Load Spectrum Recorder LKZ 701

Original
Operating Manual

List of Contents

1. Use for intended purpose

The Load Spectrum Recorder LKZ 701 is intended for displaying the useful service life of hoist units, calculated in accordance with FEM Directive 9.755.
This involves connecting up a current signal 4mA…$I_{100\%}$ proportional to the load (0%…100%) of the hoist unit or a voltage 0V...$U_{100\%}$. While the hoist unit is in operation, the apparatus evaluates the current input / voltage input second-by-second and saves the values in a totalizing memory.
The contents of this totalizing memory constitute the useful service life. This can be displayed both in hours as actual usage S and as a percentage % as consumed usage V = S/D.

Two relays capable of being loaded to a maximum of 250V/5A signalize an input current signal under 4mA / 0V or the attainment of a freely adjustable useful service life.

⚠ **CAUTION!**
The Load Spectrum Recorder LKZ 701 must never be used as a means of preventing hazardous conditions on plant and machinery. Machinery and facilities must be designed in such a way that faulty conditions are not allowed to lead to any dangerous situation. It must be ensured that no material damage or risk occurs to the operating personnel or other persons due to incorrect settings or faulty connections on the apparatus.

2. Scope of delivery

Model code/	LKZ 701.01	Load spectrum recorder with 4...25mA input
	LKZ 701.02	Load spectrum recorder with 0...14V DC input
Additional accessories		Two clamping screws for control-panel installation
		Operating manual

3. Technical data

Input Eingang		
Input signal range / load resistance		4 - 20mA / 50Ω or 0...10V DC / 250kΩ
Switching input		24V DC or contact
Output Ausgang		
Relay 1: Contact/sensor error (<4mA / <0V)		Load max. 250V AC / 5A
Relay 2: Contact/useful service life		Load max. 250V AC / 5A
Display		
Line 1: Display of useful service life, consumption		8 signs
Line 2: Display of status inputs, messages		8 signs
Power supply		
Rated voltage	V DC	24
Voltage range	V DC	18 ... 36
Max. power Input	VA	1.5
Ambient conditions		
Operating temperature range	°C	- 20 ... + 60
Storage temperature range	°C	- 30 ... + 80
Design specifications		
Housing		Panel-mounting
Weight	g	160
Dimensions (W x H x D)	mm	72 x 72 x 80
Enclosure protection class to EN 60529		IP 40

Table 1 – Technical data

4.   Installation

4.1.   Assembly

The LKZ 701 should be plugged in through a 68 mm x 68 mm front-panel cutout and secured by means of the supplied clamping screws.

The apparatus is designed in the form of a panel meter. It is secured in position by means of two clamping screws.
The front panel features a two-line display with three membrane keys.
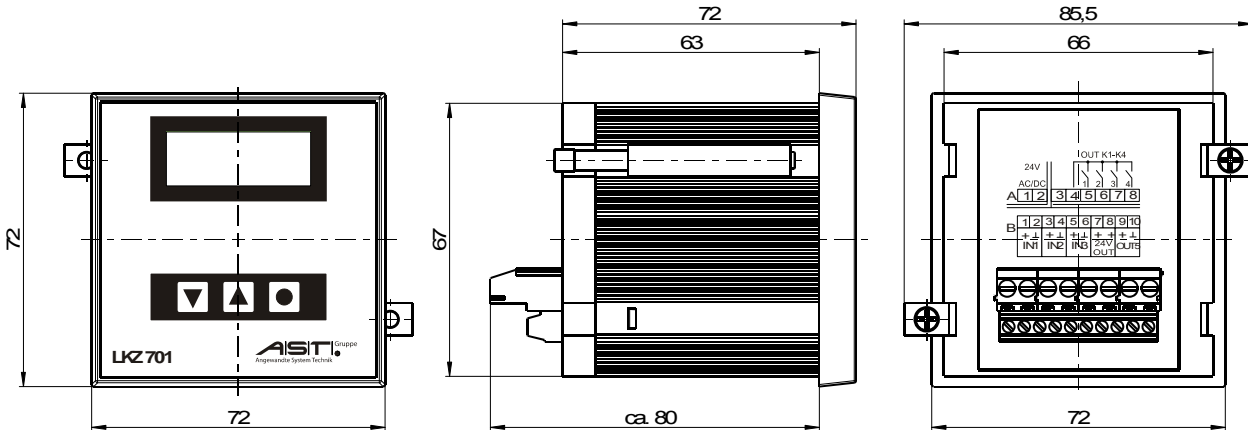The connections for voltage supply as well as input and output signals are located on the rear panel.

Figure 1 – Installation dimensions

4.2.   Connection-pin assignment

The following illustrations show the rear-panel view along with the connection-pin assignments, one connection example being given for the hoist-unit signal.

Terminal strip A is suitable for connections up to 2.5mm^2 and terminal strip B for connections up to 1.5mm^2.
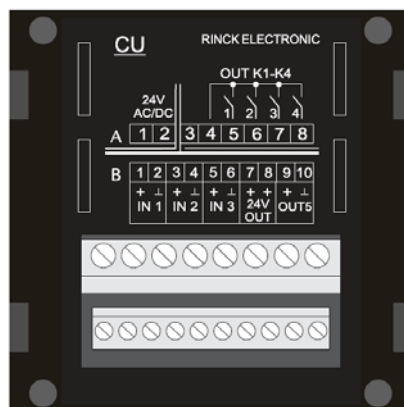

Figure 2 – Rear-panel view

Connection CU-LKZ 701

supply 24V AC/DC + / ~ A1
                   - / ~ A2

Power input max. 2VA
Pre-fuse max. 16A

Input 1 (load) IN B1
4-20mA (50Ω) or G0 B2
0...10VDC (250kΩ)

R

2x contact
load: max. 250V/5A

A4
A5
A6

Relay 1 (Off = error input 1 < 4mA)
Relay 2 (On = Value V > 90%)

+24V DC

Input 2 (disengaging) +24V B7
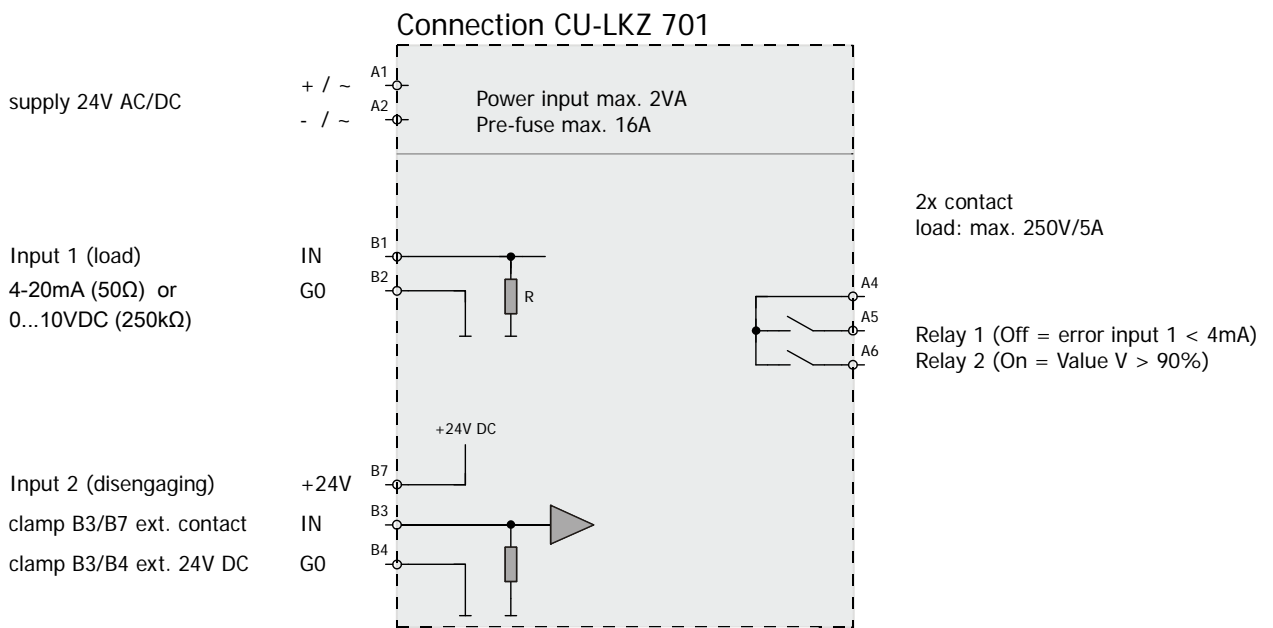clamp B3/B7 ext. contact IN B3
clamp B3/B4 ext. 24V DC G0 B4

Figure 3– Connection

Poweer supply

The stipulated voltage supply of the LKZ 701 is 24V DC. In the event of a power failure occurring, the memory contents will be preserved.

Input 1

An analogue standard signal 4 … 20mA or 0 … 10V DC proportional to the load of the hoist unit acts as a load signal for evaluation (input 1).

Input 2

The load signal is evaluated second-by-second (1/3600 h) when a switching signal (input 2) is received from the hoist unit.

⚠ **Note!**
Without a signal at the input 2 isn't possible a calculation of the useful service life!

Relay 1 and 2

Two switching outputs are available. Relay 1 opens a contact as soon as input 1 falls below 4mA or below 0V DC. Relay 2 closes a contact as soon as the set pre-warning is attained.

5. Display and operation

5.1. Switching on the apparatus

Connecting up the power supply switches on the apparatus displays the consumed usage V: menu point 1.0.

5.2. Functions of keys

The membrane keypad – where necessary protected by a password – is used for setting the values.

- theoretical usage D
- Input signal at 100% load
- Starting value for actual usage S
- Pre-warning alert (for consumed) usage V

The three keys ▼, ▲ and ● are used for scrolling through Menu 5.2.1 as well as for setting values.

Note: If the apparatus fails to respond to key activation in any menu point within 15 seconds, it will leap back to menu point 1.0 while retaining the "old" password.
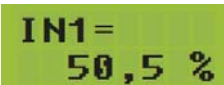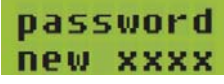
Figure 4 – Front view

Meaning of menu points

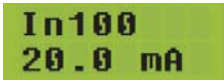| Point	Display	Meaning
All		The following applies to all menu points: If the apparatus fails to respond to key activation in any menu point within 15 seconds, it will leap back to menu point 1.0 while retaining the "old" password.
1.0	V= 50,5% aktiv	Consumed useful service life, referencing to the theoretical usage D: V = S / D entered under 2.2. If the hoist unit is in operation, the LKZ 701 will perform an "active" count of the useful service life (Chapter 4.3); input 2 is occupied.
1.1	password xxxx	Prompt to enter a password if one wishes to change the respective values applying 2.2 through 2.7.
1.2 / 2.2	value D 123456 h	Theoretical usage D; this value can be entered under 2.2.

1.3 / 2.3	In100 20.0 mA LKZ 701.01 In100 10.0 V LKZ 701.02	Input value to be entered under 2.3 (example) for 100% hoist-unit load, reference value for actual usage S (Chapter 5.3).
1.4 / 2.4	value S 123456 h	(Previous) actual usage S; this value can be fixed as the starting value under 2.4.
1.5 / 2.5	warn > 90,0 %	In the event of consumption V exceeding the value entered under 2.5, relay 2 will close.
1.6 / 2.6	IN1= 50,5 %	Display of current input value at input 1 (load), Example: For $\leq$ 4mA or $\leq$ V DC, IN1 = 0%; the 100% value corresponds to the input value In100 under 1.3.
2.7	password new xxxx	Accessing to 2.2 through 2.6 serves to display the current password at this point which can then be changed.

Scrolling

Pressing key ▼ switches the user to menu point 1.1 and further to 1.2 through 1.6 provided a password has been set, otherwise to menu point 2.2 through 2.7.

Password

The password request 1.1. – provided one wishes to change values 2.2 through 2.5 – proceeds according to the example of password "1234" digit by digit.

Key	Display	
●	0000	1st digit flashes
▲ then ●	1000	2nd digit flashes
2 x ▲ then ●	1200	3rd digit flashes
3 x ▲ then ●	1230	4th digit flashes
4 x ▲ then ●	Menu point 2.2	Setting of theoretical usage D

Password entry 2.7 proceeds in the same way. As soon as this point is reached, the current password will be displayed, e.g. "new 1234". If this is to be retained, no further key should be pressed for 15 seconds; the apparatus will then shift to display 1.0. If the password is to be changed, proceed as follows, taking "4321" as an example.

Key	Display	
●	new 1234	1st digit flashes
3 x ▲ then ●	new 4234	2nd digit flashes
1 x ▲ then ●	new 4334	3rd digit flashes
9 x ▲ then ●	new 4324	4th digit flashes
7 x ▲ then ●	new 4321	Note: Now wait for 15 seconds until the password has been taken over. The apparatus will then shift to display 1.0.

Setting of value D, In100, value S, warn
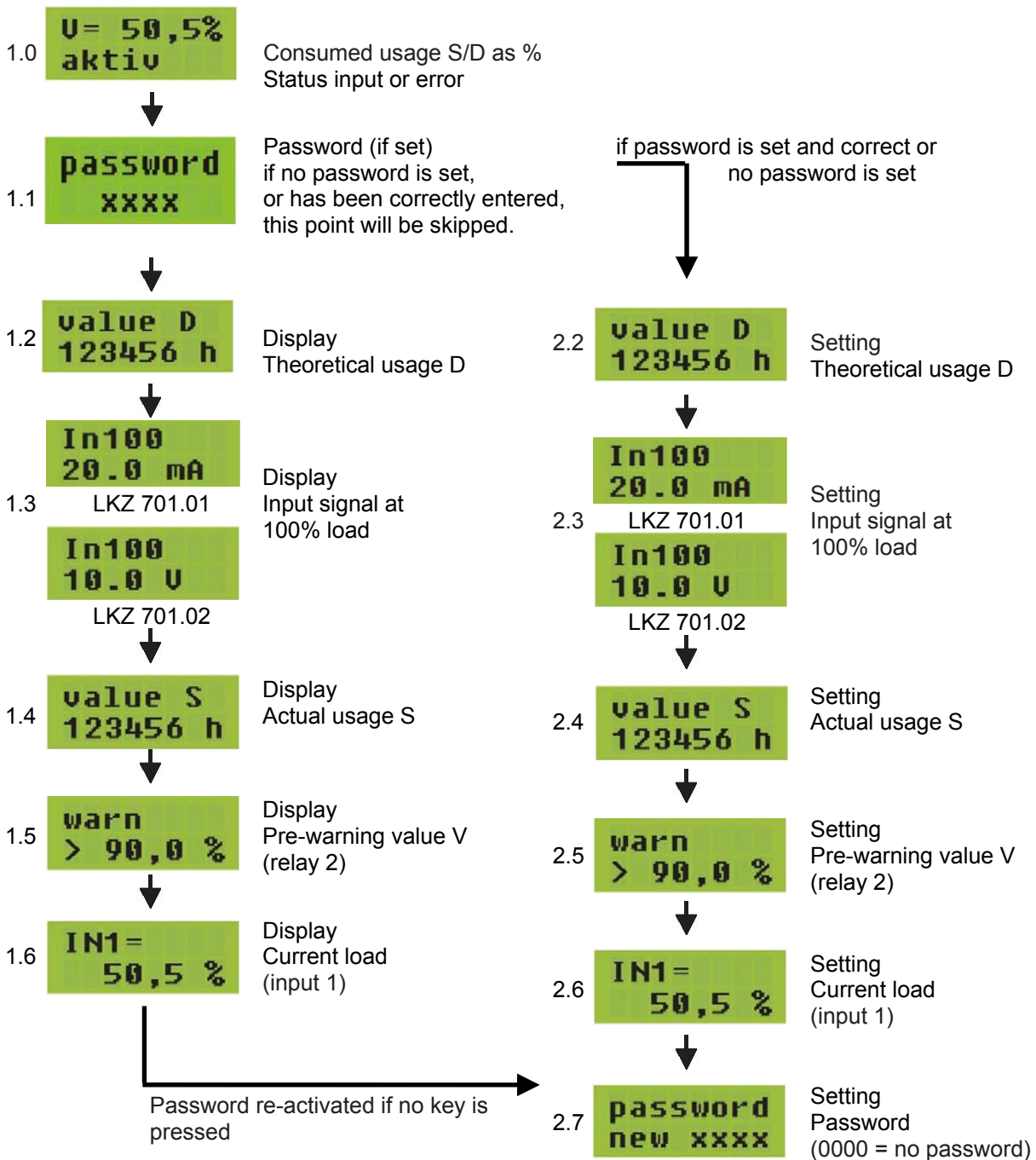
Pressing key ● serves to invoke the change function.

Keys ▼, ▲ are used for altering the whole figure.

Pressing key ● completes the process of change.

5.2.1. Menu navigation

Starting display

LKZ 701
AST DD

LKZ 701

Menu points

	Display	Description
1.0	U= 50,5% aktiv	Consumed usage S/D as % Status input or error

↓

| 1.1 | password xxxx | Password (if set) if no password is set, or has been correctly entered, this point will be skipped. |

if password is set and correct or no password is set

↓

| 1.2 | value D 123456 h | Display Theoretical usage D |
| 2.2 | value D 123456 h | Setting Theoretical usage D |

↓

| 1.3 | In100 20.0 mA   LKZ 701.01
In100 10.0 V   LKZ 701.02 | Display Input signal at 100% load |
| 2.3 | In100 20.0 mA   LKZ 701.01
In100 10.0 V   LKZ 701.02 | Setting Input signal at 100% load |

↓

| 1.4 | value S 123456 h | Display Actual usage S |
| 2.4 | value S 123456 h | Setting Actual usage S |

↓

| 1.5 | warn > 90,0 % | Display Pre-warning value V (relay 2) |
| 2.5 | warn > 90,0 % | Setting Pre-warning value V (relay 2) |

↓

| 1.6 | IN1= 50,5 % | Display Current load (input 1) |
| 2.6 | IN1= 50,5 % | Setting Current load (input 1) |

Password re-activated if no key is pressed →

| 2.7 | password new xxxx | Setting Password (0000 = no password) |

▼ = menu points can be scrolled up ▲ / ▼ down with keys

5.3.   Calculation of useful service life

Load values are calculated second-by-second: 1/3600 h.
The LKZ 701.01 evaluates a ≤ 4 mA load signal applying 0% and a current signal 4mA…$I_{100\%}$ from 0…100%.
The LKZ 701.02 evaluates a ≤ 0V DC load signal applying 0% and a voltage signal 0V DC…$U_{100\%}$ from 0…100%.

Evaluation and totalizing in respect of actual usage S_i is carried out according to equation (1).

$$S = S_i = S_{i-1} + (IN_i / IN_{100\%})^3 / 3600 \quad (1)$$

- S_i Useful service life in h after i-th measuring interval
- S_{i-1} .   Previous useful service life in h
- IN_i Input value to i-th measurement interval
- $IN_{100\%}$ Input value at 100% hoist-unit load

The „consumed" useful service life V_i is calculated according to equation (2).

$$V = V_i = S_i / D \quad (2)$$

- V_i Consumed useful service life after i-th measurement interval, displayed as %
- S_i Useful service life in h after i-th measurement interval
- D   Theoretical usage to be entered in h