

Controller

ESSK 103 and ELSK 103



- solid state electronics
- infinitely metering
- ergonomic design
- robust enclosure

1 Proportional amplifier module ESK 103

1.1 Description

The ESK 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.

The proportional 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. 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 amplifier switches off automatically for the duration of any short circuit at the load terminals.

Within the amplifier, a quenching diode is connected in parallel with the power output.

The ESK 103 is available in the following enclosures with numerous additional features.

1.2 Application examples

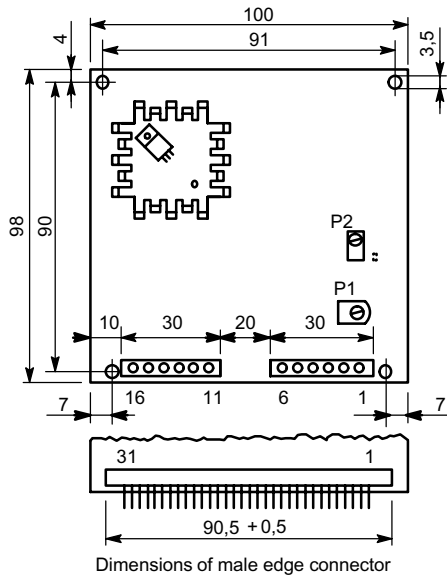
- Agricultural and forestry equipment
 - Fertiliser spreader
 - Dung spreader
 - Fodder mix and cast wagon
- Construction equipment
 - Road rollers
 - Ground drilling rigs
- Municipal equipment
 - Snow and ice cleaning equipment
 - Sweeper
- General
 - Speed and pressure control
 - Materials handling
 - Belt and spinner drive
 - Scraper floor drive

1.3 Technical data

General characteristics	Unit	Description, value
Power supply (U_b)	V	12 - 30 V DC, smoothed. Ripple < 10%
Reference voltage	V	4,7 - 5,1
Max. output from reference voltage	mA	10
Demand signal voltage	V	0 - 5
Minimum current (adjustable)	A	$(0 - 0,5) \times I_{max}$ (with 2,2 k Ω control signal potentiometer)
Maximum current (adjustable)	A	$(0 - 0,68) \times I_{max}$ (with 1 k Ω control signal potentiometer)
Maximum permissible output current	A	0,5 - 2,5

General characteristics	Unit	Description, value
Dither frequency	Hz	Factory set at 40 Hz (square wave form); (if required, can alternatively be set at 120 Hz)
Enclosure protection		IP00 (non-encapsulated, without housing)
Operating temperature	°C	-20°C - +50°C
Notable features		- The power supply input is reverse-polarity protected - The amplifier switches off automatically for the duration of excessive coil current (coil short circuit)
Dimensions	mm	approx. 100 x 98 x 20
Weight	g	approx. 80g non-encapsulated, 180g encapsulated
connection		Options: connector DIN 41617-S31M or screw terminals
Cable length and section		For 1 mm ² section wire, max. cable length is 10 metres

1.4 Dimensions and connection diagram



1.4.1 Trim potentiometer

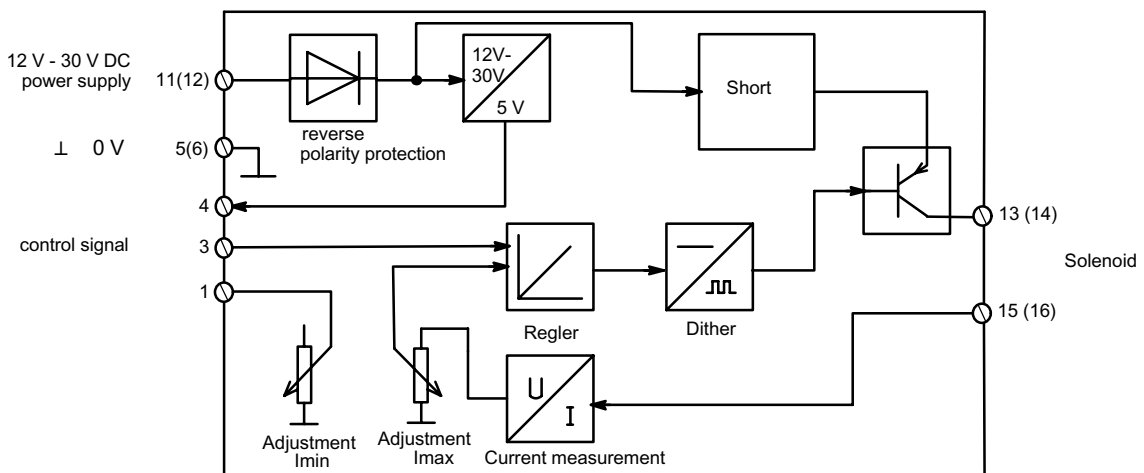
Trimming potentiometer, max. 20 turns

↻ + - ↻

P2 = Maximum current (I_{max})

P1 = Minimum current (I_{min})

1.5 Block diagram



1.6 Ordering code

		E	S	S	K	1	0	3	-	9	1	*	*	*	/	
Electronic product																
Push-in card	=	S														
Proportional amplifier	=	SK														
Type																
Model																
	with male edge connector (standard)	=	90													
	with screw terminals (standard)	=	91													
	with screw terminals; side adjustment	=	92													
	with male edge connector; side adjustment	=	93													
	with terminal strip, customized (standard)	=	99													
	with male edge connector; encapsulated model (standard)	=	80													
	with screw terminals; encapsulated model (standard)	=	81													
	with screw terminals; side adjustment; encapsulated model	=	82													
	with male edge connector; side adj.: encapsulated model	=	83													
Power supply	12 - 30 V DC	=	***													
Variants / special features (inserted by the factory)																
	Dither frequency of 120 Hz	=	01													

1.6.1 Accessories






To house the amplifier, Bucher Hydraulics GmbH 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 ESK 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	100607681
Cable gland PG 9	100601551
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

1.6.2 Applicable document

Document	Purpose
Technical data sheet ESK 103 100-P-700004	Technical documentation with all relevant descriptions, data characteristic lines and measurements.

2 What is possible?

<p>ELSK 103 compact amplifier</p> 	<p>Description</p> <p>Makrolon® enclosure with front panel, demand-signal potentiometer with indicator knob On/Off switch, green status LED</p> <p>see chapter 3</p>
<p>ELSK 103-13*** compact amplifier</p> 	<p>Description</p> <p>Makrolon® enclosure with front panel, demand-signal potentiometer with indicator knob, 2 switches (detending/nondetending) (forward/backward), On/Off switch, 6-pin solder socket insert Sta 6F, green status LED,</p> <p>see chapter 4</p>
<p>ELSK 103-16*** compact amplifier</p> 	<p>Description</p> <p>Makrolon® enclosure with front panel, demand-signal potentiometer with indicator knob, On/Off switch, switch 100% / 50 % demand signal, switches (detending/nondetending) (forward/backward), 6-pin solder socket insert Sta 6F, green status LED,</p> <p>see chapter 5</p>
<p>ELSK 103-17*** compact amplifier</p> 	<p>Description</p> <p>Makrolon® enclosure with front panel, demand-signal potentiometer with indicator knob, On/Off switch, switch 100% / 50 % demand signal, 6-pin solder socket insert Sta 6F green status LED,</p> <p>see chapter 6</p>
<p>ELSK 103-18***</p> 	<p>Description</p> <p>Makrolon® enclosure with front panel, demand-signal potentiometer with indicator knob, switches (detending/detending) (forward/backward) On/off switch, 6-pin solder socket insert Sta 6F green status LED,</p> <p>siehe chapter 7</p>

3 Controller ELSK 103-*****



3.1 Description

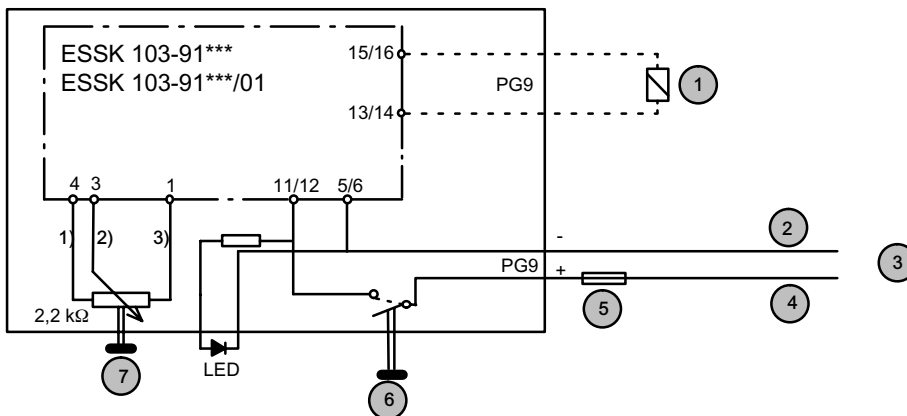
The ELSK 103-***** unit is used to control a proportional solenoid. It consists of the ESK 103-91*** card, fitted in a plastic enclosure. The enclosure is provided with a front plate with an On/Off switch, a green LED and a demand signal potentiometer with indicator knob.

The output current varies linearly with the angle of rotation of the demand signal potentiometer. The green LED lights as soon as the unit is switched on.

3.2 Technical data

General characteristics	Unit	Description, value
Dimensions	mm	160 x 120 x 55 (L x B x H)
Protection class		IP41

3.3 Connection diagram



1	Solenoid	5	3 A - 5 A fast-acting fuse (not supplied)
2	black 2 (-)	6	On/Off switch
3	Power supply 12 V ... 30 V / cable 1x1mm ² ; two metres long	7	Potentiometer
4	black 1 (+)		

3.4 Ordering code

Description	Type	Ordering code
Controller	ELSK103-*****	100015402
Accessories see chapter 8		



3.4.1 Applicable document

Document	Purpose
Technical data sheet ELSK 103 100-P-700006	Technical documentation with all relevant descriptions, data characteristic lines and measurements.

4 Controller ELSK 103-13***



4.1 Description

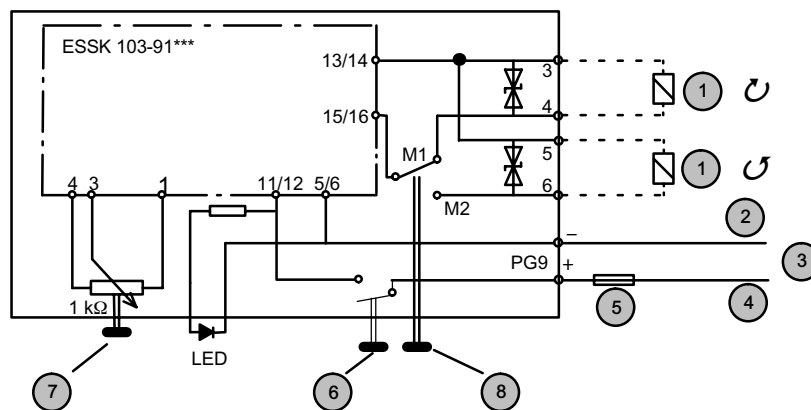
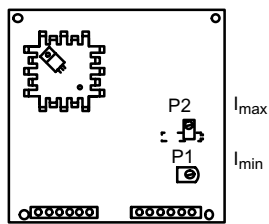
The ELSK103-13*** unit is used to control one or other of two proportional solenoids. It consists of the ESK 103-91*** card, fitted in a plastic enclosure. The enclosure is provided with a front panel with a three position switch, a green LED and control signal potentiometer with indicator knob. With the On/Off switch in the neutral position, there is no power supply to the amplifier. In the two working positions   the respective power output is active. The output current varies linearly with the angle of rotation of the control signal potentiometer. The green LED lights when the switch is in either of the two working positions.

4.2 Technical data

General characteristics	Unit	Description, value
Dimensions	mm	160 x 120 x 55
Protection class		IP41

4.3 Connection diagram

Location of potentiometer P1 and P2 on the card



1	Solenoid	5	3 A ... 5 A fast-acting fuse (not supplied)
2	black 2 (-)	6	On/Off switch
3	Power supply 12 V ... 30 V / cable 2 x 1 mm ² ; two metres long	7	Potentiometer
4	black 1 (+)	8	Switch M1=continuous function M2=momentary function

4.4 Ordering code

Description	Type	Ordering code
Controller	ELSK 103-13***	100018265
Accessories see chapter 8		

4.4.1 Applicable document



Document	Purpose
Technical data sheet ELSK 103-13*** 100-P-700014	Technical documentation with all relevant descriptions, data characteristic lines and measurements.

5 Controller ELSK 103-16***



5.1 Description

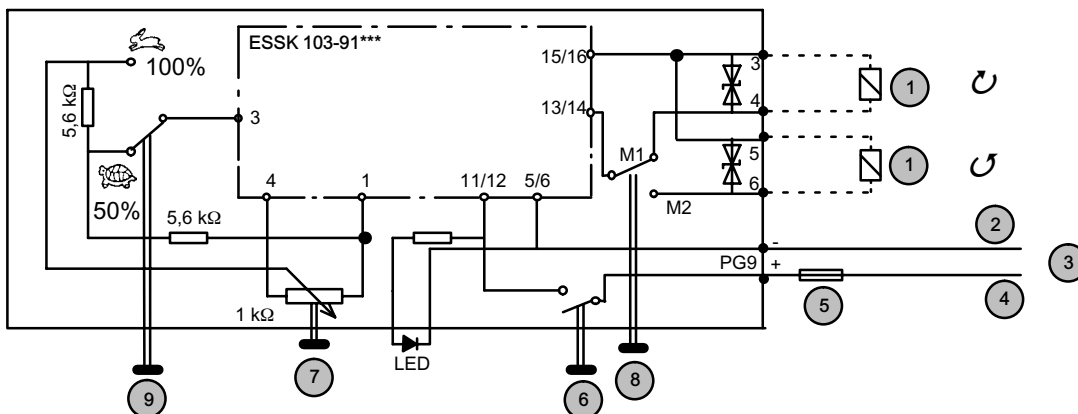
The ELSK 103-16*** unit is used to control one or other of two proportional solenoids. It consists of the ESSK 103-91*** card, fitted in a plastic enclosure. The enclosure is provided with a front panel with an On/Off switch, a green status LED, a switch (Hare 0-100%, Tortoise 0-50%), and a demand-signal potentiometer with indicator knob.

In each of the two working positions  , the corresponding output is energised. The output current varies linearly with the angle of rotation of the demand-signal potentiometer. The green LED lights as soon as the unit is switched on.

5.2 Technical data

Electrical characteristics	Unit	Description, value
Dimensions	mm	160 x 120 x 55
Protection class		IP41

5.3 Connection diagram



1	Solenoid	6	On/Off switch
2	black 2 (-)	7	Potentiometer
3	Power supply 12 V ... 30 V / cable 2x1mm ² ; two metres long	8	Switch M1 normal function M2 actuated function
4	black 1 (+)	9	Switch (Hare 0-100% - Tortoise 0-50%)
5	3 A ... 5 A fast-acting fuse (not supplied)		

Description	Type	Ordering code
Controller	ELSK 103-16***	100023613
Accessories see chapter 8		

5.3.1 Applicable document

Document	Purpose
Technical data sheet ELSK 103-16*** 100-P-700050	Technical documentation with all relevant descriptions, data characteristic lines and measurements.

6 Controller ELSK 103-17***



6.1 Description

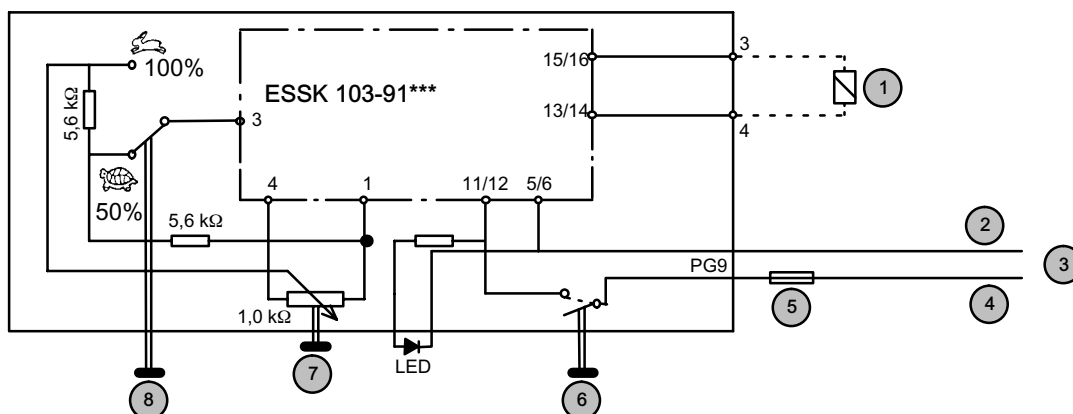
The ELSK 103-17*** is used to control a proportional solenoid. It consists of the ESSK 103-91*** card, fitted in a plastic enclosure. The enclosure is provided with a front panel with an On/Off switch, a green status LED, a switch (Hare 0-100%, Tortoise 0-50%), and a demand-signal potentiometer with indicator knob.

The output current varies linearly with the angle of rotation of the demand-signal potentiometer. The green LED lights as soon as the unit is switched on.

6.2 Technical data

Electrical characteristics	Unit	Description, value
Dimensions	mm	160 x 120 x 55
Protection class		IP41

6.3 Connection diagram



1	Solenoid	5	3 A ... 5 A fast-acting fuse (not supplied)
2	black 2 (-)	6	On/Off switch
3	Power supply 12 V ... 30 V / cable 2x1mm ² ; two metres long	7	Potentiometer
4	black 1 (+)	8	Switch (Hare 0-100% - Tortoise 0-50%)

6.4 Ordering code

Description	Type	Ordering code
Controller	ELSK 103-17***	100024935
Accessories see chapter 8		

6.4.1 Applicable document



Document	Purpose
Technical data sheet ELSK 103-17*** 100-P-700048	Technical documentation with all relevant descriptions, data characteristic lines and measurements.

7 Controller ELSK 103-18***



7.1 Description

The ELSK103-18*** units are used to control one or other of two proportional solenoids. It consists of the ESK 103-91*** card, fitted in a plastic enclosing. The enclosing is provided with a front plate with a three-position switch, a green LED and control signal potentiometer with indicator knob. With the On/Off switch in the neutral position, there is no power supply to the amplifier.

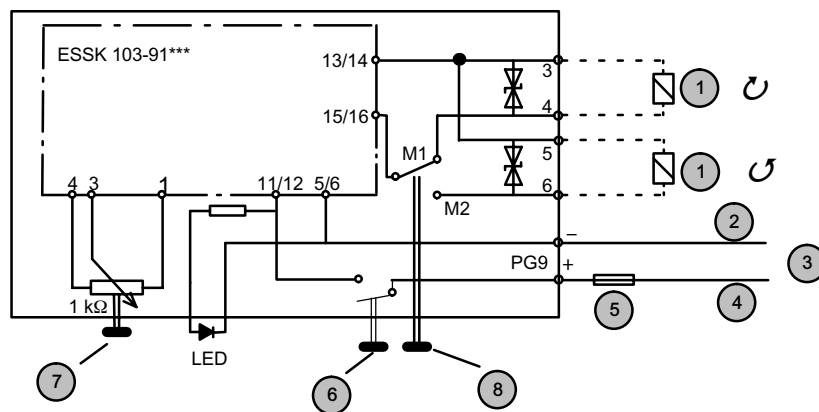
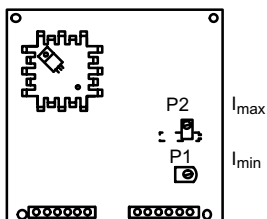
In the two working positions  , the respective power output is active. The output current varies linearly with the angle of rotation of the control signal potentiometer. The green LED lights when the switch is in either of the two working positions.

7.2 Technical data

General characteristics	Unit	Description, value
Dimensions	mm	160 x 120 x 55
Protection class		IP41

7.3 Connection diagram

Location of potentiometer P1 and P2 on the card



1	Solenoid	5	3 A - 5 A fast-acting fuse (not supplied)
2	black 2 (-)	6	On/Off switch
3	Power supply 12 V - 30 V / cable 2 x 1 mm ² ; two metres long	7	Potentiometer
4	black 1 (+)	8	Switch M1 = continuous function M2 = continuous function

7.4 Ordering code

Description	Type	Ordering code
Controller	ELSK 103-18***	100031605
Accessories see chapter 8		

7.4.1 Applicable document

Document	Purpose
Technical data sheet ELSK 103-18*** 100-P-700014	Technical documentation with all relevant descriptions, data characteristic lines and measurements.

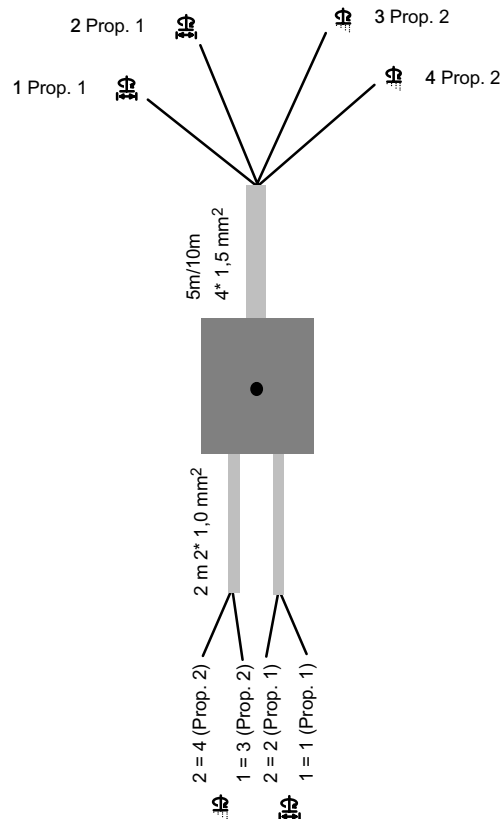
8 Accessories

To connect the solenoid, a GDM 309 connector plug can be supplied. In the event of proportional valve malfunctions

that are caused by long power leads, use GDM 209D solenoid plug.

Description	ELSK 103-****	ELSK 103-13***	ELSK 103-16***	ELSK 103-17***	ELSK 103-18***	Part No.
Cable for power supply 2x1mm ² (lengths in meters)	X	X	X	X	X	100604380
Coil connector plug GDM 309	X	X	X	X	X	100064970
Coil connector plug GDM 209D	X	X	X	X	X	100014130
Fuse, 5 A	X	X	X	X	X	100606938
Fuse holder (line mounting)	X	X	X	X	X	100607349
Plug insert (solder), Sta 6F		X	X	X	X	100209336
Line housing, H-A3 Tgv, for plug insert		X	X	X	X	100209472

9 Wiring loom



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Classification: 470.710.710