Operation Instructions

for

ABUS load indication system

LIS – SE

Factory No. _____

These installation, operation and maintenance instructions are intended for use in an English–speaking country by English–speaking specialist personnel.

AN 120076.000_EN 01.03.2016

Original operating manual

Contents

1 General

The operating instructions must always be stored near the ABUS rope hoist and must be available to operating personnel at all times.

Operating, maintenance and repair personnel must have read and understood the operating instructions before starting work.

1.1 Brief Description of System

The ABUS LIS- SE load indicator system is a compact universal load measurement and evaluation system for hoists and crane systems. It also performs certain hoist control functions. The design of the LIS–SE is based on the microprocessor–controlled evaluation of the current and voltage of the hoist motor.
The basic LIS–SE module with optional load population recorder offers the possibility of recording and evaluating the actual operating conditions of a crane system in accordance with FEM 9.755.
The unit can monitor a hoist for compliance with the maximum admissible load capacity. In addition, the wide variety of functions integrated ensure a high degree of versatility.

Special features:

- overload shut–down function
- load evaluation
- LAZ and/or GLZ load indicator (optional)
- load population recorder in accordance with FEM 9.755 (optional)
- second shut- down point (adjustable in 2 % steps)
- shut–down of main lifting speed on sudden load take–up
- Overload shut–down points can be set up to a maximum of 110 % of the rated load capacity of the hoist.
- integrated digital operator terminal for adjustment of unit
- display of fault messages on operator terminal and load indicator
- electrically isolated control signals
- compact space–saving design
- all connections made by plug–type connectors for easy maintenance
- integrated control and monitoring functions

1.2 Use for the Intended Purpose

The ABUS LIS- SE is designed for use in the control systems of electric hoists. The unit was designed especially for use with pole- changing induction motors. However, it may also be used for monitoring non-pole- changing induction motors. It is intended for installation in a closed housing and for use under the conditions listed in Section 4 below.
Special investigations must be made concerning the suitability of the unit for use in other conditions and modes of operation. It may be necessary to obtain the manufacturer's approval for any deviations.

1.3 Notes on warranty

ABUS assumes no liability for any loss or damage caused by use other than for the intended purpose or any work performed improperly or by unauthorized persons. ABUS assumes no liability as towards third parties.

Attention!
If you modify any components under your own responsibility, assemble components other than in accordance with the installation instructions and/or plans or use any components other than genuine ABUS components, ABUS will be released from any warranty obligations for the entire equipment.
ABUS assumes no liability whatsoever for any damage to cranes or hoists which may be caused by the incorrect setting of the unit.

It is recommended that repair and maintenance work should be carried out by the ABUS service department.

1.4 Replacement of unit

If a unit with load population recorder is replaced, the last value of the load population recorder must be read out and entered as the starting value for the new unit. In addition, a note must be made in the crane test book.

---

2 Functions

General:
in order to evaluate the load, the LIS- SE measures the current and voltage on all three phase conductors feeding the motor. Current is measured via an external instrument transformer module.
A load- proportional signal is derived from the values measured.

As load evaluation is not possible for about 150 ms in the start- up phase of the hoist motor, only the slow hoist speed is initially released for operation. After the completion of the load measurement and a delay of 0.5 sec., the fast speed is enabled if overloading is not detected.

In order to prevent a load from being lifted in inching operation, an inching counter is integrated in the system. This counter shuts down the hoist motor if the set limit is exceeded without load evaluation being possible.
If the preset load limits are exceeded, hoist movement is stopped or other appropriate action is initiated using relay contacts.

2.1 Overload Shut–Down

Overload shutdown thresholds can be set between 0 and 110 % of rated load using the DBE operator terminal. The values given in this section are based on the standard setting of 110 %. The LIS–SE is equipped with two relays for enabling the main and precision lifting speed. If the overload threshold is exceeded, these relays shut the hoist down. At the same time, the load indicator display flashes at intervals of one second.
The unit implements two types of overload shut–down function:

a) Static overload shut–down. Static loads must not exceed 110 % of the rated value. The actual load value is averaged over the measurement time and compared with the threshold. This prevents premature shut–down caused by dynamic load peaks. If the static load measured exceeds 110 % of the rated value, the two output relays are shut down.
b) Shut–down on sudden load increase. If the load increases too rapidly, the relay for the main lifting speed is shut down. The relay is only re–activated when the load has ceased to increase, provided that the maximum load has not been exceeded. This function prevents rope breakage as a result of lifting an excessive load with a loose rope at main lifting speed. Also, excessive force on the rope is prevented if the crane hook is suddenly blocked.

Note:
In the event of an overload shut–down, the load can always be lowered using the precision lifting speed. The ”overload” status is only reset if the load is lowered for at least one second.
The overload status is not reset by a power failure or by operation of the EMERGENCY SHUT–DOWN switch.

2.2 Part–Load Switch

In some applications, another shut–down point below the rated load is required in addition to the overload shut–down. This may be the case if part of the hall structure is not designed for the entire load capacity of a crane system.
The LIS - SE allows the user to set an additional shut-down point (which can be adjusted via parameter 4.0).As soon as a signal is available at input EA of the unit, the lifting relays drop out when the value set in parameter 4.0 is exceeded.
The unit is then switched to the overload mode.
A current transformer module with an additional switching relay may be used for more complex applications. The switching point for this relay may be set to any value between 0 and 110 % of rated load capacity using parameter P 4.2.

2.3 Taring

The load indicated can be set to zero with a defined load on the hook (for example, the weight of load supports) using the tare button (TARA) which is normally incorporated in the pendant control. To do so, this button must be pressed for at least 3 sec. during lifting until the display is reset to zero.
Before taring, a load must have been measured.
This procedure can be repeated at any time.
If a load lower than the value previously used for taring is lifted, the value ”–0.00” is displayed, indicating that the current load is lower than the tare load.
The tare value stored is deleted if the tare button is pressed for about 3 sec. when the hoist is stationary.

2.4 Load Population Recorder

(optional)

If a load population recorder is integrated in the LIS–SE, the actual operating conditions of a hoist can be recorded. In addition to the total running time T, which is equivalent to the time during which the motor is switched on, the actual load on the hoist is recorded. For this purpose, the unit evaluates the load measurements on a continuous basis.
The LIS–SE unit calculates the actual use S, the load spectrum factor Km and the remaining service life of the hoist in accordance with FEM 9.755 from these values. The load spectrum factor is equivalent to the load population with which the hoist was operated.

2.4.1 FEM Groups

The EU machinery directive calls for precautions to be taken to prevent risks caused by fatigue and ageing on hoists and cranes. The following precautions have therefore been taken in order to achieve safe working periods (S.W.P.).
Cranes and hoists are subdivided into various groups in accordance with FEM 9.511.
The operator of a standard hoist is responsible for ensuring that the actual operating conditions of the hoist are recorded and documented in the test book at least once per year. In the course of regular inspection, the inspector must verify and determine whether the hoist is still being operated within its safe working period.

The following table shows the theoretical service life D as a function of the FEM group and the load spectrum factor.

Theoretical service life D, (h)

	FEM groups	1Dm M1	1Cm M2	1Bm M3	1Am M4	2m M5	3m M6	4m M7	5m M8
Line	load group / ropes | load factor	Theoretical service life D (h)							
1	light 1 / L1 K = 0.5 ($Km_1 = 0.125 \equiv 0.5^3$)	800	1600	3200	6300	12500	25000	50000	100000
2	medium 2 / L2 0.5 < K < 0.63 ($Km_2 = 0.25 \equiv 0.63^3$)	400	800	1600	3200	6300	12500	25000	50000
3	heavy 3 / L3 0.63 < K < 0.8 ($Km_3 = 0.5 \equiv 0.8^3$)	200	400	800	1600	3200	6300	12500	25000
4	very heavy 4 / L4 0.8 < K < 1 ($Km_4 = 1 \equiv 1^3$)	100	200	400	800	1600	3200	6300	12500

When the theoretical service life D has elapsed, cranes and hoists connected to them may represent a risk to persons and machines. If a load population recorder is used, it is easier to determine the actual hours of use S, from which the remaining service life is calculated.

In the case of standard hoists equipped with anLIS–SE with integrated load population recorder, the operating conditions are recorded electronically. The inspector can have the actual hours of use S and other parameters displayed at any time (see Section 5.3).

The FEM group is stored in the LIS–SE unit and can be displayed using the operator terminal. The group is indicated in hours at full load.

2.4.2 Definitions

Theoretical service life

The theoretical service life D is the calculated hours of service of a crane or a hoist over a period of about 10 years taking into consideration the group determined in accordance with FEM 9.511.

Actual hours of use

The actual hours of use S represent the effective use of the unit determined on the basis of operating hours and load populations.

Total service life

The total service life of a standard hoist is the period from initial commissioning through to final decommissioning of the hoist.

Remaining service life

The remaining service life or theoretical remaining service life of a hoist is the difference between the actual hours of use S and the theoretical service life D. When the theoretical service life has elapsed, the hoist must be overhauled.I

Safe working period (SWP)

The hoist is within its safe working period if S/D is less than or equal to 1.

2.5 Integrated Control Functions

In addition to overload protection functions, the LIS-SE features a number of integrated hoist control functions.

- AC- 4 disable control
  In order to prolong the service life of the high lifting speed contactor, the LIS- SE unit prevents the contactor from being switched off until the set start- up delay of the motor has elapsed. This function significantly reduces contact erosion.
- Braking with the motor acting as a generator
  Each time the hoist is braked from high speed, the LIS- SE unit ensures that the hoist is first braked by operating the motor as a generator at low speed before the brake is activated. This significantly extends the service life of the brake rotor.
- Motor current monitoring function
  LIS- SE monitors the current inputs.
  If excessive motor current is detected for an inadmissibly long time, the unit immediately switches off main contactor K1.

The motor circuit breakers installed in the electrical control system are therefore no longer required
The main contactor is also switched off if a motor current is detected without a lifting or lowering control signal.
Following a shut- down, the unit display flashes and the current measured is indicated.
The unit is switched back on automatically after a delay of 2 minutes.
To reset the unit before this delay has elapsed, proceed as follows:

a. Switch off the power supply.
b. Press the up and down buttons on the digital operator terminal at the same time.

2.6 Safety Functions

The LIS- SE is a microprocessor- controlled unit. In order to ensure the highest level of operational safety, the unit is equipped with an additional switching relay which only enables lifting or lowering if the correct mode of operation of the microprocessor is detected. The mode of operation is monitored by integrated logic which operates independently of the microprocessor. Before hoist motor starting is enabled, the system checks whether the switching relay is in rest position. If this is not the case, for example as a result of "welding" of the relay contacts, the monitoring system positively prevents hoist start- up.
As a further safety function, the system monitors whether the lifting or lowering signal is present at all times when the hoist motor is in operation. If the logic circuitry does not detect a control signal at any time, the hoist is automatically shut down by the safety circuit.

---

3 Components

3.1 LIS–SE evaluation unit

The LIS–SE unit (see **Figur 1**) is designed for evaluating the power of one hoist motor.
The terminals for motor voltage evaluation are designated L1 to L3 and the current module terminals are designated I1 to I3.
The functions of the isolated control inputs E1 to E4 are as follows:

E1 = not used
E2 = lowering control signal
E3 = taring control signal
E4 = monitoring of fast lifting speed
E5 = receipt of malfunction signal from hoist 2
E6 = lifting control signal
E7 = fast control signal
EA = activation of second overload shut- down point

Output Q supplies a serial data protocol for the control of the ABUS load indicators LAZ (display in pendant control) and GLZ (large load display).
The 5V power supply for the LAZ unit is provided by the LIS–SE unit.
The GLZ unit has an integrated 24 V AC power supply.
The integrated digital operator terminal DBE is used for reading and setting the variable parameters of the LIS–SE unit (see also Section 5.1).

3.2 Current Measurement Module

The current module is selected on the basis of the rated current of the hoist motor in main lifting speed (see table).

Measuring range	Rated current [A]	Art.–No.
0	3	19683
I	8	9743
II	16	9744
III	23	9745
IV	36	9746
V	60	9747
VI	136	19682

The marked conductors of the current terminal are connected to terminals I1, I2, I3 and GND of the SE unit.

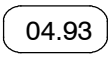
3.3 Load indicator (Optional)

The LIS–SE is equipped with contacts for the connection of an ABUS load indicator. The load can then be indicated by a three or four–digit LAZ load indicator incorporated in the pendant control and/or a large GLZ load indicator. Both types of load indicator are so designed that it is easy to read the load value even in poor visibility.
During lifting operation, the driver stage of the display is updated at intervals of 2 seconds, ensuring that any load changes are rapidly indicated. In the case of pole–changing hoist motors, loads are evaluated separately for the main and precision lifting speeds. In order to distinguish the indication of precision lifting, the display flashes at 2/1 second intervals. In the precision lifting speed, the accuracy at rated load is normally better than 10 % of rated load. In the main lifting speed, the accuracy is normally approx. 5 %. In the event of overloading, the display flashes at intervals of 1 sec.

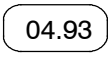
3.3.1 Function of load indicator

3.3.1.1 Normal functions

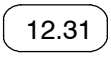
1. The load is always measured and indicated with the motor running in lifting operation.

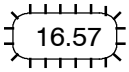
2. When the hoist is at a standstill and during lowering, the last value measured is displayed.
   e.g.

3. The value indicated is updated when the hoist is raised again.

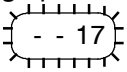
   

4. If the hoist is shut down as a result of overloading, the display **flashes** at one- second intervals.

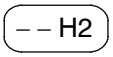
   

3.3.1.2 Malfunction signals

1. If the hoist is shut down because the maximum limit of the inching counter is exceeded, the number of inching operations completed is displayed.
   e.g.

2. In the case of mutual monitoring of two hoists, this symbol appears on the display in the event of a hoist failure as long as the up or down button on the pendant control is pressed:

3. If a rotor power input of <10Watt is measured with the motor in operation, the hoist is shut down and

   is indicated on the display as long as the ”up” or ”down” button on the pendant control is pressed.

---

4 Technical Data

4.1 Load Indicator SystemLIS–SE

LIS – SE	17787	17788	17789
Power supply voltage A1,A2:	230VAC ± 10%	110VAC ± 10%	48VAC ± 10%
Input voltage range E1–E7; EA	80–230VAC	80–230VAC	35–48VAC
Measuring range L1, L2, L3	0 – 627 V AC		
Transformer output voltage I1, I2, I3	0 – 7,24 V AC		
Power supply frequency	50 – 60 Hz		
Switch contacts (3u,1a):	250 V AC, 8A		
Power required	max. 15VA		
Ambient temperature range	–20 to +55 °C; no condensation		
Output voltage for LAZ	5V, max. 250 mA		
Indicator signal Q	Serial data protocol ± 12V		
Maximum acceleration time for hoist motor	Low speed: 150 ms High speed: 460 ms		

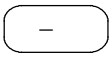
4.2 LAZ / GLZ Load Indicator

	Pendant control LAZ	Large load indicator GLZ
Power supply voltage	5VDC	24VAC
Digit size	10 mm (LED)	127 mm (LED)

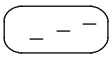
5 Operation

5.1 Digital Operator Terminal

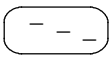
The integrated digital operator terminal (DBE) with LED display and three–button keypad **(Figur 1, items 1 to 4)** is used for operating the unit and reading operating parameters. The unit is normally in the power down mode. This is indicated on the display **(4)** by a horizontal bar running from left to right.



If the unit detects a lift signal (E6), the display show steps running from **bottom** left to **top** right.



In the case of a lower signal (E2,) the steps run from **top** left to **bottom** right.



Following each operation of the hoist, the current reading of the operating hours meter is shown on the display for about 3 seconds.

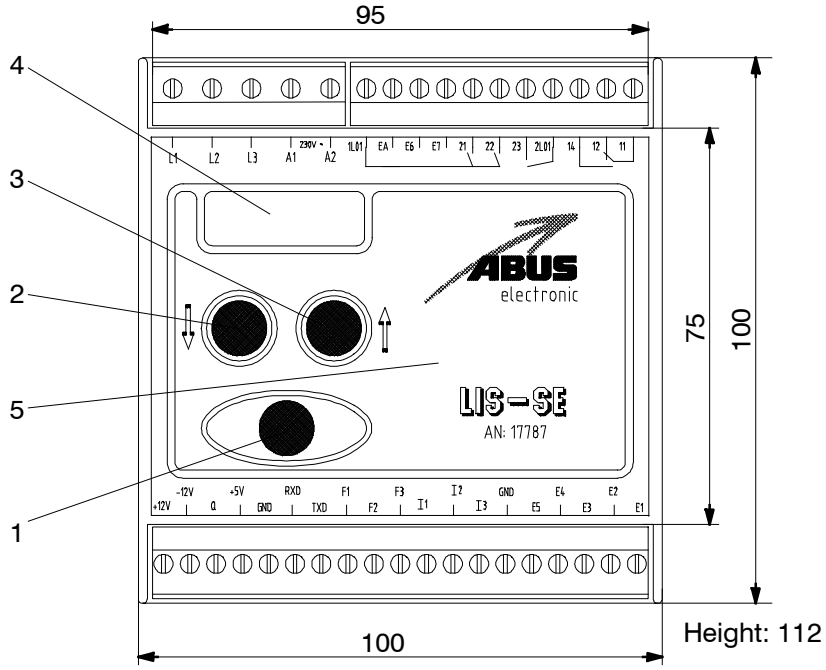
The parameter level consists of three operation levels. In order to access level 3, a PIN authorized by ABUS and a special CODE no. must be entered.

Menu level 2 is accessed by entering the PIN number “0055”.

Menu level 1 us used solely for reading the values of the load population recorder and is only available if the load population recorder has been enabled. To reach this menu level, press the ENTER button for about 2 seconds and then enter the appropriate CODE number (see Section 5.3)

If four incorrect attempts are made to enter a PIN or CODE number, the menu level concerned is entirely disabled and can only be enabled by ABUS.

In this case, **[no]** appears on the display.



1 “Enter”–key

2 “up“–key

3 “down”–key

4 Display

5 digital operator terminal (DBE)

Figur 1

5.2 Basic Settings

TheLIS–SE is adjusted at the factory. Any fine adjustments or new adjustments which may be necessary can be carried out in accordance with the adjustment instructions in chapter 10 using a test load. Where possible, the test load should be equal to the rated load.

If the test load is lower, there will be a significant deterioration in system accuracy. As a basic principle, the higher the test load, the higher the accuracy. It is recommended that a test load of at least 80 % of the rated load should be used.

5.3 Reading the Load Population Recorder

Menu level 1

The work required for enabling the load population recorder can only be performed by ABUS.

If a valid code number “2223” is entered, the values stored and calculated by the load population recorder are displayed in sequence. To return to level 1, you must press the enter button (1, **Figur 1**) for a little longer.

6 Installation

Attention!
Before commissioning the unit, it is essential to check whether the system has been wired up in accordance with the attached wiring diagrams.

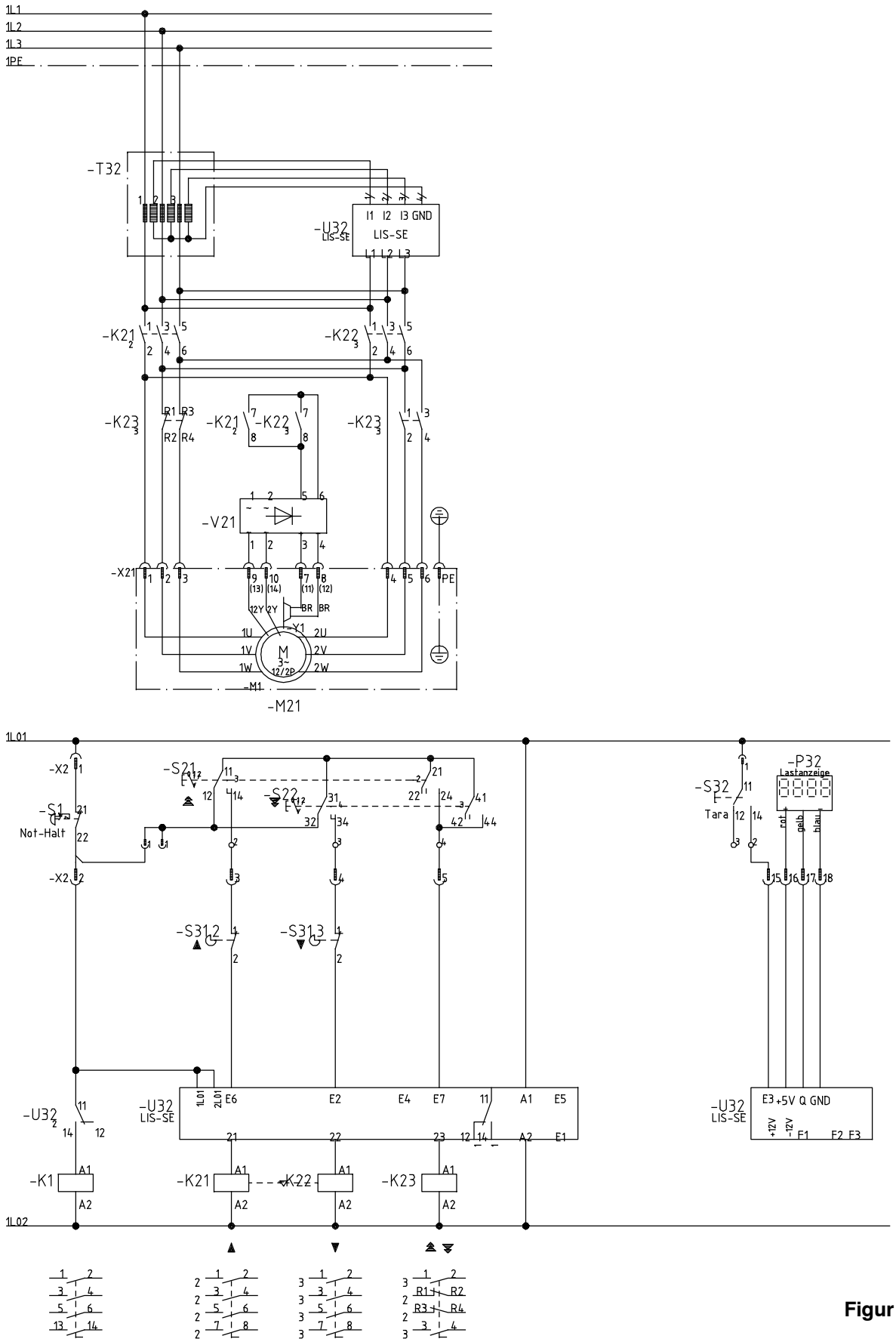
The ABUS LIS–SE must only be installed by qualified electricians

If the LIS–SE is retrofitted to an existing crane, inspection by an independent inspector may be necessary (see BGV D6, Section 25).

6.1 Housing and wiring diagrams

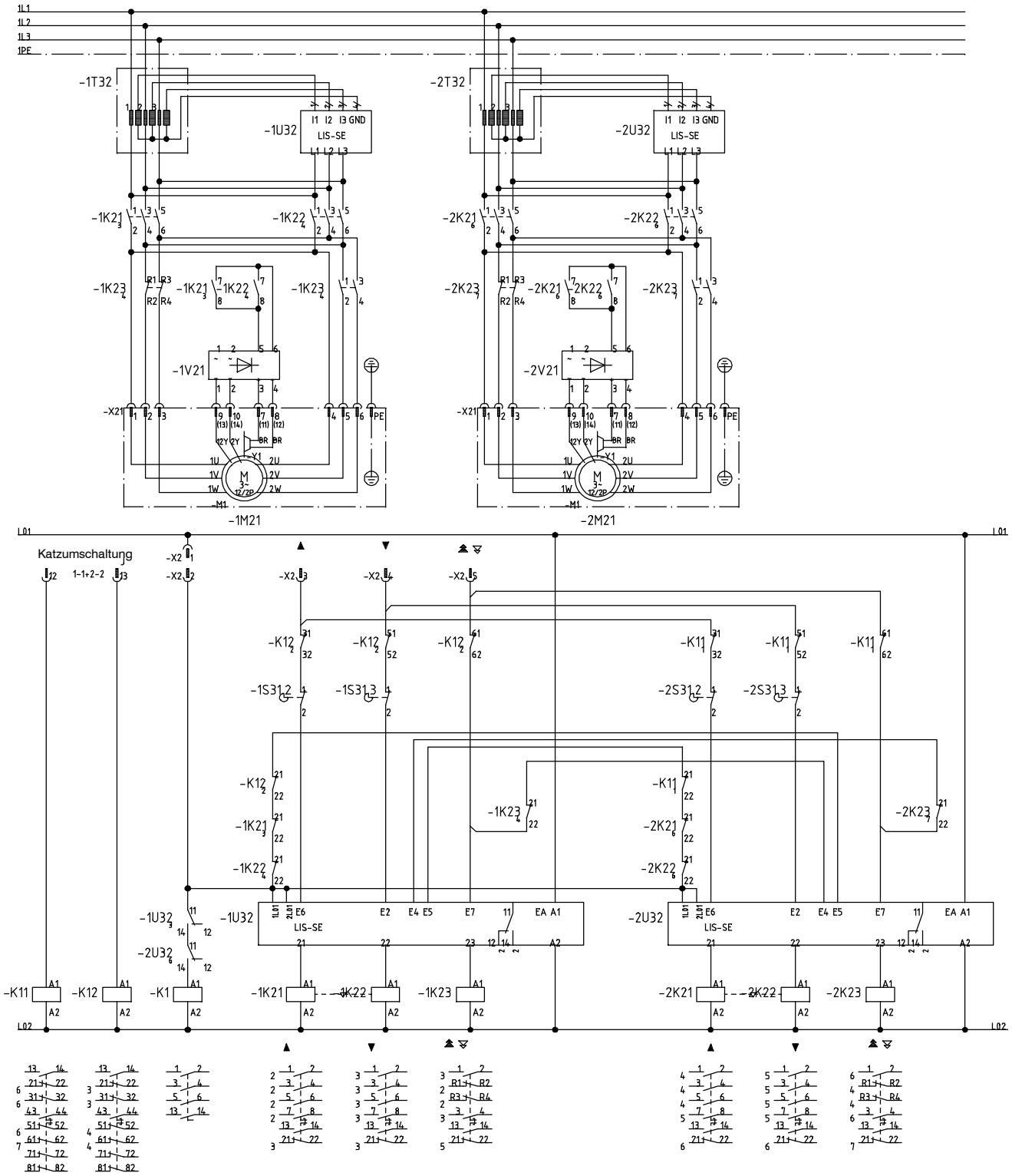
The dimensions required for the installation of the LIS–SE are given in **Figur 1**.

Standard wiring diagram, LIS- SE with one hoist



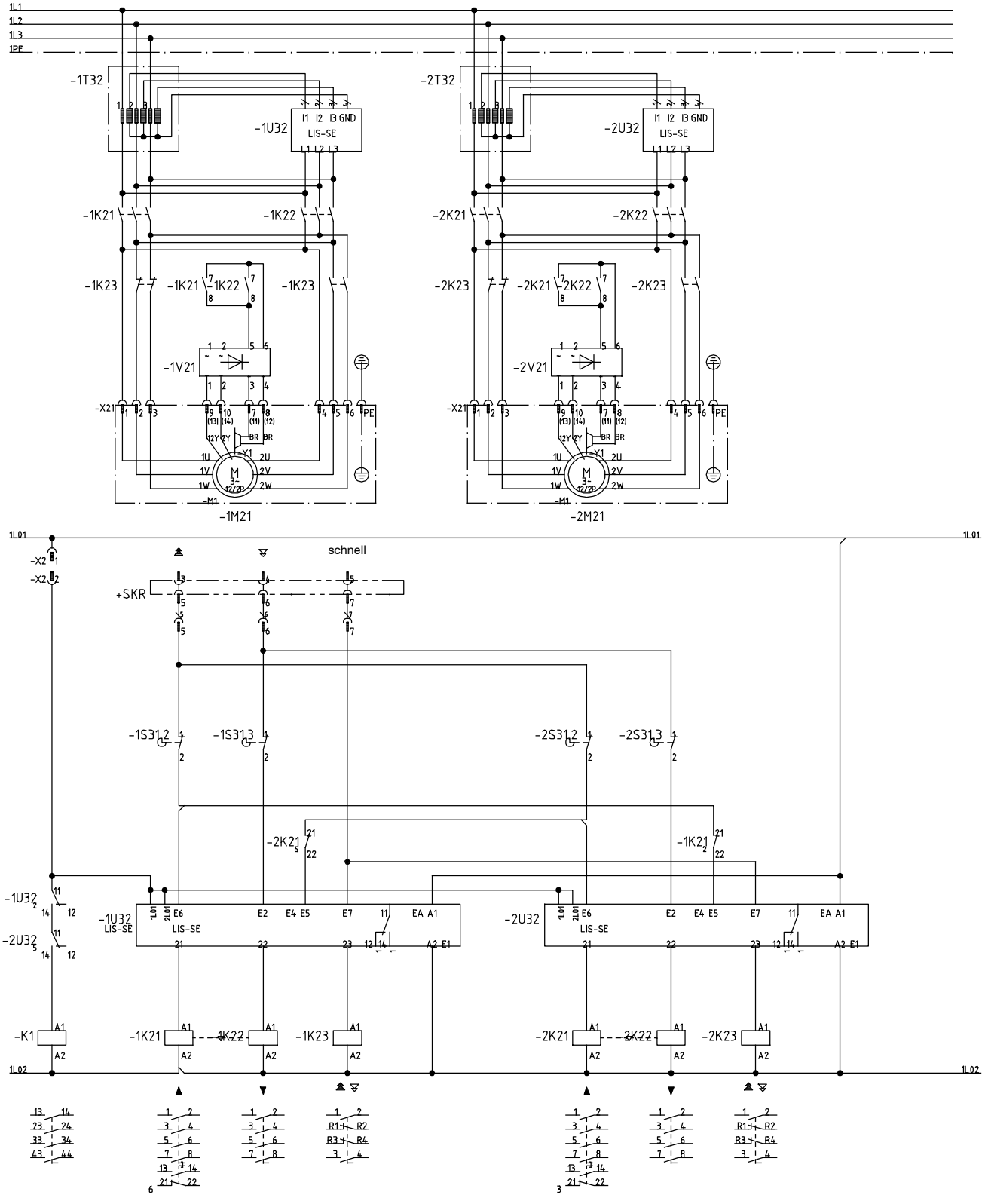
Figur 2

Standard wiring diagram, LIS- SE with two hoists



Figur 3

Standard wiring diagram, LIS- SE with twin hoist



Figur 4

6.2 Regulations

The load indicator systemLIS–SE is in accordance with the following codes and standards:

NSR 20014/35/EG (low voltage)

EMC 2014/30/EG (electromagnetic compatibility)

EN 61000- 6- 4 (interference emission)
EN 61000- 6- 2 (resistance to interferences)

Electrical installation work must be performed in accordance with the following general codes and standards:

IEC 60364- 5- 56
Requirements for the installation of power systems with rated voltages up to 1000V

EN 60204- 32
Safety of machinery: Electrical equipment of machines; requirements for hoists.

For special applications, other standards and regulations may also be applicable.

Safety warnings:
You must not carry out any work inside the unit.

In the event of a defect in anLIS–SE unit, please contact our service department.
In order to avoid the risk of serious injury and severe damage, only persons qualified to work on electric power systems may work on the units. Before installing any commissioning the units, these persons must carefully read the operating instructions and observe the safety instructions.

Attention!
Any modifications to ABUS products and any parts installed in or on ABUS products which could impair the safety of the products must be approved by the manufacturer. ABUS will not be liable for any injury, loss or damage which may occur as a result of modifications which have not been approved or the use of products other than for the intended purpose.

Note:
ELECTROMAGNETIC COMPATIBILITY
The unit has been designed in accordance with the EMC directive no. 2014/30/EG.

---

7 Malfunctions

7.1 Causes and Remedies

TheLIS–SE displays the following error codes on the operator terminal or the load display.

Err–Code	Explanation	Remedy
Err 1	Current correction factor not entered	Enter current correction factor in parameter P 1.3
Err 2	Rated load capacity not set	Enter load capacity in parameter P 0.1
Err 3	Unit not set	Set unit with known load
Err 6	Is displayed when parameter P 2.3 is selected Setting load too low or setting/connection error	Increase load to 80 % of rated load capacity
Err 7	Setting not correctly completed	see page 14
Err 8	Data save error	Replace unit
Err 9	Data read error	Press ”Enter” until the function returns. Otherwise, replace unit
U_I	Measured rotor power input <10 Watt	Check the basic setting of the unit; if the setting is OK, the problem has probably been caused by the wiring factor.

The input and output voltage data required for troubleshooting are stated in Section 4 ”Technical Data”.
If any other malfunctions occur, please contact our service centre (see Section 7.2).

7.2 Service

Notes:
The ABUS Service Centre can be reached day and night.

8 Activation of LIS control unit

Important: Once the load measurement and evaluation function has been activated, it cannot be deactivated again.
To activate the load measurement and evaluation function of the LIS control unit, select parameter 3.0 using the ”up” button. Press the ”enter” button for some time and the system will request you to enter a PIN no. Enter ”0055”. Press ”enter” again. The unit will be re- initialized and activation will be completed.

---

9 Disposal

ABUS products are designed with a view to recycling and have a modular structure which facilitates environmentally compatible disposal when they are no longer required.

The electronic components may be disposed of at special disposal sites in accordance with the applicable local regulations.

---

10 LIS – SE parameter list

Parameter	Range	Unit	Designation	Remarks
CodE			*Reading out load population recorder “Menu level 1”*	*Only available if LKS has been enabled. CODE 2223*
P 0.0	0 – 100	t	Total load capacity	Input not required
P 0.1	0 – 80	t	Display and input *Load capacity, hoist 1*	
P 1.1	0 – 17		Display and input *Motor type*	in accordance with table
P 1.2	0–97,999		Display and input *Winding resistance*	
P 1.3			Display and input *Current correction factor*	
P 2.1			Display and input *Unit setting, precision lift*	
P 2.2			Display and input *Unit setting, main lift*	
P 2.3			Unit setting t load ”Teach–in 1”	
P 2.4			Unit diagnosis parameter *CODE 1443*	
P 3.0		t	Display mode *”Load indication”*	
P 3.1		kW	Display mode *”Rotating field power”*	
P 3.2		t	Display mode *”Load indication”*	
P 3.3		A	Display mode *”Conductor current”*	
P 3.4		V	Display mode *”Supply voltage”*	
P 3.41		V	Network voltage analysis	
P 4.0	0–110	%	Display and input *second shut- down point*	only active with signal at input EA
P 4.1	0–110	%	Display and input *Overload shut–down, hoist 1*	
P 4.2	0–110	%	Display and input *Part–load switch 1*	
P 4.3				no function
P 4.4			Operation on twin hoist	no function

Parameter	Range	Unit	Designation	Remarks
P 5.0	300	ms	Extend measurement time (main lift only) *Code*	May only be changed with the permission of ABUS
P 5.01	20 – 255		Sensitivity to rapid load increase *Code*	May only be changed with the permission of ABUS
P 5.1		h	Display of *theoretical service life*	
P 5.2		h	Read load population recorder	
P 5.3			Acceptance test	
P 5.4	12 – 30		Set / change inching counter	May only be changed with the permission of ABUS
P 5.5			Delete all settings	
P 6.1			Display / input Starting value for load population recorder	
P 6.2		h	Display *Actual hours of use S*	
P 6.3		h	Display *Total operating hours Ti*	
P 6.4		h	Set FEM group *Special ABUS CODE*	This parameter is used to enable the load population recorder; *The parameter can only be set by ABUS.*
P 6.5			delete load population recorder *Code*	CODE only accessible to inspector.
P 7.0			Password input for level 3	*Only for ABUS*
P 9.9			Quit parameter level	**Quit menu level**

11 Description of LIS – SE parameters

0015 Operating hours are displayed on unit.
This display appears if
1. after the hoist has been shut down for about 3 sec.
2. after you have pressed the ”Enter” button briefly

Menu level 1

CodE Readout of load population recorder by customer:
Appears on the display if you press the *Enter* key for some time, provided that the load population recorder has been enabled by ABUS.

Menu level 2

Before carrying out any settings on the LIS–SE, you should read the notes on the parameters carefully.
Always remember that incorrect settings may cause malfunction.
ABUS will assume no liability whatsoever for any damage to the crane or any consequential damage resulting from incorrect settings.

On level 2, if no entries are made for 5 minutes, the unit switches to the operating mode.

All entries made and saved up to that point are maintained.

Parameter: **P 0.0** Total load capacity of crane or system

Adjustment:
This parameter currently has no effect on evaluation. It is not necessary to enter a value.

Parameter: **P 0.1** Load capacity of hoist **1**
This parameter defines the load capacity of the hoist. About 200 load capacity values are stored in the LIS–SE, in steps of 100 kg up to a value of 10 t and in steps of 500 kg for values above 10 t.

Adjustment:
The rated load capacity of the hoist must always be entered.

Parameter: **P 1.1** Enter motor type
This parameter defines the motor data: the values in the list "Current measurement modules for GM hoists" must be entered. The table only applies to the latest generation of ABUS motors, voltage range 380- 415 V, star circuitry

Adjustment:
The value in the motor type column for the current generation of ABUS hoists must be entered.
In this case, it is not necessary to enter parameters P 1.2 and P 1.3. The unit sets these parameters automatically as the values for current–generation hoists are stored in the unit.
For older ABUS hoists, non–ABUS hoists and hoists with a supply voltage other than 400 V, "0" must be entered.
In this case, parameters P 1.2 and P 1.3 must also be set.
In order to prevent unintentional deletion of the preset data with motor type "0", the code must be entered before making any changes.
To enter the code, keep the *Enter* key pressed until *Code* appears on the display. After you have entered the code number *1443*, the unit automatically switches to parameter 1.2 and then to parameter 1.3, without indicating the parameter number.

Parameter: **P 1.2** Enter winding resistance
This parameter defines the resistance (R) of the precision and main lift windings.
The resistance must be measured on the motor; the value required is the resistance in one phase. In the case of motors with *delta circuits*, the equivalent star circuit resistance must be entered.

Adjustment:
This parameter has two levels:

Level 1:
1. display of R (in Ohms) of precision lift winding
2. display of R (in Ohms) of main lift winding

Level 2: (can be accessed using CODE 1443)
1. entry of measured resistance (in Ohms) of precision lift winding
2. entry of measured resistance (in Ohms) of main lift winding

Following the entry and verification of the resistance value, there may be a discrepancy between the value entered and the value displayed. This discrepancy is caused by processing in the computer but has no effect on accuracy.

Parameter: **P 1.3** Enter current correction factor
This parameter defines the correction factor for the current measurement modules.
The correction factor must be taken from the table "correction factors for current measurement modules".

Adjustment:
This parameter has two levels:

Level 1:
- display of correction factor stored

Level 2: (can be accessed using CODE 1443)
- entry of correction factor from table 1

Parameter: **P 2.1** Precision lift setting
This parameter can be used for reading stored values and entering new values.

Input:
This parameter has two levels:

Level 1:
Last – *1* – display empty hook load, precision lift (zero load)
Po–r – *1* – display empty hook power, precision lift
Last – *2* – display known load, precision lift
Po–r – *2* – display known power, precision lift

Level 2: (CODE 1443 required for access)
Last – *1* – enter empty hook load, precision lift (zero load)
Po–r – *1* – enter empty hook power, precision lift
Last – *2* – enter known load, precision lift
Po–r – *2* – enter known load power, precision lift
Last = load on hook
Po–r = rotating field power
– *1* – = zero load on hook
– *2* – = known load on hook

Parameter: **P 2.2** Main lift setting
This parameter can be selected for reading stored values and entering new values.

Input:
This parameter has two levels:

Level 1:
Last – *1* – display empty hook load, main lift (zero load)
Po–r – *1* – display empty hook power, main lift
Last – *2* – display known load, main lift
Po–r – *2* – display known power, main lift

Level 2: (CODE 1443 required for access)
Last – *1* – enter empty hook load, main lift (zero load)
Po–r – *1* – enter empty hook power, main lift
Last – *2* – enter known load, main lift
Po–r – *2* – enter known load power, main lift
Last = load on hook
Po–r = rotating field power
– *1* – = zero load on hook
– *2* – = known load on hook

Parameter: **P 2.3** Unit setting under load

This parameter is used for automatically measuring and recording the points needed for the precision and main lift load lines following a defined program.

Adjustment:

Step 1: enter known load (using DBE)
The other steps are completed from ground level using the pendant control.

Step 2: Pro 1 = precision lift setting, zero load
Using the pendant control, the precision lift must be operated until the motor is shut down (after about 5 sec.).
The rotating field power is automatically measured and recorded.
The power recorded is indicated on the display until the key is released.

Step 3: Pro 2 = main lift setting, zero load
Using the pendant control, the main lift must be operated until the motor is shut down (after about 5 sec.). The rotating field power is automatically measured and recorded.
The power recorded is indicated on the display until the key is released.

Step 4: lift known load in precision lift until load is suspended
This function is enabled for 15 min. If confirmation is not given by pressing emergency shut–down within this time, theLIS–SE switches back to normal mode. The setting must then be repeated.

Step 5: press emergency shut–down when load is suspended freely; the key must be pressed for more than 5 sec. After the emergency shut–down has been reset, the procedure continues with step 6.

Step 6: Pro 3 = precision lift setting, known load
Using the pendant control, the precision lift must be operated. The rotating field power is automatically measured and recorded.
The power recorded is indicated on the display until the key is released.

Step 7: Pro 4 = main lift setting, known load
Using the pendant control, the main lift must be operated until the motor is shut down (after about 5 sec.). The rotating field power is automatically measured and recorded.
The power recorded is indicated on the display until the key is released.

Step 8: Lift known load in main lift until hoist motor shuts down. In the case of short hook paths, this step may also be completed in precision lift.

Step 9: Lower load

Step 10: Compare load with indication onLIS–SE unit. If the deviation is more than 10 %, the procedure must be repeated.

Caution!
If any of the steps 2, 3, 6 or 7 is interrupted too soon by releasing the button (before the hoist motor is automatically shut down), Err 7 appears on the display. If you release the key and press the Enter key, the program will automatically revert to Step 2. The setting procedure must be repeated by pressing the ENTER button.
In case of an insufficient adjustment load, after step 6 the message Err6 will appear on the display.
In this case, the adjustment has also to be repeated.

Parameter: **P 2.4** Equipment diagnosis

This parameter can be used to switch the outputs of the LIS–SE manually (main lift, precision lift, Y1 and Y2). In addition, the signals at inputs E1 to E7, EA can be tested.
The hoist cannot be operated when this parameter is selected.

To access the diagnosis parameter, enter *CODE no. 1443.*
This parameter allows you to perform the following tests:

- output relay test
- part- load switch test
- input test

To call up the various tests in sequence, press the Enter key.

Output relay test							
	Switch contact status				Display	Note	Error display
Test point	Lift	Lower	Fast	Monitoring			
- - 0 -	0	0	0	0	0001	all relays at rest	0000
- - 1 -	1	0	0	0	1000	relays set to ”lift”	1001
- - 2 -	0	1	0	0	0100	relays set to ”lower”	0101
- - 3 -	0	0	1	1	0011	relays set to ”fast”	
Part- load switch test							
- - 4 -	External part load switch test currently not active						
- - 5 -							
Input test “E6” / “E2” / “E7” / “EA”							
	Input status				Display	Note	Error display
	E6	E2	E7	EA			
- - 6 -	0	0	0	0	4000	no signal at inputs monitoring ok	0000
	1	0	0	0	0001	”lift” signal at input	4000
	0	1	0	0	0020	”lower” signal at input	4000
	1 0	0 1	1	1	0301 0320	”fast” and “lift” signal at input ”fast” and “lower” signal at input	4000
Input test “E1” / “E3” / “E4” / “E5”							
	Input status				Display	Note	Error display
	E5	E4	E3	E1			
- - 7 -	0	0	0	1	0005	signal at input E1 evaluated	0000
	0	0	1	0	0060	signal at input E3 evaluated	0000
	0	1	0	0	0700	signal at input E4 evaluated	0000
	1	0	0	0	8000	signal at input E5 evaluated	0000

(0 = contact open, 1 = contact closed)
You must leave this parameter following each test.
For safety reasons, a time limit has been incorporated for this parameter. When this parameter has been selected for 45 minutes, the unit is switched automatically back to normal operation.
To leave the diagnosis parameter, press the Enter key for some time.

Parameter: **P 3.0** Display mode – load indication (in t)
When this parameter is selected, the last load measured is indicated.
Measurement and display are only possible with the motor running. When the motor is shut down, the display is frozen.If the motor is started up again, the display is updated.
When this parameter is selected, the unit switches to a *special mode of operation*. The overload protection function of the unit is active but the load is displayed and not the operating hours.

Parameter: **P 3.1** Display mode – rotating field power (in kW)
When this parameter is selected, the power measured is indicated.
Measurement and display are only possible with the motor running. When the motor is shut down, the display is frozen.

Parameter: **P 3.2** Display mode – load indication (in t)
This has the same function as parameter P3.0 except that **the overload protection function is disabled**.

Parameter: **P 3.3** Display mode – conductor current (in A)
When this parameter is selected, the conductor current measured is indicated.
Measurement and display are only possible with the motor running. When the motor is shut down, the display is frozen. If the motor is started up again, the display is updated following the measurement time.

Parameter: **P 3.4** Display mode – supply voltage (in V)

When this parameter is selected, the supply voltage measured is indicated.
Measurement and display are only possible with the motor running. When the motor is shut down, the display is frozen. If the motor is started up again, the display is updated following the measurement time.

Note:
In parameters 3.1 to 3.4, the overload protection function is ***disabled***.

The special display mode remains active for about 20 min, after which the unit automatically switches back to the normal display mode.

If you wish to quit the special display mode before the 20 min. have elapsed, you must return to the normal display mode by selecting parameter P 9.9.

Parameter: **P 3.41** Supply voltage analysis

This parameter allows simple, rapid diagnosis of the power supply voltage with the hoist in operation.
If the unit is in normal operation, the power supply voltage is recorded for 500 ms each time main lift is activated.
After this parameter has been selected, the r.m.s. value of the supply voltage is calculated for intervals of 50 ms each. To switch to the value for the next interval, simply press the Enter key.

Parameter: **P4.0** Second shut- down point

Using parameter P4.0, you can set the additional shut- down point to any value between 0 and 100 % in 2 % steps.
After this parameter has been selected, the value stored is displayed. Use the up and down keys to change the value. To confirm the value selected, press Enter.

Safety note!
As the unit has an internal monitoring system to detect possible relay welding, a power supply for the activation of the shut- down point must only be available at input EA when outputs K21 and K22 have switched.

Parameter: **P4.1** Overload shut–down, hoist **1**

The overload shut–down point is defined by this parameter and the value entered for parameter P 0.1.
Adjustment:
110 % of rated load capacity.
This parameter cannot be set to a value higher than 110 % of rated load capacity.
A value between 2 % and 110 % can be set.

Parameter: **P 4.2** Part–load switch **1**

These parameters can be used to set shut–down points from 0 to 100 % of rated load capacity, in steps of 2 %.
The shut- down point of the part load switch always refers to the rated load capacity of the hoist.
It is only necessary to enter a value if you need to use the part- load switch.

Parameter: **P 4.3** Currently not used

Parameter: **P 4.4** Operation on twin hoist

Parameter P4.4 is used to set the unit for special operating conditions. The parameter can be set to 0, 1 or 2. Depending on the mode of operation, select the following value:

Mode of operation	Unit 1	Unit 2
One hoist	0	- - -
Two parallel hoists	1	1
Operation on twin hoist	1	2

Parameter: **P 5.0** Extension of measurement time, main lift

The parameter, which is used to extend the measurement time, can only be accessed using a special code.

Adjustment:
Standard setting 300 ms.

Parameter: **P 5.01** Change sensitivity to rapid load change

The parameter can only be accessed using a special code. This parameter must not be used without the permission of ABUS.

Parameter: **P 5.1** Display FEM group

This parameter indicates the full–load hours of the corresponding FEM group. It cannot be used to change the full–load hours or the FEM group.
If this parameter is set to 0000, the load population recorder is not active.

FEM group		Full–load hours
1Dm	M1	100
1Cm	M2	200
1Bm	M3	400
1Am	M4	800
2m	M5	1600
3m	M6	3200
4m	M7	6300
5m	M8	12500

Parameter: **P 5.2** Load population recorder

This parameter can be used to read out the data of the load population recorder:
1. Theoretical service life **D**
2. Actual hours of use **S**
3. Load spectrum factor **kmi**
4. Total operating hours **Ti**
5. Remaining service life
6. Starting value

Adjustment:
It is only possible to read out the data of the load population recorder if the recorder has been enabled. **Only ABUS can enable the load population recorder.**
If the load population recorder is not enabled, it is not possible to call up any data for the recorder.
If the load population recorder has been enabled and activated, the data can be called up on menu level 1 after entering *CODE 2223*.

Parameter: **P 5.3** Acceptance test
This parameter can be used to switch the outputs of the LIS–SE manually (main lift, precision lift, Y1 and Y2).
In this mode of operation, the **overload protection function is overridden** (no overload shut–down).
Caution: The switch contacts are always switched in accordance with the control signal received.

Value on display	Function
1	lifting/lowering not possible
2	slow lifting/lowering possible
3	fast lifting/lowering possible
4	– – –
5	– – –

(0 = contact open, 1 = contact closed)
You must leave this parameter following each test.
If the LIS- SE continues to be set to this parameter, the hoist will operate, but the overload protection function will be deactivated. For this reason, a time limit has been incorporated for this parameter. When this parameter has been selected for about 45 minutes, the LIS- SE is switched automatically back to normal operation, and the overload protection function is active again.

Parameter: **P 5.4** Max. cycles (inching)
This parameter can only be accessed using a special CODE.

Adjustment
This parameter is set to 16.

Parameter: **P 5.5** Delete all parameters (except load population recorder values)
It can only be accessed using *CODE 1443*.

Caution !!
This parameter deletes ***all*** parameters except for those of the load population recorder.

Parameter: **P 6.1** Enter starting value
This parameter is used to enter a starting value (in hours) which must be deducted from the theoretical hours at full load when calculating the remaining service life.
(For example, this parameter is used when installing a newLIS–SE on an existing system.)

Adjustment:
This parameter has two levels:
1. Level 1 = display stored starting value
2. Level 2 = set new starting value

CODE 1443 must be entered in order to access level 2.

Parameter: **P 6.2** Display actual hours of use **S**
To display the value stored, press Enter.

Parameter: **P 6.3** Display total operating hours **Ti**
To display the value stored, press Enter.

Parameter: **P 6.4** Enter FEM group
This parameter is used to set the FEM group and to activate the load population recorder. It can only be used if the load population recorder has been enabled by ABUS.

Adjustment:
This parameter can only be enabled by ABUS.
The theoretical service life stated by the manufacturer is entered (in hours at full load). (See also table 1 in FEM 9.755.)

Parameter: **P 6.5** Erase all values of load population recorder
This parameter is used to erase the values stored in the load population recorder

Adjustment
A special CODE must be entered in order to access this parameter.

Parameter: **P 7.0** Password (code) input for level 3
When this parameter is selected, level 3 can be accessed by entering a code. This code no. is only available to ABUS.

Parameter: **P 9.9** Quit parameter level
This parameter is used to quit the parameter setting mode. The hoist is then ready for operation and the overload protection function is active.

Further Information

1. Parameter P 0.1 must always be set in accordance with the load capacity of the hoist.If this parameter is not set correctly, the shut–down point of the overload protection device may be too high or too low.

2. TheLIS–SE should be adjusted using a load of 80 % or more of the rated load capacity. At this load, the accuracy is as specified.
   The minimum load which can be used for adjustment is 40 % of rated load capacity. However, the specified accuracy cannot always be reached at this value.
   If it is only possible to adjust the unit with a load between 40 % and 80 % of rated load, this must be stated in the test report (failure to comply with specified tolerances).

3. After an incorrect PIN code or CODE no. has been entered four times, the unit is locked out for all further PIN and CODE entries.
   If the unit is locked out and you attempt to enter a PIN or CODE number, ”no” appears on the display.
   A locked out unit can only be unlocked by ABUS.
   However, the unit will still function correctly.

   [no]

4. When you leave the menu level, the current software version is displayed.

---

5. Table 1: *Measuring ranges of current measurement modules*

Current measurement module				
Measuring range	I_n [A] Current measurement module	**Correction factor**	AN	Remarks
0	3	**115**	19683	
I	8	**306**	9743	
II	16	**613**	9744	
III	23	**873**	9745	
IV	36	**1381**	9746	
V	60	**2344**	9747	
VI	136	**5169**	19682	

12 Standard settings

Important: Steps 1a* and 1b* only apply if the load population recorder is **activated**.
Otherwise, start with step 1.

0 flashing

No.	Key	Description	Display
*1a**	*Enter*	*"Code" appears on display*	*C o d E*
*1b**	*Enter briefly*	*"P–Nr." appears on display*	*P – nr*
1	Enter	Press until "P–Nr." appears on display	P – nr
2	Enter	press for about 1 sec. and release. The display is:	***0*** 0 0 0
3	↓↑ + Enter	Enter PIN No. from left to right. After entering the last digit, press "Enter" until P 0.0 appears on the display	0055 └ flasching
4		The unit is now on level 2 (parameter level)	**P 0.0**
5	↓↑	select parameter P 0.1 **load capacity, hoist 1**	**P 0.1**
6	Enter	the load capacity currently stored appears on display (in t)	3.20 e.g
7	↓↑	enter required value for load capacity, hoist 1, in t	5.00 e.g.
8	Enter	display flashes briefly; load capacity, hoist 1, is stored; the display is:	**P 0.1**
9	↓↑	select parameter P 4.1 **overload shut–down, hoist 1**	**P 4.1**
10	Enter	110 or the value currently stored appears on display	110
11	↓↑	enter required value for overload shut–down, hoist 1, in % of load capacity, hoist 1	100 e.g.
12	Enter	P 4.1 appears on display; value is stored	**P 4.1**
13	↓↑	select parameter P 4.0 **Second shut- down point**	**P 4.0**
14	Enter	0 or the value currently stored appears on display	0
15	↓↑	enter required value e.g. 40 % for part load switch 1 (in % of load capacity, hoist 1 see parameter 0.1). *If input EA is not used, this setting is of no importance.*	40 e.g.
16	Enter	P 4.0 appears on display; value is stored	**P 4.0**

0 flashing

No.	Key	Description	Display
17	↓↑	select parameter P 4.2 **part load switch 2**	**P 4.2**
18	Enter	0 or the value currently stored appears on display	0
19	↓↑	enter required value e.g. 20 % for part load switch 2 (in % of load capacity, hoist 1 see parameter 0.1) *If the part - load switch is not active (module without switching relay), this setting is of no importance.*	20 e.g.
20	Enter	P 4.2 appears on display; value is stored	**P 4.2**
21	↓↑	select parameter P 1.1 **motor type**	**P 1.1**
22	Enter	the motor type currently stored appears on display	– – 0 9 e.g.
For current–generation ABUS hoists (with L6 or H6 in model name), follow items 23a and 23b; then continue with 31 (items 23 to 30 do not apply).			
23a*	↓↑	Select motor type required from current measurement module allocation table for GM hoists	– – 0 7 e.g.
23b*	Enter	"SP" flashes several times; motor data have been stored. the display on the right appears	**P 1.1**
Items 23a und 23b do not apply to ABUS hoists (not included in chapter 13) and non–ABUS hoists or hoists with power supply voltages other than 400 V. Continue with item 23.			
23	↓↑	select motor type 0	– – 0 0
24	Enter	confirm by pressing ENTER. The display on the right appears	0.00 ***0*** (#)
25	↓↑ + Enter	enter precision lift winding resistance in one phase (in Ohms) working from right to left; confirm each digit with ENTER	12.31 z.B. ⌞ flashing (#)
26	Enter	confirm the last digit by pressing ENTER: the display on the right appears	0.00 ***0*** (#)
27	↓↑ + Enter	enter main lift winding resistance in one phase (in Ohms) working from right to left; confirm each digit with ENTER	2.350 z.B. ⌞ flashing (#)
28	Enter	confirm the last digit by pressing ENTER: the display on the right appears	0.00 ***0*** (#)
29	↓↑ + Enter	enter current correction factor taken from table (measuring ranges of current measuring modules) working from right to left; confirm each digit with ENTER	0613 e.g. ⌞ flashing
30	Enter	confirm the last digit by pressing ENTER: SP flashes several times; motor data have been stored: the display on the right appears	**P 1.1**
31	↓↑	select parameter P 2.3 ***Teach – In***	**P 2.3**
32	Enter	the display on the right appears	Last
33	Enter	press for about 1 sec. and release: the display on the right appears	0.00 ***0*** (#)

(#) see page 26 "Notes"

No.	Key	Description	Display
34	↓↑ + Enter	enter known load, working from right to left confirm each digit with ENTER	10.50 e.g. ⊤⊏ flashing
35	Enter	after the last digit has been confirmed by pressing ENTER, the display flashes briefly: known load is stored. the display on the right appears	Pro 1
36	HT↑ FH	<u>no load (empty hook)</u> Press **FH** until hoist motor shuts down (about 5 sec.) The unit completes measurement and storage automatically. Following storage, the hoist motor is shut down. The rotating field power stored is then displayed (in kW) until the key is released. The procedure must not be interrupted.	0.542 e.g. After releasing button Pro 2
37	HT↑ HH	<u>no load (empty hook)</u> Press **HH** until hoist motor shuts down (about 5 sec.). The unit completes measurement and storage automatically. Following storage, the hoist motor is shut down. The rotating field power stored is then displayed (in kW) until the key is released. The procedure must not be interrupted.	1.025 e.g. After releasing button the bar runs from bottom left to top right.
38	HT↑ FH	<u>lift known load at precision speed until it is suspended freely</u> This function is enables for 15 min. If confirmation is not given by pressing emergency shut–down (as described under point 33) within this time, the-LIS–SE switches back to normal mode. The setting must then be repeated (points 1 to 4 and then from point 25 onwards).	The bar runs from bottom left to top right.
39	HT Emergency shut–down	<u>press ”Not–Aus” (emergency shut–down)</u> The key must be pressed for more than 5 sec.	After resetting emergency off Pro 3
40	HT ↑ FH	<u>known load on hook</u> Press **FH** until hoist motor shuts down (about 5 sec.). The unit completes measurement and storage automatically. Following storage, the hoist motor is shut down. The rotating field power stored is then displayed (in kW) until the key is released. The procedure must not be interrupted.	0.722 e.g. After releasing button Pro 4
41	HT ↑ HH	<u>known load on hook</u> Press **HH** until hoist motor shuts down (about 5 sec.) The unit completes measurement and storage automatically. Following storage, the hoist motor is shut down. The rotating field power stored is then displayed (in kW) until the key is released. The procedure must not be interrupted.	3.623 e.g. After the button has been released, SP flashes briefly and ABUS then runs across the screen. The display is: 00.00

Steps 44a* and 44b* only apply if the load population recorder is activated. Otherwise, step 44 applies.

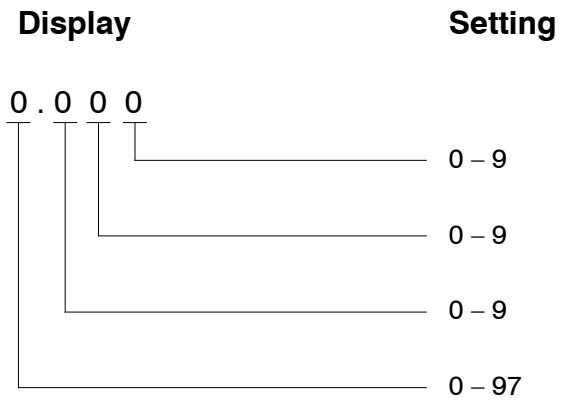
0 flashing

No.	Key	Description	Display
42	HT ↑ HH	Lift known load in main lift until hoist motor shuts down. The LIS – SM switches to setting/overload mode. The display flashes and the known load value measured by the unit is displayed (in t). The setting/overload mode cannot be cancelled by lowering.	3.120 e.g. flashing
43	HT ↓ FS	Lower known load Compare the value on theLIS–SE display with the known load. The following requirement must be met: **known load = indicated load (in t) +/– 10 %** *If this requirement is not met, the setting of parameter P 2.3 must be repeated.* If the requirement is met, continue with step 44a or 44.	3.120 e.g. flashing
*44a**	*Enter*	*"Code" appears on display*	*C o d E*
*44b**	*Enter briefly*	*"P–Nr." appears on display.*	*P – nr*
44	Enter	press until "P–Nr." appears on display	P – nr
45	Enter	press for about 1 sec. and release	***0*** 0 0 0
46	↓↑ + Enter	Enter PIN No. from left to right. After entering the last digit, press "Enter" until P 0.0 appears on the display	0055 ⌞ flashing
47	Enter	after the last digit has been confirmed by ENTER, P 0.0 appears on display	**P 0.0**
48	↓↑	select parameter P 9.9	**P 9.9**
49	Enter	LIS – SE switches back to normal mode. The display on the right appears:	0.000
50	HT ↓ FS	press "lower" for about 3 sec. (setting/overload mode is cancelled) overload protection is activated; the hoist is ready for operation	

Important:
1. From **step 36 to step 43**, lowering is always possible without any change in the program.
2. From **step 40 to step 43**, the load must not be fully lowered (it must always remain suspended).
3. If the power measured with a load is lower than the power with zero load (by about 10 %), Err 6 is indicated and setting must be repeated, starting with Pro 1 (step 31).

#) **Notes:**

6.



Example:

Input	Display
1250 kg	1.250
10250 kg	10.25

7. ***0*** The underlined digit flashes.

8. The hoist motor resistance is the resistance measured in one phase.

   The measurement must be made on the hoist motor using an ohmmeter or multimeter.

Measurements on motors with star circuits (Y).

Measurement

between neutral point and U1	= resistance on one phase	= input value for P 1.2
between U1 and V1	= resistance in two phases	= input value for P 1.2 = is reading divided by 2

Measurements on motors with delta circuit (△)

between U1 and V1	= input value for P 1.2 = is reading divided by 2

13 Current measurement modules for GM hoist motors

Current hoist designs

Voltage range **3 Y**

(380 – 415 V; 50 Hz. // 440 – 480 V; 60 Hz.)

Hoist motor						Current measuing module				
No.	**Hoist Type**	**Motor Type** (Input P 1.1)	**P** [KW] at 50 Hz. 12 / 2 pole	**In** [A] 12 / 2 pole	**R** – Input for P1.2 (in Ohms) 12/2–pole	**Measu-ring range**	**In** [A] Current measuing module	**Correction factor**	AN	Remarks
1	Non–ABUS motor, old ABUS motor F6 or motor with voltage other than 400 V	**0**	(see nameplate)	(see nameplate)	measure and enter in P1.2					
2	GM 800 L.4	**1**	0,28 / 1,9	1,8 / 5,0	28,2 / 4,06	**I**	8	**306**	9743	
3	GM 800 H.4	**2**	0,45 / 3,2	3,1 / 7,2	21,0 / 2,16	**I**	8	**306**	9743	
4	GM 800 U.4	**0**	0,55 / 4,0	4,0 / 8,5	17,6 / 1,76	**I**	8	**306**	9743	
5	GM 1000 L.6	**3**	0,45 / 3,0	2,4 / 7,7	18,6 / 2,16	**I**	8	**306**	9743	
6	GM 1000 H.6	**4**	0,80 / 4,9	4,4 / 11,2	11,2 / 1,3	**II**	16	**613**	9744	
7	GM 1000 U.6	**0**	0,90 / 6,0	4,6 / 13,0	10,2 / 1,05	**II**	16	**613**	9744	
8	GM 2000 L.3	**5**	0,80 / 4,9	4,4 / 11,2	11,2 / 1,3	**II**	16	**613**	9744	
9	GM 2000 H.3	**6**	1,1 / 7,6	5,1 / 15,9	8,65 / 0,79	**II**	16	**613**	9744	
10	GM 3000 L.4	**7**	1,2 / 7,4	5,6 / 15,3	10,4 / 1,0	**II**	16	**613**	9744	
11	GM 3000 H.4	**8**	1,9 / 12,3	8,2 / 22,9	6,65 / 0,51	**III**	23	**873**	9745	
12	GM 5000 L.3	**9**	1,9 / 12,3	8,2 / 22,9	6,65 / 0,51	**III**	23	**873**	9745	

Voltage range **3 Y**

(380 – 415 V; 50 Hz. // 440 – 480 V; 60 Hz.)

Hoist motor						**Current measuring module**				
No.	**Hoist Type**	**Motor Type** (Input P 1.1)	**P** [KW] at 50 Hz. 12 / 2 pole	**I**n [A] 12 / 2 pole	**R** – Input for P1.2 (in Ohms) 12/2–pole	**Measu-ring range**	**I**n [A] Current measuing module	**Correction factor**	AN	Remarks
13	GM 5000 H.3	**10**	2,9 / 18,8	12,2 / 34,0	3,97 / 0,27	**IV**	36	**1381**	9746	
14	GM 6000 L 3	**11**	2,9 / 18,8	12,2 / 34,0	3,97 / 0,27	**IV**	36	**1381**	9746	
15	Reserve									
16	GM 7000 L	**13**	2,4 / 16	11 / 29,5	4,48 / 0,42	**IV**	36	**1381**	9746	1 motor
17	GM 7000 H	**14**	4,8 / 32	22 / 59	2,24 / 0,212	**V**	60	**2344**	9747	2 motors
18	GM 7000 M	**15**	3 / 20	13,5 / 39,5	3,97 / 0,27	**IV**	36	**1381**	9746	1 motor
19	GM 7000 U	**16**	6 / 40	27 / 79	1,99 / 0,135	**VI**	136	**5169**	19682	2 motors
20										

$$\mathbf{R}_{\text{Input}} = \mathbf{R}_{\text{phase}} \qquad \mathbf{R}_{\text{phase}} = \frac{\mathbf{R}_{\text{measured [U-V]}}}{2} \quad \text{or} \quad \mathbf{R}_{\text{phase}} = \mathbf{R}_{\text{measured [Y-U]}} \qquad \text{for 2 motors} \quad \mathbf{R}_{\text{Input}} = \frac{\mathbf{R}_{\text{phase one motor}}}{2}$$

Voltage range **3 Δ**

(220 – 240 V; 50 Hz. // 255 – 280 V; 60 Hz.)

Hoist motor						**Current measuring module**				
No.	**Hoist Type**	**Motor Type** (Input P 1.1)	**P** [KW] at 50 Hz. 12 / 2 pole	**In** [A] 12 / 2 pole	**R** – Input for P1.2 (in Ohms) 12/2–pole	**Measu-ring range**	**In** [A] Current measuing module	**Correction factor**	AN	Remarks
1	Non–ABUS motor, old ABUS motor F6	**0**	(see nameplate)	(see nameplate)	measure and enter in P1.2					
2	GM 800 L.4	**0**	0,28 / 1,9	3,1 / 8,7	4,7 / 0,677	**I**	8	**306**	9743	
3	GM 800 H.4	**0**	0,45 / 3,2	5,4 / 12,5	7 / 0,72	**II**	16	**613**	9744	
4	GM 800 U.4	**0**	0,55 / 4,0	6,9 / 14,7	5,86 / 0,585	**II**	16	**613**	9744	
5	GM 1000 L.6	**0**	0,45 / 3,0	4,2 / 12,8	6,15 / 0,707	**II**	16	**613**	9744	
6	GM 1000 H.6	**0**	0,80 / 4,9	7,6 / 19,4	3,70 / 0,43	**III**	23	**873**	9745	
7	GM 1000 U.6	**0**	0,90 / 6,0	8,0 / 22,5	3,4 / 0,35	**III**	23	**873**	9745	
8	GM 2000 L.3	**0**	0,80 / 4,9	7,6 / 19,4	3,70 / 0,43	**III**	23	**873**	9745	
9	GM 2000 H.3	**0**	1,1 / 7,6	8,8 / 27,5	2,9 / 0,26	**IV**	36	**1381**	9746	
10	GM 3000 L.4	**0**	1,2 / 7,4	9,7 / 26,5	3,45 / 0,33	**IV**	36	**1381**	9746	
11	GM 3000 H.4	**0**	1,9 / 12,3	14,2 / 39,7	2,22 / 0,17	**IV**	36	**1381**	9746	
12	GM 5000 L.3	**0**	1,9 / 12,3	14,2 / 39,7	2,22 / 0,17	**IV**	36	**1381**	9746	

Voltage range **3 Δ**

(220 – 240 V; 50 Hz. // 255 – 280 V; 60 Hz.)

Hoist motor						**Current measuring module**				
No.	**Hoist Type**	**Motor Type** (Input P 1.1)	**P** [KW] at 50 Hz. 12 / 2 pole	**I**n [A] 12 / 2 pole	**R** – Input for P1.2 (in Ohms) 12/2–pole	**Measu-ring range**	**I**n [A] Current measuing module	**Correction factor**	AN	Remarks
13	GM 5000 H.3	**0**	2,9 / 18,8	21,1 / 59	1,31 / 0,09	**V**	60	**2344**	9747	
14	GM 6000 L 3	**0**	2,9 / 18,8	21,1 / 59	1,31 / 0,09	**V**	60	**2344**	9747	
15	Reserve									
16	GM 7000 L	**0**	2,4 / 16	19,1 / 51	1,49 / 0,141	**V**	60	**2344**	9747	1 motor
17	GM 7000 H	**0**	4,8 / 32	38,2 / 102	0,745 / 0,07	**VI**	136	**5169**	19682	2 motors
18	GM 7000 M	**0**	3 / 20	23,4 / 69	1,31 / 0,09	**VI**	136	**5169**	19682	1 motor
19	GM 7000 U	**0**	6 / 40	46,8 / 138	0,44 / 0,045	**VI**	136	**5169**	19682	2 motors
20										

$$\mathbf{R}_{\text{Input}} = \frac{\mathbf{R}_{\text{measured}}}{2} \qquad \mathbf{R}_{\text{phase}} = \frac{\mathbf{3} * \mathbf{R}_{\text{measured}}\ [U - V]}{2} \qquad \text{for 2 motors} \quad \mathbf{R}_{\text{Input}} = \frac{\mathbf{R}_{\text{measured}}}{4}$$

Voltage range **5 Y**

(460 – 500 V; 50 Hz. // 550 – 600 V; 60 Hz.)

Hoist motor						**Current measuring module**				
No.	**Hoist Type**	**Motor Type** (Input P 1.1)	**P** [KW] at 50 Hz. 12 / 2 pole	**I_n** [A] 12 / 2 pole	**R** – Input for P1.2 (in Ohms) 12/2–pole	**Measu-ring range**	**I_n** [A] Current measuing module	**Correction factor**	AN	Remarks
1	Non–ABUS motor, old ABUS motor F6	**0**	(see nameplate)	(see nameplate)	measure and enter in P1.2					
2	GM 800 L.4	**0**	0,28 / 1,9	1,5 / 4,1	20,3 / 2,9	**I**	8	**306**	9743	
3	GM 800 H.4	**0**	0,45 / 3,2	2,6 / 6	25,4 / 2,59	**I**	8	**306**	9743	
4	GM 800 U.4	**0**	0,55 / 4,0	3,3 / 7,1	26,1 / 2,5	**I**	8	**306**	9743	
5	GM 1000 L.6	**0**	0,45 / 3,0	2,6 / 6,2	26,8 / 3,07	**I**	8	**306**	9743	
6	GM 1000 H.6	**0**	0,80 / 4,9	3,7 / 9,3	15,45 / 1,94	**II**	16	**613**	9744	
7	GM 1000 U.6	**0**	0,90 / 6,0	3,8 / 10,8	15,5 / 1,32	**II**	16	**613**	9744	
8	GM 2000 L.3	**0**	0,80 / 4,9	3,7 / 9,3	15,45 / 1,97	**II**	16	**613**	9744	
9	GM 2000 H.3	**0**	1,1 / 7,6	4,3 / 13,3	12,5 / 1,14	**II**	16	**613**	9744	
10	GM 3000 L.4	**0**	1,2 / 7,4	4,7 / 12,7	15,8 / 1,46	**II**	16	**613**	9744	
11	GM 3000 H.4	**0**	1,9 / 12,3	6,8 / 19,1	9,15 / 0,67	**III**	23	**873**	9745	
12	GM 5000 L.3	**0**	1,9 / 12,3	6,8 / 19,1	9,15 / 0,67	**III**	23	**873**	9745	

Voltage range **5 Y**

(460 – 500 V; 50 Hz. // 550 – 600 V; 60 Hz.)

Hoist motor						**Current measuring module**				
No.	**Hoist Type**	**Motor Type** (Input P 1.1)	**P** [KW] at 50 Hz. 12 / 2 pole	**I**n [A] 12 / 2 pole	**R** – Input for P1.2 (in Ohms) 12/2–pole	**Measu-ring range**	**I**n [A] Current measuing module	**Correction factor**	AN	Remarks
13	GM 5000 H.3	**0**	2,9 / 18,8	10,2 / 28,3	5,6 / 0,414	**IV**	36	**1381**	9746	
14	GM 6000 L 3	**0**	2,9 / 18,8	10,2 / 28,3	5,6 / 0,414	**IV**	36	**1381**	9746	
15	Reserve									
16	GM 7000 L	**0**	2,4 / 16	9,2 / 24,6	6,15 / 0,64	**IV**	36	**1381**	9746	1 motor
17	GM 7000 H	**0**	4,8 / 32	18,4 / 49,2	3,075 / 0,32	**V**	60	**2344**	9747	2 motors
18	GM 7000 M	**0**	3 / 20	11,3 / 33	5,6 / 0,414	**IV**	36	**1381**	9746	1 motor
19	GM 7000 U	**0**	6 / 40	22 / 66	2,8 / 0,207	**V**	60	**2344**	9747	2 motors
20										

$$\mathbf{R}_{\text{Input}} = \mathbf{R}_{\text{phase}} \qquad \mathbf{R}_{\text{phase}} = \frac{\mathbf{R}_{\text{measured [U – V]}}}{2} \quad \text{or} \quad \mathbf{R}_{\text{phase}} = \mathbf{R}_{\text{measured [Y – U]}} \qquad \text{for 2 motors} \quad \mathbf{R}_{\text{Input}} = \frac{\mathbf{R}_{\text{phase one motor}}}{2}$$

Voltage range **1 Y**

(300 – 335 V; 50 Hz. // 360 – 400 V; 60 Hz.)

Hoist motor						**Current measuring module**				
No.	**Hoist Type**	**Motor Type** (Input P 1.1)	**P** [KW] at 60 Hz. 12 / 2 pole	**I_n** [A] 12 / 2 pole	**R** – Input for P1.2 (in Ohms) 12/2–pole	**Measu-ring range**	**I_n** [A] Current measuing module	**Correction factor**	AN	Remarks
1	Non–ABUS motor, old ABUS motor F6	**0**	(see nameplate)	(see nameplate)	measure and enter in P1.2					
2	GM 800 L.4	**0**	0,34 / 2,3	2,3 / 8,3	8,9 / 1,28	**I**	8	**306**	9743	
3	GM 800 H.4	**0**	0,54 / 3,8	3,9 / 9,1	13,3 / 1,35	**II**	16	**613**	9744	
4	GM 800 U.4	**0**	0,66 / 4,8	5,0 / 10,7	11,1 / 1,08	**II**	16	**613**	9744	
5	GM 1000 L.6	**0**	0,54 / 3,6	3 / 9,3	11,7 / 1,34	**II**	16	**613**	9744	
6	GM 1000 H.6	**0**	0,96 / 5,9	5,5 / 14	7,08 / 0,82	**II**	16	**613**	9744	
7	GM 1000 U.6	**0**	1,1 / 7,2	5,8 / 16,4	6,37 / 0,59	**II**	16	**613**	9744	
8	GM 2000 L.3	**0**	0,96 / 5,9	5,5 / 14	7,08 / 0,82	**II**	16	**613**	9744	
9	GM 2000 H.3	**0**	1,3 / 9,1	6,4 / 20	5,47 / 0,5	**III**	23	**873**	9745	
10	GM 3000 L.4	**0**	1,44 / 8,9	6,7 / 18,3	6,65 / 0,59	**III**	23	**873**	9745	
11	GM 3000 H.4	**0**	2,3 / 14,8	9,8 / 27,5	4,09 / 0,34	**IV**	36	**1381**	9746	
12	GM 5000 L.3	**0**	2,3 / 14,8	9,8 / 27,5	4,09 / 0,34	**IV**	36	**1381**	9746	

Voltage range **1 Y**

(300 V – 335 V; 50 Hz. // 360 – 400 V; 60 Hz.)

Hoist motor						**Current measuring module**				
No.	**Hoist Type**	**Motor Type** (Input P 1.1)	**P** [KW] at 60 Hz. 12 / 2 pole	**I_n** [A] 12 / 2 pole	**R** – Input for P1.2 (in Ohms) 12/2–pole	**Measu-ring range**	**I_n** [A] Current measuing module	**Correction factor**	AN	Remarks
13	GM 5000 H.3	**0**	3,5 / 22,6	15,3 / 43	2,6 / 0,15	**V**	60	**2344**	9747	
14	GM 6000 L 3	**0**	3,5 / 22,6	15,3 / 43	2,6 / 0,15	**V**	60	**2344**	9747	
15	Reserve									
16	GM 7000 L	**0**	2,9 / 19,2	11,6 / 31	2,79 / 0.268	**IV**	36	**1381**	9746	1 Motor
17	GM 7000 H	**0**	5,8 / 38,4	23,2 / 62	1,4 / 0,134	**V**	60	**2344**	9747	2 Motoren
18	GM 7000 M	**0**	3,6 / 24	14,2 / 42	2,6 / 0,15	**V**	60	**2344**	9747	1 Motor
19	GM 7000 U	**0**	7,2 / 48	28,4 / 84	1,3 / 0,075	**VI**	136	**5169**	19682	2 Motoren
20										

$$\mathbf{R}_{\text{Input}} = \mathbf{R}_{\text{phase}} \qquad \mathbf{R}_{\text{phase}} = \frac{\mathbf{R}_{\text{measured [U – V]}}}{2} \quad \text{or} \quad \mathbf{R}_{\text{phase}} = \mathbf{R}_{\text{measured [Y – U]}} \qquad \text{for 2 motors} \quad \mathbf{R}_{\text{Input}} = \frac{\mathbf{R}_{\text{phase one motor}}}{2}$$

Voltage range **1 Δ**

(175 – 195 V; 50 Hz. // 208 – 230 V; 60 Hz.)

Hoist motor						**Current measuring module**				
No.	**Hoist Type**	**Motor Type** (Input P 1.1)	**P** [KW] at 60 Hz. 12 / 2 pole	**I**n [A] 12 / 2 pole	**R** – Input for P1.2 (in Ohms) 12/2–pole	**Measu-ring range**	**I**n [A] Current measuing module	**Correction factor**	AN	Remarks
1	Non–ABUS motor, old ABUS motor F6	**0**	(see nameplate)	(see nameplate)	measure and enter in P1.2					
2	GM 800 L.4	**0**	0,34 / 2,3	4 / 10,9	2,95 / 0,42	**II**	16	**613**	9744	
3	GM 800 H.4	**0**	0,54 / 3,8	6,7 / 15,7	4,4 / 0,45	**II**	16	**613**	9744	
4	GM 800 U.4	**0**	0,66 / 4,8	8,7 / 18,5	3,7 / 0,36	**III**	23	**873**	9745	
5	GM 1000 L.6	**0**	0,54 / 3,6	5,2 / 16	3,88 / 0,44	**II**	16	**613**	9744	
6	GM 1000 H.6	**0**	0,96 / 5,9	9,5 / 24,2	2,33 / 0,27	**III**	23	**873**	9745	
7	GM 1000 U.6	**0**	1,1 / 7,2	10,0 / 28,3	2,13 / 0,20	**IV**	36	**1381**	9746	
8	GM 2000 L.3	**0**	0,96 / 5,9	9,5 / 24,2	2,33 / 0,27	**III**	23	**873**	9745	
9	GM 2000 H.3	**0**	1,3 / 9,1	11,1 / 35	1,80 / 0,166	**IV**	36	**1381**	9746	
10	GM 3000 L.4	**0**	1,44 / 8,9	11,6 / 31,7	2,22 / 0,196	**IV**	36	**1381**	9746	
11	GM 3000 H.4	**0**	2,3 / 14.8	17 / 47,6	1,366 / 0,114	**V**	60	**2344**	9747	
12	GM 5000 L.3	**0**	2,3 / 14,8	17 / 47,6	1,366 / 0,114	**V**	60	**2344**	9747	

Voltage range **1 Δ**

(175 – 195 V; 50 Hz. // 208 – 230 V; 60 Hz.)

Hoist motor						**Current measuing module**				
No.	**Hoist Type**	**Motor Type** (Input P 1.1)	**P** [KW] at 60 Hz. 12 / 2 pole	**I**n [A] 12 / 2 pole	**R** – Input for P1.2 (in Ohms) 12/2–pole	**Meßbe–reich**	**I**n [A] Current measuing module	**Correction factor**	AN	Remarks
13	GM 5000 H.3	**0**	3,5 / 22,6	26,5 / 74	0,866 / 0,05	**VI**	136	**5169**		
14	GM 6000 L 3	**0**	3,5 / 22,6	26,5 / 74	0,866 / 0,05	**VI**	136	**5169**		
15	Reserve									
16	GM 7000 L	**0**	2,9 / 19,2	20,1 / 54	0,93 / 0,09	**V**	60	**2344**	9747	1 motor
17	GM 7000 H	**0**	5,8 / 38,4	40,2 / 108	0,465 / 0,045	**VI**	136	**5169**	19682	2 motors
18	GM 7000 M	**0**	3,6 / 24	25 / 73	0,866 / 0,05	**VI**	136	**5169**	19682	1 motor
19	GM 7000 U	**0**	7,2 / 48	50 / 146	0,433 / 0,025	**VI**	136	**5169**	19682	2 motors
20										

$$\mathbf{R}_{\text{Input}} = \frac{\mathbf{R}_{\text{measured}}}{2} \qquad \mathbf{R}_{\text{phase}} = \frac{\mathbf{3} * \mathbf{R}_{\text{measured}}\ [U - V]}{2} \qquad \text{for 2 motors} \quad \mathbf{R}_{\text{Input}} = \frac{\mathbf{R}_{\text{measured}}}{4}$$

14 Declaration of conformity

under the terms of the machinery directive of Appendix II 1A

We	ABUS Kransysteme GmbH
Address	Sonnenweg 1 D - 51647 Gummersbach

Authorised person for assembly of the special technical documentation:

Name, function, company designation	Michael Müller Department head of technical documentation ABUS Kransysteme GmbH
address	Sonnenweg 1 D- 51647 Gummersbach

hereby declare, that the product:

Designation	**Load indicator system**
Types	**LIS- SE**
	in Series production

is in accordance with the european guidlines

2006/42/EG	Machines
2014/35/EG	Low voltage
2014/30/EG	Electromagnetic compatibility

referring to the version in force on the date of issue.

The following harmonized standards were used:

EN 954- 1	Safety of machinery
EN ISO 12100- 1	Safety of machinery, tools and plants
EN ISO 12100- 2	Safety of machinery, Basic concepts, general principles for design
EN 60204 T32	Electrical equipment of machines; requirements for hoists
EN 61000- 6- 4	Electromagnetic compatibility; interference emission
EN 61000- 6- 2	Electromagnetic compatibility; resistance to interferences

and the standards referred to therein.

Technical documentation is completely available.
The operating instructions belonging to it are in the language of the land of users.

Name: Dr. Eckhard Bube

Gummersbach, 01.03.2016

Signature of authorised person

Board of Management

Indication for the subscriber

This declaration is in accordance with EN ISO 170050.
The company ABUS Kransysteme GmbH runs a certified quality management system according to DIN EN ISO9001.