Wizards → Copy

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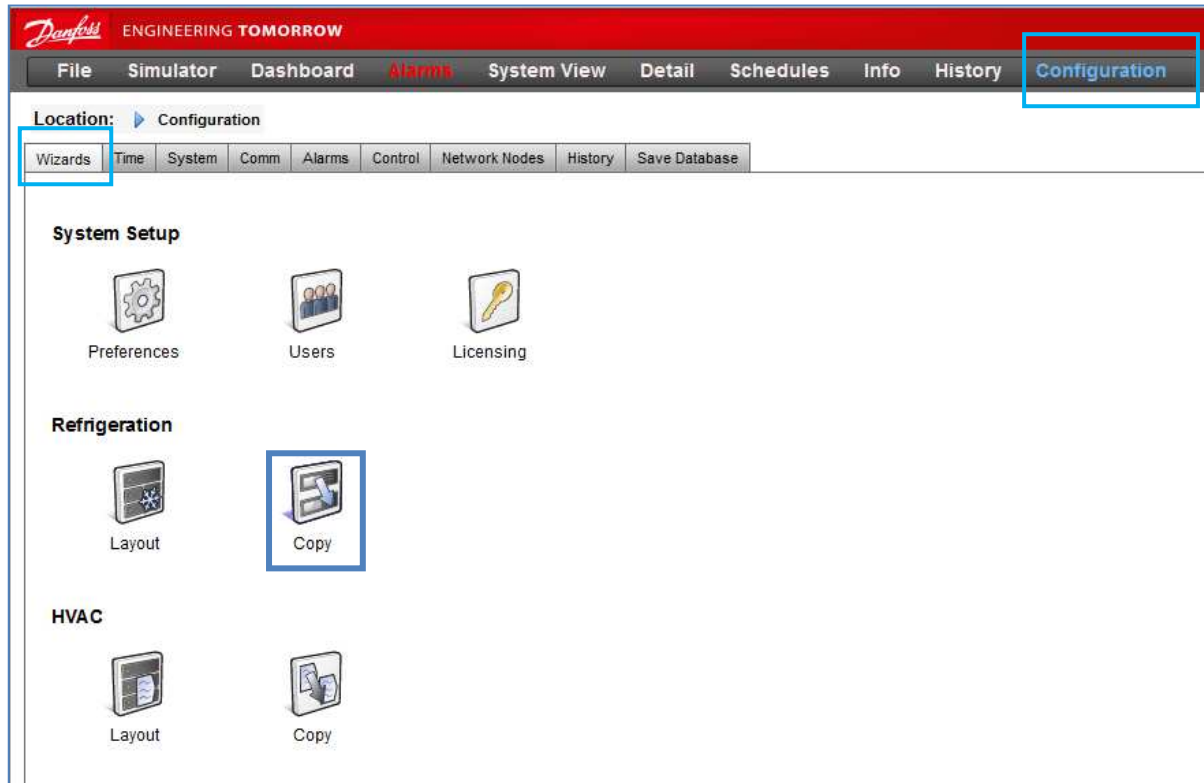
b. Click on "Controller" and select one of the MT controllers

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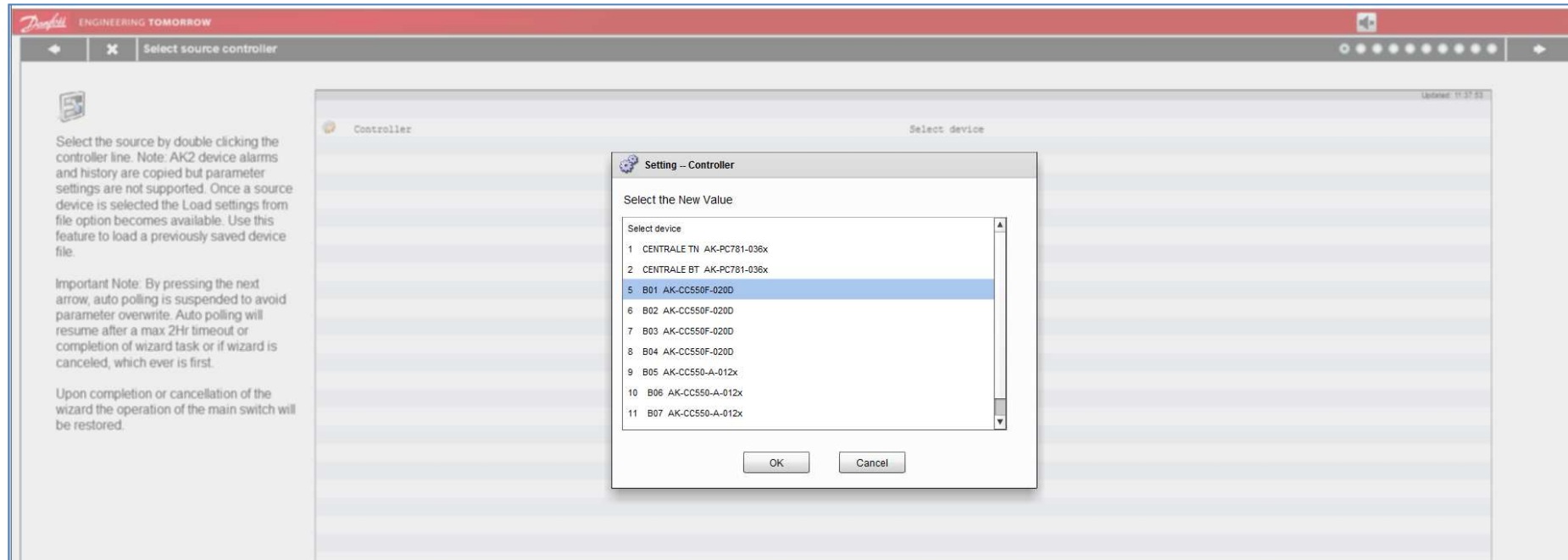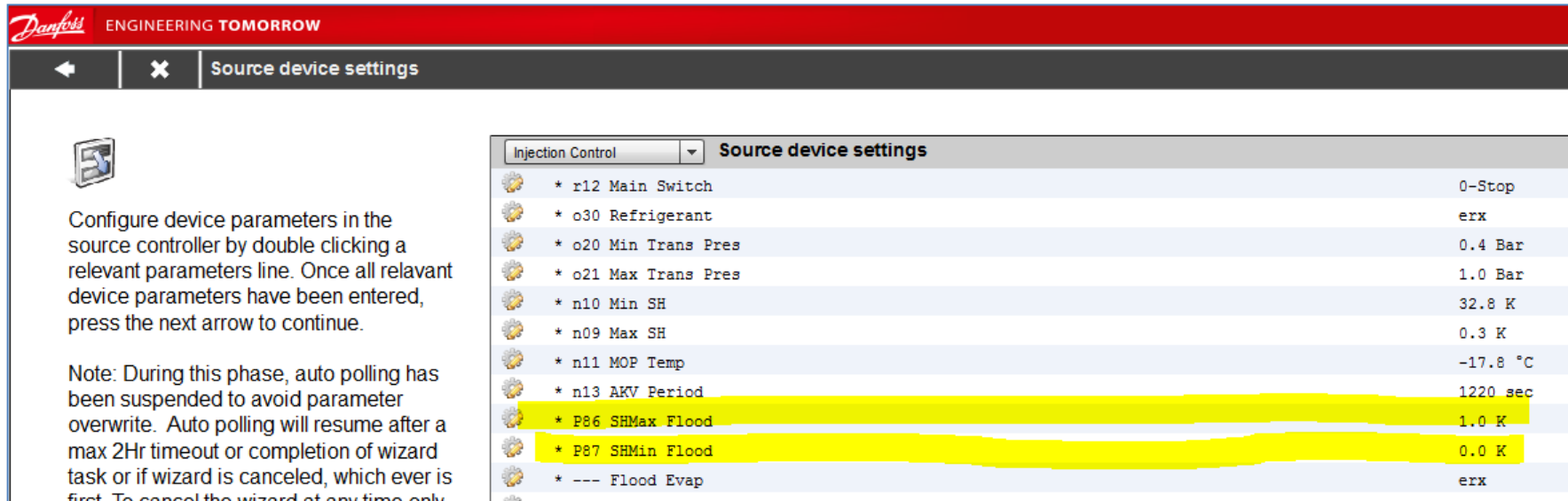
c. The controller has been selected. Go on until the screen below:

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d. Modify the following 5 parameters.
    i.   From "Injection Control" menu: change the values of *P86* and *P87* parameters

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ii. From "For Danfoss Only" menu: change the values of *SHClose Flood* and *S2StabFlood* parameters

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iii.   From "Thermostat Control" menu: change the values of *r14 Therm Mode* parameter
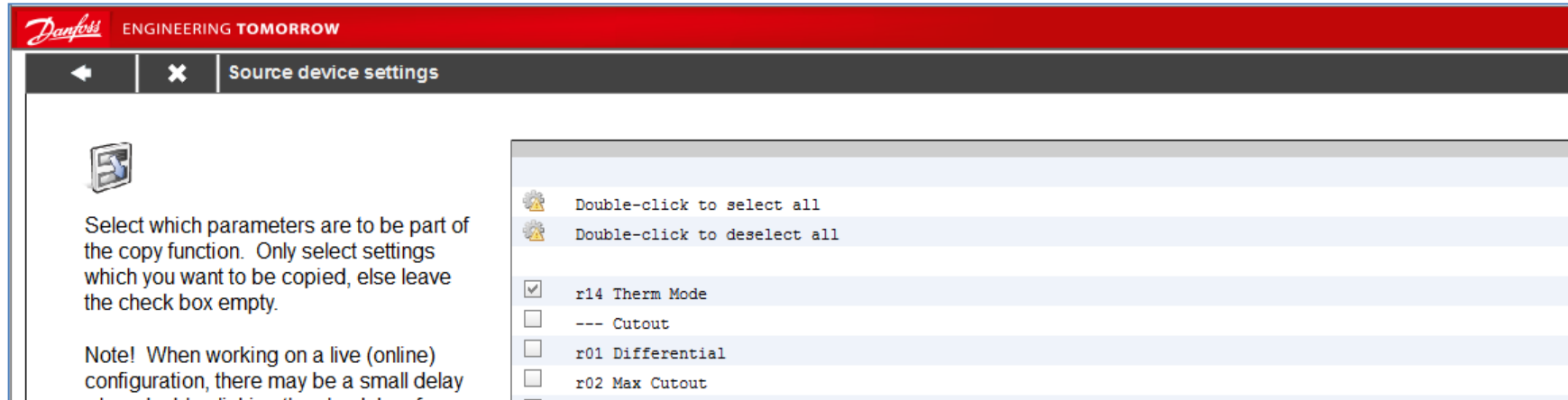
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e. Go on until the screen below. Flag the parameters just modified:

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Press the next arrow to continue.

☐	--- SH Close
☑	--- SHClose Flood
☐	--- Th Duty Cycle
☐	--- AFident Force
☐	--- SH Kp Min
☐	--- SH Kp Max
☐	--- SH Tn
☐	--- Te-Gain
☐	--- SHref Tn
☐	--- SHref Kp
☐	--- S2 Stability
☑	--- S2StabFlood
☐	--- MTR Kpfactor

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f. Go on. Flag the controllers on which the parameters of flooded operation mode have to be copied:

g. To complete the action, click "Finish" and then "Yes".

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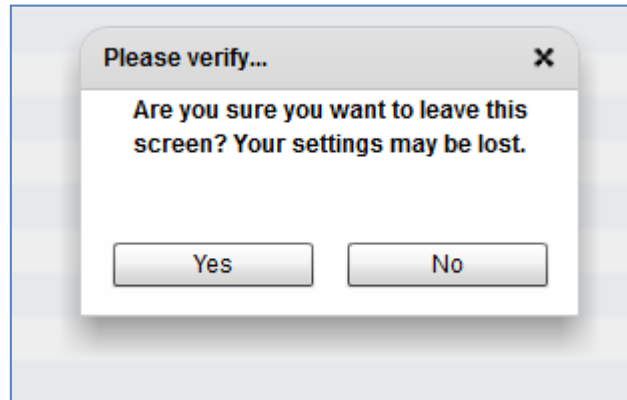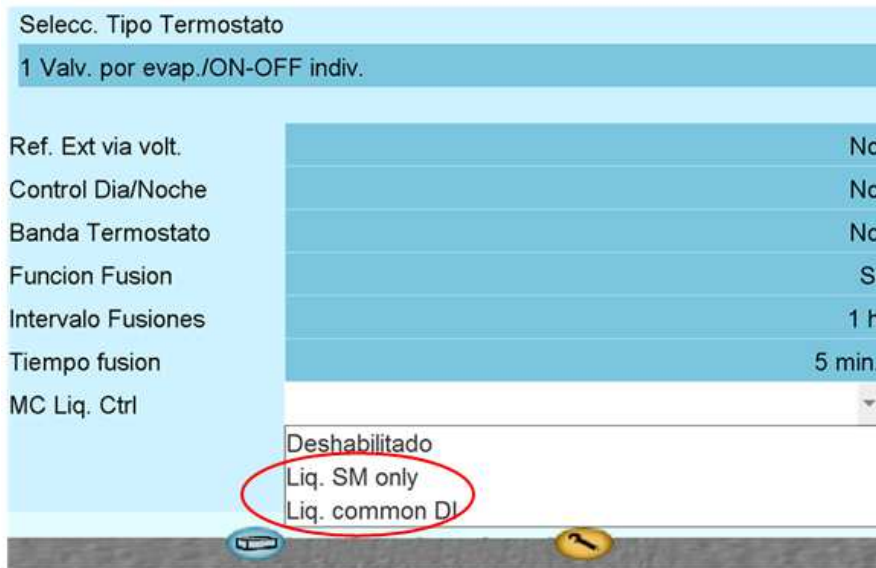
10. SETTING PARAMETERS FOR FLOODED OPERATION MODE IN MT CONTROLLERS 750

With these controllers is NOT possible to use the widzard function of 850.
It is mandatory change the Flood Evap parameters through the Service Tool, connected at each single controller.

Enter in setting and common thermostat
Select in MC Liq. Ctrl.

- If you select "SM only" you can control flood evap only through System Manager
- If you select "Liq. Common DI" you can control flood evap through wire to Digital Input

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And you must do it in all evaporators (B and C).

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11. CHANGE PARAMETER IN THE CONTROLLER

Config: Receiver control

Receiver control	
Vrec output type	1 Stepper
Vrec min. OD	10 %
Vrec max. OD	100 %
Show Trec on overview	No
Prec setpoint	37.00 bar
Trec setpoint	3.4 °C
Kp	10.0
Tn	90 s
Prec min.	32.00 bar
Trec min.	-1.9 °C
Prec max.	42.00 bar
Prec min limit P-band	1.00 bar
Prec max limit P-band	1.00 bar
Monitor liquid level	None
Use hot gas dump	No
Show advanced settings	Yes
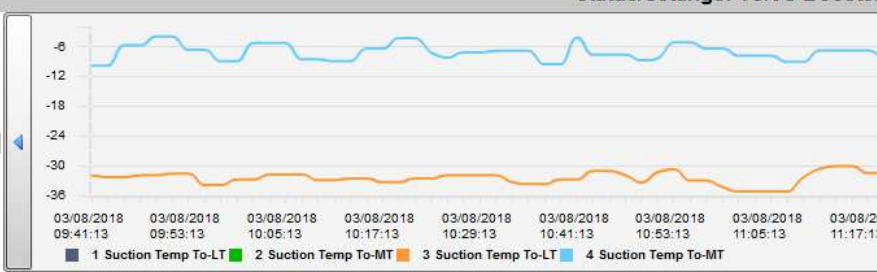
Decrease the value of *Prec max.* to 40 bar instead of the 42 bar.

In case of error, try also to decrease the set point (*Prec setpoint*) to 36 instead of 37.

Attention, decrease gradually the value of Prec max.

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12.   VERIFY THE PARAMETERS OF OIL MANAGEMENT

The parameters of oil management must be updated to fit with new running pressure on MT.

- P1 Cut In Pressure: 33bar;
- P1 Cut Out Pressure: 37bar;
- P1 High Alarm Limit: 43 or 45bar.

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SYSTEM CONNECTION WITH DANFOSS SUPERVISOR OF TRANSCRITICA BOOSTER PACK - FTE2.0

TSC PACK

MT CABINETS / COLD ROOMS

AKCC55 061
AKCC55 091
AKCC55 092
AKCC55 98
AKCC55 99
AKCC55 100

*REPEATER AKA 222

LT CABINETS / COLD ROOMS

AKCC55 060
AKCC55 002
AKCC55 001

Lon-rs485

*CONVERTITORE AKA 223
0 TP78-05

SUPERVISOR AK - SM 850

Modbus

Lon-rs485

EXOR GATEWAY

Gavazzi EM24 DIN
Gavazzi EM24 DIN
Energy Meter

FTE 2.0

AKD
AKD

AKD INVERTER 80
AKD INVERTER 81
AKD INVERTER 82

AKPC782
AKPC782 BACKUP

NOTE : When using the Lon RS485 network, ensure the Term. Switch on the AK-SM is in the 'On' position (enable internal resistor). Any repeaters must also have 120 Ohm resistor in place.
Finally, ensure that the last controller on the network run also has its end of line on line resistor enabled.

PARTICOLAR OF CONNECTION ON SYSTEM MANAGER AKSM850 :
LON — rs 485 FOR refrigeration controller and Modbus for Energy Meter, ...

Term. switch
off | on
20 | 21 | 22
Modbus
Energy Meter

Term. switch
off | on
28 | 29 | 30
RS 485
Not available

Term. switch
off | on
34 | 35 | 36
LON (rs-485)
Cooling controllers

SIGNAL FOR CHANGIN STATUS REGULATION
MT CABINETS / COLD ROOMS FROM OVERFEED
TO STANDARD AND REVERSE

LEGEND:
BELDEN CABLE TO CHANGE SH TROUGH DI
MODBUS CABLE FROM FTE2.0 TO GTW
MODBUS CABLE TO SUPERVISOR
LON TO SUPERVISOR