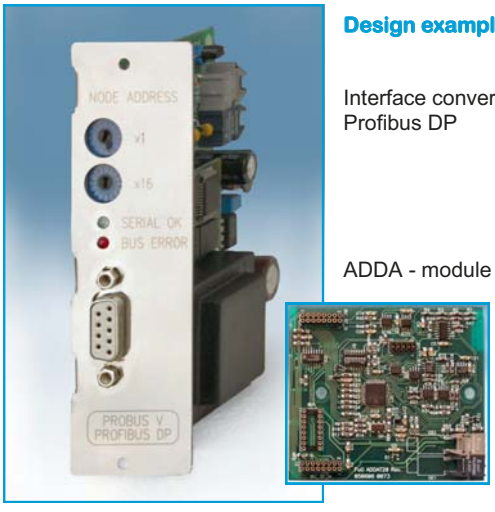
Options and modifications:
Probus V (digital interface system)



Design example

Interface converter
Profibus DP

ADDA - module

General:

The modular interface system **PROBUS V** allows to connect FuG- power supplies with various interfaces and bus-systems.

The **PROBUS V** system consist of two assemblies, the ADDA module and an interface converter respectively.

The **ADDA** module is an intelligent analog-digital and digital-analog converter for controlling the power supply. This part is always in the power supply and communicates by a serial ASCII protocol via optical fibres with the interface converter. It evaluates the programmed commands, controls the power supply by reference voltages and makes available serially the feed back data of the power supply .

The ADDA module stores also all calibration data and all unit specific data.

All commands and read-back-data are transmitted between these both modules as readable ASCII characters.

For customer specific multi-channel-units up to 256 ADDAs can be used parallel by optical fiber hub or can be used serial by a optical fiber chain. Every single ADDA-module of the group can be addressed by sub -addressing. (Not for Profibus DP)

Connection to the customer is made by the **Interface Converter,** which converts the signals of the respective bus system or interface standard to the serial data stream of the optical transfer line.

Available versions:

- IEEE 488
- RS 232 electrical or optical
- RS 422
- USB
- Profibus DP
- LAN (Ethernet)
- More on request

Every version can be integrated completely into the power supply or delivered with an external interface converter. In the last case the connection is via optical fibre cables. The external interface converters are Euro Cassettes of 61mm width (12U), 133mm (3U) high and 170mm deep. The fibre optic cable from the external interface converter to the power supply can be up to 30m long (plastic optical fibre) or in special design more than 1000m (glass fibre).

Furthermore, an external version with electrical connections to the power supply via the analog programming is also possible.

Features:

- Easy programming with SCPI-like syntax; Standard set of commands compatible to previous version PROBUS IV.
- Extended set of commands for special functions.
- Most modern RISC-Microcontroller techniques with SMD.
- Completely digitally adjusted for highest precision.
- Isolation between interface converter and ADDA component via optical fibre, though extremely immune against interferences.
- More than one ADDA components addressable in one optical fibre chain.

Technical data:

- Instruction processing time approx. 300µs (without serial data transfer time)
- At 625kBd at least 1000 settings per second programmable (typ. 2000/sec)
- Up to 100 measurements per second
- Two outputs 0..+/-10V, effective resolution 14 to 20 bit incl. sign (depending on integration time), theoretical resolution 24 bit.
- Setting time of outputs <500us
- Tc < $1x10^{-5}$/K, typ. 3ppm/K
- Two inputs 0..+/-10V, programmable resolution, max. 22 bit incl. sign, input impedance >1GΩ
- Several digital I/Os for control of the power supply
- Optical connectors: Standard Agilent (HP) HFBR-0500 series. Optionally HFBR-0400 series.
- When several ADDA modules are connected to a fibre optic chain, then an additional time delay depending on the selected baud rate and the string length is necessary. For 625kBd approx. 1ms delay per ADDA module must be added.

IEEE 488:

- Delay time of the data transfer: <100us.
- Baud rates on the serial side of the optical link: 38400Bd or 625kBd selectable.
- SRQ (Service Request) programmable.
- LED indicators for "addressed" und "SRQ" conditions.
- Together with ADDA commonly compatible to the IEEE -488 mode of the predecessor PROBUS IV.
- IEEE-488 address selectable by switch near the IEEE-488 connector (outside the unit).

RS 232 electrical (active):

- Own power supply, 3-wire connection sufficient (Rx, Tx, GND).
- Baud rates up to 115200Bd possible.
- Connector: 9-pol. Sub-D.
- Together with ADDA commonly compatible to the RS-232 mode of the predecessor PROBUS IV.
- Optical connectors: Standard Agilent (HP) HFBR-0500 series. Optionally HFBR-0400 series.

RS 232 optical (passive):

- Equal to RS 232 active, but:
- Optical connectors: Direct sticking connection for standard 1mm POF optical link.
- Includes 5m fibre optic cable to connect the power supply to the computer.
- Fibre optic cables up to 30m on request. (Longer version available as special cables, glass fibre up to 1000m)
- The complete interface converter is housed in a Sub-D-connector-like case.

Options and modifications:
Probus V (digital interface system)

RS 422:

- Baud rates up to 625kBd possible.
- Optical connectors: Standard Agilent (HP) HFBR-0500 series. Optionally HFBR-0400 series.

USB:

- Control via virtual COM-Port or directly via USB-driver. (Virtual Com-Port driver for the most common operation systems available, very simple programming, no USB-programming knowledge necessary.)
- Delay time typical approx.1ms due to USB principle.

LAN (Ethernet):

- Control via virtual COM-Port or directly by TCP/IP-programming. (Virtual Com-Port driver for the most common operation systems available, very simple programming, no profound knowledge of TCP/IP-programming necessary.)
- Delay time approx. 20ms.

.

Profibus DP:

- An initial data block is made available on the Profibus-DP side. Into this the primary SPS writes the required set points and control commands.
- This initial data block is transferred cyclically by the converter via optical link to the ADDA part.
- The feedback data (e.g. measurements) of the ADDA part is questioned cyclically and provided n the exit data block of the converter to the primary SPS.
- Cycle time 40ms.
- Profibus address selectable by code-switch outside the unit.
- Mode indication for Profibus connection (red Error-LED).
- Mode indication for optical link.
- The Profibus-DP interface does not support the interconnection of several ADDA modules

Possible analog and digital interface alternatives for FuG - Power supplies (Overview)