Test Report issued under the responsibility of:

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TEST REPORT
DIN V VDE V 0126-1-1

Report Number. .....:	EFSH16041203-IE-01-L12
Date of issue .....:	2016-11-28
Total number of pages.....	25 pages
Testing Laboratory .....:	**Eurofins Product Testing Service (Shanghai) Co., Ltd.**
Address .....:	No. 395, West Jiangchang Road, Jing'an District, Shanghai, China
Applicant's name .....:	**Zhejiang BLD Solar Technology CO., LTD.**
Address .....:	Qinggang Industrial Zone, Yuhuan, 317606, Zhejiang Province, P.R.China
Test specification:	
Standard .....:	DIN VDE 0126-1-1:2013-08
Test procedure .....:	Test report
Non-standard test method……..:	N/A
Test Report Form No. .....:	VDE 0126-1-1_V1.1
Test Report Form(s) Originator ....:	Eurofins Shanghai
Master TRF.....:	Dated 2014-05
Test item description .....:	PV Grid-tied Inverter
Trade Mark .....:	BLD | solar
Manufacturer.....:	Zhejiang BLD Solar Technology CO., LTD. Qinggang Industrial Zone, Yuhuan, 317606, Zhejiang Province, P.R.China
Model/Type reference .....:	BLD-1K-TL3; BLD-1.5K-TL3; BLD-2K-TL3; BLD-2.5K-TL3; BLD-3K-TL3-S

Ratings .....:	IP65, Class I; BLD-1K-TL3 Input MPPT100-500Vd.c, max 500Vd.c ,max.10A; Output 240V 60Hz, max. 5A, max.1000W BLD-1.5K-TL3 Input MPPT100-500Vd.c, max 500Vd.c ,max.10A; Output 240V 60Hz, max. 8A, max.1600W BLD-2K-TL3 Input MPPT100-500Vd.c, max 500Vd.c ,max.13A; Output 240V 60Hz, max. 11A, max.2200W BLD-2.5K-TL3 Input MPPT100-500Vd.c, max 500Vd.c ,max.13A; Output 240V 60Hz, max. 12A, max.2500W BLD-3K-TL3 Input MPPT100-500Vd.c, max 500Vd.c , max.15Ax2; Output 240V 60Hz, max. 15A, max.3000W

Testing procedure and testing location:			
☐	**Testing Laboratory:**	Eurofins Product Testing Service (Shanghai) Co., Ltd.	
Testing location/ address.....:		No. 395, West Jiangchang Road, Jing'an District, Shanghai, China	
☐	**Associated Laboratory:**	**N/A**	
Testing location/ address.....:		**N/A**	
	Tested by (name + signature).....:	Daniel Li Project Supervisor	Daniel Li
	Approved by (name + signature)..:	Teddy Wang Technical Manager	
☐	**Testing procedure: TMP**		
Testing location/ address.....:		**N/A**	
	Tested by (name + signature).....:	**N/A**	
	Approved by (name + signature)..:	**N/A**	
☐	**Testing procedure: WMT**	**N/A**	
Testing location/ address.....:		**N/A**	
	Tested by (name + signature).....:	**N/A**	
	Witnessed by (name + signature).:	**N/A**	
	Approved by (name + signature)..:	**N/A**	
☐	**Testing procedure: SMT**	**N/A**	
Testing location/ address.....:		**N/A**	
	Tested by (name + signature).....:	**N/A**	
	Approved by (name + signature)..:	**N/A**	
	Supervised by (name + signature):	**N/A**	
☐	**Testing procedure: RMT**	**N/A**	
Testing location/ address.....:		**N/A**	
	Tested by (name + signature).....:	**N/A**	
	Approved by (name + signature)..:	**N/A**	
	Supervised by (name + signature):	**N/A**	

Copy of marking plate:

Rating label:

BLD solar BLD-1K-TL3

DC-INPUT

Max.input power:	1100W
Absolute max.voltage(Vmax):	500V
MPPT voltage range:	80-500V
Max.input current:	10A
Isc PV (absolute maximum):	20A

AC-OUTPUT

Max.output power:	1000W
Nominal operating frequency:	50/60Hz
Nominal operating voltage:	230/180~270V
Max.output current:	5A
Power factor (nominal):	0.99
Protective class:	Class I
Ingress protection:	IP65
Operation temperature rang:	-20/+60C°
Overvoltage category:	III (MAINS), II (PV)

AS4777 G83 G59 VDE-AR-N 4105 CE/EN62109
AS/NZS3100 IEC62116 IEC61727 UL1741 IEEE1547.1

Zhejiang BLD Solar Technology CO.,LTD
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Taizhou city,Zhejiang China
TEL:+86-576-81731993 Email:sales 26@bldsolar.com
FAX:+86-576-81731990 Http://www.bldsolar.com

BLD solar BLD-1.5K-TL3

DC-INPUT

Max.input power:	1750W
Absolute max.voltage(Vmax):	500V
MPPT voltage range:	100-500V
Max.input current:	10A
Isc PV (absolute maximum):	20A

AC-OUTPUT

Max.output power:	1600W
Nominal operating frequency:	50/60Hz
Nominal operating voltage:	230/180~270V
Max.output current:	8A
Power factor (nominal):	0.99
Protective class:	Class I
Ingress protection:	IP65
Operation temperature rang:	-20/+60C°
Overvoltage category:	III (MAINS), II (PV)

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BLD solar BLD-2K-TL3

DC-INPUT

Max.input power:	2350W
Absolute max.voltage(Vmax):	500V
MPPT voltage range:	100-500V
Max.input current:	13A
Isc PV (absolute maximum):	20A

AC-OUTPUT

Max.output power:	2200W
Nominal operating frequency:	50/60Hz
Nominal operating voltage:	230/180~270V
Max.output current:	11A
Power factor (nominal):	0.99
Protective class:	Class I
Ingress protection:	IP65
Operation temperature rang:	-20/+60C°
Overvoltage category:	III (MAINS), II (PV)

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BLD solar BLD-2.5K-TL3

DC-INPUT

Max.input power:	2700W
Absolute max.voltage(Vmax):	500V
MPPT voltage range:	100-500V
Max.input current:	13A
Isc PV (absolute maximum):	20A

AC-OUTPUT

Max.output power:	2500W
Nominal operating frequency:	50/60Hz
Nominal operating voltage:	230/180~270V
Max.output current:	12A
Power factor (nominal):	0.99
Protective class:	Class I
Ingress protection:	IP65
Operation temperature rang:	-20/+60C°
Overvoltage category:	III (MAINS), II (PV)

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Cautioning label:

Test item particulars ..... :	
Classification of installation and use..... :	Class I
Supply Connection ..... :	Input: Connector Output: Connector
Protection against ingress of water……..... :	IP65
Mass of equipment [kg] ..... :	Max. 10,5Kg for BLD-1K-TL3; BLD-1.5K-TL3; BLD-2K-TL3; BLD-2.5K-TL3; BLD-3K-TL3-S;
Possible test case verdicts:	
- test case does not apply to the test object .....:	**N/A**
- test object does meet the requirement .....:	**P (Pass)**
- test object does not meet the requirement .....:	**F (Fail)**
Testing .....:	
Date of receipt of test item.....:	2016-10-17
Date (s) of performance of tests .....:	2016-10-17 to 2016-11-25

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Determination of the test result includes consideration of measurement uncertainty from the test equipment and methods.

All tests were performed and the most unfavourable test results are recorded.

Name and address of factory (ies):

Zhejiang BLD Solar Technology CO., LTD.
Qinggang Industrial Zone, Yuhuan, 317606, Zhejiang Province, P.R.China

General product information:

The Product was tested to the standard DIN VDE 0126-1-1:2013-08.
The Solar converter converts DC voltage into AC voltage.

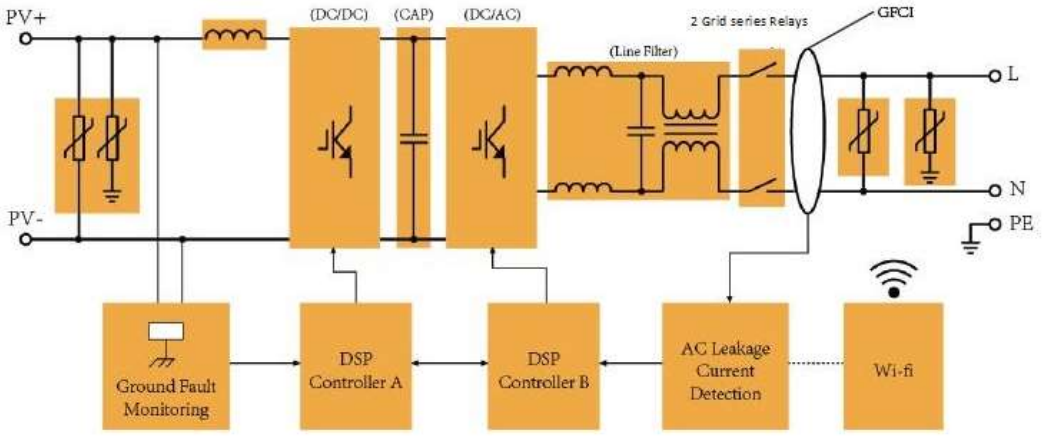
The grid type inverters type BLD-1K-TL3; BLD-1.5K-TL3; BLD-2K-TL3; BLD-2.5K-TL3; BLD-3K-TL3-S are single-phase solar-power inverters. They are responsible for converting the direct current generated by photovoltaic panels into single phase 230V, 50 Hz alternative current for deliver into the electrical power distribution grid. The inverter only operates when it is connected to the electrical utility grid and cannot operate as a stand-alone unit or in case of AC grid disruption.
Between the inverter and AC grid there has to be a 16A circuit breaker for models BLD-1K-TL3; BLD-1.5K-TL3 and BLD-2K-TL3; Between the inverter and AC grid there has to be a 20A circuit breaker for models BLD-2.5K-TL3 and BLD-3K-TL3-S.
The safety of the unit relies on the branch circuit of building installation. If used on a branch circuit greater than this, additional testing may be necessary. The unit is approved for TN mains connections and IEC

60664 overvoltage category III.

The equipment has been evaluated for use in a Pollution Degree III (reduction to pollution degree II because of enclosure IP 65.) and overvoltage category III environment and a maximum altitude of 2000m according to IEC 62109-1. The unit is specified for outdoor and indoor (unconditioned) use.

The input and output are protected by Varistors to Earth. The unit is providing EMC filtering at the output toward mains. The unit does not provide galvanic separation from input to output (transformer-less type). The output is switched off redundant by the high power switching bridge and a dual Switch relays. This assures that the opening of the output circuit will also operate in case of one error.
The anti-islanding function in this unit is carried out by the frequency-shifting method.
The internal control is redundant built. It consists of two Microcontrollers Main CPU (U2) and Slave CPU (U8). The Main CPU (U2) control the relays by switching signals, sample the PV voltage, current and the bus voltage, measures AC voltage that before and after the relays, grid frequency, AC current with injected DC and the array insulation resistance to ground. In addition it tests the current sensors and the RCMU circuit before each start up.
The Slave Main CPU (U8) is using for sample the single phase grid voltage and current, detect inverter internal and heatsink's temperature, communicate and compare sample signals deviation with Main CPU (U8) each other, it also can switch off the relays independently.
The unit provides dual Switch relays in single phase inverter .The relays are tested before each start up. In addition the power bridge can be stopped by both CPU, alarm an error code in display panel, another redundant relay provides basic insulation maintained between the PV array and the mains. All the relays are tested before each start up.
Block diagrams

Model:BLD-1K-TL3; BLD-1.5K-TL3; BLD-2K-TL3; BLD-2.5K-TL3; BLD-3K-TL3-S



Model difference:
The models BLD-1K-TL3; BLD-1.5K-TL3; BLD-2K-TL3 and BLD-2.5K-TL3 are identical with model BLD-3K-TL3-S in hardware and just derated power by software.
The product was tested on:
hardware version: V1.00
software version: V1.00

DIN V VDE V 0126-1-1			
Clause	Requirement - Test	Result - Remark	Verdict
4	Requirements		P
	The following requirements applied to integrated and separated safety disconnect device. The disconnection device must disconnect the generator unit from the grid on the AC side with two switches in series due to		P
	- Voltage-and/or frequency change of low voltage network		P
	- DC current feed-in into the low voltage network		P
	- Unintended island operation		P
	- Intended island operation with standby network generator.		P
4.1	Functional safety		P
	The safety of the functions of automatic disconnection device defined in 4.3 to 4.6 and 4.8, if applicable, shall be ensured under all operation conditions. It can be installed as independent device or integrated parts of generation system and must be disconnect in single fault condition and indicate the fault condition		P
4.1.1	Single fault safety		P
	The disconnection device must fulfill the requirement of single fault safety according to VDE-AR-N 4105: 2011-08, A.6		P
4.1.2	Disconnection device		P
	The disconnection device must comply with DIN EN 62109-2 (VDE 0126-14-2): 2012-04, 4.4.4.15.2 in case of integration in a PV converter and VDE-AR-N 4105: 2011-08, 6.4 in other cases.		P
4.2	Connection condition		P
	The connection, which reconnect after a network fault and reconnect after short interruption, shall comply with VDE-AR-N 4105: 2011-08, 8.3.1.		P
4.3	Voltage monitoring		P
4.3.1	Voltage decrease U<		P
	The disconnection due to a voltage decrease must comply with VDE-AR-N 4105: 2011-08, 6.5.1 and 6.5.2		P
4.3.2	Voltage increase U>>		P
	The disconnection due to a voltage increase must comply with VDE-AR-N 4105: 2011-08, 6.5.1 and 6.5.2		P
4.3.3	Slow voltage increase U>		P
	The disconnection due to a slow voltage increase (10-minute-mean-value) must comply with VDE-AR-N 4105: 2011-08, 6.5.1 and 6.5.2		P
4.4	Frequency monitoring		P

DIN V VDE V 0126-1-1			
Clause	Requirement - Test	Result - Remark	Verdict
	The disconnection due to a frequency decrease or a frequency increase must comply with VDE-AR-N 4105: 2011-08, 6.5.1 und 6.5.2		P
4.5	DC current monitoring		P
	A DC current feed into the low voltage network due to a disorder system operation must activate the disconnection within 0.2s. For this, the disorder itself or a measured DC component of current of more than 1A can be regarded as disconnection criterion.		P
4.6	Detection of islanding operation		P
	The disconnection due to the detection of a unintended islanding operation must comply with VDE-AR-N 4105: 2011-08, 6.5.1 and 6.5.3		P
4.7	Marking		P
	A generation with automatic disconnection device must include with visible specification “VDE 0126-1-1”. It can be done through - Rating plate or - Issue on the brochure of disconnection or - A separate labelling		P
4.8	Requirement for the integrated disconnection device in photovoltaic converter		P
	The requirement of DIN EN 62109-2 (VDE 0126-14-2): 2012-04, 4.8 for the residual current monitoring and for the isolation monitoring of PV generators must be complied.	See safety report: EFSH16041203-IE-01-L02	P
5	General requirements		P
	The limits of radio interference shall comply with DIN EN 61000-6-3 (VDE 0839-6-3). The interference immunity are tested according to DIN EN 61000-6-2 (VDE 0839-6-2)	See EMC report: ACWE-E1608001	P
6	Type test		P
	General		P
	If not specified in other cases, the following tests are applied for integrated and separated disconnection device. A separate disconnection device is tested together with a suitable input feeder Here it is to ensure, that the disconnection signal generate not from input feeder but from the disconnection device.		P
6.1	Functional safety		P
	The test on single fault safety and fault detection with followed disconnection shall comply with DIN V DIN VDE V 0124-100 (VDE V 0124-100):2012-07, 5.4.5.2.		P
6.2	Voltage monitoring (Translator note: (should be related to 4.2: Connection condition))		P
	The tests of connection are re-connection shall comply with DIN V DIN VDE V 0124-100 (VDE V 0124-100):2012-07, 5.5.1 and 5.5.2.		P
6.3	Voltage monitoring		P

DIN V VDE V 0126-1-1			
Clause	Requirement - Test	Result - Remark	Verdict
	The test of voltage monitoring shall comply with DIN VDE V 0124-100 (VDE V 0124-100):2012-07, 5.4.5.3		P
6.4	Frequency monitoring		P
	The test of frequency monitoring shall comply with DIN VDE V 0124-100 (VDE V 0124-100):2012-07, 5.4.5.4		P
6.5	DC current monitoring		P
	The test of disconnection due to DC current feed in is done optionally according to a) or b): a) In the measurement device of disconnection device (e.g. current transducer, resistor), a DC current of 1A is impressed. The disconnection must be done within 0.2s. b) Through fault simulation and by means of measurement, it is determined whether a disordered system operation with a DC component of feed in current of more than 1A will lead to disconnection within 0.2s.		P
6.6	Detection of island operation		P
	The test on disconnection due to unintended islanding operation shall comply with DIN VDE V 0124-100 (VDE V 0124-100):2012-07, 5.4.6.		P
7	Production test		P
	Before shipment of automatic disconnection device, each manufacturer shall undertake the production test in sense of safety related parameter.		P
8	Installation specifications		P
	Initial and repeated test of automatic disconnection device besides the production test can be waived. If the automatic disconnection device is installed as independent device, it shall not used in TN-C system. It is accepted for TN-C-S system in the case.		P

4.1.1	Functional safety						P
	ambient temperature (°C)			:	25		—
No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result
Model: BLD-3K-TL3-S							
1.	R159	OC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
2	C102	SC	400	5 min		< 3A	Can not start, fault indication; no hazard
3	C111	SC	400	15 min	-	< 3A	No abnormal phenomenon observed
4	R182	SC/OC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
5	C115	SC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
6	R181	OC	400	15 min	-	< 3A	No abnormal phenomenon observed
7	R178	OC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
8	R187	SC/OC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
9	R28	SC	400	5 min	-	< 3A	Can not start, no hazard
10	R28	OC	400	15 min	-	< 3A	Normal work, current monitor value double, no hazard
11	R30	OC	400	15 min	-	< 3A	No abnormal phenomenon observed
12	R44	SC/OC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
13	C30	SC	400	5 min	-	< 3A	Can not start, no hazard
14	RY3	SC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
15	R57	OC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
16	C36	SC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
17	C29	SC	400	15 min	-	< 3A	No abnormal phenomenon observed
18	R50	OC	400	15 min	-	< 3A	No abnormal phenomenon observed
19	R64	SC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
20	R69	OC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
21	R135	OC	400	5 min	-	< 3A	Can not start, no hazard
22	C85	SC	400	5 min	-	< 3A	Can not start, no hazard
23	R134	OC	400	15 min	-	< 3A	No abnormal phenomenon observed
24	TX1~TX3	SC	400	5 min	-	< 3A	Can not start, no hazard
25	C82	SC	400	5 min	-	< 3A	Can not start, no hazard
26	D19	SC	400	5 min	-	< 3A	Can not start, no hazard
27.	R148	OC	400	5 min	-	< 3A	Can not start, no hazard
28.	C12	SC	400	5 min	-	< 3A	Can not start, no hazard

29	C18	SC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
30	R7	SC/OC	400	15 min	-	< 3A	No abnormal phenomenon observed
31	R14	SC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
32	R2	SC/OC	400	5 min	-	< 3A	Can not start, no hazard
33	R186	OC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
34	C39	SC	400	5 min	-	< 3A	Can not start, fault indication; no hazard
35	C43	SC	400	15 min	-	< 3A	Normal start, C41 damaged, fault indication; no hazard
36	R90	OC	400	15 min	-	< 3A	No abnormal phenomenon observed
37	R73	OC	400	5 min	-	< 3A	Can not start, no hazard
38	R85	OC	400	15 min	-	< 3A	No abnormal phenomenon observed
39	R93	OC	400	15 min	-	< 3A	No abnormal phenomenon observed
40	R77	OC	400	15 min	-	< 3A	Normal start, fault indication; no hazard
41	R86	OC	400	15 min	-	< 3A	No abnormal phenomenon observed
42	R92	OC	400	20 min	-	< 3A	Can not start when PV input <360V; normal work when PV input ⩾360V.
43	L-N output	Overload	400	15 min	-	< 3A	The max. deliver output power was limited to 2250VA by the inverter itself, not possible to overload, no excessive temperature rise, no hazard
44	L-N	SC	400	5 min	-	< 3A	Inverter shutdown due to loss of grid voltage, short circuit peak current < 200A
45	L to earth	SC	400	5 min	-	< 3A	External circuit breaker open, Inverter shutdown due to loss of grid voltage, short circuit peak current < 200A
46	N to earth	SC	400	5 min	-	< 3A	External circuit breaker open, Inverter shutdown due to loss of grid voltage, short circuit peak current < 200A
47	DC input	Reverse polarity	400	2 hours	-	< 3A	Feed in max. PV array short circuit current, until steady state, no excessive temp. rise; no hazard
48	PCB	SC	400	-	-	-	Refer to above, component single fault test
49	Transform er	SC	400	-	-	-	Refer to item 24 & 67

supplementary information SC : short-circuit OC : open-circuit
See technical documentation.

4.1.2	**Disconnection switch**	P
The interface switch consists of two electrical break devices connected in series and is therefore designed with redundancy. Functional safety for the test for single-fault tolerance and fault finding with subsequent disconnection for the entire functional chain. An all-pole galvanic break device is provided. For synchronous machines, the break device for synchronisation is designed three pole instead of four pole.		

4.2	**Connecting conditions and synchronisation** Model: BLD-3K-TL3-S			P
Setting values of the NS protection:		Setting Treconnection 60s [s]:	60s	
		Setting f< [Hz]:	47,5Hz	
		Setting f> [Hz]:	51,5Hz	
		Setting V< [V]:	184V	
		Setting V>> [V]:	264,5V	
	fist	Reset time:	Limit:	
Connecting conditions for frequencies:				
a)	<47,45 Hz	No reconnection	No resetting allowed	
	Switch to:			
b)	≥ 47,45 Hz	79,7s	≥ 60 s	
c)	>50,10 Hz	No reconnection	No resetting allowed	
	Switch to:			
d)	≤ 50,10 Hz	70,0s	≥ 60 s	
Connecting conditions for voltages:				
e)	<84%	No reconnection	No resetting allowed	
	Switch to:			
f)	≥ 84%	70,1s	≥ 60 s	
g)	>111 %	No reconnection	No resetting allowed	
	Switch to:			
h)	≤ 111%	70,0s	≥ 60 s	

4.2	**Short interruption** Model: BLD-3K-TL3-S						P
Setting values of the NS protection:		Setting $T_{disconnection}$ 5s [s]:		60s			
		Setting $T_{reconnection}$ 60s [s]:		60s			
		Setting V< [V]:		184V			
		Step 1:			Step 2:		
Step [V to V]		230 V to 177,1 V			230 V to 177,1 V		
Jump Duration [s]:		2 s			4 s		
Limit [s]:		≥ 5 s			≥ 60 s		
Reconnection Time [s]:		14,3s			74,4s		
Test: After providing evidence of a short interruption the network voltage is reduced from the nominal voltage with a surge of 77% U_n. A surge to the nominal voltage takes place after 2 s. After providing evidence of a short interruption the network voltage is reduced from the nominal voltage with a surge of 77% U_n. A surge to the nominal voltage takes place after 4 s. A short interruption is characterised by exceeding or not reaching the NS protection settings for the network frequency and/or network voltage for a maximum period of 3 seconds. A ramp of 10% P_n is not necessary after short interruptions. Limit values: Short interruption ≤ 2 s Reset time ≥ 5 s Short interruption ≥ 3 s Reset time ≥ 60 s							

4.3	Voltage control Model: BLD-3K-TL3-S						P
Integrated NS protection three phase ≤ 30kVA (phase to neutral)							
Setting values of the NS protection:		Setting U< [V]:		184			
		Setting U>> [V]:		264,5			
		Setting $T_{disconnection}$ [ms]		120			
Operating time of the monitoring device:							
		Under voltage:			Over voltage:		
L to N:							
Step [V to V]:		230,0 V to 177,1 V			230,0 V to 271,4 V		
Limit [V]:		184,0 V			264,5 V		
Measurement [V:]		182,1	182,1	182,1	264,5	264,5	264,5
Limit [ms]:		200 ms			200 ms		
Disconnection time [ms]:		145,8	140,0	142,1	147,0	145,0	143,8
Test: The voltages per phase conductor are measured, into which current is fed between the line conductor and the neutral conductor. To measure the disconnection time a surge of 77%n is taken from the nominal voltage and of 118%n from the nominal voltage for undervoltage and undervoltage.							

The permitted tolerance between setting value and trip value of the voltage may not exceed ± 1% of Un .
Limit values:
Voltage drop protection U<0,8 Un 200 ms
Rise-in voltage protection U>>1,15 Un 200 ms

4.3	**Measuring the rise-in voltage protection as a running 10-minute mean value** Model: BLD-3K-TL3-S		P
		Disconnection time:	Limit:
a)	The voltage is set to 100% Un and held for 600 s. Thereafter the voltage is set to 112% Un. Disconnection must take place within 600 s.		
	Phase 1:	549,6s	600 s
	Phase 2:	-	
	Phase 3:	-	
b)	The voltage is set to U_n for 600 s and then to 108% U_n for 600 s. No disconnection should take place.		
	Phase 1:	No disconnection	Disconnection should not take place.
	Phase 2:	-	
	Phase 3:	-	
c)	The voltage is set to 106 % U_n and held for 600 s. Thereafter the voltage is set to 114 % U_n. *The disconnection should last for half the period as in Point a)		
	Phase 1:	310,6s	300 s
	Phase 2:	-	
	Phase 3:	-	

Test:
a) This test serves as proof of the measurement accuracy and the maximum set time.
b) This test serves as proof of the measurement accuracy.
c) This test serves as proof of the correct formation of the 10 minute running mean value.
The permitted tolerance between setting value and trip value of the voltage may not exceed ± 1 % of U_n.

Limit values:
Rise-in voltage protection U>1,1 U_n after a max. 600 s, the switch off after 200 ms.
If only one integrated NS protection is used for the power generation systems ≤30kVA, the value of the rise-in voltage protection U> of 1,1 U_n may not be changed.

4.4	**Frequency measurement** Model: BLD-3K-TL3-S						P
Setting values of the NS protection:	Setting f< [Hz]:	47,5					
	Setting f>[Hz]:	51,5					
	Setting $T_{disconnection}$ [ms]	120					
Operating time of the monitoring device							
	Under frequency			Over frequency			
Ramp [Hz to Hz]:	48,00 Hz -> 47,00 Hz			51,00 Hz -> 52,00 Hz			
Limit [Hz]:	47,50 Hz			51,50 Hz			
Measurement [Hz]:	47,50	47,50	47,50	51,51	51,51	51,51	
Limit [ms]:	200 ms			200 ms			
Disconnection time [ms]:	65,8	65,8	65,8	60,4	60,4	60,4	

The measuring is performed at a continuous change of frequency of 1 Hz/s. The trip value was determined manually by reducing the frequency in 10 mHz steps. When the trip value is known (e.g. 47,50 Hz), the grid simulator is programmed to run from e.g. 48,00 Hz to 47,00 Hz with 1 Hz/s. The disconnection time is calculated by the measured time minus the 500 ms from 48,00 Hz to 47,50 Hz.

The setting value and the trip value of the frequency may not vary by more than ±0.1 % f_n .
For frequencies of between 47,5 Hz and 51,5 Hz (±0,1% f_n) automatic disconnection from the network as a result of a deviation in frequency is not permitted.

Limit values:
Frequency decrease protectionf<47,5 Hz 200 ms
Frequency increase protectionf<51,5 Hz 200 ms

4.5	TABLE: Monitoring the DC current					P
Model	Model: BLD-3K-TL3-S					
PV Input 1			PV Input 2	-	-	
L1-N						
	Trip value measured (mA)	Trip time measured (ms)				
		1	2	3	1	2	3
		+ 1 A			- 1 A		
Measured	1A	79,0	81,0	93,5	92,5	70,5	80,0
Trip limit	⩽1A	200 ms					
Reconnection time measured		60,0s					
Reconnection time limited		> 30 s					

4.6	Test of the resonance circuit Model: BLD-3K-TL3-S		P
Test condition:	Frequency: 50+/-0,01 Hz UN = 230+/-1% Vac RLC consumes inverter real power within +/-3% Distortion factor of chokes <3% Quality Q>2		
Disconnection limit:	5 s		
Osc. parameter \ Output power	25%	50%	100%
- 5%	0,160s	0,420s	0,320s
- 4%	0,455s	0,425s	0,330s
- 3%	0,265s	0,440s	0,340s
- 2%	0,405s	0,200s	0,305s
- 1%	0,360s	0,365s	0,305s
0%	0,295s	0,300s	0,322s
+1%	0,255s	0,285s	0,305s
+2%	0,235s	0,240s	0,295s
+3%	0,225s	0,255s	0,297s
+4%	0,225s	0,240s	0,237s
+5%	0,245s	0,245s	0,277s
Parameter at 0% L= mH	102,8	51,38	25,69
Parameter at 0% R=Ω	64,53	32,27	16,13
Parameter at 0% C=µF	99,00	197,00	395,00

Test:
The capacitors and the chokes of the resonant circuit were adjusted in order to reach a quality of >2. PQC+PQL=-PQ,WR. The resistors of the resonant circuit consumed the real power of the inverter (PWR) within +/-3%.
Limit values:
Quality factorQ> 2
Disconnectiont≤ 5 s

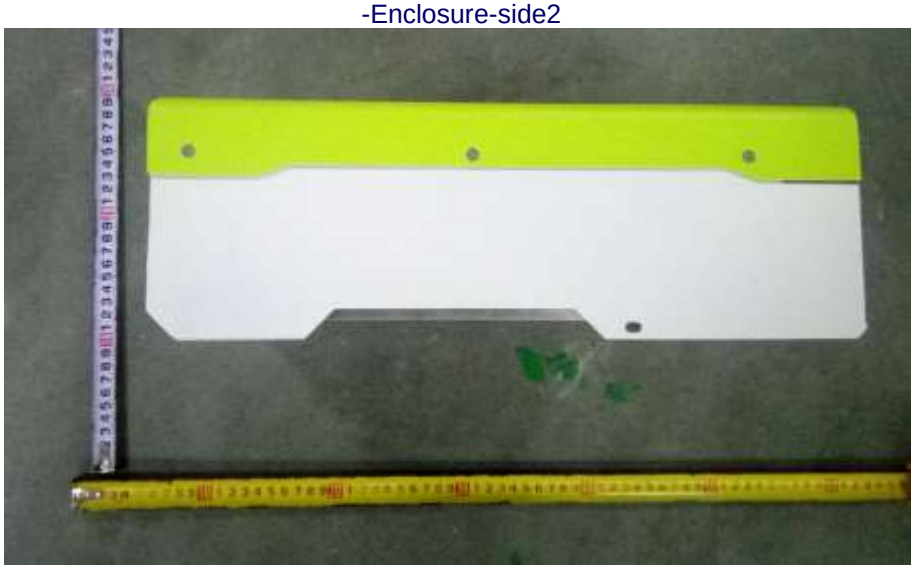
Appendix 1:

BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
-Enclosure-Front

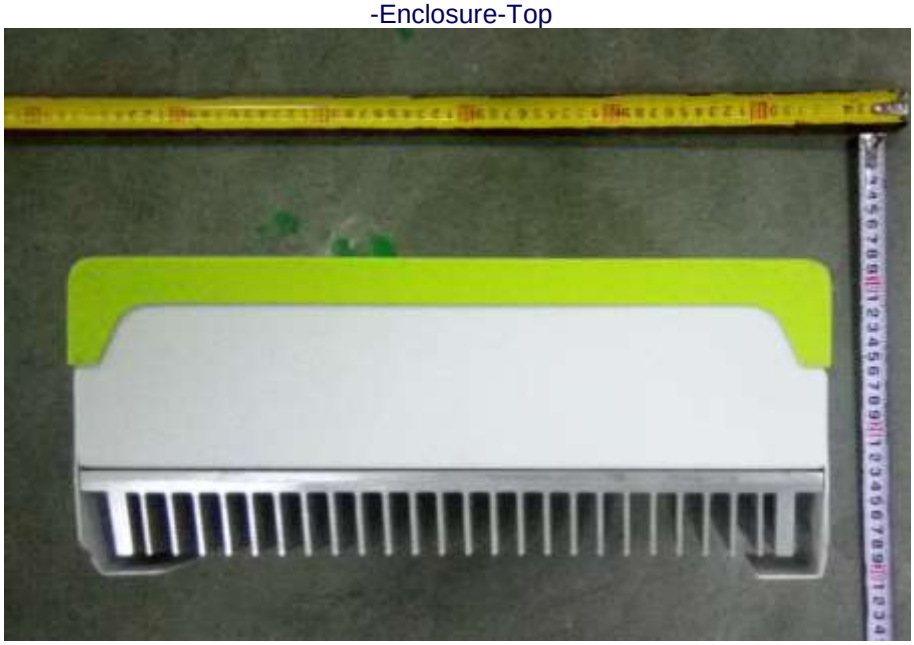
BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
-Enclosure-Bottom

BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
-Enclosure-side1

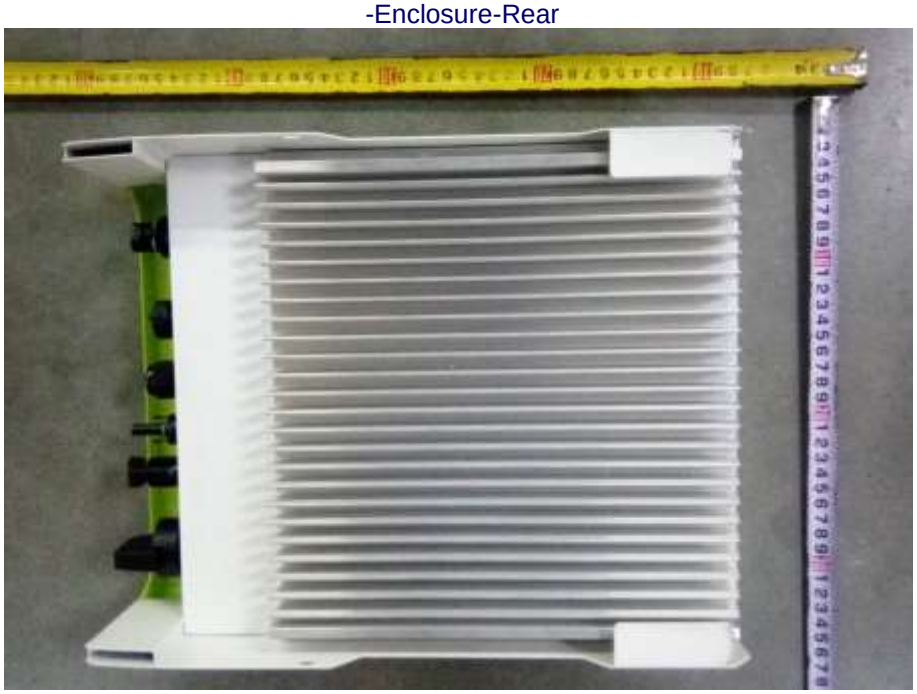
BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
-Enclosure-side2



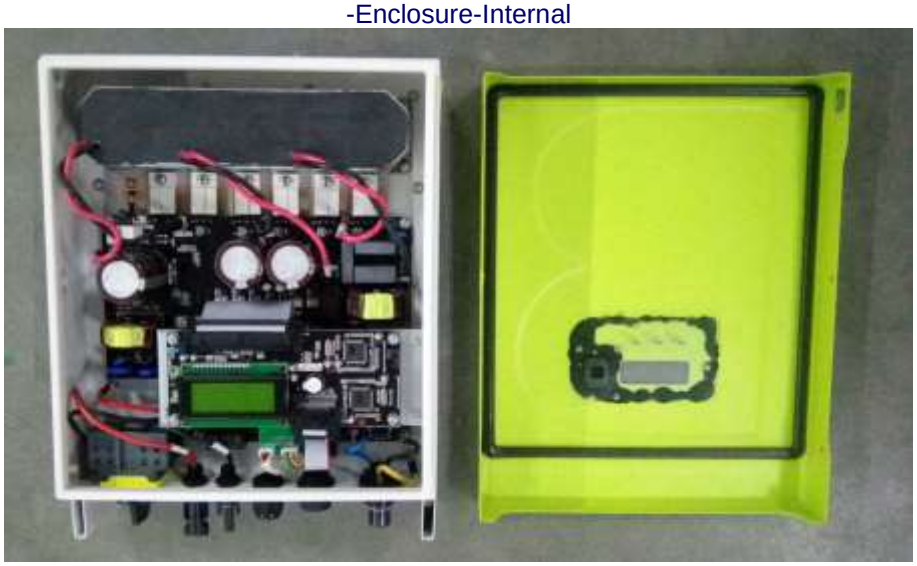
BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
-Enclosure-Top



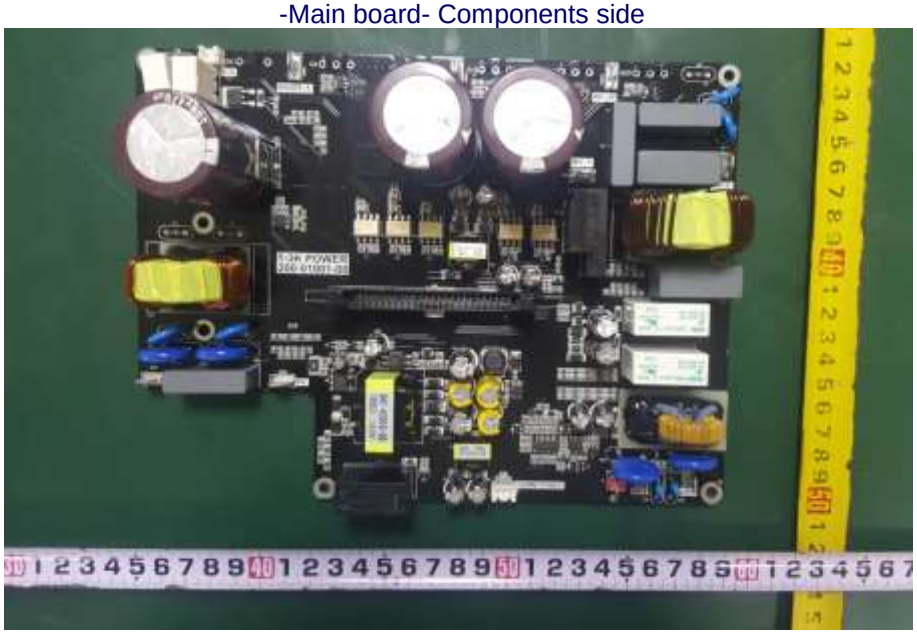
BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
-Enclosure-Rear



BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
-Enclosure-Internal

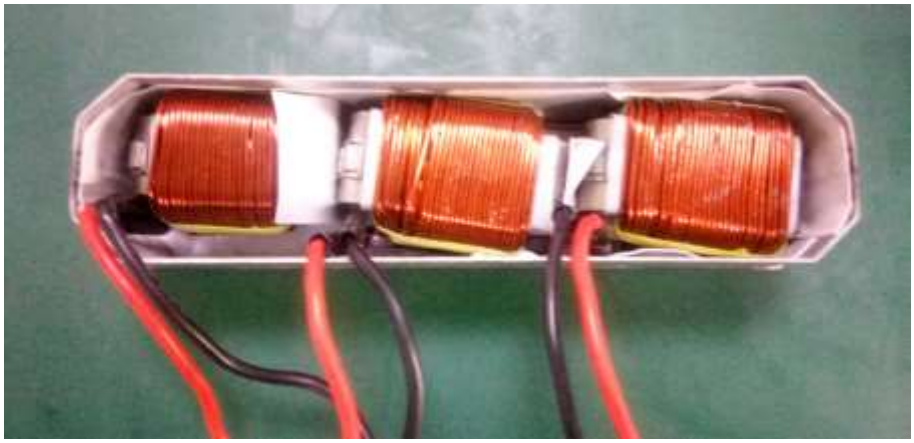


BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
-Main board- Components side



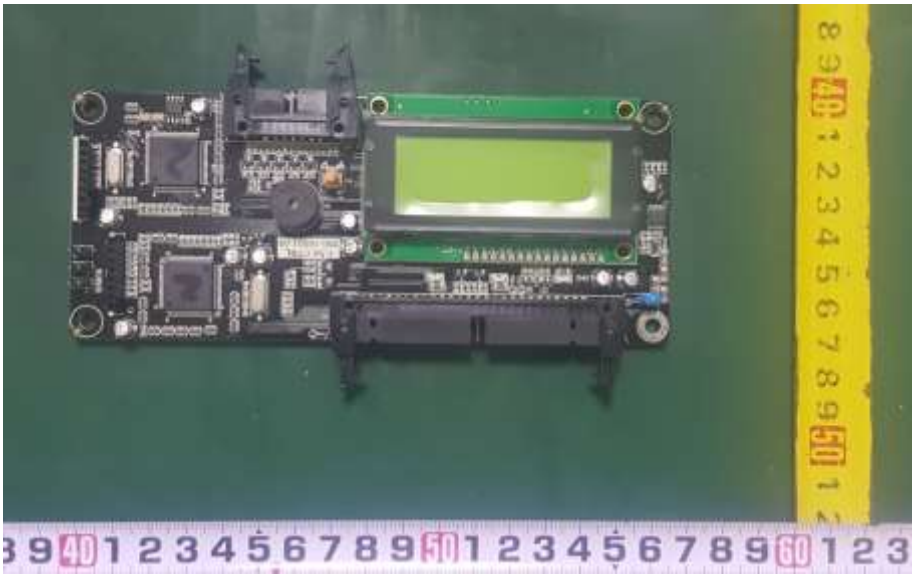
BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
- Main board-Solder side

BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
-Choke

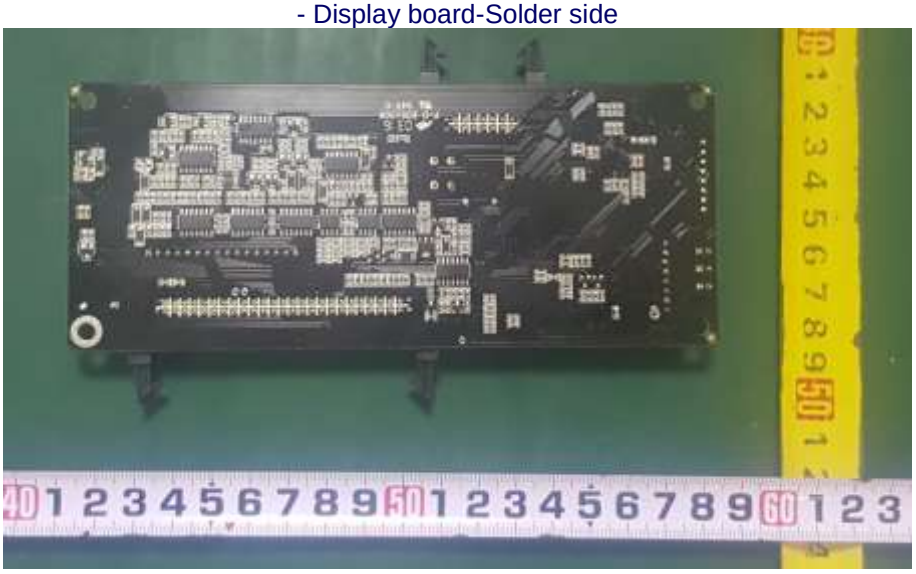


BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-2.5K-TL3, BLD-3K-TL3-S
-Earth part

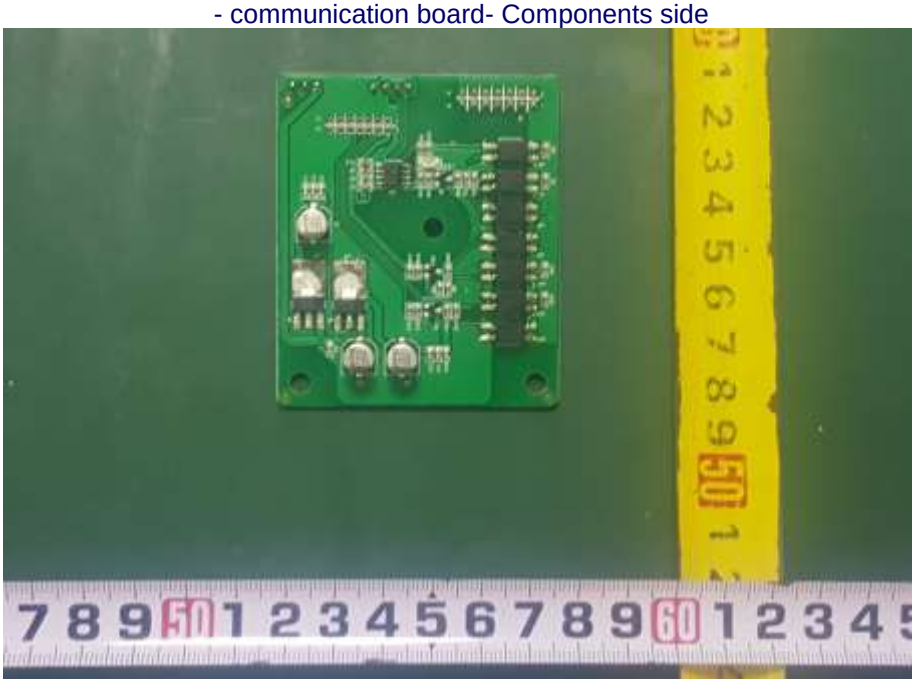
BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-3K-TL3-S
Display board- Components side



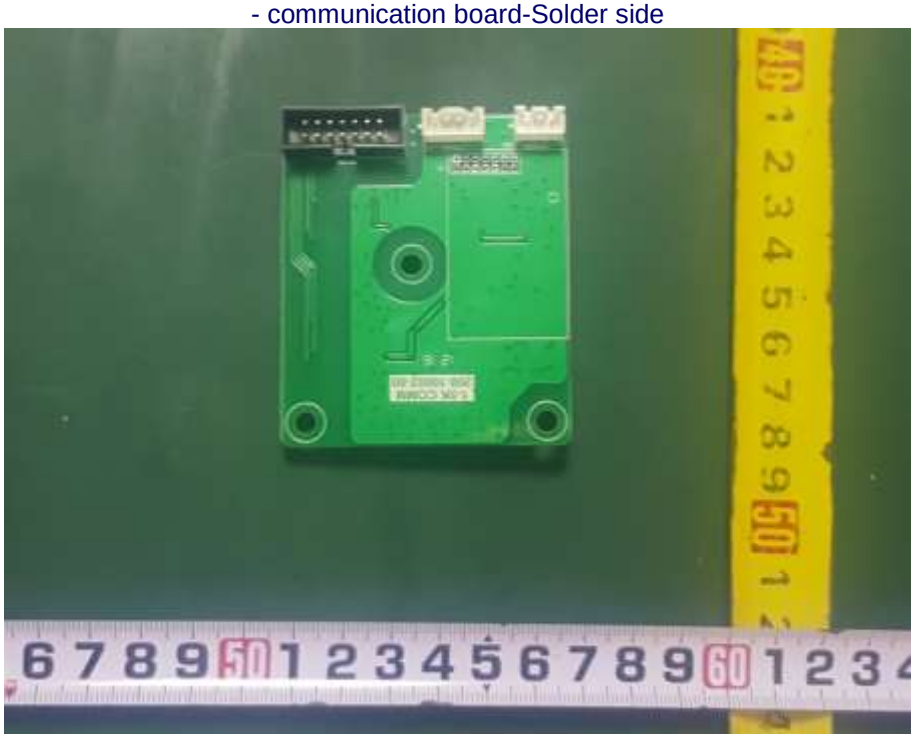
BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-3K-TL3-S
- Display board-Solder side



BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-3K-TL3-S
- communication board- Components side



BLD-1K-TL3, BLD-1.5K-TL3, BLD-2K-TL3, BLD-3K-TL3-S
- communication board-Solder side



********** End of Report**********