

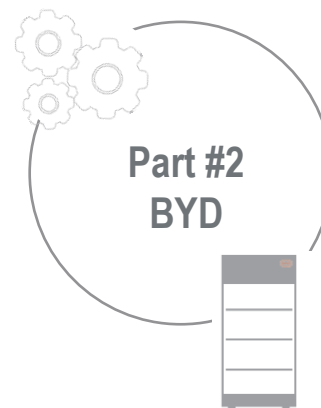
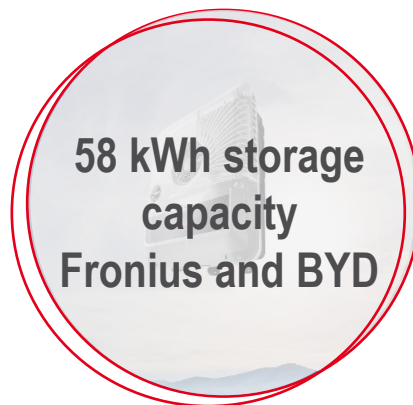
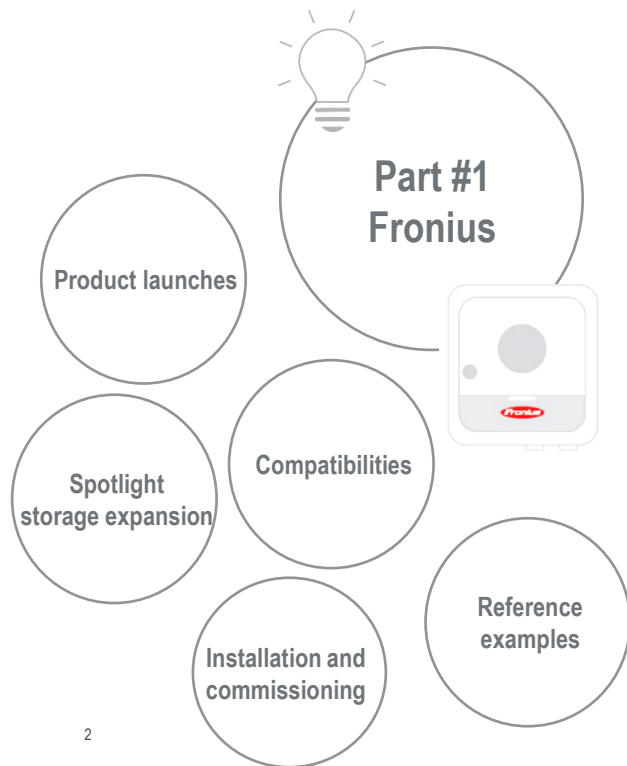
/ Perfect Welding / Solar Energy / Perfect Charging



Fronius International GmbH  
Froniusplatz 1, 4600 Wels

**58 KWH STORAGE WITH FRONIUS AND BYD  
THE SOLUTION FOR SMALL COMMERCIAL**

# AGENDA OF THE WEBINAR



58 kWh storage with Fronius and BYD – the solution for small commercial

# Fronius and BYD storage solutions



FRONIUS  
**GEN24 PLUS**

## UNIQUELY VERSATILE



**Fronius  
Primo GEN24 Plus**

1-phase

Power classes: 3 - 6 kW

2 MPPT + 1 battery input

**Fronius  
Symo GEN24 Plus**

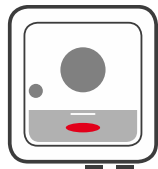
3-phase

Power classes: 3 - 10 kW

2 MPPT + 1 battery input

All GEN24 Plus devices  
***Available now!***





# FRONIUS **PRIMO** GEN24 PLUS

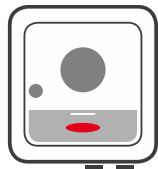
## SINGLE-PHASE HYBRID-INVERTER



Power classes: 3 - 6 kW

2 MPPT Inputs: 22 A/ 12 A

1 battery input: 22 A



# FRONIUS **SYMO** GEN24 PLUS

## THREE-PHASE HYBRID INVERTER



**Power classes: 3 / 4 / 5 kW**

**2 MPPT: 12,5 A / 12,5 A  
1 battery input: 12,5 A**

**PV Point**

**Power classes: 6 / 8 / 10 kW**

**2 MPPT: 25 A / 12,5 A  
1 battery input: 22 A**

**PV Point and full backup**



FRONIUS  
**SYMO HYBRID**

## RELIABILITY OVER YEARS



**Fronius  
SYMO HYBRID**

3-phase

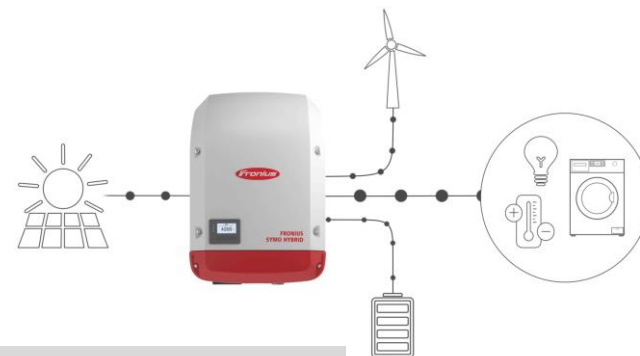
Power classes: 3 - 5 kW

1 MPPT + 1 battery input

1 MPPT / 1 battery input: 16 A

Up to 8 kW charging power

Full backup



# BYD STORAGE COMBINATION MATRIX

## COMPATIBILITIES AND MAXIMUM CHARGING / DISCHARGING POWER

/ Easy calculation of charging / discharging power -  $P = U * I$

/ **Module voltage HVS: 100 V / HVM: 50 V ; current e. g. Fronius Symo 6.0-10.0 GEN24 Plus: 22 A**

BYD BATTERY-BOX PREMIUM *	HVS 5.1	HVS 7.7	HVS 10.2	HVM 11.0	HVM 13.8	HVM 16.6	HVM 19.3	HVM 22.1
Usable capacity of the battery [kWh]	5.12	7.68	10.24	11.04	13.8	16.56	19.32	22.08
Nominal voltage of the battery [V]	204.8	307.2	409.6	204.8	256	307.2	358.4	409.6
Battery operating voltage [V]	160 - 230.4	240 - 345.6	320 - 460.8	160 - 230.4	200 - 288	240 - 345.6	280 - 403.2	320 - 460.8

	SYMO GEN24 PLUS (3.0 - 5.0)	PRIMO GEN24 PLUS (3.0-6.0) AND SYMO GEN24 PLUS (6.0-10.0)
Max. charge/discharge current Primo/Symo GEN24 Plus [A]	12.5	22

\* Values according to BYD.



# CHARGING & DISCHARGING POWER

## UP TO 9 KW EVEN IN FULL BACKUP POWER MODE

MAXIMUM CHARGING AND DISCHARGING POWER WITH GEN24 PLUS (KW)	HVS 5.1	HVS 7.7	HVS 10.2	HVM 11.0	HVM 13.8	HVM 16.6	HVM 19.3	HVM 22.1
Primo GEN24 3.0 Plus	3.13	3.13	-	3.13	3.13	3.13	3.13	-
Primo GEN24 3.6 Plus	3.81	3.81	-	3.81	3.81	3.81	3.81	-
Primo GEN24 4.0 Plus	4.14	4.14	-	4.14	4.14	4.14	4.14	-
Primo GEN24 4.6 Plus	4.51	4.75	-	4.51	4.75	4.75	4.75	-
Primo GEN24 5.0 Plus	4.51	5.17	-	4.51	5.17	5.17	5.17	-
Primo GEN24 6.0 Plus	4.51	6.20	-	4.51	5.63	6.20	6.20	-
Symo GEN24 3.0 Plus	2.56	3.13	3.13	2.56	3.13	3.13	3.13	3.13
Symo GEN24 4.0 Plus	2.56	3.84	4.17	2.56	3.20	3.84	4.17	4.17
Symo GEN24 5.0 Plus	2.56	3.84	5.12	2.56	3.20	3.84	4.48	5.12
Symo GEN24 6.0 Plus	4.51	6.22	6.22	4.51	5.63	6.22	6.22	6.22
Symo GEN24 8.0 Plus	4.51	6.76	8.26	4.51	5.63	6.76	7.88	8.26
Symo GEN24 10.0 Plus	4.51	6.76	9.01	4.51	5.63	6.76	7.88	9.01



FRONIUS  
**GEN24 PLUS AND SYMO HYBRID**



# BYD: PARALLEL OPERATION

## STORAGE CASCADING

Parallel operation of up to 3 storage units

High capacities up to 57.96 kWh\*

Realisation of small commercial systems

Full backup power capability



\* Attention:  
The combination of 3x HVM  
22.1 is not possible!



## FRONIUS GEN24 PLUS AND SYMO HYBRID



# BYD: PARALLEL OPERATION

Fronius software updates  
**Available since January 2021**

### STORAGE CASCADING

Fronius Symo GEN24 Plus - SW: V1.10.5-0

Fronius Symo Hybrid – SW: V1.16.7-1

	BYD BATTERY-BOX PREMIUM								
	2x / 3x HVS 5.1	2x / 3x HVS 7.7	2x / 3x HVS 10.2	2x / 3x HVM 11.0	2x / 3x HVM 13.8	2x / 3x HVM 16.6	2x / 3x HVM 19.3	2x HVM 22.1	3x HVM 22.1
Capacity [kWh]	10.24 / 15.36	15.36 / 23.04	20.48 / 30.72	22.08 / 33.12	27.60 / 41.40	33.12 / 49.68	38.64 / 57.96	44.16	66.24
Symo GEN24 Plus	✓	✓	✓	✓	✓	✓	✓	✓	-
Primo GEN24 Plus	✓	✓	-	✓	✓	✓	✓	-	-

	BYD BATTERY-BOX PREMIUM HVM						
	2x / 3x HVM 8.3	2x / 3x HVM 11.0	2x / 3x HVM 13.8	2x / 3x HVM 16.6	2x / 3x HVM 19.3	2x HVM 22.1	3x HVM 22.1
Capacity [kWh]	16.56 / 24.84	22.08 / 33.12	27.60 / 41.40	33.12 / 49.68	38.64 / 57.96	44.16	66.24
Symo Hybrid	✓	✓	✓	✓	✓	✓	-



FRONIUS  
**GEN24 PLUS AND SYMO HYBRID**



# MAXIMUM BACKUP POWER: FULL BACKUP <sup>1</sup>



## 3-PHASE<sup>2</sup> BACKUP POWER

### Overall supply.

Of entire household

### Maximum supply.

Automatic switch-over < 60 sec.

### Electric loads.

Single-phase and three-phase

### Maximum energy consumption.

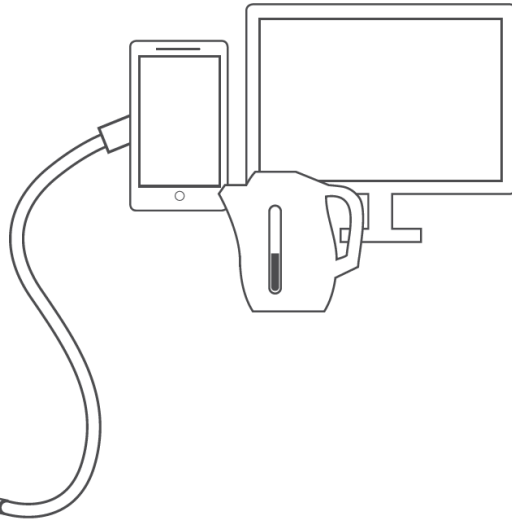
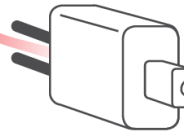
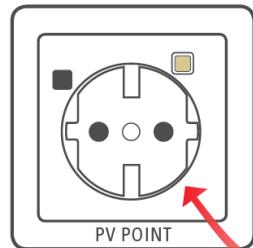
Parallel supplying of loads / charging of the battery

- 1) The full backup option can be implemented with the Primo GEN24 Plus 3-6 kW and the Symo GEN24 Plus 6-10 kW
- 2) Three-phase backup power can be realised with Symo GEN24 Plus 6-10 kW



FRONIUS  
GEN24 PLUS

## BASIC GRID BACKUP: PV POINT



### PV POINT ON BOARD

#### **Backup connection.**

Only supplied in case of grid outage

#### **Automatic re-connection.**

In case of power outage

#### **Electric loads.**

Up to 3 kW, single-phase

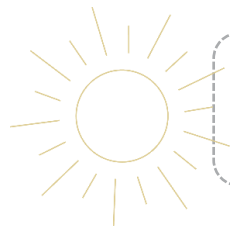
#### **Easy installation.**

No additional installation necessary

# FRONIUS **SMART METER**

## ESSENTIAL FOR EVERY PV STORAGE SYSTEM!

- / Fronius Smart Meter and Fronius Smart Meter TS
  - / 63A-1; 63A-3; 50 kA-3
  - / TS 100A-1; TS 65A-3; TS 5kA-3
- / Basis for complete monitoring in **Fronius Solar.web**
  - / Analysis and visualization of consumption data
- / **Bidirectional energy meter**
  - / Differentiation between mains supply and feed-in



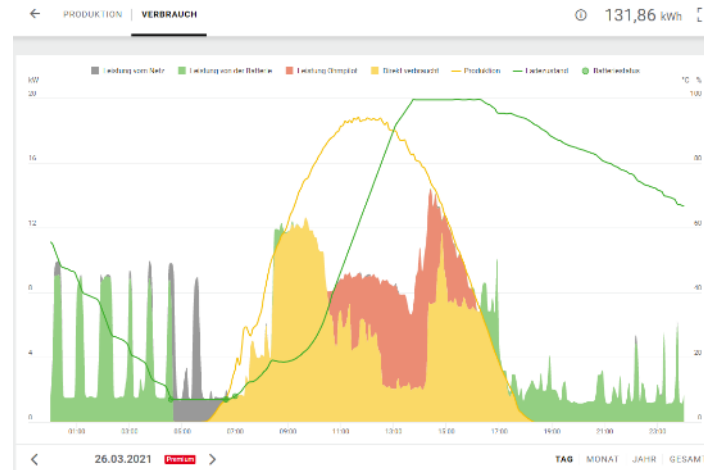
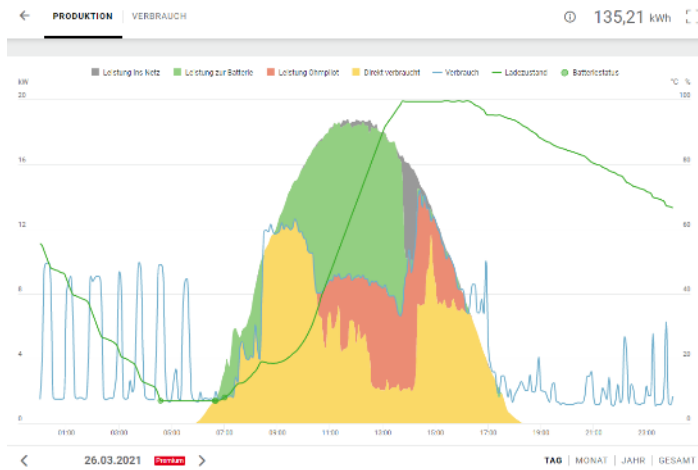
**EACH FRONIUS INSTALLATION WITH  
FRONIUS SMART METER!**

58 kWh storage with Fronius and BYD – the solution for small commercial

# Use Cases

# REFERENCE EXAMPLE TRADING COMPANY

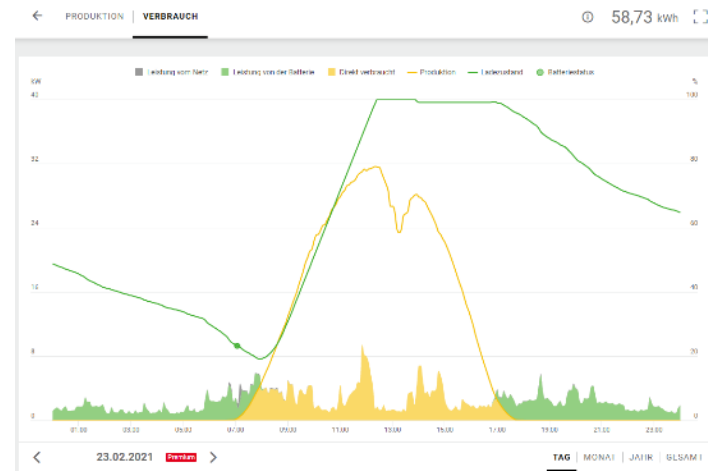
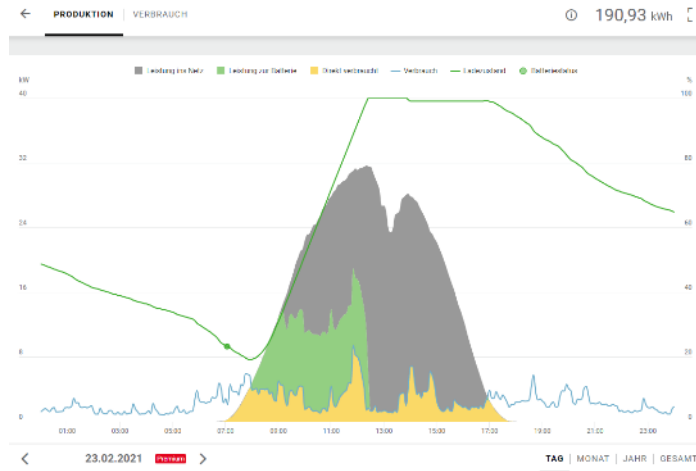
- / **39,7 kWp PV system.** Symo GEN24 10.0 Plus + Symo 20.0 + Symo 10.0
- / **44,16 kWh storage.** 2x BYD Premium HVM 22.1
- / Heat pump, hot water preparation with Ohmpilot (9 kW heating rod), EV charger
- / Even in the spring time, the electricity demand can be almost completely supplied from the storage system at night. Grid feed-in is minimized as far as possible.





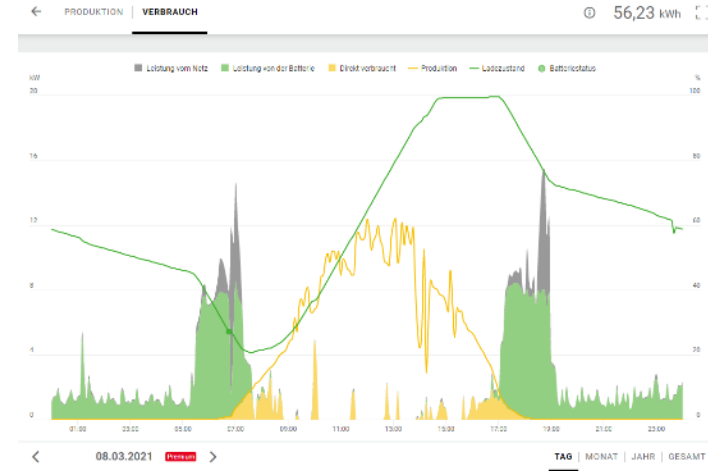
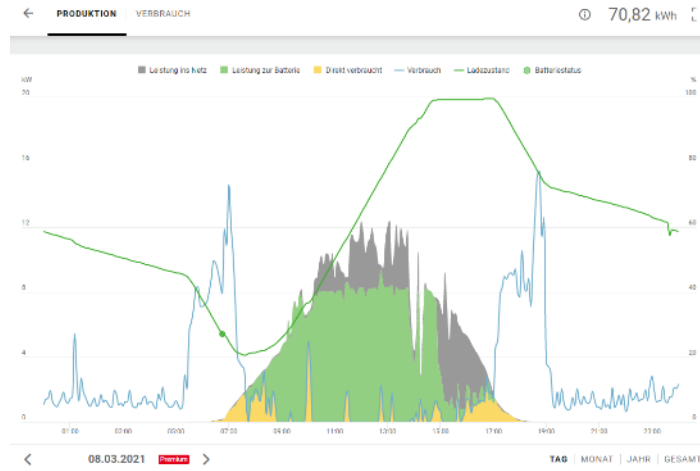
# REFERENCE EXAMPLE **AGRICULTURE**

- / **49 kWp PV system.** Symo GEN24 10.0 Plus + Symo 20.0 + Symo 10.0
- / **44,16 kWh storage.** 2x BYD Premium HVM 22.1
- / Automatic feeding system, ventilation in the shed, milk cooling system
- / Even in the winter months, the complete electricity demand is covered by the storage from the own PV system. Stored energy could still be used for additional consumers (e.g. hot water heating, EV charging).



# REFERENCE EXAMPLE **AGRICULTURE (II)**

- / **15 kWp PV system.** Symo GEN24 10.0 Plus
- / **57,96 kWh storage.** 3x BYD Premium HVM 19.3
- / The very high consumption in the early morning hours and in the evening can be covered from the battery. The large load peaks of up to 15 kW are supplied as far as possible by the storage unit and the power from the grid is significantly reduced.



# FRONIUS **WATTPILOT**

## COMBINATION WITH INTELLIGENT CHARGING SOLUTION

### CHARGING POWER

/ 11 kW or 22 kW

### A HOST OF FEATURES AND FUNCTIONS

- / Compatible with variable electricity tariffs
- / PV surplus charge
- / Intelligent charging modes
- / RFID authentication

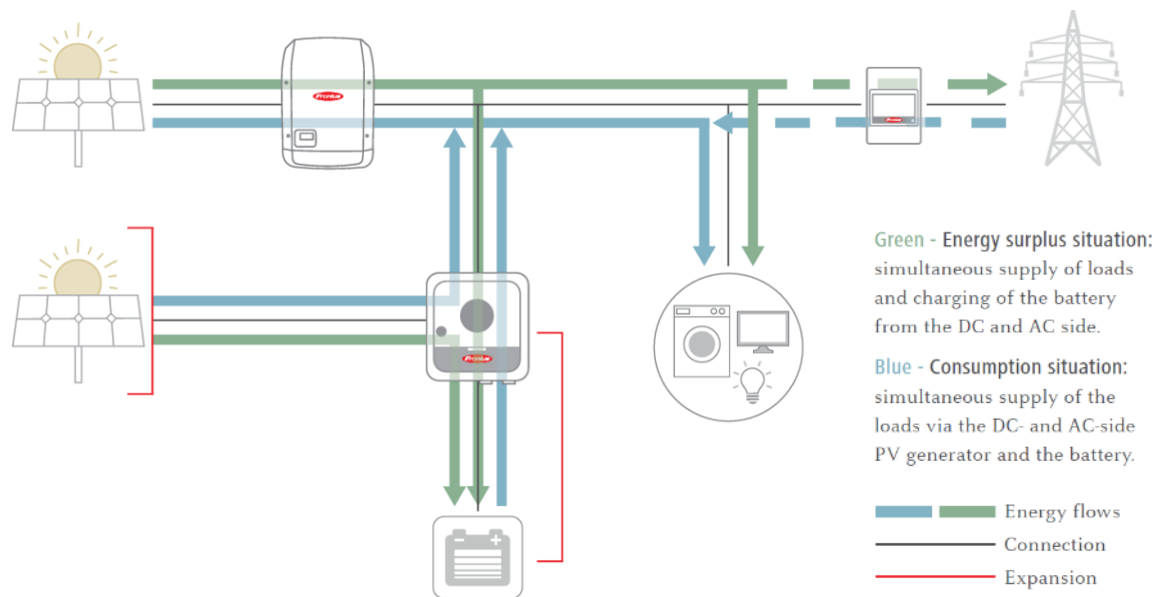
### STANDALONE APP

- / Commissioning, operation and visualisation



# INTEGRATION IN EXISTING SYSTEMS

- / 1 Fronius **hybrid inverter**
- / 1 or more **PV inverter(s)**
- / PV generator only connected to PV inverter or also to hybrid inverter
- / 1-3 **storage units** BYD Battery-Box Premium HVS/HVM
- / 1-3 Fronius **Smart Meter\***



\*) Depending on inverter power, feed-in limit and/or display in Solar.web.

# ALTERNATIVE TO DIESEL GENSET

- / Larger storage capacities – higher efficiencies
- / **100% capable of full backup mode** in combination with Fronius Primo GEN24 Plus / Symo GEN24 6.0-10.0 Plus and Symo Hybrid
- / Independence from fossil fuels
  - / No running costs
- / **No tank management (circulation)** and test runs necessary
  - / Official requirements – storage problems
- / Simple integration into the in-house grid
- / No noisy operation and exhaust fumes



58 kWh storage with Fronius and BYD – the solution for small commercial

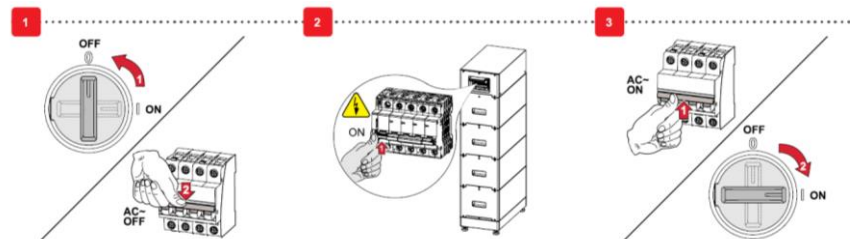
# Installation and commissioning

# SWITCH ON IN A BATTERY SYSTEM

/ Connection of GEN24 Plus and BYD battery

/ **Mind the sequence** when switching on!

- / 1. Switch on battery
- / 2. Switch on inverter (DC disconnector)



1<sup>st</sup> step



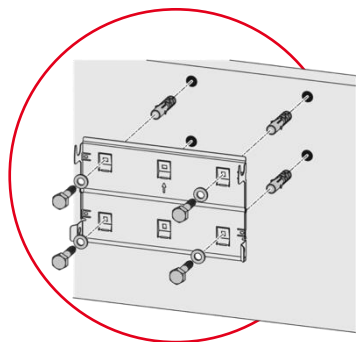
2<sup>nd</sup> step



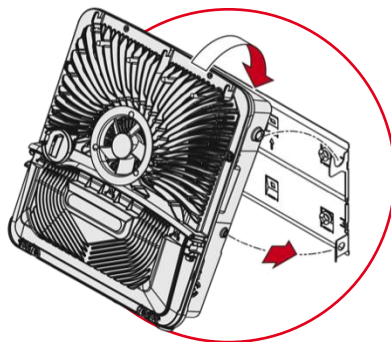


FRONIUS  
**GEN24 PLUS**

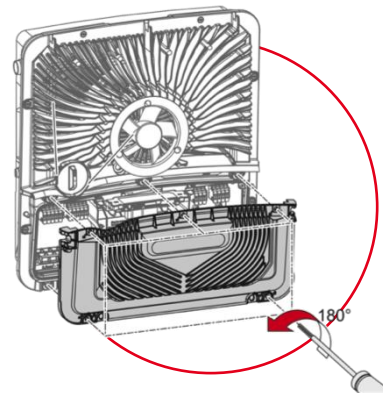
## EASY & FAST INSTALLATION



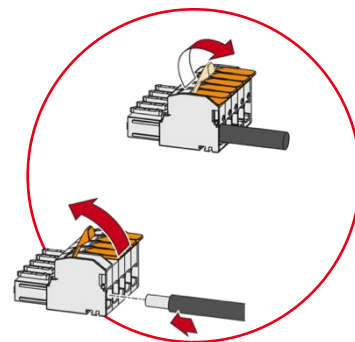
**Lightweight wall bracket**



**Easy mounting concept  
- SnapIN -**



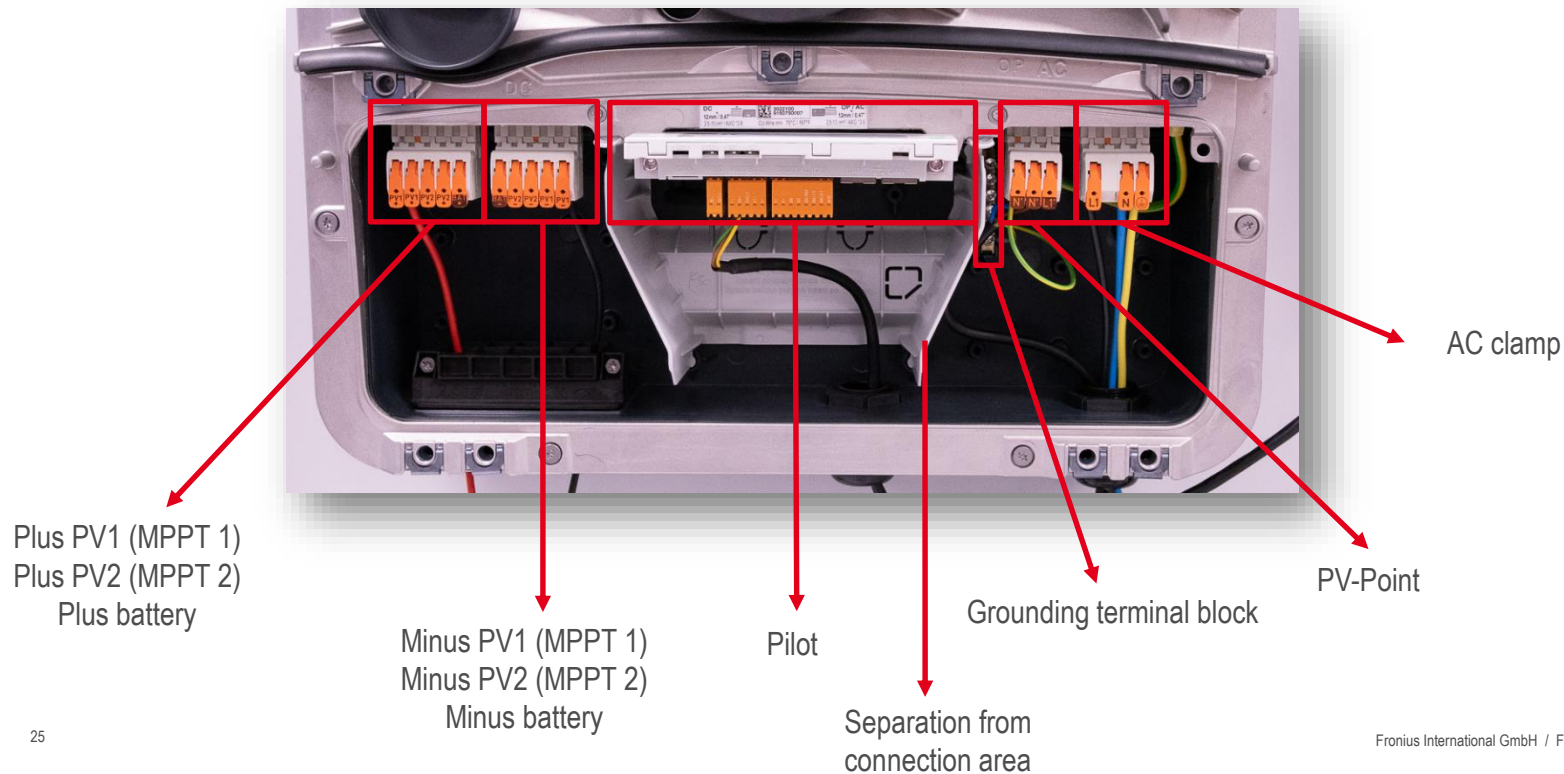
**Fastest access  
180° locking screws**



**No tool, no torque  
Spring connection**



# CABLE CONNECTIONS FRONIUS PRIMO GEN24 PLUS

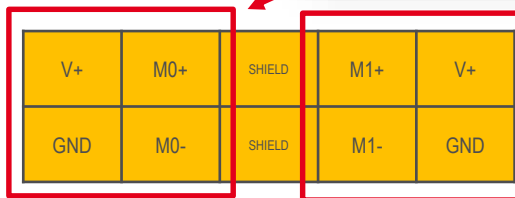
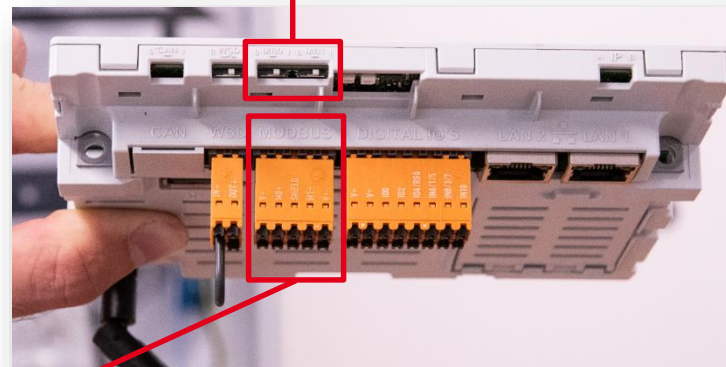


# COMMUNICATION **GEN24 PLUS AND BYD**

## MODBUS RTU / RS485

- / Oranger plug on the pilot
- / **2 Modbus RTU (RS 485) interfaces**
- / Modbus 0, Modbus 1, 12 V and GND (ground)
- / Communication to **BYD Battery-Box**
- / **No additional hardware for parallel operation**
- / Ground the shield
- / Modbus 0 switch
  - / Position 0: termination resistance off
  - / Position 1: termination resistance on
- / Modbus 1 switch
  - / Position 0: termination resistance off
  - / Position 1: termination resistance on

Modbus 0 / 1 switch



+12V	RS 485 (0) D+	SHIELD	RS 485 (1) D+	+12V
GND	RS 485 (0) D-	SHIELD	RS 485 (1) D-	GND

# COMMUNICATION SYMO HYBRID AND BYD

## MODBUS RTU / RS485

- / Orange plug on datamanager 2.0
- / 1 Modbus RTU (RS 485) interface
- / Modbus, 12 V and GND (ground)
- / Communication to **BYD Battery-Box**
- / 120 ohm termination resistance (white switch)
- / Ground the shield



D+	+	+	IO 0	IO 2	4	6	8
D-	-	-	IO 1	IO 3	5	7	9

# FRONIUS SOLAR.START

3 easy  
steps

=

Better  
usability

Automatic  
WIFI connection

=

Fast  
commissioning



FRONIUS  
GEN24 PLUS

=

**EASIEST  
COMMISSIONING  
ON THE MARKET**

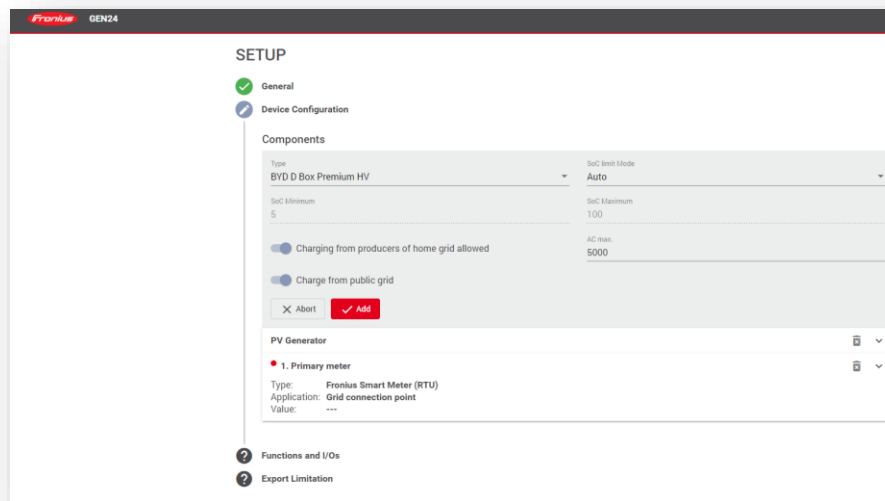


1...2...3...  G 

# HOW TO ACTIVATE THE BATTERY?

## FRONIUS GEN24 PLUS

- / Via **product wizard** during initial commissioning (technician account access)
- / **Anytime** at later stage (web user interface)

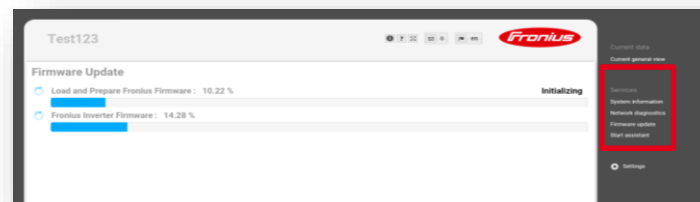


The screenshot shows the 'SETUP' screen for a Fronius GEN24 system. The interface is divided into several sections:

- General**: Indicated by a green checkmark icon.
- Device Configuration**: Indicated by a blue gear icon.
- Components**: A table with the following fields:
  - Type: BYD D Box Premium HV/
  - SoC limit Mode: Auto
  - SoC Minimum: 5
  - SoC Maximum: 100
  - Charging from producers of home grid allowed: ☒
  - Charge from public grid: ☒
  - AC max: 5000
- PV Generator**: A section with a dropdown arrow.
- 1. Primary meter**: A section with a dropdown arrow.
- Functions and I/Os**: Indicated by a question mark icon.
- Export Limitation**: Indicated by a question mark icon.

At the bottom of the 'Components' section, there are two buttons: 'X Abort' and '✓ Add'.

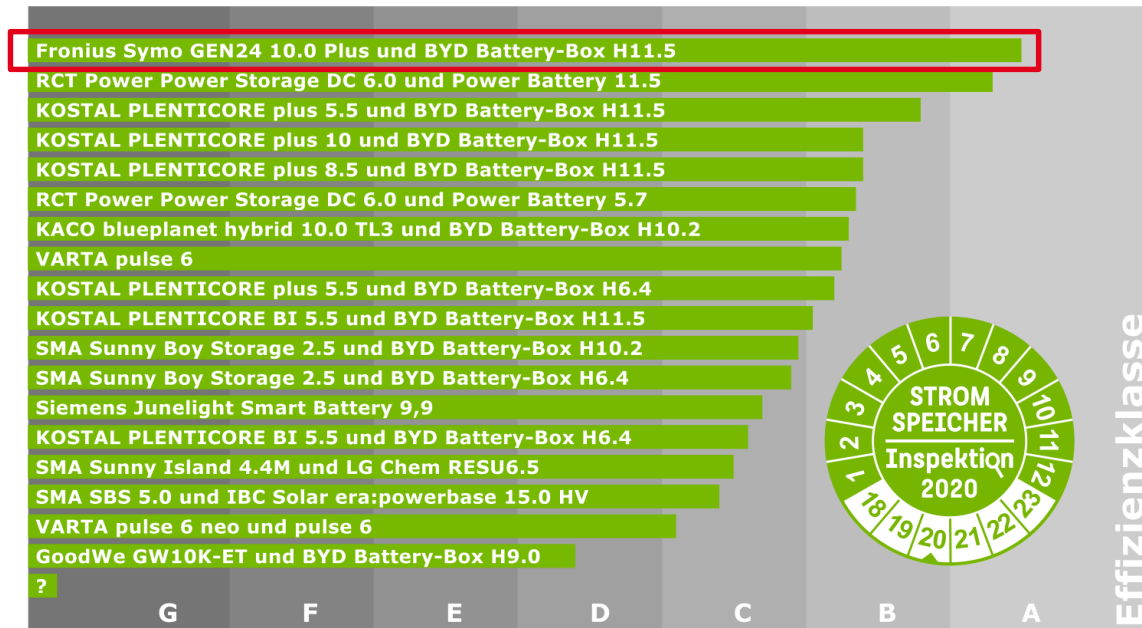
- / Software update (available since August 2020)
- / Via **technician wizard** during initial commissioning (service account access)
- / **Anytime** at a later stage (web user interface)





FRONIUS  
GEN24 PLUS

## MAXIMUM SYSTEM EFFICIENCY WITH BYD



### ENERGY STORAGE INSPECTION 2020

1st place at the energy storage inspection  
of HTW Berlin

94% system efficiency with BYD –  
best result of all time

Maximum yields  
Highest self-consumption rates  
Fastest profitability

/ Perfect Welding / Solar Energy / Perfect Charging



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