Enertek International

International Consultants in Product
Research, Design, Development
& Certification

BESA HIU Test Report

TP 70/10A

Modules Tested: 2 & 8

Client: Evinox Energy Ltd

Project Number: E4944 Report Issue: 1

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1 EXECUTIVE SUMMARY

1.1.1 The TP 70/10 A HIU underwent testing to the BESA Technical Standard for UK HIU Test Regime, V3-Rev001 September 2023. Modules 2 & 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:	Evinox
Model:	TP 70/10 A
Modules:	2 & 8

Table 2- Modules Tested Pass or Fail Summary

Module 2:	Pass
Module 8:	Pass

Table 3 - Modules 1 & 7 VWART Information

	VWART (°C)	Volume (m^3)
DHW	16	33.3
Standby	45	43.4
Space Heating	36	76.8

	VWART (°C)
Summer	32
Winter	34
Overall	33

2 BRIEF

2.1.1 Enertek international Limited (EIL), were contracted to receive, install, and commission a production sample, of the TP 70/10 A.

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 4 below.

Table 4 - 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_3	Arithmetic mean of DHW power recorded during test
H_2	Arithmetic mean of space heating 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 Evinox.

4.2 Appliance Details

4.2.1 Details of the HIU TP 70/10 A appliance are given in Table 5. Photographs of the installed appliance are given in Figure 11 and Figure 12.

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 5 - Appliance Details

Item	Description
Manufacturer	Evinox Energy Ltd
Model	TP 70/10 A
Serial Number	HTPE2H4423A57
Year of Manufacture	2023
DHW Priority	Yes
EUT Number	EUT 0668
Date Test Item Received	10/11/2023

4.3 Appliance Design Pressures and Temperatures

4.3.1 The maximum design pressures and temperatures of the TP 70/10 A appliance for the primary side and the secondary side for both Space Heating and DHW are given in Table 6.

Table 6 - Appliance Design Pressures and Temperatures

Item	Pressure (bar)	Differential Pressure (bar)	Temperature (°C)
Primary Side	16	4	85
Secondary Side Space Heating	3	0.7	85
Secondary Side DHW	10	10	85

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 2.

5.1.3 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 9.

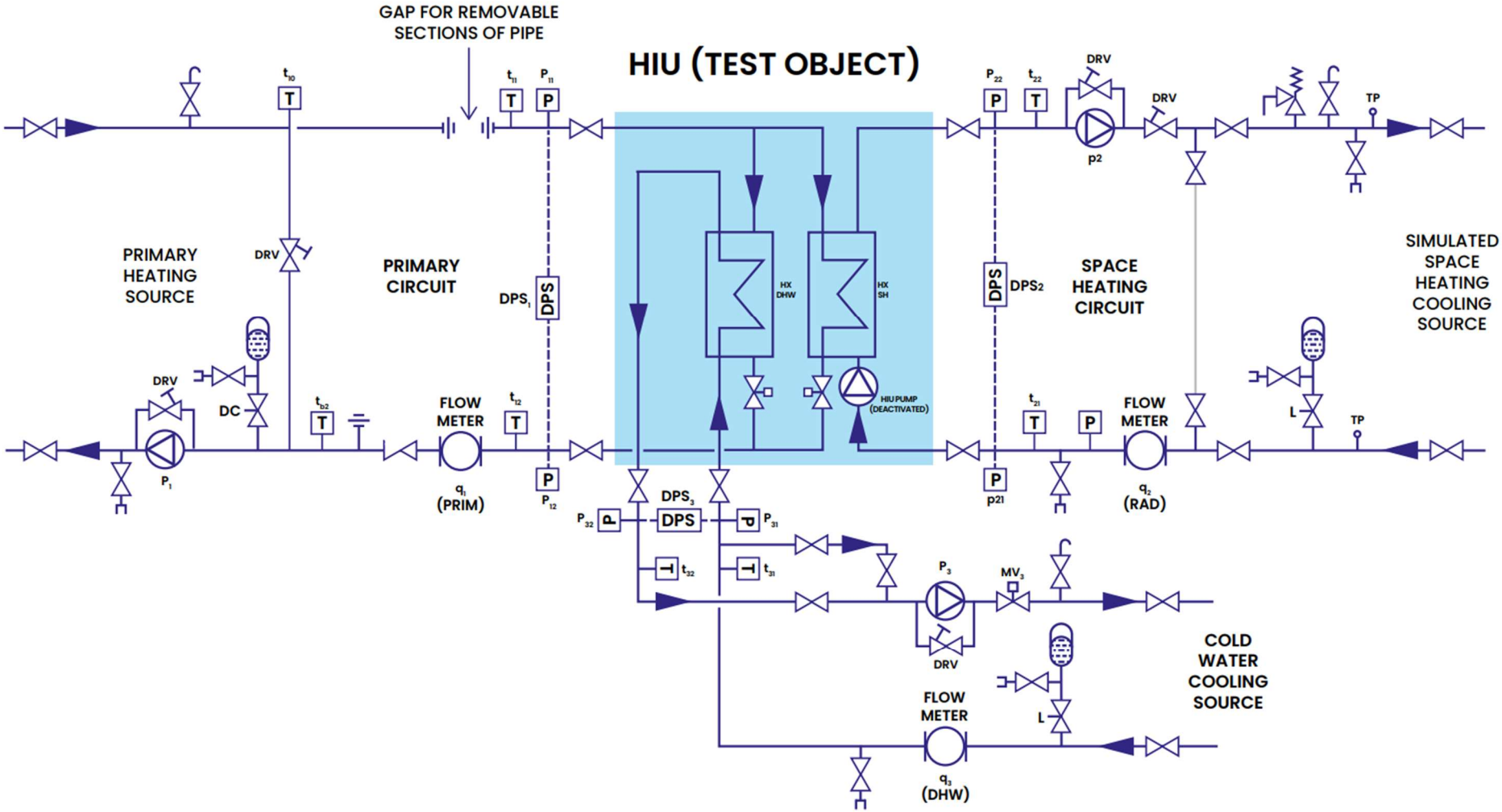


Figure 1 - EIL's HIU test rig schematic which is taken from Appendix B, Figure 4, of Technical Standard for UK HIU Test Regime Version 3: 2023

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

6.1 Test Module 2 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 45°C/35°C tertiary heating circuit and 55°C primary flow temperature.

6.1.2 The following set of tests are from test module 2 - Space Heating, Low Temperature, Indirect Heating Module 2-DH55 Indirect HM2-DH55C

Table 7 - 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

6.2 Test Module 2 Results

6.2.1 Performance criteria results can be seen in Table 8, Test result data can be seen in Table 10 and key metrics can be found in Figure 2, Figure 3 and Figure 4. Best practice criteria can be found in table 9.

Table 8 - 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 9 - Module 2 Best Practice

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

Table 10 - 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)	54.8	55.1	54.6
Temperature, primary side return connection	t_{12} (°C)	34.8	35.9	37.3
Volume flow, primary side	q_1 (l/s)	0.0065	0.0145	0.0563
Differential pressure, primary system across HIU	dP_1 (kPa)	51	201	50
Arithmetic mean of primary side power recorded during test	H_1 (W)	553	1111	4070
Temperature, space heating system return connection	t_{21} (°C)	34.9	35.3	34.7
Temperature, space heating system flow connection	t_{22} (°C)	44.6	44.6	44.8
Volume flow, space heating system	q_2 (l/s)	0.0122	0.0245	0.0927
Differential pressure, space heating system across HIU	dP_2 (kPa)	1	1	3
Arithmetic mean of space heating power during test	H_2 (W)	489	961	3949
Volume weighted avg. return temp	VWART (°C)	35	36	37
Overall space heating VWART (°C)		36		

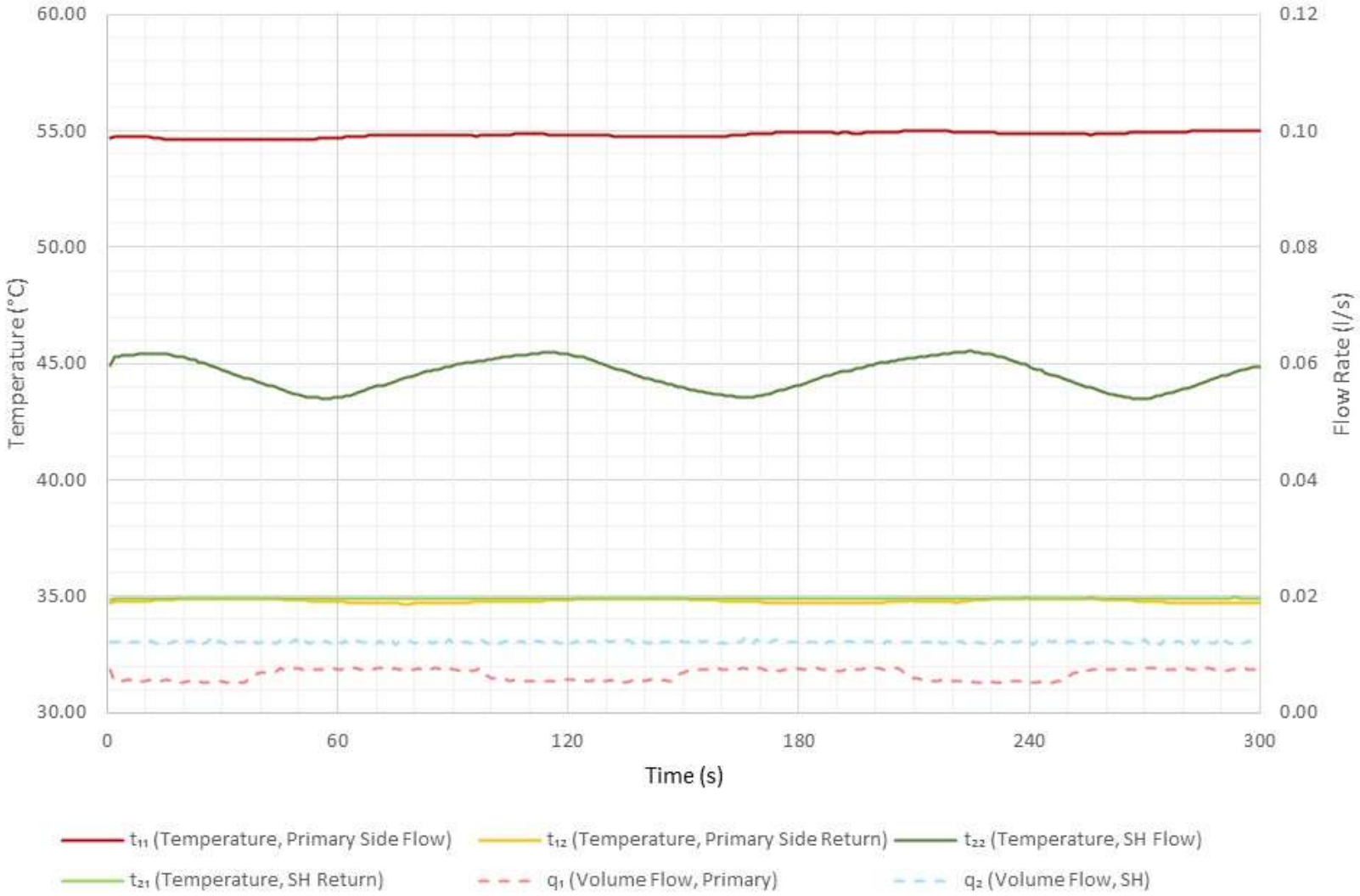


Figure 2 - Test 01d Key Metrics

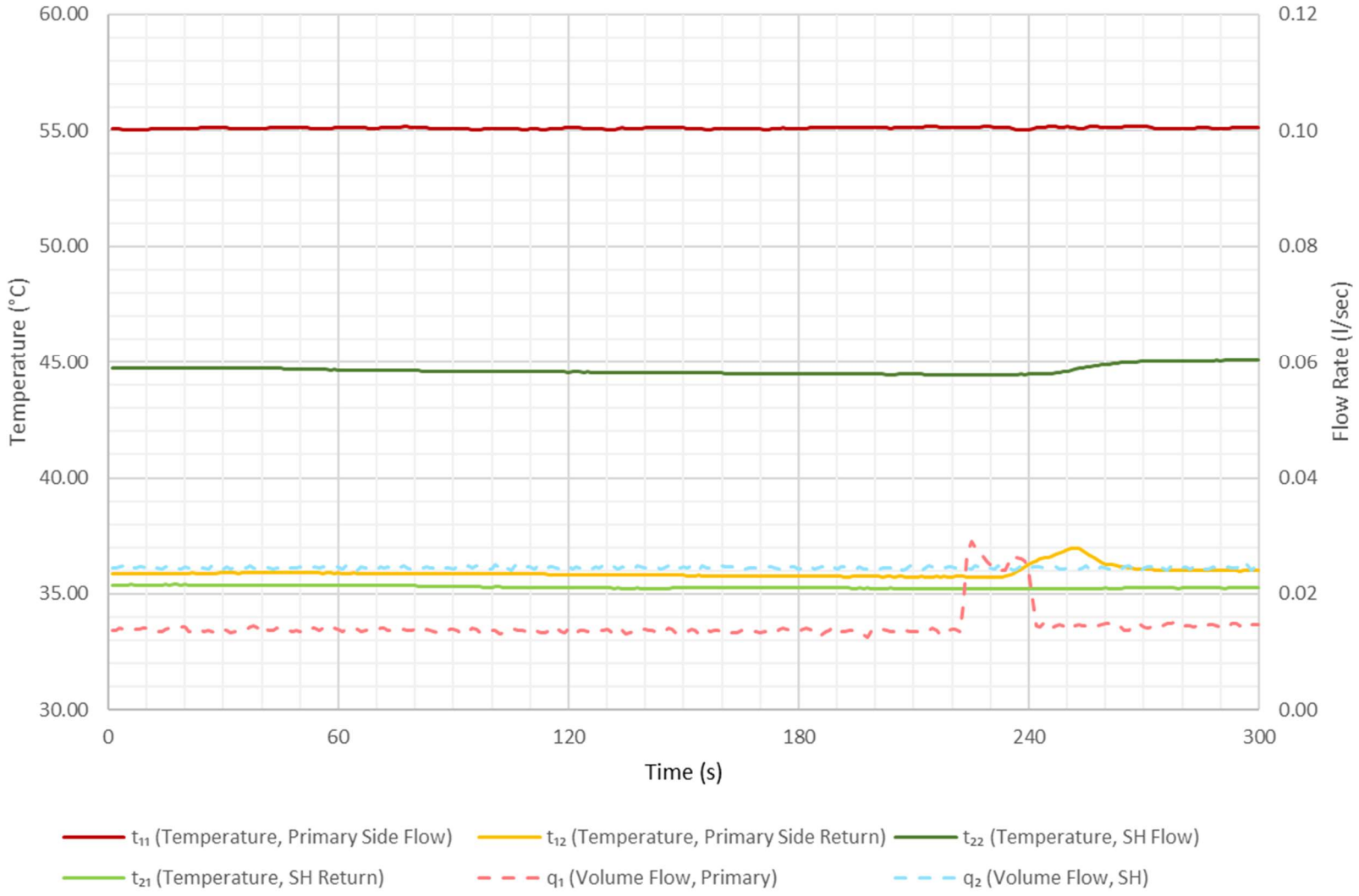


Figure 3 - Test 01e Key Metrics

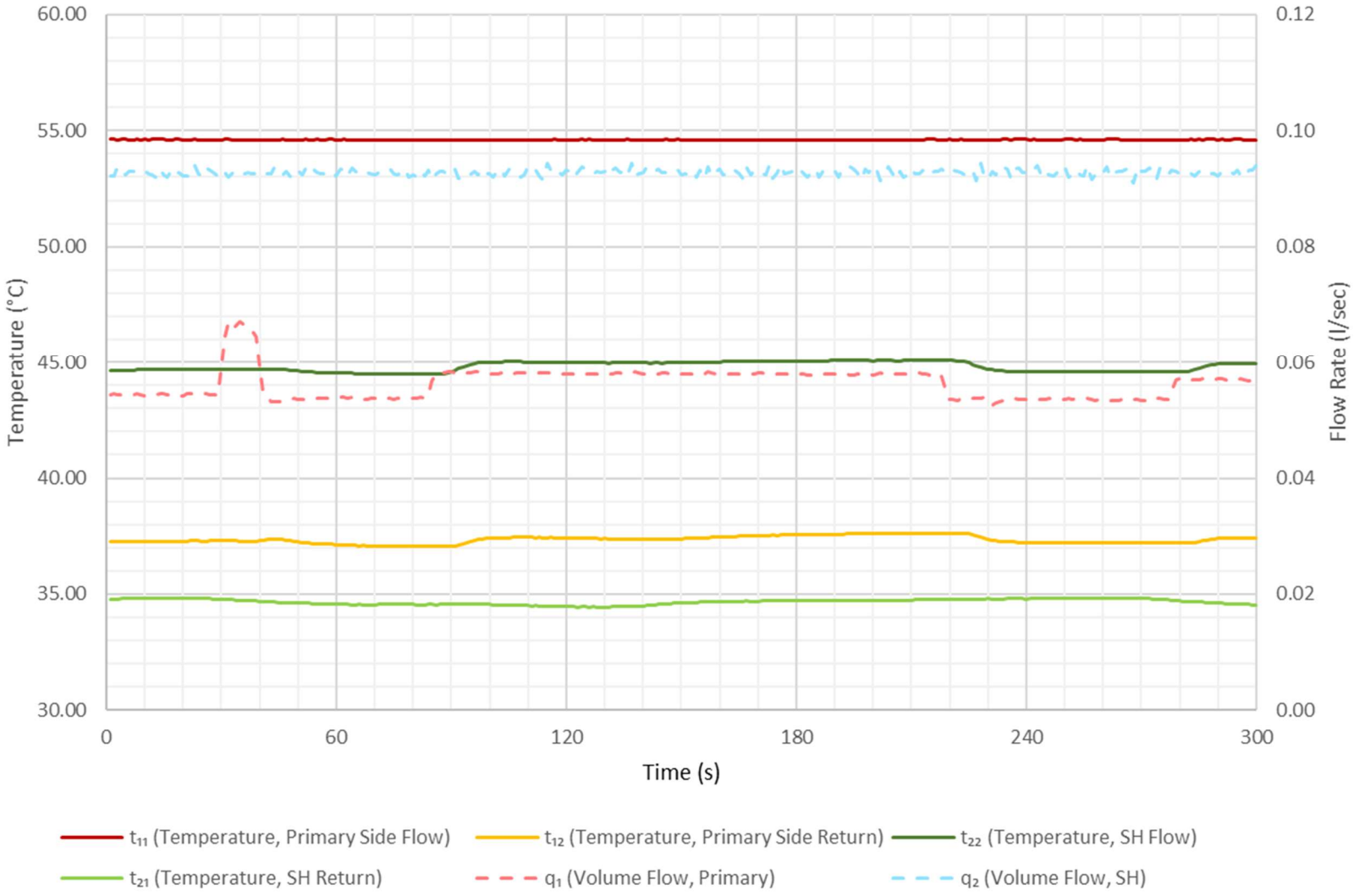


Figure 4 - Test 01f Key Metrics

7 TEST MODULE 8 – DHW, LOW TEMPERATURE, DH55 KWARM

7.1 Test Module 8 Information

7.1.1 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.

7.1.2 The following set of tests are from test module 8 – Domestic Hot Water, Low Temperature, Keep Warm Hot Water Module 8-DH55-KWarm.

Table 11 - 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

7.2 Test 11b information

7.2.1 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.

7.3 Test 11b Results

7.3.1 Performance criteria results can be seen in Table 13, Test result data can be seen in Table 12 and key metrics can be found in Figure 5. Best practice criteria can be found in table 14.

Table 12 - 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)	53.5	44.1
Number of consecutive seconds where t_{32} > 55°C.	(s)	0	
Overall DHW volume weighted avg. return temp	VWART (°C)	16	

Table 13 - 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 14 - Module 8 - 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	Not Achieved

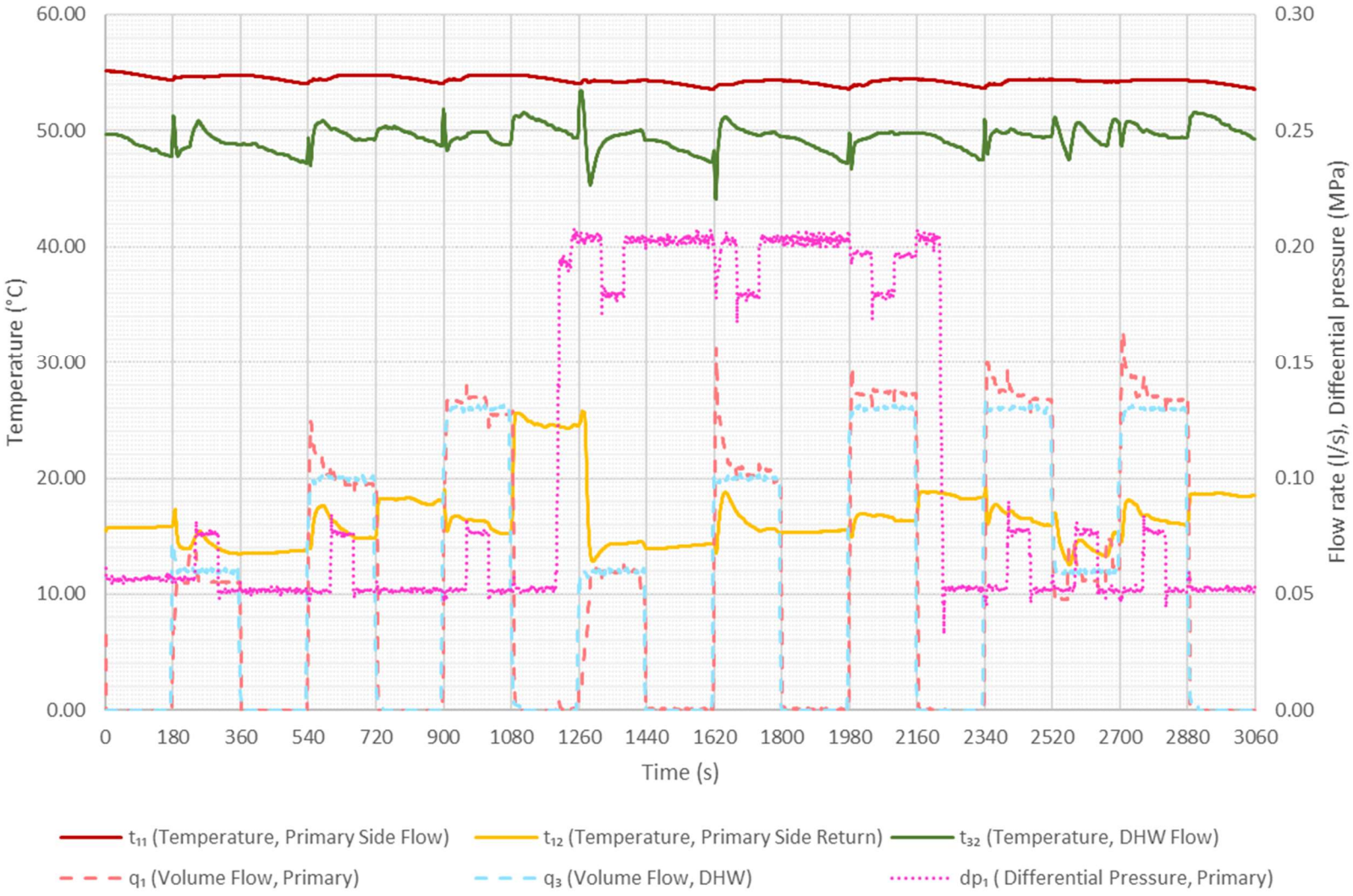


Figure 5 - Test 11b Key Metrics

7.4 Test 12b / 12d Information

7.4.1 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.

7.5 Test 12b / 12d Results

7.5.1 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.

7.5.2 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.

7.5.3 Performance criteria results can be seen in Table 16, Test result data can be seen in Table 15 and key metrics can be found in Figure 6 and Figure 7. Best practice criteria can be found in table 17.

Table 15 - 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)	52.8	36.2	52.5	36.1
Number of consecutive seconds where t_{32} > 55°C	(s)	0		0	

Table 16 - 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 17 - 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

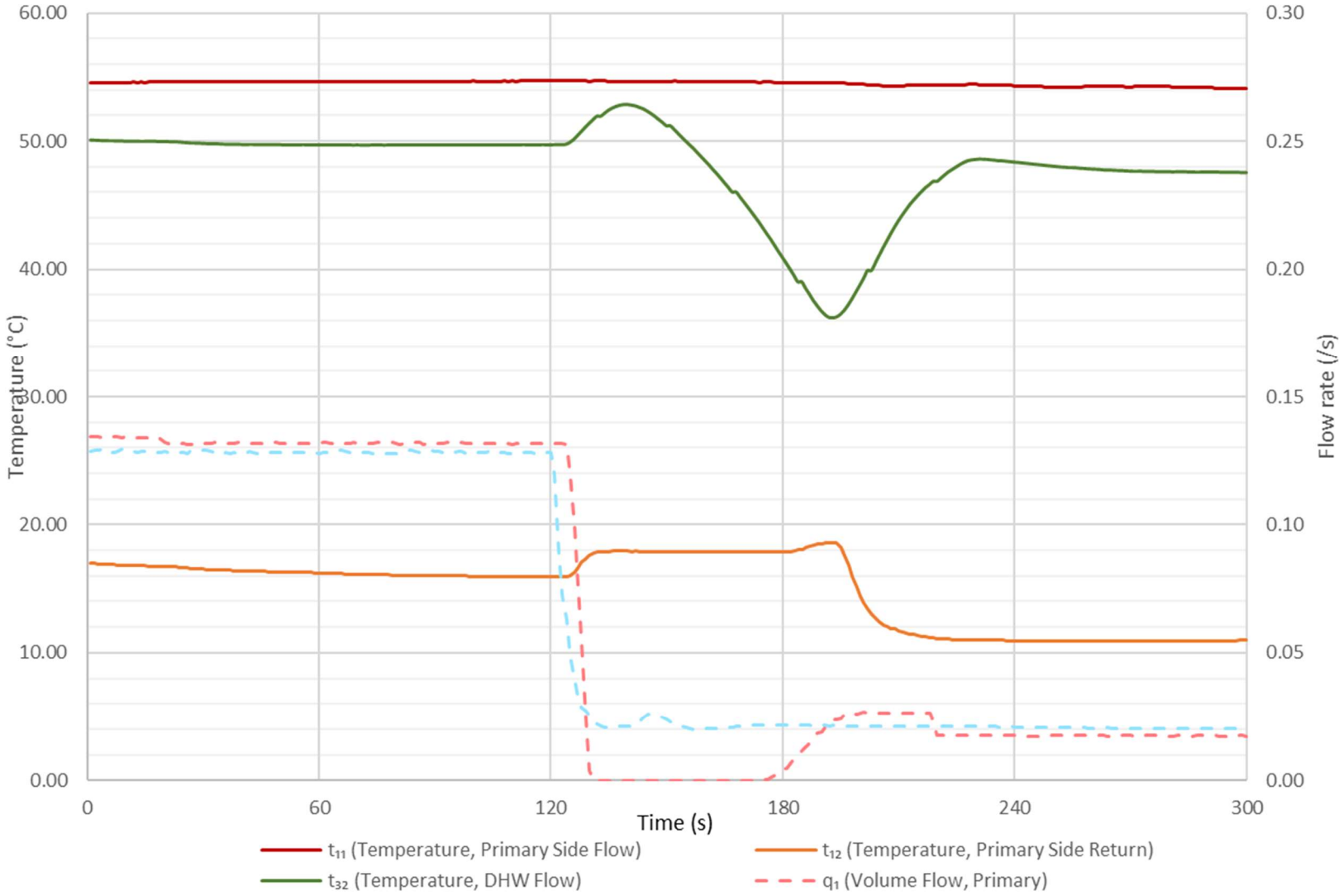


Figure 6 - Test 12b Key Metrics

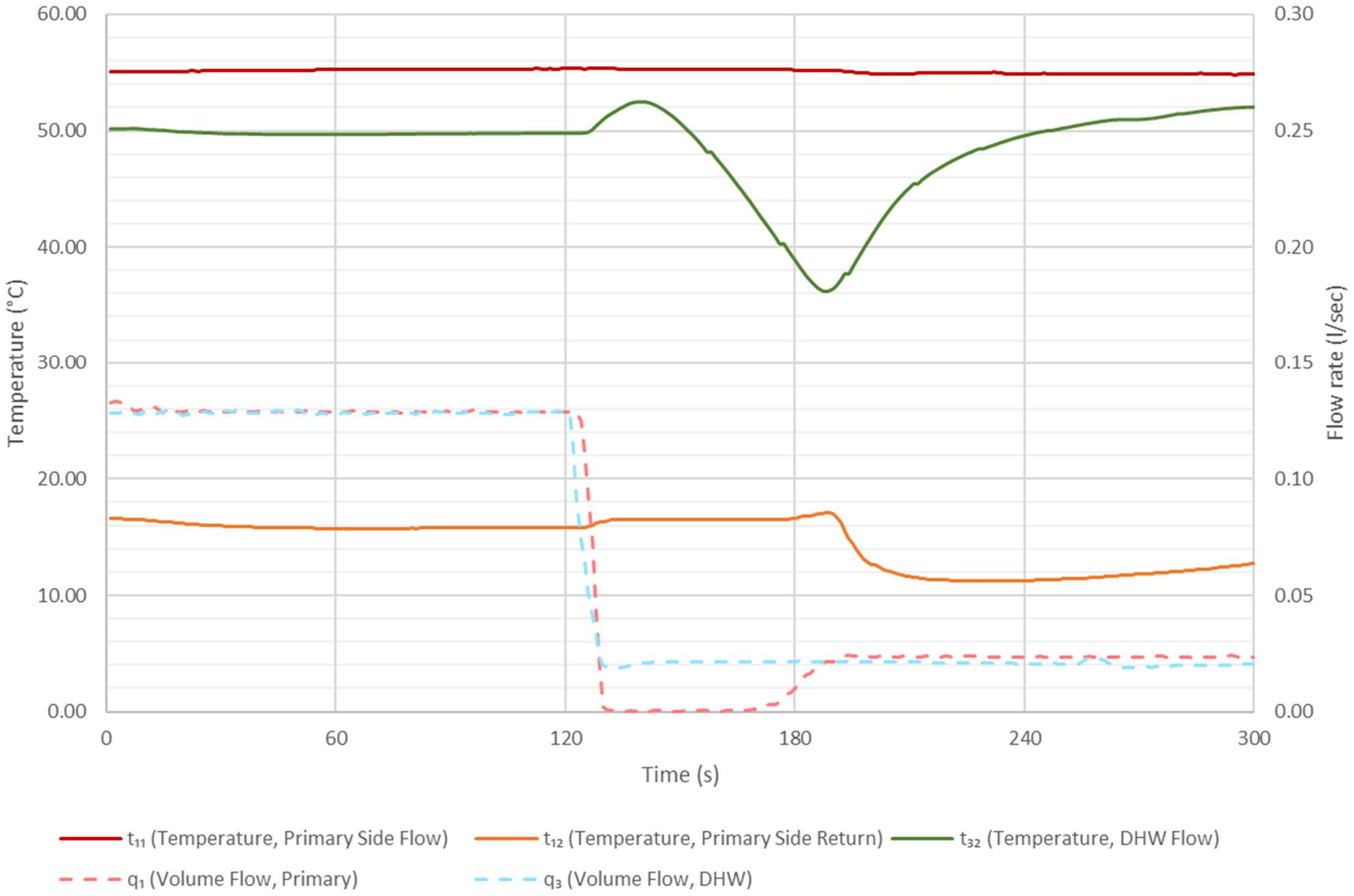


Figure 7 - Test 12d Key Metrics

7.6 Test 13b Information

7.6.1 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.

7.7 Test 13b Results

7.7.1 The maximum DHW heat output was recorded as 51.9 kW, with a measured flow rate of 0.36 l/s, when producing minimum DHW at 45°C or above (Temperature achieved at final step 46.3°C)

7.7.2 The recorded DHW line pressure drop across the HIU was 62 kPa.

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

7.7.4 Performance criteria results can be seen in Table 18, Test result data can be seen in Table 19, key metrics can be found in Figure 8.

Table 18 - 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 19 - 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	55.3	55.3	55.2	55.0	54.7	-	-
Temperature, primary side return connection	t_{12} (°C)	17.3	17.1	18.1	18.7	18.3	18.1	16.2	15.0	-	-
Volume flow, primary side	q_1 (l/s)	0.158	0.190	0.227	0.266	0.288	0.314	0.314	0.314	-	-
Arithmetic mean of primary side power recorded during test	H_1 (kW)	24.8	30.0	35.1	40.3	44.1	48.2	50.4	51.6	-	-
Temperature, cold water supply	t_{31} (°C)	9.9	9.8	9.8	9.9	10.0	10.0	9.6	9.7	-	-
Temperature, domestic hot water flow from HIU	t_{32} (°C)	50.2	49.8	50.0	50.0	49.1	48.5	46.3	44.0	-	-
Volume flow, domestic hot water	q_3 (l/s)	0.151	0.181	0.211	0.241	0.271	0.300	0.331	0.361	-	-
Differential pressure, domestic hot water across HIU	dP_3 (kPa)	17	23	28	36	44	53	62	73	-	-
Arithmetic mean of DHW power recorded during test	H_3 (kW)	25.5	30.4	35.6	40.4	44.3	48.4	50.8	51.9	-	-

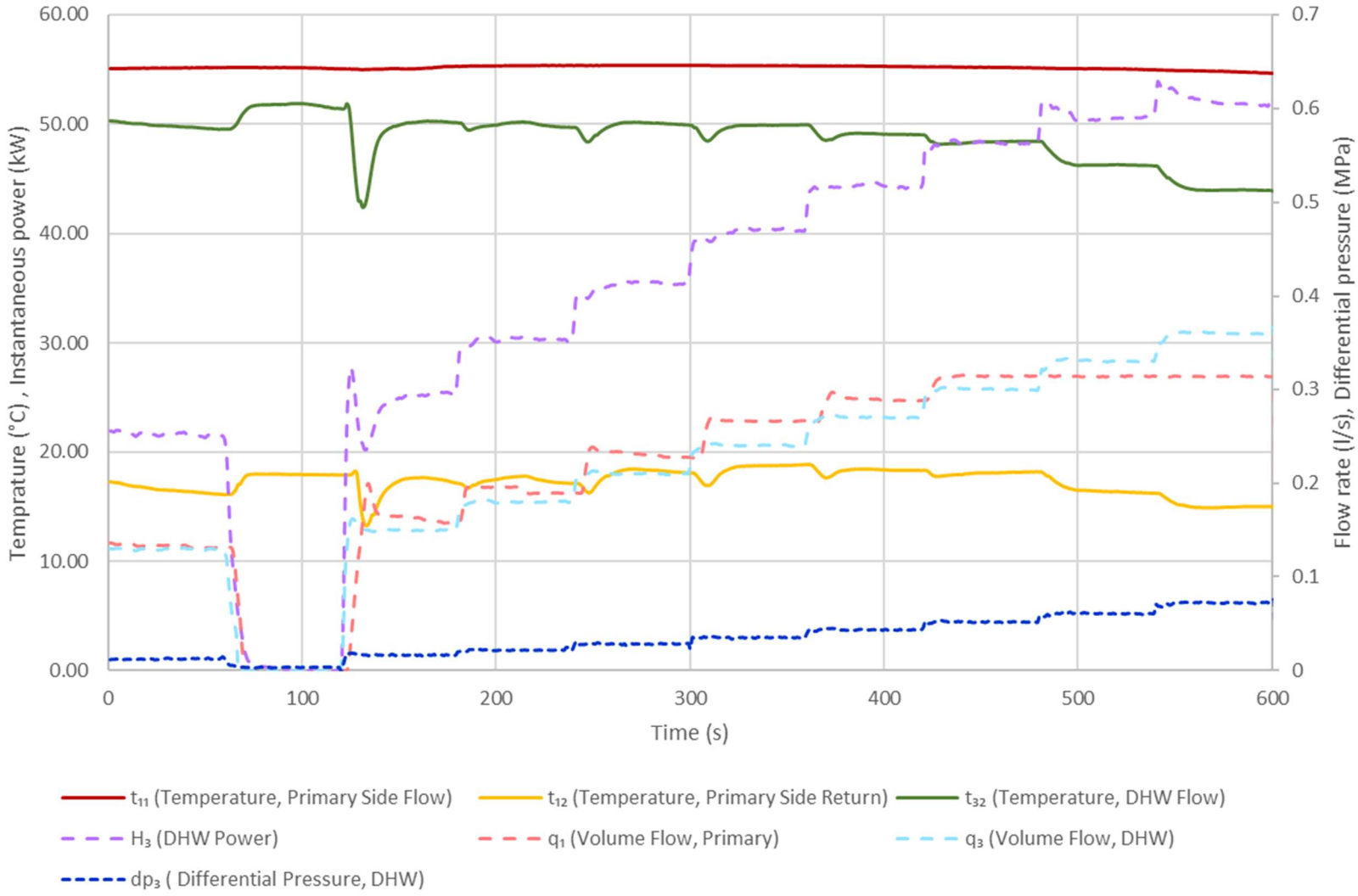


Figure 8 - Test 13b Key Metrics

7.8 Test 21b Information

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

7.9 Test 21b Results

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

7.9.2 The keep warm does not undergo cycling (i.e. t_{11} varies by more than ±3 °C during the final 3 hours of the test).

7.9.3 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. Best practice criteria can be found in table 22.

Table 20 - Module 8, Test 21b Results

Module 8 - Test 21b Results		
Parameter	**Symbol**	**Result**
Mean average volume flow, primary side	q_1 (l/s)	0.0016
Mean average of primary side power recorded during test	H_1 (kW)	0.03
Mean average electrical energy use	$W_{electrical}$ (W)	5.2
Mean average thermal energy use	$W_{thermal}$ (W)	31.1
Overall energy loss per day	(kWh)	0.870
Overall keep warm volume weighted avg. return temp	VWART (°C)	45

Table 21 - 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 22 - 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)	Not Achieved
Best practice if HIU overall energy losses are less than 0.7 kWh/day (to three decimal places)	Not Achieved

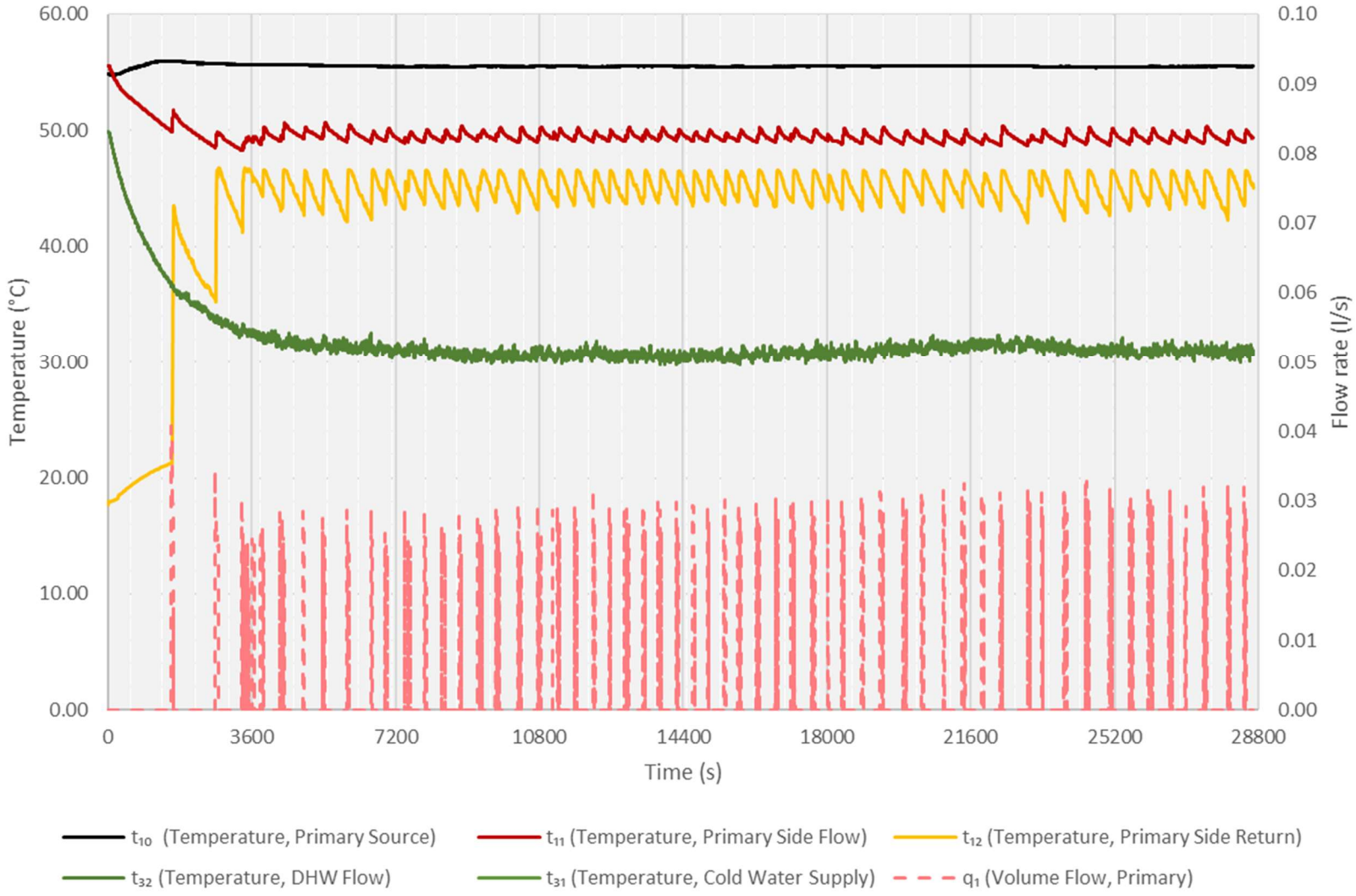


Figure 9 - Test 21b Key Metrics

7.10 Test 22b Information

7.10.1 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.

7.11 Test 22b Results

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

7.11.2 Performance criteria results can be seen in Table 24, Test result data can be seen in Table 23 and key metrics can be found in Figure 10. Best practice criteria can be found in table 25.

Table 23 - 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)	7
Number of consecutive seconds where t_{32} > 55°C.	(s)	0
Mean average Volume flow, primary side	q_1 (l/s)	0.121

Table 24 - 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 25 - Module 8 - Test 22 Best Practice

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	Achieved

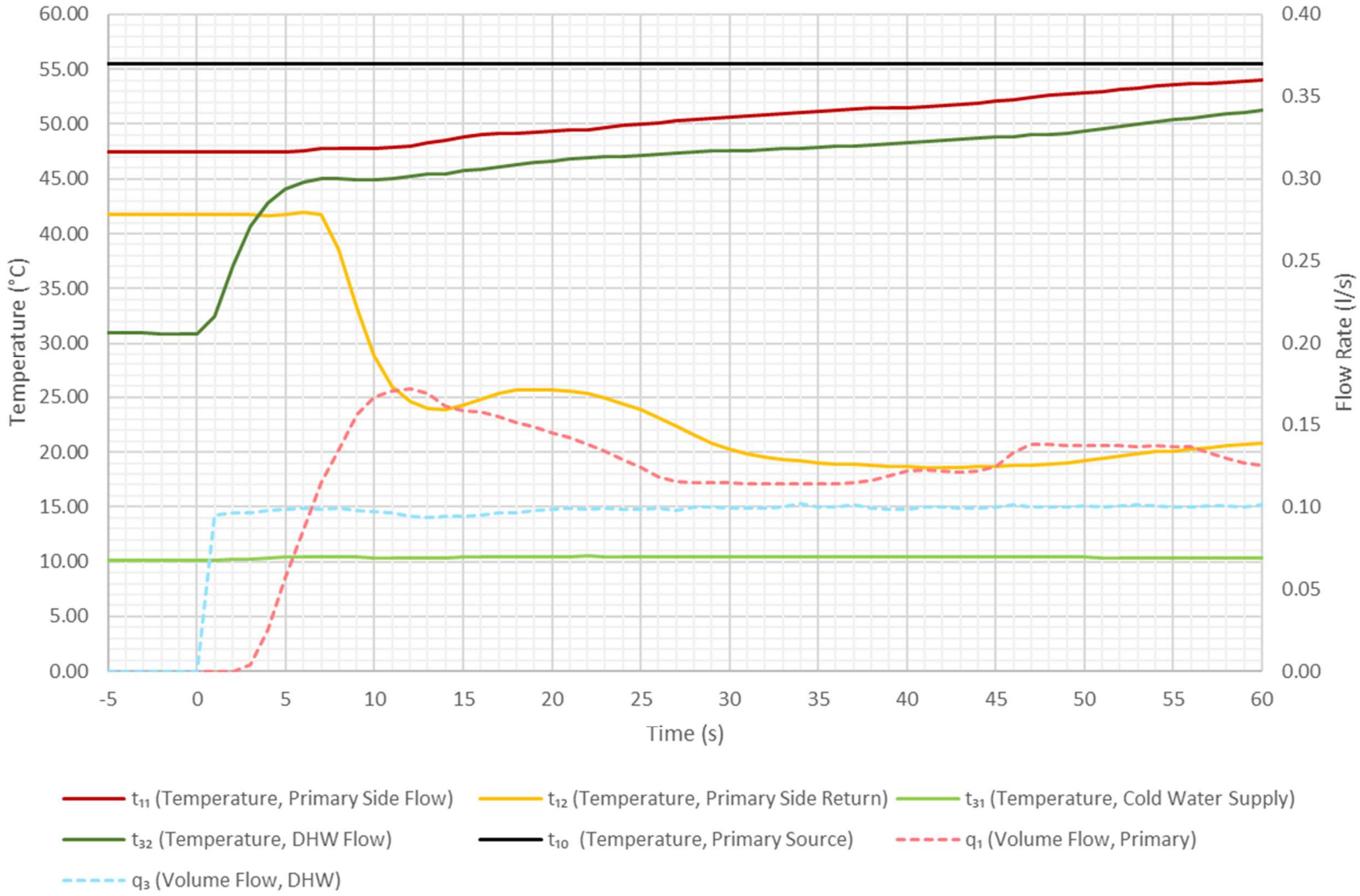


Figure 10 - Test 22b Key Metrics

8 CONCLUSIONS

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

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

9 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.

10 APPENDIX A

10.1 VWART Calculations for Modules 2 & 8

	VWART (°C)	Volume (m^3)
DHW	16	33.3
Standby	45	43.4
Space Heating	36	76.8

	VWART (°C)
Summer	32
Winter	34
Overall	33

	DHW Draw Test Results			Post DHW Draw (60 seconds)	
	Power (W)	Primary Flow (m^3/hr)	VWART (°C)	Primary Volume (l)	VWART (°C)
Low	9638	0.2	15	0.23	14
Medium	16577	0.4	16	0.08	17
High	21149	0.5	16	0.11	22

DHW Draw Volumes pa		
kWh pa	Hours	Volume pa (m^3)
729	75.64	14.7
297	17.92	6.5
444	20.99	9.8

Post DHW Draw Volumes pa	
Events pa	Volume pa (m^3)
10000	2.3
660	0.054
300	0.033

Standby Test Results	
Primary Flow (m^3/hr)	VWART (°C)
0.0058	45

Standby Volumes pa	
Hours	Volume pa (m^3)
7479	43.4

	Space Heating					
	Power (W)	Primary Flow (m^3/hr)	VWART (°C)	kWh pa	Hours	Volume pa (m^3)
0.5kW	489	0.024	35	98	200	4.8
1kW	961	0.053	36	787	819	43.0
4kW	3949	0.203	37	565	143	29.0

11 APPENDIX B

11.1 Appliance Documentation

11.1.1 The details of the appliance documentation are given in table 26 below.

	Component:	Document Submitted (Y/N):	Manufacturer and Type:
1	Space Heating Heat Exchanger	Y	Swep E8LAS
2	Domestic Hot Water Heat Exchanger	Y	Swep E8LAS
3	Controller for Space Heating	Y	Argus Vision 882MS20_2R
4	Control Valve and Actuator for Space Heating	Y	Frese 53-1304 PICV, 53-1183 Actuator
5	Space Heating Strainer	Y	NA
6	Controller for Domestic Hot Water	Y	Argus Vision 882MS20_2R
7	Control Valve and Actuator for Domestic Hot Water	Y	Frese OEM DN20 PICV, 53-1183 Actuator
8	Temperature Sensors	Y	Tasseron TSCOAIO
9	Domestic Hot Water Isolating Valve	Y	NA
10	Primary Side Strainer	Y	Double-Lin LL5005
11	Drain Valves	Y	NA
12	Vent Valves	Y	Ningbo Beilum EVI_00002
13	Circulation Pump set with AAV & PRV	Y	Wilo Yonos Para 15/7.0
14	Heat Meter	Y	Ploumeter RC15
15	Domestic Hot Water Flow Sensor	Y	Huba OEM 200
16	Pipes	Y	Hecapo 4503419000
17	Connections	Y	Hecapo 4503416500
18	Joints	Y	NA
19	Gaskets	Y	Gambit AF – 300B PRO
20	Expansion Vessel	Y	Aquasystems VRP220-8
21	Insulation	Y	Bautech 75-0, Armaflex AC
22	Pressure Sensors	Y	Huba OEM 505
A1	'O' Ring	Y	NA
A2	Commissioning Guide.	Y	Modusat XR TP Installation Manual 2551868AC
A3	Operation Guides with a Function Description / Description of Operation and Care Instructions as Suited to the Intended User Category.	Y	ViewSmart Temperature Control Instructions 2551851A
A4	Declaration of Conformity for CE-marked HIUs.	Y	2020-05-01_EC Declaration
A5	Full Parameter List for Electrically Controlled HIUs.	Y	FW = 10.2.0.1 DHW = 50ºC KWF = 41ºC (V_{min} = 2V) Prim. Rtn limit = 44ºC $V_{min/max}$ = 0 / 10V Htg. = 45ºC $V_{min/max}$ = 0 / 10V PI_{valve} = 3 200 PID_{pump} = disabled
A6	Maximum Primary Static Operating Differential Pressure.	Y	Static - 16 bar, Differential - 4 bar
A7	Deactivation Procedure of the Internal SH Pump.	Y	SH Pump was unplugged
	Model Name and Type Number	Y	ModuSat XR ECO TP70-10A
	Serial Number	Y	HTPE2H4423A57

12 APPENDIX B

12.1 Appliance Photographs

Figure 11 - HIU with outer case fitted

Figure 12 - HIU with outer case removed

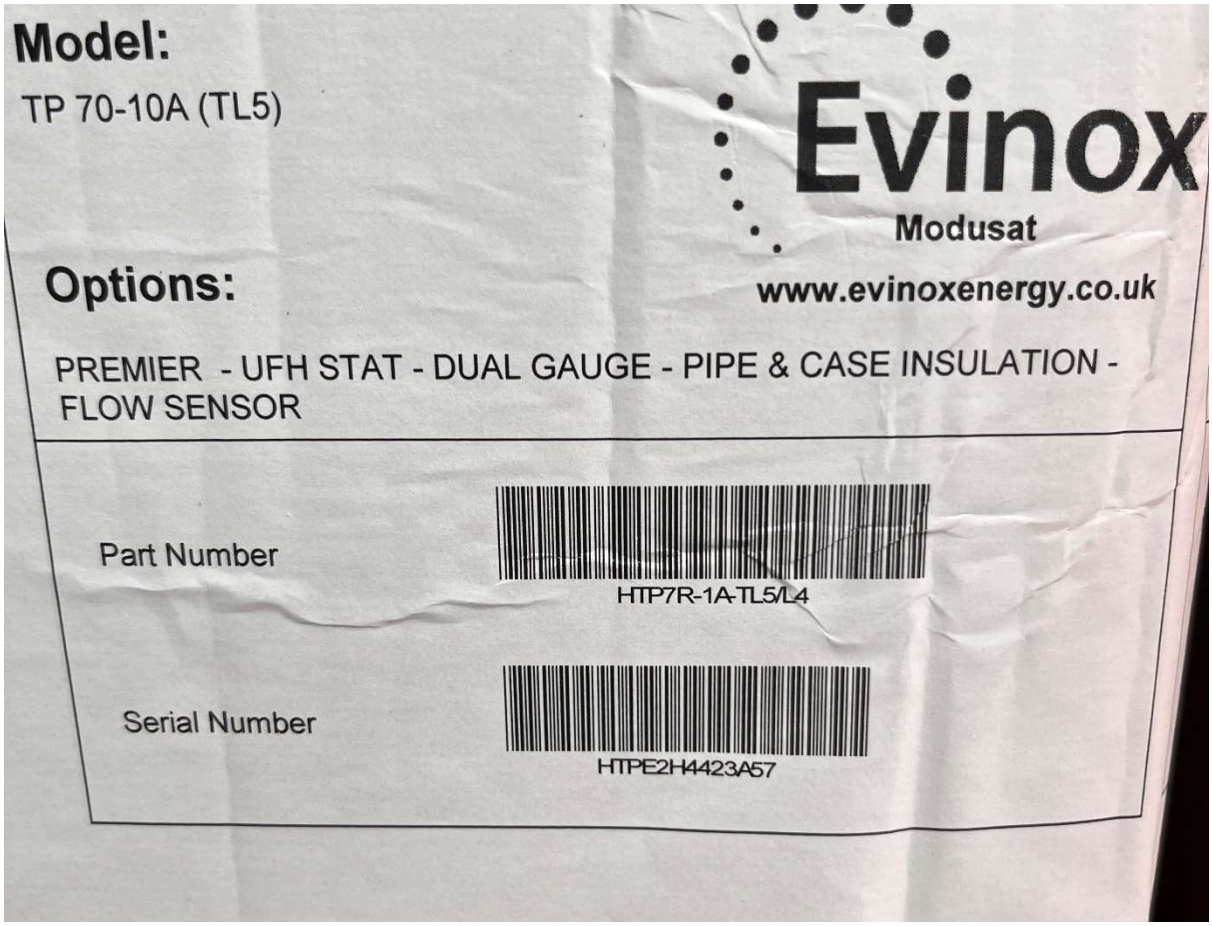
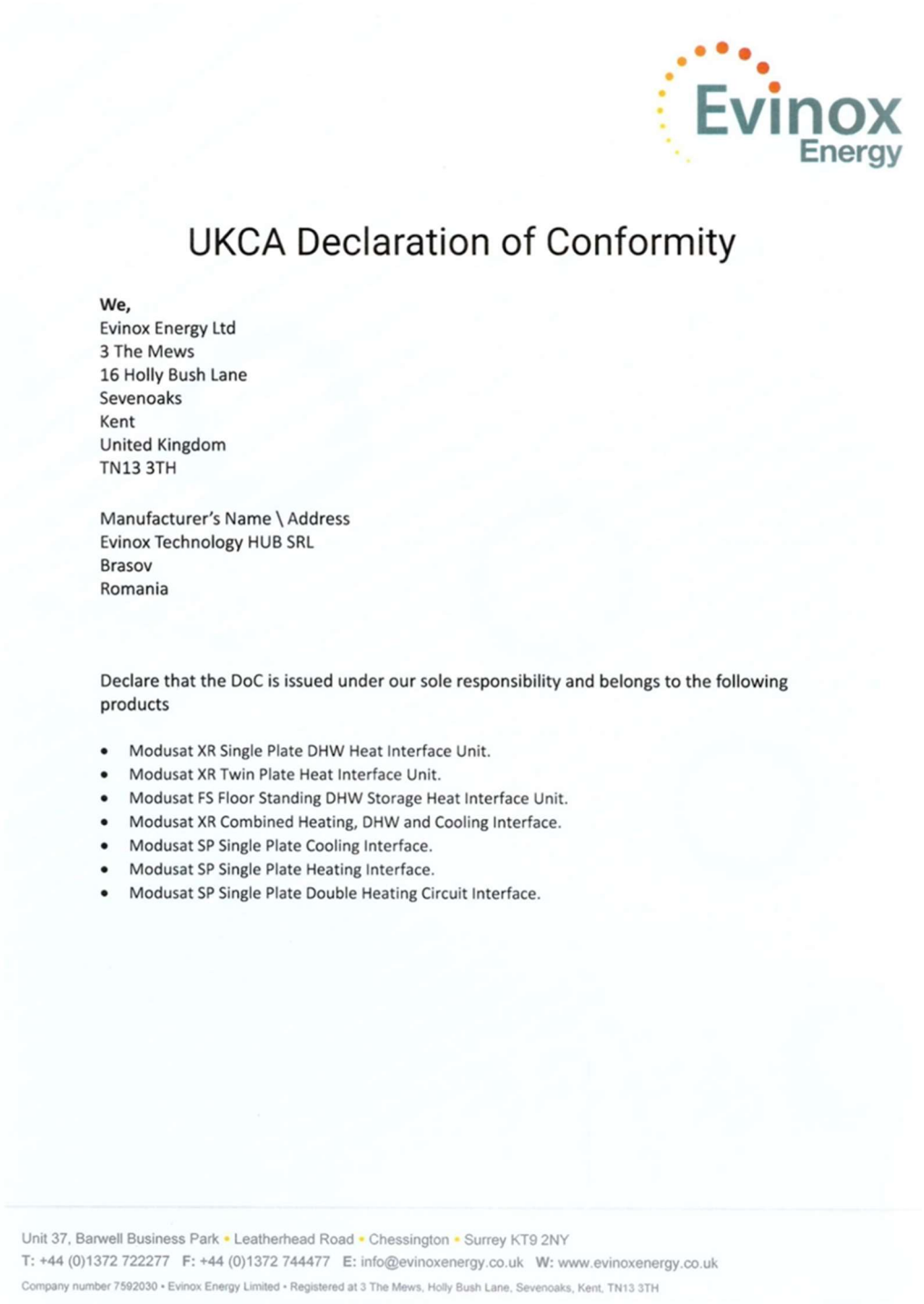


Figure 13 - Data Label

13 APPENDIX C

13.1 UK Declaration of Conformity



Evinox Energy

UKCA Declaration of Conformity

We,
Evinox Energy Ltd
3 The Mews
16 Holly Bush Lane
Sevenoaks
Kent
United Kingdom
TN13 3TH

Manufacturer's Name \ Address
Evinox Technology HUB SRL
Brasov
Romania

Declare that the DoC is issued under our sole responsibility and belongs to the following products

- Modusat XR Single Plate DHW Heat Interface Unit.
- Modusat XR Twin Plate Heat Interface Unit.
- Modusat FS Floor Standing DHW Storage Heat Interface Unit.
- Modusat XR Combined Heating, DHW and Cooling Interface.
- Modusat SP Single Plate Cooling Interface.
- Modusat SP Single Plate Heating Interface.
- Modusat SP Single Plate Double Heating Circuit Interface.

Unit 37, Barwell Business Park • Leatherhead Road • Chessington • Surrey KT9 2NY
T: +44 (0)1372 722277 F: +44 (0)1372 744477 E: info@evinoxenergy.co.uk W: www.evinoxenergy.co.uk
Company number 7592030 • Evinox Energy Limited • Registered at 3 The Mews, Holly Bush Lane, Sevenoaks, Kent, TN13 3TH

The objects of the above declaration described above are in conformity with the relevant union harmonization legislation:

Low Voltage Directive 2014/35/EU
Small Pressure Vessels - Directive 2014/29/EU
Electromagnetic Compatibility – Directive 2014/30/EU

The following harmonised standards and technical specifications have been applied.

Title:	Reference & Date
Electromagnetic compatibility (EMC). Generic standards. Immunity for residential, commercial and light-industrial environments.	EN 6100-6-1:2007
Electromagnetic compatibility (EMC). Generic standards. Emission Standard for residential, commercial and light-industrial environments.	EN 6100-6-3:2007
Safety Requirements for electrical equipment for measurement, control and laboratory use. Particular requirements for measurement equipment for insulation resistance and test equipment for electric strength.	EN IEC 61010-2-034:2021/A11 :2021

CE mark was first applied in 2013

Signed for and on behalf of:

Terry Mahoney, Managing Director
Evinox Energy Limited
3 The Mews
16 Holly Bush Lane
Sevenoaks
Kent
United Kingdom
TN13 3TH

Date: 30-3-2022 Signature: TMMahoney

Unit 37, Barwell Business Park • Leatherhead Road • Chessington • Surrey KT9 2NY
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Company number 7592030 • Evinox Energy Limited • Registered at 3 The Mews, Holly Bush Lane, Sevenoaks, Kent, TN13 3TH

Figure 14 - UK declaration of conformity

13.2 Water Regulation 4 Certificate

WRAS
APPROVED PRODUCT

This certifies that

EVINOX ENERGY LTD

has had the undermentioned product(s) examined, tested and certified as being of an appropriate quality and standard as required in the Water Supply (Water Fittings) Regulations and Scottish Water Byelaws, subject to scheme requirements being met when installed.

Model Numbers

MODUSAT SPDHW XR-ECO, MODUSAT TP XR-ECO & MODUSAT CHHC XR-ECO RANGE OF MODULAR COMBINED HEATING INTERRFACE UNITS

The certificate by itself is not evidence of a valid WRAS Approval. Confirmation of the current status of an approval must be obtained from the WRAS Approvals Directory (www.wras.co.uk/directory)

The product so mentioned will be valid until the end of:

July 2025

Certificate No.

2007348

Ian Hughes,
WRAS Approvals Manager

Figure 15 - Water regulation 4 certificate

14 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

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EUA energy&utilities alliance

HHIC HEATING & HOTWATER INDUSTRY COUNCIL