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Energy Environment
Energy Systems, Evaluation

CLMS-21-1061-22-14637-15-c

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Request by

Tecno-Ventil SPA
Via Degli Imprenditori
4 26016 Spino d'Adda (CR)
Italy

Fan Coil Unit 2 Pipes Variable Speed

Date of the test report : 31/01/2023

Laboratory

CSTB
290 route des Lucioles
06904 Sophia Antipolis

Client

Tecno-Ventil SPA
Via Degli Imprenditori
4 26016 Spino d'Adda (CR)
Italy

Licensee

Tecno-Ventil SPA
Via Degli Imprenditori
4 26016 Spino d'Adda (CR)
Italy

Manufacturer

Tecno-Ventil SPA
Via Degli Imprenditori
4 26016 Spino d'Adda (CR)
Italy

1. Test conditions

Specifications	EN15500-1:2017 eu.bac CERT PART 1 - General rules - Version 15 - February 2016 eu.bac CERT PART 2-1 – Specific rules - IZC version 5.0 – April 2019
Application	Fan Coil Unit 2 Pipes Variable Speed
Test Mode	Cooling
Operating modes	Comfort, Economic

2. Controller

Product identification	MRC-CTRL-IO
Software version	Not Specified
Production date	2021
Serial number	Not Specified
Manufacturer product identification	MRC
Laboratory identification	21-06786

3. Test components

3.1. Room unit

Product identification	MRC-T3
Production date	2021
Serial number	Not Specified
Manufacturer product identification	MRC-T3
Laboratory identification	21-06786

3.2. Valve

Product identification	TA-COMPACT-P (IMI)
Serial number	Not Specified
Laboratory identification	21-07859

Characteristic	Linear (data provided by manufacturer)
Type	Globe (data provided by manufacturer)
Stroke [mm]	3.8

3.3. Valve Actuator

Product identification	TA Compact
Serial number	Not Specified
Laboratory identification	26063899
Running time [s]	90
Type	Thermal (data provided by manufacturer)

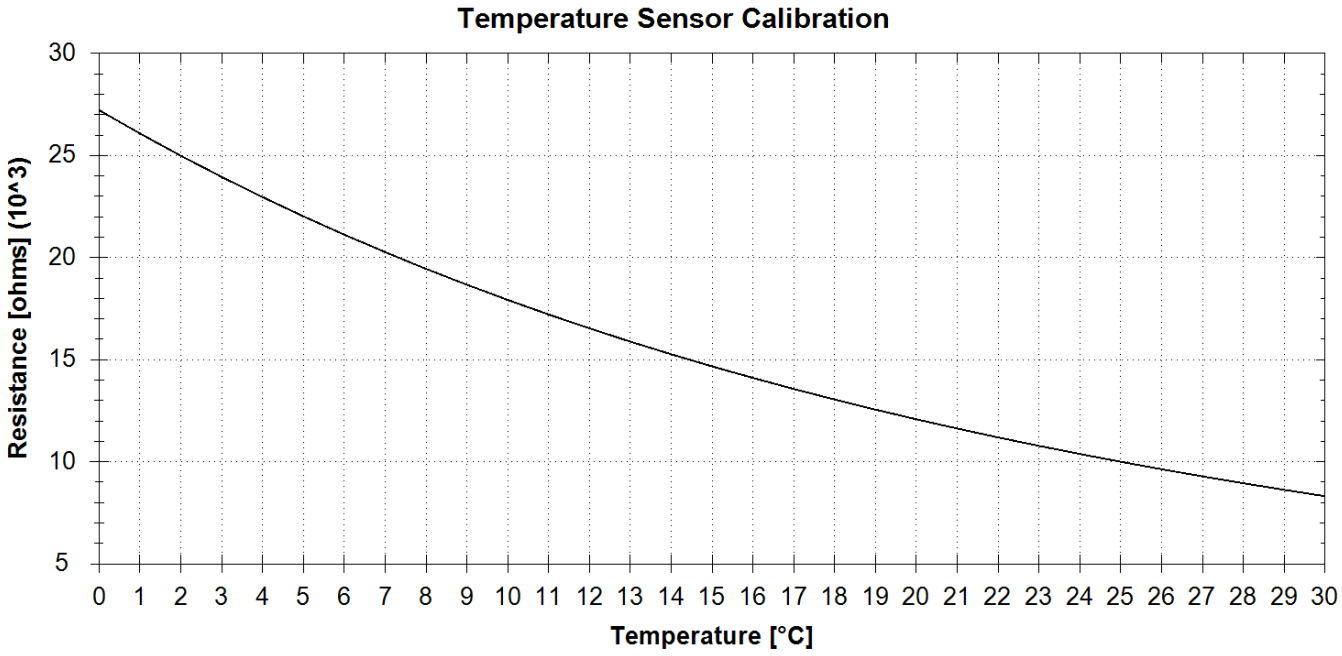
3.4. Temperature sensor

Sensor type	Tecno-Ventil_NTC_10K_6
Time constant (minutes)	6 (data provided by manufacturer)

Temperatures resistances table

0°C	27218Ω
1°C	26076Ω
2°C	24987Ω
3°C	23950Ω
4°C	22962Ω
5°C	22021Ω
6°C	21123Ω
7°C	20266Ω
8°C	19449Ω
9°C	18669Ω
10°C	17925Ω
11°C	17213Ω
12°C	16534Ω
13°C	15885Ω
14°C	15265Ω
15°C	14673Ω

16°C	14107Ω
17°C	13566Ω
18°C	13048Ω
19°C	12554Ω
20°C	12080Ω
21°C	11628Ω
22°C	11194Ω
23°C	10779Ω
24°C	10381Ω
25°C	10000Ω
26°C	9634Ω
27°C	9283Ω
28°C	8947Ω
29°C	8624Ω
30°C	8314Ω



4. Test schedule

Operator	Adam TCHA-KONDOR (Operator)
Supervisor	Jean-Charles CORBIN (Laboratory Manager)
Begin of test	28/11/2022 11:18:13
End of test	28/11/2022 16:18:19

Signé numériquement par CONNECTIVE NV - Connective eSignatures pour le compte de Jean-Charles CORBIN
Date : 31/01/2023 15:48:19

5. Results

The test results presented in this report relate only to item(s) tested.

5.1. Comfort mode

Test periods, time range and extreme temperatures

Comfort mode 1

Period	Internal gain	Time range [h]	T min [°C]	T max [°C]
2	0%	6:45 - 9:00	23.61	24.14
4	30%	9:45 - 12:00	23.74	24.19
6	60%	12:45 - 15:00	23.91	24.05

Comfort mode 2

Period	Internal gain	Time range [h]	T min [°C]	T max [°C]
2	0%	6:45 - 9:00	23.61	24.14
4	30%	9:45 - 12:00	23.73	24.21
6	60%	12:45 - 15:00	23.92	24.06

Temperature control accuracy

$$CV = \frac{max_{period2,4,6}(T_{in,max}) - min_{period2,4,6}(T_{in,min})}{2}$$

$$CSD = \frac{max_{period2,4,6}(T_{in,max}) + min_{period2,4,6}(T_{in,min})}{2} - T_{setpoint}$$

Comfort mode 1

Control accuracy :	CA = 0.3
Control setpoint deviation :	CSD = -0.1
Control variation :	CV = 0.3

Comfort mode 2

Control accuracy :	CA = 0.3
Control setpoint deviation :	CSD = -0.1
Control variation :	CV = 0.3

Simulation graphics are available in the appendix

5.2. Economic mode

The set point temperature for economic mode is 26.00°C

First time the setpoint tolerance is reached	Measured mean value of the temperature [°C]
0:09	25.94

Simulation graphics are available in the appendix

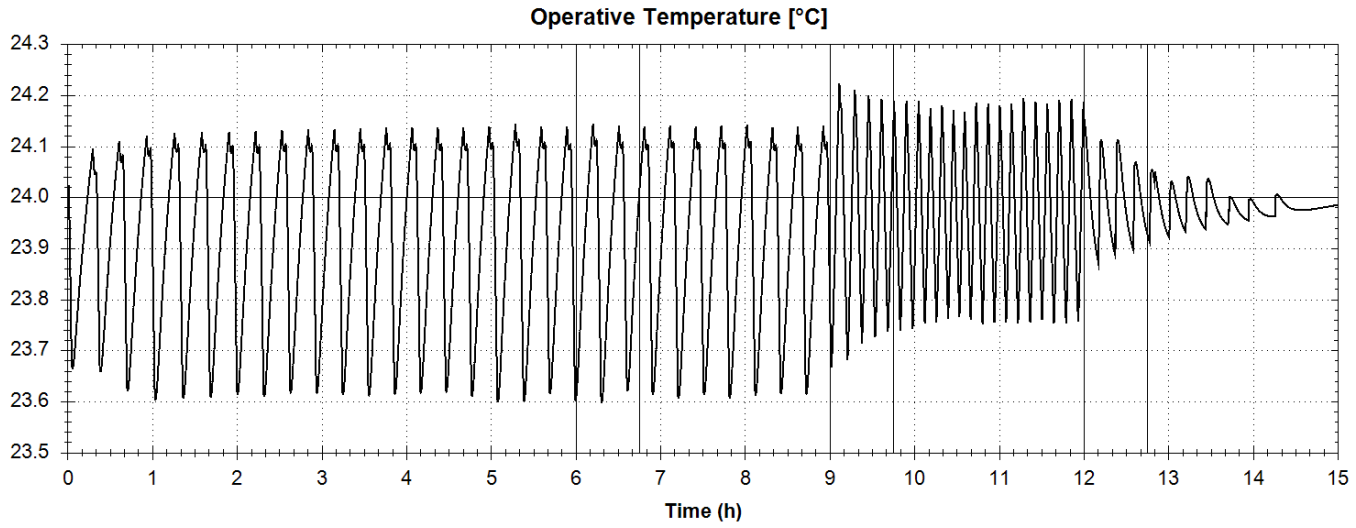
6. Results summary

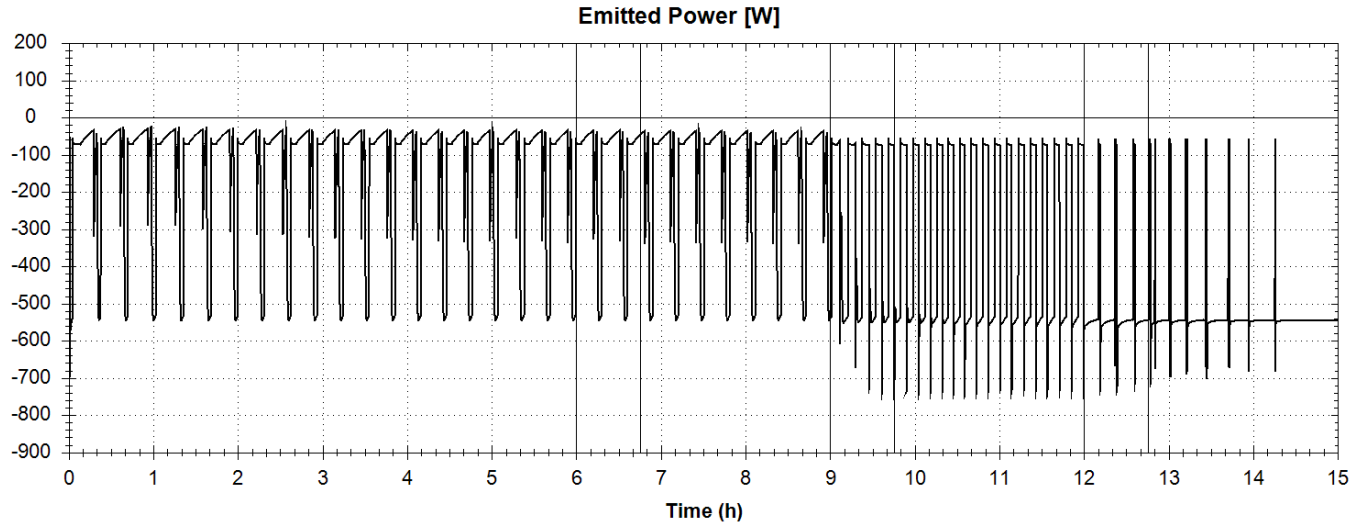
Test type	Results	Conditions	Approval
Comfort Mode	CA = 0.30°C	CA < 1.40°C	yes
Economic Mode	TM = 25.94°C	Teco - 1 < TM < Teco + 1	yes

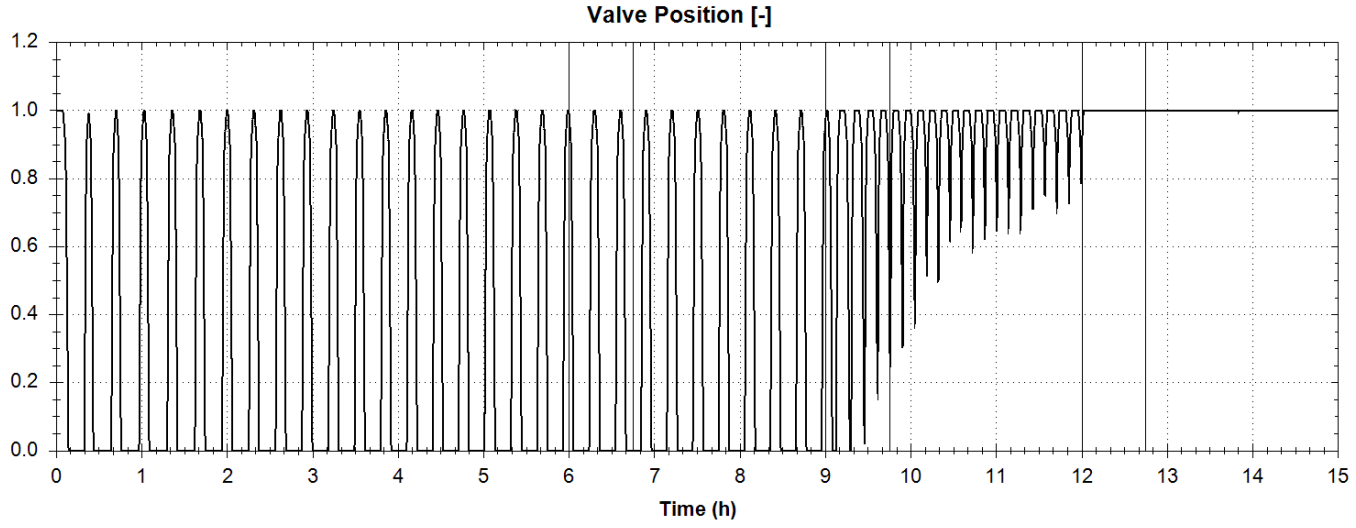
To declare, or not, the compliance with the specifications, the standard uncertainty of the laboratory was added to the test results.

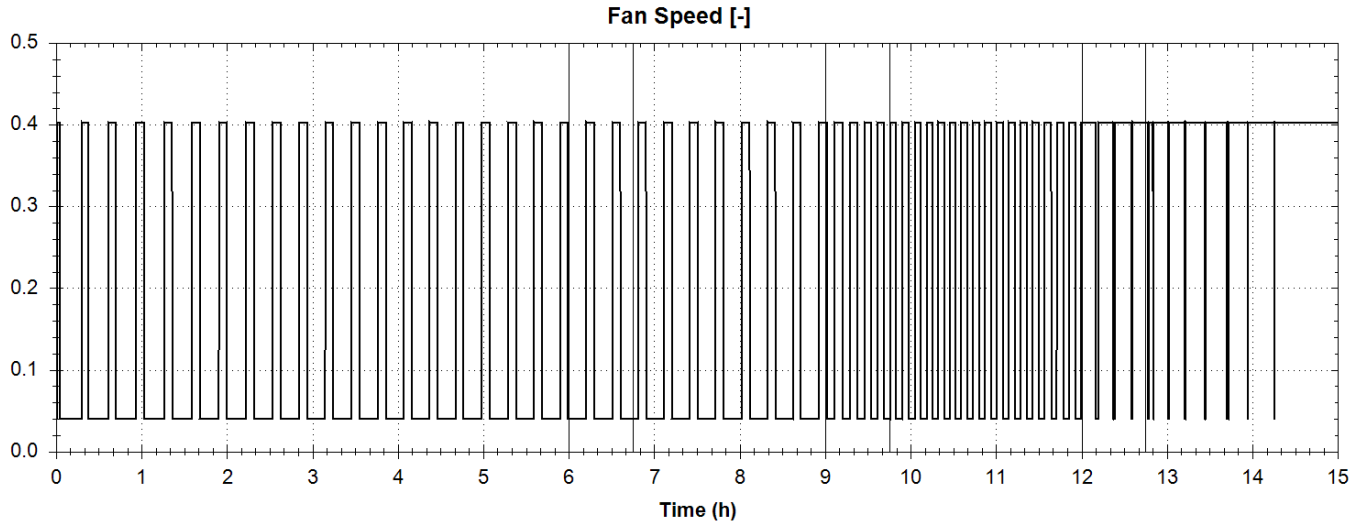
Appendix

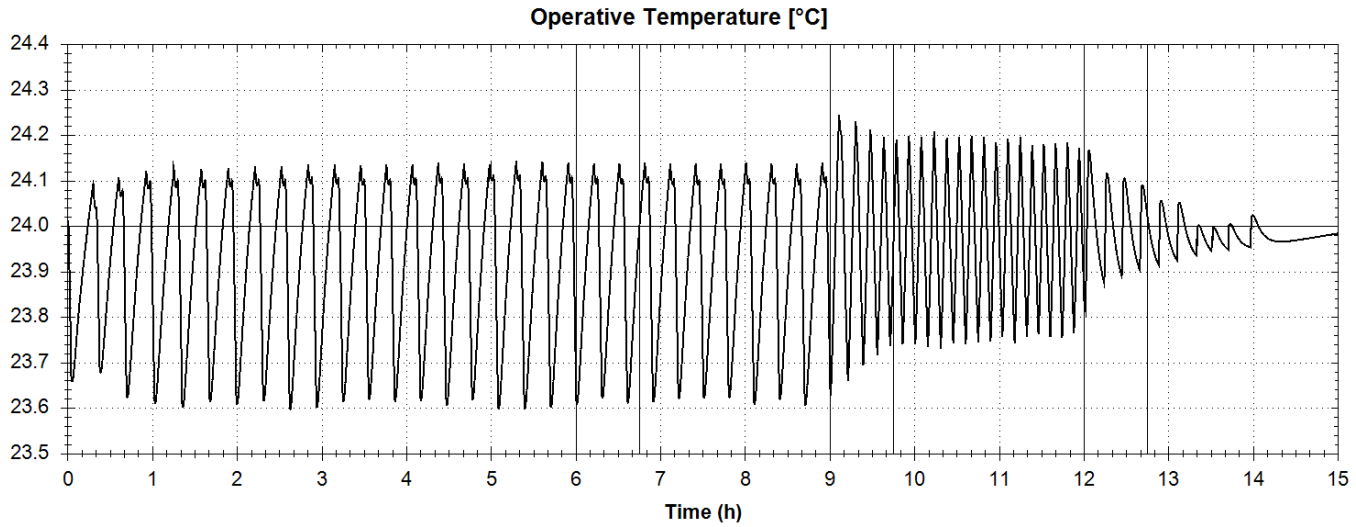
Comfort Mode : curves of the simulation results

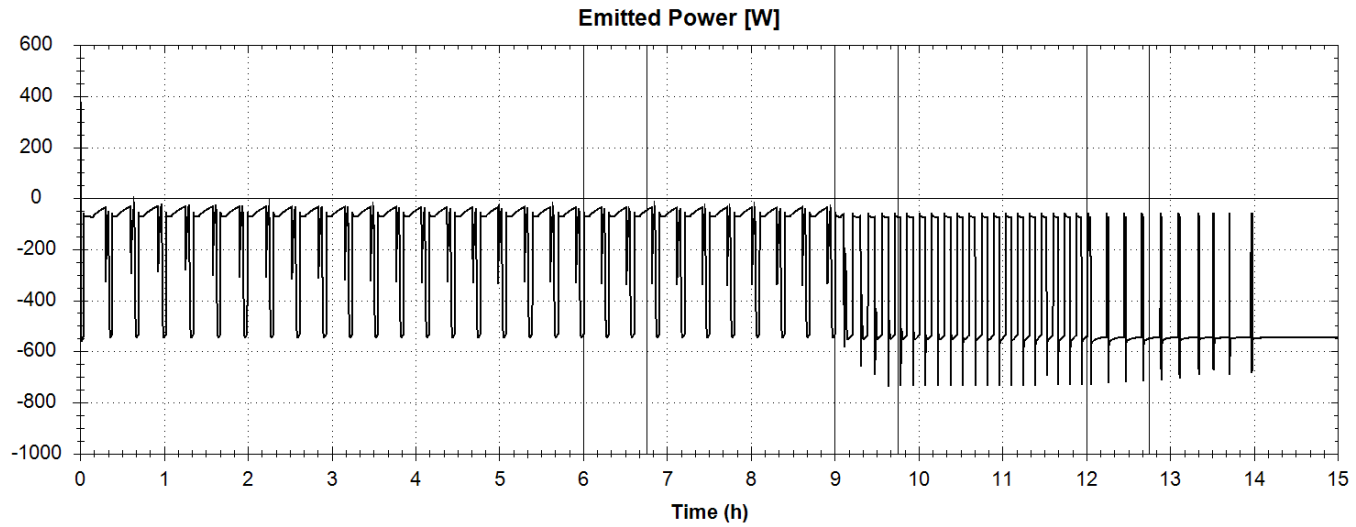


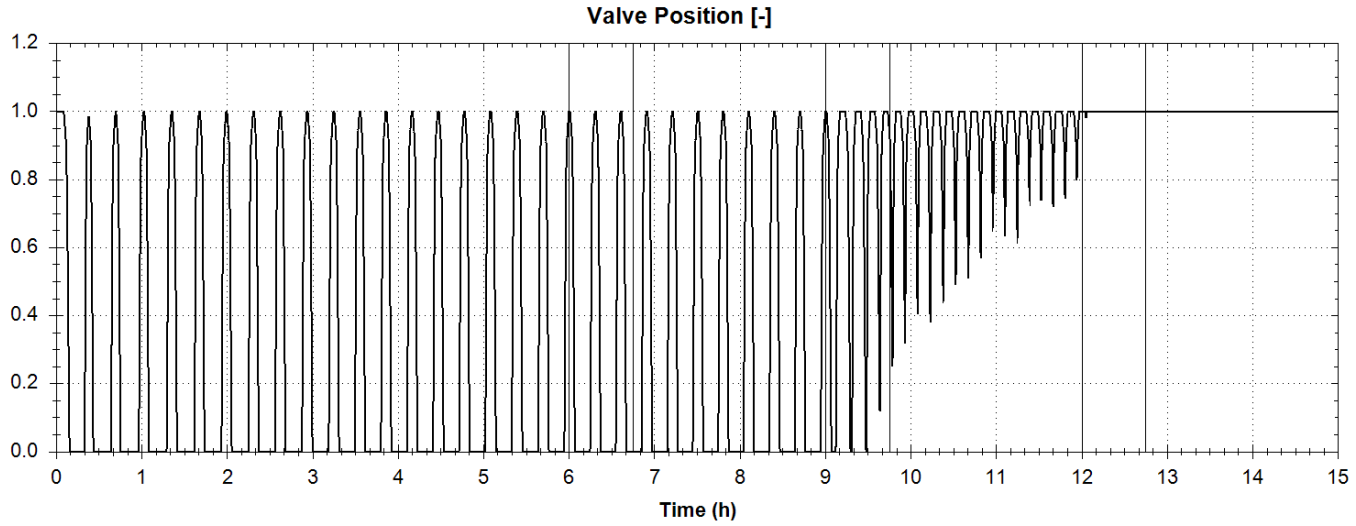


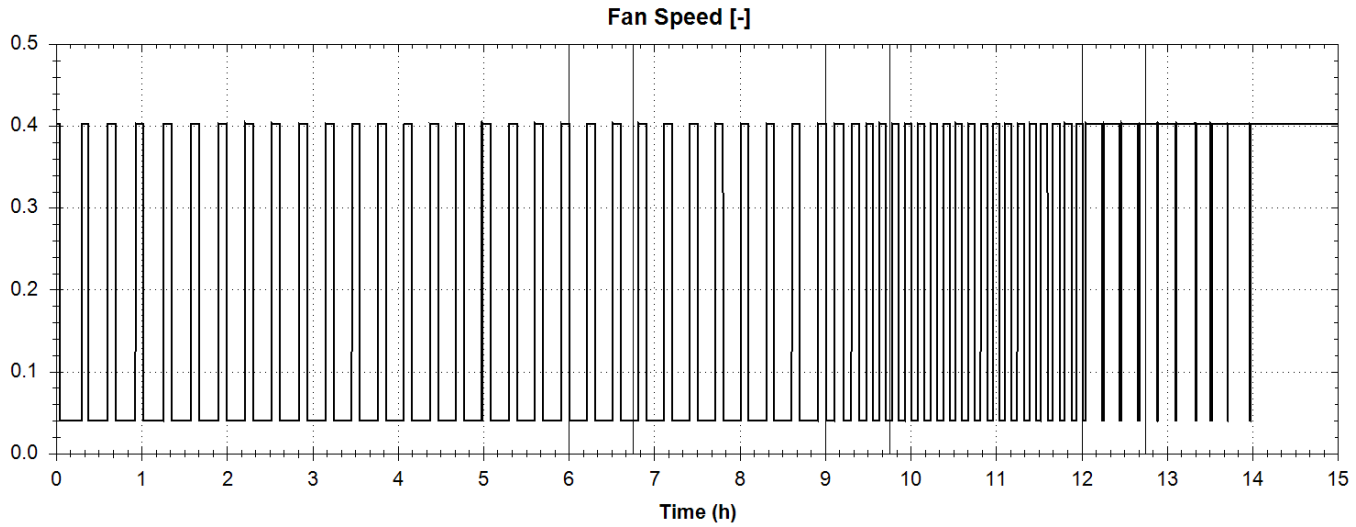



Fan Speed [-]
0.5
0.4
0.3
0.2
0.1
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Time (h)

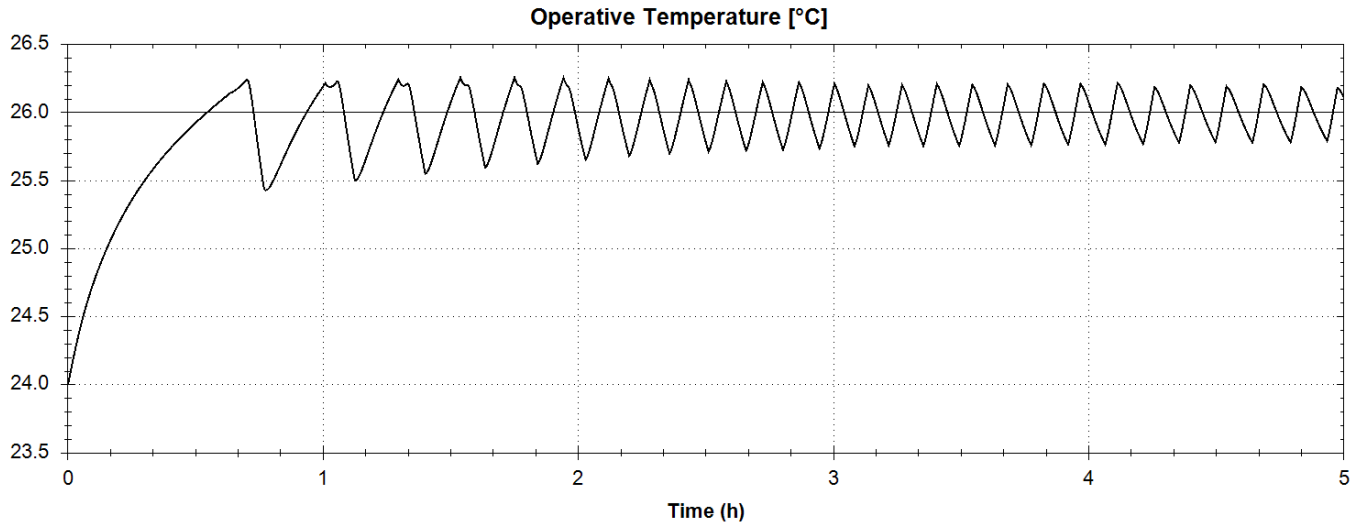

Operative Temperature [°C]
24.4
24.3
24.2
24.1
24.0
23.9
23.8
23.7
23.6
23.5
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Time (h)

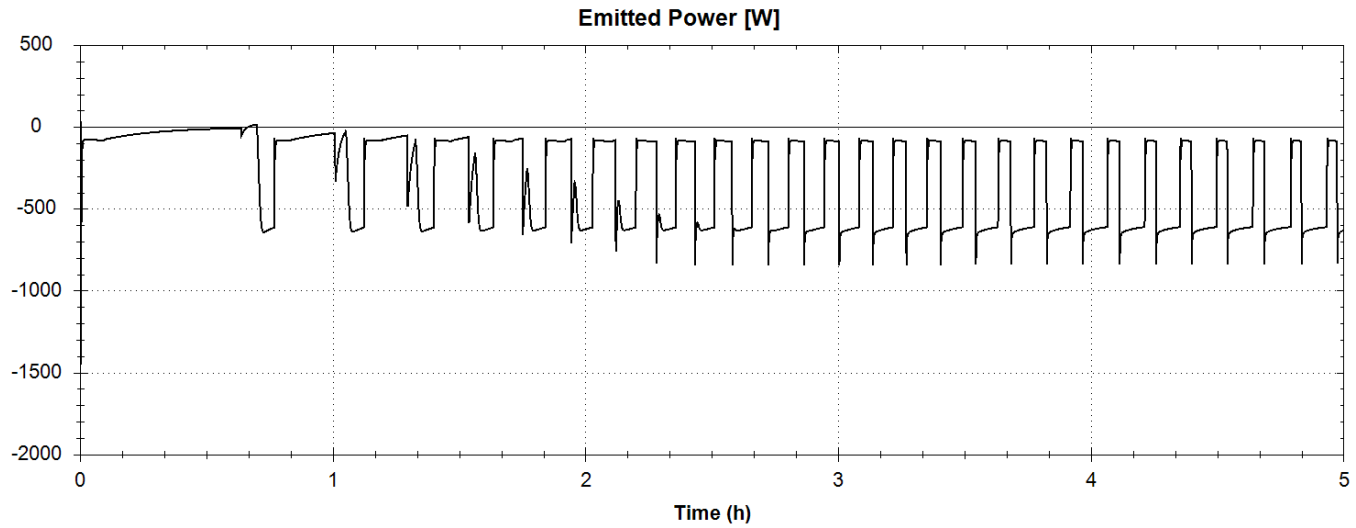

Emitted Power [W]
600
400
200
0
-200
-400
-600
-800
-1000
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Time (h)

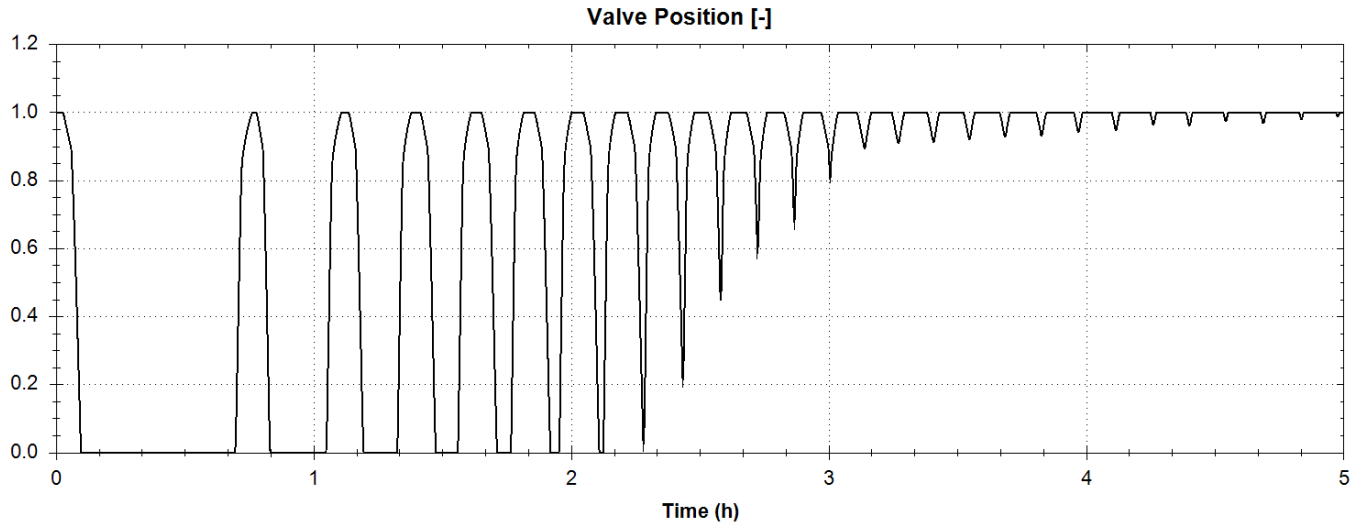

Valve Position [-]
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Time (h)

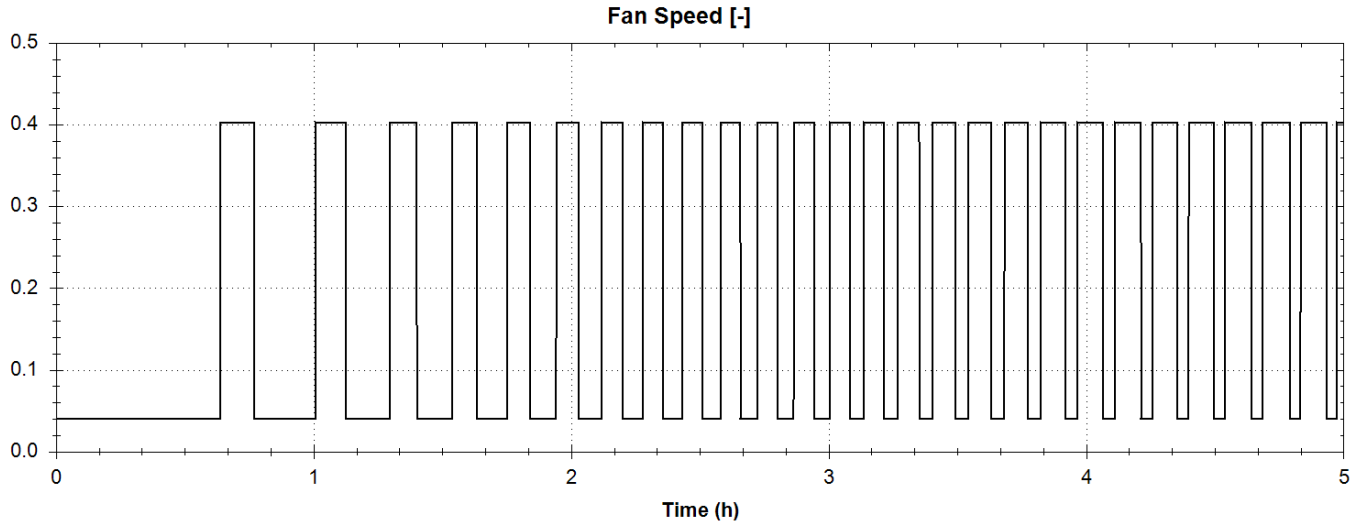

Fan Speed [-]
0.5
0.4
0.3
0.2
0.1
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Time (h)

Economic Mode : curves of the simulation results








Fan Speed [-]
0.5
0.4
0.3
0.2
0.1
0.0
0
1
2
3
4
5
Time (h)

Laboratory equipments

Resistance box

Name	13 0728
Laboratory identification	13 0728
Slope [Ω/Ω]	1
Y-intercept [Ω]	-1.6
Calibration report name	CEC F0/18708 (Valid until 15/12/2022)

Stroke measurement sensor

Name	13 0729
Laboratory identification	CSTB
Slope [mm/V]	1.93513
Y-intercept [mm]	-0.01254
Calibration report name	DT 21 0046 (validity until 10/02/2023)

Fan

Name	Fan 0-10V
Umin [V]	0
Umax [V]	10

Software

ETT IZC Version 6.0.1.1
License number : 6C308FA2-401B-4AB3-86B2-F3089B7DEFC3

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