# Proportional Amplifier

ESSK 103

- robust analogue technology
- short-circuit protected
- reference voltage for control signal generator

## 1 Description

### 1.1 General

The ESSK 103 proportional amplifier is used to control the solenoid of a hydraulic valve. The current compensation feature ensures that changes in the coil temperature or fluctuations in the supply voltage do not affect the coil current level. To provide for a trouble free hydraulic function, an optimum level of dither signal is superimposed on the coil current.
The proportional amplifier requires a smoothed DC power supply in the range 12...30 V. The amplifier has an input for a voltage control signal. The control signal terminal has a high input impedance and - for safety reasons - the control signal source should always remain connected. An on-board voltage regulator generates a stabilised DC reference voltage. This can be used, among other purposes, to power the control signal source. The stabilised voltage and amplifier ground are both available at the card's edge connector. The current at the power output varies linearly with the voltage at the control signal input. With the aid of two trimming potentiometers, both minimum and maximum current values can be set. The adjustment range of the minimum current setting is influenced by the resistance of the control signal potentiometer.The amplifier switches off automatically for the duration of any short circuit at the load terminals. Within the amplifier, a quenching diode is connected in pa-rallel with the power output. This protects the output stage against switch-off spikes. It is therefore possible to use a standard connector plug at the solenoid. To avoid operational problems, the nominal voltage of the solenoid coil should be matched to the amplifier's power supply voltage.

### 1.2 Models

The card can be ordered with a 31-pin edge connector to DIN 41617 or with screw terminals. For applications in high air humidity, or in equipment with high vibration levels, a fully encapsulated version is available.

### 1.3 Application example

- Agricultural engineering
- Municipal equipment
- Forestry machines
- Construction equipment

## 2 Technical data

| General characteristics | | Description, value, unit |
|---|---|---|
| Power supply | V DC | 12 V...30 V DC, smoothed. Ripple < 10% |
| Reference voltage | V DC | 5 V (is available for external use) |
| max. output from reference voltage | mA | 10 mA |
| Demand signal voltage | V | 0...5 |
| Minimum current (adjustable) | A | (0...0,5) x $I_{max}$ (with 2,2 kΩ control signal pot.) |
| Maximum current (adjustable) | A | (0...0,68) x $I_{max}$ (with 1 kΩ control signal pot.) |
| Max. permissible output current ($I_{max}$) | A | 0,5 ...2,5 |

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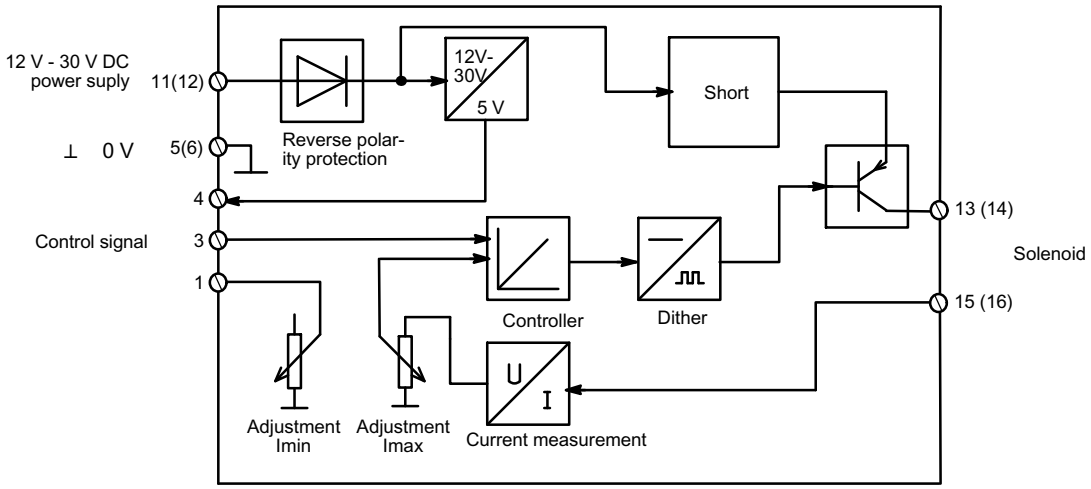
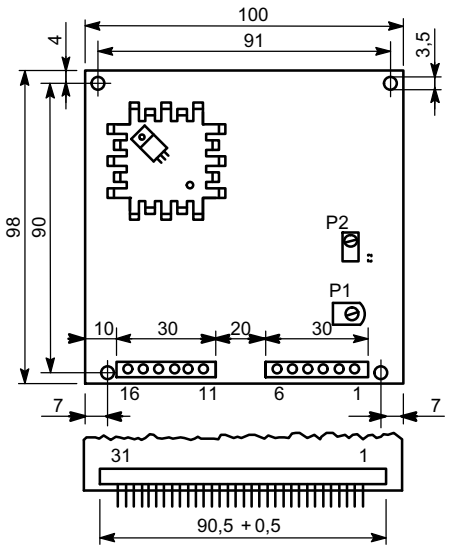
| General characteristics | | Description, value, unit |
|---|---|---|
| Dither frequency | Hz | factory set at 40 Hz (square wave from)<br>(if required, can alternatively be set at 120 Hz |
| Enclosure protection | | IP 00 (non-encapsulated, without housing) |
| Operating temperature | °C | - 20 °C ... + 50°C |
| Notable features | | - the power supply input is reverse-polarity protected<br>- the amplifier switches off automatically for the duration of excessive coil current (coil short circuit) |
| Dimensions | mmm | approx. 100 x 98 x 20 mm |
| Mass | g | approx. 80g non-encapsulated, 180 g encapsulated |
| Connections | | options: connector DIN 41617-S31M or screw terminals |
| Cable length and section | | for 1 $mm^2$ section wire, max. cable length is 10 metres |

## 3 Block diagram




## 4 Function and dimension



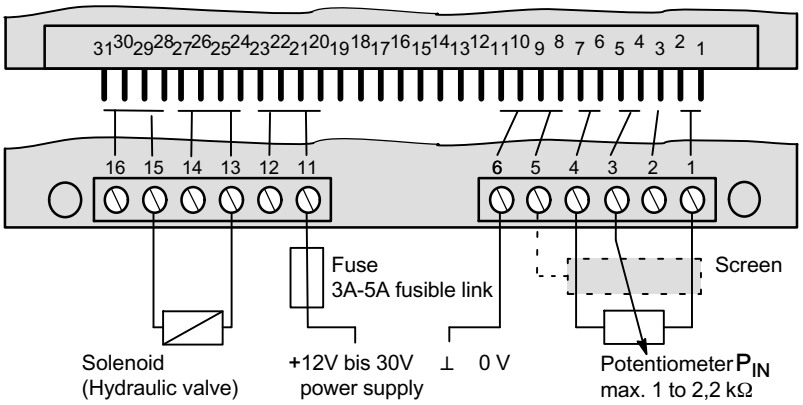

Dimensions of the card with screw terminals or with edge connector

Trim Potentiometer, max. 20 turns

\+ -

P2 = maximum current ($I_{max}$)
P1 = minimum current ($I_{min}$)

# 5 Connection diagram



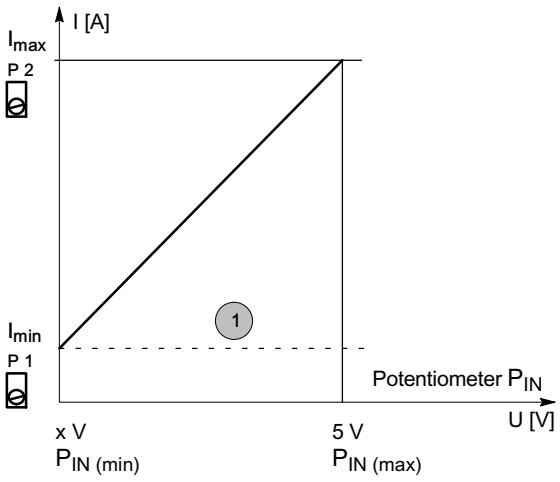

NOTE:
When the pin connector is used, the power supply and the solenoid loads must be connected using both pins.

NOTE:
Use screened cable for all demand-signal lines. The screen must be bonded to the power-supply negative.

# 6 Initial start-up

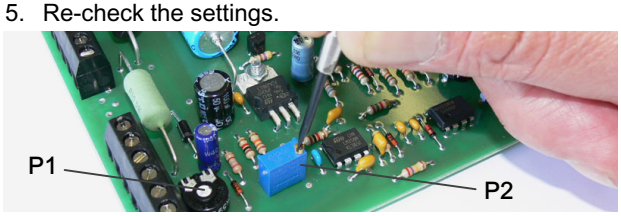
NOTE:
Connect the card in accordance with the connection diagram, using only with trim potentiometer.

# 7 Setup procedure




| | |
|---|---|
| 1 | Hydraulic opening range |

1. Set the potentiometer $P_{IN}$ to maximum.
2. Using trim potentiometer P2, and while increasing the signal, set the required maximum current ($I_{max}$) (the coil current must not exceed 2.5 A).
3. Set the potentiometer $P_{IN}$ to minimum.
4. Using trim potentiometer P1, and while decreasing the signal, set the required minimum current ($I_{min}$).
5. Re-check the settings.




The trim potentiometers that are sealed with colour spots are preset in the factory.

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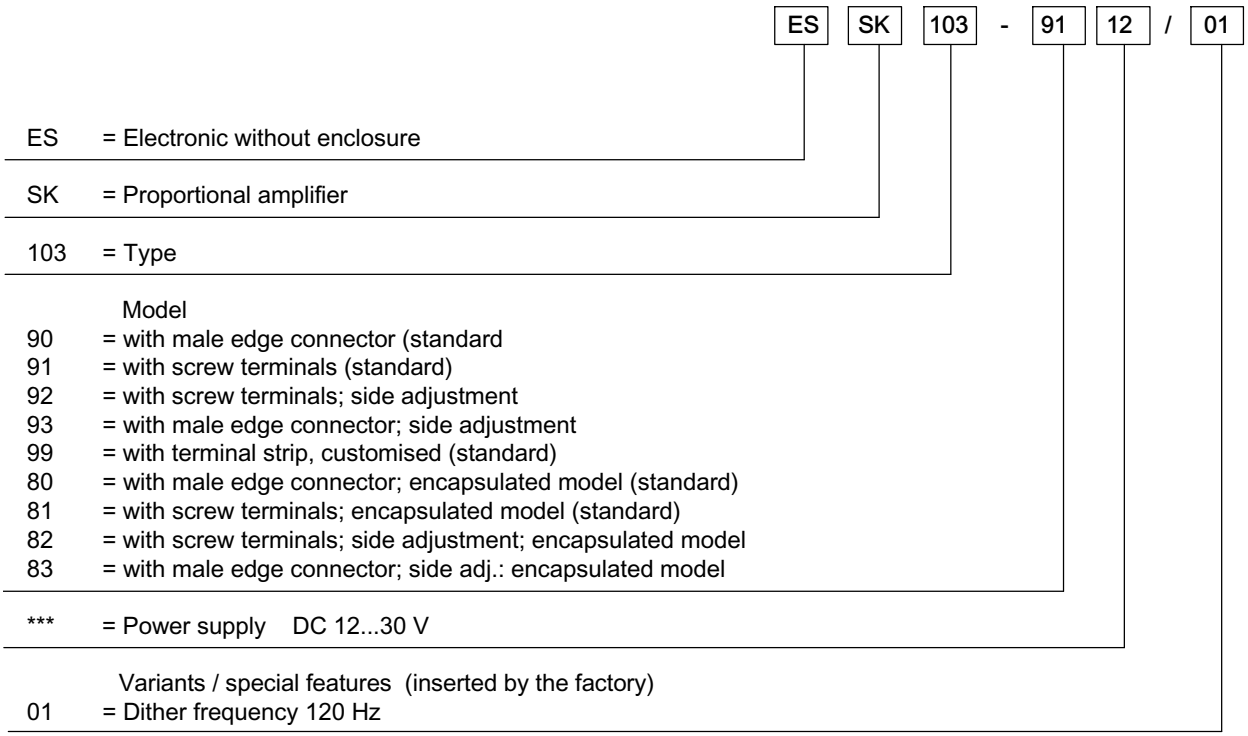
# 8 Ordering code



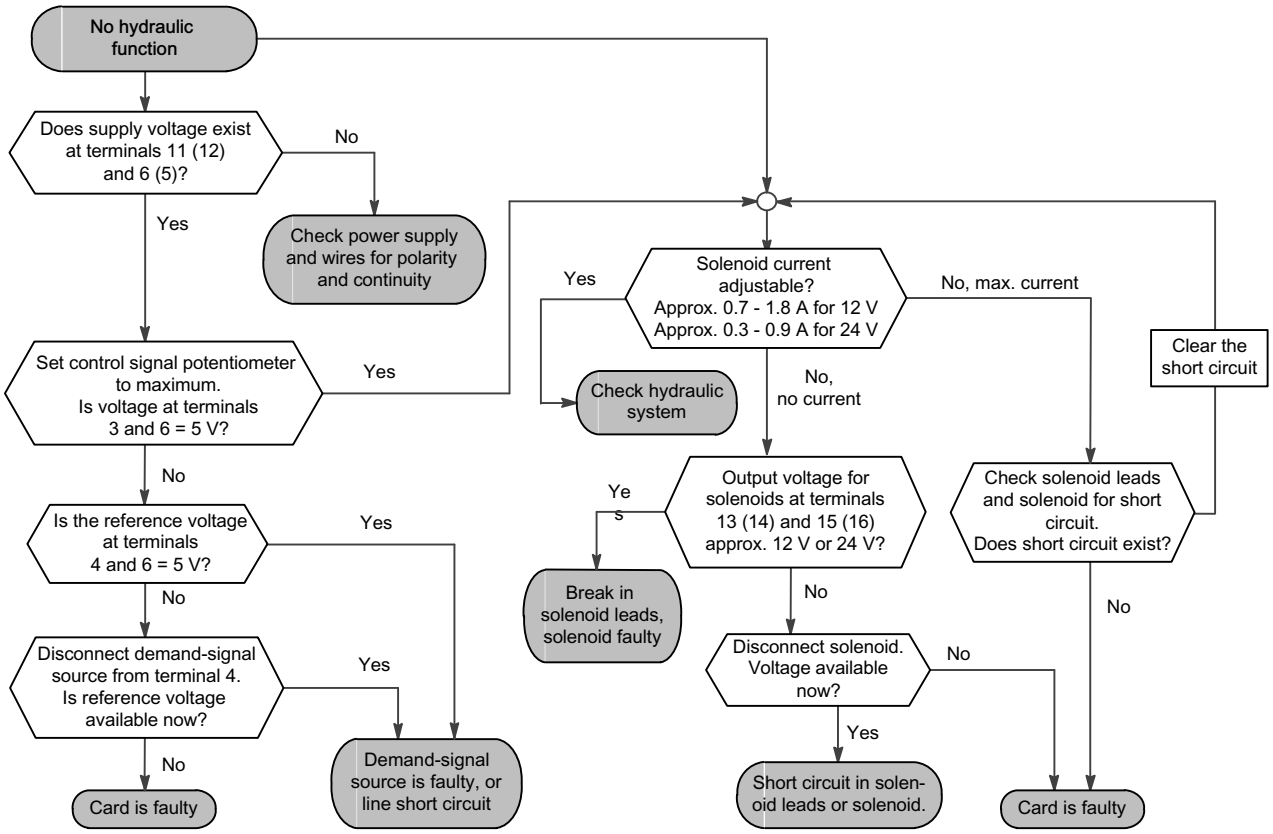

# 9 Accessories

To house the amplifier, Bucher can provide an enclosure that accepts two PG9 cable glands. An ON/OFF switch for the amplifier is also available. To generate demand signals, a potentiometer can be supplied.

As an alternative to the enclosure, a suitable card holder (for model ESSK 103-90 only) can be supplied, as can an appropriate snap-in retaining foot. Connector plugs, type GDM 309, can be used to connect to the solenoids. In the event of proportional valve malfunctions that are caused by long power leads, use connector plugs type GDM 209D.

| Description | Order. no.: |
|---|---|
| Potentiometer 1 kΩ | 100214662 |
| Potentiometer 2,2 kΩ | 100214663 |
| Potentiometer scale knob | 100604397 |
| ON/OFF switch | 100606576 |
| Cable glandPG 9 | 100601550 |
| Retaining nut PG 9 | 100601554 |
| Plastic enclosure (110 x 188 x 60 mm) | 100214819 |
| Card holder | 100606201 |
| Snap-in retaining foot | 100606202 |
| Female connector, DIN 41617, with solder terminals | 100604304 |
| Connector plug GDM 309 | 100064970 |
| Connector plug GDM 209D | 100014130 |

# 10 Fault Finding

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