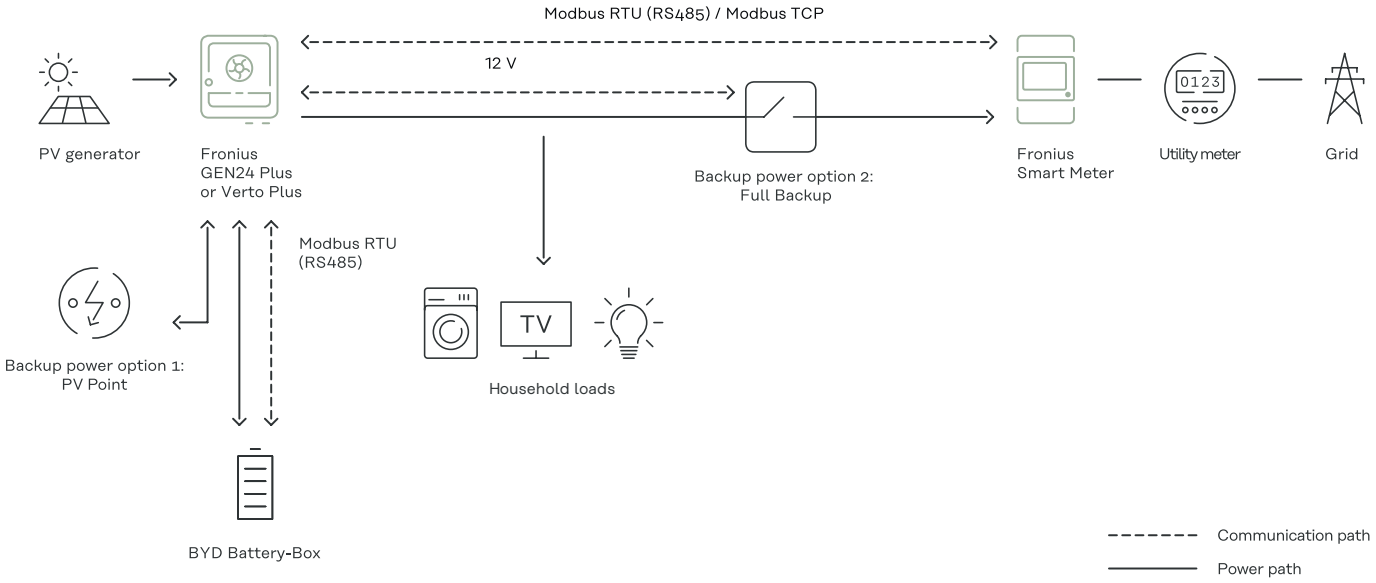
Fronius Battery Storage Solution



With Fronius GEN24 Plus (SC) or Verto Plus[1], Fronius Smart Meter[2] and BYD Battery-Box HVS/HVM, HVS+/HVM+ & HVB[3]



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What is needed for implementation?

Device	Type	Notes
Fronius Inverter	Fronius Primo GEN24 Plus (SC) Fronius Symo GEN24 Plus (SC)	Depending on the type of inverter and the type and capacity of the battery
	Fronius Verto Plus	
Battery storage	BYD Battery-Box HVS/HVM and HVS+/HVM+	Types compatible with BYD Battery-Box Premium HVS/HVM & HVS+/HVM+ HVS / HVS+ : 5.1 / 7.7 / 10.2 / 12.8 HVM / HVM+: 11.0 / 13.8 / 16.6 / 19.3 / 22.1 Compatibility of the individual storage types differ for Fronius Primo and Symo GEN24 Plus (SC)!
	BYD Battery-Box HVB	Compatible types with BYD Battery-Box HVB - only for Verto Plus: HVB 11.8 / 14.8 / 17.8 / 20.7 / 23.7 / 26.7 / 29.6
Energy meter	Fronius Smart Meter 63A-1, 63A-3, 50kA-3	Current transformers with an output current of 5 A must be used for the Fronius Smart Meter 50kA-3
	Fronius Smart Meter TS 100A-1, TS 65A-3, TS 5kA-3	Current transformers with an output current of 5 A must be used for the Fronius Smart Meter TS 5kA-3
	Fronius Smart Meter IP 5kA-3	Current transformers with an output voltage of 333 mV must be used for the Fronius Smart Meter IP
Communication	Inverter – battery	The inverter communicates with the battery via a shielded, 4-pole cable (CAT5 and higher) via Modbus RTU (RS485). The terminating resistors must always be placed at the end of the chain. With the BYD Battery-Box Premium HVS/ HVM, this is accomplished with a DIP switch directly on the storage system. To ensure error-free functionality, the inverter and the battery must always have the latest software update. The software update of the inverter can be activated via Fronius Solar.web.
	Inverter – Smart Meter & Smart Meter TS	Cable connection (CAT5 and higher) via Modbus RTU (RS485)
	Inverter – Smart Meter IP	Cable connection (CAT5 and higher) via Modbus RTU (RS485) or via Modbus TCP (WLAN, LAN)

Backup power options

Device	Type	Notes
Backup power variants*	PV Point (on board)	Socket supplied during backup power operation Single-phase power up to 3 kW Optional battery storage Fuse protection with 30 mA type A RCD required
	PV Point Comfort	Continuously supplied socket (backup power supply and parallel grid operation) Single-phase power up to 3 kW Optional battery storage Fuse protection with 30 mA type A RCD and 13 A line protection required
	Full Backup**	Backup power supplies the entire household when needed (1-phase and 3-phase) **Fronius Backup Switch**: Manual switchover to backup power mode **Fronius Backup Controller**: Automatic switchover to backup power mode Battery storage required Additional contactors for switchover or auxiliary relays are required***

* Only one backup power variant can be implemented. PV Point and PV Point Comfort are only available for the Fronius GEN24 (SC) product family
** The Full Backup option is not available for the Fronius Symo GEN24 3.0 - 5.0 Plus (SC). The Fronius Backup Controller is only approved for Verto Plus inverters up to 20 kW.
*** The requirements for this switchover vary from country to country – please contact your grid operator.

Compatibilities and nominal DC-charge/discharge power [kW]

Nominal DC charge/ discharge power [kW] *	BYD Battery-Box								
	HVS / HVS+				HVM / HVM+				
	5.1	7.7	10.2	12.8	11.0	13.8	16.6	19.3	22.1
Primo GEN24 3.0 Plus (SC)	3.11	3.11	-	-	3.11	3.11	3.11	3.11	-
Primo GEN24 3.6 Plus (SC)	3.81	3.81	-	-	3.81	3.81	3.81	3.81	-
Primo GEN24 4.0 Plus (SC)	4.14	4.14	-	-	4.14	4.14	4.14	4.14	-
Primo GEN24 4.6 Plus (SC)	4.51	4.75	-	-	4.51	4.75	4.75	4.75	-
Primo GEN24 5.0 Plus (SC)	4.51	5.17	-	-	4.51	5.17	5.17	5.17	-
Primo GEN24 6.0 Plus (SC)	4.51	6.20	-	-	4.51	5.63	6.20	6.20	-
Primo GEN24 8.0 Plus	4.51	6.76	-	-	4.51	5.63	6.76	7.88	-
Primo GEN24 10.0 Plus	4.51	6.76	-	-	4.51	5.63	6.76	7.88	-
Symo GEN24 3.0 Plus (SC)	2.56	3.15	3.15	3.15	2.56	3.15	3.15	3.15	3.15
Symo GEN24 4.0 Plus (SC)	2.56	3.84	4.18	4.18	2.56	3.20	3.84	4.18	4.18
Symo GEN24 5.0 Plus (SC)	2.56	3.84	5.12	5.20	2.56	3.20	3.84	4.48	5.12
Symo GEN24 6.0 Plus (SC)	4.51	6.22	6.22	6.22	4.51	5.63	6.22	6.22	6.22
Symo GEN24 8.0 Plus (SC)	4.51	6.76	8.26	8.26	4.51	5.63	6.76	7.88	8.26
Symo GEN24 10.0 Plus (SC)	4.51	6.76	9.01	10.30	4.51	5.63	6.76	7.88	9.01
Symo GEN24 12.0 Plus SC	4.51	6.76	9.01	11.26	4.51	5.63	6.76	7.88	9.01
Verto 15.0 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48
Verto 17.5 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48
Verto 20.0 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48
Verto 25.0 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48
Verto 30.0 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48
Verto 33.3 Plus**	5.12	7.68	10.24	12.80	10.24	12.80	15.36	17.92	20.48

Nominal DC charge/ discharge power [kW] *	BYD Battery-Box HVB						
	11.8	14.8	17.8	20.7	23.7	26.7	29.6
Verto 15.0 Plus**	10.24	12.80	15.36	17.92	20.48	22.50	22.50
Verto 17.5 Plus**	10.24	12.80	15.36	17.92	20.48	23.04	25.60
Verto 20.0 Plus**	10.24	12.80	15.36	17.92	20.48	23.04	25.60
Verto 25.0 Plus**	10.24	12.80	15.36	17.92	20.48	23.04	25.60
Verto 30.0 Plus**	10.24	12.80	15.36	17.92	20.48	23.04	25.60
Verto 33.3 Plus**	10.24	12.80	15.36	17.92	20.48	23.04	25.60

* This data refers to the DC charge and discharge power. The DC discharge power varies from the AC power that reaches the loads in the home, since the efficiency rate of the inverter must also be included here.
**The discharge power is limited by the maximum inverter power. For specific performance details, refer to the Verto Plus datasheet.

Differences between BYD Battery-Boxes

HVS / HVS+	HVM / HVM+	HVB
High battery module voltage, therefore excellent system efficiency (confirmed by HTW Berlin)	Higher energy density, therefore less space required	Highest energy density, compact design
Higher charge and discharge power with similar capacity: HVS 12.8 up to 11.26 kW	Lower charge and discharge power with similar capacity: HVM 11.0 up to 4.51 kW	High charge and discharge power with similar capacity: HVB 11.8 up to 10.24 kW
One tower scalable up to 7.68 kWh (Primo GEN24 Plus (SC)) / 12.8 kWh (Symo GEN24 Plus (SC) & Verto Plus)	One tower scalable up to 7.68 kWh (Primo GEN24 Plus (SC)) / 12.8 kWh (Symo GEN24 Plus (SC) & Verto Plus)	One tower scalable up to 29.6 kWh (Verto Plus).
Parallel operation up to approx. 23.04 kWh (Primo GEN24 Plus (SC)) / 38.4 kWh (Symo GEN24 Plus (SC) & Verto Plus)	Parallel operation up to approx. 57.96 kWh	Parallel operation up to 89.07 kWh**
A suitable combiner box for battery currents up to 50 A is required, such as the BYD Battery Box Combiner Box Plus.		

Parallel operation Fronius GEN24 Plus (SC) or Verto Plus and BYD HVS/HVM , HVS+/HVM+ & HVB

Thanks to the expandability of the BYD Battery-Box HVS/HVM, HVS+/HVM+ and HVB, up to 3 batteries can be operated in parallel on a Fronius GEN24 Plus (SC) or Verto Plus inverter. The advantage of operating multiple storage units in parallel is that high capacities can be achieved. This means that even small commercial systems can be equipped with the combination of Fronius GEN24 Plus (SC) or Verto Plus and BYD Battery-Box HVS/HVM , HVS+/HVM+ and HVB.

The following table shows the possible combinations depending on the inverter and storage type:

BYD Battery-Box										
	HVS / HVS+				HVM / HVM+ **					
	2x / 3x 5.1	2x / 3x 7.7	2x / 3x 10.2	2x / 3x 12.8	2x / 3x 11.0	2x / 3x 13.8	2x / 3x 16.6	2x / 3x 19.3	2x HVM/ HVM+ 22.1***	3x HVM+ 22.1
Primo GEN24 Plus (SC)	✓	✓	-	-	✓	✓	✓	✓	-	-
Symo GEN24 Plus (SC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Verto Plus*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

BYD Battery-Box HVB **							
	2x / 3x 11.8	2x / 3x 14.8	2x / 3x 17.8	2x / 3x 20.7	2x / 3x 23.7	2x / 3x 26.7	2x / 3x 29.6
Verto Plus*	✓	✓	✓	✓	✓	✓	✓

The parallel operation of multiple batteries (up to 3) increases the capacity, but the charge and discharge rates remain the same as when operating a single battery. Please also observe the BYD specifications for parallel operation of the BYD Battery-Box HVS/HVM, HVS+/HVM+ and HVB. National regulations of the grid operator or other conditions may require an earth-leakage circuit breaker in the AC connection cable. In this case, Fronius recommends using an earth-leakage circuit breaker suitable for frequency inverters with a tripping current of at least 100 mA, taking into account the national regulations. Parallel operation depends on the respective availability or certification in the country.

* The Premium HVS/HVM combiner box cannot be used for a parallel connection with the Verto Plus. Either the installer must carry out the wiring in accordance with local regulations, or a suitable combiner box for battery currents up to 50 A must be used, such as the BYD Battery-Box Combiner Box Plus.
** The parallel connection of three HVB towers (23.7, 26.7, 29.6) and three HVM+ 22.1 towers is supported from inverter firmware version 1.40 onwards.
*** Parallel operation with 3× HVM 22.1 is not supported; only 3× HVM+ 22.1 is possible.

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