

# G59/3 certificate

## Engineering Recommendation

Manufacturer: Autarco Group BV  
 Address: Schansoord 60, 5469 SH Erp,  
 Tel: +86 21 5404 5905  
 Country: The Netherlands  
 Test house details: Autarco Limited, R&D department, Shanghai, China  
 Version: G59-S2.3P-EN-V2.0

Type reference	Nominal AC power (VA)	Max. AC Power (VA)
LX6000	6000	6600
LX10000	10000	11000
LX15000	15000	16500
XLX20000	20000	22000
XLX25000	25000	27500
XLX30000	30000	33000
UX40000	40000	44000
UX50000	50000	55000
UX70000-HV	70000	77000

The results of the G59/3 tests are summarized in this certificate. Autarco declares hereby that all units shipped to the UK are within the specification and parameters set by the G59/3 engineering recommendation. These settings cannot be changed by an installer, user or any person other than authorized by Autarco. Complete documentation on test details is available from Autarco on demand.

### Test details

- Harmonic current emission as per BS EN 61000-3-11A
- Voltage fluctuations and flicker as per BS EN 61000-3-12A
- DC injection
- Power Factor
- Under / Over frequency switch off
- Under / Over voltage switch off
- Loss of mains test

Manufacturer stamp

Autarco Limited  
Hong Kong, 2018-08-13

**Roel van den Berg**



# G59/3 test result details

## Power quality

Harmonic current emissions as per BS EN 61000-3-12						
Order	Frequency (Hz)	Limit (A)	At 50% rated output		At 100% rated output	
			MV(A)	NV (A)	MV (A)	NV (A)
2	100	1.080	0.034	0.039	0.041	0.048
3	150	2.300	0.232	0.275	0.221	0.262
4	200	0.430	0.027	0.033	0.032	0.041
5	250	1.140	0.128	0.136	0.134	0.144
6	300	0.300	0.017	0.023	0.018	0.023
7	350	0.770	0.083	0.095	0.064	0.072
8	400	0.230	0.017	0.025	0.015	0.022
9	450	0.400	0.035	0.043	0.043	0.057
10	500	0.184	0.015	0.019	0.013	0.019
11	550	0.330	0.037	0.046	0.048	0.060
12	600	0.153	0.012	0.020	0.010	0.017
13	650	0.210	0.025	0.034	0.033	0.041
14	700	0.131	0.011	0.018	0.015	0.020
15	750	0.150	0.022	0.027	0.021	0.026
16	800	0.115	0.012	0.016	0.010	0.014
17	850	0.132	0.023	0.028	0.018	0.022
18	900	0.102	0.008	0.015	0.009	0.015
19	950	0.118	0.013	0.024	0.024	0.032
20	1000	0.092	0.007	0.017	0.010	0.017
21	1050	0.107	0.008	0.013	0.004	0.012
22	1100	0.084	0.006	0.012	0.005	0.011
23	1150	0.098	0.009	0.015	0.006	0.013
24	1200	0.077	0.004	0.008	0.003	0.009
25	1250	0.090	0.005	0.009	0.013	0.016
26	1300	0.071	0.007	0.009	0.007	0.012
27	1350	0.083	0.009	0.013	0.002	0.008
28	1400	0.066	0.011	0.015	0.004	0.009
29	1450	0.078	0.013	0.018	0.012	0.016

30	1500	0.061	0.006	0.012	0.001	0.003
31	1550	0.073	0.007	0.014	0.006	0.008
32	1600	0.058	0.009	0.018	0.007	0.013
33	1650	0.068	0.004	0.008	0.006	0.009
34	1700	0.054	0.002	0.005	0.005	0.008
35	1750	0.064	0.002	0.005	0.005	0.007
36	1800	0.051	0.007	0.013	0.006	0.012
37	1850	0.061	0.003	0.007	0.004	0.006
38	1900	0.048	0.005	0.008	0.003	0.005
39	1950	0.058	0.002	0.006	0.004	0.006
40	2000	0.046	0.002	0.005	0.003	0.006

#### Voltage fluctuations and flicker as per BS EN 61000-3-11

	Starting			Stopping			Running	
	$d_{max}$	$d_c$	$D_{(t)}$ in ms	$d_{max}$	$d_c$	$D_{(t)}$ in ms	$P_{st}$	$P_{lt}$ (2 hours)
Limit	4%	3.3%	500	4%	3.3%	500	1	0.65
MV	0.43%	0.35%	0	0.37%	0.24%	0	0.06	0.07
NV	0.43%	0.35%	0	0.37%	0.24%	0	0.06	0.07

#### DC injection

Limit	0.25% $I_n$		
Test level (% of rated power)	10%	55%	100%
MV	15.2mA	13.3mA	16.4mA
As % of rated AC current	0.096%	0.083%	0.10%

#### Power factor

Test level (AC voltage)	218.2V	230V	253V
Limit	0.95	0.95	0.95
MV	>0.995	>0.995	>0.995

## Grid monitoring and reconnection time

Voltage tests						
Function	Setting		Trip test		No trip tests	
	Voltage (V)	Time (s)	Voltage (V)	Time (s)	Voltage / Time	OK?
U/V stage 1	202	2.7	202.5	2.7	204.1V / 3.5s	Yes
U/V stage 2	186	0.6	186.2	0.62	188V / 2.48s	Yes
					180V / 0.48s	Yes
O/V stage 1	260	1.2	259.6	1.2	258.2V / 2.0s	Yes
O/V stage 2	272	0.6	271.8	0.63	269.7V / 0.98s	Yes
					277.7V / 0.48s	Yes

Frequency tests						
Function	Setting		Trip test		No trip tests	
	Frequency (Hz)	Delay (s)	Frequency (Hz)	Delay (s)	Frequency/time	OK?
U/F stage 1	47.55	20.2s	47.56	20.2	47.7Hz / 25s	Yes
U/F stage 2	47.05	0.6s	47.04	0.62	47.2Hz / 19.98s	Yes
					46.8Hz / 0.48s	Yes
O/F stage 1	51.45	90.3s	51.45	90.3	51.3Hz / 95s	Yes
O/F stage 2	51.95	0.52s	51.95	0.53	51.8Hz / 89.98s	Yes
					52.2Hz / 0.48s	Yes

Loss of mains test						
Test power	10%	55%	100%	10%	55%	100%
Imbalance	-5%Q	-5%Q	-5%Q	+5%Q	+5%Q	+5%Q
G83/2 limit	0.5s	0.5s	0.5s	0.5s	0.5s	0.5s
Trip value	0.29s	0.37s	0.15s	0.42s	0.27s	0.35s

Frequency change – stability test				
	Start frequency (Hz)	Change	End frequency (Hz)	OK?
Positive vector shift	49.5	+9 degrees		Yes
Negative vector shift	50.5	-9 degrees		Yes
Positive frequency drift	49.5	+0.19 Hz/s	51.5	Yes
Negative frequency drift	50.5	-0.19 Hz/s	47.5	Yes

**Fault level contribution**

According to Clause C.4.6, as photovoltaic SSEGs are inverter connected, they are deemed to automatically comply with regulations and no further tests are required.

**Self-monitoring**

Not applicable because electro-mechanical relays are used.

Autarco Group BV  
Eindhoven, 2018-08-13



**Roel van den Berg**  
CEO