Enertek International

International Consultants in Product Research, Design, Development & Certification

BESA HIU Test Report

HI / HWI – 4/50 - 7867470

Modules Tested: 1, 2, 7 & 8

Client: BAXI Heating UK Ltd

Project Number: E4973 Report Issue: 3

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CONTENTS

1 EXECUTIVE SUMMARY 8

2 BRIEF 9

3 DEFINITIONS 10

4 INTRODUCTION 13

4.1 Installation of Appliance 13
4.2 Appliance Details 13
4.3 Appliance Design Pressures and Temperatures 13

5 TEST METHOD 14

5.1 Test Regime 14

6 TEST MODULE 1 – SPACE HEATING, HIGH TEMPERATURE, DH70 INDIRECT 16

6.1 Test Module 1 Information 16
6.2 Test Module 1 Results 16

7 TEST MODULE 2 – SPACE HEATING, LOW TEMPERATURE, DH55 INDIRECT 21

7.1 Test Module 2 Information 21
7.2 Test Module 2 Results 21

8 TEST MODULE 7 – DHW, HIGH TEMPERATURE, DH70-KWARM 26

8.1 Test Module 7 Information 26
8.2 Test 11a Information 26
8.3 Test 11a Results 27
8.4 Test 12a / 12c Information 29
8.5 Test 12a / 12c Results 29
8.6 Test 13a Information 33
8.7 Test 13a Results 33
8.8 Test 21a Information 36
8.9 Test 21a Results 36
8.10 Test 22a Information 39
8.11 Test 22a Results 39

9 TEST MODULE 8 – DHW, LOW TEMPERATURE, DH55-KWARM 41

9.1 Test Module 8 Information 41
9.2 Test 11b Information 41
9.3 Test 11b Results 42
9.4 Test 12b / 12d Information 44
9.5 Test 12b / 12d Results 44
9.6 Test 13b Information 48
9.7 Test 13b Results 48
9.8 Test 21b Information 51
9.9 Test 21b Results 51
9.10 Test 22b Information 54
9.11 Test 22b Results 54

10 CONCLUSIONS 56

11 EQUIPMENT AND INSTRUMENT LIST 57

12 APPENDIX A 58

12.1 VWART Calculations for Modules 1 & 7 58
12.2 VWART Calculations for Modules 2 & 8 59

13 APPENDIX B 60

13.1 Appliance Documentation 60

13.2 Appliance Photographs 62

14 APPENDIX C 65

14.1 UK Declaration of Conformity 65

14.2 Water Regulation 4 Certificate 66

15 BIBLIOGRAPHY 67

List of Figures

Figure 1 - EIL's HIU Test Rig Schematic which is taken from Appendix B, Figure 4, of Technical Standard for UK HIU Test Regime Version 3: 2023 15
Figure 2 - Test 01a Key Metrics 18
Figure 3 - Test 01b Key Metrics 19
Figure 4 - Test 01c Key Metrics 20
Figure 5 - Test 01d Key Metrics 23
Figure 6 - Test 01e Key Metrics 24
Figure 7 - Test 01f Key Metrics 25
Figure 8 - Test 11a Key Metrics 28
Figure 9 - Test 12a Key Metrics 31
Figure 10 - Test 12c Key Metrics 32
Figure 11 - Test 13a Key Metrics 35
Figure 12 - Test 21a Key Metrics 38
Figure 13 - Test 22a Key Metrics 40
Figure 14 - Test 11b Key Metrics 43
Figure 15 - Test 12b Key Metrics 46
Figure 16 - Test 12d Key Metrics 47
Figure 17 - Test 13b Key Metrics 50
Figure 18 - Test 21b Key Metrics 53
Figure 19 - Test 22b Key Metrics 55
Figure 20 - HIU with Outer Case Fitted 62
Figure 21 - HIU with Outer Case Removed 63
Figure 22 – Name Plate with Model Details and Serial Number 64
Figure 23 – UK Declaration of Conformity 65
Figure 24 - Water Regulation 4 Certificate 66

List of Tables

Table 1 - Appliance Details and Modules Tested 8
Table 2 - Modules Tested Pass or Fail Summary 8
Table 3 - Modules 1 & 7 VWART Information 8
Table 4 - Modules 2 & 8 VWART Information 8
Table 5 - Definitions and Abbreviations 10
Table 6 - Appliance Details 13
Table 7 - Appliance Design Pressures and Temperatures 13
Table 8 - Module 1 Tests 16
Table 9 - Module 1 Performance Criteria 16
Table 10 - Module 1 Best Practice 16
Table 11 - Module 1 Test Results 17
Table 12 - Module 2 Tests 21
Table 13 - Module 2 Performance Criteria 21
Table 14 – Module 2 Best Practice 21
Table 15 - Module 2 Test Results 22
Table 16 - Module 7 Tests 26
Table 17 - Module 7, Test 11a Results 27
Table 18 - Module 7, Test 11a Performance Criteria 27
Table 19 – Module 7 – Test 11 Best Practice 27
Table 20 - Module 7, Test 12 Results 29
Table 21 - Module 7, Test 12 Performance Criteria 29
Table 22 – Module 7 – Test 12 Best Practice 30
Table 23 - Module 7, Test 13 Performance Criteria 33
Table 24 - Module 7, Test 13a Results 34
Table 25 - Module 7, Test 21a Results 36
Table 26 - Module 7, Test 21 Performance Criteria 36
Table 27 - Module 7 - Test 21 Best Practice 37
Table 28 - Module 7, Test 22a Results 39
Table 29 - Module 7, Test 22 Performance Criteria 39
Table 30 - Module 7 - Test 22 Best Practice 39
Table 31 - Module 8 Tests 41
Table 32 - Module 8, Test 11b Results 42
Table 33 - Module 8, Test 11b Performance Criteria 42
Table 34 - Module 8 - Test 11 Best Practice 42
Table 35 - Module 8, Test 12 Results 44
Table 36 - Module 8, Test 12 Performance Criteria 44
Table 37 - Module 8 - Test 12 Best Practice 45
Table 38 - Module 8, Test 13 Performance Criteria 48
Table 39 - Module 8, Test 13b Results 49
Table 40 - Module 8, Test 21b Results 51
Table 41 - Module 8, Test 21 Performance Criteria 51
Table 42 - Module 8 - Test 21 Best Practice 52
Table 43 - Module 8, Test 22b Results 54
Table 44 - Module 8, Test 22 Performance Criteria 54
Table 45 - Module 8 - Test 22 Best Practice 54
Table 46 - Appliance Documentation 60

1 EXECUTIVE SUMMARY

1.1.1 The Baxi HI / HWI – 4/50 HIU underwent testing to the BESA Technical Standard for UK HIU Test Regime, V3-Rev001 September 2023. Modules 1, 2, 7 & 8 were tested. Summary tables can be seen below, with further technical data shown in each respective test module chapter of this report. VWART calculations can be found within APPENDIX A.

Table 1 - Appliance Details and Modules Tested

Manufacturer:	Baxi Heating UK Ltd
Model:	HI / HWI – 4/50
Modules:	1, 2, 7 & 8

Table 2 - Modules Tested Pass or Fail Summary

Module 1:	Pass
Module 2:	Pass
Module 7:	Pass
Module 8:	Pass

Table 3 - Modules 1 & 7 VWART Information

	VWART (°C)	Volume (m^3)
DHW	12	35.5
Standby	39	24.0
Space Heating	36	62.4

	VWART (°C)
Summer	23
Winter	29
Overall	26

Table 4 - Modules 2 & 8 VWART Information

	VWART (°C)	Volume (m^3)
DHW	17	41.2
Standby	39	41.4
Space Heating	35	79.4

	VWART (°C)
Summer	28
Winter	32
Overall	30

1.1.2 It should be noted that all VWART figures are to within ±2°C tolerance.

2 BRIEF

2.1.1 Enertek International Limited (EIL) were contracted to receive, install and commission a production sample of the Baxi HI / HWI – 4/50.

2.1.2 To perform the tasks required for assessing the efficiency of Domestic Hot Water (DHW) and Space Heating (SH) as per the BESA UK HIU BESA Technical Standard for UK HIU Test Regime, V3-Rev001 September 2023, a publicly available online test regime. This is here-on referred to as the Test Regime throughout this document.

2.1.3 To provide a report detailing the tests carried out and generated results in accordance with the Test Regime criteria, including calculations for Volume Weighted Average Return Temperatures (VWART).

3 DEFINITIONS

3.1.1 The following definitions and abbreviations which have been used within this report can be found in Table 5 below.

Table 5 - Definitions and Abbreviations

Symbol	Description
t_{10}	Temperature, primary source
t_{11}	Temperature, primary side flow connection
t_{12}	Temperature, primary side return connection
t_{21}	Temperature, space heating system return connection
t_{22}	Temperature, space heating system flow connection
t_{31}	Temperature, cold water supply
t_{32}	Temperature, domestic hot water flow from HIU
t_{b1}	Temperature, primary side bypass flow (for non-keep warm configuration)
t_{b2}	Temperature, primary side bypass return (for non-keep warm configuration)
q_1	Volume flow, primary side
q_2	Volume flow, space heating system
q_3	Volume flow, domestic hot water
P_{11}	Static pressure, primary side flow connection
P_{12}	Static pressure, primary side return connection
P_{21}	Static pressure, space heating system return connection
P_{22}	Static pressure, space heating system flow connection
P_{31}	Static pressure, cold water supply
P_{32}	Static pressure, domestic hot water flow from HIU
dP_1	Differential pressure, primary system across HIU
dP_2	Differential pressure, space heating system across HIU
dP_3	Differential pressure, domestic hot water across HIU
Q_{DHW}	Estimated annual energy demand per year for hot water
Q_{SH}	Estimated annual energy demand per year for space heating
n_{DHW}	Number of DHW events per year
H_1	Arithmetic mean of primary side power recorded during test

H_2	Arithmetic mean of space heating power recorded during test
H_3	Arithmetic mean of DHW power recorded during test
h_{DHW}	Annual hours that HIU is producing DHW
h_{SH}	Annual hours that HIU is producing space heating
h_{KWM}	Annual hours that HIU is in keep warm mode
h_{NKWM}	Annual hours that HIU is in non-keep warm mode
V_{DHW}	Volume of primary water recorded during and post-DHW test
V_{SH}	Volume of primary water recorded during space heating tests
V_{KWM}	Volume of primary water recorded during keep warm test
V_{NKWM}	Volume of primary water recorded during non-keep warm test
$Prop_{Summer}$	Proportion of year HIU is operating in “summer” mode
$Prop_{Winter}$	Proportion of year HIU is operating in “winter” mode
$VWART_{DHW}$	DHW Volume Weighted Average Return Temperature
$VWART_{SH}$	Space Heating Volume Weighted Average Return Temperature
$VWART_{KWM}$	Keep Warm Volume Weighted Average Return Temperature
$VWART_{NKWM}$	Non-Keep Warm Volume Weighted Average Return Temperature
$VWART_{WINTER}$	Annual Volume Weighted Average Return Temperature for Heating Period
$VWART_{SUMMER}$	Annual Volume Weighted Average Return Temperature for Non-Heating Period
$VWART_{HIU}$	Total Annual Volume Weighted Average Return Temperature
$W_{thermal}$	Thermal energy use
$W_{electrical}$	Electrical energy use
SH_{PROP}	Annual heating period
NSH_{PROP}	Annual non-space heating period
TMV	Thermostatic mixing valve
TRV	Temperature regulating valve
UFH	Underfloor heating
DHW	Domestic hot water
HIU	Heat interface unit
DPCV	Differential pressure control valve

DRV	Double regulating valve
SH	Space heating
UKAS	United Kingdom Accreditation Service
EIL	Enertek International Limited

4 INTRODUCTION

4.1 Installation of Appliance

4.1.1 The appliance was installed and commissioned (as received) and as defined in the product literature provided. Testing was carried out without further adjustment other than disabling the internal space heating pump and adjusting the setting of the SH and DHW set points through the user interface on the HIU controller to suit the conditions of the HIU test rig. The HIU rig schematic is shown within Figure 1.

4.1.2 The HIU was commissioned in accordance with the technical manual / installation guide provided by Baxi**.** The location of which can be found within the references section of this report.

4.2 Appliance Details

4.2.1 Details of the HIU Baxi HI / HWI – 4/50 appliance are given in Table 6. Photographs of the installed appliance are given in Figure 20, Figure 21 and Figure 22.

4.2.2 The UK declaration of conformity (CE or UKCA or equivalent) and water regulation 4 certificate can be found within APPENDIX C.

Table 6 - Appliance Details

Item	Description
Manufacturer	Baxi Heating UK Ltd
Model	HI / HWI 4/50 - 7867470
Serial Number	F0500240000372
Year of Manufacture	2024
DHW Priority	Yes
EUT Number	EUT 0708
Date Test Item Received	05/04/2024

4.3 Appliance Design Pressures and Temperatures

4.3.1 The maximum design pressures and temperatures of the Baxi HI / HWI – 4/50 appliance for the primary side and the secondary side for both Space Heating and DHW are given in Table 7.

Table 7 - Appliance Design Pressures and Temperatures

Item	Pressure (bar)	Differential Pressure (Bar)	Temperature (°C)
Primary Side	16	6	90
Secondary Side Space Heating	2.5*	0.7	85
Secondary Side DHW	10	-	65

*Safety valve set to lift at 3 bar

5 TEST METHOD

5.1 Test Regime

5.1.1 The testing described in this report was carried out in accordance with the test regime. The test regime outlines a series of static and dynamic tests to determine the performance of a HIU's DHW and SH functions. The test regime outlines the test method including the reporting of the results, the performance requirements and the VWART calculations.

5.1.2 Testing was carried out in accordance with Test Module 1.

5.1.3 Testing was carried out in accordance with Test Module 2.

5.1.4 Testing was carried out in accordance with Test Module 7.

5.1.5 Testing was carried out in accordance with Test Module 8.

5.2 Measurement & Uncertainties

5.2.1 All measurements and uncertainties adhere to the requirements stipulated in the BESA Test Regime. All measurements were sampled at a rate of 1 Hz for all tests.

5.2.2 The BESA uncertainties of measurement requirements are as follows:

- Differential Pressure, ± 1.0 kPa
- Temperature, ± 0.1 °C
- Volume Flow (≥ 0.06 l/s) ± 1.5 %
- Volume Flow (< 0.06 l/s), ± 3.0 %

Note: the time constant for the temperature sensors is less than 1.5 s. The time constant for the differential pressure sensors is less than 5s.

5.2.3 EIL's reported uncertainty is based on a standard uncertainty by a coverage factor K=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements. The EIL equipment list and uncertainties are given in shown within chapter 11.

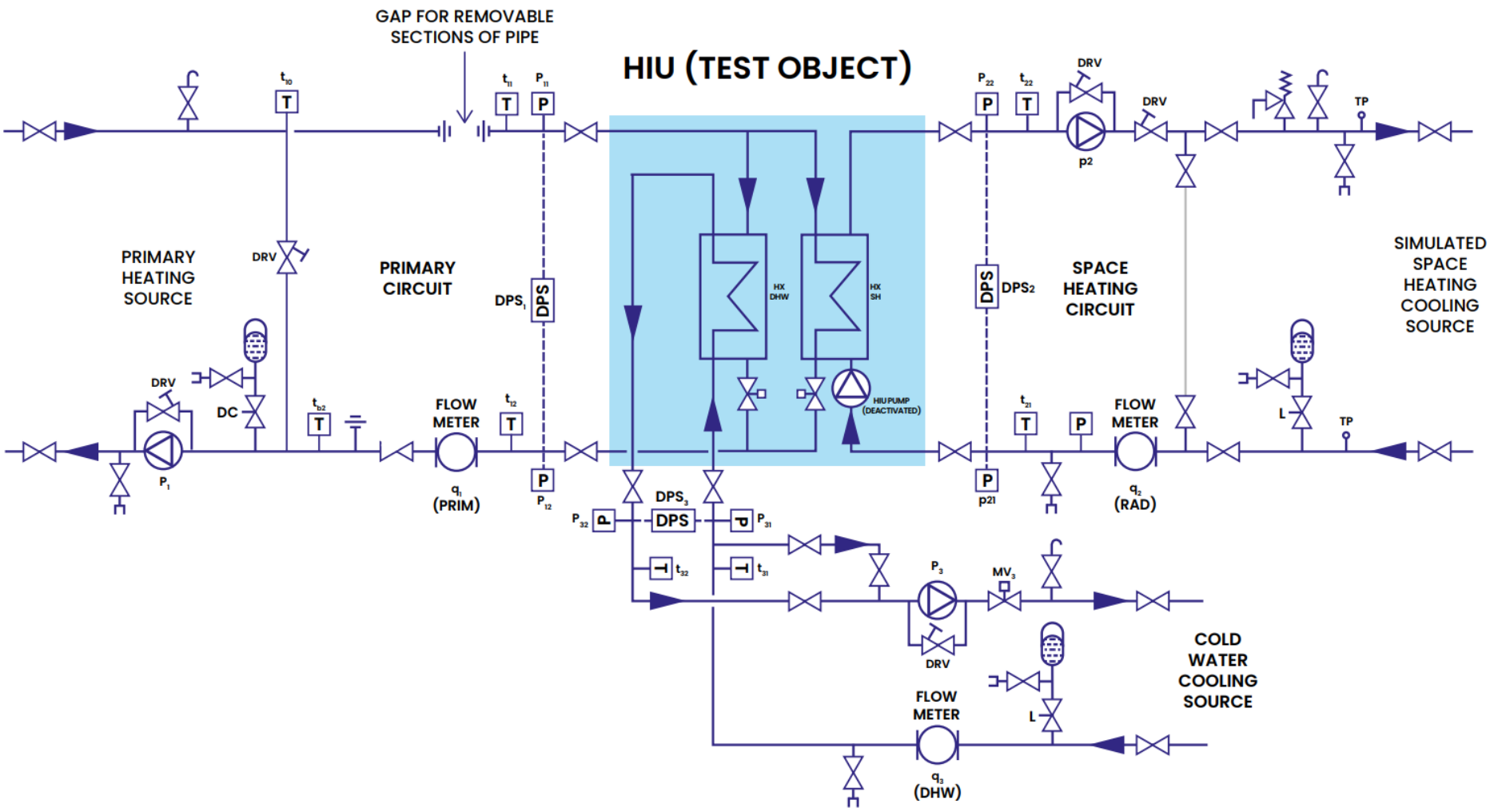

Figure 1 - EIL's HIU Test Rig Schematic which is taken from Appendix B, Figure 4, of Technical Standard for UK HIU Test Regime Version 3: 2023

6 TEST MODULE 1 – SPACE HEATING, HIGH TEMPERATURE, DH70 INDIRECT

6.1 Test Module 1 Information

6.1.1 Objective: Perform static testing to investigate the performance characteristics of the HIU when indirectly meeting a space-heating load given a 55°C/35°C tertiary heating circuit and 70°C primary flow temperature.

6.1.2 The following set of tests are from test module 1 – space heating, high temperature, indirect heating module 1-DH70 indirect HM1-DH70C.

Table 8 - Module 1 Tests

Module 1 Tests	
01a	DH/70C, Space Heating Indirect 0.5 kW, 55/35°C tertiary, 50 kPa
01b	DH/70C, Space Heating Indirect 1 kW, 55/35°C tertiary, 200 kPa
01c	DH/70C, Space Heating Indirect 4 kW, 55/35°C tertiary, 50 kPa

6.2 Test Module 1 Results

6.2.1 Performance criteria results can be seen in Table 9. Test result data can be seen in Table 11 and key metrics can be found in Figure 2, Figure 3 and Figure 4. Best practice criteria can be found in table 10.

Table 9 - Module 1 Performance Criteria

Module 1 Tests Performance Criteria	
Performance Criteria, Fail if:	**PASS/FAIL**
VWART (fail if the VWART is above 40°C)	Pass

Table 10 - Module 1 Best Practice

Module 1 – Best Practice Criteria	
Best Practice Criteria if:	**Best Practice**
VWART is below 37 °C	Achieved

Table 11 - Module 1 Test Results

Module 1 Test Results				
Parameter	**Symbol**	**01a (0.5kW)**	**01b (1kW)**	**01c (4kW)**
Temperature, primary side flow connection	t_{11} (°C)	70.0	70.0	69.8
Temperature, primary side return connection	t_{12} (°C)	36.0	35.4	35.9
Volume flow, primary side	q_1 (l/s)	0.0037	0.016	0.029
Differential pressure, primary system across HIU	dP_1 (kPa)	54	201	55
Arithmetic mean of primary side power recorded during test	H_1 (W)	527.52	2260.15	4041.42
Temperature, space heating system return connection	t_{21} (°C)	35.4	35.4	35.0
Temperature, space heating system flow connection	t_{22} (°C)	54.6	55.1	54.7
Volume flow, space heating system	q_2 (l/s)	0.0064	0.013	0.049
Differential pressure, space heating system across HIU	dP_2 (kPa)	12	13	22
Arithmetic mean of space heating power during test	H_2 (W)	479.21	974.78	4027.82
Volume Weighted Avg. Return Temp	VWART (°C)	36	35	36
Overall VWART (°C)		36		

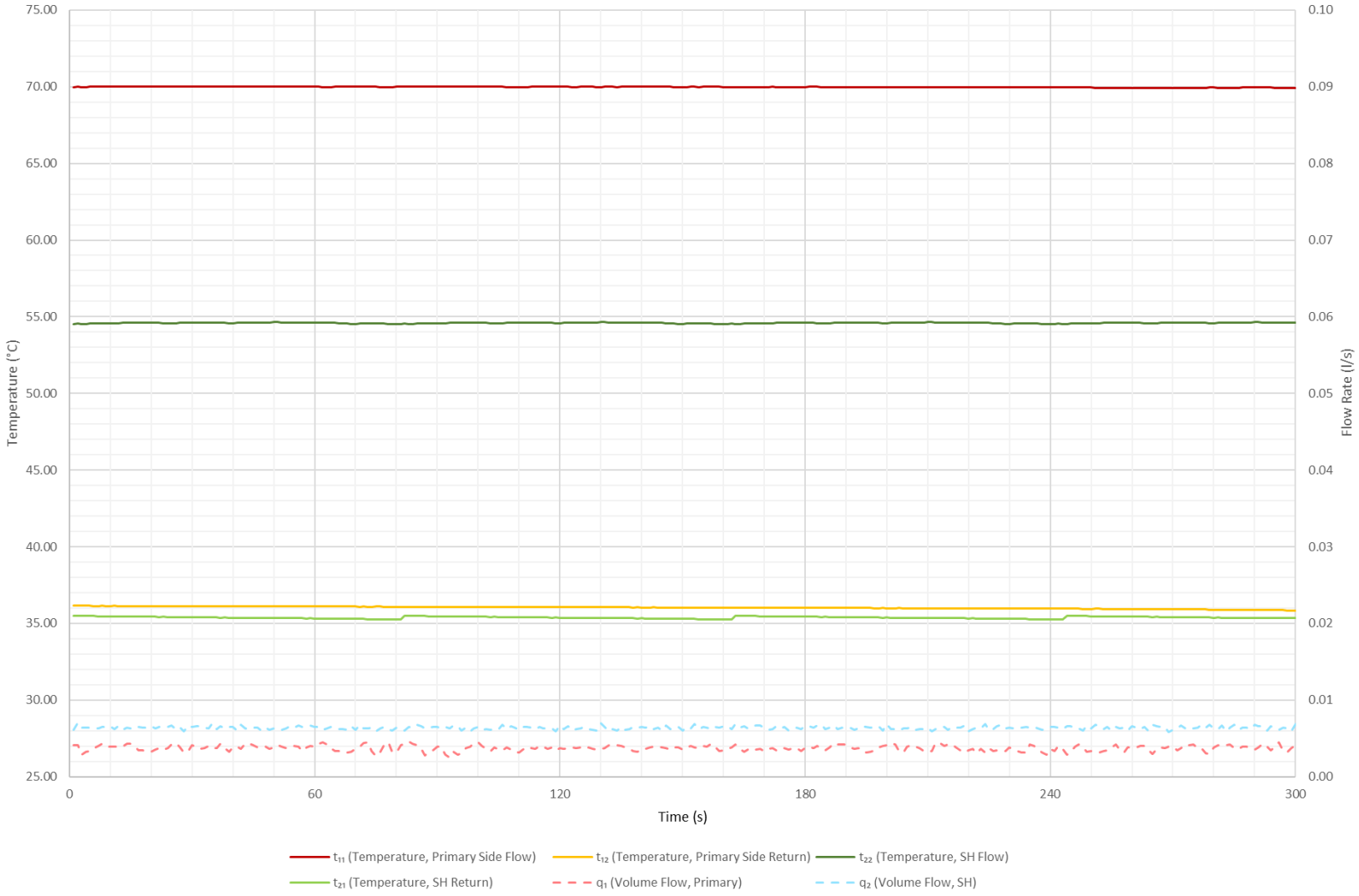

Figure 2 - Test 01a Key Metrics

Figure 3 - Test 01b Key Metrics

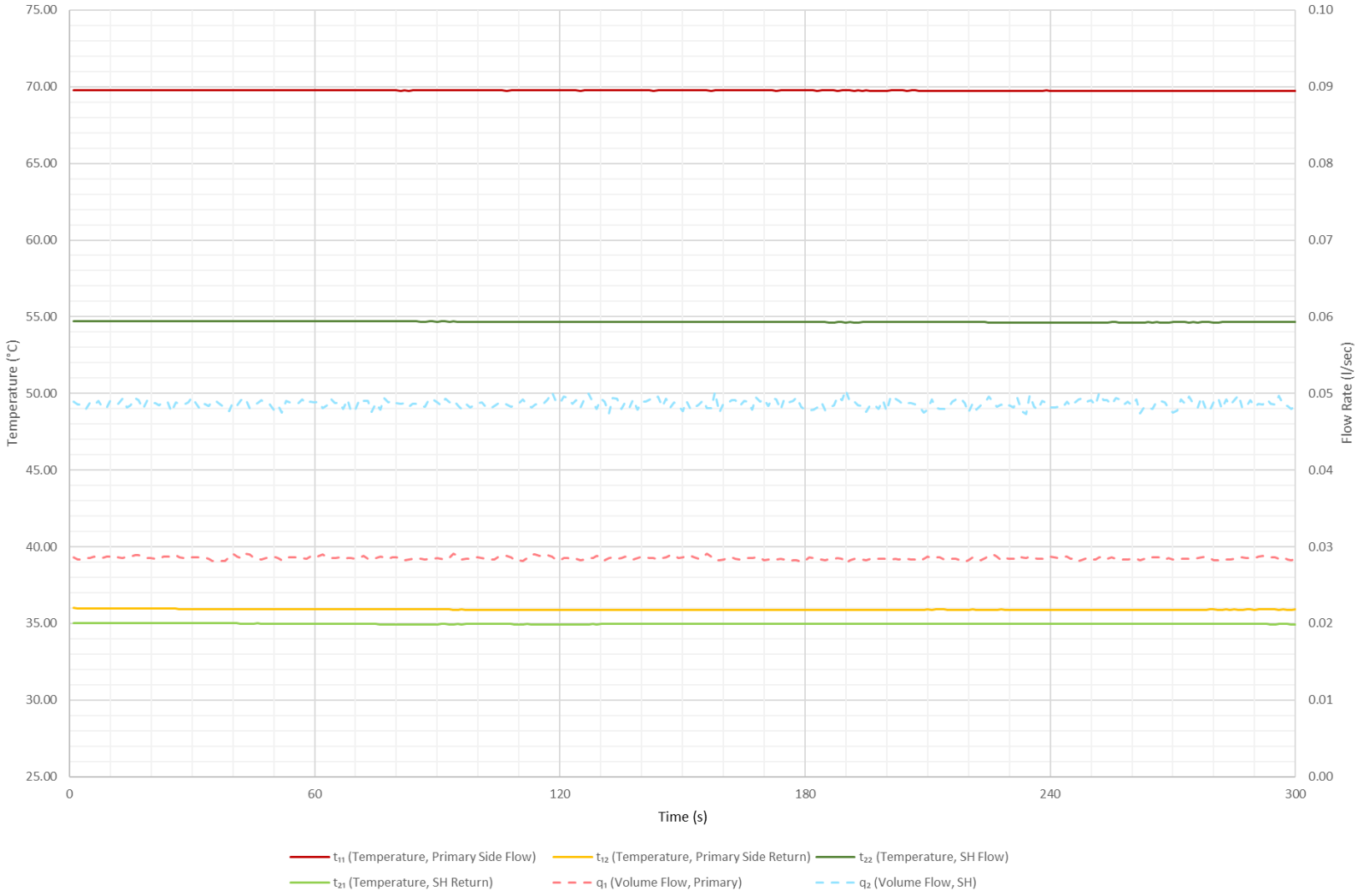

Figure 4 - Test 01c Key Metrics

7 TEST MODULE 2 – SPACE HEATING, LOW TEMPERATURE, DH55 INDIRECT

7.1 Test Module 2 Information

7.1.1 Objective: Perform static testing to investigate the performance characteristics of the HIU when indirectly meeting a space-heating load given a 45°C/35°C tertiary heating circuit and 55°C primary flow temperature.

7.1.2 The following set of tests are from test module 2 - Space heating, low temperature, indirect heating module 2-DH55 indirect HM2-DH55C

Table 12 - Module 2 Tests

Module 2 Tests	
01d	DH/55C, Space Heating Indirect 0.5 kW, 45/35°C tertiary, 50 kPa
01e	DH/55C, Space Heating Indirect 1 kW, 45/35°C tertiary, 200 kPa
01f	DH/55C, Space Heating Indirect 4 kW, 45/35°C tertiary, 50 kPa

7.2 Test Module 2 Results

7.2.1 Performance criteria results can be seen in Table 13. Test result data can be seen in Table 15 and key metrics can be found in Figure 5, Figure 6 and Figure 7. Best practice criteria can be found in table 14.

Table 13 - Module 2 Performance Criteria

Module 2 Tests Performance Criteria	
Performance Criteria, Fail if:	**PASS/FAIL**
VWART (fail if the VWART is above 40°C)	Pass

Table 14 – Module 2 Best Practice

Module 2 – Best Practice Criteria	
Best Practice Criteria if:	**Best Practice**
VWART is below 37 °C	Achieved

Table 15 - Module 2 Test Results

Module 2 Test Results				
Parameter	**Symbol**	**01d (0.5kW)**	**01e (1kW)**	**01f (4kW)**
Temperature, primary side flow connection	t_{11} (°C)	55.1	55.3	54.5
Temperature, primary side return connection	t_{12} (°C)	35.0	35.2	36.0
Volume flow, primary side	q_1 (l/s)	0.0060	0.016	0.050
Differential pressure, primary system across HIU	dP_1 (kPa)	54.51	202.67	53.14
Arithmetic mean of primary side power recorded during test	H_1 (W)	505.86	1380.66	3818.76
Temperature, space heating system return connection	t_{21} (°C)	35.2	35.3	35.2
Temperature, space heating system flow connection	t_{22} (°C)	45.1	44.6	44.6
Volume flow, space heating system	q_2 (l/s)	0.012	0.024	0.098
Differential pressure, space heating system across HIU	dP_2 (kPa)	9.03	11.05	38.88
Arithmetic mean of Space heating power during test	H_2 (W)	448.06	949.02	3872.52
Volume Weighted Avg. Return Temp	VWART (°C)	35	35	36
Overall VWART (°C)		35		

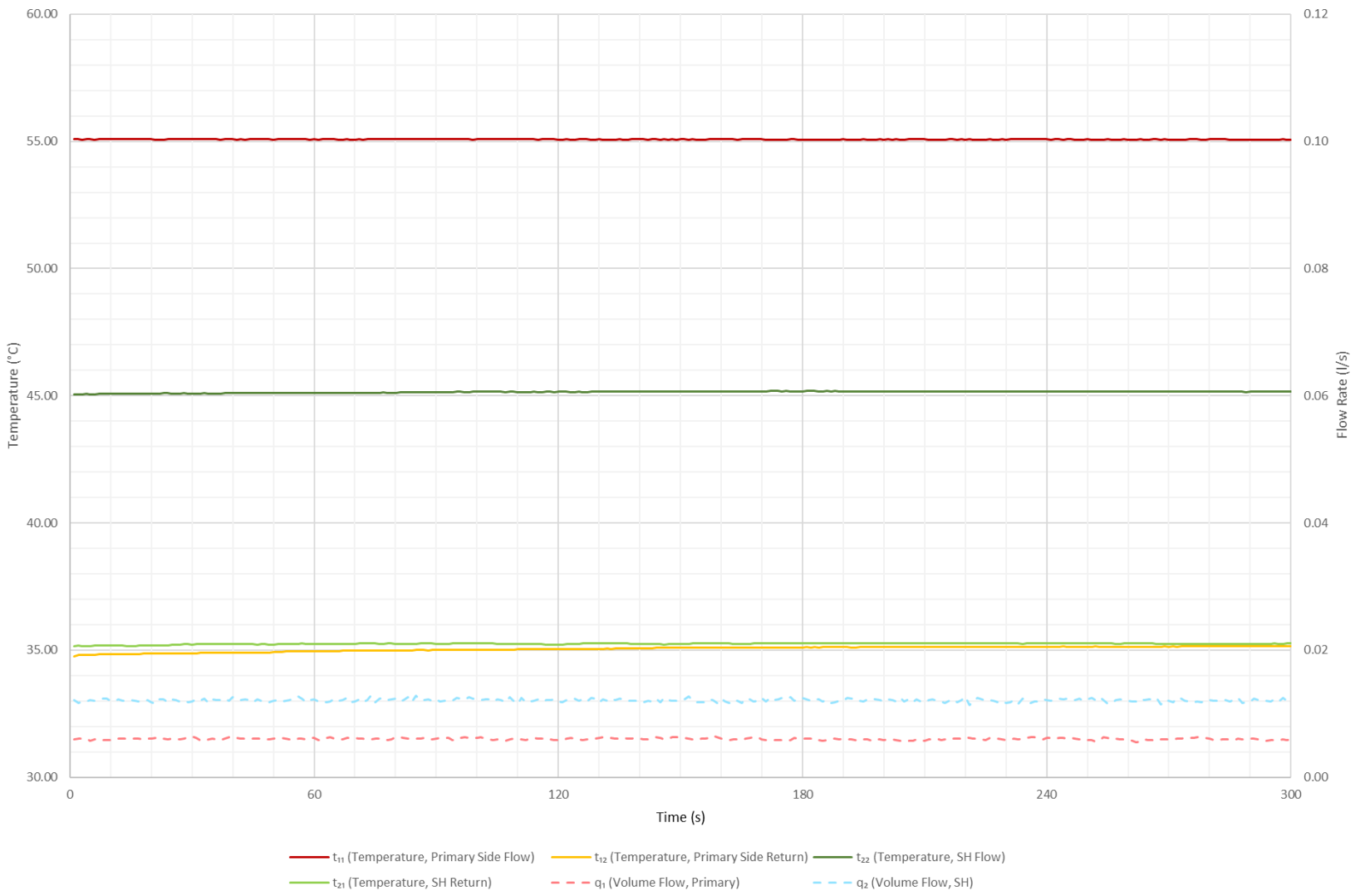

Figure 5 - Test 01d Key Metrics

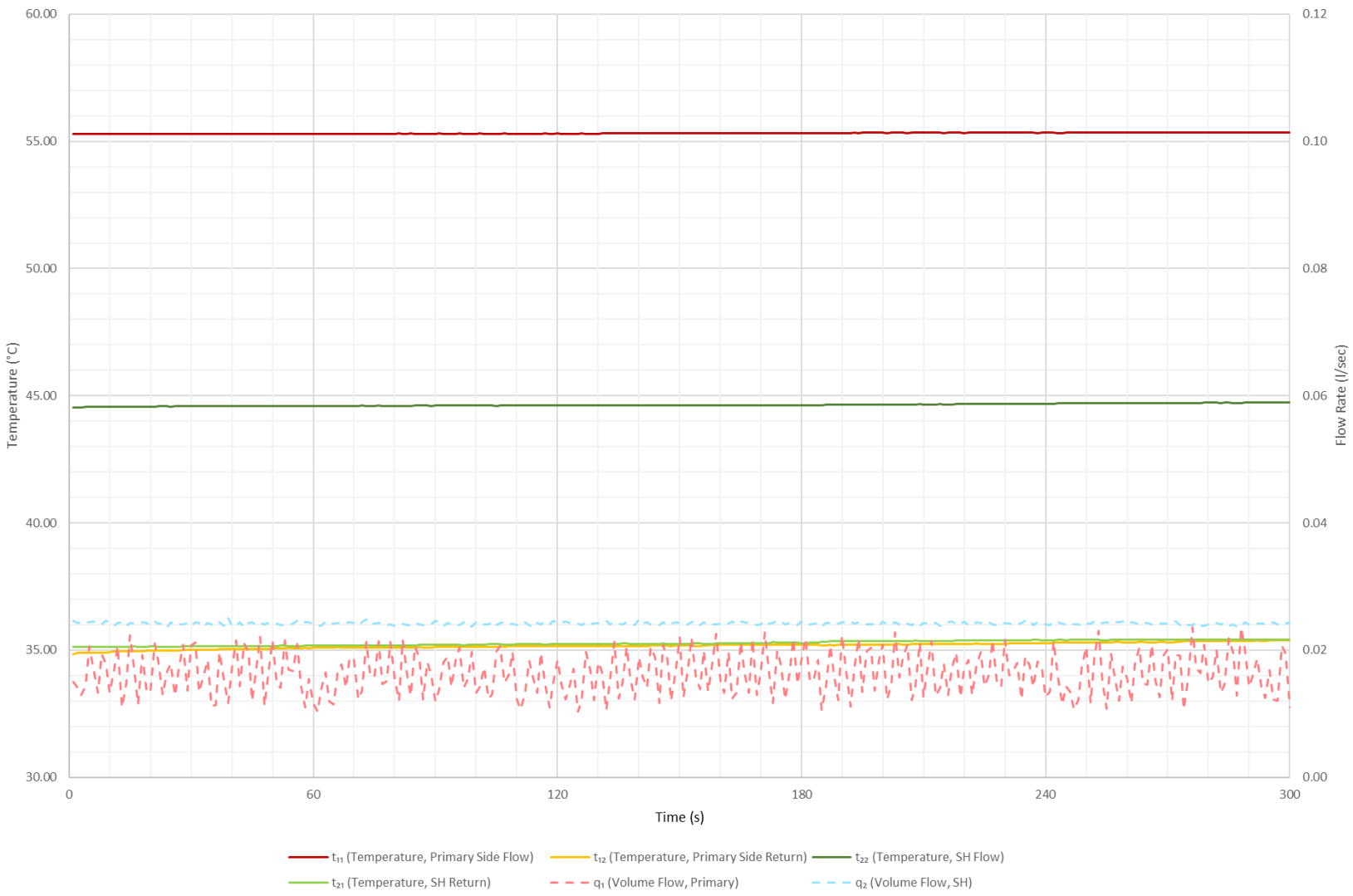

Figure 6 - Test 01e Key Metrics

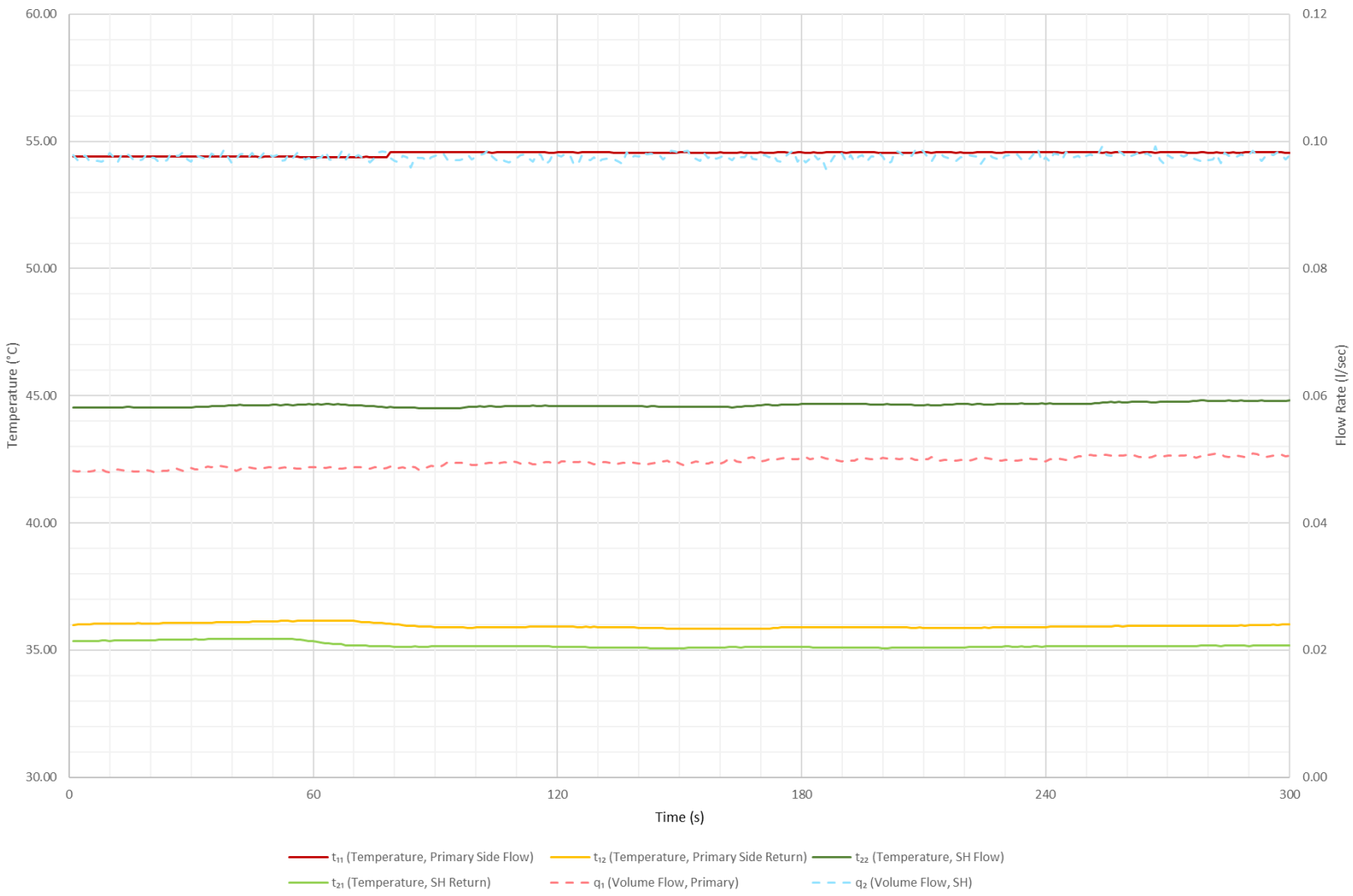

Figure 7 - Test 01f Key Metrics

8 TEST MODULE 7 – DHW, HIGH TEMPERATURE, DH70-KWARM

8.1 Test Module 7 Information

8.1.1 Objective: To explore the performance of the HIU under changing loads, as would be the case in practical operation. Key performance criteria are speed and consistency of DHW delivery to the customer; DHW staying at a safe temperature at all times and the volume weighted average return temperature when supplying space heating or DHW.

8.1.2 The following set of tests are from test module 7 – Domestic hot water, high temperature, keep warm hot water module 7-DH70-KWarm.

Table 16 - Module 7 Tests

Module 7 Tests	
11a	DH/70C, DHW only, 50°C DHW, Variable dP
12a	DH/70C, DHW Low Flow, 50°C DHW, 50kPa
12c	DH/70C, DHW Low Flow, 50°C DHW, 200kPa
13a	DH/70C, DHW Load Test, 50°C DHW
21a	DH/70C, DHW Keep Warm, 50°C DHW
22a	DH/70C, DHW Keep Warm Response Time, 50°C DHW

8.2 Test 11a Information

8.2.1 Objective: To investigate the performance of the HIU when delivering DHW, at a range of flow rates and differential pressures, given a 70°C primary flow temperature. The test investigates HIU operation in terms of DHW delivery and impacts on primary heat network return temperatures.

8.3 Test 11a Results

8.3.1 Performance criteria results can be seen in Table 18. Test result data can be seen in Table 17 and key metrics can be found in Figure 8. Best practice criteria can be found in table 19.

Table 17 - Module 7, Test 11a Results

Module 7 - Test 11a Results			
Parameter	**Symbol**	**Result**	
Maximum and minimum values of t_{32} when there is DHW flow	t_{32} (°C)	54.5	45.0
Number of consecutive seconds where t_{32} > 55°C	(s)	0	
Volume Weighted Avg. Return Temp	VWART (°C)	12	

Table 18 - Module 7, Test 11a Performance Criteria

Module 7 - Test 11a Performance Criteria	
Performance Criteria, Fail if:	**PASS/FAIL**
Fail if DHW temperature (t_{32}) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk	Pass
Fail if primary return temperature (t_{12}) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk	Pass
Fail if the VWART is above 22°C (to one decimal place)	Pass
Fail if the average DHW temperature (t_{32}) is not 50.0°C ±1°C (to one decimal place) for the final 150 seconds of each of the 180 second DHW flow periods	Pass
Fail if the DHW temperature (t_{32}) is not being maintained at 50.0°C ±3°C (to one decimal place) for >150 seconds of each of the DHW flow periods	Pass
Fail if the DHW temperature (t_{32}) drops below 45.0°C (to one decimal place) for more than 5 consecutive seconds, as this would impact resident comfort	Pass

Table 19 – Module 7 – Test 11 Best Practice

Module 7 – Test 11 – Best Practice Criteria	
Best Practice Criteria if:	**Best Practice**
Best practice if the VWART is less than 17°C (to one decimal place)	Achieved
Best practice if the DHW temperature (t32) is being maintained at 50.0°C ±2°C throughout periods of DHW flow	Not Achieved
Best practice if the DHW temperature (t32) doesn't drop below 45.0°C (to one decimal place) for more than 2 consecutive seconds	Achieved

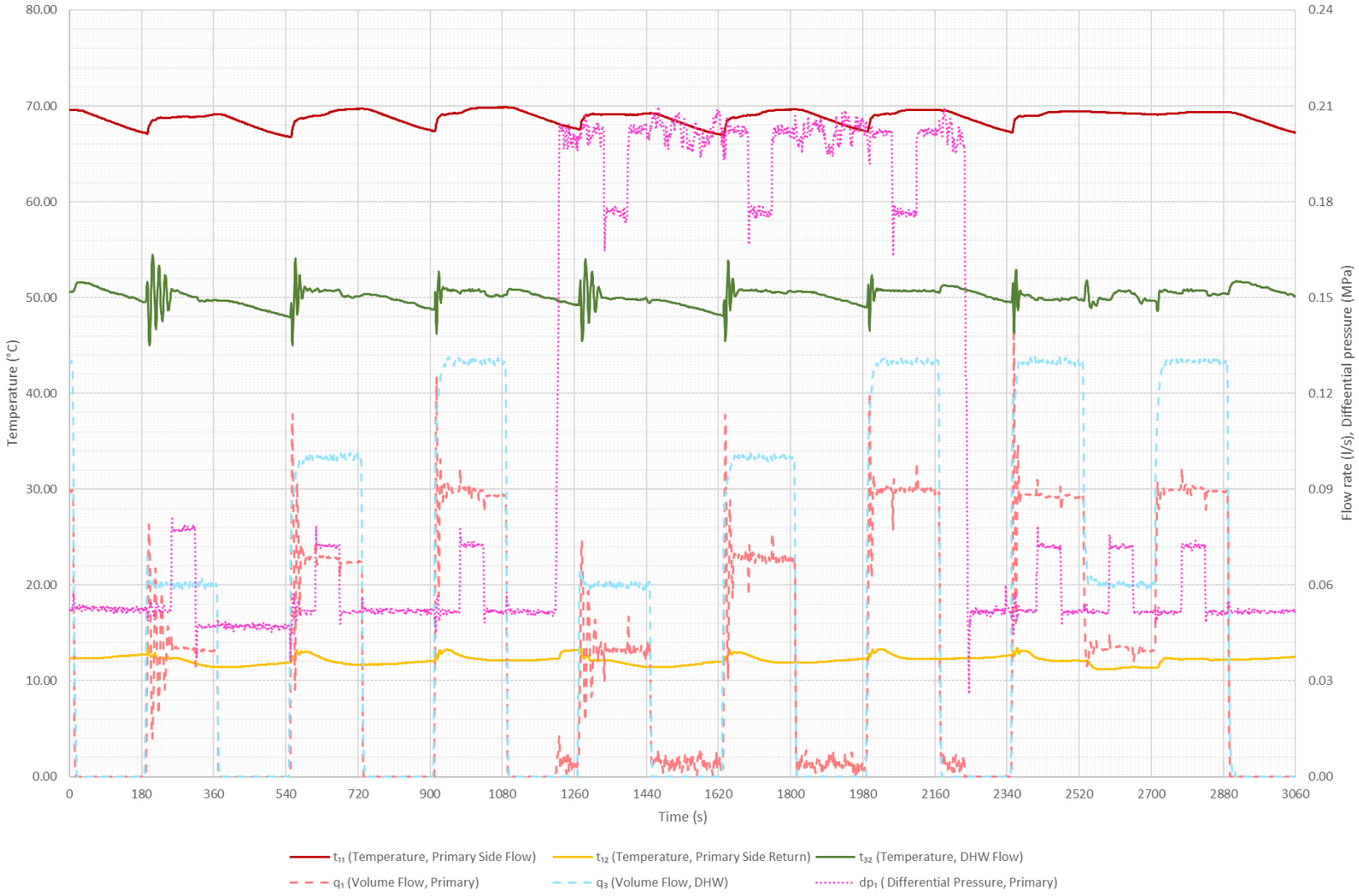

Figure 8 - Test 11a Key Metrics

8.4 Test 12a / 12c Information

8.4.1 Objective: To investigate the stability of DHW temperature at low flow rates. During operation domestic hot water is sometimes drawn off at extremely low flow rates. Test 12 investigates the ability of the system to meet this condition by measuring the temperature at test point t_{32} at a flow rate of 0.02 l/s.

8.5 Test 12a / 12c Results

8.5.1 The HIU was able to deliver DHW at low flow rate above 45.0°C at the end of the 180 second period of low flow DHW.

8.5.2 The HIU was able to deliver stable DHW flow temperature (at t_{32}), defined as ability to maintain 50.0 ±3.0°C (1 decimal place) during the last 60 seconds of the test.

8.5.3 Performance criteria results can be seen in Table 21. Test result data can be seen in Table 20 and key metrics can be found in Figure 9 and Figure 10. Best practice criteria can be found in table 22.

Table 20 - Module 7, Test 12 Results

Module 7 - Test 12 Results					
Parameter	**Symbol**	**12a Result**		**12c Result**	
Maximum and minimum values of t_{32} when there is low DHW flow	t_{32} (°C)	54.8	36.6	54.1	37.9
Number of consecutive seconds where t_{32} > 55°C	(s)	0		0	

Table 21 - Module 7, Test 12 Performance Criteria

Module 7 - Test 12 Performance Criteria	
Performance Criteria, Fail if:	**PASS/FAIL**
Fail if DHW temperature (t_{32}) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk	Pass
Fail if primary return temperature (t_{12}) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk	Pass
Fail if DHW temperature (t_{32}) is not maintained at 50°C ±3°C (to one decimal place) for more than 60 seconds	Pass

Table 22 – Module 7 – Test 12 Best Practice

Module 7 – Test 12 – Best Practice Criteria	
Best Practice Criteria if:	**Best Practice**
Best practice if DHW temperature (t32) is maintained at 50°C ±2°C (to one decimal place) throughout the test for both test 12a and 12c	Not Achieved

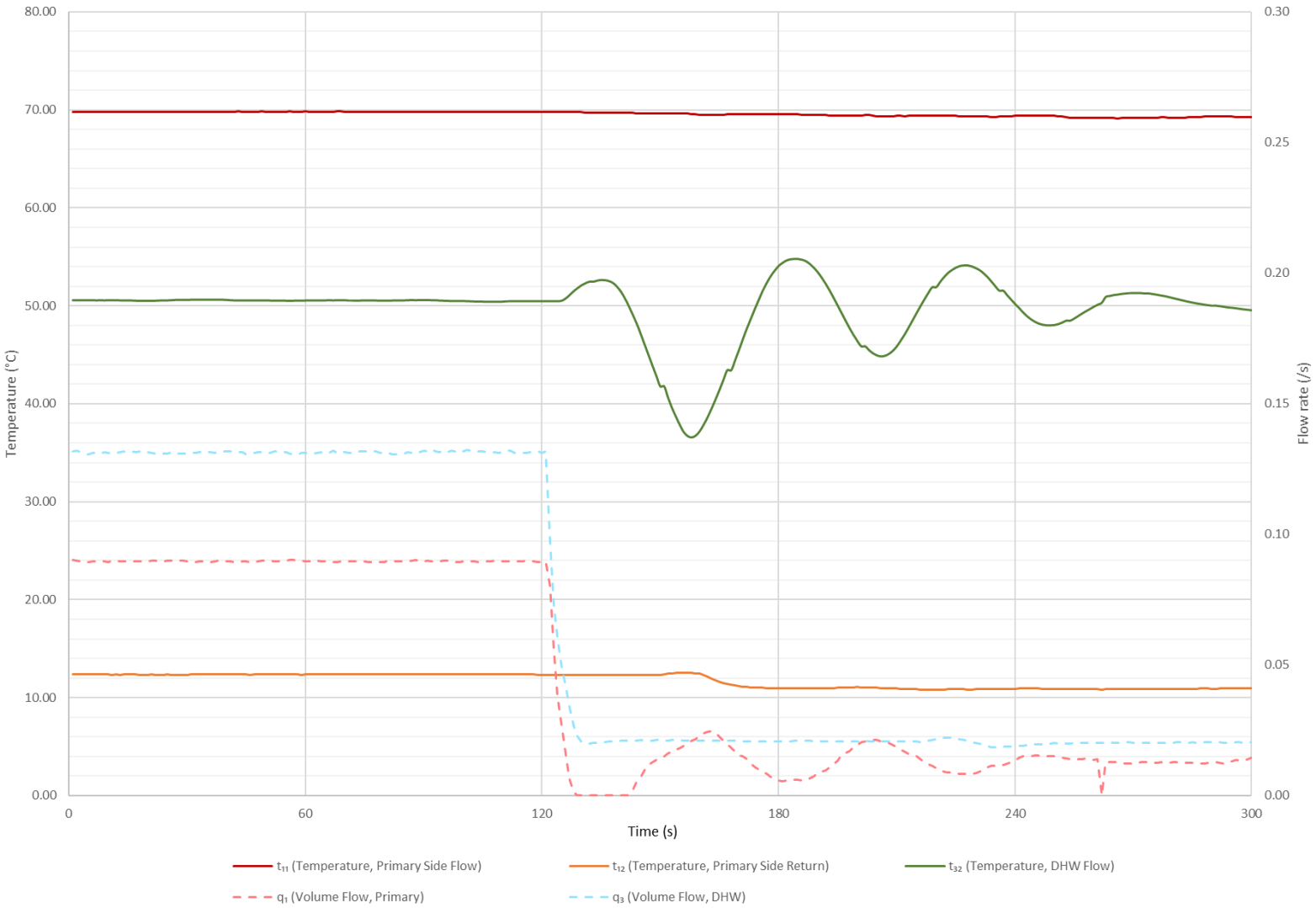

Figure 9 - Test 12a Key Metrics

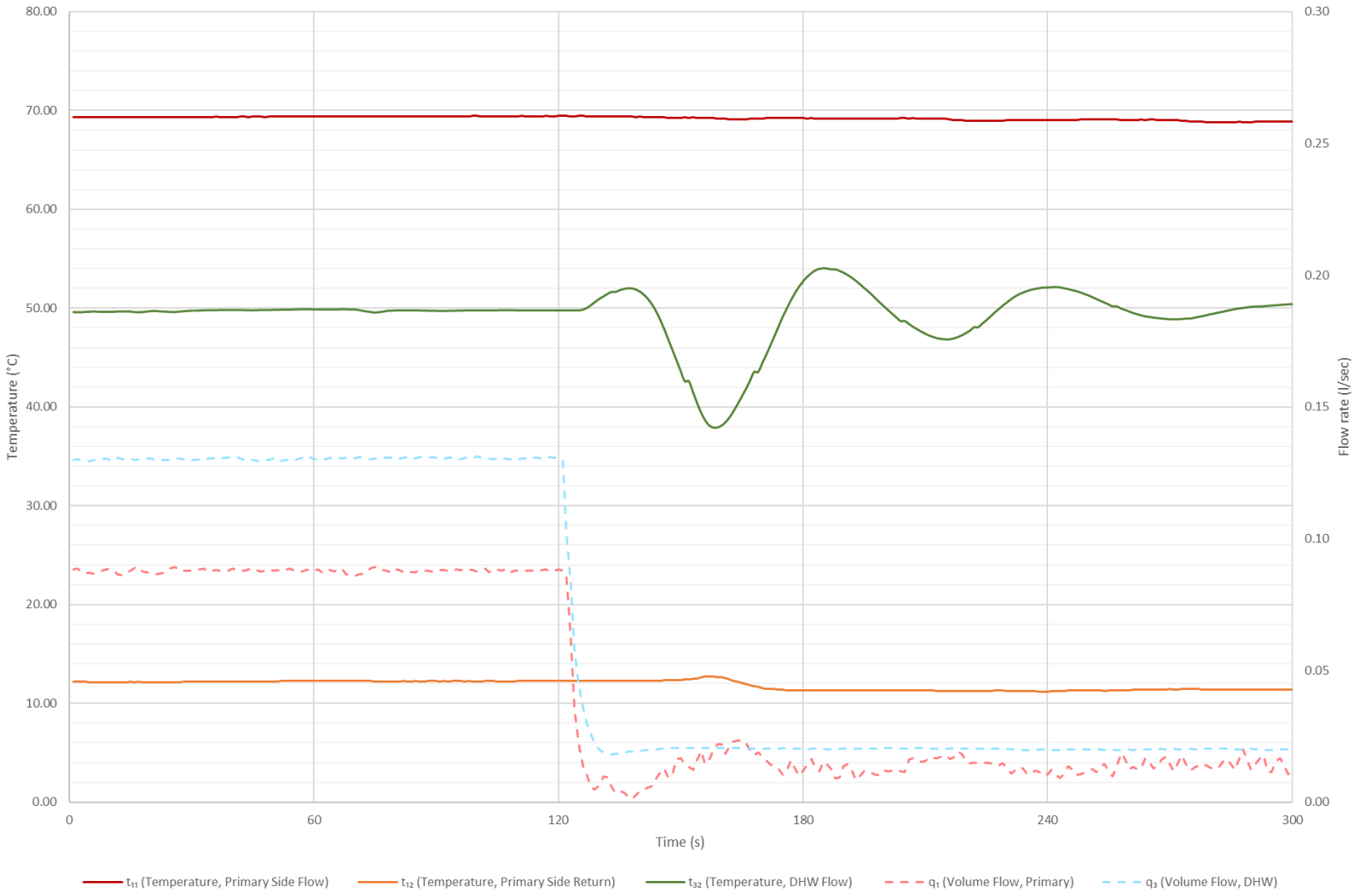

Figure 10 - Test 12c Key Metrics

8.6 Test 13a Information

8.6.1 Objective: To measure the maximum heat output (kW) and flow (l/sec) DHW output that can be delivered from the HIU. The HIU shall be set to deliver 50°C and the maximum DHW power output shall be measured with a flow step change and the peak value recorded when the DHW flow temperature is above 45°C.

8.7 Test 13a Results

8.7.1 The maximum DHW heat output was recorded as 68.49 kW, with a measured flow rate of 0.42 l/s, when producing minimum DHW at 45°C or above (49.8 °C).

8.7.2 The recorded DHW line pressure drop across the HIU was 94 kPa.

8.7.3 The number of consecutive seconds where t_{32} > 55°C was 0 seconds.

8.7.4 Performance criteria results can be seen in Table 23. Test result data can be seen in Table 24 and key metrics can be found in Figure 11.

Table 23 - Module 7, Test 13 Performance Criteria

Module 7 - Test 13 Performance Criteria	
Performance Criteria, Fail if:	**PASS / FAIL**
Fail if DHW (at t_{32}) is less than 50°C ±1.0°C (to one decimal place) at 0.13 l/s flow rate, as the HIU must be able to produce DHW to the target temperature at a moderate load	Pass
Fail if DHW temperature (t_{32}) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk	Pass
Fail if primary return temperature (t_{12}) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk	Pass

Table 24 - Module 7, Test 13a Results

Module 7 - Test 13a Results – Mean Average of Last 10 Seconds											
Parameter	**Symbol**	**0.15 l/s (25kW)**	**0.18 l/s (30kW)**	**0.21 l/s (35kW)**	**0.24 l/s (40kW)**	**0.27 l/s (45kW)**	**0.30 l/s (50kW)**	**0.33 l/s (55kW)**	**0.36 l/s (60kW)**	**0.39 l/s (65kW)**	**0.42 l/s (70kW)**
Temperature, primary side flow connection	t_{11} (°C)	69.5	70.0	70.1	70.2	70.2	70.2	70.3	70.3	70.3	70.3
Temperature, primary side return connection	t_{12} (°C)	12.8	12.7	13.0	13.2	13.7	14.1	14.4	14.3	14.7	15.1
Volume flow, primary side	q_1 (l/s)	0.105	0.122	0.144	0.165	0.188	0.210	0.230	0.251	0.273	0.297
Arithmetic mean of primary side power recorded during test	H_1 (kW)	24.83	29.30	34.38	39.41	44.48	49.39	53.90	58.84	63.62	68.49
Temperature, cold water supply	t_{31} (°C)	10.1	10.1	9.9	9.8	9.9	10.0	10.0	9.7	9.8	10.0
Temperature, domestic hot water flow from HIU	t_{32} (°C)	50.8	49.9	50.1	50.0	50.3	50.3	50.0	49.7	49.7	49.8
Volume flow, domestic hot water	q_3 (l/s)	0.150	0.180	0.210	0.240	0.270	0.300	0.330	0.360	0.390	0.420
Differential pressure, domestic hot water across HIU	dP_3 (kPa)	20	25	31	38	45	52	61	71	82	94
Arithmetic mean of DHW power recorded during test	H_3 (kW)	25.68	30.04	35.50	40.51	45.64	50.56	55.19	60.27	65.12	70.02

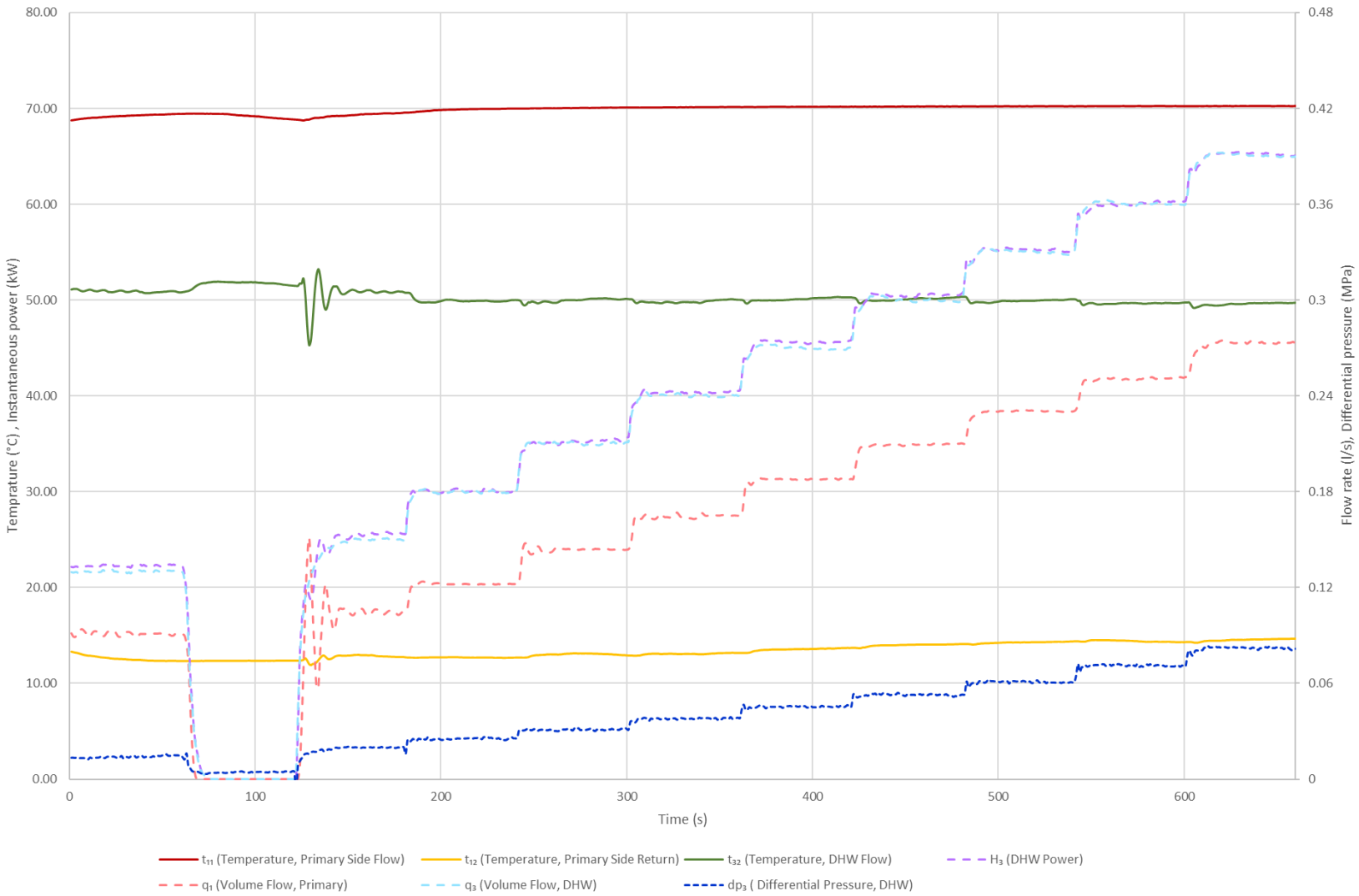

Figure 11 - Test 13a Key Metrics

8.8 Test 21a Information

8.8.1 Objective: To establish HIU performance during periods of no load, when operating in keep warm mode.

8.9 Test 21a Results

8.9.1 The keep warm operation is valid (based on Test 22a response time criteria).

8.9.2 The keep warm undergoes cycling (i.e. t_{11} varies by more than ±3 °C during the final 3 hours of the test).

8.9.3 Performance criteria results can be seen in Table 26. Test result data can be seen in Table 25 and key metrics can be found in Figure 12. Best practice criteria can be found in table 27.

Table 25 - Module 7, Test 21a Results

Module 7 - Test 21a Results		
Parameter	**Symbol**	**Result**
Mean average volume flow, primary side	q_1 (l/s)	0.0009
Mean average of primary side power recorded during test	H_1 (kW)	0.04
Mean average electrical energy use	$W_{electrical}$ (W)	3.0
Mean average thermal energy use	$W_{thermal}$ (W)	36.7
Overall energy loss per day	(kWh)	0.952
Overall keep warm volume weighted avg. return temp	VWART (°C)	39

Table 26 - Module 7, Test 21 Performance Criteria

Module 7 - Test 21 Performance Criteria	
Performance Criteria, Fail if:	**PASS/FAIL**
Fail if VWART is above 44°C (to one decimal place)	Pass
Fail if primary return temperature (t_{12}) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk	Pass
Fail if the primary supply temperature to the HIU (t_{11}) drops to below 39°C	Pass
Fail if the HIU overall energy losses are greater than 1.0 kWh/day (to three decimal places)	Pass
Fail if the Test 22a DHW temperature response time test fails (i.e. the HIU Keep Warm operation is not a valid keep warm)	Pass

Table 27 - Module 7 - Test 21 Best Practice

Module 7 – Test 21 – Best Practice Criteria	
Best Practice Criteria if:	**Best Practice**
Best practice if VWART is below 38°C (to one decimal place)	Not Achieved
Best practice if HIU overall energy losses are less than 0.7 kWh/day (to three decimal places)	Not Achieved

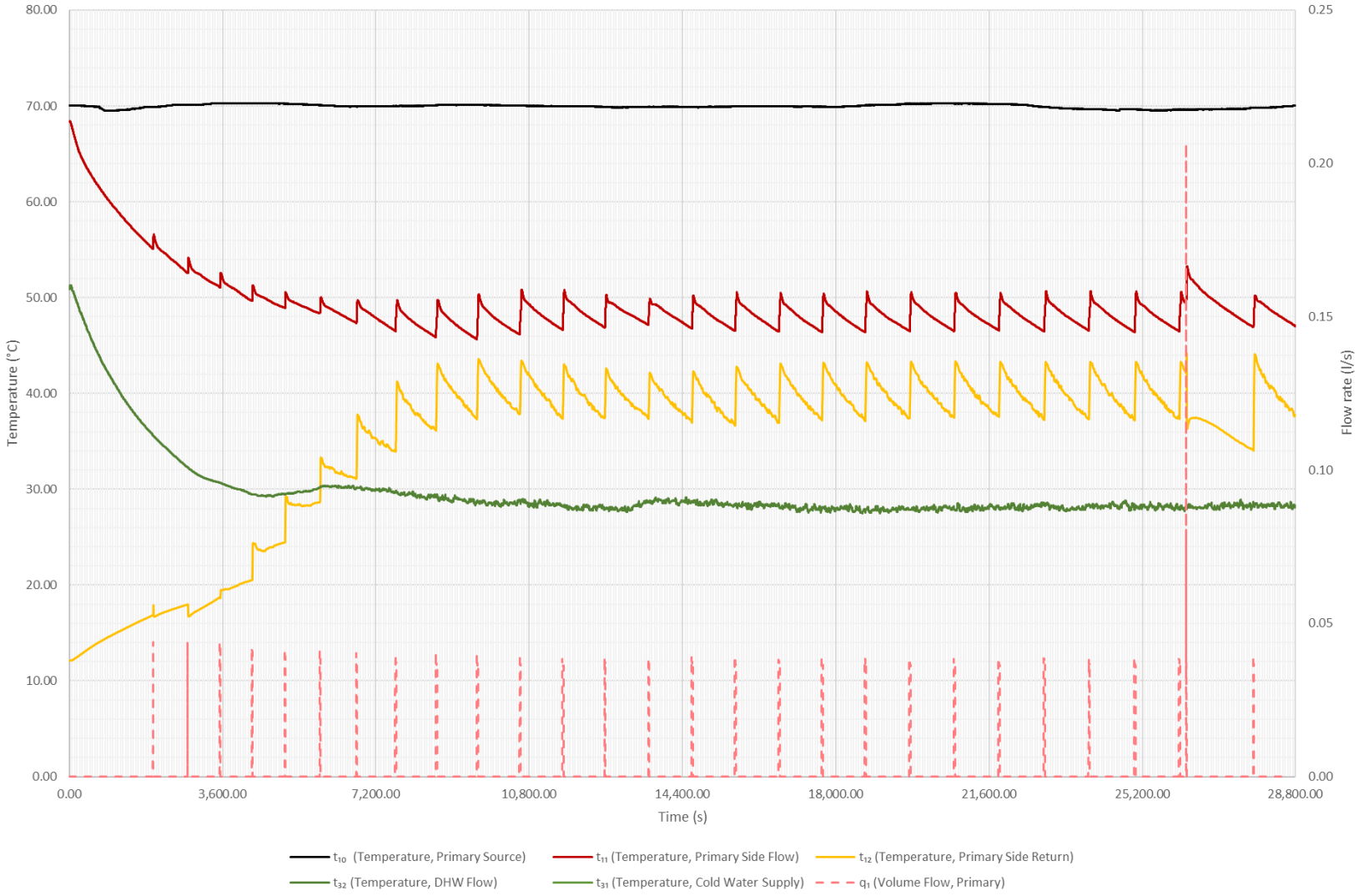

Figure 12 - Test 21a Key Metrics

8.10 Test 22a Information

8.10.1 Objective: To investigate DHW delivery time after a period of at least 8 hours keep warm only operation. This tests if the HIU can supply domestic hot water within an acceptable time of turning on the tap, which is a basic comfort requirement.

8.11 Test 22a Results

8.11.1 The keep warm operation is valid (based on response time criteria shown in Test 22 performance criteria).

8.11.2 Performance criteria results can be seen in Table 29. Test result data can be seen in Table 28 and key metrics can be found in Figure 13. Best practice criteria can be found in table 10.

Table 28 - Module 7, Test 22a Results

Module 7 - Test 22a Results		
Parameter	**Symbol**	**Result**
Time taken for t_{32} to reach 45.0°C and not subsequently drop below 42.0°C	(s)	10
Number of consecutive seconds where t_{32} > 55°C	(s)	0
Mean average volume flow, primary side	q_1 (l/s)	0.087

Table 29 - Module 7, Test 22 Performance Criteria

Module 7 - Test 22 Performance Criteria	
Performance Criteria, Fail if:	**PASS/FAIL**
Fail if the DHW response time takes more than 15 seconds to reach 45.0°C (to one decimal place) at t_{32} while not dropping below 42.0°C (to one decimal place) thereafter	Pass
Fail if DHW temperature (t_{32}) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk	Pass
Fail if primary return temperature (t_{12}) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk	Pass

Table 30 - Module 7 - Test 22 Best Practice

Module 7 – Test 22 – Best Practice Criteria	
Best Practice Criteria if:	**Best Practice**
Best practice if DHW response time at t32 is less than 10 seconds	Not Achieved

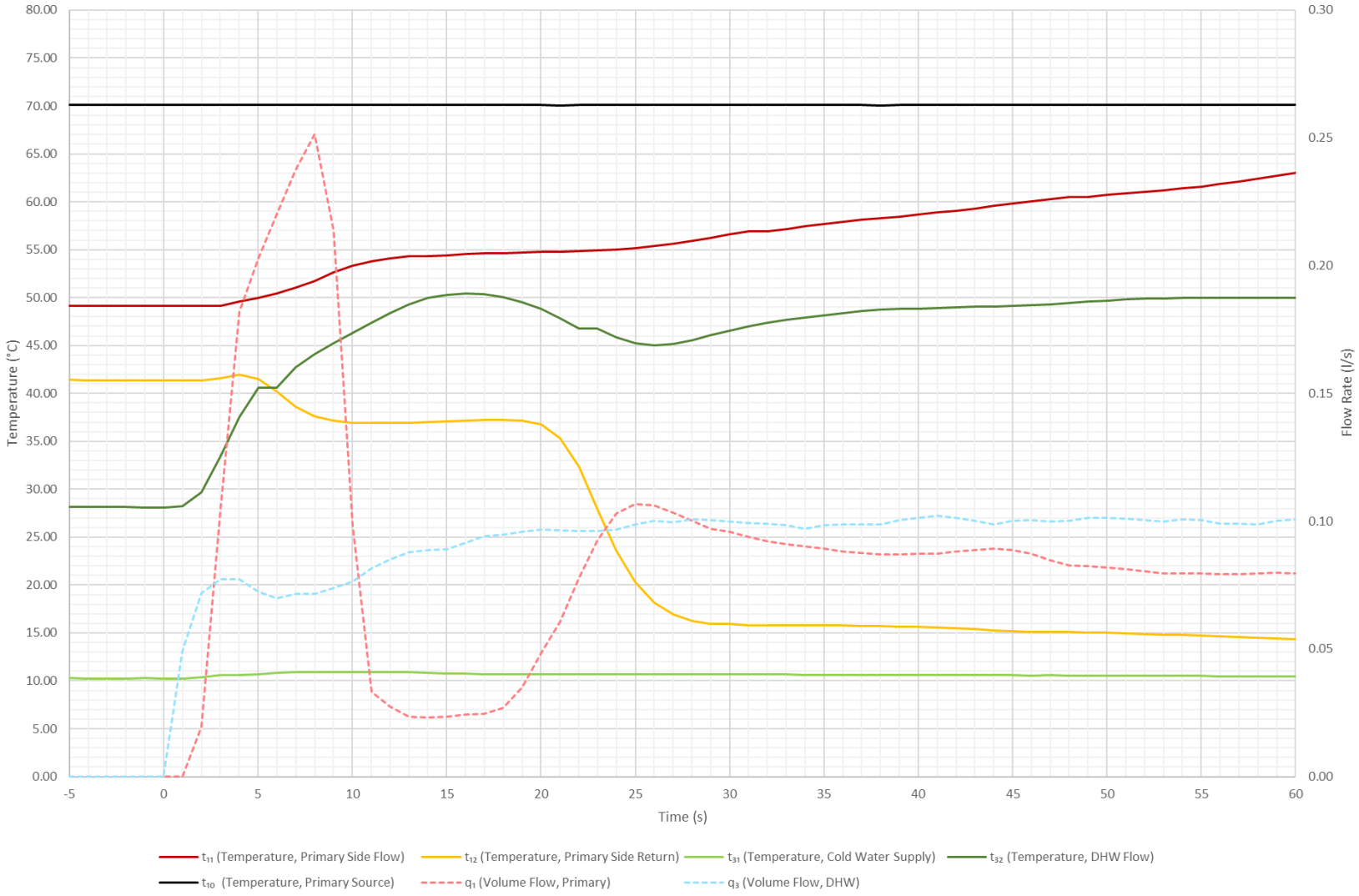

Figure 13 - Test 22a Key Metrics

9 TEST MODULE 8 – DHW, LOW TEMPERATURE, DH55-KWARM

9.1 Test Module 8 Information

9.1.1 Objective: To explore the performance of the HIU under changing loads, as would be the case in practical operation. Key performance criteria are speed and consistency of DHW delivery to the customer; DHW staying at a safe temperature at all times and the volume weighted average return temperature when supplying space heating or DHW.

9.1.2 The following set of tests are from test module 8 – Domestic hot water, low temperature, keep warm hot water module 8-DH55-KWarm.

Table 31 - Module 8 Tests

Module 8 Tests	
11b	DH/55C, DHW only, 50°C DHW, variable dP
12b	DH/55C, DHW Low Flow, 50°C DHW, 50kPa
12d	DH/55C, DHW Low Flow, 50°C DHW, 200kPa
13b	DH/55C, DHW Load Test, 50°C DHW
21b	DH/55C, DHW Keep Warm, 50°C DHW
22b	DH/55C, DHW Keep Warm Response Time, 50°C DHW

9.2 Test 11b Information

9.2.1 Objective: To investigate the performance of the HIU when delivering DHW, at a range of flow rates and differential pressures, given a 55°C primary flow temperature. The test investigates HIU operation in terms of DHW delivery and impacts on primary heat network return temperatures.

9.3 Test 11b Results

9.3.1 Performance criteria results can be seen in Table 33. Test result data can be seen in Table 32 and key metrics can be found in Figure 14. Best practice criteria can be found in table 34.

Table 32 - Module 8, Test 11b Results

Module 8 - Test 11b Results			
Parameter	**Symbol**	**Result**	
Maximum and minimum values of t_{32} when there is DHW flow	t_{32} (°C)	52.9	47.8
Number of consecutive seconds where t_{32} > 55°C	(s)	0	
Overall DHW Volume Weighted Avg. Return Temp	VWART (°C)	18	

Table 33 - Module 8, Test 11b Performance Criteria

Module 8 - Test 11b Performance Criteria	
Performance Criteria, Fail if:	**PASS/FAIL**
Fail if DHW temperature (t_{32}) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk	Pass
Fail if primary return temperature (t_{12}) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk	Pass
Fail if the VWART is above 27°C (to one decimal place)	Pass
Fail if the average DHW temperature (t_{32}) is not 50.0°C ±1°C (to one decimal place) for the final 150 seconds of each of the 180 second DHW flow periods	Pass
Fail if the DHW temperature (t_{32}) is not being maintained at 50.0°C ±3°C (to one decimal place) for >150 seconds of each of the DHW flow periods	Pass
Fail if the DHW temperature (t_{32}) drops below 45.0°C (to one decimal place) for more than 5 consecutive seconds, as this would impact resident comfort	Pass

Table 34 - Module 8 - Test 11 Best Practice

Module 8 – Test 11 – Best Practice Criteria	
Best Practice Criteria if:	**Best Practice**
Best practice if the VWART is less than 20°C (to one decimal place)	Achieved
Best practice if the DHW temperature (t32) is being maintained at 50.0°C ±2°C throughout periods of DHW flow	Not Achieved
Best practice if the DHW temperature (t32) doesn't drop below 45.0°C (to one decimal place) for more than 2 consecutive seconds	Achieved

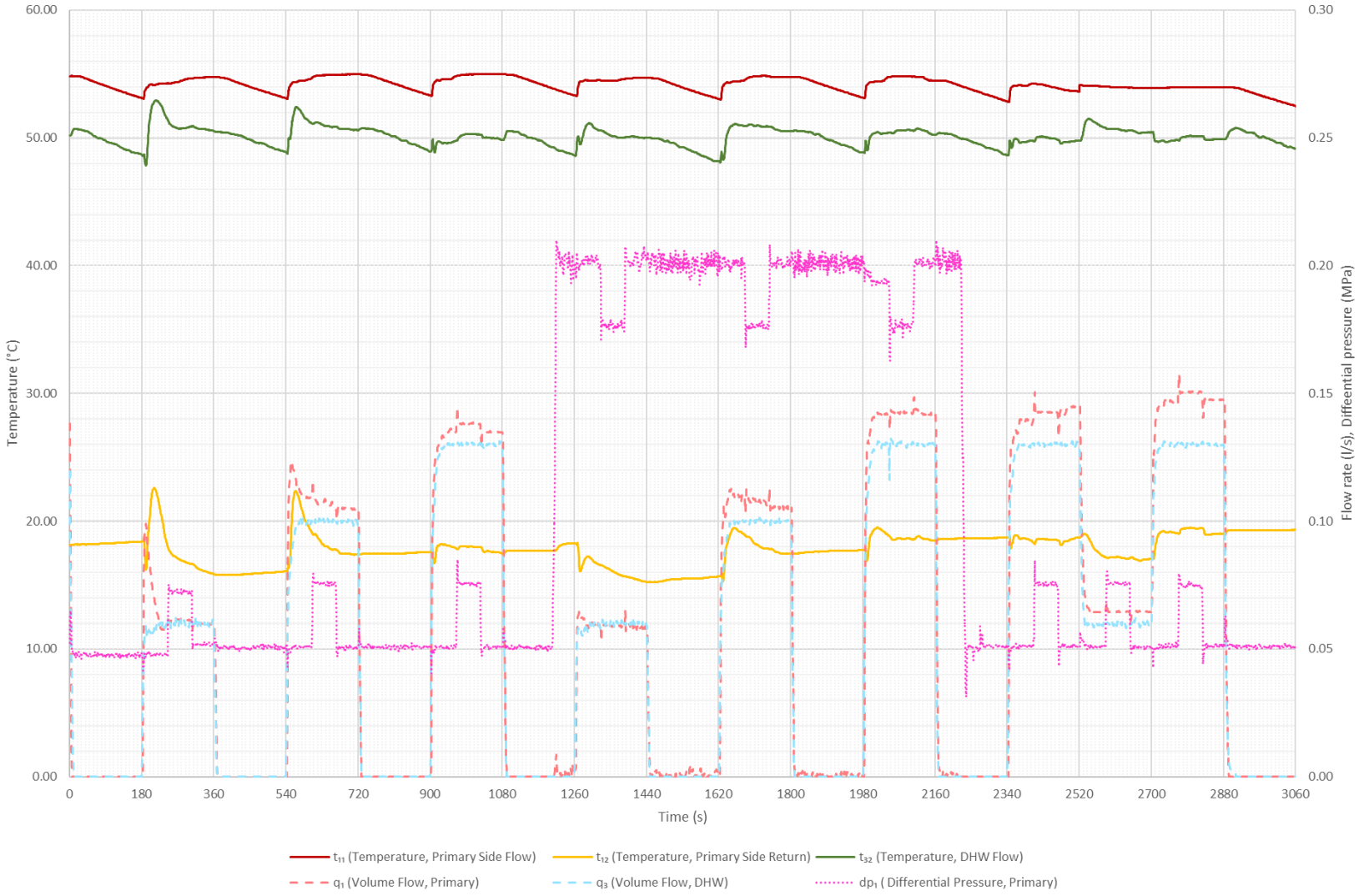

Figure 14 - Test 11b Key Metrics

9.4 Test 12b / 12d Information

9.4.1 Objective: To investigate the stability of DHW temperature at low flow rates. During operation, domestic hot water is sometimes drawn off at extremely low flow rates. Test 12 investigates the ability of the system to meet this condition by measuring the temperature at test point t_{32} at a flow rate of 0.02 l/s.

9.5 Test 12b / 12d Results

9.5.1 The HIU was able to deliver DHW at low flow rate above 45.0°C at the end of the 180 second period of low flow DHW.

9.5.2 The HIU was able to deliver stable DHW flow temperature (at t_{32}), defined as ability to maintain 50.0 ±3.0°C (1 decimal place) during the last 60 seconds of the test.

9.5.3 Performance criteria results can be seen in Table 36. Test result data can be seen in Table 35 and key metrics can be found in Figure 15 and Figure 16. Best practice criteria can be found in table 37.

Table 35 - Module 8, Test 12 Results

Module 8 - Test 12 Results					
Parameter	**Symbol**	**12b Result**		**12d Result**	
Maximum and minimum values of t_{32} when there is low DHW flow	t_{32} (°C)	52.7	32.7	52.0	45.9
Number of consecutive seconds where t_{32} > 55°C	(s)	0		0	

Table 36 - Module 8, Test 12 Performance Criteria

Module 8 - Test 12 Performance Criteria	
Performance Criteria, Fail if:	**PASS/FAIL**
Fail if DHW temperature (t_{32}) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk	Pass
Fail if primary return temperature (t_{12}) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk	Pass
Fail if DHW temperature (t_{32}) is not maintained at 50°C ±3°C (to one decimal place) for more than 60 seconds	Pass

Table 37 - Module 8 - Test 12 Best Practice

Module 8 – Test 12 – Best Practice Criteria	
Best Practice Criteria if:	**Best Practice**
Best practice if DHW temperature (t32) is maintained at 50°C ±2°C (to one decimal place) throughout the test for both test 12b and 12d	Not Achieved

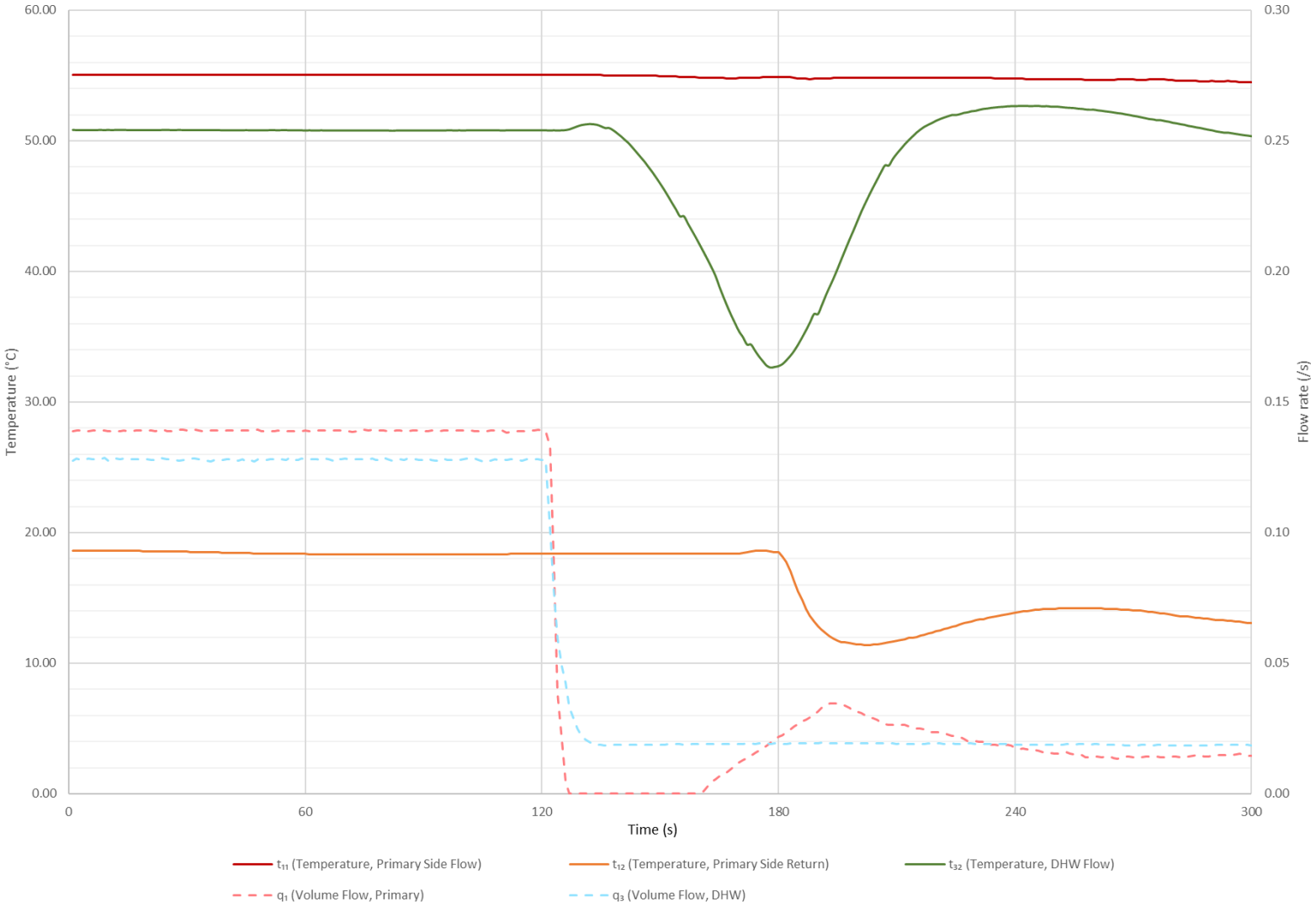

Figure 15 - Test 12b Key Metrics

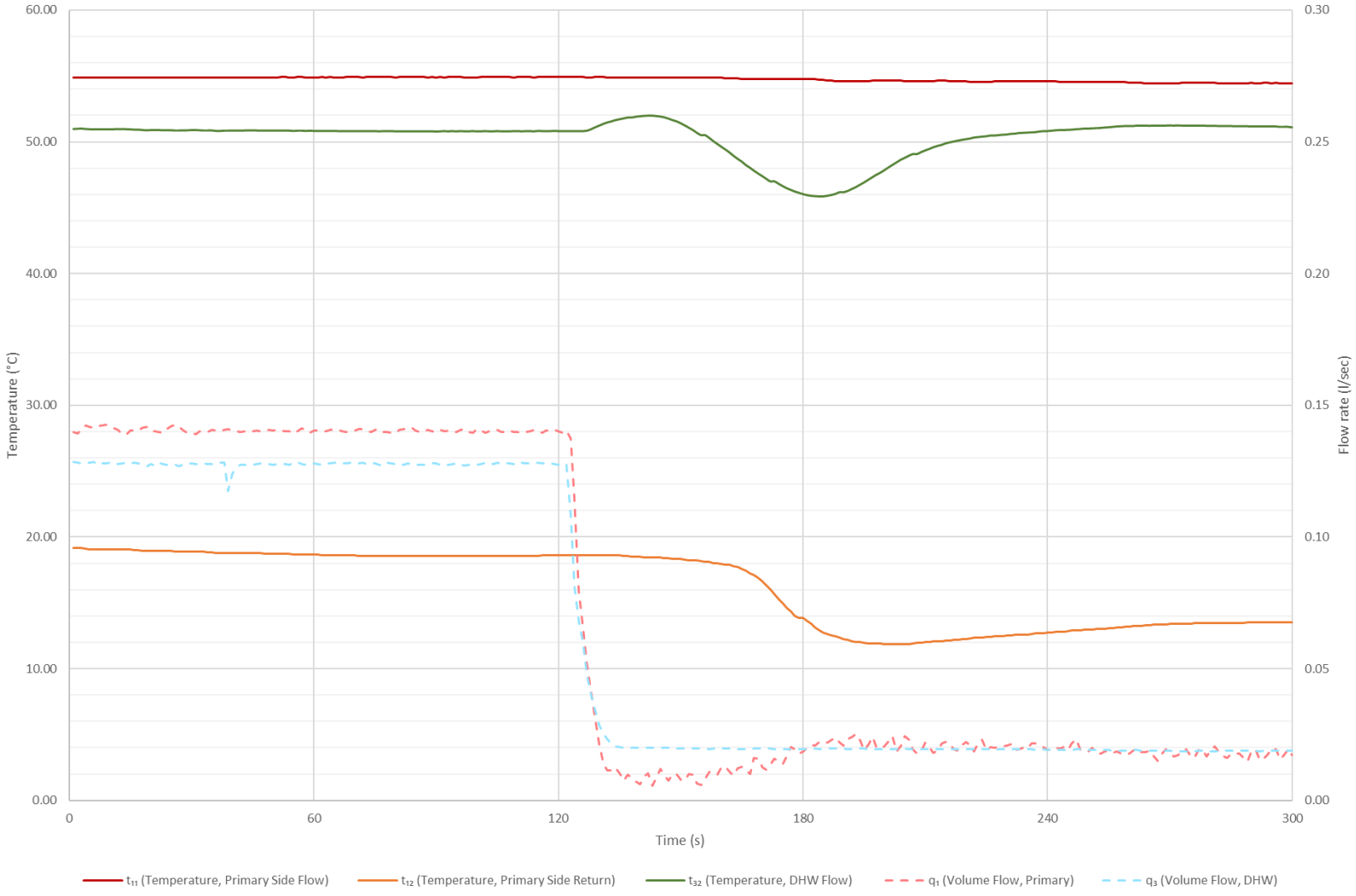

Figure 16 - Test 12d Key Metrics

9.6 Test 13b Information

9.6.1 Objective: To measure the maximum heat output (kW) and flow (l/sec) DHW output that can be delivered from the HIU. The HIU shall be set to deliver 50°C and the maximum DHW power output shall be measured with a flow step change and the peak value recorded when the DHW flow temperature is above 45°C.

9.7 Test 13b Results

9.7.1 The maximum DHW heat output was recorded as 48.06 kW, with a measured flow rate of 0.33 l/s, when producing minimum DHW at 45°C or (45.3°C).

9.7.2 The recorded DHW line pressure drop across the HIU was 60.55 kPa.

9.7.3 The number of consecutive seconds where t_{32} > 55°C was 0 seconds.

9.7.4 Performance criteria results can be seen in Table 38. Test result data can be seen in Table 39 and key metrics can be found in Figure 17.

Table 38 - Module 8, Test 13 Performance Criteria

Module 8 - Test 13 Performance Criteria	
Performance Criteria, Fail if:	**PASS / FAIL**
Fail if DHW (at t_{32}) is less than 50°C ±1.0°C (to one decimal place) at 0.13 l/s flow rate, as the HIU must be able to produce DHW to the target temperature at a moderate load	Pass
Fail if DHW temperature (t_{32}) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk	Pass
Fail if primary return temperature (t_{12}) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk	Pass

Table 39 - Module 8, Test 13b Results

Module 8 - Test 13b Results – Mean Average of Last 10 Seconds											
Parameter	**Symbol**	**0.15 l/s (25kW)**	**0.18 l/s (30kW)**	**0.21 l/s (35kW)**	**0.24 l/s (40kW)**	**0.27 l/s (45kW)**	**0.30 l/s (50kW)**	**0.33 l/s (55kW)**	**0.36 l/s (60kW)**	**0.39 l/s (65kW)**	**0.42 l/s (70kW)**
Temperature, primary side flow connection	t_{11} (°C)	55.1	55.2	55.2	55.3	55.3	55.3	55.3	55.3	N/A	N/A
Temperature, primary side return connection	t_{12} (°C)	19.9	18.8	19.2	19.9	20.2	18.4	16.6	15.6	N/A	N/A
Volume flow, primary side	q_1 (l/s)	0.168	0.192	0.228	0.264	0.297	0.298	0.297	0.297	N/A	N/A
Arithmetic mean of primary side power recorded during test	H_1 (kW)	24.65	29.28	34.40	39.06	43.72	45.97	48.06	49.28	N/A	N/A
Temperature, cold water supply	t_{31} (°C)	10.3	10.1	9.8	10.0	10.0	10.1	9.7	9.8	N/A	N/A
Temperature, domestic hot water flow from HIU	t_{32} (°C)	51.2	50.0	49.8	49.8	49.5	47.6	45.3	43.3	N/A	N/A
Volume flow, domestic hot water	q_3 (l/s)	0.149	0.180	0.210	0.240	0.270	0.301	0.330	0.360	N/A	N/A
Differential pressure, domestic hot water across HIU	dP_3 (kPa)	20	25	32	38	45	53	61	71	N/A	N/A
Arithmetic mean of DHW power recorded during test	H_3 (kW)	25.65	30.13	35.30	40.06	44.86	47.27	49.32	50.47	N/A	N/A

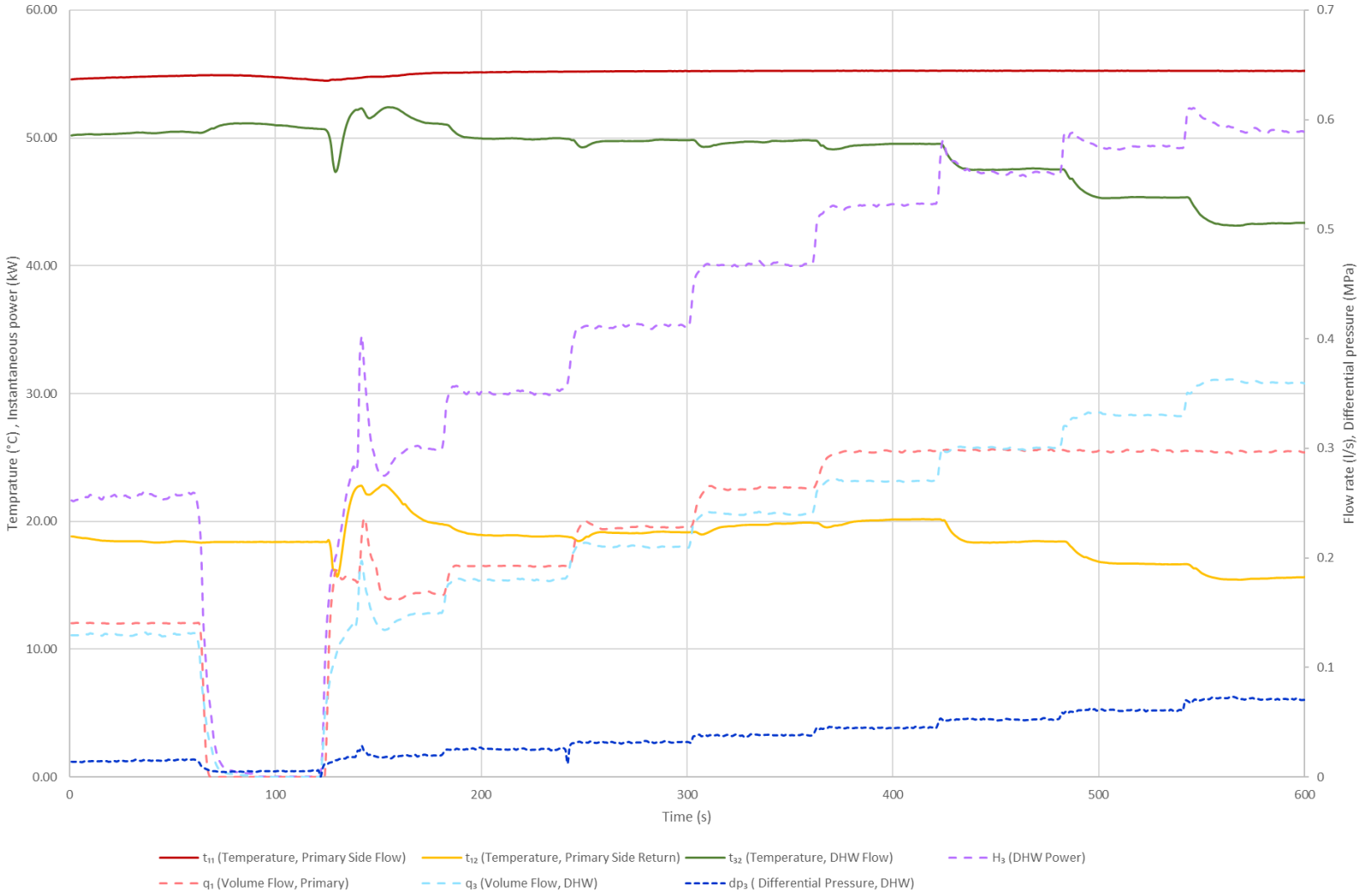

Figure 17 - Test 13b Key Metrics

9.8 Test 21b Information

9.8.1 Objective: To establish HIU performance during periods of no load, when operating in keep warm mode.

9.9 Test 21b Results

9.9.1 The keep warm operation is valid (based on Test 22b response time criteria).

9.9.2 The keep warm undergoes cycling (i.e. t_{11} varies by more than ±3 °C during the final 3 hours of the test).

9.9.3 Performance criteria results can be seen in Table 41. Test result data can be seen in Table 40 and key metrics can be found in Figure 18. Best practice criteria can be found in table 42.

Table 40 - Module 8, Test 21b Results

Module 8 - Test 21b Results		
Parameter	**Symbol**	**Result**
Mean average volume flow, primary side	q_1 (l/s)	0.0015
Mean average of primary side power recorded during test	H_1 (kW)	0.03
Mean average electrical energy use	$W_{electrical}$ (W)	3.0
Mean average thermal energy use	$W_{thermal}$ (W)	34.9
Overall energy loss per day	(kWh)	0.910
Overall Keep Warm Volume Weighted Avg. Return Temp	VWART (°C)	39

Table 41 - Module 8, Test 21 Performance Criteria

Module 8 - Test 21 Performance Criteria	
Performance Criteria, Fail if:	**PASS/FAIL**
Fail if VWART is above 48°C (to one decimal place)	Pass
Fail if primary return temperature (t_{12}) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk	Pass
Fail if the primary supply temperature to the HIU (t_{11}) drops to below 39°C	Pass
Fail if the HIU overall energy losses are greater than 1.0 kWh/day (to three decimal places)	Pass
Fail if the Test 22b DHW temperature response time test fails (i.e. the HIU keep warm operation is not a valid keep warm)	Pass

Table 42 - Module 8 - Test 21 Best Practice

Module 8 – Test 21 – Best Practice Criteria	
Best Practice Criteria if:	**Best Practice**
Best practice if VWART is below 44°C (to one decimal place)	Achieved
Best practice if HIU overall energy losses are less than 0.7 kWh/day (to three decimal places)	Not Achieved

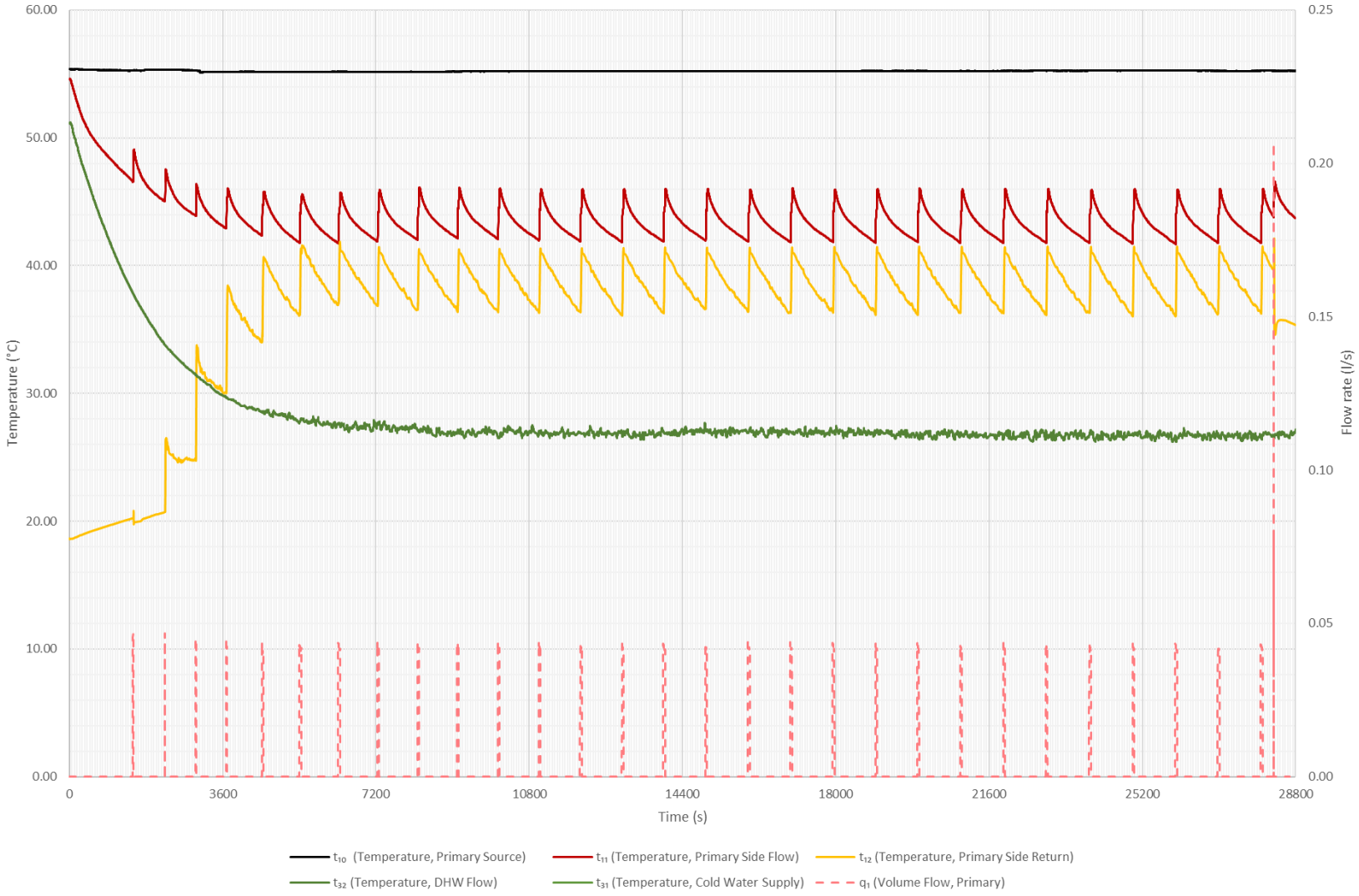

Figure 18 - Test 21b Key Metrics

9.10 Test 22b Information

9.10.1 Objective: To investigate DHW delivery time after a period of at least 8 hours keep warm only operation. This tests if the HIU can supply domestic hot water within an acceptable time of turning on the tap, which is a basic comfort requirement.

9.11 Test 22b Results

9.11.1 The keep warm operation is valid (based on response time criteria shown in Test 22 performance criteria).

9.11.2 Performance criteria results can be seen in Table 44. Test result data can be seen in Table 43 and key metrics can be found in Figure 19. Best practice criteria can be found in table 45.

Table 43 - Module 8, Test 22b Results

Module 8 - Test 22b Results		
Parameter	**Symbol**	**Result**
Time taken for t_{32} to reach 45.0°C and not subsequently drop below 42.0°C	(s)	14
Number of consecutive seconds where t_{32} > 55°C	(s)	0
Mean average volume flow, primary side	q_1 (l/s)	0.116

Table 44 - Module 8, Test 22 Performance Criteria

Module 8 - Test 22 Performance Criteria	
Performance Criteria, Fail if:	**PASS/FAIL**
Fail if the DHW response time takes more than 15 seconds to reach 45.0°C (to one decimal place) at t_{32} while not dropping below 42.0°C (to one decimal place) thereafter	Pass
Fail if DHW temperature (t_{32}) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk	Pass
Fail if primary return temperature (t_{12}) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk	Pass

Table 45 - Module 8 - Test 22 Best Practice

Module 8 – Test 21 – Best Practice Criteria	
Best Practice Criteria if:	**Best Practice**
Best practice if DHW response time at t32 is less than 10 seconds	Not Achieved

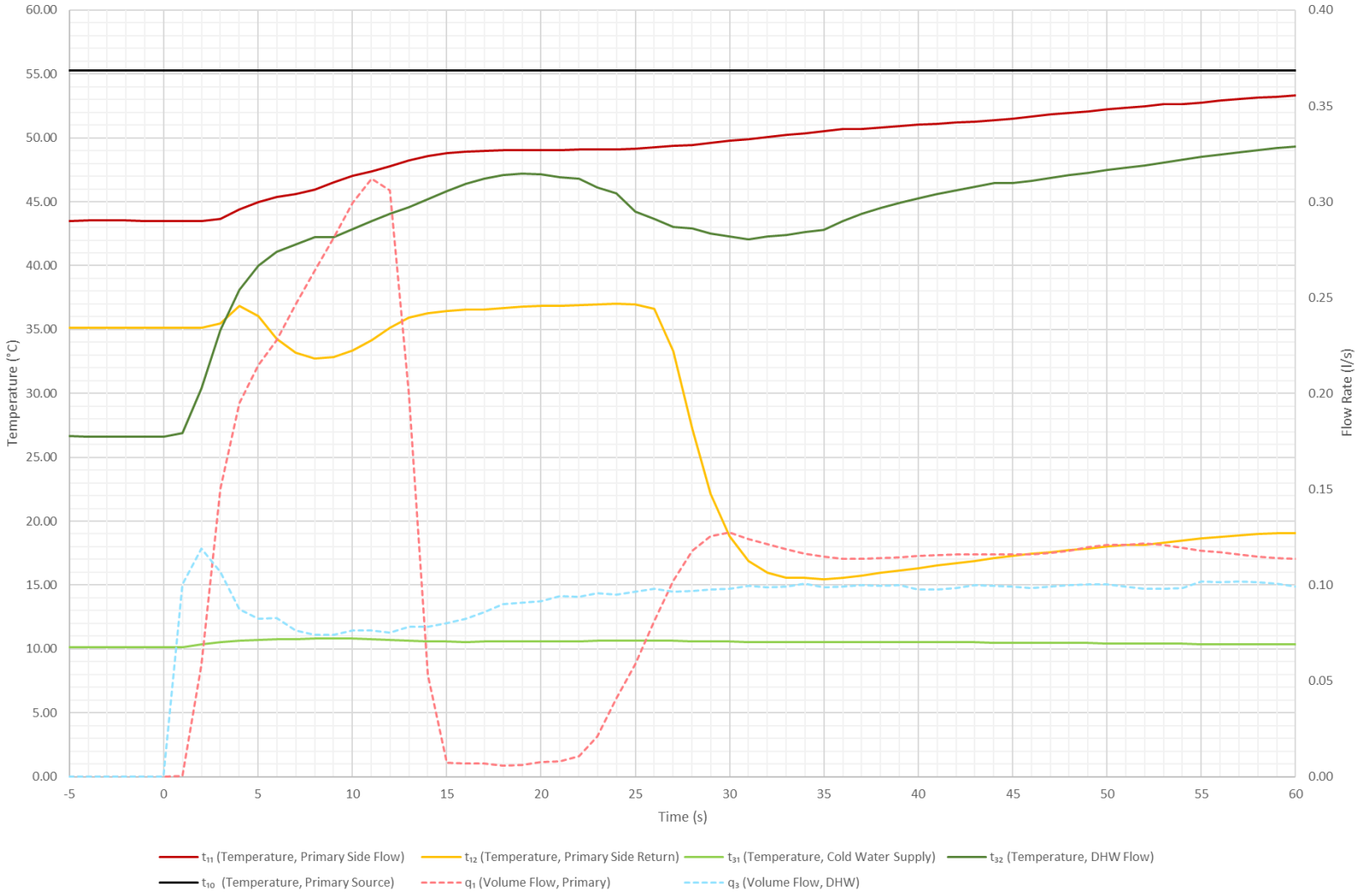

Figure 19 - Test 22b Key Metrics

10 CONCLUSIONS

All conclusions, opinions and interpretations indicated in this report are outside the scope of Enertek's UKAS accreditation.

10.1.1 The HIU has passed the requirements of the BESA UK HIU BESA Technical Standard for UK HIU Test Regime, V3-Rev001 September 2023.

11 EQUIPMENT AND INSTRUMENT LIST

EQUIPMENT NAME	ID NUMBER	CERTIFICATE NUMBER	MEASUREMENT UNCERTAINTY K=2	CALIBRATION DATE	CALIBRATION DUE
Cold Water Supply Probe	PRT 5002	CAL 000292	0.077 °C	27/04/2023	04/2024
DHW Outlet Probe	PRT 5003	CAL 000292	0.077 °C	27/04/2023	04/2024
Primary Inlet Probe	PRT 5004	CAL 000292	0.077 °C	27/04/2023	04/2024
Primary Return Probe	PRT 5005	CAL 000292	0.077 °C	27/04/2023	04/2024
SH Flow Probe	PRT 5006	CAL 000292	0.077 °C	27/04/2023	04/2024
SH Return Probe	PRT 5007	CAL 000292	0.077 °C	27/04/2023	04/2024
Primary Flow T[10]	PRT 5008	CAL 000292	0.077 °C	27/04/2023	04/2024
Flow Meter	FM 601	3953070009	0.006 l/sec	07/11/2022	04/2024
Flow Meter	FM 602	3953070011	0.0025 l/sec	09/11/2022	04/2024
Flow Meter	FM 603	3953070012	0.0046 l/sec	13/11/2022	04/2024
Flow Meter	FM 605	3953070010	0.001 l/sec	14/11/2022	04/2024
Pressure Transducer	PT 083	395307005	6.87 kPa	31/10/2022	04/2024
Pressure Transducer	PT 084	3953070003	8.33 kPa	18/10/2022	04/2024
Pressure Transducer	PT 085	3953070002	7.46 kPa	18/10/2022	04/2024
Pressure Transducer	PT 086	3953070004	7.23 kPa	18/10/2022	04/2024
Pressure Transducer	PT 087	3953070006	7.10 kPa	19/10/2022	04/2024
Pressure Transducer	PT 088	3953070007	6.54 kPa	19/10/2022	04/2024
Power Meter	PM 1022	3953070008	0.16 W	11/01/2023	01/2024
Pipe	PIPE 001	-	-	27/04/2024	04/2024

The reported expanded uncertainty is based on a standard uncertainty by a coverage factor K = 2, providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with BS EN ISO/IEC 17025:2017 requirements.

12 APPENDIX A

12.1 VWART Calculations for Modules 1 & 7

	VWART (°C)	Volume (m^3)
DHW	12	35.5
Standby	39	24.0
Space Heating	36	62.4

	VWART (°C)
Summer	23
Winter	29
Overall	26

	DHW Draw Test Results			Post DHW Draw (60 seconds)	
	Power (W)	Primary Flow (m^3/hr)	VWART (°C)	Primary Volume (m^3)	VWART (°C)
Low	9291	0.1	12	1.35	12
Medium	15158	0.2	12	0.30	12
High	19789	0.3	13	0.29	12

DHW Draw Volumes pa		
kWh pa	Hours	Volume pa (m^3)
729	78.47	10.6
297	19.59	4.5
444	22.44	6.7

Post DHW Draw Volumes pa	
Events pa	Volume pa (m^3)
10000	13.465
660	0.200
300	0.087

Standby Test Results	
Primary Flow (m^3/hr)	VWART (°C)
0.0032	39

Standby Volumes pa	
Hours	Volume pa (m^3)
7485	23.955

	Space Heating					
	Power (W)	Primary Flow (m^3/hr)	VWART (°C)	kWh pa	Hours	Volume pa (m^3)
0.5kW	479	0.013	36	98	205	2.73
1kW	975	0.056	35	787	807	45.31
4kW	4028	0.103	36	565	140	14.40

12.1.1 It should be noted that all VWART figures are to within ±2°C tolerance.

12.2 VWART Calculations for Modules 2 & 8

	VWART (°C)	Volume (m^3)
DHW	17	41.2
Standby	39	41.4
Space Heating	35	79.4

	VWART (°C)
Summer	28
Winter	32
Overall	30

	DHW Draw Test Results			Post DHW Draw (60 seconds)	
	Power (W)	Primary Flow (m^3/hr)	VWART (°C)	Primary Volume (m^3)	VWART (°C)
Low	9696	0.2	17	0.75	16
Medium	15847	0.4	18	0.17	18
High	20341	0.5	18	0.16	18

DHW Draw Volumes pa		
kWh pa	Hours	Volume pa (m^3)
729	75.18	16.1
297	18.74	7.1
444	21.83	10.3

Post DHW Draw Volumes pa	
Events pa	Volume pa (m^3)
10000	7.499
660	0.114
300	0.047

Standby Test Results	
Primary Flow (m^3/hr)	VWART (°C)
0.0056	39

Standby Volumes pa	
Hours	Volume pa (m^3)
7448	41.358

	Space Heating					
	Power (W)	Primary Flow (m^3/hr)	VWART (°C)	kWh pa	Hours	Volume pa (m^3)
0.5kW	448	0.022	35	98	219	4.75
1kW	949	0.059	35	787	829	48.63
4kW	3873	0.178	36	565	146	26.01

12.2.1 It should be noted that all VWART figures are to within ±2°C tolerance.

13 APPENDIX B

13.1 Appliance Documentation

13.1.1 The details of the appliance documentation are given in Table 46 below.

Table 46 - Appliance Documentation

#	Component:	Document Submitted (Y/N):	Manufacturer and type:
1	Space Heating Heat Exchanger	Y	SWEP E8LAS W-10
2	Domestic Hot Water Heat Exchanger	Y	SWEP E8LAS N-50
3	Controller for Space Heating and Hot Water Heating	Y	EBM Papst TR-04 basic with powerpack
4	Control Valve and Actuator for Space Heating	Y	Frese optima compact with fast acting actuator
5	Space Heating Strainer	N	Tojato insert filter
6	Control Valve and Actuator for Hot Water Heating	Y	Frese optima compact with fast acting actuator
7	Temperature Sensors	Y	Tasseron clip sensor
8	Domestic Hot Water Isolating Valve	Y	Watts
9	Primary Side Strainer	Y	Barberi filter
10	Drain Valves	N/A	
11	Vent Valve	N	Flamco type C
12	Circulation Pump	Y	Grundfos UPM3 auto
13	Heat Meter	Y	Axioma E3 energy meter
14	Domestic Hot Water Flow Sensor	Y	Sika VTY
15	Pipes	N	Copper
16	Connections	N	¾'' Union CW724R ecobrass and gaskets
17	Joints	N	Tojato CW724R ecobrass 90° connections and T-pieces
18	Gaskets	Y	Reinz ¾''
19	O Rings	N/A	
20	Pressure Sensor	Y	Huba 505 DE
21	Expansion Vessel	Y	Elbi ERP-RETT 8 litre
22	Insulation	Y	Synprodo EPP insulation

A1	Commissioning Guide	Y	
A2	Operation Guide	Y	
A3	Declaration of Conformity	Y	
A4	Full Parameter List	Y	Commissioning guide provided
A5	Maximum Primary Static Operating Differential Pressure		Max. primary static pressure 16Bar Max. differential pressure 600 kPa
	Software Version		EBM Papst AC74
	Model Name and Type Number		7867470 - AquaHeat HI/HWI - 4/50 with heat meter & mercurius* 7867472 – 7867470 - AquaHeat HI/HWI - 4/50* *Units are the same, only with or without heat meter & mercurius
	Serial Number		F0500240000372
	Any other components stated by manufacturer		Mercurius: Quectel - BG95-M3

13.2 Appliance Photographs

Figure 20 - HIU with Outer Case Fitted

Figure 21 - HIU with Outer Case Removed

Figure 22 – Name Plate with Model Details and Serial Number

14 APPENDIX C

14.1 UK Declaration of Conformity

BDR THERMEA GROUP

CE

EU - Declaration of Conformity

Name and address manufacturer:	**Name and address authorised representative:**
Baxi Heating UK Limited Brooks House, Coventry Road Warwick CV34 4LL, United Kingdom	BDR Thermea Group B.V. Kanaal Zuid 106 – 7332 BD Apeldoorn - The Netherlands

Declares that the products described below are in conformity with the relevant European Union harmonisation legislation. This declaration is issued under the sole responsibility of the manufacturer.

Generic name: HI/HWI series

Function: Generation of instantaneous domestic hot water and the supply of indirect space heating

Type: HI/HWI series

Commercial name: HI/HWI series

Directive/Regulation

Radio Equipment Directive 2014/53/EU*

Pressure Equipment Directive 2014/68/EU

RoHS Directive 2011/65/EU & Delegated Directive (EU) 2015/863

The following harmonised standards and, where applicable, technical standards and specifications have been used

EN ISO 12100:2010

EN IEC 63000:2018

EN IEC 60335-1:2020

EN IEC 55014-1:2021

EN IEC 55014-2:2021

**see also declarations/reports or appliance documentation for the applicable Mercurius radio module for frequency bands and maximum power in these bands.*

Signed for and on behalf of BDR Thermea Group B.V.

Place and date of issue:
Apeldoorn, June 6, 2024

name:
Elisabeth van der Heijden (proxy holder)

Signature:

Figure 23 – UK Declaration of Conformity

14.2 Water Regulation 4 Certificate

Recognises that

Baxi Heating UK Limited

Brooks House, Coventry Road, Warwick CV34 4LL

Has had the following products certified as complying with:
The requirements of Regulation 4.1.a of the Water Supply (Water Fittings) Regulations 1999 in England and Wales,
the Water Supply (Water Fittings) (Scotland) Byelaws 2014 and the Water Supply (Water Fittings) Regulations (Northern Ireland) 2009

Description: AquaHeat Range of Heat Interface Units

Models: 7867470, 7867471, 7867472, 7867473, 7867476 & 7867477

For full details of the certified range of products and any restrictions, please visit the NSF REG4 section of the official NSF listings at nsf.org
Products appearing in the NSF official listing for the REG4 S3 Scheme are authorised to bear the NSF Mark on the left below.
Please refer to the NSF REG4 Certification Policies for mark usage requirements.

Certified Product to NSF REG4 S3

Simon Warburton – Operations Manager

Certificate Number: 2405945
Issue Date: 21-May-2024
Expiry Date: 20-May-2029

UKAS PRODUCT CERTIFICATION 0110

This certificate is the property of NSF and must be returned upon request. This certificate remains valid as long as the referenced products are listed in the NSF official listing for the referenced standard. For the most current and complete listing information, please access NSF's website (www.nsf.org).

NSF Wales Limited (Trading as NSF) Unit 30 Fern Close, Pen-Y-Fan Industrial Estate, Oakdale, Gwent, NP11 3EH Tel: +44(0) 1495 236 260

Figure 24 - Water Regulation 4 Certificate

15 BIBLIOGRAPHY

[1] *BESA (Building Engineering Services Association) UK HIU (Heat Interface Unit) Test regime Technical Specification*, V3-Rev001 September 2023

[2] *Technical Standard for UK HIU Test Regime - Space Heating, High Temperature, Indirect HEATING MODULE 1-DH70 Indirect*, Version 1: 2023

[3] *Technical Standard for UK HIU Test Regime - Space Heating, Low Temperature, Indirect HEATING MODULE 2-DH55 Indirect*, Version 1: 2023

[4] *Technical Standard for UK HIU Test Regime - Domestic Hot Water, High Temperature, Keep Warm HOT WATER MODULE 7-DH70-KWarm*, Version 1: 2023

[5] *Technical Standard for UK HIU Test Regime - Domestic Hot Water, Low Temperature, Keep Warm HOT WATER MODULE 8-DH55-KWarm*, Version 1: 2023

Report Issue No	Reason for Report Update
1	Original issue
2	Changing decimal places and significant figures in tables
3	Changing of decimal places for flow rate in space heating tables

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