

Electronic Load Weighing Device

WLWD-M

Operating instructions

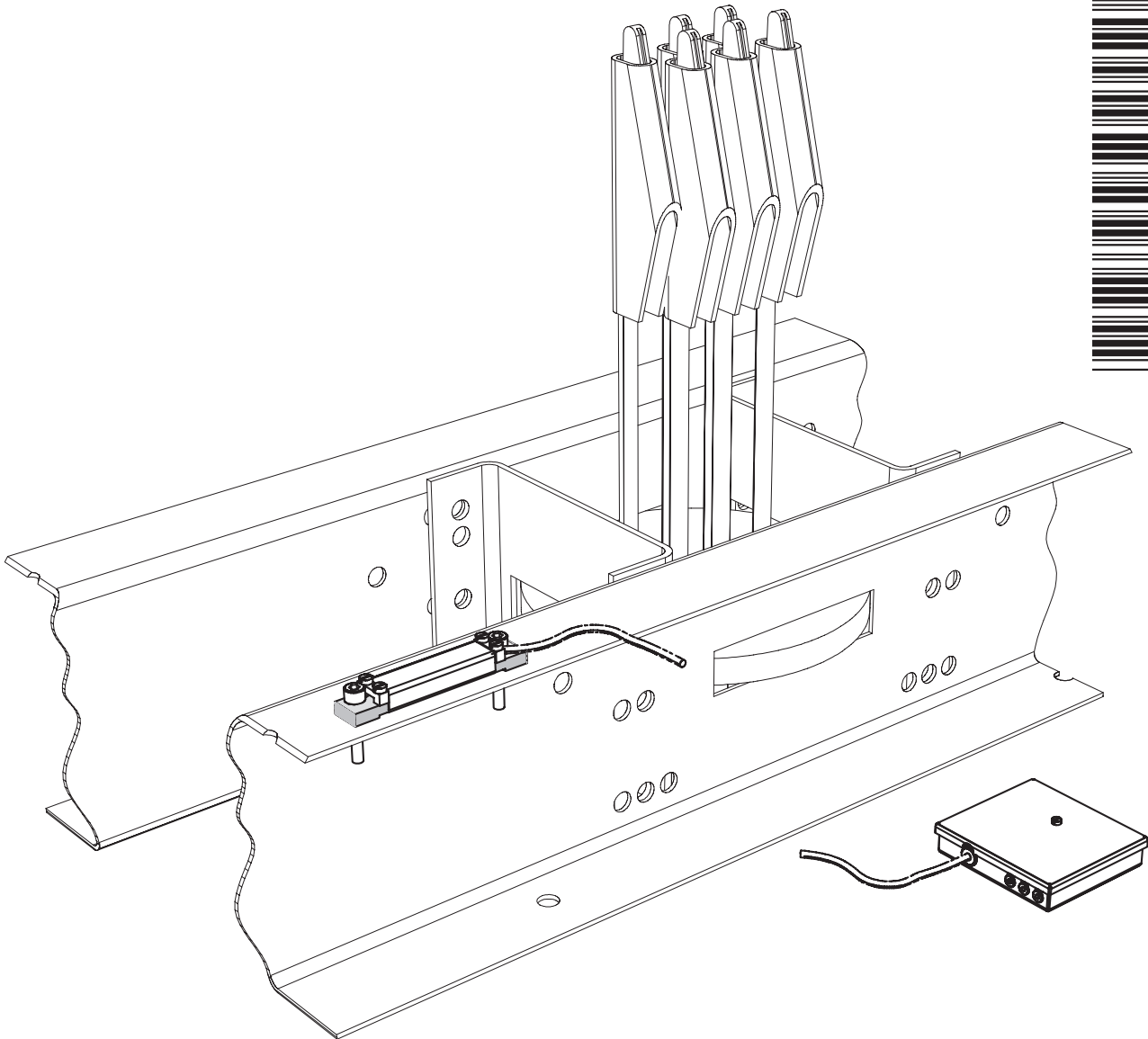
Blatt/sheet D961MGB.000
Datum/date 31.01.2002
Stand/version D-08.01.2015
Geprüft/approved WAT/MZE

Electronic Load Weighing Device



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D961MGB



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We reserve the right to make alterations with respect to the specifications and figures in this manual.



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1 General information prior to installation

1.1 Description and function

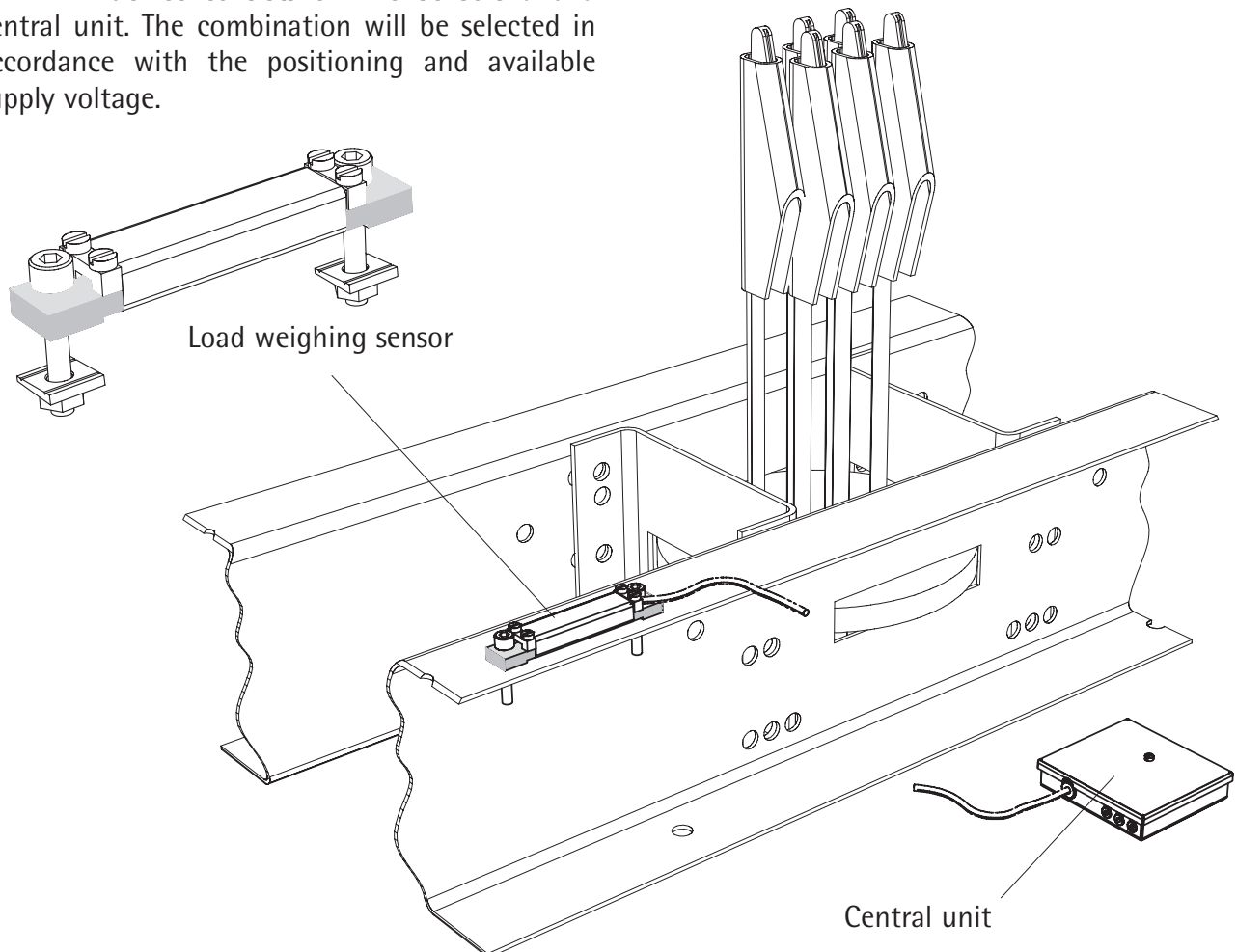
The electronic load weighing system WLWD-M can be used in all elevator types (passenger- and freight elevators) e.g. for measuring the nominal load of the car (according to EN81 § 14.2.5).

The WLWD-M is a load weighing device based on strain gauge technics. The sensor(s) of the WLWD-M can be mounted to the crosshead beam or on some other place in the support structure.

Because of the easy installation the sensor WLWD-M is suitable also for modernizations. The WLWD-M device consists of 1...3 sensors and a central unit. The combination will be selected in accordance with the positioning and available supply voltage.

The installation and set up of the device is possible without huge amount of time and "special" measuring tools.

The load weighing system WLWD-M is to be mounted on a bend-loaded beam (e.g. onto the crosshead beam in top suspended car frames). It doesn't matter whether it is subject to tension or to compression.



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1.2 Liability and guarantee

This instruction handbook is written for people who are familiar with lift servicing and installation. Sufficient knowledge of lifts is essential.

WITTUR accept no responsibility for damage caused by improper handling, or for damage caused as a result of actions other than those stated in these operating instructions.

The WITTUR guarantee may be voided if parts other than those described in these instructions are installed.

Unless stated otherwise, the following it is not permissible to carrying out modifications, of any kind, on the load weighing device.



Risk of damage to machinery parts (i.e. due to incorrect installation, or such like).



Important information sign

These operating instructions belong with the whole installation and must be kept in a safe place at all times (i.e. machine room).

The proper assembly and installation of WITTUR load weighing devices requires correspondingly well trained fitting engineers. The responsibility of training lies with the company appointed to carry out the work.

1.3 Safety precautions

WITTUR machine installation or repair engineers are chiefly responsible for the safe operation of machinery.

It is essential to comply with and keep abreast of all safety rules and legal obligations in order to avoid personal / product damage during installation, maintenance and repair work.

Important safety advice and danger warnings are emphasized with the following symbols:



General danger warning



High danger risk warning (i.e. crushing edge, cutting edge etc.).

Before starting installation work:



Only properly trained personnel may carry out work, or be allowed access to the installation site.

- Attach safety devices to guard against falling (platform or harnesses)
- Cover any floor openings
- Secure installation tools or objects against accidental falling
- Lift shaft openings should be cordoned off and suitable warning signs should be erected when working in shaft openings
- Work involving electrical equipment should only be carried out by an electrical engineer or qualified personnel.

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1.4 Preparation

Before installation work begins, it is in your own interests to clarify what structural and spatial conditions are available for installation work, so that you can see which installation procedures should / must be carried out.

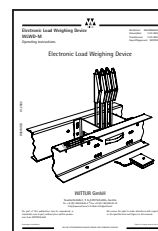
Therefore it is recommended that all circumstances be taken into consideration, and to mentally plan the installation sequence before any rash or badly planned work is carried out.

On receipt of the delivery, the goods or components should be checked for correctness and completeness with the order sheet.

1.5 Content of supply

The content of supply covers:

- WLWD-M sensor(s) ... 1-3 pieces
- Central unit with cover
- Fixing material
- WLWD-M operating instructions manual



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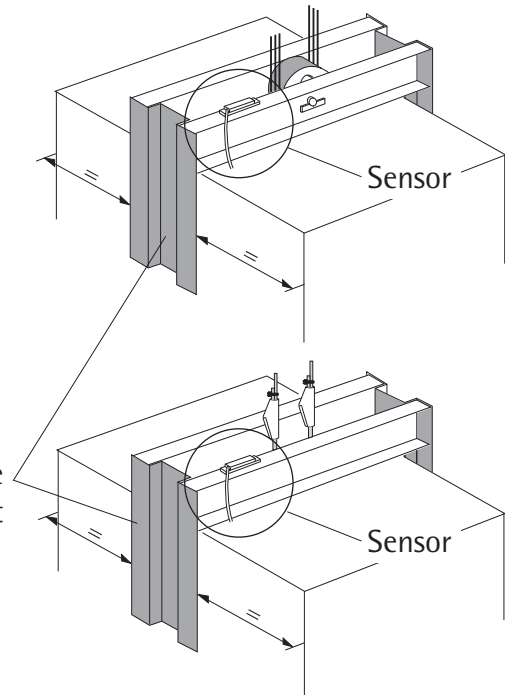
2 Installation

2.1 WLWD-M sensors in different types of car frames

Typically only one sensor is used on the crosshead beam when:

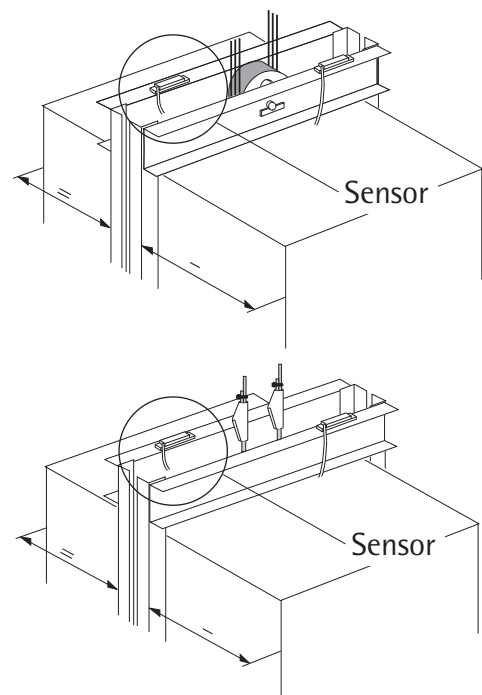
- the capacity (Q) of the car is lower than 1000 kg and the crosshead beams are fixed to same upright and the car is symmetrically situated within the car frame

The crosshead beams are fixed to the same upright



Typically two sensors are used on the crosshead beam(s) when:

- the capacity (Q) of the car is over 1000 kg or the depth of the car is more than 1,4 x width (e.g. bed-lifts)
- the crosshead beams are fixed to separate uprights
- the car is not symmetrically situated within the car frame



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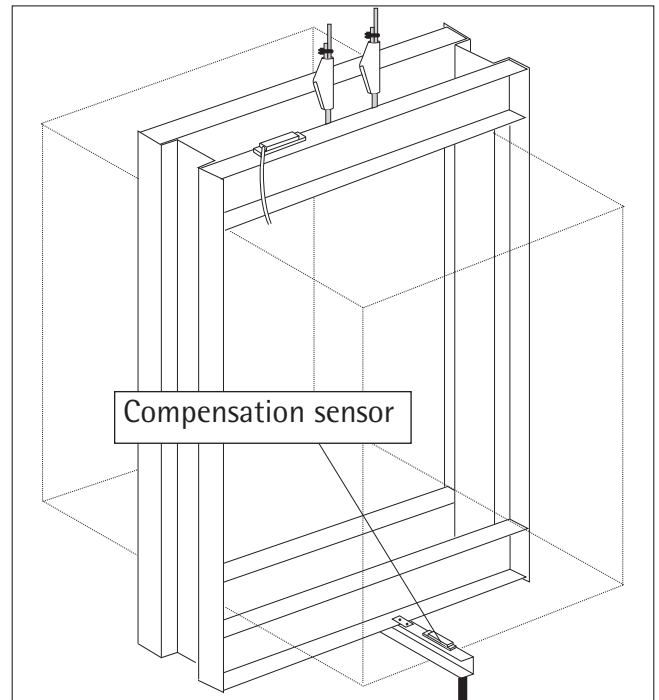
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2.1.1 Compensation sensor

In order to eliminate the error caused by the travelling cable and the compensating ropes in high-rise buildings the compensation sensor can be used in addition.

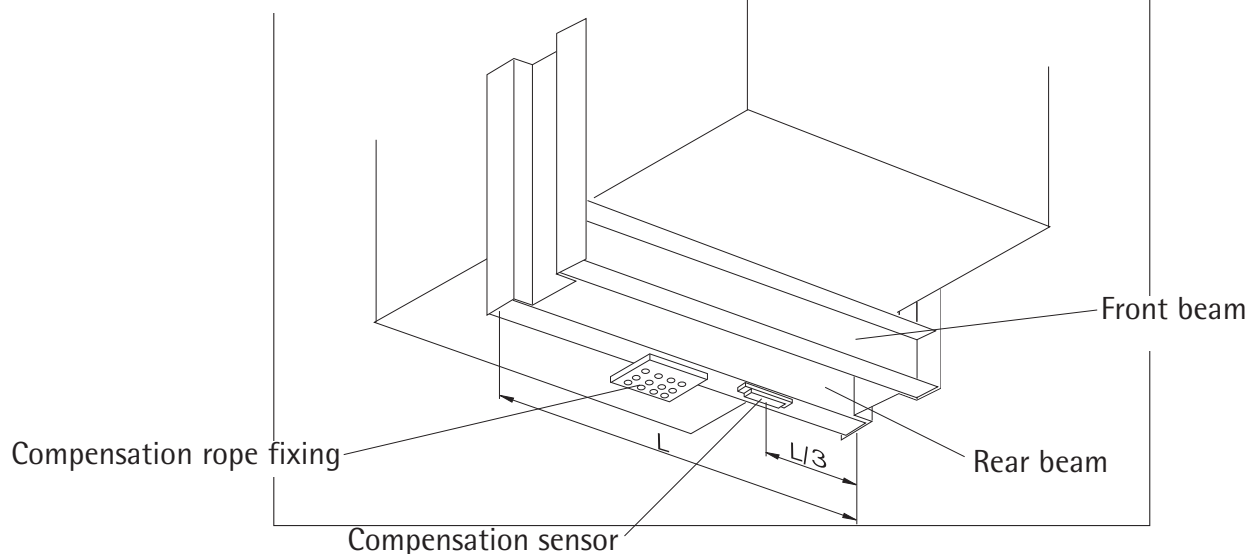
 It is recommended to use the compensation sensor when the travel height is 25m or more.

The compensation sensor is mounted to the beam where travelling cable or compensating ropes are fixed. If there is no room for the sensor add an extra fixing for cable(s) or rope(s); if the beam is too inflexible, change the beam to a more flexible type.



Compensation sensor

Installation of compensation sensor to the bottom cross beam



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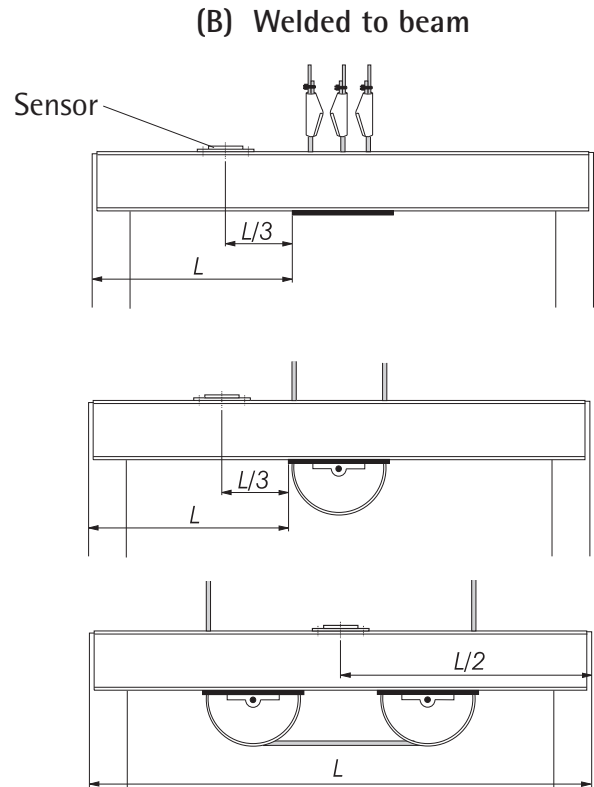
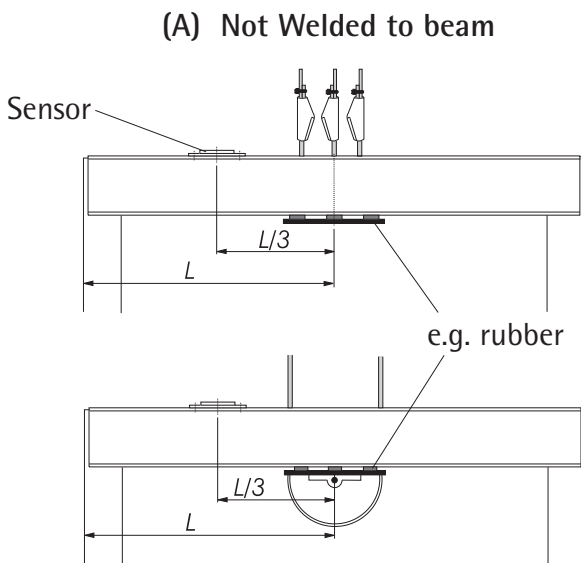
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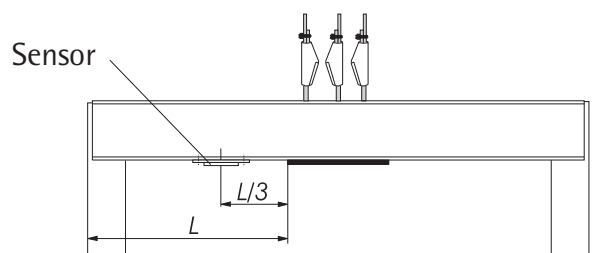
2.2 Position of the sensor(s)

The position of the sensor(s) depends on the construction of the car frame. Example pictures beside shows the optimum position of the sensor(s) for common car frame types (A) and (B).



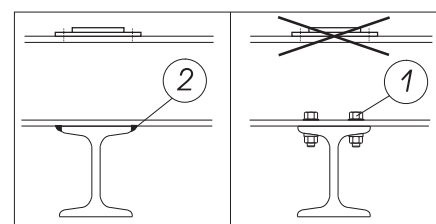
 It is possible to mount the load sensor to the bottom face of the beam.

 If so, the sensor cable wires (yellow and green) must be connected reverse to the central unit terminal.



If you have a different kind of car frame check following principles:

- the sensor measures relative stretch, avoid twist.
- do not install the sensor above cross of two beams with bolt fixing (1). If there is welding (2) between the beams, the place is suitable for sensor installation.



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2.3 Sensor installation methods

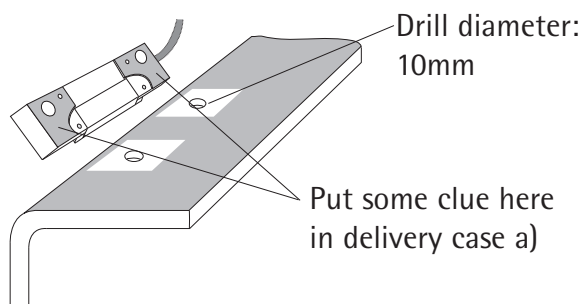
- (1) Drive the car to bottom landing, empty the car.

 There must be only one person on the car during the installation and adjusting of the strain gage.

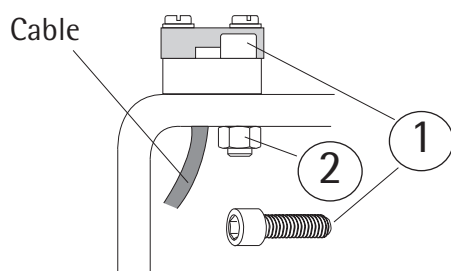
- (2) Mark exactly and drill screw holes with 10 mm drill. For high accuracy, location of the sensor should be as close as possible to the beam web (see location from pictures below).



Remove any burrs and smooth the beam surface with sandpaper. Check that the surface is flat, clean and free of oil and grease.



Fixing to bent plate



Fixing parts:

1. Hexagon socket head screw
2. Nut M8-12.9
3. Square taper washer (gradient 8%)
4. Square taper washer (gradient 14%)
5. Loctite LT638-5ML

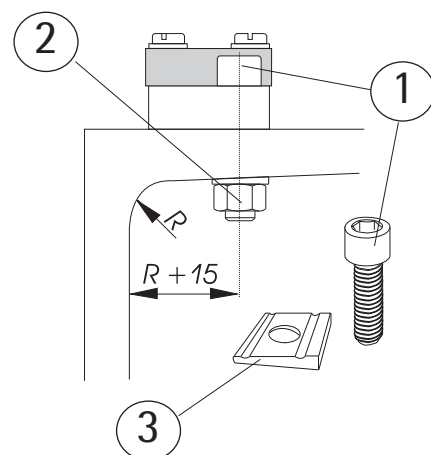
- (3) Check with sensor that screws go freely through drilled holes.

- (4) Depending on the delivery fix the sensor with

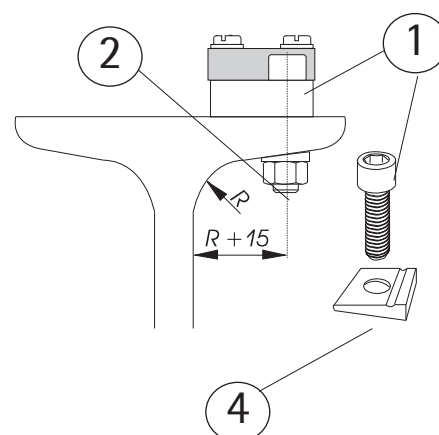
- a) glue, bolts (hardness 12.9; tightening to 20 Nm) and nuts (hardness 12.9) or
- b) only bolts (hardness 12.9; tightening to 36 Nm) and nuts (hardness 12.9)

- (4) Apply glue (Loctite, check total hardening time from packing case) to the contact surfaces and fix the sensor as shown in picture below.

Fixing to U-profile



Fixing to I-beam



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2.4 Position of the central unit and wiring



Work involving electrical equipment should only be carried out by an electrical fitter or qualified personnel.



Before carrying out work, switch off all voltage to installation equipment.



Take note of the following when laying the connection cable:

- that the single wire cables have double insulation
- the use and laying of cables is governed by the EMC

(1) Place the central unit into the car operation panel, if there is room.



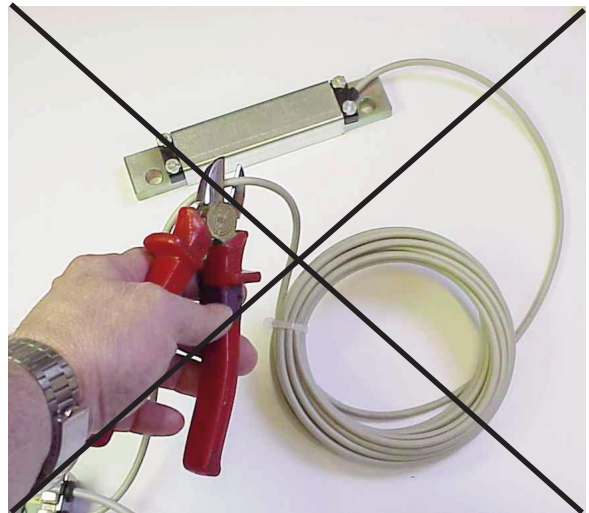
Leave the cables long enough, so that it is possible to take the central unit to the landing for adjustment of potentiometer

If there is not enough space in the car operating panel:

(1a) Place the central unit on the car roof so that the adjustment of potentiometer is possible from the landing.

Wiring notes:

- Install the sensor cable far from electromagnetic interferences such as engines or live wires
- Don't cut sensor cables; tuck them if they are too long.



- An extension of the cable is allowed by soldering and insulation carefully between wires.
- It is possible to lengthen sensor cable(s) if needed.
- For high rise elevator a separate negative return for central unit is desirable.

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2.5 Connection of the central unit

The central unit is connected as shown in the diagrams (power supply 24 V: diagram A and power supply 230/110 V: diagram B)



It is supposed to be tensile stress in each sensor.

Diagram A
(power supply 24 VDC)

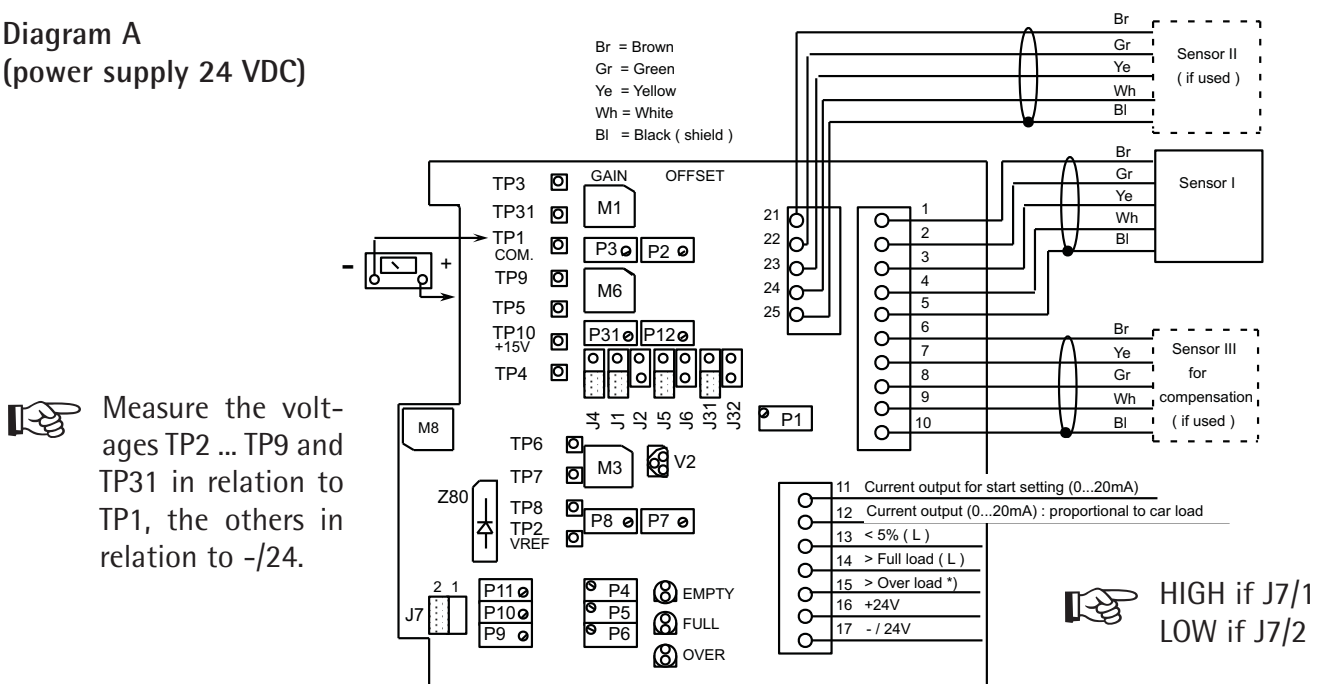
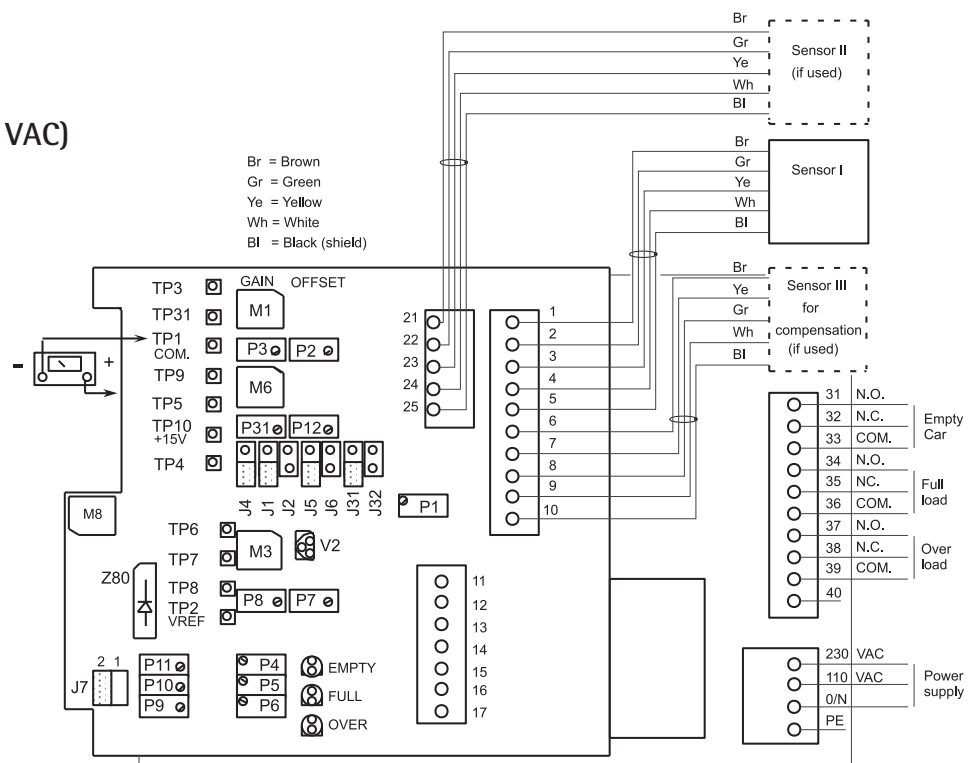


Diagram B
(Power supply 230/110 VAC)




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3 Adjustment of the WLWD-M

3.1 Preadjustment of load limits

 You must know or measure the balancing-
% before you can do adjustments.

The voltage between measuring points corre-
sponds to the percentage of loading.

The following adjustments have been carried out
at the factory but must be checked on site. The
load limits are adjustet to 5%, 80% and 110% at
50% balancing factor.

- Potentiometers P3, P31, P8, P9, P10 have been
turned to the extreme position counter clock-
wise at the factory

Load limits:

Limit	Bal. factor 50%	Bal. factor 40%
1%	20 mV	25 mV
2%	40 mV	50 mV
5%	100 mV	125 mV
10%	200 mV	250 mV

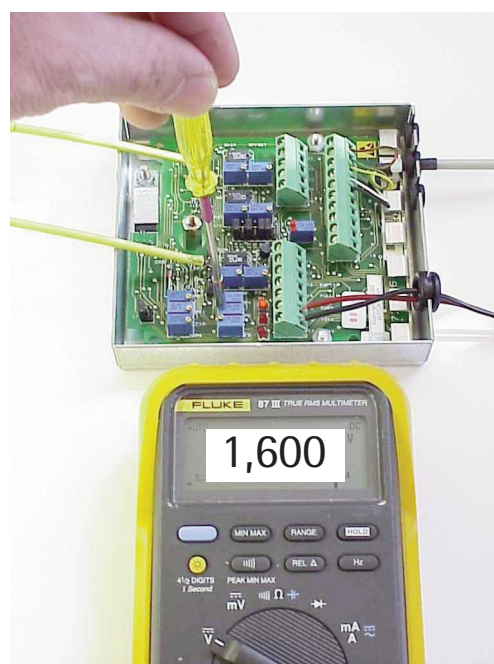
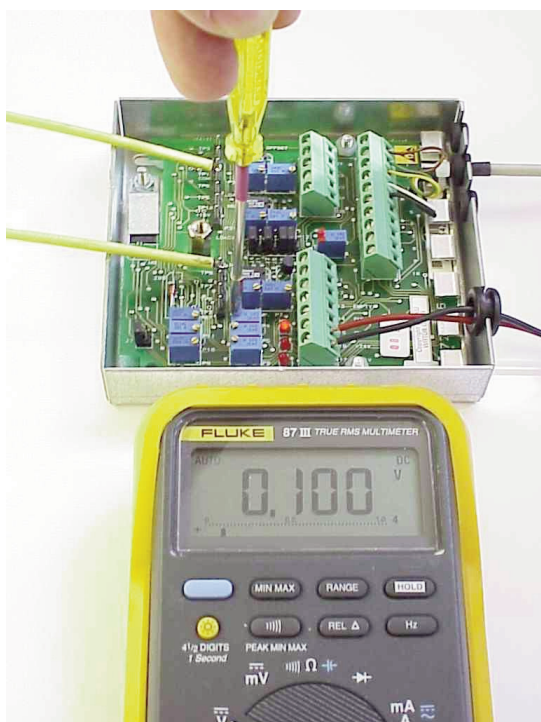
3.1.1 Adjusting the limit for empty car (0 ... 10%)

- Check the voltage between TP6 and TP1. Adjust
potentiometer P4 to the required voltage. The
values for balancing of 50% and 40% can be
found in following table, or use the formula for
calculating other limits.

$$\frac{50}{\text{Balancing factor \%}} \times \text{adjusted limit[\%]} \times 0,02[\text{V}]$$

3.1.2 Adjusting the limit for full loaded car (50 ... 150%)

- Check the voltage between TP7 and TP1. Adjust
potentiometer P5 to the required voltage. The
values for balancing of 50% and 40% can be
found in following table, or use the formula for
calculating other limits.



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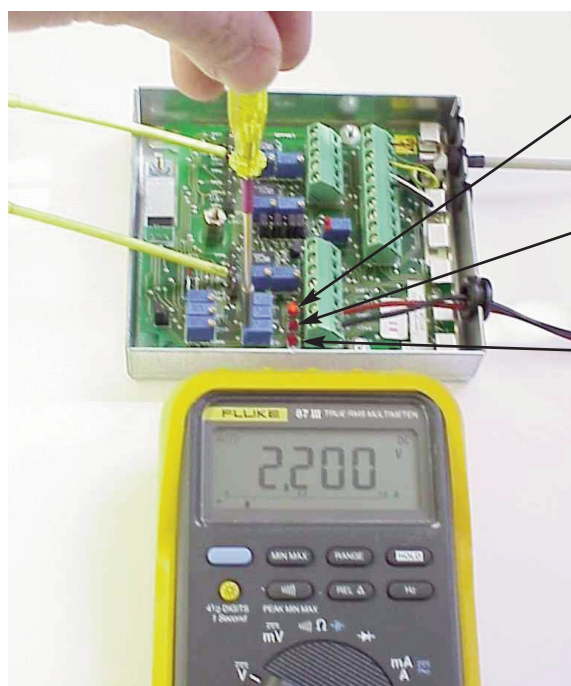
The voltage between measuring points corresponds to the percentage of loading.

Limit	Bal. factor 50%	Bal. factor 40%
60%	1,2 V	1,5 V
70%	1,4 V	1,75 V
80%	1,6 V	2,0 V
90%	1,8 V	2,25 V
100%	2,0 V	2,5 V
110%	2,2 V	2,75 V
120%	2,4 V	3,0 V

$$\frac{50}{\text{Balancing factor \%}} \times \text{adjusted limit [\%]} \times 0,02[\text{V}]$$

3.1.3 Adjusting the limit for over loaded car (50 ... 150%)

- Check the voltage between TP8 and TP1. Adjust potentiometer P6 to the required voltage. The values for balancing of 50% and 40% can be found in following table, or use the formula for calculating other limits.



The voltage between measuring points corresponds to the percentage of loading.

Limit	Bal. factor 50%	Bal. factor 40%
60%	1,2 V	1,5 V
70%	1,4 V	1,75 V
80%	1,6 V	2,0 V
90%	1,8 V	2,25 V
100%	2,0 V	2,5 V
110%	2,2 V	2,75 V
120%	2,4 V	3,0 V

$$\frac{50}{\text{Balancing factor \%}} \times \text{adjusted limit [\%]} \times 0,02[\text{V}]$$

3.1.4 Check of load limits

Check the correctness of adjusted load limits by loading the with the corresponding loads.

- The LED H1 (empty) must lit, if the load in car is less than 5% of nominal load (or the adjusted value).
- The LED H2 (full load) must lit, if the load in car is more than 80% of nominal load (or the adjusted value).
- The LED H3 (over load) must lit, if the load in car is more than 110% of nominal load (or the adjusted value).

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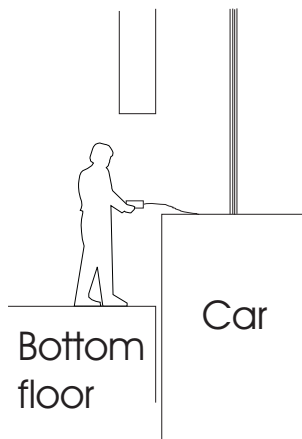
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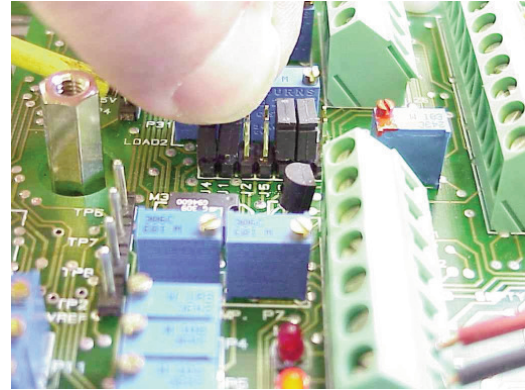
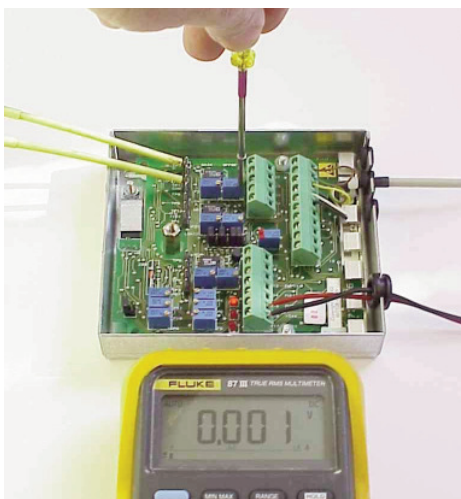
3.2 Adjustment of amplifier

3.2.1 One sensor on the crosshead beam

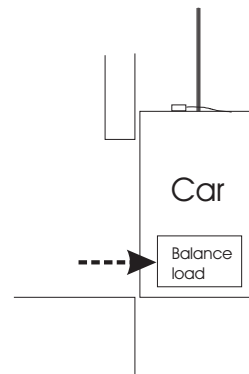
- (1) Drive car to bottom landing, empty car (there is nothing in or on it).



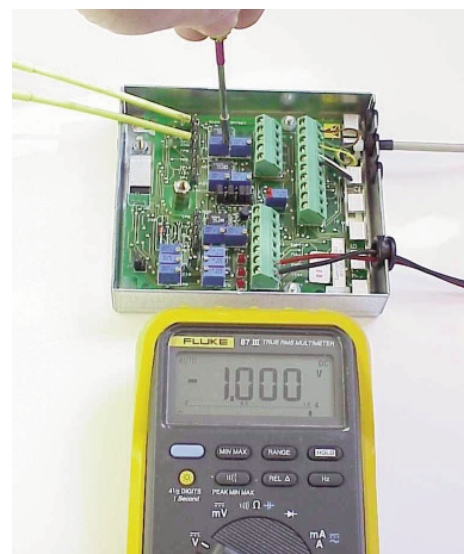
- (2) Use P2 to adjust the TP3 voltage to $0,00 \pm ,01V$. The voltage decreases when turning clockwise. Use the jumper J1, if the adjustment range is not sufficient (i.e. remains positive) and J2, if the value remains negative.



- (3) Load the balance load into the car.



- (4) Use P3 to adjust the TP3 voltage to $-1,000V \pm 0,005V$. The absolute value of voltage increases when turning clockwise.



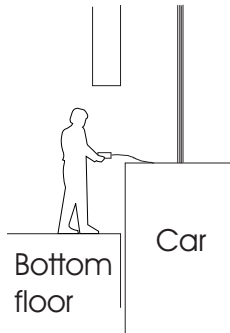
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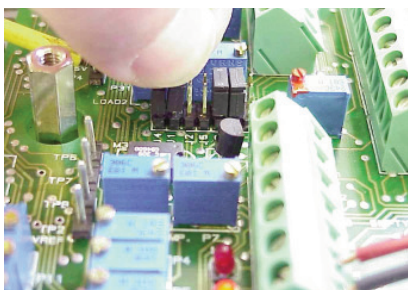
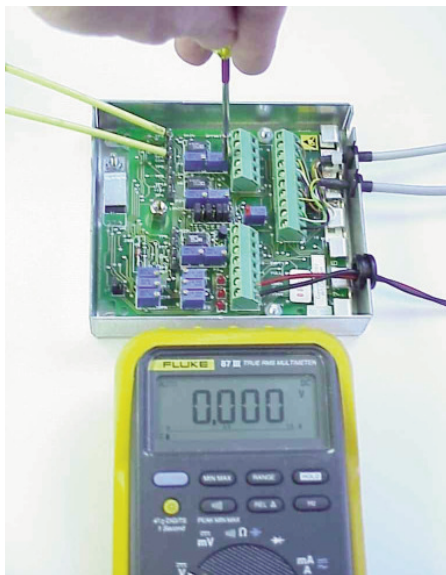
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3.2.2 One sensor on the crosshead beam + compensation sensor

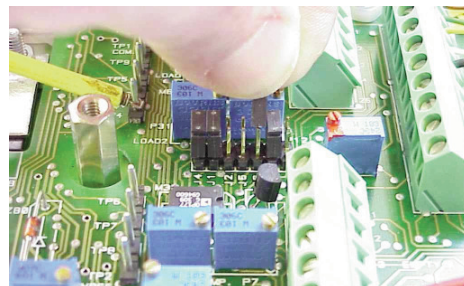
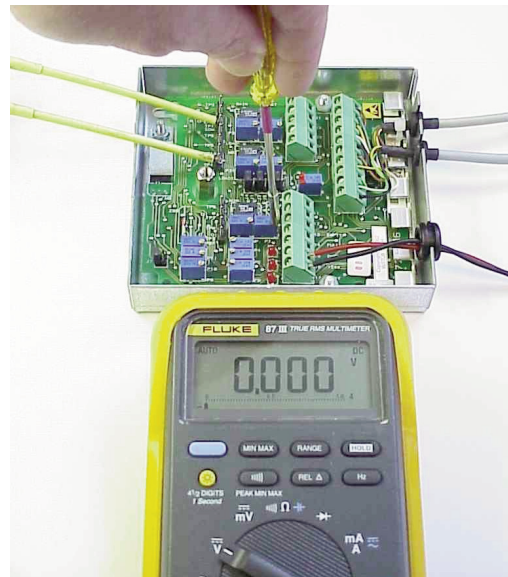
- (1) Drive car to bottom landing, empty car (there is nothing in or on it).



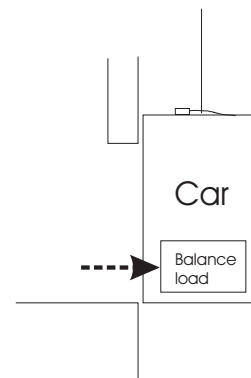
- (2) Use P2 to adjust the TP3 voltage to $0,00 \pm 0,01V$. The voltage decreases when turning clockwise. Use the jumper J1, if the adjustment range is not sufficient (i.e. remains positive) and J2, if the value remains negative.



- (3) Use P7 to adjust the TP4 voltage to $0,00V \pm 0,01 V$. The voltage changes negative (decreases) when turning clockwise. Use the jumper J5, if the value remains positive and J6, if the value remains negative.



- (4) Load the balance load into the car.



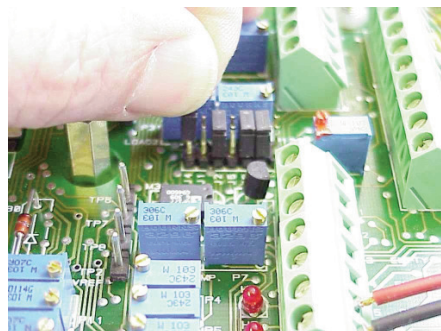
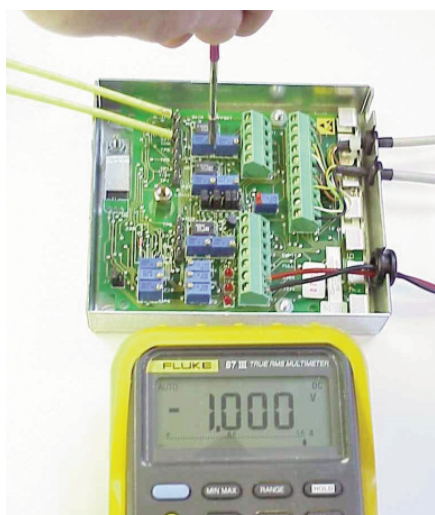
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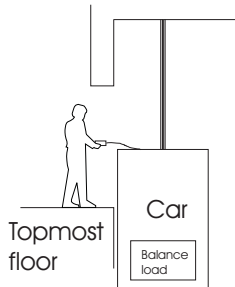
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- (5) Use P3 to adjust the TP3 voltage to $-1,000V \pm 0,005V$. The absolute value of voltage increases when turning clockwise.
- (8) If needed, the amplification of the compensation channel can be decreased by setting J4.

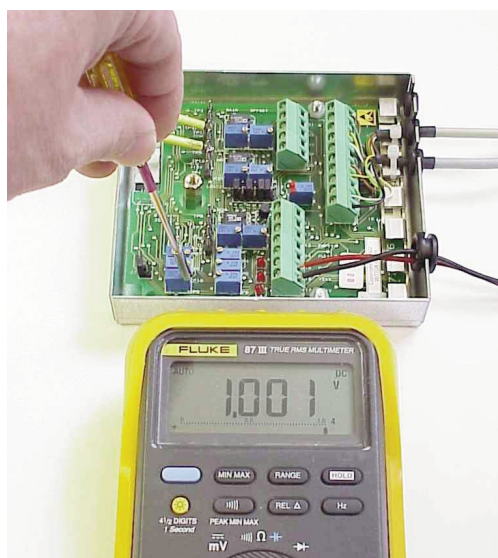
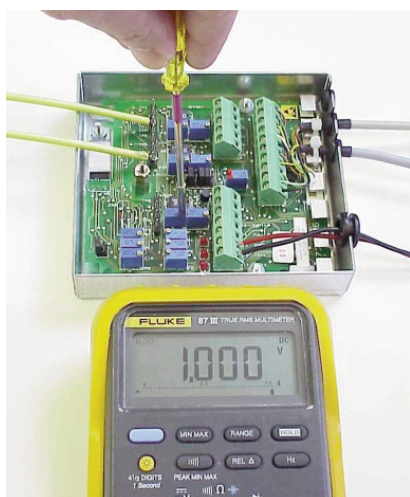


- (9) Use P9 to adjust the TP5 voltage to $1,000V \pm 0,005V$ by turning the potentiometer in the clockwise direction.

- (6) Drive the car to the topmost landing.



- (7) Use P8 to adjust the TP4 voltage to $1,000V \pm 0,005V$. The voltage increases when turning clockwise.



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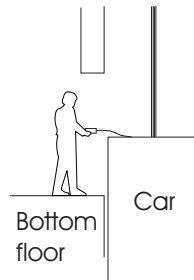
WLWD-M

Operating instructions

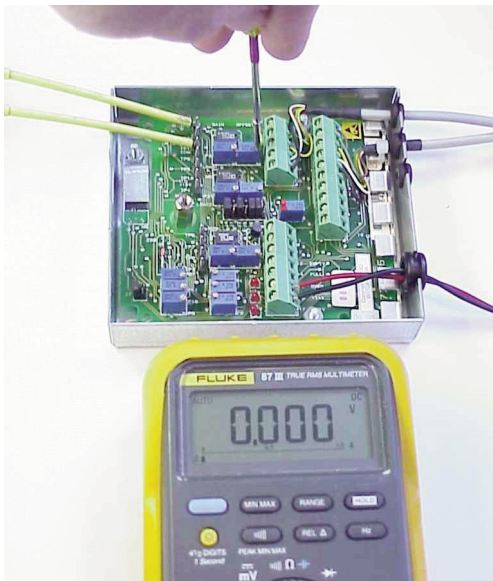
Blatt/sheet D961MGB.016
 Datum/date 31.01.2002
 Stand/version C-31.08.2007
 Geprüft/approved WAT/MZE

3.2.3 Two sensors on the crosshead beam

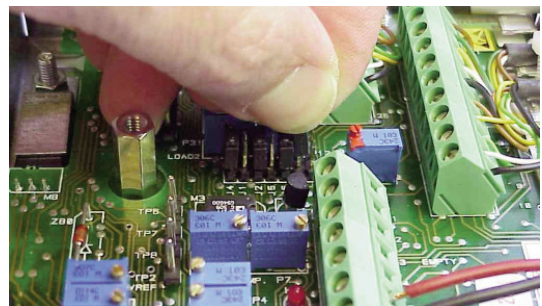
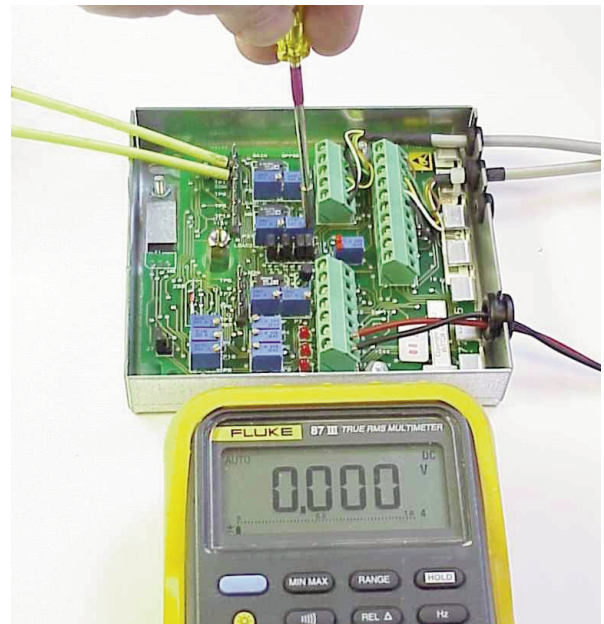
- (1) Drive car to bottom landing, empty car (there is nothing in or on it).



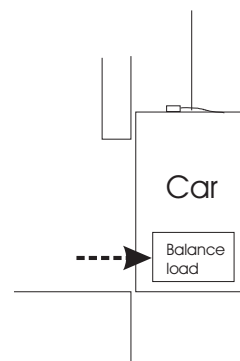
- (2) Use P2 to adjust the TP3 voltage to $0,000V \pm 0,005V$. The voltage changes to negative (decreases) when turning clockwise. Use the jumper J1, if the adjustment range is not sufficient (i.e. remains positive) and J2, if the value remains negative.



- (3) Use P12 to adjust the TP31 voltage to $0,000V \pm 0,005V$. The voltage decreases when turning clockwise. Use the jumper J31, if the adjustment range is not sufficient (i.e. remains positive) and J32, if the value remains negative.



- (4) Load the balance load into the car.



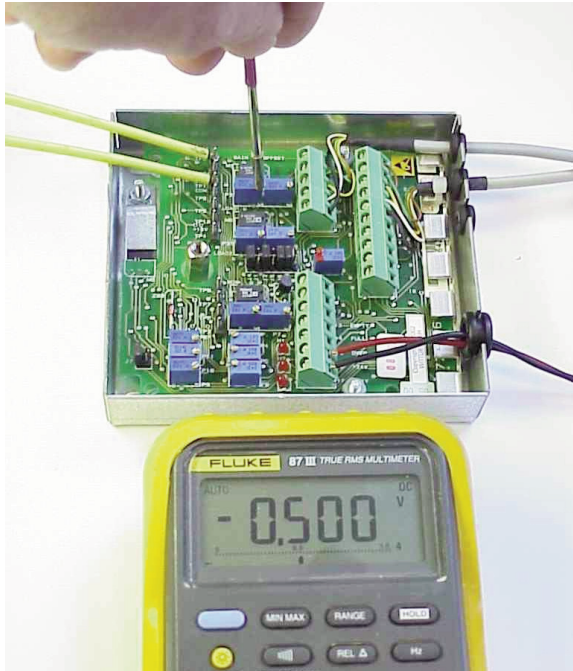
Electronic Load Weighing Device

WLWD-M

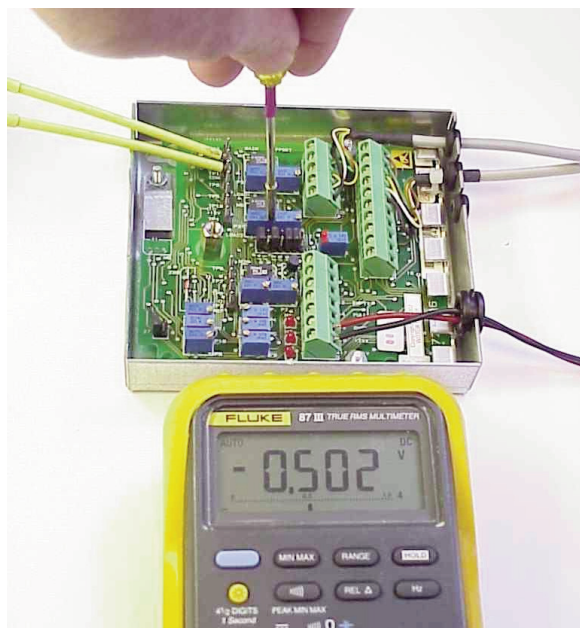
Operating instructions

Blatt/sheet D961MGB.017
Datum/date 31.01.2002
Stand/version 31.01.2002
Geprüft/approved WAT/MZE

- (5) Use P3 to adjust the TP3 voltage to $-0,500V \pm 0,005V$.



- (6) Use P31 to adjust the TP31 voltage to $-0,500V \pm 0,005V$.



Electronic Load Weighing Device

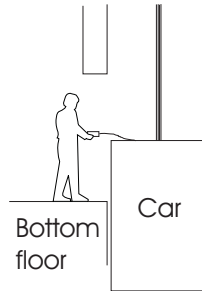
WLWD-M

Operating instructions

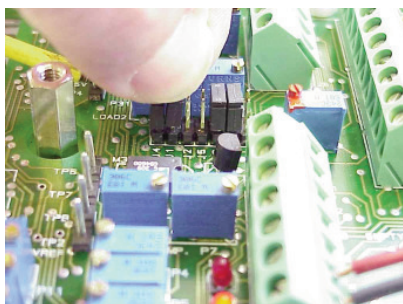
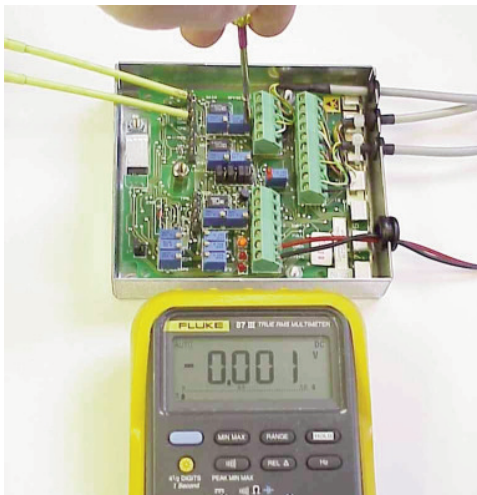
Blatt/sheet D961MGB.018
 Datum/date 31.01.2002
 Stand/version C-31.08.2007
 Geprüft/approved WAT/MZE

3.2.4 Two sensors on the crosshead beam + compensation sensor

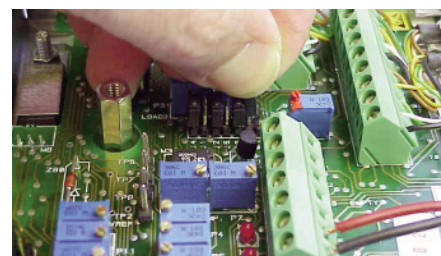
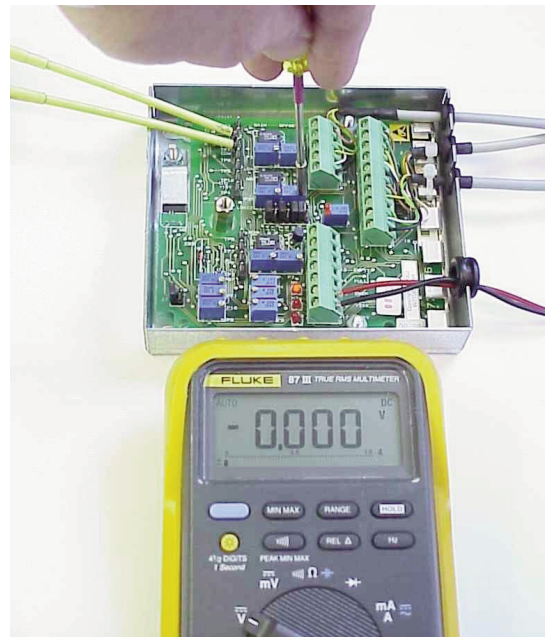
- (1) Drive car to bottom landing, empty car (there is nothing in or on it).



- (2) Use P2 to adjust the Tp3 voltage to $0,00V \pm 0,005V$. The voltage changes to negative (decreases) when turning clockwise. Use the jumper J1, if the adjustment range is not sufficient (i.e. remains positive) and J2, if the value remains negative.



- (3) Use P12 to adjust the TP31 voltage to $0,000V \pm 0,005V$. The voltage decreases when turning clockwise. Use the jumper J31, if the adjustment range is not sufficient (i.e. remains positive) and J32, if the value remains negative.



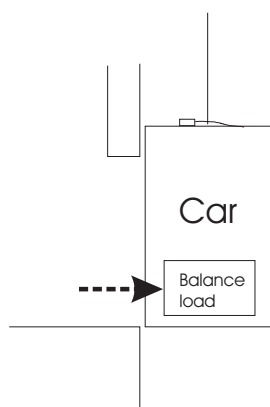
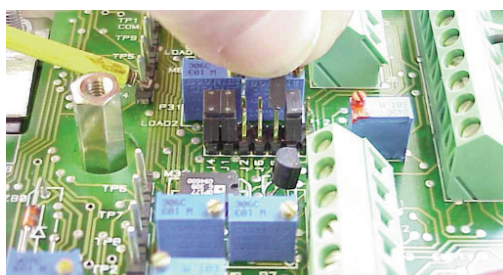
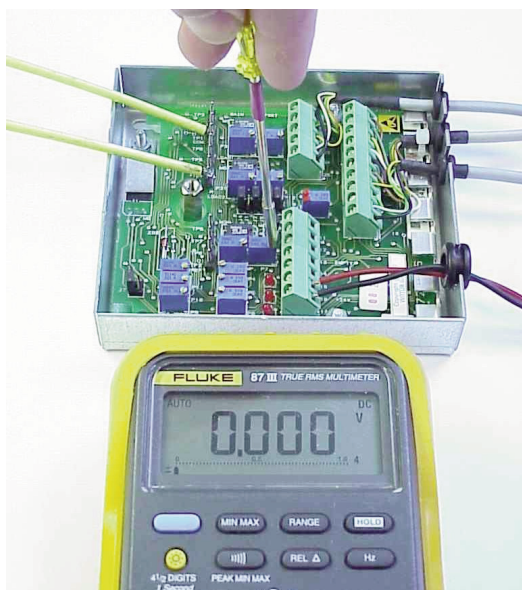
Electronic Load Weighing Device WLWD-M

Operating instructions

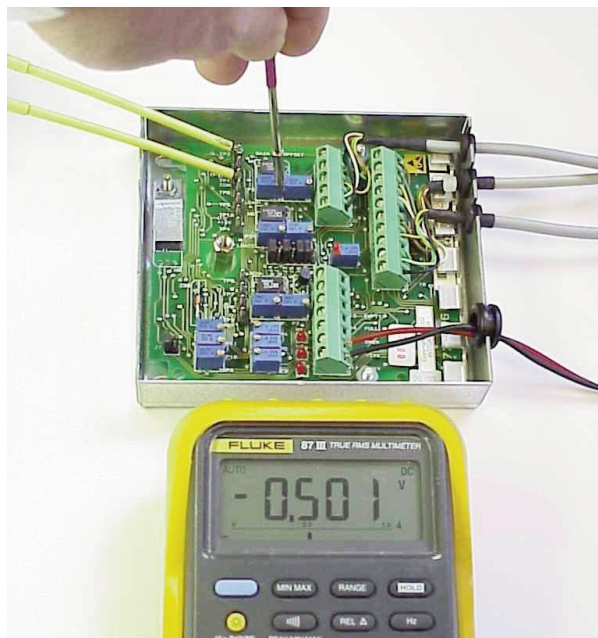
Blatt/sheet D961MGB.019
Datum/date 31.01.2002
Stand/version C-31.08.2007
Geprüft/approved WAT/MZE

- (4) Use P7 to adjust the TP4 voltage to $0,000V \pm 0,005V$. The voltage changes to negative (decreases) when turning clockwise. Use the jumper J5, if the value remains positive and J6, if the value remains negative.

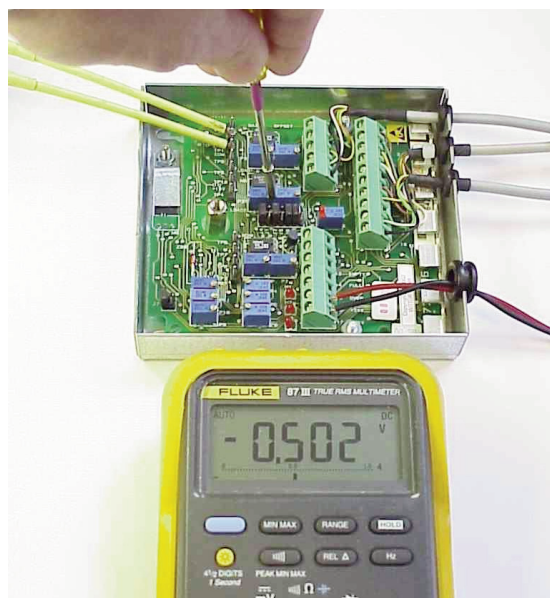
- (5) Load the balance load into the car.



- (6) Use P3 to adjust the TP3 voltage to $-0,500V \pm 0,005V$.



- (7) Use P31 to adjust the TP31 voltage to $-0,500V \pm 0,005V$.



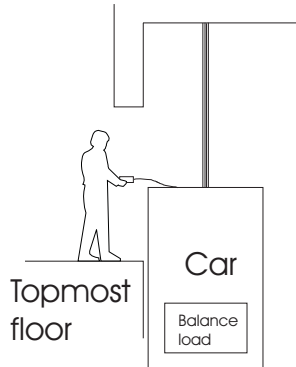
Electronic Load Weighing Device

WLWD-M

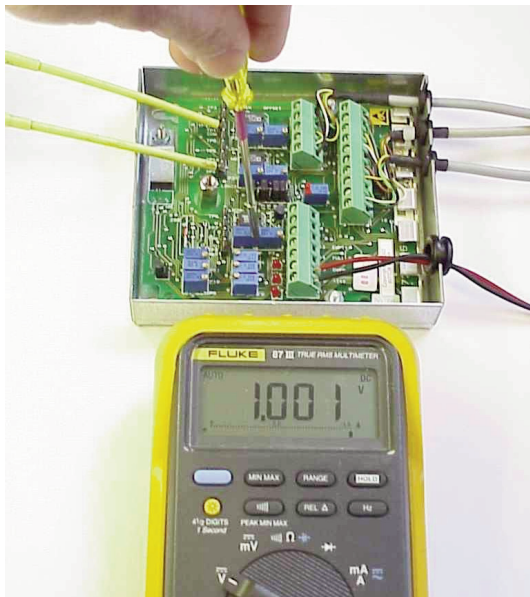
Operating instructions

Blatt/sheet D961MGB.020
Datum/date 31.01.2002
Stand/version C-31.08.2007
Geprüft/approved WAT/MZE

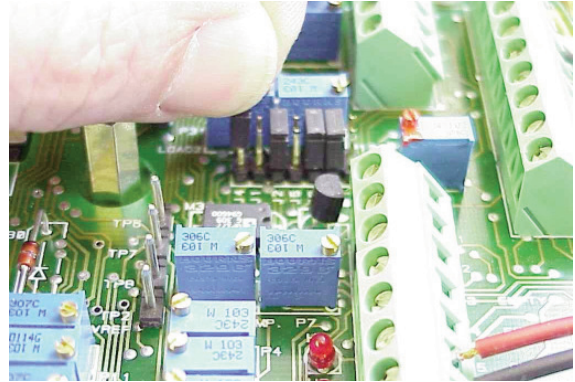
(8) Drive to the topmost landing.



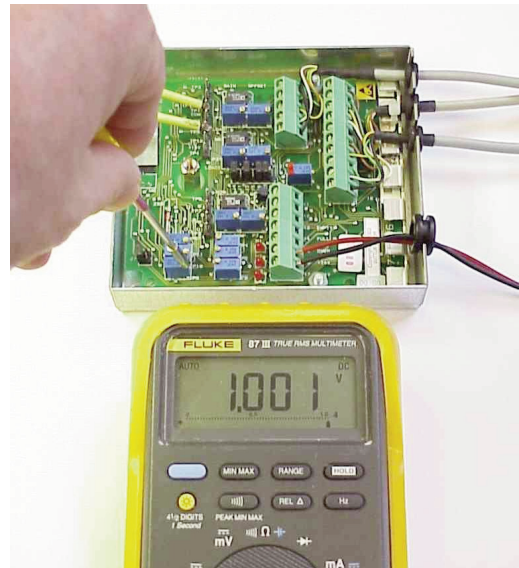
(9) Use P8 to adjust the TP4 voltage to $1,000V \pm 0,005V$.



(10) If needed, the amplification of the compensation channel can be decreased by setting J4.



(11) Use P9 to adjust the TP5 voltage to $1,000 \pm 0,005 V$ by turning the potentiometer in the clockwise direction.



Electronic Load Weighing Device WLWD-M

Operating instructions

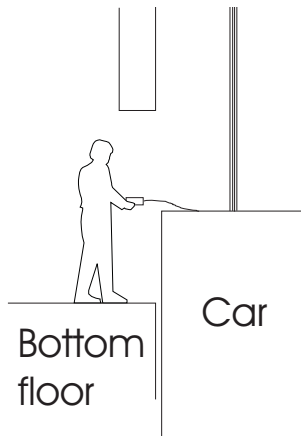
Blatt/sheet D961MGB.021
Datum/date 31.01.2002
Stand/version C-31.08.2007
Geprüft/approved WAT/MZE

3.3 Adjustment of WLWD-M load-weighing device with current 4-20mA (V3F25 and KDH drive)

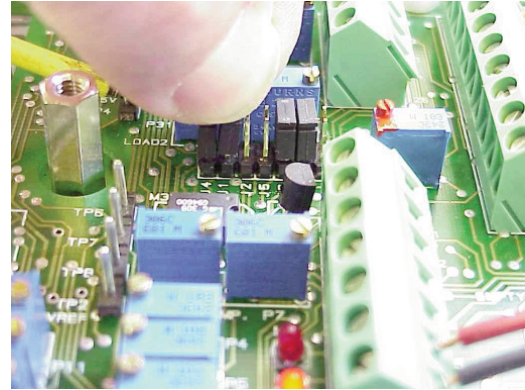
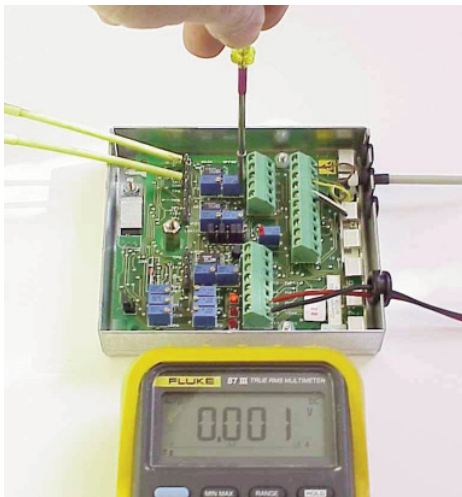
NOTE! See first preadjustment on section 3.1.

3.3.1 One sensor on the crosshead beam

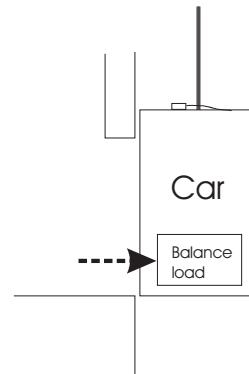
- (1) Drive car to bottom landing, empty car (there is nothing in or on it).



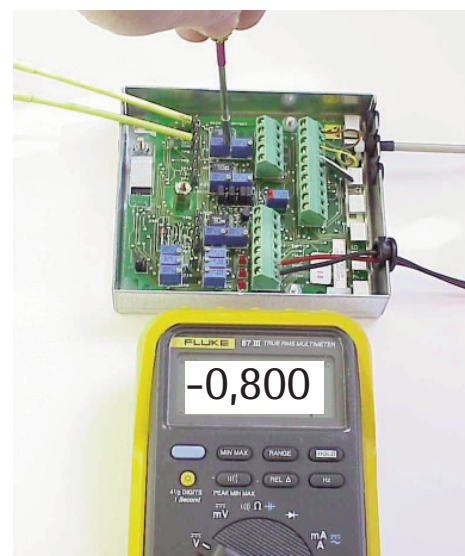
- (2) Use P2 to adjust the TP3 voltage to $0,00 \pm ,01V$. The voltage decreases when turning clockwise. Use the jumper J1, if the adjustment range is not sufficient (i.e. remains positive) and J2, if the value remains negative.



- (3) Load the balance load into the car.



- (4) Use P3 to adjust the TP3 voltage to $-0,800V \pm 0,005V$. The absolute value of voltage increases when turning clockwise.



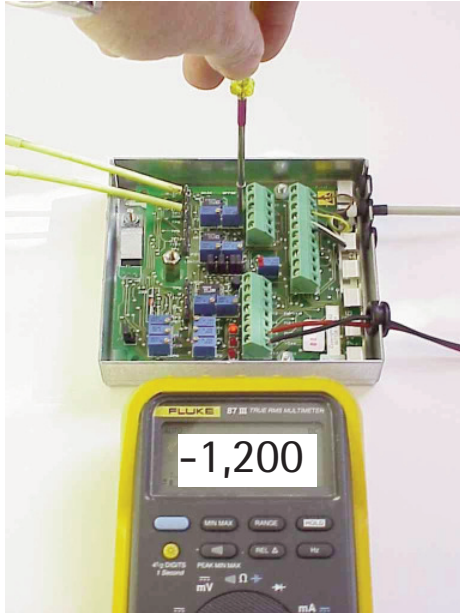
Electronic Load Weighing Device

WLWD-M

Operating instructions

Blatt/sheet D961MGB.022
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Geprüft/approved WAT/MZE

- (5) Use P2 to adjust the TP3 voltage to $-1,200V \pm 0,005V$.



Electronic Load Weighing Device

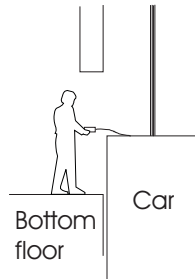
WLWD-M

Operating instructions

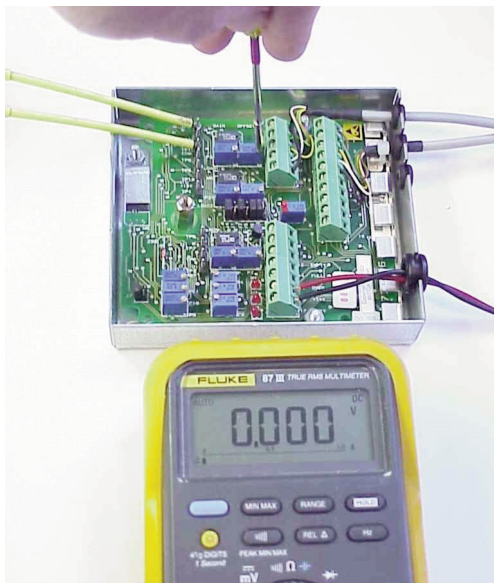
Blatt/sheet D961MGB.023
 Datum/date 31.01.2002
 Stand/version C-31.08.2007
 Geprüft/approved WAT/MZE

3.3.2 Two sensors on the crosshead beam

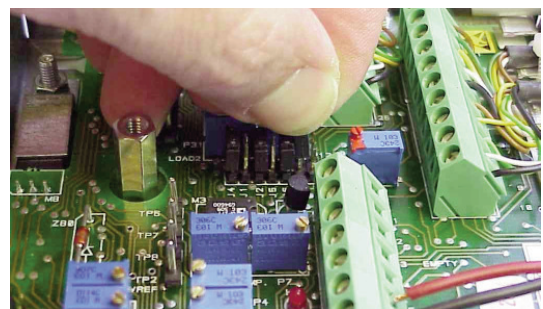
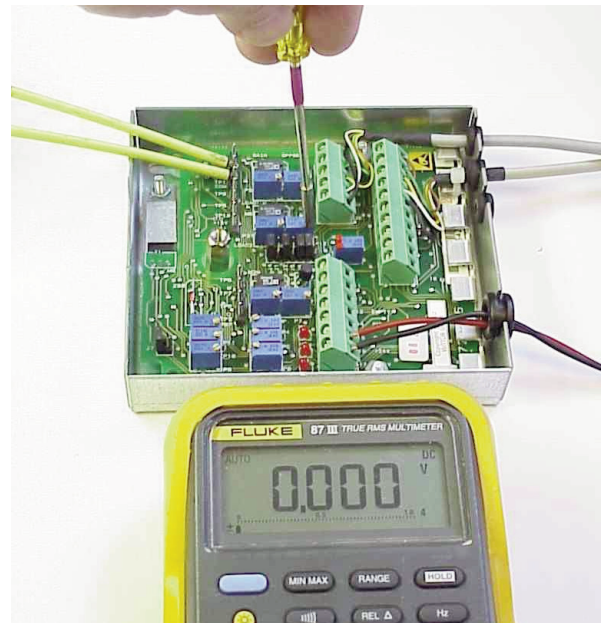
- (1) Drive car to bottom landing, empty car (there is nothing in or on it).



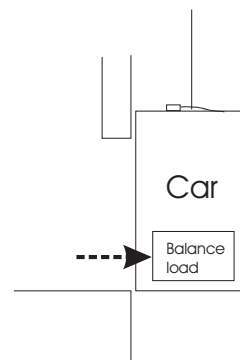
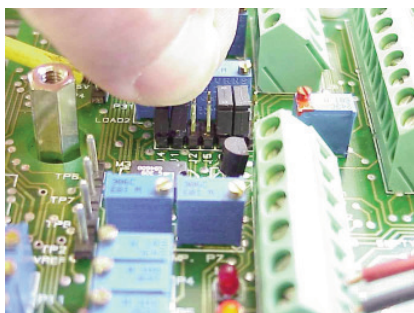
- (2) Use P2 to adjust the TP3 voltage to $0,000V \pm 0,005V$. The voltage changes to negative (decreases) when turning clockwise. Use the jumper J1, if the adjustment range is not sufficient (i.e. remains positive) and J2, if the value remains negative.



- (3) Use P12 to adjust the TP31 voltage to $0,000V \pm 0,005V$. The voltage decreases when turning clockwise. Use the jumper J31, if the adjustment range is not sufficient (i.e. remains positive) and J32, if the value remains negative.



- (4) Load the balance load into the car.



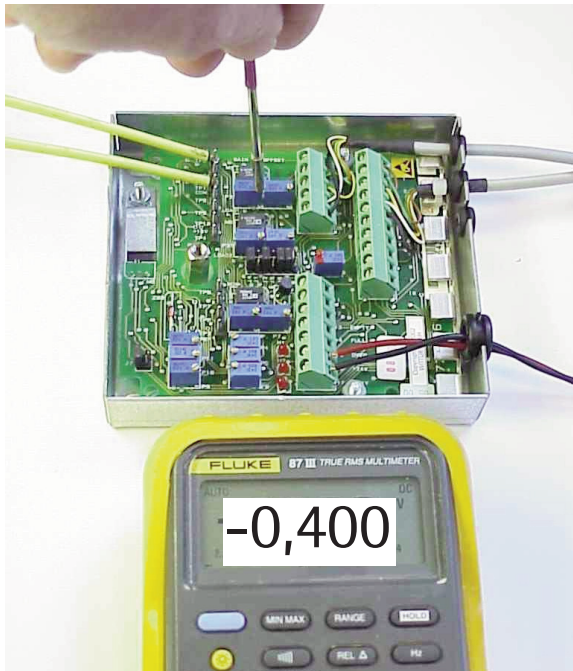
Electronic Load Weighing Device

WLWD-M

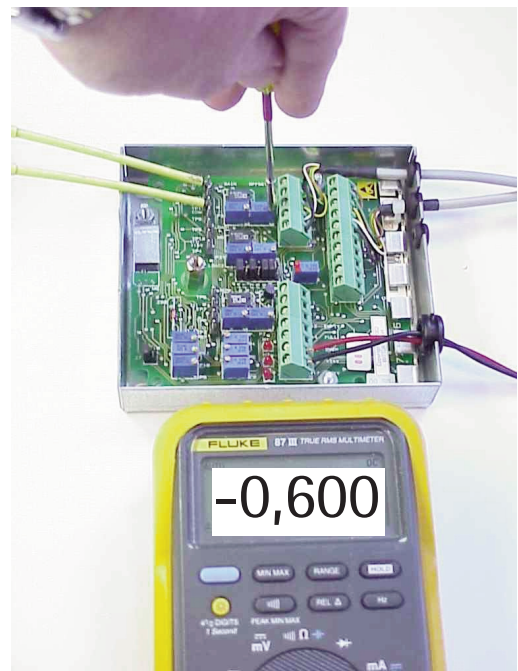
Operating instructions

Blatt/sheet D961MGB.024
 Datum/date 31.01.2002
 Stand/version C-31.08.2007
 Geprüft/approved WAT/MZE

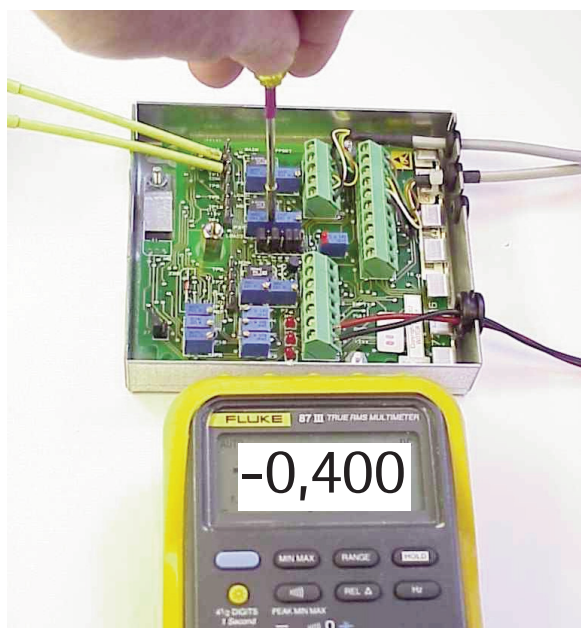
(5) Use P3 to adjust the TP3 voltage to $-0,400V \pm 0,005V$.



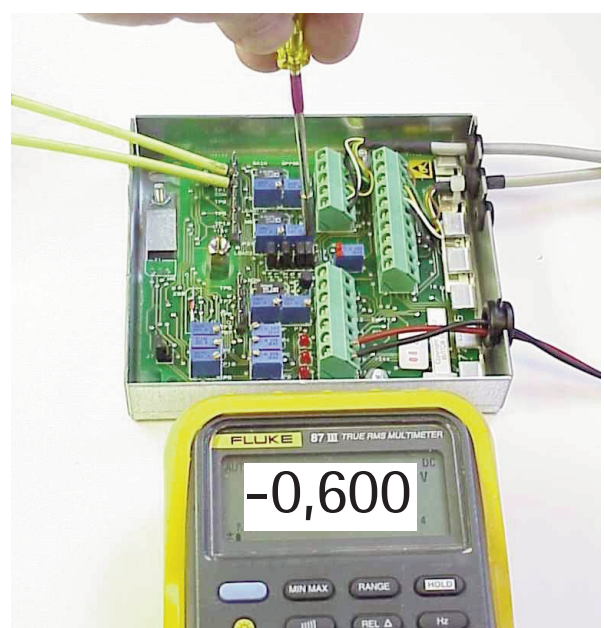
(7) Use P2 to adjust the TP3 voltage to $-0,600V \pm 0,005V$.



(6) Use P31 to adjust the TP31 voltage to $-0,400V \pm 0,005V$.



(8) Use P12 to adjust the TP31 voltage to $-0,600V \pm 0,005V$.



Electronic Load Weighing Device

WLWD-M

Operating instructions

Blatt/sheet D961MGB.025
Datum/date 31.01.2002
Stand/version 31.01.2002
Geprüft/approved WAT/MZE

3.4 Start setting for the motor drive

The adjustments of the start setting are necessary only, if the output 11 is in use (= current loop for start setting).

The adjustment is based on the relation of the motor currents or the motor current reference values at the top and bottom of the elevator shaft.

Measure the motor current at inspection drive in the down direction with the empty car:

- a) in the top of the shaft
- b) at the bottom of the shaft

- Calculate:
 $1-(z : y) [V] = \text{reference voltage}$
smaller current in the shaft = z,
bigger current in the shaft = y

If the measured current at the bottom of the shaft is smaller than in the top of the shaft:

- (1) Drive the car to the bottom landing.
- (2) Check that the potentiometer P10 is turned to the extreme position counter clockwise.
- (3) Adjust the voltage of TP9 to the reference voltage with the potentiometer P11 (=offset).
- (4) Drive the car to the topmost landing. Adjust the voltage of TP9 to 0 V with the potentiometer P10 (=gain).

If the measured current at the bottom of the shaft is bigger than in the top of the shaft:

- (1) Drive the car to the bottom landing.
- (2) Check that the potentiometer P10 is turned to the extreme position counter clockwise.
- (3) Adjust the voltage of TP9 to the 0 V with the potentiometer P11 (=offset).
- (4) Drive the car to the topmost landing. Adjust the voltage of TP9 to the reference voltage with the potentiometer P10 (=gain).



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WLWD-M

Operating instructions

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Stand/version 31.01.2002
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4 Troubleshooting

Effect	Failure description	Correction possibility, solution
Electronic does not work at all	No voltage supply	Check the 24VDC supply voltage by multimeter
	Sensor defect	Check the resistance of each sensor, measure between wires brown and white / green and yellow, it must be 350 ohm $\pm 2\%$, if not change defect sensor.
	Supply voltage ok, but still no function	Measure the voltage between TP10 and -/24V (15VDC), change board if the voltage is not in the area of 15VDC $\pm 10\%$
No output signal, but LED H1, H2 oder H3 light's	No voltage on output	Output driver defect, change board

Faults which can appear during installation and adjustment

Effect	Failure description	Correction possibility, solution
Measurement value between TP1 - TP3 or TP1 - TP31 or TP1 - TP4 can not be adjusted by P2/ P12/ P7	Sensor cable connected wrong	Connect sensor cable according circuit diagram page 10
	Sensor defect	Check the resistance of each sensor, measure between wires brown and white / green and yellow, it must be 350 ohm $\pm 2\%$, if not change defect sensor.
	The potentiometers P2, P12 and P7 are not, or very difficult to adjust (measured voltage jumps)	The GAIN potentiometers P3, P31 and P8 are not turned fully counter clockwise (see pages 11 and 12)
Measurement value between TP1 - TP3 or TP1 - TP31 or TP1 - TP4 decreases when sensor is loaded	Tension instead of compression loading or sensor cable connected wrong	Exchange sensor wires yellow and green of the corresponding sensor.
The load is measured wrong	Load limits are adjusted wrong	Adjust load limits by potentiometer's P4, P5, P6 (see pages 11 and 12)
	Zero load adjustment is wrong, LED H1 (<5% load) is light also when a person is in car.	The fitter was standing on the car during adjustment, repeat adjustment standing on landing floor.
	Balancing load is wrong, normally it is half of nominal load	The balancing load was calculated wrong, balancing factor is not 50% (the values given in the operating instruction are using a balancing factor of 50%) Calculate balancing factor, load limits and readjust the load limits by P4, P5, P6, for description see pages 11 and 12)
No output signal available, but LED H1, H2 or H3 light's	No voltage available on output	The output drivers are of open collector type, for this reason the output must be supplied by a load (relais or resistor) to get a measurable signal. (e.g.: a relais is connected with one terminal to +24VDC, the second terminal is connected to the board output. Note, a freewheeling diode must be added!)

Electronic Load Weighing Device

WLWD-M

Operating instructions

Blatt/sheet D961MGB.027
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 Geprüft/approved WAT/MZE

4 Spare parts list

Pos.	Component	Spare part ... used	Number...	Art. No.
1	Load weighing sensor		1	87122G01
2	Central unit (complete)	power supply 24 VDC	1	88520G01
3	Amplifier board		1	88645G01
3	Amplifier board	power supply 110/230 VAC	1	88645G01
4	Central unit (complete)		1	87208G01
5	Supply board		1	87616G02

