

## FEATURES OF THE PRODUCT

### FUNCTION:

With this option the output voltage and current of the power supply can be set via analog signals. Monitor signals of voltage and current are also available on the programming terminal. An external "ON"- command as well as different other commands and signalizations are also available (see table 1 below).

Selection of manual operation or external programming is possible by a switch button on the front panel. When "REMOTE" + "ANALOG" is selected, the controls at the front panel are disabled and the unit will be controlled via the 15 pole Sub-D connector at the rear side of the unit.

The analog programming can be performed in the standard version with 0-10V signals (set values and monitor signals) referenced to ground, in an insulated version with internal 0-10V signals floating against ground up to 2kV, in a „current loop“ version with analog signals 4-20mA and in a special „PLC“ version, which matches to most PLC analog interfaces. Depending on the features of the individual power supplies there may be differences in the implementation for special and customized power supplies. Table 1 in this data sheet shows the implementation for the most of common FuG power supplies. For customized power supplies please ask.

The analog programming interface fits into the FuG power supplies without influence on the outer dimensions. All standard power supplies of the professional line are prepared for this option, so that it is also possible to retrofit the option later on in course of a works service.

### CHARACTERISTICS:

- Direct access to the internal regulation loop of the power supply
- most authentic influence to the control electronics
- fast real time control without delay for data converting
- infinitely variable adjustment with no digitalization steps
- Shielded 15 pole female Sub-D connector installed on the rear panel of the power supply
- Mating connector for soldering control cable included in scope of delivery
- We recommend to use a shielded data cable and connect the screen of the cable to the screen of the connector
- High integrity of data with short cables (up to 3m) or with 4-20mA version

**We will be pleased to advise you - contact us at:** [sales@fug-elektronik.de](mailto:sales@fug-elektronik.de) or +49 8039 400 77 0.

### TECHNICAL DATA AND CONFIGURATIONS

All data of the power supply regarding regulation stability and regulation speed stay valid also when controlled via the analog programming.

Absolute accuracy of voltage and current monitors:

±20mV for standard version and PLC version

±25mV for insulated version

±32µA for “current loop” version

These values are only true for pure DC. For changes in the output values with frequency higher about 0,1 Hz, the monitors may deviate from the true value up and down.

For proper function of the analog programming (standard version) at least pin 12 (Output ON/OFF - link to pin 6 - 0V digital) and both pins 8 and 15 (set values ≠ 0 referenced to pin 9 “0V”) have to be connected. Programming of an output voltage always requires also the setting of the current control pin to a non-zero value and vice versa.

For versions other than standard this applies accordingly.

The “V-LIM” function (Limitation of output voltage by means of a screwdriver-potentiometer on the front plate) for units, which are equipped with such function, is always active and has higher priority than the set values of the analog programming.

For more technical data see table 1.

For single types of equipment as well as for customized units, deviations from this configuration are possible. In these cases the equipment description (user manual) will explain these deviations.

# DATASHEET

## Analog Programming Interface for FuG power supplies



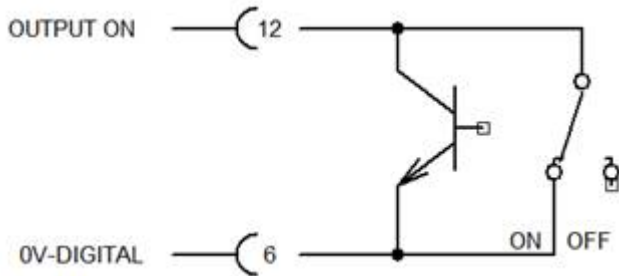
View to solder side of the plug:							
Pin configuration:							
Pin	Designation	Signal type	For which FuG products	Function for the versions:			
				0-10V (Non insulated analog programming)	0-10V insulated (up to 2kV DC)	"Current loop" 4-20mA (Non insulated)	0-10V for PLC control (Non insulated)
		D=Digital, A=Analog, I=Input, O=Output, NC=Not used, free for special functions	If empty, applicable for all not specially mentioned types of professional line power supplies.	<b>Standard version of this option</b>	green when deviating from standard	green when deviating from standard	green when deviating from standard
				<b>Digital signals:</b> HIGH-Level = 12 ... 15V LOW-Level = 0 ... 2V <b>Analog signals:</b> 0 ... 10V		Analog signals: current loop 4-20mA	Digital signals: HIGH-Level = 22 ... 24V LOW-Level = 0 ... 2V External supply of 24V input is mandatory
1	CC	DO		HIGH, when power supply is in constant current mode "CC" (see also "CC" LED on front plate.) Ri approx. 10kΩ			Ri approx. 2,7kΩ
2	CV	DO		HIGH, when power supply is in constant voltage mode "CV" (see also "CV" LED on front plate.) Ri approx. 10kΩ			Ri approx. 2,7kΩ
3	I-MON	AO		Current monitor 0...10V = 0...Imax Ri approx. 10kΩ	Ri approx. 11kΩ	Current monitor 4...20mA = 0...Imax	Current monitor 0...10V = 0...Imax Ri approx. 100Ω
4	VPS	AO		Slider front plate potentiometer for voltage 0 ... +10V (-10V ... +10V for bipolar power supplies HCB, NLB) Ri approx. 10kΩ	Not connected	Slider front plate potentiometer for voltage 0 ... +10V (-10V ... +10V for bipolar power supplies HCB, NLB) Ri approx. 10kΩ	
5	IPS	AO		Slider front plate potentiometer for current 0 ... +10V (-10V ... +10V for bipolar power supplies NLB, not connected for HCB) Ri approx. 10kΩ	Not connected	Slider front plate potentiometer for current 0 ... +10V (-10V ... +10V for bipolar power supplies NLB, not connected for HCB) Ri approx. 10kΩ	
6	OVD	D-GND		Digital ground, current flow allowed			
	ON	DI		HIGH applied = OUTPUT ON			
7	POL-SET	DI	HCP/HCK and others with polarity reversal	For power supplies with optional remotely controllable polarity reversal Not connected = POS Connected to pin 6 (OVD) = NEG HIGH applied = NEG			
	V/I REG	DI	NLB	For power supplies with arbitrary selection of regulation/ limitation mode (Basically NLB series) Not connected = I-REG Connected to pin 6 (OVD) = V-REG HIGH applied = V-REG			
	NC	NC		For all other types of power supplies not connected or free for special functions			
8	V-SET	AI		Voltage set value 0...+10V = 0 ... Vmax. (-10V ... +10V for bipolar power supplies HCB, NLB) Input impedance approx. 10MΩ		Voltage set value by current loop 4...20mA = 0 ... Vmax	Voltage set value 0...+10V = 0 ... Vmax. (-10V ... +10V for bipolar p. s. HCB, NLB) Input impedance approx. 10MΩ
9	0V	A-GND		Analog GND, no current flow allowed		Analog GND	Analog GND, no curr. allowed
10	+10VREF	AO		+10V output reference voltage, max. load 2mA			
11	V-MON	AO		Voltage monitor 0...10V = 0...Vmax Ri approx. 10kΩ	Ri approx. 11kΩ	Voltage monitor 4...20mA = 0...Vmax	Voltage monitor 0...10V = 0...Vmax Ri approx. 100Ω
12	OUTPUT ON	DI		Not connected = OUTPUT OFF, Connected to pin 6 (OVD) = OUTPUT ON			
	24V0	GND		Ground for 24V, current flow allowed			
13	POL-Status	DO	HCP/HCK and others with polarity reversal	For power supplies with optional remotely controllable polarity reversal (Basically HCP / HCK series) NEG polarity = LOW POS polarity = HIGH			
	-10V REF	AO	HCB, NLB	For bipolar power supplies (series HCB, NLB) -10V output reference voltage, max. load 2mA			
	P-LIM	DO	MCA and units with optional power regulation	HIGH, when power supply is in constant power mode "P-LIM" or "CP" (see also LED on front plate.)			
	S-REG	DO	NTN, NLN and others with sense lines	HIGH when power supply is in SENSE limitation (Voltage difference to high or sense lines activated but not connected - see LED S-ERR on front plate.)			
14	NC/24V	NC/INPUT		(RESET input für some kinds of customized power supplies)			+24V external supply from PLC
15	I-SET	AI		Current set value 0...+10V = 0 ... Imax. (-10V ... +10V for bipolar power supplies NLB) Input impedance approx. 10MΩ		Current set value by current loop 4...20mA = 0 ... Imax	Current set value 0...+10V = 0 ... Vmax. (-10V ... +10V for bipolar p. s. HCB, NLB) Input impedance approx. 10MΩ
15	NC	NC	HCB				

Table 1: Pinout of versions of the analog programming interface

### WIRING OPTIONS AND APPLICATION EXAMPLES

#### Output enable/ disable

for standard version:

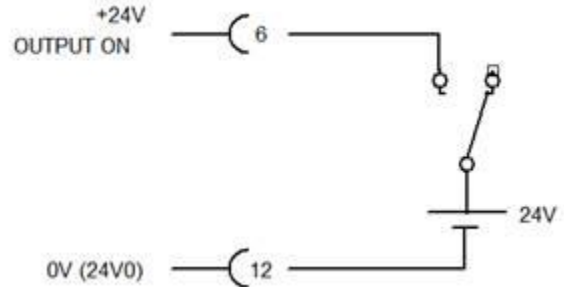


Pic. 1  
 Closed connection between 12 and 6: ON  
 Connection interrupted: OFF

When transistors (Opto-coupler outputs) used watch for polarity as shown.  
 Current capability should be  $\geq 1,5\text{mA}$

**Attention:**  
 Leaving pin 12 unconnected prevents operation of the power supply in remote analog mode!

for PLC version:

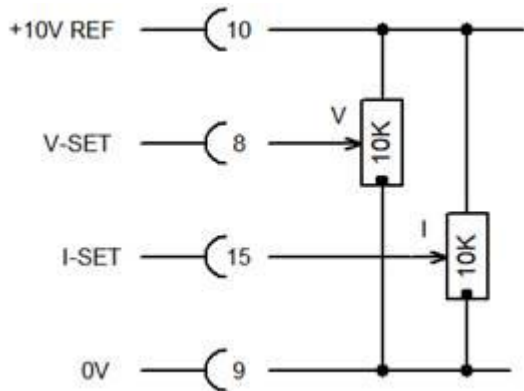


Pic.2  
 +24V on pin 6: ON  
 Pin 6 unconnected: OFF

Current consumption: approx. 2,4mA

**Attention:**  
 Leaving pin 6 unconnected prevents operation of the power supply in remote analog mode!

#### Setting of set values (proposals for standard version):



Pic.3

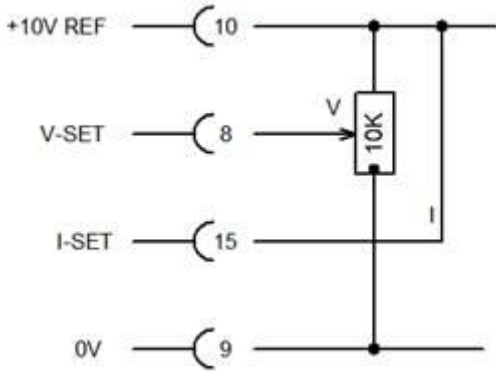
Voltage 0-10V applied to the pins 8 and 15 represents the set value input for the power supply. External potentiometers can be used as source for this adjustable voltage. Any other external voltage source is possible as well.

# DATASHEET

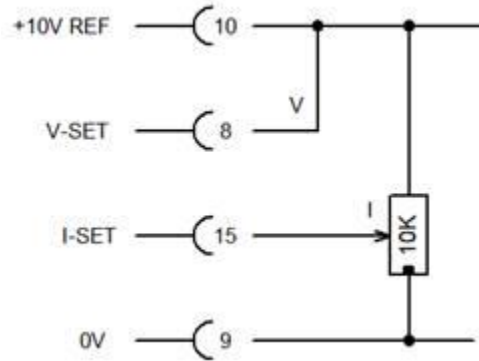
## Analog Programming Interface for FuG power supplies



If only voltage or only current shall be set externally, the respective other value has to be clamped either to maximum (10VREF)

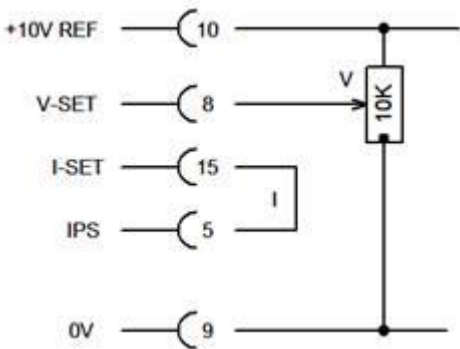


Pic.4

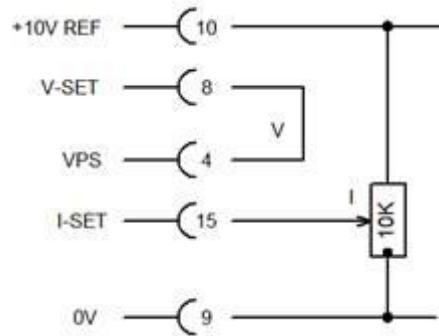


Pic.5

or to the slider of the internal potentiometer:



Pic.6

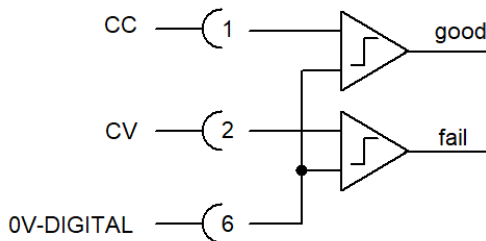


Pic.7

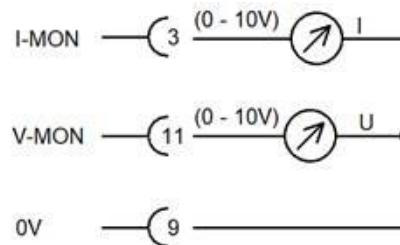
Proposal on pic. 6 and pic. 7 is not applicable for the insulated version of analog programming. Appropriate adjustment of front plate potentiometer is required.

### Reading the outputs:

The output signals (digital signals for regulation mode and analog signals for monitors resp. measured values) are always present and can be used also in internal control mode. The external measurement has to be performed with high input impedance (See values of internal resistance in table1).



Pic.8

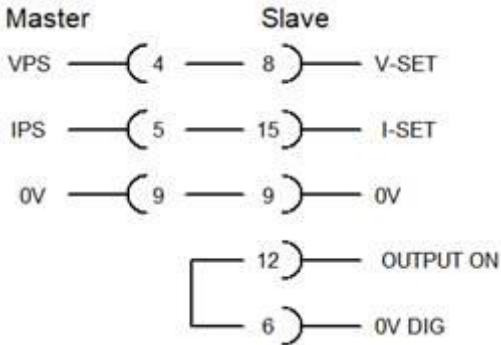


Pic. 9

### Controlling two power supplies with only one control input:

#### Example 1

For two units, which are supposed to be controlled by identical set values. The "Master" unit shall be set to internal control mode, while the "Slave" unit must be set to external analog mode.

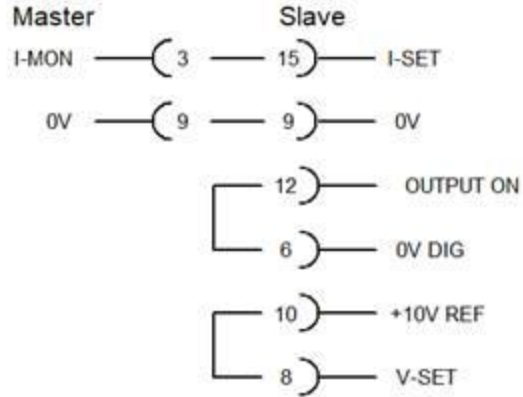


Pic.9

This proposal can be applied e.g. for two units of different polarity to create a symmetrical voltage source.

#### Example 2

For two units, which are switched in parallel and shall share the current equally. The "Master" unit shall be set to internal or external control mode, while the "Slave" unit must be set to external analog mode.



Pic.10

For forcing the "Slave" unit to be in constant current control mode, the voltage set value shall be maximum (clamped to 10V REF)

**Please feel free to contact our sales team for any further questions:**

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