ZEMIC
EUROPE ®

Elevator Weighing Kit – Cabin

Installation Manual

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1.   General Overview

This elevator weighing kit is designed to measure the load level applied to an elevators cabin, which is being monitored and to transmit the load level data to a control system.

The elevator weighing kit Cabin's Indicator module uses "Relay contacts" which, when reaching a load of 15kg, 90% of the rated load and 110% (or 100% + 75kg) overload, change their output.

2.   Principle of Operation

The working of the elevator weighing kit-Cabin is displayed schematically in the following figure:
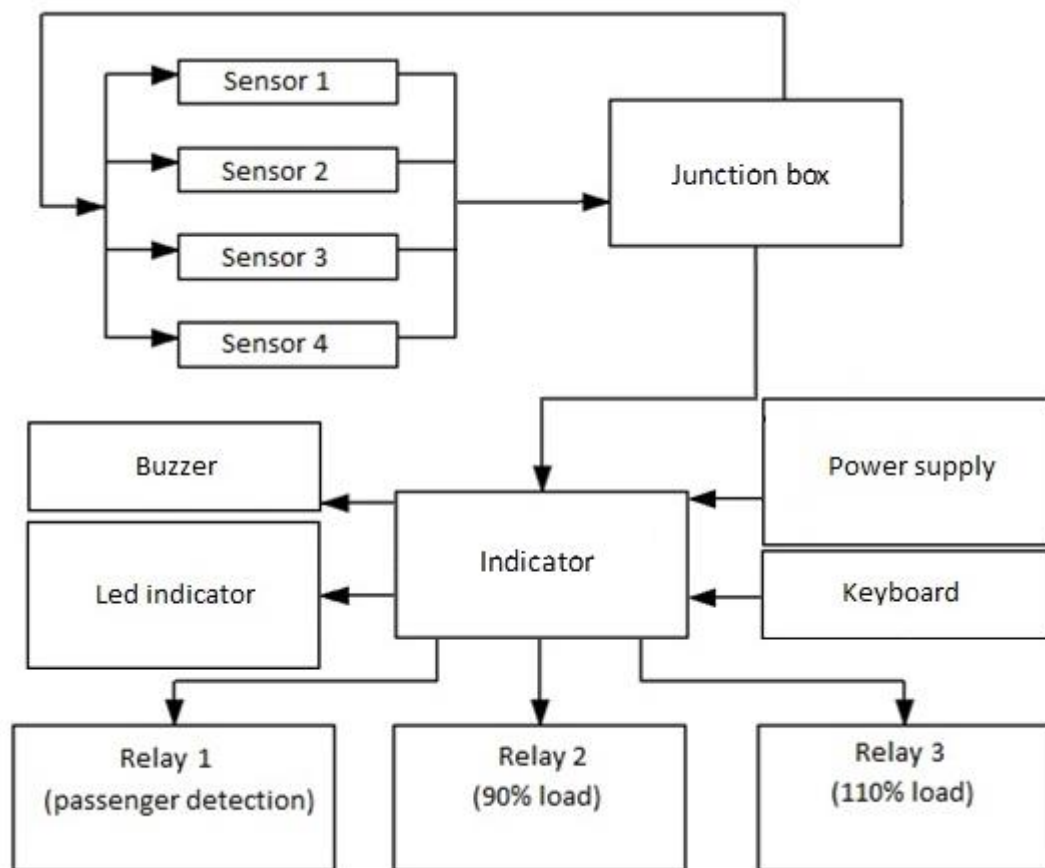

Figure 1: Schematic representation of the Cabin system with 4 sensors (loadcells). This also applies to systems with 8 or 12 loadcells.

The sensors are connected to a junction box which connects the sensors in parallel and transfers the combined signal to the Indicator, which has 3 relays for detection. The relays also have a LED indication.

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The junction box will send an analog signal to the Indicator, which in turn will convert the signal to a digital signal. This signal is compared to the signal when the cabin is empty. When the signal is at a point which will trigger one of the relays it will do so. At this point the relays led light are also activated. When an overload is detected the buzzer will also sound.

In default settings the relays are set to a normally closed position. The normally closed position is displayed as the following block scheme:
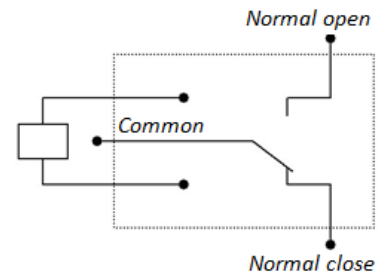
When a signal is presented which will trigger the relay, the relay will switch on.
It is possible to change the relays from normally closed to normally opened.

Figure 2: Normally closed relay

Automatic weight zero-ing

In order to compensate the empty cabin weight measurement error caused by the influence of temperature or parasitic load, the elevator weighing kit has a feature of automatic zeroing. By default, every 180 seconds the HC51x Indicator receives a weight value from the sensors. To avoid false zeroing, the measurement is performed twice with an interval of 1 second. If both measurements give the same weight lower than 15 kg, this value is set to zero. The interval of automatic zeroing can be set through the service menu. A range of 0 to 180 seconds can be chosen. The weight, for which the automatic zeroing is performed can be set between 5kg and 50 kg.

Weight hold during the movement

In order to avoid dynamic weighing errors during the movement of the lift, it is necessary that during the movement of the car the HC51x Indicator does not receive any weight values from the sensors. To realize this, the HC51x Indicator shuts down the input as soon as the doors of the lift close. The principle of work of the disabling of the input is shown in figure 3.
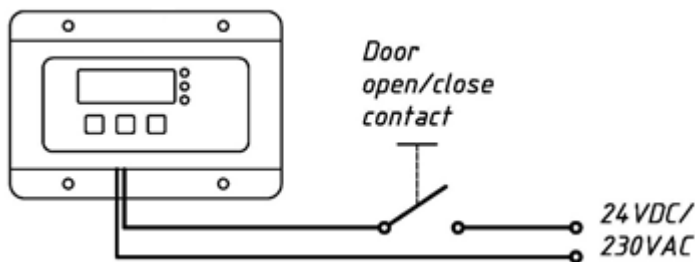

Figure 3: Schematic representation of the weight hold function.

The HC51x Indicator will have a disabled signal during the movement of the elevator. This means the signal will be registered and stored in the indicator when the doors are closing and the signal from the sensors will then be disabled. When the lift arrives at the destination floor and the doors open the signal from the sensors will be enabled again and the weight will be registered again.

By default, this option is disabled. It can be enabled in the service menu (described in chapter 10 – *Set up and Calibrating the Device*).

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Gained weight zeroing

Furthermore, in order to compensate the weight which could be gained during the journey of a cabin between floors, the elevator weighing kit is provided with a function which will make sure the value registered at the departure floor will be equal to the value measured on the destination. This way the change in weight value will be negated.
By default, this option is disabled. It can be enabled in the service menu (described in chapter 10 – Set up and calibrating the device).

Please note: Enabling of this function is only possible when there is a connection between the disabled signal to the disabled input.

3.   Labelling

Marking is applied to the front panel of the HC51x indicator and should contain the following data:
-     name and model type of the device
-     the trademark and company name of the manufacturer
-     CE marking
-     symbols of function keys
-     identification of indicating LEDs

4.   Safety Notes

To work with the Cabin weighing set it is advised to know the rules of working with high voltages.
Before starting to work with the set, this manual should be read.
Please heed the following warnings:
- Do NOT operate an ungrounded application. Always make sure the application is grounded before starting to work on it.
- Do NOT open the Indicator or other parts of the set, nor make modifications to them.
- Do NOT connect or disconnect cables when the application is switched on or is in use.
- Do NOT load the set with more than the permissible load.
- Do NOT allow children or inexperienced persons to operate the indicator.
- Do NOT use the weighing kit if any of the components are cracked or otherwise broken.

5.   Before Installing

Before installing the set into the application there are a few things which have to be done:
First unpack the complete set and do a visual inspection of the integrity of the set.
No dents, cracks or cable damages should be found.

The electrical integrity should be checked as well. This is done by connecting the wires of the junction box to the indicator. When turning on the power, a value should be shown.

Please pay attention that the set is in the same temperature range as it will be used in, 6 hours prior to installation.

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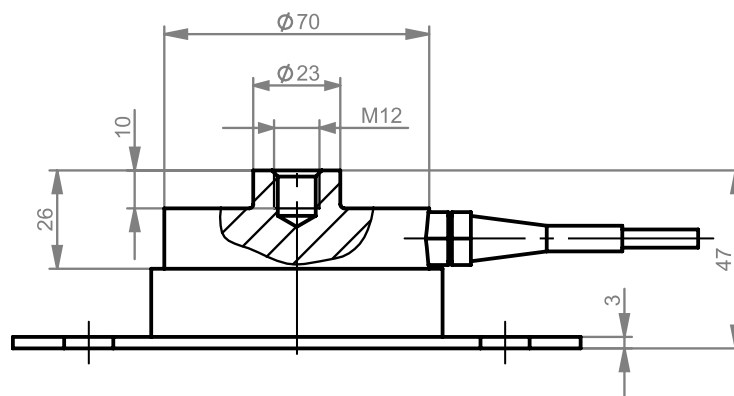## 6.   Loadcell Specifications

Short Description

- Aluminum IP65 compression loadcell
- High accuracy
- Suitable for elevator weighing systems
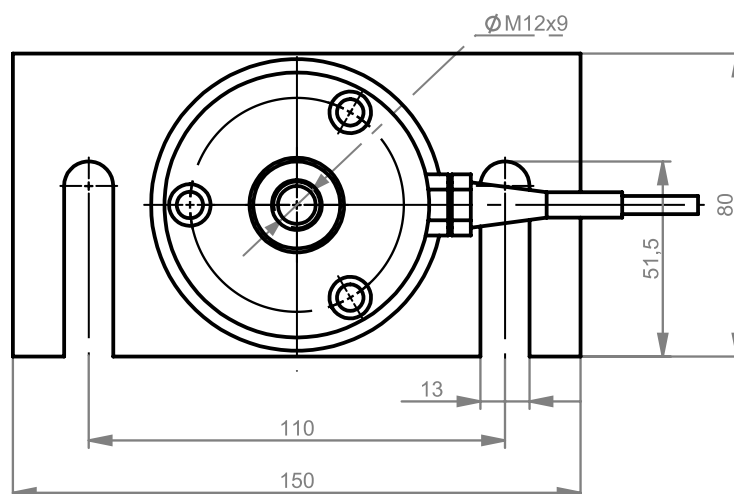- To use as set with 4, 8 or 12 loadcells

Available models

Capacity	Accuracy	Full Article Description
1t	G5	L2H-1-1T-2B

Dimensions in mm

Side View

Top View

Note: The loadcells are already mounted on the bottom plates.

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Technical Specifications Single Load Cell (model no. L2H-1-1T-2B)

Maximum Capacity (E_{max})	t	1
Accuracy Class		G5
Output Sensitivity (= FS)	mV/V	1.0 ± 0.2
Max. Number of Load Cell Intervals	n_{LC}	3000
Ratio of min. LC Verification Interval	$Y = E_{max} / v_{min}$	10000
Zero Balance	%FS	≤± 0.1
Combined Error	%FS	≤± 0.5
Creep Error (5 minutes)	%FS	≤± 0.05
Non-Linearity	%FS	≤± 0.5
Repeatability	%FS	≤± 0.5
Hysteresis	%FS	≤± 0.5
Temperature Effect on Zero (ZTC)	%FS/10°C	≤± 1.0
Temperature Effect on Sensitivity (STC)	%FS/10°C	≤± 0.3
Safe Overload	of E_{max}	120%
Ultimate Overload	of E_{max}	150%
Lateral Break Force	N	4000 @ 20°C
Excitation, Recommended Voltage	V	5 ~ 10
Excitation, Maximum Voltage	V	12
Input Resistance	Ω	350 ± 50
Output Resistance	Ω	350 ± 50
Insulation Resistance (50V)	MΩ	≥2000
Compensated Temperature	°C	-10 ~ + 40
Operating Temperature	°C	-35 ~ + 65
Storage Temperature	°C	-40 ~ + 70
Element Material		Aluminium
Ingress Protection (acc. to EN 60529)		IP65

Wiring

Features:

Cable type: Shielded, 4 conductor cable, conductor AWG 26
Cable diameter: Ø 5.0mm
Cable length: 2.0m ± 0.05m
Cable jacket: PVC
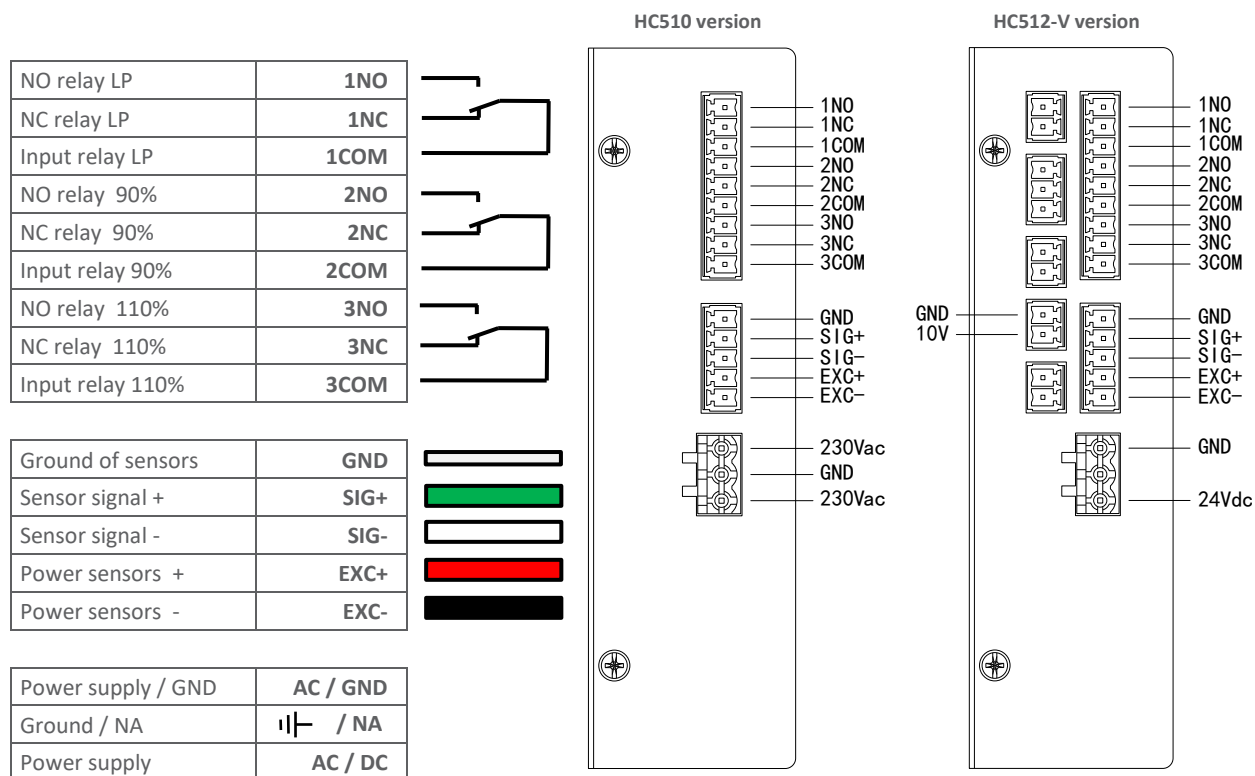Shield not connected to element

4-Wire Connection Diagram
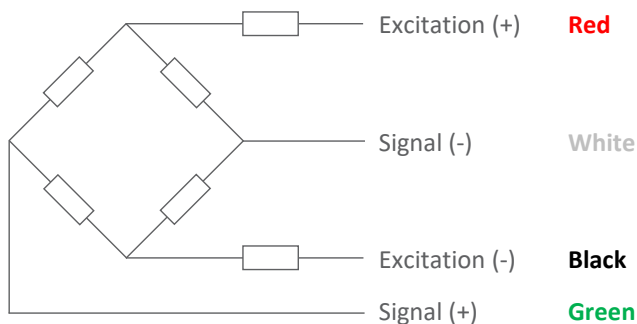
Excitation (+)   **Red**

Signal (-)   White

Excitation (-)   **Black**

Signal (+)   **Green**

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7.   Indicator Specifications

Technical Features Top-Sensors HC51x Indicator

Power Supply	HC510: 230VAC ± 10% / 50~60 Hz		HC512: 24VDC ± 10%
Power Consumption	6 W (max.)		
Maximum Current Switched by Relay Outputs	10 A / 28VDC		
Operating Mode	continuous		
Number of Programmable Relay Outputs	3		
Setting Threshold Range Loading	Set in kg		
Passenger Availability	0-50 kg		
90%	0-4000 kg	0-8000 kg	0-12000 kg
110%	0-4000 kg	0-8000 kg	0-12000 kg
Maximum Load	Sum of individual loadcells		
Maximum Permissible Short-time Overload	150%		
Lower Limit of Transformations	5 kg		
Maximum Duration of the Conversion Cycle	2 seconds		
Display	4-digit LED, 14.2mm 7-segment		
Indicators	Overload, Caution, Pre-caution		
Keypad	3-key flat tactile switches		
Operating Temperature Range	-10 ~ +40˚C		
Storage Temperature Range	-20 ~ +50˚C		
Humidity	0 ~ 90% @ 20˚C (rel.)		
Degree of Protection for IEC 60529 (DIN 40050)	IP54		

Indicator Connection Diagram

NO relay LP	1NO
NC relay LP	1NC
Input relay LP	1COM
NO relay 90%	2NO
NC relay 90%	2NC
Input relay 90%	2COM
NO relay 110%	3NO
NC relay 110%	3NC
Input relay 110%	3COM

Ground of sensors	GND
Sensor signal +	SIG+
Sensor signal -	SIG-
Power sensors +	EXC+
Power sensors -	EXC-

Power supply / GND	AC / GND
Ground / NA	/ NA
Power supply	AC / DC

(-V indicates additional 10V analog output, marked above on left side)

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Indicator Dimensions in mm

Top View
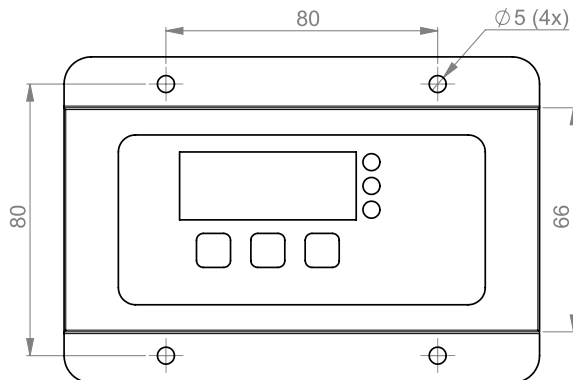
Side View
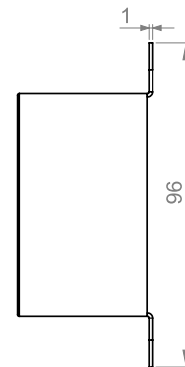
Front View
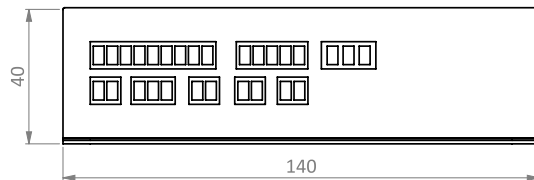
Display Keys and Settings

Indicator	Status	Key	Functions
● *110%*	LED Overload	▲	Reset button / Scroll parameter / Increase value
● *90%*	LED 90% Load	►	Select a digit / Scroll menu
● 🚶	LED Child only in elevator	↵	Turn on and off the display / Enter

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8.   Quick Start-up

The manufacturer did the calibration of the Cabin weighing set on a force measuring machine at the end of production.

If it is necessary to recalibrate the Cabin weighing set at the site of operation, it should be carried out with control weights (cargoes). The recommended total weight of reference cargo is not less than 50% of the maximum load.
Recalibration should be carried out according to the requirements of this manual.

Turn off the power and make sure that the junction box is connected to the indicator in the right way.

Turn on the indicator.

With an empty elevator (empty cabin), you must reset the weight, for this, in the current weight display mode, press the ⬆ button.

It is necessary to check the installed nominal lift capacity, in case of a mismatch, change the parameter according to the procedure.

Set capacity (min. 0kg, max. 99.9t)

In Normal/Work mode `1234`   press ⬆ + ▶ together to enter the User Configuration page.

Press ⬆ until you see `CAP`   then press ↵ to enter the edit menu.

When in the edit menu use the ▶ and ⬆ button to set the right capacity. Then press ↵ button to confirm the changes made.

9.   Maintenance

The maintenance of the Cabin set must be done in accordance to the requirements set in this manual and in the manner which is described in the operating and service manual of the elevator in which it is used.

All work related to the maintenance of the elevators should be carried out with strict adherence to the safety regulations.

10.   Setup and Calibrating the Device

If necessary, the Cabin set allows you to configure and calibrate the device on site. To do this you can use the service menu. The instrument is adjustable with help of the function keys on the front of the indicator. The general overview of the menu can be found on the following pages:

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User Configuration

In Normal/Work Mode

Press ▲ and ► at the same time for 1 sec. to enter User Configuration.

10.1.1 Zero

Zero function takes out the system deviations in zero when needed.

When `EEro` shows,

Press ↵ to perform zero. Indicator will count down in 10 seconds to wait for operater to leave the cabin.
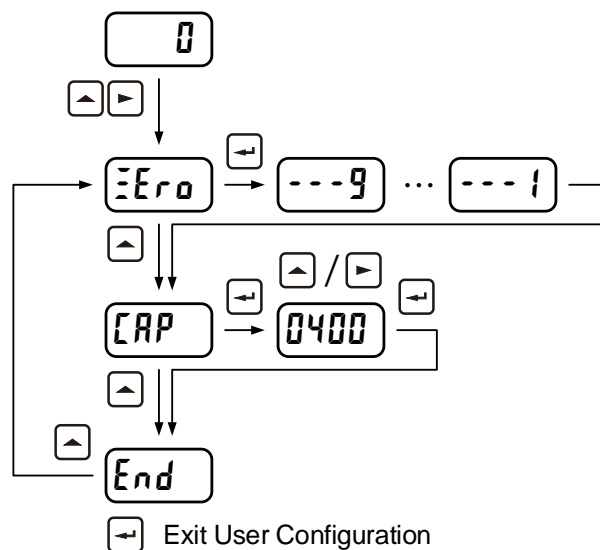
10.1.2 Capacity

When `CAP` shows,

Press ▲ to increase blinking digit, press ► to move blinking digit right.

Input the rated capacity of the lift system, in kg or ton unit (see **10.2.1 Display Unit**).

Note: Be aware to not exceed the sum of the loadcells' capacity.

Press ↵ to confirm.

When `End` shows, press ↵ to exit the User Configuration and return to normal mode.

System Configuration

In User Configuration

When `End` shows, press ▲ and ↵ at the same time for 1 sec. to enter password mode.

Please refer to the diagram on the next page.

In Password Mode

Press ▲ to increase blinking digit, press ► to move blinking digit right. Input Password.

Press ↵ to confirm password (0258) and enter sub menu.

10.1.3 Display Unit

Display Unit defines system unit on the LED display.

If `KG` is selected, the weight reading is in kg unit. For example, `1055` means 1055 kg.

If `t` is selected, the weight reading is in t(ons) unit. The decimal point is always fixed and the unit t is always shown. For example, `1.05t` means 1.05 ton.

After display Unit is configured, all the user-input will be changed to accommodate to the new display format.

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10.1.4 Gain Ratio

The Gain Ratio `GRin` is the ratio to multiply the real weight.

If Gain is set to `1`, the displayed weight is the real weight. If Gain is set to `2`, the display weight is twice the real weight.

10.1.5 Zero Delay Time

The Zero Delay Time `Ed` defines the period of the count-down timing for user to walk out of the cabin during Zero and calibration.

The Zero Delay Time can be set from 0s to 60s, in 5s steps.

10.1.6 Pre-caution Weight

Start Weight `H15` is the detection threshold against a light weight such as animal, infant, etc.
Start Weight can be set from 0 to 50kg;
by default it is set to 15kg.
When the load is greater than Start Weight,

● 🧍 lamp lights on

Relay 1 set.

10.1.7 Warning Weight

Warning Weight `H90` is the detection threshold for 90% F.S.
Warning Weight needs to be set higher than P15.
When the load is greater than Warning Weight,

● **90 %** lamp lights on

Relay 2 set.

10.1.8 Cut-off Weight

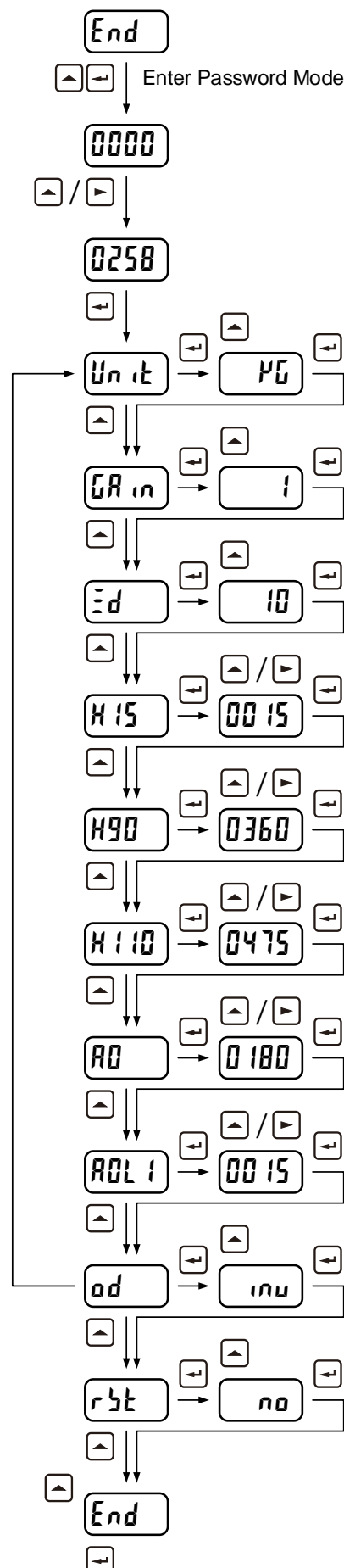Cut-off Weight `H110` is the detection threshold for 110% F.S.
Cut-off Weight needs to be set higher than P90.
When the load is greater than Cut-off Weight,

● **110 %** lamp lights on

Relay 3 set.

Note: The beeper keeps alarming every 300ms.

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10.1.9 Zero-tracking Time

The indicator's Zero-tracking function will enhance system temperature and drifting performance, if properly set.

Zero-tracking Time | $A0$ | can be set from 0s to 180s.

10.1.10 Zero-tracking Range

Zero-tracking Range | $A0L1$ | can be set from 5kg to 50kg.

10.1.11 Output Mode

The three relays can be configured to work in 2 modes; normal logic mode and inverted logic mode.
In normal logic mode, relay works in NC way. When load is greater than set-point, corresponding relay will open, otherwise it is closed.
In inverted logic mode, relay works in NO way. When load is greater than set-point, corresponding relay will close, otherwise it is open.

10.1.12 System Reset

System Reset | rSt | is used to reset all configuable parameters to its default / their default value.

Item	Display	Note
Display Unit	$Unit$	Select unit. Kg or t
Gain Ratio	$GAin$	Select gain ratio. 1 or 2
Zero Delay Time	$\exists d$	Select zero delay time. 0, 5, .., 55, 60
15%FS Weight	$H15$	Input the 15% weight. Val ≤ 50kg
90%FS Weight	$H90$	Input the 90% weight. P15 ≤ Val ≤ max capacity
110%FS Weight	$H110$	Input the 110% weight. P90 ≤ Val ≤ max capacity
Zero-tracking Time	$A0$	Input the tracking time. 0 ≤ Val ≤ 180s
Zero-tracking Range	$A0L1$	Input the tracking range. 5kg ≤ Val ≤ 50kg
Relay Output Mode	od	Select output logic. NORmal (dft.) / INVerted
System Reset	rSt	YES/NO

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Calibration

To (re-)calibrate the lift system, prepare the calibration weight 20%-50% of the lift capacity.

In Normal/Work Mode

Press ▲ and ► at the same time for 1 second to enter menu.

Press ▲ to go to `End`.

Press ▲ and ↵ at the same time for 1 second to enter password mode.

In Password Mode

Press ▲ to increase blinking digit,

Press ► to move blinking digit right.

Input Password (8416).

Press ↵ to confirm password and enter calibration.

When `SEt0` shows, make sure the lift cabin is empty (without any load).
Press ↵ to start zero calibration.
Indicator will count down from 9 to 0.
During this 10 second count-down, the operator needs to walk out of the cabin.

When `400` shows, apply the calibration weight.
Press ▲ to increase blinking digit, press ► to move blinking digit right.
Input weight value.
Press ↵ to start weight calibration.
Indicator will count down from 9 to 0.

During the 10 second count-down, the operator needs to walk out of the cabin also.

After `End` shows, the calibration is successfully done.

Press ↵ to return to normal mode.

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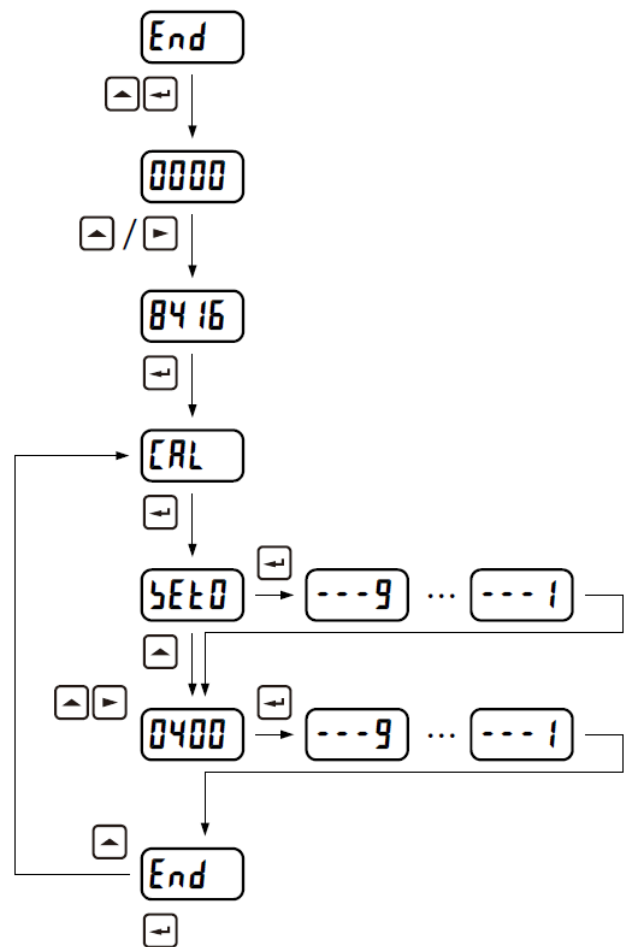
0 – 10V Adjustment (optional)

To adjust the indicator's output voltage, a voltmeter or multi-meter is needed.
Connect the output V+ terminal to voltmeter's positive pin (red cable), and connect the output GND terminal to voltmeter's negative pin (black cable).

<u>During the power-up (display shows 8888).</u>
Press ▲ and ► and ↵ at the same time, and quickly release them, to enter the 10V adjustment mode.
The display shows `u935`.
The last 3-digit is the adjustment ratio, ranging from 000-999.
Press ▲ to increase blinking digit, press ► to move blinking digit right. Modify the ratio, to make the output voltage to be 10.0V.
Press ↵ to confirm and exit.

Functions

Load	Normal Close Relay n						Annunciator		
	OUT = nor (default)			OUT = inv					
	1	2	3	1	2	3	1	2	3
Power-Off	Close	Close	Close	Close	Close	Close	Off	Off	Off
< H15 Weight	Close	Close	Close	Open	Open	Open	Off	Off	Off
>= H15 Weight	Open	Close	Close	Close	Open	Open	On	Off	Off
>= H90 Weight	Open	Open	Close	Close	Close	Open	On	On	Off
>= H110 Weight	Open	Open	Open	Close	Close	Close	On	On	On

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11.   Troubleshooting Procedures

In case of a malfunction, try to eliminate them using the table below.
If the fault is not found in the table, contact the manufacturer's service centre. Independent changes in the design or self-elimination of other malfunctions that require intervention in the design of the device may result in failure of the warranty service. Possible faults and methods for their remedy are given in the following table:

Symptom	Possible Cause	Likely Solution
The device won't turn on	No power supply	Check if power is applied, if not, turn on the power
	Power supply does not meet the required amount	Supply the required voltage and frequency
The display does not show the weight	Display is off	Turn on the display
With an empty elevator car, the weight is different from 0	Not made reset the weight	Reset the weight
Incorrect weight readings	Incorrect calibration	Perform (re-)calibration
	Bad contact between connecting wires and load cells	Reconnect wires
Relays are triggered at incorrect value of the measured weight	Incorrect limits of weight set	Reset limits of weight
The device does not react to loading the cab	Load cells output signal is incorrect	Recheck specifications of load cells. Use this manual.
	Loadcell(s) are broken	Replace a loadcell(s)
Incorrect operation of the relay	Wrong communication	Check communication; change if it's necessary
	Wrong mode relay operation are selected	Change mode into menu of the device
Automatic zero doesn't work, if cabin are empty weight accumulated	Range of automatic zero is not enough	Range of automatic zero should be increased
	Friction between cab and rails	Eliminate friction

12.   Set Content

Part	Quantity
Top-Sensors HC51x Indicator	1 piece
Loadcell L2H-1-1t-2B	4, 8 or 12 pieces
Loadcell Feet with Rubber Damper	4, 8 or 12 pieces
Junction Box	1 piece
Cabin Manual	1 piece

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13. Storage

The Cabin set should be stored in an environment where chance of falling or bumping into it is reduced to a minimum. Preferably in a storage room with an ambient temperature between -20 ~ +50˚C with a maximum ambient humidity of 90%.

14. Serial Number Registration and Compliance

Hereby Zemic Europe declares the indicator and loadcells in this set are tested and calibrated during production and comply with the specifications mentioned in this manual.

The serial numbers corresponding with this set are the following:

Part:	Serial Number:
HC51x Indicator	
L2H-1 Loadcell No. 1	
L2H-1 Loadcell No. 2	
L2H-1 Loadcell No. 3	
L2H-1 Loadcell No. 4	
L2H-1 Loadcell No. 5	
L2H-1 Loadcell No. 6	
L2H-1 Loadcell No. 7	
L2H-1 Loadcell No. 8	
L2H-1 Loadcell No. 9	
L2H-1 Loadcell No. 10	
L2H-1 Loadcell No. 11	
L2H-1 Loadcell No. 12	

Release Date: Signature and Stamp:

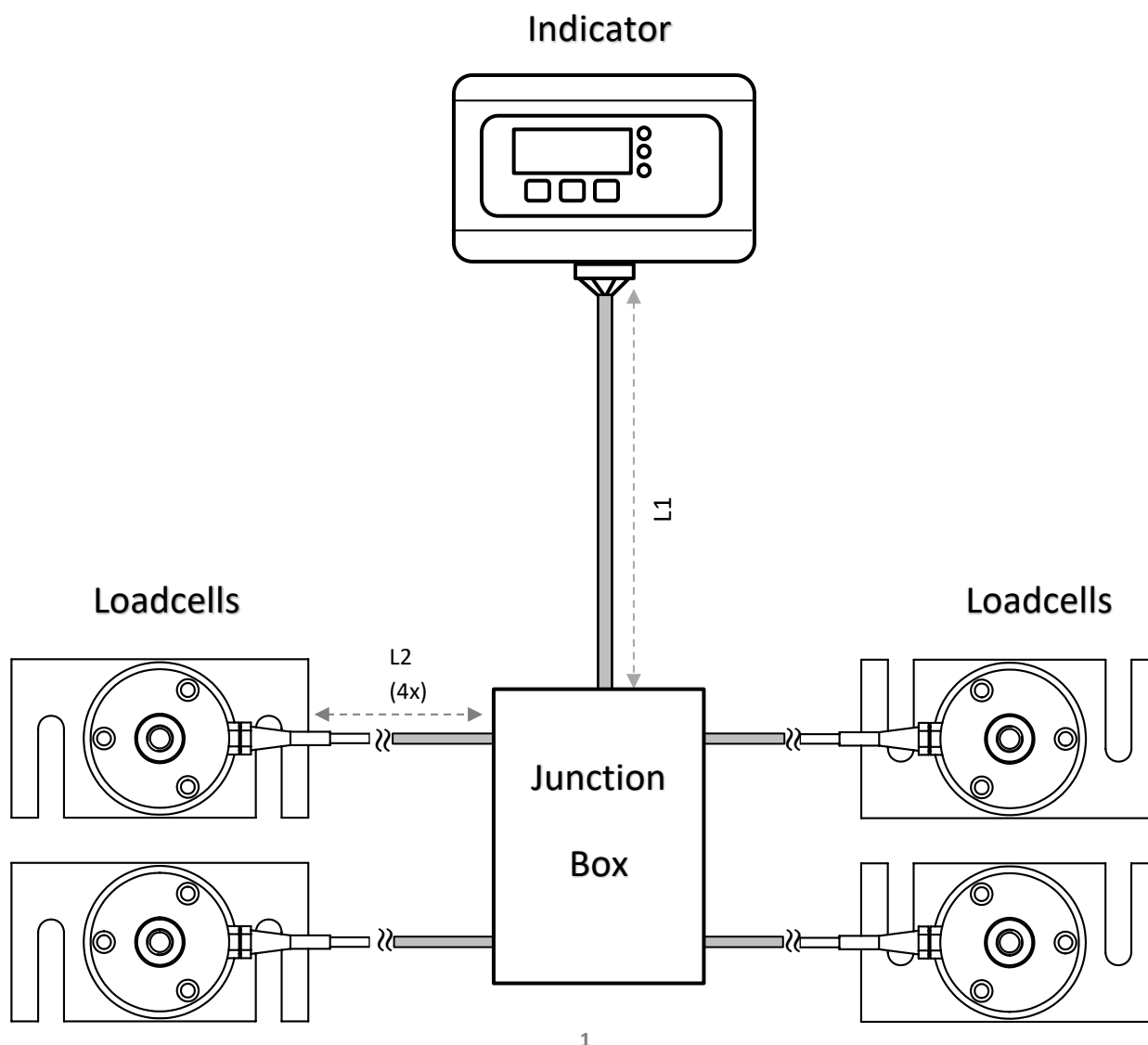…………………………………………   …………………………………………

The manufacturer guarantees that the Cabin weighing set complies with the data of this Operating Manual subject to the consumer's observance of the storage, installation and operation conditions.
The warranty period is 12 months from the date of commissioning.
Guaranteed shelf life is 36 months from the date of manufacture.
During the warranty period, the manufacturer is obliged to replace or repair the Cabin weighing set free of charge, if the customer finds any failures in operation or any inconsistency with the parameters specified in this Operating Manual which are caused due to faulty workmanship or other failing caused by the weighing kit itself.

Specifications and dimensions are subject to change without notice and do not constitute any liability whatsoever.

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Appendix

Indicator

Loadcells

Loadcells

L1

L2
(4x)

Junction

Box

1

Set Dimensions and Weight

№	Parts	Overall dimensions, mm			Weight, kg
		Length	Width	Height	
1	Top-Sensors HC51x Indicator	140	96	40	0,6
2	IP65 Fully Potted Junction Box	63 / 175 /230[2]	50	15	0,2
3	L2H-1-1t-2B Load Cell (including feet)	150	80	47	0,5
4	Cable Length				
	From Loadcell to Junction Box	2000	-	-	-
	From Junction box to Indicator	5000	-	-	-

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[1] This drawing shows an arrangement with 4 loadcells. 8 or 12 loadcells are also possible.

[2] Junction box length depending on version for 4, 8 or 12 loadcells.

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