Enertek International

International Consultants in Product
Research, Design, Development
& Certification

BESA HIU Test Report

vTherm°e (Cu)

Modules Tested: 1, 2, 7 & 8

Client: Vital Energi Utilities Ltd

Project Number: E5081 Report Issue: 5

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1 EXECUTIVE SUMMARY

1.1.1 The vTherm°e (Cu) 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:	Vital Energi Utilities Ltd
Model:	vTherm°e (Cu)
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	13	25.8
Standby	33	15.4
Space Heating	35	45.4

	VWART (°C)
Summer	21
Winter	28
Overall	25

Table 4 - Modules 2 & 8 VWART Information

	VWART (°C)	Volume (m^3)
DHW	20	45.0
Standby	38	39.0
Space Heating	35	60.6

	VWART (°C)
Summer	28
Winter	31
Overall	30

1.1.2 It should be noted that all VWART figures are 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 vTherm°e (Cu).

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.

4.1.2 The HIU rig schematic is shown within Figure 1.

4.1.3 The HIU was commissioned in accordance with the technical manual / installation guide provided by Vital Energi Utilities Ltd.

4.2 Appliance Details

4.2.1 Details of the HIU vTherm°e (Cu) 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	Vital Energi Utilities Ltd
Model	vTherm°e (Cu)
Serial Number	140000-000001
Year of Manufacture	2024
DHW Priority	Yes
EUT Number	EUT 0770
Date Test Item Received	30/09/2024

4.3 Appliance Design Pressures and Temperatures

4.3.1 The maximum design pressures and temperatures of the vTherm°e (Cu) 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	4	90
Secondary Side Space Heating	2.5	-	80
Secondary Side DHW	10	-	60

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 01.

5.1.3 Testing was carried out in accordance with Test Module 02.

5.1.4 Testing was carried out in accordance with Test Module 07.

5.1.5 Testing was carried out in accordance with Test Module 08.

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.

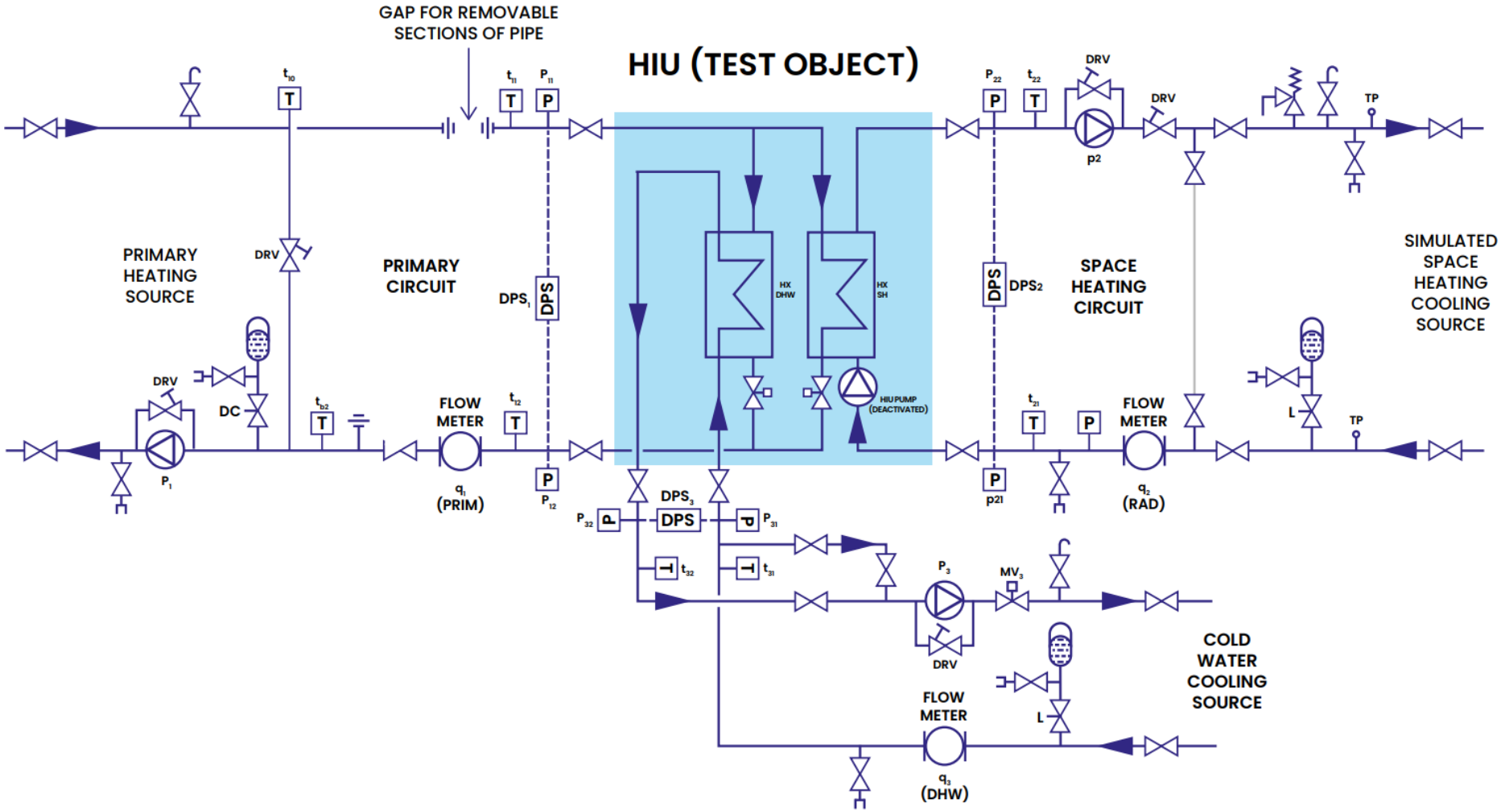


Figure 1 - EIL's HIU Test Rig Schematic, which is taken from Appendix B, Figure 4, of Technical Standard for UK HIU Test Regime Version 3: 2023

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

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

6.2.1 Figure 4. Best practise 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 Criteria

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)	69.8	69.7	70.3
Temperature, primary side return connection	t_{12} (°C)	35.2	35.0	35.4
Volume flow, primary side	q_1 (l/s)	0.0041	0.011	0.028
Differential pressure, primary system across HIU	dP_1 (kPa)	54	201	53
Arithmetic mean of primary side power recorded during test	H_1 (W)	600.4	1578.3	4026.2
Temperature, space heating system return connection	t_{21} (°C)	35.3	35.0	35.0
Temperature, space heating system flow connection	t_{22} (°C)	55.3	55.4	55.5
Volume flow, space heating system	q_2 (l/s)	0.0065	0.012	0.047
Differential pressure, space heating system across HIU	dP_2 (kPa)	3	3	0
Arithmetic mean of space heating power during test	H_2 (W)	533.9	1065.7	4076.9
Volume Weighted Avg. Return Temp	VWART (°C)	35	35	35
Overall VWART (°C)		35		

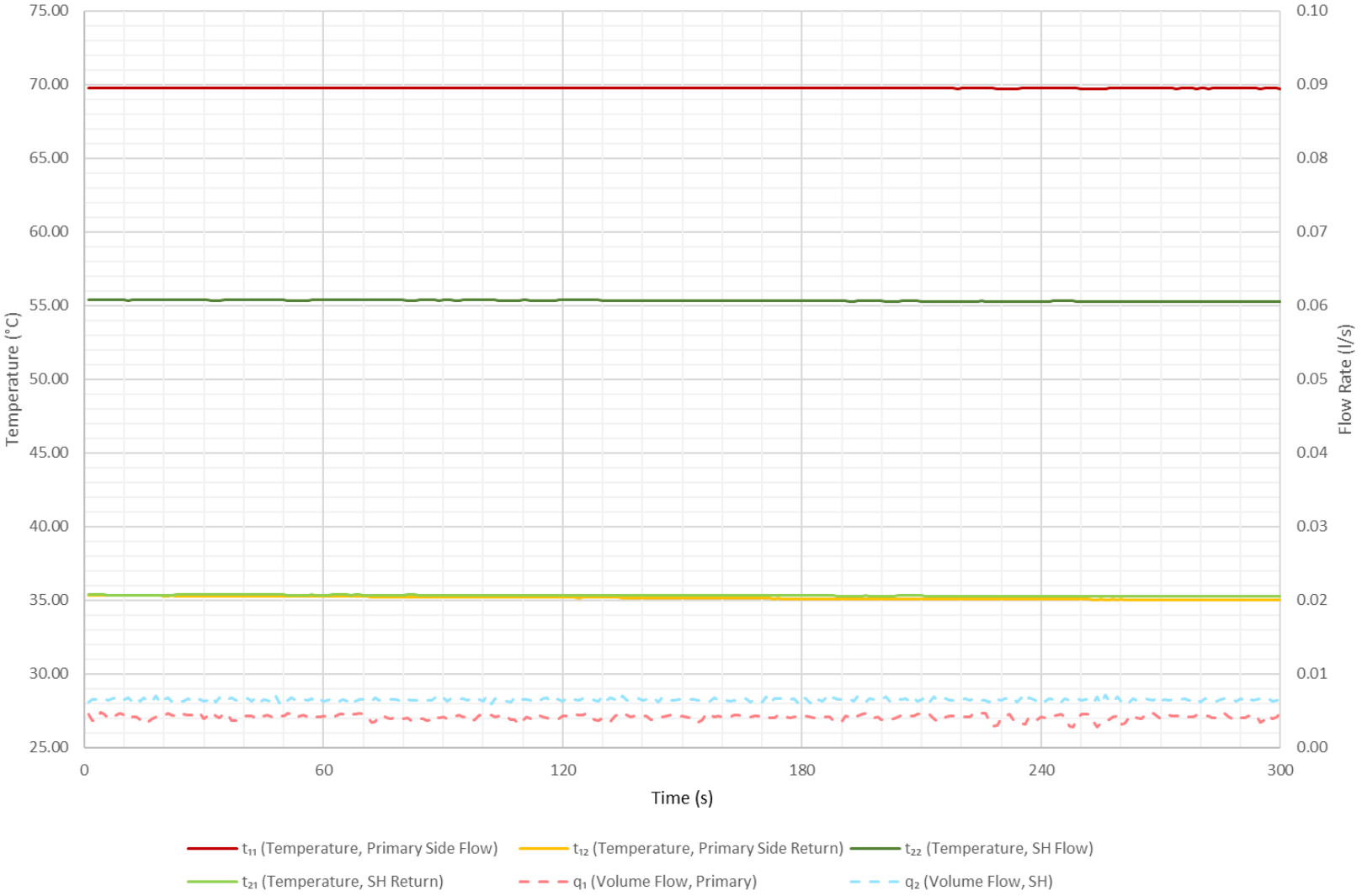


Figure 2 - Test 01a Key Metrics

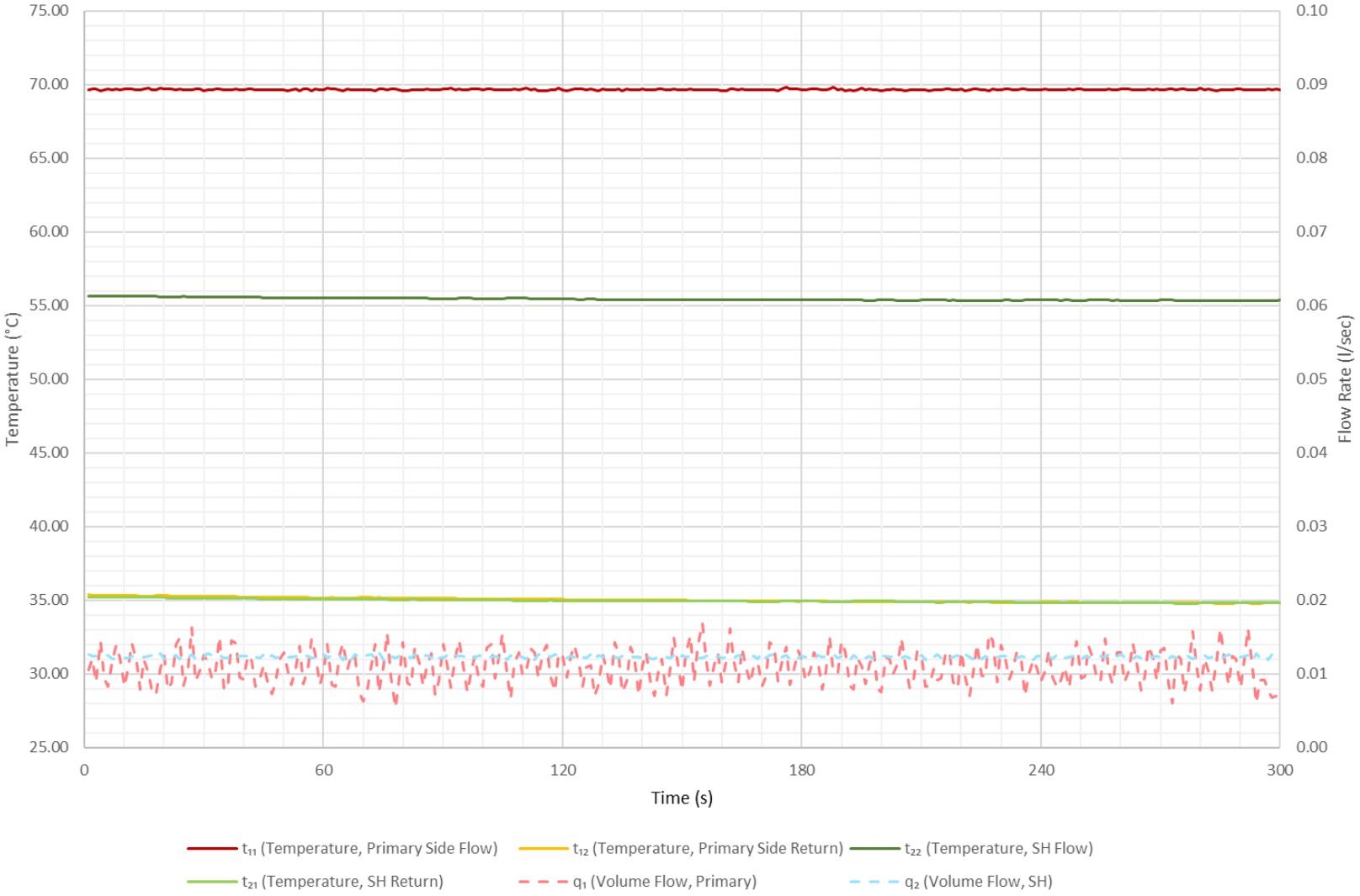


Figure 3 - Test 01b Key Metrics

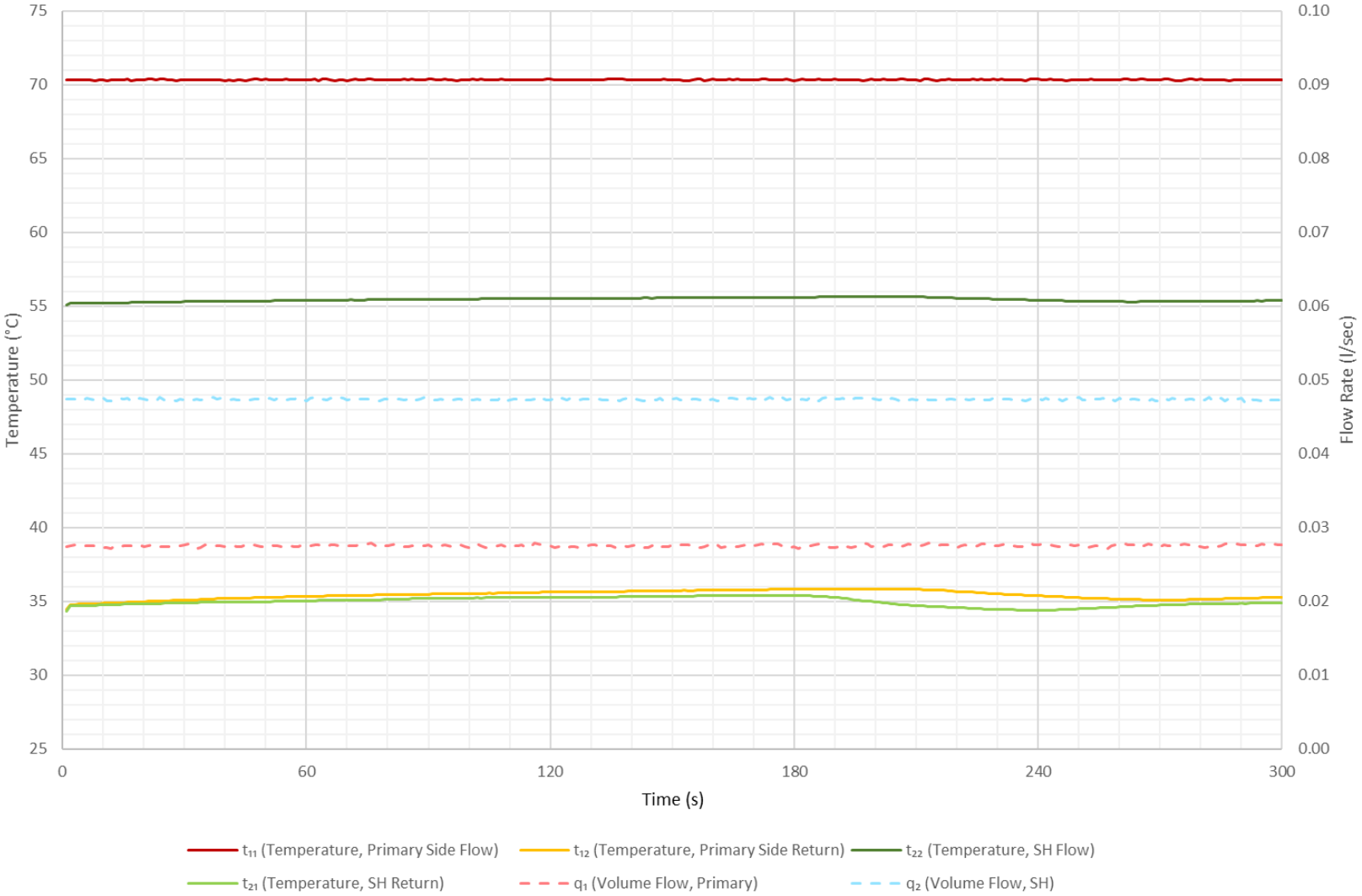


Figure 4 - Test 01c Key Metrics

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 practise 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 Criteria

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)	55.3	55.2	54.8
Temperature, primary side return connection	t_{12} (°C)	34.8	34.5	34.9
Volume flow, primary side	q_1 (l/s)	0.0064	0.013	0.049
Differential pressure, primary system across HIU	dP_1 (kPa)	54	203	55
Arithmetic mean of primary side power recorded during test	H_1 (W)	568.0	1124.5	4270.8
Temperature, space heating system return connection	t_{21} (°C)	35.1	34.5	34.6
Temperature, space heating system flow connection	t_{22} (°C)	45.4	45.4	45.3
Volume flow, space heating system	q_2 (l/s)	0.012	0.024	0.097
Differential pressure, space heating system across HIU	dP_2 (kPa)	3	3	3
Arithmetic mean of Space heating power during test	H_2 (W)	529.0	1106.6	4350.1
Volume Weighted Avg. Return Temp	VWART (°C)	35	34	35
Overall VWART (°C)		35		

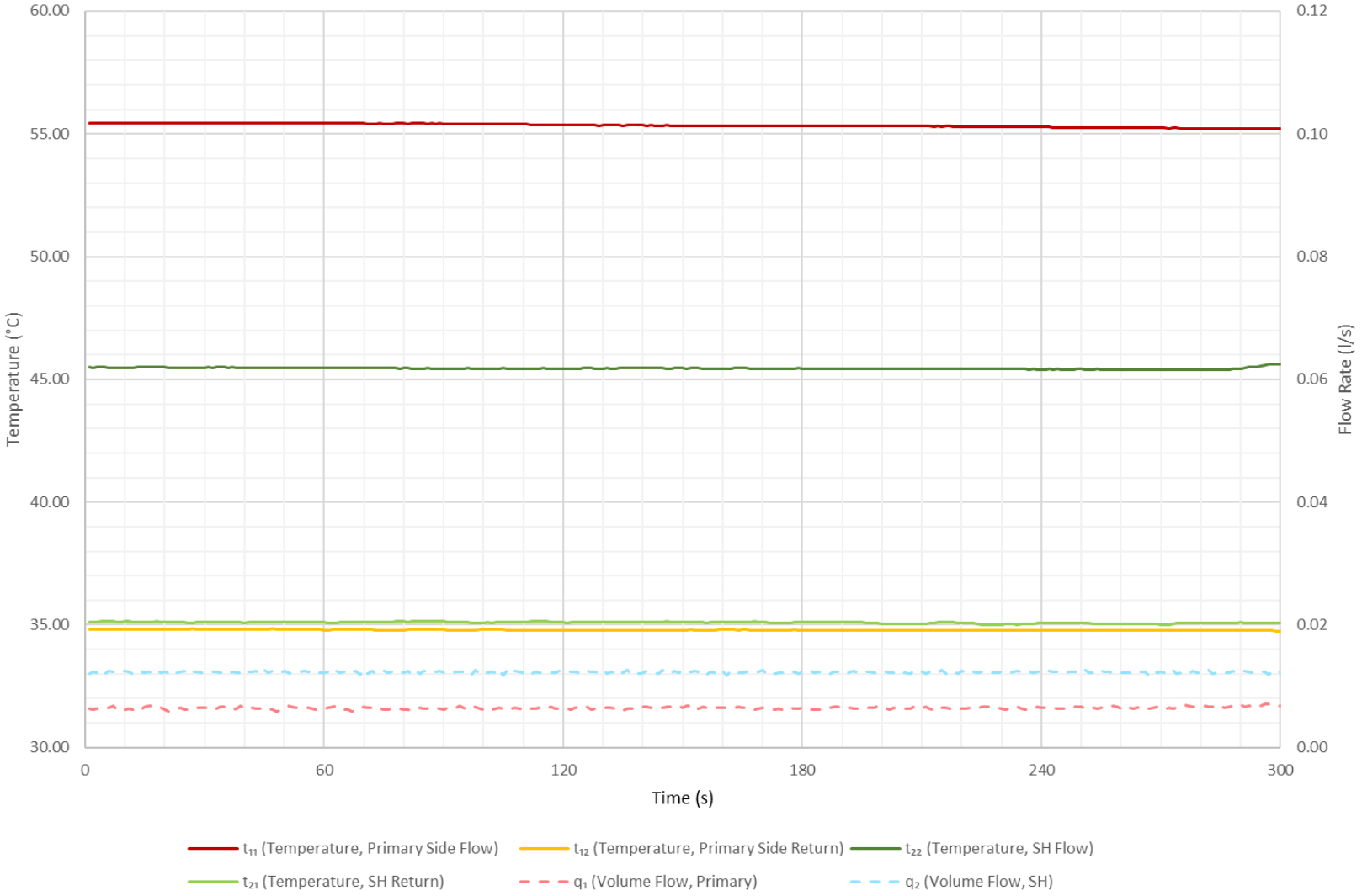


Figure 5 - Test 01d Key Metrics

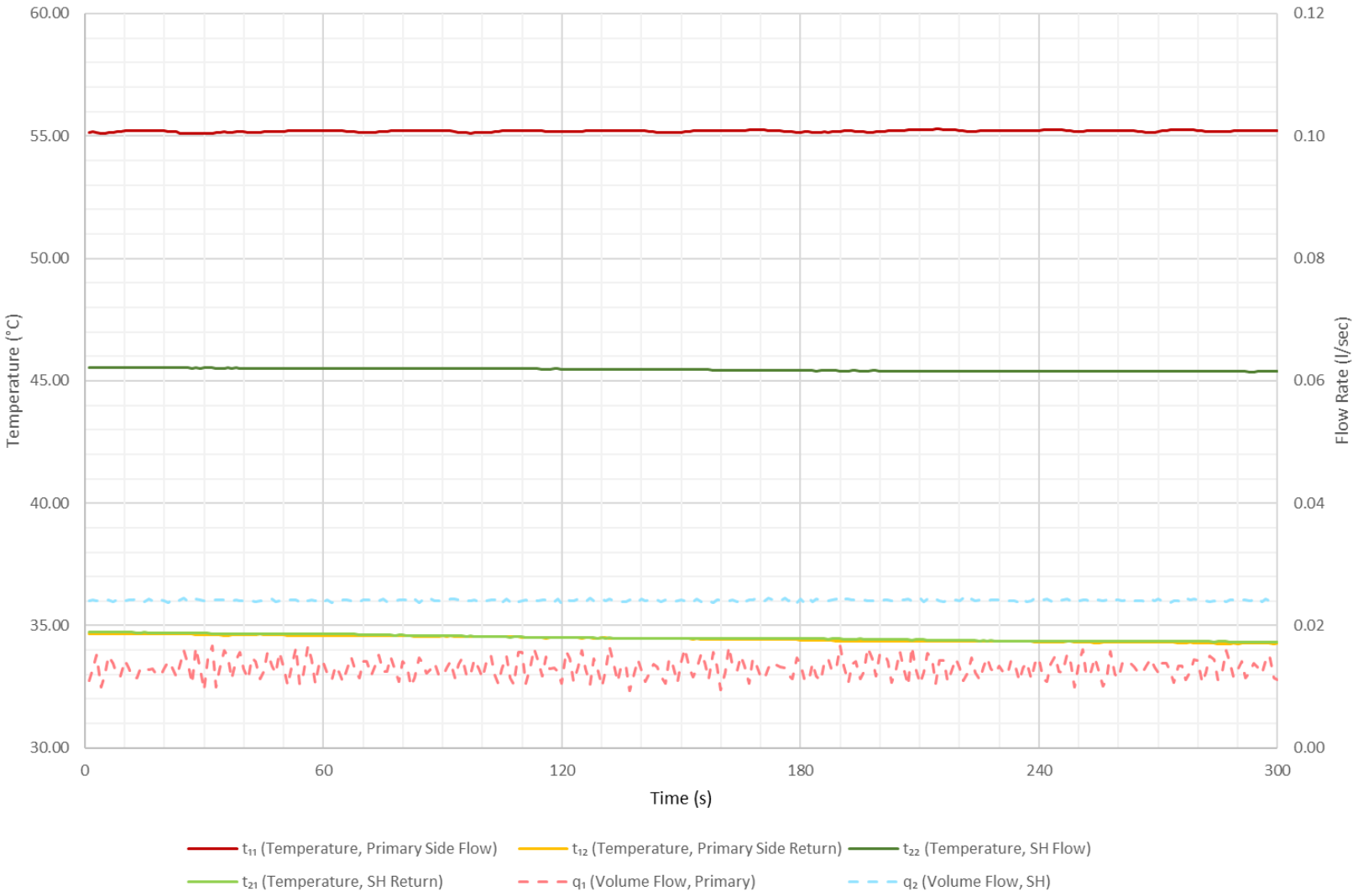


Figure 6 - Test 01e Key Metrics

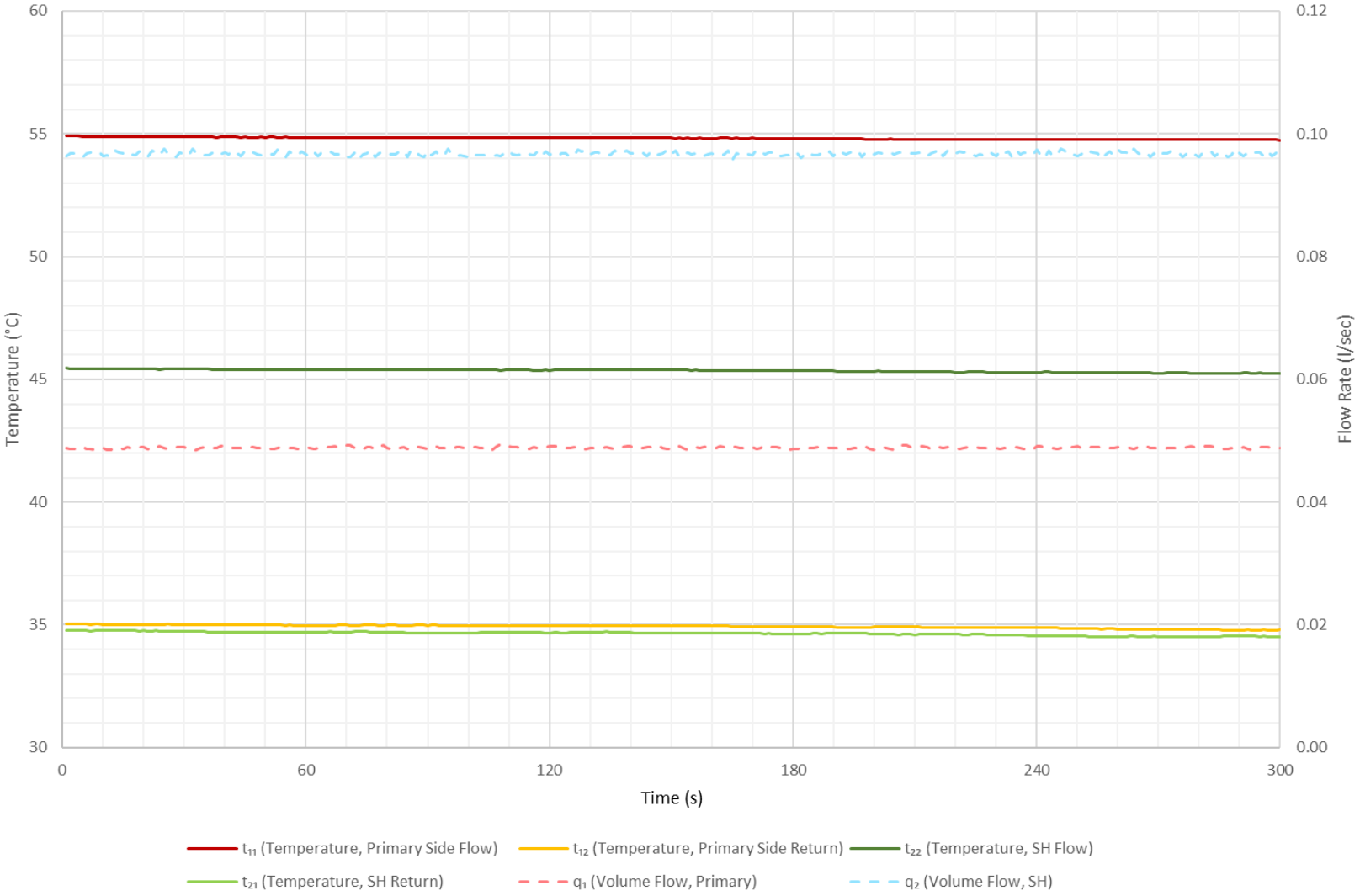


Figure 7 - Test 01f Key Metrics

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 practise 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)	55.0	41.7
Number of consecutive seconds where t_{32} > 55°C.	(s)	1	
Volume Weighted Avg. Return Temp	VWART (°C)	14	

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 Criteria

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	Not Achieved

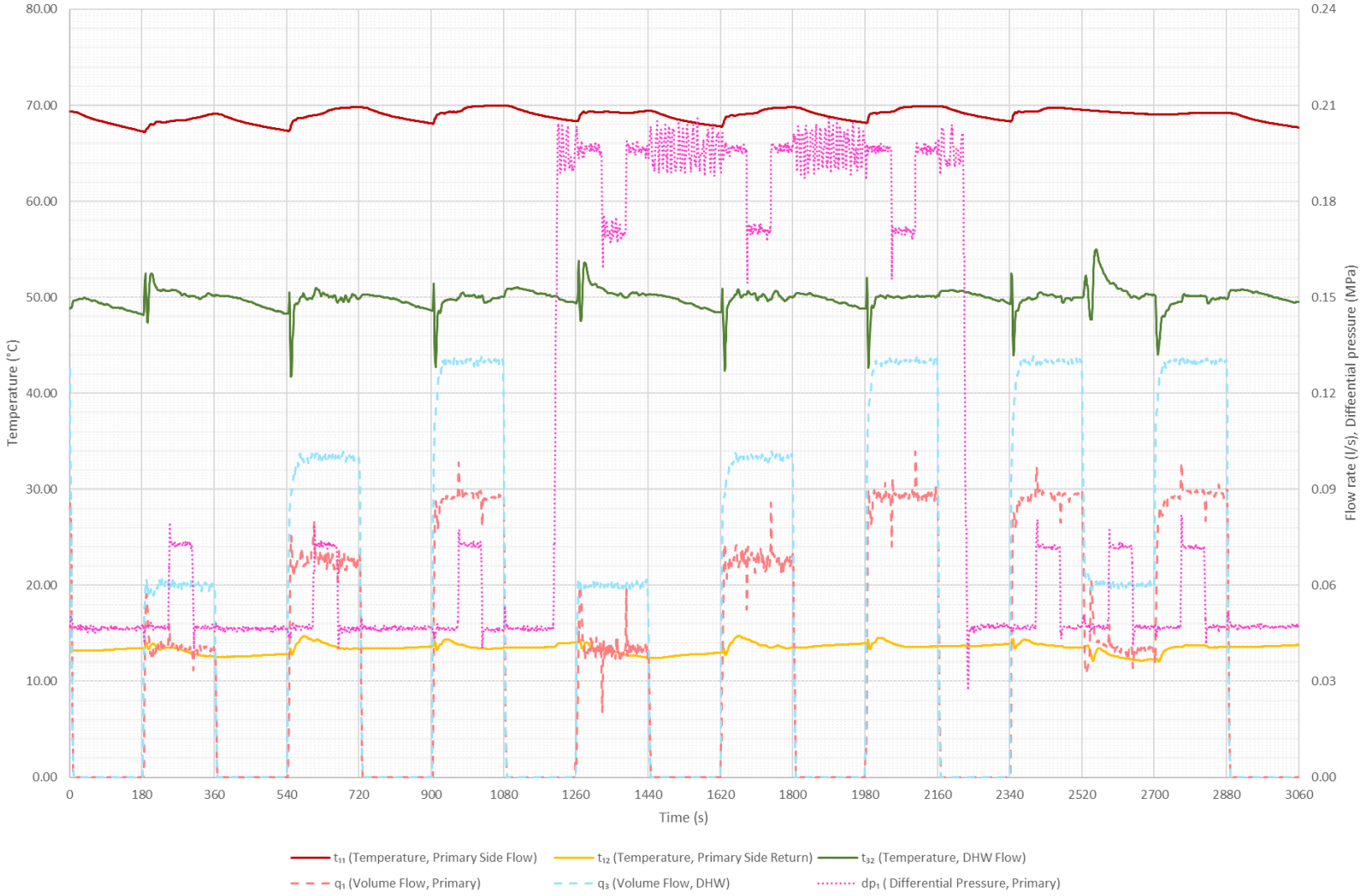


Figure 8 - Test 11a Key Metrics

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 practise 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)	55.8	48.8	56.8	40.1
Number of consecutive seconds where t_{32} > 55°C	(s)	6		10	

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 Criteria

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

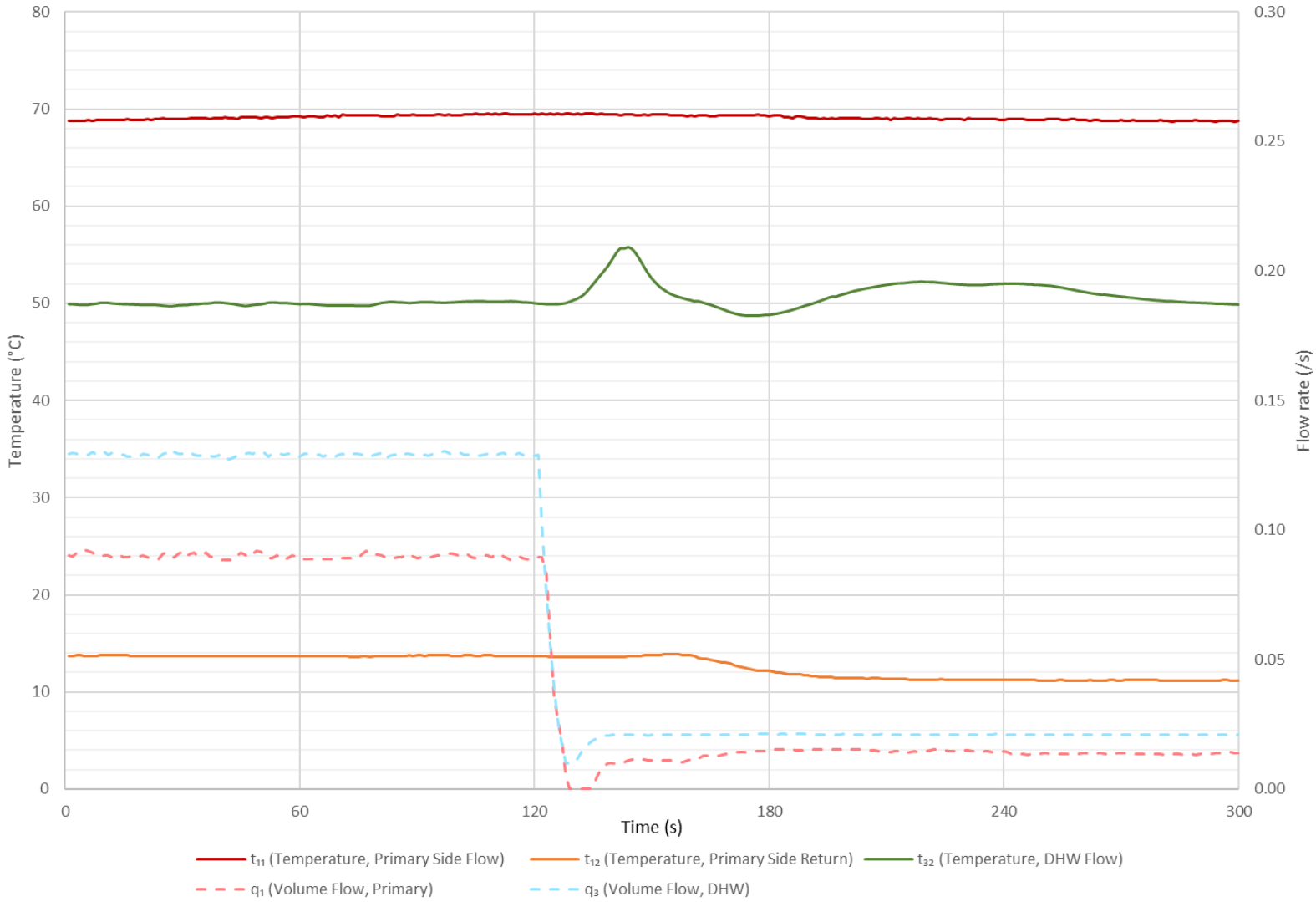


Figure 9 - Test 12a Key Metrics

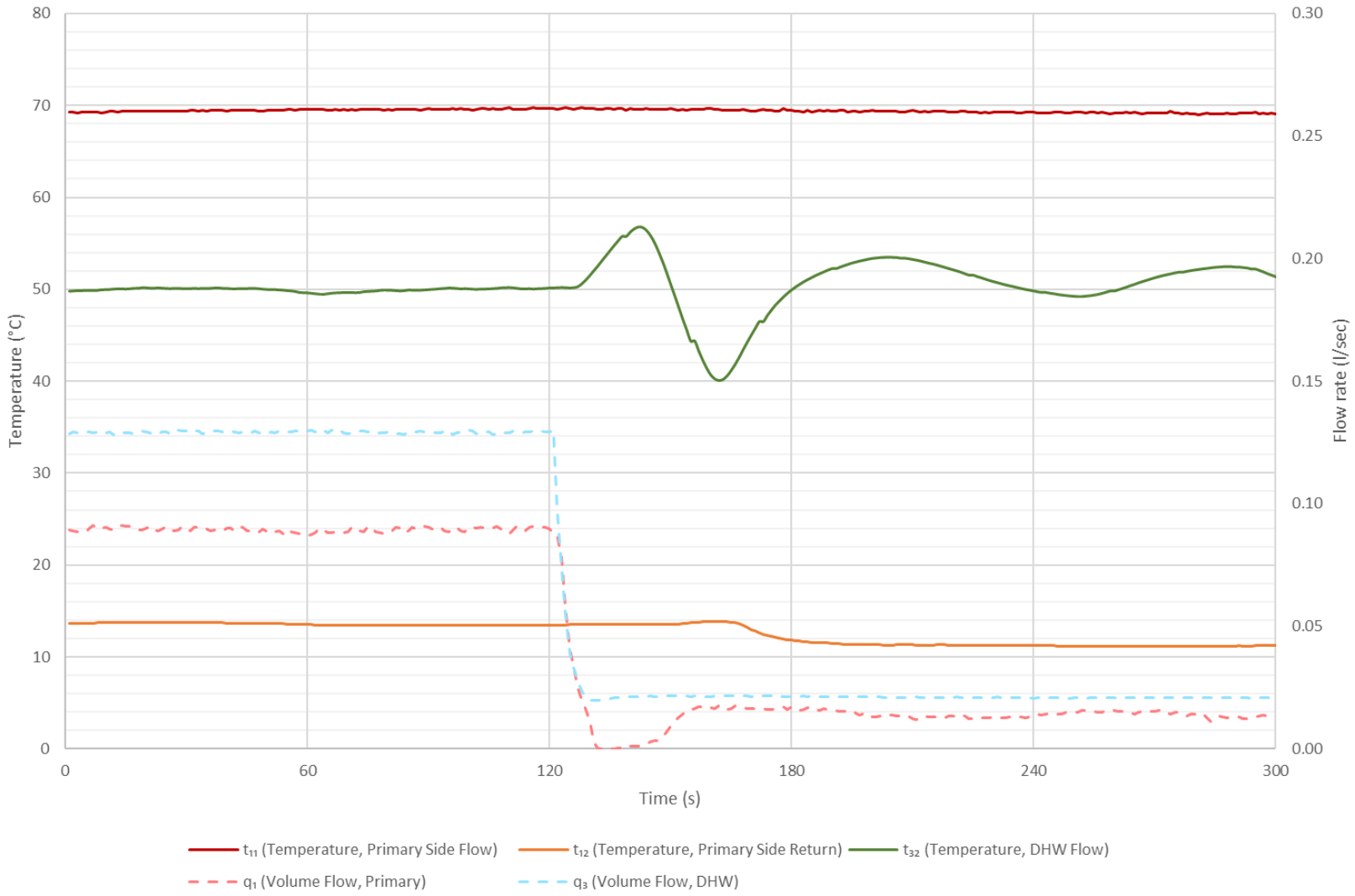


Figure 10 - Test 12c Key Metrics

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 70.3 kW, with a measured flow rate of 0.41 l/s, when producing minimum DHW at 45°C or above, (Temperature achieved in final step 54.8 °C).

8.7.2 The recorded DHW line pressure drop across the HIU was 76 kPa.

8.7.3 The number of consecutive seconds where t_{32} > 55°C was 223 seconds in nine separate instances.

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

8.7.4 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)	70.2	70.3	70.4	70.4	70.4	70.4	70.4	70.4	70.4	70.4
Temperature, primary side return connection	t_{12} (°C)	14.8	14.6	15.1	15.9	16.6	17.8	18.0	18.4	17.8	17.1
Volume flow, primary side	q_1 (l/s)	0.112	0.133	0.157	0.184	0.216	0.248	0.276	0.301	0.317	0.319
Arithmetic mean of primary side power recorded during test	H_1 (kW)	26.0	31.1	36.2	42.1	48.7	54.7	60.7	65.5	69.8	71.1
Temperature, cold water supply	t_{31} (°C)	9.9	9.9	9.9	9.8	9.6	9.9	9.6	9.9	9.5	9.8
Temperature, domestic hot water flow from HIU	t_{32} (°C)	53.7	52.6	52.8	53.4	54.2	55.0	54.8	54.6	53.4	51.4
Volume flow, domestic hot water	q_3 (l/s)	0.150	0.180	0.210	0.240	0.271	0.300	0.330	0.359	0.390	0.420
Differential pressure, domestic hot water across HIU	dP_3 (l/s)	21	25	30	35	42	48	54	61	69	79
Arithmetic mean of DHW power recorded during test	H_2 (kW)	27.6	32.3	37.9	44.0	50.6	56.8	62.6	67.3	71.8	73.1

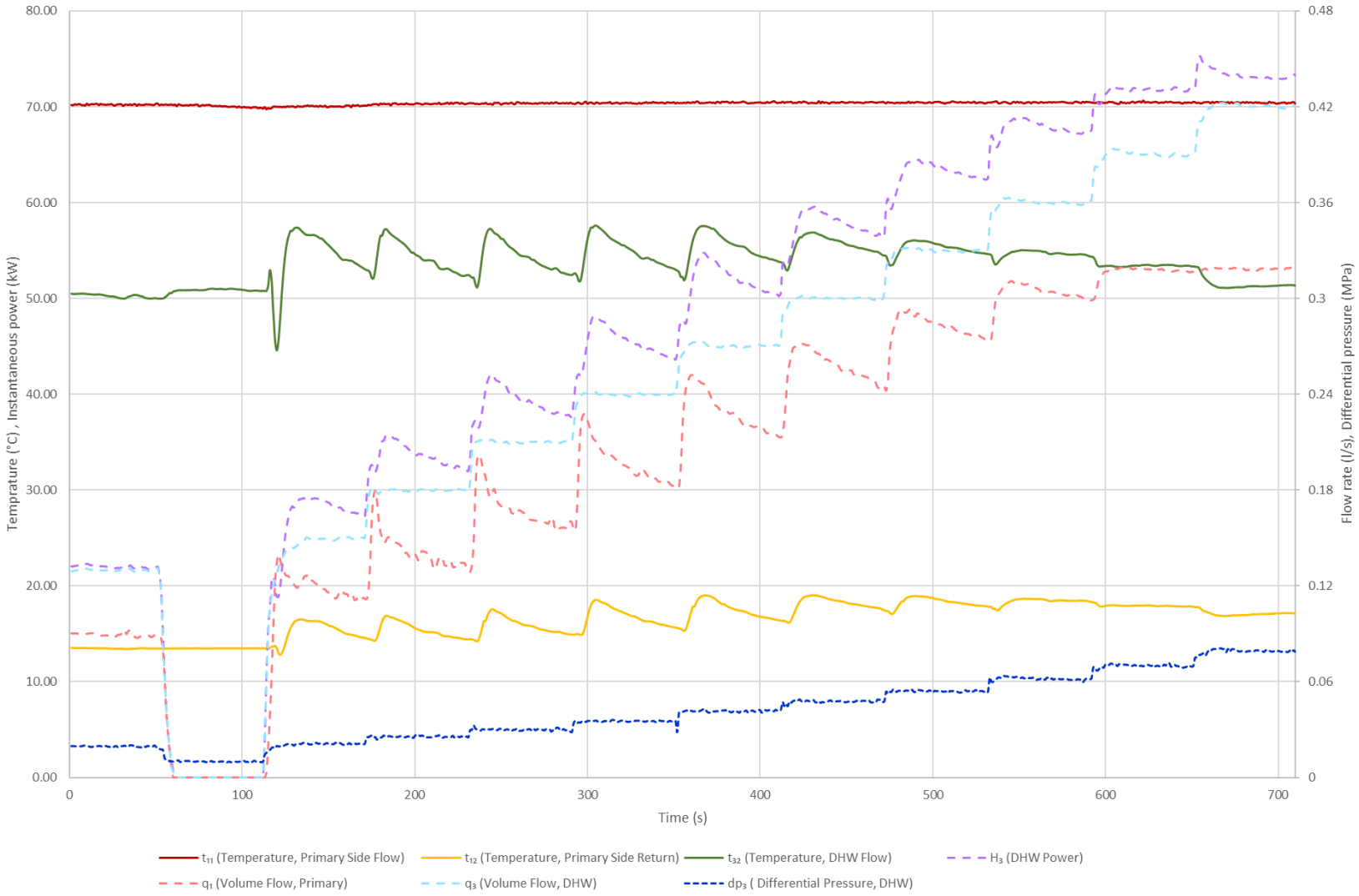


Figure 11 - Test 13a Key Metrics

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 practise 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)	0.0006
Mean average of primary side power recorded during test	H_1 (kW)	0.03
Mean average electrical energy use	$W_{electrical}$ (W)	2.8
Mean average thermal energy use	$W_{thermal}$ (W)	26.4
Overall energy loss per day	(kWh)	0.696
Overall Keep Warm Volume Weighted Avg. Return Temp	VWART (°C)	33

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 Criteria

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)	Achieved
Best practice if HIU overall energy losses are less than 0.7 kWh/day (to three decimal places)	Achieved

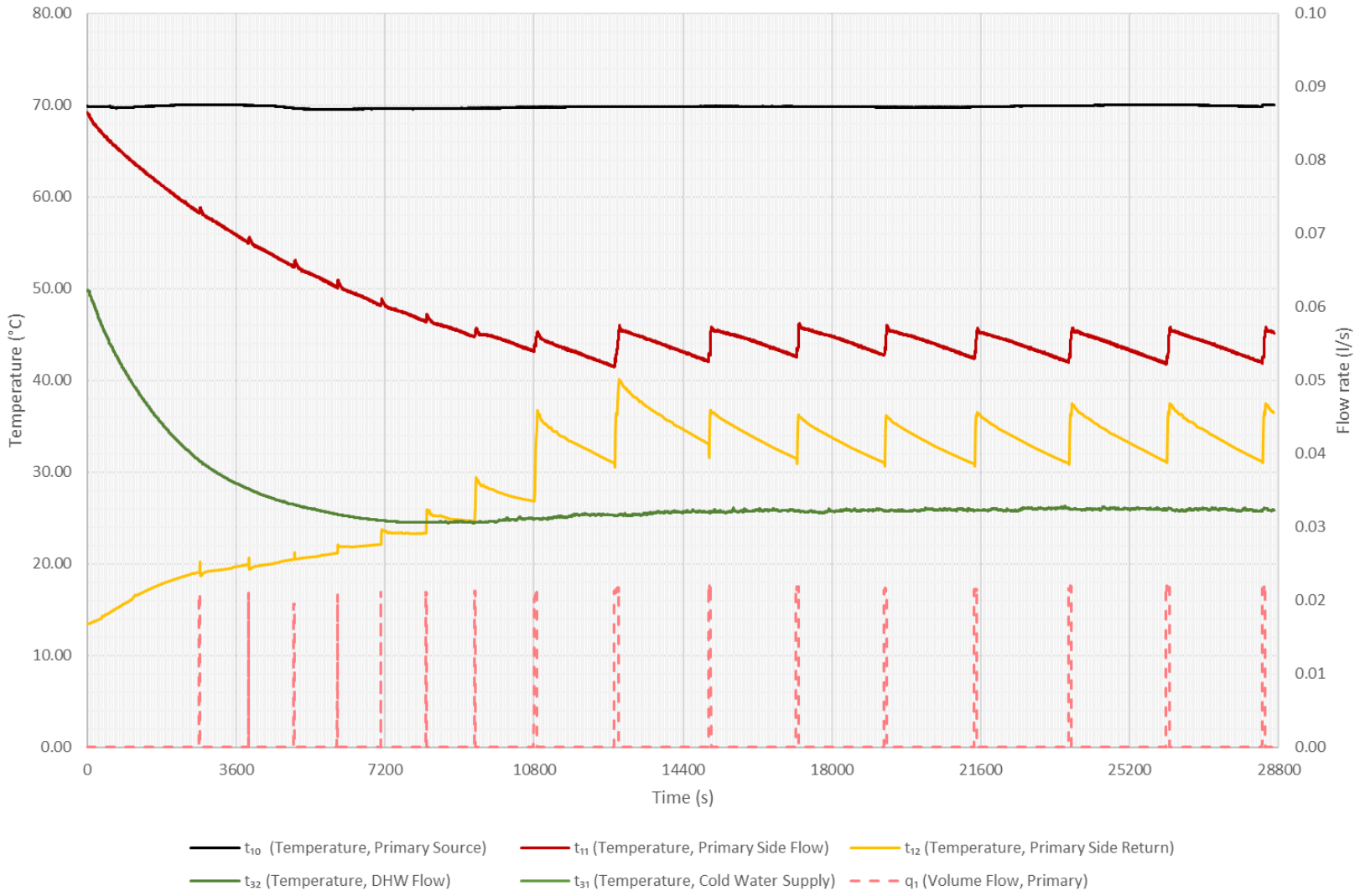


Figure 12 - Test 21a Key Metrics

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 practise criteria can be found in Table 30.

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)	15
Number of consecutive seconds where t_{32} > 55°C.	(s)	0
Mean average Volume flow, primary side	q_1 (l/s)	0.111

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

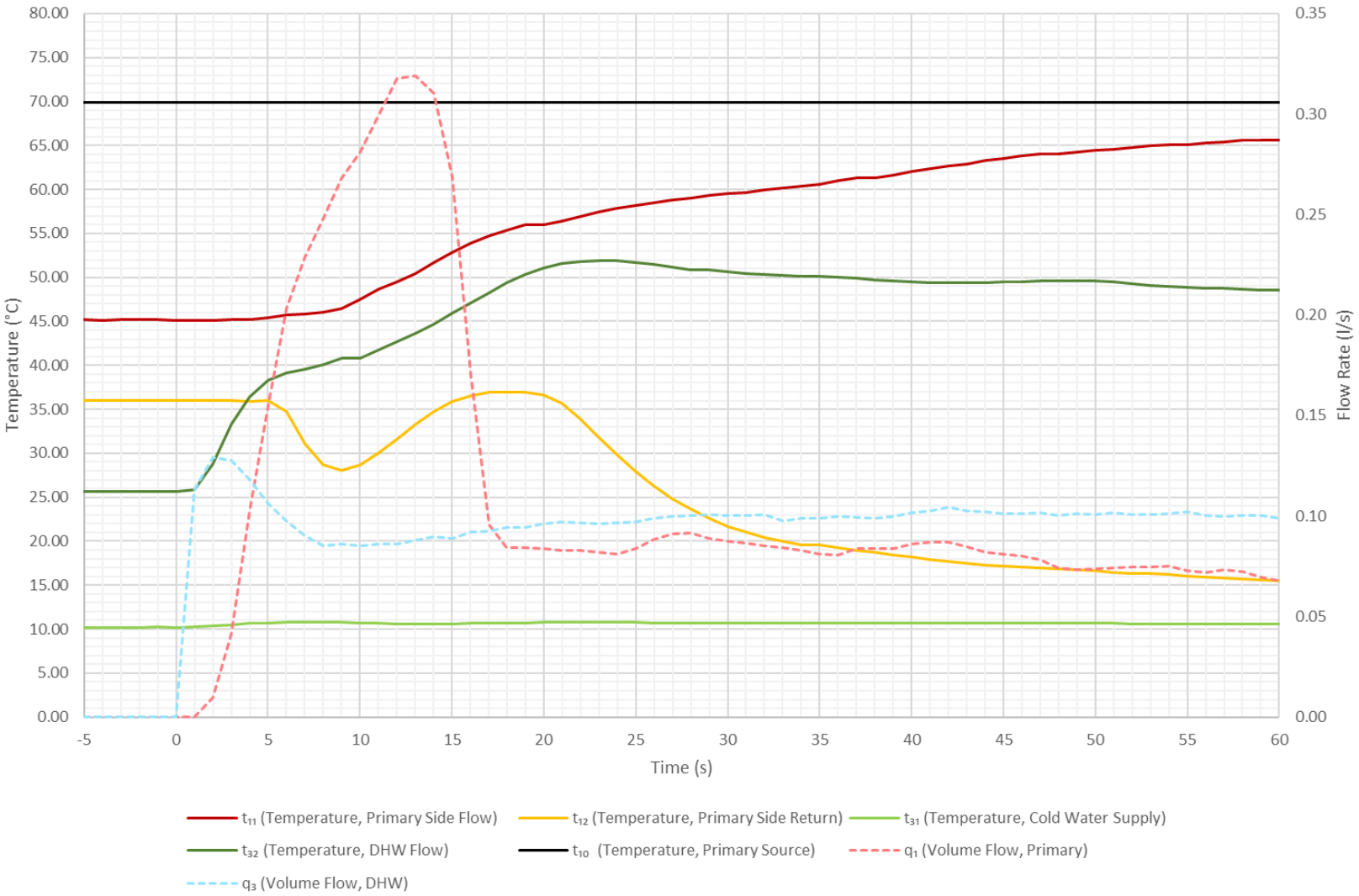


Figure 13 - Test 22a Key Metrics

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 practise 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)	52.5	44.8
Number of consecutive seconds where t_{32} > 55°C.	(s)	0	
Overall DHW Volume Weighted Avg. Return Temp	VWART (°C)	20	

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 Criteria

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	Not Achieved

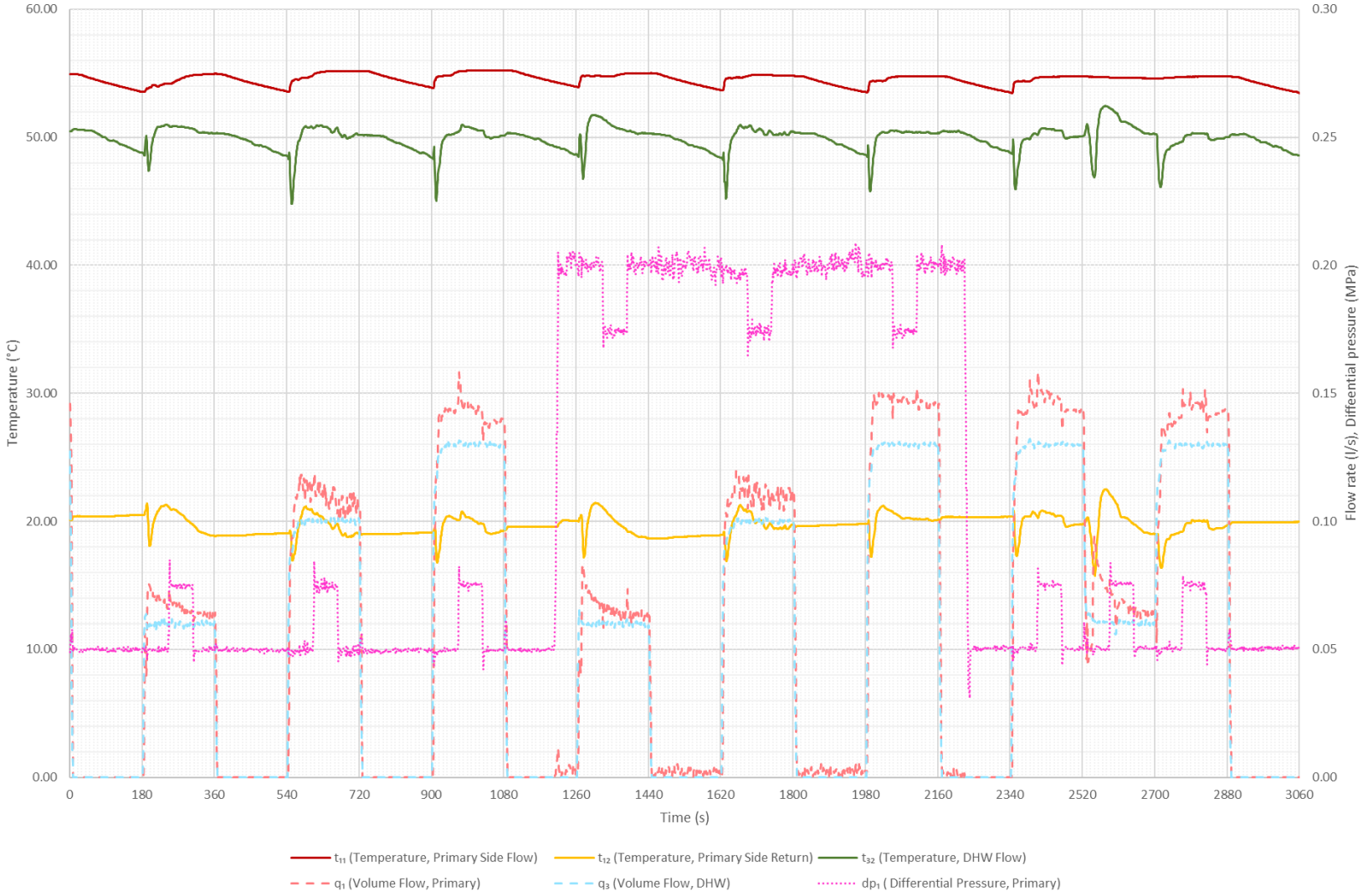


Figure 14 - Test 11b Key Metrics

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 practise 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)	52.4	48.9	52.6	49.1
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 Criteria

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

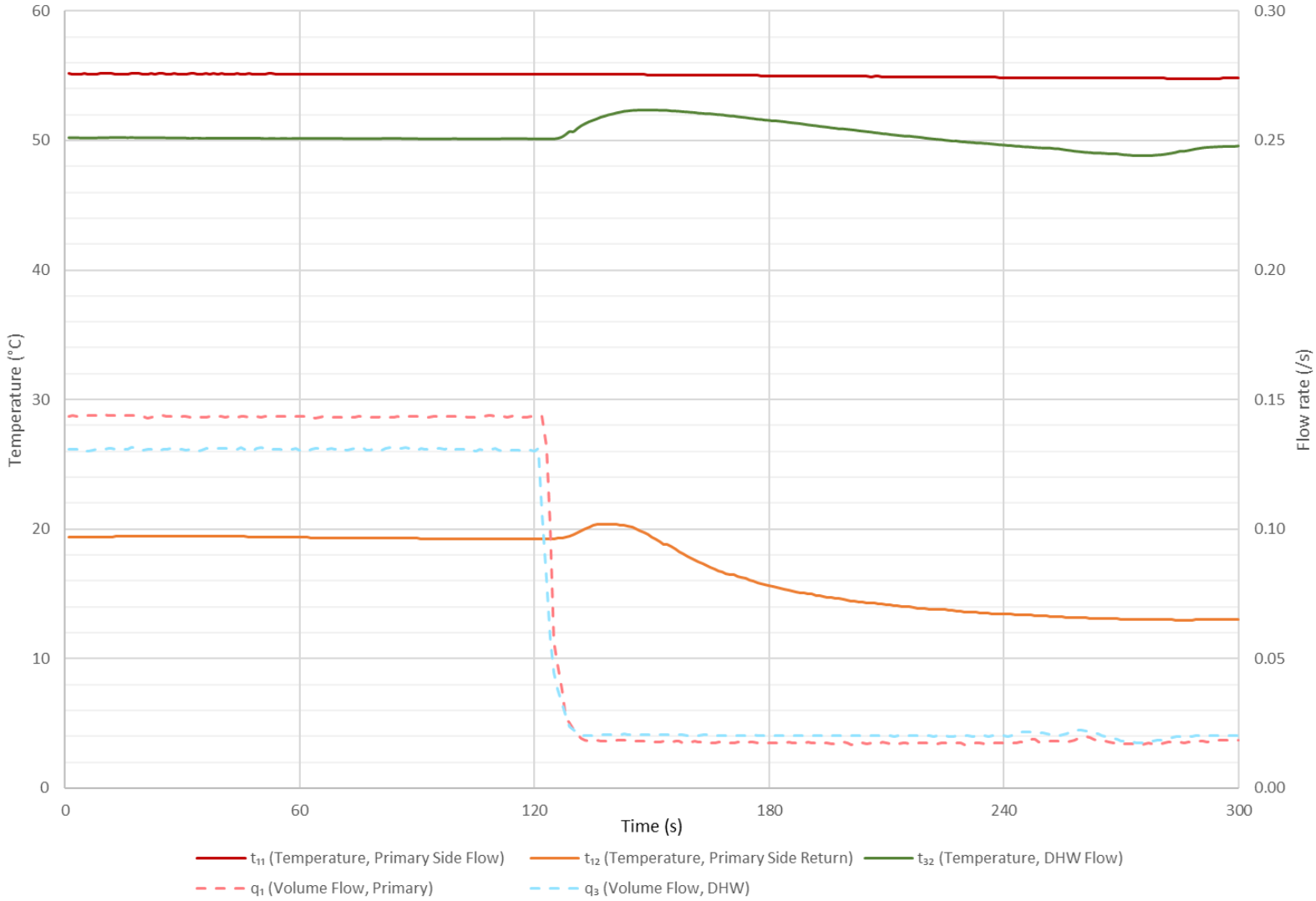


Figure 15 - Test 12b Key Metrics

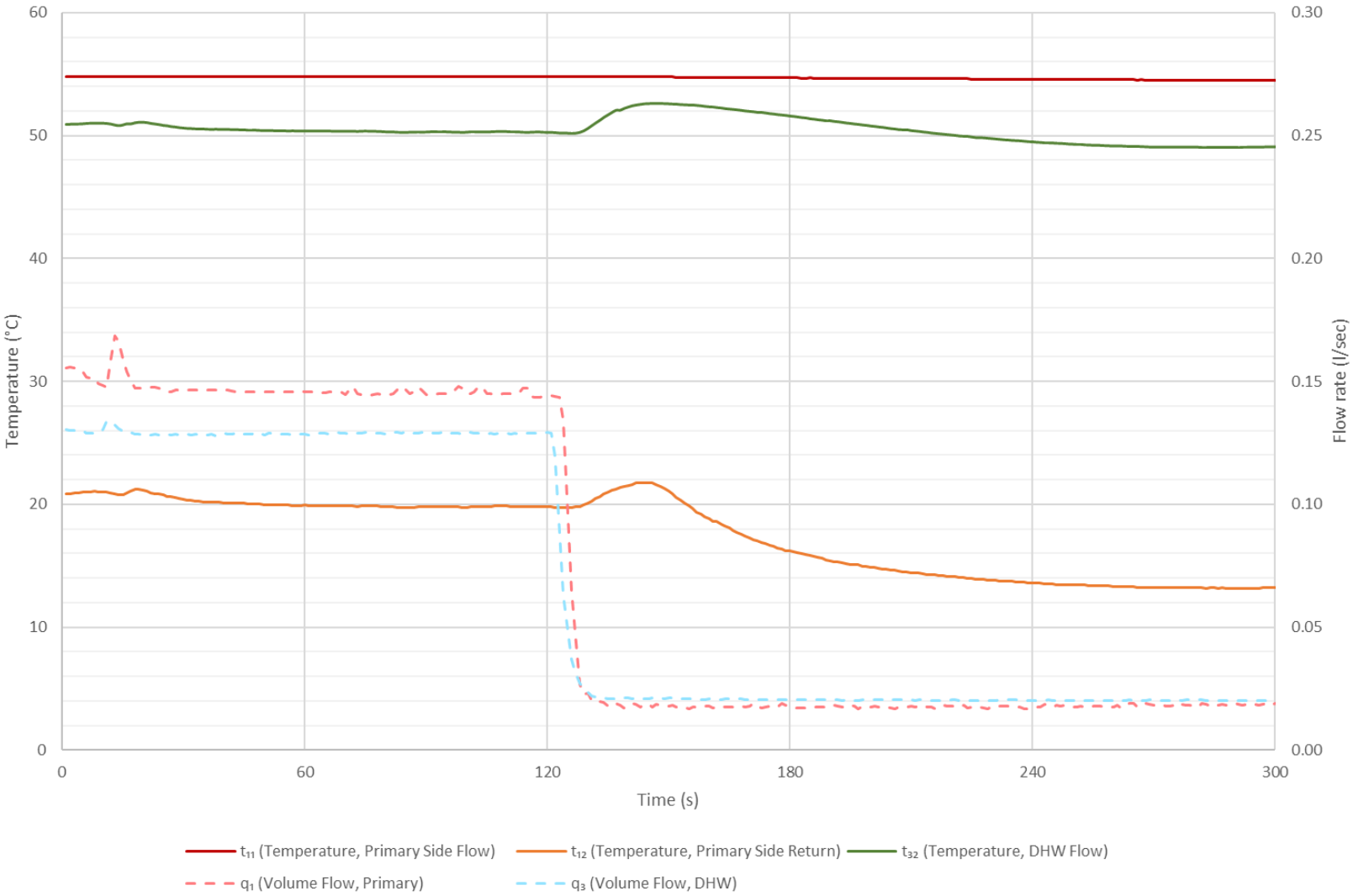


Figure 16 - Test 12d Key Metrics

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 52.6 kW, with a measured flow rate of 0.31 l/s, when producing minimum DHW at 45°C or above (Temperature achieved in final step 45.1 °C).

9.7.2 The recorded DHW line pressure drop across the HIU was 61 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, 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)	55.3	55.4	55.4	55.4	55.4	55.4	55.4	55.4	N/A	N/A
Temperature, primary side return connection	t_{12} (°C)	22.8	24.6	24.7	23.9	21.2	19.9	18.2	16.9	N/A	N/A
Volume flow, primary side	q_1 (l/s)	0.1873	0.2440	0.2847	0.3107	0.3038	0.3143	0.3136	0.3124	N/A	N/A
Arithmetic mean of primary side power recorded during test	H_1 (kW)	25.4	31.4	36.6	41.0	43.5	46.7	48.9	50.2	N/A	N/A
Temperature, cold water supply	t_{31} (°C)	9.9	9.7	9.8	9.6	9.6	9.6	9.5	9.5	N/A	N/A
Temperature, domestic hot water flow from HIU	t_{32} (°C)	51.9	52.5	52.1	51.4	49.4	47.9	45.9	43.8	N/A	N/A
Volume flow, domestic hot water	q_3 (l/s)	0.150	0.180	0.210	0.239	0.268	0.300	0.329	0.360	N/A	N/A
Differential pressure, domestic hot water across HIU	dP_3 (l/s)	19	24	29	34	40	47	53	61	N/A	N/A
Arithmetic mean of DHW power recorded during test	H_2 (kW)	26.4	32.3	37.4	42.0	44.8	48.1	50.1	51.8	N/A	N/A

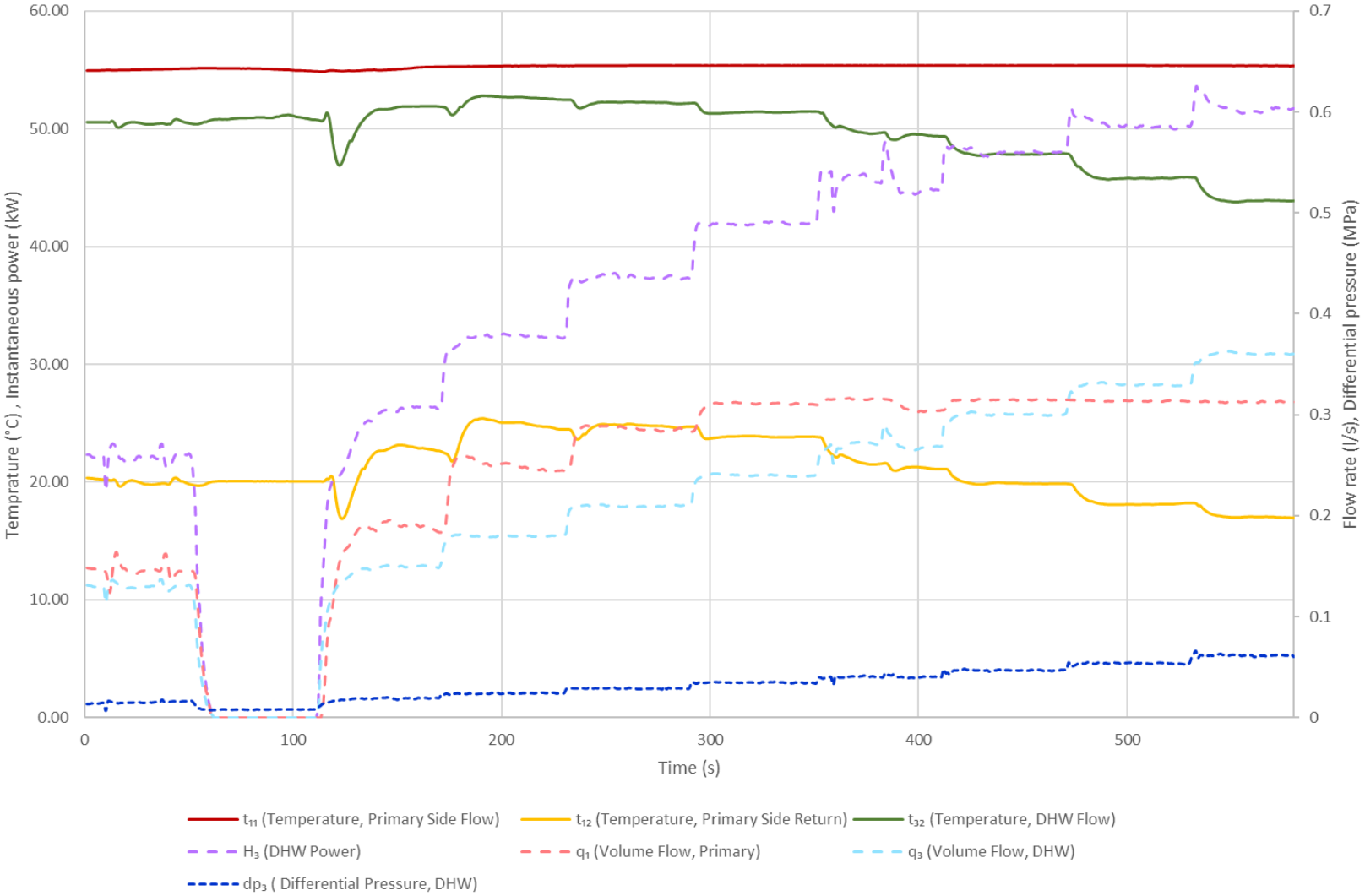


Figure 17 - Test 13b Key Metrics

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 practise 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)	0.0014
Mean average of primary side power recorded during test	H_1 (kW)	0.04
Mean average electrical energy use	$W_{electrical}$ (W)	2.8
Mean average thermal energy use	$W_{thermal}$ (W)	38.3
Overall energy loss per day	(kWh)	0.987
Overall Keep Warm Volume Weighted Avg. Return Temp	VWART (°C)	38

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 Criteria

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

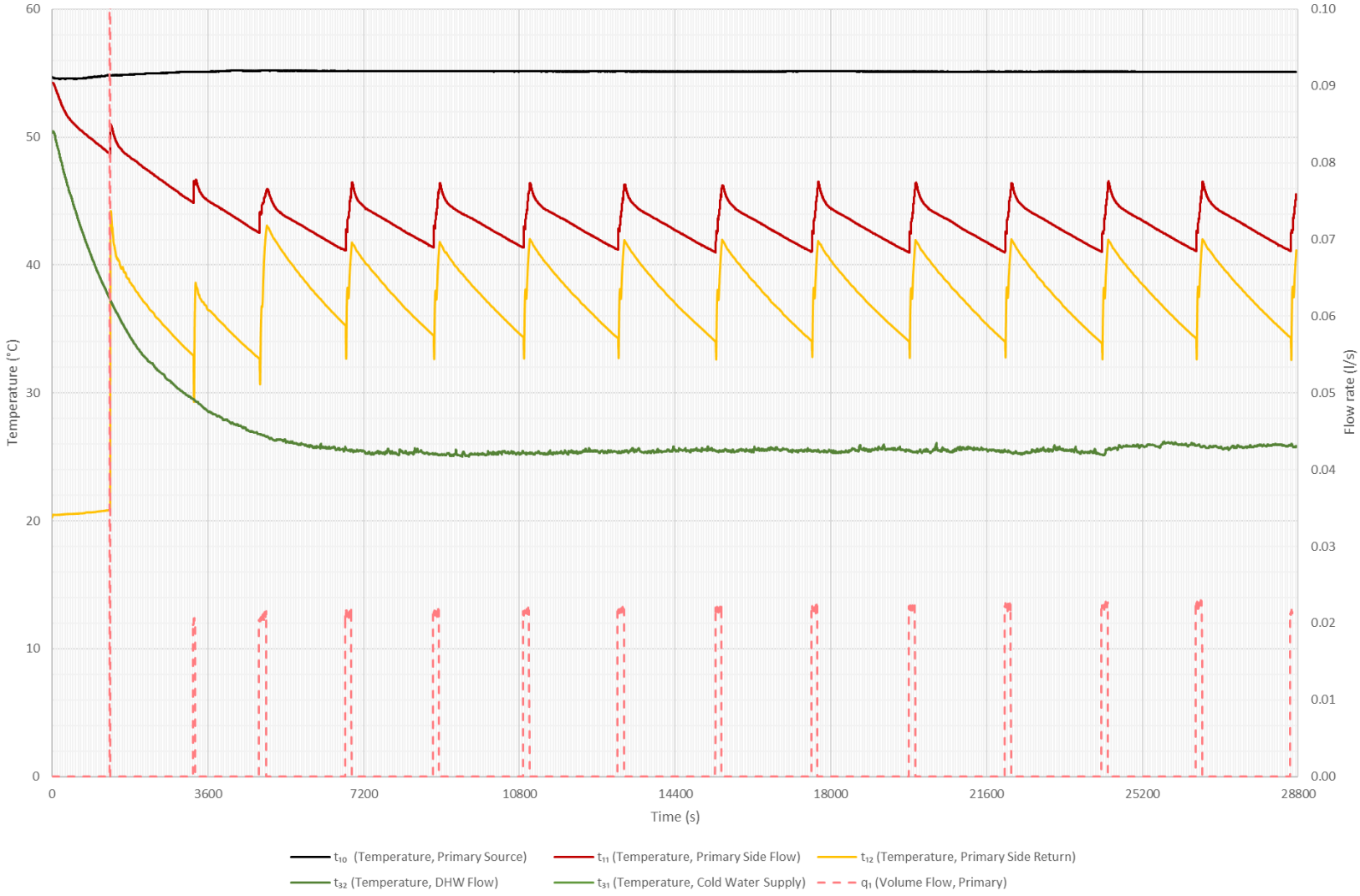


Figure 18 - Test 21b Key Metrics

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 practise 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)	0.133

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 Criteria

Module 8 – 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

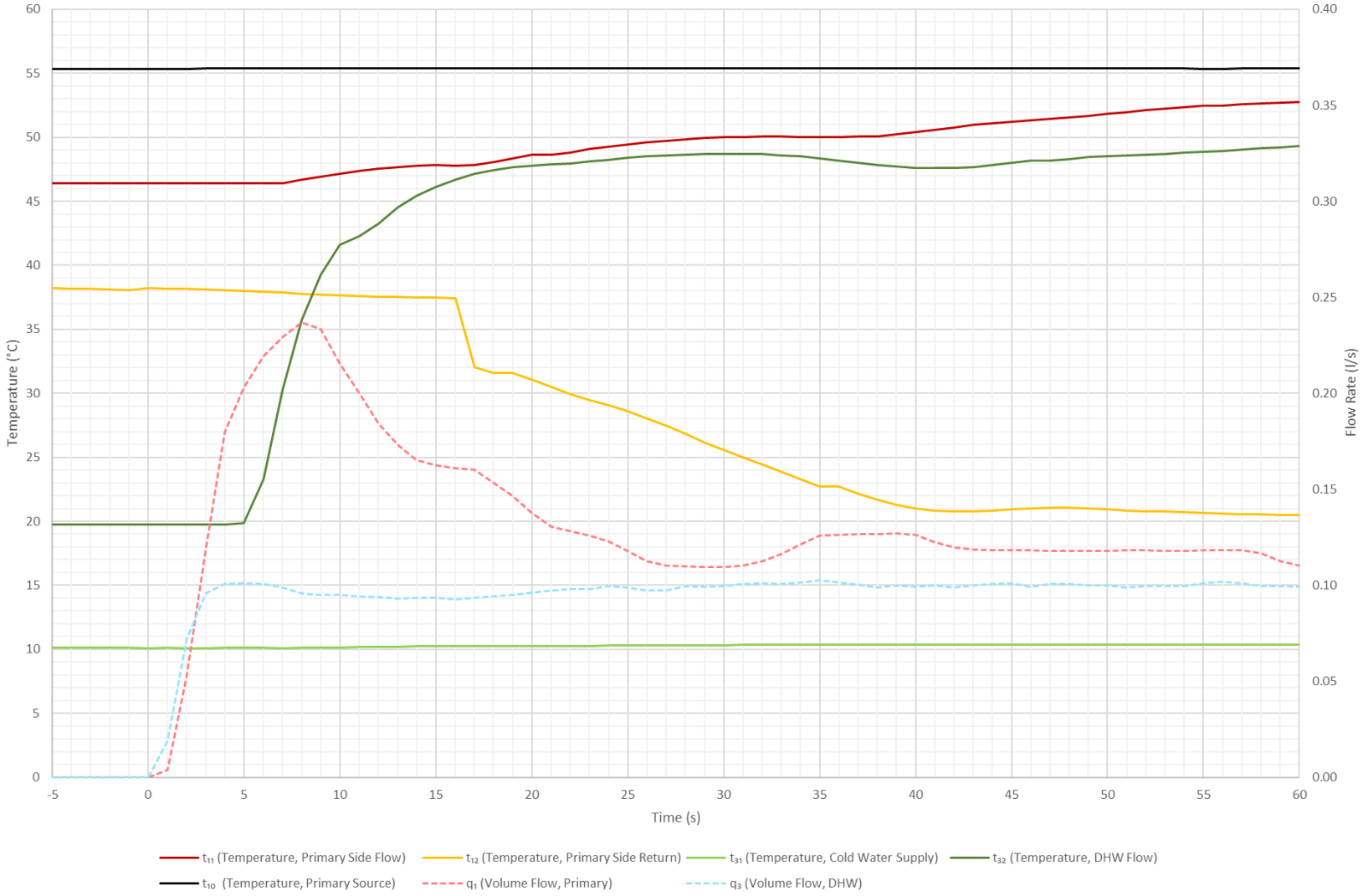


Figure 19 - Test 22b Key Metrics

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 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 000636	0.067 °C	22/02/2024	02/2025
DHW Outlet Probe	PRT 5003	CAL 000637	0.074 °C	22/02/2024	02/2025
Primary Inlet Probe	PRT 5004	CAL 000638	0.078 °C	22/02/2024	02/2025
Primary Return Probe	PRT 5005	CAL 000639	0.076 °C	22/02/2024	02/2025
SH Flow Probe	PRT 5006	CAL 000640	0.077 °C	22/02/2024	02/2025
SH Return Probe	PRT 5007	CAL 000641	0.067 °C	22/02/2024	02/2025
Primary Flow T[10]	PRT 5008	CAL 000642	0.083 °C	22/02/2024	02/2025
Flow Meter	FM 601	K56400FW	0.0135 l/sec	03/09/2024	09/2025
Flow Meter	FM 602	K56401FW	0.0092 l/sec	03/09/2024	09/2025
Flow Meter	FM 603	K56402FW	0.0090 l/sec	03/09/2024	09/2025
Flow Meter	FM 605	K56403FW	0.0035 l/sec	03/09/2024	09/2025
Pressure Transducer	PT 083	K56404P	5.1 kPa	03/09/2024	09/2025
Pressure Transducer	PT 084	K56405P	8.8 kPa	03/09/2024	09/2025
Pressure Transducer	PT 085	K56406P	4.7 kPa	03/09/2024	09/2025
Pressure Transducer	PT 086	K56407P	8.6 kPa	03/09/2024	09/2025
Pressure Transducer	PT 087	K56408P	2.6 kPa	03/09/2024	09/2025
Pressure Transducer	PT 088	K56409P	6.4 kPa	03/09/2024	09/2025
Power Meter	PM 1022	07122	0.09 W	27/08/2024	08/2025
Pipe	PIPE 001	-	-	12/2023	12/2025

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	13	25.8
Standby	33	15.4
Space Heating	35	45.4

	VWART (°C)
Summer	21
Winter	28
Overall	25

	DHW Draw Test Results			Post DHW Draw (60 seconds)	
	Power (W)	Primary Flow (m^3/hr)	VWART (°C)	Primary Volume (l)	VWART (°C)
Low	9809.9	0.1	13	0.38	13
Medium	15201.5	0.2	14	0.10	14
High	19741.2	0.3	14	0.07	14

DHW Draw Volumes pa		
kWh pa	Hours	Volume pa (m^3)
729	74.31	10.5
297	19.54	4.6
444	22.49	6.8

Post DHW Draw Volumes pa	
Events pa	Volume pa (m^3)
10000	3.840
660	0.067
300	0.020

Standby Test Results	
Primary Flow (m^3/hr)	VWART (°C)
0.002	33

Standby Volumes pa	
Hours	Volume pa (m^3)
7579	15.400

	Space Heating					
	Power (W)	Primary Flow (m^3/hr)	VWART (°C)	kWh pa	Hours	Volume pa (m^3)
0.5kW	534	0.015	35	98	184	2.73
1kW	1066	0.039	35	787	738	28.87
4kW	4077	0.099	35	565	139	13.75

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	20	45.0
Standby	38	39.0
Space Heating	35	60.6

	VWART (°C)
Summer	28
Winter	31
Overall	30

	DHW Draw Test Results			Post DHW Draw (60 seconds)	
	Power (W)	Primary Flow (m^3/hr)	VWART (°C)	Primary Volume (l)	VWART (°C)
Low	9751.9	0.2	20	0.98	19
Medium	15425.4	0.4	20	0.23	19
High	20100.6	0.5	20	0.20	20

DHW Draw Volumes pa		
kWh pa	Hours	Volume pa (m^3)
729	74.75	17.0
297	19.25	7.2
444	22.09	10.8

Post DHW Draw Volumes pa	
Events pa	Volume pa (m^3)
10000	9.810
660	0.149
300	0.061

Standby Test Results	
Primary Flow (m^3/hr)	VWART (°C)
0.005	38

Standby Volumes pa	
Hours	Volume pa (m^3)
7614	39.044

	Space Heating					
	Power (W)	Primary Flow (m^3/hr)	VWART (°C)	kWh pa	Hours	Volume pa (m^3)
0.5kW	529	0.023	35	98	185	4.30
1kW	1107	0.047	35	787	711	33.44
4kW	4350	0.176	35	565	130	22.84

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	Danfoss XB05H
2	Domestic Hot Water Heat Exchanger	Y	Danfoss XB05H
3	Controller for Space Heating and Hot Water Heating	Y	Pactrol Controls PX427
4	Control Valve and Actuator for Space Heating	Y	Belimo C215QP-D PICV and Belimo CQ230A-T actuator
5	Space Heating Strainer	Y	Pettinaroli ¾" FilterBall
6	Control Valve and Actuator for Hot Water Heating	Y	Frese Integra Compact PICV and Stepper actuator
7	Temperature Sensors	Y	Tasseron immersion sensors
8	Domestic Hot Water Isolating Valve	Y	Pettinaroli ¾"
9	Primary Side Strainer	Y	Pettinaroli ¾" FilterBall
10	Drain Valves	Y	WESA 1523-04
11	Vent Valve	Y	N/A
12	Circulation Pump	Y	Grundfos UPM3
13	Heat Meter	Y	Return-mounted DN15 Qp1.5
14	Domestic Hot Water Flow Sensor	Y	Resideo C7195B
15	Pipes	Y	Ø18 x 1mm copper
16	Connections	Y	Brass CW614N
17	Joints	Y	N/A
18	Gaskets	Y	Tesnit BA-U fibre washers
19	O Rings	Y	N/A
20	Pressure Sensor	Y	N/A
21	Expansion Vessel	Y	Zilio VRP220 8L
22	Insulation	Y	ARPRO5130 EPP casing

A1	Commissioning Guide	Y	Supplied
A2	Operation Guide	Y	Supplied
A3	Declaration of Conformity	Y	Supplied
A4	Full Parameter List	Y	Keep warm active High temperature set point: 48 °C Low temperature set point: 50 °C
A5	Maximum Primary Static Operating Differential Pressure	Y	Max. static pressure: 16 bar Max. differential pressure: 400kPa
	Software Version	Y	X43R D6
	Model Name and Type Number	Y	vTherm°e (Cu)
	Serial Number	Y	140000-000001
	Any other components stated by manufacturer		

13.2 Appliance Photographs

Figure 20 - HIU with Outer Case Fitted

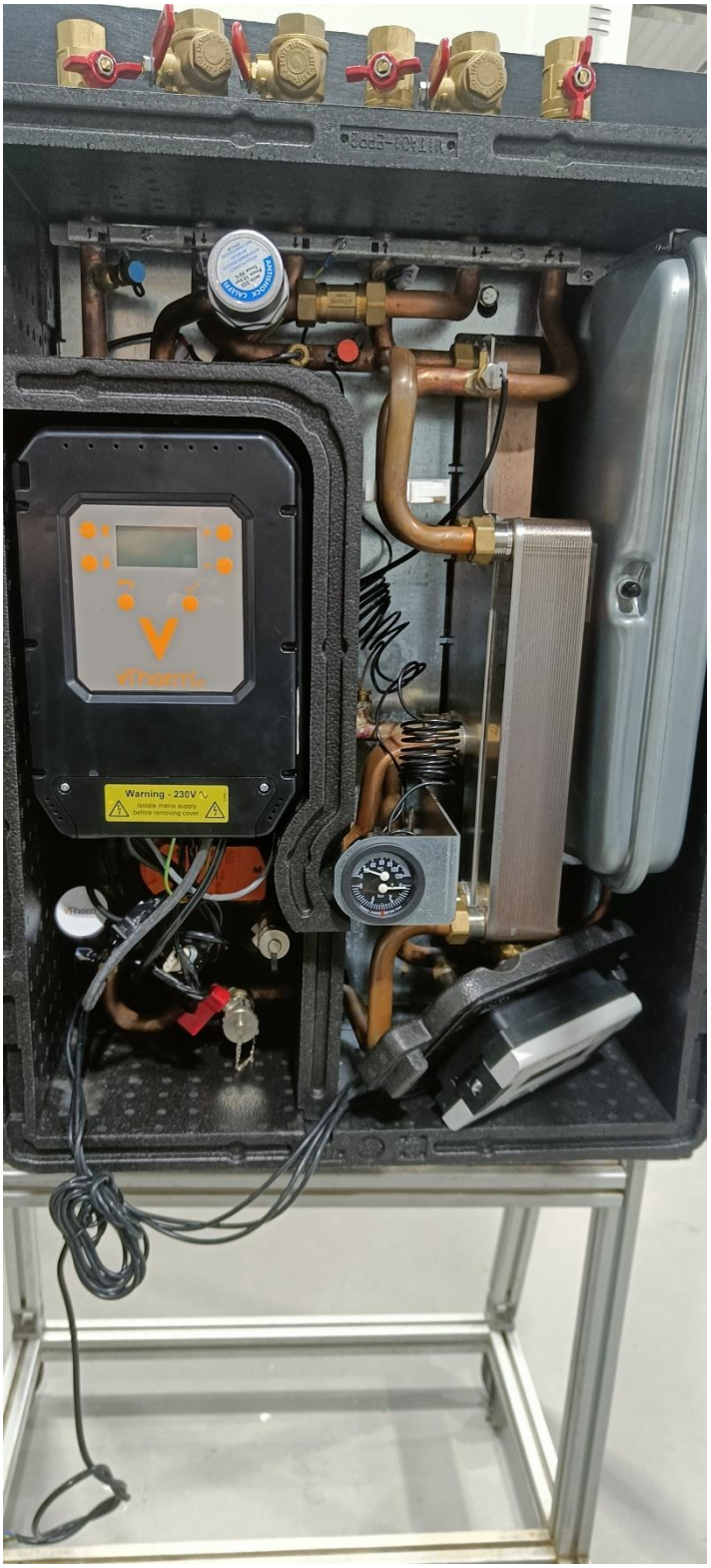
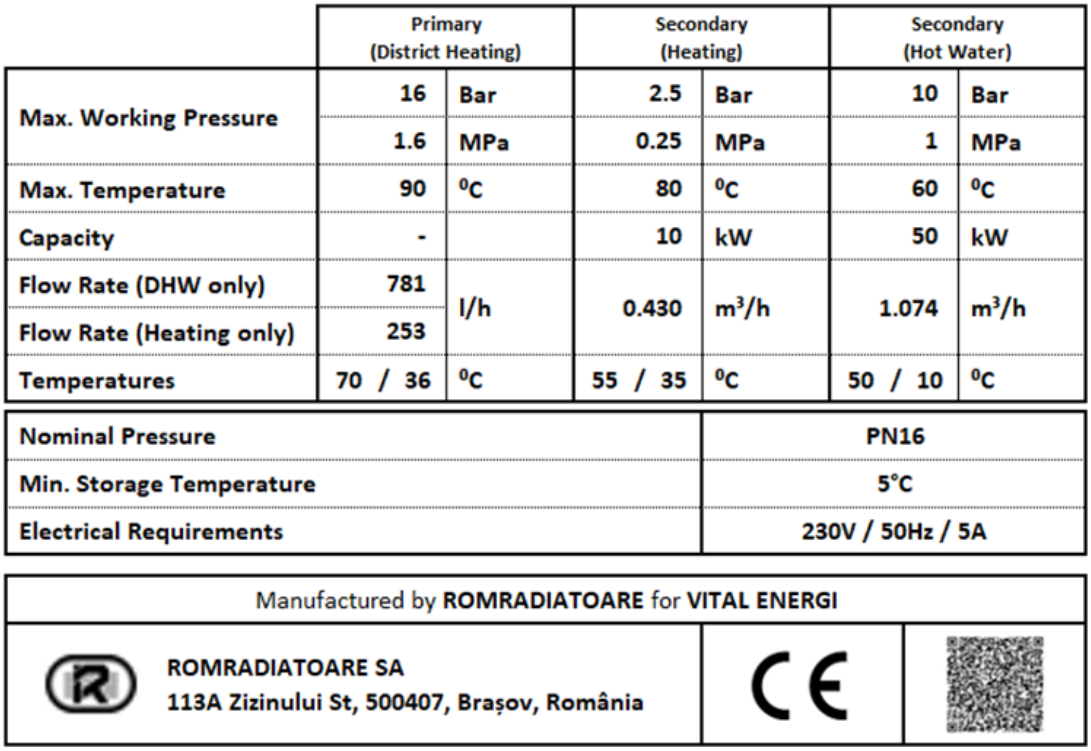


Figure 21 - HIU with Outer Case Removed



	Primary (District Heating)		Secondary (Heating)		Secondary (Hot Water)	
Max. Working Pressure	16	Bar	2.5	Bar	10	Bar
	1.6	MPa	0.25	MPa	1	MPa
Max. Temperature	90	°C	80	°C	60	°C
Capacity	-		10	kW	50	kW
Flow Rate (DHW only)	781	l/h	0.430	m^3/h	1.074	m^3/h
Flow Rate (Heating only)	253					
Temperatures	70 / 36	°C	55 / 35	°C	50 / 10	°C

Nominal Pressure	PN16
Min. Storage Temperature	5°C
Electrical Requirements	230V / 50Hz / 5A

Manufactured by **ROMRADIATOARE** for **VITAL ENERGI**

ROMRADIATOARE SA
113A Zizinului St, 500407, Brașov, România

CE

Figure 22 – Name Plate with Model Details and Serial Number

14 APPENDIX C

14.1 UK Declaration of Conformity

CE

Declaration of Conformity (DOC)

Manufactured for VitalEnergi Ltd by: ROMRADIATOARE S.A., 113A Zizinului Street, Brasov, 500407, Romania,

Product: vTherm°e - Electronically Controlled HIU (Hydraulic Interface Unit) for the transfer of energy to Domestic Hot Water and Heating systems.

The product complies with the following directives and regulations:

Product Name	Directive	Documentation	Compliance
vTherm°e Wireless Integrated Heat Interface Unit (HIU) with Bluetooth, Wi-Fi and NB-IoT	(LVD) 2014/35/EU	BS EN 60335-1: 2012 + A11:2014 + A13:2017	Compliance demonstrated by: Kiwa report No. R20-5024
	(EMC) 2014/30/EU	EN 55014-1:2017 EN 55014-2:2015 CAT IV EN 61000-3-2:2014 EN 61000-3-3:2013	Compliance demonstrated by: Kiwa report. No. R20-5038
		ETSI EN 301 489-17 v3.2.4 ETSI EN 301 489-52 v1.1.2 ETSI EN 301 489-1 v2.2.3 EN 55014-1:2017 + A11:2020 EN 55014-2:2015 CAT IV	Compliance demonstrated by: Kiwa report. No. R21-5595

Manufacturer's Authorised Representatives:

Name: Oliviu Niculescu Position: General Director Date: 10/28/2024 Signature:	Name: Ioan Barbu Position: Deputy Director Date: 10/28/2022 Signature:

Product Data Label:

VITAL ENERGI — Century House, Roman Road, Blackburn, Lancashire BB1 2LD

Site Name & Project No.:	2023 BESA Test HIU KD00023
HIU Type:	Vital Energi vTherm°e (Cu)
Month / Year of Manufacture:	Oct-24
HIU Item No.:	140000-000001

	Primary (District Heating)		Secondary (Heating)		Secondary (Hot Water)	
Max. Working Pressure	16	Bar	2.5	Bar	10	Bar
	1.6	MPa	0.25	MPa	1	MPa
Max. Temperature	90	°C	80	°C	60	°C
Capacity	-		10	kW	50	kW
Flow Rate (DHW only)	781	l/h	0.480	m³/h	1.074	m³/h
Flow Rate (Heating only)	258					
Temperatures	70 / 36	°C	55 / 35	°C	50 / 10	°C

Nominal Pressure	PN16
Min. Storage Temperature	5°C
Electrical Requirements	230V / 50Hz / 5A

Manufactured by ROMRADIATOARE for VITAL ENERGI

ROMRADIATOARE SA
113A Zizinului St, 500407, Brasov, Romania

CE

Figure 23 – UK Declaration of Conformity

14.2 Water Regulation 4 Certificate

Evidence supplied that the application has been made and is ongoing.

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	Updated model name and company name
3	Data label and DOC updated
4	Test 11a & 11b updated to most recent tests. Added in text explaining best practise criteria into the body of text. Updated formatting.
5	Updated values entered into test 11a, 11b, 13a & 13b

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EUA energy&utilities alliance

HHIC HEATING & HOTWATER INDUSTRY COUNCIL