



APPENDIX

CP inverter

CP100TR, CP200TR, CP200TL & CP140TR-LV

CENTRAL POWER GRID CONNECTED SOLAR INVERTER



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1 MAXIMUM POWER POINT TRACKER (MPPT)

1.1 FLOWCHARTS

1.1.1 Total overview

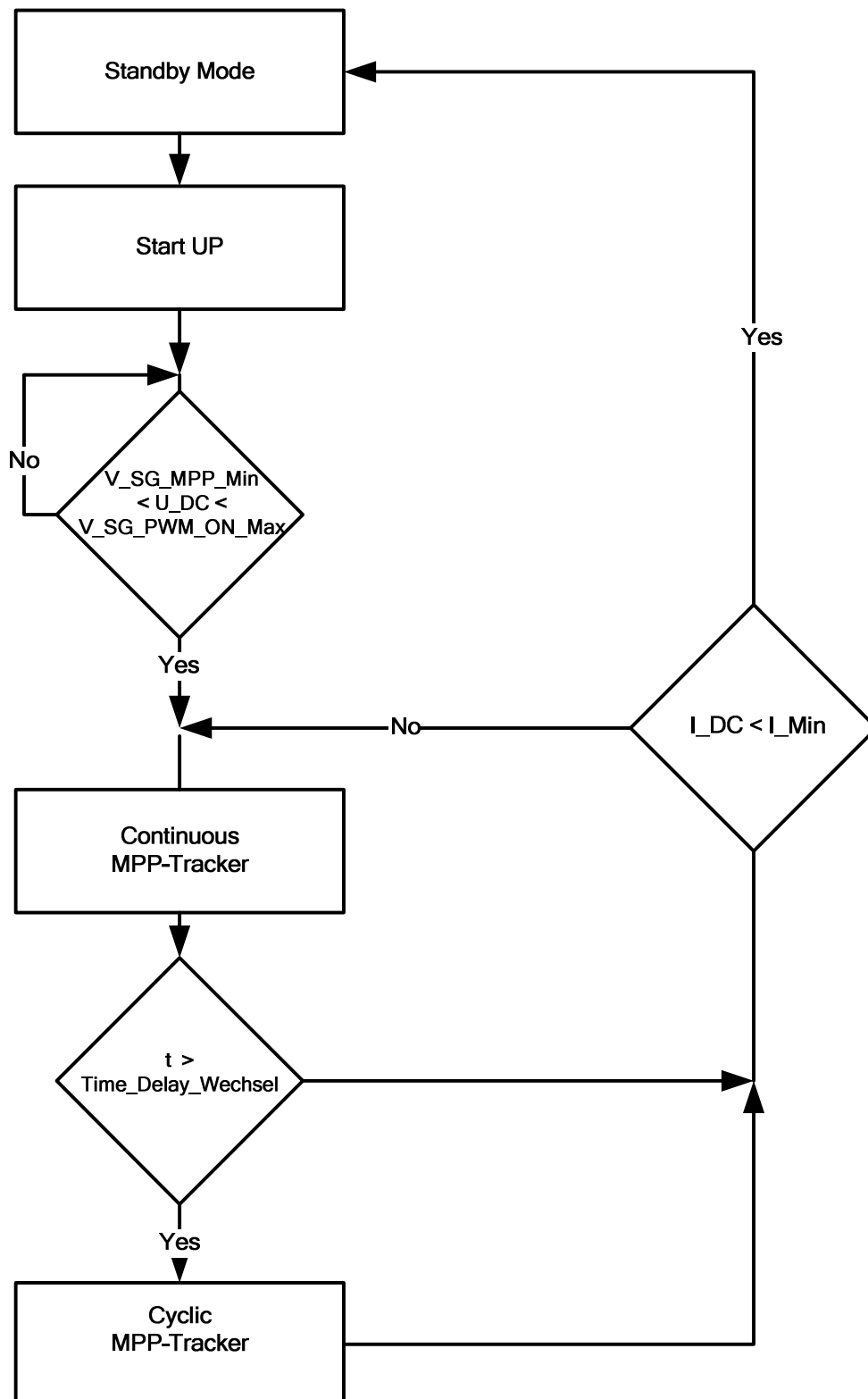


Figure xx: Total overview Stand-by mode, Start-up, Continuous MPPT and Cyclic MPPT

1.1.2 Start-up

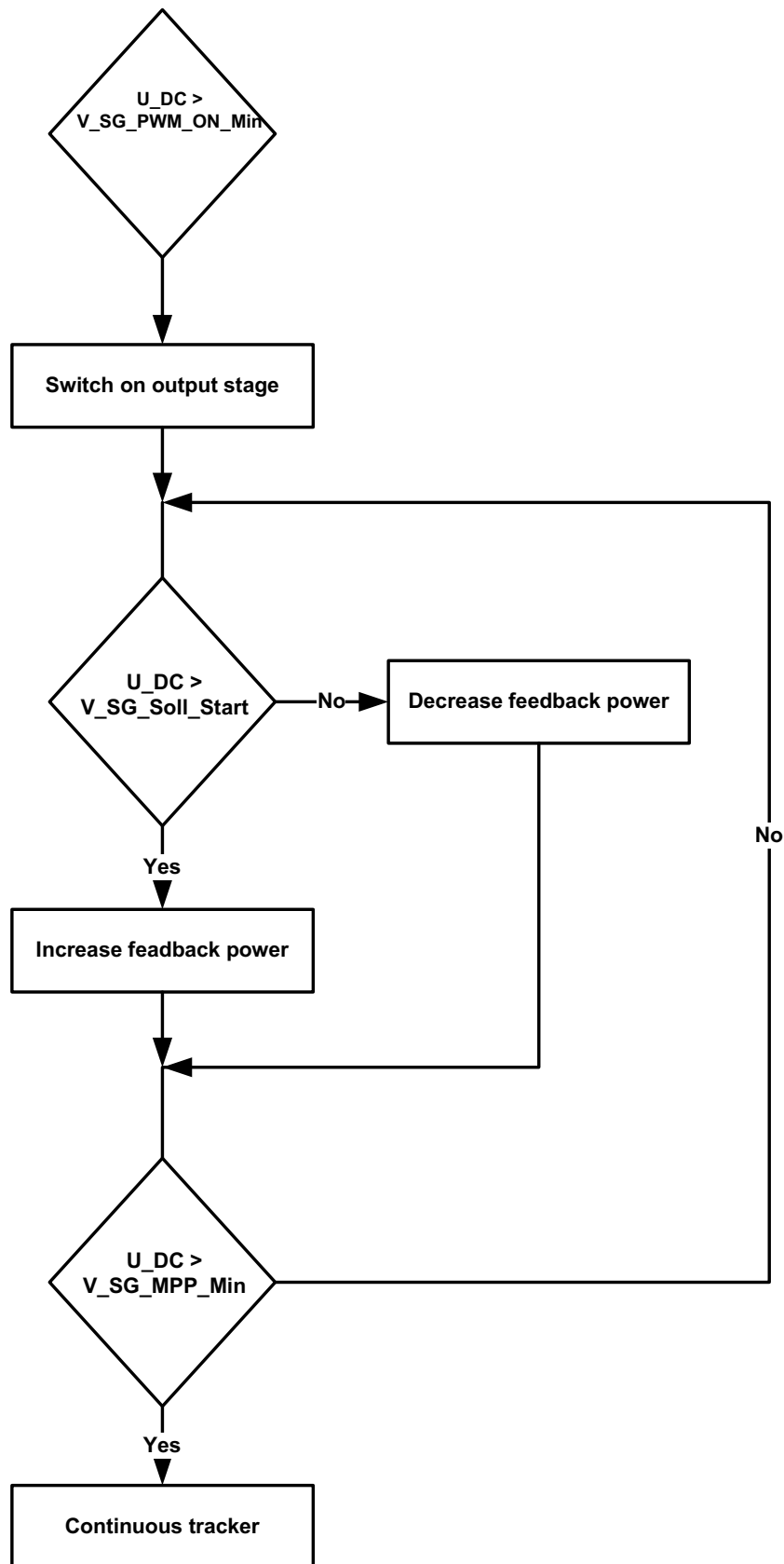


Figure xx: Flowchart of the Start-up mode

1.1.3 Continuous MPPT

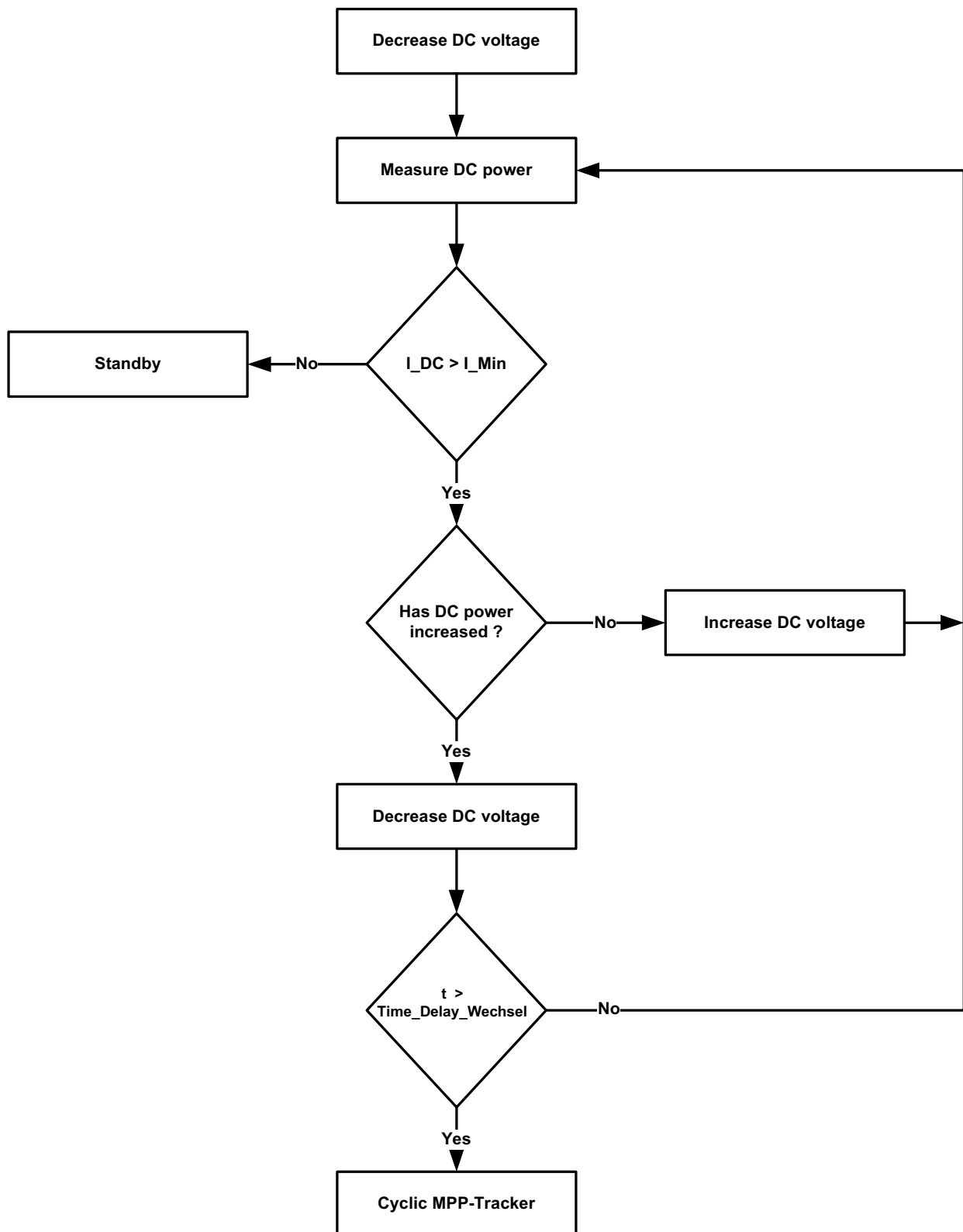


Figure xx: Flowchart of the Continuous MPP Tracker

1.1.4 Cyclic MPPT

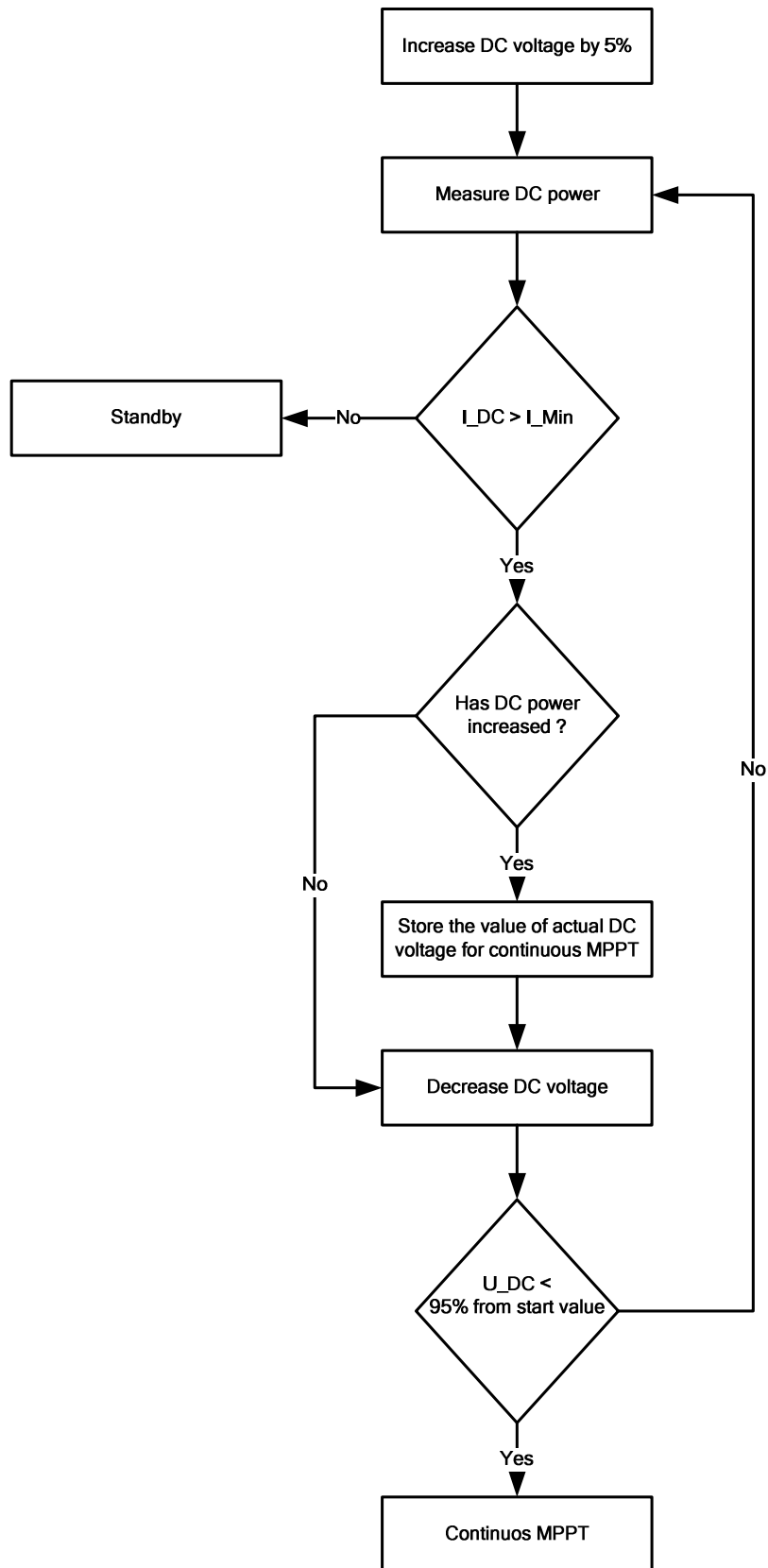


Figure xx: Flowchart of the Cyclic MPP Tracker

1.2 CONFIGURATION OF THE MPPT

To change the configuration of the MPP Tracker, updating of the source code is necessary. This may only be performed by a Mastervolt authorized service agent.



CAUTION!

Changing the configuration of the MPP Tracker may lead to unsafe operation of the CP-inverter and/or serious damage to the CP inverter. Therefore adjustment of the configuration settings may be undertaken by a Mastervolt authorized service agent only!

The configurable parameters of the MPP Tracker are listed below:

MPPT:

V SG K1 ON Min:	Minimal U _{DC} for Switch ON of AC contactor
V SG K1 ON Max:	Maximal U _{DC} for Switch ON of AC contactor
V SG PWM ON Min:	Minimal U _{DC} for PWM ON
V SG PWM ON Max:	Maximal U _{DC} for PWM ON
V SG K1 OFF:	Minimal U _{DC} for Stay ON of AC contactor
V SG Soll Start:	First U _{DC} value for U _{PV}
V SG MPP Min:	Minimal U _{DC} for MPP Mode
V SG MPP Max:	Maximal U _{DC} for MPP Mode
V SG Regel Min:	Minimal U _{DC} for PID
V SG Regel Max:	Maximal U _{DC} for PID
Delay Restart:	Delay restart after P _{DC} < P _{DC} Min event
Delay Start:	Delay between AC Switch ON contactor and PWM On
control.bits.MPPT_Testmode	De-/ Active MPPT

Continuous MPPT:

cont.I_min	Minimal current for MPPT
cont.Schrittweite	Step size
cont.Delay_Scanwert	Time for engaging the new U _{DC} value
cont.Delay_Messen	measuring time
cont.Delay_Wechsel	Time between 2 Cyclic MPPT scans

Cyclic MPPT:

cyc.I_min	Minimal current for MPPT
cyc.Grenz_Max	Maximum limit of scan area (percent) in regard to actual U _{DC} value
cyc.Scan_Breite	Maximum scan area (percent)
cyc.Schrittweite	Step size
cyc.Delay_Scanwert	Time for engaging the new U _{DC} value
cyc.Delay_Messen	measuring time
cyc.Delay_Wechsel	Time between change Cyclic and Continuous MPPT scans

Default settings of the MPPT parameters

Parameter	Default value	Measuring unit
V_SG_K1_ON_Min	4800	[100mV]
V_SG_K1_ON_Max	9000	[100mV]
V_SG_PWM_ON_Min	5000	[100mV]
V_SG_PWM_ON_Max	9000	[100mV]
V_SG_K1_OFF	4600	[100mV]
V_SG_Soll_Start	5000	[100mV]
V_SG_MPP_Min	4800	[100mV]
V_SG_Regel_Min	4500	[100mV]
V_SG_Regel_Max	9000	[100mV]
Delay_Restart	30	(Sec.)
Delay_Start	10	(Sec.)
cyc.I_min	20	[100mA]
cyc.Grenz_Max	105	[Percent]
cyc.Scan_Breite	10	[Percent]
cyc.Schrittweite	50	[100mV]
cyc.Delay_Scanwert	1000	[Cycles]
cyc.Delay_Messen	5000	[Cycles]
cyc.Delay_Wechsel	10000	[Cycles]
cont.I_min	20	[100mA]
cont.Schrittweite	30	[100mV]
cont.Delay_Scanwert	200	[Cycles]
cont.Delay_Messen	2800	[Cycles]
cont.Delay_Wechsel	2500	[Cycles]

2 ERROR CODES

Code	Error description	Possible cause
0	No error	
1		
2		
3		
4		
5		
6		
7		
8		
9		
10	Temperature errors	
11	Temperature Inverter Phase L1, HW-driver	Temperature IGBT L1 > 90°C; check the fan.
12	Temperature Inverter Phase L1, Software	
13	Temperature Inverter Phase L2, HW-driver	Temperature IGBT L2 > 90°C; check the fan.
14	Temperature Inverter Phase L2, Software	
15	Temperature Inverter Phase L3, HW-driver	Temperature IGBT L3 > 90°C; check the fan.
16	Temperature Inverter Phase L3, Software	
17	n.a.	
18	Temperature ambient	Ambient temperature > 50°C; check airflow.
19	n.a.	
20	Temperature water	
21	Temperature controlcard	Ambient temperature > 50°C; check airflow.
22	No error	
23	No error	
24		
25		
26		
27		
28		
29		
30	General Overcurrent errors	
31	Overcurrent Inverter Phase L1, HW-driver	Phase current too high
32	Overcurrent Inverter Phase L1, HW controlcard	Phase current too high
33	Overcurrent Inverter Phase L1, Software	Phase current L1 > 400A
34	Overcurrent Phase L1, Software	Grid current L1 > 180A
35	Overcurrent Inverter Phase L2, HW-driver	Phase current too high
36	Overcurrent Inverter Phase L2, HW controlcard	Phase current too high
37	Overcurrent Inverter Phase L2, Software	Phase current L2 > 400A
38	Overcurrent Phase L2, Software	Grid current L2 > 180A
39	Overcurrent Inverter Phase L3, HW-driver	Phase current too high
40	Overcurrent Inverter Phase L3, HW controlcard	Phase current too high
41	Overcurrent Inverter Phase L3, Software	Phase current L3 > 400A
42	Overcurrent Phase L3, Software	Grid current L3 > 180A
43	Overcurrent I_DC, HW-controlcard	IDC too high
44	Overcurrent I_DC, Software	IDC > 280A
45	Unsymmetry Inverter currents	
46	n.a.	
47		

Code	Error description	Possible cause
48		
49		
50	Overvoltage errors	
51	No error	
52	No error	
53	No error	
54	No error	
55	No error	
56	No error	
57	No error	
58	No error	
59	No error	
60	No error	
61	No error	
62	No error	
63	No error	
64	No error	
65	No error	
66	Overvoltage grid Phase L1, stage 1	
67	Overvoltage grid Phase L1, stage 2	
68	Overvoltage grid Phase L1, stage 3	
69	Overvoltage grid Phase L1, stage 4	
70	Overvoltage grid Phase L1, stage 5	Grid voltage L1 > 110% x U nominal
71	Overvoltage grid Phase L2, stage 1	
72	Overvoltage grid Phase L2, stage 2	
73	Overvoltage grid Phase L2, stage 3	
74	Overvoltage grid Phase L2, stage 4	
75	Overvoltage grid Phase L2, stage 5	Grid voltage L2 > 110% x U nominal
76	Overvoltage grid Phase L3, stage 1	
77	Overvoltage grid Phase L3, stage 2	
78	Overvoltage grid Phase L3, stage 3	
79	Overvoltage grid Phase L3, stage 4	
80	Overvoltage grid Phase L3, stage 5	Grid voltage L3 > 110% x U nominal
81	Overvoltage DC Link, HW control card	DC input voltage > 900 V
82	Overvoltage DCLink, Software	DC input voltage > 900 V
83		
84		
85		
86		
87		
88		
89		
90		
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92		
93		
94		
95		
91		
92		
93		
94		

Code	Error description	Possible cause
95		
96		
97		
98		
99		
100	Undervoltage Errors	
101	No error	
102	No error	
103	No error	
104	No error	
105	No error	
106	No error	
107	No error	
108	No error	
109	No error	
110	No error	
111	No error	
112	No error	
113	No error	
114	No error	
115	No error	
116	Undervoltage grid Phase L1, stage 1	
117	Undervoltage grid Phase L1, stage 2	
118	Undervoltage grid Phase L1, stage 3	
119	Undervoltage grid Phase L1, stage 4	
120	Undervoltage grid Phase L1, stage 5	Grid voltage L1 < 90% x U nominal
121	Undervoltage grid Phase L2, stage 1	
122	Undervoltage grid Phase L2, stage 2	
123	Undervoltage grid Phase L2, stage 3	
124	Undervoltage grid Phase L2, stage 4	
125	Undervoltage grid Phase L2, stage 5	Grid voltage L2 < 90% x U nominal
126	Undervoltage grid Phase L3, stage 1	
127	Undervoltage grid Phase L3, stage 2	
128	Undervoltage grid Phase L3, stage 3	
129	Undervoltage grid Phase L3, stage 4	
130	Undervoltage grid Phase L3, stage 5	Grid voltage L3 < 90% x U nominal
131	Undervoltage DC Link, HW control card	
132	Undervoltage DC Link, Software	
133		
134		
135		
136		
137		
138		
139		
140		
141		
142		
143		
144		
145		
146		

Code	Error description	Possible cause
147		
148		
149		
150	Connector Errors	
151	Q1 tripped	DC disconnect Q1 tripped. Is the emergency button pressed?
152	Q2 tripped	AC main switch is open
153	Q3 tripped	
154	No error	
155	K1 open	
156		
157		
158		
159		
160	Hardware Errors	
161	Inverter Phase L1	Change IGBT driver L1
162	Inverter Phase L2	Change IGBT driver L2
163	Inverter Phase L3	Change IGBT driver L3
164	Error_X103	Check the cable to the IDC sensor
165		
166	Shortcircuit DC Link	
167	Insulation error	Insulation problem at the DC side
168	Over voltage protection	
169		
170	Grid errors	
171	Grid rotation	Check the correct sequence L1 - L2 - L3
172	No error	
173	No error	
174	Grid frequency	Check the grid frequency
175		
176		
177		
178		
179		
180	Software Errors	
181	Wrong Systemparamter	
182	No error	
183	Errorcounter overrun (x errors / hour)	
184	User switched off Inverter via Display or Ethernet	



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