Enertek International

International Consultants in Product
Research, Design, Development
& Certification

# BESA HIU Test Report

## HIPER II Twin Plate

## Modules Tested: 1, 2, 7 & 8

**Client: Intatec**

Project Number: E5311 Report Issue: 4

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# 1 EXECUTIVE SUMMARY

1.1.1 The HIPER II Twin Plate HIU underwent testing to the BESA Technical Standard for UK HIU Test Regime, V3-Rev002 March 2026. 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.

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

Table 1 - Appliance Details and Modules Tested

| | |
|---|---|
| **Manufacturer:** | Intatec |
| **Model:** | HIPER II Twin Plate |
| **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 | 28.7 |
| **Standby** | 38 | 24.5 |
| **Space Heating** | 37 | 38.1 |

| | VWART (°C) |
|---|---|
| **Summer** | 25 |
| **Winter** | 30 |
| **Overall** | 27 |

Table 4 - Modules 2 & 8 VWART Information

| | VWART (°C) | Volume ($m^3$) |
|---|---|---|
| **DHW** | 17 | 42.2 |
| **Standby** | 39 | 41.8 |
| **Space Heating** | 36 | 68.7 |

| | VWART (°C) |
|---|---|
| **Summer** | 28 |
| **Winter** | 32 |
| **Overall** | 30 |

# 2 BRIEF

2.1.1 Enertek International Limited (EIL), were contracted to receive, install and commission a production sample of the HIPER II Twin Plate.

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 Technical Standard for UK HIU Test Regime, V3-Rev002 March 2026, 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 Intatec**.** The location of which can be found within the references section of this report.

## 4.2 Appliance Details

4.2.1 Details of the HIPER II Twin Plate HIU 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 | Intatec |
| Model | HIPER II Twin Plate |
| Serial Number | INC260310001AR |
| Year of Manufacture | 2026 |
| DHW Priority | Yes |
| EUT Number | EUT 0949 |
| Date Test Item Received | 19/01/2026 |

## 4.3 Appliance Design Pressures and Temperatures

4.3.1 The maximum design pressures and temperatures of the HIPER II Twin Plate 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) | Temperature (°C) | Differential Pressure (bar) |
|---|---|---|---|
| Primary Side | 16 | 85 | 4 |
| Secondary Side Space Heating | 3 | 85 | - |
| Secondary Side DHW | 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 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.

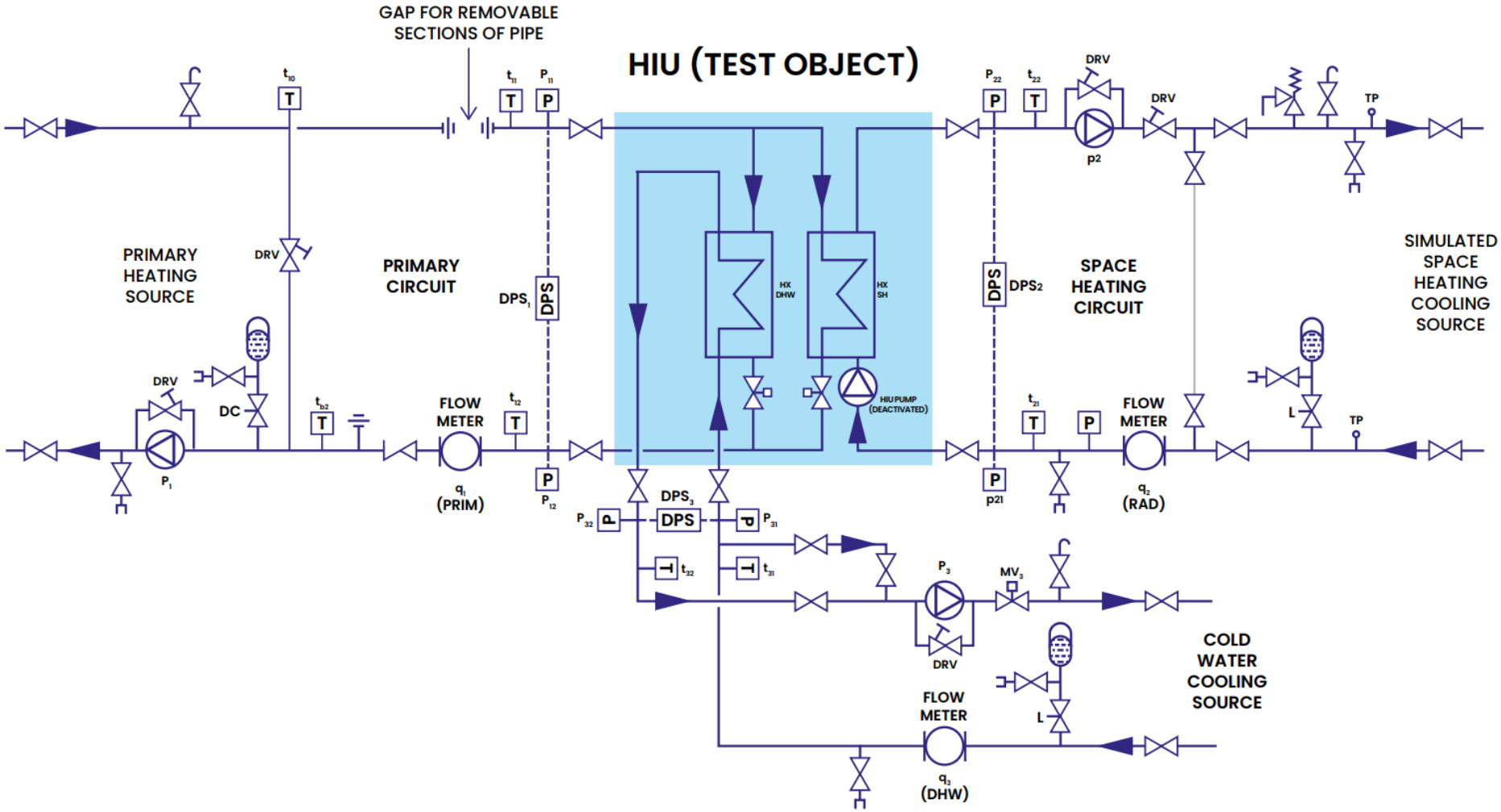



Figure 1 - EIL's HIU Test Rig Schematic which is taken from Appendix B, Figure 4, of Technical Standard for UK HIU Test Regime V3-Rev002: March 2026

# 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 - V1 - Rev002:2026.

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 is above 37°C (to one decimal point) | PASS |
| Space heating flow temperature, t22, is not maintained at 55°C ± 5.0°C (to one decimal place) for more than one second | PASS |
| Average space heating flow temperature, t22, across the test is not 55°C ±0.5°C (to one decimal place) (01c only) | PASS |
| Average space heating flow temperature, t22, across the test is not 55°C -0.5°C / +2.0°C (to one decimal place) (01a and 01b) | PASS |

Table 10 - Module 1 Best Practice

| Module 1 – Best Practice Criteria | |
|---|---|
| **Best Practice Criteria if:** | **Best Practice** |
| VWART is less than or equal to 36°C (to one decimal point) | Not Achieved |
| Average space heating flow temperature, t22, across all three tests is within 55°C ±0.5°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 | 70.3 | 69.6 |
| Temperature, primary side return connection | $t_{12}$ (°C) | 35.7 | 36.0 | 38.0 |
| Volume flow, primary side | $q_1$ (l/s) | 0.0036 | 0.0070 | 0.031 |
| Differential pressure, primary system across HIU | $dP_1$ (kPa) | 49 | 199 | 48 |
| Arithmetic mean of primary side power recorded during test | $H_1$ (W) | 511.1 | 1002.8 | 4035.9 |
| Temperature, space heating system return connection | $t_{21}$ (°C) | 34.8 | 35.0 | 34.8 |
| Temperature, space heating system flow connection | $t_{22}$ (°C) | 55.3 | 54.9 | 54.8 |
| Volume flow, space heating system | $q_2$ (l/s) | 0.0060 | 0.012 | 0.049 |
| Differential pressure, space heating system across HIU | $dP_2$ (kPa) | 13 | 13 | 12 |
| Arithmetic mean of space heating power during test | $H_2$ (W) | 513.7 | 978.2 | 4045.2 |
| Volume Weighted Avg. Return Temp | VWART (°C) | 36 | 36 | 38 |
| Overall VWART (°C) | | 37 | | |

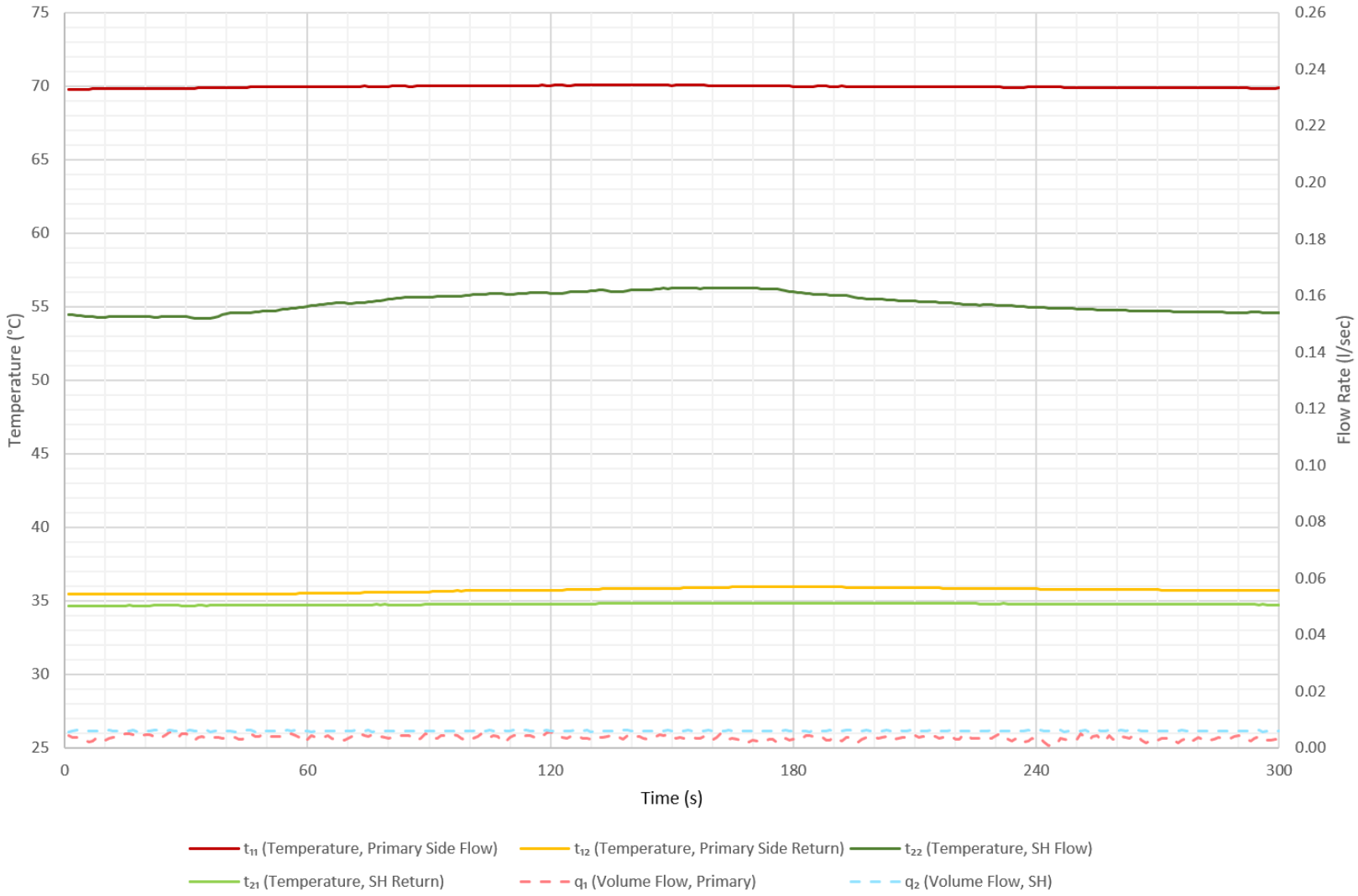



Figure 2 - Test 01a Key Metrics

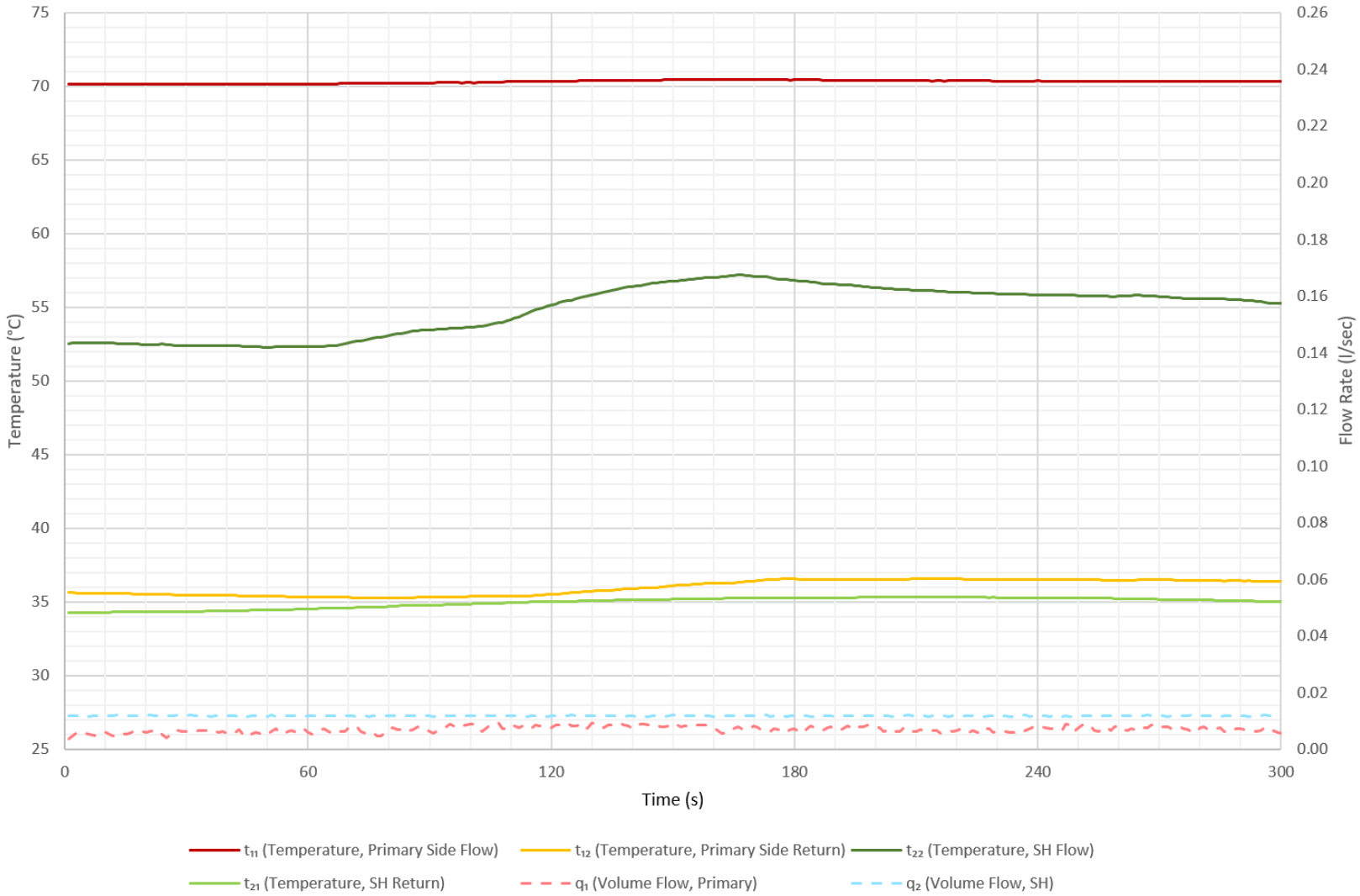



Figure 3 - Test 01b Key Metrics

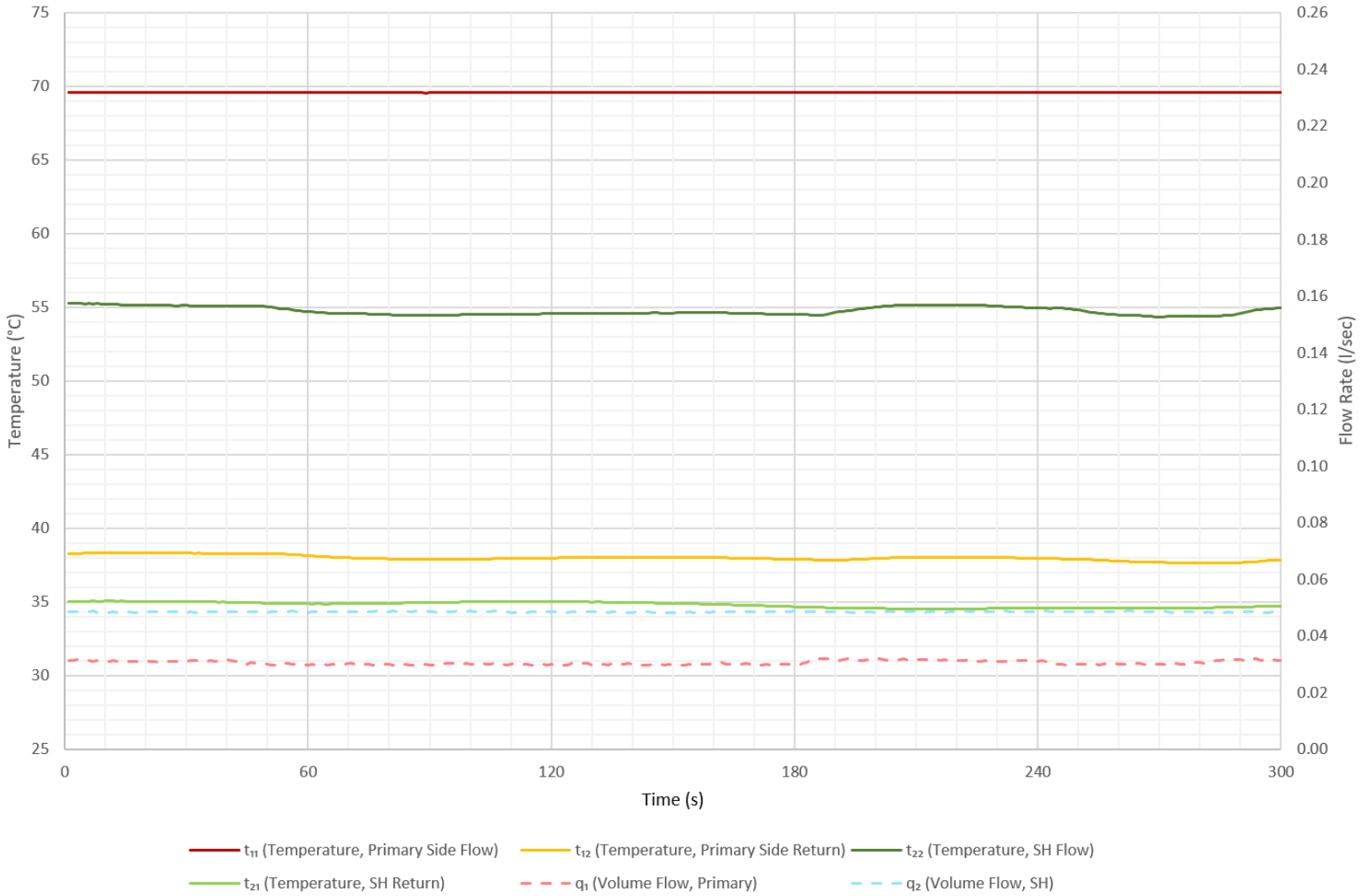



Figure 4 - Test 01c Key Metrics

# 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 - V1 - Rev002: 2026.

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 is above 37°C (to one decimal point) | PASS |
| Space heating flow temperature, t22, is not maintained at 45°C ± 5.0°C (to one decimal place) for more than one second | PASS |
| Average space heating flow temperature, t22, across the test is not 45°C ±0.5°C (to one decimal place) (01f only) | PASS |
| Average space heating flow temperature, t22, across the test is not 45°C -0.5°C / +2.0°C (to one decimal place) (01d and 01e) | PASS |

Table 14 - Module 2 Best Practice

| Module 2 – Best Practice Criteria | |
|---|---|
| **Best Practice Criteria if:** | **Best Practice** |
| VWART is less than or equal to 36°C (to one decimal point) | Not Achieved |
| Average space heating flow temperature, t22, across all three tests is within 45°C ±0.5°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) | 54.9 | 55.3 | 55.2 |
| Temperature, primary side return connection | $t_{12}$ (°C) | 35.1 | 35.5 | 37.1 |
| Volume flow, primary side | $q_1$ (l/s) | 0.0062 | 0.012 | 0.051 |
| Differential pressure, primary system across HIU | $dP_1$ (kPa) | 52 | 202 | 51 |
| Arithmetic mean of primary side power recorded during test | $H_1$ (W) | 512.8 | 1040.8 | 3823.2 |
| Temperature, space heating system return connection | $t_{21}$ (°C) | 35.1 | 35.2 | 35.4 |
| Temperature, space heating system flow connection | $t_{22}$ (°C) | 45.1 | 45.2 | 44.8 |
| Volume flow, space heating system | $q_2$ (l/s) | 0.013 | 0.023 | 0.097 |
| Differential pressure, space heating system across HIU | $dP_2$ (kPa) | 15 | 14 | 11 |
| Arithmetic mean of Space heating power during test | $H_2$ (W) | 492.0 | 956.4 | 3811.2 |
| Volume Weighted Avg. Return Temp | VWART (°C) | 35 | 35 | 37 |
| Overall VWART (°C) | | 36 | | |

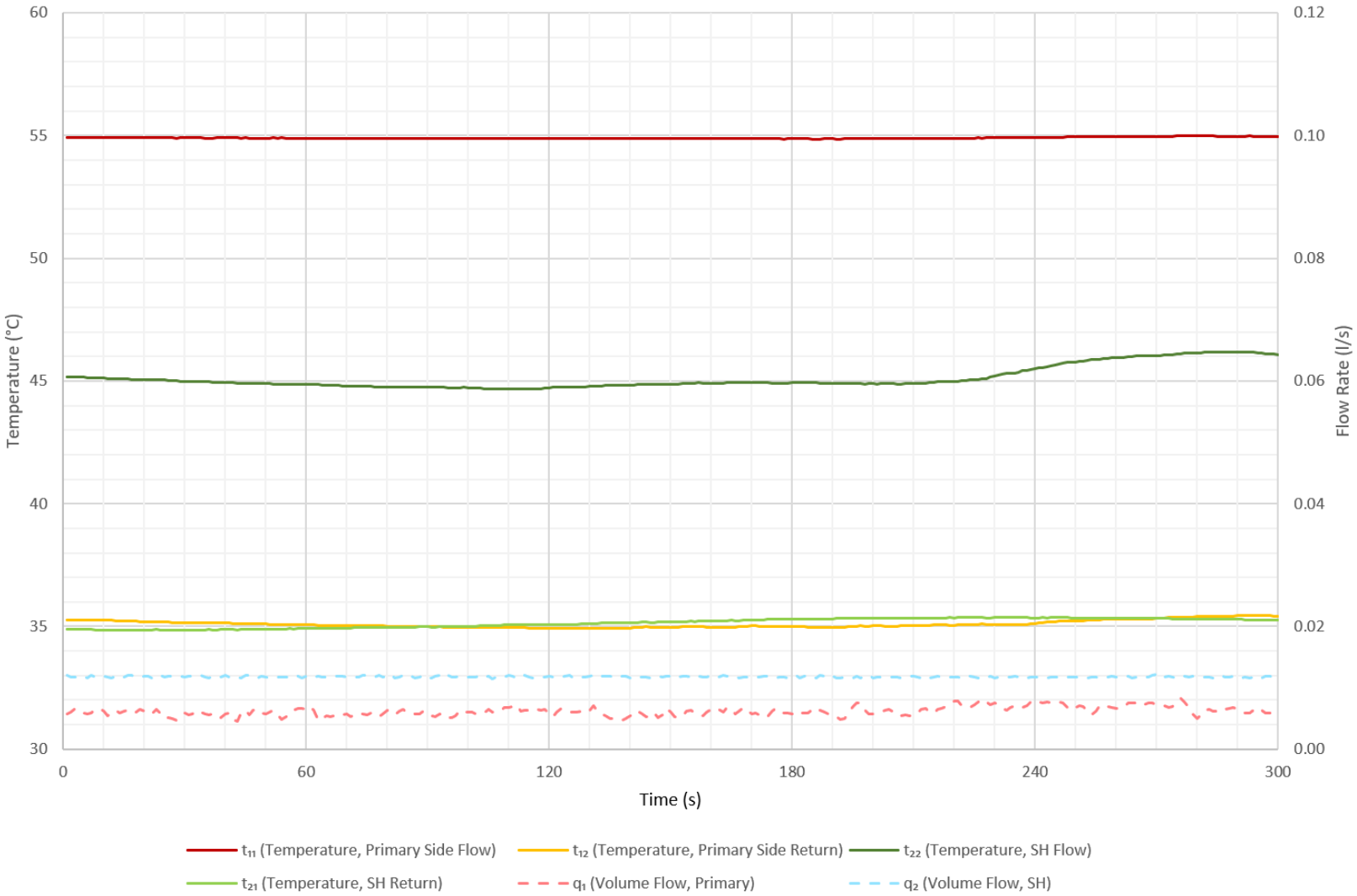



Figure 5 - Test 01d Key Metrics

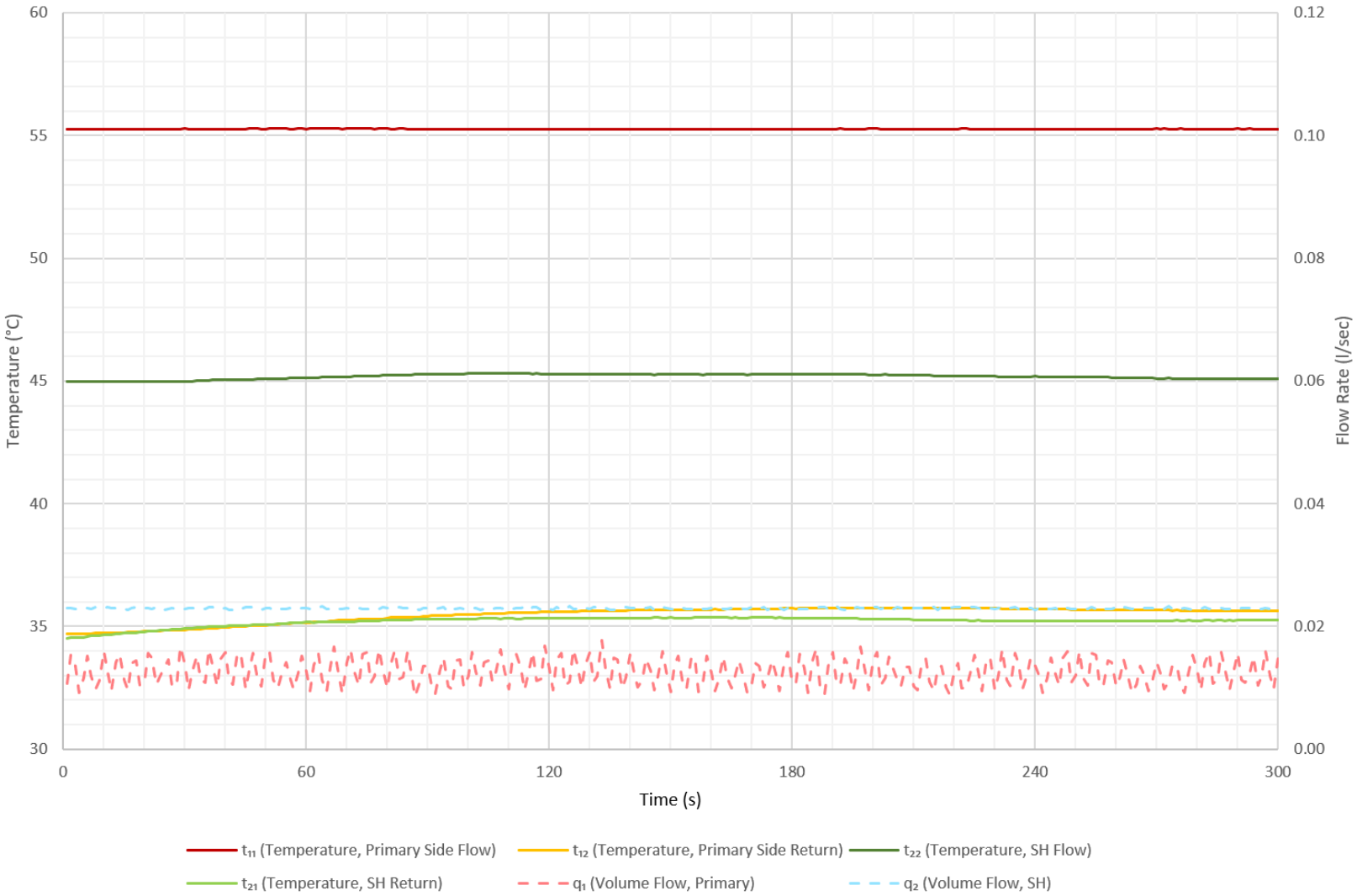



Figure 6 - Test 01e Key Metrics

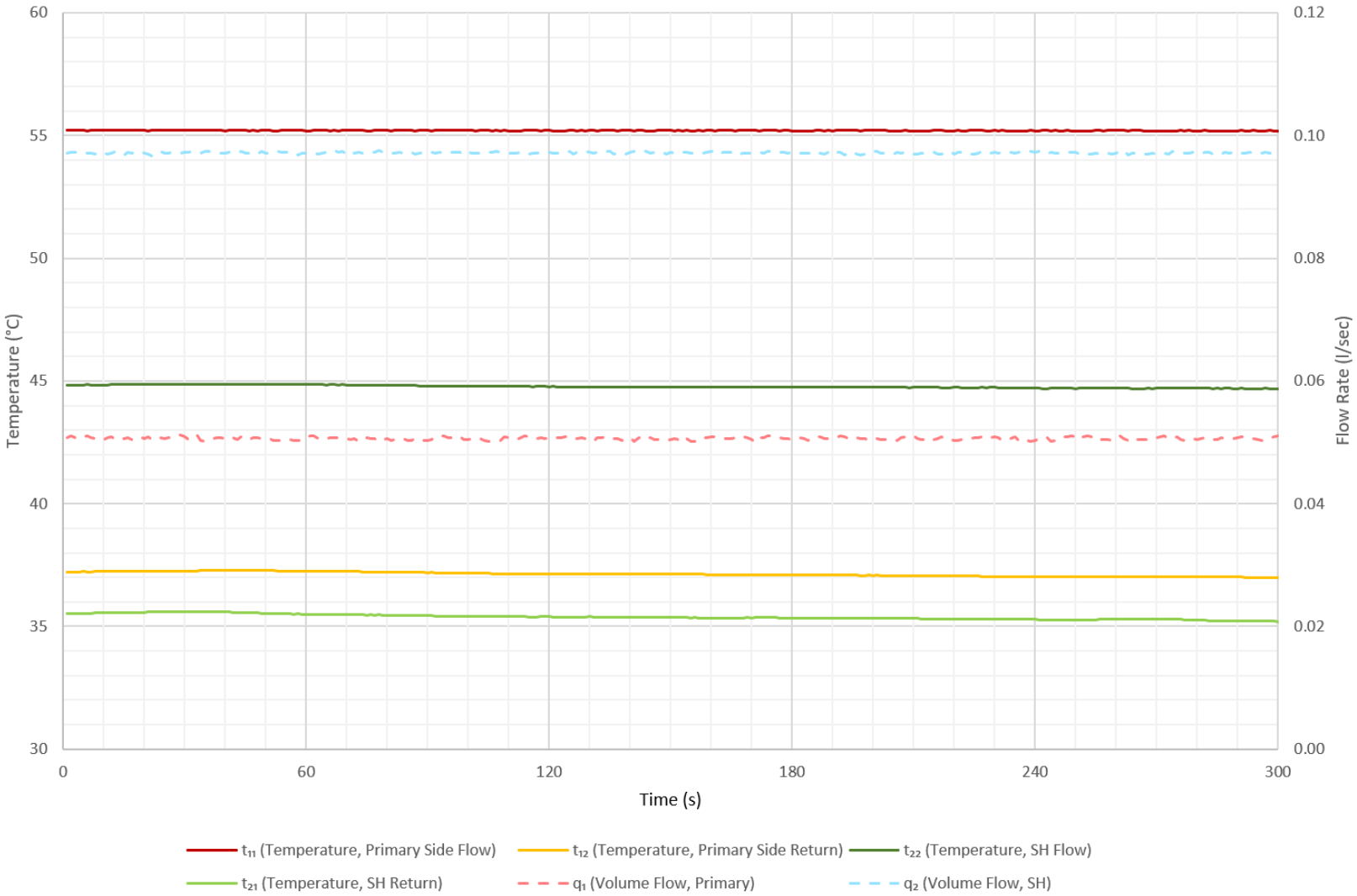



Figure 7 - Test 01f Key Metrics

# 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 - V1 – Rev002: 2026.

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) | 54.1 | 43.4 |
| Number of consecutive seconds where $t_{32}$ > 55°C | (s) | 0 | |
| Volume Weighted Avg. Return Temp | VWART (°C) | 13 | |

Table 18 - Module 7 Test 11a Performance Criteria

| Module 7 - Test 11a Performance Criteria | |
|---|---|
| **Performance Criteria, Fail if:** | **PASS/FAIL** |
| DHW temperature ($t_{32}$) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk | PASS |
| Primary return temperature ($t_{12}$) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk | PASS |
| VWART is above 20°C (to one decimal place) | PASS |
| 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 |
| 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 |
| 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 11a Best Practice

| Module 7 – Test 11a – Best Practice Criteria | |
|---|---|
| **Best Practice Criteria if:** | **Best Practice** |
| VWART is less than or equal to 15°C (to one decimal place) | Achieved |
| DHW temperature ($t_{32}$) is being maintained at 50.0°C ±2°C throughout periods of DHW flow | Not Achieved |
| DHW temperature ($t_{32}$) 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.

8.4.2 Test 12a performs the low flow test at 50kPa differential pressure.

8.4.3 Test 12c performs the low flow test at 200kPa differential pressure.

## 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) | 57.7 | 50.2 | 58.8 | 49.0 |
| Number of consecutive seconds where $t_{32}$ > 55°C | (s) | 18 | | 13 | |

Table 21 - Module 7 Test 12 Performance Criteria

| Module 7 - Test 12 Performance Criteria | |
|---|---|
| **Performance Criteria, Fail if:** | **PASS/FAIL** |
| DHW temperature ($t_{32}$) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk | PASS |
| Primary return temperature ($t_{12}$) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk | PASS |
| 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** |
| 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 |

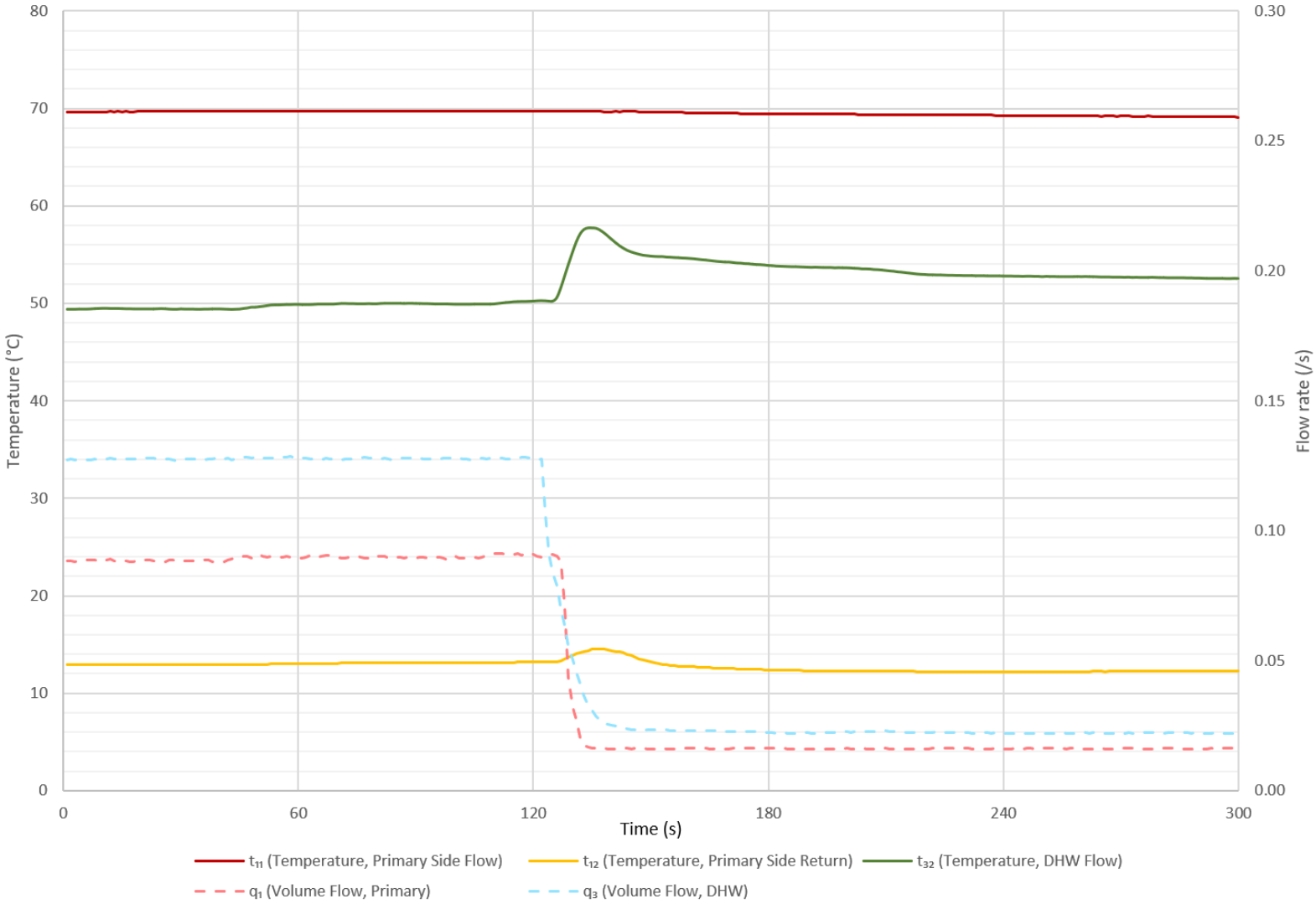



Figure 9 - Test 12a Key Metrics

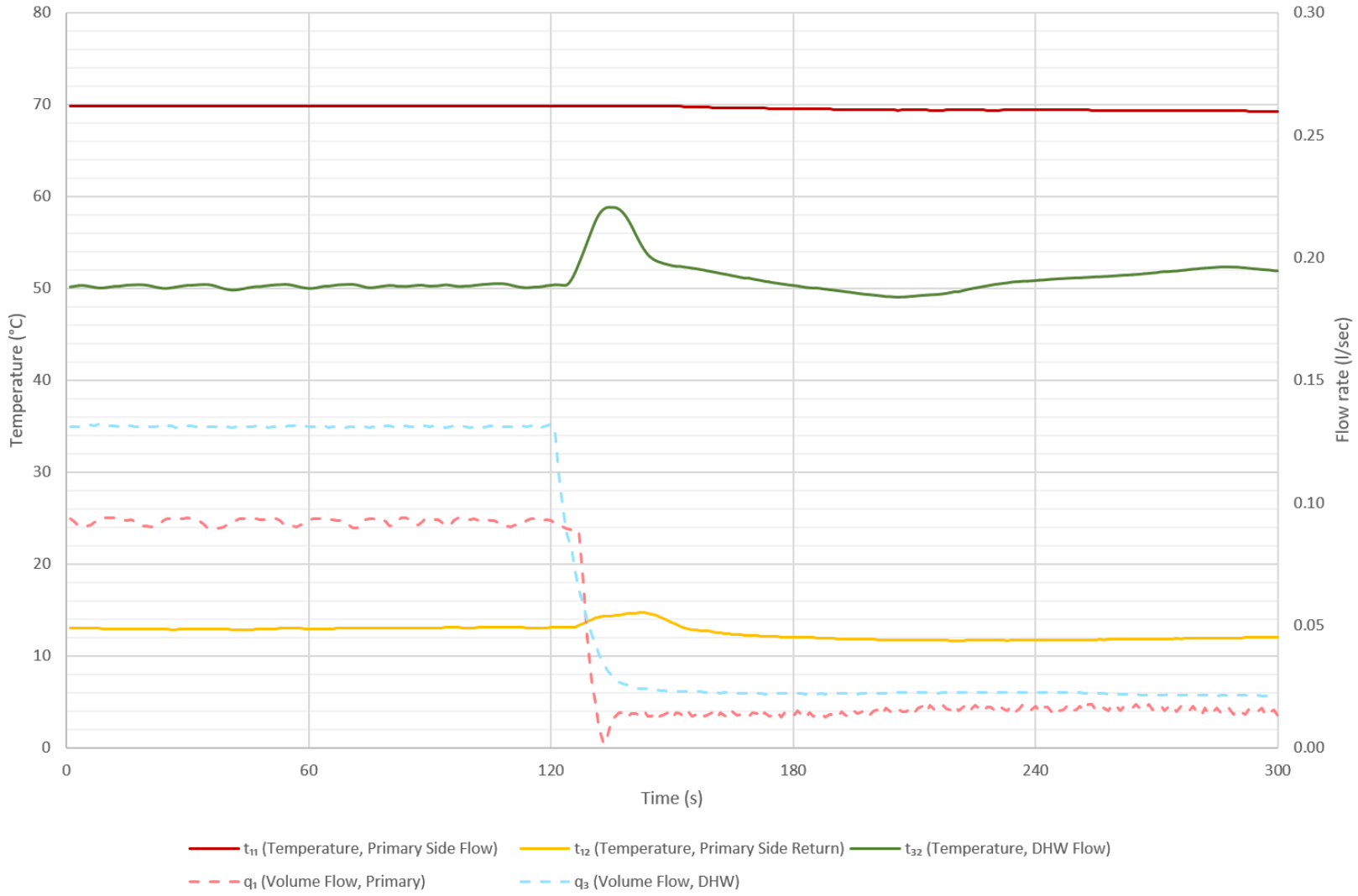



Figure 10 - Test 12c Key Metrics

## 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 66.3 kW, with a measured flow rate of 0.424 l/s, when producing minimum DHW at 45°C or above (Temperature achieved at final step 47.2 °C).

8.7.2 The recorded DHW line pressure drop across the HIU was 148 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 13a Performance Criteria

| **Module 7 - Test 13a Performance Criteria** | |
|---|---|
| **Performance Criteria, Fail if:** | **PASS / FAIL** |
| DHW (at $t_{32}$) is not maintained at 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 |
| DHW temperature ($t_{32}$) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk | PASS |
| 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) | 69.9 | 70.3 | 70.4 | 70.5 | 70.5 | 70.4 | 70.4 | 70.2 | 70.0 | **69.5** |
| Temperature, primary side return connection | $t_{12}$ (°C) | 13.5 | 14.2 | 13.8 | 14.2 | 14.6 | 15.5 | 15.8 | 16.2 | 16.3 | **15.6** |
| Volume flow, primary side | $q_1$ (l/s) | 0.106 | 0.129 | 0.147 | 0.171 | 0.192 | 0.220 | 0.244 | 0.266 | 0.294 | **0.295** |
| Arithmetic mean of primary side power recorded during test | $H_1$ (kW) | 24.9 | 30.3 | 34.7 | 40.1 | 44.9 | 50.5 | 55.6 | 60.1 | 65.9 | **66.5** |
| Temperature, cold water supply | $t_{31}$ (°C) | 10.2 | 10.1 | 9.8 | 9.8 | 9.8 | 9.9 | 10.0 | 10.0 | 9.6 | **9.8** |
| Temperature, domestic hot water flow from HIU | $t_{32}$ (°C) | 49.8 | 50.8 | 49.4 | 49.6 | 49.4 | 50.3 | 50.1 | 49.9 | 49.7 | **47.3** |
| Volume flow, domestic hot water | $q_3$ (l/s) | 0.150 | 0.180 | 0.210 | 0.241 | 0.270 | 0.301 | 0.330 | 0.360 | 0.391 | **0.424** |
| Differential pressure, domestic hot water across HIU | $dP_3$ (kPa) | 23 | 31 | 42 | 53 | 65 | 78 | 93 | 108 | 126 | **148** |
| Arithmetic mean of DHW power recorded during test | $H_3$ (kW) | 24.9 | 30.5 | 34.8 | 40.0 | 44.7 | 50.7 | 55.4 | 59.9 | 65.6 | **66.3** |

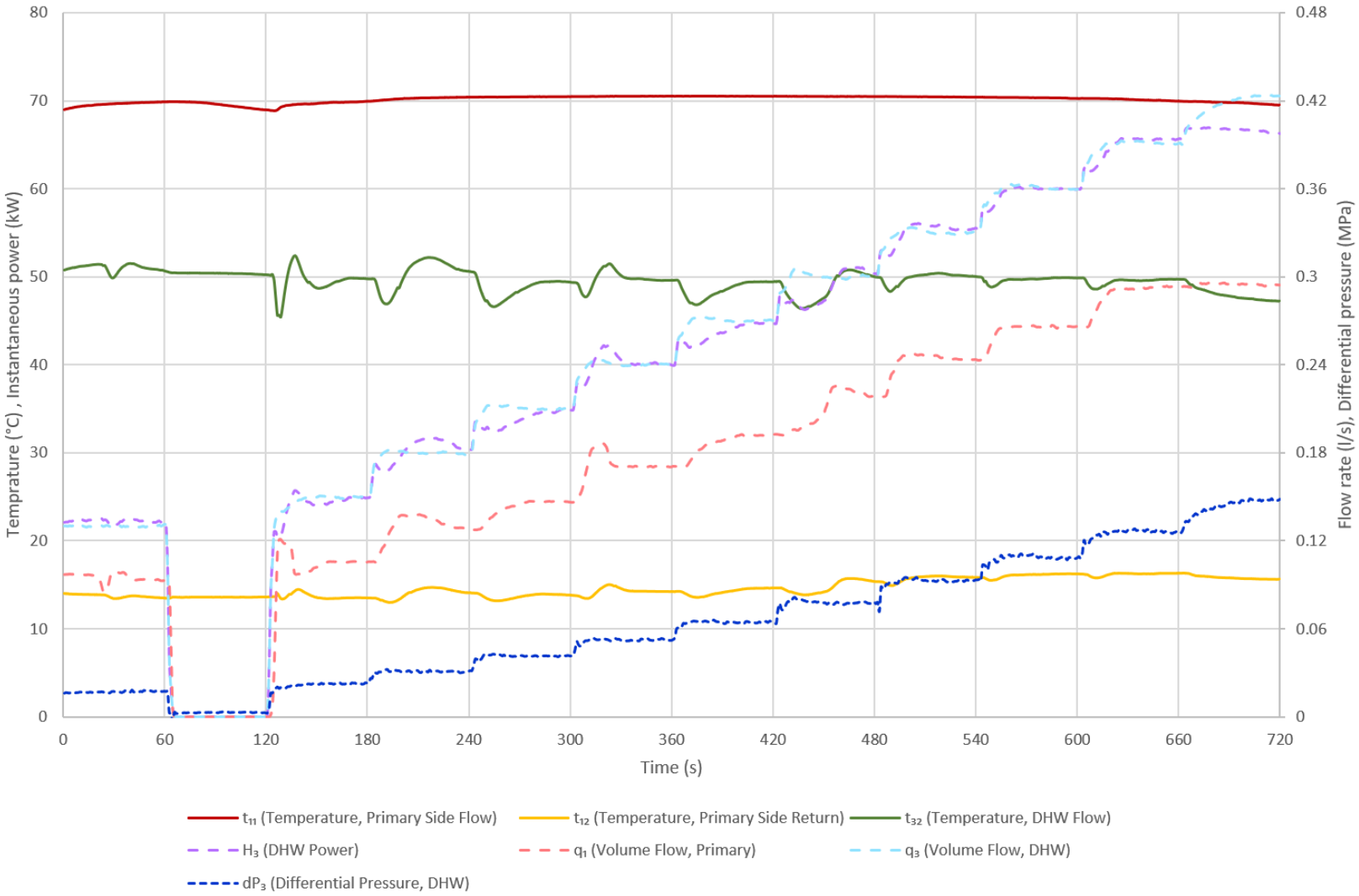



Figure 11 - Test 13a Key Metrics

## 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) | 1.5 |
| Mean average thermal energy use | $W_{thermal}$ (W) | 36.3 |
| Overall energy loss per day | (kWh) | 0.906 |
| Overall keep warm volume weighted avg. return temp | VWART (°C) | 38 |

Table 26 - Module 7 Test 21a Performance Criteria

| Module 7 - Test 21a Performance Criteria | |
|---|---|
| **Performance Criteria, Fail if:** | **PASS/FAIL** |
| VWART is above 44°C (to one decimal place) | PASS |
| Primary return temperature ($t_{12}$) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk | PASS |
| Primary supply temperature to the HIU ($t_{11}$) drops to below 39°C | PASS |
| HIU overall energy losses are greater than 1.000 kWh/day (to three decimal places) | PASS |
| 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 21a Best Practice

| Module 7 – Test 21a – Best Practice Criteria | |
|---|---|
| **Best Practice Criteria if:** | **Best Practice** |
| HIU overall energy losses are less than or equal to 0.700 kWh/day (to three decimal places) | Not Achieved |

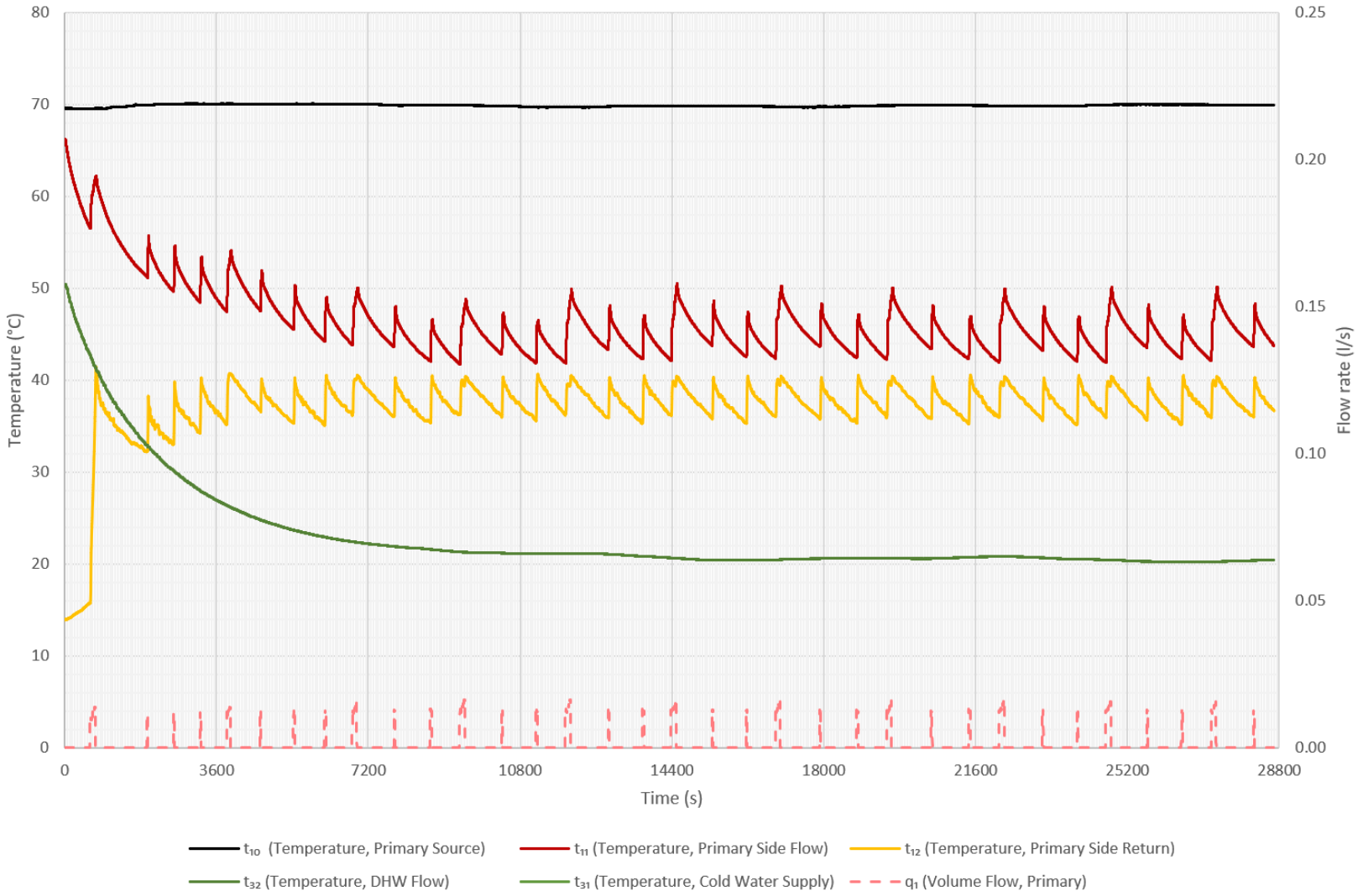



Figure 12 - Test 21a Key Metrics

## 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 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) | 10 |
| Number of consecutive seconds where $t_{32}$ > 55°C | (s) | 10 |
| Mean average volume flow, primary side | $q_1$ (l/s) | 0.128 |

Table 29 - Module 7 Test 22a Performance Criteria

| Module 7 - Test 22a Performance Criteria | |
|---|---|
| **Performance Criteria, Fail if:** | **PASS/FAIL** |
| 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 |
| DHW temperature ($t_{32}$) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk | PASS |
| 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 22a Best Practice

| Module 7 – Test 22a – Best Practice Criteria | |
|---|---|
| **Best Practice Criteria if:** | **Best Practice** |
| DHW response time at t32 is less than or equal to 10 seconds | Achieved |

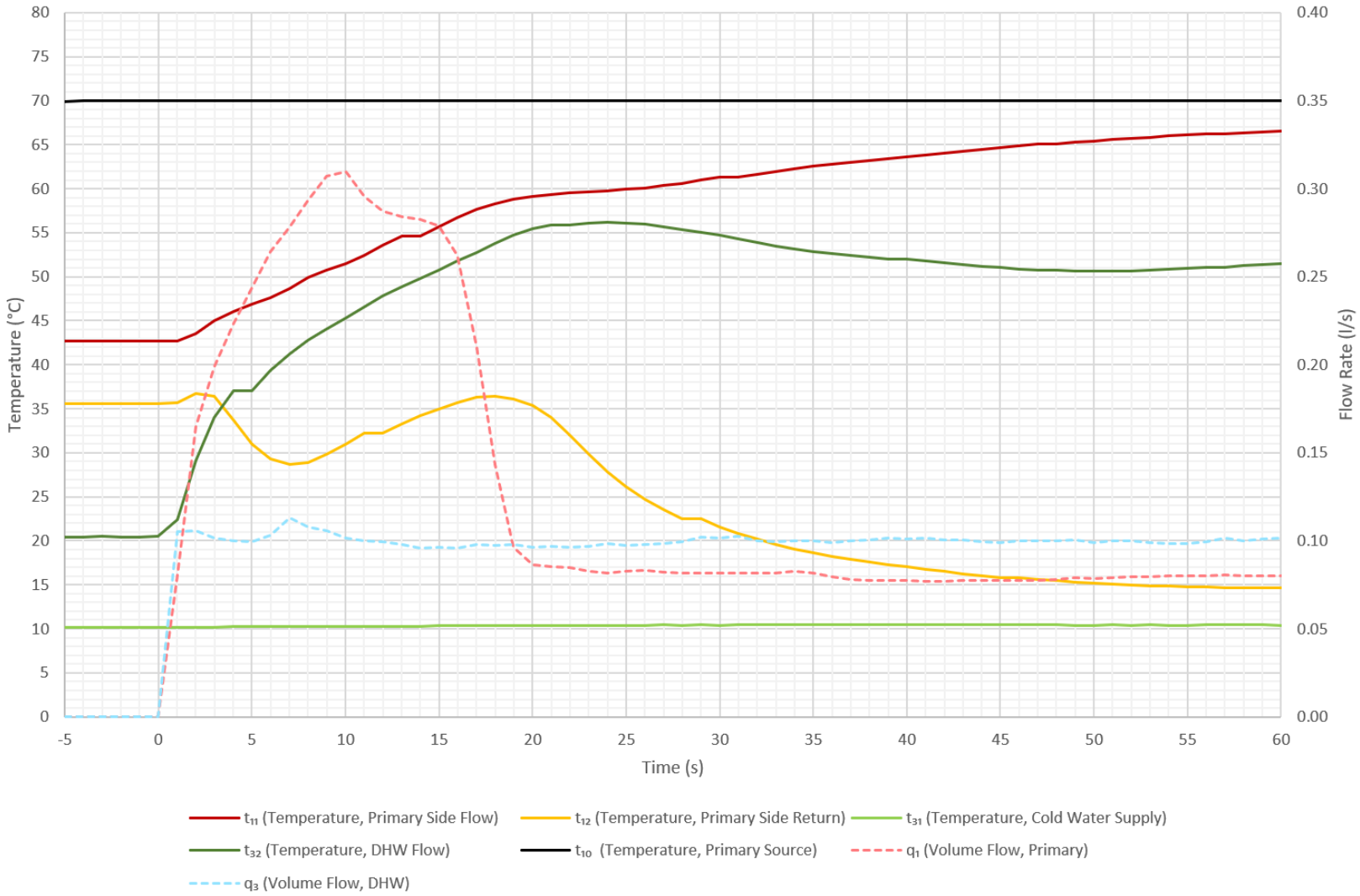



Figure 13 - Test 22a Key Metrics

# 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 – V1 - Rev002: 2026.

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) | 52.4 | 44.3 |
| Number of consecutive seconds where $t_{32}$ > 55°C | (s) | 0 | |
| Overall DHW Volume Weighted Avg. Return Temp | VWART (°C) | 17 | |

Table 33 - Module 8 Test 11b Performance Criteria

| Module 8 - Test 11b Performance Criteria | |
|---|---|
| **Performance Criteria, Fail if:** | **PASS/FAIL** |
| DHW temperature ($t_{32}$) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk | PASS |
| Primary return temperature ($t_{12}$) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk | PASS |
| VWART is above 25°C (to one decimal place) | PASS |
| 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 |
| 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 |
| 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 11b Best Practice

| Module 8 – Test 11b – Best Practice Criteria | |
|---|---|
| **Best Practice Criteria if:** | **Best Practice** |
| VWART is less than or equal to 19°C (to one decimal place) | Achieved |
| DHW temperature (t32) is being maintained at 50.0°C ±2°C throughout periods of DHW flow | Not Achieved |
| DHW temperature (t32) doesn't drop below 45.0°C (to one decimal place) for more than 2 consecutive seconds | Not Achieved |

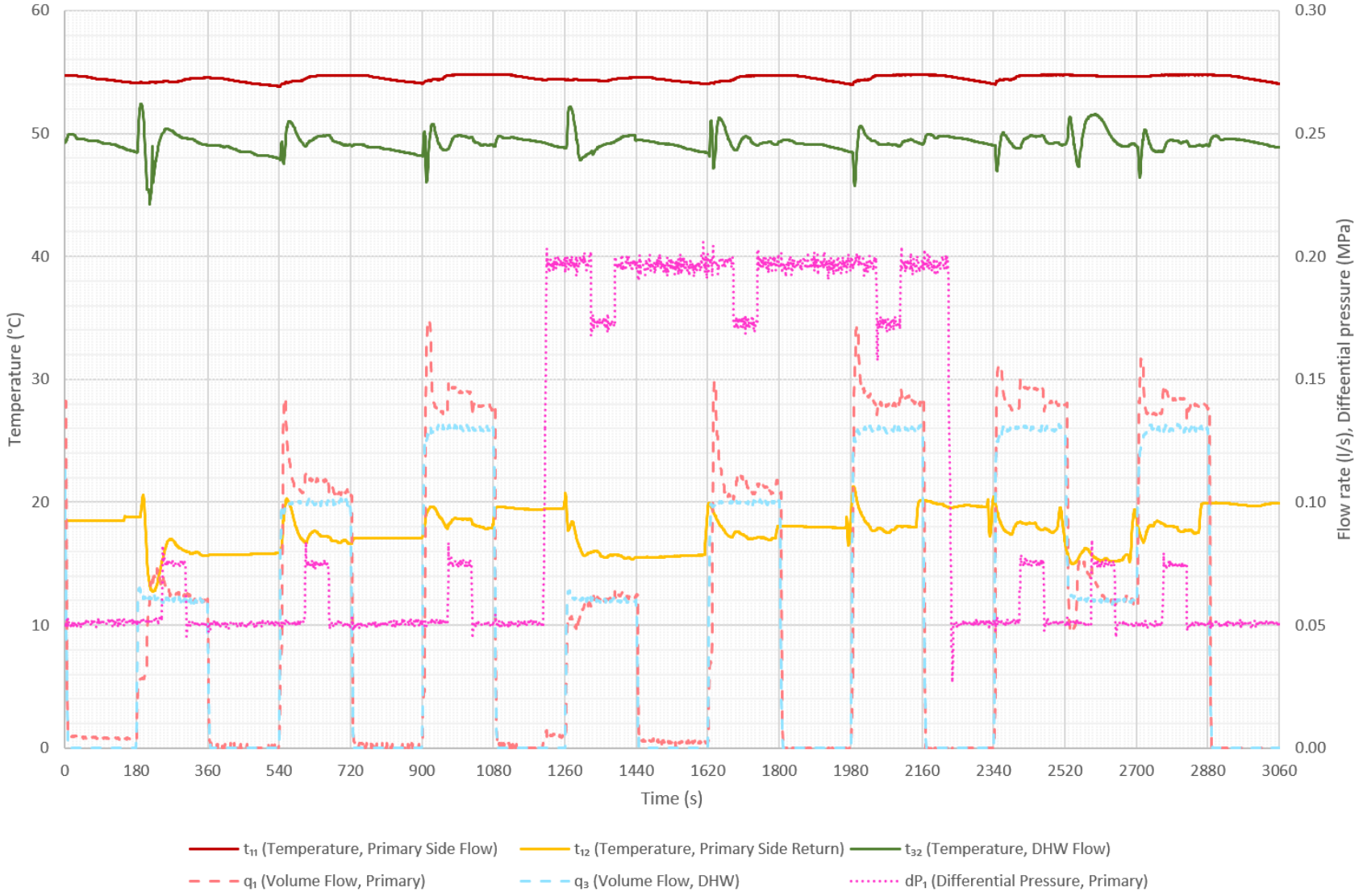



Figure 14 - Test 11b Key Metrics

## 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.

9.4.2 Test 12b performs the low flow test at 50kPa differential pressure.

9.4.3 Test 12d performs the low flow test at 200kPa differential pressure.

## 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) | 52.9 | 48.2 | 52.6 | 47.2 |
| 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** |
| DHW temperature ($t_{32}$) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk | PASS |
| Primary return temperature ($t_{12}$) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk | PASS |
| 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** |
| 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 |

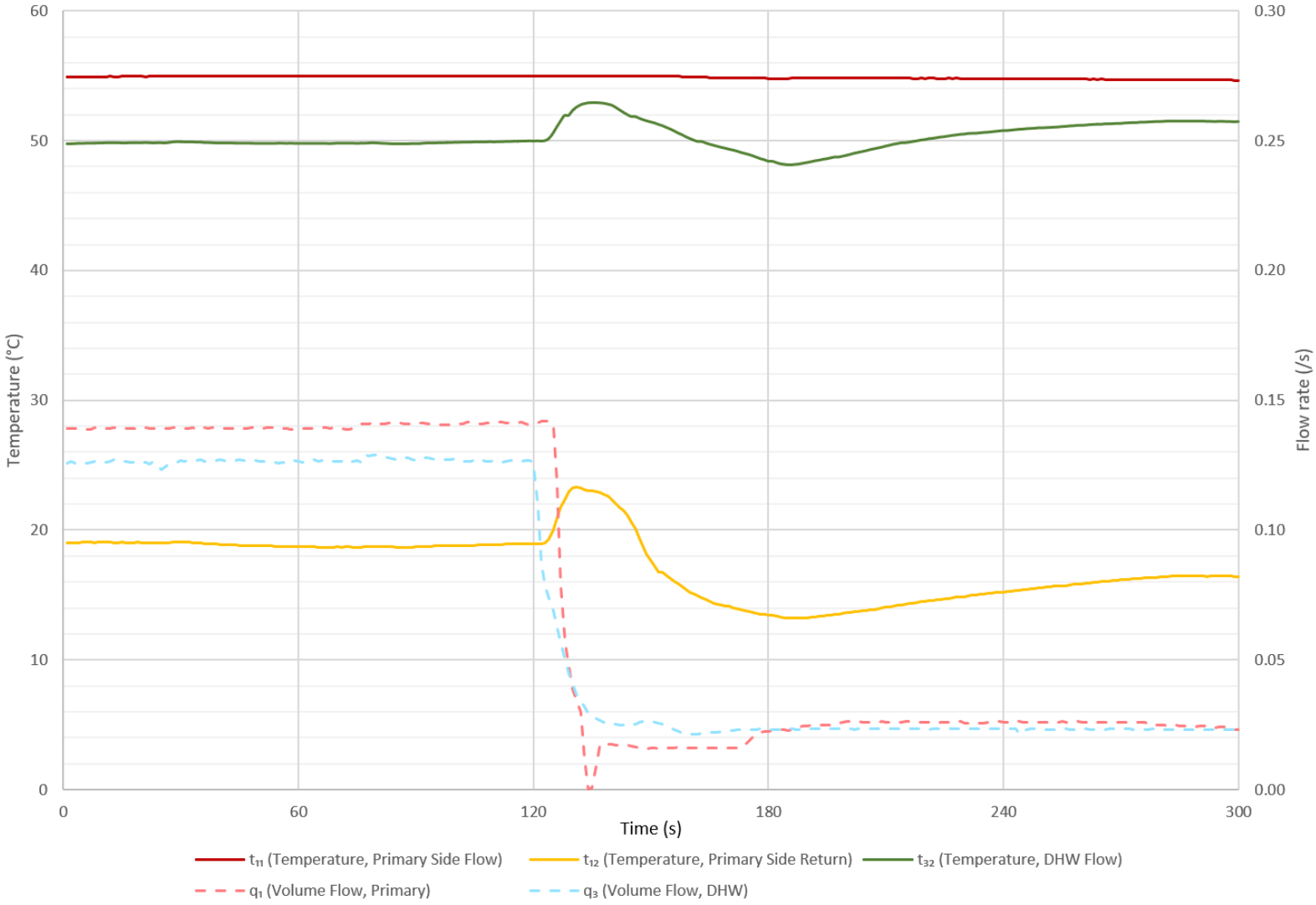



Figure 15 - Test 12b Key Metrics

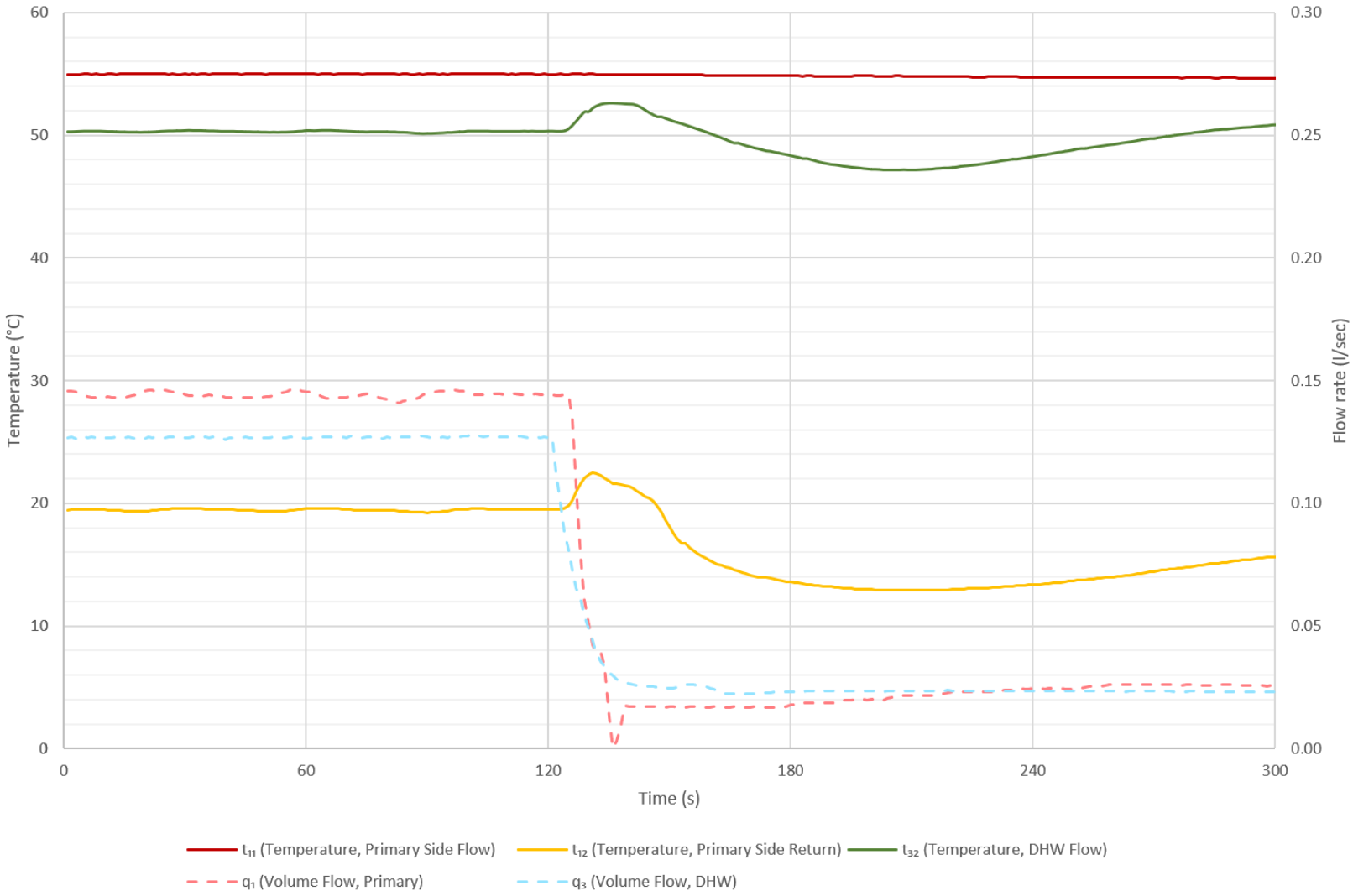



Figure 16 - Test 12d Key Metrics

## 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 45.3 kW, with a measured flow rate of 0.300 l/s, when producing minimum DHW at 45°C or above. (Temperature achieved at final step 45.9°C).

9.7.2 The recorded DHW line pressure drop across the HIU was 78 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 13b Performance Criteria

| **Module 8 - Test 13b Performance Criteria** | |
|---|---|
| **Performance Criteria, Fail if:** | **PASS / FAIL** |
| DHW (at $t_{32}$) is not maintained at 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 |
| DHW temperature ($t_{32}$) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk | PASS |
| 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) | 55.2 | 55.3 | 55.3 | 55.3 | 55.3 | **55.2** | 55.2 | - | - | - |
| Temperature, primary side return connection | $t_{12}$ (°C) | 19.8 | 22.1 | 21.3 | 22.0 | 19.7 | **18.2** | 16.8 | - | - | - |
| Volume flow, primary side | $q_1$ (l/s) | 0.171 | 0.223 | 0.249 | 0.289 | 0.291 | **0.292** | 0.291 | - | - | - |
| Arithmetic mean of primary side power recorded during test | $H_1$ (kW) | 25.3 | 30.9 | 35.4 | 40.3 | 43.3 | **45.2** | 46.7 | - | - | - |
| Temperature, cold water supply | $t_{31}$ (°C) | 9.9 | 9.9 | 9.9 | 10.0 | 9.6 | **9.8** | 9.8 | - | - | - |
| Temperature, domestic hot water flow from HIU | $t_{32}$ (°C) | 50.1 | 51.1 | 50.1 | 50.0 | 48.0 | **45.9** | 43.7 | - | - | - |
| Volume flow, domestic hot water | $q_3$ (l/s) | 0.151 | 0.181 | 0.210 | 0.240 | 0.270 | **0.300** | 0.331 | - | - | - |
| Differential pressure, domestic hot water across HIU | $dP_3$ (kPa) | 24 | 32 | 42 | 53 | 65 | **78** | 92 | - | - | - |
| Arithmetic mean of DHW power recorded during test | $H_3$ (kW) | 25.3 | 31.1 | 35.3 | 40.2 | 43.4 | **45.3** | 46.9 | - | - | - |

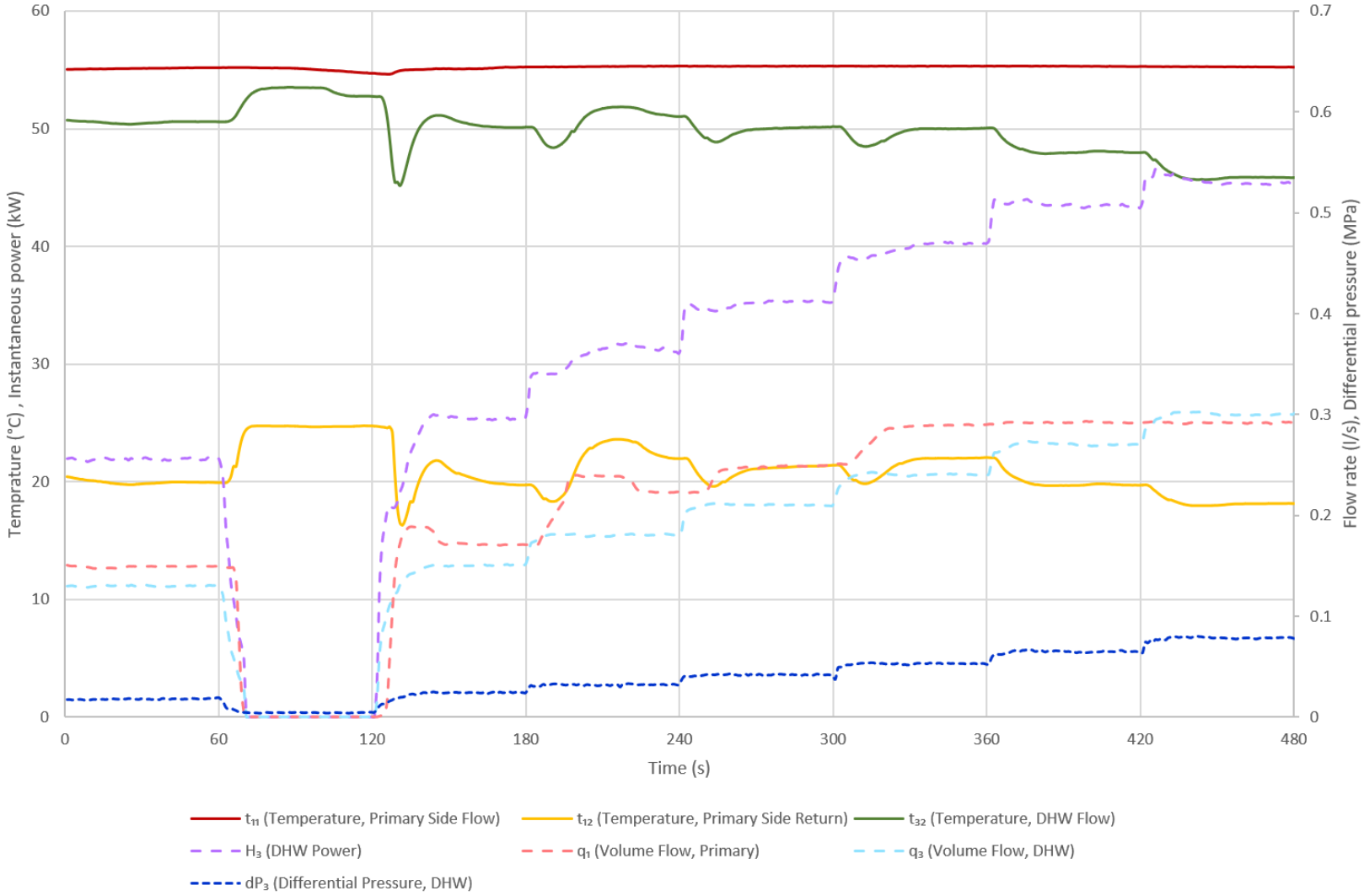



Figure 17 - Test 13b Key Metrics

## 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) | 0.0016 |
| Mean average of primary side power recorded during test | $H_1$ (kW) | 0.03 |
| Mean average electrical energy use | $W_{electrical}$ (W) | 0.6 |
| Mean average thermal energy use | $W_{thermal}$ (W) | 33.4 |
| Overall energy loss per day | (kWh) | 0.817 |
| Overall Keep Warm Volume Weighted Avg. Return Temp | VWART (°C) | 39 |

Table 41 - Module 8 Test 21b Performance Criteria

| Module 8 - Test 21b Performance Criteria | |
|---|---|
| **Performance Criteria, Fail if:** | **PASS/FAIL** |
| VWART is above 48°C (to one decimal place) | PASS |
| Primary return temperature ($t_{12}$) exceeds 55.0°C (to one decimal place) at any point, as this poses a scaling risk | PASS |
| Primary supply temperature to the HIU ($t_{11}$) drops to below 39°C | PASS |
| HIU overall energy losses are greater than 1.000 kWh/day (to three decimal places) | PASS |
| 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 21b Best Practice

| Module 8 – Test 21b – Best Practice Criteria | |
|---|---|
| **Best Practice Criteria if:** | **Best Practice** |
| HIU overall energy losses are less than or equal to 0.700 kWh/day (to three decimal places) | Not Achieved |

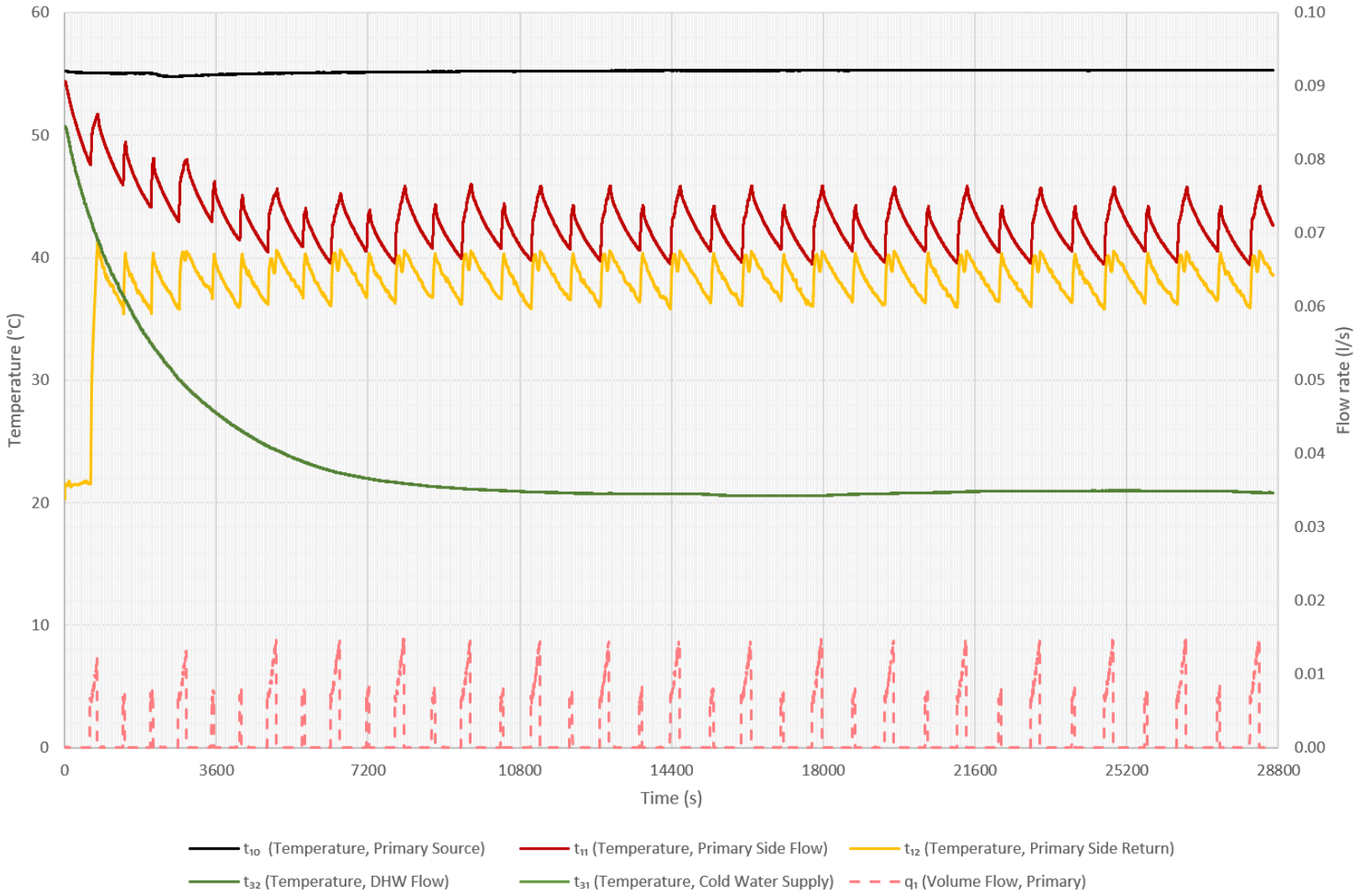



Figure 18 - Test 21b Key Metrics

## 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) | 12 |
| Number of consecutive seconds where $t_{32}$ > 55°C | (s) | 0 |
| Mean average volume flow, primary side | $q_1$ (l/s) | 0.169 |

Table 44 - Module 8 Test 22b Performance Criteria

| Module 8 - Test 22b Performance Criteria | |
|---|---|
| **Performance Criteria, Fail if:** | **PASS/FAIL** |
| 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 |
| DHW temperature ($t_{32}$) exceeds 60.0°C (to one decimal place) for more than 1 second, as this poses a scalding risk | PASS |
| 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 22b Best Practice

| Module 8 – Test 22b – Best Practice Criteria | |
|---|---|
| **Best Practice Criteria if:** | **Best Practice** |
| DHW response time at t32 is less than or equal to 10 seconds | Not Achieved |

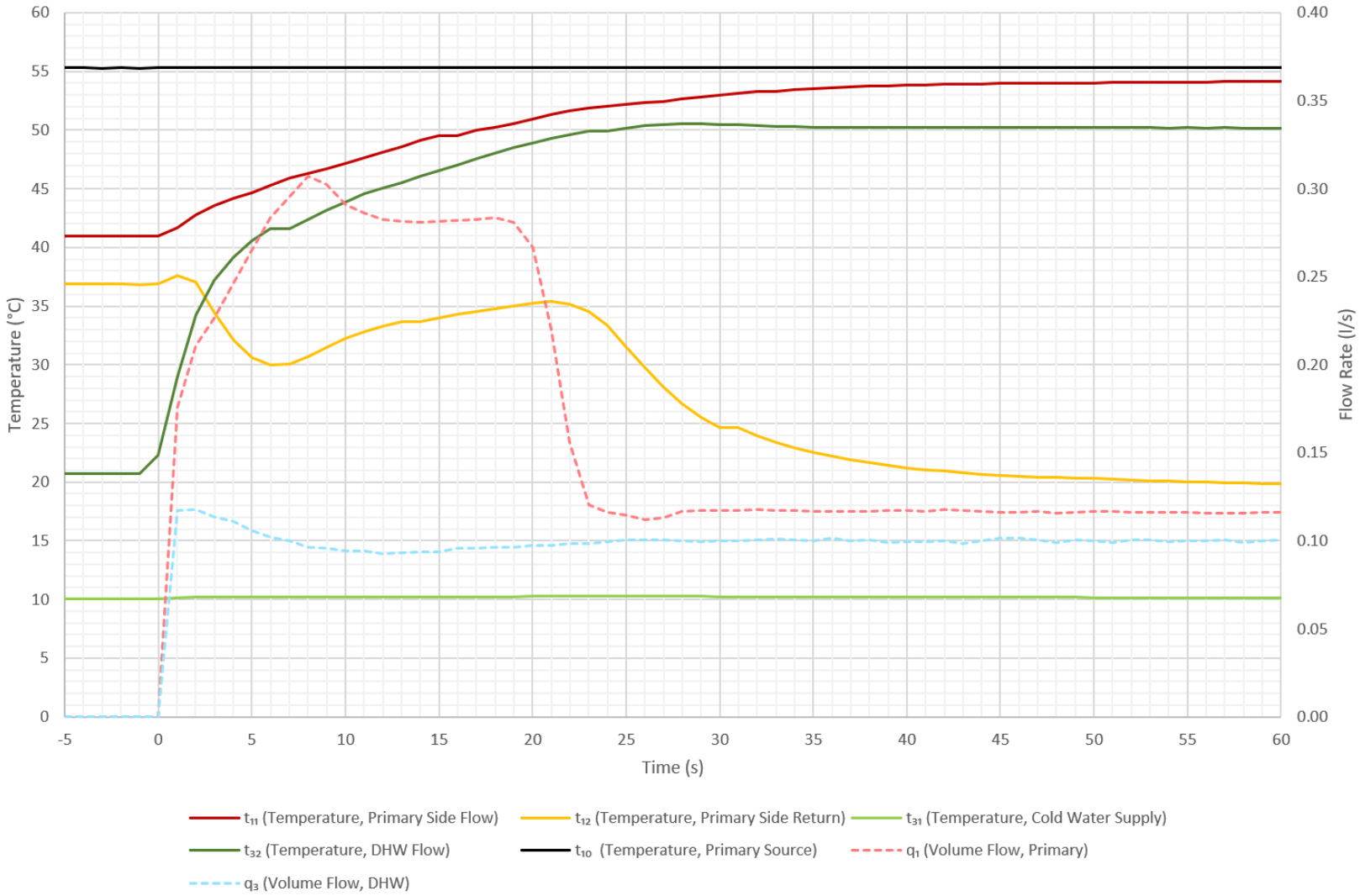



Figure 19 - Test 22b Key Metrics

# 10 CONCLUSIONS

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

10.1.2 The HIU has passed the requirements of the BESA Technical Standard for UK HIU Test Regime, V3-Rev002: March 2026 – Modules 1, 2, 7 and 8.

# 11 EQUIPMENT AND INSTRUMENT LIST

| EQUIPMENT NAME | ID NUMBER | CERTIFICATE NUMBER | MEASUREMENT UNCERTAINTY K=2 | CALIBRATION DATE | CALIBRATION DUE |
|---|---|---|---|---|---|
| **Cold Water Supply Probe $T_{31}$** | PRT 6035 | CAL-001085 | ± 0.070 °C | 25/09/2025 | 25/09/2026 |
| **DHW Outlet Probe $T_{32}$** | PRT 6036 | CAL-001086 | ± 0.070 °C | 25/09/2025 | 25/09/2026 |
| **Primary Inlet Probe $T_{11}$** | PRT 6034 | CAL-001084 | ± 0.070 °C | 25/09/2025 | 25/09/2026 |
| **Primary Return Probe $T_{12}$** | PRT 6033 | CAL-001083 | ± 0.070 °C | 25/09/2025 | 25/09/2026 |
| **SH Flow Probe $T_{22}$** | PRT 6031 | CAL-001080 | ± 0.070 °C | 25/09/2025 | 25/09/2026 |
| **SH Return Probe $T_{21}$** | PRT 6032 | CAL-001081 | ± 0.072 °C | 25/09/2025 | 25/09/2026 |
| **Primary Flow $T_{10}$** | PRT 6037 | CAL-001161 | ± 0.072 °C | 15/01/2026 | 15/01/2027 |
| **Ambient Temperature** | PRT 4607 | CAL-000873 | ± 0.136 °C | 25/09/2025 | 25/09/2026 |
| **Flow Meter** | FM 601 | K59426FW | ± 0.0112 l/sec | 19/09/2025 | 19/09/2026 |
| **Flow Meter** | FM 602 | K59425FW | ± 0.0132 l/sec | 22/09/2025 | 22/09/2026 |
| **Flow Meter** | FM 603 | K59427FW | ± 0.0090 l/sec | 22/09/2025 | 22/09/2026 |
| **Flow Meter** | FM 605 | K59428FW | ± 0.0040 l/sec | 23/09/2025 | 23/09/2026 |
| **Pressure Transducer** | PT 083 | K59419P | ± 2.7 kPa | 18/09/2025 | 18/09/2026 |
| **Pressure Transducer** | PT 084 | K59420P | ± 8.1 kPa | 18/09/2025 | 18/09/2026 |
| **Pressure Transducer** | PT 085 | K59421P | ± 3.6 kPa | 18/09/2025 | 18/09/2026 |
| **Pressure Transducer** | PT 086 | K59422P | ± 4.0 kPa | 18/09/2025 | 18/09/2026 |
| **Pressure Transducer** | PT 087 | K59423P | ± 3.8 kPa | 18/09/2025 | 18/09/2026 |
| **Pressure Transducer** | PT 088 | K59424P | ± 4.93 kPa | 18/09/2025 | 18/09/2026 |
| **Power Meter** | PM 1022 | TH120471 | ± 0.09 W | 05/09/2025 | 05/09/2026 |
| **Pipe** | PIPE 001 | - | - | 10/2025 | 10/2026 |

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 | 28.7 |
| **Standby** | 38 | 24.5 |
| **Space Heating** | 37 | 38.1 |

| | VWART (°C) |
|---|---|
| **Summer** | 25 |
| **Winter** | 30 |
| **Overall** | 27 |

| | 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** | 9590.0 | 0.1 | 13 | 0.60 | 12 |
| **Medium** | 15975.9 | 0.3 | 13 | 0.17 | 13 |
| **High** | 20372.9 | 0.3 | 13 | 0.29 | 14 |

| DHW Draw Volumes pa | | |
|---|---|---|
| kWh pa | Hours | Volume pa ($m^3$) |
| 729 | 76.02 | 10.7 |
| 297 | 18.59 | 4.8 |
| 444 | 21.79 | 7.1 |

| Post DHW Draw Volumes pa | |
|---|---|
| Events pa | Volume pa ($m^3$) |
| 10000 | 6.030 |
| 660 | 0.109 |
| 300 | 0.086 |

| Standby Test Results | |
|---|---|
| Primary Flow ($m^3$/hr) | VWART (°C) |
| 0.003 | 38 |

| Standby Volumes pa | |
|---|---|
| Hours | Volume pa ($m^3$) |
| 7506 | 24.527 |

| | Space Heating | | | | | |
|---|---|---|---|---|---|---|
| | Power (W) | Primary Flow ($m^3$/hr) | VWART (°C) | kWh pa | Hours | Volume pa ($m^3$) |
| **0.5kW** | 514 | 0.013 | 36 | 98 | 191 | 2.45 |
| **1kW** | 978 | 0.025 | 36 | 787 | 805 | 20.24 |
| **4kW** | 4045 | 0.110 | 38 | 565 | 140 | 15.36 |

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 | 42.5 |
| **Standby** | 39 | 41.8 |
| **Space Heating** | 36 | 68.7 |

| | 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** | 9632.2 | 0.2 | 16 | 0.89 | 17 |
| **Medium** | 15580.3 | 0.4 | 17 | 0.18 | 18 |
| **High** | 20251.7 | 0.5 | 19 | 0.19 | 18 |

| DHW Draw Volumes pa | | |
|---|---|---|
| kWh pa | Hours | Volume pa ($m^3$) |
| 729 | 75.68 | 15.6 |
| 297 | 18.41 | 7.0 |
| 444 | 21.92 | 10.8 |

| Post DHW Draw Volumes pa | |
|---|---|
| Events pa | Volume pa ($m^3$) |
| 10000 | 8.942 |
| 660 | 0.117 |
| 330 | 0.057 |

| Standby Test Results | |
|---|---|
| Primary Flow ($m^3$/hr) | VWART (°C) |
| 0.006 | 39 |

| Standby Volumes pa | |
|---|---|
| Hours | Volume pa ($m^3$) |
| 7471 | 41.759 |

| | Space Heating | | | | | |
|---|---|---|---|---|---|---|
| | Power (W) | Primary Flow ($m^3$/hr) | VWART (°C) | kWh pa | Hours | Volume pa ($m^3$) |
| **0.5kW** | 492 | 0.022 | 35 | 98 | 199 | 4.44 |
| **1kW** | 956 | 0.045 | 35 | 787 | 823 | 37.27 |
| **4kW** | 3811 | 0.182 | 37 | 565 | 148 | 27.02 |

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 | Zilmet ZB315 – 13 plates |
| 2 | Domestic Hot Water Heat Exchanger | Y | Zilmet ZA315 – 42 plates |
| 3 | Controller for Space Heating and Hot Water Heating | Y | Selco Inta |
| 4 | Control Valve and Actuator for Space Heating | Y | Frese Optima OEM |
| 5 | Space Heating Strainer | - | n/a |
| 6 | Control Valve and Actuator for Hot Water Heating | Y | Frese Optima OEM |
| 7 | Temperature Sensors | Y | Nordgas |
| 8 | Domestic Hot Water Isolating Valve | Y | RBM |
| 9 | Primary Side Strainer | Y | PICV inlet block assembly |
| 10 | Drain Valves | Y | RBM |
| 11 | Vent Valve | Y | RBM |
| 12 | Circulation Pump | Y | Grunfos UPM3 |
| 13 | Heat Meter | Y | ISTA Ultego III |
| 14 | Domestic Hot Water Flow Sensor | Y | Nordgas |
| 15 | Pipes | Y | Copper |
| 16 | Connections | Y | Flat faced with gasket |
| 17 | Joints | - | n/a |
| 18 | Gaskets | Y | Fasit omnia |
| 19 | O Rings | - | n/a |
| 20 | Pressure Sensor | Y | Ma-Ter |
| 21 | Expansion Vessel | Y | Zilmet |
| 22 | Insulation | - | n/a |

| | | | |
|---|---|---|---|
| A1 | Commissioning Guide | Y | Manufacturers Commissioning Manual |
| A2 | Operation Guide | Y | Manufacturers Operating Manual |
| A3 | Declaration of Conformity | Y | See section 12.1 |
| A4 | Full Parameter List | Y | Module 1 SH temperature setpoint: 55 °C<br><br>Module 2 SH temperature setpoint: 45 °C<br><br>Module 7 DHW temperature setpoint: 50 °C<br><br>Module 7 keep warm setpoints: 37C min – 40C Max<br><br>Module 8 DHW temperature setpoint: 50 °C<br><br>Module 8 keep warm setpoints: 37C – 40C Max |
| A5 | Maximum Primary Static Operating Differential Pressure | Y | 4 Bar |
| | Software Version | Y | RBM/R4 (Revision 3 Firmware)<br>Date of Issue: 06/01/2026 |
| | Model Name and Type Number | Y | Intatec HIPER II Indirect |
| | Serial Number | Y | INC260310001AR |
| | Any other components stated by manufacturer | - | n/a |

## 13.2 Appliance Photographs




Figure 20 - HIU with Outer Case Fitted




Figure 21 - HIU with Outer Case Removed

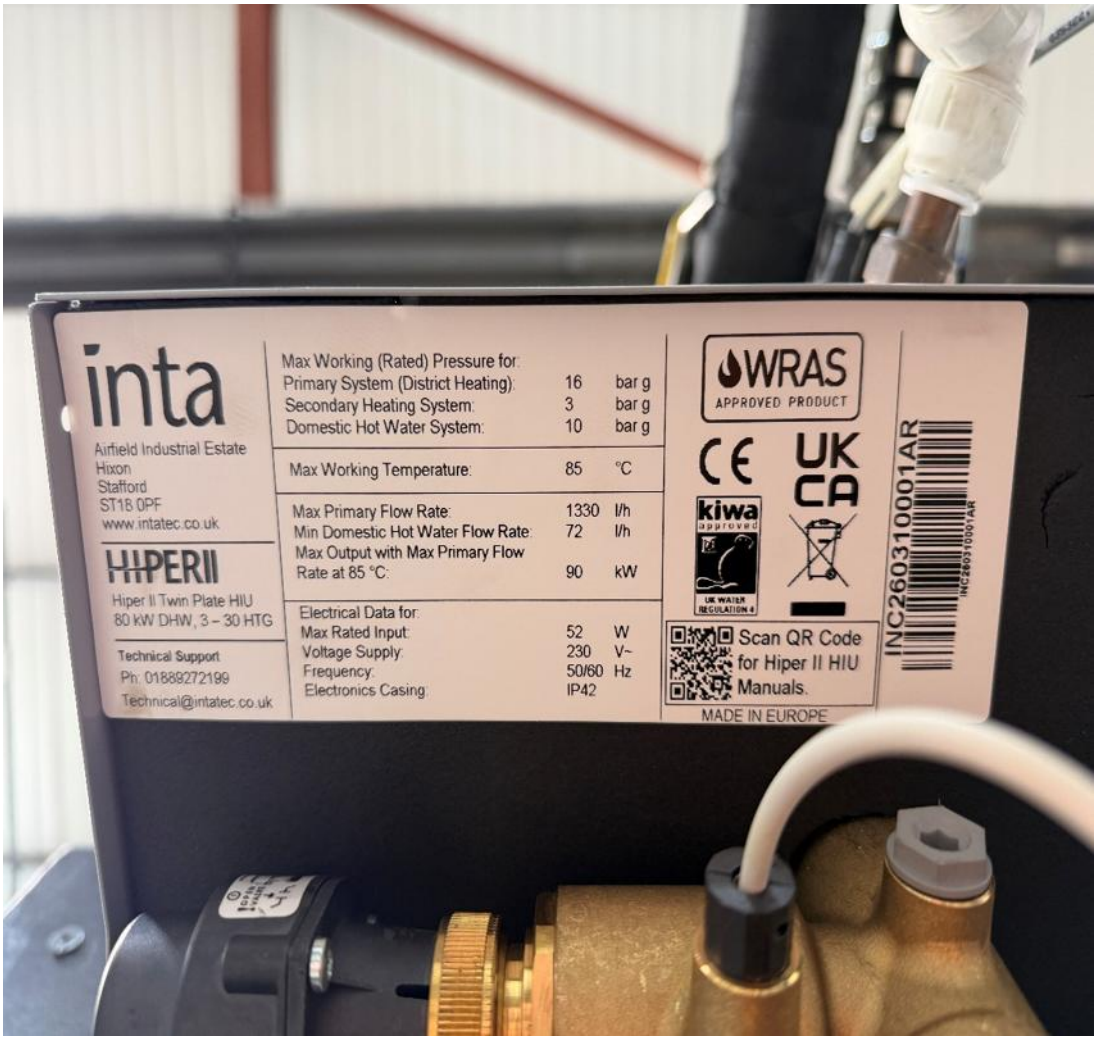



Figure 22 - Nameplate with Model Details and Serial Number

# 14 APPENDIX C

## 14.1 UK Declaration of Conformity

M7-22_03
DC 3891.0–ITA&EN_00

UE DECLARATION OF COMFORMITY

The company **RBM S.p.A.,**
manufacturer of components for hydrothermal systems, with head office at S.Giovanni di Polaveno
Via Industriale 23 (BS) Italy

**HEREBLY DECLARES:**

Model/Type: **Utility satellite "HIPERII / HIUltra"**

Serie: **3897**

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

LVD Directive 2014/35/EU;
EMC Directive 2014/30/EU;
Restriction of the use of certain hazardous substances Directive 2011/65/UE (RoHS);
Delegated Directive amending Annex II of Directive 2011/65/EU of the European Parliament and of the Council regarding the list of substances with usage restrictions 2015/863/EU;

The following harmonised standards and/or technical specifications have been applied:

**EN 60335-1:2012+A11:2014+A13:2017+A1:2019+A2:2019+A14:2019**
**EN 62233:2008**
**EN 55014-1:2017 +A11:2020**
**EN 61000-3-2:2014**
**EN 61000-3-3:2013**
**EN 55014-2:2015**

RBM S.p.A.

Nave (BS), 17/11/2021

(signature):

RBM S.p.A.
Sede legale:
Via Industriale, 23
25060 S. Giovanni di Polaveno (BS)

Sede amministrativa:
Via S. Giuseppe, 1
25075 Nave (BS)

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info@rbm.eu

C.S. i.v. € 17.000.000
Reg. imprese BS 00293730172
P.IVA 00551250988
SDI: A4707H7

Figure 23 - UK Declaration of Conformity

## 14.2 Water Regulation 4 Certificate

CERTIFICATE

*Certificate number: 2506701 (1)*

Issued *05/06/2025*
Expires *05/06/2030*

### Kiwa Regulation 4 (KUKreg4) Certification

Evaluation Guideline – Kiwa UK – EG004 – Regulation 4(1)(a)
Model number(s) – see Appendix

### Intatec Ltd.

Kiwa Watertec declares that legitimate confidence exists in the products specified in this certificate and supplied by the above organisation be relied upon to comply with the Kiwa Evaluation Guideline referred above.

Which verifies the requirements of:

**Regulation 4(1)a of the Water Supply (Water Fittings) Regulations 1999 England & Wales: 2009 Northern Ireland and 2014 Byelaws Scotland.**

This certificate has been issued in accordance with the Kiwa regulations for product certification.

Signed on behalf of Kiwa Watertec

David Jay, Business Unit Manager – Authorised Signatory
Kiwa Watertec

Publication of this certificate is allowed.
Products are intended to be used in the UK only. For other countries, other (National) requirements will apply.
See https://www.kiwa.com/gb/en/about-kiwa/water-products/ or the QR code below to ensure that the certificate is still valid.

Kiwa Watertec
(A Trading Division of Kiwa Ltd)
26A Rassau Industrial Estate
Ebbw Vale
Gwent
NP23 5SD
United Kingdom
T +44 (0)1495 308185
uk.water@kiwa.com
www.kiwa.co.uk

Certificate Issued to:
Intatec Ltd
Hixon
Industrial Estate
ST18 0PF
United Kingdom

KUKreg4



Figure 24 - Water Reg 4 Certification – Page 1

## Product Certificate

Appendix to Certificate number: 2506701

**The following products belong to this certificate**

| |
|---|
| PRODUCT DESCRIPTION<br>Electronically controlled heat interface units (HIU) with stainless-steel plate heat exchangers providing space heating and instantaneous hot water. The cold inlet supply to the plate heat exchanger incorporates an isolation valve and a water hammer arrestor. The space heating circuit incorporates an expansion vessel and a pressure relief valve (set at 3.0 bar). The product is supplied with a filling loop assembly consisting of an elbow shaped copper pipe, isolation valve and double check valve assembly (which incorporates an isolation valve), verified by test (suitable for backflow protection against fluid category 3)<br>ATS3 – Without Production Surveillance. |
| MODEL(S)<br>HIPER2TPSZ80<br>HIPER2SPSW80<br>HIPER2SPSW80IS<br>HIPER2SPSW80ZE |
| SIZE:<br>¾" BSP(M). |
| SCOPE:<br>Manufacturer recommended maximum working pressures and temperatures:<br>Maximum working pressures and operating temperatures: Primary: 16.0 bar and 90°C. Domestic hot water (DHW): 10 bar and 65°C. Secondary (space heating): 2.5 bar and 85°C.<br>Hygienic Purposes: Non-metallic materials suitable for continuous use up to 65°C. |
| MARKING<br>Inta, model no, pressure, temperature, Kiwa and other technical information inside cover. |
| MATERIALS<br>Non-metallic materials assessed (BS6920) to point of discharge. |
| BACKFLOW PROTECTION NOTES<br>No supply pipe or secondary circuit shall be permanently connected to a closed circuit for filling a heating system unless it incorporates a backflow prevention device in accordance with a specification approved by the regulator for the purposes of this schedule. |
| ADDITIONAL NOTES<br>All water contact & exposed components satisfy opacity requirements.<br>Sealed primary circuits and /or secondary hot water systems shall incorporate a means for accommodating the thermal expansion of water to prevent any discharge from the circuit and/or system except in an emergency situation. |

**Extra Notes**



Figure 25 - Water Reg 4 Certification – Page 2

# 15 BIBLIOGRAPHY


[1] *BESA (Building Engineering Services Association) UK HIU (Heat Interface Unit) Test regime Technical Specification*, V3-Rev002 March 2026

[2] *Technical Standard for UK HIU Test Regime - Space Heating, High Temperature, Indirect HEATING MODULE 1-DH70 Indirect*, V1-Rev002: March 2026

[3] *Technical Standard for UK HIU Test Regime - Space Heating, Low Temperature, Indirect HEATING MODULE 2-DH55 Indirect*, V1-Rev002: March 2026

[4] *Technical Standard for UK HIU Test Regime - Domestic Hot Water, High Temperature, Keep Warm HOT WATER MODULE 7-DH70-KWarm*, V1-Rev002: March 2026

[5] *Technical Standard for UK HIU Test Regime - Domestic Hot Water, Low Temperature, Keep Warm HOT WATER MODULE 8-DH55-KWarm*, V1-Rev002: March 2026

| Report Issue No | Reason for Report Update |
|---|---|
| 1 | Original issue |
| 2 | DHW data (Module 8) updated |
| 3 | BESA Comments and DHW data (Module 7) updated |
| 4 | Table 19 Best Practice Criteria Changed |

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EUA energy&utilities alliance

HHIC HEATING & HOTWATER INDUSTRY COUNCIL