

1.1 System power calculator

For correct installation and operation of an evacuation system, it is essential to calculate battery capacity meeting standard requirements.

The calculation is however not quite an easy task because such a system would usually draw varying current in different operating modes.

Excel-based Power-Calculator has been developed for a convenient battery capacity estimation. Power Calculator tool use instructions are provided below.

The Power-Calculator tool is included with each IRIS-Net version and is updated regularly.


The tool can be found in the IRIS-Net program folder under the following path:

C:\ProgramData\IRIS-Net\X.x\Tools\PA PowerCalculator.

The most recent power calculator can also be downloaded from the product website to ensure the latest version is used.

The image below shows the layout of power calculator V2.0

PAVIRO
Power Calculator V2.0

 **BOSCH**
Invented for life

Date **DD-MM-YYYY**

Battery Operation Requirements		
Standby	1800	min
Idle (no audio)	0	min
Speech (-10 dB)	20	min
Alarm (-3 dB)	10	min
Safety factor (tolerance, temperature)	5,0	%

Optional "other" device	
Name	123456
Current consumption in standby mode	0 mA
Current consumption in idle mode	0 mA
Current consumption during speech	0 mA
Current consumption during alarm	0 mA

Device	Description	Used / Quantity
PVA-4CR12	Controller	NO
Control Out HP (6 output in total max. 200 mA)		
		NO
Control Out (max. 40 mA per control out)		
		0
OM-1	OMNEO network module	NO
LT-802GBTME	Ethernet switch	0
PVA-4R24	24 zone router	0
Control Out (max. 40 mA per control out)		
		0
PLN-24CH12	Power supply 24 V/12 A	NO
PVA-2P500	Amplifier 2 X 500 W	0
Nominal power load, all speaker lines in W		
		0
Nominal power load, EOL-monitored speaker lines in W		
		0
PVA-15CST	Call station	0
PVA-20CSE	Call station extension	0
PVA-15ECS	Emergency call station	0
PVA-FMP-AT	Fire brigade call station - ÖNORM	0
123456		0


Project **NAME**

Required battery capacity incl. safety factor:		0,00	Ah
Required battery capacity incl. safety factor if standby time < 24 h (applicable only for Germany according to the DIN VDE 0833-2)		0,00	Ah

Battery (re)charging time			
Battery capacity		65	Ah
Available charging current (PLN-24CH12 maximum 12 A)		12	A
Charging time to 90 % battery capacity (according to the DIN VDE 0833-2 maximum 24 h)		4,9	h

Maximum battery current		0,0	A
Mains current draw at 230 V AC (during alarm and maximum battery charging)		0,0	A
Mains current draw at 115 V AC (during alarm and maximum battery charging)		0,0	A

Max. DC current needed for all DC consumers except amplifiers		0,0	A		
Power loss calculation (heat dissipation within the rack)					
Power loss on of 24VDC Devices	W	0	0	0	0
Power loss on of PVA-2P500	W	0	0	0	0
System power loss	BTU/h	0	0	0	0

 **NOTE: The RED font entries are input fields and must be filled out according to the system requirements.**

This tool can calculate battery energy required for a given PAVIRO system. Calculated results are to be used as reference values only because of the high variety of tolerances in the batteries from different suppliers.

Special Note

Maximum battery discharging current must be observed while it highly varies among different battery types.

Exclusion of liability

Bosch accepts no liability whatsoever with regard to direct and/or indirect, immaterial or consequential damage, including loss of profit (even if Bosch is informed of the possibility of this damage), that is in any the way the result of this power calculation tool.

Description and explanations of the individual parameters

IMPORTANT:

A separate calculation must be made for each power supply unit used in the system!

To calculate the battery capacity, all red font input fields must be filled out according to the system requirements.

In the first line, there is a possibility to enter the editing date (Date) and project name (Project).

Date **DD-MM-YYYY**

Project **NAME**

Battery Operation Requirements

In the section **Battery Operation Requirements**, the bridging time and alarm time in case of mains power failure must be specified.

Note:

According to the DIN VDE 0833-4 requirements, the bridging time of at least 30 hours is required. If an emergency power supply system is available, the bridging time can be only 4 hours.

The alarm time must be twice the evacuation time, but at least 30 minutes altogether.

This requirement may vary by region or country. Observe your regional regulations.

Battery Operation Requirements		
Standby	1800	min
Idle (no audio)	0	min
Speech (-10 dB)	20	min
Alarm (-3 dB)	10	min
Safety factor (tolerance, temperature)	5,0	%

There are two options for specifying the bridging time:

Standby: The devices are put into standby mode.

They are briefly activated at regular intervals (<100s) so that the required by standards monitoring can be carried out. This is the option with lowest power consumption.

Idle (no audio): In some cases, it may be necessary to keep the devices active – then the bridging time is entered into the Idle field.

In this case, the power consumption is much higher comparing to the standby mode.

Definition and explanation of the evacuation time:

"Speech (-10dB)" and **"Alarm (-3dB)"** define the duration ratio between the specific evacuation signal durations.

Example: If the articulated message part in an EVAC message is 10 seconds and the alert signal tone (e.g. slow whoop) is 5 seconds, their respective durations for a 30-minute EVAC message sequence would be 20 minutes of "Speech" and 10 minutes of "Alarm".

"Safety factor (tolerance, temperature)" The default 5% security factor can be reduced, if:

- high-performance batteries are used
- the system operates in air-conditioned rooms
- battery use duration is shorter (<30 minutes)

Optional “other” device

In the section **Optional “other” device**, the bridging- and evacuation times in case of mains power failure for external devices can be specified.

Optional "other" device		
Name	123456	
Current consumption in standby mode	0	mA
Current consumption in idle mode	0	mA
Current consumption during speech	0	mA
Current consumption during alarm	0	mA

For the optional "other" device, the same rules apply for standby, idle, voice, and alarm as described above in battery operation requirements.

Hint:

Within the systems built in accordance with EN54-16 requirements, only certified devices may be powered from the PLN-24CH12 power supply.

Device main section

All relevant PAVIRO devices are listed in the following section. The number of devices and speaker line loads must be entered in the red-font cells according to the project requirements.

For some devices just select YES or NO, depending on their presence – e.g. PVA-4CR12 controller. For other devices such as PVA-2P500 amplifier, select a number in the dialog or type it directly. For "Nominal power load, all speaker lines", type the planned loudspeaker load directly. Type also the loudspeaker load value for the "Nominal power, EOL-monitored loudspeaker lines" if EOL monitoring is required.

The specified speaker load under "Nominal power, EOL-monitored loudspeaker lines" cannot be greater than the "Nominal power load, all speaker lines".

Device	Description	Used / Quantity
PVA-4CR12	Controller	NO
<i>Control Out HP (6 output in total max. 200 mA)</i>		NO
<i>Control Out (max. 40 mA per control out)</i>		0
OM-1	OMNEO network module	NO
LT-802GBTME	Ethernet switch	0
PVA-4R24	24 zone router	0
<i>Control Out (max. 40 mA per control out)</i>		0
PLN-24CH12	Power supply 24 V/12 A	NO
PVA-2P500	Amplifier 2 X 500 W	0
<i>Nominal power load, all speaker lines in W</i>		0
<i>Nominal power load, EOL-monitored speaker lines in W</i>		0
PVA-15CST	Call station	0
PVA-20CSE	Call station extension	0
PVA-15ECS	Emergency call station	0
PVA-FMP-AT	Fire brigade call station - ÖNORM	0
123456		0

Explanation of some devices mentioned in the table:

<i>Control Out HP (6 output in total max. 200 mA)</i>	NO
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If at least one GPO output of the PVA-4CR12 controller CONTROL OUT HP connector is used, this entry should be set to "YES".

This ensures that the correct maximum current is calculated for the PVA-4CR12 controller

<i>Control Out (max. 40 mA per control out)</i>	0
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In case one or more PVA-4CR12 controller or PVA-4R24 router CONTROL OUT GPO output is used, the total number must be entered here.

This ensures that the correct maximum current is calculated for the PVA-4CR12 controller and/or the PVA4R24 router.

<i>Nominal power load, all speaker lines in W</i>	0
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Specify the total speaker load that must be maintained by amplifiers. It is recommended to specify the available amplifier power here. This would allow eventual load increase without any problems.

This value cannot be greater than the available amplifier power.

<i>Nominal power load, EOL-monitored speaker lines in W</i>	0
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Enter the loudspeaker load of the loudspeaker lines monitored with EOL modules (PLN-1EOL or EOL8001) here.

The entry is possible only if a PVA-4CR12 controller or a PVA-4R24 router is available.

123456		0
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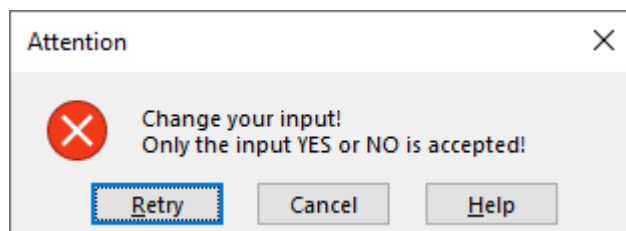
If you have entered something under "Optional "other" device" the number has to be entered here.

Operation and messages in the main section

Clicking on red-font cells reveals drop-down lists with available choices.

Device	Description	Used / Quantity
PVA-4CR12	Controller	NO
<i>Control Out HP (6 output in total max. 200 mA)</i>		YES
<i>Control Out (max. 40 mA per control out)</i>		YES NO

Invalid entries invoke warning message boxes.



It is also checked whether PLN-24CH12 power supply unit is used.

If yes, not more than 6 PVA-2P500 power amplifiers can be entered. Since the PLN-24CH12 power supply has only 6 power outputs.

PLN-24CH12	Power supply 24 V/12 A	YES
PVA-2P500	Amplifier 2 X 500 W	7
A PLN-24CH12 can supply a maximum of 6 PMX-2P500 power amplifiers!		

Required battery capacity

Required battery capacity incl. safety factor:	0,00	Ah
Required battery capacity incl. safety factor if standby time < 24 h (applicable only for Germany according to the DIN VDE 0833-2)	0,00	Ah

The upper value shows the calculated battery capacity including the specified safety factor (default: 5%).

If PLN-24CH12 power supply is used and the battery capacity is higher than 225 Ah, an error message would appear. Then the consumers must be reduced until the battery capacity is below 225Ah.

**A PLN-24CH12 only supports battery capacities up to 225 Ah!
Reduce the entered consumers!**

The lower value is only relevant for Germany and shows the calculated battery capacity at bridging times of less than 24 h, as required by DIN VDE 0833-2.

Battery (re)charging time

The following part is usually relevant for Germany, but can also apply to other countries. Therefore, observe the regional requirements.

This section is used to calculate the duration of battery recharge to the 90% of its capacity.

Battery (re)charging time		
Battery capacity	65	Ah
Available charging current (PLN-24CH12 maximum 12 A)	12	A
Charging time to 90 % battery capacity (according to the DIN VDE 0833-2 maximum 24 h)	4,9	h

For this purpose, the capacity of the battery must be entered in the upper red-font cell.

When using PLN-24CH12 power supply, only entries between 65 Ah and 225 Ah are accepted.

**A PLN-24CH12 only supports battery capacities from 65 Ah up to 225 Ah!
Change your input accordingly!**

The maximum available power supply current must be entered in the middle red-font cell. When using PLN-24CH12 power supply, only entries up to 12 A are accepted.

**The available charging current of a PLN-24CH12 of 12 A has been exceeded!
Change your entries accordingly!**

The calculated charging time is displayed in the lower right cell.
 If the calculated time is greater than 24 hours the following message would appear.
 Then the consumers must be reduced until the charging time is less than 24h.

**The charging time to 90% of the battery capacity is longer than 24 h!
 Reduce the entered consumers!**

Maximum battery current

Maximum battery current	0,0	A
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This is the maximum battery current ($I_{\max b}$) required for all devices required for battery operation.
 When using PLN-24CH12, this must not be higher than 125 A, otherwise an error message would appear.

**The maximum battery current of a PLN-24CH12 of 125A is exceeded!
 Reduce the entered consumers!**

Mains current

Mains current draw at 230 V AC (during alarm and maximum battery charging)	0,0	A
Mains current draw at 115 V AC (during alarm and maximum battery charging)	0,0	A

This is the calculated maximum current required by the 230 V AC or 115 V AC mains supply.

Maximum DC current needed for all DC consumers except amplifiers.

Max. DC current needed for all DC consumers except amplifiers	0,0	A
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Max. DC current needed for all DC consumers except amplifiers.
 This calculated current is permanently needed for the supply of the devices and is automatically subtracted for the calculation of the "Charging time to 90% battery capacity" ($I_{\max a}$).

Power loss calculation (heat dissipation within the rack)

Power loss calculation (heat dissipation within the rack)		Standby	Idle	Speech	Alarm (max)
Power loss on of 24VDC Devices	W	0	0	0	0
Power loss on of PVA-2P500	W	0	0	0	0
System power loss	BTU/h	0	0	0	0

Here the heat loss power is calculated for the four operating modes (standby, idle, speech and alarm).
 This is necessary, for example, when planning an air conditioning system.