

Managing large plants

The power grid management for photovoltaic plants in the medium voltage network

Large plants often have advanced requirements. In addition to the stipulations on controlling PV plants, the information on the actual amount of feed-in power may need to be provided. Communication with grid operators here is usually carried out with remote control technology such as telecontrol systems. This technology makes bi-directional communication possible. The signals are transmitted between the telecontrol system and Solar-Log 2000 PM+ via I/O Box(es) with the PM-Package. Depending on which value has to be transmitted to the grid operator, a measurement of transformer voltage and current with the Solar-Log™ Utility Meter is required.

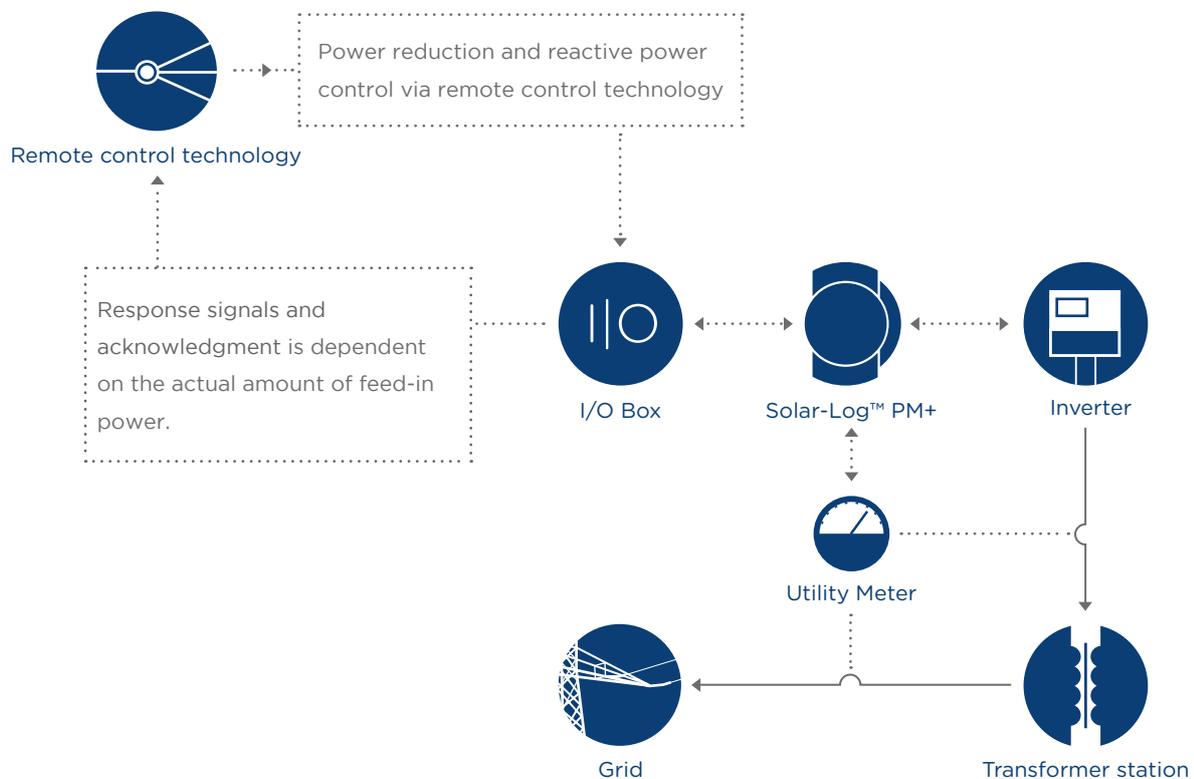
Controlling active power and regulating reactive power represents a serious technical challenge. Grid operators rely on various concepts here. The Solar-Log™ Utility Meter is used to control voltage-dependent reactive power via the Q(U) function and reactive power at the feeding point. Other functions such as the fixed value cos phi shift factor or performance-related cos phi functions can be implemented without additional measurements.



Operator interface for installing PM profiles.

Feed-in management

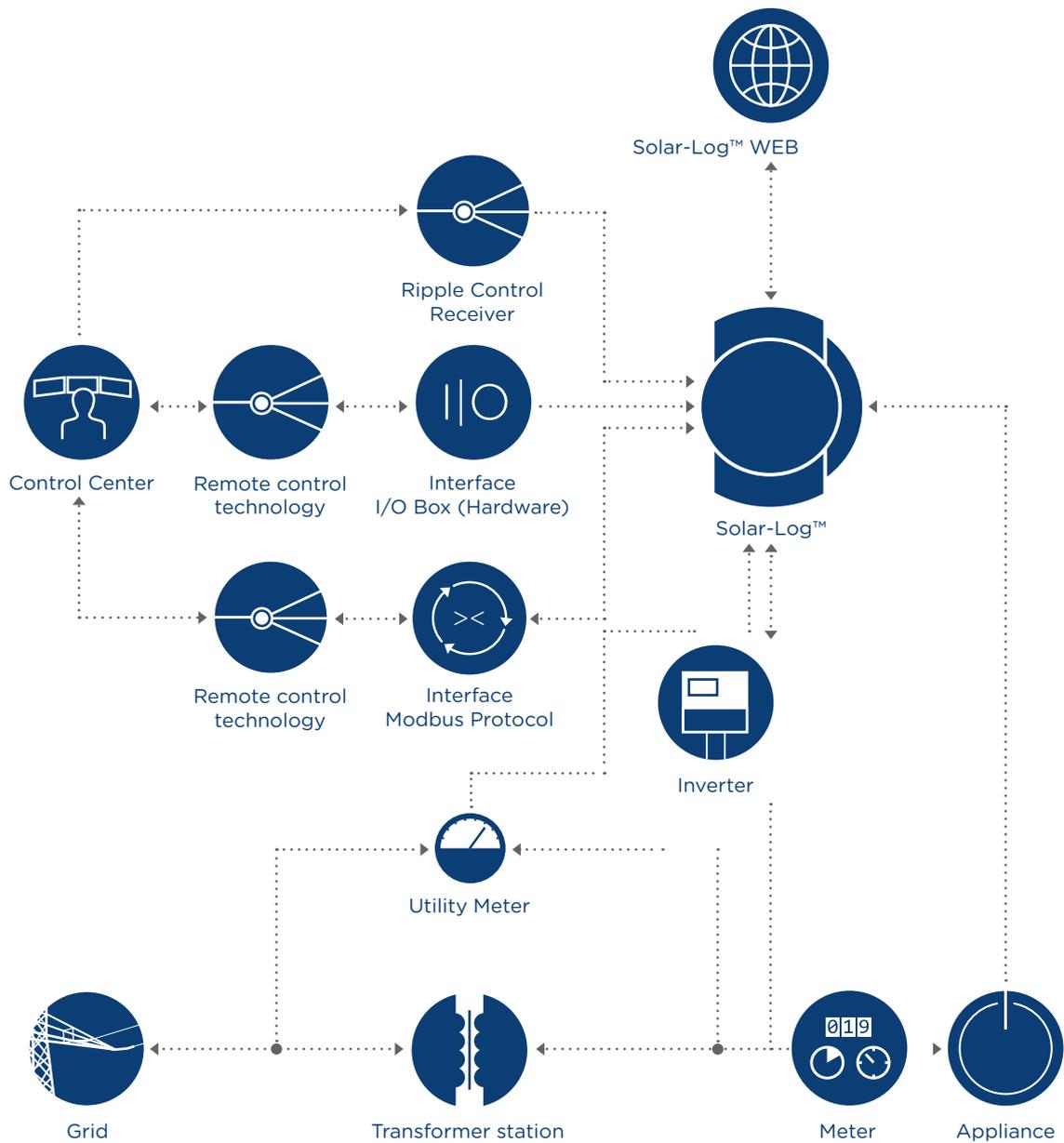
Feed-in management is becoming a more common requirement for large plants. In contrast to simple feed-in management, a response signal with the actual amount of feed-in power is also required. That is why most grid operators deploy remote control technology with different command and response signals. The Solar-Log™ I/O Box can receive and send the wide range of signals from various grid operators. This function is only available with the Solar-Log 2000 PM+. When used with the SolarLog™ Utility Meter, measured values such as reactive power, voltage and currents are reported back.



Modbus TCP PM interface

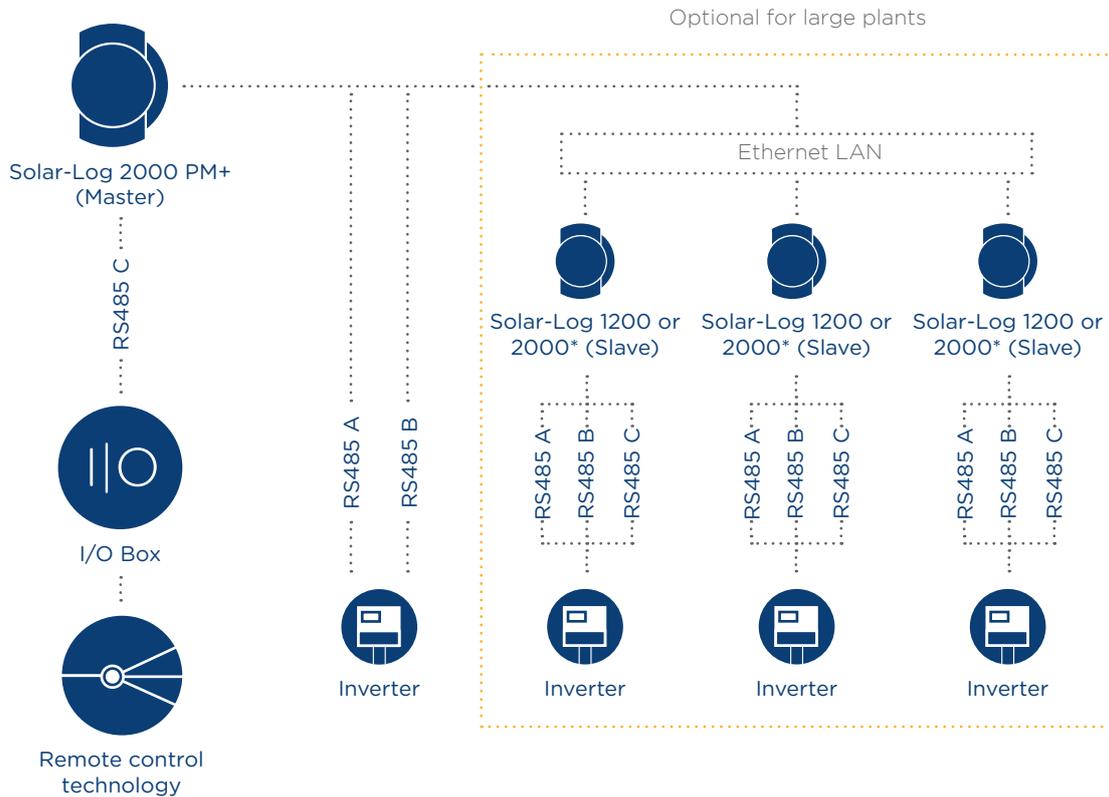
A direct connection to telecontrol systems from select manufacturers is possible with the Solar-Log™ via the TCP-based Modbus protocol. With this set up, the command signals and response signals between the remote control technology and the Solar-Log 2000 PM+ are relayed back and forth without potential-free and analog interfaces. Telecontrol protocols such as IEC 60870-C, IEC 61850-5-101 and 61850-5-104 can be implemented when direct linking is used.

Several ways to transfer commands and responses between the Solar-Log™ and grid control center



Feed-in management with Solar-Log™ networks

Solar-Log 1200 and 2000 data loggers are linked together via Ethernet to implement feed-in management at plants in the megawatt range. This linking over the network allows the control signals from Ripple Control Receivers to be interchanged.



* RS485 C interface only available with the Solar-Log 2000

The grid operator's signals are received by the Solar-Log 2000 PM+ (master) and distributed to the connected inverters via the Solar-Log 1200 or 2000 (slaves). The master can be connected to up to nine slaves in this setup. Linking the Solar-Logs together over the network helps to implement complex requirements (several plant parts, feeding points and inverters from several manufacturers).

Solar-Log™ functions for feed-in management

| | Solar-Log 300/1200/2000 | Solar-Log 300 PM+/1200 PM+ | Solar-Log 2000 PM+ |
|----------------|--|-------------------------------|-----------------------|
| Active power | Reduction to X percent with or without the calculation of self-consumption ¹⁾ | ● | ● ²⁾ |
| | Remote controlled reduction with or without the calculation of self-consumption ¹⁾ | - | ● ²⁾ |
| Reactive power | Fixed value cos phi shift factor | ● | ● |
| | Fixed reactive power in VAR | ● | ● |
| | Variable cos phi shift factor over characteristic curve P/Pn | ● | ● |
| | Remote controlled fixed value cos phi shift factor | - | ● |
| | Variable reactive power via characteristic curve Q(U) (only with Utility Meter voltage measurement) | - | ● |
| | Remote controlled switch between fixed and characteristic curve P/Pn | - | - |
| | Remote controlled switch between fixed and characteristic curve Q(U) | - | - |
| | Controlled shift factor at the feeding point (only with Utility Meter voltage measurement) | - | - |
| | Connection for two Ripple Control Receivers | - | ● |
| | PM-Packages | - | - |
| Interfaces | Flexible interface for remote control technology Inputs: max. 4 analog and 9 digital Outputs: max. 3 analog and 10 digital | - | ● |
| | Modbus TCP interface for a direct connection to remote control technology | - | ● |
| | Solar-Log™ Master-Slave network | - | ● |
| | Modbus TCP DPM | - | ● |

1) Only with additional meter.

2) Allocation of self-consumption is not possible when using PM-Packages or Modbus TCP interface at the same time.