

Addendum to manual

PLN-24CH12 / PRS-48CH12

Bosch Security Systems B.V.
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1 General

This addendum to the manual of the PLN-24CH12 and PRS-48CH12 chargers contains important information for proper installation and operation.

2 R_i -monitoring

The PLN-24CH12 and PRS-48CH12 battery chargers have built-in R_i monitoring. This is important and mandatory for compliance to EN54-4. It means that the charger monitors the summed resistance of the wiring, fuse, electrical connections and the R_i of the battery. It warns the user when the battery has aged and must be replaced. The R_i supervision threshold has been selected such that when the R_i of the battery has increased to the maximum allowed value the backup power system can still power the VACIE.

Because the resistance of the wiring and the connections is incorporated into the measured R_i , it is important that these resistances are very low, otherwise even good batteries will generate a fault. This makes sense because a VACIE can take up to 150 A from the battery and then every 10 mohm will already cause a voltage drop of 1.5 V, limiting the maximum available output power from the VACIE.

Allow for up to 5 hours for the unit to report a battery fault.

3 Wire gauge selection

As installer, you should take into consideration all major contributors to the total resistance, being:

- Battery R_i – typically 2 to 6 mohm per battery, depending on size and make.
- Cables – very dependent on length and gauge.
- Battery fuse – typically 1 to 2 mohms.
- Connections – typically 1 mohm.

The actual values need to be checked with the battery supplier and fuse supplier. Also be aware of possible influences of connections, e.g. pay attention to screw-tightening of connections.

Keep some margin to avoid false positive faults. Stay at least 20% below the selected R_i -limit, because there is some tolerance on the measurement accuracy.

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To help you selecting the right cable gauge, two tables are provided with maximum cable lengths per wire gauge for a number of battery types. Use this guideline to determine the needed gauge.

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4 Battery charging

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Normal operating mode: the battery charger (re)charges the batteries and maintains them when they are fully charged. The maximum current that can be provided to the main outputs and auxiliary outputs is $I_{max a}$.

Back-up operating mode: the total operating current is provided by the batteries and may not exceed ' $I_{max b}$ (mains not present)'.

$I_{max a}$	Maximum available current which may be drawn continuously while charging the battery: - $I_{max a} = 12 A - C/20$ (C = battery capacity in Ah)
$I_{max b}$ (mains present)	Maximum available output current which may be drawn a short time, during which the battery may not be charged, but not be discharged: - $I_{max b} = 12 A$
$I_{max b}$ (mains not present)	Maximum available current which may be drawn from the batteries when the mains supply is not available: - $I_{max b} = 150 A$ if the jumper is set on '75' - $I_{max b} = 100 A$ if the jumper is set on '50'

If $I_{max b}$ (mains not present) is greater than 100 A, use batteries with a capacity of 86 Ah to 225 Ah and set daughter board jumper on '75'.

If $I_{max b}$ (mains not present) is less than 100 A, use batteries with a capacity of 65 Ah to 225 Ah, and set daughter board jumper on '50'.

5 Approved batteries

The first table is for 24 V battery systems and the second table is for 48V battery systems. The maximum length is given in cm and depicts the total cable length, i.e. all the wire length from charger to battery, the bridges to connect the batteries in series and the length back to the charger. Five different cable gauges are shown with cross-sectional areas of 6 mm² to 35 mm².

In some cases, the maximum resistance is already exceeded, even for zero length cables. This is not allowed and indicated as n.a. (not allowed).

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Maximum total cable length to battery and return (cm)

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24V			Cable gauge		16 mm ²		25 mm ²		35 mm ²		50 mm ²	
			Jumper setting		50	75	50	75	50	75	50	75
C20	Brand	Type	100A	150A	100A	150A	100A	150A	100A	150A	100A	150A
65	Ah SSB	SBL65-12i	129	n.a.	201	n.a.	282	n.a.	403	n.a.		
65	Ah Europower	EPS 65-12	289	n.a.	451	n.a.	632	n.a.	903	n.a.		
65	Ah Sun	SB12-65SV0	84	n.a.	132	n.a.	185	n.a.	264	n.a.		
65	Ah Sun	SB12-65V0	111	n.a.	174	n.a.	243	n.a.	347	n.a.		
66	Ah SSB	SBL66-12HR	227	n.a.	354	n.a.	496	n.a.	708	n.a.		
68	Ah Leoch	LPL12-65	84	n.a.	132	n.a.	185	n.a.	264	n.a.		
70	Ah Yuasa	NPL78-12IFR	289	n.a.	451	n.a.	632	n.a.	903	n.a.		
75	Ah SSB	SBL75-12i(sh)	147	n.a.	229	n.a.	321	n.a.	458	n.a.		
75	Ah Sun	SB12-80	147	n.a.	229	n.a.	321	n.a.	458	n.a.		
78	Ah Sun	SB12-75	147	n.a.	229	n.a.	321	n.a.	458	n.a.		
80	Ah SSB	SBL80-12i	156	n.a.	243	n.a.	340	n.a.	486	n.a.		
80	Ah Leoch	LPF12-75	289	n.a.	451	n.a.	632	n.a.	903	n.a.		
80	Ah Effekta	BTL12-80	244	n.a.	382	n.a.	535	n.a.	764	n.a.		
80	Ah Fiamm	FG28009	431	n.a.	674	n.a.	943	n.a.	1347	n.a.		
80	Ah Long	6FM80G/B	200	n.a.	313	n.a.	438	n.a.	625	n.a.		
85	Ah SSB	SBL85-12HR	200	n.a.	313	n.a.	438	n.a.	625	n.a.		
90	Ah Effekta	BTL12-90	271	0	424	0	593	0	847	0		
90	Ah EnerSys	12VE90	329	0	514	76	719	107	1028	153		
90	Ah Europower	EPS 90-12	289	0	451	0	632	0	903	0		
95	Ah SSB	SBLFT90-12i	67	0	104	0	146	0	208	0		
100	Ah SSB	SBL100-12HR	289	0	451	0	632	0	903	0		
100	Ah SSB	SBL100-12i(sh)	289	0	451	0	632	0	903	0		
100	Ah Europower	EPS 100-12	333	53	521	83	729	117	1042	167		
100	Ah Effekta	BTL12-100	289	0	451	0	632	0	903	0		
100	Ah Fiamm	FG2A007	458	178	715	278	1001	389	1431	556		
100	Ah PowerSonic	PS121000GB	298	0	465	0	651	0	931	56		
100	Ah Yuasa	NPL100-12	378	98	590	153	826	214	1181	306		
105	Ah Sun	SB12-110AFT	244	0	382	0	535	0	764	0		
105	Ah Leoch	LPF12-100	333	53	521	83	729	117	1042	167		
105	Ah Long	6FM100G/B	289	0	451	0	632	0	903	0		
107	Ah Sun	SB12-100	298	0	465	0	651	0	931	56		
110	Ah Sun	SB12-100HFT	351	71	549	111	768	156	1097	222		
115	Ah Long	6FM115G/B	289	0	451	0	632	0	903	0		
116	Ah SSB	SBLFT110-12i	307	0	479	0	671	58	958	83		
120	Ah SSB	SBL120-12i(sh)	378	98	590	153	826	214	1181	306		
120	Ah Europower	EPS 120-12	378	98	590	153	826	214	1181	306		

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24V		Cable gauge	16 mm ²		25 mm ²		35 mm ²		50 mm ²	
		Jumper setting	50	75	50	75	50	75	50	75
C20	Brand	Type	100A	150A	100A	150A	100A	150A	100A	150A
120	Ah Effekta	BTL12-120	378	98	590	153	826	214	1181	306
120	Ah Fiamm	FG2C007	502	222	785	347	1099	486	1569	694
120	Ah Long	6FM120G/B	378	98	590	153	826	214	1181	306
125	Ah Sun	SB12-120	378	98	590	153	826	214	1181	306
125	Ah SSB	SBL125-12HR	378	98	590	153	826	214	1181	306
125	Ah Sun	SB12-125FT	449	169	701	264	982	369	1403	528
130	Ah Yuasa	NPL130-6IFR	289	0	451	0	632	0	903	0
131	Ah Leoch	LPF12-125	351	71	549	111	768	156	1097	222
132	Ah Leoch	LPF12-120	378	98	590	153	826	214	1181	306
134	Ah SSB	SBL134R-12i	289	0	451	0	632	0	903	0
135	Ah SSB	SBL135-12HR	378	98	590	153	826	214	1181	306
140	Ah EnerSys	6VE140	476	199	749	311	1048	436	1497	622
140	Ah PBQ	FA140-12	378	98	590	153	826	214	1181	306
150	Ah Effekta	BTL12-150	378	98	590	153	826	214	1181	306
150	Ah Fiamm	FG2F009	547	267	854	417	1196	583	1708	833
150	Ah SSB	SBL150-12i	422	142	660	222	924	311	1319	444
151	Ah SSB	SBL151-12HR	333	53	521	83	729	117	1042	167
155	Ah Cell Power	CPF155-12	467	187	729	292	1021	408	1458	583
156	Ah Sun	SB12-150	422	142	660	222	924	311	1319	444
157	Ah Leoch	LPF12-150	378	98	590	153	826	214	1181	306
159	Ah Sun	SB12-150AFT	369	89	576	139	807	194	1153	278
159	Ah SSB	SBLFT150-12i	289	0	451	0	632	0	903	0
160	Ah Haze	HZB12-160	555	275	868	430	1215	603	1736	861
170	Ah SSB	SBL170-12HR	396	116	618	181	865	253	1236	361
180	Ah EnerSys	6VE180	518	238	810	372	1134	521	1619	744
180	Ah Leoch	LPF12-180	422	142	660	222	924	311	1319	444
200	Ah SSB	SBL200-12i	484	204	757	319	1060	447	1514	639
200	Ah Europower	EPS 200-12	511	231	799	361	1118	506	1597	722
200	Ah Effekta	BTL12-200	378	98	590	153	826	214	1181	306
200	Ah Fiamm	FG2M009	591	311	924	486	1293	681	1847	972
200	Ah Yuasa	NPL200-6	502	222	785	347	1099	486	1569	694
210	Ah Leoch	LPF12-200	467	187	729	292	1021	408	1458	583
210	Ah Long	6FM200G/B	467	187	729	292	1021	408	1458	583
214	Ah Sun	SB12-200	493	213	771	333	1079	467	1542	667
225	Ah EnerSys	2VE225	525	245	821	383	1149	537	1642	767
225	Ah SSB	SBL225-12HR	413	133	646	208	904	292	1292	417
228	Ah Leoch	PLH210FT	493	213	771	333	1079	467	1542	667
230	Ah Europower	EPS 230-12	511	231	799	361	1118	506	1597	722

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48V		Cable gauge	16 mm ²		25 mm ²		30 mm ²		50 mm ²	
		Jumper setting	50	75	50	75	50	75	50	75
C20	Brand	Type	100A	150A	100A	150A	100A	150A	100A	150A
65 Ah	ABT	TM12-310W	460	n.a.	718	n.a.	1005	n.a.	1436	n.a.
65 Ah	Effekta	BTL12-65	467	n.a.	729	n.a.	1021	n.a.	1458	n.a.
65 Ah	Fiamm	FG26505	911	n.a.	1424	n.a.	1993	n.a.	2847	n.a.
65 Ah	Fiamm	FG26507	911	n.a.	1424	n.a.	1993	n.a.	2847	n.a.
65 Ah	PowerSonic	PS12650GB	236	n.a.	368	n.a.	515	n.a.	736	n.a.
65 Ah	Yuasa	NP65-12	556	n.a.	868	n.a.	1215	n.a.	1736	n.a.
65 Ah	SSB	SBL65-12i	324	n.a.	507	n.a.	710	n.a.	1014	n.a.
65 Ah	Sun	SB12-65SV0	236	n.a.	368	n.a.	515	n.a.	736	n.a.
65 Ah	Sun	SB12-65V0	289	n.a.	451	n.a.	632	n.a.	903	n.a.
65 Ah	Europower	EPS 65-12	644	n.a.	1007	n.a.	1410	n.a.	2014	n.a.
66 Ah	SSB	SBL66-12HR	520	n.a.	813	n.a.	1138	n.a.	1625	n.a.
68 Ah	Long	6FM65G/B	289	n.a.	451	n.a.	632	n.a.	903	n.a.
68 Ah	Leoch	LPL12-65	236	n.a.	368	n.a.	515	n.a.	736	n.a.
70 Ah	ABT	TM12-320W	748	n.a.	1168	n.a.	1635	n.a.	2336	n.a.
70 Ah	Fiamm	FG27004	627	n.a.	979	n.a.	1371	n.a.	1958	n.a.
70 Ah	Fiamm	FG27007	893	n.a.	1396	n.a.	1954	n.a.	2792	n.a.
73 Ah	Long	6FM70G/B	467	n.a.	729	n.a.	1021	n.a.	1458	n.a.
75 Ah	ABT	TM12-350W	760	n.a.	1188	n.a.	1663	n.a.	2375	n.a.
75 Ah	Effekta	BTL12-75	520	n.a.	813	n.a.	1138	n.a.	1625	n.a.
75 Ah	Energys	12VE75	632	n.a.	988	n.a.	1383	n.a.	1975	n.a.
75 Ah	SSB	SBL75-12i(sh)	360	n.a.	563	n.a.	788	n.a.	1125	n.a.
75 Ah	Sun	SB12-80	360	n.a.	563	n.a.	788	n.a.	1125	n.a.
75 Ah	PowerSonic	PS12750GB	360	n.a.	563	n.a.	788	n.a.	1125	n.a.
78 Ah	Yuasa	NPL78-12IFR	644	n.a.	1007	n.a.	1410	n.a.	2014	n.a.
78 Ah	Sun	SB12-75	360	n.a.	563	n.a.	788	n.a.	1125	n.a.
80 Ah	Leoch	LPF12-100/A	644	n.a.	1007	n.a.	1410	n.a.	2014	n.a.
80 Ah	Effekta	BTL12-80	556	n.a.	868	n.a.	1215	n.a.	1736	n.a.
80 Ah	SSB	SBL80-12i	378	n.a.	590	n.a.	826	n.a.	1181	n.a.
80 Ah	Fiamm	FG28009	929	n.a.	1451	n.a.	2032	n.a.	2903	n.a.
84 Ah	Long	6FM80G/B	467	n.a.	729	n.a.	1021	n.a.	1458	n.a.
85 Ah	SSB	SBL85-12HR	467	n.a.	729	n.a.	1021	n.a.	1458	n.a.
90 Ah	Effekta	BTL12-90	609	49	951	76	1332	107	1903	153
90 Ah	Energys	12VE90	724	164	1132	257	1585	360	2264	514
90 Ah	Europower	EPS 90-12	644	84	1007	132	1410	185	2014	264
95 Ah	SSB	SBLFT90-12i	200	0	313	0	438	0	625	0

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48V	Cable gauge		16 mm ²		25 mm ²		30 mm ²		50 mm ²	
		Jumper setting	50	75	50	75	50	75	50	75
C20	Brand	Type	100A	150A	100A	150A	100A	150A	100A	150A
100 Ah	SSB	SBL100-12HR	644	84	1007	132	1410	185	2014	264
100 Ah	SSB	SBL100-12i(sh)	644	84	1007	132	1410	185	2014	264
100 Ah	Effekta	BTL12-100	644	84	1007	132	1410	185	2014	264
100 Ah	Fiamm	FG2A007	982	422	1535	660	2149	924	3069	1319
100 Ah	PowerSonic	PS121000GB	662	102	1035	160	1449	224	2069	319
100 Ah	Yuasa	NPL100-12	822	262	1285	410	1799	574	2569	819
100 Ah	Europower	EPS 100-12	733	173	1146	271	1604	379	2292	542
105 Ah	Sun	SB12-110AFT	556	0	868	0	1215	0	1736	0
105 Ah	Long	6FM100G/B	644	84	1007	132	1410	185	2014	264
105 Ah	Leoch	LPF12-100/A	733	173	1146	271	1604	379	2292	542
107 Ah	Sun	SB12-100	662	102	1035	160	1449	224	2069	319
110 Ah	Sun	SB12-100HFT	769	209	1201	326	1682	457	2403	653
110 Ah	Sun	SB12-100HFT	769	209	1201	326	1682	457	2403	653
116 Ah	SSB	SBLFT110-12i	680	120	1063	188	1488	263	2125	375
120 Ah	Effekta	BTL12-120	822	262	1285	410	1799	574	2569	819
120 Ah	Fiamm	FG2C007	1071	511	1674	799	2343	1118	3347	1597
120 Ah	SSB	SBL120-12i(sh)	822	262	1285	410	1799	574	2569	819
120 Ah	Europower	EPS 120-12	822	262	1285	410	1799	574	2569	819
121 Ah	Long	6FM115G/B	644	84	1007	132	1410	185	2014	264
125 Ah	SSB	SBL125-12HR	822	262	1285	410	1799	574	2569	819
125 Ah	Sun	SB12-120	822	262	1285	410	1799	574	2569	819
126 Ah	Long	6FM120G/B	822	262	1285	410	1799	574	2569	819
130 Ah	Yuasa	NPL130-6IFR	644	84	1007	132	1410	185	2014	264
131 Ah	Leoch	LPF12-125	769	209	1201	326	1682	457	2403	653
132 Ah	Leoch	LPF12-120	822	262	1285	410	1799	574	2569	819
134 Ah	SSB	SBL134R-12i	644	84	1007	132	1410	185	2014	264
135 Ah	SSB	SBL135-12HR	822	262	1285	410	1799	574	2569	819
140 Ah	Energys	6VE140	1025	465	1601	726	2242	1017	3203	1453
150 Ah	Effekta	BTL12-150	822	262	1285	410	1799	574	2569	819
150 Ah	Fiamm	FG2F009	1160	600	1813	938	2538	1313	3625	1875
150 Ah	SSB	SBL150-12i	911	351	1424	549	1993	768	2847	1097
151 Ah	SSB	SBL151-12HR	733	173	1146	271	1604	379	2292	542
156 Ah	Sun	SB12-150	911	351	1424	549	1993	768	2847	1097
157 Ah	Leoch	LPF12-150	822	262	1285	410	1799	574	2569	819
159 Ah	SSB	SBLFT150-12i	644	84	1007	132	1410	185	2014	264
159 Ah	Sun	SB12-150AFT	804	244	1257	382	1760	535	2514	764

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48V			Cable gauge		16 mm ²		25 mm ²		30 mm ²		50 mm ²	
			Jumper setting		50	75	50	75	50	75	50	75
C20	Brand	Type	100A	150A	100A	150A	100A	150A	100A	150A	100A	150A
170 Ah	SSB	SBL170-12HR	858	298	1340	465	1876	651	2681	931		
180 Ah	Energys	6VE180	1103	543	1724	849	2413	1188	3447	1697		
180 Ah	Leoch	LPF12-180	911	351	1424	549	1993	768	2847	1097		
200 Ah	Effekta	BTL12-200	822	262	1285	410	1799	574	2569	819		
200 Ah	SSB	SBL200-12i	1036	476	1618	743	2265	1040	3236	1486		
200 Ah	Fiamm	FG2M009	1249	689	1951	1076	2732	1507	3903	2153		
200 Ah	Yuasa	NPL200-6	1071	511	1674	799	2343	1118	3347	1597		
200 Ah	Europower	EPS 200-12	1089	529	1701	826	2382	1157	3403	1653		
210 Ah	Leoch	LPF12-200	1000	440	1563	688	2188	963	3125	1375		
210 Ah	Long	6FM200G/B	1000	440	1563	688	2188	963	3125	1375		
214 Ah	Sun	SB12-200	1053	493	1646	771	2304	1079	3292	1542		
225 Ah	SSB	SBL225-12HR	893	333	1396	521	1954	729	2792	1042		
225 Ah	Energys	2VE225	1117	557	1746	871	2444	1219	3492	1742		
228 Ah	Leoch	PLH210FT	1053	493	1646	771	2304	1079	3292	1542		
230 Ah	Europower	EPS 230-12	1089	529	1701	826	2382	1157	3403	1653		

6 New batteries

Capacity - New batteries often do not give their rated capacity when received from the manufacturer. This is due to the methods of making the plates. The plates are made by applying oxides of lead, mixed with a liquid, which generally is dilute sulphuric acid, to the grids. These oxides must be subjected to a charging current in order to produce the spongy lead and lead peroxide. After the charge, they must be discharged, and then again charged. This is necessary because not all of the oxides are changed to active material on one charge, and **repeated** charges and discharges are required to produce the maximum amount of active materials.

Some manufacturers do not charge and discharge a battery a sufficient number of times before sending it out, expecting that after a battery is put into use, its capacity eventually will increase to the specified value, because more active material is produced during each charge. Backup batteries, however, may never get enough discharge and charge cycles to reach that capacity.

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Internal resistance - It is important to recognize that due to this reduction of active material new batteries and batteries that have been stored for longer periods of time also show a relatively high internal resistance. This degradation does not recover once re-charged! Again, in order for the battery to recover, it must be discharged and charged several times. Every cycle will result in a reduction of the internal resistance.

Therefore, if you install one of these batteries and it shows a fault on the charger, this fault will not just go away by charging. The charger is not at fault, but the battery.