

# Controller

## ELMR 152-\*\*\*



- closed-loop and/or open-loop systems
- precisely metered deposition rate
- spread-data recording, including a protocol for use with GPS
- good adaptability for interfacing with hydraulic system
- good adaptability for interfacing with spreading system
- ergonomic user interface
- customised versions can be supplied

## 1 Description

### 1.1 General

The ELMR 152 \*\*\* digital controller is available for general sale. It is designed for use with any make of single- or twin-chamber salt spreader for winter road management.

All functions are controlled by a microcontroller. The system can be operated in “closed loop” or “open loop” modes, as well as in mixed mode. To fully exploit the advantages of the digital system (e.g. quantity measurements), the auger, belt and liquid pump should be run in closed-loop mode with this controller.

If a function is controlled in open-loop mode, certain limitations in comparison to closed-loop mode must be accepted.

Meter readings for both total and daily quantities of salt, liquid, sand and grit can be called up on a display.

Further informations on operating hours, spread distance, etc. can be provided. Interfaces for data transfer to a PC are also provided, as are the prerequisites for communication with GPS systems. Software for general-purpose salt/grit spreading is installed as standard. We can carry out application-specific modifications to suit customer preferences. The control panel can be laid out to suit the specific application and customer requirements.

### 1.2 Application example

- Municipal applications

- Gritter

### 1.3 Optional product functions

#### 1.3.1 Spread-data recording (option /01)






With the /01 option, the ELMR 152-\*\*\* digital controller maintains a record of entire spreading patrols. At what speed, and with what spread settings was the vehicle driven? Was the flow of grit interrupted - and, if yes, by what? If suitable sensors are fitted, the ELMR 152-\*\*\* also accurately records the quantities deposited. Two protocols are available: the standard protocol and a GPS protocol. The standard protocol sends the recorded data via the serial interface to a printer or a PC data-capture program. This enables, for example, the invoicing justification for subcontractors can be gathered. Precise depositing means optimised use of the spread material and improved inventory management. Automatic fault detection ensures that vehicle defects can be rectified promptly. A GPS protocol is implemented; this can be used in vehicles that have a GPS reception system.

It not only captures and checks the spreading performance, but also provides planning and maintenance support to fleet managers, including visualisation of the routes patrolled. The data is recorded every 10 seconds. As well as determining positions, the distance driven and the exact geographical route patrolled can be established

#### 1.3.2 Thermo-CTR (option /03 and /04)

The surface temperature of the road can also be used to regulate the amount of spread material being deposited. This function is known as Thermo-CTR (controlled). In conjunction with a temperature sensor in form of an infrared camera, the ELMR 152-\*\*\* with option /03 has 4 different automatic programs with which it can continuously meter the spread material. A minimum rate of deposition can be set. If the Thermo-CTR function is switched off, the normal spread function is available.

## 2 Product overview









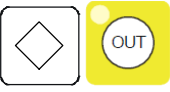
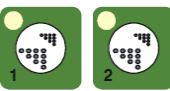

Controller	ELMR 152-01***	Description
		<p>Aluminium housing with front panel,          Display: alphanumerically, LCD-display,          illuminated, 4x20 signs,          25-pin plug          Single chamber salt spreader with wet salt equipment          Dimension: 185 x 180 x 65mm          Weight: approx.: ca. 1,8 kg          compatible with family of ELMR 150</p> <p>see chapter 5</p>
Controller	ELMR 152-60***/01	Description
Controller	ELMR 152-60***/03	
		<p>Aluminium housing with front panel,          LCD-Display, text display 4x20 signs, illuminated          42-pin plug          Single- or twin chamber salt spreader with wet salt equip-          ment          Dimension: 215 x 166 x 70mm          Weight: approx. 3,5 kg</p> <p>see chapter 6</p>
Controller	ELMR 152-61***/01	Description
Controller	ELMR 152-61***/03	
		<p>Aluminium housing with front panel,          LCD-Display, text display 4x20 signs, illuminated          42-pin plug          Single- or twin chamber salt spreader with wet salt equip-          ment          Dimension: 215 x 166 x 70mm          Weight: approx. 3,5 kg</p> <p>see chapter 7</p>
Controller	ELMR 152-62***/01	Description
Controller	ELMR 152-62***/03	
		<p>Aluminium housing with front panel,          LCD-Display, text display 4x20 signs, illuminated          42-pin plug          Single- or twin chamber salt spreader with wet salt equip-          ment          Dimension: 215 x 166 x 70mm          Weight: approx. 3,5 kg</p> <p>see chapter 8</p>
Controller	ELMR 152-70***/01	Description
Controller	ELMR 152-70***/03	
		<p>Aluminium housing with front panel,          graphic display, LCD-Display, illuminated, 42-pin plug          Single- or twin chamber salt spreader with wet salt equip-          ment          Dimension: 243 x 199 x 105mm          Weight: approx. 3,5 kg</p> <p>siehe chapter 9</p>











### 3 General technical datas

Characteristics	Unit	Description, value										
Supply voltage	V DC	12 V to 28 V smoothed DC, ripple < 10%										
Special characteristic		Reverse-polarity protected supply input terminal										
Front panel		Back-lit										
Operating temperature	°C	-25 °C ... +85 °C <sup>1)</sup>										
Protection class		IP30										
Option: Serial interface		SUB-D 9, adjustable, 2400 baud, 4800 baud, 9600 baud, 19200 baud, 8N1										
Plug connectors		7-pin for supply and road signal 25-pin connectors H-D25 for operation										
Electromagnetic compatibility		<table border="0"> <tr> <td>EN 14982</td> <td>Interference emission</td> </tr> <tr> <td>ISO 11452-2..-5</td> <td>Immunity to radiated electromagnetic energy</td> </tr> <tr> <td>ISO/TR 10605</td> <td>Immunity to electrostatic discharge (ESD)</td> </tr> <tr> <td>ISO 7637-0..-2</td> <td>Immunity to conducted disturbances, function class D</td> </tr> <tr> <td>e1 to 95/54/EC</td> <td>Automotive radio interference</td> </tr> </table>	EN 14982	Interference emission	ISO 11452-2..-5	Immunity to radiated electromagnetic energy	ISO/TR 10605	Immunity to electrostatic discharge (ESD)	ISO 7637-0..-2	Immunity to conducted disturbances, function class D	e1 to 95/54/EC	Automotive radio interference
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ISO/TR 10605	Immunity to electrostatic discharge (ESD)											
ISO 7637-0..-2	Immunity to conducted disturbances, function class D											
e1 to 95/54/EC	Automotive radio interference											

1) At temperatures below 0 °C degrees, the display works very slowly.

### 4 Description of function

Key / Display	Function / Meaning
	<p><b>INFO-button (press the button for a short time)</b> The following information can be displayed on the LCD screen. Select the menu by repeated pressing the INFO switch.</p>
	<p>Road- and driver number daily operating hours in h daily travel distance in km daily quantity of gritting in kg daily quantity of salt1 in kg daily quantity of sand1 in kg daily quantity of salt2 in kg daily quantity of sand2 in kg daily quantity of liquid in kg</p> <p>total quantity of operating hours in h total quantity of travelled distance in km total quantity of gritting total quantity of salt1 in kg total quantity of sand1 in kg total quantity of salt2 in kg total quantity of sand2 in kg total quantity of liquid in kg</p>
	<p><b>INFO-button (press and held the button)</b></p> <p>&gt; 5 sec.: switch for resetting the daily quantity counter</p> <p>Delete with  button. Please follow the instructions on the display.</p> <p>&gt; 10 sec.: switch to diagnostic menu with following button:  </p> <ul style="list-style-type: none"> <li>- diagnosis of sensors</li> <li>- diagnosis of magnetic currents</li> <li>- diagnosis of setpoints</li> <li>- fault memory</li> </ul>
	<p><b>ASW Work light</b> The corresponding spotlight output is powered.</p>
	<p><b>RKL Warning beacon</b> The corresponding output is powered.</p>
	<p><b>SWITCH OUT</b> One customer output is powered.</p>
	<p><b>Medium selection (triple function)</b> Activated range of gritting conditions is show via LED.</p>
	<p><b>Wet salt</b> A on/off solenoid is powered (LED in wet salt symbol)</p>

Key / Display	Function / Meaning
	<b>Gritting start</b> (not for ELMR152-01) Activate the gritting mode
	<b>STOP</b> Stops the spreader from gritting. The spinner remains at the set speed.
	<b>BLAST</b> Auger/belt and liquit pump goes up to 4* set value, the spinner remains at the set speed.
	<b>TEST</b> Set a predefined road speed in case of speed sensor failure.
	<b>Spread symmetry</b> An infinitely adjustable potentiometer (270°) is used as ideal value input. Two ON/OFF outputs are powered that way, that one motor or 2 ON/OFF valves can be used for control. Feedback is also done by a potentiometer. The spread spinner's moves are controlled. Power supply is limited to about 5 seconds, if there is no movement. Spread symmetry can be activated or deactivated by using the SETUP. If the spread symmetry is activated, an error is signalled with the display and the error LED, if an adjustment error occurs. As soon as an error is signalled it is possible to change the modus to open.
	<b>Error treatment</b> In case of a failure (no feedback) the electronic automatically switches over to control. The Buzzer signals this up to the confirmation of the "INFO"-button. If the feedback sensor exist again, the electronic starts the control operations with feedback sensor again.
	<b>Error messages</b> Acoustic and optical error message "LED ERROR" for auger/belt, spinner "!SPINNER" and liquid "IWETSALT". If a failure of the feedback sensor happens or if the necessary hydraulic movement is not reached, a acoustic and optical error message LED ERROR for sole empty "!LIQUID" and for spread symmetrie "!ASYMETR" follow. Optical error message LED, if the salt-out sensor is activated.  The buzzer can be switched off by pressing following button:
  	

## 5 Controller ELMR 152-01\*\*\*



### 5.1 Description

The ELMR 152-01\*\* is a digital control unit, specially designed to suit any make of single-chamber salt spreader that is used in winter road maintenance operations. Basic functions are auger and belt speed, spinner speed and liquid pump. The system can be operated in “closed loop” or “open loop” modes, as well as in mixed mode. To fully exploit the advantages of the digital system ( e.g. quantity measurements), the auger, belt and liquid pump should be run in closed-loop mode, certain limitations in comparison to closed-loop mode must be accepted. Meter readings for both total daily quantities of salt, liquid, sand and grit can be called up. Further information on operating hours, spread distance, etc. can be provided. Interfaces for data transfer to a PC are also provided, as are the prerequisites for communication with GPS systems.

### 5.2 Technical data

Signal inputs and outputs		Description
Inputs	2 analogue inputs	Actual value, spread-symmetry adjustment Actual value, Thermo-CTR (optional)
	3 frequency inputs	Impulse inputs for feedback signals (NPN sensors) from spinner, auger/ belt and liquid pump.
	1 frequency input	for sensor for road-speed signal.
	3 ON/OFF inputs	for spread-monitoring, brine emty, salt empty , NPN sensors
Outputs	3 proportional outputs	for desired-value presets for spinner, auger and belt
	6 ON/OFF outputs	for work headlights, warning beacons, wet salt, customer output, spread-symmetry adjustment
	Outputs für actuators and sensors	25-pin plug H-D25
	Ports for power supply and speed signal	1 m cable ( 7 x 1mm <sup>2</sup> ) with 8-pin plug H-D7
	Dimensions	185 x 80 x 65mm

### 5.3 Ordering code

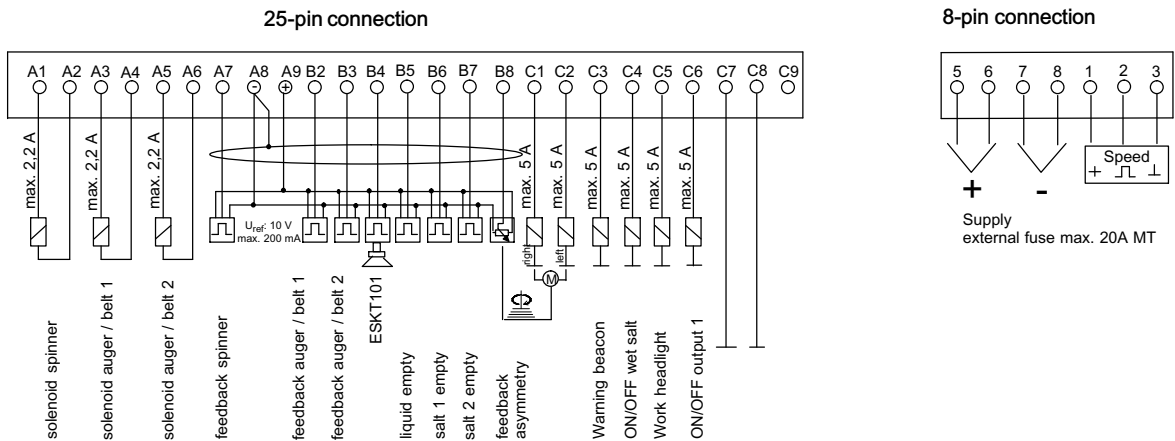
Description	Type	Part number
Controller	ELMR 152-01***	100035175

### 5.4 Accessories

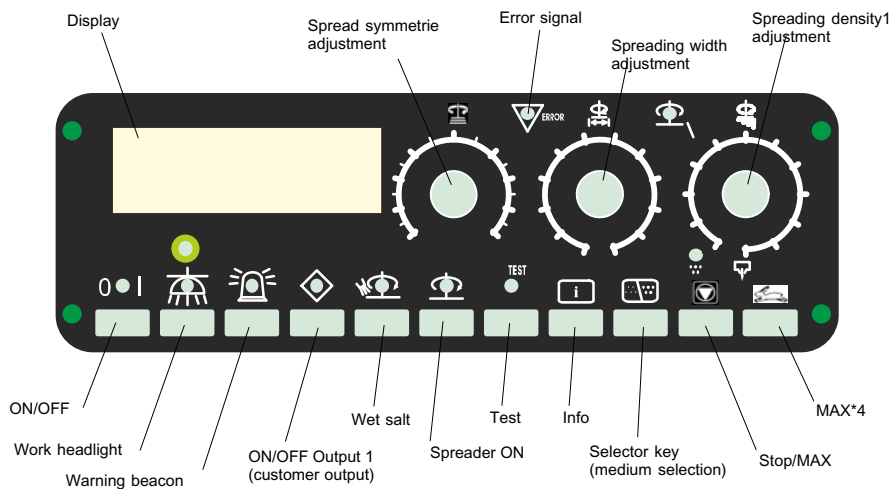
25-pin plug/socket connection	Part number
Line housing, H-A16KT, straight, PG16	100209521
Line housing, H-A16KT, angled, PG16	100607668
Line housing, H-A16KT, 2x PG16 at front	100607798
Line housing, H-A16KT, straight PG21	100607419
Plug insert H-D25	100607797
Contact pin for 0,14 - 0,37 mm <sup>2</sup>	100217472

Contact pin for 0,5 mm <sup>2</sup>	100217473
Contact pin for 0,75 - 1 mm <sup>2</sup>	100217474
Plastic cover for line housing	100607750
Plastic cover for line housing	100607751
<b>8-pin plug / socket connection</b>	<b>Part number</b>
Bulkhead housing, angled	100214661
Bulkhead housing, straight	100607297
Connector insert	100607391
Contact socket 1,5 mm <sup>2</sup>	100217469
Contact socket 2,5 mm <sup>2</sup>	100217471

### 5.5 Connection diagram



### 5.6 Key Layout



### 6 Controller ELMR 152-60\*\*\*



#### 6.1 Description

The ELMR 152-60\*\*\* is intended for single-chamber unit with proportional liquid pump. The liquid proportion from 0% to 100% can be selected with a step switch. The controller is also intended for the application as two-chamber unit with the facility for operating with blended materials. Using as two-chamber unit with proportional liquid pump and additional on/off valve is also possible.

#### 6.2 Technical data

Signal inputs and outputs		Description
Inputs	2 analogue inputs	Actual value, spread-symmetry adjustment Actual value, Thermo-CTR (optional)
	4 frequency inputs	Impulse inputs for feedback signals (NPN sensors) from spinner, auger/belt and liquid pump.
	1 frequency input	for sensor for road-speed signal
	4 ON/OFF inputs	for spread-monitoring, brine empty and salt empty 1, salt empty 2
Outputs	4 proportional outputs	for demand-signal presets for spinner, auger/belt 1, auger/belt2 and liquid
	6 ON/OFF outputs	for work headlights, warning beacons, wet salt, customer output, spread symmetry left and spread symmetry right
Outputs for actuators and sensors		42-pin plug HAN 42DD
Ports for actuators and sensors		1m cable (7 x 1 mm <sup>2</sup> ) with 8-pin plug H-D7
Dimension		215 x 166 x 70mm

#### 6.3 Ordering code

Description	Type	Part number
Controller with data acquisition	ELMR 152-60***/01	100030871
Controller with data acquisition and Thermo-CTR plug	ELMR 152-60***/03	100031646

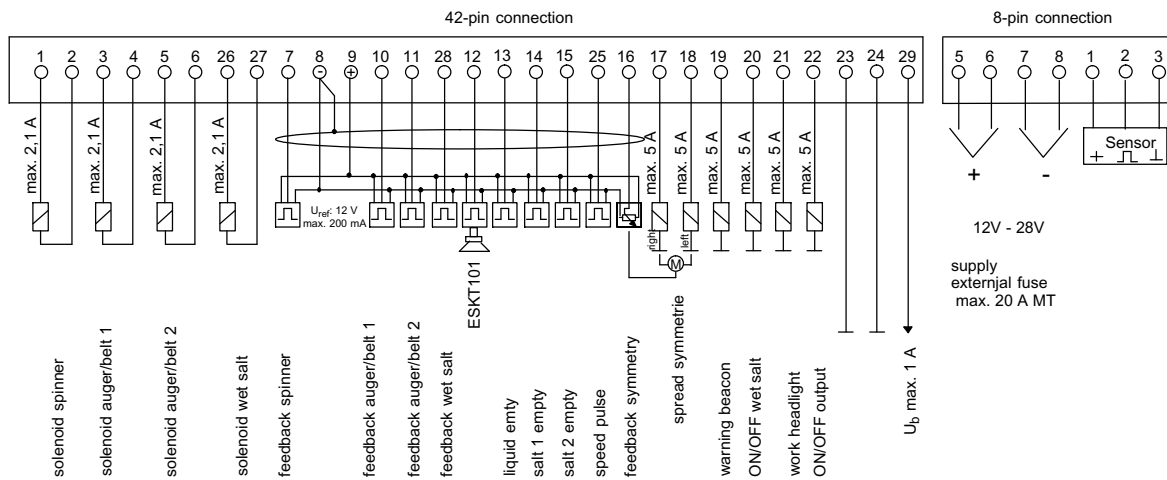
#### 6.4 Accessories

42-pin plug/socket connector	Part number
Line housing HAN-DD42, PG21 straight	100607910
Plug insert HAN-DD42	100607909
Contact pin 0,14 - 0,37 mm <sup>2</sup>	100217472
Contact pin 0,5 mm <sup>2</sup>	100217473
Contact pin 0,75 - 1 mm <sup>2</sup>	100217474

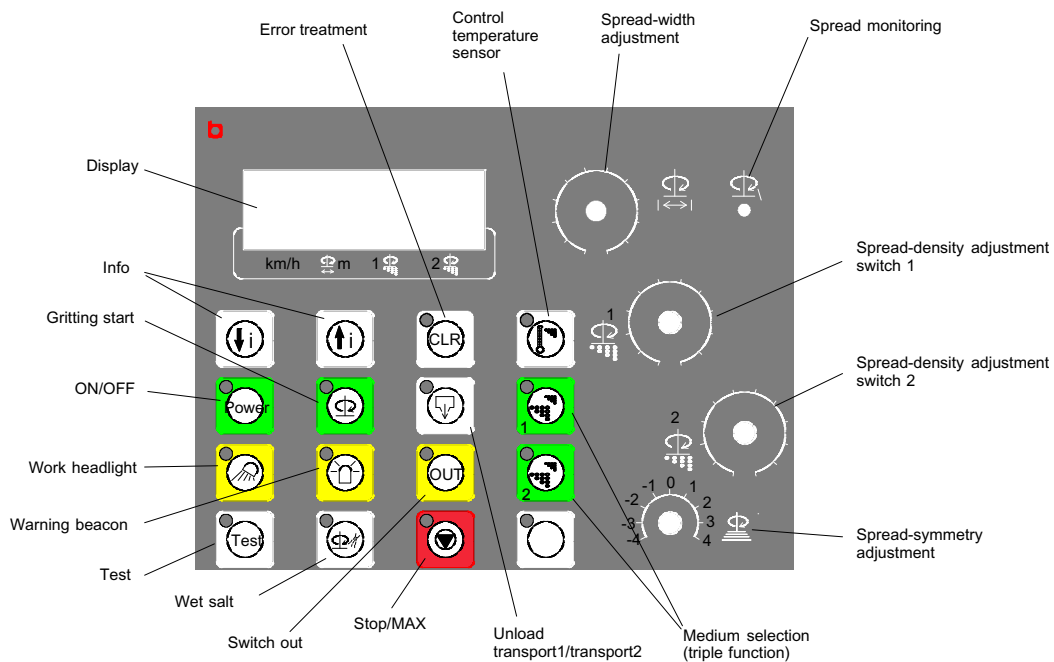


8-pin plug/socket connector	Part number
Bulkhead housing straight	100607297
Bulkhead housing angled	100214661
Socket insert	100607391
Contact socket 1,5 mm <sup>2</sup>	100217469
Contact socket 2,5 mm <sup>2</sup>	100217471

## 6.5 Connection diagram



## 6.6 Key Layout



### 7 Controller ELMR 152-61\*\*\*



#### 7.1 Description

The controller ELMR 152-61\*\*\* is intended for single-chamber unit with proportional liquid pump. The liquid proportion from 0% to 100% can be selected with a step switch. The controller is also intended for the application as two-chamber unit with the facility for operating with blended materials. Using as two-chamber unit with proportional liquid pump and additional ON/OFF valve is also possible.

#### 7.2 Technical data

Signal inputs and outputs	Description
Inputs	2 analogue inputs Actual value, spread-symmetry adjustment Actual value, Thermo-CTR (optional)
	4 frequency inputs Impulse inputs for feedback signals (NPN sensors) from spinner, auger/belt and liquid pump.
	1 frequency input for sensor for road-speed signal.
	4 ON/OFF inputs For spread-monitoring, brine empty, salt empty 1, salt empty 2
Outputs	4 proportional outputs For demand-signal presets for spinner, auger/belt 1 and auger/belt 2 and liquid
	6 ON/OFF outputs for work headlights, warning beacons, wet salt, customer output, spread symmetry left and spread symmetry right
Outputs for actuators and sensors	42-pin plug HAN 42DD
Ports for actuators and sensors	1m cable (7 x 1 mm <sup>2</sup> ) with 8-pin plug H-D7
Dimensions	215 x 166 x 70mm

#### 7.3 Ordering code

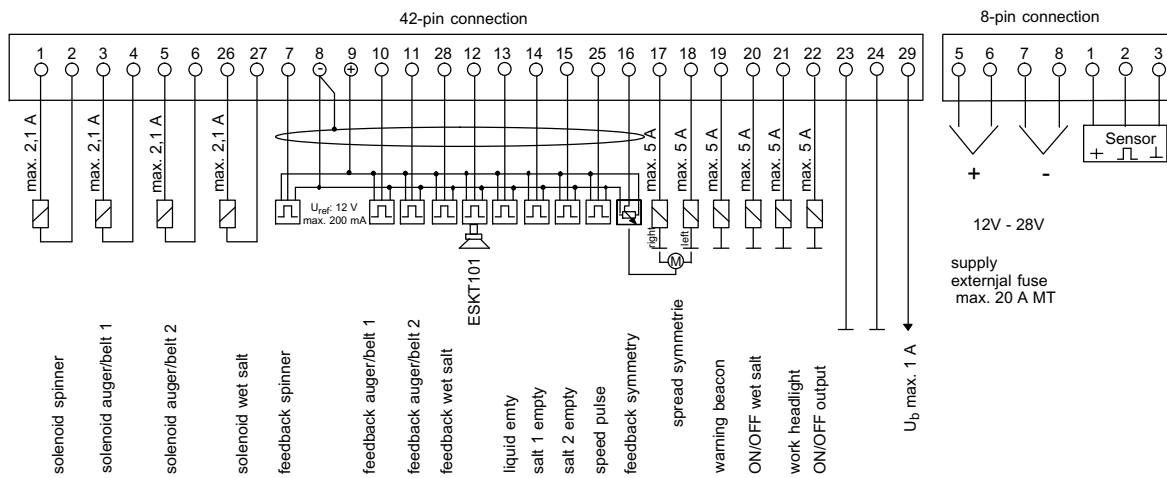
Description	Type	Part number
Controller with data acquisition	ELMR 152-61***/01	100033179
Controller with data acquisition and Thermo-CTR plug	ELMR 152-61***/03	100031424

#### 7.4 Accessories

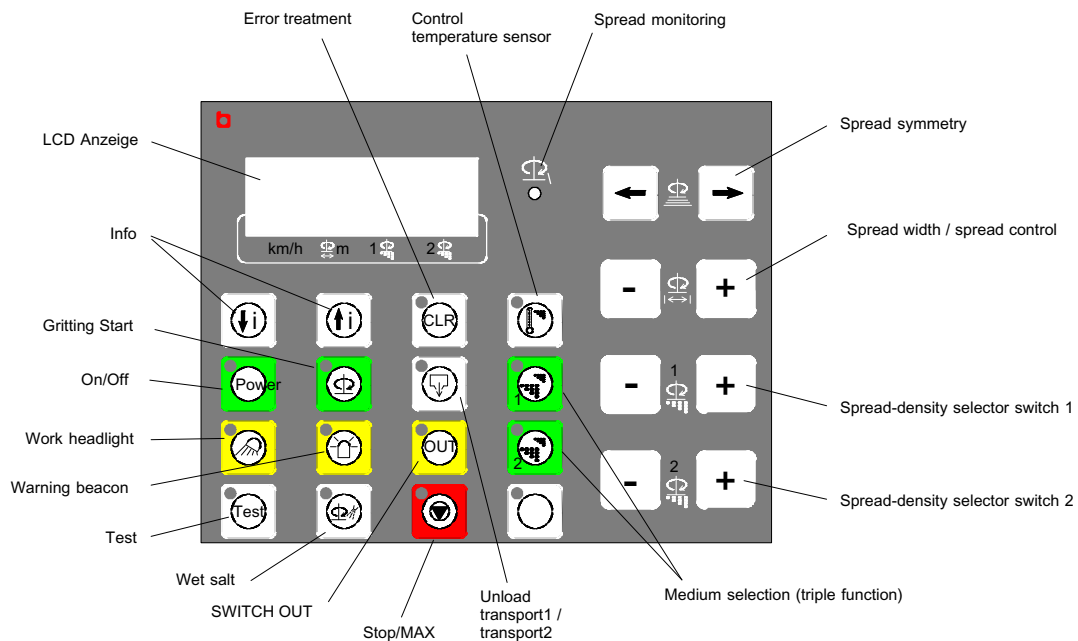
42-pin plug/socket connector	Part number
Line housing HAN-DD42, PG21 straight	100607910
Plug insert HAN-DD42	100607909
Contact pin 0,14 - 0,37	100217472
Contact pin 0,5	100217473
Contact pin 0,75 - 1	100217474

8-pin plug/socket connector	Part number
Bulkhead housing straight	100607297
Bulkhead housing angled	100214661
Socket insert	100607391
Contact socket 1,5 mm <sup>2</sup>	100217469
Contact socket 2,5 mm <sup>2</sup>	100217471

## 7.5 Connection diagram



## 7.6 Key Layout



## 8 Regeleinheit ELMR 152-62\*\*\*



### 8.1 Description

The ELMR 152-60\*\*\* is intended for single-chamber unit with proportional liquid pump. The liquid proportion from 0% to 100% can be selected with a step switch. The controller is also intended for the application as two-chamber unit with the facility for operating with blended materials. Using as two-chamber unit with proportional liquid pump and additional on/off valve is also possible.

### 8.2 Technical data

Signal inputs and outputs		description
Inputs	2 analogue inputs	Actual value for spread-symmetry adjustment Actual value for Thermo-CTR (optional)
	4 frequency inputs	Impulse inputs for feedback signals (NPN sensors) from spinner, auger/belt and liquid pump.
	1 frequency input	for sensor for road-speed signal.
	4 ON/OFF inputs (sensor inputs)	for spread-monitoring, brine empty, salt empty 1, salt empty 2,
Outputs	4 proportional outputs	for desired-value presets for spinner, auger/belt1, auger/belt 2 and liquid
	6 ON/OFF outputs	for working headlight, warning beacons, wet salt, spread symmetry left and spread symmetry right.
Outputs for actuators and sensors		42-pin plug socket HAN 42DD
Ports for power supply and speed signal		1 m cable ( 7 x 1 mm <sup>2</sup> ) with 8-pin plug H-D7
Dimensions		215 x 166 x 70mm

### 8.3 Ordering code

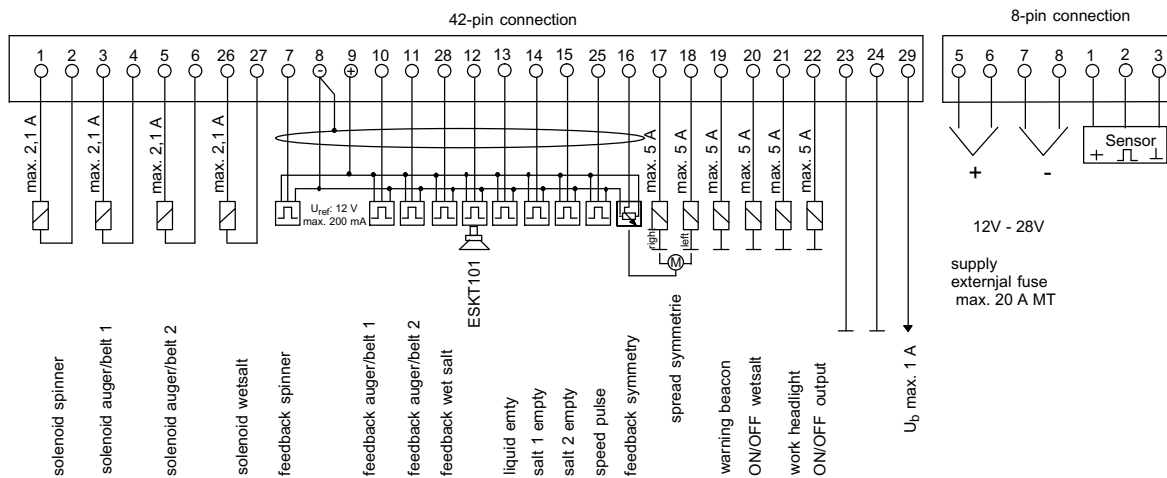
Description	Type	Ordering code
Controller with data acquisition	ELMR 152-62***/01	100030843
Controller with data acquisition and Thermo-CTR plug	ELMR 152-62***/03	100034273

### 8.4 Accessories

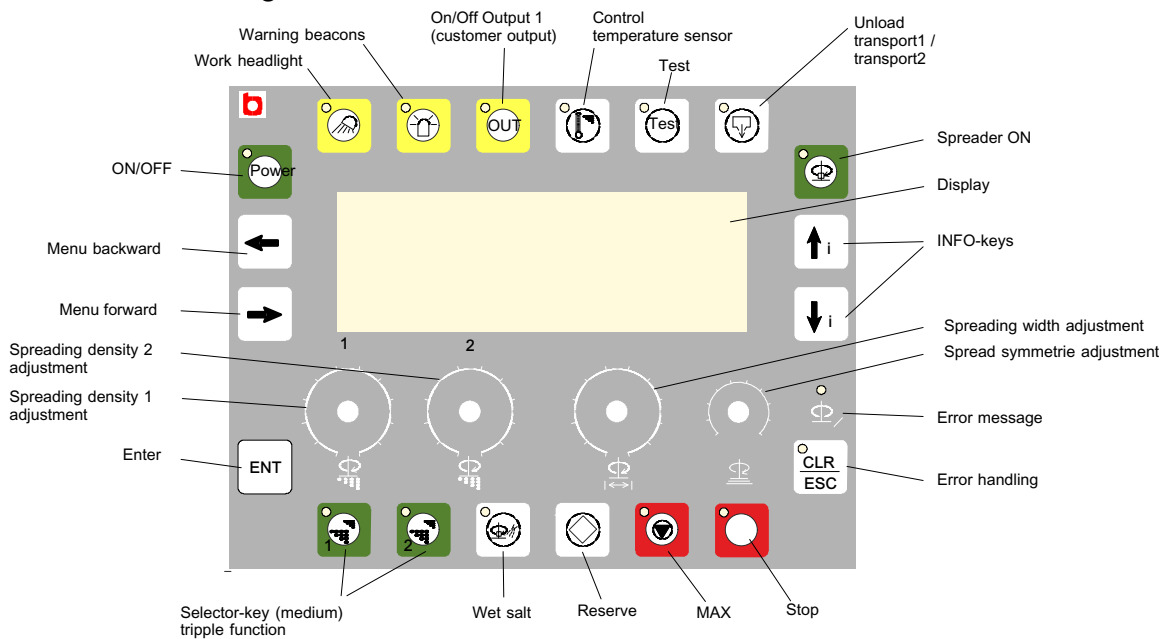
42-pin plug/socket connector	Part number
Line housing HAN-DD42, PG21 straight	100607910
Plug insert HAN-DD42	100607909
Contact pin 0,14 - 0,37	100217472
Contact pin 0,5	100217473
Contact pin 0,75 - 1	100217474

8-pin plug/socket connection	Ordering code
Line housing straight	100607297
Line housing angled	100214661
Connector insert	100607391
Contact socket 1,5 mm <sup>2</sup>	100217469
Contact socket 2,5 mm <sup>2</sup>	100217471

## 8.5 Key Layout



## 8.6 Connection diagram



## 9 Regeleinheit ELMR 152-70\*\*\*



### 9.1 Description

The ELMR 152-70\*\*\* is intended for single-chamber unit with proportional liquid pump. The liquid proportion from 0% to 100% can be selected with a step switch. The controller is also intended for the application as two-chamber unit with the facility for operating with blended materials. Using as two-chamber unit with proportional liquid pump and additional on/off valve is also possible.

### 9.2 Technical data

Signal inputs and outputs		Description
Inputs	2 analogue inputs	Actual value for spread-symmetry adjustment; Actual value for Thermo-CTR (optional)
	4 frequency inputs	Impulse inputs for feedback signals (NPN sensors) from spinner, auger/belt and liquid pump
	1 frequency input	For sensor for road-speed signal. Can be set for NPN, PNP sensors or inductive AC sources.
	4 ON/OFF inputs (sensor inputs)	For spread-monitoring, brine empty, salt empty 1, salt empty 2,
Outputs	4 proportional outputs	For desired-value presets for spinner, auger/belt 1, auger/belt 2 and liquid
	6 on/off outputs	For work headlight, warning beacon, wet salt, customer output, spread symmetry left and spread symmetry right.
Outputs for actuators and sensors		42-pin plug HAN 42DD
Ports for power supply and speed signal		1 m cable (7 x 1 mm <sup>2</sup> ) with 8-pin plug H-D7
Dimensions		243 x 199 x 105mm

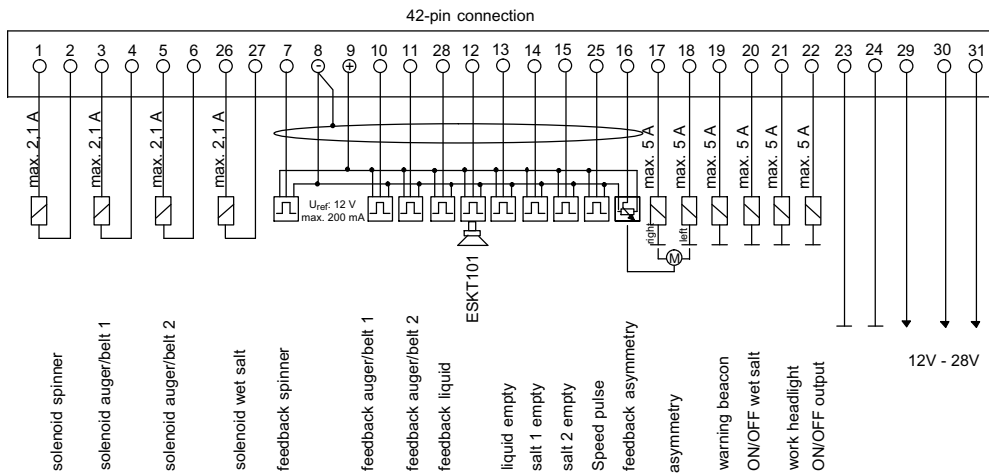
### 9.3 Ordering code

Description	Type	Part number
Controller with data acquisition	ELMR 152-70***/01	
Controller with data acquisition and Thermo-CTR plug	ELMR 152-70***/03	

### 9.4 Accessories

42-pin plug/socket connector	Part number
Line housing HAN-DD42 straight, PG21 high	100607910
Plug insert HAN-DD42	100607909
Contact pin 0,14 - 0,37	100217472
Contact pin 0,5	100217473
Contact pin 0,75 - 1	100217474

## 9.5 Connection diagram



## 9.6 Key Layout



### 9.7 Setup - short menu

From software version 2.2 there is a facility for altering some setup parameters without opening the electronic system. If the „ENTER“ and „ESC“ keys are pressed simultaneously when the vehicle is stationary and spreading is switched off, then the specific densities of the materials, among other parameters, can be set. As in setup mode, the values are adjusted with the rotary switch for density 1. The values can also be set in the setup mode.

### 9.8 Data logging

With the option /01 version of the unit, the operating data is recorded. Through a serial interface, the data can be either output directly by a printer, or transferred to a PC or mobile data logger for further processing. If the data is not output online, it is stored in an internal memory that retains its data even when the controller's power supply is switched off. As soon as the data has been output, it is automatically deleted. The data can also be deleted manually via the menu item "LOG- CLR".

#### Technical data - interface:

RS232 connecting cable	1:1 connector
Baud rate	2400, 4800,9600 or 19200
Parity	none
Data bits	8
stop bits	1
Format	ASCII text
Plug	SUB 9-pin connector