



**Low Temperature VWARD Calculation for Essco Controls Ltd. HIU**

Primary flow temperature = 60°C, DHW set point = 50°C, Space heating temperatures = 35°C/45°C

Test carried out by BSRIA Ltd. in May 2020, Test Reference 101281/1

Manufacturer: Essco Controls Ltd.; Model: Smart Twin; Serial number: ESS100010434; Year of manufacture: 2019

VWARD calculation prepared by Colin Judd of BSRIA Ltd. on 27 May 2020

|                      | VWARD (°C) | Volume (m <sup>3</sup> ) |
|----------------------|------------|--------------------------|
| <b>DHW</b>           | 24         | 35.6                     |
| <b>Keep warm</b>     | 42         | 49.7                     |
| <b>Space heating</b> | 36         | 53.5                     |

| VWARD with keep warm active |            |        |
|-----------------------------|------------|--------|
| Period                      | VWARD (°C) | % Time |
| <b>No heating</b>           | 34         | 93%    |
| <b>Heating</b>              | 36         | 7%     |
| <b>Overall</b>              | 34         |        |

|        | DHW draw test results |                                   |                  | Post DHW draw (60 seconds)        |                  |
|--------|-----------------------|-----------------------------------|------------------|-----------------------------------|------------------|
|        | Power (W)             | Primary flow (m <sup>3</sup> /hr) | Return temp (°C) | Primary flow (m <sup>3</sup> /hr) | Return temp (°C) |
| Low    | 10352                 | 0.229                             | 23.4             | 0.016                             | 19.61            |
| Medium | 16431                 | 0.383                             | 23.0             | 0.029                             | 22.93            |
| High   | 21333                 | 0.510                             | 24.5             | 0.024                             | 24.95            |

| DHW draw volumes per annum |              |                          |
|----------------------------|--------------|--------------------------|
| Energy (kWh)               | Time (hours) | Volume (m <sup>3</sup> ) |
| 729                        | 70.42        | 16.099                   |
| 297                        | 18.08        | 6.926                    |
| 444                        | 20.81        | 10.623                   |

| Post DHW draw volumes per annum |                        |                          |
|---------------------------------|------------------------|--------------------------|
| Events                          | Avg duration (seconds) | Volume (m <sup>3</sup> ) |
| 10000                           | 30                     | 1.310                    |
| 660                             | 75                     | 0.392                    |
| 300                             | 145                    | 0.291                    |

| Keep warm test results            |                  |
|-----------------------------------|------------------|
| Primary flow (m <sup>3</sup> /hr) | Return temp (°C) |
| 0.0062                            | 42.1             |

| Keep warm volumes per annum |                          |
|-----------------------------|--------------------------|
| Time (hours)                | Volume (m <sup>3</sup> ) |
| 8038                        | 49.723                   |

|      | Space heating test results |                                   |                  |
|------|----------------------------|-----------------------------------|------------------|
|      | Power (W)                  | Primary flow (m <sup>3</sup> /hr) | Return temp (°C) |
| 1 kW | 1033                       | 0.036                             | 35.5             |
| 2 kW | 2128                       | 0.079                             | 36.3             |
| 4 kW | 3820                       | 0.140                             | 36.7             |

| Space heating volumes per annum |              |                          |
|---------------------------------|--------------|--------------------------|
| Energy (kWh)                    | Time (hours) | Volume (m <sup>3</sup> ) |
| 98                              | 94.86        | 3.415                    |
| 787                             | 369.81       | 29.289                   |
| 565                             | 147.89       | 20.767                   |