catim centro de apoio tecnológico à indústria metalomecânica

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TESTING LABORATORY

TEST REPORT

Report Ref. **20204001453/20**

APPLIANCE TESTED:	Heat Pump
TRADE NAME:	MITSUBISHI ELECTRIC
MODEL:	ATW-ACS-DV200
SERIAL NUMBER:	72202000036
COMMISSION REGULATION (EU)	**No 812/2013 of 18 February 2013** - supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to the energy labelling of water heaters, hot water storage tanks and packages of water heater and solar device. **No 814/2013 of 2 August 2013** - implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water heaters and hot water storage tanks.
STANDARD	**EN 16147: 2017+AC2017** – Heat pumps with electrically driven compressors – Testing and requirements for marking of domestic hot water units. (sections 7.7, 7.8, 7.9, 7.10, 7.12 and 7.13)
LOAD PROFILE:	**L**
HEAT SOURCE:	**Outdoor ambient air (inlet dry-bulb: 7 °C / inlet wet-bulb: 6 °C)**
INQUIRER:	MITSUBISHI ELECTRIC
MANUFACTURER:	Depósitos Coballes O Viso Industrial Area A Cunchada - CP 36770 - O Rosal Pontevedra - Spain
Date of the reception of the appliance:	2020-12-14
Date of the end of the tests:	2020-12-23
Date of the report:	2021-01-04
CONCLUSION	Energy efficiency class A+. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k = 2,05. For conformity evaluation, measurement uncertainty is not taken into account.
NOTE:	

Technician:

(Ricardo Tavares)

The Technical Responsible:

(Pedro Castro)

IPAC acreditação
L0009
ISO/IEC 17025
Ensaios

NOMINAL DATA:

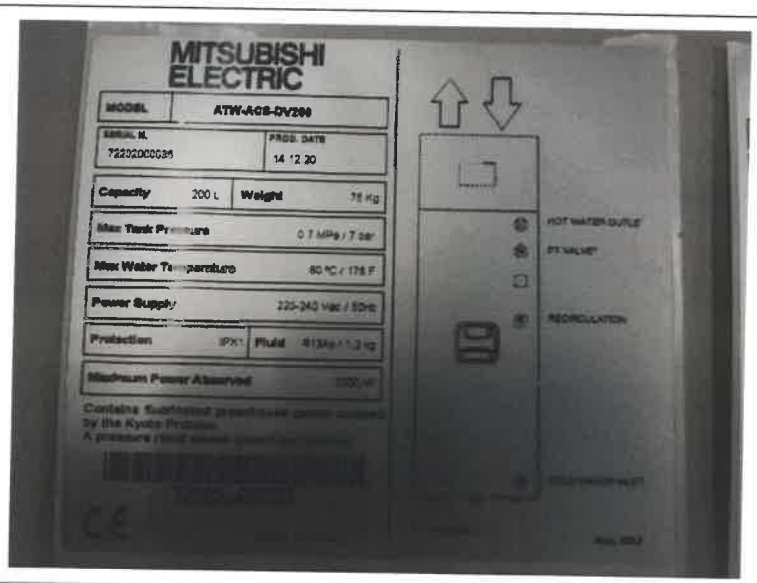
Storage tank capacity:	200 L
Power supply voltage:	230 V
Frequency:	50 Hz
Type and mass of refrigerant charge:	R134a / 1,2 Kg
Off-peak product:	No
Software Version Indoor Unit:	No information provided
Software Version Outdoor Unit:	------
Software Version Programming Unit:	------

TEST CONDITIONS:

Load profile:	L
Installation type:	Vertical
Type of heat source:	Outdoor ambient air
Heat source temperature, inlet dry-bulb:	7 °C
Heat source temperature, inlet wet-bulb:	6 °C
Sanitary cold water temperature, inlet:	10 °C
Set-up temperature:	52 °C
Domestic hot water operation mode:	Economy
Ambient temperature for storage tank:	20 °C

Notes:

Photos a) - Tested sample



Photos b) - Tested sample

Technician: *(Ricardo Tavares)*

TEST RESULTS:

Clause	EN 16147:2017			Expanded uncertainty
	Load profile		L	
	Reference energy of the load profile	*Q*ref	11,655 kWh	-
7.7	**Filling and heating up period (stage C)**			
	Electrical energy consumption during the test duration	*W*eh-HP	2,420 kWh	-
	Heating up time (h:min)	*t*h	5:52	-
7.8	**Standby power input (stage D)**			
	Total electrical energy consumption during the last on-off-cycle	*W*es-HP	0,435 kWh	*±0,008 kWh*
	Duration of the last on-off-cycle of the heat pump (h:min:ss)	*t*es	18:35:51	-
	Standby power input	*P*es	23,4 W	*±0,4 W*
7.12	**Ambient correction term**			
	Conversion coefficient, equal to 2,5	*CC*	2,5	-
	Coefficient for the determination of ambient correction term	*k*	0,23	-
	Primary standby heat loss	*P*stby	0,058 kW	-
	Ambient correction term	*Q*cor	-0,322 kWh	*±0,006 kWh*
7.9.1	**Useful energy**			
	Useful energy during the whole load profile	*Σ QHP-tap*	11,542 kWh	*±0,002 kWh*
	Calculated heat energy produced by electrical resistance heater to reach the required tapping temperature	*QEL-LP*	0,119 kWh	*±0,25 W*
	Overall tapping energy of the load profile	*Q*LP	11,661 kWh	-
7.9.2	**Electrical energy consumption**			
	Load profile time (h:min:ss)	*t*TTC	36:04:27	-
	Total measured electrical energy consumption	*W*EL-M-LP	3,986 kWh	-
	Total electrical energy consumption during the whole load profile	*W*EL-LP	3,780 kWh	*±0,046 kWh*
7.9.3	**Coefficient of performance**			
	Coefficient of performance for domestic hot water	*COP*DHW	3,0851	*±0,0007*
7.13.2	**Water heating energy efficiency**			
	Smart control factor	*SCF*	0,0	-
	Smart control (NO = 0 or YES = 1)	*smart*	0	-
	Daily electrical energy consumption	*Q*elec	3,778 kWh	*±0,048 kWh*
	Water heating energy efficiency (%)	*η*wh	127,8%	*±0,02 %*
7.13.3	**Annual consumption of electric energy**			
	Annual electrical energy consumption	*AEC*	801 kWh/a	-
7.14	**Other performance**			
	Reference hot water temperature	*θ*'WH	51,8 °C	-
	Maximum volume of mixed water at 40 °C	*V*40	218,4 L	-
	Rated heat output	*P*rated	1,3 kW	-

Regulation (EU) nº 812/2013	Energy efficiency class		
Energy efficiency measured	Class	A+	-

Technician: _____ *(Ricardo Tavares)*

Data acquisition

Note: Draw-offs where peak temperature Tp of 55 °C was not achieved is in grey. The missing temperature difference to the required Tp was assumed by an additional electrical resistance heater. This peak temperature Tp of 55 °C cannot always be achieved by the heat pump alone and is not mandatory.

Cycle	Virtual Time	Tapping duration	QHP-tap (kWh)		QHP-tap total (kWh)		QEL-tap (kWh)	Flow (kg/min)		Outlet Temp. (°C)			Average Inlet Temp. (°C)
			Req.	Mesured	Req.	Mesured		Req.	Mesured Average	Req. Tp *	Mesured Average **	Maximum ***	
Cycle 1	7:00:00	0:01:19	0,105	0,1050	0,1050	0,1050	0,0000	3	3,0	-	51,1	51,8	9,8
Cycle 2	7:05:01	0:04:59	1,400	1,4002	1,5050	1,5052	0,0000	6	5,9	-	51,8	51,8	9,8
Cycle 3	7:30:01	0:00:47	0,105	0,1050	1,6100	1,6102	0,0000	3	3,0	-	51,4	51,6	10,0
Cycle 4	7:45:01	0:00:47	0,105	0,1051	1,7150	1,7153	0,0000	3	3,0	-	51,4	51,6	10,0
Cycle 5	8:05:01	0:07:41	3,605	3,6051	5,3200	5,3204	0,0000	10	9,9	-	51,2	51,5	9,8
Cycle 6	8:25:02	0:00:50	0,105	0,1050	5,4250	5,4254	0,0000	3	3,0	-	50,5	50,7	10,1
Cycle 7	8:30:02	0:00:49	0,105	0,1053	5,5300	5,5307	0,0000	3	3,0	-	50,5	50,6	10,4
Cycle 8	8:45:02	0:00:49	0,105	0,1052	5,6350	5,6359	0,0000	3	3,0	-	50,2	50,4	10,0
Cycle 9	9:00:03	0:00:49	0,105	0,1053	5,7400	5,7412	0,0000	3	3,0	-	50,0	50,1	10,2
Cycle 10	9:30:03	0:01:01	0,105	0,1052	5,8450	5,8464	0,0000	3	3,0	-	49,3	49,7	10,1
Cycle 11	10:30:03	0:01:29	0,105	0,1051	5,9500	5,9516	0,0000	3	3,0	40	48,4	48,8	10,1
Cycle 12	11:30:03	0:01:30	0,105	0,1053	6,0550	6,0568	0,0000	3	3,0	-	50,5	51,1	10,2
Cycle 13	11:45:04	0:00:49	0,105	0,1051	6,1600	6,1619	0,0000	3	3,0	-	51,4	51,7	10,4
Cycle 14	12:45:04	0:01:38	0,315	0,2888	6,4750	6,4774	0,0267	4	3,8	55	51,3	51,4	10,2
Cycle 15	14:30:04	0:00:47	0,105	0,1052	6,5800	6,5826	0,0000	3	3,0	-	50,6	50,9	10,1
Cycle 16	15:30:03	0:00:49	0,105	0,1053	6,6850	6,6879	0,0000	3	2,9	-	50,4	50,7	10,1
Cycle 17	16:30:04	0:00:48	0,105	0,1053	6,7900	6,7932	0,0000	3	3,0	-	50,1	50,5	10,0
Cycle 18	18:00:04	0:00:51	0,105	0,1051	6,8950	6,8982	0,0000	3	2,9	-	49,7	50,0	10,1
Cycle 19	18:15:04	0:00:51	0,105	0,1052	7,0000	7,0034	0,0000	3	2,9	-	49,7	50,0	10,0
Cycle 20	18:30:05	0:00:50	0,105	0,1051	7,1050	7,1085	0,0000	3	2,9	-	49,7	49,9	9,9
Cycle 21	19:00:05	0:00:50	0,105	0,1051	7,2100	7,2136	0,0000	3	2,9	-	49,5	49,8	9,9
Cycle 22	20:30:05	0:03:40	0,735	0,6436	7,9450	7,9490	0,0918	4	3,9	55	49,4	49,4	10,0
Cycle 23	21:00:06	0:08:09	3,605	3,6060	11,5500	11,5550	0,0000	10	9,9	40	48,6	49,3	9,5
Cycle 24	21:30:06	0:00:58	0,105	0,1051	11,6550	11,6602	0,0000	3	2,9	-	45,3	45,6	9,8

* "Peak temperature (Tp) means the minimum water temperature, expressed in degrees Celsius, to be achieved during water draw-off, (...). The peak temperature Tp shall be calculated as a mean value over the water draw-offs with a minimum value as specified in the tapping cycles." *in Guidelines accompanying Regulations (EU) No 811 & 812/2013 and Regulations (EU) No 813 & 814/2013 - 2018.*

** average outlet temperature registered during the water draw-off;

*** maximum outlet temperature registered during the water draw-off;

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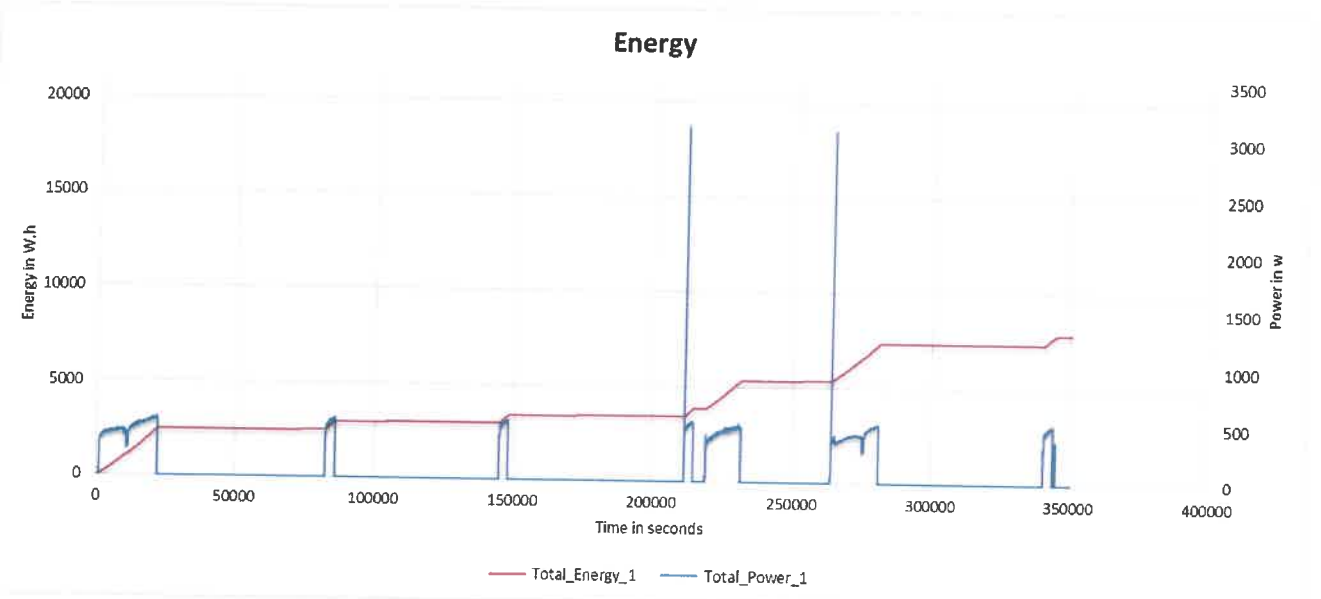
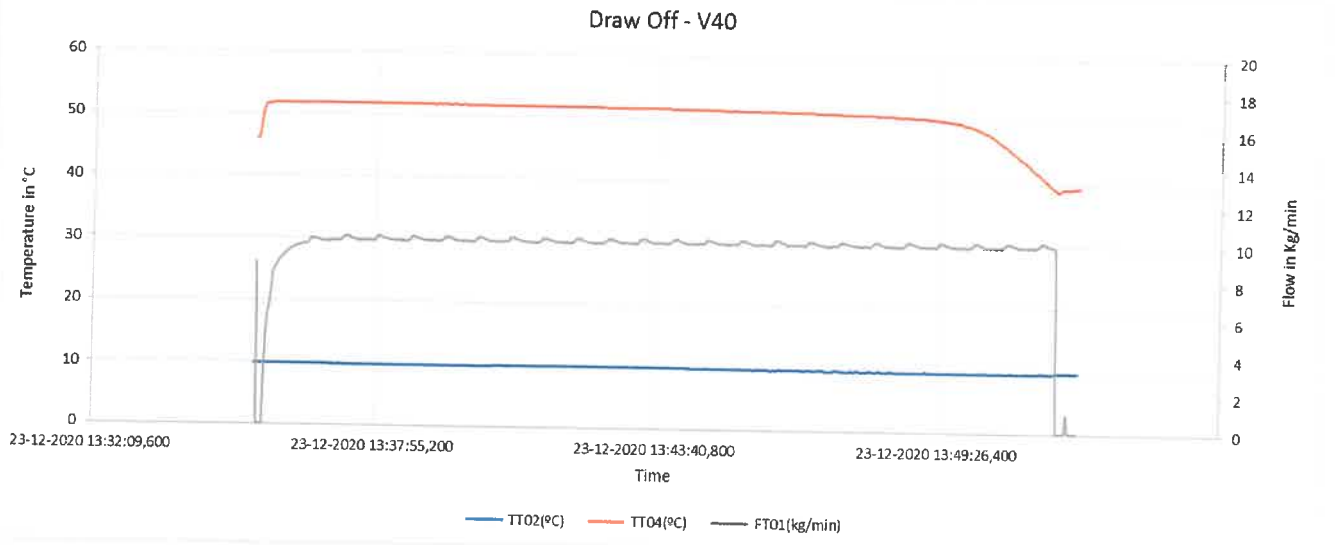
Data acquisition

Energy



V40



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