

Application notes for the FuG - Analog Programming

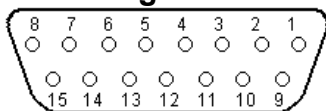
To operate an FuG - unit via the external analog programming, select the operating mode "Remote" and "Analog" by the buttons on the front plate. Herewith, the controls at the front panel are disabled and the unit will be controlled via the 15 pole Sub-D connector at the rear side of the unit.

ATTENTION: The reference point "0V" for all external programming voltages (Pins 6 and 9) usually is connected to the earthy output pole. The programming connector may float up for some 100 V if there is no connection between earthy pole and safety earth. Please note, that the connection cable as well as the following equipment must have the corresponding dielectric strength or make sure that the connection to safety earth is not cut.

On request a floating version of the analog programming option without connection to one of the output poles is available.

Programming Cable: The cable for the analog programming has to be screened. The screen has to be connected to the earth point of the connector. The mounting studs of the programming sockets have to have earth potential. Please do not exceed a cable length of approx 10m.

Pin configuration:



(Solder side of the plug)

Pin	Signal	Input/Output	Description
1)	I-REG	Output	Status report "Current control" Active \triangleq approx. +15V via 10k Ω
2)	V-REG	Output	Status report "Voltage control" Active \triangleq approx. +15V via 10k Ω
3)	I-MON	Output	Monitor output current 0... nominal \triangleq 0..+10V via 10k Ω (always positive, not depending on the output polarity)
4)	VPS	Output	Slider of the front plate potentiometer "Voltage" (not with "floating analog programming")
5)	IPS	Output	Slider of the front plate potentiometer "Current" (not with "floating analog programming")
6)	0V-DIG		Reference for digital signals (digital ground)
7)	POL-SET	Input	Polarity change for units with electronic polarity reversal (Open \triangleq positive; Connection with Pin 6 \triangleq negative)
8)	V-SET	Input	Set value voltage 0..+10V \triangleq 0..nominal
9)	0V		Reference for analog signals (analog ground)
10)	+10VR	Output	Reference voltage +10V (against Pin 9, load max. 2mA)
11)	U-Mon	Output	Monitor output voltage 0... nominal \triangleq 0..+10V. Ri = 10k Ω (always positive, not depending on the output polarity)
12)	UNIT ON	Input	Power supply ON (Connection with Pin 6 \triangleq ON) (Attention! Only Output-Voltage ON/OFF => No mains disconnection! .)
13)	POL-STAT	Output	Status report "Polarity" Positive \triangleq approx. +15V via 10k Ω
14)	n.c.		
15)	I-SET	Input	Set value current 0..+10V \triangleq 0..nominal

ATTENTION!

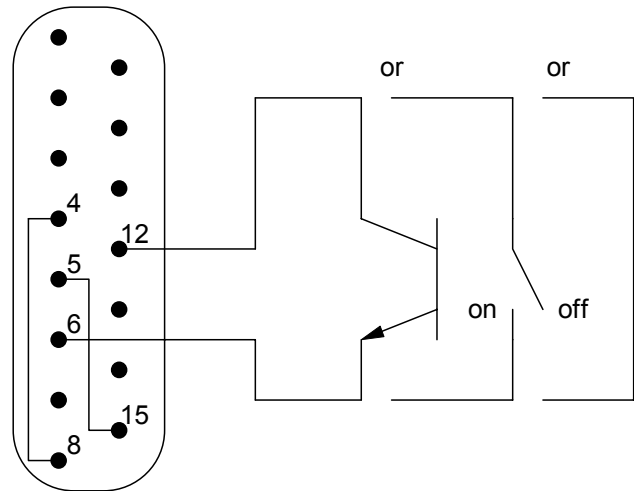
If the unit is switched off or mains fails eventually existing output figures will not be displayed on the monitor terminals.

Programming of an output voltage always requires also the setting of the current control pin to a non-zero value and vice versa. To ensure operation pin 12 ("ON/ OFF") always should be connected pin 6 (0V digital).

Programming examples:

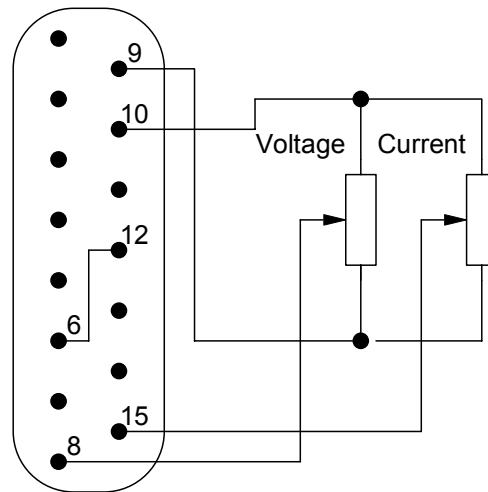
1. Only external ON/ OFF, all other functions internal:

For this wiring switch the programming switch into position "Analog". Connect the pins of the programming connector as shown. Connecting pin 12 with pin 6 by means of a switch, a wire bridge or a transistor (e.g. of an opto coupler) will switch on the unit, disconnecting them, will switch it off.



2. External control of voltage and current, unit always on:

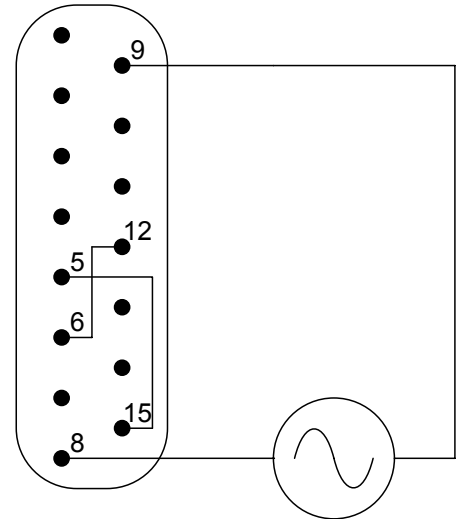
For this wiring switch the programming switch into position "Analog". Connect the pins of the programming connector as shown. Now the front panel potentiometers are out of function and the unit may be controlled with the external (remote) potentiometers. Please don't exceed a maximum cable length of approx. 10m.



Examples 1 and 2 may be combined to switch on and off and control voltage and current remotely all together.

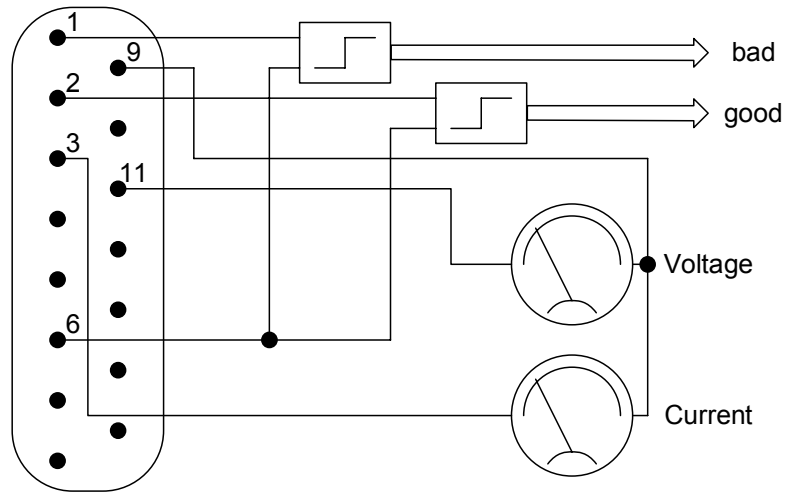
3. Voltage control by an external signal source, unit always on:

For this wiring switch the programming switch into position "Analog". Connect the pins of the programming connector as shown. Now the front panel potentiometer for voltage is out of function, while the current still may be limited by the front plate current potentiometer. The external signal source may be the digital/analog converter card of a computer and shall deliver 0 - 10V. Please pay attention to your unit's programming speed and frequency capabilities.



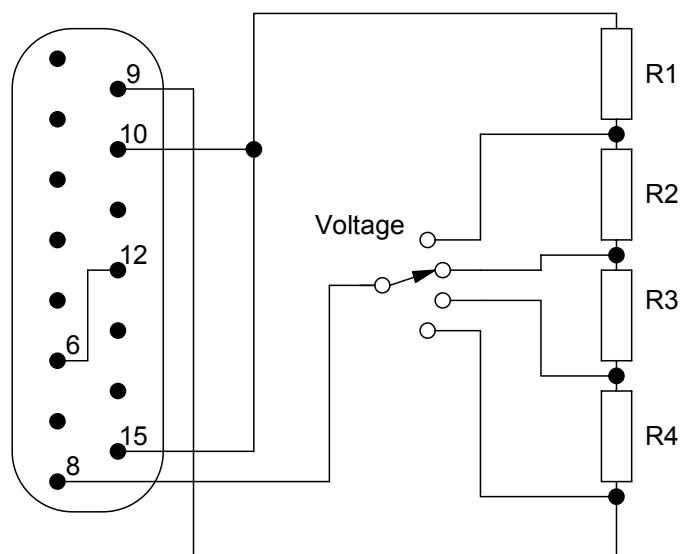
4. Voltage and current monitoring with a "good" / "bad" evaluation:

For this wiring the programming switch can remain in position "Off" or (if equipped) "Digital". In the example the signals for voltage mode and current mode are evaluated with an external electronics (made by the user) to have a simple "good" / "bad" evaluation e.g. for an isolation test. Voltage and current can be monitored by external meters with a measuring range of 0 - 10V. For local operation (programming switch in "Off" position), no bridge between 6 and 12 is necessary.



5. Application of a set of fixed preselected voltages:

For this wiring switch the programming switch into position "Analog". Connect the pins of the programming connector as shown. Selecting appropriate resistors of the voltage divider, you may preselect a set of voltages, which than simply could be selected by a switch. The current in this example is limited to it's maximum value. (Pin 15 connected to 10)

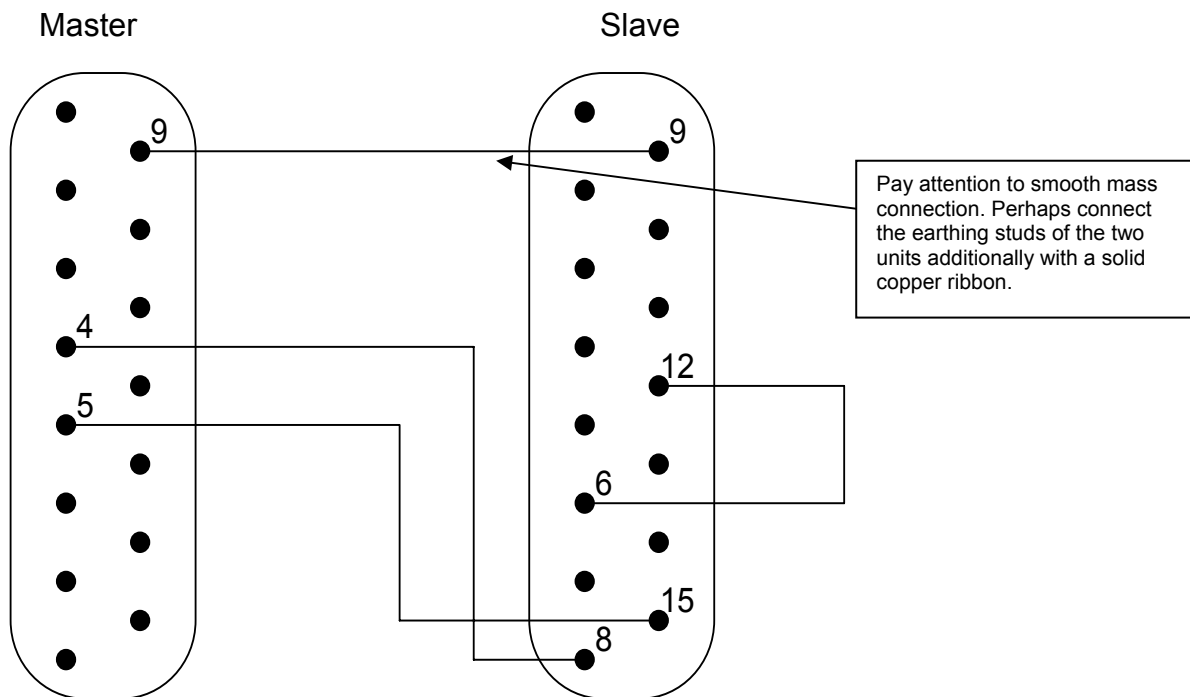


6. Switching parallel two power supplies with analogue programming; Manual control of both power supplies by one set of potentiometers (Manual Master- Slave- Operation):

With this wiring, for example, a symmetrical bipolar source can be built up from a positive and a negative unit. The Programming switch at the master unit must be in position "OFF" and the one at the slave unit in position "ANALOG". The programming sockets of the two units must be connected by a corresponding cable as follows:

Master	Slave
Pin 9 (0V analog)	Pin 9 (0V analog)
Pin 4 (Slider front panel pot. "Voltage")	Pin 8 (Voltage set value)
Pin 5 (Slider front panel pot. "Current")	Pin 15 (Current set value)

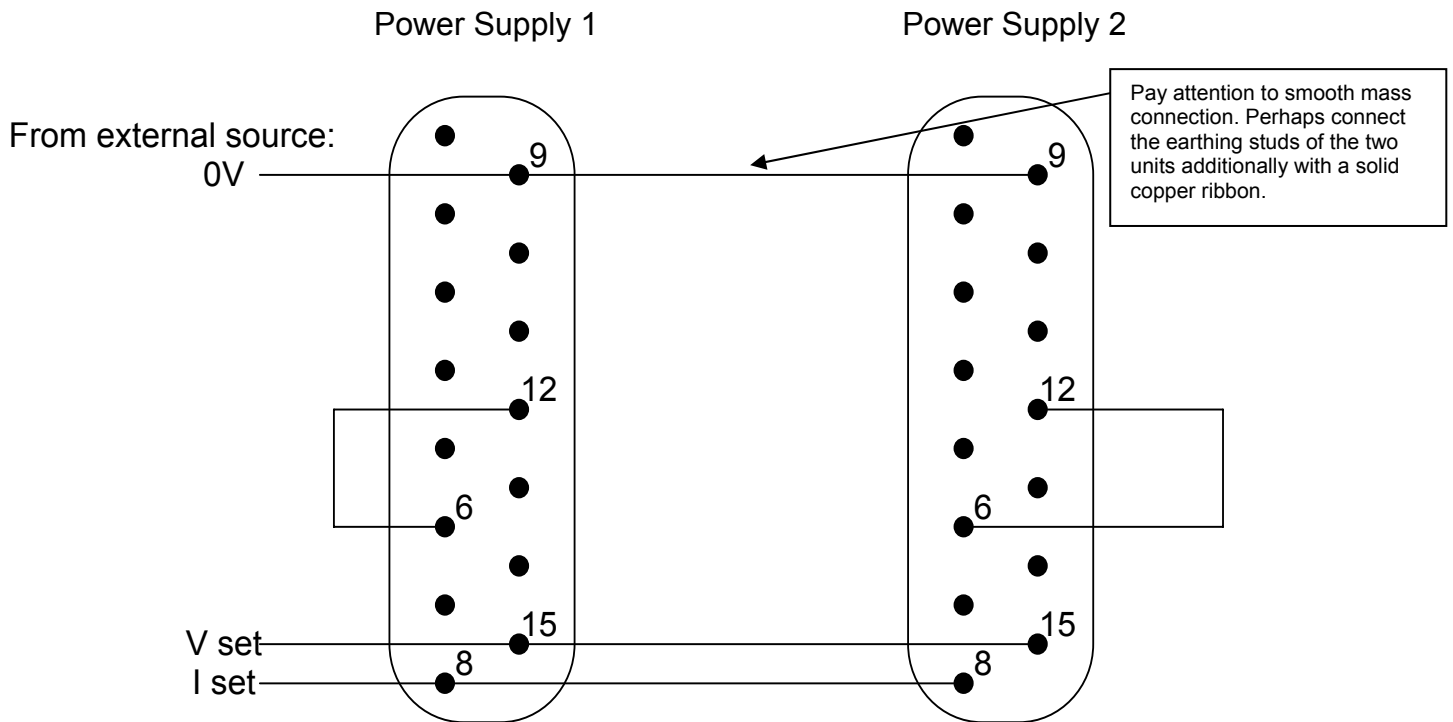
To ensure operation furthermore at the "Slave" unit pin 12 ("ON/ OFF") has to be connected to pin 6 (0V digital).



With this wiring the front plate potentiometers of the „slave“ are out of operation and both units will be controlled by the "masters" potentiometers.

7. Switching parallel two power supplies with analogue programming; Remote control of both power supplies with one set of analogue signals:

With this wiring, for example, a symmetrical bipolar source can be built up from a positive and a negative unit. At both units the programming switches must be in position "ANALOG". To ensure operation at both units pin 12 ("ON/ OFF") has to be connected to pin 6 (0V digital). The external signal source has to be connected parallel to both power supplies as shown below:

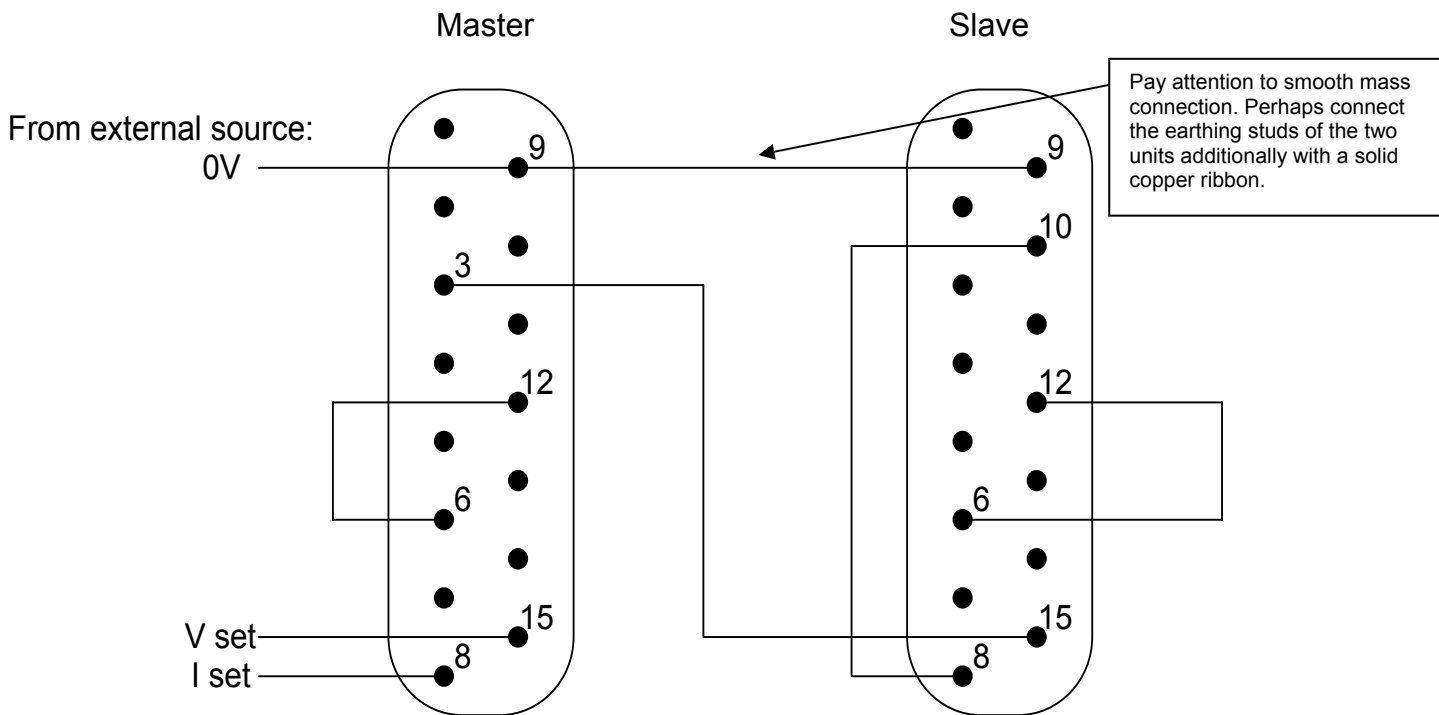


8. Switching parallel two power supplies with analogue programming; Remote control of both power supplies with one set of analogue signals and current sharing (Remote Controlled Master- Slave- Operation):

At both units the programming switches must be in position "ANALOG". To ensure operation at both units pin 12 ("ON/ OFF") has to be connected to pin 6 (0V digital). The external signal source has to be connected to the "Master" unit.

This wiring ensures that both units deliver the same current to the load. **Be careful:** without load the output voltage of the "Slave" unit will be limited only by the maximum value. The programming sockets of the two units must be be connected by a corresponding cable as follows:

Master	Slave
Pin 9 (0V analog)	Pin 9 (0V analog)
	Pin 8 (Voltage set value) connect to pin 10 (+10V ref.)
Pin 3 (Current Monitor)	Pin 15 (Current set value)



To control the master unit by the front plate potentiometers and share the current equally like before, switch the programming switch of the "Master" to "OFF".