

Technical data

DualGuard-S – central battery system

DualGuard-S compact cabinets

Model	DualGuard-S 28	DualGuard-S 20	DualGuard-S LAD 100
Control section: ACU DG-S & HMI	1	1	1
PSU	1	1	1
BCM.1	1	1	1
SKU.1 CG-S circuit module	0-28 *2	0-20 *2	0-3
CM.1 1.7A charging module	0-1	0-1	0-1
CM.1 3.4A charging module	0-6 *1	0-6 *1	0-8
Cabinet design, electric:			
Rated voltage	400/230V	400/230V	400/230V
Rated frequency	50/60 Hz	50/60 Hz	50/60 Hz
Cable placement and grounding system in mains mode / battery mode	TN-C-S/IT	TN-C-S/IT	TN-C-S/IT
Max. ambient temperature *4	-5°C to +35°C	-5°C to +35°C	-5°C to +35°C
Protection class	1	1	1
Degree of protection	IP21	IP21	IP21
Max. rated current (mains) [$\sum$ L1, L2, L3] [A]	80	80	100
Max. rated output (mains) [KW]	18.4	18.4	23
Max. rated current (battery) [A]	80	80	100
Max. rated output (battery) [KW]	17.3	17.3	21.6
Three-phase split	yes	yes	yes
Connection diameter for mains and battery feed	50 mm ²	50 mm ²	50 mm ²
Outlet distributor	0- 6 outlets	0- 6 outlets	0- 15 outlets DC and AC 1-phase, 0-5 outputs AC 3-phase
Terminal capacity	16 mm ²	16 mm ²	16 mm ²
Max. connection diameter final circuit	4 mm ²	4 mm ²	4 mm ²
Max. number of final circuit connections	88	88	14
Cabinet design, mechanical:			
Dimensions H x W x D (mm)	2070 x 800 x 405	2070 x 800 x 405	2040 x 800 x 405
Material/design	Sheet steel/free-standing cabinet	Sheet steel/free-standing cabinet	Sheet steel/free-standing cabinet
Hinge position	Right	Right	Right
Outer finish	Powder coating	Powder coating	Powder coating
Color	RAL 7035	RAL 7035	RAL 7035
Color touch in-door	Yes	Yes	Yes
Partial glazed door	–	–	–
Lock mechanism	3 mm double ward key	3 mm double ward key	3 mm double ward key
cable inlets on top	Yes	Yes	Yes
Cable inlets on bottom	Yes	Yes	Yes
Base (optional)	100/200	100/200	100/200
Weight (w/o battery)	approx. 180 kg	approx. 170 kg	approx. 170 kg
Battery capacity, integrated into:			
Battery cabinet (H x W x D: 2050 x 800 x 400 mm)	23.3-245 Ah	23.3-245 Ah	23.3-308 Ah
Compact cabinet	–	–	–
Battery rack	23.3-245 Ah	23.3-245 Ah	23.3-308 Ah

Other battery sizes on request

*1 When equipped with more than 4 charging modules CM 3.4 A, an upgrade to charging module rack 8-way is necessary.

*2 When equipped with more than 13 SKU.1 CG-S 4 x 1.5 A or 26 SKU.1 CG-S 2 x 3 A/1 x 6 A, a second PSU module is necessary.

*3 When equipped with 1 charging module CM 3.4 A, an additional charging module rack 1-way must be configured.

*4 Optimum ambient temperature battery +20 °C.

DualGuard-S 20C6	DualGuard-S 12C6	DualGuard-S 12C	DualGuard-S 12C4	DualGuard-S 4C3
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
0-20 *2	0-12	0-12	0-12	0-5
0-1	0-1	0-1	1	1
0-2	0-2	0-1 *3	–	–
400/230V	230V	230V	230V	230V
50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
TN-C-S/IT	TN-C-S/IT	TN-C-S/IT	TN-C-S/IT	TN-C-S/IT
-5°C to +35°C	-5°C to +35°C	-5°C to +35°C	-5°C to +35°C	-5°C to +35°C
1	1	1	1	1
IP21	IP21	IP21	IP21	IP21
50	50	35	25	12
14.5	14.5	13.8	5.8	3.5
50	50	35	25	12
13.6	13.6	7.6	5.4	2.6
–	–	–	–	–
35 mm ²	35 mm ²	35 mm ²	35mm ² /10mm ²	35mm ² /10mm ²
2 outlets	1 outlet	1 outlet	1 outlet	–
35 mm ²	35 mm ²	35 mm ²	16 mm ²	–
4 mm ²	4 mm ²	4 mm ²	4 mm ²	4 mm ²
68	48	48	48	20
2070 x 800 x 605	2040 x 800 x 605	2040 x 800 x 405	1800 x 600 x 405	1000 x 600 x 305
Compact cabinet	Compact cabinet	Compact cabinet	Compact cabinet	Compact cabinet
Right	Right	Right	Right	Right
Powder coating	Powder coating	Powder coating	Powder coating	Powder coating
RAL 7035	RAL 7035	RAL 7035	RAL 7035	RAL 7035
–	–	–	–	–
Yes	Yes	Yes	Yes	Yes
3mm double ward key	3mm double ward key	3mm double ward key	3mm double ward key	3mm double ward key
Yes	Yes	Yes	Yes	Yes
No	No	No	No	No
100/200	100/200	100/200	100/200	–
approx. 220 kg	approx. 190 kg	approx. 155 kg	approx. 115 kg	approx. 50 kg
–	–	–	–	–
5.5-89.4 Ah	5.5-89.4 Ah	5.5-53.7 Ah	5.5-23.3 Ah	5.5-18 Ah
–	–	–	–	–

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DualGuard-S US sub-stations

Model	DualGuard-S US 38	DualGuard-S US 30	DualGuard-S US 23	DualGuard-S US 15	DualGuard-S US 7
Modules:					
Control section: ACU DG-S & HMI	1	1	1	1	1
PSU	1	1	1	1	1
SKU.1 CG-S circuit module	0-38 *2	0-30 *2	0-23 *1	0-15	0-7
Cabinet design, electric:					
Rated voltage	400/230V	400/230V	230V	230V	230V
Rated frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Cable placement and grounding system in mains/battery mode	TN-C-S/IT	TN-C-S/IT	TN-C-S/IT	TN-C-S/IT	TN-C-S/IT
Max. ambient temperature range	-5°C to +35°C	-5°C to +35°C	-5°C to +35°C	-5°C to +35°C	-5°C to +35°C
Protection class	1	1	1	1	1
Degree of protection	IP21	IP21	IP54	IP54	IP54
Max. rated current (mains) [$\sum$ L1, L2, L3] [A]	80	80	50	50	25
Max. rated output (mains) [KW]	18.4	18.4	11.5	11.5	6.9
Max. rated current (battery) [A]	80	80	50	50	25
Max. rated output (battery) [KW]	17.3	17.3	10.8	10.8	6.5
Three-phase split	Yes	Yes	No	No	No
Connection diameter for mains and battery feed	35 mm ²	35 mm ²	35 mm ²	35 mm ²	10 mm ²
Terminal capacity	–	–	–	–	–
Max. connection diameter of final circuit	4 mm ²	4 mm ²	4 mm ²	4 mm ²	4 mm ²
Max. number of final circuit connections	88	88	52	32	28
Cabinet design, mechanical:					
Dimensions H x W x D (mm)	2070 x 800 x 405	2070 x 800 x 405	1200 x 600 x 305	800 x 600 x 305	750 x 400 x 305
Material/design	Sheet steel/ free-standing cabinet	Sheet steel/ free-standing cabinet	Sheet steel/wall cabinet	Sheet steel/wall cabinet	Sheet steel/wall cabinet
Hinge position	Right	Right	Right	Right	Right
Outer finish	Powder coating	Powder coating	Powder coating	Powder coating	Powder coating
Color	RAL 7035	RAL 7035	RAL 7035	RAL 7035	RAL 7035
Partial glazed door	Yes	Yes	No	No	No
Lock mechanism	3 mm double ward key	3 mm double ward key	3 mm double ward key	3 mm double ward key	3 mm double ward key
Cable inlets on top	Yes	Yes	Yes	Yes	Yes
Cable inlets on bottom	Yes	Yes	No	No	No
Base (optional)	100/200	100/200	–	–	–
Weight (w/o battery)	approx. 170 kg	approx. 165 kg	approx. 110 kg	approx. 75 kg	approx. 42 kg

*1 A maximum of 12 SKU.1 CG-S 4 x 1.5 A may be installed.

DualGuard-S SOU sub-stations

Model	SOU2	SOU1
SKU.1 CG-S *1 circuit module	including 2 x SOU CG-S 2 x 4A	including 1 x SOU CG-S 2 x 4A
Cabinet design, electric:		
Rated voltage	230V	230V
Rated frequency	50/60 Hz	50/60 Hz
Cable placement and grounding system in mains/ battery mode	TN-C-S/IT	TN-C-S/IT
Max. ambient temperature range	-5°C to +35°C	-5°C to +35°C
Protection class	2	2
Degree of protection	IP65	IP65
Max. rated current (mains) $\sum L1, L2, L3$ [A]	16	8
Max. rated output (mains) [KW]	3.6	1.8
Max. rated current (battery) [A]	16	8
Max. rated output (battery) [KW]	3.4	1.7
Three-phase split	No	No
Connection diameter for mains and battery feed	10 mm ²	10 mm ²
Max. connection diameter of final circuit	4 mm ²	4 mm ²
Max. number of final circuit connections	4	2
Cabinet design, mechanical:		
Dimensions H x W x D (mm)	583 x 295 x 129	458 x 295 x 129
Material/design	Plastic small distribution board	Plastic small distribution board
Hinge position	Right	Right
Color	RAL 7035	RAL 7035
Partial glazed door	Yes	Yes
Lock mechanism	On request	On request
Cable inlets on top	Yes	Yes
Weight (w/o battery)	approx. 8.8 kg	approx. 7.5 kg

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DualGuard-S ESF sub-stations

Model	DualGuard-S ESF30 15P	DualGuard-S ESF30 30P
Modules:		
Control section: ACU DG-S & HMI	1	1
PSU	1	1
SKU.1 CG-S 1 x 6A circuit module	0-15	0-30
SKU.1 CG-S 2 x 3A circuit module	0-15	0-30
SKU.1 CG-S 4 x 1.5A circuit module	0-15	0-30
DLS/TLS interface module	1	2
Cabinet design, electric:		
Rated voltage	230V	400/230V
Rated frequency	50/60 Hz	50/60 Hz
Ventilation, decibel level (dB)	55	55
Cable placement and grounding system in mains/battery mode	TN-C-S/IT	TN-C-S/IT
Max. ambient temperature range	-5°C to +35°C	-5°C to +30°C
Protection class	I	I
Degree of protection	IP42	IP42
Max. total rated current [A] relative to ambient temperature		
+25°C		
+30°C	33	48
+35°C	33	48
	33	48
Max. total rated output [A] relative to ambient temperature		
+25°C	7	10.3
+30°C	7	10.3
+35°C	7	10.3
Three-phase split	No	Yes
Connection diameter for mains and battery feed	35 mm ²	35 mm ²
Max. connection diameter of final circuit	4 mm ²	4 mm ²
Max. number of final circuit connections	40	58
Cabinet design, mechanical:		
Dimensions H x W x D (mm)	1265 x 898 x 449	2278x918x604
Material/design	Coated gypsum fiber-board/wall cabinet	Coated gypsum fiber-board/free-standing cabinet
Hinge position	Right	Right
Color	RAL 7035	RAL 7035
Cable entry	From above	From above
Base (optional)	–	– only with base
Weight	235 kg	approx. 420 kg
Licenses/certifications		
ABZ housing including components Z-86.3 ...	Yes	Yes
ABZ empty housing Z-86.1 ...	Yes	Yes
Summary report for functional integrity fire test MPA NRW	Yes	Yes
VDE certificate	–	–
Specialized company declaration	Yes	Yes

DualGuard-S ESF sub-stations SOU

Model	ESF30 SOU5	ESF30 SOU4 IO	ESF30 SOU3	ESF30 SOU2	ESF30 SOU1
Modules:					
SOU CG-S 2 x 4 A circuit switching module	5	4	3	2	1
3-PM-IO / 3-PM-IO-INV Modules	–	0-2	–	–	–
Cabinet design, electric:					
Rated voltage	230V	230V	230V	230V	230V
Rated frequency	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz
Ventilation, decibel level (dB)	–	–	–	–	–
Cable placement and grounding system in mains/battery mode	TN-C-S/IT	TN-C-S/IT	TN-C-S/IT	TN-C-S/IT	TN-C-S/IT
Max. ambient temperature range	-5°C to +35°C	-5°C to +35°C	-5°C to +35°C	-5°C to +35°C	-5°C to +35°C
Protection class	II	II	II	II	II
Degree of protection	IP54	IP54	IP54	IP54	IP54
Maximum installed heat dissipation performance [W]					
Max. total rated current [A] relative to ambient temperature					
+25°C	33	33	20	15	8
+30°C	28	28	17	12	6
+35°C	16	16	10	9	5
Max. total rated power [W] relative to ambient temperature					
+25°C	7.1	7.1	4.3	3.2	1.7
+30°C	6.0	6.0	3.6	2.5	1.2
+35°C	3.4	3.4	2.1	1.9	1.0
Three-phase split	No	No	No	No	No
Connection diameter for mains and battery feed	10 mm ²	10 mm ²	10 mm ²	10 mm ²	10 mm ²
Max. connection diameter final circuit	4 mm ²	4 mm ²	4 mm ²	4 mm ²	4 mm ²
Max. number of final circuit connections	10	8	6	4	2
Cabinet design, mechanical:					
Dimensions H x W x D (mm)	1228 x 478 x 295	1228 x 478 x 295	928 x 478 x 295	778 x 478 x 295	628 x 478 x 295
Material/design	Fire protection panels	Fire protection panels	Fire protection panels	Fire protection panels	Fire protection panels
Hinge position	Left	Left	Left	Left	Left
Color	RAL 7035	RAL 7035	RAL 7035	RAL 7035	RAL 7035
Cable entry	From above	From above	From above	From above	From above
Weight (w/o battery)	approx. 103 kg	approx. 103 kg	approx. 80 kg	approx. 69 kg	approx. 60 kg
Licenses/certifications					
ABZ housing including components Z-86.2 ...	Will be required	Will be required	Will be required	Will be required	Will be required
ABZ empty housing Z-86.1 ...	Yes	Yes	Yes	Yes	Yes
Summary report for functional integrity	Yes	Yes	Yes	Yes	Yes
fire test MPA STGT					
VDE certificate	–	–	–	–	–
CE declaration of conformity	Yes	Yes	Yes	Yes	Yes

Determination of battery capacity

DualGuard-S – central battery system

Table 1

Determining the required battery capacity from maintenance-free AGiV block batteries as per EN 50171 (larger battery capacities on request).

C10 battery capacity at 1.8V/cell and +20°C	Ah	5.5	8.5	16.0	23.3	32.0	39.8	50.4	53.7	66.2	85.7	89.4	106.0	118.0	143.1	155.6	178.8	195.4	245.0	268.2	308.0	357.6
													1 x 39.8 1 x 66.2		1 x 89.4 1 x 53.7	1 x 89.4 1 x 66.2	2 x 89.4	1 x 89.4 1 x 66.2	1 x 39.8 2 x 89.4	1 x 66.2 3 x 89.4	3 x 89.4 1 x 39.8	4 x 89.4
Max. discharge current [A] at rated operating period [h], 1.8V per cell and +20°C ambient temperature	1.0	3.2	4.5	10.7	15.4	20.2	24.1	30.7	37.9	49.2	52.6	63.8	73.3	85.1	101.7	113.0	127.6	137.1	176.8	191.4	215.5	255.2
	1.5	2.5	3.4	8.3	11.9	15.0	19.0	22.7	27.6	34.5	38.3	46.1	53.5	60.0	73.7	80.6	92.2	99.6	126.7	138.3	157.3	194.7
	2.0	2.1	2.9	6.0	9.2	12.3	14.6	18.5	21.5	26.3	31.0	36.0	40.9	46.9	57.5	62.3	72.0	76.9	98.3	108.0	122.6	144.0
	3.0	1.5	2.1	4.4	6.9	9.1	11.0	13.6	15.8	18.2	23.1	26.5	29.2	33.3	42.3	44.7	53.0	55.7	71.2	79.5	90.5	106.0
	8.0	0.7	1.0	1.9	2.8	3.7	4.8	5.9	6.6	7.9	10.3	11.0	12.7	14.2	17.6	18.9	22.0	23.7	29.9	33.0	37.8	44.0

Special note: The aging allowance of 25% for the batteries is not included in the discharge current figures.

Table 2

Number of 1.7A and 3.4A charging modules given a recharging time as per DIN EN 50171 of:

C10 battery capacity at 1.8 V/cell and +20°C	h	A	5.5	8.5	16.0	23.3	32.0	39.8	50.4	53.7	66.2	85.7	89.4	106.0	118.0	143.1	155.6	178.8	195.4	245.0	268.2	308.0	357.6
12 hours/80%	1.0	1.7	1	1	1	1	1	0	0	0	1	1	1	0	0	1	0	0	1	1	1	1	0
		3.4	0	0	0	0	0	1	1	1	1	1	1	1	2	2	2	3	3	3	4	4	5
	1.5	1.7	1	1	1	1	0	0	0	0	1	1	0	0	1	0	0	1	1	1	0	0	1
		3.4	0	0	0	0	1	1	1	1	1	1	2	2	2	3	3	3	3	4	5	6	6
	2.0	1.7	1	1	1	1	0	0	0	0	1	1	0	0	1	0	0	1	0	0	1	0	0
		3.4	0	0	0	0	1	1	1	1	1	1	2	2	2	3	3	3	4	5	5	6	7
	3.0	1.7	1	1	1	1	0	0	0	1	1	1	0	1	1	0	1	0	0	0	0	1	1
		3.4	0	0	0	0	1	1	1	1	1	1	2	2	2	3	3	4	4	5	6	6	7
	8.0	1.7	1	1	1	0	0	0	1	1	1	0	0	1	0	1	0	1	1	0	1	1	1
		3.4	0	0	0	1	1	1	1	1	1	2	2	2	3	3	4	4	4	6	6	7	8

Table 3

Number of battery cabinets; battery weight

C10 battery capacity at 1.8V/cell and +20°C	5.5	8.5	16.0	23.3	32.0	39.8	50.4	53.7	66.2	85.7	89.4	106.0	118.0	143.1	155.6	178.8	195.4	245.0	268.2	308.0	357.6
Number of battery cabinets (weight/cabinet approx. 150 kg)	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	4	4
Total weight per battery set approx. kg	45	65	99	180	243	252	351	405	499	527	594	612	900	1000	1093	1296	1354	1687	1782	1782	2376

Table 4

Determination of air supply and ventilation in electrical operating rooms according to DIN EN IEC 62485-2 (calculated for boost charge):

216V battery	5.5	8.5	16.0	23.3	32.0	39.8	50.4	53.7	66.2	85.7	89.4	106.0	118.0	143.1	155.6	178.8	195.4	245.0	268.2	308.0	357.6
Air volume flow required to ventilate the installation space [m³/h]	0.24	0.37	0.69	1.01	1.38	1.72	2.18	2.32	2.86	3.70	3.86	4.58	5.10	6.18	6.72	7.72	8.44	10.58	11.59	13.31	15.45
Ventilation cross-section of the inlet and outlet openings of the installation space [cm²]	6.65	10.28	19.35	28.18	38.71	48.14	60.96	64.96	80.08	103.66	108.14	128.22	142.73	173.09	188.21	216.28	236.36	296.35	324.41	372.56	432.55

Table 5

Determination of air supply and ventilation in electrical operating rooms according to DIN EN IEC 62485-2 (calculated for trickle charge*):

216V battery	5.5	8.5	16.0	23.3	32.0	39.8	50.4	53.7	66.2	85.7	89.4	106.0	118.0	143.1	155.6	178.8	195.4	245.0	268.2	308.0	357.6
Air volume flow required to ventilate the installation space [m³/h]	0.03	0.05	0.09	0.13	0.17	0.21	0.27	0.29	0.36	0.46	0.48	0.57	0.64	0.77	0.84	0.97	1.06	1.32	1.45	1.66	1.93
Ventilation cross-section of the inlet and outlet openings of the installation space [cm²]	0.83	1.29	2.42	3.52	4.84	6.02	7.62	8.12	10.01	12.96	13.52	16.03	17.84	21.64	23.53	27.03	29.54	37.04	40.55	46.57	54.07

* If a boost charge is not frequently used (for example, once a month), the air flow rate for ventilation can be calculated based on the trickle charge current.