Proportional amplifier card E05

- **Amplifier card for 1 or 2 proportional solenoids**
- **Expandable by different modules**
- **Preset value pre-setting with voltage or current**

DESCRIPTION

Proportional amplifier in Eurocard print format. Pin terminal strip in accordance with DIN 41612, type C. The print in its basic function is equipped with one or two solenoid amplifiers. The solenoid current is regulated. Optionally, the function can be expanded by a ramp module and preset value module. On request, the system can be supplemented with modules specific to the customer.

FUNCTION

The amplifier operates with a constant current, dither frequency and- level can be adjusted separately. The output is short-circuit proof. The preset value can be set to all conventional signal forms in an adaptation amplifier, the adaptation is by means of potentiometers and an optical check. For preset values by current, a separate input stage is available.

APPLICATION

The Eurocard controller is principally used in the industrial field. The wide range of supply voltages renders controlled voltage sources superfluous. The print is available as an AC - or DC version.The filtering of the input voltage is effected on the print. External supporting capacitors are not necessary.

CONTENTS

GENERAL SPECIFICATIONS 1

ELECTRICAL SPECIFICATIONS 1-2

BLOCK DIAGRAM 2

DIMENSIONS 2

ADDITIONAL INFORMATION 2

START-UP 3-4

TYPE CODE

E 05 □ □ □ □ 0 # □

- Eurocard
- Designation
- Delivery without front-plate 0 / Delivery with front-plate 1
- Amplifier basic card 0
  Additional with:
  Ramp module 1 / Preset value module 2 / Ramp- and preset value module 3
- 1 solenoid version 1 / 2 solenoid version 2
- Supply voltage: 24 VDC proportional solenoid D2 / 24 VAC proportional solenoid A2
- Preset value input variably adjustable
  0...20 mA or 4...20 mA
  0...+2 VDC to 0...+40 VDC, 0...+/-2 VDC to 0...+/-40 VDC
- Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Execution	Eurocard	Weight	130 gr.
Dimensions	Front plate 30,1x128,4; 6 TE/3 HE Print plate: 160x100 mm	Connections	Plug strip according to DIN 41612, type C
		Working temperature	0..+50°C

ELECTRICAL SPECIFICATIONS

Supply voltage	24 Volt DC or 24 Volt AC		Stabilised output voltage	15 VDC max. load 100 mA	
Voltage fluctuation	AC: (45-60 Hz) +/-10% DC: 22 ... 34 Volt		Solenoid current output	Short circuit proof with negativ surge supression diode	
Ripple on supply voltage	+/-10%		Solenoid current	Min. current I_{min} adjustable	0..400 mA
Fuse	Multifuse 1,8 A cutts off power supply. After 3 min switches on again			Work setting	150 mA
				Max. current I_{max} adjustable	I_{min} ..1200 mA
No load power	1,4 W			Work setting	700 mA
Preset value inputs	0 ... 20 mA or 4 ... 20 mA / burden 200 Ω 0 ... 2 V to 0 ... 40 V adjuststable or +/- 2 V to +/- 40 V adjuststable		Dither	Frequency adjustable	20...180 Hz
				Amplitude adjustable (mesured at test point TP1)	0...6 Vpp
	Input resistance	133 kΩ		Work setting	100 Hz / 3 Vpp
Digital inputs	Low level	< 3 V	Release / $\overline{\text{Block}}$	releases / blocks the function of the amplifier	
	High level	> 12 V	EMV		
	Input resistance	33 kΩ (Pull-up +15 V)	Immunity	EN 61 000-6-2	
			Emission	EN 61 000-6-4	

ELECTRICAL SPECIFICATIONS (continued)

Status indication by LED's

LED green	Supply voltage
LED yellow	Solenoid B
LED red	Preset value overflow

Ramp module

No load power	0,35 W
Ramps	2 ramps up/down separately adjustable with potentiometers
Ramp time	0,25...10 s.

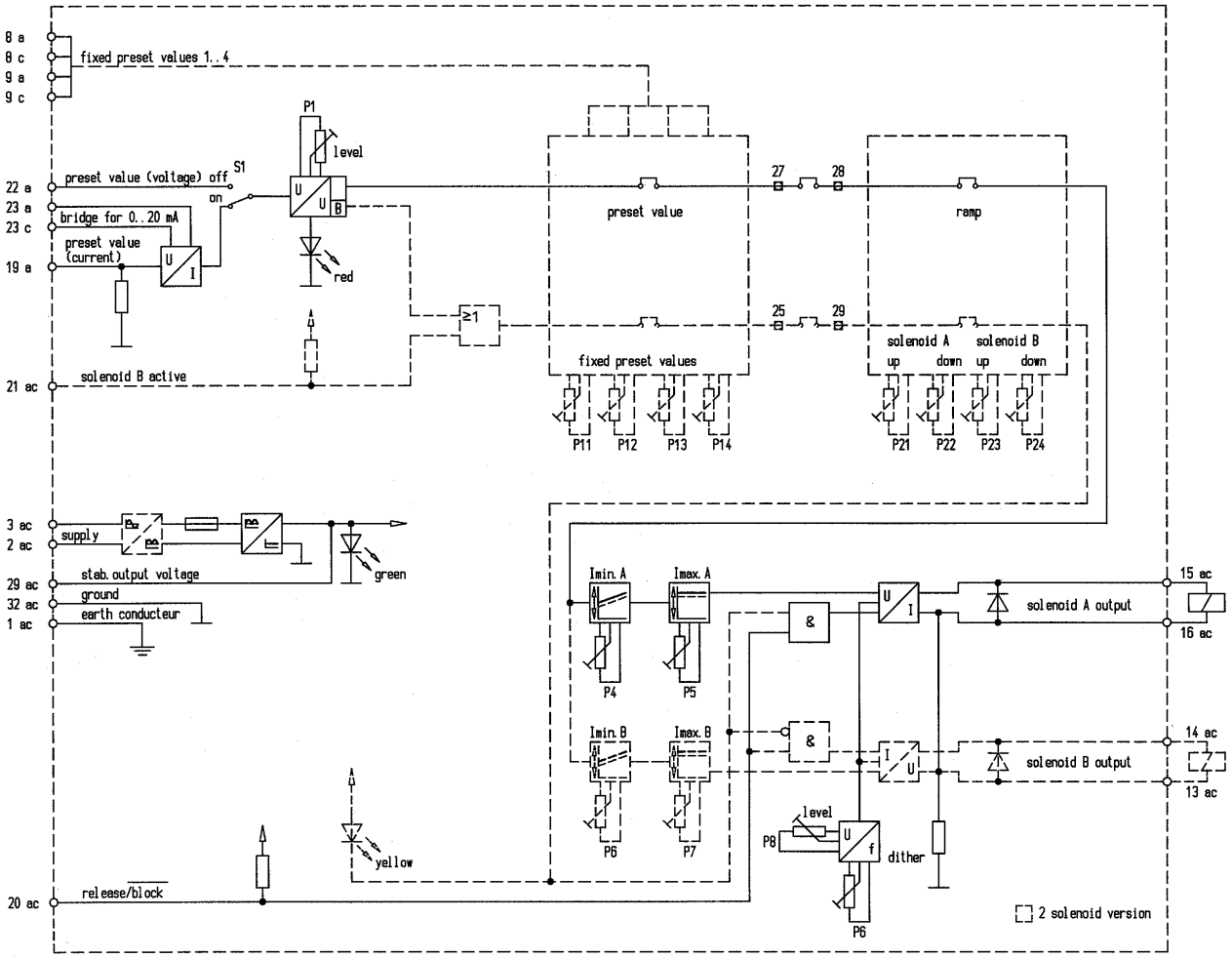
Preset value module

No load power	0,35 W
	4 preset values adjustable by potentiometers, selection by digital inputs (low aktive).

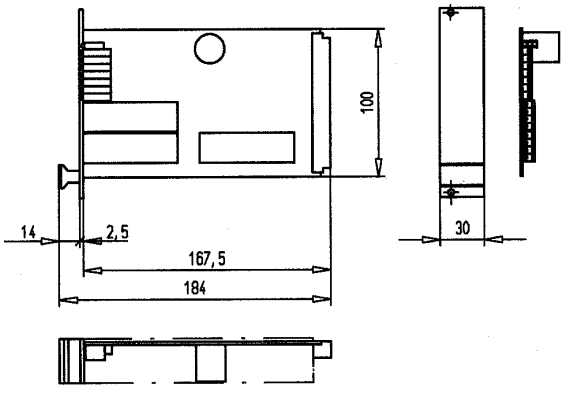
EMC - testing

For EMC testing amplifier E05 was mounted together with a power supply T04 into a 19" rack. Mesurements were made with shielded cables. Fluctuation of solenoid current $I_{Solenoid}$ was ≤ 2 %.

BLOCK DIAGRAM



DIMENSIONS



START-UP

The information required for connection and start-up are included with each proportional amplifier:

Data sheet	1.13-135/3-4

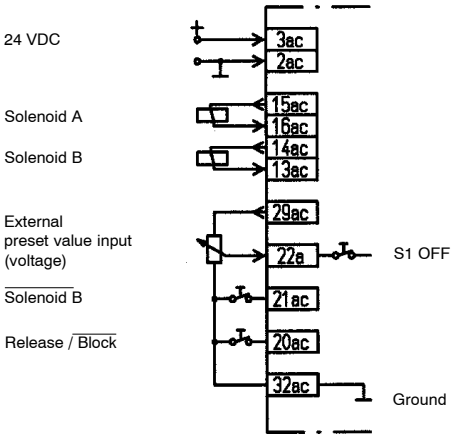
ADDITIONAL INFORMATION

	Wandfluh documentation	
Wandfluh-electronics general	Register	1.13
Accessories	Register	1.13
Proportional directional control valves	Register	1.10
Proportional pressure control valves	Register	2.3
Proportional flow control valves	Register	2.6

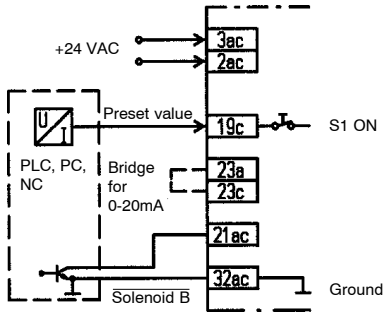
START-UP OF THE PROPORTIONAL AMPLIFIER E05

Examples of connections

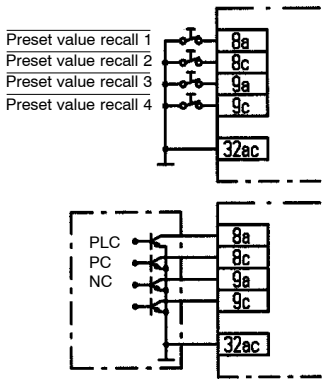
Supply voltage 24 VDC, preset value pre-setting as voltage with potentiometer. Solenoid B change with switch.



Supply voltage 24 VAC, preset value pre-setting with current. Solenoid B change with PLC, PC, NC



Connection of the preset value module with switch or PLC, PC, NC



Instructions for connecting

The screw terminal assignments in the following description refer to the above examples of connections.
..ac means that terminals rows a and c are internally connected.

Supply voltage
AC-Version: Terminals 2ac/3ac
The AC voltage is connected here. On the print the voltage is rectified and smoothened. The admissible voltage tolerances have to be observed.

Supply voltage
DC-Version: Terminals 2ac/3ac
The DC voltage is connected to pin 3ac (+) and 2ac (Ground). The polarity has to be observed, as well as the admissible voltage toleranes. Internally there is a protective diode against wrong polarities.

Stabilized output voltage: Terminals 29ac
On the print a stabilized output voltage of + 15 VDC is generated. Here potentiometers can be connected as external preset value transmitters. The maximum load is 100 mA.

External preset values:
Voltage: Terminal 22a
The voltage preset value is connected to terminals 22a and 32a (Ground). When commissioning, the switch position of S1 has to be observed.

Current: Terminal 19a
The current preset value is connected to terminals 19a and 32a (Ground). When commissioning, the switch position of S1 has to be observed.

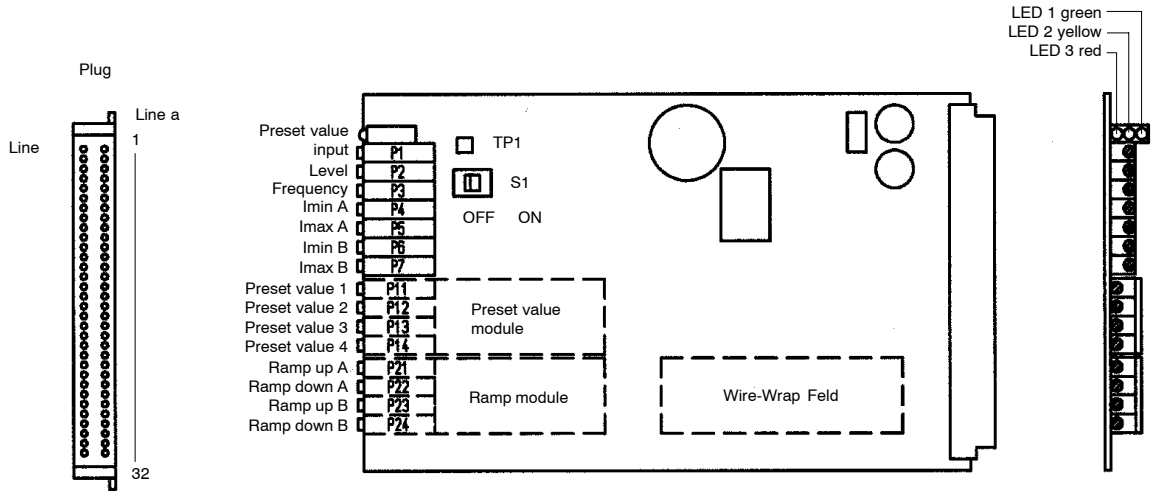
Differing current preset values:
Bridge for 0...20 mA: Terminals 23a, 23c
If a current preset value of 0...20 mA is present, then the terminals 23a and 23c have to be connected. In the case of a signal 4...20 mA, the bridge must not be there.

Solenoid connection: Terminals 15ac, 16ac,
(13ac, 14ac 2-solenoid version)
The proportional solenoids are connected to this terminals, the polarity is unimportant. The maximum load has to be observed

Calling-up preset values: Terminals 8a, 8c, 9a, 9c
The inputs are low-active and are wired to terminals 32ac. The inputs can be selected by switches or PLC, NC or PC.

Release/Block: Terminals 20ac
The input is low-active. With the input open, the control system is enabled, with the contact closed, it is blocked.

Installation instructions



Preliminary settings

Switch S1: The position of switch S1 is dependent on the type of preset value setting. If the preset value is available as a voltage (terminal 22a), then S1 must be switched to OFF. In case of a current preset value (terminal 19a), the switch must be switched to ON.

Sequence of settings

Adaptation of the preset value (voltage)

First block the control system with the input release/block. Then set the maximum possible preset value. The red LED 3 indicates the status of the adaptation amplifier. If the LED 3 already is lit, then a preset value overflow is present. In this case, turn P1 to the left, until the LED 3 extinguishes. If the LED 3 is not yet lit, then P1 has to be turned to the right, until the LED 3 lights up, and then to the left, until it extinguishes again. With this, the preset value has been adapted.

Adaptation of the preset value (current)

The preset value is input at terminal 19a and converted into a proportional voltage in a I/U converter. Through S1, the voltage is then brought to the adaptation amplifier. S1 in position ON!
Thereafter the setting is effected as described above.

Setting the minimum solenoid current solenoid A I_{min} A

Release the control system at the input release/block (input 20ac open) and select solenoid A (input 21ac open). If one is working with positive and negative preset values, then the preset value 0% has to be set in such a way, that red LED 3 is just not lit yet (solenoid A is selected),then adjust required minimum solenoid current with P4.

Setting the maximum solenoid current solenoid A I_{max} A

Pre-set a preset value of 100% at the preset value input. In the case of positive and negative preset values plus 100%, LED 3 must not be lit. Set the required maximum solenoid current with the potentiometer P5.

Setting the minimum solenoid current solenoid B I_{min} B
(2-solenoid version only)

Release the amplifier at the input release/block (input 20ac open) and select solenoid B (input 21ac to mass). If one is working with positive and negative preset values, then the preset value 0% has to be set in such a way, that the yellow LED 2 just lights up (solenoid B is selected). Subsequently set the required minimum solenoid current with P6.

Setting the maximum solenoid current solenoid B I_{max} B

Set preset value 100% at the preset value input. In the case of positive and negative preset values minus 100%. LED 2 must be lit. Set the required maximum solenoid current with the potentiometer P7.

Setting the dither: Frequency and level

The rectangular dither signal is set at the factory to 100 Hz / 3 VDC of the nominal current. If the consumer should not react sufficiently sensitive to small changes to the preset value, then by means of turning the potentiometers P2 (level) and P3 (frequency) the dither signal can be changed, until the required sensitivity is obtained. Generally a slight change of the freqency is sufficient.
On TP1 the dithersignal may be controlled with an oscilloscope.
Turning the potentiometers to the right: Frequency and level increase.
Turning the potentiometers to the left: Frequency and level decrease.

Adjusting the ramps (optional)

The linear ramps can be adjusted separately for up and down with two (four with 2-solenoid version) potentiometers.
P 21: Ramp up solenoid A
P 22: Ramp down solenoid A
P 23: Ramp up solenoid B
P 24: Ramp down solenoid B
Turning the potentiometers to the left: Short ramp time
Turning the potentiometers to the right: Long ramp time

Setting the preset values (optional)

Four preset values are available. For setting them, the desired preset-value has to be selected through one of the inputs 8a, 8c, 9a or 9c. Subsequently the preset value can be set by the potentiometers P11 - P14 within the range of 0 - 100 %.
Preset value 1: P11, input 8a
Preset value 2: P12, input 8c
Preset value 3: P13, input 9a
Preset value 4: P14, input 9c

Setting 1-solenoid version:

Lefthand potentiometer stop: 0%
Righthand potentiometer stop: 100%

Setting 2-solenoid version:

Potentiometer middle position: 0%
Righthand potentiometer stop: 100% solenoid A
Lefthand potentiometer stop: 100% solenoid B

Priority of the preset values:

Highest priority: Preset value 4
Lowest priority: Preset value 1
If no preset value has been selected, then the external preset value is selected automatically.