

## TT191202-FUP-Sequencing Module for 4 Devices (Advance)

### Note

This Support Knowledge Base article KB is the result of a support request.

It is not part of the official documentation of DEOS AG and does not claim to be complete.

The article is intended to support the solution of a similar problem.

If you have any questions, comments or additions, please contact DEOS AG Support.

### Title

FUP - Sequencing Module for 4 Devices (Advance) (TT191202)

### Object

FUP

### Reference version

2

### Date

12.2019

### Author

EK

### Goal

To perform sequencing control of 4 equipment (e.g. chillers) with more functions

### Content:

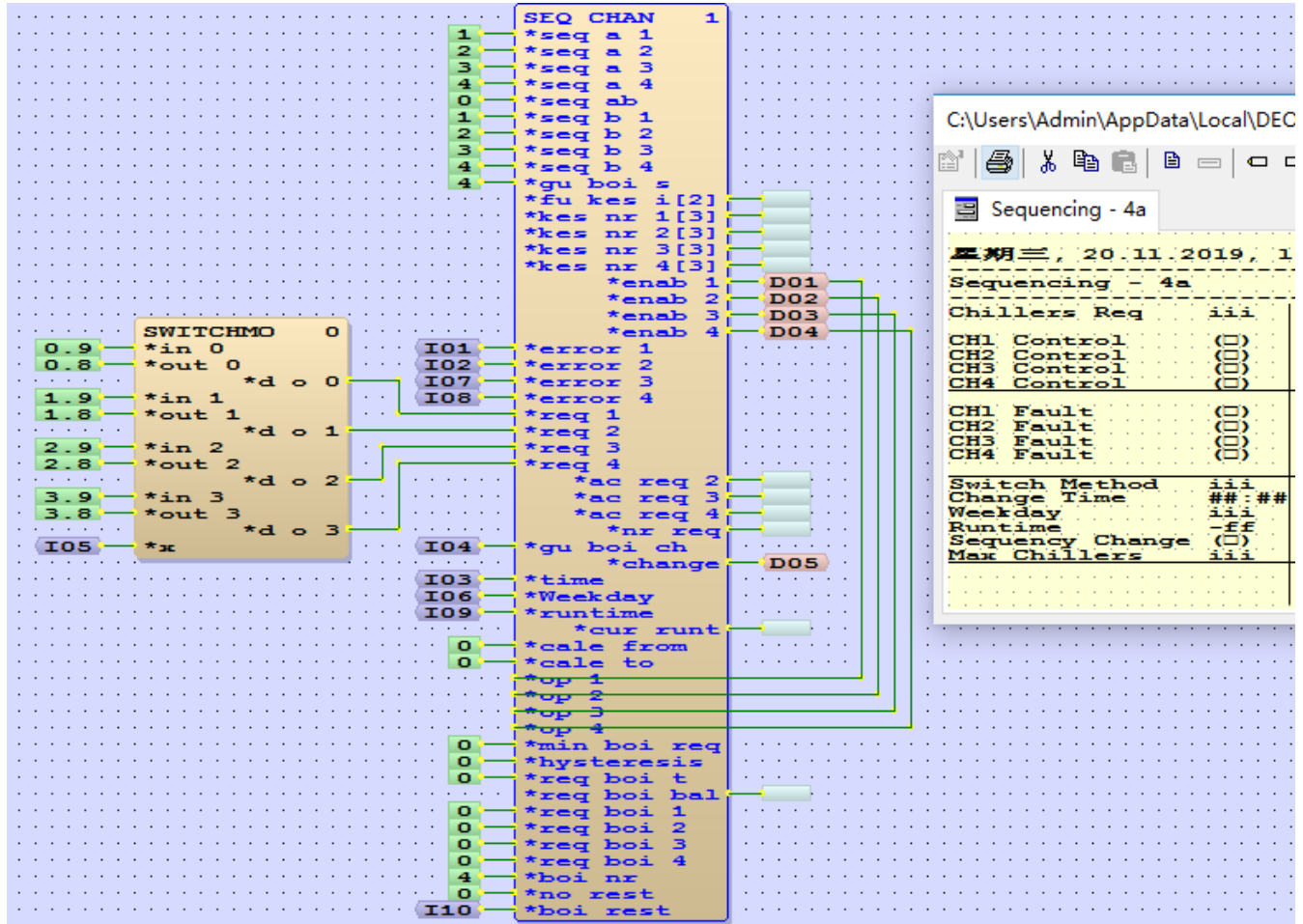
C:\Users\Admin\AppData\Local\DEOS\FUP XL\2\workspace\prj\Testing\DDC101\seq4a.f.utf - FUP editor

File Edit View HTML Graphic FUP Extras ?

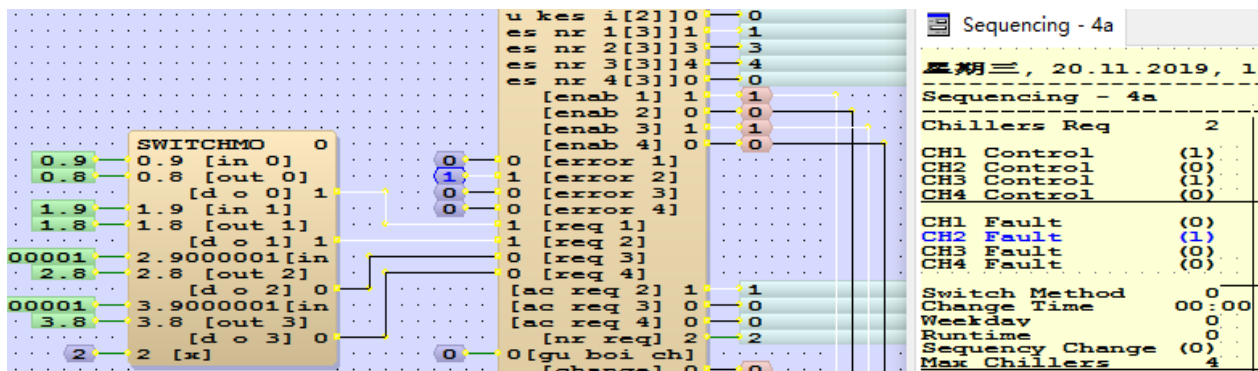
Sequencing - 4a	
星期五, 22.11.2019, 09:	
Sequencing - 4a	
Chillers Req	2
CH1 Control	(0)
CH2 Control	(1)
CH3 Control	(1)
CH4 Control	(0)
CH1 Fault	(0)
CH2 Fault	(0)
CH3 Fault	(0)
CH4 Fault	(0)
Switch Method	1
Change Time	01:30
Weekday	1
Runtime	0
Sequency Change	(0)
Max Chillers	4

## TT191202-FUP-Sequencing Module for 4 Devices (Advance)

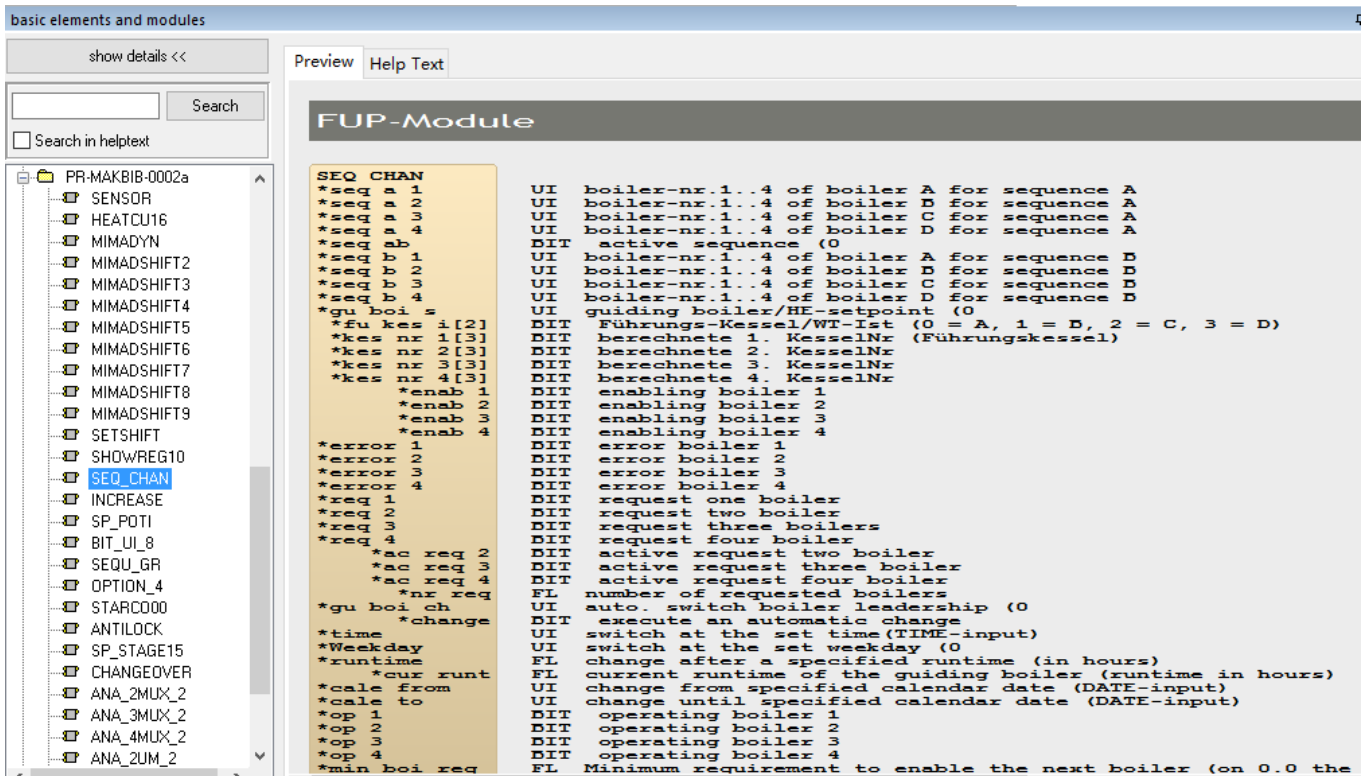
1. To perform sequencing control of 4 equipment (e.g. chillers), we can use the "SEQ\_CHAN" module in FUP, which provide the switching of chillers based on different criteria
2. First create a new FUP page call "seq4a.f" and add the below logic. Please refer to TT191104 and TT191201 for detail explanations of the inputs and outputs



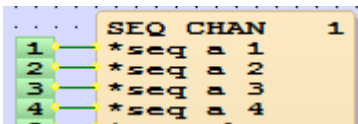
3. This program combines the functions of the modules we use in TT191104 (PU\_SW) and TT191201 (ORDER), allowing you to simply control the chiller sequencing of 4 chillers with automatic switching based on daily, weekly and runtime.
4. You can try it by simulation
  - a. Set I10 to 4, I05 to 1, then Chiller 1 will turn on
  - b. If more chiller is required, then set I05 to 2, and Chiller 2 will turn on
  - c. If Chiller 2 is fault, then it will turn off, and Chiller 3 will turn on
  - d. If Chiller 2 fault is clear, then Chiller 3 will turn off, and Chiller 2 turn on again



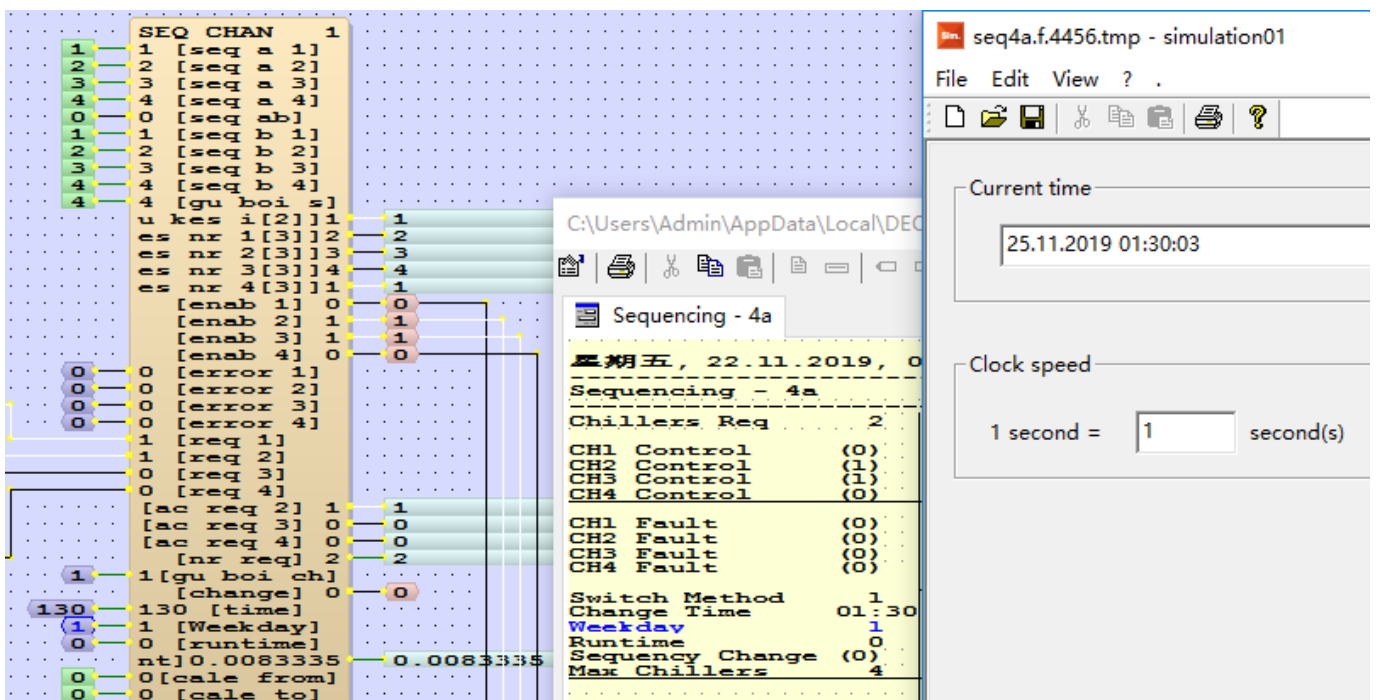
5. You can find the help text of the module for detail explanation of the functions



6. The order of the chiller sequencing is set like this. In this example, if sequence is 0, then the order is 1-2-3-4. You can manually change the sequence by setting D05 (Sequence Change) to 1. After changing, the sequence will change to 2-3-4-1, etc. It will also change daily when the "Switch Method" is set to 0



7. Try in simulation. Set "Switching Method" to 1, and set "Weekday" to 1, such that the pump will change weekly on Monday at 1:30am. To test it, you can set the simulation date/time in the simulation window on the "Time" tab



8. Now set the “Switching Method” to 2, and set “Runtime” to 1. The pump will then be switched based on runtime of the pump. In this example, it will be switched after running for 1 hour. To test it, you can set the “Clock Speed” to “1 second = 60 seconds” so that the clock will run much faster

The screenshot displays a software interface for a 4-chillers application. On the left, a ladder logic diagram shows sequences for 4 chillers (seq a, seq b, seq c, seq d) and a master refrigeration machine (rm) control. The simulation window on the right shows the current time as 22.11.2019 11:04:33 and the clock speed set to 1 second = 60 second(s). A table titled 'Sequencing - 4a' lists parameters for 4 chillers and the master refrigeration machine.

Sequencing - 4a	
Chillers Req	2
CH1 Control	(0)
CH2 Control	(1)
CH3 Control	(1)
CH4 Control	(0)
CH1 Fault	(0)
CH2 Fault	(0)
CH3 Fault	(0)
CH4 Fault	(0)
Switch Method	2
Change Time	01:30
Weekday	1
Runtime	1
Sequency Change	(0)
Max Chillers	4

9. We have some macros for 4-chillers application like this (e.g. rmseq4.f\$x)

The screenshot displays a software interface for a 4-chillers application, showing two panels. The left panel is titled 'scaling Y-posit. signal' and contains controls for sequence control, internal sequence-preselection, and selection of the master - RM. The right panel is titled 'scaling Y-posit. signal' and contains controls for cooling request (total), 4 RM. (1. RM., 2. RM., 3. RM., 4. RM.), and a graphical visualization section.

**Left Panel: scaling Y-posit. signal**

- control: scaling Y-posit. signal
- stage control: scaling Y-posit. signal
- sequence control: scaling Y-posit. signal
- switch between sequence 1 + 2 done: ext. ☐ inter. ☒
- RM - sequence: A -- B -- C -- D
- sequence 1: 1 2 3 4
- sequence 2: 4 3 2 1
- internal sequence-preselection: sequence 1 ☐ sequence 2 ☐ AUTO ☒
- selection of the master - RM: automatic ☒
- refrigeration machine -A- ☐ refrigeration machine -C- ☐
- refrigeration machine -B- ☐ refrigeration machine -D- ☐
- automatic change of the master refrigeration machine: daily ----> at 23:00 ☒
- weekly ----> Sunday at 23:00 ☐
- depend. on runtime ----> all 72.00 hour rem. 71.99 ☐
- ctrl'd by calendar ----> of 01.05 to 30.09 ☐
- master - RM is -----> RM -A- forward switch (Test) ☐
- OA temperature: 22.0 °C
- lock of the slave - refrigeration machine at OA-temp. < 18.0 °C
- maximal number of the refrigeration machine at active lock: 1

**Right Panel: scaling Y-posit. signal**

- control: scaling Y-posit. signal
- stage control: scaling Y-posit. signal
- sequence control: scaling Y-posit. signal
- cooling request (total): 68.0 %
- 1. RM. ON by 5.0 % OFF by 2.0 % ☒
- switch-on delay: 10 s remain.time: 0.0 s
- 2. RM. ON by 25.0 % OFF by 10.0 % ☒
- switch-on delay: 10 s remain.time: 0.0 s
- 3. RM. ON by 70.0 % OFF by 60.0 % ☐
- switch-on delay: 10 s remain.time: 0.0 s
- 4. RM. ON by 100.0 % OFF by 90.0 % ☐
- switch-on delay: 10 s remain.time: 0.0 s
- The according following refrigeration machine will be requested, when the output signal of the previous refrigeration machine for
- minimum 0 s bigger than 0.0 % is.
- remain.time 0 s switch diff. -2.0 %
- ready enabling operat. request
- RM -1- ☒ ☒ ☒ 0.0 %
- RM -2- ☒ ☒ ☒ 0.0 %
- RM -3- ☒ ☐ ☒ 0.0 %
- RM -4- ☒ ☐ ☒ 0.0 %
- graphical visualization