



SUNNY TRIPower HYBRID X

Approved batteries and information on connecting batteries

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1 Validity

This document is valid for:

- STPH5-60
- STPH6-60
- STPH8-60
- STPH10-60
- STPH12-60
- STPH15-60
- STPH20-70
- STPH25-70
- STPH30-70

2 Approved Batteries

The following table lists the batteries approved for the Sunny Tripower Hybrid X by SMA Solar Technology AG.

i Firmware version of the battery

The firmware version of the SMA batteries can be accessed and updated via the inverter user interface.

The firmware version of third-party batteries can be updated via the respective battery's user interface (see the manufacturer's manual).

i Inverter firmware version

The firmware version of the inverter can be accessed via the user interface of the inverter.

Sunny Tripower Hybrid X 5 / 6 / 8 / 10 / 12 / 15

Battery name (type) Manufacturer	Firmware Version of the Battery	Firmware Version of the Inverter
SMA Home Storage (3.2-16.4) SMA Solar Technology AG	≥ 1.01.59.R	≥ 3.17.90.R
SMA Storage M (12.3-36.8) SMA Solar Technology AG	≥ 1.0.9.R	
BYD Battery-Box HVM+ (8.3-22.1)	= 1.36.0 or 1.37.0 ¹⁾	
BYD Battery-Box HVS+ (5.1-12.8)	= 1.36.0 or 1.37.0 ¹⁾	
BYD Battery-Box HVB (5.9-29.6)	= 1.36.0 or 1.37.0 ¹⁾	

Sunny Tripower Hybrid X 20 / 25/ 30

Battery name (type) Manufacturer	Firmware Version of the Battery	Firmware Version of the Inverter
SMA Home Storage (6.5-19.6) SMA Solar Technology AG	≥ 1.01.59.R	≥ 3.17.90.R
SMA Storage M (12.3-49.1) SMA Solar Technology AG	≥ 1.0.9.R	
BYD Battery-Box HVM+ (8.3-22.1)	= 1.36.0 or 1.37.0 ¹⁾	
BYD Battery-Box HVS+ (5.1-12.8)	= 1.36.0 or 1.37.0 ¹⁾	
BYD Battery-Box HVB (8.9-29.6)	= 1.36.0 or 1.37.0 ¹⁾	

¹⁾ Compatibility with this firmware version was tested and approved by SMA Solar Technology AG. For the operation with another battery firmware version, contact the battery manufacturer.

3 Usable power

3.1 General information on usable power

Synchronizing the battery and hybrid inverter

All batteries mentioned supply a defined nominal current. Please pay attention to the battery manufacturer's recommendation regarding the suitable dimensioning of the battery in order to achieve the nominal and overload currents of the systems stated in the datasheet with a Sunny Tripower Hybrid X. Only if the dimensioning of the battery size is synchronized (battery capacity, battery currents, number of battery modules if necessary), the full functionality and power incl. overload can be guaranteed for the PV storage system with the respective hybrid inverter in use.

Please note that the maximum discharge capacity is limited according to the rated power of the individual power classes.

Please note that the maximum charging power may be limited depending on the power class of the inverter:

- STPH5-60 / STPH6-60 / STPH8-60 / STPH10-60: maximum charging power 10000 W
- STPH12-60 / STPH15-60: maximum charging power 15000 W
- STPH20-70 / STPH25-70 / STPH30-70: maximum charging power 30000 W

3.2 Usable Power with SMA Home Storage

	SMA Home Storage 3.2	SMA Home Storage 6.5	SMA Home Storage 9.8
Voltage range of battery	90 V to 108 V	180 V to 216 V	270 V to 324 V
Maximum current	36 A		
Maximum battery power	3.8 kW	7.7 kW	11.6 kW
Maximum charge / discharge capacity STPH5-60	3.8 kW / 3.8 kW	7.7 kW / 5 kW	10 kW / 5 kW
Maximum charge / discharge capacity STPH6-60	3.8 kW / 3.8 kW	7.7 kW / 6 kW	10 kW / 6 kW
Maximum charge / discharge capacity STPH8-60	3.8 kW / 3.8 kW	7.7 kW / 7.7 kW	10 kW / 8 kW
Maximum charge / discharge capacity STPH10-60	3.8 kW / 3.8 kW	7.7 kW / 7.7 kW	10 kW / 10 kW
Maximum charge / discharge capacity STPH12-60	3.8 kW / 3.8 kW	7.7 kW / 7.7 kW	11.6 kW / 11.6 kW
Maximum charge / discharge capacity STPH15-60	3.8 kW / 3.8 kW	7.7 kW / 7.7 kW	11.6 kW / 11.6 kW
Maximum charge / discharge capacity STPH20-70 / STPH25-70 / STPH30-70	Not compatible	7.7 kW / 7.7 kW	11.6 kW / 11.6 kW

	SMA Home Storage 13.1	SMA Home Storage 16.4	SMA Home Storage 19.6
Voltage range of battery	360 V to 432 V	450 V to 540 V	540 V to 648 V
Maximum current	36 A		
Maximum battery power	15.5 kW	19.4 kW	23.3 kW
Maximum charge / discharge capacity STPH5-60	10 kW / 5 kW	10 kW / 5 kW	Not compatible
Maximum charge / discharge capacity STPH6-60	10 kW / 6 kW	10 kW / 6 kW	Not compatible
Maximum charge / discharge capacity STPH8-60	10 kW / 8 kW	10 kW / 8 kW	Not compatible
Maximum charge / discharge capacity STPH10-60	10 kW / 10 kW	10 kW / 10 kW	Not compatible
Maximum charge / discharge capacity STPH12-60	15 kW / 12 kW	15 kW / 12 kW	Not compatible
Maximum charge / discharge capacity STPH15-60	15 kW / 15 kW	15 kW / 15 kW	Not compatible
Maximum charge / discharge capacity STPH20-70	15.5 kW / 15.5 kW	19.4 kW / 19.4 kW	23.3 kW / 20 kW
Maximum charge / discharge capacity STPH25-70 / STPH30-70	15.5 kW / 15.5 kW	19.4 kW / 19.4 kW	23.3 kW / 23.3 kW

3.3 Usable power with SMA Home Storage

	SMA Storage M 12.3	SMA Storage M 16.4	SMA Storage M 20.5
Voltage range of battery	151 V to 191 V	201 V to 255 V	252 V to 319 V
Maximum current	50 A		
Maximum battery power	9.5 kW	12.7 kW	15.9 kW
Maximum charge / discharge capacity STPH5-60	9.5 kW / 5 kW	10 kW / 5 kW	10 kW / 5 kW
Maximum charge / discharge capacity STPH6-60	9.5 kW / 6 kW	10 kW / 6 kW	10 kW / 6 kW
Maximum charge / discharge capacity STPH8-60	9.5 kW / 8 kW	10 kW / 8 kW	10 kW / 8 kW

	SMA Storage M 12.3	SMA Storage M 16.4	SMA Storage M 20.5
Maximum charge / discharge capacity STPH10-60	9.5 kW / 9.5 kW	10 kW / 10 kW	10 kW / 10 kW
Maximum charge / discharge capacity STPH12-60	9.5 kW / 9.5 kW	12.7 kW / 12 kW	15 kW / 12 kW
Maximum charge / discharge capacity STPH15-60	9.5 kW / 9.5 kW	12.7 kW / 12.7 kW	15 kW / 15 kW
Maximum charge / discharge capacity STPH20-70 / STPH25-70 / STPH30-70	9.5 kW / 9.5 kW	12.7 kW / 12.7 kW	15.9 kW / 15.9 kW
	SMA Storage M 24.6	SMA Storage M 28.7	SMA Storage M 32.8
Voltage range of battery	302 V to 383 V	352 V to 447 V	403 V to 511 V
Maximum current	50 A		
Maximum battery power	19.1 kW	22.3 kW	25.5 kW
Maximum charge / discharge capacity STPH5-60	10 kW / 5 kW	10 kW / 5 kW	10 kW / 5 kW
Maximum charge / discharge capacity STPH6-60	10 kW / 6 kW	10 kW / 6 kW	10 kW / 6 kW
Maximum charge / discharge capacity STPH8-60	10 kW / 8 kW	10 kW / 8 kW	10 kW / 8 kW
Maximum charge / discharge capacity STPH10-60	10 kW / 10 kW	10 kW / 10 kW	10 kW / 10 kW
Maximum charge / discharge capacity STPH12-60	15 kW / 12 kW	15 kW / 12 kW	15 kW / 12 kW
Maximum charge / discharge capacity STPH15-60	15 kW / 15 kW	15 kW / 15 kW	15 kW / 15 kW
Maximum charge / discharge capacity STPH20-70	19.1 kW / 19.1 kW	22.3 kW / 20 kW	25.5 kW / 20 kW
Maximum charge / discharge capacity STPH25-70	19.1 kW / 19.1 kW	22.3 kW / 22.3 kW	25.5 kW / 25 kW
Maximum charge / discharge capacity STPH30-70	19.1 kW / 19.1 kW	22.3 kW / 22.3 kW	25.5 kW / 25.5 kW

	SMA Storage M 36.9	SMA Storage M 40.9	SMA Storage M 45.0	SMA Storage M 49.1
Voltage range of battery	453 V to 575 V	504 V to 639 V	554 V to 702 V	604 V to 766 V
Maximum current	50 A			
Maximum battery power	28.7 kW	30 kW	30 kW	30 kW
Maximum charge / discharge capacity STPH5-60	10 kW / 5 kW	Not compatible	Not compatible	Not compatible
Maximum charge / discharge capacity STPH6-60	10 kW / 6 kW	Not compatible	Not compatible	Not compatible
Maximum charge / discharge capacity STPH8-60	10 kW / 8 kW	Not compatible	Not compatible	Not compatible
Maximum charge / discharge capacity STPH10-60	10 kW / 10 kW	Not compatible	Not compatible	Not compatible
Maximum charge / discharge capacity STPH12-60	15 kW / 12 kW	Not compatible	Not compatible	Not compatible
Maximum charge / discharge capacity STPH15-60	15 kW / 15 kW	Not compatible	Not compatible	Not compatible
Maximum charge / discharge capacity STPH20-70	28.7 kW / 20 kW	30 kW / 20 kW	30 kW / 20 kW	30 kW / 20 kW
Maximum charge / discharge capacity STPH25-70	28.7 kW / 25 kW	30 kW / 25 kW	30 kW / 25 kW	30 kW / 25 kW
Maximum charge / discharge capacity STPH30-70	28.7 kW / 29.9 kW	30 kW / 29.9 kW	30 kW / 29.9 kW	30 kW / 29.9 kW

3.4 Usable power with Battery-Box HVM+

	HVM+ 8.3	HVM+ 11.0	HVM+ 13.8
Voltage range of battery	120 V to 172 V	160 V to 230 V	200 V to 288 V
Maximum current	50 A		
Maximum battery power	8.6 kW	11.5 kW	14.4 kW
Maximum charge / discharge capacity STPH5-60	8.6 kW / 5 kW	10 kW / 5 kW	10 kW / 5 kW

	HVM+ 8.3	HVM+ 11.0	HVM+ 13.8
Maximum charge / discharge capacity STPH6-60	8.6 kW / 6 kW	10 kW / 6 kW	10 kW / 6 kW
Maximum charge / discharge capacity STPH8-60	8.6 kW / 8 kW	10 kW / 8 kW	10 kW / 8 kW
Maximum charge / discharge capacity STPH10-60	8.6 kW / 8.6 kW	10 kW / 10 kW	10 kW / 10 kW
Maximum charge / discharge capacity STPH12-60	8.6 kW / 8.6 kW	11.5 kW / 11.5 kW	14.4 kW / 12 kW
Maximum charge / discharge capacity STPH15-60	8.6 kW / 8.6 kW	11.5 kW / 11.5 kW	14.4 kW / 14.4 kW
Maximum charge / discharge capacity STPH20-70 / STPH25-70 / STPH30-70	8.6 kW / 8.6 kW	11.5 kW / 11.5 kW	14.4 kW / 14.4 kW
	HVM+ 16.6	HVM+ 19.3	HVM+ 22.1
Voltage range of battery	240 V to 345 V	280 V to 403 V	320 V to 460 V
Maximum current	50 A		
Maximum battery power	17.2 kW	20.1 kW	23 kW
Maximum charge / discharge capacity STPH5-60	10 kW / 5 kW	10 kW / 5 kW	10 kW / 5 kW
Maximum charge / discharge capacity STPH6-60	10 kW / 6 kW	10 kW / 6 kW	10 kW / 6 kW
Maximum charge / discharge capacity STPH8-60	10 kW / 8 kW	10 kW / 8 kW	10 kW / 8 kW
Maximum charge / discharge capacity STPH10-60	10 kW / 10 kW	10 kW / 10 kW	10 kW / 10 kW
Maximum charge / discharge capacity STPH12-60	15 kW / 12 kW	15 kW / 12 kW	15 kW / 12 kW
Maximum charge / discharge capacity STPH15-60	15 kW / 15 kW	15 kW / 15 kW	15 kW / 15 kW
Maximum charge / discharge capacity STPH20-70	17.2 kW / 17.2 kW	20.1 kW / 20 kW	23 kW / 20 kW

	HVM+ 16.6	HVM+ 19.3	HVM+ 22.1
Maximum charge / discharge capacity STPH25-70	17.2 kW / 17.2 kW	20.1 kW / 20.1 kW	23 kW / 23 kW
Maximum charge / discharge capacity STPH30-70	17.2 kW / 17.2 kW	20.1 kW / 20.1 kW	23 kW / 23 kW

3.5 Usable power with Battery-Box HVS+

	HVS+ 5.1	HVS+ 7.7	HVS+ 10.2	HVS+ 12.8
Voltage range of battery	160 V to 230 V	240 V to 346 V	320 V to 461 V	400 V to 576 V
Maximum current	25 A			
Maximum battery power	6 kW	9 kW	12 kW	15 kW
Maximum charge / discharge capacity STPH5-60	6 kW / 5 kW	9 kW / 5 kW	10 kW / 5 kW	10 kW / 5 kW
Maximum charge / discharge capacity STPH6-60	6 kW / 6 kW	9 kW / 6 kW	10 kW / 6 kW	10 kW / 6 kW
Maximum charge / discharge capacity STPH8-60	6 kW / 6 kW	9 kW / 8 kW	10 kW / 8 kW	10 kW / 8 kW
Maximum charge / discharge capacity STPH10-60	6 kW / 6 kW	9 kW / 9 kW	10 kW / 10 kW	10 kW / 10 kW
Maximum charge / discharge capacity STPH12-60	6 kW / 6 kW	9 kW / 9 kW	12 kW / 10 kW	15 kW / 12 kW
Maximum charge / discharge capacity STPH15-60	6 kW / 6 kW	9 kW / 9 kW	12 kW / 10 kW	15 kW / 15 kW
Maximum charge / discharge capacity STPH20-70 / STPH25-70 / STPH30-70	6 kW / 6 kW	9 kW / 9 kW	12 kW / 12 kW	15 kW / 15 kW

3.6 Usable power with Battery-Box HVB

	HVB 5.9	HVB 8.9	HVB 11.8
Voltage range of battery	80 V to 115 V	120 V to 172 V	160 V to 230 V

	HVB 5.9	HVB 8.9	HVB 11.8
Maximum current		50 A	
Maximum battery power	5.7 kW	8.6 kW	11.5 kW
Maximum charge / discharge capacity STPH5-60	5.7 kW / 5 kW	8.6 kW / 5 kW	10 kW / 5 kW
Maximum charge / discharge capacity STPH6-60	5.7 kW / 5.7 kW	8.6 kW / 6 kW	10 kW / 6 kW
Maximum charge / discharge capacity STPH8-60	5.7 kW / 5.7 kW	8.6 kW / 8 kW	10 kW / 8 kW
Maximum charge / discharge capacity STPH10-60	5.7 kW / 5.7 kW	8.6 kW / 8.6 kW	10 kW / 10 kW
Maximum charge / discharge capacity STPH12-60	5.7 kW / 5.7 kW	8.6 kW / 8.6 kW	11.5 kW / 11.5 kW
Maximum charge / discharge capacity STPH15-60	5.7 kW / 5.7 kW	8.6 kW / 8.6 kW	11.5 kW / 11.5 kW
Maximum charge / discharge capacity STPH20-70 / STPH25-70 / STPH30-70	Not compatible	8.6 kW / 8.6 kW	11.5 kW / 11.5 kW
	HVB 14.8	HVB 17.8	HVB 20.7
Voltage range of battery	200 V to 288 V	240 V to 345 V	280 V to 403 V
Maximum current		50 A	
Maximum battery power	14.4 kW	17.2 kW	20.1 kW
Maximum charge / discharge capacity STPH5-60	10 kW / 5 kW	10 kW / 5 kW	10 kW / 5 kW
Maximum charge / discharge capacity STPH6-60	10 kW / 6 kW	10 kW / 6 kW	10 kW / 6 kW
Maximum charge / discharge capacity STPH8-60	10 kW / 8 kW	10 kW / 8 kW	10 kW / 8 kW
Maximum charge / discharge capacity STPH10-60	10 kW / 10 kW	10 kW / 10 kW	10 kW / 10 kW
Maximum charge / discharge capacity STPH12-60	14.4 kW / 12 kW	15 kW / 12 kW	15 kW / 12 kW

	HVB 14.8	HVB 17.8	HVB 20.7
Maximum charge / discharge capacity STPH15-60	14.4 kW / 14.4 kW	15 kW / 15 kW	15 kW / 15 kW
Maximum charge / discharge capacity STPH20-70	14.4 kW / 14.4 kW	17.2 kW / 17.2 kW	20.1 kW / 20 kW
Maximum charge / discharge capacity STPH25-70	14.4 kW / 14.4 kW	17.2 kW / 17.2 kW	20.1 kW / 20.1 kW
Maximum charge / discharge capacity STPH30-70	14.4 kW / 14.4 kW	17.2 kW / 17.2 kW	20.1 kW / 20.1 kW
	HVB 23.7	HVB 26.7	HVB 29.6
Voltage range of battery	320 V to 460 V	360 V to 518 V	400 V to 576 V
Maximum current	50 A		
Maximum battery power	23 kW	25.9 kW	28.8 kW
Maximum charge / discharge capacity STPH5-60	10 kW / 5 kW	10 kW / 5 kW	10 kW / 5 kW
Maximum charge / discharge capacity STPH6-60	10 kW / 6 kW	10 kW / 6 kW	10 kW / 6 kW
Maximum charge / discharge capacity STPH8-60	10 kW / 8 kW	10 kW / 8 kW	10 kW / 8 kW
Maximum charge / discharge capacity STPH10-60	10 kW / 10 kW	10 kW / 10 kW	10 kW / 10 kW
Maximum charge / discharge capacity STPH12-60	15 kW / 12 kW	15 kW / 12 kW	15 kW / 12 kW
Maximum charge / discharge capacity STPH15-60	15 kW / 15 kW	15 kW / 15 kW	15 kW / 15 kW
Maximum charge / discharge capacity STPH20-70	23 kW / 20 kW	25.9 kW / 20 kW	28.8 kW / 20 kW
Maximum charge / discharge capacity STPH25-70	23 kW / 23 kW	25.9 kW / 25 kW	28.8 kW / 25 kW
Maximum charge / discharge capacity STPH30-70	23 kW / 23 kW	25.9 kW / 25.9 kW	28.8 kW / 28.8 kW

4 Battery Communication Connection

4.1 Cable Requirements

4.1.1 Battery Communication Cable Requirements

The cable length and quality affect the quality of the signal. Observe the following cable requirements:

- ☐ Cable type: 100BaseTx
- ☐ Cable category: minimum CAT5e
- ☐ Plug type: RJ45 of Cat5e or higher
- ☐ Shielding: SF/UTP, S/UTP, SF/FTP or S/FTP
- ☐ Number of insulated conductor pairs and insulated conductor cross-section: at least 2 x 2 x 0.34 mm²
- ☐ Maximum cable length between inverter and battery when using patch and installation cables: 10 m²⁾
- ☐ UV-resistant for outdoor installation.

4.1.2 Requirements for the Battery Power Cables

Observe the following cable requirements:

- ☐ Conductor type: copper wire
- ☐ Conductor cross-section: 10 mm²
- ☐ Insulation stripping length: 6.5 mm
- ☐ Outer diameter: 6.4 mm to 8.4 mm
- ☐ Use the crimp contacts included in the scope of delivery and observe the manufacturer's specifications.
- ☐ Maximum permissible cable length between the inverter and the battery: 10 m³⁾
- ☐ The cables must be rated for a minimum voltage of 800 V.

i Observe manufacturer's specifications for battery power cables

When crimping battery power cables, the appropriate tool, correct cable cross-section, proper insulation stripping length, and a firm but non-damaging crimp are essential for a safe and conductive connection. Make sure not to damage the stranded wires and to insert and tighten all components correctly, especially the strain relief, to ensure a durable, moisture-proof, and abrasion-resistant connection.

²⁾ Approval for cable lengths > 10 m is currently under review.

³⁾ Approval for cable lengths > 10 m is currently under review.

4.2 Cabling plan with SMA Home Storage and SMA Storage M

SMA Home Storage

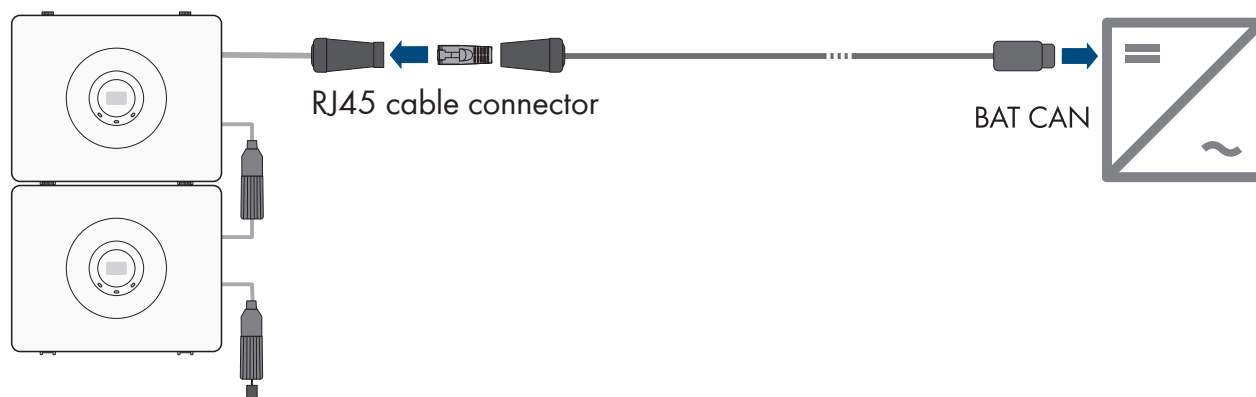


Figure 1: Cabling plan with standard patch cable Sunny Tripower Hybrid X with SMA Home Storage

SMA Storage M

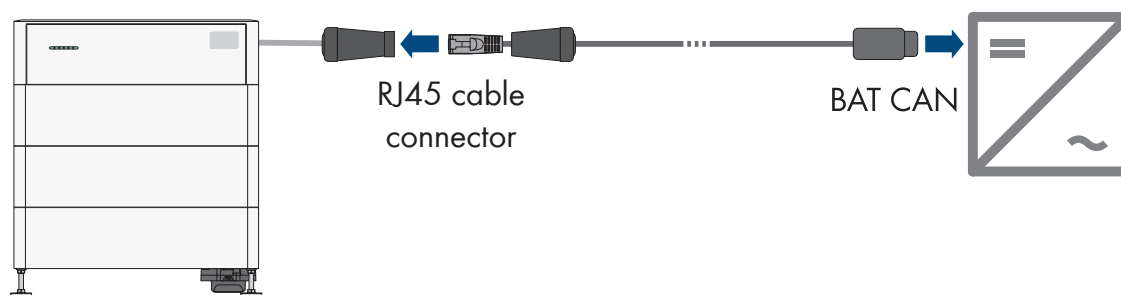


Figure 2: Cabling plan with standard patch cable Sunny Tripower Hybrid X with SMA Storage M

Use of non-standardized communication cables

i If a standard patch cable is not used and you are wiring the communication cable yourself, make sure that the pin assignment, conductor assignment and shielding correspond to the specifications. Check the cable for correct wiring and continuity before commissioning.

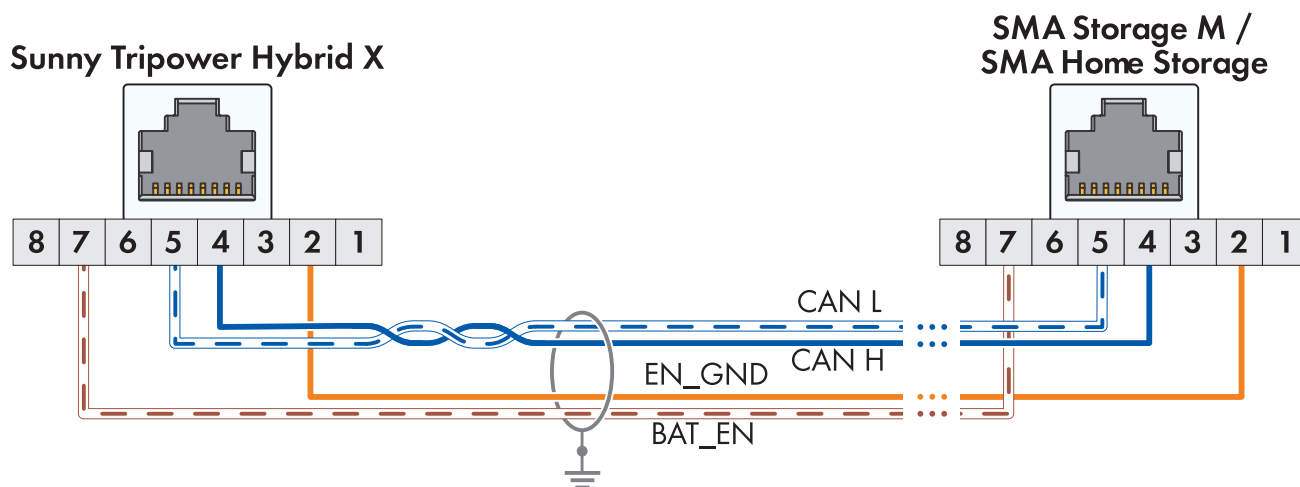


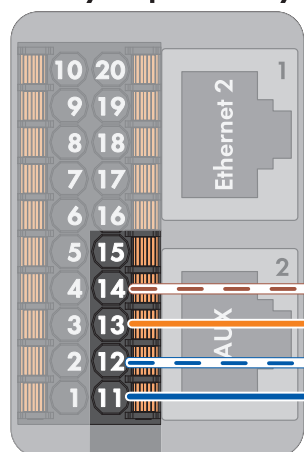
Figure 3: Cabling plan Sunny Tripower Hybrid X with SMA Home Storage and Storage M via BAT CAN (RJ45)

Pin RJ45 connector on the inverter	Signal	RJ45 connector on the battery
4	CAN_H	4
5	CAN_L	5
2	EN_GND	2
7	BAT_EN	7
-	"Do not use"	-

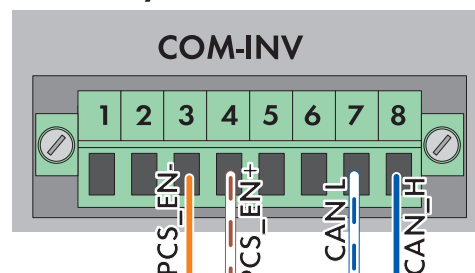
4.3 Cabling plans for: BYD Battery-Box HVB, HVM+ and HVS+ with corresponding BCU

i With BYD batteries, the battery communication can take place via the Multi I/O interface or via an RJ45 interface. SMA Solar Technology AG recommends wiring of the BYD batteries via the Multi I/O. Check prior to installation which communication interface is needed for the battery used. Note the required pin assignment for each communication interface. Incorrect interface selection or pin assignment can result in communication errors or failed commissioning.

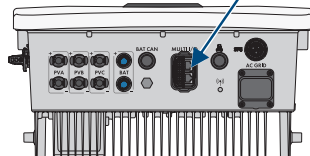
Sunny Tripower Hybrid X



BYD Battery-Box HVB, HVM+, HVS+



STPHxx-60



STPHxx-70

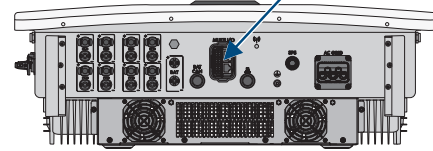


Figure 4: Cabling plan for the circuitry of Sunny Tripower Hybrid X with BYD Battery-Box HVB, HVM+ and HVS+.

Pin at the MULTI I/O inverter	Signal	Terminal point at battery
11	CAN_H	8
12	CAN_L	7
13	EN_GND	3
14	BAT_EN	4
15	"Do not use"	-

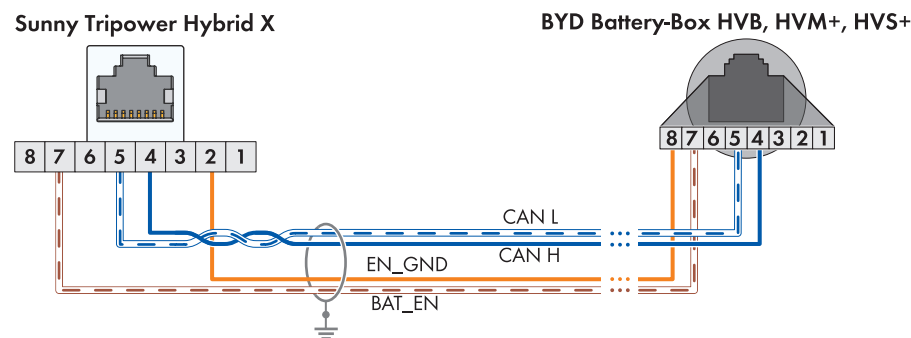


Figure 5: Cabling plan: Sunny Tripower Hybrid X with BYD Battery-Box HVB, HVM+ and HVS+.

Pin at the RJ45 connector on the inverter	Signal	RJ45 connector on the battery
2	EN_GND	8
4	CAN_H	4
5	CAN_L	5
7	BAT_EN	7

ENERGY
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CHANGES



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