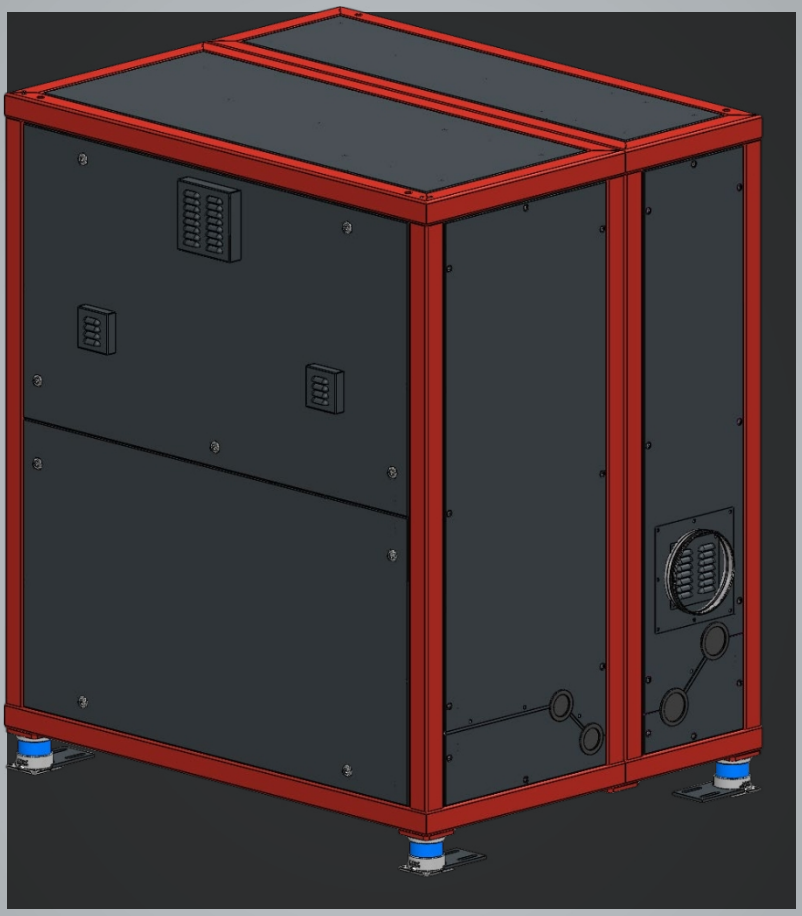

Appendix to the original operating instructions

WP Max-HiQ pF67 & WP Max-LoQ pF67

As at July 2026

ratiotherm
Smart Energy Systems

INFORMATION

These operating instructions form part of the technical documentation for the device in accordance with:

- Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
- Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment

These operating instructions are intended for the operator and must be provided to staff who come into contact with the equipment. The operator must ensure that the information contained in these operating instructions and the accompanying documents is read and understood.

NOTE

In case of the slightest doubt, the operating instructions must be consulted and kept in a known and easily accessible place.

The manufacturer accepts no liability for damage to persons, animals, property or the equipment itself resulting from:

- improper use,
- failure to observe instructions,
- insufficient attention

of the safety guidelines contained herein, or caused by:

- modification of the device,
- the use of unsuitable spare parts.

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For ease of reading, the generic masculine form is used in this original operating manual. The terms used to refer to persons apply to all genders.

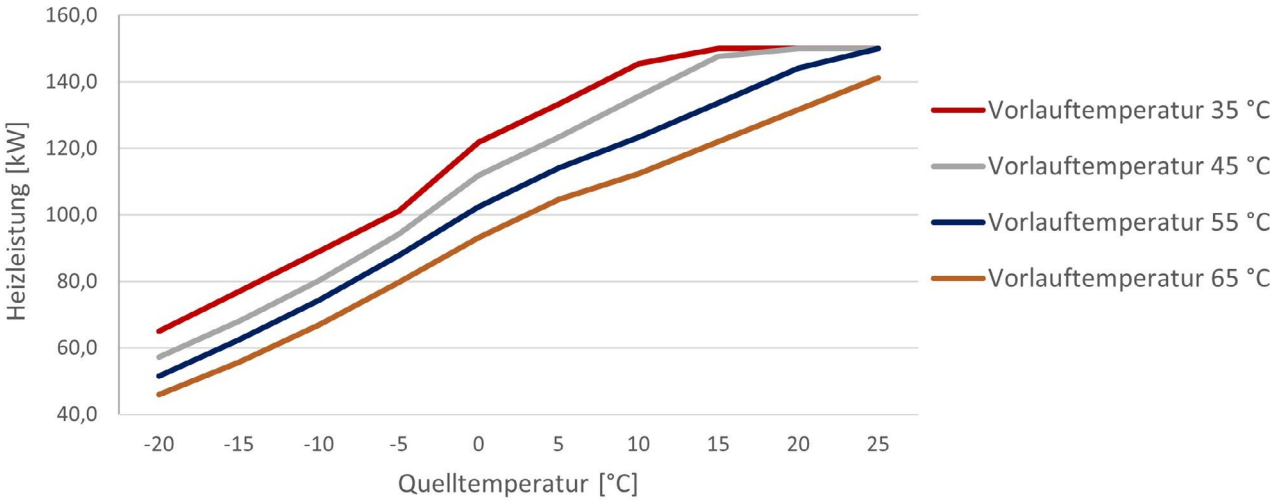
Date: 7 October 2024

TABLE OF CONTENTS

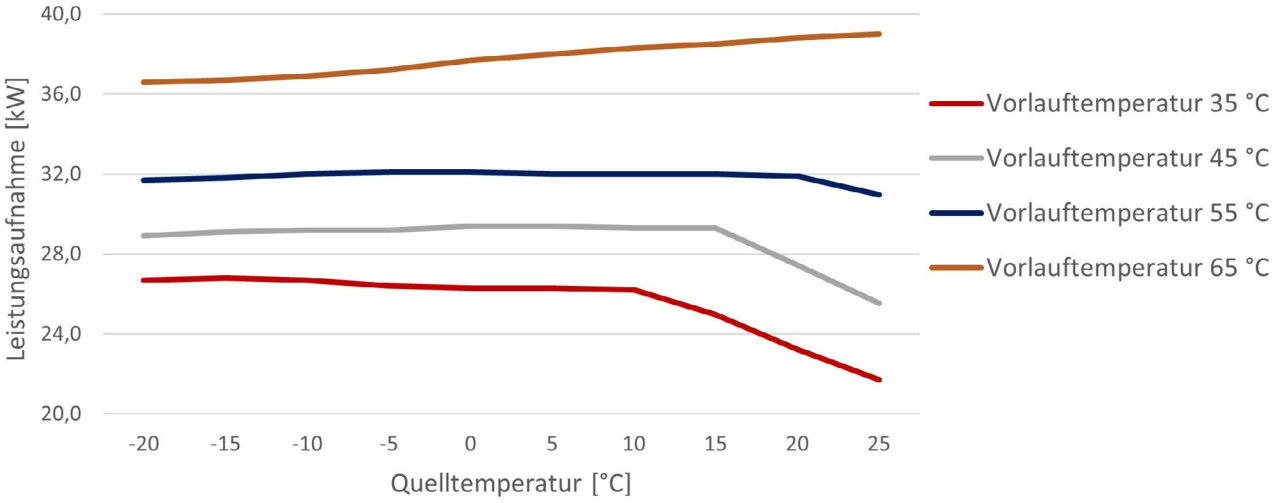
1. PERFORMANCE DIAGRAMS

Source temperature	Heating capacity in kW				Power consumption in kW				COP			
	Flow temperature				Flow temperature				Flow temperature			
	35 °C	45 °C	55 °C	65 °C	35 °C	45 °C	55 °C	65 °C	35 °C	45 °C	55 °C	65 °C
- 20 °C	65.0	57.2	51.5	46.0	26.7	28.9	31.7	36.6	2.43	1.98	1.62	1.26
-15 °C	76.9	68.1	62.4	55.7	26.8	29.1	31.8	36.7	2.87	2.34	1.96	1.52
-10 °C	88.9	80.2	74.3	66.8	26.7	29.2	32.0	36.9	3.33	2.75	2.32	1.81
-5 °C	101.1	94.1	87.7	79.7	26.4	29.2	32.1	37.2	3.83	3.22	2.73	2.14
0 °C	121.8	111.9	102.5	93.2	26.3	29.4	32.1	37.7	4.63	3.81	3.19	2.47
5 °C	133.3	123.4	114.0	104.7	26.3	29.4	32.0	38.0	5.07	4.20	3.56	2.76
10 °C	145.5	135.7	123.3	112.4	26.2	29.3	32.0	38.3	5.55	4.63	3.85	2.93
15 °C	150.0	147.7	133.7	122.0	25.0	29.3	32.0	38.5	6.00	5.04	4.18	3.17
20 °C	150.0	150.0	144.1	131.6	23.2	27.4	31.9	38.8	6.45	5.47	4.52	3.39
25 °C	150.0	150.0	150.0	141.2	21.7	25.5	31.0	39.0	6.90	5.88	4.84	3.62

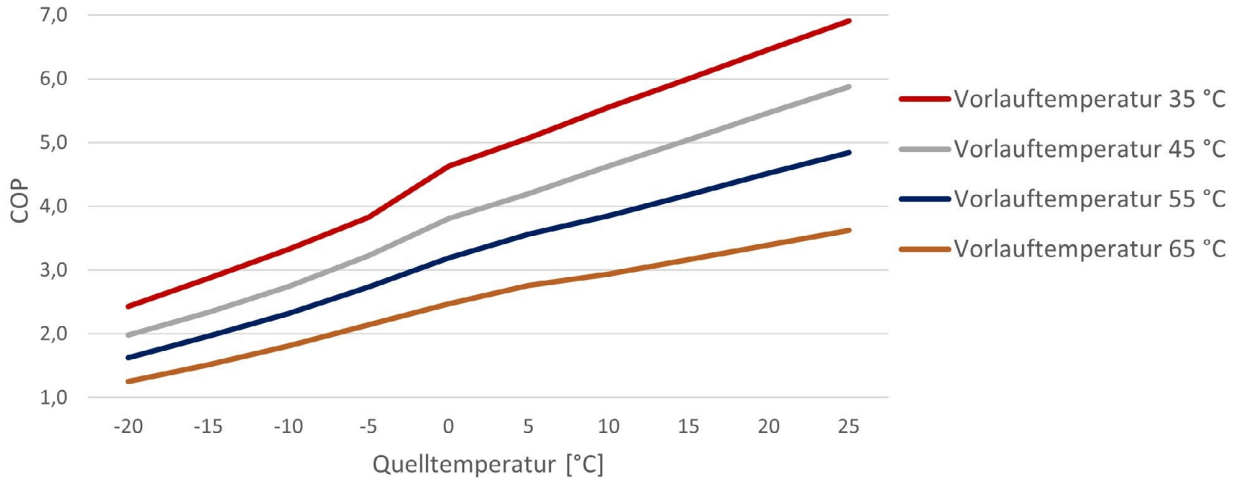
WP Max-HiQ/LoQ pF67 - Heizleistung



WP Max-HiQ/LoQ pF67 - Leistungsaufnahme



WP Max-HiQ/LoQ pF67 - COP



2. PERFORMANCE DATA

PERFORMANCE DATA

WP Max-HiQ pF67, WP Max-LoQ pF67

COP, heating capacity and power consumption (25 per cent)

Heating capacity **at 25 per cent compressor capacity**

Source / Sink	-20	-15	-10	-5	0	5	10	15	20	25
30	7.8	9.4	11.1	13.2	15.7	18.9	22.1	25.3	28.5	31.8
35	7.5	9.0	10.7	12.7	15.1	18.3	21.3	24.4	27.5	30.6
40	7.3	8.7	10.4	12.3	14.5	17.7	20.5	23.5	26.5	29.4
45	7.0	8.4	10.0	11.8	14.0	17.2	19.7	22.6	25.4	28.2
50	6.8	8.1	9.6	11.4	13.5	16.7	19.0	21.7	24.5	27.2
55	6.6	7.9	9.3	11.0	13.0	16.2	18.3	20.9	23.6	26.2
60	6.4	7.6	9.0	10.6	12.5	15.8	17.6	20.1	22.7	25.2
65	6.2	7.4	8.7	10.3	12.2	15.4	17.0	19.4	21.8	24.2
70	6.1	7.2	8.5	9.9	11.7	14.9	16.4	18.7	21.0	23.4

Power consumption

Source / Sink	-20	-15	-10	-5	0	5	10	15	20	25
30	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.8	2.9	2.9
35	2.8	2.8	2.8	2.8	2.9	2.9	2.9	2.9	3.0	3.0
40	3.0	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1
45	3.3	3.2	3.2	3.3	3.3	3.3	3.3	3.4	3.4	3.4
50	3.5	3.5	3.5	3.6	3.6	3.6	3.6	3.7	3.7	3.7
55	3.9	3.9	3.9	3.9	4.0	4.0	4.0	4.0	4.0	4.0
60	4.3	4.3	4.3	4.3	4.4	4.4	4.4	4.5	4.5	4.6
65	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8
70	5.1	5.2	5.2	5.3	5.3	5.3	5.3	5.3	5.4	5.4

COP

Source / Sink	-20	-15	-10	-5	0	5	10	15	20	25
30°C	2.92	3.50	4.14	4.86	5.72	6.80	7.86	8.90	9.91	10.90
35°C	2.68	3.25	3.85	4.47	5.22	6.29	7.28	8.30	9.31	10.31
40°C	2.42	2.92	3.45	4.03	4.71	5.74	6.61	7.55	8.48	9.41
45°C	2.16	2.61	3.09	3.61	4.27	5.21	5.92	6.73	7.53	8.32
50°C	1.92	2.31	2.73	3.17	3.75	4.62	5.22	5.94	6.66	7.36
55°C	1.70	2.03	2.39	2.79	3.29	4.08	4.58	5.22	5.85	6.48
60°C	1.50	1.78	2.09	2.44	2.88	3.58	3.96	4.50	5.02	5.53
65°C	1.34	1.58	1.85	2.16	2.55	3.21	3.54	4.03	4.51	5.00
70°C	1.18	1.39	1.62	1.89	2.23	2.83	3.08	3.50	3.92	4.33

PERFORMANCE DATA

WP Max-HiQ pF67, WP Max-LoQ pF67

COP, heating capacity and power consumption (50 per cent)

Heating capacity **at 50 per cent compressor capacity**

Source / Sink	-20	-15	-10	-5	0	5	10	15	20	25
30	15.6	18.7	22.3	26.4	31.4	37.8	44.2	50.7	57.1	63.5
35	15.0	18.1	21.5	25.4	30.2	36.6	42.6	48.8	54.9	61.1
40	14.5	17.4	20.7	24.5	29.0	35.5	41.0	46.9	52.9	58.9
45	14.1	16.9	20.0	23.6	28.0	34.4	39.4	45.1	50.8	56.5
50	13.6	16.3	19.3	22.8	27.0	33.4	38.0	43.5	49.0	54.4
55	13.2	15.8	18.6	22.0	26.0	32.5	36.6	41.9	47.2	52.4
60	12.8	15.3	18.0	21.2	25.1	31.5	35.2	40.3	45.3	50.4
65	12.4	14.8	17.5	20.5	24.3	30.7	33.9	38.8	43.6	48.4
70	12.1	14.4	16.9	19.9	23.5	29.9	32.8	37.4	42.1	46.7

Power consumption

Source / Sink	-20	-15	-10	-5	0	5	10	15	20	25
30	5.3	5.4	5.4	5.4	5.5	5.6	5.6	5.7	5.8	5.8
35	5.6	5.6	5.6	5.7	5.8	5.8	5.8	5.9	5.9	5.9
40	6.0	6.0	6.0	6.1	6.2	6.2	6.2	6.2	6.2	6.3
45	6.5	6.5	6.5	6.5	6.6	6.6	6.7	6.7	6.7	6.8
50	7.1	7.0	7.1	7.2	7.2	7.2	7.3	7.3	7.4	7.4
55	7.8	7.8	7.8	7.9	7.9	8.0	8.0	8.0	8.1	8.1
60	8.6	8.6	8.6	8.7	8.7	8.8	8.9	9.0	9.0	9.1
65	9.3	9.4	9.4	9.5	9.5	9.6	9.6	9.6	9.7	9.7
70	10.2	10.3	10.4	10.5	10.5	10.6	10.6	10.7	10.7	10.8

COP

Source / Sink	-20	-15	-10	-5	0	5	10	15	20	25
30°C	2.92	3.50	4.14	4.86	5.72	6.80	7.86	8.90	9.91	10.90
35°C	2.68	3.25	3.85	4.47	5.22	6.29	7.28	8.30	9.31	10.31
40°C	2.42	2.92	3.45	4.03	4.71	5.74	6.61	7.55	8.48	9.41
45°C	2.16	2.61	3.09	3.61	4.27	5.21	5.92	6.73	7.53	8.32
50°C	1.92	2.31	2.73	3.17	3.75	4.62	5.22	5.94	6.66	7.36
55°C	1.70	2.03	2.39	2.79	3.29	4.08	4.58	5.22	5.85	6.48
60°C	1.50	1.78	2.09	2.44	2.88	3.58	3.96	4.50	5.02	5.53
65°C	1.34	1.58	1.85	2.16	2.55	3.21	3.54	4.03	4.51	5.00
70°C	1.18	1.39	1.62	1.89	2.23	2.83	3.08	3.50	3.92	4.33

PERFORMANCE DATA

WP Max-HiQ pF67, WP Max-LoQ pF67

COP, heating capacity and power consumption (75 per cent)

Heating capacity **at 75 per cent compressor capacity**

Sink \ Source	-20	-15	-10	-5	0	5	10	15	20	25
30	24.8	29.4	34.2	39.3	47.2	54.2	61.2	68.2	75.2	82.2
35	23.5	28.0	32.9	38.1	45.6	52.6	59.4	66.3	73.2	80.1
40	22.5	26.8	31.5	36.9	43.8	50.8	57.0	63.5	70.1	76.7
45	21.4	25.5	30.1	35.4	42.1	49.1	55.2	61.7	68.3	74.8
50	20.4	24.4	28.8	34.0	40.4	47.4	52.8	59.0	65.1	71.3
55	19.6	23.6	28.0	33.0	38.9	45.9	50.8	56.7	62.7	68.6
60	19.1	22.8	27.1	32.0	37.3	44.3	48.4	54.0	59.5	65.1
65	18.0	21.6	25.7	30.5	35.8	42.8	46.7	52.1	57.6	63.0
70	17.1	20.5	24.4	28.9	34.4	41.4	44.4	49.4	54.4	59.4

Power consumption

Sink \ Source	-20	-15	-10	-5	0	5	10	15	20	25
30	9.0	9.0	9.0	9.0	9.1	9.1	9.2	9.2	9.3	9.3
35	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.4	9.4
40	9.8	9.7	9.7	9.7	9.8	9.8	9.8	9.9	9.9	9.9
45	10.3	10.3	10.3	10.4	10.4	10.5	10.5	10.5	10.6	10.6
50	10.9	10.9	10.8	10.6	11.2	11.2	11.2	11.3	11.3	11.3
55	11.8	11.8	11.8	11.9	12.0	12.0	12.0	12.0	12.1	12.1
60	12.8	12.8	12.9	12.9	13.1	13.2	13.3	13.4	13.5	13.6
65	13.8	13.9	13.9	14.1	14.2	14.3	14.3	14.4	14.4	14.5
70	14.7	14.9	15.1	15.3	15.4	15.5	15.6	15.7	15.8	15.9

COP

Sink \ Source	-20	-15	-10	-5	0	5	10	15	20	25
30°C	2.76	3.27	3.80	4.37	5.22	5.96	6.69	7.42	8.13	8.84
35°C	2.55	3.06	3.59	4.15	4.92	5.66	6.37	7.10	7.82	8.53
40°C	2.30	2.76	3.26	3.79	4.46	5.17	5.79	6.45	7.10	7.76
45°C	2.07	2.48	2.92	3.42	4.03	4.69	5.25	5.85	6.45	7.05
50°C	1.88	2.25	2.68	3.22	3.62	4.24	4.70	5.24	5.77	6.30
55°C	1.67	2.00	2.37	2.77	3.25	3.83	4.23	4.72	5.20	5.68
60°C	1.49	1.78	2.10	2.47	2.85	3.36	3.65	4.04	4.42	4.80
65°C	1.30	1.56	1.84	2.16	2.52	3.01	3.26	3.63	3.99	4.35
70°C	1.16	1.38	1.62	1.90	2.24	2.67	2.85	3.15	3.45	3.74

PERFORMANCE DATA

WP Max-HiQ pF67, WP Max-LoQ pF67

COP, heating capacity and power consumption (100 per cent)

Heating capacity **at 100% compressor capacity**

Sink \ Source	-20	-15	-10	-5	0	5	10	15	20	25
30	34.8	40.8	46.5	51.8	62.7	68.4	74.2	79.9	85.7	91.4
35	32.5	38.4	44.4	50.6	60.9	66.7	72.7	78.6	84.6	90.5
40	30.7	36.4	42.4	49.0	58.3	64.1	69.4	74.9	80.4	85.9
45	28.6	34.1	40.1	47.1	55.9	61.7	67.9	73.8	79.8	85.8
50	27.1	32.2	38.0	44.8	53.5	59.3	64.3	69.7	75.1	80.5
55	25.8	31.2	37.2	43.9	51.3	57.0	61.7	66.9	72.1	77.2
60	25.0	30.1	35.9	42.7	49.0	54.7	58.2	62.9	67.5	72.1
65	23.0	27.9	33.4	39.9	46.6	52.4	56.2	61.0	65.8	70.6
70	21.1	25.7	31.0	37.2	44.4	50.2	52.4	56.4	60.4	64.4

Power consumption

Sink \ Source	-20	-15	-10	-5	0	5	10	15	20	25
30	13.3	13.3	13.3	13.2	13.1	13.1	13.1	13.0	13.0	13.0
35	13.4	13.4	13.3	13.2	13.1	13.1	13.1	13.1	13.1	13.1
40	14.0	13.9	13.9	13.8	13.8	13.8	13.8	13.8	13.8	13.7
45	14.5	14.6	14.6	14.6	14.7	14.7	14.7	14.6	14.6	14.6
50	14.8	14.9	14.6	13.8	15.4	15.4	15.3	15.3	15.3	15.3
55	15.8	15.9	16.0	16.1	16.0	16.0	16.0	16.0	16.0	16.0
60	17.0	17.1	17.1	17.2	17.4	17.6	17.7	17.8	17.9	18.0
65	18.3	18.4	18.5	18.6	18.9	19.0	19.1	19.3	19.4	19.5
70	18.9	19.2	19.5	19.8	20.1	20.3	20.5	20.6	20.8	21.0

COP

Sink \ Source	-20	-15	-10	-5	0	5	10	15	20	25
30°C	2.61	3.06	3.50	3.94	4.77	5.22	5.68	6.13	6.59	7.05
35°C	2.43	2.87	3.33	3.83	4.63	5.08	5.54	6.00	6.46	6.92
40°C	2.19	2.61	3.05	3.54	4.23	4.65	5.04	5.44	5.85	6.25
45°C	1.98	2.34	2.74	3.23	3.80	4.20	4.63	5.05	5.46	5.88
50°C	1.83	2.17	2.60	3.25	3.48	3.86	4.19	4.55	4.91	5.26
55°C	1.63	1.96	2.32	2.73	3.20	3.56	3.85	4.18	4.51	4.84
60°C	1.47	1.77	2.10	2.48	2.81	3.12	3.30	3.54	3.78	4.01
65°C	1.26	1.52	1.81	2.14	2.47	2.76	2.94	3.17	3.39	3.62
70°C	1.12	1.34	1.59	1.88	2.21	2.47	2.56	2.73	2.90	3.07

PERFORMANCE DATA

WP Max-HiQ pF67, WP Max-LoQ pF67

COP, heating capacity and power consumption (150 per cent)

Heating capacity at 150 per cent compressor capacity (compressors 1 and 2 each running at 75 per cent)

Source / Sink	-20	-15	-10	-5	0	5	10	15	20	25
30	52.2	61.2	69.7	77.7	94.0	102.7	111.3	119.9	128.5	137.1
35	48.8	57.6	66.7	75.8	91.4	100.0	109.1	118.0	126.8	135.7
40	46.1	54.5	63.6	73.5	87.5	96.1	104.1	112.3	120.6	128.9
45	42.9	51.1	60.2	70.6	83.9	92.5	101.8	110.8	119.7	128.7
50	40.6	48.4	57.1	67.2	80.3	88.9	96.5	104.5	112.6	120.7
55	38.7	46.8	55.8	65.8	76.9	85.5	92.5	100.3	108.1	115.9
60	37.5	45.2	53.9	64.0	73.5	82.1	87.3	94.3	101.2	108.2
65	34.5	41.8	50.1	59.8	69.9	78.5	84.3	91.5	98.7	105.9
70	31.7	38.6	46.4	55.8	66.6	75.3	78.6	84.6	90.6	96.6

Power consumption

Source / Sink	-20	-15	-10	-5	0	5	10	15	20	25
30	20.0	20.0	19.9	19.8	19.7	19.7	19.6	19.6	19.5	19.5
35	20.1	20.1	20.0	19.8	19.7	19.7	19.7	19.7	19.6	19.6
40	21.0	20.9	20.8	20.8	20.7	20.7	20.7	20.6	20.6	20.6
45	21.7	21.9	21.9	21.9	22.1	22.0	22.0	22.0	21.9	21.9
50	22.2	22.3	21.9	20.7	23.1	23.1	23.0	23.0	23.0	22.9
55	23.8	23.9	24.0	24.1	24.1	24.0	24.0	24.0	24.0	23.9
60	25.5	25.6	25.7	25.8	26.2	26.3	26.5	26.6	26.8	26.9
65	27.5	27.5	27.7	27.9	28.3	28.5	28.7	28.9	29.1	29.3
70	28.3	28.7	29.2	29.7	30.1	30.4	30.7	31.0	31.2	31.5

COP

Source / Sink	-20	-15	-10	-5	0	5	10	15	20	25
30°C	2.61	3.06	3.50	3.94	4.77	5.22	5.68	6.13	6.59	7.05
35°C	2.43	2.87	3.33	3.83	4.63	5.08	5.54	6.00	6.46	6.92
40°C	2.19	2.61	3.05	3.54	4.23	4.65	5.04	5.44	5.85	6.25
45°C	1.98	2.34	2.74	3.23	3.80	4.20	4.63	5.05	5.46	5.88
50°C	1.83	2.17	2.60	3.25	3.48	3.86	4.19	4.55	4.91	5.26
55°C	1.63	1.96	2.32	2.73	3.20	3.56	3.85	4.18	4.51	4.84
60°C	1.47	1.77	2.10	2.48	2.81	3.12	3.30	3.54	3.78	4.01
65°C	1.26	1.52	1.81	2.14	2.47	2.76	2.94	3.17	3.39	3.62
70°C	1.12	1.34	1.59	1.88	2.21	2.47	2.56	2.73	2.90	3.07

PERFORMANCE DATA

WP Max-HiQ pF67, WP Max-LoQ pF67

COP, heating capacity and power consumption (200 per cent)

Heating capacity at 200 per cent compressor capacity (compressors 1 and 2 each running at 100 per cent)

Sink \ Source	-20	-15	-10	-5	0	5	10	15	20	25
30	69.6	81.6	93.0	103.6	125.4	136.9	148.4	150.0	150.0	150.0
35	65.0	76.9	88.9	101.1	121.8	133.3	145.5	150.0	150.0	150.0
40	61.4	72.7	84.8	98.0	116.6	128.1	138.7	149.8	150.0	150.0
45	57.2	68.1	80.2	94.1	111.9	123.4	135.7	147.7	150.0	150.0
50	54.1	64.5	76.1	89.6	107.1	118.6	128.6	139.4	150.0	150.0
55	51.5	62.4	74.3	87.7	102.5	114.0	123.3	133.7	144.1	150.0
60	49.9	60.3	71.9	85.4	97.9	109.4	116.5	125.7	135.0	144.2
65	46.0	55.7	66.8	79.7	93.2	104.7	112.4	122.0	131.6	141.2
70	42.3	51.4	61.9	74.4	88.9	100.4	104.8	112.8	120.8	128.7

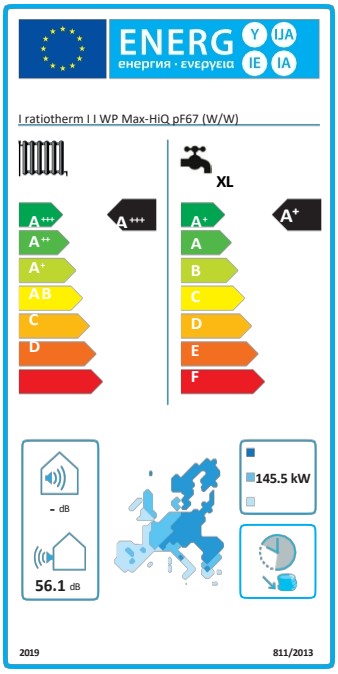
Power consumption

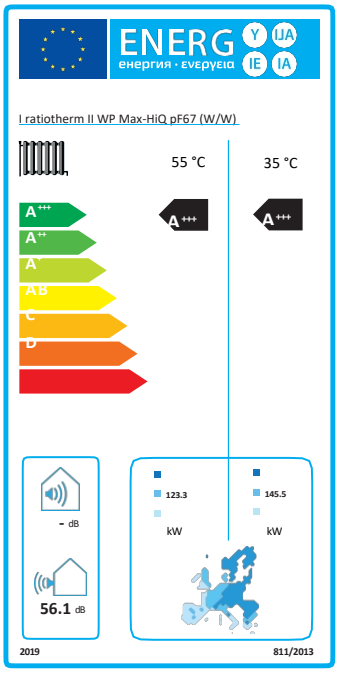
Sink \ Source	-20	-15	-10	-5	0	5	10	15	20	25
30	26.7	26.7	26.6	26.3	26.3	26.2	26.1	24.5	22.8	21.3
35	26.7	26.8	26.7	26.4	26.3	26.3	26.2	25.0	23.2	21.7
40	28.0	27.9	27.8	27.7	27.6	27.6	27.5	27.5	25.7	24.0
45	28.9	29.1	29.2	29.2	29.4	29.4	29.3	29.3	27.5	25.5
50	29.5	29.7	29.2	27.6	30.8	30.7	30.7	30.7	30.6	28.5
55	31.7	31.8	32.0	32.1	32.1	32.0	32.0	32.0	31.9	31.0
60	33.9	34.1	34.3	34.4	34.9	35.1	35.3	35.5	35.7	35.9
65	36.6	36.7	36.9	37.2	37.7	38.0	38.3	38.5	38.8	39.0
70	37.7	38.3	39.0	39.7	40.2	40.6	40.9	41.3	41.6	42.0

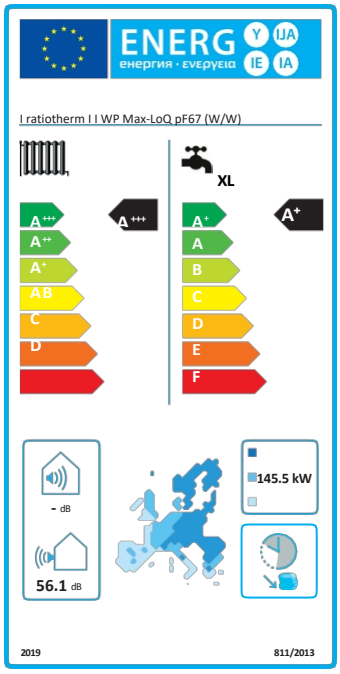
COP

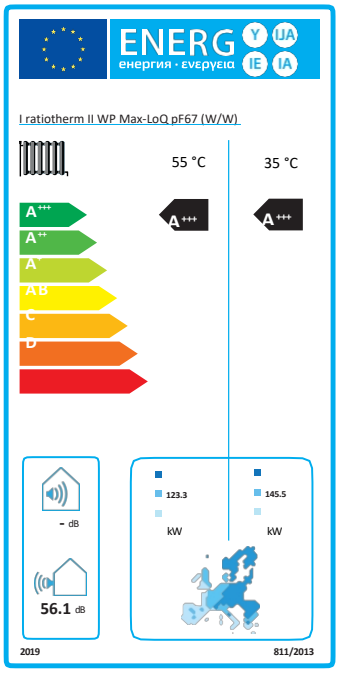
Sink \ Source	-20	-15	-10	-5	0	5	10	15	20	25
30°C	2.61	3.06	3.50	3.94	4.77	5.22	5.68	6.13	6.59	7.05
35°C	2.43	2.87	3.33	3.83	4.63	5.08	5.54	6.00	6.46	6.92
40°C	2.19	2.61	3.05	3.54	4.23	4.65	5.04	5.44	5.85	6.25
45°C	1.98	2.34	2.74	3.23	3.80	4.20	4.63	5.05	5.46	5.88
50°C	1.83	2.17	2.60	3.25	3.48	3.86	4.19	4.55	4.91	5.26
55°C	1.63	1.96	2.32	2.73	3.20	3.56	3.85	4.18	4.51	4.84
60°C	1.47	1.77	2.10	2.48	2.81	3.12	3.30	3.54	3.78	4.01
65°C	1.26	1.52	1.81	2.14	2.47	2.76	2.94	3.17	3.39	3.62
70°C	1.12	1.34	1.59	1.88	2.21	2.47	2.56	2.73	2.90	3.07

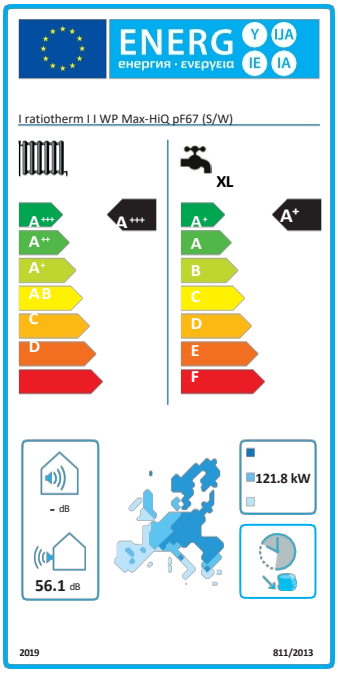
3. EU energy label

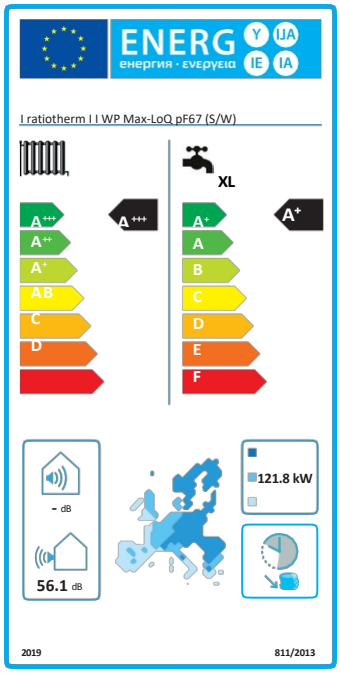










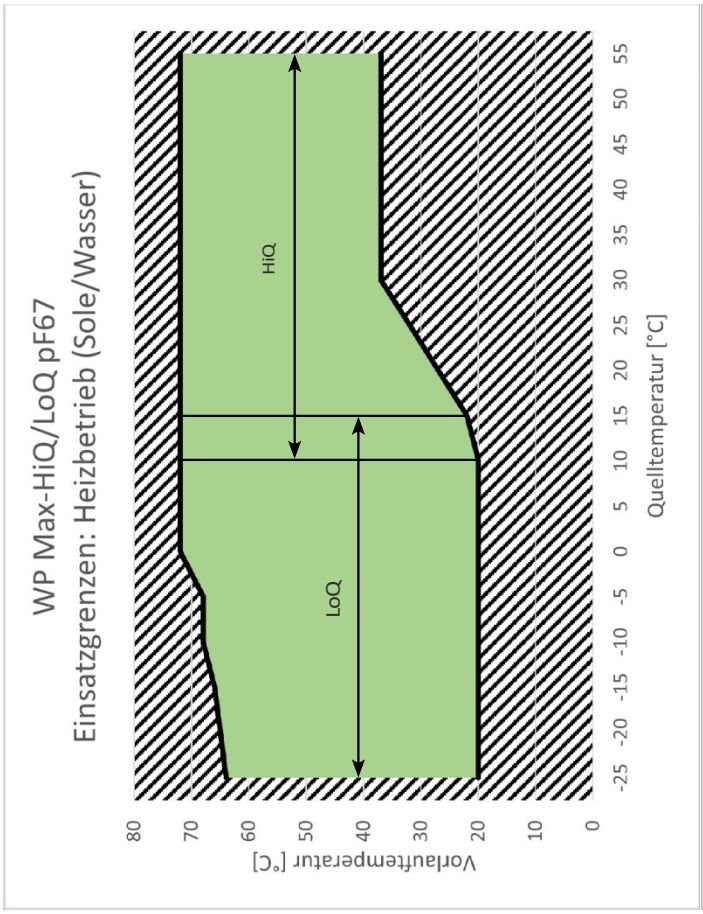


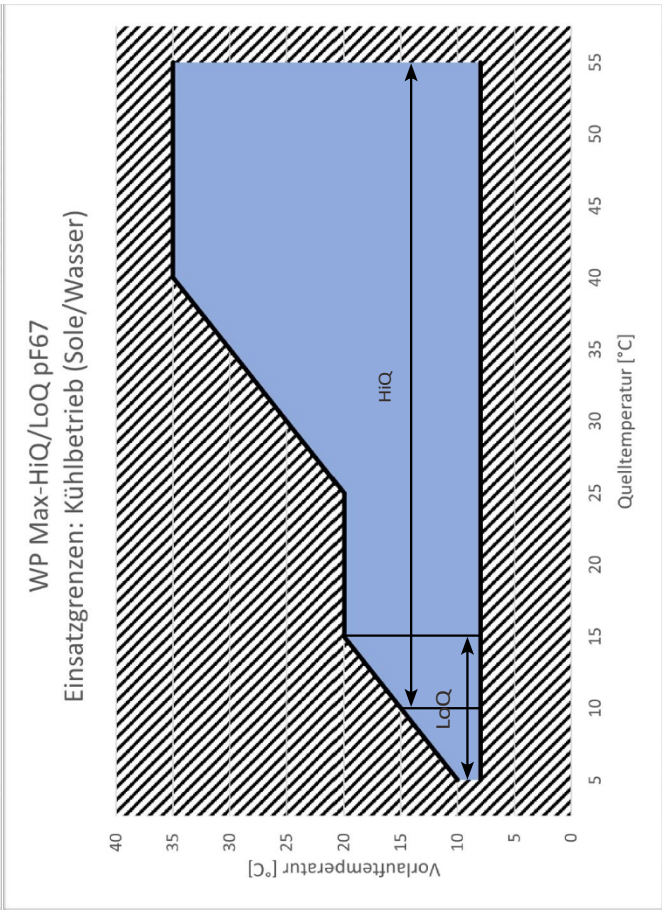
4. PRODUCT DATA SHEET IN ACCORDANCE WITH EU REGULATION NO. 811/2013

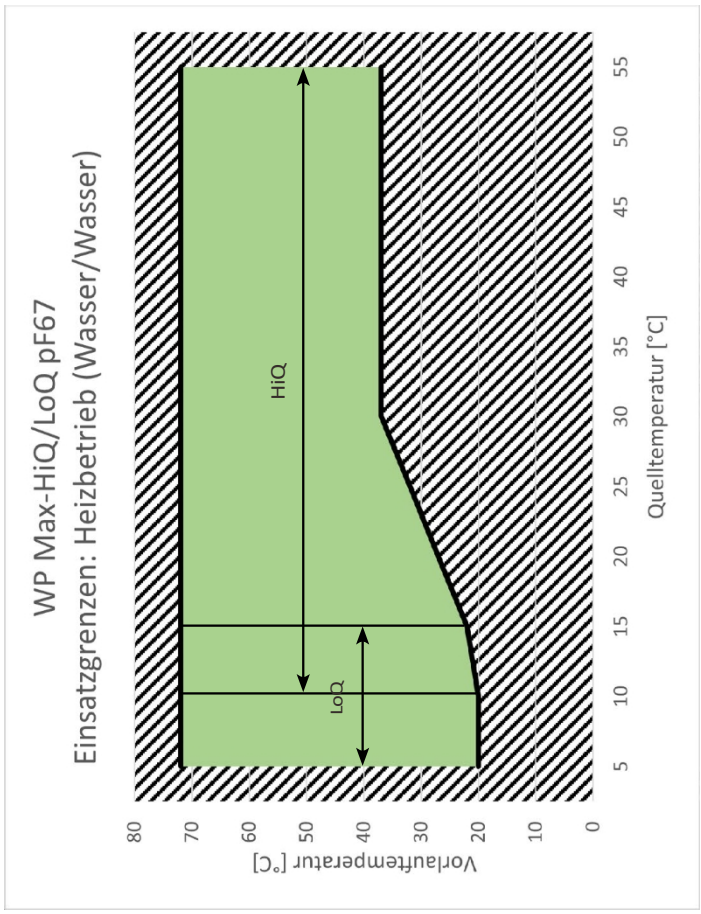
Product data sheet in accordance with EU Regulation No 811/2013					
Model			WP Max-HiQ/LoQ pF67		
Air-to-water heat pump ☐		Water/water heat pump ☑		Brine/water heat pump ☐	
Fitted with an auxiliary heater				No (optional)	
Combi heater				yes	
Heating mode		**Climate zone**	**flow temperature 35 °C**	**55 °C**	
Class for space heating energy efficiency η_s		medium	A+++	A+++	
Space heating energy efficiency η_s		average	242.9	205.1	%
Seasonal Coefficient of Performance (SCOP)		average	6.27	5.33	
$_{Rated}$heating capacity P_{rated}		average	145.5	123.3	kW
Performance points					
Operating point 1 / Bivalent temperature	$_{Outdoor/bivalent}$ = -7 °C	P1	131.5	113.9	kW
		COP1	5.58	4.05	
Operating point 2	$_{Outdoor}$ = 2 °C	P2	81.6	68.8	kW
		COP2	5.67	4.86	
Operating point 3	$_{Outdoor}$ = 7 °C	P3	52.0	45.6	kW
		COP3	7.49	6.93	
Operating point 4	$T_{outdoor}$ = 12 °C	P4	22.9	22.1	kW
		COP4	8.48	7.89	
Minimum operating temperature	TOL = -10 °C	P5	145.5	123.3	kW
		COP5	5.54	3.85	
Power consumption – consumption figures					
P temperature controller $_{TempOFF}$				18	W
Standby mode $P_{Standby}$				16	
Switched off P_{Off}				18	
Heating band $P_{Heating}$				22	
Energy label – Hot water supply					
Load profile				XL	
Hot water heating energy efficiency				155.1	%
Hot water energy efficiency class				A+	
Daily electricity consumption Q_{elec}				4.95	kWh
Annual electricity consumption AEC				1079.98	kWh

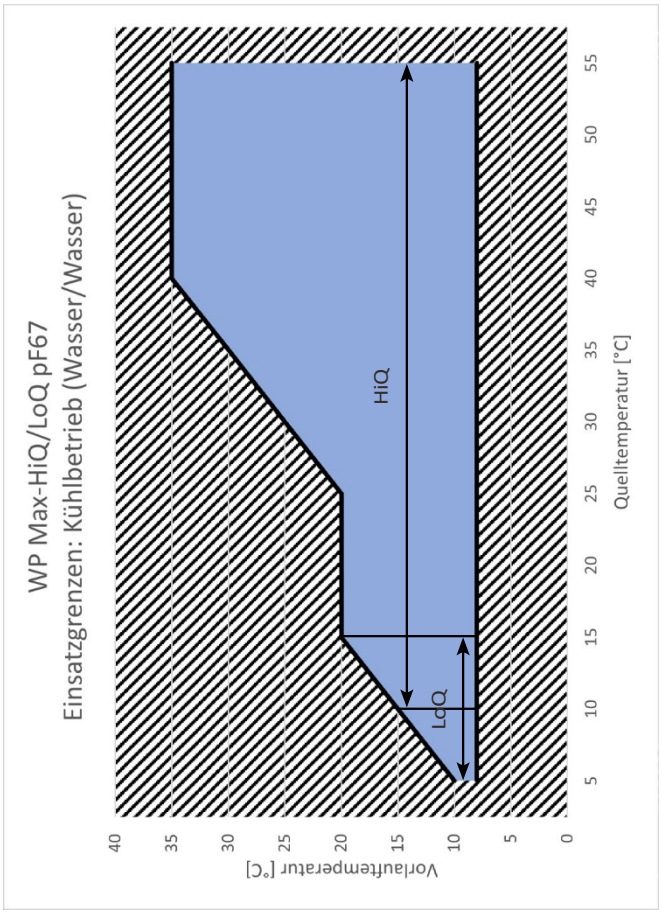
Product data sheet in accordance with EU Regulation No. 811/2013					
Model			WP Max-HiQ/LoQ pF67		
Air-to-water heat pump ☐	Water-to-water heat pump ☐		Brine/water heat pump ☑		
Fitted with an auxiliary heater			No (optional)		
Combi heater			yes		
Heating mode	**Climate zone**		**flow temperature** 35 °C	55 °C	
Class for space heating energy efficiency η_s	medium		A+++	A+++	
Space heating energy efficiency η_s	average		193.7	161.5	%
Seasonal Coefficient of Performance (SCOP)	average		5.04	4.24	
$_{Rated}$heating capacity P_{rated}	average		121.8	102.5	kW
Performance points					
Operating point 1 / Bivalent temperature	$T_{Outdoor/bivalent}$ = -7 °C	P1	110.3	94.7	kW
		COP1	4.66	3.36	
Operating point 2	$T_{Outdoor}$ = 2 °C	P2	69.0	57.3	kW
		COP2	4.78	4.06	
Operating point 3	$T_{Outdoor}$ = 7 °C	P3	45.0	36.1	kW
		COP3	5.45	4.95	
Operating point 4	$T_{outdoor}$ = 12 °C	P4	19.6	18.8	kW
		COP4	6.43	5.80	
Minimum operating temperature	TOL = -10 °C	P5	121.8	102.5	kW
		COP5	4.63	3.20	
Power consumption – consumption figures					
P temperature controller $_{TempOFF}$				18	W
Standby mode $P_{Standby}$				16	
Switched off P_{Off}				18	
Heating band $P_{Heating}$				22	
Energy label – Hot water supply					
Load profile				XL	
Hot water energy efficiency				128.8	%
Hot water energy efficiency class				A+	
Daily electricity consumption Q_{elec}				5.96	kWh
Annual electricity consumption AEC				1,300.92	kWh

5. OPERATING LIMITS: HEATING AND COOLING





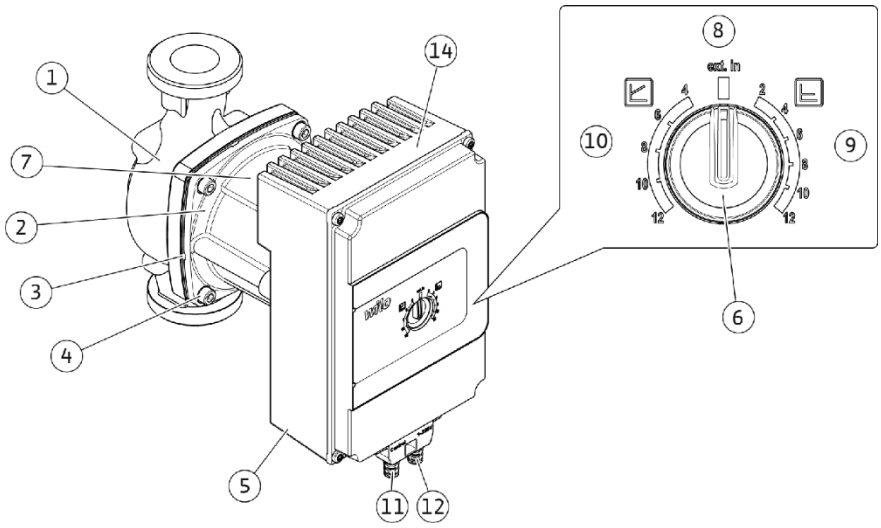




6. WILO STRATOS PARA-C PUMP

Technical specifications – Wilo Stratos PARA-C 40-220-08-T21 |
- Wilo Stratos PARA-C 50-240-08-T21 |

Supply voltage	1 ~ 230 V +10 %/-10 %, 50/60 Hz
Protection class	IPX4D
Energy Efficiency Index (EEI)	see type plate (Fig. I, item 7)
Permissible medium temperature	-20 °C to +95 °C (+110 °C with reduced reduced output)
Permissible fluid temperature for drinking-temperature hot water	0 °C to +80 °C
Permissible ambient temperature	-20 °C to +40 °C (+60 °C with reduced- (at maximum output)
Maximum operating pressure	10 bar (1000 kPa)
T21 model	• Control knob • Internal Δp-v control • Internal Δp-c control • External PWM2 control



Pump design

1	Pump housing
2	Wet-rotor motor
3	Condensate drain holes (4x around the circumference)
4	Housing screws
5	Control module
6	Control knob for adjusting the pump
7	Type plate
8	Adjustment range Ext. In
9	Setting range for differential pressure Constant (Δp-c)
10	Differential pressure setting range variable (Δp-v)
11	Signal cable connection
12	Mains cable connection

Minimum inlet pressure

Nominal diameter	Fluid temperature		
	-20 °C to +50 °C	up to +95 °C	up to +110 °C
G 1½	0.3 bar	1.0 bar	1.6 bar
G 2	0.3 bar	1.0 bar	1.6 bar
DN 32	0.3 bar	1.0 bar	1.6 bar
DN 40	0.5 bar	1.2 bar	1.8 bar
DN 50	0.5 bar	1.2 bar	1.8 bar
DN 65	0.7 bar	1.5 bar	2.3 bar

These values apply up to 300 m above sea level; an allowance for higher altitudes is 0.01 bar per 100 m increase in altitude.

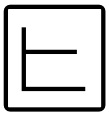
FAULTS

Faults must only be rectified by a qualified specialist tradesman; work on the electrical connection must only be carried out by a qualified electrician.

Faults	Causes	Remedy
The pump does not run when the power supply is switched on.	Faulty electrical fuse.	Check the fuse.
The pump does not run when the power is switched on.	The pump is not receiving any power.	Rectify the power cut.
The pump is making noise.	Cavitation due to insufficient inlet pressure.	Increase the system pressure to within the permissible range.
The pump is making noise.	Cavitation due to insufficient inlet pressure.	Check the head setting and, if necessary, set a lower head.
The building is not warming up.	The heat output of the heating surfaces is too low.	Increase the setpoint.
The building is not warming up.	The heat output of the heating surfaces is too low.	Set the control mode to Ap-c instead of Ap-v.

SETTING THE CONTROL MODE

The control mode is selected using the control knob. The following settings can be made:



Setting range: constant differential pressure

(Ap-c) Fig. I a, item 9: The Ap-c control mode is

active.
The figure indicates the delivery head in metres of water column.

Variable differential pressure setting range (Ap-v)

Fig. I a, pos. 10: The Ap-v control mode is active.
The figure indicates the delivery head in metres of water column at nominal flow rate.

ext. in

External input setting range

Fig. I a, item 8: External control is active. The control mode depends on the technical version of the product. (See chapter ‘Equipment variants’) The

following settings are possible:

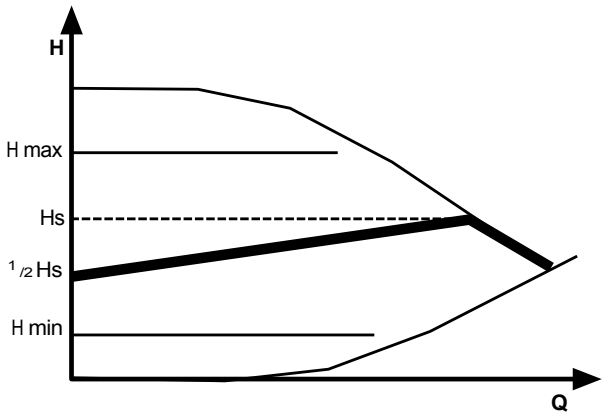
- Setpoint adjustment via analogue input 0 … 10 V.
- Setpoint adjustment via pulse width modulation (PWM).
- Setpoint adjustment at fixed speed (not externally controlled).

Default setting

By default, the pump is supplied with the “ext. In” setting mode.

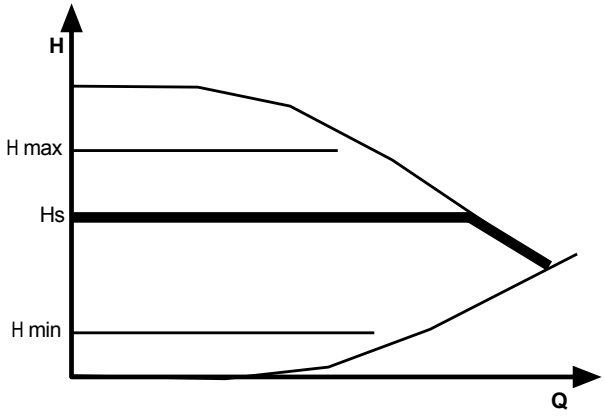
CONTROL AND COMMUNICATION FUNCTIONS

Variable differential pressure Δp-v



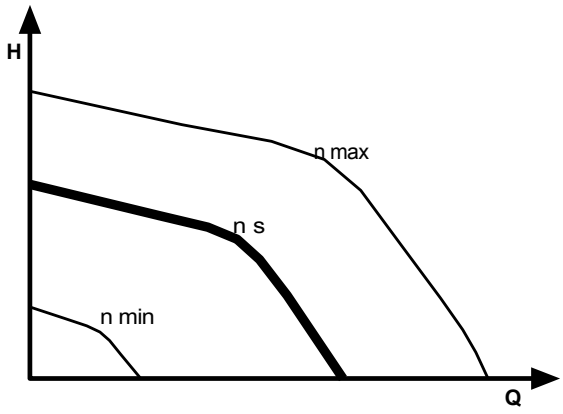
Recommendation for two-pipe heating systems with radiators to reduce flow noise at thermostatic valves. The pump reduces the head by half as the flow rate in the pipework decreases.
Savings in electrical energy through adaptation of the head to the required flow rate and lower flow rates.

Constant differential pressure Δp-c



Recommended for underfloor heating systems, large-diameter pipework, or any applications without a variable pipework characteristic curve (e.g. storage tank charging pumps), as well as single-pipe heating systems with radiators. The control system maintains the set head constant, regardless of the flow rate.

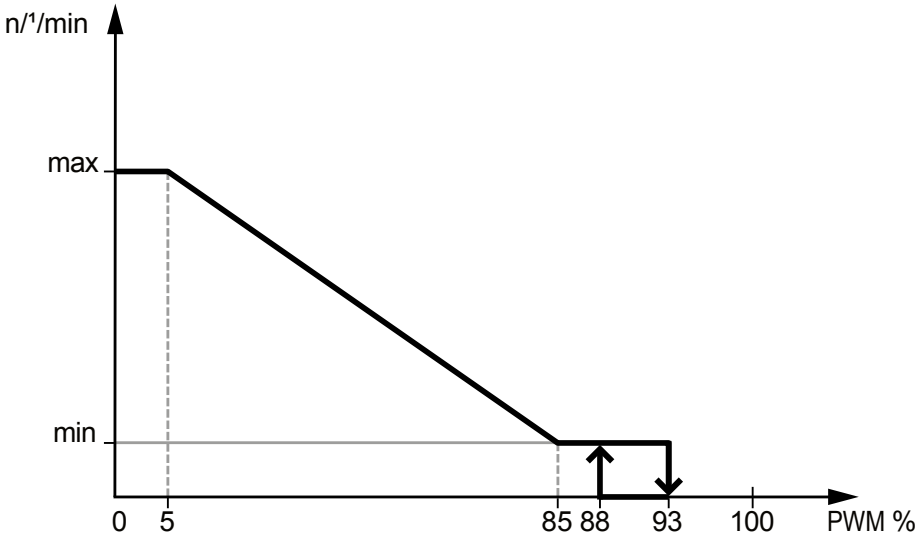
Constant speed 1



Recommended for systems with a fixed system resistance that require a constant flow rate. The control system maintains the set speed at a constant level, regardless of the flow rate.

PNM In Type 1

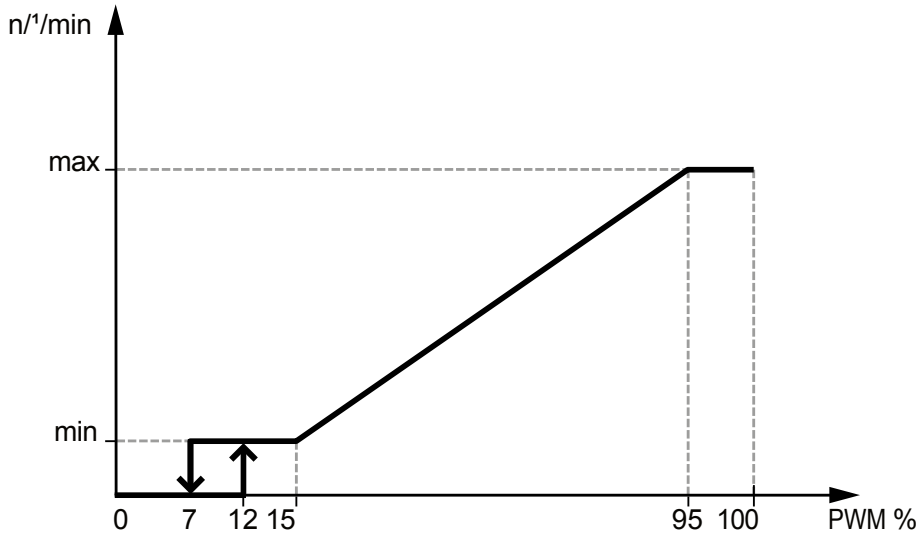
In PWM 1 mode, the pump speed is controlled in response to the PWM input signal. Behaviour in the event of a cable break:
If the signal cable is disconnected from the pump, e.g. due to a cable break, the pump accelerates to maximum speed.



PNM 1 signal input (%)	Pump response
< 5	The pump is running at maximum speed.
5 ... 85	The pump speed decreases linearly from n_{max} to n_{min}.
85 ... 93 (Operation)	The pump is running at minimum speed (operation).
85 ... 88 (start-up)	The pump is running at minimum speed (start-up).
93 ... 100	Pump stops (standby).

PNM In Type 2

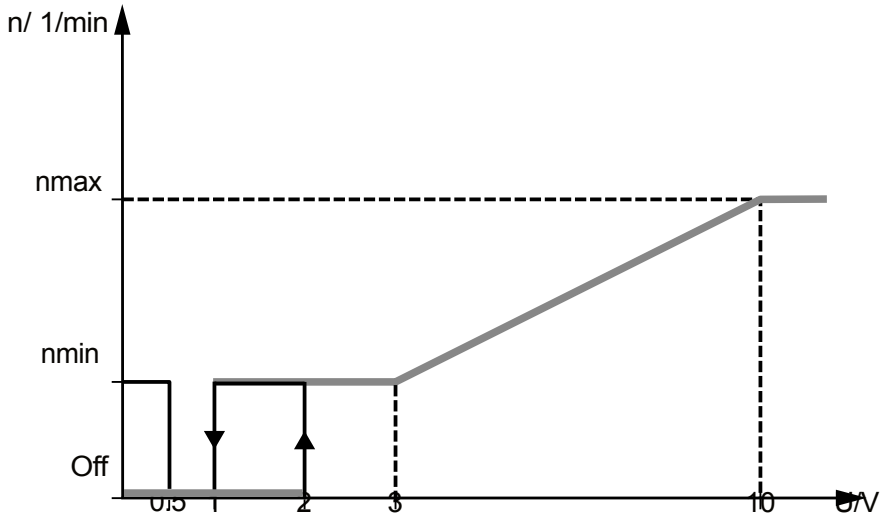
In PWM 2 mode, the pump speed is controlled based on the PWM input signal. Behaviour in the event of a cable break:
If the signal cable is disconnected from the pump, e.g. due to a cable break, the pump stops.



PNM 2 signal input (%)	Pump response
< 7	Pump stops (standby).
7 ... 15 (Operation)	Pump runs at minimum speed.
12 ... 15 (Start-up)	Pump runs at minimum speed.
15 ... 95	The pump's speed increases linearly from n_{min} to n_{max}.
> 95	The pump is running at maximum speed.

Control input "Analogue In 0 ... 10 V" with threshold function

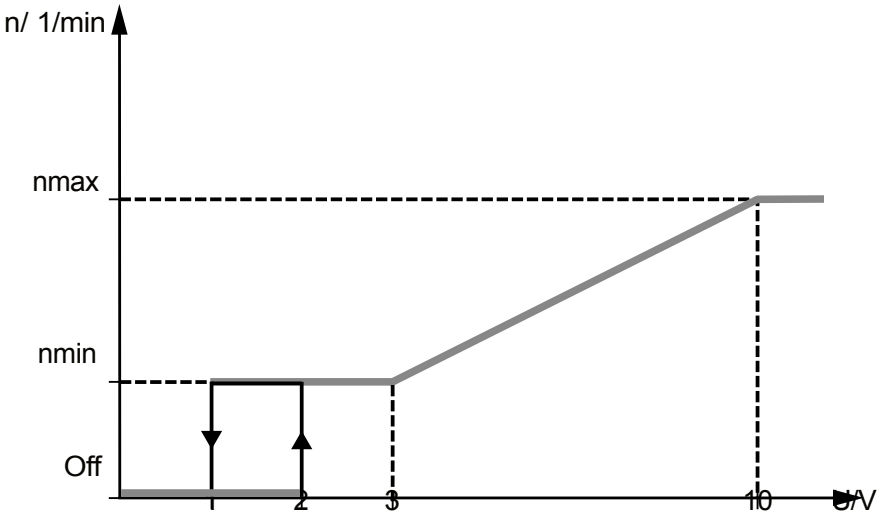
The pump is controlled by an analogue signal in the range 0 ... 10 V. Behaviour in the event of a cable break: If the signal cable is disconnected from the pump, e.g. due to a cable break, the pump reduces to minimum speed.



Analogue signal input (V)	Pump response
< 0.5	Pump runs at minimum speed (emergency mode).
0.5 ... 1	Pump stops.
1 ... 3 (Normal operation)	The pump is running at minimum speed.
2 ... 3 (start-up)	The pump is running at minimum speed.
3 ... 10	The pump speed increases linearly from n_{min} to n_{max}.

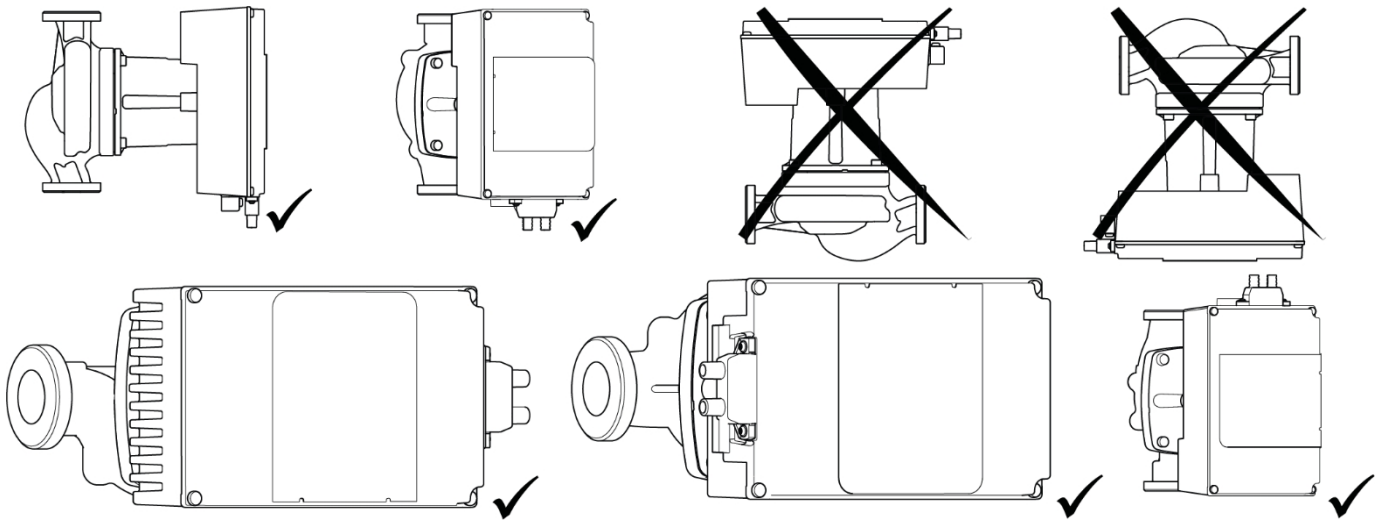
Control input “Analogue In 0 ... 10 V” without chopping function

The pump is controlled by an analogue signal in the range 0 ... 10 V. Behaviour in the event of a cable break: If the signal cable is disconnected from the pump, e.g. due to a cable break, the pump stops.



Analogue signal input (V)	Pump response
< 1	Pump stops.
1 ... 3 (Operation)	Pump runs at minimum speed.
2 ... 3 (Start-up)	Pump runs at minimum speed.
3 ... 10	The pump speed increases linearly from n_{min} to n_{max}.

Installation position

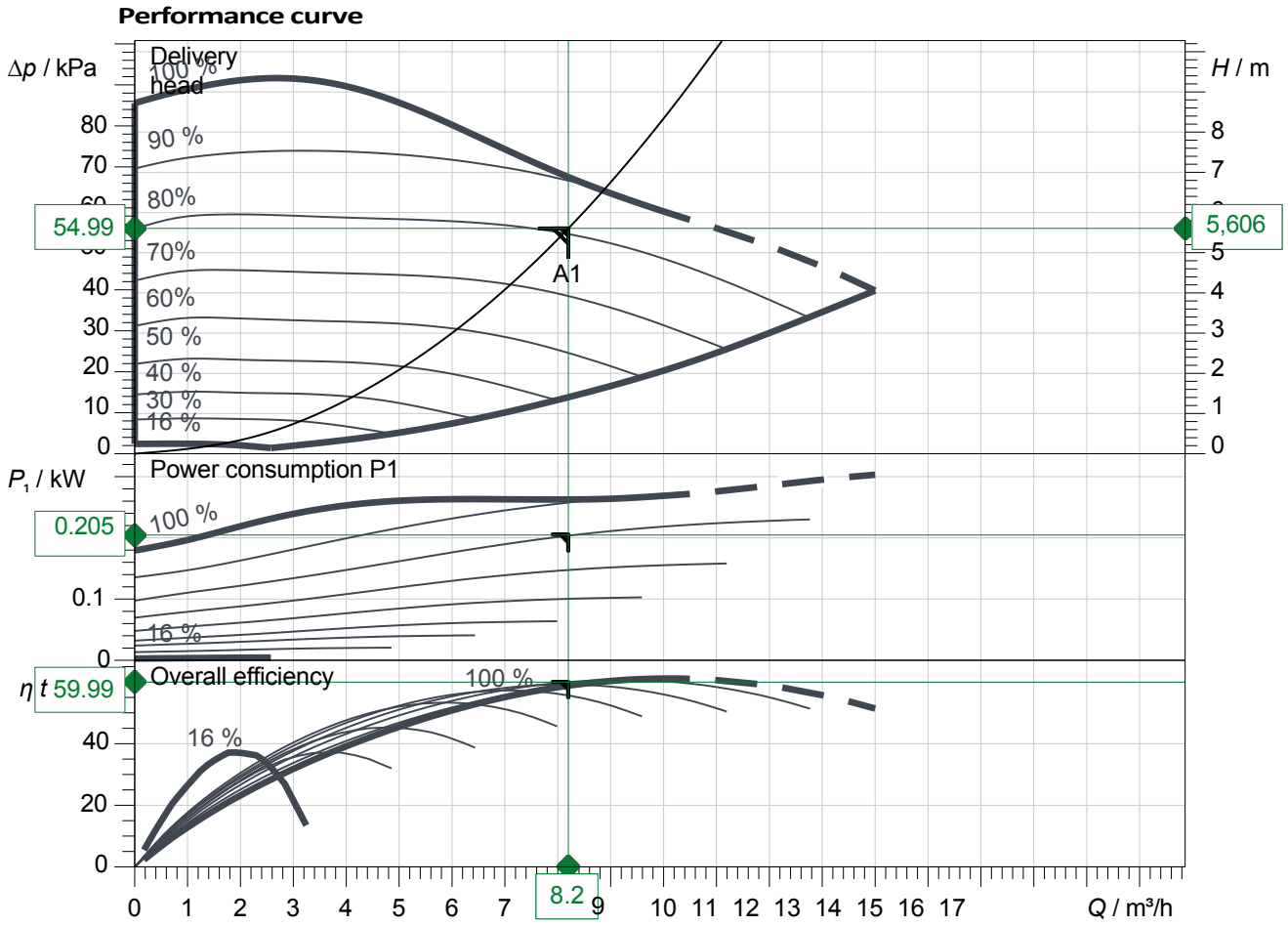


CAUTION

Running dry1 will cause bearing damage!

Ensure the pump does not run dry!

STRATOS PARA-C 40-220-08 T21 I



Operating data

specification: Flow rate,	8.20 m³/h
Head	5.61 m
Pumped medium	Water 100 %
Fluid temperature Density	4.00 °C
Kinematic viscosity	999.94 kg/m³
	1.57 mm²/s

Hydraulic data (operating point)

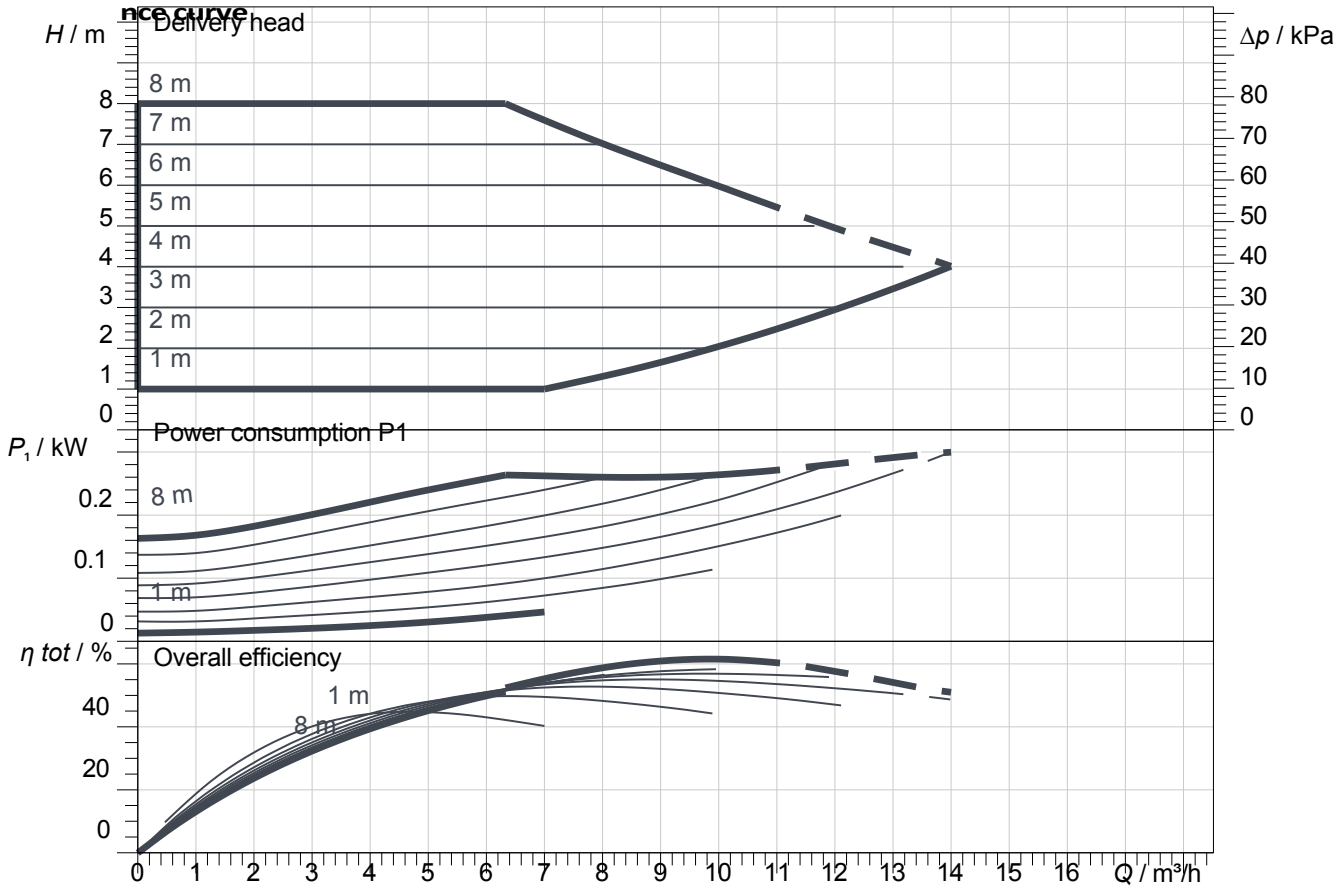
Flow rate Head	8.20 m³/h
Power consumption P 1	5.61 m
	0.20 kW

Product data

High-efficiency wet-runner pump	
Stratos PARA-C 40-220-08 T21 I	
Control type	PWM2
Human-machine interface	Rotating button
Max. operating	1000 kPa
pressure Fluid	-20 °C ... + 110 °C
temperature	40 °C
Max. ambient temperature	

STRATOS PARA-C 50-220-08 T21 I

Performance curve



Specified operating data:

flow rate, head	
Fluid	Water 100 %
Fluid temperature Density	20.00 °C
Kinematic viscosity	998.30 kg/m³
	1.00 mm²/s

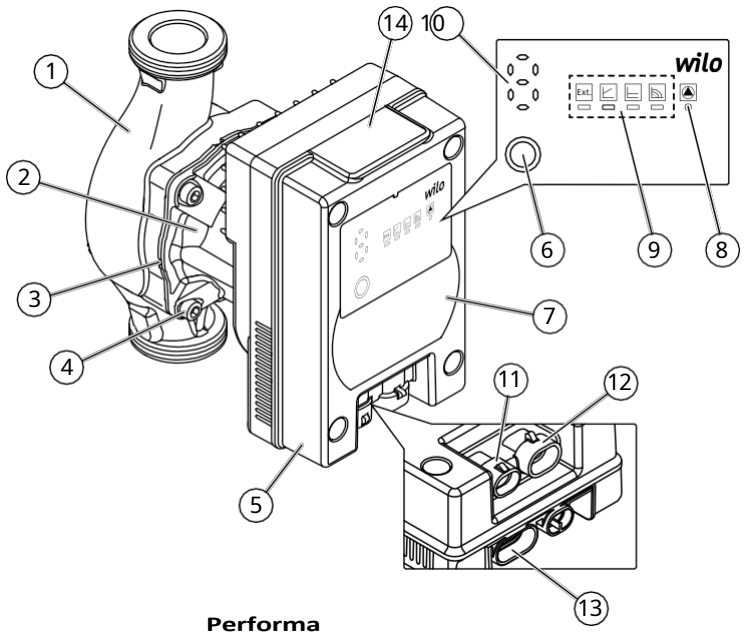
Hydraulic data (operating point)

Flow rate Head	
Power consumption P 1	

Product data

High-efficiency wet-runner pump	
Stratos PARA-C 50-240-08 T21 I	
Control type	PWM2
Human-Machine Interface	Rotating button
Max. operating	1000 kPa
pressure, medium	-20 °C ... + 110 °C
temperature	40 °C
Max. ambient temperature	

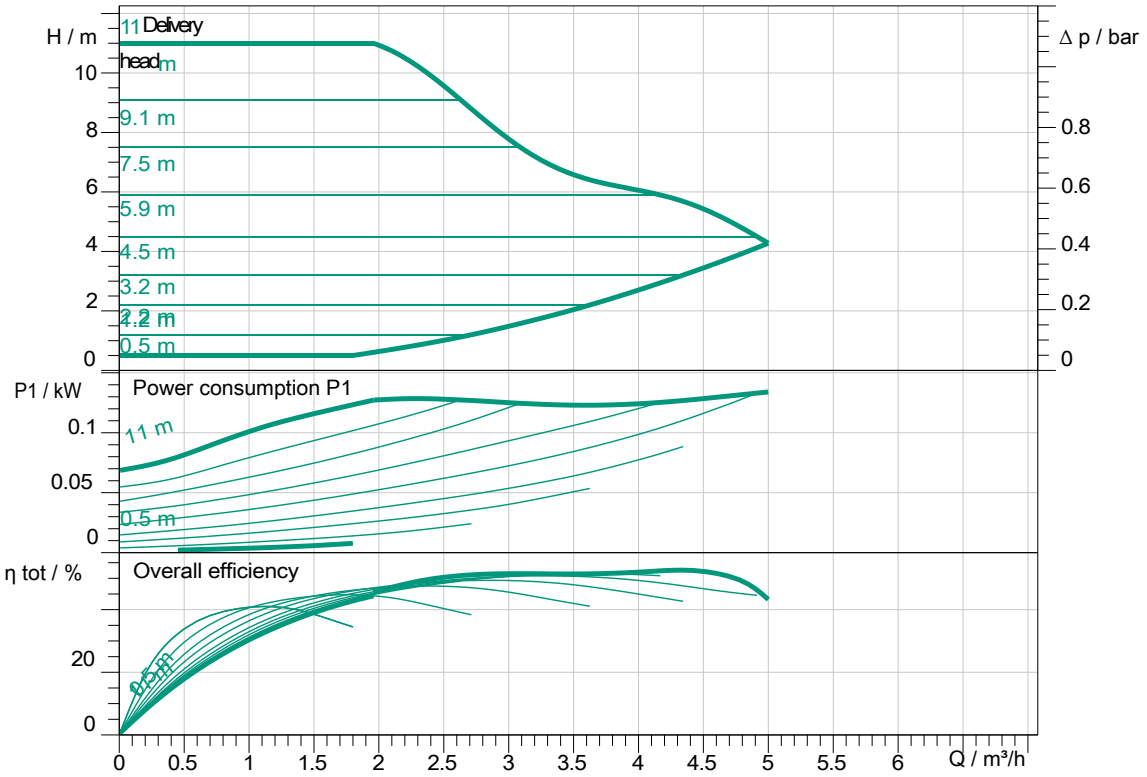
7. WILO PARA MAXO 1-8 PUMP



Pump construction

1	Pump housing
2	Wet-rotor motor
3	Condensate drain holes (4 around the circumference)
4	Housing screws
5	Control module
6	Control knob for adjusting the pump
7	Type plate
8	Status LED
9	Display of the selected operating mode
10	Display of the selected characteristic curve or the selected signal
11	Signal cable connection
12	Collective fault signal
13	Mains cable connection
14	Wilo-Connectivity interface

Performance chart



Specified operating data

Flow rate	
Head	
Pumped medium	Water 100 %
Fluid temperature	20.00 °C
Density	998.30 kg/m³
Kinematic viscosity	1.00 mm²/s

Hydraulic data (operating point)

Flow rate Head Power consumption P1

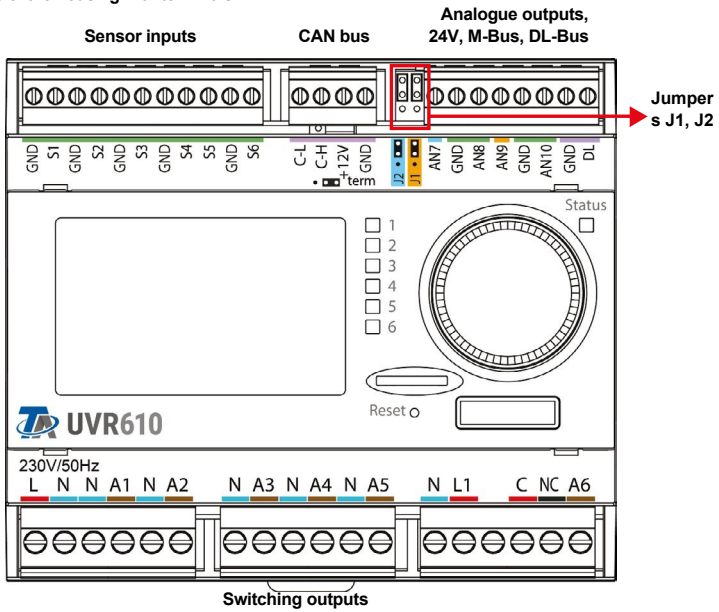
Product data

Premium Smart wet-runner pump
Para MAXO 30-180-11-F02 I

Control type	PWM1, PWM2, 0–10 V, SS
Operating mode	dp-c
Max. operating pressure	10 bar
Fluid temperature	-20 °C to +110 °C
Max. ambient temperature	70 °C

Terminal diagram

View of the top of the housing with terminals



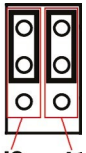
Mains:

L... Outer conductor (phase)
N... Neutral conductor

Outputs:

C... Root
A1 – A6... Normally open (**NO**) **and normally closed (NC)...** Normally open **A6**
N... Neutral conductor
L1... Output: outer conductor/phase

Jumper settings J1 and J2



Jumper **J2** changes the function of analogue output **A7** to a 24 V output for powering external devices. In the position shown (above), the analogue output is active.

Jumper **J1** changes the function of analogue output **A9** to an M-Bus interface. In the position shown (top), the analogue output is active.

J2 ... J1 connection

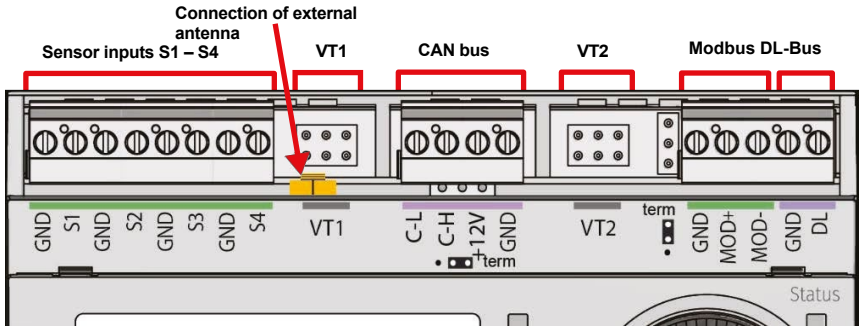
The controller has a built-in power supply unit and is powered by this. The mains connection must therefore be **230V 50Hz**; this voltage is also passed through the output relays. The built-in power supply unit also provides power to the CAN bus.

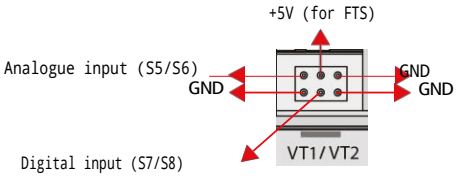
Technical data UVR610S

All inputs	Temperature sensors of the types PT1000, KTY (2 kΩ/25˚C), KTY (1 kΩ/25˚C), PT100, PT500, Ni1000, Ni1000TK5000 and room sensors RAS and RASPT room sensors, GBS01 radiation sensor, THEL thermocouple, RFS humidity sensor, RES01 rain sensor, pulses **up to 10 Hz** (e.g. for VSG volume flow transmitters), voltage **up to 3.3 V DC**, resistance (1–100 kΩ), as well as digital inputs
Inputs 5, 6	plus voltage 0–10 V DC
Outputs 1–5	Relay outputs, normally open
Output 6	Relay changeover contact (normally open/normally closed) – **potential-free**
Outputs 7–10	Analogue outputs 0–10 V (max. 20 mA) or PWM (10 V/1 kHz) in 1,000 steps each (= 0.01 V or 0.1% per step) or option to expand as switching outputs with additional relay modules
Max. switching capacity	Relay outputs: 230 V / 3 A each
M-Bus	M-Bus input for up to 4 M-Bus meters (= 4 unit loads)
24V	Power supply for external 24V devices, in addition to the 12V devices max. 6W
Max. bus load (DL-Bus)	100%
CAN bus	Standard data rate 50 kbit/s, adjustable from 5 to 500 kbit/s
Temperature differentials	with separate switch-on and switch-off differentials
Threshold values	with separate on and off setpoints or with fixed hysteresis
Temperature measurement range	PT100, PT500, PT1000: -200.0˚C to +850˚C with a resolution of 0.1K All other temperature sensors: -49.9˚C to +249.9˚C with a resolution of 0.1K
Temperature accuracy	typ. 0.4 K, max. ±1 K in the range 0–100 °C **for PT1000 sensors**
Accuracy of resistance measurement	max. 1.6% at 100 kΩ (measured quantity: resistance, process variable: resistance)
Voltage accuracy	typ. 1%, max. 3% of the maximum measurement range of the input
Accuracy of 0–10 V output	max. –2% to +6%
Dimensions W x H x D	107 x 95 x 64 mm
Connection	100–230 V, 50–60 Hz, (outputs A1–A5 and the unit are jointly fused with a 6.3 A fast-acting fuse) (output A6 is fused only when live; see '**Output 6** live' on page 16)
Max. cable cross-section for power supply	2.5 mm²
Power consumption	1.0 – 1.9 W depending on the number of active switching outputs
Protection class	IP10
Protection class	II - Protective insulation ⧈
Permissible ambient temperature	+5 to +45˚C

Subject to technical changes, typographical errors and printing errors. These instructions are only valid for devices with the corresponding firmware version. Our products are subject to continuous technical progress and further development; we therefore reserve the right to make changes without prior notice.

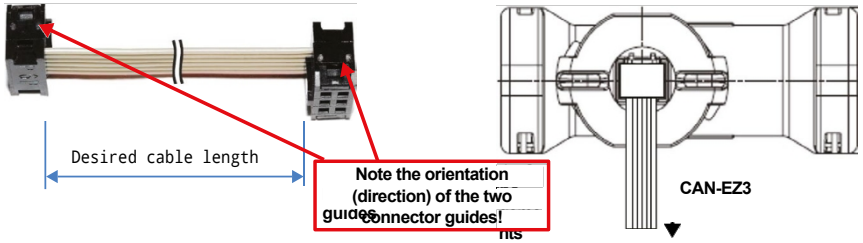
Connections for sensors & buses



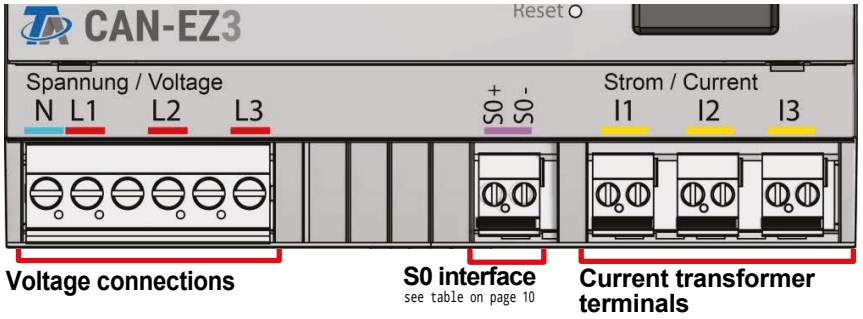
S1 – S4	Sensor inputs **1–4** Configuration in the **Inputs** (1–4) menu Connect the sensors between AN1/2/3/4 and the sensor earth ⊥
VT1 & VT2	Special connection for **FTS** volume flow sensors (without DL) Parameterisation: **Inputs** menu Inputs **5–6** for temperature (PT1000 sensor) Inputs **7–8** for flow sensor (DN) **or** digital signals (S0)  Connection between sensor **Sx** and ground (**GND**) in each case. The ground (GND) is looped through.
CAN bus (C-L, C-H +12V, GND)	CAN-Low, CAN-High, +12V, earth The basics of bus cabling are described in detail in the manuals for the freely programmable controllers and must be adhered to.
Modbus	Interface for Modbus RTU (as master or slave)
DL	DL-Bus interface for DL sensors (e.g. FTS-DL (with adapter board)) Parameterisation: **DL-Bus** menu (any **analogue** input) Connection between DL and GND ⊥
External antenna connection	The antenna cable does not need to be screwed in – connect and disconnect by pushing and pulling. The antenna itself is designed to be mounted outside the meter box. The antenna should not be mounted directly onto metal (e.g. the meter box).
S0 output	The connection for S0 signals is located on the lower terminal strip of the device (diagram on page 11). This output can generate pulses with **a maximum frequency of 20 Hz** and a minimum pulse duration of **25 ms**. It outputs either mains consumption or mains feed-in, which can be set in the basic settings (see page 81).

Connecting the FTS... sensor to VT1 or VT2

A flow sensor can be connected directly to the CAN-EZ3 without an interface board. To do this, a separately available 6-pin ribbon cable is cut to the required length by crimping the second connector onto the cable as shown in the following diagram.



Electrical measurement



3-phase measurement

All three phase conductors (**L1 – L3**) are connected to the voltage terminals **L1–L3**, and the neutral conductor is connected to terminal **N**. The three external clamp-on current transformers are connected to terminals **I1–I3** in the correct order and clamped onto the conductors to be measured.

For **simple** measurements, it is possible to set the **'Phase replication'** parameter to 'Yes' in the **basic settings**. In this case, the values (voltage / cos phi / power) for **L2** and **L3** are internally replicated in relation to **L1**. Phase replication is based on a clockwise rotating field; therefore, when measuring the currents **I2** and **I3**, care must also be taken to ensure a clockwise rotating field.

This makes the measurement **less accurate**. When phase replication is enabled, phases L2 and L3 are output as **0**.

Single-phase measurement

Only the phase conductor is connected to the voltage terminal **L1** and the neutral conductor **N**. An external clamp-on current transformer is connected to terminal **I1** and clamped onto the conductor to be measured.

If phase simulation is deactivated, the high-impedance voltage input may cause random values to be displayed on **L2** and **L3** due to interference. This can be rectified by also connecting the neutral conductor **N** to the voltage inputs **L2** and **L3**.

10. PROPANE SENSOR

The new A3 gas sensor is designed for use in general HVAC applications.

An accurate and compact leak detector designed in accordance with IEC 60355-2-40 and compatible with the customer's application specifications – both hardware and software.

Photoacoustic technology offers a service life of over 15 years, immunity to poisoning, a fast response time and reliable self-diagnostics.

Features:

- Designed for use with R290 (other refrigerants available on request)
- Output modes: Modbus RTU via RS485, relay, relay & Modbus
- Supply voltage: 5V DC, 12–24V AC/DC
- Designed for a service life of 15 years or more without calibration
- Self-diagnostics
- CE marked

Technical data

Table 1: Sensor specifications

Measuring range	0 to 100% LFL
Alarm setpoint	15% LFL
Operating temperature	-40°C to 80°C
Maximum temperature (intermittent)	-40°C to 105°C
Storage temperature	-40°C to 80°C
Operating pressure	700 to 1200 mbar
Operating humidity	0% to 100% RH
Enclosure protection (EN 60529)	IP 55
Connector protection (EN 60529)	IP 56 and IP 57

Table 2: Performance specifications

Accuracy at ambient temperature (15°C to 25°C), 0–25% LFL	±2.5% LFL
Accuracy across the operating range, 0–25% LFL	±5.0% LFL
Response time	< 27 s (validation in progress)
Sensor recovery time	< 5 minutes in clean air
Lifetime	Minimum 15-year lifetime – self-monitoring
Alarm reset timer	5 seconds – can be customised
Alarm response	Depending on the output mode: Relay open – red LED – alarm flag
Reset setpoint	2.5% LFL below alarm setpoint

Table 3: Electrical specifications

Output mode	Modbus	Modbus	Modbus & Relay*	Relay*
Supply voltage	12–24 V AC/DC ±10%	5V DC ±10%	12–24 V AC/DC ±10%	12–24 V AC/DC ±10%
Power consumption	0.5W average	0.3W average	0.6W average	1.1W max 0.6W average
Digital output	RS485, 120 ohm termination included in the sensor	RS485, 120 ohm termination included in the sensor	RS485, 120 ohm termination included in the sensor	-
Code number (1)	073G2060	073G2061	073G2062	073G2063

(1) To be released

* Relay information: 30V/1A maximum switching load (signal relay).

Table 4: Mechanical characteristics

Materials – Enclosure	PA66 25% GF (top), PC (bottom)
Materials – Electrical connector	Nylon
Net weight (depending on the format)	0.04 – 0.06 kg

11. ERROR CODES: INVERTEK FREQUENCY CONVERTER

NOTE:
A Class 'B' trip is part of the frequency converter's safety system. These trips are recognised by the Class 'B' firmware in the frequency converter, which forms part of the certification to 60730; this includes phase failures at inputs and outputs, stalled rotors and overload protection. Class 'B' trips cannot be reset for two minutes after they have been triggered.
If 10 trips of any type occur between two power-off and power-on cycles, a Class B lockout trip is triggered. Once a Class B lockout trip has been triggered, the drive MUST be switched off and then switched on again to clear the fault.
A Class 'A' trip is a standard inverter trip which, in some cases, can be reset manually or automatically. The following trips cannot be reset by the automatic reset function:

- Error code 10 'P-def',
- Error code 17 'Data-F',
- Error code 19 "Data-E",
- Fault code 29 "STO-F".

11.1 CLASS A FAULT CODES

Fault codes	No.	Description	Suggested remedy
no-FLt	00	No error	Not required
Ol - b	01	Brake channel over-current	Check the condition of the external braking resistor and the connection (wiring wiring).
OL - br	02	Overload of the braking resistor	The inverter has switched itself off via a fault shutdown to prevent damage to the braking resistor.
O - I	03	Overcurrent at the output	Instantaneous overcurrent at the inverter output. Excessive load or shock load on the motor. *High current in either direction – short circuit at the drive output / acceleration ramps too short / incorrect compressor data.* *Note: Setting the maximum peak current of the inverter in P5-18 can also lead to this shutdown.*
PS-trp	05	Power stage Fault shutdown	Check for short circuits in the motor and connection cables. *Hardware fault; contact the inverter supplier.*
O - Volt	06	DC link overvoltage	DC bus overvoltage: either the supply voltage is too high, there is a voltage spike, or the compressor is unstable. Check that the supply voltage is within the permitted tolerance range for the inverter. If the fault occurs during deceleration or stopping, increase the deceleration time in P-04 or install a suitable braking resistor and activate the dynamic braking function via P-34 or set P1-05 to 3.
U-Volt	07	DC link undervoltage	The incoming supply voltage is too low. This fault routinely occurs when the power to the inverter is switched off. If this happens during operation, check the input voltage and all components in the supply line from the mains to the inverter; all connections on the inverter, the fuses, contactors, etc.

Fault codes	No.	Description	Recommended remedial action
P-DEF	10	Reset to factory settings	Warning: the drive has been reset to factory settings.
E-Trip	11	External fault trip	The STO circuit has opened whilst the drive is running. E-Trip requested on digital input 3. A normally closed contact has opened for some reason. If a motor thermistor is connected, check whether the motor is overheating. Check that all connections and devices in the STO circuit.
SC-OBS	12	Optibus communication loss	Communication has been interrupted between the inverter and the controller. Check the communication link between the inverter and external devices. Ensure that each inverter in the network has its own address.
Flt - DC	13	DC ripple too high	Check that all incoming supply phases are present and sym- .
P-Loss	14	Error due to loss of the input phase	Check that all incoming supply phases are present and symmetrical , or the inverter is currently being shut down.
h O-I	15	Output overcurrent/ Hardware overcurrent	Check for short circuits in the motor and connection cables. Overcurrent at the inverter output.
DATA-F	17	Internal memory error (IO)	If this is not related to a firmware update, press the stop button. If the fault persists, please contact your supplier.
4-20F	18	4–20 mA signal lost	The analogue input is configured for 4–20 mA, but less than 3 mA is measured at the drive terminals. Check the analogue input connection(s).
DATA-E	19	Internal memory error (DSP)	If this is not related to a firmware update, press the stop button. If the error persists, please contact your supplier.
U-DEF	20	User parameters Default	User default parameters have been loaded.
F-PTC	21	PTC in the motor overheating	Overtemperature of the connected motor thermistor; check the wiring connections and the motor. Motor temperature is monitored via the PTC and if the resistance rises above 2.5 kΩ.
FAN-F	22	Cooling fan fault (IP66 only)	Check the cooling fan for obstructions or replace it. This fault is caused by the fan at the front of the inverter, not by the heat sink fan.
O - hEAt	23	Internal inverter tem- temperature too high	The inverter’s ambient temperature is too high; check whether adequate .
Out-F	26	Fault at inverter output	Check that all three motor phases are connected. Check for wiring faults, loose connections or poorly routed compressor cables.
STO-F	29	Fault in the STO circuit	Slow rising edge on the 24V supply/fault in the safety input circuit. This fault may occur with an external 24V supply if the voltage rises slowly on switch-on. It may also occur in the event of an overload or a brief drop in the drive’s 24V supply voltage. Check the load on the 24V supply voltage and all control connections.

Error codes	No.	Description	Suggested remedy
AtF-01	40	Stator resistance imbalance	The inverter was unable to measure the resistance of the compressor stator during Auto-Tune. The measured resistance of the motor stator varies between phases. Check the motor cable and connections for continuity. Check that all three phases of the motor are present and symmetrical, and that the windings have the correct resistance and symmetry.
AtF-02	41	Stator resistance too high	The stator resistance measured during Auto-Tune (self-calibration) is too high. Ensure Ensure that the motor is correctly connected and free from faults. Check that the rated power of the connected drive matches the requirements.
AtF-03	42	Motor inductance too low	The measured motor inductance is too low. Ensure that the motor is correctly connected and free from faults.
AtF-04	43	Motor inductance too high	The measured motor inductance is too high. Ensure that the motor is correctly connected and in good working order. Check that the rated power matches the rated power of the connected drive.
AtF-05	44	Parameters not convergent	The measured motor parameters are not convergent. Ensure that the motor is correctly connected and free from faults. Check that the rated power matches the rated power of the connected drive.
Out-Ph	49	Phase loss during motor power	Check the motor wiring.
SC-F01	50	Error due to loss of Modbus communication	Check the incoming Modbus RTU connection cable. Check whether at least one register is being polled cyclically within the time-out limit set in P-36 Index 3. Ensure that the 0 V common line is used, and take care to keep the communication cables away from the power cables.
SC-F02	51	Fault shutdown due to loss of CANopen communication	Check the incoming CAN connection cable. Check whether cyclic communications are taking place within the time-out limit set in P-36, index 3.
OI-U	81	Overcurrent in phase U	Overcurrent in the U/V or W phase. High current due to: short circuit at the inverter output; acceleration ramps set too short; incorrect motor data.
OI-V	82	Overcurrent in phase V	
OI-W	83	Overcurrent in phase W	
Out-U	88	Output fault in phase U	At the PWM output. The U, V or W phase is not connected to the inverter or has a loose connection. Check the connections and the condition of the compressor's power cable.
Out-V	89	Output fault in phase V	
Out-W	90	Output fault in Phase W	
SC batch	97	IO-PS communication failure	Communication failure between the IO processor and the PS processor (DSP). If the fault persists, please contact the supplier of the inverter.
DATA-03	98	Incorrect VDo3 checksum	Error in internal memory. Communication between the IO processor and the PS (DSP) processor has been interrupted.
STO-R	101	The STO has opened whilst the drive is running	The STO input opens whilst the drive is running. Check that all connections and devices in the STO circuit are correctly connected. If pressure switches are connected to the STO circuit, check the system pressure for pressure spikes.
ML-Run	102	Power failure during operation	Three-phase input failure during operation. Is the drive currently being shut down? Check the three-phase power supply.

Error codes	No.	Description	Suggested remedy
FW-Err	103	The PS firmware has been modified	The PS software has been modified outside of a firmware update. The PS software was not programmed using OptiTools.
Stall	107	The compressor is jammed	Excessive power consumption at low speed. Check the operating condition of the compressor.
HW-ID	253	Hardware ID is not supported	An incorrect hardware identification.
Type-E	254	Drive ID is not supported	Incorrect drive identifier

112 CLASS B ERROR CODES

Error codes	No.	Description	Suggested remedy
I.t-trP	04	Motor thermally overloaded (I2t)	The inverter has shut down due to an overload after supplying more than 100% of the value specified in P1-08 for a certain period of time. Check that the length of the motor cable is within the limits specified for the respective drive (maximum permissible motor cable length for all models: 10 metres shielded, 20 metres unshielded). Ensure that the parameters from the motor nameplate have been entered correctly in P1-07, P1-08, P1-09, P1-10, P7-03, P7-04 and P7-05. Ensure that an Autotune setting for the connected compressor has been successfully completed. Check the load mechanically to ensure that it is unobstructed and that there are no blockages or obstructions.
O-T	08	Trigger due to overheating of the heat sink	The heat sink temperature exceeds the maximum value. The limit value is set based on the switching frequency. 200 V single-phase drives: 400 V three-phase drives: 4 kHz 91 °C 10 kHz 95 °C 8 kHz 89 °C 12 kHz 95 °C 12 kHz 88 °C 14 kHz 92 °C 16 kHz 87 °C 16 kHz 89 °C 24 kHz 85 °C 18 kHz 86 °C 32 kHz 84 °C 20 kHz 83 °C The drive is too hot. Check that the ambient temperature around the drive is within its specifications. Ensure that sufficient cooling air can circulate around the drive. Increase the enclosure ventilation if necessary. Ensure that sufficient cooling air can enter the drive and that the lower intake vents and upper exhaust vents are not blocked or obstructed. Ensure that the required clearance is maintained around the drive. Reduce the effective switching frequency setting in parameter P5-06. The heat sink temperature can be displayed in P0-21. A log of the last 8 values is stored at 30-second intervals prior to a shutdown in parameter P0-38. Reduce the load on the compressor/ inverter.
U-T	09	Under-temperature	Low temperature of the heat sink. The system shuts down when the ambient temperature falls below -20 °C. The temperature must rise above -20 °C before the inverter can be started.

Error codes	No.	Description	Suggested remedy
Th - Flt	16	Faulty thermistor on the heat sink	If the temperature of the drive heat sink is within the specified limits, contact the inverter supplier. See P0-21.
Outph-U	85	Output phase U missing	Output phase U/V or W is not connected or cannot be detected. Check the compressor connections and ensure that they are secure and connected.
Outph-V	86	Output phase V missing	
Outph-W	87	Output phase W missing	
Ph-L1	92	Phase failure on input L1	Input phase L1/L2 or L3 is not connected or cannot be detected. Check the mains connections and ensure they are secure and connected.
Ph-L2	93	Phase failure at input input L2	
Ph-L3	94	Phase failure at input input L3	
Rotor-L	104	A locked rotor has been detected	Rotor blockage. The rotor speed is below the threshold speed (P7-12) for a period longer than the blockage time (P7-13).
CLB-LK	105	Class B software lockout	UL60730-1, Class B lockout; If any of the Class B trip functions are triggered 10 times, the drive initiates a Class B lockout, which can only be reset by a power failure and subsequent restart of the drive.

12. FAULT CODES: FAN

Address 19:
This parameter indicates the operating status of the fans. When the fans are in normal operation, the parameter value is 0; if a fault is present, the parameter value is the non-zero value of the corresponding fault.

Fault codes:

None Fault	Low VPS	Overcurrent	Over-temperature	Module fault	Motor fault	Bus voltage voltage error	Restart error
0	1	2	3	4	5	6	7

13. SIGNAL LIST: CAN BUS

No.	Analogue/	Node number	Output number	Description	Unit of measur	Value range
1	Digital	12	33	Fixed value ‘Enable’ for refrigeration unit 1	On/Off	-
2	Digital	14	33	Fixed value ‘Enable’ for refrigeration unit 2	On/Off	-
3	Digital	12	34	Fixed value ‘Manual mode’ for refrigeration unit 1	On/Off	-
4	Digital	14	34	Fixed value ‘Manual mode’ for refrigeration unit 2	On/Off	-
5	Digital	12	35	Signal: WP wishes to start refrigeration unit 1	On/Off	-
6	Digital	14	35	Signal: WP wishes to start cooling unit 2	On/Off	-
7	Digital	12	38	Compressor active, refrigeration unit 1	On/Off	-
8	Digital	14	38	Compressor active, refrigeration unit 2	On/Off	-
9	Digital	12	40	4-way valve, active, refrigeration unit 1	On/Off	-
10	Digital	14	40	4-way valve, active, refrigeration unit 2	On/Off	-
11	Digital	12	44	"Antifreeze error" message active Refrigeration unit 1	On/Off	-
12	Digital	14	44	"Antifreeze error" message active Refrigeration unit 2	On/Off	-
13	Digital	12	45	"Antifreeze fault" message active Refrigeration unit 1	On/Off	-
14	Digital	14	45	"Antifreeze fault" message active Refrigeration unit 2	On/Off	-
15	Digital	12	46	"Low-pressure fault" message active Refrigeration unit 1	On/Off	-
16	Digital	14	46	'Low pressure fault' message active Refrigeration unit 2	On/Off	-
17	Digital	12	47	"Low-pressure fault" message active Refrigeration unit 1	On/Off	-
18	Digital	14	47	"Low-pressure fault" message active Refrigeration unit 2	On/Off	-
19	Digital	12	48	"High-pressure fault" message active Refrigeration set 1	On/Off	-
20	Digital	14	48	"High-pressure fault" message active Refrigeration set 2	On/Off	-
21	Digital	12	49	"High-pressure fault" message active Refrigeration unit 1	On/Off	-
22	Digital	14	49	"High-pressure fault" message active Refrigeration unit 2	On/Off	-
23	Digital	12	50	"Inverter fault" message active Refrigeration set 1	On/Off	-
24	Digital	14	50	"Inverter fault" message active Refrigeration set 2	On/Off	-
25	Digital	12	51	‘Fan fault’ message active – refrigeration unit	On/Off	-

Error codes: Fan

				1		
26	Digital	14	51	'Fan fault' message active – refrigeration unit 2	On/Off	-
27	Digital	12	52	'Hot gas fault' message active Refrigeration unit 1	On/Off	-

Sequence No.	Analogue/	Node number	Output number	Description	Unit of measur	Value range
28	Digital	14	52	'Hot gas fault' message active Refrigeration unit 2	On/Off	-
29	Digital	12	54	Message: "Flow monitoring (Min-Max VL)" active, refrigeration unit 1	On/Off	-
30	Digital	14	54	Message: "Flow monitoring (Min-Max VL)" active, refrigeration unit 2	On/Off	-
31	Digital	29	55	Message: 'Fault: elevated gas concentration' Active: Entire system	On/Off	-
32	Digital	12	57	'Cooling active' message active Refrigeration unit 1	On/Off	-
33	Digital	14	57	'Cooling active' message active Refrigeration unit 2	On/Off	-
34	Digital	12	58	"Pressure control fault" message active Refrigeration unit 1	On/Off	-
35	Digital	14	58	"Pressure control fault" message active Refrigeration unit 2	On/Off	-
36	Digital	12	59	Message: 'Flow control fault' Refrigeration unit 1 active	On/Off	-
37	Digital	14	59	Message: 'Flow control fault' Refrigeration unit 2 active	On/Off	-
38	Analogue	29	16	Operating status of refrigeration unit 1	-	0–100
39	Analogue	29	17	Operating status of refrigeration unit 2	-	0–100
40	Analogue	29	18	Fault code, refrigeration unit 1	-	0–100
41	Analogue	29	19	Fault code, refrigeration unit 2	-	0–100
42	Analogue	12	28	Maximum compressor speed – performance curve Refrigeration unit 1	-	0–6600
43	Analogue	14	28	Maximum compressor speed characteristic curve Refrigeration unit 2	-	0–6600
44	Analogue	12	29	Actual superheat, refrigeration unit 1	K	-9999.9 - 9999.9
45	Analogue	14	29	Actual superheat, refrigeration unit 2	K	-9999.9 - 9999.9
46	Analogue	12	30	Evaporation temperature, refrigeration circuit 1	°C	-9999.9 - 9999.9
47	Analogue	14	30	Evaporation temperature, refrigeration circuit 2	°C	-9999.9 - 9999.9
48	Analogue	12	31	Subcooling, refrigeration circuit 1	K	-9999.9 - 9999.9
49	Analogue	14	31	Subcooling, refrigeration circuit 2	K	-9999.9 - 9999.9
50	Analogue	12	32	Condensation temperature, refrigeration unit 1	°C	-9999.9 - 9999.9

51	Analogue	14	32	Condensation temperature, refrigeration unit 2	°C	-9999.9 - 9999.9
52	Analogue	12	33	T.WP VL Refrigeration Unit 1	°C	-9999.9 - 9999.9

Serial No.	Analogue/ Digital	Node number	Output number	Description	Unit of measurement	Value range
53	Analogue	14	33	T.WP VL Refrigeration Unit 2	°C	-9999.9 - 9999.9
54	Analogue	12	34	T.WP RL refrigeration unit 1	°C	-9999.9 - 9999.9
55	Analogue	14	34	T.WP RL Refrigeration Unit 2	°C	-9999.9 - 9999.9
56	Analogue	12	35	Flow rate, cooling unit 1	l/h	0–10,000
57	Analogue	14	35	Flow rate, cooling unit 2	l/h	0–10,000
58	Analogue	12	36	Cooling capacity, cooling unit 1	W	0–10,000
59	Analogue	14	36	Cooling capacity, cooling unit 2	W	0–10,000
60	Analogue	13	39	T-air outlet, refrigeration unit 1	°C	-9999.9 - 9999.9
61	Analogue	15	39	T-air outlet, refrigeration unit 2	°C	-9999.9 - 9999.9
62	Analogue	12	43	High-pressure refrigeration unit 1	bar	0.00 – 40.00
63	Analogue	14	43	High-pressure refrigeration unit 2	bar	0.00 – 40.00
64	Analogue	12	44	Low-pressure refrigeration unit 1	bar	0.00 – 40.00
65	Analogue	14	44	Low-pressure refrigeration unit 2	bar	0.00 – 40.00
66	Analogue	13	45	T. Compressor outlet, refrigeration unit 1	°C	-9999.9 - 9999.9
67	Analogue	15	45	Compressor outlet temperature, refrigeration unit 2	°C	-9999.9 - 9999.9
68	Analogue	13	46	Oil sump temperature, refrigeration unit 1	°C	-9999.9 - 9999.9
69	Analogue	15	46	Oil sump temperature, refrigeration unit 2	°C	-9999.9 - 9999.9
70	Analogue	12	48	Actual speed of compressor, refrigeration unit 1	Hz	0 – 100.00
71	Analogue	14	48	Actual speed of compressor, refrigeration unit 2	Hz	0 – 100.00
72	Analogue	12	49	Actual motor current, refrigeration unit 1	A	
73	Analogue	14	49	Actual motor current, refrigeration unit 2	A	
74	Analogue	12	50	Actual power consumption: motor, refrigeration unit 1	kW	0–10,000
75	Analogue	14	50	Actual power consumption: Motor, refrigeration unit 2	kW	0–10,000
76	Analogue	12	51	Inverter status, refrigeration unit 1	-	
77	Analogue	14	51	Inverter status, refrigeration unit 2	-	
78	Analogue	12	52	Fault shutdown code, refrigeration unit 1	-	
79	Analogue	14	52	Fault shutdown code, refrigeration unit 2	-	
80	Analogue	12	53	Operating hours, compressor, refrigeration unit 1	h	
81	Analogue	14	53	Operating hours, compressor, refrigeration unit 2	h	
82	Analogue	12	54	Proportion of propane in the entire system	%	0–100.0
83	Analogue	12	56	Actual fan speed, refrigeration unit 1	-	
84	Analogue	14	56	Actual fan speed, refrigeration unit 2	-	
85	Analogue	12	57	Fault condition: Ventilation unit, refrigeration	-	

				unit 1		
86	Analogue	14	57	Fault condition: Ventilation unit, refrigeration unit 2	-	
87	Analogue	12	58	Compressor 0–10 V, refrigeration unit 1	V	0–10.0
88	Analogue	14	58	Compressor 0–10 V, refrigeration unit 2	V	0–10.0
89	Analogue	12	60	Condenser pump PWM refrigeration unit 1	%	0 – 100.0
90	Analogue	14	60	Condenser pump PWM refrigeration unit 2	%	0–100.0
91	Analogue	12	62	Ex-valve PWM 1 Refrigeration unit 1	%	0–100.0
92	Analogue	14	62	Ex-valve PWM 1 Refrigeration unit 2	%	0–100.0
93	Analogue	12	63	Ex-valve PWM 2, refrigeration unit 1	%	0–100.0
94	Analogue	14	63	Ex-valve PWM 2, refrigeration unit 2	%	0–100.0
95	Analogue	12	64	Ex-valve cooling, refrigeration unit 1	%	0–100.0
96	Analogue	14	64	Ex-valve cooling, refrigeration unit 2	%	0–100.0
97	Analogue	27	21	COP in heating mode, cooling unit 1	-	0 – 100.00
98	Analogue	28	21	COP in heating mode, cooling unit 2	-	0 – 100.00
99	Analogue	27	22	COP surplus operation, chiller unit 1	-	0 – 100.00
100	Analogue	28	22	COP surplus operation, chiller unit 2	-	0 – 100.00
101	Analogue	27	23	EER cooling mode, refrigeration unit 1	-	0 – 100.00
102	Analogue	28	23	EER cooling mode, refrigeration unit 2	-	0 – 100.00
103	Analogue	27	24	JAZ Heating mode, cooling unit 1	-	0 – 100.00
104	Analogue	28	24	JAZ Heating mode, cooling unit 2	-	0 – 100.00
105	Analogue	27	25	JAZ surplus operation, refrigeration unit 1	-	0 – 100.00
106	Analogue	28	25	JAZ surplus operation, refrigeration unit 2	-	0 – 100.00
107	Analogue	27	26	SEER cooling mode, cooling unit 1	-	0 – 100.00
108	Analogue	28	26	SEER cooling mode, cooling unit 2	-	0 – 100.00

14. SIGNAL LIST: MODBUS RTU

Sequence No.	Address	Function code	Data type	Byte Order	Description	Unit of measur	Value range
1	40160	04-read input register	16-bit signed	Big-endian	Operating status of cooling unit 1	-	0–100
2	40170	04-read input register	16-bit signed	Big-endian	Operating status of refrigeration unit 2	-	0–100
3	40180	04-read input register	16-bit signed	Big-endian	Fault code, cooling circuit 1	-	0–100
4	40190	04-read input register	16-bit signed	Big-endian	Fault code, cooling unit 2	-	0–100
5	40290	04-read input register	16-bit signed	Big-endian	Actual superheat, cooling stage 1	K	-9999.9 - 9999.9
6	41290	04-read input register	16-bit signed	Big-endian	Actual superheat, cooling stage 2	K	-9999.9 - 9999.9
7	40330	04-read input register	16-bit signed	Big-endian	T.WP VL cooling unit 1	°C	-9999.9 - 9999.9
8	41330	04-read input register	16-bit signed	Big-endian	T.WP VL cooling unit 2	°C	-9999.9 - 9999.9
9	40340	04-read input register	16-bit signed	Big-endian	T.WP RL cooling unit 1	°C	-9999.9 - 9999.9
10	41340	04-read input register	16-bit signed	Big-endian	T.WP RL cooling unit 2	°C	-9999.9 - 9999.9
11	40350	04-read input register	16-bit signed	Big-endian	Flow rate, drain, refrigeration unit 1	l/h	0–10,000
12	41,350	04-read input register	16-bit signed	Big-endian	Flow rate, drain, refrigeration unit 2	l/h	0 – 10,000
13	40,360	04-read input register	16-bit signed	Big-endian	Power sink cooling unit 1	W	0 – 10,000
14	41360	04-read input register	16-bit signed	Big-endian	Power sink cooling unit 2	W	0–10,000
15	40390	04-read input register	16-bit signed	Big-endian	T-air outlet, refrigeration unit 1	°C	-9999.9 - 9999.9
16	41390	04-read input register	16-bit signed	Big-endian	T-air outlet, refrigeration unit 2	°C	-9999.9 - 9999.9
17	40430	04-read input register	16-bit signed	Big-endian	High-pressure refrigeration unit 1	bar	0.00 – 40.00
18	41430	04-read input register	16-bit signed	Big-endian	High-pressure refrigeration unit 2	bar	0.00 - 40.00
19	40440	04-read input register	16-bit signed	Big-endian	Low-pressure refrigeration unit 1	bar	0.00 - 40.00
20	41440	04-read input register	16-bit signed	Big-endian	Low-pressure refrigeration unit 2	bar	0.00 - 40.00
21	40450	04-read input register	16-bit signed	Big-endian	T. Compressor outlet, refrigeration unit 1	°C	-9999.9 - 9999.9

22	41450	04-read input register	16-bit signed	Big-endian	T. Compressor outlet, refrigeration unit 2	°C	-9999.9 - 9999.9
23	40460	04-read input register	16-bit signed	Big-endian	T. Oil sump, refrigeration unit 1	°C	-9999.9 - 9999.9
24	41460	04-read input register	16-bit signed	Big-endian	T. Oil sump, refrigeration unit 2	°C	-9999.9 - 9999.9
25	40480	04-read input register	16-bit signed	Big-endian	Actual compressor speed, refrigeration set 1	Hz	0 – 100.00
26	41480	04-read input register	16-bit signed	Big-endian	Actual compressor speed, refrigeration set 2	Hz	0 – 100.00
27	40490	04-read input register	16-bit signed	Big-endian	Actual motor current, refrigeration unit 1	A	
28	41490	04-read input register	16-bit signed	Big-endian	Actual motor current, refrigeration unit 2	A	
29	40500	04-read input register	16-bit signed	Big-endian	Actual power consumption: motor, refrigeration set 1	kW	0–10,000
30	41,500	04-read input register	16-bit signed	Big-endian	Actual power consumption: Motor, refrigeration set 2	kW	0–10,000
31	40510	04-read input register	16-bit signed	Big-endian	Inverter status, cooling unit 1	-	
32	41510	04-read input register	16-bit signed	Big-endian	Inverter status, cooling unit 2	-	
33	40520	04-read input register	16-bit signed	Big-endian	Fault shutdown code Cooling stage 1	-	
34	41520	04-read input register	16-bit signed	Big-endian	Fault shutdown code Cooling stage 2	-	
35	40530	04-read input register	16-bit signed	Big-endian	Compressor operating hours Refrigeration unit 1	h	
36	41530	04-read input register	16-bit signed	Big-endian	Compressor operating hours Refrigeration unit 2	h	
37	40540	04-read input register	16-bit signed	Big-endian	Propane content, refrigeration unit 1	%	0 – 100.0
38	41540	04-read input register	16-bit signed	Big-endian	Propane content, refrigeration unit 2	%	0 – 100.0
39	40560	04-read input register	16-bit signed	Big-endian	Actual fan speed, refrigeration set 1	-	
40	41560	04-read input register	16-bit signed	Big-endian	Actual fan speed, refrigeration set 2	-	
41	40570	04-read input register	16-bit signed	Big-endian	Fault status: Ventilation, cooling set 1	-	
42	41570	04-read input register	16-bit signed	Big-endian	Error status: Ventilation, Cooling set 2	-	

43	40580	04-read input register	16-bit signed	Big-endian	Compressor 0–10 V Refrigeration unit 1	V	0–10.0
44	41580	04-read input register	16-bit signed	Big-endian	Compressor 0–10 V Refrigeration unit 2	V	0–10.0
45	40600	04-read input register	16-bit signed	Big-endian	Condenser pump PWM Refrigeration unit 1	%	0–100
46	41600	04-read input register	16-bit signed	Big-endian	Condenser pump PWM Refrigeration unit 2	%	0–100

Sequence No.	Address	Function code	Data type	Byte Order	Description	Unit of measur ement	Value range
47	40620	04-read input register	16-bit signed	Big-endian	Ex-valve PWM 1 Cooling set 1	%	0 – 100.0
48	41620	04-read input register	16-bit signed	Big-endian	Ex-valve PWM 1 Cooling set 2	%	0 – 100.0
49	40630	04-read input register	16-bit signed	Big-endian	Ex-valve PWM 2 Cooling set 1	%	0 – 100.0
50	41630	04-read input register	16-bit signed	Big-endian	Ex-valve PWM 2 Cooling unit 2	%	0 – 100.0
51	40640	04-read input register	16-bit signed	Big-endian	Ex-valve cooling, refrigeration unit 1	%	0 – 100.0
52	41640	04-read input register	16-bit signed	Big-endian	Ex-valve cooling, refrigeration unit 2	%	0 – 100.0
53	40210	04-read input register	16-bit signed	Big-endian	COP heating mode, cooling circuit 1	-	0 – 100.00
54	41210	04-read input register	16-bit signed	Big-endian	COP heating mode, cooling stage 2	-	0 – 100.00
55	40220	04-read input register	16-bit signed	Big-endian	COP surplus operation Refrigeration set 1	-	0 – 100.00
56	41220	04-read input register	16-bit signed	Big-endian	COP surplus operation Refrigeration set 2	-	0 – 100.00
57	40230	04-read input register	16-bit signed	Big-endian	EER cooling mode, cooling circuit 1	-	0 – 100.00
58	41230	04-read input register	16-bit signed	Big-endian	EER cooling mode, cooling stage 2	-	0 – 100.00
59	40240	04-read input register	16-bit signed	Big-endian	JAZ Heating mode, cooling unit 1	-	0 – 100.00
60	41240	04-read input register	16-bit signed	Big-endian	JAZ Heating mode, cooling unit 2	-	0 – 100.00
61	40250	04-read input register	16-bit signed	Big-endian	JAZ surplus operation, refrigeration set 1	-	0 – 100.00
62	41250	04-read input register	16-bit signed	Big-endian	JAZ surplus operation, refrigeration set 2	-	0 – 100.00
63	40260	04-read input register	16-bit signed	Big-endian	SEER cooling mode, cooling circuit 1	-	0 – 100.00
64	41260	04-read input register	16-bit signed	Big-endian	SEER cooling mode, cooling circuit 2	-	0 – 100.00

Handelsname: R290 - Propan 2.5; Tegan®290, Propan 2.5
Produkt-Nr.: R290
Aktuelle Version: 4.0.0, erstellt am: 08.06.2023 **Ersetzte Version:** 3.0.0, erstellt am: 20.04.2022 **Region:** DE

ABSCHNITT 1: Bezeichnung des Stoffs beziehungsweise des Gemischs und des Unternehmens

1.1 Produktidentifikator

Handelsname

R290 - Propan 2.5; Tegan®290, Propan 2.5

Name des Stoffs	Propan
REACH Registrierungsnr.	01-2119486944-21

Identifikationsnummern

CAS-Nr.	74-98-6
EG-Nr.	200-827-9
Index-Nr.	601-003-00-5

1.2 Relevante identifizierte Verwendungen des Stoffs oder Gemischs und Verwendungen, von denen abgeraten wird

Relevante identifizierte Verwendungen
Kältemittel
Aerosol
Treibgas

Verwendungen, von denen abgeraten wird
Keine Angaben verfügbar.

1.3 Einzelheiten zum Lieferanten, der das Sicherheitsdatenblatt bereitstellt

Adresse
TEGA - Technische Gase und Gasetechnik GmbH
Werner-von-Siemens-Straße 18
97076 Würzburg

Telefon-Nr.	+49 931 2093-220
Fax-Nr.	+49 931 2093-180
e-mail	kaeltemittel@tega.de

Auskünfte zum Sicherheitsdatenblatt
sdb info@umco.de

1.4 Notrufnummer

Für medizinische Auskünfte (in deutscher und englischer Sprache):
+49 (0)551 192 40 (Giftinformationszentrum Nord)

ABSCHNITT 2: Mögliche Gefahren

2.1 Einstufung des Stoffs oder Gemischs

Einstufung gemäß Verordnung (EG) Nr. 1272/2008 (CLP)
Flam. Gas 1A; H220
Press. Gas liq.; H280

Hinweise zur Einstufung
Die Einstufung des Produkts wurde auf Basis der folgenden Verfahren gemäß Artikel 9 und den Kriterien der Verordnung (EG) Nr. 1272/2008 ermittelt:
Physikalische Gefahren: Bewertung von Prüfdaten gem. Anhang I, Teil 2
Gesundheits- und Umweltgefahren: Bewertung von toxikologischen und ökotoxikologischen Daten gem. Anhang I, Teil 3 und 4.

2.2 Kennzeichnungselemente

Kennzeichnung gemäß Verordnung (EG) Nr. 1272/2008 (CLP)

Produktidentifikator
74-98-6 (Propan)

Gefahrenpiktogramme

Sicherheitsdatenblatt gemäß
1907/2006/EG

Handelsname: R290 - Propan 2.5; Tegan®290, Propan 2.5
Produkt-Nr.: R290
Aktuelle Version: 4.0.0, erstellt am: 08.06.2023 **Ersetzte Version:** 3.0.0, erstellt am: 20.04.2022 **Region:** DE


GHS02


GHS04

Signalwort
Gefahr

Gefahrenhinweise

H220	Extrem entzündbares Gas.
H280	Enthält Gas unter Druck; kann bei Erwärmung explodieren.

Sicherheitshinweise

P210	Von Hitze, heißen Oberflächen, Funken, offenen Flammen und anderen Zündquellen fernhalten. Nicht rauchen.
P377	Brand von ausströmendem Gas: Nicht löschen, bis Undichtigkeit gefahrlos beseitigt werden kann.
P381	Bei Undichtigkeit alle Zündquellen entfernen.
P410+P403	Vor Sonnenbestrahlung schützen. An einem gut belüfteten Ort aufbewahren.

Ergänzende Kennzeichnungselemente
Vorgeschriebene persönliche Schutzausrüstung verwenden. Verwendung nur gemäß Sicherheitsdatenblatt.
Wiederbefüllung verboten.

2.3 Sonstige Gefahren

Verflüssigtes Gas kann schwere Erfrierungen und Augenschäden verursachen. Dämpfe in höheren Konzentrationen können narkotisch wirken.
Dämpfe können mit Luft explosionsfähige Gemische bilden. Dämpfe sind schwerer als Luft und breiten sich über dem Boden aus. Das Produkt enthält keine Bestandteile, die gemäß REACH Artikel 57(f) oder der delegierten Verordnung (EU) 2017/2100 der Kommission oder der delegierten Verordnung (EU) 2018/605 der Kommission in Mengen von 0,1 % oder mehr endokrinschädliche Eigenschaften aufweisen.

PBT-Beurteilung
Das Produkt gilt nicht als PBT.

vPvB-Beurteilung
Das Produkt gilt nicht als vPvB.

ABSCHNITT 3: Zusammensetzung/Angaben zu Bestandteilen

3.1 Stoffe

Chemische Charakterisierung

Name des Stoffs	Propan
Summenformel	C3H8
Molekulargewicht	44,09

Identifikationsnummern

CAS-Nr.	74-98-6
EG-Nr.	200-827-9
Index-Nr.	601-003-00-5

Nach Verordnung (EG) Nr.1907/2006, Anhang II, Abschnitt 3.1 zu nennende Bestandteile

Name des Stoffs CAS / EG / Index / REACH Nr.	Zusätzliche Hinweise Konzentration	 %
Butan	Verunreinigung	
106-97-8 203-448-7 601-004-00-0 -	<= 2,00	Gew%
Isobutan	Verunreinigung	

75-28-5 200-857-2 601-004-00-0 -		<= 2,00	Gew%

Sonstige Angaben

Anmerkung	Spezifische Konzentrationsgrenzwerte	M-Faktor (akut)	M-Faktor (chronisch)
U	-	-	-

Vollständiger Wortlaut der Anmerkungen: Siehe Abschnitt 16, „Anmerkungen zur Identifizierung, Einstufung und Kennzeichnung von Stoffen (EG) Nr. 1272/2008, Anhang VI".

3.2 Gemische
Nicht zutreffend. Das Produkt ist kein Gemisch.

ABSCHNITT 4: Erste-Hilfe-Maßnahmen

4.1 Beschreibung der Erste-Hilfe-Maßnahmen

Allgemeine Hinweise
Hohe Konzentrationen können Ersticken verursachen. Symptome können Verlust der Bewegungsfähigkeit und des Bewußtseins sein. Das Opfer bemerkt das Ersticken nicht. Betroffenen aus dem Gefahrenbereich bringen und hinlegen. Sofort Arzt hinzuziehen.

Nach Einatmen
Betroffene Person unter Einhaltung geeigneter Atemschutzmaßnahmen aus der Gefahrenzone bringen. Für Frischluft sorgen. Bei unregelmäßiger Atmung/Atemstillstand: künstliche Beatmung. Sofort Arzt hinzuziehen.

Nach Hautkontakt
Bei Berührung mit der Haut sofort abwaschen mit Wasser und Seife. Bei Erfrierungen mit viel Wasser spülen. Kleidung nicht entfernen.

Nach Augenkontakt
Kontaktlinsen entfernen. Auge unter Schutz des unverletzten Auges 10-15 Minuten unter fließendem Wasser bei weitgespreizten Lidern spülen.

Nach Verschlucken
Mund gründlich mit Wasser spülen. Kein Erbrechen einleiten. Bewusstlosen Personen darf nichts eingeflößt werden.

4.2 Wichtigste akute und verzögert auftretende Symptome und Wirkungen

Symptome
Atemnot; Erfrierungen; Atemstillstand. Bewusstlosigkeit

4.3 Hinweise auf ärztliche Soforthilfe oder Spezialbehandlung
Symptomatisch behandeln.

ABSCHNITT 5: Maßnahmen zur Brandbekämpfung

5.1 Löschmittel

Geeignete Löschmittel
Löschpulver; Wassersprühstrahl; Schaum; Kohlendioxid

Ungeeignete Löschmittel
Wasservollstrahl

5.2 Besondere vom Stoff oder Gemisch ausgehende Gefahren
Bei Brand kann freigesetzt werden: Kohlenmonoxid und Kohlendioxid; Explosionsgefahr bei Erhitzen. Verflüssigtes Gas: austretende Flüssigkeit kann Erfrierungen verursachen. Das Gas ist schwerer als Luft, es kann sich in tiefergelegenen Räumen ansammeln. Dämpfe können mit Luft ein leichtentzündliches Gemisch bilden.

5.3 Hinweise für die Brandbekämpfung
Umluftunabhängiges Atemschutzgerät verwenden. Vollschutzanzug tragen. Gefährdete Behälter wenn möglich aus der Gefahrenzone bringen. Geschlossene Behälter in Nähe des Brandherdes mit Wasser kühlen. Drucksteigerung, Berst- und Explosionsgefahr beim Erhitzen. Brandrückstände und kontaminiertes Löschwasser müssen entsprechend den örtlichen behördlichen Vorschriften entsorgt werden.

Sicherheitsdatenblatt gemäß
1907/2006/EG
Handelsname: R290 - Propan 2.5; Tegan®290, Propan 2.5
Produkt-Nr.: R290
Aktuelle Version: 4.0.0, erstellt am: 08.06.2023 **Ersetzte Version:** 3.0.0, erstellt am: 20.04.2022 **Region:** DE

ABSCHNITT 6: Maßnahmen bei unbeabsichtigter Freisetzung

6.1 Personenbezogene Vorsichtsmaßnahmen, Schutzausrüstungen und in Notfällen anzuwendende Verfahren

Nicht für Notfälle geschultes Personal
Schutzvorschriften beachten (siehe Abschnitt 7 und 8). Für ausreichende Lüftung sorgen. Zündquellen fernhalten. Gas nicht einatmen. Den kontaminierten Bereich absperren und kennzeichnen. Personen in Sicherheit bringen. Explosionsgefahr.

Einsatzkräfte
Keine Angaben verfügbar. Persönliche Schutzausrüstung – siehe Abschnitt 8.

6.2 Umweltschutzmaßnahmen
Freisetzung in die Umwelt vermeiden. Gase/Dämpfe/Nebel mit Wassersprühstrahl niederschlagen.

6.3 Methoden und Material für Rückhaltung und Reinigung
Für ausreichende Lüftung sorgen. Das aufgenommene Material vorschriftsmässig entsorgen.

6.4 Verweis auf andere Abschnitte
Informationen zur sicheren Handhabung, siehe Abschnitt 7. Informationen zur persönlichen Schutzausrüstung, siehe Abschnitt 8. Informationen zur Entsorgung, siehe Abschnitt 13.

ABSCHNITT 7: Handhabung und Lagerung

7.1 Schutzmaßnahmen zur sicheren Handhabung

Hinweise zum sicheren Umgang
Handhabung nur durch qualifiziertes und geschultes Personal. Für gute Raumbelüftung sorgen, gegebenenfalls Absaugung am Arbeitsplatz. Anwendung nur nach Gebrauchsanweisung. Behälter nicht unter Druck setzen, aufschneiden, schweißen, hartlöten, löten, anbohren, schleifen und von Hitze und Zündquellen fernhalten. Bei Austritt von flüssigem Produkt Gefahr durch tiefe Temperaturen. Das Material nur an Orten verwenden, bei denen offenes Licht, Feuer und andere Zündquellen ferngehalten werden. Die Bildung entzündlicher und explosionsfähiger Dampfkonzentrationen in der Luft und ein Überschreiten der Arbeitsplatzgrenzwerte vermeiden. Behälter steht unter Druck. Vor Sonnenstrahlung und Temperaturen über 50 °C schützen. Auch nach Gebrauch nicht gewaltsam öffnen oder verbrennen. Gesetzliche Schutz- und Sicherheitsvorschriften befolgen.

Allgemeine Schutz- und Hygienemaßnahmen
Vor den Pausen und bei Arbeitsende Hände waschen. Gase nicht einatmen. Bei der Arbeit nicht rauchen, essen oder trinken. Von Nahrungsmitteln und Getränken fernhalten. Notdusche bereithalten.

Hinweise zum Brand- und Explosionsschutz
Dämpfe können mit Luft ein explosionsfähiges Gemisch bilden. Von Hitzequellen, Funken und offenen Flammen fernhalten. Maßnahmen gegen elektrostatische Aufladungen treffen (Erdung beim Umfüllen). Explosionsgeschützte Geräte/Armaturen und funkenfreie Werkzeuge verwenden. Elektrische Geräte müssen nach dem anerkannten Standard geschützt sein.

7.2 Bedingungen zur sicheren Lagerung unter Berücksichtigung von Unverträglichkeiten

Technische Maßnahmen und Lagerungsbedingungen
Behälter dicht geschlossen halten, an einem kühlen, gut gelüfteten Ort aufbewahren, mit Vorsicht öffnen und handhaben. Vor Hitze und direkter Sonneneinstrahlung schützen.

Empfohlene Lagertemperatur
Wert < 50 °C

Anforderung an Lagerräume und Behälter
Geöffnete Behälter sorgfältig verschließen und aufrecht lagern, um jegliches Austreten zu verhindern. Stets in Behältern aufbewahren, die dem Originalgebinde entsprechen.
Geeignetes Material Stahl

Zusammenlagerungshinweise
Zu vermeidende Substanzen, siehe Abschnitt 10.

Lagerklasse gemäß TRGS 510
2A Gase (ohne Aerosolpackungen und Feuerzeuge)

7.3 Spezifische Endanwendungen

Keine Angaben verfügbar.

ABSCHNITT 8: Begrenzung und Überwachung der Exposition/Persönliche Schutzausrüstungen

8.1 Zu überwachende Parameter

Arbeitsplatzgrenzwerte

Nr.	Name des Stoffs	CAS-Nr.		EG-Nr.	
1	**Propan**	**74-98-6**		**200-827-9**	
	TRGS 900				
	Propan				
	Wert	1800	mg/m³	1000	ml/m³
	Spitzenbegrenzung	4(II)			
2	**Butan**	**106-97-8**		**203-448-7**	
	TRGS 900				
	Butan				
	Wert	2400	mg/m³	1000	ml/m³
	Spitzenbegrenzung	4(II)			
3	**Isobutan**	**75-28-5**		**200-857-2**	
	TRGS 900				
	Isobutan				
	Wert	2400	mg/m³	1000	ml/m³
	Spitzenbegrenzung	4(II)			

8.2 Begrenzung und Überwachung der Exposition

Geeignete technische Steuerungseinrichtungen
Für gute Raumbelüftung sorgen, gegebenenfalls Absaugung am Arbeitsplatz. Falls dies nicht ausreicht, um die Aerosol- und Lösemitteldampf-Konzentration unter den Arbeitsplatzgrenzwerten zu halten, muss ein geeignetes Atemschutzgerät getragen werden.

Persönliche Schutzausrüstung

Atemschutz
Atemschutz bei ungenügender Absaugung oder längerer Einwirkung. Atemschutzgerät: Gasfilter AX
Kennfarbe: Braun

Augen-/Gesichtsschutz
Dichtschließende Schutzbrille (DIN EN 166).

Handschutz
Kälteschutzhandschuhe (EN 511). Bei möglichem Hautkontakt mit dem Produkt bietet die Verwendung von Handschuhen, geprüft nach z.B. EN 374, ausreichenden Schutz. Der Schutzhandschuh sollte in jedem Fall auf seine arbeitsplatzspezifische Eignung (z.B. mechanische Beständigkeit, Produktverträglichkeit, Antistatik) geprüft werden. Anweisungen und Informationen des Handschuhherstellers zur Anwendung, Lagerung, Pflege und zum Austausch der Handschuhe befolgen. Die Schutzhandschuhe sollten bei Beschädigung oder ersten Abnutzungserscheinungen sofort ersetzt werden. Arbeitsvorgänge so gestalten, dass nicht dauernd Handschuhe getragen werden müssen.
Geeignetes Material Leder

Sonstige Schutzmaßnahmen
Chemikalienbeständige Arbeitskleidung. Flammhemmend und antistatisch ausgerüstete Schutzkleidung. Sicherheitsschuhe.

Begrenzung und Überwachung der Umweltexposition
Keine Angaben verfügbar.

ABSCHNITT 9: Physikalische und chemische Eigenschaften

9.1 Angaben zu den grundlegenden physikalischen und chemischen Eigenschaften

Aggregatzustand
gasförmig

Sicherheitsdatenblatt gemäß 1907/2006/EG

Handelsname: R290 - Propan 2.5; Tegan®290, Propan 2.5
Produkt-Nr.: R290
Aktuelle Version: 4.0.0, erstellt am: 08.06.2023 **Ersetzte Version:** 3.0.0, erstellt am: 20.04.2022 **Region:** DE

Form			
verflüssigtes Gas			
Farbe			
farblos			
Geruch			
charakteristisch			
pH-Wert			
Nicht anwendbar			
Quelle	Lieferant		
Siedepunkt / Siedebereich			
Wert	-42,1	°C	
Bezugsdruck	101,32	kPa	
Quelle	Lieferant		
Schmelzpunkt / Gefrierpunkt			
Wert	-187,6	°C	
Quelle	Lieferant		
Zersetzungstemperatur			
Keine Daten vorhanden			
Fließpunkt (Pourpoint)			
Nicht anwendbar			
Quelle	Lieferant		
Flammpunkt			
Wert	-80	°C	
Quelle	Lieferant		
Zündtemperatur			
Wert	450	°C	
Quelle	Lieferant		
Explosive Eigenschaften			
Kann explosive Gas-Luft-Gemische bilden.			
Entzündbarkeit			
Extrem entzündbares Gas.			
Quelle	Lieferant		
Untere Explosionsgrenze			
Wert	ca.	1,7	Vol-%
Quelle	Lieferant		
Obere Explosionsgrenze			
Wert	ca.	10,8	Vol-%
Quelle	Lieferant		
Dampfdruck			
Wert	8300	hPa	
Bezugstemperatur	20	°C	
Quelle	Lieferant		
Relative Dampfdichte			
Keine Daten vorhanden			
Relative Dichte			
Keine Daten vorhanden			
Dichte			
Wert	0,493	g/cm³	

Bezugstemperatur	25	°C	
Quelle	Lieferant		

Schüttdichte

Nicht anwendbar	
Quelle	Lieferant

Wasserlöslichkeit

Wert	<	0,1	g/l
Quelle	Lieferant		

Löslichkeit

Keine Daten vorhanden

Verteilungskoeffizient n-Oktanol/Wasser (log-Wert)

Nr.	Name des Stoffs	CAS-Nr.	EG-Nr.
1	Propan	74-98-6	200-827-9

log Pow	ca.	1,8
Methode	QSAR	
Quelle	ECHA	

Kinematische Viskosität

Nicht anwendbar	
Quelle	Lieferant

Festkörpergehalt

Nicht anwendbar

Partikeleigenschaften

Keine Daten vorhanden

9.2 Sonstige Angaben

Sonstige Angaben

Kritische Temperatur: 96,7 °C

ABSCHNITT 10: Stabilität und Reaktivität

10.1 Reaktivität
Bei bestimmungsgemäßer Verwendung sind keine gefährlichen Reaktionen zu erwarten.

10.2 Chemische Stabilität
Bei Anwendung der empfohlenen Vorschriften zur Lagerung und Handhabung stabil (siehe Abschnitt 7).

10.3 Möglichkeit gefährlicher Reaktionen
Bildung explosiver Gasgemische mit Luft. Kann sich unter Einwirkung von starken Oxidationsmitteln entzünden.

10.4 Zu vermeidende Bedingungen
Hitze, offene Flammen und andere Zündquellen. Kontakt mit unverträglichen Substanzen.

10.5 Unverträgliche Materialien
starke Oxidationsmittel; Chlor; Chlorwasserstoff; Fluor; Sauerstoff

10.6 Gefährliche Zersetzungsprodukte
Keine bei bestimmungsgemäßer Lagerung, Handhabung, Beförderung. Bei Brand: siehe Abschnitt 5.

ABSCHNITT 11: Toxikologische Angaben

11.1 Angaben zu den Gefahrenklassen im Sinne der Verordnung (EG) Nr. 1272/2008

Akute orale Toxizität

Keine Daten vorhanden

Akute dermale Toxizität

Keine Daten vorhanden

Sicherheitsdatenblatt gemäß
1907/2006/EG
TEGA
Handelsname: R290 - Propan 2.5; Tegan®290, Propan 2.5
Produkt-Nr.: R290
Aktuelle Version: 4.0.0, erstellt am: 08.06.2023 **Ersetzte Version:** 3.0.0, erstellt am: 20.04.2022 **Region:** DE

Akute inhalative Toxizität

Nr.	Name des Stoffs	CAS-Nr.	EG-Nr.
1	Propan	74-98-6	200-827-9

LC50	>	800000	ppmV
Expositionsdauer		0,25	Std.
Aggregatzustand	Gas		
Spezies	Ratte		
Quelle	ECHA		
Bewertung/Einstufung	Aufgrund der verfügbaren Daten sind die Einstufungskriterien nicht erfüllt.		

Ätz-/Reizwirkung auf die Haut

Keine Daten vorhanden

Schwere Augenschädigung/-reizung

Keine Daten vorhanden

Sensibilisierung der Atemwege/Haut

Keine Daten vorhanden

Keimzell-Mutagenität

Keine Daten vorhanden

Reproduktionstoxizität

Nr.	Name des Stoffs	CAS-Nr.	EG-Nr.
1	Propan	74-98-6	200-827-9

Aufnahmeweg	inhalativ		
NOAEC		12000	ppm
Art der Untersuchung	Combined Repeated Dose Toxicity Study with the Reproduction/Developmental Toxicity Screening Test		
Spezies	Ratte		
Methode	OECD 422		
Quelle	ECHA		
Bewertung/Einstufung	Aufgrund der verfügbaren Daten sind die Einstufungskriterien nicht erfüllt.		

Karzinogenität

Keine Daten vorhanden

Spezifische Zielorgan-Toxizität bei einmaliger Exposition

Keine Daten vorhanden

Spezifische Zielorgan-Toxizität bei wiederholter Exposition

Nr.	Name des Stoffs	CAS-Nr.	EG-Nr.
1	Propan	74-98-6	200-827-9

Aufnahmeweg	inhalativ		
LOAEC		12000	ppm
Spezies	Ratte		
Methode	OECD 422		
Quelle	ECHA		
Bewertung/Einstufung	Aufgrund der verfügbaren Daten sind die Einstufungskriterien nicht erfüllt.		

Aspirationsgefahr

Keine Daten vorhanden

11.2 Angaben über sonstige Gefahren

Endokrinschädliche Eigenschaften
Keine Angaben verfügbar.

Sonstige Angaben
Keine Angaben verfügbar.

ABSCHNITT 12: Umweltbezogene Angaben

12.1 Toxizität

Fischtoxizität (akut)
Keine Daten vorhanden

Fischtoxizität (chronisch)
Keine Daten vorhanden

Daphnientoxizität (akut)
Keine Daten vorhanden

Daphnientoxizität (chronisch)
Keine Daten vorhanden

Algentoxizität (akut)
Keine Daten vorhanden

Algentoxizität (chronisch)
Keine Daten vorhanden

Bakterientoxizität
Keine Daten vorhanden

12.2 Persistenz und Abbaubarkeit

Biologische Abbaubarkeit			
Nr.	Name des Stoffs	CAS-Nr.	EG-Nr.
1	Propan	74-98-6	200-827-9

Art	Aerobe biologische Abbaubarkeit		
Wert		50	%
Dauer		3	d
Methode	QSAR		
Quelle	ECHA		
Bewertung	leicht biologisch abbaubar (readily biodegradable)		

12.3 Bioakkumulationspotenzial

Verteilungskoeffizient n-Oktanol/Wasser (log-Wert)			
Nr.	Name des Stoffs	CAS-Nr.	EG-Nr.
1	Propan	74-98-6	200-827-9

log Pow	ca.	1,8
Methode	QSAR	
Quelle	ECHA	

12.4 Mobilität im Boden

Keine Angaben verfügbar.

12.5 Ergebnisse der PBT- und vPvB-Beurteilung

Ergebnisse der PBT- und vPvB-Beurteilung	
PBT-Beurteilung	Das Produkt gilt nicht als PBT.
vPvB-Beurteilung	Das Produkt gilt nicht als vPvB.

12.6 Endokrinschädliche Eigenschaften

Keine Angaben verfügbar.

12.7 Andere schädliche Wirkungen

Keine Angaben verfügbar.

12.8 Sonstige Angaben

Sonstige Angaben
Produkt nicht unkontrolliert in die Umwelt gelangen lassen.

ABSCHNITT 13: Hinweise zur Entsorgung

Sicherheitsdatenblatt gemäß 1907/2006/EG

Handelsname: R290 - Propan 2.5; Tegan®290, Propan 2.5
Produkt-Nr.: R290
Aktuelle Version: 4.0.0, erstellt am: 08.06.2023 **Ersetzte Version:** 3.0.0, erstellt am: 20.04.2022 **Region:** DE

13.1 Verfahren der Abfallbehandlung

Produkt
Die Zuordnung einer Abfallschlüsselnummer gemäß europäischem Abfallkatalog (AVV) ist in Absprache mit dem regionalen Entsorger vorzunehmen.
Entsorgung gemäß den behördlichen Vorschriften.

Verpackung
Druckgaspackung steht unter Druck, darf nicht gewaltsam geöffnet und nicht über 50°C erwärmt werden. Nur völlig restentleerte Druckgaspackungen wegwerfen. Leere Druckgaspackungen nicht verbrennen. Ungereinigte Behälter nicht durchlöchern, zerschneiden oder schweißen.

ABSCHNITT 14: Angaben zum Transport

14.1 Transport ADR/RID/ADN

Klasse	2
Klassifizierungscode	2F
Gefahrennr. (Kemler-Zahl)	23
UN-Nummer	UN1978
Bezeichnung des Gutes	PROPAN
Tunnelbeschränkungscode	B/D
Gefahrzettel	2.1 RID: (+13)

14.2 Transport IMDG

Klasse	2.1
UN-Nummer	UN1978
Proper shipping name	PROPANE
EmS	F-D, S-U
Label	2.1

14.3 Transport ICAO-TI / IATA

Klasse	2.1
UN-Nummer	UN1978
Proper shipping name	Propane
Label	2.1

14.4 Sonstige Angaben

Keine Angaben verfügbar.

14.5 Umweltgefahren

Angaben zu Umweltgefahren, sofern relevant, siehe 14.1 - 14.3.

14.6 Besondere Vorsichtsmaßnahmen für den Verwender

Transport immer in geschlossenen, aufrecht stehenden und sicheren Behältern. Sicherstellen, dass Personen, die das Produkt transportieren, wissen, was im Falle eines Unfalls oder Auslaufens zu tun ist.

14.7 Massengutbeförderung auf dem Seeweg gemäß IMO-Instrumenten

Nicht relevant

ABSCHNITT 15: Rechtsvorschriften

15.1 Vorschriften zu Sicherheit, Gesundheits- und Umweltschutz / spezifische Rechtsvorschriften für den Stoff oder das Gemisch

EU Vorschriften

Verordnung (EG) Nr. 1907/2006 (REACH) Anhang XIV (Verzeichnis der zulassungspflichtigen Stoffe)
Das Produkt enthält keine(n) Stoff(e), der/die gemäß REACH Verordnung (EG) 1907/2006 Anhang XIV als zulassungspflichtige Stoff(e) gilt/gelten.

REACH Kandidatenliste besonders besorgniserregender Stoffe (SVHC) für das Zulassungsverfahren
Der Stoff gilt nicht gemäß Artikel 57 in Verbindung mit Artikel 59 der REACH Verordnung (EG) 1907/2006 als ein für die Aufnahme in den Anhang XIV in Frage kommender Stoff (Verzeichnis der zulassungspflichtigen Stoffe).

Verordnung (EG) Nr. 1907/2006 (REACH) Anhang XVII: Beschränkungen der Herstellung, des Inverkehrbringens und der Verwendung bestimmter gefährlicher Stoffe, Gemische und Erzeugnisse	
Das Produkt unterliegt REACH Verordnung (EG) 1907/2006 Anhang XVII.	Nr. 40

Richtlinie 2012/18/EU zur Beherrschung der Gefahren schwerer Unfälle mit gefährlichen Stoffen	
Das Produkt unterliegt Anhang I, Teil 1, Gefahrenkategorie:	P2

Sonstige Vorschriften
Die nationalen Gesundheits- und Arbeitssicherheitsvorschriften sind bei der Verwendung dieses Produktes anzuwenden.

Nationale Vorschriften

Wassergefährdungsklasse

Klasse	nwg
Kenn-Nr.	560
Quelle	Einstufung gemäß AwSV (Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen).

Sonstige Vorschriften
Zu beachten: TRGS 510 "Lagerung von Gefahrstoffen in ortsbeweglichen Behältern"

15.2 Stoffsicherheitsbeurteilung
Eine Stoffsicherheitsbeurteilung wurde für diesen Stoff durchgeführt.

ABSCHNITT 16: Sonstige Angaben

Datenquellen, die zur Erstellung des Datenblattes verwendet wurden:
Verordnung (EG) Nr. 1907/2006 (REACH), 1272/2008 (CLP) in der jeweils gültigen Fassung.
Richtlinien 2000/39/EG, 2006/15/EG, 2009/161/EU, (EU) 2017/164.
Nationale Arbeitsplatzgrenzwertlisten der jeweiligen Länder in der jeweils gültigen Fassung.
Transportvorschriften gemäß ADR, RID, IMDG, IATA in der jeweils gültigen Fassung.
Datenquellen, die zur Ermittlung von physikalischen, toxikologischen und ökotoxikologischen Daten benutzt wurden, sind direkt in den jeweiligen Abschnitten angegeben.

Anmerkungen zur Identifizierung, Einstufung und Kennzeichnung von Stoffen und Gemischen ((EG) Nr. 1272/2008, Anhang VI)

U	Beim Inverkehrbringen müssen die Gase als „Gase unter Druck" in die Gruppe der verdichteten Gase, der verflüssigten Gase, der tiefgekühlten Gase oder der gelösten Gase eingestuft werden. Die Zuordnung zu einer Gruppe hängt vom Aggregatzustand ab, in dem das Gas verpackt wird, und muss deshalb von Fall zu Fall entschieden werden.

Datenblatt ausstellender Bereich
UMCO GmbH

Die Angaben stützen sich auf den heutigen Stand unserer Kenntnisse und Erfahrungen.
Das Sicherheitsdatenblatt beschreibt Produkte im Hinblick auf Sicherheitserfordernisse.
Die Angaben haben nicht die Bedeutung von Eigenschaftszusicherungen und begründen kein vertragliches Rechtsverhältnis.

Änderungen / Textergänzungen:
Änderungen im Text sind am Seitenrand gekennzeichnet.

Prod-ID 753969

Panasonic Daphne Hermetic Oil PZ68S

Safety Data Sheet

in accordance with Regulation (EC) No 1907/2006 (REACH) as amended by Regulation (EU) 2020/878 Date of issue: 17/01/2022 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form : Mixture
Product name : Daphne hermetic oil PZ68S
UFI : G200-U0CW-500H-QDCR

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1. Relevant identified uses

Use of the substance/mixture : Lubricant

1.2.2. Uses advised against

No further information available

1.3. Details of the supplier of the safety data sheet

Manufacturer:
Idemitsu Kosan Co., Ltd.
1-1-3 Manunouchi, Chiyoda-ku, Tokyo 100-8321, Japan Telephone: +81-3-3213-3143

EU Supplier:
Panasonic Appliances Air Conditioning Europe (PAPAEU) Panasonic Marketing Europe GmbH
Hagenauer Str. 43, 65203 Wiesbaden, Germany Telephone: +49 611 2350
Email: sds@eu.panasonic.com

1.4. Emergency telephone number

Emergency number : Carechem 24 : +44 (0)1235 239 670 (24 hours a day)

Country	Organisation/Company	Address	Emergency number	Comment
Ireland	National Poisons Information Centre, Beaumont Hospital	PO Box 1297 9 Beaumont Road, Dublin	+353 1 809 2566 (Healthcare professionals – 24/7) +353 1 809 2166 (public, 8 am – 10 pm, 7 days a week)	

SECTION 2: Identification of hazards

2.1. Classification of the substance or mixture

Classification in accordance with Regulation (EC) No 1272/2008 [CLP]

Skin Sens. 1 H317

Aquatic Chronic 2 H411

Full text of hazard classes, H- and EUH statements: see section 16

Adverse physicochemical, human health and environmental effects

No further information available

Daphne hermetic oil PZ68S

Safety Data Sheet

in accordance with Regulation (EC) No 1907/2006 (REACH) as amended by Regulation (EU) 2020/878

2.2. Label elements

Labelling in accordance with Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :

GHS07 GHS09

Signal word (CLP) : Warning
Contains : Poly[oxy(methyl-1,2-ethanediyl)], α-methyl-ω-methoxy-, [[(2-ethylhexyl)oxy]methyl]oxirane
Hazard statements (CLP) : H317 - May cause an allergic skin reaction.
H411 - Toxic to aquatic life with long-lasting effects.
Precautionary statements (CLP) : P261 - Avoid breathing vapours.
P272 - Do not allow contaminated work clothing to leave the workplace. P280 - Wear eye protection, protective clothing and protective gloves.
P302+P352 - IF ON SKIN: Wash with plenty of soap and water. P333+P313 - If skin irritation or a rash occurs: Seek medical advice or attention.
P501 – Dispose of contents and container at an authorised waste collection point.

2.3. Other hazards

This substance/mixture does not meet the PBT criteria set out in Annex XIII of the REACH Regulation.
This substance/mixture does not meet the vPvB criteria set out in Annex XIII of the REACH Regulation. Contains no PBT/vPvB substances ≥ 0.1% assessed in accordance with Annex XIII of REACH

The mixture does not contain any substance(s) included in the list established in accordance with Article 59(1) of REACH for having endocrine-disrupting properties, nor is it identified as having endocrine-disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	Classification in accordance with Regulation (EC) No 1272/2008 [CLP]
Poly[oxy(methyl-1,2-ethanediyl)], .alpha.-methyl-ω-methoxy-	CAS No.: 24991-61-5 EC No.: 680-48-1	90–100	Skin Sens. 1, H317
Tris(methylphenyl) phosphate	CAS No.: 1330-78-5 EC No.: 215-548-8	1 – < 2.5	Repro. 2, H361 Aquatic Acute 1, H400 Aquatic Chronic 1, H410
2,6-di-tert-butyl-p-cresol	CAS No.: 128-37-0 EC No.: 204-881-4	0.25 – < 1	Aquatic Acute 1, H400 (M=1) Aquatic Chronic 1, H410
[[(2-ethylhexyl)oxy]methyl]oxirane	CAS No.: 2461-15-6 EC No.: 219-553-6	0.1 - < 1	Skin Irrit. 2, H315 Skin Sens. 1A, H317
Lubricating oil additive	-	< 0.1	Not classified

Full text of H- and EUH-statements: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

General first-aid measures : Never give anything by mouth to an unconscious person. If medical advice is required, have the product container or label to hand.

First-aid measures following inhalation : Move the patient to fresh air, keep them warm and at rest. If symptoms develop, seek medical attention.

First-aid measures following skin contact : Remove any affected clothing and wash all exposed skin with mild soap and water, followed by a rinse with warm water. If skin irritation or a rash occurs: Seek medical advice or attention.

First-aid measures following eye contact : Rinse carefully with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If symptoms develop, seek medical attention.

First-aid measures following ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth. Give 100–200 ml of water to drink. If symptoms develop, seek medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects : May cause an allergic skin reaction.

4.3. Indication of any immediate medical attention and special treatment required

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for the surrounding fire.

Unsuitable extinguishing media : None known.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Not flammable. Will burn if heated.

Hazardous decomposition products in the event of fire : Carbon dioxide. Carbon monoxide.

5.3. Advice for firefighters

Firefighting instructions : Cool closed containers exposed to fire with a water spray. Exercise caution when fighting any chemical fire. Do not allow run-off from firefighting to enter drains or watercourses.

Protection during firefighting : As with any fire, wear self-contained breathing apparatus and full protective gear.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency staff

Emergency procedures : Ventilate the area. Avoid inhaling vapours. Avoid contact with eyes, skin and clothing. Evacuate non-essential personnel.

6.1.2. For emergency responders

Protective equipment : Use personal protective equipment as required. See Section 8.

Emergency procedures : Ventilate the area. Avoid inhaling vapours. Avoid contact with eyes, skin and clothing.

6.2. Environmental precautions

Do not allow the product to enter drains or watercourses. Notify the authorities if the product enters sewers or public waters.

6.3. Methods and materials for containment and clean-up

For containment : Stop the leak, if possible without risk. Contain the liquid spill.

Methods for cleaning up : Small spills: Wipe up with absorbent material (e.g. cloth). Large spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.

Daphne hermetic oil PZ68S
Safety Data Sheet
in accordance with Regulation (EC) No 1907/2006 (REACH) as amended by Regulation (EU) 2020/878

6.4. Reference to other sections

SECTION 8: Exposure controls/personal protection. SECTION 13: Disposal considerations.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Avoid contact with skin, eyes and clothing. Avoid inhaling vapours. Ensure good ventilation in the process area to prevent vapour build-up.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke whilst using this product. Remove contaminated clothing and wash it before reuse. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking, and when leaving work. Contaminated work clothing must not be taken out of the workplace.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store tightly closed in a dry, cool and well-ventilated place.

Incompatible materials : Strong bases. Strong oxidising agents.

7.3. Specific end use(s)

Lubricant.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 National occupational exposure and biological limit values

2,6-di-tert-butyl-p-cresol (128-37-0)	
Ireland – Occupational Exposure Limits	
Local name	2,6-Di-tert-butyl-para-cresol [Butylated hydroxytoluene (BHT)]
OEL (8-hour reference) (mg/m³)	2 mg/m³
Regulatory reference	Chemical Agents Code of Practice 2021
United Kingdom – Occupational Exposure Limits	
Local name	2,6-Di-tert-butyl-p-cresol
WEL TWA (mg/m³)	10 mg/m³
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE

8.1.2. Recommended monitoring procedures

No further information available

8.1.3. Air contaminants formed

No further information available

8.1.4. DNEL and PNEC

No further information available

8.1.5. Control banding

No further information available

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Appropriate engineering controls:
Ensure good ventilation in the process area to prevent the formation of vapour. Ensure exposure remains below occupational exposure limits (where available). Local exhaust ventilation (LEV) may be required to control inhalation exposure.

8.2.2. Personal protective equipment:
Avoid all unnecessary exposure.

8.2.2.1. Eye and face protection

Eye protection:
Safety glasses. Standard EN 166 – Personal eye protection.

8.2.2.2. Skin protection;

skin and body protection:
Long-sleeved protective clothing

Hand protection:
In the event of repeated or prolonged contact, wear gloves. Standard EN 374 – Protective gloves against chemicals. Recommended: Material thickness: >= 0.3 mm. The exact breakthrough time must be obtained from the manufacturer of the protective gloves and must be observed. Gloves should be removed and replaced if there are any signs of degradation or breakthrough.

8.2.2.3. Respiratory protection:
Not required under normal conditions of use. In the event of inadequate ventilation, wear suitable respiratory protection

8.2.2.4. Thermal hazards

Protection against thermal

hazards:
Not required under normal conditions of use.

8.2.3. Environmental exposure controls

Environmental exposure controls:
Avoid release into the environment. Contain any spills using bunds or absorbents to prevent migration and entry into sewers or watercourses.

Other information:
Do not eat, drink or smoke whilst using this product. Handle in accordance with good industrial hygiene and safety procedures.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Colour	: Light yellow.
Appearance	: Transparent.
Odour	: Characteristic.
Odour threshold	: Not available
Melting point	: Not available
Freezing point	: Not available
Boiling point	: Not available
Flammability	: Not flammable, capable of being set alight
Explosive properties	: Not explosive.
Oxidising properties	: Not oxidising.
Explosive limits	: Not available
Lower explosion limit	: Not available
Upper explosion limit	: Not available
Flash point	: 216 °C (Cleveland Open Cup method)
Auto-ignition temperature	: Not available
Decomposition temperature	: Not available
pH	: Not available
Kinematic viscosity	: 68.73 mm²/s (40 °C)
Solubility	: Insoluble in water.
Log Kow	: Not available
Vapour pressure	: Not available
Vapour pressure at 50 °C	: Not available
Density	: 0.9973 g/cm³ (15 °C)
Relative density	: Not available
Relative vapour density at 20 °C	: Not available

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Particle characteristics	: Not applicable

9.2. Other information

9.2.1. Information regarding physical hazard classes

No further information available

9.2.2. Other safety characteristics

Other properties	: Pour point: -50.0 °C

SECTION 10: Stability and reactivity

10.1. Reactivity

Stable under recommended handling and storage conditions (see section 7).

10.2. Chemical stability

Stable under recommended handling and storage conditions (see section 7).

10.3. Possibility of hazardous reactions

None known.

10.4. Conditions to avoid

Intense heating.

10.5. Incompatible materials

Strong bases. Strong oxidising agents.

10.6. Hazardous decomposition products

Carbon dioxide. Carbon monoxide.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity (oral)	: Not classified
Acute toxicity (dermal)	: Not classified
Acute toxicity (inhalation)	: Not classified
Additional information	: Based on available data, the classification criteria are not met

Tris(methylphenyl) phosphate (1330-78-5)	
LD50 (oral), rat	> 20,000 mg/kg body weight
LD50 dermal, rabbit	3.7 g/kg
LC50 (inhalation, rat) (mg/l)	> 11.1 mg/l – 1 hour

2,6-di-tert-butyl-p-cresol (128-37-0)	
LD50 oral, rat	> 6000 mg/kg (OECD 401 method)
LD50 dermal, rat	> 2,000 mg/kg (OECD 402 method)

[[(2-ethylhexyl)oxy]methyl]oxirane (2461-15-6)	
LD50 oral, rat	> 5000 mg/kg

Skin corrosion/irritation	: Not classified
Additional information	: Based on available data, the classification criteria are not met
Serious eye damage/irritation	: Not classified
Additional information	: Based on available data, the classification criteria are not met
Respiratory or skin sensitisation	: May cause an allergic skin reaction.

Germ cell mutagenicity : Not classified
Additional information : Based on available data, the classification criteria are not met
Carcinogenicity : Not classified
Additional information : Based on available data, the classification criteria are not met

2,6-di-tert-butyl-p-cresol (128-37-0)	
IARC group	3 – Not classifiable

Reproductive toxicity : Not classified
Additional information : Based on available data, the classification criteria are not met
STOT – single exposure : Not classified
Additional information : Based on available data, the classification criteria are not met
STOT – repeated exposure : Not classified
Additional information : Based on available data, the classification criteria are not met
Aspiration hazard : Not classified
Additional information : Based on available data, the classification criteria are not met

Daphne hermetic oil PZ68S	
Kinematic viscosity	68.73 mm²/s (40 °C)

11.2. Information on other hazards

11.2.1. Endocrine-disrupting properties

Adverse health effects caused by endocrine-disrupting properties : No further information available

11.2.2. Other information

Potential adverse effects on human health and symptoms : May cause an allergic skin reaction.

SECTION 12: Ecological information

12.1. Toxicity

Hazardous to the aquatic environment, short-term (acute) : Not classified
Hazardous to the aquatic environment, long-term (chronic) : Toxic to aquatic life with long-lasting effects.

Tris(methylphenyl) phosphate (1330-78-5)	
LC50 in fish	0.6 mg/l – 96 hours (Pimephales promelas)
EC50 Daphnia	146 µg/l – 48 hours (Daphnia magna)
ErC50 algae	> 2500 µg/L – 72 hours (Pseudokirchneriella subcapitata, WAF)
NOEC (chronic) fish	0.01 mg/l – 28 days (Jordanella floridae)
NOEC chronic crustaceans	0.1 mg/l – 21 days (Daphnia magna)
NOEC (chronic) for algae	> 2500 µg/L – 72 hours (Pseudokirchneriella subcapitata, WAF)

2,6-di-tert-butyl-p-cresol (128-37-0)	
LC50 fish	> 0.57 mg/l – 96 hours (Danio rerio, EU method C.1)
LC50 fish 2	0.199 mg/l – 96 hours (QSAR)
EC50 Daphnia	0.48 mg/l – 48 hours (Daphnia magna, mobility), (OECD Method 202)
ErC50 algae	> 0.4 mg/l – 72 hours (Desmodesmus subspicatus), (EU method C.3)
NOEC (chronic) fish	0.053 mg/l – 30 days (Oryzias latipes) (OECD Method 210)
NOEC chronic crustaceans	0.069 mg/l – 21 days (Daphnia magna, reproduction) (OECD Method 211)
ErC10, algae, Chronic	> 0.4 mg/l (72 hours, Desmodesmus subspicatus, EU method C.3)

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12.2. Persistence and degradability

Tris(methylphenyl) phosphate (1330-78-5)	
Persistence and degradability	Readily biodegradable.

2,6-di-tert-butyl-p-cresol (128-37-0)	
Persistence and degradability	Not expected to be readily biodegradable.

[[(2-ethylhexyl)oxy]methyl]oxirane (2461-15-6)	
Persistence and degradability	Not biodegradable.

12.3. Bioaccumulative potential

Tris(methylphenyl) phosphate (1330-78-5)	
Log Pow	5.93

2,6-di-tert-butyl-p-cresol (128-37-0)	
Log Pow	5.1

[[(2-ethylhexyl)oxy]methyl]oxirane (2461-15-6)	
Log Pow	3.83

12.4. Mobility in soil

Tris(methylphenyl) phosphate (1330-78-5)	
Organic Carbon Normalised Adsorption Coefficient (Log Koc)	4.31

2,6-di-tert-butyl-p-cresol (128-37-0)	
Organic Carbon Normalised Adsorption Coefficient (Log Koc)	4.362 (calculated value)

12.5. Results of PBT and vPvB assessment

Daphne hermetic oil PZ68S
This substance/mixture does not meet the PBT criteria set out in Annex XIII of the REACH Regulation
This substance/mixture does not meet the vPvB criteria set out in Annex XIII of the REACH Regulation

12.6. Endocrine-disrupting properties

No further information available

12.7. Other adverse effects

Additional information : Avoid release into the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Dispose of safely in accordance with local/national regulations. Empty containers should be taken to an approved waste disposal site for recycling or disposal. The correct waste code must be determined by the producer of the waste, based on how the waste was generated.
Additional information : Handle empty containers with care.
Ecology – waste materials : Avoid release into the environment.

SECTION 14: Transport information

In accordance with ADR / IMDG / IATA

14.1. UN number or ID number

UN No. (ADR) : UN 3082
UN No. (IMDG) : UN 3082
UN No. (IATA) : UN 3082

14.2. UN proper shipping name

Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Tris(methylphenyl) phosphate, 2,6-di-tert-butyl-p-cresol)
Proper Shipping Name (IMDG) : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Tris(methylphenyl) phosphate, 2,6-di-tert-butyl-p-cresol)
Proper Shipping Name (IATA) : Environmentally hazardous substance, liquid, n.o.s. (Tris(methylphenyl) phosphate, 2,6-di-tert-butyl-p-cresol)
Transport document description (ADR) : UN 3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Tris(methylphenyl) phosphate, 2,6-di-tert-butyl-p-cresol), 9, III, (-)
Transport document description (IMDG) : UN 3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Tris(methylphenyl) phosphate, 2,6-di-tert-butyl-p-cresol), 9, III, MARINE POLLUTANT Transport
document description (IATA) : UN 3082 Environmentally hazardous substance, liquid, n.o.s. (Tris(methylphenyl) phosphate, 2,6-di-tert-butyl-p-cresol), 9, III

14.3. Transport hazard class(es)

ADR
Transport hazard class(es) (ADR) : 9
Hazard labels : 9

IMDG
Transport hazard class(es) (IMDG) : 9
Danger labels (IMDG) : 9

IATA
Transport hazard class(es) (IATA) : 9
Danger labels (IATA) : 9

14.4. Packing group

Packing group : III
Packing group (IMDG) : III
Packing group (IATA) : III

14.5. Environmental hazards

Dangerous for the environment : Yes
Marine pollutant : Yes
Other information : No further information available

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14.6. Special precautions for users

Overland transport
Tunnel restriction code (ADR) : -

Transport by sea
No data available

Air transport
No data available

14.7. Maritime transport in bulk in accordance with IMO instruments

Not applicable

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific to the substance or mixture

15.1.1. EU regulations

EU Restriction List (REACH Annex XVII)

Reference code	Applicable to	Entry title or description
3.	Daphne hermetic oil PZ68S; Poly[oxy(methyl-1,2-ethanediyl)], α-methyl-ω-methoxy- ; [[(2-ethylhexyl)oxy]methyl]oxirane; tris(methylphenyl) phosphate	Liquid substances or mixtures which are classified as dangerous in accordance with Directive 1999/45/EC or which meet the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008
3(b)	Daphne hermetic oil PZ68S; Poly[oxy(methyl-1,2-ethanediyl)], α-methyl-ω-methoxy- ; [[(2-ethylhexyl)oxy]methyl]oxirane; tris(methylphenyl) phosphate	Substances or mixtures meeting the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard classes 3.1 to 3.6, 3.7 adverse effects on sexual function and fertility or on development, 3.8 effects other than narcotic effects, 3.9 and 3.10
3(c)	Daphne hermetic oil PZ68S; Tris(methylphenyl) phosphate	Substances or mixtures meeting the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard class 4.1

Contains no substance on the REACH Candidate List Contains no REACH Annex XIV substances
Contains no substance subject to Regulation (EU) No 649/2012 of the European Parliament and of the Council of 4 July 2012 concerning the export and import of hazardous chemicals.
Contains no substance subject to Regulation (EU) No 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants
Contains no substance subject to Regulation (EU) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer.
Contains no substance subject to Regulation (EU) 2019/1148 of the European Parliament and of the Council of 20 June 2019 on the marketing and use of explosives precursors.
Contains no substance subject to Regulation (EC) No 273/2004 of the European Parliament and of the Council of 11 February 2004 on the manufacture and placing on the market of certain substances used in the illicit manufacture of narcotic drugs and psychotropic substances.

15.1.2. National regulations

No further information available

15.2. Chemical safety assessment

No chemical safety assessment has been carried out

SECTION 16: Other information

Abbreviations and acronyms:	
	ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road)
	BCF (Bioconcentration factor)
	CAS (Chemical Abstracts Service) number
	CLP (Classification, Labelling and Packaging)
	DNEL (Derived No Effect Level)
	EC (European Community)
	EC50 (Effective Concentration 50%)
	EN (European Standard)
	IARC (International Agency for Research on Cancer)
	IATA (International Air Transport Association)
	IBC (Intermediate Bulk Container)
	IMDG (International Maritime Dangerous Goods Code)
	IOELV (Indicative Occupational Exposure Limit)
	Koc (soil adsorption coefficient)
	LC50 (Lethal Concentration 50%)
	LD50 (Lethal Dose 50%)
	OECD (Organisation for Economic Co-operation and Development)
	OEL (Occupational Exposure Limit)
	NOEC (No Observed Effect Concentration)
	PBT (Persistent, Bioaccumulative and Toxic)
	PNEC (Predicted No Effect Concentration)
	QSAR (Quantitative Structure-Activity Relationship)
	REACH (Registration, Evaluation and Authorisation of Chemicals)
	SCOEL (Scientific Committee on Occupational Exposure Limits)
	STEL (Short-Term Exposure Limit)
	TWA (Time-Weighted Average)
	UNxxxx (Number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods)
	UVCB (Unknown or Variable Composition, Complex Reaction Products or Biological Materials)
	vPvB (very Persistent and very Bioaccumulative)
	WAF (Water-Accommodated Fraction)

Data sources : REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on the classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

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Other information : Classification procedure in accordance with Regulation (EC) No. 1272/2008 [CLP]: Physical hazards: Based on test data. Health hazards: Calculation method. Environmental hazards: Calculation method.

Full text of H- and EUH-statements:	
Aquatic Acute 1	Hazardous to the aquatic environment — Acute hazard, Category 1
Aquatic Chronic 1	Hazardous to the aquatic environment — Chronic hazard, Category 1
Chronic aquatic hazard, Category 2	Hazardous to the aquatic environment — Chronic hazard, Category 2
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H361	Suspected of damaging fertility or the unborn child.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life, with long-lasting effects.
H411	Toxic to aquatic life with long-lasting effects.
Repro. 2	Reproductive toxicity, Category 2
Skin Irrit. 2	Skin corrosion/irritation, Category 2
Skin Sens. 1	Skin sensitisation, Category 1
Skin Sens. 1A	Skin sensitisation, Category 1A

Safety Data Sheet (SDS), EU

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

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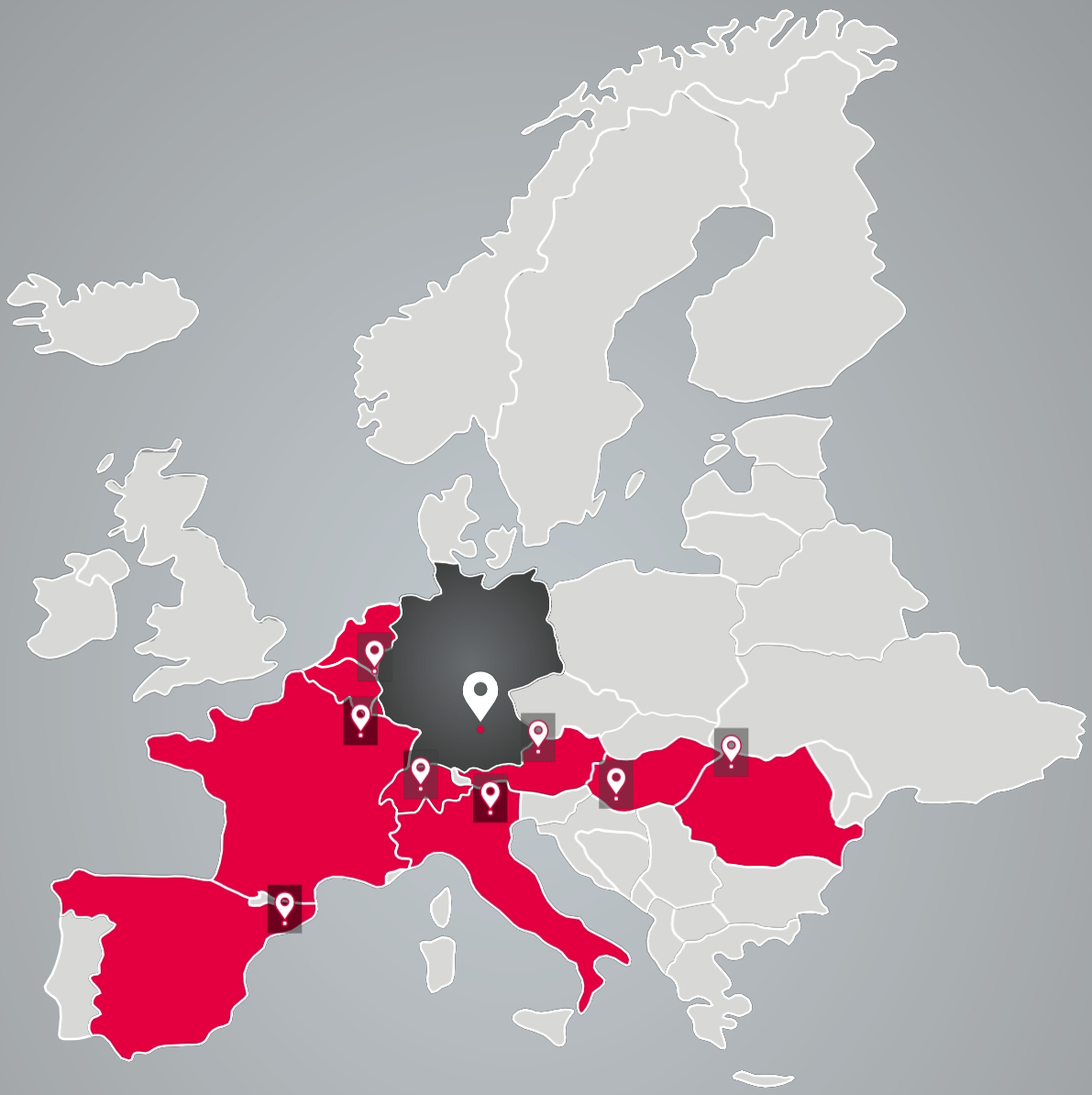

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