

1 DYNAMIC POWER REDUCTION

1.1 General

When feed-in limits are set (e.g., max. 70% of the kWp or max. 5 kW), self-consumption in the home should be taken into account before a power reduction of the inverter is implemented.

This is possible with Fronius' dynamic feed-in control. An individual limit can therefore be set and a meter for recording the self-consumption via S0 meter or the Fronius Smart Meter (RS-485)* can be connected directly to the inverter (with Fronius Galvo and Symo). The settings are easily set via the web interface of the inverter or of the Fronius Datamanager.

1.2 Overview of Integrated Interfaces



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- 1 **EXTERNAL INPUT (e.g., for S0 meter)**
- 2 FRONIUS SOLAR.NET IN
- 3 FRONIUS SOLAR.NET OUT
- 4 USB INTERFACE
- 5 FLOATING RELAY OUTPUT
- 6 **DIGITAL INPUTS AND OUTPUTS (I/Os) / RS-485 (MODBUS RTU)**
- 7 ETHERNET
- 8 WLAN ANTENNA

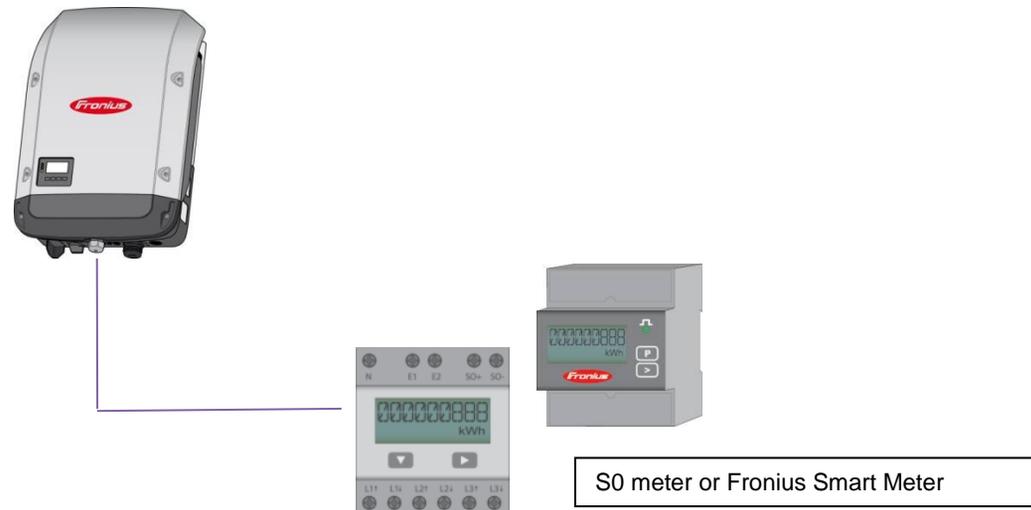
* Modbus RTU is available with the newest Fronius Galvo and Fronius Symo inverters and with the Fronius Datamanager 2.0 (card or box).

1.3 How Can a Dynamic Power Reduction Be Implemented?

- / An S0 meter or the Fronius Smart Meter can be connected directly to the inverter in order to take into account self-consumption with feed-in limits.
- / The meter can be placed at the feed-in point or in the consumption branch. **If you use a S0 meter, we recommend to locate the meter in the consumption branch:**
 - / There can be controlling problems when the S0 meter is located at the feed-in point and the current energy consumption in the house is higher than the set feed-in limit (no impulses from the S0 meter). This happens most likely at sunrise, when there is not enough PV power. It could happen that the control loop gets stuck at the set limit.
 - / If the meter is in the consumption path, the system complies with the limit even when the S0 meter is defective.
 - / Only in the consumption path the visualization of self-consumption in Solar.web works proper.

When using the Fronius Smart Meter, both positions work without problems. Therefore Fronius recommends the Fronius Smart Meter.

- / The feed-in limit and the number of impulses can be configured freely.



1.3.1 S0 Meter – Functional Description

The S0 interface is a hardware interface and is used to transfer measured values. Data transfers are supported by weighted impulses. This means that a specific number of impulses are transferred per kWh. The weighting is always dependent on the relevant meter type. The subsequent inverter collects the impulses and then generates a displayable value.

There are two basic classes of S0 meters, A and B. The former is designed for longer and the latter for shorter transfer paths. In class B up to 15 V DC can be connected, and in class A up to 27 V DC. The maximum current flow is limited to 15 mA and 27 mA respectively, which corresponds to a resistance of 1 kOhm.

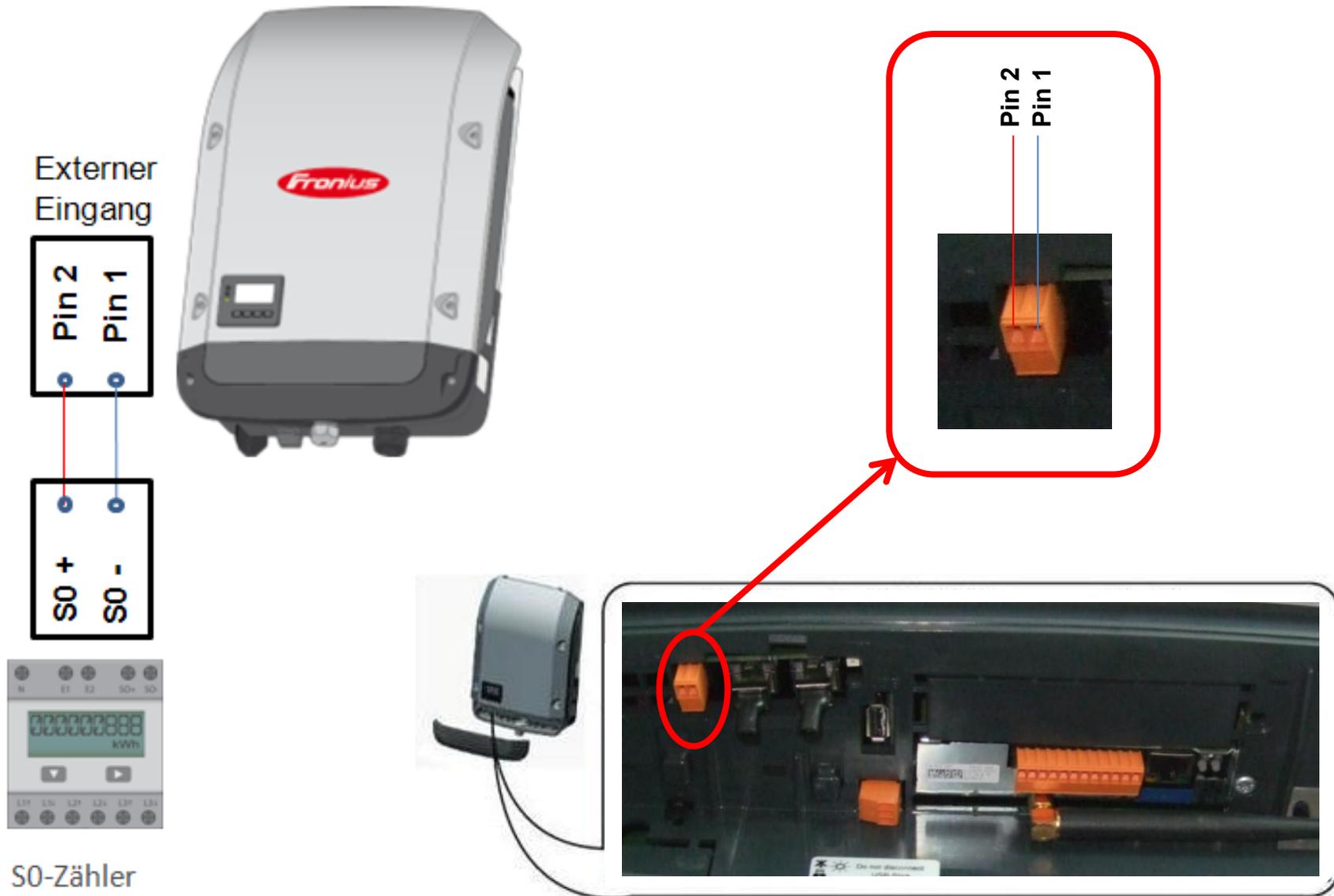
1.3.2 Requirements of the S0 Meter from Fronius Inverters Symo/Galvo

Standard	IEC 62053-31
Class	B
Maximum voltage	15 V DC
Maximum current when ON	15 mA
Minimum current when ON	2 mA
Maximum current when OFF	0.15 mA

1.3.3 Recommended Max. Impulse Rate of S0 Meter

Solar power kWp [kW]	Maximum impulse rate Imp/kWh
> 30	1000
> 20	2000
> 5.5	5000
<=5.5	10000

1.3.4 Connecting the S0 Meter to Fronius Galvo/Symo



1.3.1 Connecting the Fronius Smart Meter

Please see manual of the Fronius Datamanager 2.0 or Datamanager Box 2.0.

1.4 Setting the Dynamic Power Reduction on the Fronius Datamanager Web Interface

The dynamic power reduction can be set in the "UC editor" menu. The meter settings can be set in the "Meter" menu.

Settings
FRONIUS, on 28.10.2014, 12:53:50

- GENERAL
- PASSWORDS
- INVERTERS
- FRONIUS SENSOR CARDS
- FRONIUS SOLAR.WEB
- SERVICE MESSAGES
- NETWORK
- ENERGY MANAGER
- PUSH SERVICE
- MODBUS
- METER
- UC EDITOR**

UC editor

Ripple control signal receiver

unlocked	Input pattern									Active power	Power factor cosφ	UC output	excluded inverter(s)	
	I/O 0	I/O 1	I/O 2	I/O 3	4	5	6	7	8	9		I/O 0		
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> 60 %	<input type="checkbox"/> 1 <input type="radio"/> ind <input checked="" type="radio"/> cap	<input checked="" type="checkbox"/>	<input type="text"/>										
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... not applicable
 ... not considered
 ... pin open
 ... pin closed

Dynamic power reduction

Power limit: No limit limit for entire system

total DC power of the system: Wp

Maximum grid feed-in power: %

Dynamic power reduction

- 1 Power limit: No limit limit for entire system
- 2 total DC power of the system: Wp
- 3 Maximum grid feed-in power: % ▼

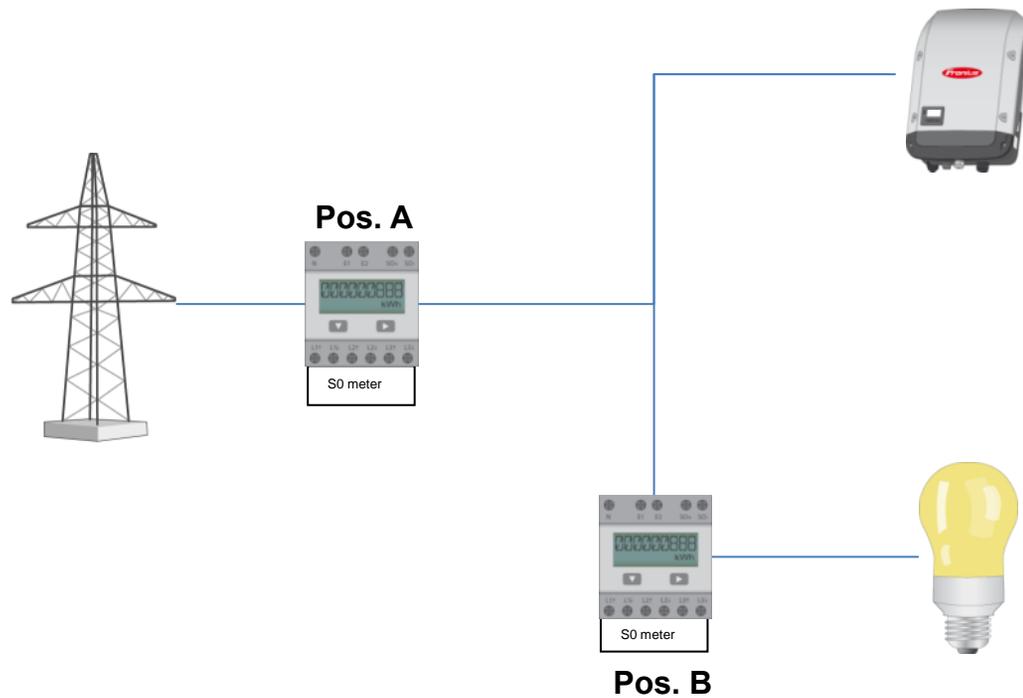
- 4 Meter: ▼ Impulses/kWh: 6
- 5 Location of the meter: Feed-in point Consumption path

Click [here](#) for circuit diagrams of the meter installation

- 1 **"Power limit"**
The power limit allows a maximum output power to be defined for the PV system.
/ "No limit": The inverters convert all available PV energy and feed it into the grid.
/ at the inverter: The inverters are limited to the output power limit (e.g., to 70%). The great advantage lies in the fact that the limit for all inverters (that are wired in a DATCOM Ring) can now be set centrally on the Fronius Datamanager web server. Furthermore, fluctuations (e.g., when an inverter is in standby) can also be compensated for through this or the yield can be increased in systems with different alignments (e.g., East-West systems with two inverters: with this, an inverter can supply more energy because the two never work on full power at the same time).
/ at the meter: Function for dynamic power reduction. Self-consumption is taken into account and the inverters are assigned a power limit at the meter point (feed-in point/consumption branch).
- 2 **"total DC power of the system"**
The total DC power [Wp] of the PV system is entered here. This value serves as the control reference. It is also the reference value in the case of a "fallback" (see 1.7) in the case of a meter failure error.
- 3 **"Maximum feed-in power"**
In this field, the desired maximum power of feeding in (effective power) of the PV system is defined in "%" or "W".
- 4 **"Meter"**
If the system has several inverters, the number of the inverter to which the S0 meter is connected is selected here.
- 5 **"Location of the meter"**
The exact location of the S0 meter within the installation is set here.
/ Position A: Feed-in point: Because various meters count in both directions, but energy is only converted into impulses without signs, the meter must be configured at the feed-in point so that counting only takes place in one direction (only the fed-in energy).
/ Position B: Consumption branch: Only the consumption is measured.

6 "Impulse/kWh"

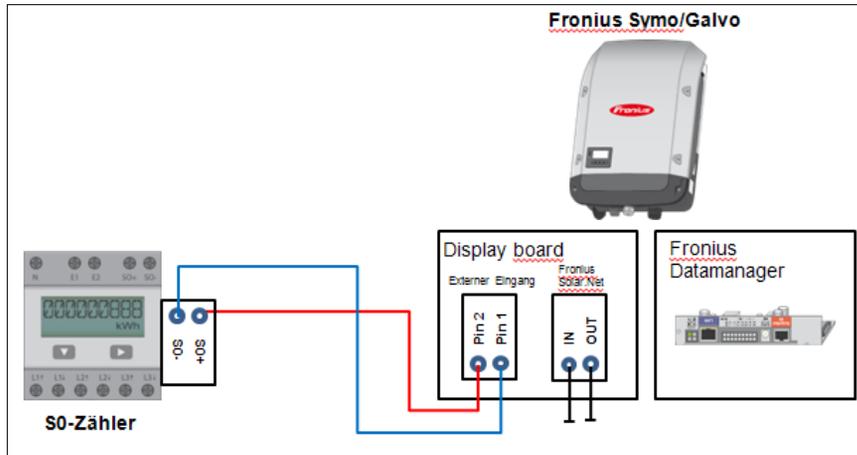
Setting the impulse rate that is specified/set by the S0 meter.



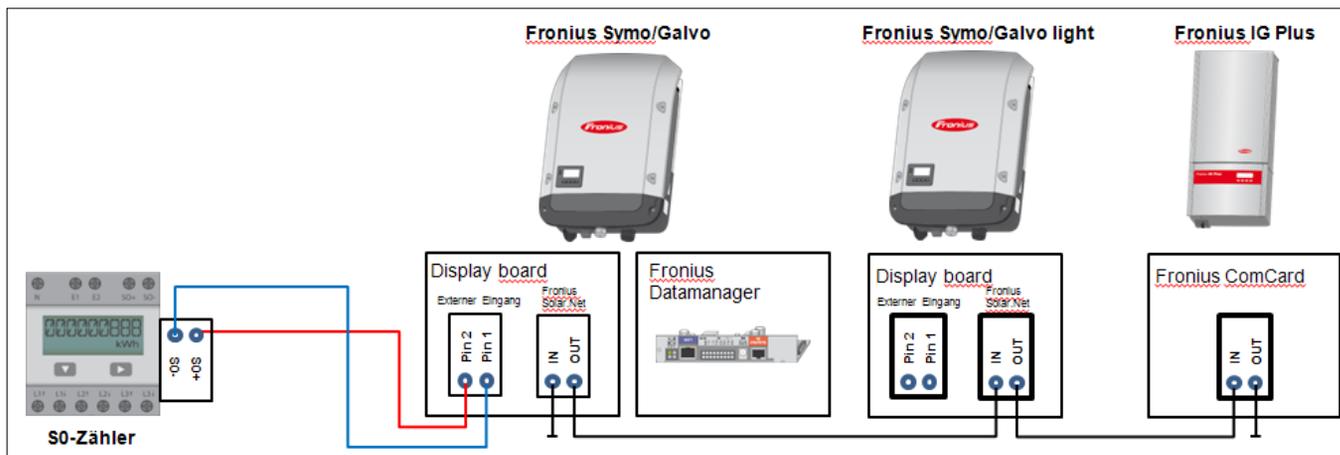
1.5 Connection Options

The various configuration options are shown below:

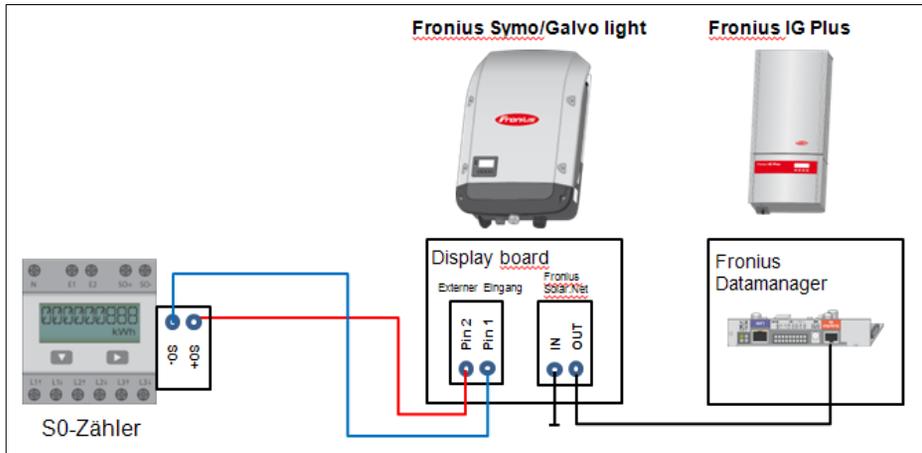
/ S0 meter with Fronius Symo/Galvo



/ S0 meter connected to a mixed system comprising Fronius Symo/Galvo, Fronius Symo/Galvo light and Fronius IG Plus



/ S0 meter connected to a mixed system comprising Fronius Symo/Galvo light and Fronius IG Plus



- / It is not currently possible to connect an S0 meter to a Fronius IG Plus without at least a Fronius Symo/Galvo.**
- / It is possible to connect the Fronius Smart Meter (in combination with the Fronius Datamanager 2.0)!**



1.6 Mixed Systems

For system expansions where only part of the complete system falls within a power control, the system power that is to be limited as a result must be calculated by the installer. The easiest way is to configure the maximum power of feeding in in watts to avoid converting to a percentage. The power is calculated using the following formula:

1.6.1 Formula

$$P_{in} = P_{alt} + \left(\frac{P_{neu} * Limit}{100} \right)$$

P_{in}	Calculated maximum power of feeding in [kW]
P_{old}	PV power of the old system part [kW]
P_{new}	PV power of the new system part [kW]
Limit	Limit of the new system part [%]

1.6.2 Application Example

A 5 kW standard system without 70% control is expanded by 5 kW, which falls under the 70% control. The new total system power is therefore 10 kWp and the following must be used to calculate the maximum power of feeding in:

$$P_{in} = P_{alt} + \left(\frac{P_{neu} * Limit}{100} \right)$$

P_{old}	5 kW
P_{new}	5 kW
Limit	70%

$$P_{in} = 5 + \left(\frac{5 * 70}{100} \right) = 8,5 \text{ kW}$$

The following values for "total DC power of the system" and "Maximum power of feeding in" are therefore given on the Fronius Datamanager web interface:

Dynamic power reduction

Power limit: No limit limit for entire system

total DC power of the system: Wp

Maximum grid feed-in power:

Meter: Impulses/kWh:

Location of the meter: Feed-in point Consumption path

Click [here](#) for circuit diagrams of the meter installation

For a 10 kWp system, Fronius also recommends an S0 meter with a maximum impulse rate of 5000 Imp/kWh.

1.7 Error Detection/Fallback

If the Fronius Datamanager cannot read out any meter values, active control is stopped and the system is instead fixed within the normative limit value. This normative limit value consists either of the previously set percentage value or is calculated from the total PV output and the maximum power of feeding in and is sent to the inverter as a limit.