

Operating Instructions



Construction Site Traffic Signal System MPB 1400 LED

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1. Introduction

1.1 General hazard warnings



WARNING!

Risk of injury due to insufficient qualification!

Improper handling can lead to considerable personal injury and damage to property. For this reason, all work may only be carried out by qualified personnel.



WARNING!

Risk of injury due to missing or inadequate personal protective equipment!

Personal protective equipment must be worn when handling, before and during all work on and with the traffic light system in order to minimise health hazards. In accordance with legal requirements or the employer's instructions on occupational safety, personal protective equipment may also include



Safety shoes, protective gloves, a hard hat and, in particular, a high-visibility waistcoat or high-visibility clothing for all persons in the area of public traffic.



WARNING!

Risk of crushing on moving components!

Parts of the body can be crushed when installing the traffic light system, resulting in serious injuries and permanent physical damage!

Therefore: Always carry out installation and maintenance work as well as troubleshooting measures with particular care and attention to possible crushing hazards. Wear personal protective equipment to protect against crushing during all work.



WARNING!

Battery acid!

There is a risk of severe chemical burns when handling batteries! Therefore: Wear personal protective equipment (especially safety goggles, gloves).



Do not touch leaking liquid. In case of skin contact, rinse immediately with plenty of water. If liquid gets into the eyes, rinse eyes immediately with water for at least 10 minutes and seek medical attention immediately. Carefully remove any leaking liquid with a suitable absorbent cloth and dispose of in an environmentally friendly manner.

To prevent possible leakage of battery acid, we recommend the use of our battery acid-resistant battery protection trays, into which the complete battery is inserted.



WARNING!

Hydrogen gas!

There is a risk of escaping hydrogen gas when handling accumulators! Therefore: Do not smoke! Keep all ignition sources (e.g. naked flames, heat sources, non-explosion-proof electrical appliances) away! Do not carry out any welding, cutting or grinding work!



Basic information on rechargeable batteries

Never reverse or short-circuit batteries! Only charge batteries according to the manufacturer's instructions in dry, well-ventilated rooms.

Regularly clean the battery terminals and terminals with a terminal brush to prevent contact resistance from forming, which could lead to voltage losses. Grease the terminals again after cleaning to prevent corrosion.

Check the acid level of the batteries from time to time with an acid lifter, especially before the start of the cold season and during the cold season. Check the acid level after each charge and top up with distilled water if necessary.

Used batteries must be disposed of properly. Most of the valuable raw materials they contain can be recycled. This protects the environment and conserves important resources.

1.2 Brief description signal system MPB 1400

The MPB 1400 is an extremely cost-effective, mobile roadworks traffic light system with state-of-the-art technology. The standard version is designed to control one-way alternating traffic and can be used as required to control T-junctions and crossroads by simply adding further identical signal heads - where national regulations permit.

Simple handling and uncomplicated operation in seven languages, as well as the ability to be extended as required to control T-junctions or crossroads - these are the key features of the MPB 1400.

All settings are made conveniently via a coded infrared remote control, which is protected against unauthorised access. Any number of identical signalling devices can be programmed with a single handbox. The required parameters are queried in the handbox using the dialogue procedure, making operation extremely simple: enter the red and green times for each traffic light separately for up to 999 seconds, transfer the data - done!

Various language packages, each with three languages, are available when ordering the handbox. The customer can be guided through the menu in German, English, French, Italian, Spanish, Dutch or Turkish. Other languages are available on request.

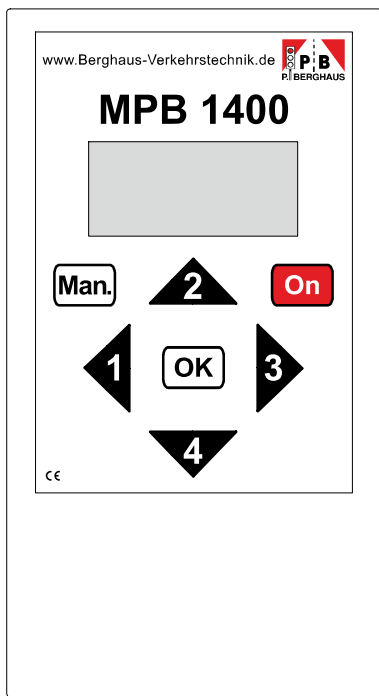
Of course, in addition to GPS-synchronised quartz operation, "manual operation" with "continuous red", "continuous green", "flashing amber" as a warning and "lamps off" can also be set - ideal, for example, for tree felling work or special traffic situations where manual intervention in traffic control is required.

The MPB 1400 has reverse polarity and undervoltage protection, night-time lowering and data buffering when the battery is changed as standard. The signalling system is equipped ex works with energy-saving LED technology (tested in accordance with DIN EN 12368), with automatic night-time dimming as standard. In order to inform road users of the length of the waiting red time to the second, an optional red countdown display can be installed in the signal head above the red chamber at the factory. This can also be retrofitted at a later date.

It is not only the innovative electronic equipment of the MPB 1400 that is impressive: Sturdy yet lightweight aluminium battery stands with solid rubber tyres facilitate transport. Proven, field-tested traffic light housings in a modular design keep spare part costs low in the event of repairs, as only the defective individual part can be replaced at a reasonable price.

2. Operation

2.1 Hand box MPB 1400



The hand box is used for quick and easy programming of the signal system MPB 1400. The hand box queries the necessary inputs and guides you through the menu.

Your national language is already adjusted when the hand box is delivered.

If you should prefer another language, you can change this accordingly.

2.1.1 Adjusting the language

To do so, press buttons "1+2+4+ON" at the same time on the hand box which has been switched off, and hold them for 5 seconds until the hand box has introduced itself and the language selection menu appears. Now use buttons "1" or "3" to select the required language. Press "4" to confirm your choice. (Other languages are available on request).

2.1.2 Button functions

- "ON" switches the hand box on; press and hold for 2 sec. to switch the lighting on
- "1" moves to the left in the menu or decreases values
- "3" moves to the right in the menu or increases values
- "2" moves backwards in the menu
- "4" moves forwards in the menu or confirms inputs.
- "Man" activates the manual mode
- "OK" start button and special functions

The power supply for the hand box consists of a 9V block battery. Please purchase a new top quality alkali battery when the display shows "Battery old". The battery must be replaced at the latest when the display shows "Battery flat".

2.2 Signal system type MPB 1400

The quartz-controlled signal system type MPB 1400 can be used for controlling traffic in construction sites with alternating one-way traffic, at T-junctions or crossroads. The length of the red and green phases can be adjusted differently right down to the last second for all signals – so versatile is this new system. MPB 1400 is synchronised with GPS to warrant a precise phase cycle all the time.

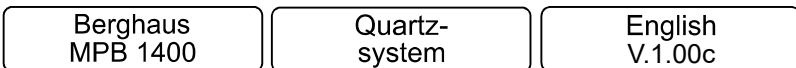
For initial commissioning, please proceed as follows:

- 1.) Provide the signal head with 12 VDC operating voltage by placing the batteries or N1 type power supply units in the battery casing. Pay attention to correct polarity! The signal heads switch on automatically (electronic on/off switch).
- 2.) The signals now show "flashing yellow".
- 3.) If the signals have been placed next to each other for commissioning, please make sure that they are spaced at intervals of approx. 3 metres. This ensures that the infrared signals of the hand box can be unequivocally allocated to each individual signal..

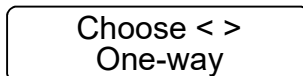
Data can be entered in the hand box at any point in time, even in a different space and time from the signals themselves. Please proceed as follows:

2.2.1 Alternating one-way traffic:

- 1.) Press "ON" to switch the hand box on.
Press "ON" again and hold for 2 seconds to switch the display back lighting on if required.
- 2.) The hand box introduces itself:



Then the display shows the menu point >Choose<.



Press "1" and "3" to change values or make a selection (left/right). Use "2" and "4" to move through the menu. "2" takes you back and "4" moves you forward in the menu, and is used to confirm your inputs.



During initial commissioning, please use "2" to check the specific national settings for the red-and-yellow and yellow phases (e.g.: RdYe = 1 second, Yell = 4 seconds). These time settings are then saved as basic values for all future inputs. That means as a rule, you will not have to change these basic values any more. Press "4" several times to return to the menu point >Choose<.

- 3.) In the menu point >Choose<, use "1" or "3" to choose the required type of traffic control, e.g. "one-way" (function as bottleneck signal system in alternating one-way traffic).

Choose < >
one-way

- 4.) Press "4" to confirm your selection (e.g. "one-way"), thus moving to the next menu point. Stipulate the corresponding red phase (e.g. indicative values stated in the table on page 10 of these instructions, or sticker on the hand box) as >RED 1< using "1" and "3".



As a simple guide, you can calculate at least 12 seconds red phase for every 100 m construction site length, based on a clearance speed of 30 km/h. At gradients or on difficult ground, it is advisable to select different red phases >RED 1< and >RED 2<.

RED 1
=> 16 s

RED 2
=> 16 s

- 5.) Press "4" to go to menu point >RED 2<. Enter the required red phase as described above.
- 6.) Press "4" to confirm your selection and go to the next menu point >Green 1<.



Recommendation: for light traffic enter 15 to 20 seconds, for medium traffic 30 to 40 seconds and for heavy traffic 50 to 70 seconds for green 1 and green 2. It goes without saying that different green times can also be selected for every direction.

Adjust the required times using "1" and "3". Now proceed in the same way for >Green 2> and press "4" to confirm your inputs.

GREEN 1
=> 20 s

GREEN 2
=> 20 s

This already completes all the inputs necessary for alternating one-way traffic control!

The display now shows:

Start
1 >ok<

Please go to the signal which you want to program as signal 1. Hold the front of the hand box at a distance of approx. 1 metre face-to-face with the control housing under the green chamber. Now press "OK".

The LED display in the control flickers on reception. Signal 1 now starts the program, the signal head lights up and the hand box display shows:

Started?
yes >ok<

If signal 1 has started, press "OK" to confirm. Otherwise press "2" to go back one step in the menu. You can then start programming signal 1 again from the beginning. It may help to reduce the distance between the signal and your hand box when sending data, or improve the angle to the system if signal 1 does not start.

If you have pressed "OK" as confirmation, you now have up to 15 minutes time to program the second signal. The display therefore shows:

Start
2 >ok<

Now program the second signal as explained above. Please now check that the second signal has started up

Started ?
yes >ok<

Press "OK" to confirm. You can now switch the hand box off, and use it to program other MPB 1400 signals located in other places.

Box off?
>ok<

The signal system has now been successfully programmed with the data which you had entered previously in the hand box: alternating one-way traffic control has now started.

Please continue reading on the next page for programming the signal for traffic control at a T-junction or crossroads, with or without parallel signal heads.

2.2.2 T-junctions

- 1.) In the menu point >Choose<, use "1" or "3" to select the required type of traffic control, e.g. "T-junction" (function as signal system for traffic control at T-junctions).

Choose < >
T-junct.

- 2.) Press "4" to confirm your selection (e.g. T-junction) and thus go to the next menu point. Use "1" and "3" to stipulate the corresponding red phases as >RED 1< to >RED 3<.

RED 1
=> 16 s

>>>>>>

RED 3
=> 16 s

- 3.) Press "4" to confirm your selection and go to the next menu point >Green 1<. Use "1" and "3" to adjust the required green phases. Now proceed in the same way for >Green 2< and >Green 3<, pressing "4" to confirm your inputs.

GREEN 1
=> 20 s

>>>>>>

GREEN 3
=> 20 s

This already completes all the inputs for traffic control at T-junctions: you can now program the signals accordingly, as described on page 5!

2.2.3 Crossroads

- 1.) In the menu point >Choose<, use "1" or "3" to select the required type of traffic control, e.g. "crossroads" (function as signal system for traffic control at crossroads).

Choose < >
crossrds

Now select the red and green phases as described above. This time, you have to enter four values in each case for red (1 – 4) and for green (1 – 4).

This already completes all the inputs for traffic control at crossroads: you can now program the signals accordingly, as described on page 4!

2.2.4 Parallel signal heads

If repeat signals are to be erected on the left-hand side of the carriageway, or if two synchronised signals are to be erected on the opposite side, you can use parallel signal heads for this purpose. Synchronised parallel signal heads can be programmed for traffic control as alternating one-way traffic, at T-junctions and also at crossroads.

To do so, after switching the hand box on, activate the submenu parallel signal heads "par.sig.". To do so, press "2" to go back in the menu until you see

par.sig.
no

in the display. Press "3" to activate the inputs for parallel signal heads. ("1" would deactivate this choice again). The display shows

par.sig.
yes

Press "4" to move on in the menu and now define the time phases necessary for the procedure as described above. You can then allocate the time inputs for each group to up to max. 9 synchronised parallel signals.



After entering the required number of parallel signal heads in the required groups, you can now program them according to your allocation and as described above. You will now see the corresponding menu for each signal head.

Start
1H1 >ok<

"1H1" stands for group 1 head 1. Press >OK< to start data transfer for every signal head. Please check the procedure as described above and confirm with the following:

Started?
yes >ok<

This already completes all the inputs for traffic control with parallel signal heads. Press >OK< to switch the hand box off.

2.3 Special operating modes

When the hand box is switched off, press "Man." and "On" at the same time to go to the special operating modes. When the box is switched on, please hold "Man." for at least 5 seconds.

The display shows

Manual
Op.

Use "3" to scroll through the selection. "1" brings you back to the selection. To leave the manual mode,

Auto
>ok<

press "OK" at every signal head.

2.3.1 Flashing mode

Select

Flashing
>ok<

in the hand box. The selected signal head flashes yellow. Please repeat the input at the other signal head. To stop the flashing mode, switch back to Automatic as described above.

2.3.2 Lamps off / dark:

Select

Dark
>ok<

in the hand box. The selected signal head switches to dark (lamps off e.g. at night). All of the signal head lamps go off or stay dark. Please repeat the input at the other signal head. To stop the dark mode, switch back to Automatic as described above.

2.3.3 Continuous red:

Select

Red
>ok<

in the hand box. The selected signal head switches to continuous red (e.g. for moving a vehicle around in the construction site or when felling trees).



CAUTION! You must activate a defined status at both signal heads to avoid any misunderstandings in the construction site traffic! For example, if you switch signal 1 to "red", then you must set signal 2 either to "red" as well, or to "green". Please repeat the appropriate input at the other signal head. To stop the continuous red mode, switch back to Automatic as described above.

2.3.4 Continuous green:

Select

Green
>ok<

in the hand box. The selected signal head switches to continuous green (e.g. to release a traffic jam).



CAUTION! You must activate a defined status at both signal heads to avoid any misunderstandings in the construction site traffic! For example, if you switch signal 1 to "green", then you must set signal 2 to "red" beforehand. Please repeat the appropriate input at the other signal head. To stop the continuous green mode, switch back to Automatic as described above.

2.3.5 Automatic:

To leave the manual mode, press "OK" at every signal:

Auto
>ok<

Now you can switch the hand box off. Use "2" or "4" to go to the menu point "Box off" and press "OK" to confirm. The hand box switches off.

Box off?
>ok<

3. GENERAL INFORMATION

3.1 Explanation of the LED display

The control housing of every traffic signal contains multi-coloured LEDs which provide the following information:

LED yellow – not on	= Battery full
LED red/yellow/green running	= GPS signal is being received
LED continuous yellow	= Battery warning from approx. 10.5V
LED flashing yellow quickly	= Battery flat (signal dark); Change battery within 5 minutes as otherwise the programmed data will be deleted.
LED flashing yellow slowly	= Manual mode flashing yellow
LED continuous red	= Manual mode continuous red
LED flashing red	= Red defect (bulb); Please replace the bulb in the red chamber!
LED red/green (orange)	= Manual mode dark (lamps off).

When traffic signals change from green to yellow, the green LED at the signal head programmed as signal 1 flashes once, twice at signal 2, three times at signal 3, etc. This shows you how the corresponding signal head has been programmed.

3.2 Battery change

When the battery has a voltage level of approx. 9V, the corresponding signal head switches the lamps off. Replace the "flat" battery with a fully charged 12V/170 Ah battery. (The battery/ies are accommodated in the battery casing at the bottom). The systems continue to work normally after changing the batteries. Changing the battery must not take longer than 5 minutes to avoid having to reprogram the signals!

3.3 Temporary interruption of operations

If the systems are temporarily decommissioned without deleting the program workflow, both signals have to be set to "dark" first. The batteries must not be disconnected. The program workflow continues internally, running on the connected power supply.

3.4 Longer interruption of operations

If the systems are decommissioned for longer periods of time, the batteries should be disconnected in both battery casings. The system switches off five minutes after the batteries have been disconnected: the LED flashing yellow quickly goes off. The systems will have to be programmed again for their next use.

3.5 Automatic photocell/night-time reduction

Signal heads type MPB 1400 LED are equipped with innovative LED technology and automatic photocell/night-time reduction. This prolongs the battery change interval several times over.

3.6 User code

To stop other users from manipulating your MPB 1400 and to prevent any interference in the system while it is operating, you can stipulate your individual user code from 0 to 999. To create this code, after switching the hand box on, use "2" to go to the "User code" menu. Use "1" and "3" to select a personal number sequence. From now on, the signal code always has to be programmed with the same user code (or with the same adjusted hand box). To change the code, disconnect the batteries from the signal and wait for approx. 5 minutes until the LED flashing yellow quickly has gone off. The system will now accept any code. The delivery status is code 0, thus can be overwritten with any number sequence.

3.7 Table for adjusting the red phases (recommended)

Red phases t_{red} [s] (including a safety phase of 4 seconds)

Construction site length [m]	Clearance speed [km/h]			
	18	30	40	50
50	14	10	9	8
100	24	16	13	12
150	34	22	18	15
200	44	28	22	19
250	54	34	27	22
300	64	40	31	26
350	74	46	36	30
400	84	52	40	33
450	94	58	44	37
500		64	49	40
600			58	48
700			67	55

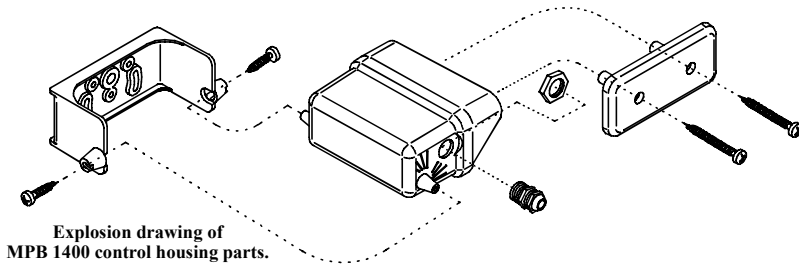
$$t_{red} = \text{construction site length [m]} / \text{clearance speed [km/h]} * 3,6 (+ 4 \text{ s safety phase})$$

4. Service

4.1 Replacing the control PCB

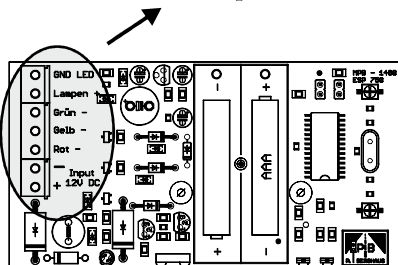
Open the control housing under the green chamber by unscrewing the two Phillips screws on the front just 2/3 of the way. Now carefully pull the front cover away by grasping the two screws.

When putting the front cover back on again later on, make sure that the seal in the control housing is correctly positioned. Before finally tightening the two Phillips screws again, please press the front cover at the four corners with your finger tips. In this way, you can make sure that the front cover seals properly onto the housing again.



To replace the control PCB, please separate from the operating voltage by disconnecting the batteries in the battery casing. Now disconnect the cable lead from the control PCB to the signal head by simply pulling the plug terminal upwards. This means that you do not have to unscrew the cables. Please pay attention to correct polarity when fitting the new control PCB.

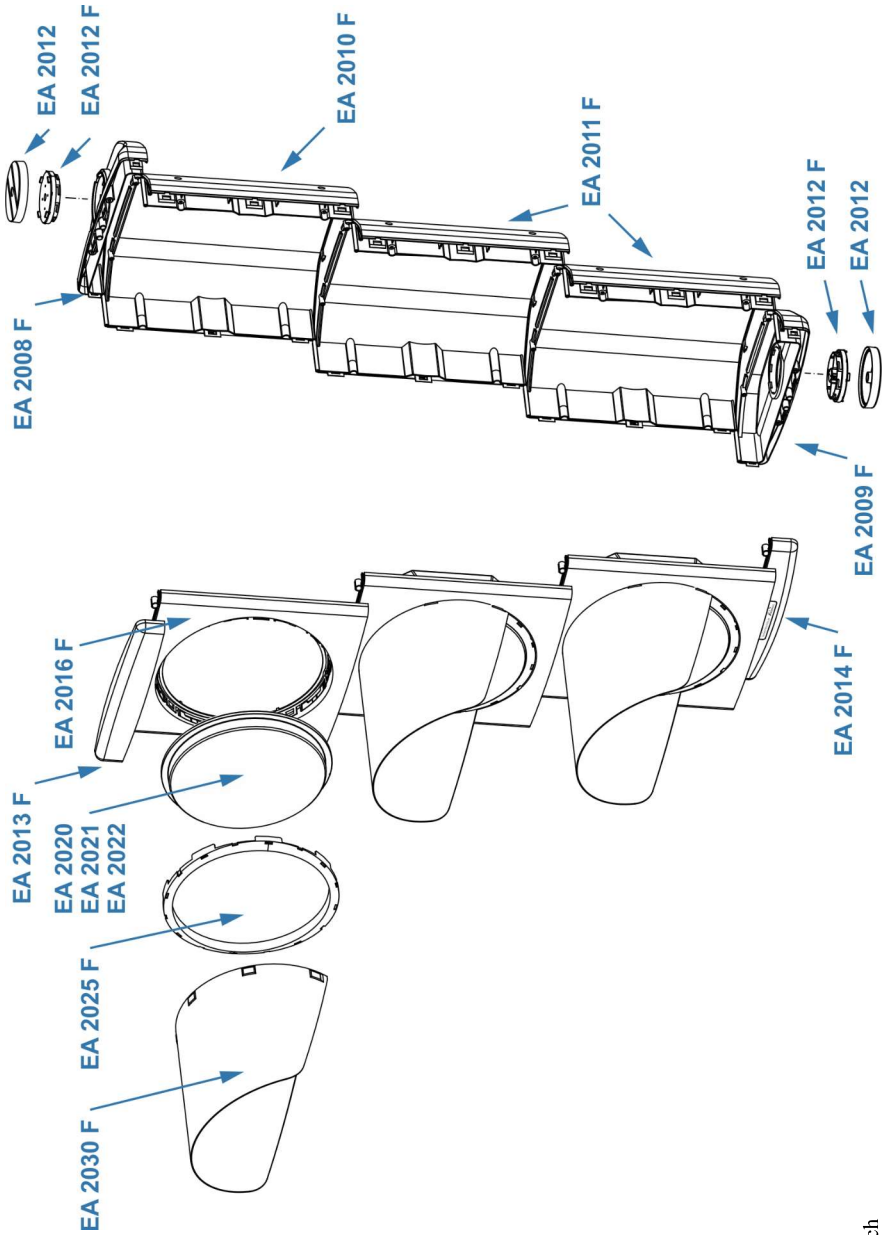
		Colour of the wire/wires	
(GND LED)		GND LED	violet + grey + grey/pink
(Lamps +)		Lampen +	black + white + pink
(Green -)		Grün -	green
(Yellow -)		Gelb -	yellow
(Red -)		Rot -	red
(- Input		- Input	blue
+ 12V DC)		+ 12V DC	brown



The control PCB is fitted with buffer batteries (cannot be recharged) which maintain the program when changing the main battery.

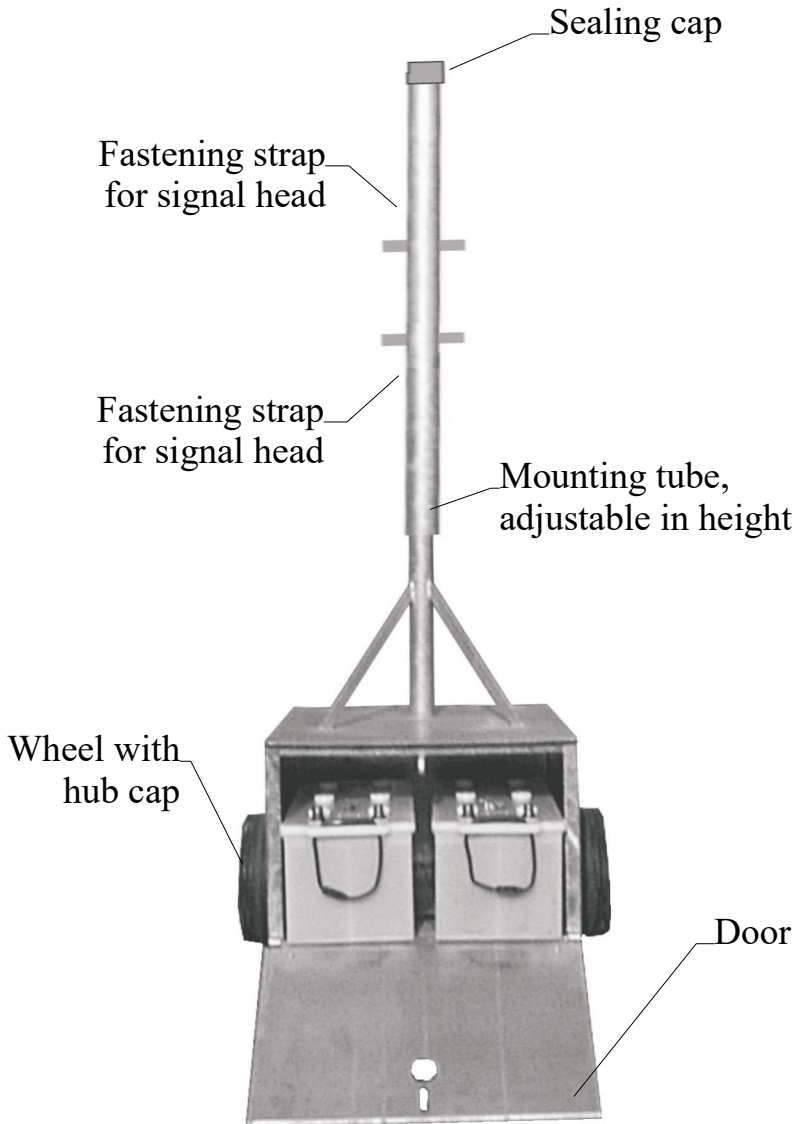
For your own safety, replace these buffer batteries every twelve months, using top quality alkali micro batteries AAA.

4.2 Sketch signal head flat for LED technology



Sketch
Signal head flat for LED technology

4.3 Sketch aluminium traffic signal stand



similar illustration

4.4 Spare parts list

Article: Traffic signal system type MPB 1400 LED" Flat housing"

Order.-No.:	Article
ESP 770	Control PCB for signal system MPB 1400
EP 6048	Control housing for MPB 1400 with seal, without holder
EP 6047	Holder for control housing MPB 1400
EP 6047 M	Rubber seal for control housing MPB 1400
PB 1450	Hand box (infrared remote control) for MPB 1400
ESP 760	PCB for hand box MPB 1400
PB 1451	Housing for hand box with key pad – without electronic module
N14508	Signal head type MPB 1400 LED in flat housing, front black, completely wired, connection lead hanging from the signal head for connection to existing control housing, without control, without mounting tube, without battery cable
EA 2012	Cover cap for signal head type Austria, for red and green chamber, orange
EA 2012 F	Insert with M8 thread without hole, black
EA 2008 F	Signal head back part, upper cover
EA 2010 F	Signal head back part for red chamber
EA 2011 F	Signal head back part for yellow or green chamber
EA 2009 F	Signal head back part, lower cover
EA 2013 F	Front cover black upper part
EA 2016 F	Front cover black for red, yellow and green
EA 2014 F	Front cover black lower part
EA 2020	Lens red, type Austria, 210 mm
EA 2021	Lens yellow, type Austria, 210 mm
EA 2022	Lens green, type Austria, 210 mm
EA 2025 F	Spring for Lens
EA 2030 F	Visor type Austria, for flat housing, 210 mm
WEA 232 S	Housing for LED circuit
WEA 234 K	LED lens, clear
EH 2185 RT	LED-circuit red
EH 2185 GE	LED-circuit yellow
EH 2185 GN	LED-circuit green
EE 0004 G	Aluminium mounting tube for MPB 1400 flat
EE 0014 A	Cover cap for mounting tube
EK 0003	Battery cable black, 2x2.5 mm ² for MPB 1400 with ring eyelet, without battery lugs
EI 0041 M	Battery terminal (+) red
EI 0042 M	Battery terminal (-) blue
A 49590	Battery protective casing made of aluminium for 1 battery
A 49600	Battery protective casing made of aluminium for 2 batteries
EE 0009	Linch pin for battery casing
EE 0006	Wheel, solid rubber
EE 0003	Cover cap for wheel
EE 0005	Wing screw M 10x30

4.6 Warranty for defects

We offer a

24 month guarantee

for the signal systems produced by our company.

The guarantee covers all material and workmanship faults caused by faulty manufacture during this period of time.

Please send systems and parts of systems for replacement to our factory, postage/freight prepaid. We only replace parts showing faults in the material or workmanship. There are no claims to rescission or abatement, unless we are not able to rectify the damage.

No further claims can be fulfilled, in particular claims for damages as a consequence of defects.

The necessary time and opportunity to proceed with guarantee repairs must be made available following previous agreement. The guarantee becomes null and void if the customer or third parties make changes or repairs without prior consent. The guarantee does not cover any wear or damage caused by negligent or incorrect handling.

If in exceptional cases at the customer's request warranty repairs are to be carried out on site, i.e. at the road works where the system causing the complaint has been installed, the service technician's travel expenses and journey times are not covered by the warranty and shall be invoiced separately to the client.

The place of jurisdiction for all claims arising from the business relationship is Bergisch Gladbach, Germany.

4.7 General transport instructions for mobile traffic signal systems

Please note!

Our construction site traffic signal systems must always be transported standing upright on open vehicles with the lens hood pointing in the opposite direction.

To prevent any water damage, all signal head chambers and the controller housing must always be closed properly and the controller housing should also be locked!

Failure to comply with these instructions automatically renders the warranty null and void!

4.8 Technical Data

Operating voltage:	approx. 10 - 14 V DC (elektronic on/off switch, reverse polarity and undervolt protection)
Current consumption:	On average approx. 0.15 A per signal (LED)
Light source:	Innovative LED technology (photometrically tested in accordance with DIN EN 12368) with night dimming as standard.
Control:	Precise quartz control, synchronisation synchronisation is GPS-controlled, ensuring exact phase phase run is always guaranteed.
Programming:	Is carried out in dialogue mode via a separately separately available handbox. Red and green times can be entered separately for each traffic light up to 999 seconds can be entered separately for each traffic light. Transmission of the programming is transmitted via infrared infrared to the respective traffic light.
Control types:	Fixed-time operation for one-way traffic, junction and intersection traffic; Manual operation with continuous red, continuous green; amber flashing; lamps off.



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