Energy storage

- your new business opportunity

Powering Business Worldwide

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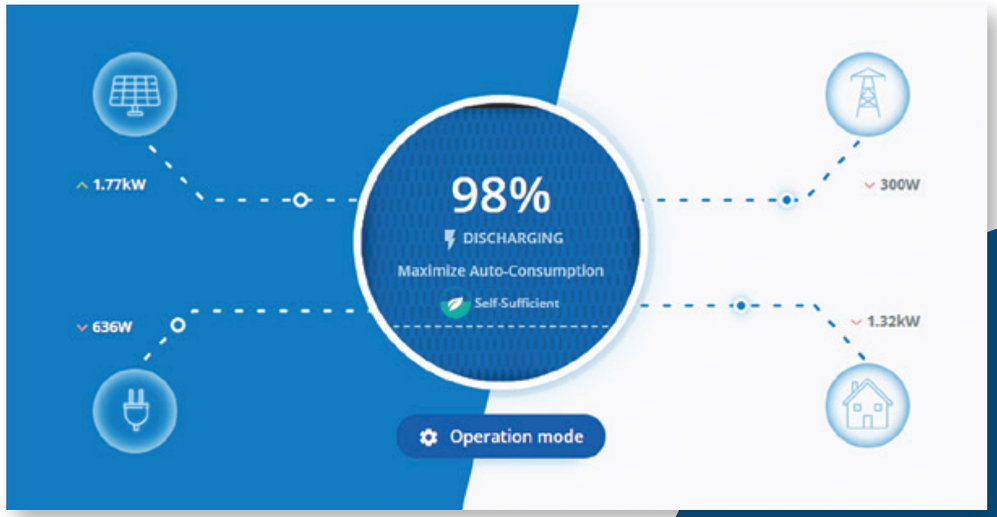
Powering Business Worldwide

Supporting the energy transition



These problems can be easily mitigated by more **self-generation** combined with an **energy storage system** to maximise the consumption of self-generated energy.

-20%

European nations agreed to EU 2020 Climate and Energy package directive, which sets **three clear targets:** **20%** cut in greenhouse gas emissions below 1990 levels, 20% of EU energy from renewables and 20% improvement in energy efficiency.

Reduction or banning of nuclear and coal power plants

2050
+18%

Electricity generation in Europe is expected to increase by 18% to 2050, from higher demand mainly caused by increased electrification of transport (EV) and heating.

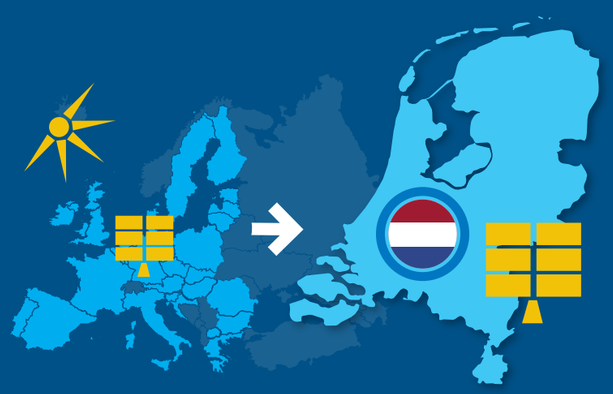
2025 +14.2 mio

EV car adoption is increasing (EV sales to reach 14,2 million by 2025). This will significantly increase the energy consumption.

Energy transition

20/20/20
Reduction of coal power plants
increase of energy demand
increase of PV adoption
grid congestion
risk of brownouts and blackouts
increase of energy costs
increase of PV capacity
lower feed in tariffs

In 2006, the market was purely driven by feed-in tariffs (FiT). However, over the last decade, FiTs have been reduced and it is now more cost-effective to use the generated PV power to reduce electricity bills rather than feeding it into the grid.



In 2016 solar PV installed capacity exceeded **100GW** in Europe, supplying **4%** of the 28 EU states' electricity demand. This equals the annual power consumption of The Netherlands.

Since 2009 EU retail electricity prices for domestic consumers have risen from **€0.16/kWh** to **€0.21/kWh** in 2016.

+ 0.05 €/kWh

Did you know that only six EVs charging close to each other at peak time could lead to local brownouts if the EV charging is not properly managed at the grid level?

The residential and small commercial solar PV markets combined account for 20%-25% of total installed solar PV capacity in the EU.

20%-25%

The grid has a certain capacity, and yet we are using **MORE** and **MORE** and **MORE** energy.

The biggest issue isn't the amount of energy consumption itself. The real problem is if we all start using it at **THE SAME TIME.**

> Residential energy storage (RES) systems market is expected to be over $13 billion by 2025.

Navigant Research, 3Q 2016

Your new market opportunity

Leverage the new business opportunity afforded by energy storage

Energy Storage is a new and fast growing market that enables home owners and small commercial enterprises to manage their energy supply, reduce bills and contribute to a sustainable future. As feed-in tariff (FiT) rates continue to be phased out, the real value in micro generation using solar photovoltaic (PV) systems lies in the ability to maximise self-consumption of the electricity generated.

Storing energy helps to balance the loads (peak shaving) by releasing energy when needed avoiding grid energy consumption at peak times and the related peak charges.
The economic drivers for energy storage continue to improve as a consequence of rising retail electricity rates, decreasing battery costs as well as solar PV costs and the continued phase out of FiT subsidies.

Energy storage

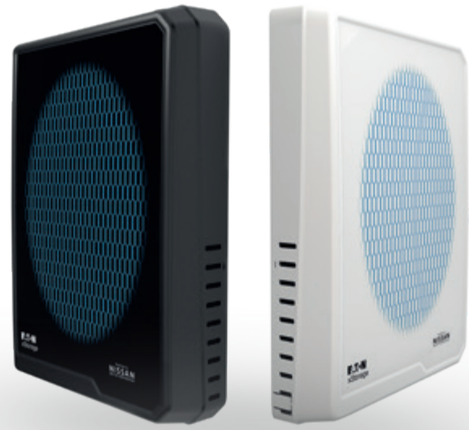
The trend toward solar self-consumption

How we generate and use electricity is changing. Energy-efficient appliances and gadgets consume less power. But as new energy vehicles become more popular, a new source of electricity demand is emerging, putting grids under strain.
More energy consumers are choosing to install solar PV to minimise their carbon footprint becoming more sustainable in their energy usage and reducing energy costs.
In markets with a large base of installed residential rooftop solar PV capacity, interest in storing energy among consumers is growing. Solar PV energy can be stored in batteries when the sun is shining and the consumption of the stored clean electricity time-shifted to correspond with a household's electricity demand, such as in the evening and early morning.

An energy storage system is also able to provide back-up power for essential loads, including lighting, modems and chargers for essential devices, like smartphones. Homeowners can be confident they will always have power even during an outage.

Did you know that you are using only around 30% of the energy produced by your PV set?

Using batteries to store the produced energy increases your self-consumption up to 70 %.



The solar future is xStorage Home

xStorage Home is an energy storage system, housed in a single unit, that integrates a battery pack and an hybrid inverter. xStorage Home is designed to maximise solar PV self consumption and give households peace of mind by powering loads in a grid event.

Designed by Eaton and incorporating lithium-ion batteries from electric vehicle (EV) leader Nissan, the xStorage Home system is one of the most reliable and safest home storage systems on the market.

Eaton and Nissan - proven and reliable technology

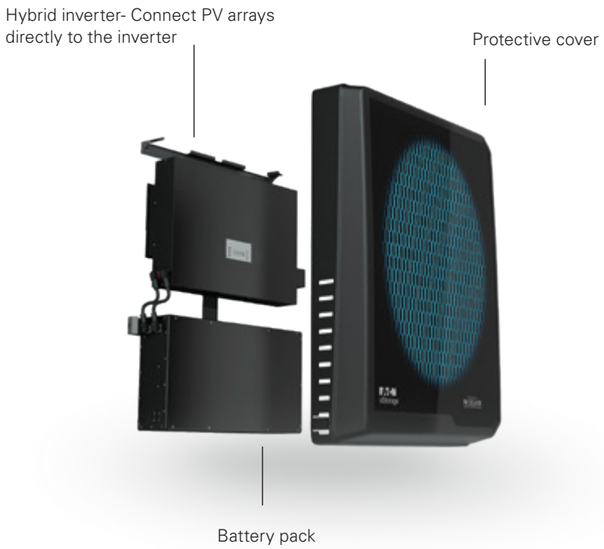
xStorage Home combines new or second-life Nissan LEAF battery modules with Eaton power quality technology and electronics. The system is simple to install, set up and use.

Safety is our number one priority and xStorage Home has been developed and tested to meet the highest electrical safety standards at EU and also national levels.

EATON
xStorage

Powered by
NISSAN
MOTOR CORPORATION

xStorage Home product range



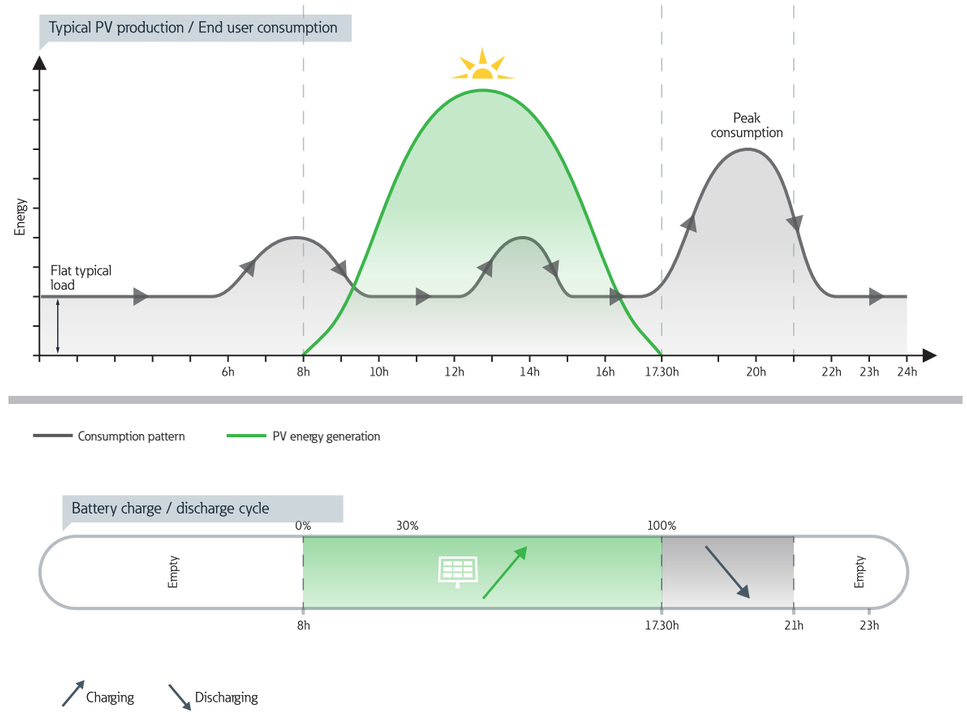
xStorage Home systems can be supplied either with new or with second-life batteries, repurposed from Nissan LEAF electric vehicles.

Battery pack	**Battery type**		
	Second life	New	
Nominal capacity	4.2 kWh	6 kWh	10.08 kWh

Here is an overview of the multiple xStorage Home system combinations:

xStorage Home systems			
Charging power	Battery capacity	Product Description	Part Number
3.6 kW	4.2 kWh	XST 1Ph 3.6 kW 4.2 kWh Gen1 Blue	XSTH1P0361UBUEV1
4.6 kW	4.2 kWh	XST 1Ph 4.6 kW 4.2 kWh Gen1 Blue	XSTH1P0461UBUEV1
6.0 kW	4.2 kWh	XST 1Ph 6.0 kW 4.2 kWh Gen1 Blue	XSTH1P0601UBUEV1
3.6 kW	6.0 kWh	XST 1Ph 3.6 kW 6 kWh Gen2 Blue	XSTH1P0362NBUEV1
4.6 kW	6.0 kWh	XST 1Ph 4.6 kW 6 kWh Gen2 Blue	XSTH1P0462NBUEV1
6.0 kW	6.0 kWh	XST 1Ph 6.0 kW 6 kWh Gen2 Blue	XSTH1P0602NBUEV1
3.6 kW	10.08 kWh	XST 1Ph 3.6 kW 10.08 kWh Gen4 Blue	XSTH1P0364NBUEV1
4.6 kW	10.08 kWh	XST 1Ph 4.6 kW 10.08 kWh Gen4 Blue	XSTH1P0464NBUEV1
6.0 kW	10.08 kWh	XST 1Ph 6.0 kW 10.08 kWh Gen4 Blue	XSTH1P0604NBUEV1

Example of PV power generated vs consumed power



Benefits for your customers

Save money

xStorage Home can save on your customers' energy bills by using more solar and harvesting cheap off-peak electricity. In case of a new solar storage installation, your customers can also save on the initial investment as the inverter for solar PV is included in the unit itself.

Be more energy independent

xStorage Home puts your customers in control of their energy, either maximising self-generated solar power, or choosing when to charge from the grid based on variable pricing tariffs.

Peace of mind

Once set-up by a certified installer, the unit is ready to go and can be plugged in and powered up simply and easily. No undesired hassle for your customers.

Keep the lights on

xStorage Home can provide your customers' house with energy if the grid fails, powering preferential devices like for example lights, modem/router and security systems.

Stay connected

The simple-to-use xStorage Home app will let your customers see and manage their energy consumption easily, from anywhere. Your customers will be able to follow the generation and consumption of their energy, check their battery status, all from their phone or tablet.

Lower the CO2 footprint

xStorage Home provides solar power storage - harvesting energy produced during the day to use in the morning, at noon and at night.

Embrace the circular economy

xStorage Home is also available with Nissan LEAF batteries that have been used in cars. These batteries still have plenty of capacity for your customers' energy needs. This way the batteries get a second life before being recycled.

Stay safe

xStorage Home energy storage systems have been developed to meet the highest electrical safety standards. Eaton is a global power management leader having been around for 100 years and working with lithium-ion battery technology from Nissan, the world's leading electric vehicle manufacturer by volume. Eaton only works with highly qualified installers, members of the Eaton xStorage Home Authorised Installer Partner Programme.

Your customers' energy at a glance

Through the friendly user interface, your customers can easily have an overview of their photovoltaic energy production, their house power consumption, their battery state of charge as well their critical and non-critical load consumption.

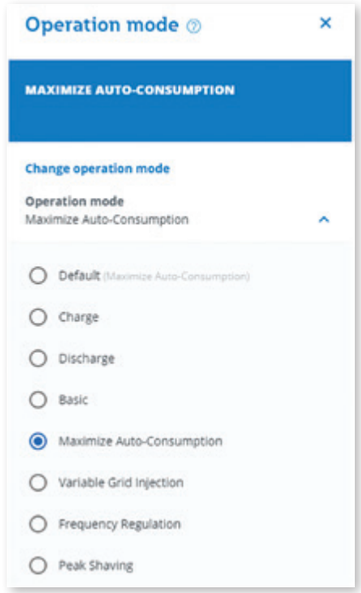
Tailored to your customers' needs

xStorage Home dashboard - your home energy at a glance

Your customers can decide the level of engagement they want in regards to their energy management, from the manual operating modes where they can customise the parameters themselves to the intelligent operating modes that run automatically for them. xStorage Home has 4 intelligent operating modes available:

- Maximise Auto-Consumption;
- Peak-Shaving;
- Variable Grid Injection;
- Frequency Regulation (for Aggregator or Utility).

Some operating modes may not be available in all countries.



Intelligent modes and installation mapping

Intelligent modes	AC coupled installation	DC coupled installation	NO-PV installation
Maximise Auto-Consumption	Yes	Yes	No
Peak-Shaving	Yes	Yes	Yes
Variable Grid Injection	Yes	Yes	Yes
Frequency Regulation	Yes	Yes	Yes

Why xStorage Home?

- xStorage Home is designed to be the safest and the most reliable home energy storage system on the market today.
- Eaton xStorage Home is a simple to install and use product. It consists of just one wall mounted cover, protecting the hybrid inverter and the battery pack with a battery management system (BMS), which is also easy to set up.
- Whether your customer has already a PV installation and wants to extend it with storage or plans to install a new PV installation, xStorage Home can be either DC or AC coupled. New PV arrays can be directly connected to the hybrid inverter. For the possible configurations see page 16-25.
- The product combines Eaton's many decades of experience in power supply equipment and lithium-ion battery technology from Nissan, the world's leading producer of electric vehicles.
- Eaton provides the complete home energy application based on your customers' needs, the innovative technology that connects, protects and efficiently manages what matters most to your customers. Integrated electrical solutions are available from the service entrance to the wall plate. For the applications and the complimentary components see page 16-25.
- Join the Eaton xStorage Home Authorised Installer Partner network: At Eaton we are committed to supporting our installer partners, with marketing, sales lead generation through to servicing. That's why we are seeking responsible businesses able to support their customers post-sale.

Become an Authorised xStorage Home Installer Partner and start benefiting today

You may already be installing solar PV panels and other microgeneration technologies. Or you might have installed on customers' behalf electric vehicle charging points.

Therefore, becoming an Eaton Authorised xStorage Home Installer Partner can be a great way to evolve your business and create new sales opportunities.

By engaging with the xStorage Home Authorised Installer Partner Programme you become legible for multiple benefits, including:

- Instructor-led certification courses to increase product and standards knowledge
- Receiving leads within your service area through promotional campaigns driven by Eaton
- Easy access to knowledge and expertise
- Marketing and technical support

Interested in becoming a Partner?

If you are a professional who is passionate about becoming involved in the business opportunity afforded by energy storage and you are committed to providing a high level of customer satisfaction through your sales and services register at our webpage: **www.eaton.com/becomeapartner**

xStorage Home installation configurations

We have developed xStorage Home with flexibility in mind, so that the system can be installed in most homes, whether with an existing PV installation, as part of a new solar-storage installation, or as a standalone energy storage unit programmed to charge up with cheaper off-peak electricity for use during peak periods. Depending on the situation and your customers' needs you can use xStorage Home in a number of configurations.

DC-coupled configurations

Configurations 1-3 show the various DC-coupled configurations for xStorage Home, where the PV panel is connected to the xStorage Home unit.

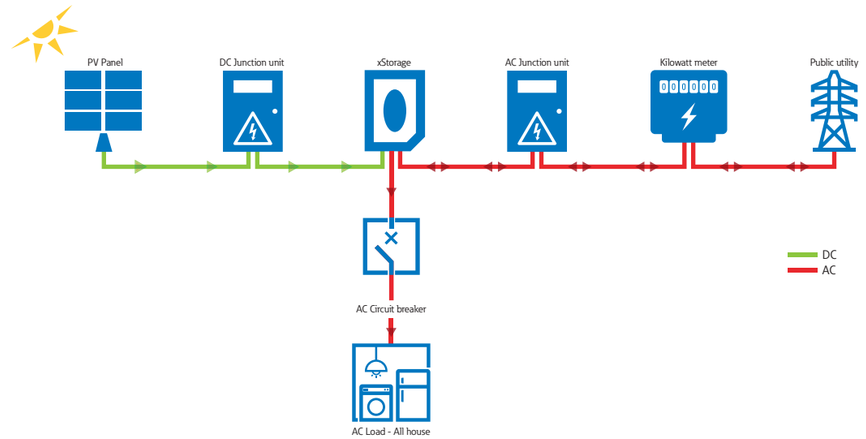
DC coupled systems are typical for new installations where:

- Households do not have an existing PV generation system installed;
- The xStorage Home system is installed together with the new PV installation;
- The xStorage Home and PV systems are connected directly through DC connectors.

The following schematics provide a general overview of the DC coupled installation with loads divided into critical and non-critical. In this case, additional PV breakers should be added to the installation to protect direct DC connection lines between the xStorage Home System and the PV panel. There is no need for an additional PV inverter to be installed as the hybrid inverter has this functionality integrated. The installation can be carried out without a power meter, but in that case functionality of the user interface will be limited.

Configuration #1: PV connected to xStorage Home

In Configuration 1, the system is installed and set-up so that all house loads can be powered.

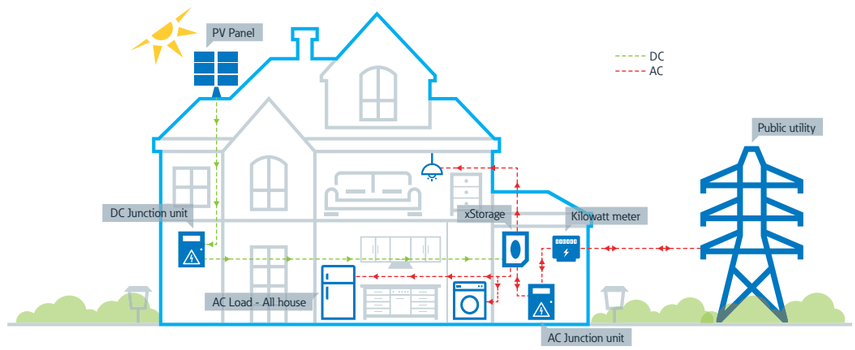


Pros

- All the house load is protected by the xStorage Home backup function
- No additional AC distribution box required
- No additional meter required for zero-out function
- Monitor PV Input directly

Cons

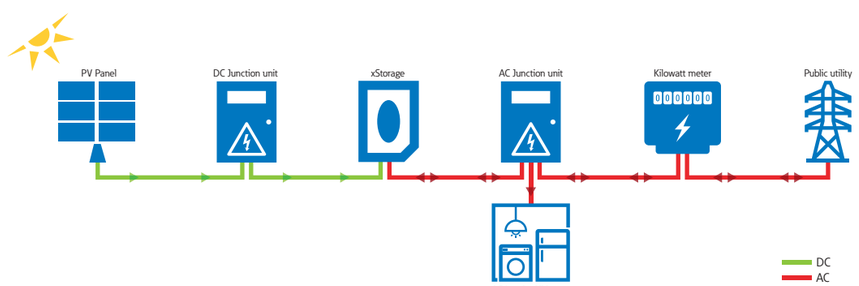
- House load must be below Grid Injection Max Power (6 kW or 3.6 kW or 4.6 kW) depending on country regulations
- If the xStorage Home unit fails, there will be no backup power for loads
- A second distribution board for the protected load required



The system is installed and set-up so that all house loads can be powered, in the event of an outage.

Configuration #2: PV connected to xStorage Home

In Configuration 2, the system is installed and set-up so that a critical load can be powered, in the event of an outage.

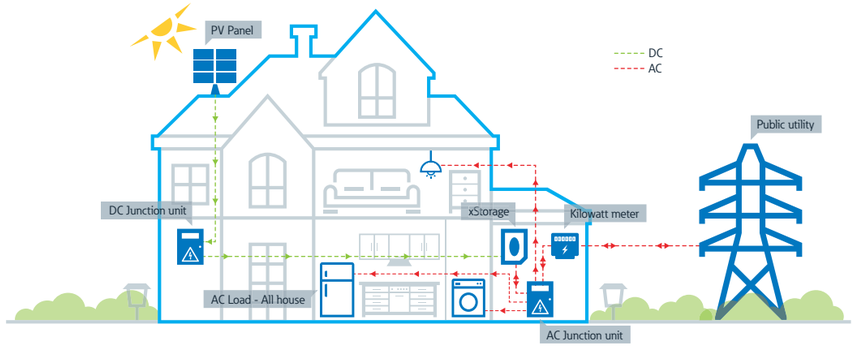


Pros

- Existing distribution board is kept unchanged
- Monitor PV Input directly

Cons

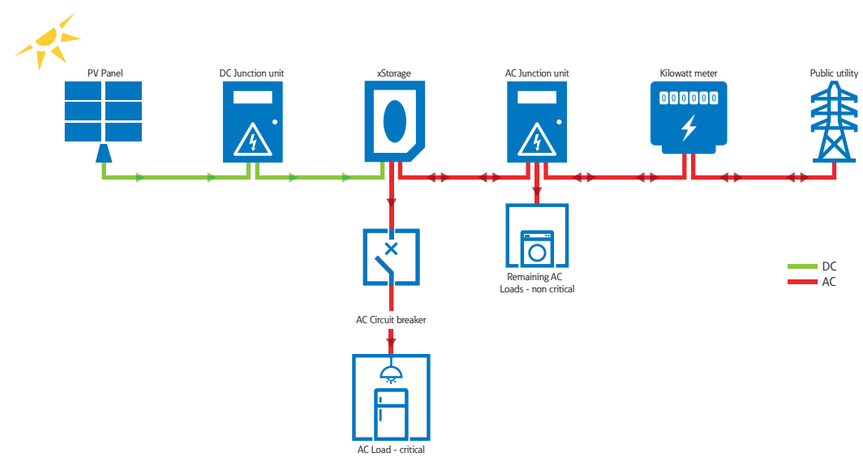
- No protected load, backup function lost
- Product works only in Grid Tie Mode



The DC coupled PV-storage system has not been set-up to provide back-up.

Configuration #3: PV connected to xStorage Home

In Configuration 3, the system is installed and set-up so that critical loads and non critical loads can be powered. In the event of a power outage, critical loads are powered.

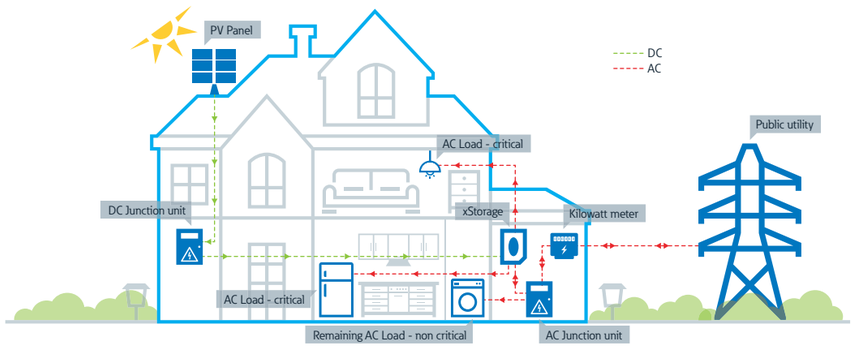


Pros

- Load partly backed up
- Directly monitor PV Input

Cons

- Protected load up to country regulations (3.6 kW, 4.6 kW or 6 kW)
- An additional power meter is required to ensure that no power is injected into the grid
- A second distribution board for the protected load required



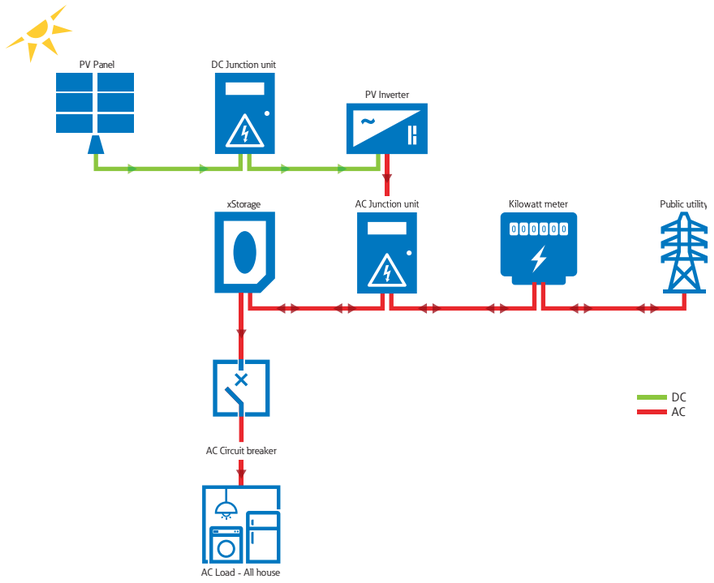
The system is installed and set-up so that all house loads can be powered, in event of an outage.

AC-coupled configurations

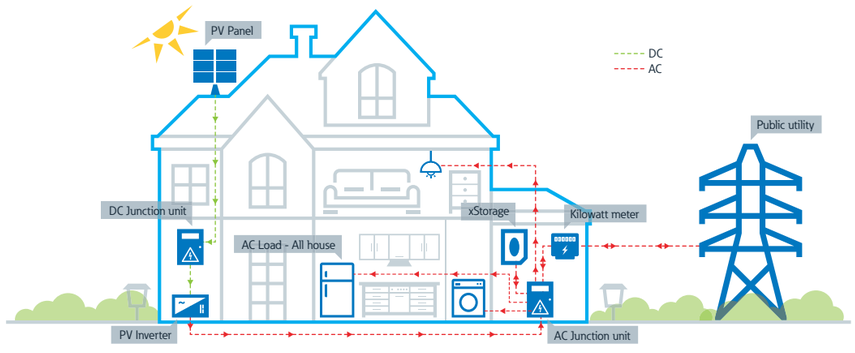
Configurations 1-3 show how xStorage Home can be installed on the AC side, usually when the PV system is already installed. The configurations show the various back-up options.
AC coupled systems are typical for the so called retrofit installations where:
• Household have an existing PV generation system installed;
• The xStorage Home system is installed on the AC side of the installation and connected through the distribution box with the existing PV installation.
The following schematics provide a general overview of the installation with loads divided into critical and non-critical. Power meters are, in general, necessary to monitor energy in order to enable full user interface functionality.

Configuration #1: PV not connected to xStorage Home

In Configuration 1, the installation is a retrofit and the system is installed and set-up so that a critical load can be powered, in the event of an outage.

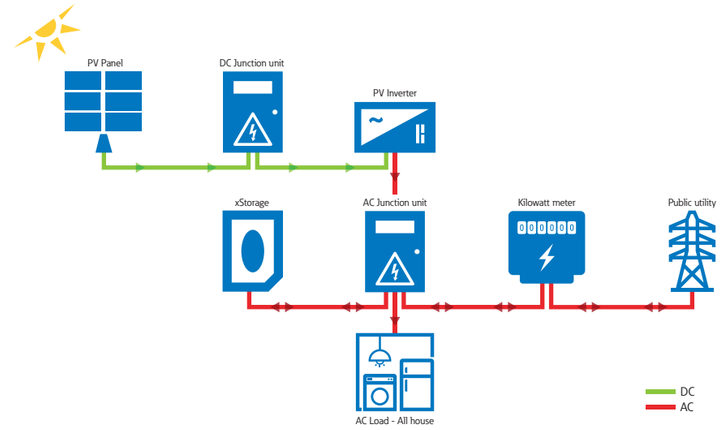


Pros	Cons
• All the house load is protected by the xStorage Home backup function • No additional AC distribution box • No additional meter required for zero-out function	• House load must be below Grid Injection Max Power (6 kW or 3.6 kW or 4.6 kW) depending on country regulations • If the xStorage Home unit fails, there will be no backup power for loads • A second distribution board for the protected load required • Additional meter required to monitor PV input from the existing PV inverter

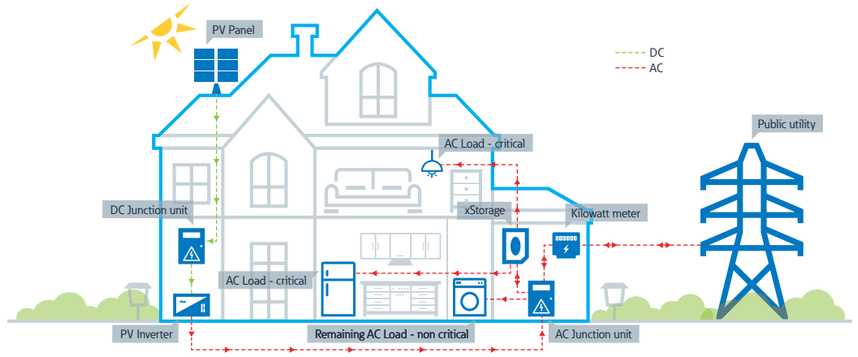


Configuration #2: PV not connected to xStorage Home

In Configuration 2, all loads are connected to the xStorage Home system. The installation is a retrofit and the system is installed and set-up so that all loads can be powered. In case of a power outage, critical loads are powered.

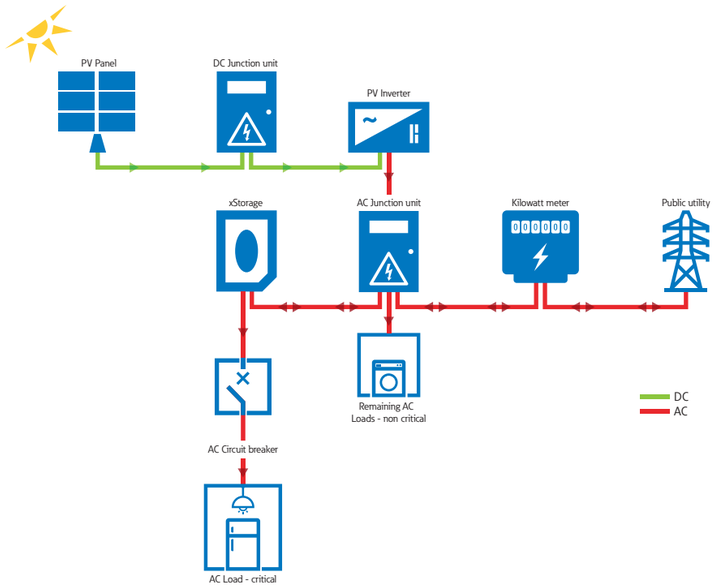


Pros	Cons
• Existing distribution board is kept unchanged	• No protected load, backup function lost • Product works only in Grid Tie Mode • Additional meter required to monitor PV input from the existing PV inverter



Configuration #3: PV not connected to xStorage Home

In Configuration 3, an AC junction unit provides protection to the non critical loads. The system is installed and set-up so that critical loads and non critical loads can be powered. in case of a power outage, critical loads can be powered.

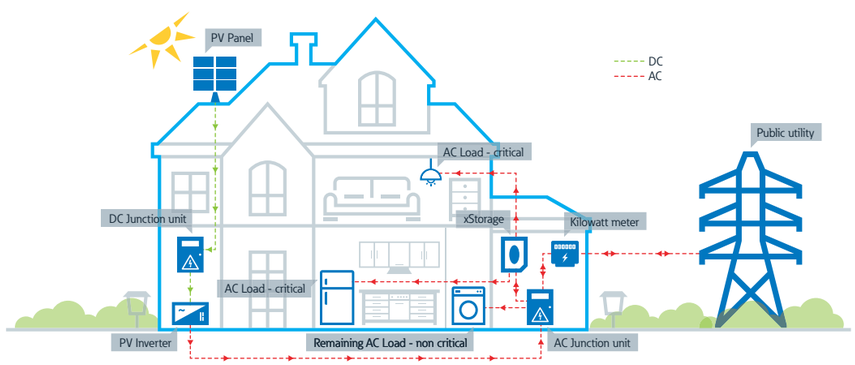


Pros

- The critical load is backed up

Cons

- Protected load depends on country regulations (3.6kW, 4.6kW or 6kW)
- Additional meter is necessary to ensure no injection into the grid
- A second distribution board is necessary to protect the load
- An additional PV Meter is necessary



No PV configurations

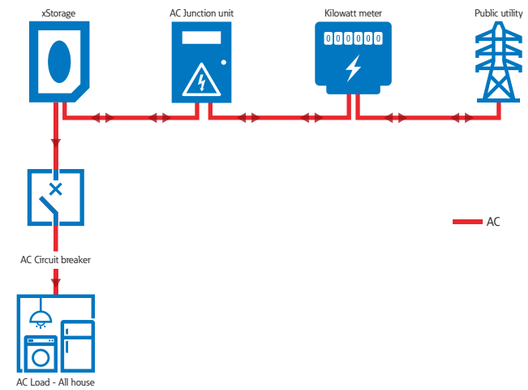
The three **No PV Configurations** are for homes where there is no PV installed at all. Each configuration shows how the system can be installed to provide, full, partial or no back-up.
Characteristics of this type of installation are as follows:

- Household which do not have existing PV generation system installed and do not want to install it;
- The xStorage Home system is installed independently from the PV and solely connected to the grid.

The following schematics provide a general overview of the NO PV installation with loads divided into critical and non-critical. Installation can be carried out without a power meter but in that case functionality of the UI will be limited.

No PV configuration #1: all loads connected to xStorage Home

In Configuration 1, the system is installed and set-up so that all house loads can be powered. In case of a power outage, the critical loads can be powered.

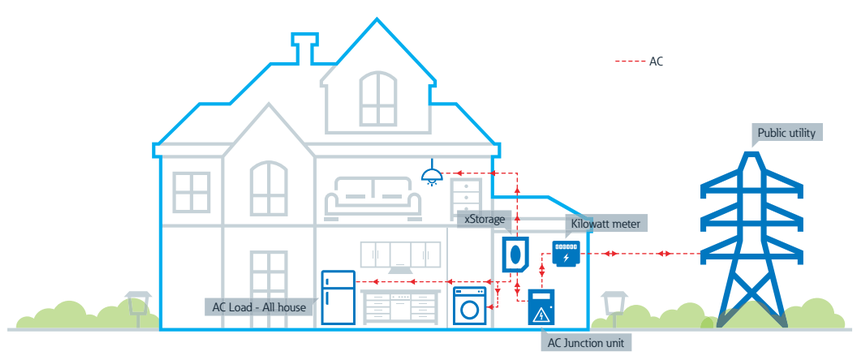


Pros

- All day house load is protected by xStorage Home
- No additional AC distribution board is needed
- No additional meter is required

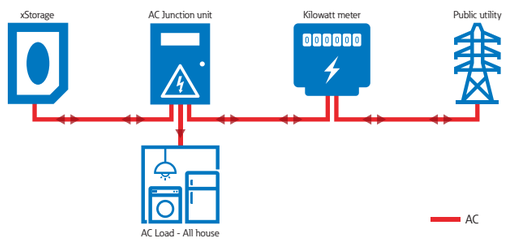
Cons

- If xStorage Home fails, the load will be dropped
- A second distribution board is needed



No PV configuration #2: all loads connected to xStorage Home

In Configuration 2, an AC junction unit provides protection to all loads. The system is installed and set-up so that all loads can be powered. in case of a power outage, critical loads can be powered.

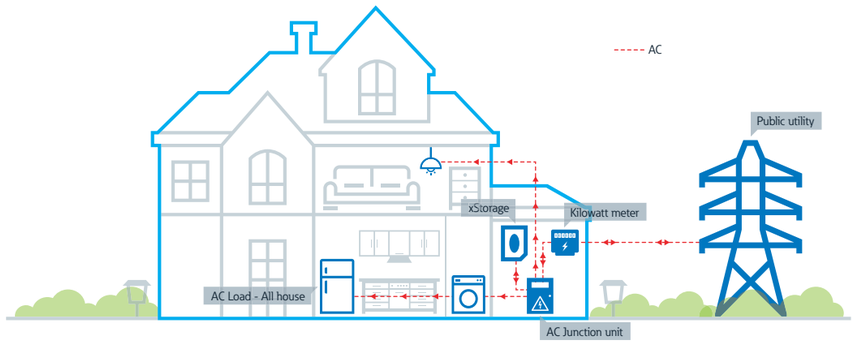


Pros

- No additional AC distribution board is needed

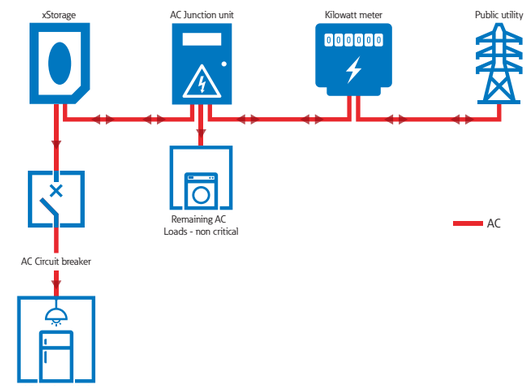
Cons

- xStorage Home only works in Grid-tie mode
- The load is not protected by xStorage Home



No PV configuration #3: all loads connected to xStorage Home

In Configuration 3, an AC junction unit provides protection to the non critical loads. The system is installed and set-up so that critical loads and non critical loads can be powered. in case of a power outage, critical loads can be powered.

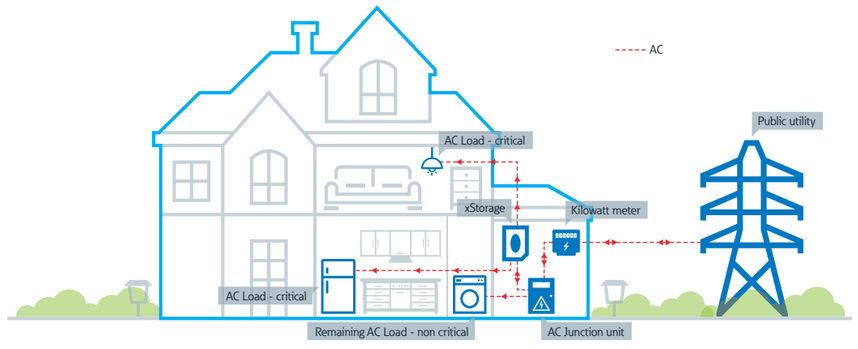


Pros

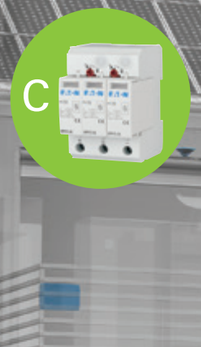
- All day house load is protected by xStorage Home
- No additional AC distribution board is needed
- The load can be backed-up by xStorage Home

Cons

- If xStorage Home fails, the critical load will be dropped
- A second distribution board is needed



1. Safely disconnect and protect PV arrays with **Eaton DC Protection** products



xStorage Home

2. AC Protection

1. Hazard free fire-fighting with Eaton PV Fireman's switch

xStorage Home

1. DC Protection
A. DC Photovoltaic disconnection
B. DC String protection
C. DC Surge Protection

2. AC Protection
A. Circuit protection devices
B. AC Surge Protection
C. Distribution boards

Complimentary components

For implementation of xStorage Home and Photovoltaic in residential applications

DC Protection

AC Protection

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DC protection

Safe disconnection and protection of PV arrays

The IEC 60364-7-712 standard requires the use of a switch-disconnector between the photovoltaic array and the inverter. Eaton provides enclosed and open switch-disconnectors for voltages up to 1000 VDC. They can be used to establish separate switching points as required by the standard VDI 6012, allowing for a defective inverter, for example, to be safely disconnected. All switch-disconnectors switch on two poles and are suitable for unearthed systems. All switches are certified by the TÜV.

DC Photovoltaic disconnection

PV fireman's switch

A house is on fire. A fire-fighting appliance approaches. The fire fighters climb out, see a solar installation – and can do very little. The fire services can frequently do little else than rescue persons and animals and prevent neighbouring buildings from catching fire. The reason being that PV installations generate voltages up to 1000 V, which are still generated even after the power inverter is switched off. The Eaton fireman's switch SOL30-SAFETY provides the solution, which disconnects the cable from the solar panels to the power inverters facilitating fire fighting without an electrical hazard.

DC Protection

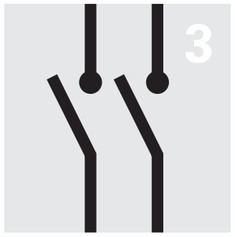
1A

Small investment, large protection

VDE 0100-712 stipulates a DC circuit-breaker, but not the location where it is installed: Frequently, the circuit-breaker is integrated into the inverter, so that the line between the power inverter and house connection is protected, but the modules and DC lines are still subjected to DC voltages of up to 1000 V and up to ~8A per string. Our fireman's switch SOL30-SAFETY disconnects the cables between the solar modules and the power inverter with manageable effort at a reasonable cost.

Ingeniously simple and simply ingenious

The fireman's switch is simply installed in the immediate vicinity of the PV module in the DC current line between the panel and power inverter. The PV modules are automatically switched off by the under voltage release in the fireman's switch, should the fire crew get the electrical utility company to de-energise the location of the fire or decide to locally actuate the PV-OFF switch. The SOL30- SAFETY – full control instead of controlled burn out.



DC Photovoltaic-Disconnector

The photovoltaic disconnector PV-DIS with the current range from 16 A to 125 A can be used in a variety of PV applications. It guarantees decreased power loss and increased safety due to semi-independent manual operation. The PV-DIS can be used polarity independent and offers 1000 VDC with only 54 mm width (3TE). The new and very powerful arcing chamber ensures a stable performance at every current.

DC string protection

String protection makes sense if the PV system has 3 or more strings and can be made with a DC fuse disconnector or a DC string circuit breaker. In addition to fuses, protection of photovoltaic strings is provided by string circuit-breakers. String protection devices protect photovoltaic modules from fault currents. They prevent reverse currents from intact modules to modules with a short circuit. The advantage of string circuit breakers, in comparison to fuses, is that they are immediately ready for use after a trip, when the cause of the trip has been remedied. Eaton offers both fuse-switch disconnectors as well as string circuit-breakers. String protective devices are not enclosed and are intended for installation in customised array junction boxes. When necessary, they can be combined with other components such as side-by-side terminals or surge protective devices. The trip currents for the string circuit breaker can be set over a wide range.

The fuse disconnector FCFD-C10DI- SOL for cylindrical fuse-links ASFLC10-SOL of size 10 x 38 protects photo-voltaic modules against short-circuit currents. A version with a "fuse blown" indication for visualization of a blown fuse link is also available. At the same time, measurements can be made on the connected modules at the disconnection point. For service reasons, test probes are easily reachable.

DC surge protection

Surge protective devices (SPD) for PV applications SPPVT2/SPPVT12 is especially designed for photovoltaic applications and protects the system against transient overvoltage's caused by indirect lightning strikes. Thanks to spark gap technology, galvanic separation in systems is ensured! The units can be provided prewired in an enclosure, thus ready for plug and play!

Selection information

1A. DC Photovoltaic disconnection

DC Photovoltaic-Disconnector

- Acc .to EN 60947-3 DC-PV1 or DC-PV2 resp
- Compact design (only 54mm width = 3MU)
- Decreased power loss due to fewer poles

PV Dis 2-poles with rotary handle, 600 V		
In	Type	Art. No
16A	PV-DIS-06-16/2-ROT	179259
32A	PV-DIS-06-32/2-ROT	179260
63A	PV-DIS-06-63/2-ROT	179261
100A	PV-DIS-06-100/2-ROT	185503
125A	PV-DIS-06-125/2-ROT	179262

2-poles with rotary handle, 1000 V		
In	Type	Art. No
16A	PV-DIS-10-16/2-ROT	179267
32A	PV-DIS-10-32/2-ROT	179268
63A	PV-DIS-10-63/2-ROT	179269
100A	PV-DIS-10-100/2-ROT	185505
125A	PV-DIS-10-125/2-ROT	179270

PV Off Switch

- Degree of protection IP 65
- Tamper-proof to ISO 13850/ EN 418
- Reset by pulling or turning
- Red enclosure upper section

Type	Art. No
M22-SOL-PVT45PMPI11Q	150644
M22-SOL-PVT45PMPI02Q	150645
M22-SOL-IR1Q	150646
M22-SOL-XGPVQ	150647
M22-XGPVQ	150648
M22-SOL-PVT45P-MPIQ	150673
M22-SOL-PVLPL11-230Q	152627

PV fireman's switch SOL30-SAFETY

- Rated operational voltage 1000 V
- Utilization category DC-21A
- Rated operational current Ie 30A
- Remote release by undervoltage release 230V, 50Hz
- Feedback of the switching status by auxiliary contacts 1NO and 1NC
- Several versions - plugs MC3, MC4 or metric glands available

SOL30-SAFETY				
Ie	Input	Output	Type	Art. No
30A	2xMC3	1xMC3	SOL30-SAFETY/2MC3-U(230V50HZ)	144121
30A	2xMC4	1xMC4	SOL30-SAFETY/2MC4-U(230V50HZ)	144122
30A	2xM12	1M16	SOL30-SAFETY/2MV-U(230V50HZ)	144123

1B. DC String protection

Fuse disconnectors

CHPV (10,3 x 38 mm)		Ue: 1000VDC
No. of poles	Type	Art. No
1P	CHPV1U	CHPV1U
2P	CHPV2U	CHPV2U
1P + LED	CHPV1IU	CHPV1IU
2P + LED	CHPV2IU	CHPV2IU

Fuse disconnectors

PV-_A10F	Ue: 1000VDC
In	Type
2A	PV-2A10F
4A	PPV-4A10F
6A	PV-6A10F
8A	PV-8A10F
10A	PV-10A10F
12A	PV-12A10F
15A	PV-15A10F
20A	PV-20A10F

DC switch disconnector

- Rated operational voltage 900 VDC
- Rated current In 4, 6, 12, 20 and 30 A
- For permissible string short-circuit currents Isc of 1.6 up to 22 A

PKZ-SOL		Ue: 900VDC	
In	Ir	Type	Art. No
12A	5..9A	PKZ-SOL12	120937
20A	9..15A	PKZ-SOL20	120938
30A	15..22A	PKZ-SOL30	120939

DC switch disconnector

- Rated operational voltage 1000 VDC
- Utilization category DC-21A

P-SOL	Ue: 1000VDC	
In	Type	Art. No
20A	P-SOL20	120934
30A	P-SOL30	120935
63A	P-SOL60	120936

1C. DC Surge protection

DC surge protection SPPVT2-...PE(-AX)

- Surge protection type T2 for PV
- For insulated and earthed systems
- UC: 600/1000 VDC
- Nominal discharge current (8/20) µs: 15 kA
- Maximum discharge current (8/20) µs: 40 kA
- Total lightning discharge current (8/20) µs: 40 kA

DC surge protection SPPVT12-...PE(-AX)

- Surge protection type T1/T2 for PV
- For insulated and earthed systems
- UC: 600/1000 VDC
- Nominal discharge current (8/20) µs: 15 kA
- Maximum discharge current (8/20) µs: 40 kA
- Impulse current (10/350) µs 5 kA

SPPVT (with remote signaling)		Class II / T2
Uc		Type
600VDC	SPPVT2-06-2+PE-AX	176087
1000VDC	SPPVT2-10-2+PE-AX	176089

SPPVT (with remote signaling)		Class I/II T1/T2
Uc		Type
600VDC	SPPVT12-06-2+PE-AX	177257
1000VDC	SPPVT12-10-2+PE-AX	177255

SPPVT		Class II / T2
Uc		Type
600VDC	SPPVT2-06-2+PE	176088
1000VDC	SPPVT2-10-2+PE	176090

SPPVT		Class I/II T1/T2
Uc		Type
600VDC	SPPVT12-06-2+PE	177258
1000VDC	SPPVT12-10-2+PE	177256

AC protection

Eaton switchgear offers your customers maximum protection. The products of the xPole series combine all of the function, mounting and safety benefits. They can be quickly and easily installed. Intelligent construction design solutions, which eliminate any mounting errors, guarantee high levels of safety during installation. The devices guarantee the end users not only protection for personnel (residual current device) but also protection of the electrical system (miniature circuit breaker). The product range is rounded off by a comprehensive range of intelligent switchgear such as remote switches, reset devices, etc.

Circuit protection devices

Digital residual current circuit-breakers (RCCB)

Digital technology makes it possible to achieve a new level in tripping accuracy, which helps to avoid unwanted tripping. This occurs, for example, as a result of permanent discharge currents on electrical devices or temporary disturbances during a thunderstorm. Eaton is the first company offering the digital residual current device, which significantly reduces nuisance tripping by permanently monitoring the system status to guarantee maximum systems availability. Three LEDs following the "traffic light" principle, offer the benefit of indicating when the warning level of 30 % leakage current is reached. In this way, corrective measures can be implemented in the system, before the situation becomes more acute. This offers the end user a considerable degree of safety and comfort.

Residual current breakers with overcurrent protection (RCBO)

The RCBO combines the advantages of a miniature circuit-breaker and a residual current device in one unit. It saves space and offers complete protection. Benefits are fire protection, protection of persons (type 30 mA) as well as flexible and generous space for wiring. Additional features:
- Contact position indicator red/green
- A- and G/A-types are available
- Can be sealed with leads in the ON or OFF position
- Twin-purpose terminal (lift/open mouthed) above and below

Surge-current protected designs prevent unwanted shutdown, selective types facilitate discriminative shutdown of the defective system section.

2A

2B

2C

Miniature circuit-breakers (MCB)

Whether it's plug-in terminals or screw connections, Eaton has the right circuit breakers for domestic as well as for industrial applications. A comprehensive range of accessories such as auxiliary switches, shunt releases, reset devices and clever busbar solutions facilitate a host of applications and automation solutions.

AC Surge protection

The cost-effective way to combat disruption or damage to sensitive electronic equipment due to surge-related events, keeping the equipment and the related processes up and running. The overvoltage protection of low voltage distribution systems protects the installation during direct and indirect lightning strikes into the overhead power supply line or external lightning protection system. Depending on application the protection is available in single, pre-assembled with busbar, or preconfigured for most applications and power grids.

Distribution boards

From service distribution boards to meter cabinets, energy distribution and data network cabinets, Eaton offers a fully comprehensive product range of boards. Thus, all of your infrastructure needs can be covered for residual, commercial and industrial energy distribution applications.

Selection information

2A. Circuit protection devices

Residual Current Operated Circuit Breaker with Overcurrent Protection (RCBO)

- 1P+N
- Type A
- Icn 10kA
- According to EN61009

PKNM - A		IDn 30mA
In	Type	Art. No
16A	PKNM-16/1N/C/003-A	236217
20A	PKNM-20/1N/C/003-A	236249
25A	PKNM-25/1N/C/003-A	236279
32A	PKNM-32/1N/C/003-A	236309

PKNM - A		IDn 300mA
In	Type	Art. No
16A	PKNM-16/1N/C/03-A	236219
20A	PKNM-20/1N/C/03-A	236251
25A	PKNM-25/1N/C/03-A	236281
32A	PKNM-32/1N/C/03-A	236311

Residual Current Operated Circuit Breaker with Overcurrent Protection (RCBO)

- 1P+N
- Type A
- Icn 10kA
- According to EN61009 and Ics/Icu acc. to EN60947-2

FRBmM - A		IDn 30mA
In	Type	Art. No
16A	FRBmM-C16/1N/003-A	170619
20A	FRBmM-C20/1N/003-A	170620
25A	FRBmM-C25/1N/003-A	170621
32A	FRBmM-C32/1N/003-A	170622

FRBmM - A		IDn 300mA
In	Type	Art. No
16A	FRBmM-C16/1N/03-A	170576
20A	FRBmM-C20/1N/03-A	170577
25A	FRBmM-C25/1N/03-A	170578
32A	FRBmM-C32/1N/03-A	170579

2B. AC Surge protection

AC Surge protection SPCT2-280…+NPE

- Test class II according to IEC 61643-1+A1
- SPD-type T2 , according to EN 61643-11
- UC: 280 VAC
- Nominal discharge current (8/20) µs L-N/N-PE/L-PE: 20 kA
- Max. discharge current L-N/N-PE/L-PE: 40 kA

SPCT2 Type 2		
No. of poles	Type	Art. No
1+NPE	SPCT2-280-1+NPE	167619
3+NPE	SPCT2-280-3+NPE	167620

AC Surge protection SPBT12-280-…NPE50

- Test class I II according to IEC 61643-1
- SPD-type T1/ T2 according to EN 61643-11
- UC: 280 VAC
- Nominal discharge current (8/20) µs L-N/N-PE: 25/50 kA
- Max. discharge current
- L-N/N-PE: 50/100 kA
- Impulse current (10/350) µs L-N/N-PE: 12,5/50 kA

SPBT12 Type 1 + 2		
No. of poles	Type	Art. No
1+NPE	SPBT12-280-1+NPE50	184752
3+NPE	SPBT12-280-3+NPE50	184750

2C. Distribution boards

IKA Surface-mounted

- quick and easy to install due to the easy-to-mount PE/N terminal rail
- pre-punched holes for cable insertions with a centration point
- degree of protection IP65

IKA Surface-mounted		
Rows/MU	Type	Art. No
1/4	IKA-1/4-ST	174221
1/6	IKA-1/6-ST	174222
1/8	IKA-1/8-ST	174196
1/12	IKA-1/12-ST	174197
2/24	IKA-2/24-ST	174198
3/36	IKA-3/36-ST	174199
1/18	IKA-1/18-ST	174200
2/36	IKA-2/36-ST	174201
3/54	IKA-3/54-ST	174202