

SYSTEM-OF-SYSTEMS THAT ACT LOCALLY FOR OPTIMIZING GLOBALLY

EU FP7 - SMALL/MEDIUM-SCALE FOCUSED RESEARCH PROJECT (STREP)
FP7-ICT-2013.3.4: ADVANCED COMPUTING, EMBEDDED AND CONTROL SYSTEMS
D) FROM ANALYZING TO CONTROLLING BEHAVIOUR OF SYSTEM OF SYSTEMS (SOS)

Local4Global Consortium Meeting

1st Evaluation Results

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München, Germany

LOCAL⁴ GLOBAL

Local⁴ Global

Contact Information

For information regarding this Project: Check the Project Web-Site: <http://local4global-fp7.eu>

Participants	
1	CERTH - Centre for Research and Technology
2	ETHZ – Eidgenössische Technische Hochschule Zürich
3	RWTH – RWTH Aachen University
4	IK4 – IK4 TEKNIKER
5	TRV – TRANSVER GmbH
6	TUC – Technical University of Crete
7	TUM – Technische Universität München

Project Acronym: Local4Global

Project Number: 611538

Project Start Date: October 2013

Duration: 3 Years

Funded by: EU FP7

Program Name:

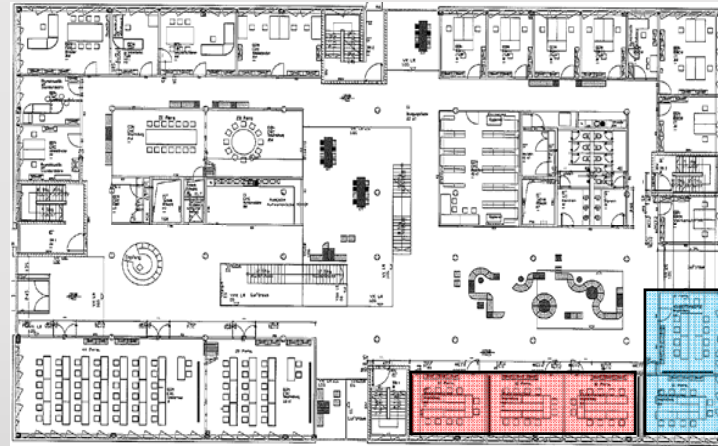
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Agenda

- 1st long-term experiment set-up
- Verification
- Analysis Influences
- Results
- Preview

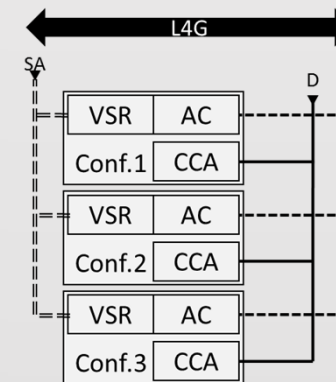
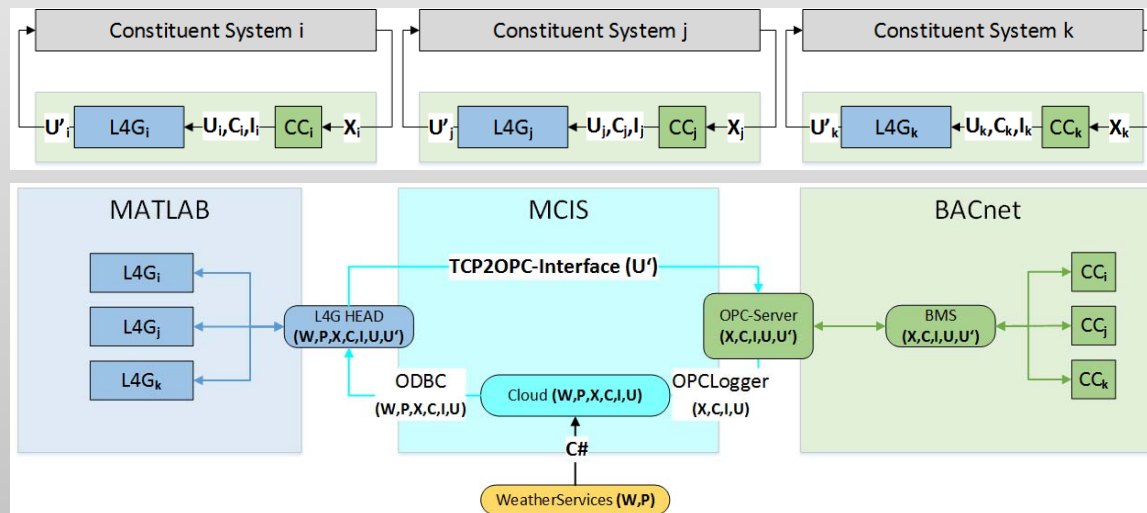
1st small TSoS – experiment set-up (1)

- Test case: 3 conference rooms
 - Base case: 2 conference rooms
 - Same weather conditions
 - Individual occupancy and use
-
- Experiment duration: 22.12.2015 00:00 - 21.01.2016 18:00
 - 2 weeks – without occupancy (X-mas, Silvester)
 - 2 weeks – with occupancy



1st small TSoS – experiment set-up (2)

- Simulative trained algorithm (1 day, 20 times)
- TimeStep 900 sec
- Weather prediction horizon: 3 h
- Controller update frequency: 24 h

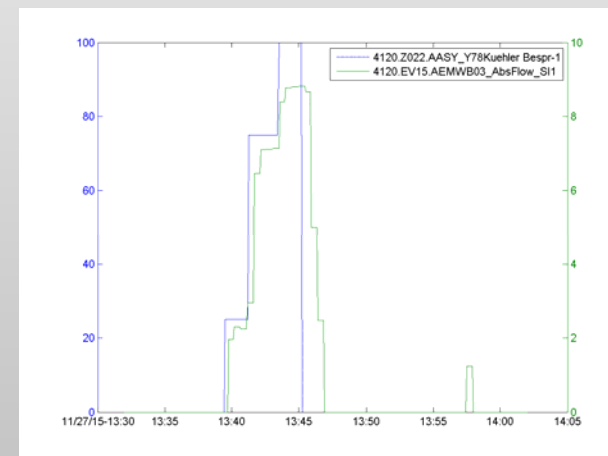
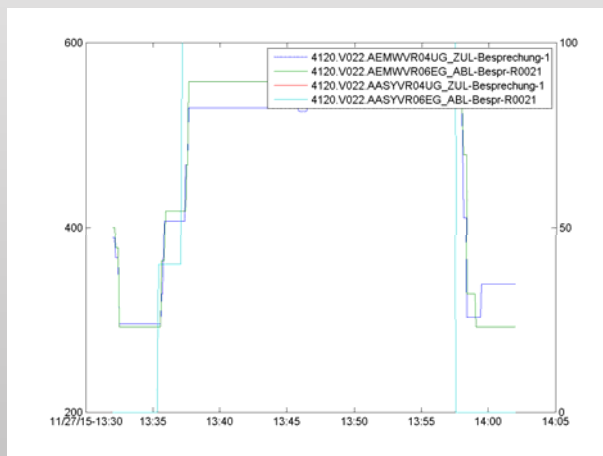
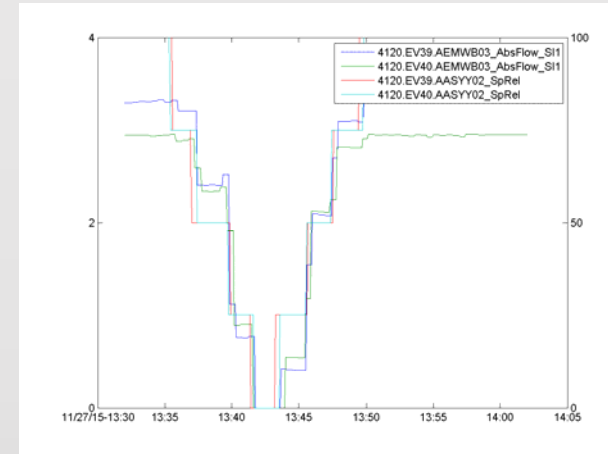
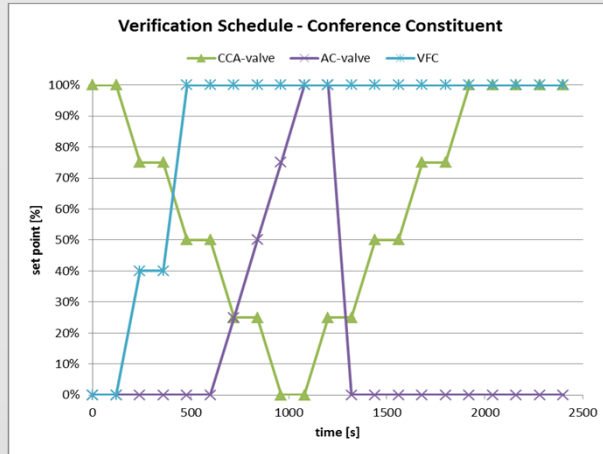


Comfort scale factor = 0,25
 $E1=5,0E-06$
 $E2=2,5E-05$

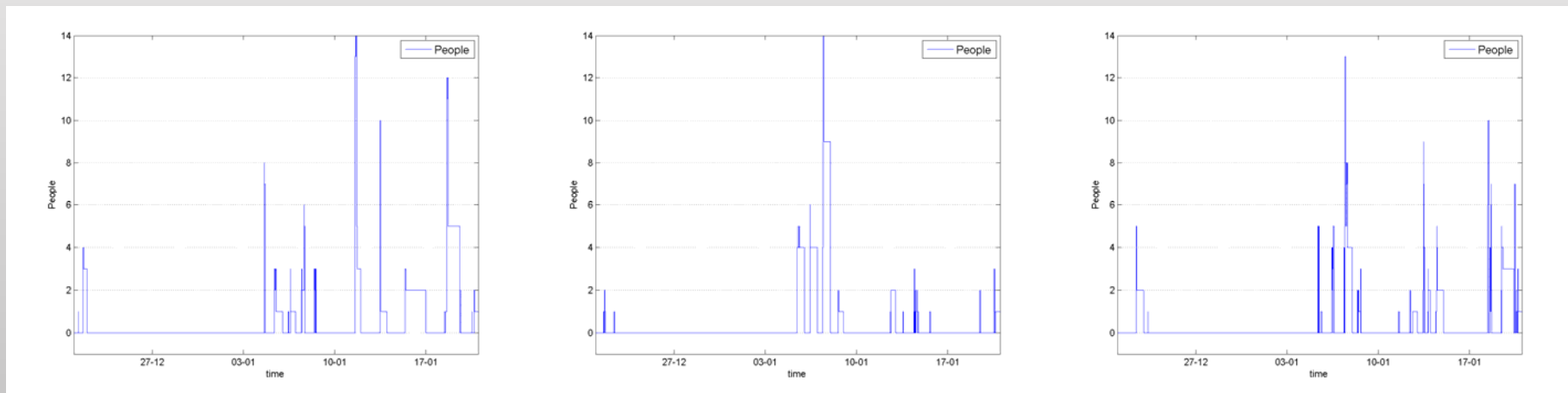
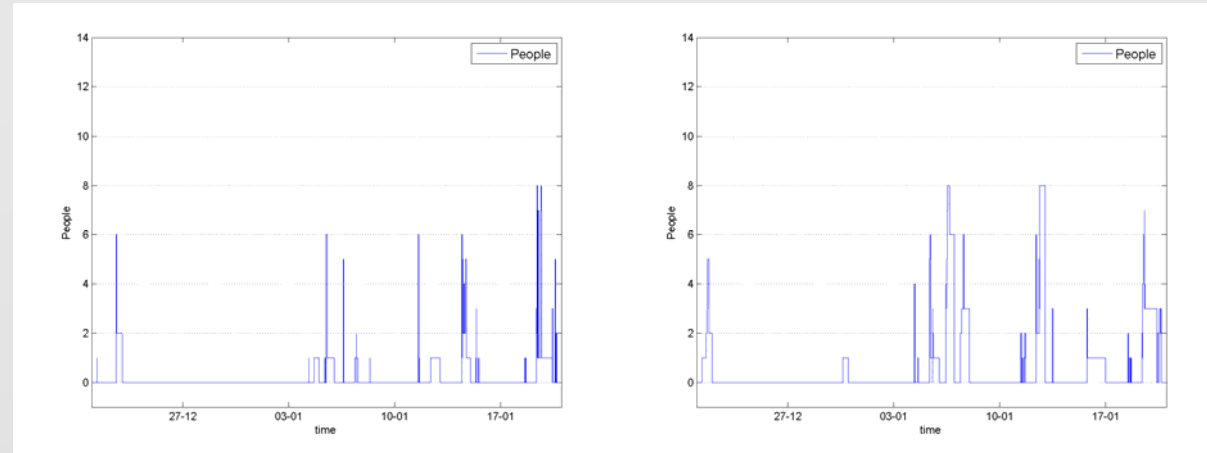
Legend

X_n := measurements
 U_n := control actions
 U'_n := rectified control actions
 W := weather data
 P := weather prediction data
 C := central parameters
 I := global information

1st small TSoS – verification

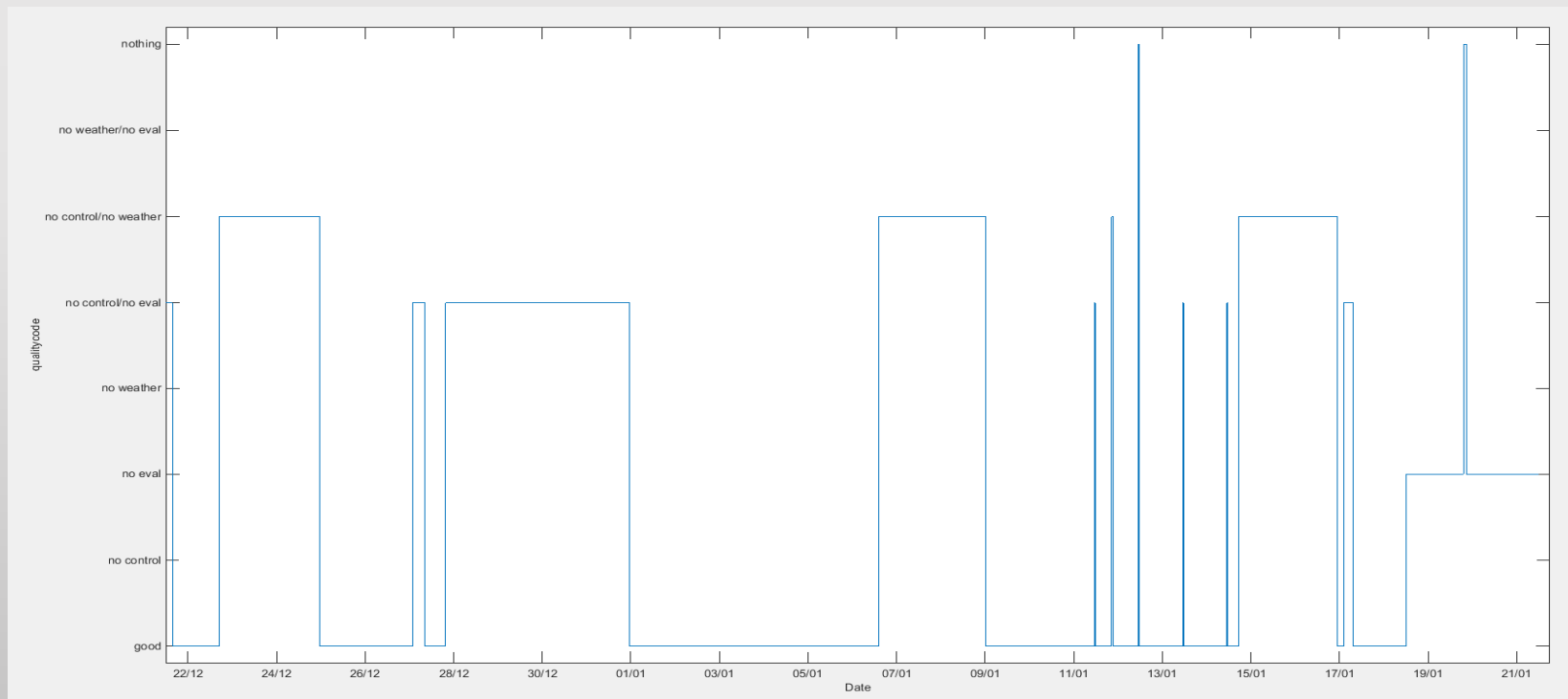


1st small TSoS – experiment analysis (1)



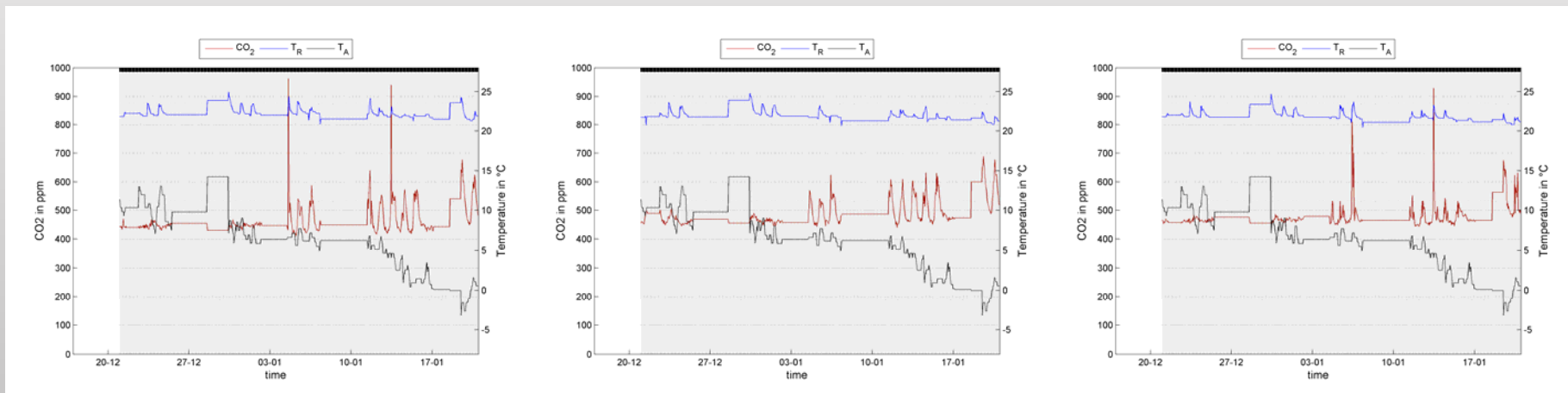
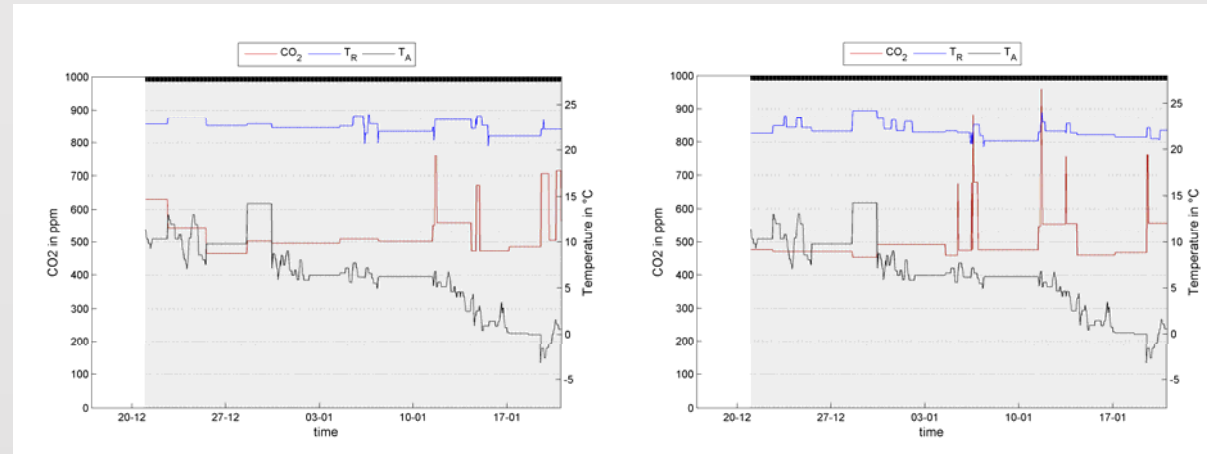
1st small TSoS – experiment analysis (2)

- Problem: about 13 of 31 days no control or no evaluation data due to OPC-malfunctions

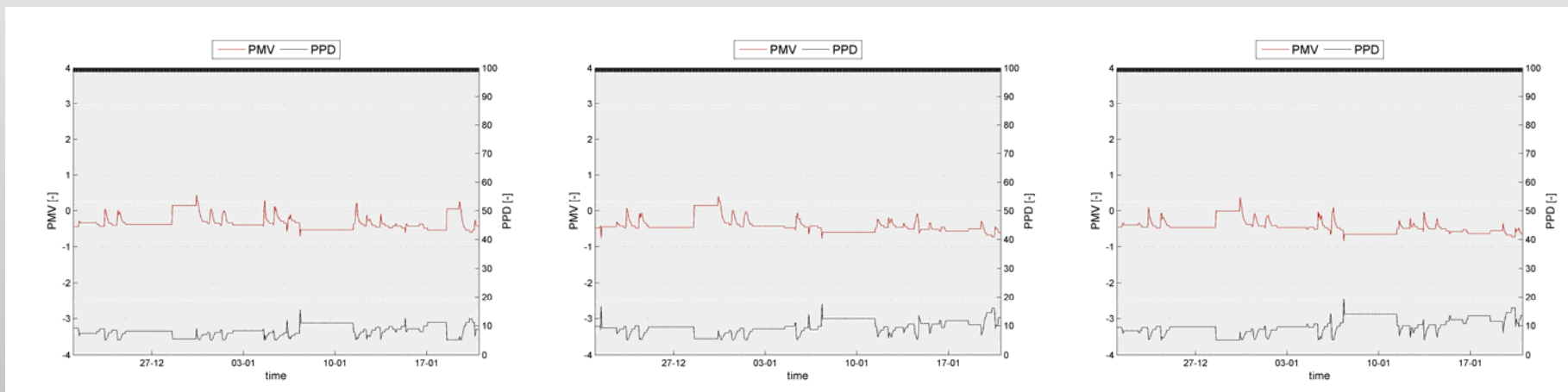
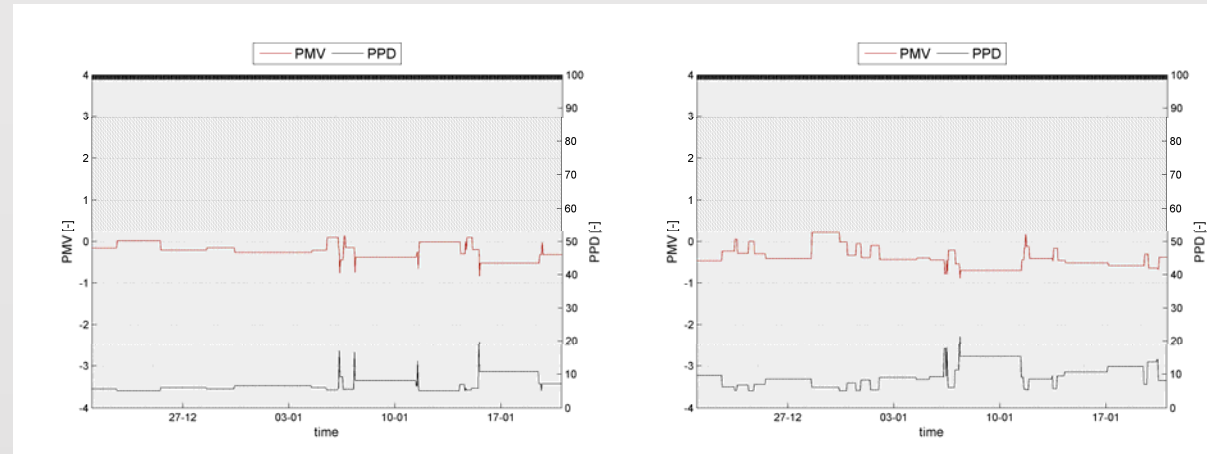


real application environment

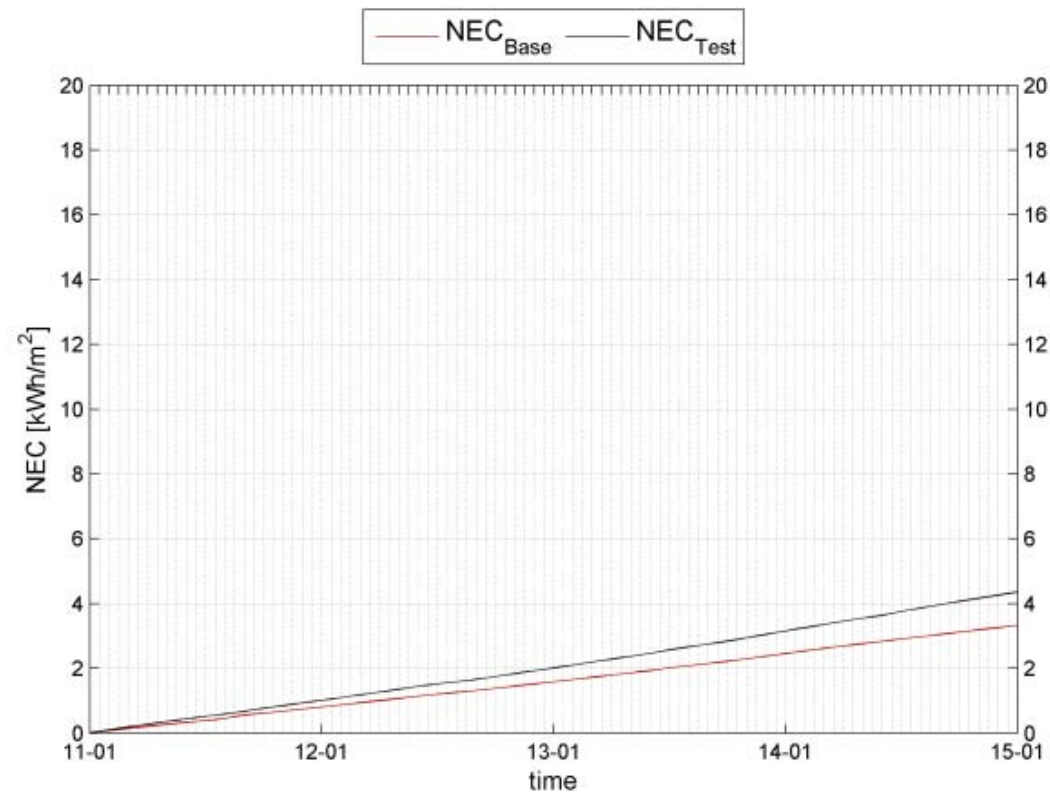
Results (1) – Indoor climate



Results (2) – Thermal Comfort (PMV/PPD)



Results (3) – Net Energy Consumed NEC



Results (4) – Numbers (week 11.-15.01.2016)

Base case	unit	NEC	NREC
00.17	kWh	139,7	75,2
00.18	kWh	66,8	64,8
absolut values	kWh	206,5	140,0
normalized values	kWh/m ²	3,3	2,3

Test case	unit	NEC	NREC
00.19	kWh	139,9	74,4
00.20	kWh	112,7	73,1
00.21	kWh	152,8	73,3
absolut values	kWh	405,4	220,8
normalized values	kWh/m ²	4,4	2,4

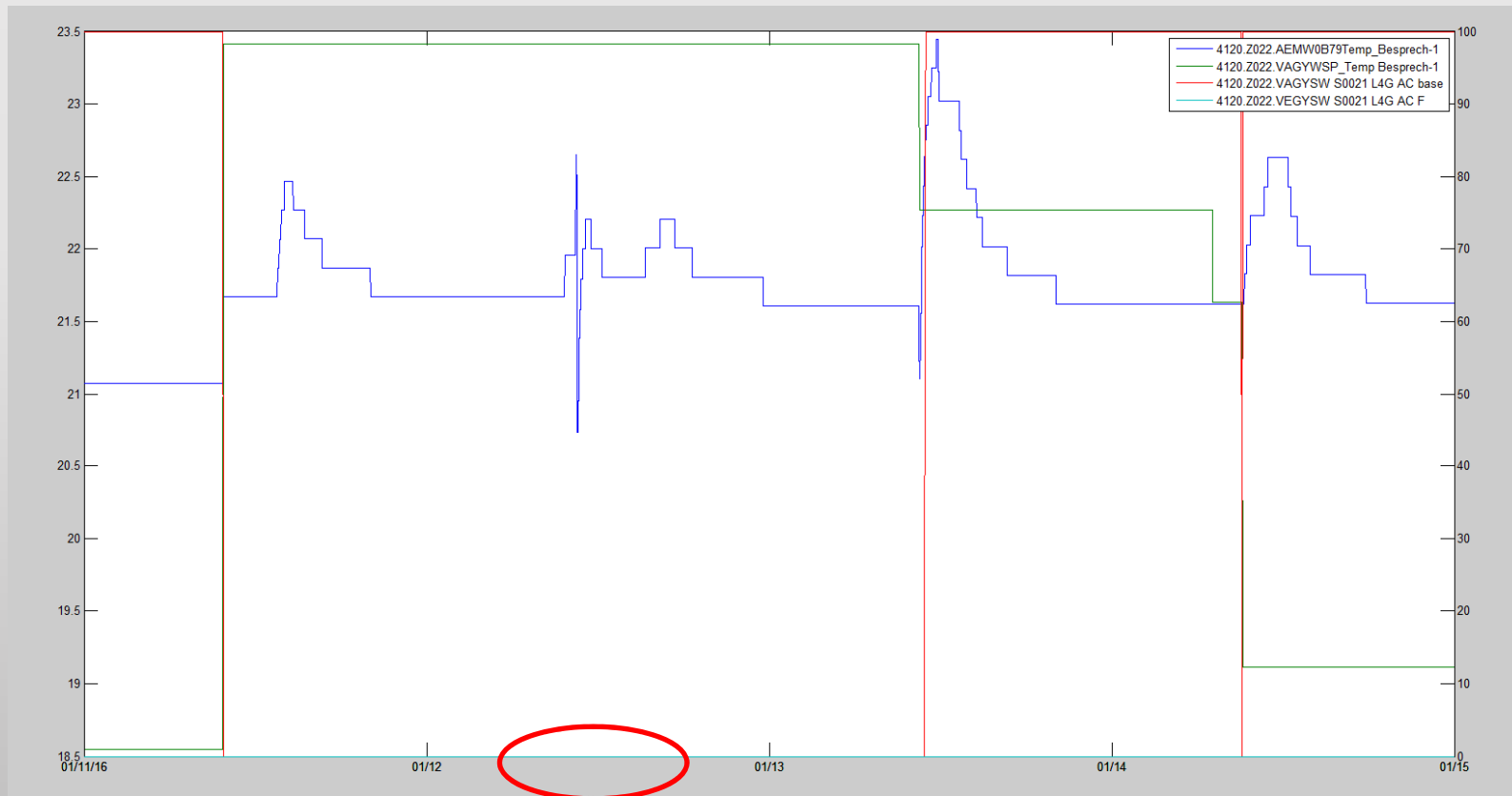
NEC/NREC base	1,47
NEC/NREC test	1,84
delta_eff	0,36
L4G efficiency improvement	25%

Next Steps

- Stabilization of OPC-server
- Development and integration of constraint expansion (e.g. supply air temperature of FVUs)

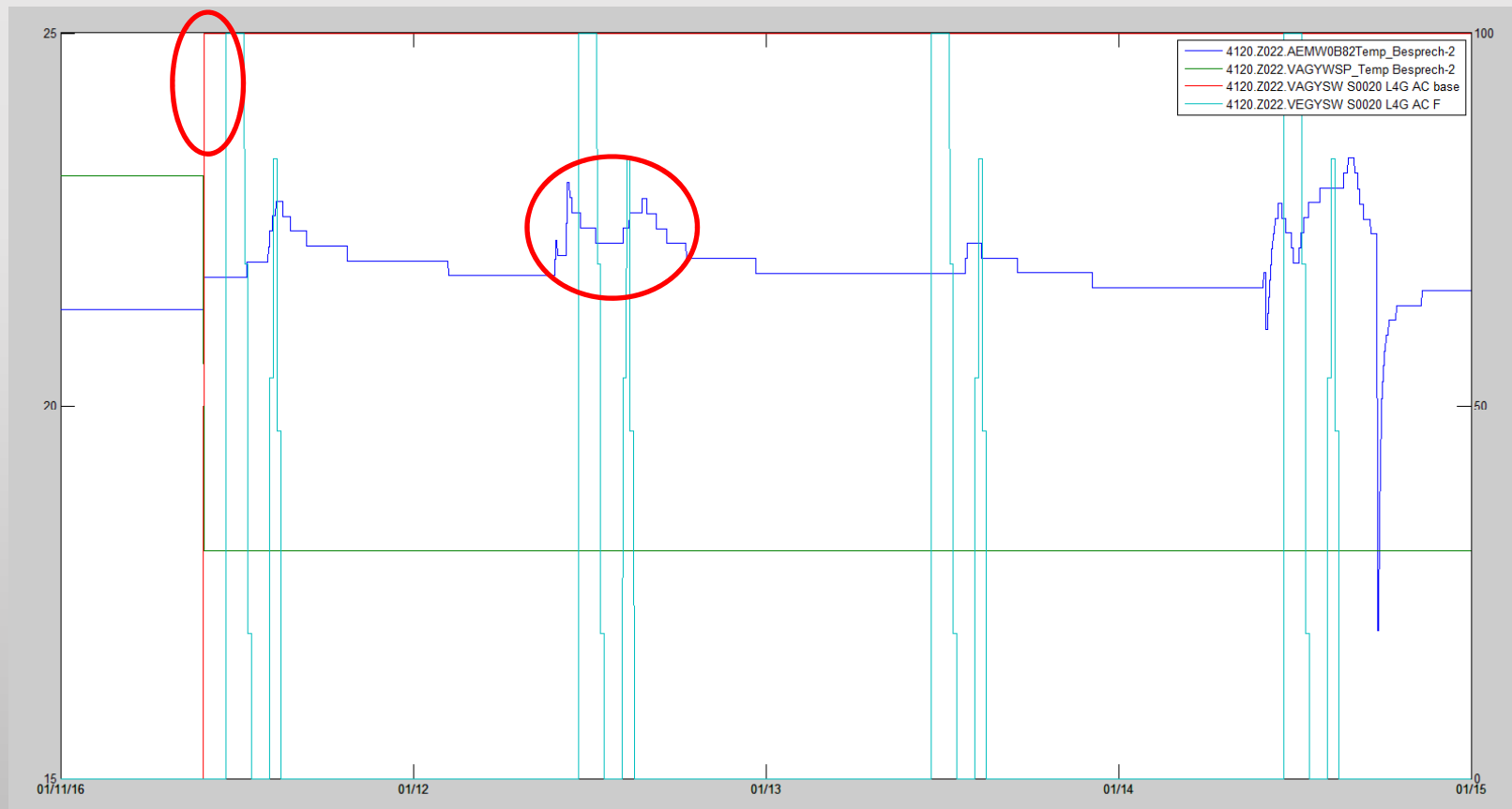
1st small TSoS – experiment analysis (3)

- AC operations in test case – room 00.21



1st small TSoS – experiment analysis (4)

- AC operations in test case – room 00.20

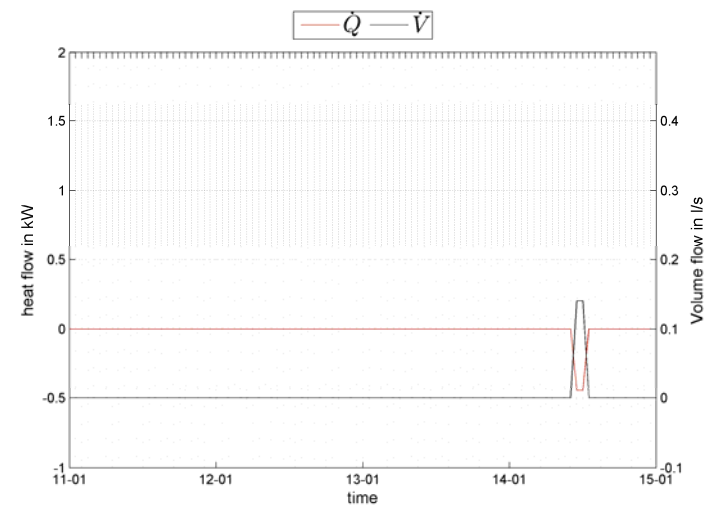
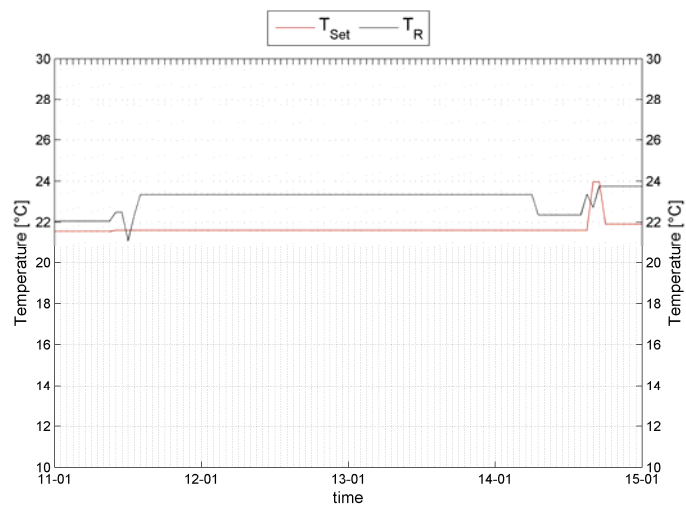
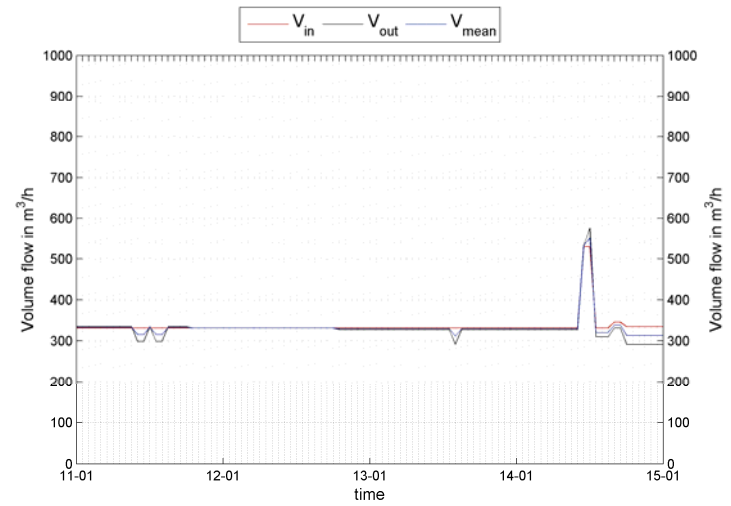
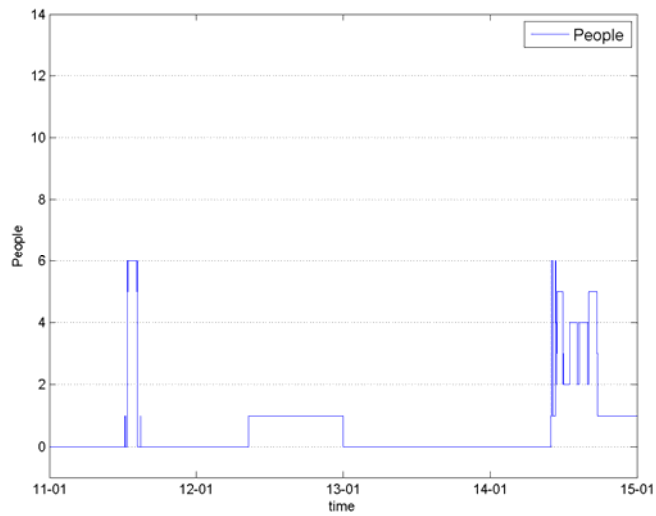


1st small TSoS – experiment analysis (5)

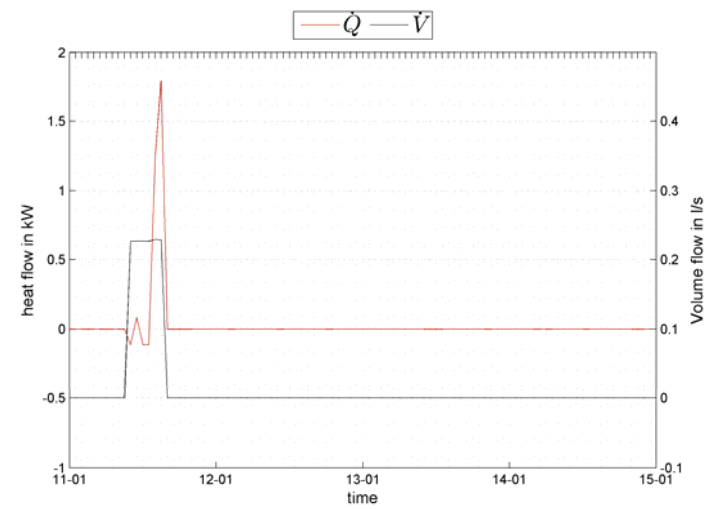
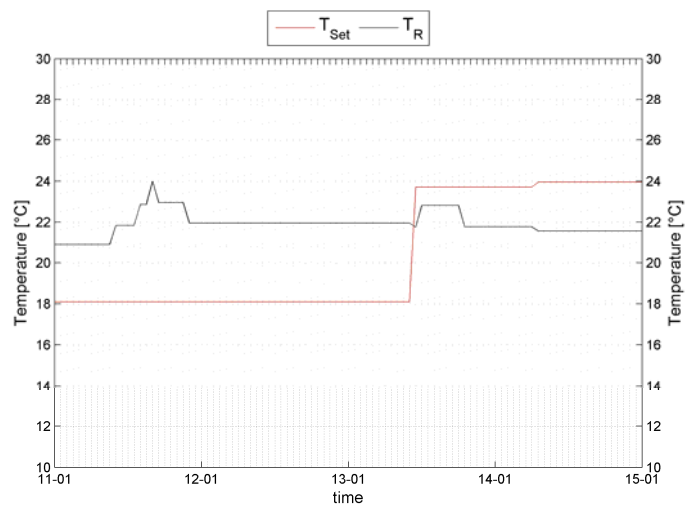
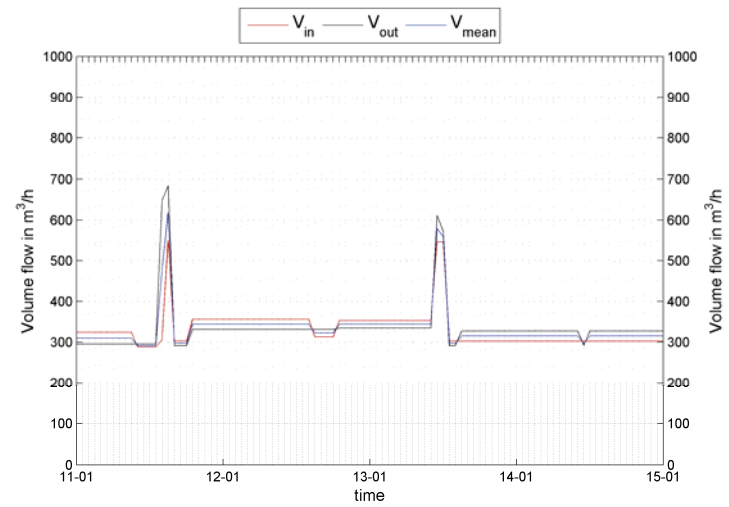
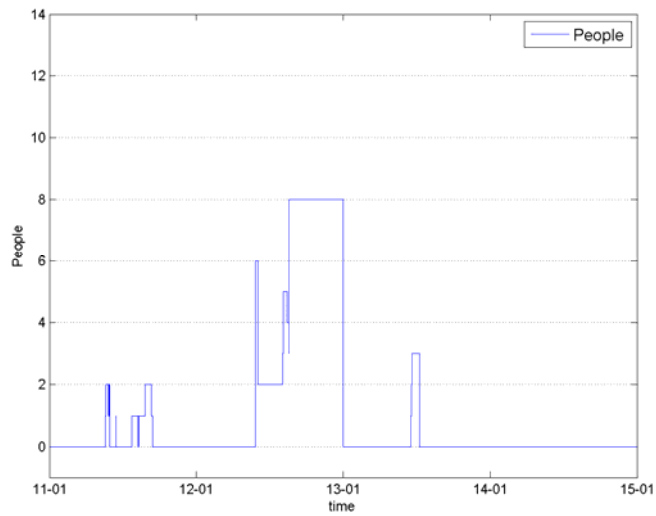
- AC operations in test case – room 00.19



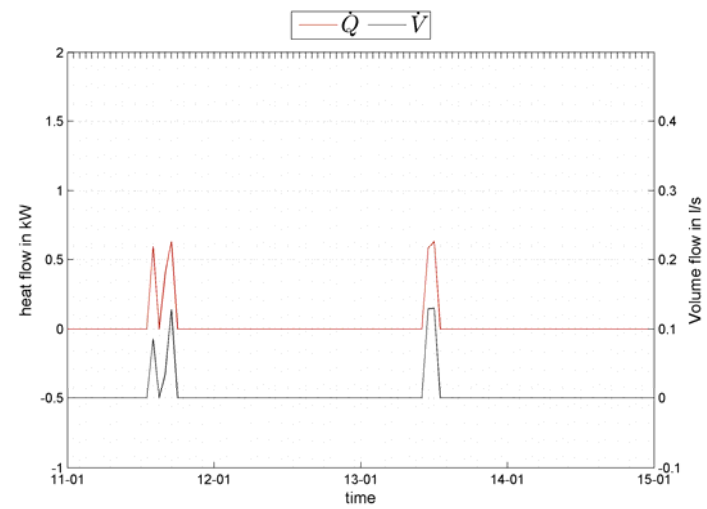
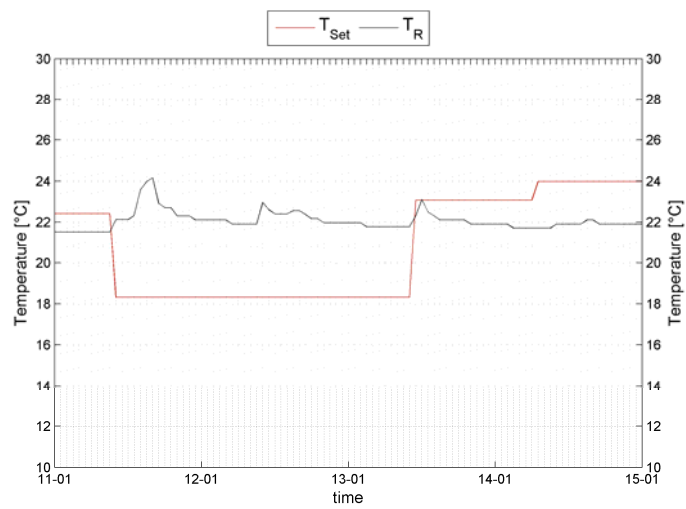
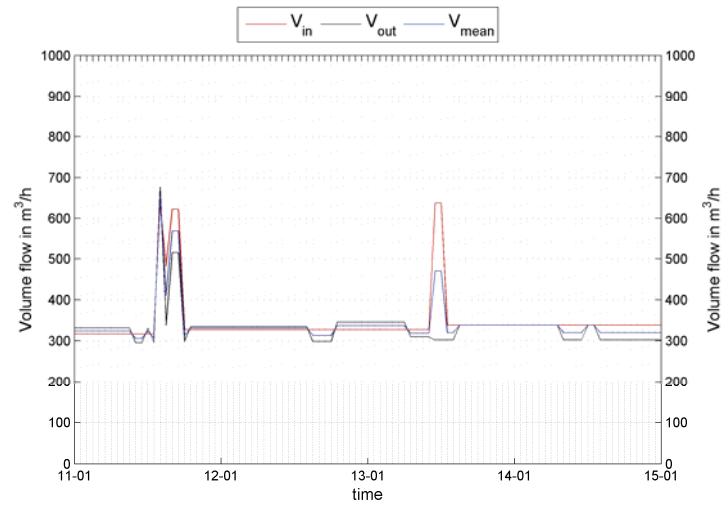
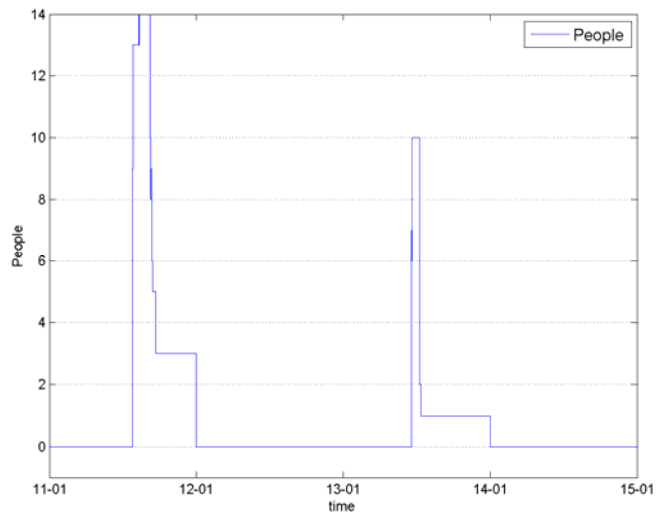
Base case - 00.17



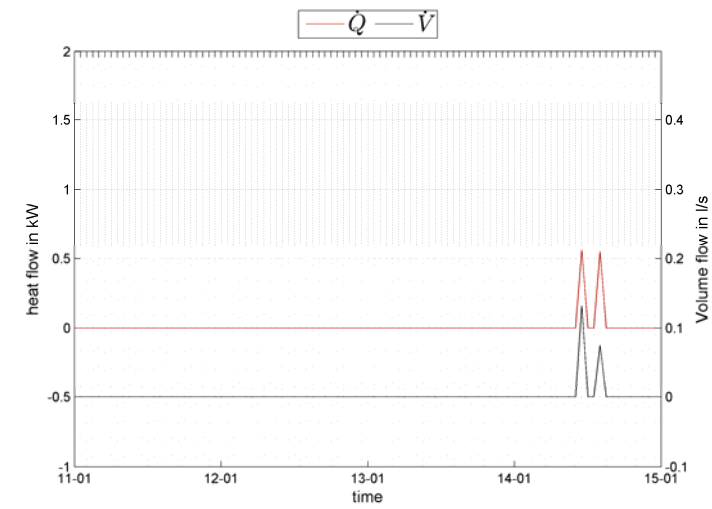
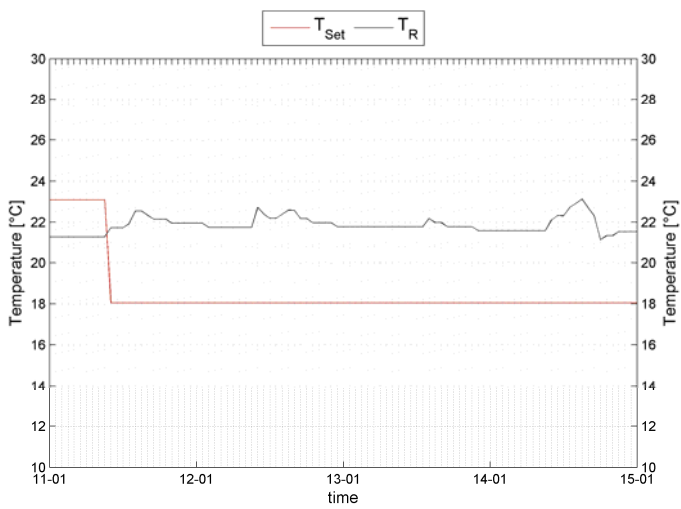
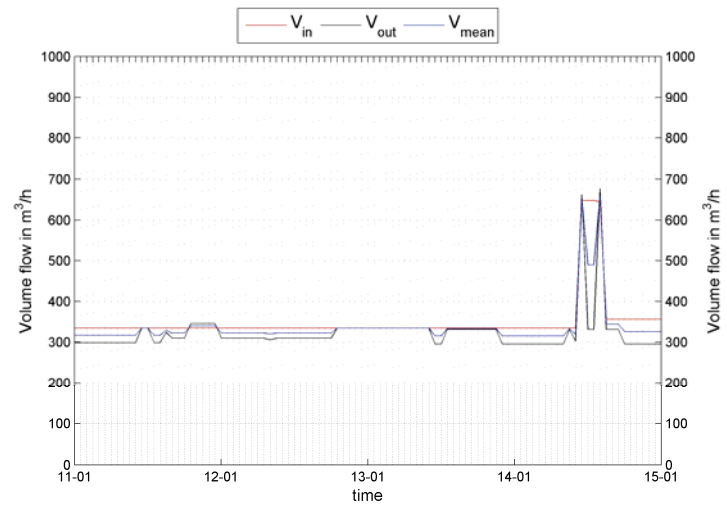
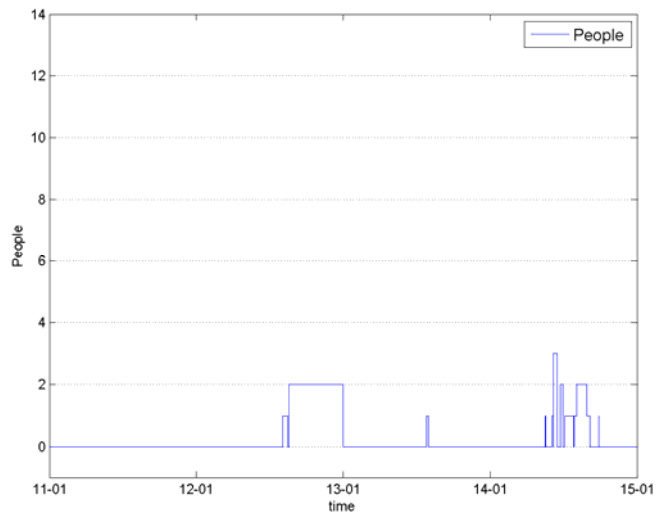
Base case - 00.18



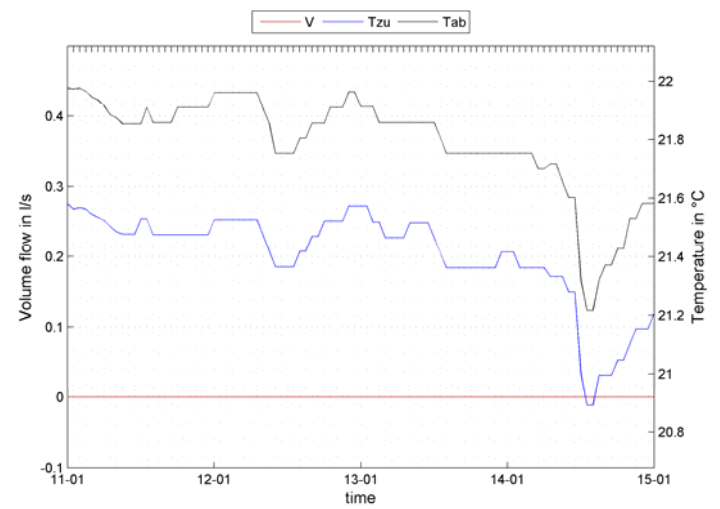
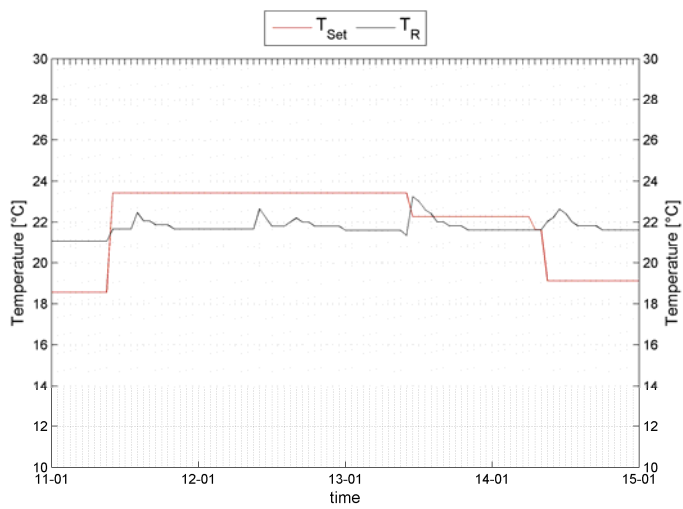
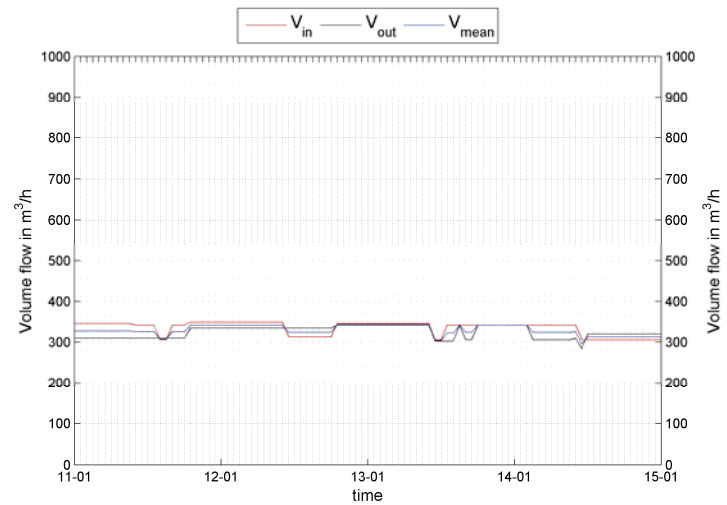
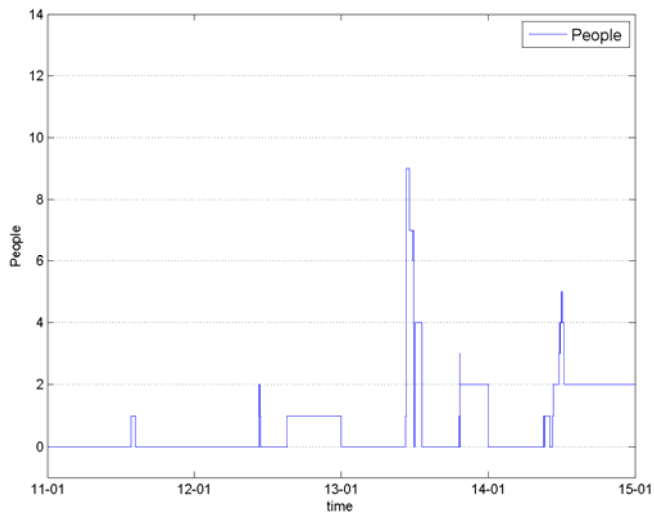
Test case - 00.19



Test case - 00.20



Test case - 00.21



Thank you for your attention!

Questions, suggestions and comments are welcome!