

# **CONNECT SERIES**

Roller Brake Testers for Passenger Cars, Vans and Commercial Vehicles

**Original Operating Instructions** 

BA023001-en

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C_I	MBT	S 2	20.0	R1	15	MI
C_I	MBT	S 2	20.0	R1	60	MU

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#### Dear Customer,

MAHA is one of the world's leading manufacturers of testing and lifting technology and places particular emphasis on quality and performance. The company's concept includes the development, manufacture and sale of products for use in automotive workshops, by vehicle manufacturers and testing organisations.

MAHA's claim is to also be a leader in the areas of reliability, safety and sustainability – this can be seen in many details that have been developed with these aspects in mind.

We are convinced that you will be more than satisfied with the quality and performance of our products for many years. With the purchase of our products you will also receive professional assistance in case of need for service and repair.

Please remember to keep these operating instructions in a safe place. Accurately following their contents will significantly extend the life of your product and also increase its resale value. If you sell your product, please also pass on the operating instructions.

MAHA is constantly working on the further development of all products and therefore reserves the right to make changes, e.g. in shape and appearance, without prior notice.

Extensive accessories, useful assembly material and auxiliary materials are available for our products. For further information, please ask your dealer or your MAHA contact person at any time.

Thank you for choosing a MAHA product!

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# **1 General Safety Instructions**

# 1.1 Introduction

- These operating instructions must be read carefully and understood before work commences.
- Please observe the specific safety information provided for the respective sections of the operating instructions.
- Adhering to the procedures, sequences and corresponding safety instructions is essential.
- A printed copy of the operating instructions must always be kept by the equipment.
- The relevant regulations regarding accident prevention and health and safety must be observed.

# 1.2 Symbols and Signal Words

## 1.2.1 Personal Injury



# DANGER

indicates an immediate hazard which, if not avoided, will result in death or severe personal injury.



# WARNING

indicates a potential hazard which, if not avoided, could result in death or severe personal injury.



# CAUTION

indicates a potential hazard which, if not avoided, could result in moderate or minor personal injury.

## 1.2.2 Property Damage

# NOTICE

indicates a potentially harmful situation which, if not avoided, could result in damage to the equipment or surrounding objects.

# **1.3** What to Do in the Event of Defects or Malfunctions

If the fault cannot be rectified using the procedures described in section "Troubleshooting", proceed as follows:

- Switch off the main switch and secure it against being switched on again (unauthorised use).
- Contact service team.

# **1.4** What to Do in the Event of an Accident

- Notify first aiders, the ambulance service and/or immediate care doctor:
  - Where did the accident happen (address, workshop ...)?
  - What happened?
  - How many are injured?
  - What injuries have occurred?
  - Who is reporting the accident?
- Keep calm and answer questions.

## **1.5 Requirements on Operating and Service Personnel**

Only persons qualified for testing in accordance with TRBS 1203 may be used as service personnel.

All persons involved in the operation, maintenance, assembly, dismantling and disposal of the equipment must

- be 18 years of age or older,
- have the mental and physical capacity for their role,
- be demonstrably trained and instructed,
- have read and understood the operating instructions, in particular the instructions on how to behave in the event of a malfunction and on proper use,
- observe the locally applicable regulations on occupational health and safety,
- show knowledge and experience in handling the equipment and the dangers posed.

# 1.6 Product-Specific Safety Instructions

- There is a ban on being in the danger zone during entry, exit, crossing and vehicle inspection.
- The accessibility of the emergency stop switch and emergency stop pushbutton must be ensured.
- Personal protective equipment (safety shoes, gloves) must be worn during all work on the test stand.
- Service work may only be performed by specially authorised and trained personnel. Qualified personnel include authorised, trained specialists of the manufacturer, the authorised dealers and the respective service partners
- Operation is only permitted with safety and protective devices ready for operation.
- The facility, including the work area, must be kept clean.
- Sufficient lighting of the work area must be provided.
- All electrical work may only be carried out by qualified electricians in accordance with the locally applicable regulations, directives and standards.
- For all work on the test stand, it must be ensured that the main switch is switched off and secured against being switched on again.
- When moving heavy components (> 25 kg), use suitable lifting equipment.

# 2 Description of the Test Stand

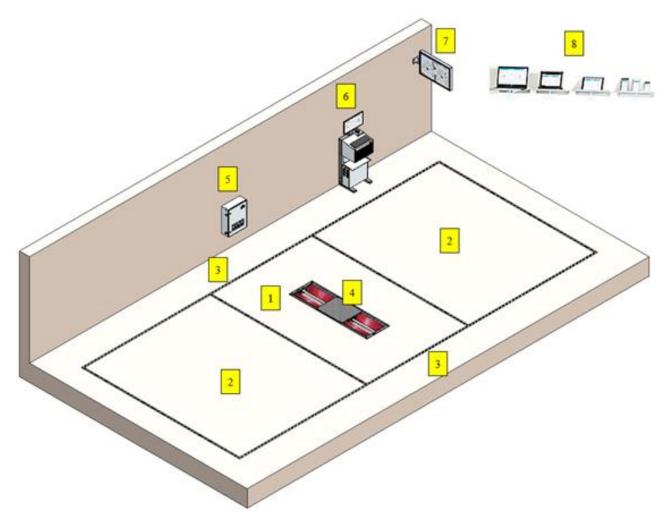
## 2.1 Service Life

The test stand is designed for a service life of approx. 10 years. This depends, among other things, on the existing operating conditions. After this period, the test stand must be replaced with a new product or undergo a general overhaul.

A general overhaul should only be carried out by the manufacturer or persons authorised by them. Among other things, the safety structures are to be inspected and, if necessary, other parts are to be replaced in accordance with the manufacturer's specifications.

# 2.2 General Machine Description

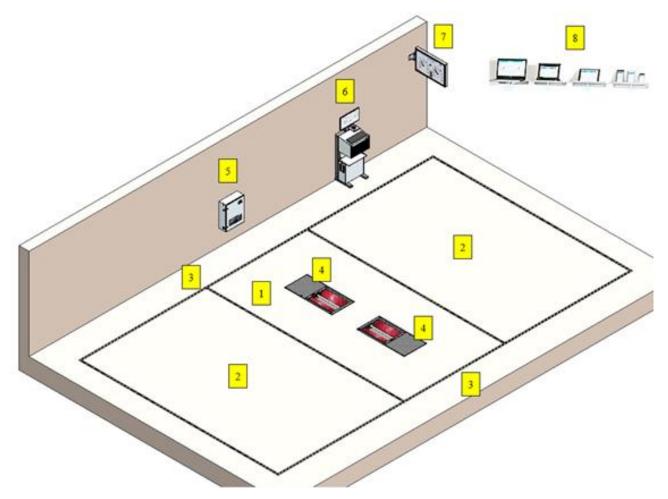
## 2.2.1 Layout Diagram and Legend C\_MBT "C" (Compact)



Layout of C\_MBT C 3.5/4.0 W220 (compact roller set)

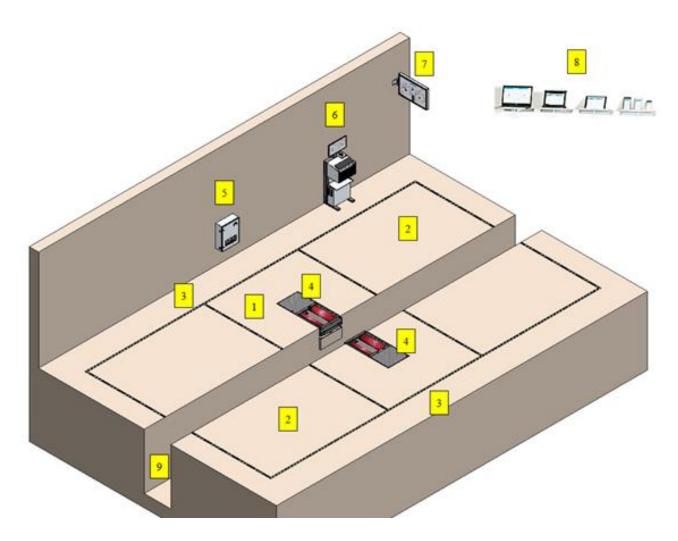
- 1 Immediate danger zone around the test stand (within the inner yellow/black markings)
- 2 Area of the vehicle parking area before and after the test stand
- 3 Side area to the left and right of the test stand
- 4 Brake tester
- 5 Control cabinet
- 6 Universal console
- 7 Simultaneous display, analogue / TV screen
- 8 Mobile devices (browser capable) with touch screen / WiFi router

## 2.2.2 Layout Diagram and Legend C\_MBT "S" (Split)



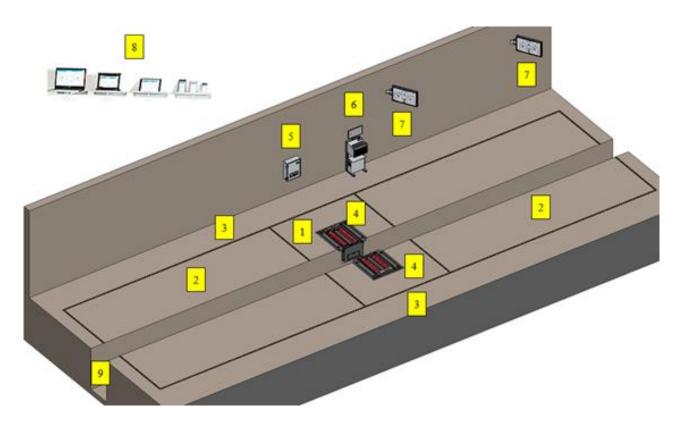
Layout of C\_MBT S 3.5/4.0 W220 (split roller set)

- 1 Immediate danger zone around the test stand (within the inner yellow/black markings)
- 2 Area of the vehicle parking area before and after the test stand
- 3 Side area to the left and right of the test stand
- 4 Brake tester
- 5 Control cabinet
- 6 Universal console
- 7 Simultaneous display analog / TV screen
- 8 Mobile devices (browser capable) with touch screen / WiFi router



Layout of C\_MBT S 3.5/4.0 W220 (split roller set with working pit)

- 1 Immediate danger zone around the test stand (within the inner yellow/black markings)
- 2 Area of the vehicle parking area before and after the test stand
- 3 Side area to the left and right of the test stand
- 4 Brake tester
- 5 Control cabinet
- 6 Universal console
- 7 Simultaneous display analog / TV screen
- 8 Mobile devices (browser capable) with touch screen / WiFi router
- 9 Working pit between the roller set halves



Layout of C\_MBT S 13.0/15.0 R100 MU (split roller set with working pit)

- 1 Immediate danger zone around the test stand (within the inner yellow/black markings)
- 2 Area of the vehicle parking area before and after the test stand
- 3 Side area to the left and right of the test stand
- 4 Brake tester
- 5 Control cabinet
- 6 Universal console
- 7 Simultaneous display analog / TV screen
- 8 Mobile devices (browser capable) with touch screen / WiFi router
- 9 Working pit between the roller set halves

#### 2.2.3 General Description of the Test Stands

In order to prevent dangerous situations in road traffic caused by a defective braking system of a vehicle, motor vehicles should be subjected to a brake performance test at regular intervals and e.g. after repairs. This is generally done on a brake tester.

The present **roller brake tester** allows wheel- and axle-wise dynamic **braking** and essentially consists of a **base assembly (compact or divided over a pit)**, a **control unit** and a **display unit**.

Components for driving the rollers and for absorbing the braking forces are installed in the **floor assembly**: Test roller(s), sensing roller(s), drive motors, strain gauge bending beam for measuring the braking force and various sensors. These sensors are plugged into an interface module in the floor assembly, which is connected to the control unit via cable.

The **control unit** consists of a control box with electronic components and a central control board (central module) with firmware and the operating elements required for safe operation.

In the simplest case, the **display unit** is a monitor of an existing PC or a notebook in the immediate vicinity of the test stand and is connected to the control unit via LAN cable or wirelessly via WiFi.

Furthermore, a commercially available TV monitor (together with a MAHA C\_BOX) or the MAHA universal analogue display can be used as a simultaneous display.

If WiFi is available, a browser-capable smart device (mobile phone, tablet PC, etc.) can also be used as a display and operating unit.

On the one hand, the display is used for status indication of the system, user guidance and visualization of the measured values; on the other hand, operating options can be selected or data can be stored with the corresponding input device.

#### 2.2.4 Function of a Roller Brake Tester

To measure the braking forces of a motor vehicle, the test stand is driven over with a vehicle axle. The wheel(s) of the motor vehicle is/are brought to a preset speed by motor-driven rollers.

As soon as the set engine speed is reached, the operator is prompted to apply the service or parking brake, slowly increasing the braking force.

The rotatably mounted drive motor would rotate freely during operation. This is prevented by the bending beam (range spring). This connects the housing of the drive motor to the test stand frame and thus forms a torque support.

The range spring now bends according to the torque generated by the motor. An applied strain gauge converts the mechanical deformation of the range spring into electrical signals, which can be converted into a braking torque in the control system and visualized via a display unit.

The sensing roller directly measures the wheel speed. The magnitude of the slip can be determined by comparing the drive speed with the sensing roller speed – both values determined via sensors. To avoid unnecessary tyre wear, MAHA

test stands switch off automatically when the (legally) specified maximum slip is reached.

#### 2.2.5 Intended Use

- This test stand is used exclusively for testing the braking efficiency of motor vehicles. The rated axle load must be observed.
- The test stand must not be modified without express written permission from the manufacturer. Non-compliance invalidates the declaration of conformity.
- The operator must carry out a workplace hazard assessment for the test stand including the available options.
- The test stand must not be set up in explosion and fire hazard areas and in damp rooms (e.g. washing halls).
- The test stand is suitable for the temperature range 5...40 °C, for a maximum humidity of 50 % (at 40 °C) and for an altitude of up to 1000 m above mean sea level. For operation under different ambient conditions, please contact the manufacturer.
- Depending on the equipment, the test stand can also be set up outdoors. Please contact the manufacturer.
- For trouble-free operation, a closed, dry and roofed installation site is strongly recommended.

#### 2.2.6 Brake Test of Vehicles with One Driven Axle

The vehicle is driven into the roller set with the axle to be tested. At the same time, the two sensing rollers that measure the wheel speed are pressed down. A warning message is issued and after approx. 3 seconds the two drive motors of the roller set are started so that both vehicle wheels turn in the forward direction.

As soon as the nominal speed is reached, the "Ready for braking" LED lights up or the corresponding user message appears on the respective display unit. This signals that the inspector can begin the braking process. To test the brakes, increase the force on the brake pedal or parking brake lever quickly but not jerkily. In conjunction with an electronic parking brake, this must be checked in accordance with the manufacturer's specifications, usually by pressing the control button for the electronic parking brake several times in quick succession.

Braking should only be applied until the required deceleration for the vehicle is reached, braking up to slip cut-off is not mandatory. In this way, unnecessary tyre wear can be avoided.

During the braking process, the speed of the drive roller and the sensing roller is constantly compared. If braking is so severe that at least one sensing roller exceeds the maximum permitted slip (e.g. 27 % slip), the drive motors are automatically switched off. This serves both to protect the drive motors from overload and to protect the tyres from excessive tread wear. On light vehicles, even a small amount of slip can cause tyre damage.

#### 2.2.7 Brake Test of Four-Wheel Drive Vehicles

# NOTICE

In order to avoid stresses in the drive train and resulting damage, care must be taken with four-wheel drive vehicles to ensure that

- the manufacturer's specifications are fully observed.

- a suitable test mode is selected on the brake tester depending on the vehicle make and model.

Only drive four-wheel drive vehicles out of the test stand when the rollers are stationary!

# Mode 1: Standard brake tester (1-axle), direction of rotation both wheels forward

This mode is only conditionally suitable for testing four-wheel drive vehicles.

On vehicles where the four-wheel drive system can be deactivated by switching off the ignition, it should be noted that the roller set must not be restarted automatically after the brake efficiency test has been carried out. Exiting the test stand is therefore only possible when the rollers are stationary. The ignition of the vehicle must not be switched on under any circumstances when the test stand rollers are rotating, as otherwise the abrupt frictional connection will put mechanical stress on the differential.

Vehicles in which the four-wheel drive system has been deactivated by removing fuses behave like a conventional two-wheel drive, i.e. the test stand can be left with the rollers rotating. The fuse shall not be reinserted until the brake performance test has been completed and the vehicle has finally exited the test stand.

#### Mode 2: Counter-rotation operation in main and reverse direction for fourwheel drive test, axle-wise left forward / right reverse rotation or vice versa

If the counter-rotation mode is selected before driving onto the test stand, the test rollers start in counter-rotation and there is no power transmission via the drive train.

In the brake efficiency test, only the forward rotating wheel is measured. Thus, two measuring processes must take place for the testing of an axle, between which the direction of rotation is reversed.

# NOTICE

In the case of counter-rotating operation, it is advisable to test in semiautomatic mode, so that when the rollers are stationary, the test stand can be exited without creating the above-mentioned stresses in the drive train. An electromechanical motor brake, which is available as an option, further facilitates extension.

#### Mode 3: Automatic four-wheel drive detection

In this mode the starting resistance of the vehicle axle is monitored and evaluated. This detects a vehicle axle that is not freewheeling, and an automatic switchover to reverse operation takes place.

During the braking efficiency test, two measuring processes take place, between which the direction of rotation is automatically reversed. The braking force of the respective wheel turning forwards is measured.

After completion of the two measurements, the test stand rollers remain stationary until the vehicle has exited the test stand.

# NOTICE

In the case of automatic four-wheel drive detection, the vehicle engine must NOT be switched off after driving on the test stand, otherwise correct fourwheel drive detection is not possible.

In the case of counter-rotation operation, it is recommended to use a pedal force meter as a measurement reference to determine the actual brake force difference.

In some vehicles, the power transmission is controlled differently depending on the driving situation. This can lead to the vehicle on the test stand not behaving like a four-wheel drive vehicle during the roller start, but like a front or rear-wheel drive vehicle. Thus, the automatic four-wheel drive detection cannot find an increased starting resistance of the four-wheel drive. In this case, ensure automatic four-wheel drive detection by applying the brake before starting the test rollers.

#### 2.2.1 Brake Test of Commercial Vehicles over 3.5 t GVW

By preselecting the vehicle type, the following parameters in the brake tester are adapted to the selected vehicle type:

- automatic/manual roller start, if necessary
- the measurement screen
- automatic storage of measured values for cars and manual storage for trucks
- the start-up monitoring
- the slip cut-off
- the test speed, if necessary

During commissioning or maintenance, the installer can set the vehicle type that is loaded by default from the test stand after the main switch is switched on. This offers the possibility that in a pure truck workshop after "Main switch ON" the vehicle type Truck is preselected. Whereas, for a test station that performs mixed mode passenger car and truck testing on the test stand, it may be advantageous if the test stand has the passenger car preselection. Changing the vehicle type is done for the user in the burger menu.

#### Two test speeds

If the truck brake tester has the option "Two test speeds" (VZ 935333/935334), the test speed is automatically adapted to the vehicle type preselected in the burger menu (car = fast / truck = slow).

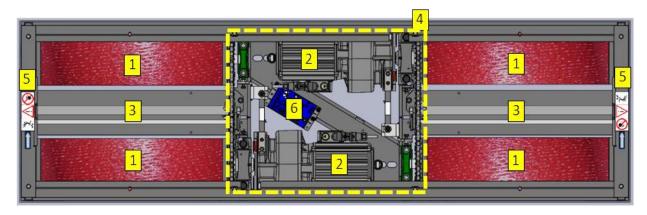
#### Load simulation

For the truck brake tester, a pull-down device or a roller set lifting device for load simulation are optionally available. The Load Simulation screen can be used to increase or decrease the weight of the axle under test. The screen shows the current wheel loads for left/right and the axle weight. Using the +/- keys on the screen (smartdevice monitor) or on the RECO S remote control, the weight of the axle under test can be increased or decreased.

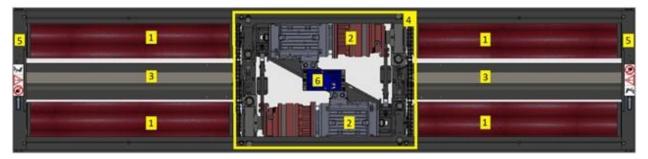
#### Save measured value / pressure sensor and axle assignment

If measured values are available, they can be saved. Pressing the Save symbol takes you to the axle assignment dialogue. Here it is possible to assign the brake type and the valid pressure sensor to the axle number.

## 2.2.2 Overall View C\_MBT "C" with Components



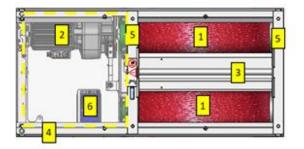
Overall view C\_MBT C 3.5/4.0/5.0 with components (compact roller set)

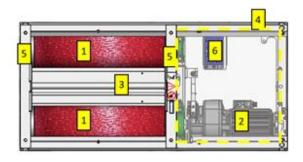


Overall view C\_MBT C 13.0 W280 with components (compact roller set)

- 1 Test stand rollers 2 Electric motor
- 3 Sensing roller with slip and drive sensor (Namur)
- 4 Middle cover (shown transparent)
- 5 Bearing cover 6 IFM (Interface module)

## 2.2.3 Overall View C\_MBT "S" with Components





Overall view C\_MBT S 3.5/4.0/5.0 with components (split roller set)

- 1 Test stand rollers 2 Electric motor
- 3 Sensing roller with slip and drive sensor (Namur)
- 4 Middle cover (shown transparent)
- 5 Bearing cover 6 IFM (Interface module)

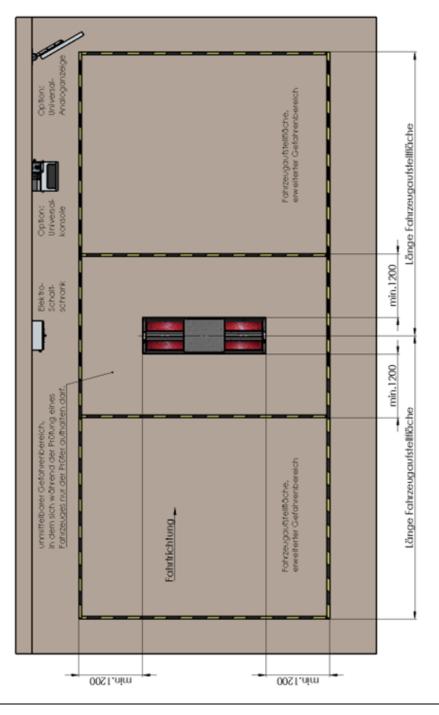
# 2.3 Danger Zone

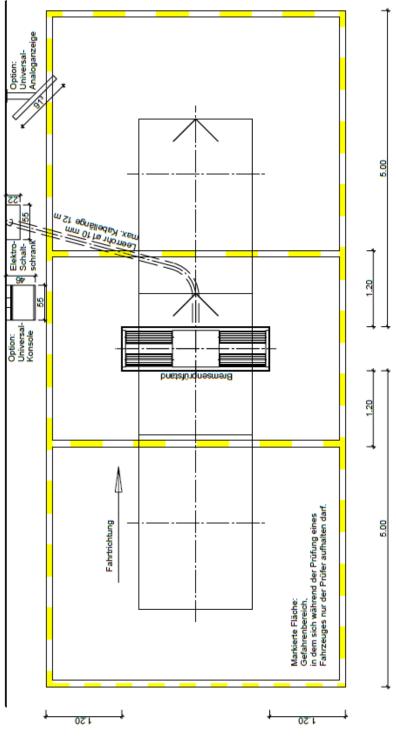
#### 2.3.1 For Vehicles up to 3.5 t GVW

When operating the test stand, there must be no persons or obstacles in the danger zone (danger of crushing!). This is to be identified by a yellow and black marking around the test stand.

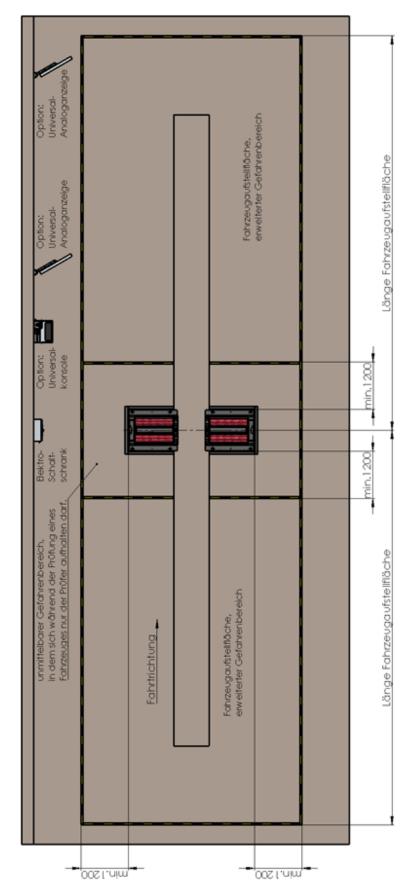
For trouble-free operation, a closed, dry and roofed installation site is strongly recommended.

The lengths of the vehicle parking areas must be determined by the operator, depending on the length of the vehicles to be tested. The boundary of the vehicle parking area should be at least 1.2 m longer than the longest vehicle to be tested.

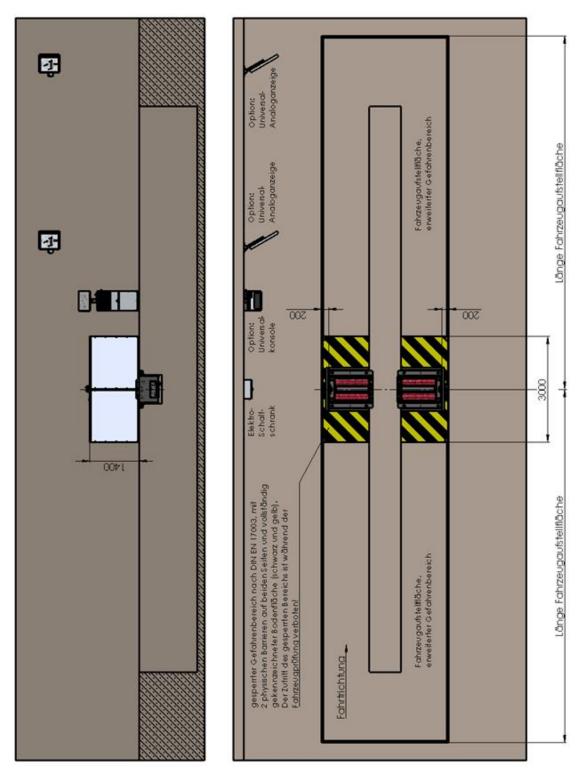




Danger zone

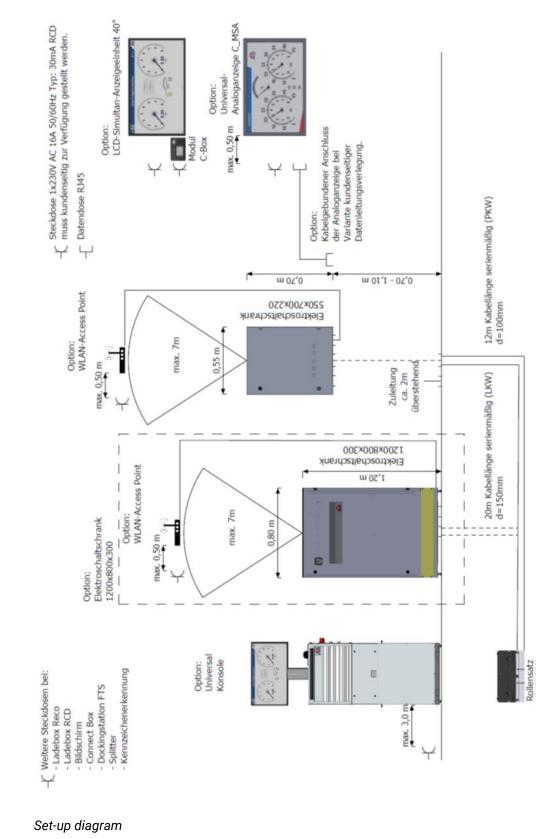


#### 2.3.2 For Vehicles over 3.5 t GVW



Danger zone according to EN 17003

# 2.4 Set-up Diagram



## 2.4.1 Set-up Diagram Car Tester

BA023001-en

# 2.5 Control Description

The control unit consists of a control box with electrical and electronic components in connection with the corresponding operating, control and monitoring software and the operating elements necessary for safe operation.

The roller set contains most of the sensor technology, the motors and an interface module.

# Control cabinet 700x550x220 mm (Car equipment & Truck with reduced equipment)

The door contains most of the controls and the antenna. In the left side panel there is another control element, the main switch and the ASA interface. Cables are fed from below via cable glands and via a protective tube. For passenger car test standes, there is room for all options in the control cabinet; for truck test standes, only a reduced configuration is possible. This means that only a fixed selection of options can be accommodated in this control cabinet, for all other options the control cabinet 1000x800x300 mm is necessary.

Retrofits are also only possible with options from this specified selection. For all other options, the complete control cabinet and the complete mounting plate must be replaced!

#### Control cabinet 1200x800x300 mm (truck equipment)

The door contains all controls, the antenna, the main switch and the ASA interface. Cables are fed from below via the base. In truck test standes, all options find space in the control cabinet.

#### **Control unit**

- ZM (central module) with one CPU module and 2 microprocessors
- µC with logic for evaluating the measured values and controlling the motors
- CPU module for visualisation and user interaction
- Safety µC for monitoring and safe switching of the outputs
- Option-dependent additional OM (option modules), e.g. expansion of I/O, if necessary (additional options of the brake tester) by 3 inputs and outputs each, address switch for setting 32 addresses (to support various options, e.g. roller set lift, pull-down device)
- Motor contactors:

- depending on the version, min. 1 contactor per motor as well as a motor protection switch

- optionally further contactors for additional functions such as multifunction control, star/delta starting, 2 test speeds etc.

- Switching power supply 24V DC
  - Supply of the control boards and contactors
  - Fuse protection via circuit breaker
- Optional soft start modules (SA)
  - to reduce the inrush current peak

- supports the "automatic 4WD detection" option (automatic measurement in counter rotation)

- Optional DC brake or magnetic brake (depending on test stand variant)
- Optional circuit breaker for further options (e.g. MSD)
- Receiver module for radio participants: FFB, RCD, PFM (optional)
- Control GSQ pit protection (optional)
- Control MSE/railing (optional)
- Signal indicator with flashing light and signal horn for RCD (optional)
- Main switch for door installation with door interlock (depending on the test stand variant)
- Control cabinet heating (optional)
- 4WD control (optional)

#### Roller set

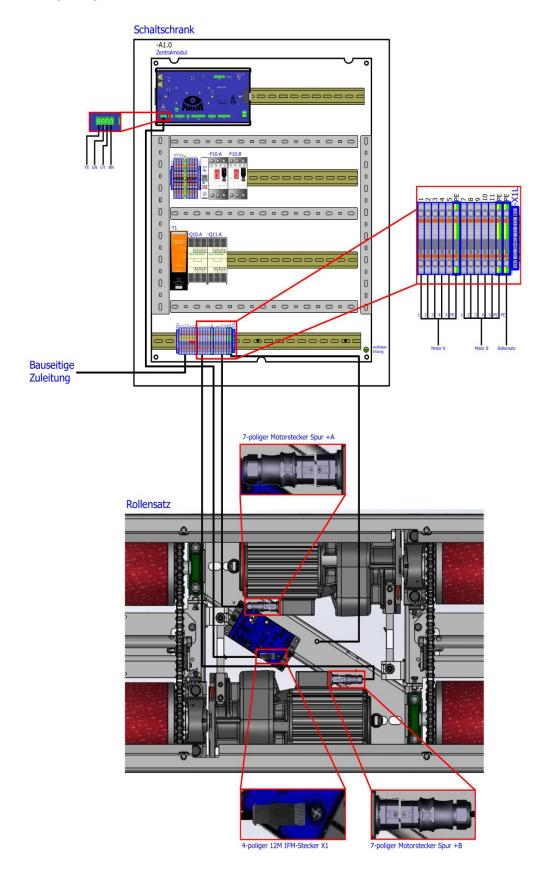
Separated from the control unit in the control cabinet, there is an interface module in each floor group, the so-called interface module (IFM).

This IFM is available in two versions: a basic version (IFM-BA) with the minimum required connections and a comfort version (IFM-CT) with all connections.

The IFM is used for analogue-digital conversion of the signals of all connected sensors (Namur switch, range spring, load cells, etc.) and for forwarding the data via CAN bus to the ZM. In addition, calibration values of the range spring are stored on the IFM.

Forwarding of the data via CAN bus to the ZM. In addition, calibration values of the range spring are stored on the IFM.

# 2.5.1 Wiring Diagram

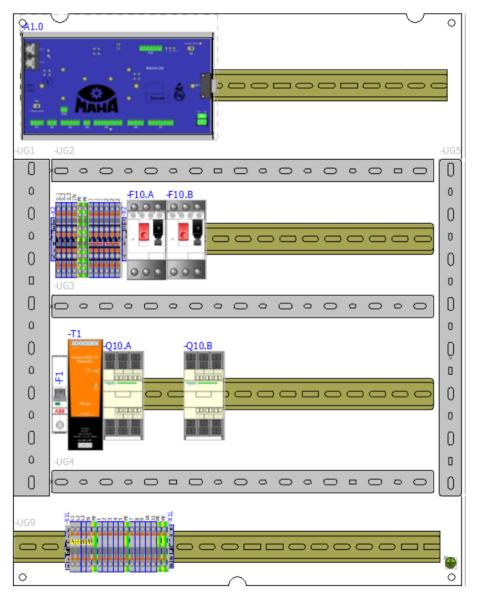


#### 2.5.2 Number Range of the Reference Identifiers

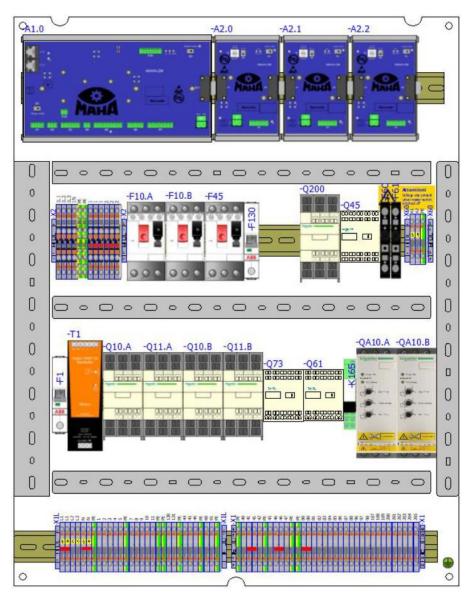
The reference identifiers refer to all designations of electrical components inside and outside the control cabinet. A fixed number range is always assigned to a unique function. Likewise, a distinction is made in the labelling of the left (+A) and right (+B) half of the roller set (track). Components that designate a left half of the roller set (track +A) end with the suffix -xxx.A. Components that designate a right half of the roller set (track +B) end with the suffix -xxx.B.

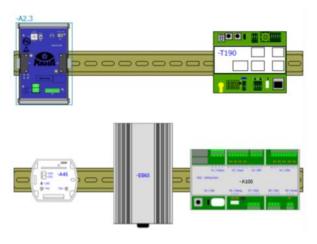
Function	Number range
Basic equipment	119
Weighing device	2024
MINC	2529
Lowering threshold	4043
RS lift integrated (car & truck)	4449
RS lifting angle iron frame (truck)	5054
Pull down	5559
Heating	6064
Multifunction control via push-button	6569
DC brake	7074
Ceiling light barrier	7579
Motorcycle mode	8089
Signal tower for radio pressure sensor	9094
License plate recognition	9599
GSQ I /GSQ II	100109
Safety railing	110120
External equipment	121129
MSD 3000	130134
Brake Tester Directive 2011 (Germany)	140149
Pointer display	150159
Control MLS	160164
Enable External	165169
Remote control	190199
Emergency stop	200209
Universal console	300349

## 2.5.3 Control Cabinet Layout, Basic Variant C\_MBT Car



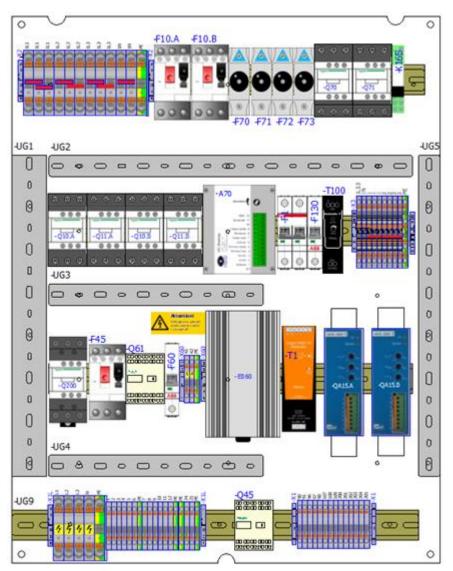
# 2.5.4 Control Cabinet Layout, Maximum Equipment C\_MBT Car Control cabinet 700x550x220 mm

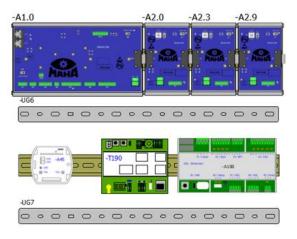




## 2.5.5 Control Cabinet Layout C\_MBT Light Truck

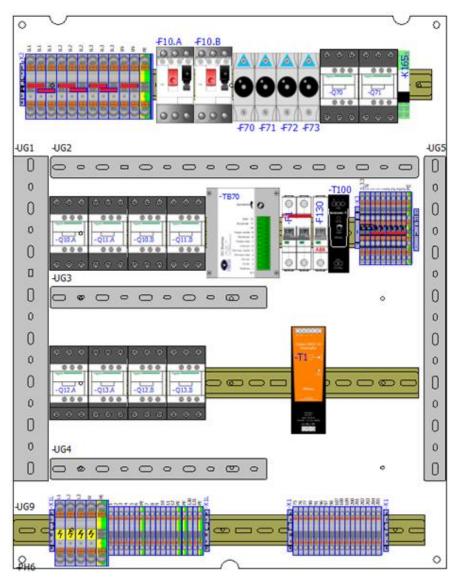
Control cabinet 700x550x220 mm

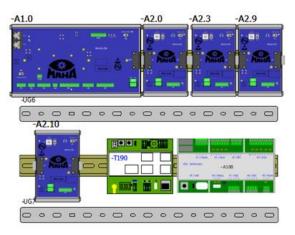




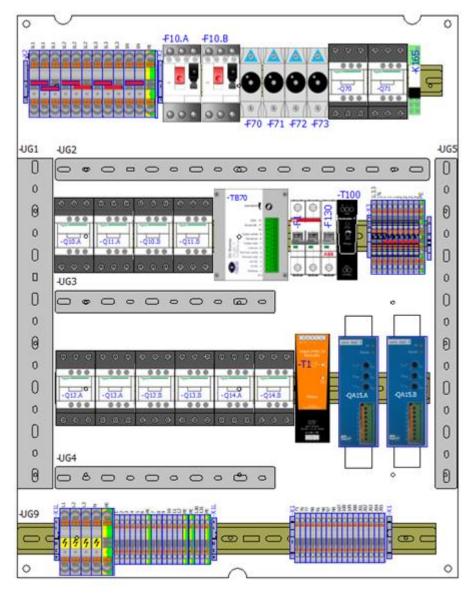
# 2.5.6 Control Cabinet Layout C\_MBT Truck

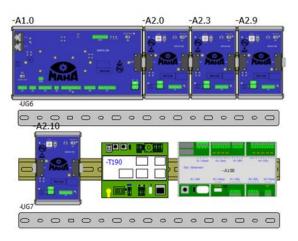
Maximum equipment Control cabinet 700x550x220 mm, star-delta

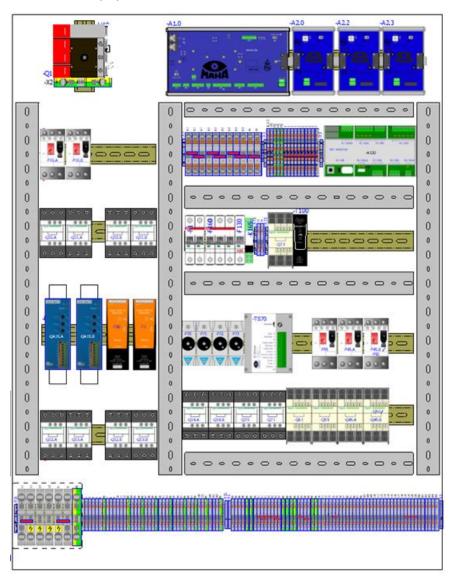




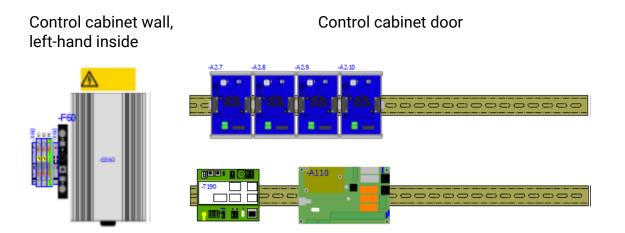
## Maximum equipment Control cabinet 700x550x220 mm, two test speeds

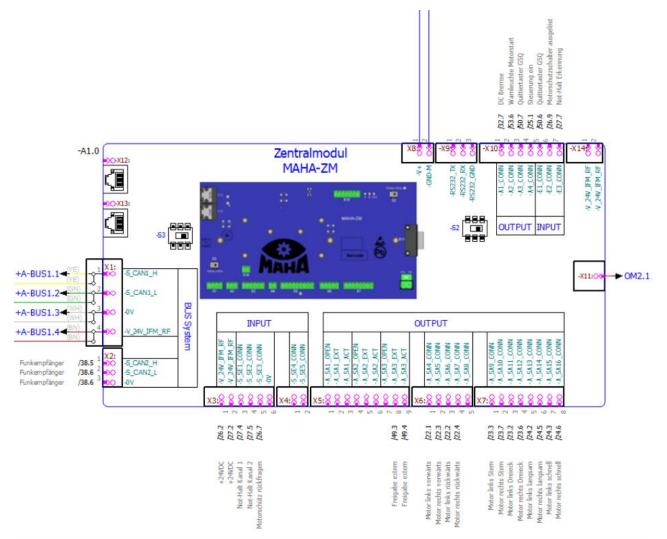






Maximum equipment Control cabinet 1200x800x300 mm

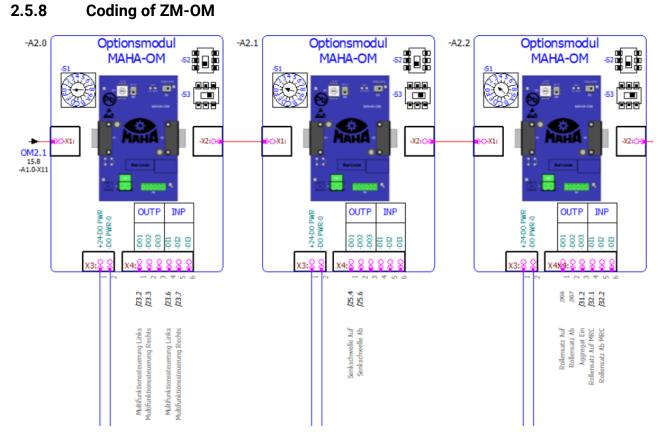




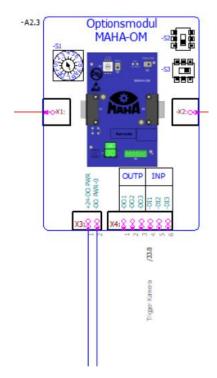
### 2.5.7 Connection and Termination of the Central Module (ZM)

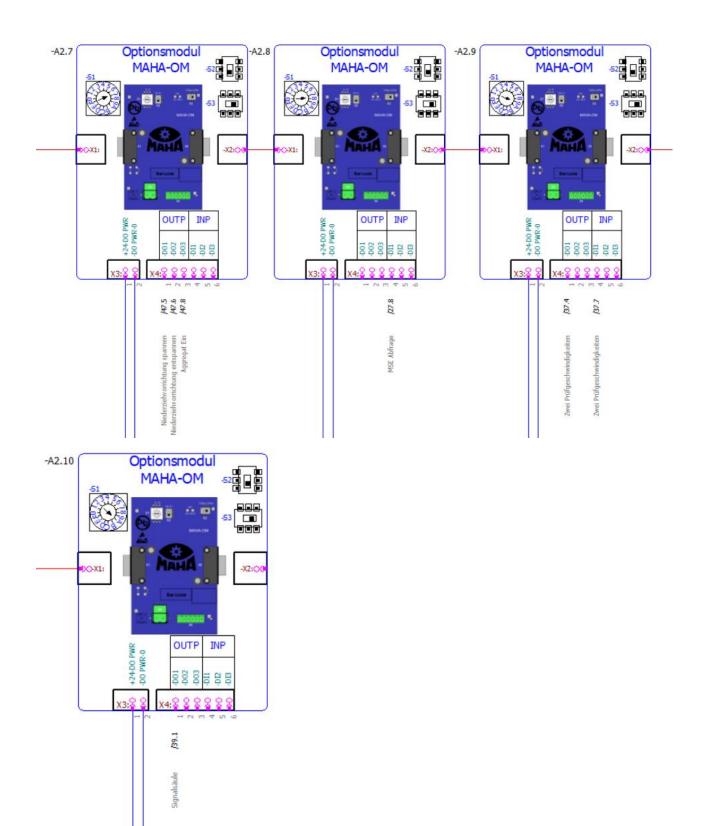
Connection of the central module

Termination of central module ZM			
-S2	-S2 Term if no OM present		
-S2	Open	if any OM present	
-S3	Term	if IFM is connected in series (ZM-IFM-IFM)	
-S3	Open	if IFM is connected in parallel (IFM-ZM-IFM)	



#### Connection of the option modules





### ZM-OM

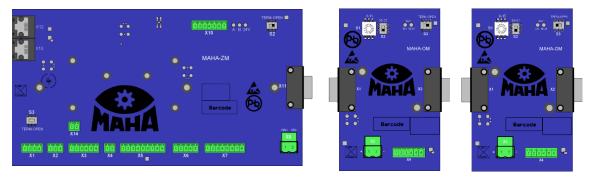
• Possibility 1



### (ZM only)

Central module ZM: S2 (+S-A1.0-S2) - Term ON

• Possibility 2

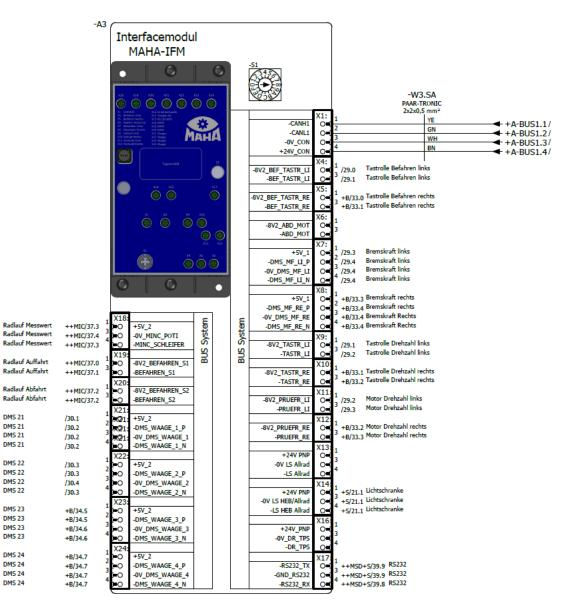


### (ZM and OM)

Central module ZM: S2 (+S-A1.0-S2) - Open (Term OFF)

Option module OM:

+S option	-S1	-S2	-S3 (Open/Term OFF)	
-A2.0 Direction of rotation/ measurement via pushbutton	0	0-15		
-A2.1 Lowering threshold	1	0-15		
-A2.2 Roller set lift	2	0-15		
-A2.3 License plate recognition	3	0-15	Term ON	
-A2.7 Pull-down device	7	0-15	only at last module	
-A2.8 MSE request	8	0-15		
-A2.9 Two test speeds	9	0-15	1	
-A2.10 Signal tower	А	0-15		



#### Connection of the interface module

#### ZM-IFM

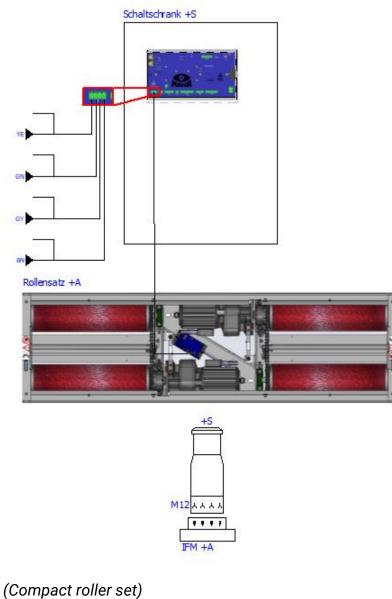
CAN address IFM-CT	S1 – Termination OFF Terminating resistor OFF	S1 – Termination ON Terminating resistor ON
"0"	0	8 (IFM-BA*)
"1"	1	9
"2"	2	А
"3"	3	В
"4"	4	С
"5"	5	D
"6"	6	E

CAN address IFM-CT	S1 – Termination OFF Terminating resistor OFF	S1 – Termination ON Terminating resistor ON
"7"	7	F

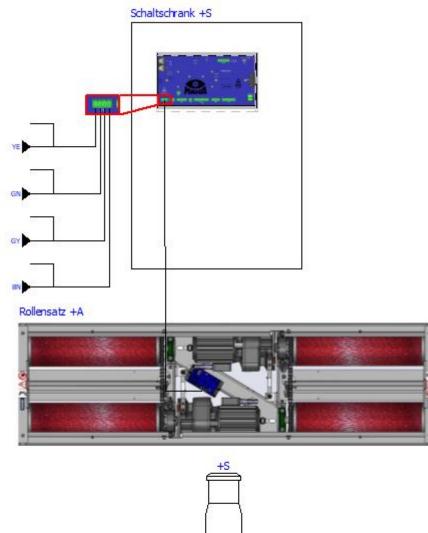
\*Interface module Basic (IFM-BA) is always preset with address "0" and term ON. No address switch S1 present.

• Possibility 1

Colours in CAN BUS illustration: YE/GN/WH/BN



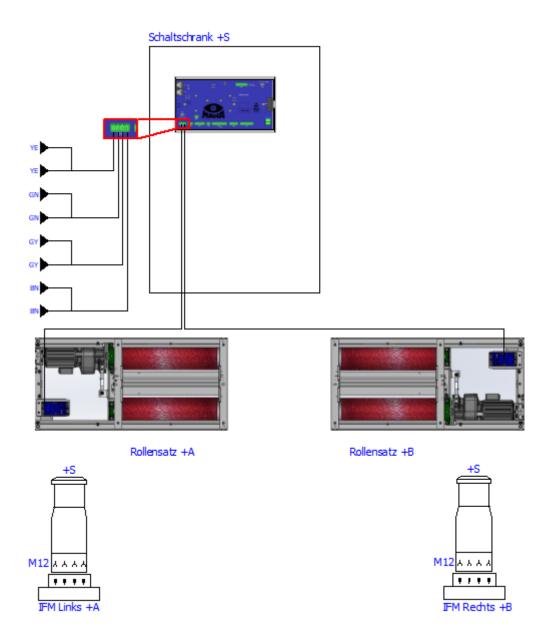
(Compact roller set) Central module ZM: -S3 (+S-A1.0-S3) – Term ON Interface module Basic IFM-BA: (no rotary switch S1 present) • Possibility 2



M12 A A A A

(Compact roller set)

Central module **ZM:** -**S3** (+S-A1.0-S3) − **Term ON** Interface module Comfort **IFM-CT**: -**S3** (+A-A3-S1) − Term **ON**: Address "0" (→ rotary switch S1 to 8) • Possibility 3

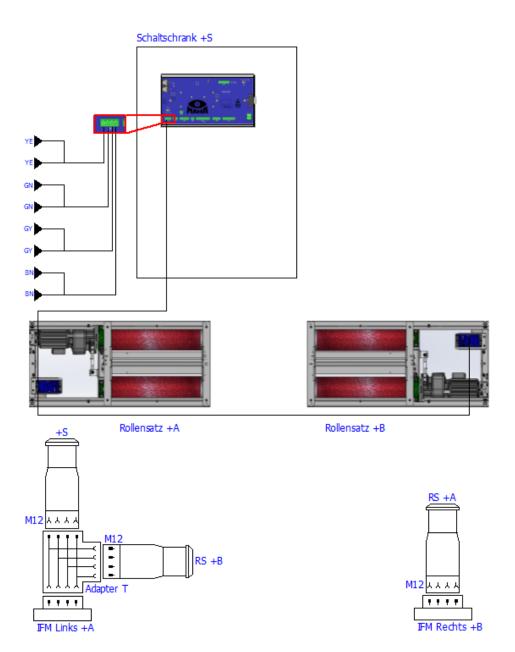


(Split roller set)

Central module **ZM:** -**S3** (+S-A1.0-S3) − **Open** (Term OFF) Left interface module Comfort **IFM-CT**: **S1** (+A-A3-S1) − Term **ON**: Address **"1"** (→ rotary switch S1 to 9) Right interface module Comfort **IFM-CT**: -**S1** (+B-A3-S1) − Term **ON**:

Address "2" ( $\rightarrow$  rotary switch S1 to A)

• Possibility 4



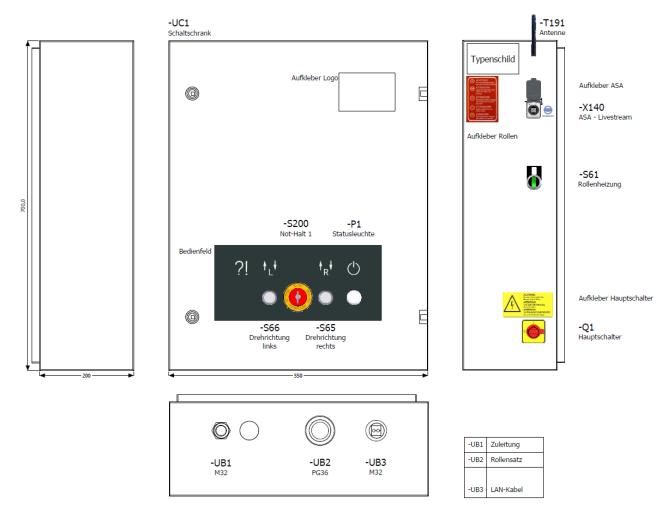
(Split roller set, in series ZM-IFM-IFM)

Central module ZM: -S3 (+S-A1.0-S3) - Term ON

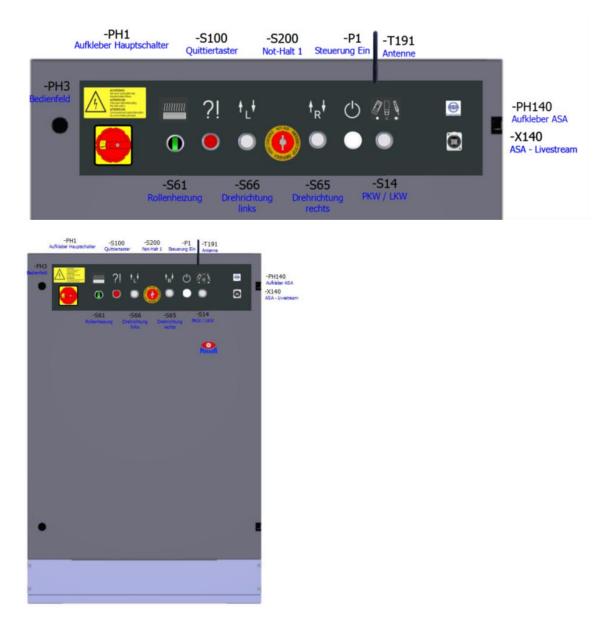
Left interface module Comfort **IFM-CT**: -**S1** (+A-A3-S1) − Term **OFF**: Address **"1"** (→ rotary switch S1 to 1)

Right interface module Comfort **IFM-CT**: -**S1** (+B-A3-S1) – Term **ON**: Address "2" ( $\rightarrow$  rotary switch S1 to A)

### 2.5.10 Control Buttons (Small Control Cabinet)



### 2.5.11 Control Buttons (Large Control Cabinet)



### 2.5.12 Indicator Light on the Control Cabinet in the Event of a Fault

The "Control On" indicator light (-P1) in the front cover of the control cabinet lights up as soon as the main switch is switched on and the control is initialised and there is no fault.

In the event of a fault, the mains lamp flashes at a frequency of 1 Hz.

For a detailed error code list, see section "Troubleshooting > Error Codes".

# 2.6 Technical Data

### 2.6.1 Technical Data Car/Van Tester

	C_MBT C 3.5 W220	C_MBT C 3.5 W250	C_MBT S 3.5 W220	C_MBT S 3.5 W250
	Track 2.20 RS 2	Track 2.50 RS 4	Track 2.20 RS 2	Track 2.50 RS 4
	compact	compact	split	split
Axle load [kg]	3500	3500	3500	3500
Track width min. [mm]	780	780	variable	variable
Track width max. [mm]	2200	2500	variable	variable
Drive power	2x3 kW	2x3 kW	2x4 kW	2x3 kW
Test speed	5 km/h	5 km/h	5 km/h	5 km/h
Roller length [mm]	730	892	730	892
Roller diameter [mm] Rollers welded/plastic	204	204	204	204
Roller diameter [mm] Rollers MIXED	208	208	208	208
Roller axle distance [mm]	400	400	400	400
Test roller with welded textured surface, friction coefficient dry / wet	0.9 / 0.7	0.9 / 0.7	0.9 / 0.7	0.9 / 0.7
Test roller with plastic / granulate coating, friction value dry / wet	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8
MIXED roller, friction coefficient dry / wet	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8
Measuring range	0 - 8 kN			
Display accuracy (full scale)	2 %	2 %	2 %	2 %
Fuse	25 A gG	25 A gG	25 A gG	25 A gG
Power supply	3x 400 V +N +PE 50 Hz			
Minimum cable cross- section Supply line*	5 x 4.0 mm <sup>2</sup>	5 x 4.0 mm²	5 x 4.0 mm²	5 x 4.0 mm²
Dimensions H x W x L [mm]	245-300 x 680 x 2320	245-300 x 680 x 2644	245-300 x 680 x 1420	245-300 x 680 x 1582

	C_MBT C 4.0 W220	C_MBT C 4.0 W250	C_MBT S 4.0 W220	C_MBT S 4.0 W250
	Track 2.20 RS 2	Track 2.50 RS 4	Track 2.20 RS 2	Track 2.50 RS 4
	compact	compact	split	split
Axle load [kg]	4000	4000	4000	4000
Track width min. [mm]	780	780	variable	variable
Track width max. [mm]	2200	2500	variable	variable
Drive power	2x4 kW	2x4 kW	2x4 kW	2x4 kW
Test speed	5 km/h	5 km/h	5 km/h	5 km/h
Roller length [mm]	730	892	730	892
Roller diameter [mm] Rollers welded/plastic	204	204	204	204
Roller diameter [mm] Rollers MIXED	208	208	208	208
Roller axle distance [mm]	400	400	400	400
Test roller with welded textured surface, friction coefficient dry / wet	0.9 / 0.7	0.9 / 0,7	0.9 / 0.7	0.9 / 0.7
Test roller with plastic / granulate coating, friction value dry / wet	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8
MIXED roller, friction coefficient dry / wet	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8
Measuring range	0 - 8 kN			
Display accuracy (full scale)	2 %	2 %	2 %	2 %
Fuse	25 A gG	25 A gG	25 A gG	25 A gG
Power supply	3x 400 V +N +PE 50 Hz			
Minimum cable cross- section Supply line*	5 x 4.0 mm <sup>2</sup>	5 x 4.0 mm <sup>2</sup>	5 x 4.0 mm <sup>2</sup>	5 x 4.0 mm²
Dimensions H x W x L [mm]	245-300 x 680 x 2320	245-300 x 680 x 2644	245-300 x 680 x 1420	245-300 x 680 x 1582

	C_MBT C 5.0 W280	C_MBT S 5.0 W280
	Track 2.80 RS 5	Track 2.80 RS 5
	compact	split
Axle load [kg]	5000	5000
Track width min. [mm]	780	variable
Track width max. [mm]	2800	variable
Drive power	2x4 kW	2x4 kW
Test speed	5 km/h	5 km/h
Roller length [mm]	1.032	1.032
Roller diameter [mm] Rollers welded/plastic	204	204
Roller diameter [mm] Rollers MIXED	208	208
Roller axle distance [mm]	400	400
Test roller with welded textured surface, friction coefficient dry / wet	0.9 / 0.7	0.9 / 0.7
Test roller with plastic / granulate coating, friction value dry / wet	0.9 / 0.8	0.9 / 0.8
MIXED roller, friction coefficient dry / wet	0.9 / 0.8	0.9 / 0.8
Measuring range	0 - 8 kN	0 - 8 kN
Display accuracy (full scale)	2 %	2 %
Fuse	25 A gG	25 A gG
Power supply	3x 400 V +N +PE 50 Hz	3x 400 V +N +PE 50 Hz
Minimum cable cross- section Supply line*	5 x 4.0 mm²	5 x 4.0 mm²
Dimensions H x W x L [mm]	245-300 x 680 x 2924	245-300 x 680 x 1722

\* Cable cross-section depending on local conditions (e.g. ambient temperature, type of installation, cable length, mains impedance) and local regulations. A flexible connection cable is recommended.

#### 2.6.2 **Technical Data Truck Tester**

## Light Truck

	C_MBT C 13.0 W280
	Track 2.80
	compact
Axle load [kg]	13 000
Track width min. [mm]	870
Track width max. [mm]	2800
Drive power	2x 7.5 kW
Test speed	5 km/h
Roll length [mm]	970
Nominal diameter [mm] Rollers welded on/ plastic	204
Nominal diameter [mm] Rollers MIXED	208
Test roll w. welded textured surface, friction coefficient dry / wet	0.9 / 0.7
Test roller w. plastic / granulate coating, friction value dry / wet	0.9 / 0.8
MIXED roll, friction coefficient dry / wet	0.9 / 0.8
Measuring range	0 - 25 kN
Display accuracy (full scale)	2 %
Fuse	50 A gG
Power supply	3x 400 V +N +PE 50 Hz
Minimum cable cross-section supply line*	5 x 4.0 mm <sup>2</sup>
Dimensions H x W x L [mm]	245-300 x 680 x 2924

## Truck

	C_MBT S 13.0 R100 MU	C_MBT S 15.0 R100 MU	C_MBT S 18.0 R115 MU	C_MBT S 18.0 R115 MI
		Motor at bottom		Motor at front
		S	plit	
Axle load [kg]	13 000	15 000	18 000	18 000
Drive power [kW]	2	2x9	2x	11
Test speed [km/h]	2	2.3	;	3
Roll length [mm]	1(	000	11	50
Nominal diameter [mm] Rollers welded on/ plastic	204	204	270	270
Nominal diameter [mm] Rollers MIXED	208	208	272	272
Roller centre distance [mm]	4	30	47	75
Test roll w. welded textured surface, friction coefficient dry / wet	0.9 / 0.7	0.9 / 0.7	0.9 / 0.7	0.9 / 0.7
Test roller w. plastic / granulate coating, friction value dry / wet	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8
MIXED roll, friction coefficient dry / wet	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8	0.9 / 0.8
Measuring range	0 – 45.5 kN			
Display accuracy (full scale)	2 %	2 %	2 %	2 %
Fuse	50 A gG	50 A gG	63 A gG	63 A gG
Power supply	3x 400 V +N +PE 50 Hz			
Minimum cable cross- section Supply cable*	5 x 25 mm²			
Dimensions roller set half: H x W x L [mm]	620 x 1045 x 1235	280 x 680 x 2924	740 x 1145 x 1430	440 x 1490 x 1505

	C_MBT S 18.0 R160 MS	C_MBT S 18.0 R160 MU	C_MBT S 20.0 R115 MU	C_MBT S 20.0 R115 MI
	Motor at side	Motor at bottom	Motor at bottom	Motor at front
		S	split	
Axle load [kg]	1	8 000	20	000
Drive power		2x	11 kW	
Test speed	3	km/h	2.3	km/h
Roller length [mm]		1600	11	50
Nominal diameter [mm] Rollers welded on/ plastic		:	270	
Nominal diameter [mm] Rollers MIXED		:	272	
Roller centre distance [mm]			475	
Test roll w. welded textured surface, friction coefficient dry / wet	0.9 / 0.7			
Test roller w. plastic / granulate coating, friction value dry / wet	0.9 / 0.8			
MIXED roll, friction coefficient dry / wet	0.9 / 0.8			
Measuring range		0 - 4	45.5 kN	
Display accuracy (full scale)			2 %	
Fuse protection	63 A gG			
Power supply	3x 400 V +N +PE 50 Hz			
Minimum cable cross- section supply line*	5 x 25 mm²			
Dimensions roller set half: H x W x L [mm]	405 x 1145 x 2685	740 x 1145 x 1880	740 x 1145 x 1430	440 x 1490 x 1.505

	C_MBT S 20.0 R160 MU	C_MBT M 18.0 W301	C_MBT T 18.0 W360	
	Motor at bottom	Mobile	Agriculture	
		split		
Axle load [kg]	20 000	18	000	
Track width min. [mm]		750	390	
Track gauge max. [mm]		3010	3600	
Drive power		2x 11 kW		
Test speed		2.3 km/h		
Roll length [mm]	16	00	1150	
Nominal diameter [mm] Rollers welded on/ plastic	270	154	270	
Nominal diameter [mm] Rollers MIXED	272	n,	/a	
Roller centre distance [mm]	47	75	685	
Test roll w. welded textured surface, friction coefficient dry / wet	0.9 / 0.7			
Test roller w. plastic / granulate coating, friction value dry / wet		0.9 / 0.8		
MIXED roll, friction coefficient dry / wet	0.9 / 0.8			
Measuring range	0 – 45.5 kN			
Display accuracy (full scale)		2 %		
Fuse	63 A gG			
Power supply	ower supply		3x 400 V +N +PE 50 Hz	
Minimum cable cross- section supply line*		5 x 25 mm²		
Dimensions roller set half: H x W x L [mm]	740 x 1145 x 1880	520 x 900 x 2410	5580 x 1340 x 370	

### 2.6.3 Noise Emission

Noise emission during a vehicle test is mainly caused by the vehicle's engine. This noise emission varies from vehicle to vehicle and cannot be attributed to the test stand.

#### **Roller brake tester**

The noise emission value caused by the brake tester (roller drive) is less than 70 dB(A) in the area of the operators' workplaces.

#### Shock absorber tester

The noise emission value caused by the MSD 3000 tester due to the vibrating test plates is between 75 and 80 dB(A) in the area of the operators' workplaces.

#### Side-slip tester

The noise emission value caused by the side-slip tester is less than 70 dB(A) in the area of the operator's workplaces.

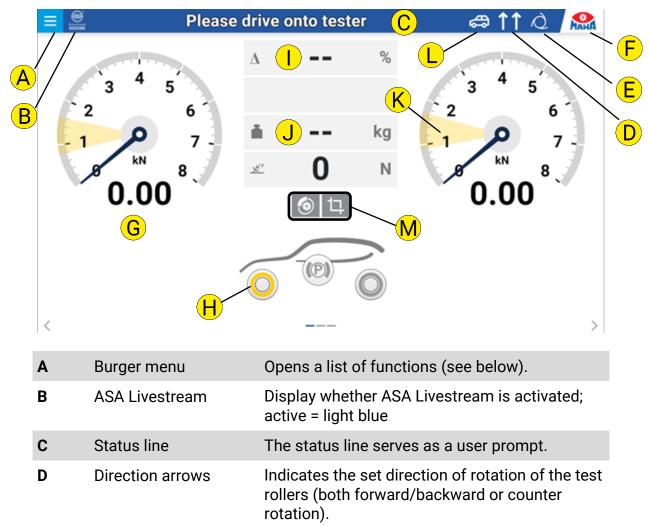
# **3** Description of the Software User Interface

The control board of the brake tester generates a website through which the user guidance and the measured value display takes place. The easiest way to connect to a C\_MBT brake tester is to use a standard computer with an Internet browser.

All common browsers (e.g. Mozilla Firefox, Microsoft Edge, Google Chrome) are supported in their current version.

### 3.1 Measurement Screen in Car Mode

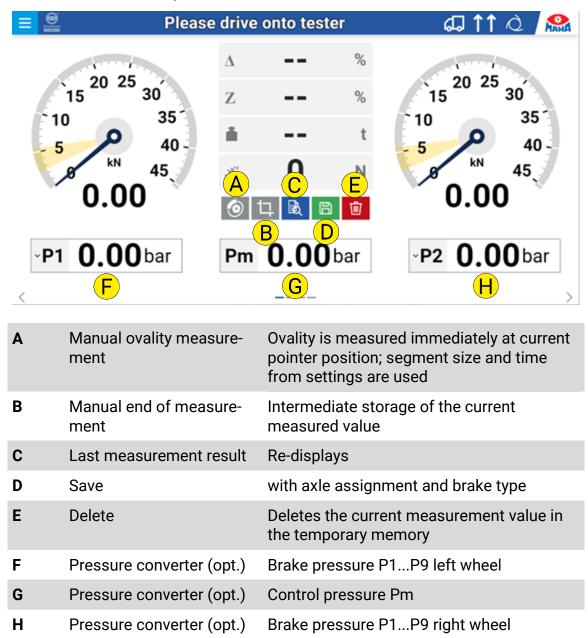
- Once the test rollers have been driven onto, the display automatically changes to the measurement screen.
- In the measurement screen, the current brake value and the difference in % are shown.
- After slip or pre-trigger (= memory threshold), the maximum brake forces of the measurement are displayed.
- The arrows at the bottom left and right can be used to switch between the measurement screen and the results screen (on touch-enabled devices also by swiping to the side).



E	Automatic/manual	Display whether automatic mode is activated or manual mode (then hand symbol).	
F	Settings	Click on gear wheel opens system settings.	
G	Brake force	Display of brake forces left/right in kN, as digital value and with pointer	
н	Brake type indicator	The brake to which the current measured value is saved is always displayed highlighted in yellow.	
I	Differential display	Displays the brake force differential in %	
J	Weight display	Display of weight measurement (static: weight symbol filled, dynamic: weight symbol as outline)	
К	Ovality segment	Ovality is measured in preset brake force area (marked yellow)	
L	Vehicle type	Display of vehicle type currently active	
М	For button assignment see section "Measurement Screen in Truck Mode"		

### 3.2 Measurement Screen in Truck Mode

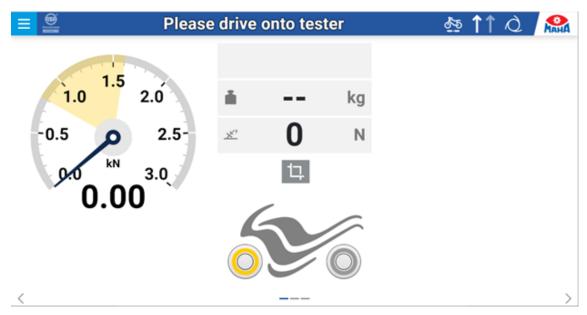
The measured value display for truck testers is similar to that of the passenger car testers, extended by some functions which are described below.



If radio-controlled devices are present, another view is available, which can be accessed via the arrows at the bottom or by swiping to the side.

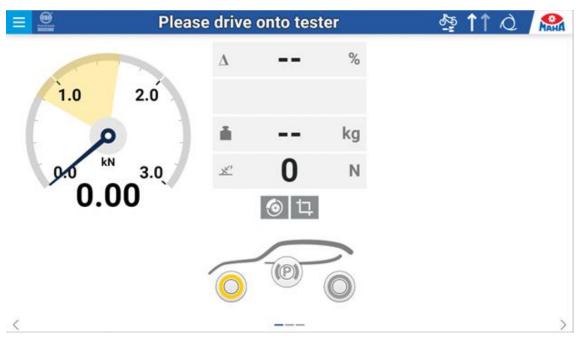
### 3.3 Measurement Screen in Motorcycle Mode

The measured value display in motorcycle mode is reduced to a single dial gauge. It is always located on the left of the user interface, regardless of the test stand side selected. The functions correspond to those in the semi-automatic car mode.



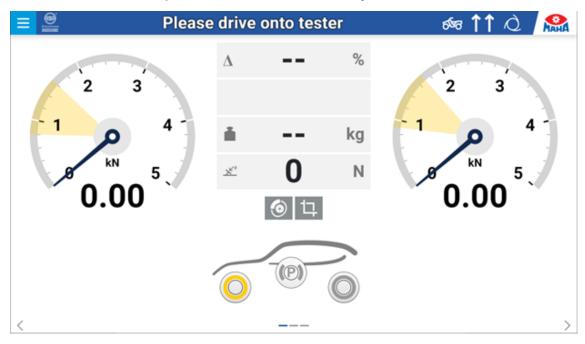
### 3.4 Measurement Screen in Tricycle Mode

The measured value display in tricycle mode consists of one or two dial gauge(s), depending on whether the axle selected has one or two wheel(s).



### 3.5 Measurement Screen in Quad Mode

The measured value display in quad mode corresponds to that in car mode, only the measurement range is dimensioned smaller by default.



### 3.6 Burger Menu Functions

In the left column, it is possible to select between the functions for the different test devices (depending on the configuration of the test stand):



Brake tester



Shock absorber tester (optional)



Side-slip tester (optional)

### 3.6.1 Functions of Brake Tester

	Car mode
G	Truck mode
<u>ি</u> ছ	Motorcycle mode
5	Tricycle mode, single wheel front

55	Tricycle mode, single wheel rear	
ର୍ଚ୍ଚଟ	Quad mode	
	Car multi-axle mode	
<del>ۇ</del> [ە	Weight-dependent Car-Truck switchover	(below the preset weight threshold Car mode, above Truck mode
$\uparrow\uparrow$	Main direction of rotation	(default)
↓↑	Four-wheel	(Automatic counter-rotation operation, measurement of the respective forward rotating wheel. First left side, then automatically right side)
$\downarrow\downarrow$	Opposite direction (opt.)	(Measurement in the opposite direction of travel)
$\uparrow\uparrow$	Single wheel left	(Measurement of the left wheel only, right roller is stationary)
$\uparrow\uparrow$	Single wheel right	(Measurement of the right wheel only, left roller is stationary)
Q	Automatic roller start	(Default setting, automatic start 3 sec. after entering the test stand)
ſ	Manual roller start via Sma	artDevice
	Manual roller strat via radi	o remote control
	Manual roller start via cab	le remote control
O∎C ¢	Lowering bar (opt.) automatic	(Lowering bar is controlled via light barrier or button)
O∎C	Lowering bar (opt.) manual	(Lowering bar is controlled via button)

Pre-trigger	(Measurement when threshold value is exceeded)
Pre-trigger Truck	(Save maximum brake force)

### **3.6.2** Functions of Shock Absorber Tester (optional)

AND	Shock Absorber Tester	(enables the shock absorber tester)
	Shock absorber tester Weighing mode	(enables weight measurement via shock absorber tester, no shock absorber test; only available if there is no weighing device in the brake tester!)
Ċ	Switch off shock absorber tester	(disables the shock absorber test)

### 3.6.3 Functions of Side-Slip Tester (optional)

Switch off side-slip tester (disables the side-slip test)

### 3.7 **Results Display**

(1)

- In the results display, the customer name and the vehicle license plate number or VIN can be entered for the current measurement, as well as the current mileage and the maximum permissible weight of the vehicle.
- The last stored measurements can be redisplayed (up to 10).
- If the ES\_IN/OUT protocol is activated (optional), a vehicle can be selected from a test list.
- The arrows at the bottom left and right can be used to switch between the results screen and the measurement screen (on touch-enabled devices also by swiping to the side).

### 3.7.1 Current Measurement

V	ehicle se	electio	'n		Current m	Beasure	ment	1	Measu	C rement ar	chive		Admini	Stration	ı	
Perso	nal data	1														
R	MAHA Firstr	name	۹	МАНА	Lastname	Ţ	Note									
Vehicl	le data															
	OA MH 4		km	Milea;	je –	kg	MPW		1	5		bar				
	5	5			5	5		5		5	5		5		5	bi
Meas	uremen	t resul	lts				G	G H	) (							
Bra					Total o	vervie	W			Service bra	ke			Parkir	ng brake	
Sho	ock abso	orber			Brake for					23.16					6.74	
Sid	e-slip				Weights					7.06					24	
					Extrapola	ted dece	leration [%	]		-					-	
					St	itic weight	tested 7.06 t			Dynamic weig	ht tested 7.26	t		Static we	ight tractor 1	5.09 t
					н					${\leftarrow}^{kN}$	$\stackrel{^{kN}}{\rightarrow}$		$\Delta$ %	2	2%	/
					1		2	•		4.83	3.69		24	:	25	Details
							2	• 🗴	1	3.76	3.69		2	:	21	Details -
					2					7.49	8.22		9		45	Details -
							()	P)		5.93	10.81		46		48	Details -
4	Veh	icle	sele	ecti	on (op	ot.)	Op	ensa	a lis	t with	test o	rdei	rs (Es	s in	)	
В					iremei					play fo			•		•	nent
с С			-		archiv	-										
										f the la		J) S	lorec	ine	asure	inen
D					(opt.)		ver	nicie	adi	ninistr	ation					
Ξ	Per	sona	al da	ata:												
	•	Firs	st, la	st r	ame		Ent	ry o	f cu	stome	r nam	е				
	•	Not	e				Ent	ry of	f ad	ditiona	al info	rma	tion	(opt	.)	
5	Veh	icle	dat	a:												
	•	Lice	ense	e pla	ate/VI	N	Ent	ry of	f lic	ense p	late n	uml	oer /	VIN		
	•	Mile	eage	Э			Ent	ry o	f mi	leage						
	•	MP	-							aximur	n nerr	nise	sible	weid	nht	
			• •					, ,								

- Calculation pressure in bar; only if extrapolation is active (opt.)
- Pressure per axle in bar; only if extrapolation is active (opt.)

G	B	Save	Saves the current measurement results. Optional ES/IN: ES_OUT can also be generated, depending on the setting in the ES service
н	⊡	Forward (opt.)	Writes back the measurement results (ES_OUT), depending on the setting in the ES service
I	匬	Delete	Deletes the measurement results
J			Selection of required test device
Κ			Overview of current measurement
L			Expand to detail view (see below)

#### **Detail view**

If the detail view is expanded with <+>, further measurement results can be seen, such as brake force sum, pedal forces, pressure values, weight, ovality and extrapolation.

н		← <sup>kN</sup>	$\stackrel{^{kN}}{\rightarrow}$	$\Delta$ %	Z%	
1	<u>&gt;&gt;</u>	4.83	3.69	24	25	Details 🕂
	💌 <u>×</u> F	3.76	3.69	2	21	Details 🕂
2	<b>&gt;</b>	7.49	8.22	9	45	Details —
	Σ	15.7	'1 kN			
	*					
	1	Px: 1.80 bar	Px: 1.90 bar	Pm: 1.95 bar		
	i i				3.53 t	
	۲	20 %	20 %			
	Factor i	5.07	4.73			
	F * i	66.0	04 kN			
	(P)	5.93	10.81	46	48	Details 🕂

#### 3.7.2 Measurement Archive

In the measurement archive, the stored measurements are listed (max. 10 vehicles) in order to redisplay them if required (by clicking "Show" button) or to print them in the form of a test report.

Use the arrows  $\Leftrightarrow$  to sort the corresponding column. Vehicle measurements that are no longer required can be deleted.

Current measurement	Measurem	nent archive				
Ø Search						
⇔ Date	Vehicle type	License plate/VIN	⇔ Mileage	Show	Print	Delete
24.07.2018 13:40	62	OA Motorcycle 1	123456	۲	6	۱.
24.07.2018 13:40	52	OA TriFront 1	123456	•	0	Û
24.07.2018 07:33	4	OA CAR 2	123456	•	ø	1
24.07.2018 13:40	4	OA MH 3	123456	•	⊜	1
24.07.2018 13:40	8	OA MH 2	123456	۲	0	<u>ا</u>
24.07.2018 13:40	\$	OA MH 1	123456	•	ē	<b></b>

#### Print

If "Print" is selected, a window opens. Here the components can be selected that are to appear on the test report.

The displayed contact address can be edited in the system settings in section "General/Test report".

When generating the test report, a PDF file is created, which can be saved on the computer, e.g. in the local download folder. This file can then be sent by e-mail or printed on paper on a connected printer.

Test report	×
Select the components to be printed.	
Brake tester	
Image: Series of the series	
Shock absorber	
Shock absorber tester Shock absorber tester graphic	
Side-slip	
Side-slip	

### 3.7.3 Vehicle Selection (optional)

As soon as the "Order Interface (ES\_IN/OUT)" option is activated under "Settings", a new view "Vehicle selection" appears.

If the pull-down menu is expanded with the down arrow, vehicles can be selected for which inspection orders have already been recorded (e.g. in the IT system of a car dealership or an inspection station). Manual license plate entry is not possible.

After selection, the fields for which entries have been made are automatically completed, e.g. vehicle type (car or truck, indicated by the symbol in front of the license plate), number of axles, VIN, mileage or maximum permissible weight. Measurements can then be taken for this vehicle.

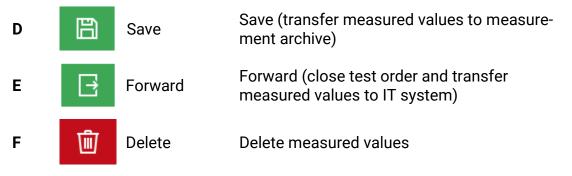
€ → 0 © loahest400						2 \$	* 0 @ I
		ease drive or			1 1 1	Ò	Мана
	Vehicle selection Personal data DB Benefung Vehicle data	Current measurement	Measurement archive	Administration	-		
	Image: second secon	01205478 PAT 6 Start time 0 102053	PANDA MRE9314MK/789  C Duration of Inspec	ken 50000 kg 30 Bg deset	20		
	K	EXY	123	Brake Shock absorber Side-slip			
<							>

- A Personal data:
  - Note Entry of additional information (opt.)
- **B** Vehicle data:
  - License plate Vehicle selection via license plate number
    - Vehicle identity number
  - Number of axles
  - Mileage

VIN

- Weight Maximum permissible weight
- First registration
- Manufacturer

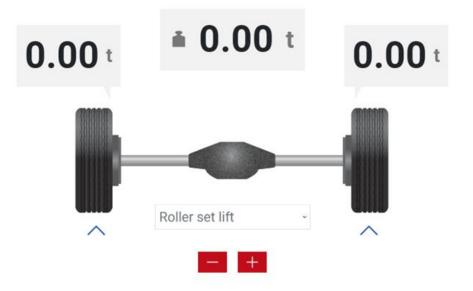
- Vehicle type Type 1 and Type 2 of vehicle
- Fuel type
- Turbo Turbo present
  - Speed limiter Speed limiter present
- Taximeter Taximeter present
- **C** Inspection data:
  - Inspection date
  - Start time
  - End time
  - Duration



### 3.8 Optional Display Screens

### 3.8.1 Scale Screen (optional)

As soon as a weighing device is installed in the test stand, another view appears:



Here, the wheel weights are displayed above the wheels, and the axle weight is displayed above the axle.

Below the axle weight, the difference appears when the weight is changed.

#### Load simulation (opt.)

If additional devices for load simulation are installed (pull-down device or roller set lift), the load simulation can be operated via the +/- buttons below the axle:

- Plus increases the load
- Minus reduces the load

The arrows under the wheels indicate by movement whether the load simulation is active.

In the case that pull-down device as well as roller set lift are installed, the pulldown menu can be used to switch between both options.

### 3.8.2 Display Radio Participants (optional)

If a radio receiver is installed in the test stand and the optional radio pressure converters are enabled, another view appears:

Pm	P5	PFM
		<b>0</b> N
P1	P6	RECO S
		~
P2	P7	
P3	P8	
P4	P9	

The existing radio participants are displayed here, e.g. the RECO S radio remote control, a PFM pedal force meter or RCD 50 radio pressure converter.

In addition, the measured values are displayed:

- "---" means that no measured values are available.
- "---" blue bordered means that a sensor is logged in, but not transmitting.
- Blue with values e.g. "0" means a sensor sends value 0.
- Blue with "charging" means sensor is charging its battery.
- "0 N", on the other hand, is a measured value.

Adding/removing a participant is done under Settings/Radio/Radio diagnostics.

### Settings



Clicking on the gear wheel in the MAHA logo opens the System settings menu.

**INFO:** The "System settings" menu is locked if the test stand is occupied and no error is present. The menu is unlocked when the vehicle exits the test stand.

Here the following submenus are available in the left column:

í	General
0	Languages
ŝ	Settings, extended (only for logged in users)
((i <sup>1</sup> ))	Radio (opt.)
٢	Brake tester
ALL	Axle damping tester (opt.)
	Side-slip tester (opt.)
8	Technician menu login

### 3.9.1 Description of the Submenus

Allgemein	
Support Netzwerk Externe Geräte	Ereignisaufzeichung Prüfprotokoll Maschinendaten
Support:	Contact and test stand information
Network:	IP settings, network name
External devices:	Connected analog displays, C_Box etc.
Event recording:	Display of events (EventLog)
Test protocol:	Configuration protocol, address header
Machine data:	Operating hours etc.
	SupportExterne GeriteSupport:Network:External devices:Event recording:Test protocol:

Languages	Sprache		
	Deutsch	Setting the language of the test stand	
Settings	Einstellungen		
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Geräte Akt./Deak. Optionen Software-Update/ZM-Zurücksetzen		
	Devices Act./Deact.:	Activate/deactivate test equipment	
	Options:	Activate booked general additional functions	
	SW Update:	Update option for software	
	Reset ZM:	Reset ZM to delivery state	
Radio	Funk		
((( <sub>1</sub> )))	Optionen Funkdiagnose Justage		
	Options:	Bookable radio options (remote control, pressure converter, pedal/hand force meter)	
	Radio diagnostics:	Status information on end devices, user guidance for pairing the devices etc.	
	Adjustment:	Adjust end devices (only for logged-in users)	
Brake tester	Bremsprüfstand		
	Optionen Kalibrieren Bremskraft Kalibrieren Wiegeeinrichtung Diagnose		
G	Options:	Activated devices and settings	
	Adjust brake force:	Display of values (force and digits)	
	Adjust weighing device (opt.):	Display of values (weight and digits)	
	Diagnostics:	Sensor diagnostics (range spring and proximity switch)	
	Additionally for logged-in users:		
	Settings:	Parameters for car, truck, motorcycle, general, customer variables	
	Adjust brake force:	Set zero point, range spring settings etc.	
	Adjust weighing device (opt.):	Set zero point etc.	
	Diagnostics:	Motor can be switched in star/delta or fast/ slow mode (service technician button required)	
	Input/output test:	Activate outputs (service technician button required), readout inputs	

Shock	Achsdämpfungsprüfstand		
absorber tester	Optionen Justage		
	Settings:	Adjust measurement parameters of shock absorber tester (for logged-in users only)	
	Options:	Activate booked options	
	Adjujstment:	Currently only possible via external "LON- Manager" tool	
Side-slip	Radlauftester		
tester	Optionen Justage		
$\leftarrow$	Settings:	Adjust measurement parameters of side-slip tester	
	Options:	Activate booked options (triggers etc.)	
	Adjustment:	Adjust side-slip tester (only for logged-in users)	
Technician menu login	Activation of the technician menu		
	Online:	via internet connection with e-mail address and password, here also password change possible	
8	Offline:	via maha-key-file, download from MAHA internet server, here <i>no</i> password change possible; once logged in: change password!	

#### 3.9.2 General/Network

The "Network MAHA (X13)" is permanently configured and cannot be changed! (Ethernet interface X13 on the central module)

On the other hand, the "Customer network (X12)"can be customized according to the requirements.

(Ethernet interface X12 "EXT" on the central module).

Likewise, the "network name" under which the test stand reports in a network can be customised.

Below, information about the ASA Livestream and the external interface (both optional) is shown.

#### General

Support	Network	External devices	Test report	Event log	Machine data	
Custom	er netwo	ork (X12)				
Status				✓ Connecte	d	
Mode				Client		
MAC				MOCK_EXT_MAC		
IPv4 / Network mask				10.10.10.2 / 255.255.255.0		
IPv6				12345667889	adfecb:3421	
Gateway				10.10.10.1		
New mode				Change		

#### MAHA network (X13)

Status	✓ Connected
Mode	Server
MAC	MOCK_MAHA_MAC
IPv4 / Network mask	10.10.10.3 / 255.255.255.0
IPv6	12345667889adfecb:3421
Connected devices	mock_client_1: 10.10.30.30 mock_mac_1 mock_client_2: 10.10.30.31 mock_mac_2

#### Network name

ma	ha-n	nbt-m	lock

Transfer in progress

ASA Livestream	
Status	× Disconnected
Manager IP address	192.168.34.35

#### Status external interface

Connected: Websocket Order Interface Example (Prüflinie 1, Sektion 8)

Change

#### X13 MAHA

The X13 MAHA interface is primarily used to connect a MAHA access point so that the test stand can be accessed via the access point's WiFi. The network interface at X13 MAHA tries to obtain IP addresses via DHCPv4/v6 for 30 seconds when the central module is started (or a cable is plugged in). If no DHCP server responds during this time, i.e. obtaining the addresses fails, then the ZM itself acts as a DHCPv4 server, assigns itself the address 192.168.201.1 and distributes IP addresses in the network in which the X13 MAHA interface is located.

×

#### INFO:

This configuration cannot be changed. On the one hand, this ensures that the MAHA Access Point functions correctly with this interface, and on the other hand, this allows the network configuration of the X12 EXT interface to be performed via the X13 MAHA port.

### X12 EXT

The X12 EXT network interface is possible for integration of the central module into the customer network. To enable such integration conveniently, the X12 EXT interface can be configured according to customer requirements. It is recommended to perform the configuration of the X12 EXT interface via a device that is directly connected to the X13 MAHA port.

DHCP server

To configure the X12 EXT interface as a DHCP server, "Server" must be selected as the new mode. After a restart of the central module, the X12 EXT interface then operates as a DHCP server. This means that the X12 EXT interface attempts to obtain IP addresses via DHCPv4/v6 for 30 seconds when the ZM is started (or a cable is plugged in). If no DHCP server responds during this time, i.e. obtaining the addresses fails, then the ZM itself acts as a DHCPv4 server and assigns itself the address 192.168.202.1.

#### INFO:

In Germany, this interface must be used as an ASA interface and is configured accordingly ex works (as a DHCP client).

Static IP

To configure the X12 EXT interface to a static IP, "Static IP" must be selected as the new mode. The IPv4 and Network mask fields are mandatory fields. Optionally, a gateway can also be entered. After a restart of the central module, the X12 EXT interface then operates with static IP.

#### Procedure for configuring the X12 EXT interface

1 Connect a laptop or similar to the X13 MAHA socket of the central module via a network cable. The network interface of the laptop must be configured as a DHCP client. This means that in the properties of the corresponding Ethernet connection in the "Internet protocol, version 4" element the "Obtain IP address automatically" and "Obtain DNS server address automatically" options must be enabled.

Eigenschaften von Ethernet	×	Eigenschaften von Internet	tprotokoll, Version 4 (TCP/IPv4)
Netzwerk Freigabe		Allgemein Alternative Konf	fguration
Verbindung herstellen über:			utomatisch zugewiesen werden, wenn das
👳 Intel(R) Ethemet Connection I217-LM			nterstützt. Wenden Sie sich andernfalls an den n die geeigneten IP-Einstellungen zu beziehen.
Kgnfigurie Diese Verbindung verwendet folgende Bemente:	eren	● P-Adresse automatis	
Service Packet Driver (NPCAP)	^	O Folgende IP-Adresse	verwenden:
Physical Packet Driver (NPCAP) (Wi-Fi)     Physical Packet Driver (NPCAP) (Wi-Fi)		IP-Adresse:	
<ul> <li>Internetprotokol, Version 4 (TCP/IPv4)</li> </ul>		Sybnetzmaske:	· · · · · · · · · · · ·
🗌 🔔 Manaafi Multiplanamentakali für Natzwark adapter		Standardgateway:	· · · · ·
<ul> <li>Microsoft-LLDP-Treiber</li> <li>Internetprotokoll, Version 6 (TCP/IPv6)</li> </ul>	~	DNS-Serveradresse a	utomatisch beziehen
<	>	O Folgende DNS-Server	adressen verwenden:
Installeren Deinstalleren Bgensch	aften	Bevorzugter DNS-Serve	a
Beschreibung TCP/IP, das Standardprotokoll für WAN-Netzwerke, das	den	Alternativer DNS-Server	d
Datenautausch über verschiedene, miteinander verbund Netzwerke emöglicht.		Einstellungen beim B	eenden überprüfen Erweitert
OK Ab	brechen		OK Abbrechen

- 2 Call up the WebApp of the central module via a web browser. The central module can be reached either via the IP 192.168.201.1 or via the name of the ZM + .maha (in the delivery state this would be e.g. <u>http://maha-mbt.maha)</u>.
- 3 Login to the technician menu, e.g. via a previously downloaded offline key.
- 4 Switch to the network area, select the desired mode and enter the desired configuration.

Support	Netzwerk	Externe Geräte	Ereignisaufzeichung	Prüfprotokoll	Maschinendaten	
Vetzwer	k Kunde	(X12)				
Status			√ Verbunden			
Modus			Client			
MAC			MOCK_EXT_MAC			
IPv4 / Netzw	verkmaske		10.10.10.2 / 255.255	255.0		
IPv6			12345667889adfecb:	3421		
Gateway			10.10.10.1			
Neuer Modu	IS		Client			
Netzwer	k MAHA	(X13)	Client Server Statische IP			

#### INFO:

Incorrect configuration of the X12 EXT interface can result in the central module no longer being accessible via the X12 EXT interface. A configuration correction can or must then be made via the X13 MAHA interface.

#### 3.9.3 Technician Menu Login

In this sub-menu, the technician menu can be opened. However, this menu is only accessible to persons who are registered with MAHA.

#### **Online activation**

If the test stand is online, i.e. if it has a direct connection to the Internet, the user can log in with an e-mail address and password. These are usually managed by the MAHA Service Center after MAHA training has been completed.

After successful login, the **password** can also be **changed** here.

#### **Offline activation**

If the test stand is not online, the user can log in using a software key ("mahakey"). This file must be downloaded to the end device beforehand and is available on the MAHA homepage in the support area under "Software/Connect Downloads" (login with e-mail address and password required):

https://www.maha.de/de/support/software/connect-downloads

It can then be imported into the test stand using the "Select" button.

The keys are limited in time (usually four weeks after issuance) and only valid for a specific test stand (S/N related)!

# 4 Transport, Handling and Storage

## 4.1 Safety Instructions



# WARNING

- For loading, unloading and transport, always use suitable lifting equipment, load handling devices (e.g. crane, forklift truck) and correct load attachment devices and lifting accessories. See also section "Transport and handling".
- Always ensure that the parts to be transported are suspended or loaded properly and in a fall-proof manner, taking into account their size, weight and centre of gravity. Observe transport regulations!
- Electrical work must only be performed by a specialist electrician in compliance with the national regulations, directives and standards. An electrical test/measurement must be performed and logged.
- The system may only be installed and commissioned by service technicians of the manufacturer or by authorised service partners.
- All parts of the electrical equipment must be protected from moisture and humidity.
- The system must not be installed or operated in potentially explosive rooms or washing bays.
- The operator must provide optional safeguards (e.g. warning lamps, barriers, monitoring of the presence of personnel in working pits) in accordance with the on-site conditions.
- Personal protective equipment (safety boots and gloves) must be worn. The personal protective equipment must meet the safety requirements for the particular work being performed.
- Secure the roller set with suitable means (e.g. barrier chain or tape). Depending on the country, the roller set must be secured with the optionally available cover when not in use (regulation in Germany). Alternatively, the automatic drive-over lowering bar can be used.
- The display must be hung up in a safe area and must be folded up against the wall during downtime (wall-mounted hinge can be used as an option).
- When folding up the display, always hold it on the outside. Crushing hazard!
- Before connecting the supply line, it must be ensured that a lockable master switch or key switch (optional) is available for the use of the brake tester.
- The emergency stop main switch, the emergency stop pushbutton (optional) and the signal lamp "Control On" must be positioned in the immediate vicinity of the test stand so that the emergency stop function according to DIN EN ISO 13850 is fulfilled.

# 4.2 Scope of Delivery

Each test stand is shipped from the factory with packaging as standard. The delivery contains:

- Roller set (basic equipment)
- Control cabinet (basic equipment)
- Options according to price list

The number of delivered packages and contents must be checked for damage and completeness according to the order confirmation. Any transport damage must be documented immediately and reported to the delivery carrier.

## 4.3 Packaging Information

In the following tables, the package weights are always indicated as approximate values, since they considerably depend on the equipment version and may vary accordingly.

#### Centre of gravity of the packed roller set

The centre of gravity is approximately in the centre of the roller set or roller set halves.

	C_MBT C 3.5 W220	C_MBT S 3.5 W220	C_MBT C 3.5 W250	C_MBT S 3.5 W250
Dimensions Package Roller set (L x W x H)	240 x 80 x 50 cm	175 x 80 x 82 cm	295 x 80 x 50 cm	175 x 80 x 82 cm
Weight Package Roller set	350550 kg	450650 kg	400650 kg	500750 kg
Dimensions Package Control cabinet (L x W x H)	•		x 50 cm	
Weight Package Control cabinet	70100 kg			

	C_MBT C 4.0 W220	C_MBT S 4.0 W220	C_MBT C 4.0 W250	C_MBT S 4.0 W250
Dimensions Package Roller set (L x W x H)	240 x 80 x 50 cm	175 x 80 x 82 cm	295 x 80 x 50 cm	175 x 80 x 82 cm
Weight Package Roller set	350550 kg	450650 kg	400650 kg	500750 kg
Dimensions Package Control cabinet (L x W x H)	bl cabinet 120 x 80 x 50 cm		x 50 cm	
Weight Package Control cabinet	70100 kg			

	C_MBT C 5.0 W280	C_MBT S 5.0 W280	C_MBT C 13.0 W280
Dimensions Package Roller set (L x W x H)	295 x 80 x 50 cm 175 x 80 x 82 cm		295 x 80 x 50 cm
Weight Package Roller set	450750 kg 550850 kg		450750 kg
Dimensions Package "Control cabinet Series" (L x W x H)	120 x 80 x 50 cm		
Weight Package "Control cabinet Series"	70100 kg		
Dimensions Package "Control cabinet Option" (L x W x H)		150 x 115 x 90 cm	
Weight Package "Control cabinet Option"	-		100130 kg

	C_MBT S 13.0 R100 MU	C_MBT S 15.0 R100 MU	
Dimensions Package Roller set (L x W x H)	2x 150 x 115 x 90 cm	2x 150 x 115 x 90 cm	
Weight Package Roller set	2x 600900 kg	2x 600900 kg	
Dimensions Package "Control cabinet Series" (L x W x H)	120 x 80 x 50 cm		
Weight Package "Control cabinet Series"	70100 kg		
Dimensions Package "Control cabinet Option" (L x W x H)	150 x 115 x 90 cm		
Weight Package "Control cabinet Option"	100130 kg		

	C_MBT S 18.0 R115 MS	C_MBT S 18.0 R115 MU	C_MBT S 18.0 R115 MI		
Dimensions Package Roller set (L x W x H)	2x 225 x 115 x 65 cm	2x 150 x 115 x 100 cm	2x 150 x 150 x 75 cm		
Weight Package Roller set	2x 8501250 kg 2x 10001350 kg 2x		2x 9001200 kg		
Dimensions Pack stück "Control cabinet Series" (L x W x H)	120 x 80 x 50 cm				
Weight Package "Control cabinet Series"	70100 kg				
Dimensions Pack stück "Control cabinet Option" (L x W x H)	150 x 115 x 90 cm				
Weight Package "Control cabinet Option"	100130 kg				

	C_MBT S 18.0 R160 MS	C_MBT S 18.0 R160 MU	
Dimensions Package Roller set (L x W x H)	2x 280 x 135 x 60 cm	2x 195 x 115 x 98 cm	
Weight Package Roller set	2x 13001500 kg	2x 11001400 kg	
Dimensions Package "Control cabinet Series" (L x W x H)	120 x 80	) x 50 cm	
Weight Package "Control cabinet Series"	70100 kg		
Dimensions Pack stück "Control cabinet Option" (L x W x H)	150 x 11	5 x 90 cm	
Weight Package "Control cabinet Option"	100130 kg		

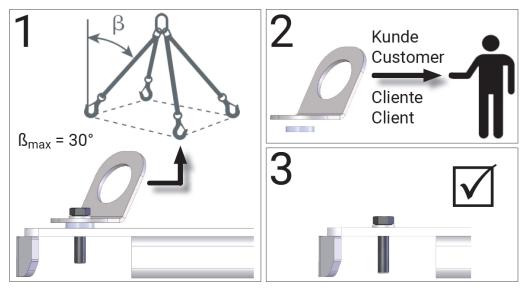
	C_MBT S 20.0 R115 MU	C_MBT S 20.0 R115 MI	C_MBT S 20.0 R160 MU
Dimensions Package Roller set (L x W x H)	2x 150 x 115 x 100 cm	2x 150 x 150 x 75 cm	2x 195 x 115 x 98 cm
Weight Package Roller set	2x 10001350 kg	2x 9001200 kg	2x 11001400 kg
Dimensions Package "Control cabinet Series" (L x W x H)		120 x 80 x 50 cm	
Weight Package "Control cabinet Series"		70100 kg	
Dimensions Package "Control cabinet Option" (L x W x H)		150 x 115 x 90 cm	
Weight Package "Control cabinet Option"		100130 kg	

	C_MBT M 18.0 W301	C_MBT T 18.0 W360
Dimensions Package Roller set (L x W x H)	2x 250 x 130 x 93 cm	2x 280 x 115 x 70 cm
Weight Package Roller set	2x 750950 kg	2x 14001600 kg
Dimensions Package "Control cabinet Series" (L x W x H)	120 x 80	) x 50 cm
Weight Package "Control cabinet Series"	701	00 kg
Dimensions Package "Control cabinet Option" (L x W x H)	150 x 11	5 x 90 cm
Weight Package "Control cabinet Option"	100	130 kg

# 4.4 Transport and Handling

Transport and handling of the test stand is only permitted in the original packaging. On the pallet the packaged test stand can be moved with the forklift truck. For loading, unloading and insertion into the foundation, use the pick-up points shown below. Hand over the load suspension lugs to the operator for reuse (dismantling, repair) after the transport process.

Dimensions and centre of gravity of the packaged test stand are shown in section "Packaging Information".



Pick-up points of the packaged test stand

#### 4.5 Storage

The packages must be stored in a covered location and protected from direct sunlight. Storage must take place at a temperature between -10 °C and +60 °C.

Packaging waste must be disposed of in accordance with applicable environmental regulations.

# 5 Installation

## 5.1 Safety Information



- Installation and initial commissioning of the device may only be carried out by specially trained personnel. Such specialist staff include authorised, trained specialists employed by the manufacturer, the authorised dealers and the relevant service partners.
- The control cabinet must be positioned in such a way that the emergency stop main switch or the emergency stop pushbutton (optional) is located in the immediate vicinity of the test stand at a height of 0.6...1.7 m above the stand level and can be assigned to the correct test stand in the case of test halls with several systems. This is necessary in order to fulfil the emergency stop function according to DIN EN ISO 13850. The "Control On" status light shall be fully visible from the test site.
- Electrical work must only be performed by a specialist electrician in compliance with the national regulations, directives and standards. Accordingly, an electrical test/measurement must also be carried out and recorded.
- All parts of the electrical equipment must be protected from moisture and humidity.
- Even when the main switch is switched off, parts of the optional control cabinet heater (components, terminals, cores, cables, etc.) are still live.
- During service work, the system must be depressurised and de-energised.
- For all work (including assembly, repair and maintenance work) on the test stand (e.g. control cabinet, roller set, other additional parts), it must be ensured that the main switch is switched off and secured against being switched back on.
- For work in the control cabinet or on the roller sets, be aware of the (optional) heater or hot parts.
- Due to the coordination used in accordance with IEC 60947, the switching elements (contactors) in the associated circuit must be replaced after a short-circuit/ housing short-circuit, and also if the B10d value of 1,300,000 switching cycles in accordance with DIN EN ISO 13849-1/-2 is exceeded. Before connecting the supply cable, it must be ensured that it is deenergised and, among other things, that the 5 safety rules are observed.
- Safety goggles must be worn when working on hydraulic/pneumatic components.
- Test and measure the protective conductor connection and insulation as part of the overall commissioning.
- Suitable working scaffolds/platforms must be used when working at height.

# 5.2 Installation Diagrams

	· · · · · ·					
	C_MBT C S	5.0 W280		C_M	BT S	5.0 W280
Foundation plan	10022	2761				
Elec. circuit diagram			202.01.	005800		
	C_MBT C 3.5/4.0 W220		S 3.5/4.0 220	C_MBT C 3.5/- W250	4.0	C_MBT S 3.5/4.0 W250
Foundation plan	10022761			10022761		
Elec. circuit diagram			202.30.	005800		
	C_MBT C S	5.0 W280		C_M	BT S	5.0 W280
Foundation plan	10022	2761				
Elec. circuit diagram			202.30.	005800		
	C_MBT C 13.0 W	/280	C_MBT S	13.0 R100 MS	C_N	MBT S 13.0 R100 MU
Foundation plan	10050232					
Elec. circuit diagram	204.30.00596 204.30.00596			204.30.	0059	50
	C_MBT S 15.0 R100 MS		T S 15.0 )0 MU	C_MBT S 18. R115 MS	0	C_MBT S 18.0 R115 MU
Foundation plan						
Elec. circuit diagram			204.30.	005950		
	C_MBT S 18.0 R115 MI		T S 18.0 50 MS	C_MBT S 18. R160 MU	0	C_MBT S 20.0 R115 MU
Foundation plan						
Elec. circuit diagram			204.30.	005950		
	C_MBT S 20.0 R115 MI		T S 20.0 50 MU	C_MBT M 18 R119 MS	.0	C_MBT M 18.0 W300
Foundation plan						
Elec. circuit diagram			204.30.	005950		
	C_MBT T 18.0 R160 MS					
Foundation plan	1					
(	1	1				

Elec. circuit diagram

204.30.005950

# 5.3 Mounting the Control Cabinet

#### 5.3.1 Mechanical Installation

#### Installation accessories

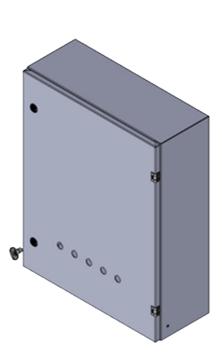
- 3 pcs hexagonal wood screws 6x60 mm, MAHA # 22 0571060 1.
- 3 pcs 6 mm washers, MAHA # 22 0125 06 3.
- 3 pcs 8 mm anchors, MAHA # 23 5008. These anchors are suitable for normal concrete, masonry walls, light weight concrete with a high degree of porosity and aerated concrete. For other materials, suitable fastening systems must be used on site!

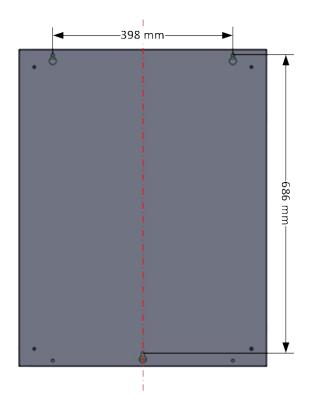
#### Installation process

- 1 Mark the drill holes on the selected wall according to the sketch and with the aid of a spirit level and drill to a depth of at least 60 mm using a suitable 8 mm masonry drill bit.
- 2 Insert the anchors and screws into the holes and screw them in at a distance of 10 mm from the wall.
- 3 Hang the control cabinet on the pre-installed screws using the keyholes, align with a spirit level if necessary and tighten the screws.

#### NOTICE

Check control cabinet for tight fit after installation.





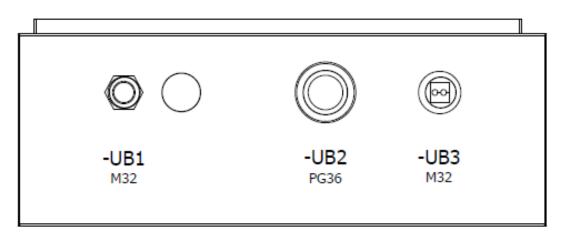
#### 5.3.2 Electrical Installation

#### NOTICE

- The cable cross-section of the on-site supply cable depends on the local conditions (e.g. ambient temperature, type of installation, cable length, mains impedance) and the local regulations.
- During installation and regular maintenance work, authorised and trained personnel must check that all electrical terminals are firmly seated and retighten all electrical screw terminals.

#### Small control cabinet (700x550x220)

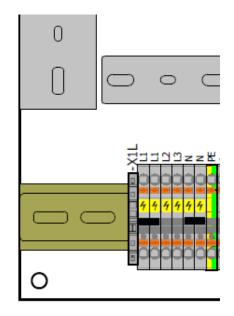
- 1 Insert the supply cable via the cable gland -UB1 (M32) on the underside of the control cabinet and tighten the cable gland using an open-end wrench. Tension check on the cable, whether the cable gland closes correctly.
- 2 Fix the supply line to the wall so that there is no tensile load on the screw connection.



- 3 Connect the single wires of the stripped supply cable to the push-in supply cable terminals -X1L without tensile load. To do this, strip the insulation from the individual wires 10...12 mm. Make sure that the spring-loaded terminal does not squeeze on the insulation of the single wire. The maximum possible wire cross-section of the terminal is 6.0 mm² for solid or flexible wire (without ferrule).
  - L1 Phase 1
  - L2 Phase 2
  - L3 Phase 3
  - N Neutral conductor
  - PE Protective conductor

#### Image: PHOENIX CONTACT







Starre Leiter lassen sich direkt und werkzeuglos kontaktieren.

Image: PHOENIX CONTACT

Der Anschluss flexibler Leiter ohne Aderendhülse erfolgt mit dem Betätigungsdrücker.

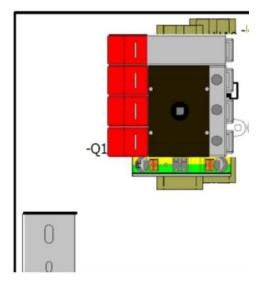
Image: PHOENIX CONTACT

#### NOTICE

Ensure that the yellow warning covers are then reattached to the terminals. The supply line L1 - L2 - L3 must have a clockwise rotating field.

#### Large control cabinet (1200x800x300)

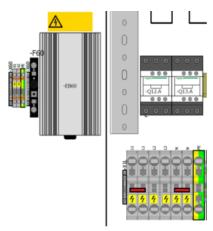
- 1 Feed the supply line from the floor's pipe outlet directly through the control cabinet base into the control cabinet. For easier handling, the front panel of the control cabinet base can be unscrewed for this purpose. Use cable ties to relieve the strain on the cables inserted through the base of the enclosure on the serrated rail.
- 2 The supply cable is led upwards along the left edge of the mounting plate and is only stripped off directly in front of the main switch (-Q1).



3 Remove the red protective cover of the main switch (-Q1) and connect the individual wires (L1, L2, L3, N) of the stripped supply cable to the terminals without tensile load and screw tight with 2.5 Nm.

Strip the 18 mm PE single wire and connect it to the green-yellow PE pushin terminal next to the main switch. Make sure that the spring-loaded clamp does not crush on the insulation of the single wire. The maximum possible wire cross-section of the terminal is 25 mm<sup>2</sup> with solid or flexible wire (without ferrule).

If the option "control cabinet heating" is available, the supply line is connected to the supply line terminals -X1L instead of the main switch.



- L1 Phase 1 L2 – Phase 2 L3 – Phase 3 N – Neutral conductor
- PE Protective conductor

# NOTICE

Make sure that the yellow or red warning covers are put back on the terminals afterwards. The supply line L1 - L2 - L3 must have an electrical clockwise rotating field.

# 5.4 Mounting the Roller Set

#### 5.4.1 Mechanical Installation

#### Installation accessories

• 4 pcs. bolt anchors B, M10x90 galvanised, MAHA # 23 5090. These bolt anchors are suitable for non-cracked concrete.

#### **Anchor dimensions**

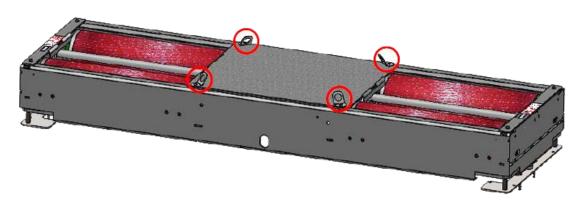
Hole diameter	d0	[mm]	10
Anchoring depth	hef	[mm]	90
Tightening torque	Tinst	[Nm]	35
Width across flats	WAF	[mm]	17

#### **Assembly process**

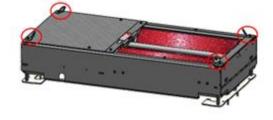
1 Lift the roller set into the prefabricated foundation using a suitable four-part chain hanger on the 4 lugs on the middle cover. If the wiring harness is pre-installed, it must be inserted into the empty conduit provided at the same time.

NOTICE

Make sure that the cables are not pinched or kinked.



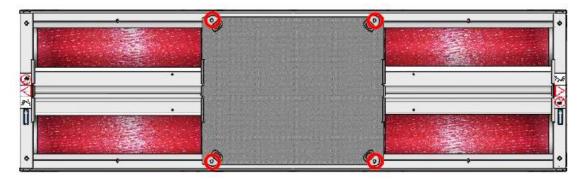
Compact roller set





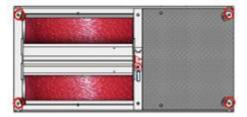
Split roller set

2 After lowering into the foundation, the suspension lugs can be removed as shown below. To do this, remove the 4 M8 screws (marked red) with WAF 13.



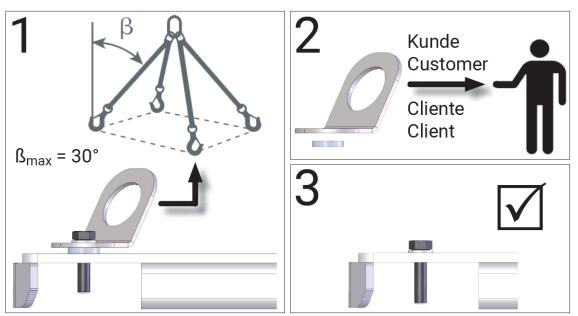
Compact roller set

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			- AL	
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3		•	CONTRACTOR OF THE	- 0

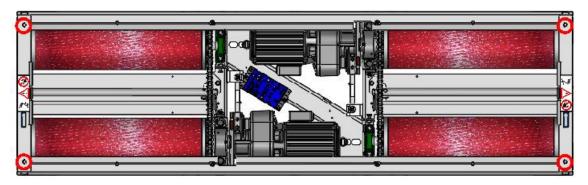


Split roller set

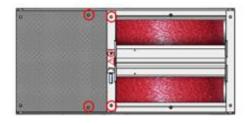
3 Remove the middle cover and set aside. Hand over the mounting material to the operator for reuse (disassembly, repair).

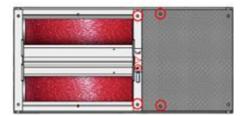


4 Remove the bearing covers on the left and right so that the test stand can be fixed in the foundation. To do this, remove the 4 M8 screws (marked red) with WAF 13 and remove the bearing covers.



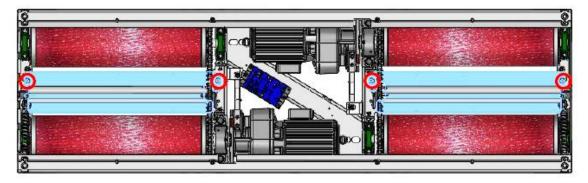
Compact roller set



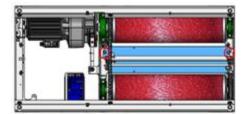


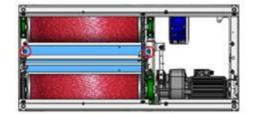
Split roller set

5 Dismantle the kick plates. To do this, remove the4 M10 screws (marked red) with WAF 17.



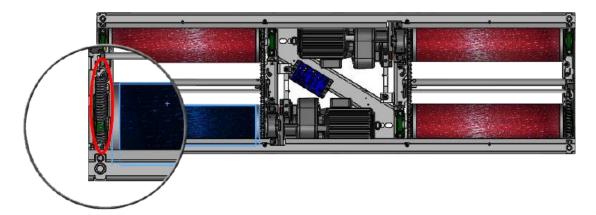
Compact roller set





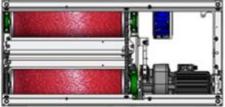
Split roller set

6 If a drill with sufficient length is not available, remove the sensing roller spiral spring (marked red) if necessary. Dismantling of the spiral spring must be carried out identically on the left and right.



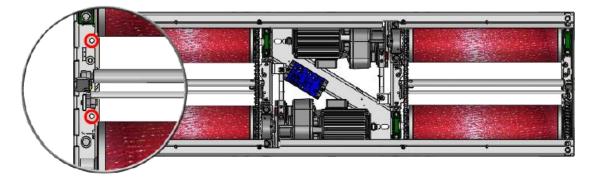
Compact roller set



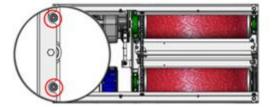


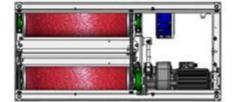
Split roller set

- 7 Center the test stand all around in the foundation, then drill a minimum depth of 90 mm at the fixing points (marked red) using a suitable 10 mm masonry drill bit. The fixing holes must be made identically on the left and right.
- 8 Drive in the bolt anchor, check the test stand centering in the foundation again. Tighten bolt anchor with ratchet and extension WAF 17.



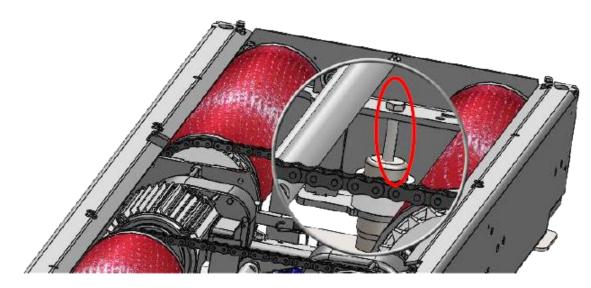
Compact roller set





Split roller set

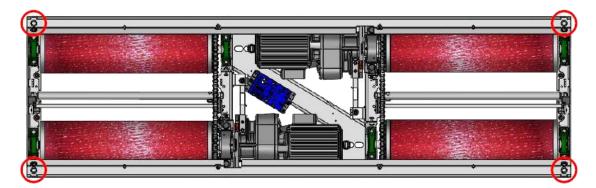
9 Remove the transport lock (marked red) with ratchet and extension WAF 17 and dispose of it. The transport lock must be removed on the left and right.



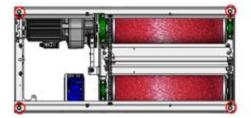
10 Adjust the test stand to the desired level (e.g. level with the floor) using the 4 levelling screws (marked red) with ratchet and extension WAF 17. Make sure that the test stand does not jam. It is advisable to gradually adjust the level in a clockwise direction. The level of the upper edge of the frame can be variably adjusted from 245...300 mm.

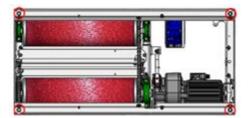
## NOTICE

If the test stand is lowered further than 280 mm, make sure that the cables are not pinched or kinked.



Compact roller set





#### Split roller set

11 Then refit the sensing roller spiral spring, the kick plate, the bearing cover and the middle cover in reverse order.

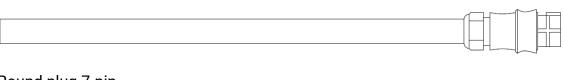
#### Info:

The split version is mounted per roller set half identically to the unsplit roller set.

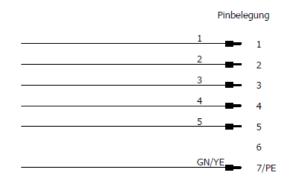
#### 5.4.2 Electrical Installation

#### Installation accessories Car

Required cables between roller set and control box (basic variant): a Motor cable left track +A and right track +B (MAHA # 1404769) Cable 7G 1.5 mm<sup>2</sup> YSLY-JZ; 15 meters



Round plug 7-pin



b CAN data line IFM (MAHA # 1402469)Cable 2x2x0.5 mm<sup>2</sup> PVC data cable; 15 meters

Connector M12, 4-pin Pinout: Pin 1 – YE Pin 2 – GN Pin 3 – WH Pin 4 – BN c Protective earth conductor (MAHA # 1402470) Single core GN/YE 4.0 mm<sup>2</sup> PVC-flexible; 15 meters Cable lug Ø 6.5 mm

#### Installation accessories Truck

Required cables between roller set and control box (basic variant):

- a. 1st speed (default): 2 pieces motor cable without plug
   2nd speed: 2 pieces motor cable without plug with shield
   Cable 4G4.0 mm<sup>2</sup> YSLY-JZ
- b. CAN data cable IFM pre-assembled
- c. Protective earth conductor pre-assembled

#### Installation accessories Truck (split roller set)

Required cables between roller set and control box (basic version):

a. 2 pieces motor cable pre-assembled left roller set half +A and right roller set half +B (MAHA # 1408450)

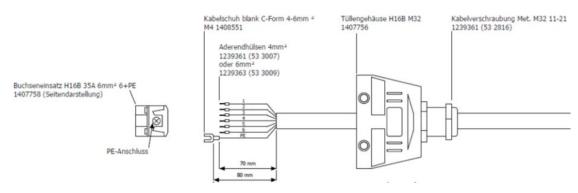
Cable 7G4.0 mm<sup>2</sup> YSLY-JZ; 24 metres

#### Pin assignment Motor connector

Buchsenanschluss	Adernummer / -farbe
1	1
2	2
3	3
4	4
5	5
6	6
PE	PE

# Mounting the motor connector on the motor cable (if the motor cable is not pre-assembled)

- Push the cable gland and housing onto the cable.
- Strip 80 mm of cable on one side.
- Cut the wires to length and crimp them with wire end ferrules and PE wire with cable lug.
- Connect the wires to the socket insert according to the pin assignment.
- When screwing the socket insert onto the grommet housing, make sure that no wires are crushed.
- Tighten the cable gland.
- Test/measure the protective conductor connection and insulation as part of the overall commissioning.



b. 2 pieces CAN data cable IFM pre-assembled left roller set half +A and right roller set half +B (MAHA # 1403840)

Cable 2x2x0.5 mm<sup>2</sup> PVC data cable; 25 metres

MAHA material # 1401834 Data line:  $2x2x0.5 \text{ mm}^2$ unshielded GN, YE, BN, WH Connector M12, 4-pin Pinout: Pin 1 – YE (yellow) Pin 2 – GN (green) Pin 3 – WH (white) Pin 4 – BN (brown)

c. 2 pieces of protective earth pre-assembled (MAHA # 1403841)
 Single core GN/YE 4.0 mm<sup>2</sup> PVC-flexible; 25 metres with cable lug Ø 6.5 mm

#### Installation process

#### NOTICE

First, carefully place the connectors on the IFM sockets and turn them until the holes snap onto the pins. Only then push the connector on completely.

- 1 Pull the required cables from the roller set through the empty conduit provided by the customer with the cable ends cut off in the direction of the control box.
- 2 Connect the two motor cables directly to the couplings provided on the motor until the plug connection engages.





Car motor connector

3 Pull off the protective cap from X1 on the IFM. Carefully plug the CAN data cable with the M12 connector onto the and tighten the locking ring on the connector by turning it clockwise.



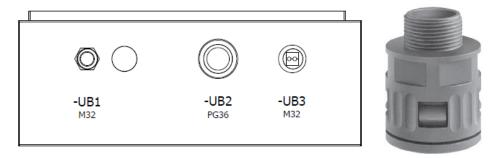
4 Attach the cable lug of the protective conductor single wire by means of M6 screw, washer and contact/toothed lock washer to the threaded hole with attached protective conductor marking in the roller set.



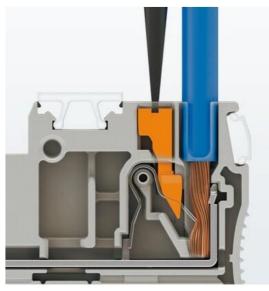
Gewindebohrung	
	<ol> <li>1) Schraube</li> <li>2) Beilagscheibe</li> <li>3) Schutzleiter</li> <li>4) Kontaktscheibe</li> <li>5) Montageplatte</li> </ol>

- 6 Secure the cable in the reel set using cable ties. Make sure that no cables are under tensile stress.
- 7 On the control cabinet side, shorten the supplied flexible plastic protective conduit with an inner diameter of 36 mm to the required length, push it over the cables protruding from the empty conduit and allow it to protrude several centimetres into the empty conduit in the floor.

Insert the cables on the underside of the control cabinet at -UB2 (PG36) of the cable entry. Push the plastic protective hose into the cable entry until it locks into place.



- 8 Inside the control cabinet, relieve the strain on all cables at the existing cable tie (above the cable entry).
- 9 Shorten the two motor cables to the required length, strip them and connect the individual wires to the push-in spring-loaded terminals (motor terminals) -X1L without tensile load. To do this, strip and twist the individual wires 10...12 mm. Make sure that the spring-loaded terminal does not squeeze on the insulation of the single wire.

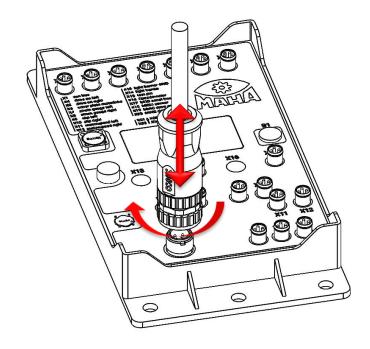


Der Anschluss flexibler Leiter ohne Aderendhülse erfolgt mit dem Betätigungsdrücker.

- 10 Feed the CAN data line through the cable duct to the ZM connector X1, untwist, strip and connect to the green 4-pin connector X1 without tensile load. To do this, strip 10 mm of insulation from the individual wires and twist them together. While actuating the push-in spring-cage terminal, use a small screwdriver to guide the bare wire into the connector opening. Make sure that the spring-loaded terminal does not squeeze on the insulation of the single wire.
- 11 Shorten the green/yellow protective conductor wire to the required length and clamp it onto the push-in spring-cage terminal (green/yellow) -X1L without tensile load.

To do this, strip the insulation from the single wire 10...12 mm and twist it. Make sure that the spring-loaded terminal does not squeeze on the insulation of the single wire.

#### Connector mounting/dismounting: detailed views

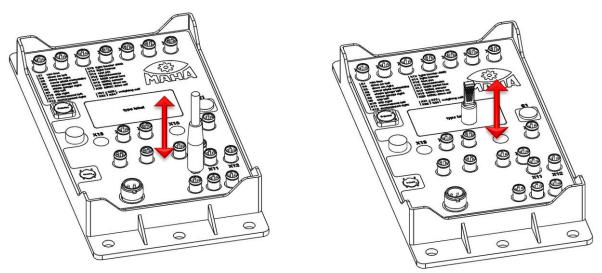


M12 CAN connector mounting/dismounting on IFM

Mount by carefully inserting the 4-pin plug and slightly turning the locking nut to the right to fix the plug.

• M8 sensor connector mounting/dismounting on IFM

Mount by carefully inserting the 3/4-pin connector. It is locked by lightly snapping into place when plugged in. The connector must not be turned under pressure!



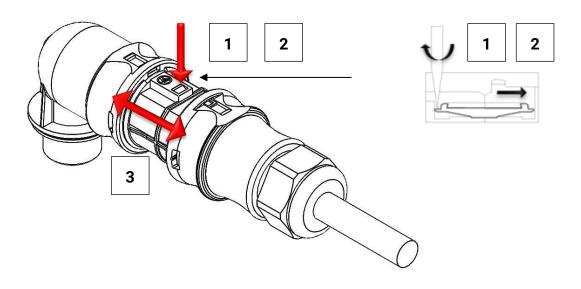
M8 protective cap mounting/dismounting on IFM

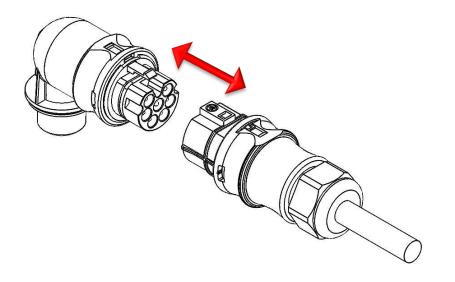
Unused plug-in connections must be fitted with a black rubber protective cap. If necessary, remove these by pulling gently.

• Motor connector mounting/dismounting Car

Mount by carefully plugging in the 7-pin connector. It is locked by lightly snapping into place when plugged in. The connector must not be turned!

For dismounting, use a screwdriver to lightly press the locking lug and pull off the connector while doing so.

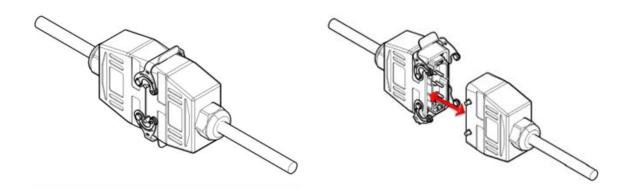




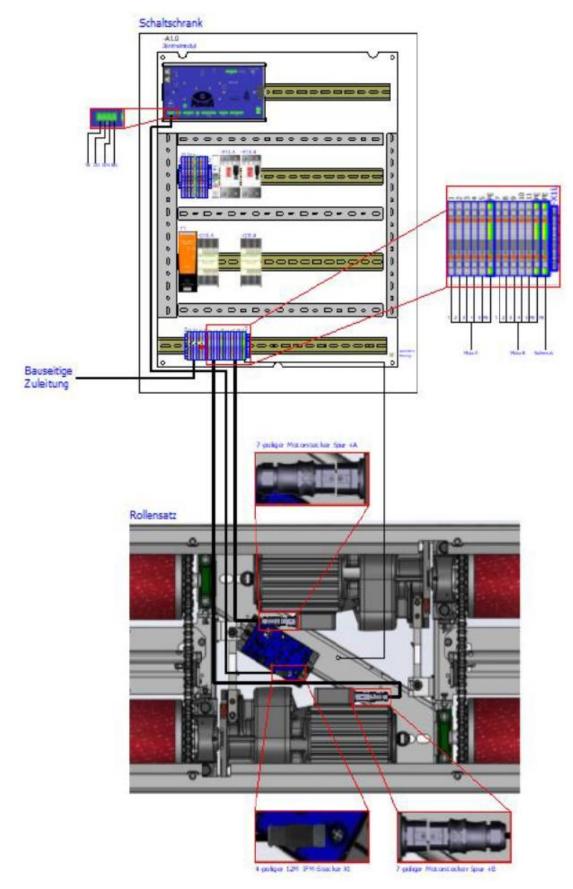
• Motor connector Truck assembly/disassembly

Assembly by carefully plugging in the 7-pin connector. Locking is done by manually closing the side brackets, these must snap over the bolts on the other casing part.

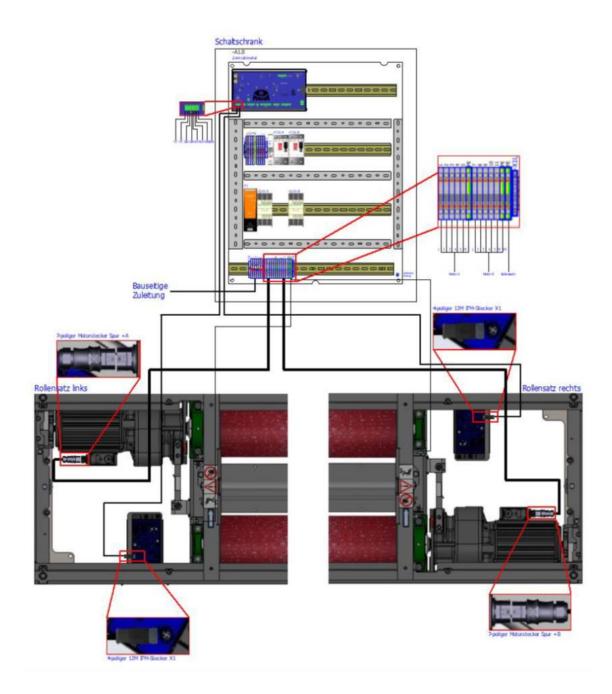
For disassembly, first open the side brackets and then pull the connector apart. Assemble or disassemble the connector only when disconnected from the power supply!



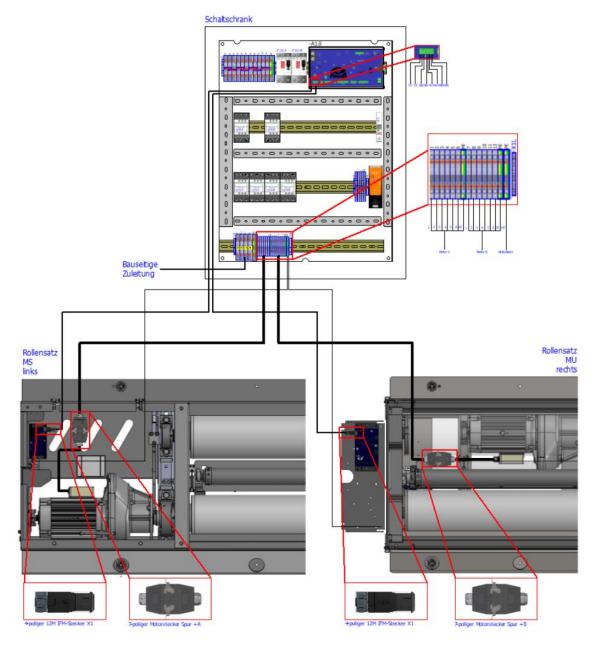
## Connection Roller set Car C\_MBT "C"



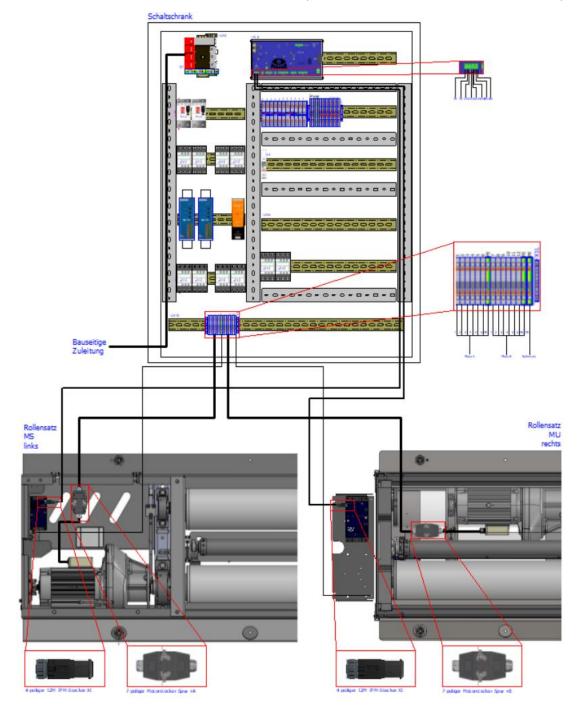
Connection Roller set Car C\_MBT "S"



# Connection Roller set Truck C\_MBT "S" (control cabinet 700x500x220 mm)



# Connection Roller set Truck C\_MBT "S" (control cabinet 1200x800x300 mm)



# 5.5 Function Test

#### Info:

The acceptance of the brake tester is carried out by an expert. He checks all functions and safety devices and confirms the result. In addition, a second sheet enclosed with the operating instructions ("Quality Certificate for Installation and Commissioning") must be completed in full and returned to the manufacturer.

During the acceptance process, the following points must be checked again in particular:

- Free movement of sensing roller holder and sensing roller.
- Electrical connection of the brake tester; acceptance according to countryspecific regulations.
- Potential equalisation.
- Correct setting of all Namur sensors (check via Service technician menu).
- Firm fit of control cabinet and brake tester.
- Smooth running of the motors.



## WARNING

Only carry out the function test on the floor assembly with the motor's protective circuit-breakers switched off!

# 6 Calibration/Adjustment

#### Info:

Calibration interval: at least every 2 years

# 6.1 Adjusting the Brake Force

- 1 Open "System settings" and select "Brake tester/calibrate brake force".
- 2 Complete the registration via the link. The following screen opens:

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ierung Rechts
tieren N – Digit
i

3 In the control cabinet, set both motor circuit breakers to the "OFF" position.

#### 6.1.1 Basic Settings

Here the specific electrical values of a range spring can be entered, which were determined during production and are engraved on the range spring.

#### Info:

These values may only be changed after replacing a range spring.

#### 6.1.2 Adjusting the Zero Point

Perform zero-balance adjustment for the brake force while no vehicle is located on the test stand: press "Adjust" button.

#### 6.1.3 Adjusting Brake Forces with Adjusting Device

- 1 Unscrew the middle cover and mount the adjustment device.
- 2 Measure the roller diameter.
- 3 Fit the adjustment device to the left-hand motor of the roller set (in the direction of travel).

- 4 Attach the counterweight and level the adjustment device. Use the counterweight to bring about balance. Only when the adjustment device is in equilibrium does no force act on the range spring. The counterweight on the left side balances out the additional weight of the calibration bar on the right side. The brake force display shows 0.00 kN ± 0.01.
- 5 Secure the counterweight with the screw. The notches on the adjustment arm are necessary for positioning the weight. The adjustment device can have two notches each for a traction force. The notches for the MBT 2000 are used for the adjustment of all roller sets with Ø 200.
- 6 Place the 30 kg adjustment weight on the 3 kN mark. The adjustment arm must be in balance with the applied weights. The spirit level is used for verification. Depending on the adjustment method, errors are taken into account for inexact alignment.
- 7 Preload the adjustment device 3x with maximum value.
- 8 Perform adjustment: press "Adjust" button.
- 9 Remove the weight and check the zero point. The zero point must not be readjusted again. It must therefore be ensured that no force acts on the brake tester's range spring when no weight is applied. If there are excessive deviations, the adjustment must be performed again.
- 10 Repeat the process for the right-hand side.

#### 6.1.4 Importing a File

Application case: Defective IFM must be replaced.

Prerequisite: all settings and parameters of the test stand have been saved beforehand:

- Settings/General: "Backup settings" => file is saved under local downloads. This file also contains the adjustment values. Filename: MAHA\_C\_MBT\_Configuration\_S/N\_yyy-mm-dd-hhmm
- After installation of the new IFM, the previously saved file can be selected as an alternative to the adjustment. The adjustment values are read from the file and accepted (stored in the IFM)

#### Info:

A complete adjustment is preferable (component tolerances etc. on PCB).

#### 6.1.5 Adjusting Brake Forces with MJV II

See quick reference guide BA020001\_003, available for download on the MAHA homepage www.maha.de.

#### 6.2 Adjusting the Weighing Device

Open "System settings" and select "Brake tester/calibrate scale". Complete the registration via the link. The following screen opens:

remsprüfs	stand					
instellungen	Optionen	Justage Bremskraft	Justage Waage	Diagnose	Ein-/Ausgangstest	
Digit	• •	.0	Digit	Digit		9 Digit
		k	g I	E.	kg	
Digit	a 0	0	Digit	Digit		¢ Digit
lullpunkt	Links 🙂				Rechts 3	Lat.
Abgleichen		0 kg	- Digit	Abgleichen	0 kg	- Digit
ustierung	j Links			Justierun	g Rechts	
Justieven		kg	- Digit	Justieren	kg	- Digit
Datei importieren						Auswählen

### 6.2.1 Adjusting the Zero Point

Perform a zero adjustment of the weighing device when the test stand is not in motion: press the "Match" button on the respective page.

#### 6.2.2 Adjusting the Weighing Device

- 1 Determine the axle weight/wheel weight of a vehicle by means of a calibrated wheel load scale.
- 2 Driving the test stand with the vehicle.
- 3 Enter values left and right according to the wheel load scale (= comparison procedure).
- 4 Save with "Adjust.

#### 6.2.3 Importing a File

Application case: Defective IFM must be replaced.

Prerequisite: all settings and parameters of the test stand have been saved beforehand.

 System Settings/General: "Backup settings" The file is saved under local downloads. This file also contains the adjustment values.

Filename: MAHA\_C\_MBT\_Configuration\_S/N\_yyy-mm-dd-hhmm

• After installation of the new IFM, the previously saved file can be selected as an alternative to the adjustment. The adjustment values are read from the file and accepted (stored in the IFM)

Info:

A cocomplete adjustment is preferable (component tolerances etc. on PCB).

# 6.3 Adjusting the Shock Absorber Tester

#### 6.3.1 Activate Option

As soon as the MSD option is activated under the "Shock absorber tester" tab, the "Calibrate MSD" or "Adjust MSD" sub-tab is displayed.

Shock absorber tester			Shock absorber tester				
Settings	Options	Calibrate MSD	Settings	Options	Adjust MSD		
Cali	brate MSD - v	vithout login	Ad	djust MSD - wii	th login		

#### 6.3.2 Calibrate

1 Zero point adjustment	o)	•
2 Adjust amplitude	5.35 mm	6.10 mm
3 Adjust weight	45 kg	47 kg
4 Determine spring constant	, <u>, , , , , , , , , , , , , , , , , , </u>	
5 Determine inherent damping		
6 Determine crank stroke		

During calibration, no adjustment of zero point, amplitude and weight can be carried out.

The steps for determining the spring constant, inherent damping or crank stroke can be carried out in the same way as for adjustment, the view remains the same.

Difference: The determined values cannot be saved, the "Save" button is not available.

#### 6.3.3 Adjustment

Sequence:

	•	
1	Zero point adjustment	(per side)
2	Adjust amplitude	(per side)
3	Adjust weight	(per side)
4	Determine spring constant	(per side)
5	Determine inherent damping	(per side)
6	Determine crank stroke	(if both sides are adjusted up to step 5)

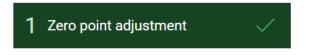
Screen layout:

- Left: sequence of an adjustment; steps are clickable, view adapts.
- Right: functional area for the corresponding adjustment step
- The current amplitude and weight values are displayed for zero point, amplitude and weight adjustment using a graphic of the floor assembly.
- The current amplitude values are displayed for determination of spring constant, inherent damping and crank stroke using text.

#### Step 1: Zero point adjustment

1 Zero point adjustment	× *	*
2 Adjust amplitude	5.35 mm	6.10 mm
3 Adjust weight	45 kg	47 kg
4 Determine spring constant	w)	
5 Determine inherent damping	Zero point adjustment	
6 Determine crank stroke	@ Perform zero balance	

- Press the "Perform zero balance" button when the test stand is idle.
- Set load cell to "0".



 If adjustment is successful, the background of the selection on the left is highlighted in green and a green tick is displayed.

#### Steps 2 + 3: Adjustment of amplitude/weight

- Steps 2 and 3 have been combined in order to utilise the generous space on the page.
- The unit of weight can optionally be changed from kilogram [kg] to newton [N]. The view adapts accordingly.
- Adjust amplitude:
  - Press the plate down by 30 mm using the spindle.
  - Check depth.
  - Enter 30 mm and adjust the amplitude.
  - Turn the spindle back again.
  - Put the load cell slightly under tension, press the plate down approx.
     1 mm.
- Adjust weight:
  - Load the plate with 400 kg or 4000 N using the spindle.
  - Enter 400 kg or 4000 N and adjust the weight.
  - Turn the spindle back again.

# Put the load cell slightly under tension, press the plate down approx. 1 mm.

Shock absorber tester

1 Zero point adjustment	5.05		6.40
2 Adjust amplitude	5.35 mm		6.10 mm
3 Adjust weight	45 kg		47 kg
4 Determine spring constant	*		¢
5 Determine inherent damping	Amplitude		
6 Determine crank stroke	Left	Right	
	^∪ Adjust amplitude	mm /v Adjust ampl	tude

- The buttons for adjustment become active as soon as the value entered is within a predefined range:
  - Amplitude: 5...50 mm in increments of 1
  - Weight: 30...1500 kg or 300...15 000 N in increments of 1

Left			Right		
∕v Adjust amplitude	5	mm	∕ ∧ Adjust amplitude	40 0	mm
				Please enter a value between 5 and 50.	
着 Adjust weight	10: 0	kg ~	👗 Adjust weight		kg ~
	Please enter a value between 30 and 1	500.			

• If amplitude or weight values are outside the tolerance range, an error message appears.

#### Step 4: Determine spring constant

Zero point adjustment	Spring c	onstant		A	mplitude	2	5.35 mm	6.10 mm	
2 Adjust amplitude	1	2	3	4	5	6	Mean value previous	Mean value new	
3 Adjust weight	200 N	2000 N	4000 N	6000 N	8000 N	10000 N	,		
Determine spring constant	Right						42	-	
Determine inherent damping							42	-	
6 Determine crank stroke				<د			R>		
	None transmission of the second secon	1000W 2000 adjustment		4000N	500CN	6009N	7000N 8000N	9000N 10	00001

- Procedure in brief:
  - $\circ~$  Use the spindle to approach the individual measuring points (200 N, 2000 N, 4000 N, ...).
  - Enter the corresponding value of the load cell in the corresponding field in the left-hand table and accept (Enter, Tab key).
  - The new mean value the spring constant is determined automatically.
  - Save the determined value.
- Entries can be accepted by pressing the Enter/Tab key.

Confirm input	×
Should the value <b>200 N (left)</b> also be used for the <b>2nd calibration point</b> ?	
✓ Continue	ancel

• If an input deviates ± 20% from the target value, it must be confirmed.

Zero point adjustment	Spri	ng con	stant		A	mplitude		5.35 mm	6.10 m	
Adjust amplitude	_	1	2	3	4	5	6	Mean value previous	Mean valu	æ
Adjust weight		200 N	2000 N	4000 N	6000 N	8000 N	10000 N	previous		
Determine spring constant	Right	200	2000	4000	6000	8000	10000	42	33917	$\otimes$
Determine inherent damping								42	-	
5 Determine crank stroke					<1.			R⇒		
	N energy managements									
	0 04 -12 61	100		30004	4000N	SOON	60001	วออัอง สออ่อง	9000N	10000N
	Exte	nded ad	justment o	data						+

Mean value outside the tolerance - with graph

- The newly determined mean value is evaluated by defined limits and marked with a red cross if it is not within the tolerance range.
  - Lower limit: 340 000
  - Upper limit: 360 000

Zero point adjustment     Adjust amplitude     Adjust weight	N most remain 10 argument						
4 Determine spring constant	-12 ON	1000N 2000N	3000N	4000N 5000N	6000N	7000N 8000N	9000N 10000N
5 Determine inherent damping	Extended a	idjustment d	ata				_
6 Determine crank stroke	Left Right	,					
	Calibration point	Target force [N]	Actual force [N]	Amplitude absolute [mm]	Force delta [N]	Amplitude delta [mm]	Spring constant [N/m]
	point	[N]		[mm]	[N]	[mm]	[N/m]
	point 1	[N] 200		[mm] -	[N] 	[mm] 	[N/m] 
	point 1 2	[N] 200 2000		[mm] 		[mm] 	[N/m]  
	point 1 2 3	[N] 200 2000 4000		[mm] - - -	[N]  	[mm]  	[N/m] - - -

 Further measurement values are listed in the "Extended adjustment data" table.

Save value	×
Should the value 40714 (left) also be used for the spring constant?	
The tolerance range for the <b>spring constant</b> is between <b>340000</b> and <b>360000</b> .	
✓ Continue × Cance	

• If the spring constant has been determined for one side and is outside the tolerance range, the saving must be confirmed.

• As soon as the spring constant has been determined for both sides, the selection on the left is highlighted in green and a tick is displayed.

1 Zero point adjustment	Inherent damping		Amplitude:	•	5.35 mm	6.10 mm	
2 Adjust amplitude		Left	Right				
3 Adjust weight	Inherent damping previous [Ns/m]	42	42				
4	Inherent damping new [Ns/m]	-	-				
4 Determine spring constant	Frequency [Hz]	-	-				
5 Determine inherent damping		_	_		81		
6 Determine crank stroke	41		<l.< td=""><td></td><td>× -</td><td></td><td></td></l.<>		× -		
	30						
	20						
	<u>F</u> 10						
	di unitari						
	30						
	-30						
	-40		nós.		154	20	i.
	Start man. Left     Start man.	Right				E Sa	ve va

#### Step 5: Determine inherent damping

- Procedure in brief:
  - Press the plate down until the mechanical holding plunger engages.
  - Loosen the spindle and remove the load cell.
  - Start measurement for the respective side.
  - Release the locking mechanism by tapping the release button and allow the plate to swing out.
  - Save the determined value.
- If the natural frequency is outside the tolerance:
  - Remove the centre plates.
  - $\circ~$  Adjust to the setpoint 7.00  $\pm 0.05$  Hz by removing/adding shims; 1 shim corresponds to a frequency change of 0.03...0.04 Hz.

2 Adjust amplitude 3 Adjust weight	Inherent damping previous [Ns/m]	Left 42	Right			
3 Adjust weight	Inherent damping previous [Ns/m]	40				
The second se		42	42			
4 Determine spring constant 🗸	Inherent damping new [Ns/m] Frequency [Hz]	**	~			
5 Determine inherent damping						
6 Determine crank stroke	45 38 39 30 30 30 4 30 4 30 4 30 4 30 4 30 4			 R+		
	© Start man. Left © Start man.	9	TÜs	155	🛱 Save	205

Inherent damping outside the tolerance; with graph

- In order to be able to measure the inherent damping for the respective side, the spring constant for the corresponding side must have been determined in advance.
- Click on the "Start man. Left" or "Start man. Right" button starts the measurement.
- The determined inherent damping/natural frequency is evaluated by defined limits and marked with a red cross if it is not within the respective tolerance range:
  - Inherent damping: 10...200 Ns/m
  - Frequency: 6.95...7.05 Hz

Save value	×
Should the value <b>205 Ns/mm (left)</b> be adopted for the <b>inherent damping</b> ?	
The tolerance range for the <b>inherent damping</b> is between <b>10 Ns/mm</b> and <b>200 Ns/mm</b> .	
✓ Continue × Abor	t

- If a value is outside the tolerance range, the saving of the value must be confirmed.
- As soon as the inherent damping has been determined for both sides, the selection on the left is highlighted in green and a tick is displayed.

#### Step 6: Determine crank stroke

1 Zero point adjustment	Crank stroke		Amplitude:	•	5.35 mm	6.10 mm	
2 Adjust amplitude		Left	Right				
3 Adjust weight	Crank stroke previous [mm]	0.42	0.42				
4 Determine spring constant	Crank stroke new [mm]						
5 Determine inherent damping	e.		<l< th=""><th></th><th>R &gt;</th><th></th><th></th></l<>		R >		
6 Determine crank stroke	20 20 20 20 20 20 20 20 20 20	51	58		156	20	
	Measure crank stroke					🖸 Sav	e value

- Procedure in brief:
  - Start crank stroke measurement.
  - Save the determined value.
  - After automatic zero point adjustment, fit the cover plates.
  - Carry out a functional test; e.g. stand on plates, check body weight.

Start crank stroke measurement	×
① The motors switch on automatically for a few seconds.	
✓ Continue	× Abort

• Click on the "Measure crank stroke" button to open a window. The user must confirm the start of the measurement, as this automatically switches on the motors of the shock absorber tester.

1 Zero point adjustment	Crank stroke		Amplitude:		5.35 mm	6.10 mm	
2 Adjust amplitude		Left	Right				
3 Adjust weight	Crank stroke previous [mm]	0.42	0.42				
4 Determine spring constant	Crank stroke new [mm]						
5 Determine inherent damping	*		<.		R>		
6 Determine crank stroke	20 1041 der globar 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 1			WWW	·····		
	40 90	50	104		194	20	
	Measure crank stroke					🖺 Save	e value

Crank stroke outside the tolerance; with graph

- The determined crank stroke values are evaluated by defined limits and marked with a red cross if they are not within the respective tolerance range:
  - o Lower limit: −3.3 mm
  - Upper limit: 2.8 mm
- The newly calculated crank stroke can be saved using the "Save value" button.
- The button becomes active as soon as a calculated crank stroke is available.

Save crank stroke	×
① The zero point is then adjusted.	
✓ Continue	× Cancel

Confirmation window for saving the crank stroke - within the tolerance

 If values are within the tolerance range, a window for saving is displayed – with a note on automatic zero point adjustment.

Save crank stroke	×
Should the values <b>3.5 mm (left)</b> and <b>2.61 mm (right)</b> be adopted for the <b>crank stroke</b> ?	
The tolerance range for the crank stroke is between -3.30 mm and 2.80 mm.	
① The zero point is then adjusted.	
✓ Continue × Cance	el

Confirmation window for saving the crank stroke - outside the tolerance

- If one of the crank stroke values is outside the tolerance range, the user is specifically asked whether these values should be saved.
- In addition, information is displayed with the specified tolerance range for the crank stroke and for an automatic zero point adjustment.
- As soon as the crank stroke has been determined, the selection on the left is highlighted in green and a tick is displayed.

# 7 Operation

# 7.1 Safety Instructions



# WARNING

- Observe the statutory accident prevention regulations.
- Before the vehicle inspection, remove any foreign particles stuck in the tyre tread.
- Drive the vehicle on/off/over the test stand with the vehicle slowly (walking speed) and centrally.
- The driver must hold an appropriate driving licence for the vehicle to be tested and must not be under the influence of alcohol, drugs or medication that impairs driving ability.
- Perform regular visual inspections for damage in lines, hoses, actuators and sensors. If there are any defects or damage, the test stand must not be operated.
- Replace hydraulic hoses which are installed depending on the option (e.g. roller set lift) according to the specifications of DIN 20066 (or according to the locally applicable regulations, directives and standards) and carry out an assessment of the functional capability at regular intervals.
- The system must only be operated within its performance limits.
- The system must only be operated by instructed staff (qualified persons).
- When the system is not being used, it must be switched off and the main switch must be secured with a padlock to prevent it from being switched back on.
- In emergency situations, switch off the system with the emergency stop main switch or emergency stop pushbutton.
- Rotating or moving parts (e.g. test stand rollers) are dangerous.
- When vehicle engines are running in enclosed spaces, there is a risk of poisoning. The operator must ensure that there is sufficient air exchange.
- Unnecessary stress to the vehicle and test stand must be avoided.
- Once the vehicle is positioned in the roller set with the driven axle, the roller set must only be exited with the roller drive running. To protect the drive motors, an automatic test roller engagement takes place in the event of impermissible acceleration of the axle. In conjunction with an exit aid (electromechanical motor brake or DC brake), it is also possible to drive out of the test stand when the test rollers are stationary.
- Never externally start a vehicle with the system or apply regenerative braking. This may cause damage to the test stand.
- Vehicle doors shall be closed during the test.
- The operator must not leave the vehicle during the inspection.
- Vehicles must never be parked in/on the roller set or on the optional ramps.

Parking in the security area is not allowed.

• The accessibility of the emergency stop switch and emergency stop pushbutton must be ensured.

# 7.2 Safety Devices



# WARNING

The safety devices (some of them optional) must be inspected regularly by an authorised service technician. Statutory requirements must be observed. *The test stand must not be operated with defective safety devices!* 

#### • Lockable main switch

Used for ordinary switching on and off of the system and as emergency stop switch. The switch can be secured with a padlock to prevent unauthorised activation.

#### • Emergency stop pushbutton

Used for rapid switch-off during operation. It interrupts the movement. (Does not apply in the case of MSD axle damping tester!)

#### • Indicator light "Control ON"

The indicator light warns of a test stand that is ready to start. An independent start-up of the test rollers is also possible without an active display (e.g. TV set, monitor, smart device).

#### • Start-up monitoring

The start-up monitoring prevents the rollers from starting up if the wheels are locked up (bearing jammed, brake pads stuck). This device protects the vehicle/the vehicle's tyres from damage.

#### • Sensing rollers

The magnitude of the slip is determined from the comparison of the drive speed with the sensing roller speed. To start the test stand, both sensing rollers must be pressed within two seconds.

#### Visual and acoustic warning devices

The visual and acoustic warning devices must be installed in a suitable position and must be clearly perceptible at all times. In the event of warning device failure, the test stand must be taken out of service until the device is fully functional once again.

#### • Pit safety system

The pit safety system serves to protect a person located in the working pit (in the test roller area) from unexpected start-up of the test rollers. National regulations for contactless protective devices must be observed by the operator.

#### • Yellow and black marker tape

The yellow and black marker tape around the roller set and pit serves to cordon off the test stand and must be replaced if defective. Item no. 19 6014 (38 mm) / 19 6015 (50 mm).

#### • Warning and information signs

Warning and information signs are affixed to the test stand. They must not be changed or removed. Defective warning and information signs must be replaced (for item no., see below).



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## 7.3 Preparations

#### 7.3.1 Switching on the Test stand

Set main switch -Q1 to position "I".

#### 7.3.2 Variant 1: Establishing a Network Cable Connection

- Connect a PC or notebook (NB) to the central module (ZM) via network cable (Ethernet port X13 "MAHA").
- Alternatively, a WiFi access point can be connected to this Ethernet port X13, which usually offers four network interfaces. Then a PC/NB is connected to one of these interfaces. Other terminal devices can be connected to the other interfaces (e.g. analogue display or C\_BOX when using a TV monitor as a simultaneous display).
- Switch on PC/NB, log in after booting, open browser.
- Call the start page in the browser via the address: http://maha-mbt(.maha) (or http://192.168.201.1).
- Once the connection is established, the measurement screen is displayed (depending on the configuration for cars or trucks, see section "Description of the Software User Interface").

#### Info:

Alternatively, free QR code generators can be found on the Internet, which can be used to generate a personal QR code for the CONNECT brake tester.

If this is photographed (e.g. on iOS devices) or scanned with a QR code scanner app, the standard browser is automatically opened and the Internet address entered.



#### 7.3.3 Variant 2: Establishing a WiFi Connection

If the test stand is to be controlled wirelessly, a WiFi router (e.g. TP-Link) can optionally be connected to the ZM (Ethernet X13 MAHA). This creates a separate WiFi for the brake tester and enables networking with corresponding accessories (e.g. analogue display, C\_BOX). This makes it possible to use browser-capable smart devices (SmartPhone, tablet PC) in addition to the PC/NB to operate the brake tester and display the measured values.

#### Windows PC

Info:

On the underside of the router, there is a label that indicates the name next to "SSID" and the wireless password next to "PIN". The router must be configured as an access point according to MAHA specifications (see section "Accessories > Configuration of WiFi Router).

- Connect WiFi router "TP-Link" with power supply and switch on.
- In the Network and Sharing Center, select WiFi router SSID "TP\_LINK\_xxxx" and establish a connection.
- Enter the wireless password "PIN".



#### Mobile devices (Android or iOS)

#### Info:

On the bottom of the optionally available WiFi router there is a label on which the name is printed next to "SSID" and the wireless password next to "PIN".

- Connect WiFi router "TP-Link" with power supply and switch on.
- On the mobile device, open the WiFi menu under "Settings".

The device will now search for available WiFi devices.

- Select TP\_LINK\_xxxx.
- Enter password.

If no WiFi device is found, the connection must be set up manually using the SSID and the PIN.

#### Info:

Alternatively, free QR code generators can be found on the Internet, which can be used to generate a personal QR code for the CONNECT brake tester.

If this is photographed (e.g. on iOS devices) or scanned with a QR code scanner app, the WiFi menu is automatically opened and the SSID entered (barcode shown is an example only).



#### 7.3.4 Variant 3: Integration of the Test stand into Company Network

Alternatively, the ZM of the test stand can also be integrated into a company network. For this purpose, the Ethernet port X12 "EXT" can be configured analogue to a LAN interface of a PC, see section "General/Network":

This means that the brake tester can be reached within the network by connecting a computer via network cable to a usual network socket of this network. If this network also offers WiFi access, it is possible for the test stand to be operated directly via WiFi-capable terminals:

- Turn on computer/mobile device, log in after booting, open browser.
- Establish the browser connection as described above.

#### ATTENTION:

As soon as the test stand is available in the company network, it is visible and also accessible for all other network participants!

#### 7.4 Test Procedure

#### 7.4.1 Drive on Test stand

#### NOTICE

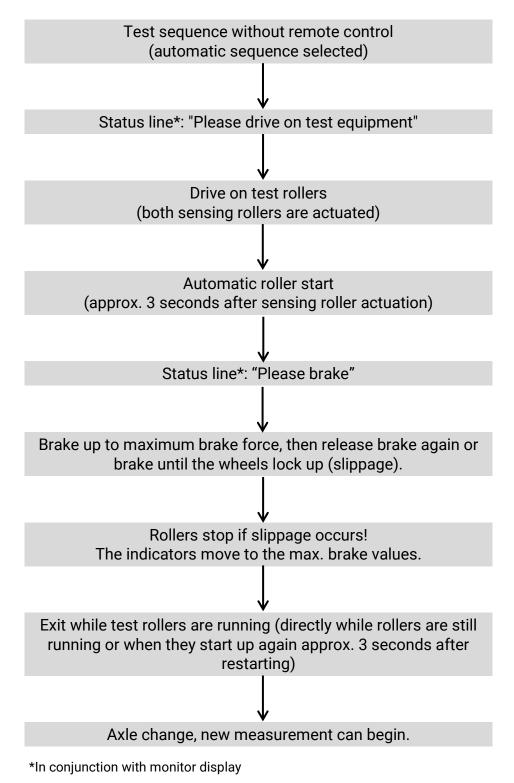
Drive slowly (walking speed), centrally and straight on the test stand. The left and right sensing rollers must be actuated simultaneously.

Position vehicles straight on roller set, for front wheel drive vehicles keep steering in straight ahead position during test.

### 7.4.2 Carry out Brake Test with Automatic Sequence

#### Info:

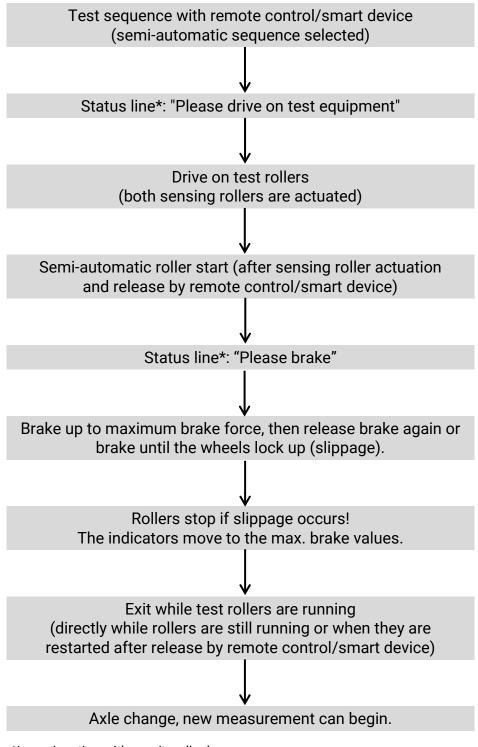
A computer with monitor, a TV or a SmartDevice is required for operation.



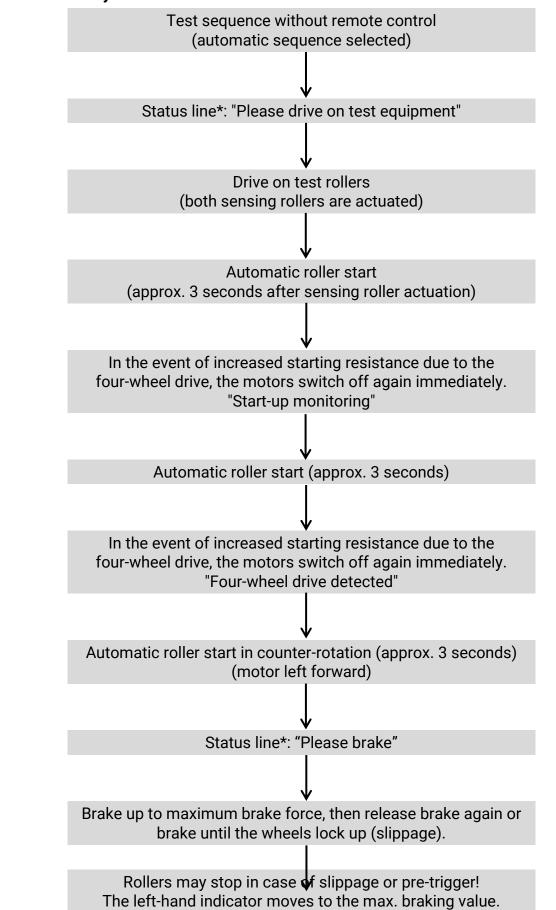
#### 7.4.3 Carry out Brake Test with Semi-Automatic Sequence

#### Info:

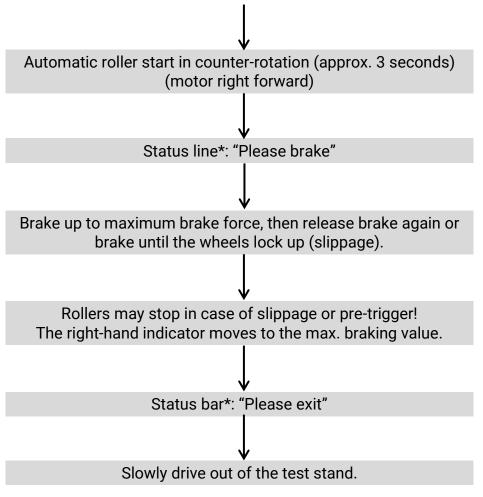
A computer with monitor, a TV or a SmartDevice is required for operation.



\*In conjunction with monitor display

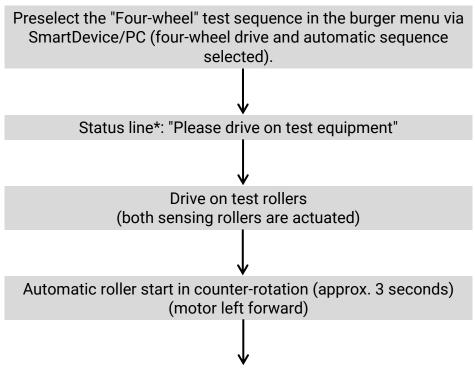


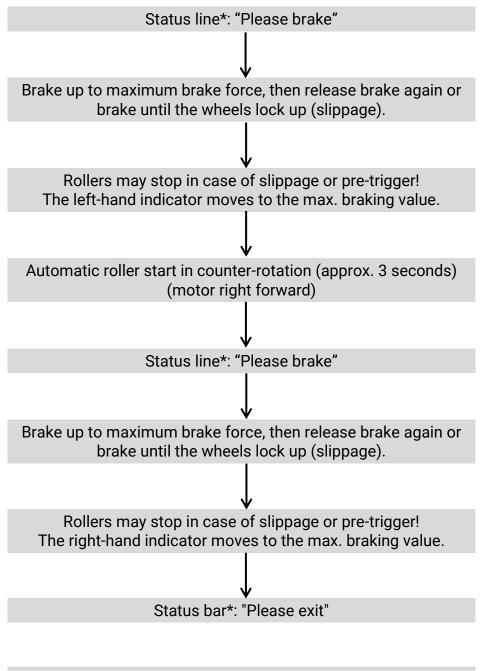
#### 7.4.4 Carry out 4WD Brake Test with SmartDevice/PC in Automatic Mode



<sup>\*</sup>In conjunction with monitor display

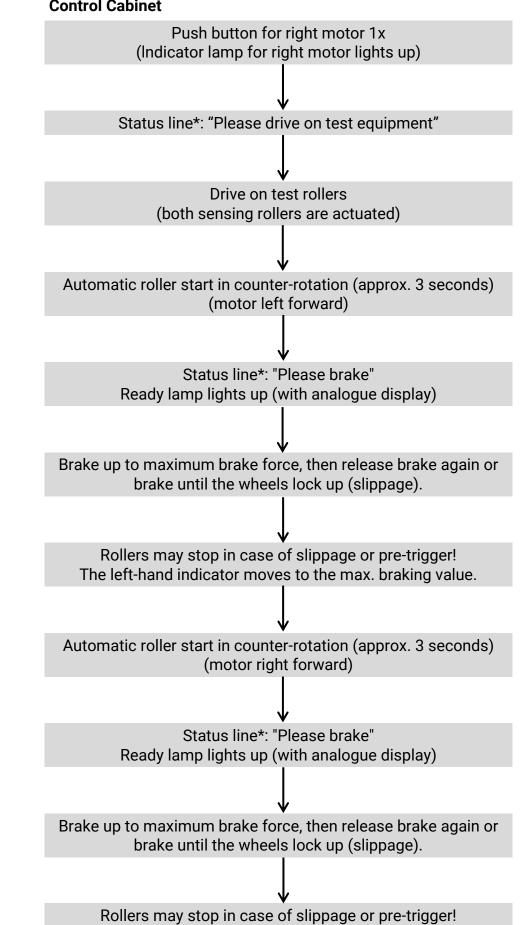
#### 7.4.5 Carry out Manual 4WD Brake Test with SmartDevice/PC in Counter-Rotation Mode



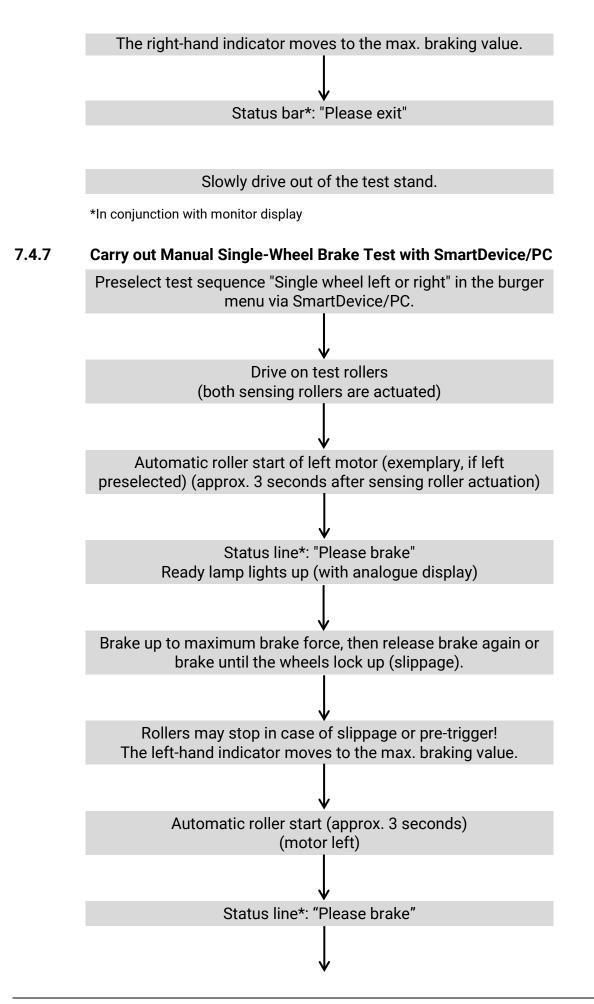


Slowly drive out of the test stand.

\*In conjunction with monitor display



7.4.6 Carry out 4WD Brake Test in Counter-Rotation Mode with Pushbutton on Control Cabinet



Brake up to the maximum braking force, then release the brake again or brake until the wheel locks (slippage).

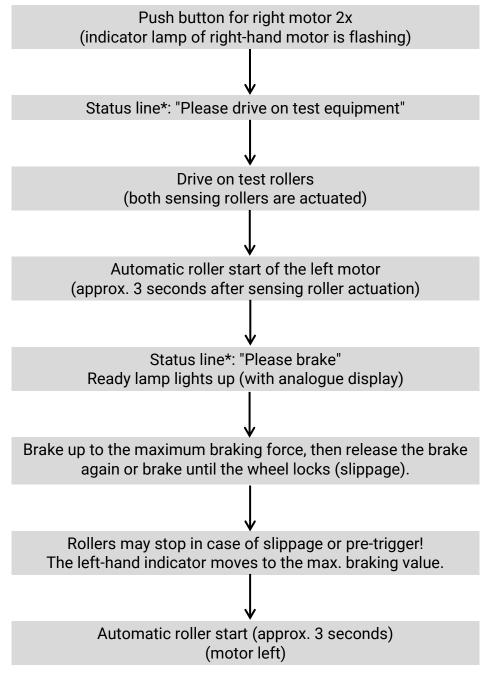
Rollers may stop in case of slippage or pre-trigger! The right-hand indicator moves to the max. braking value.

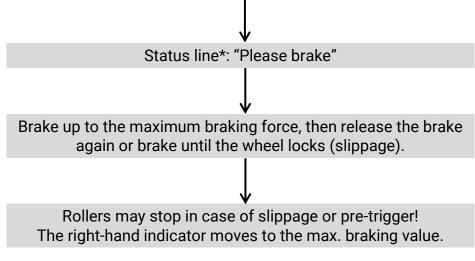
\*In conjunction with monitor display

Info:

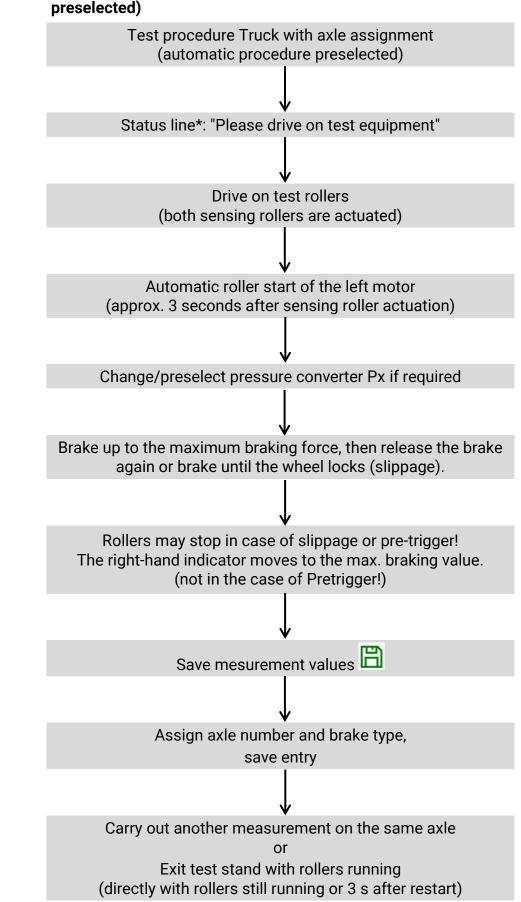
A change of the wheel side left/right is possible by means of SmartDevice/PC when the test stand is in use.

#### 7.4.8 Carry out Single-Wheel Brake Test with Pushbutton on Control Cabinet

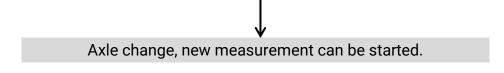




\*In conjunction with monitor display



7.4.9 Test Procedure Truck with Axle Assignment (Automatic Procedure preselected)



#### 7.4.10 Drive off Test stand

Depending on the equipment, the following must be observed when leaving the test stand:

#### NOTICE

Do not drive the vehicle out of the test stand with the rollers stationary. Exception: Static extension aid is available.

#### a Dynamic exit aid with automatic start

Wait until rollers have been automatically restarted. Then drive the vehicle out of the test stand.

#### b Dynamic exit aid with semi-automatic system

Start rollers by releasing the semi-automatic. Then drive the vehicle out of the test stand.

#### c Dynamic exit aid with start via RECO remote control

Start rollers via RECO remote control. Then drive the vehicle out of the test stand.

#### d Static exit aid (DC brake or electromechanical motor brake)

Vehicle may be driven out of the test stand even with the rollers stationary.

#### NOTICE

In case of malfunction or failure of the motor brake or the automatic / semiautomatic roller start, it is possible to activate the exit aid with the drive axle of the vehicle:

- Slowly accelerate the vehicle in the test stand in the forward direction of travel.
- At approx. 3 km/h the rollers are switched on automatically by the test stand and the vehicle can be driven out of the test stand by moderate further acceleration.

**Attention:** The test stand starts automatically! Excessive acceleration can cause damage to the test stand.

# 7.5 Deceleration Table

Axle	Axle	brake	e forc	e in kl	N											
load in kg	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
200	50	100														
300	33	67	100													
400	25	50	75	100												
500	20	40	60	80	100											
600	17	33	50	67	83	100										
700	14	29	43	57	71	86	100									
800	13	25	38	50	63	75	88	100								
900	11	22	33	44	56	67	78	89	100							
1000	10	20	30	40	50	60	70	80	90	100						
1100	9	18	27	36	45	55	64	73	82	91	100					
1200	8	17	25	33	42	50	58	67	75	83	92	100				
1300	8	15	23	31	38	46	54	62	69	77	85	92	100			
1400	7	14	21	29	36	43	50	57	64	71	79	86	93	100		
1500	7	13	20	27	33	40	47	53	60	67	73	80	87	93	100	
1600	6	13	19	25	31	38	44	50	56	63	69	75	81	88	94	100

Deceleration in %

# 8 Inspection and Maintenance

# 8.1 Safety Instructions



# WARNING

- The control cabinet must be positioned in such a way that the emergency stop main switch or the emergency stop pushbutton (optional) is located in the immediate vicinity of the test stand at a height of 0.6...1.7 m above the stand level and can be assigned to the correct test stand in the case of test halls with several systems. This is necessary in order to fulfil the emergency stop function according to DIN EN ISO 13850. The "Control On" status light shall be fully visible from the test site.
- Electrical work must only be performed by a specialist electrician in compliance with the national regulations, directives and standards. Accordingly, an electrical test/measurement must also be carried out and recorded.
- All parts of the electrical equipment must be protected from moisture and humidity.
- Even when the main switch is switched off, parts of the optional control cabinet heater (components, terminals, cores, cables, etc.) are still live.
- During service work, the system must be depressurised and de-energised.
- For all work in the roller set, it must be ensured that the main switch is switched off and secured against being switched back on and, where applicable, that the motor circuit breakers are switched off.
- For work in the control cabinet or on the roller sets, be aware of the (optional) heater or hot parts.
- Due to the coordination used in accordance with IEC 60947, the switching elements (contactors) in the associated circuit must be replaced after a short-circuit/ housing short-circuit, and also if the B10d value of 1,300,000 switching cycles in accordance with DIN EN ISO 13849-1/-2 is exceeded. Before connecting the supply cable, it must be ensured that it is deenergised and, among other things, that the 5 safety rules are observed.
- Safety goggles must be worn when working on hydraulic/pneumatic components.
- Test and measure the protective conductor connection and insulation as part of the overall commissioning.
- Do not start a vehicle with the system.
- Before the vehicle inspection, remove any foreign bodies stuck in the tyre tread.

## 8.2 Care Instructions

- The machine should be cleaned at regular intervals and treated with a machine care product.
- Any damage to the paintwork should be repaired immediately to prevent corrosion.
- To prevent damage, cleaning work must not be carried out with harsh cleaners or with high and steam pressure equipment.

#### Info:

Regular care is the most important requisite for the unit's functional efficiency and long service life!

### 8.3 Inspection and Maintenance Schedule

#### Daily before operating

• Check the function of the sensing roller spring before switching on.

#### Weekly

- Visual inspection of the entire test stand for damage.
- Check the test stand for changes in running noise and vibrations.

#### Monthly

- Clean, retighten and lubricate chains.
- Lubricate sensing roller hinges.

#### Annually

- The maintenance interval prescribed by the manufacturer is **12 (twelve) months**. This maintenance interval refers to normal workshop use. If the device/system is used more frequently or under more difficult operating conditions (e.g. in outdoor areas), the interval must be shortened accordingly.
- Failure to do so will void the manufacturer's warranty.

### 8.4 Maintenance of the Chains

Remove the cover plates from the roller set on the chains and refit them before commissioning.

#### 8.4.1 Cleaning the Chains

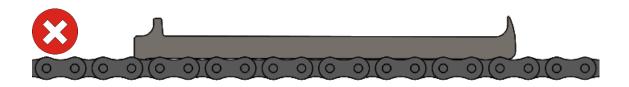
The cleaning of the chains can usually be done with rags or brushes. Stubborn dirt can be dissolved with suitable cleaning agents, never use stains or acids. Immediately after using grease-dissolving media, apply a new, suitable corrosion protection (see section "Lubricating chains").

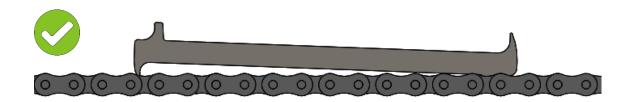
#### 8.4.2 Checking for Chain Wear

Wear check by means of a chain wear gauge 2 % (MAHA order no. 1400079).

- The chain wear gauge is suitable for all chains of the MAHA test standes. It can be used for type 12B 3/4" and type 16B 1" chains.
- If the chain wear gauge dips completely, as can be seen below, it is imperative that the chain is replaced, as otherwise consequential damage can occur, e.g. to the sprockets.

Chain pitch	CONNECT SERIES	MBT SERIES
	C_MBT C/S 1.0 Wxxx	MBT 1000
	C_MBT C/S 3.5/4.0/5.0 Wxxx	MBT 2000
12B 3/4 "	C_MBT C 8.0 W280	MBT 3000
	C_MBT C 13.0 W280	
	C_MBT M 18.0 W301	MBT 5000
	C_MBT S 13.0/15.0 R100 MU	MBT 4000
16B 1"	C_MBT T 18.0 W360	MBT 6000
	C_MBT S 18.0/20.0 Rxxx	MBT 7000





WARNING

The main switch must be switched off and secured against being switched back on.

The chains must be correctly tensioned before the wear check, otherwise the measurement results may be incorrect.

#### 8.4.3 Retensioning the Chains / Replacing the Test Rollers

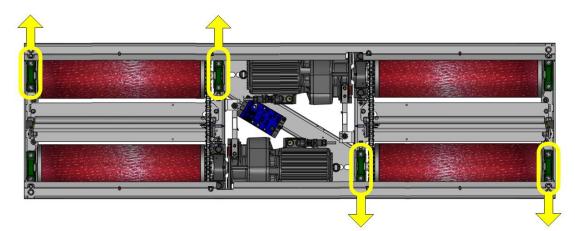
Check chain slack: It should be possible to move the chain up and down by hand by approx. 5 mm. If the chain is too lightly tensioned, proceed as follows:

- 1 Loosen the fastening screws of the pedestal bearings on both sides.
- 2 Adjust the chain to the correct tension using the adjusting screw.
- 3 Move the roller(s) in parallel, not one-sided.
- 4 Retighten the fastening screws (tightening torques: see table).

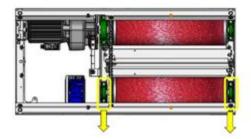
### NOTICE

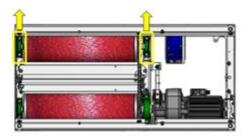
It is recommended by the manufacturer that the fastening screws be replaced each time an adjustment is made.

- 5 Use a "medium strength" threadlocker.
- 6 Recheck chain tension.

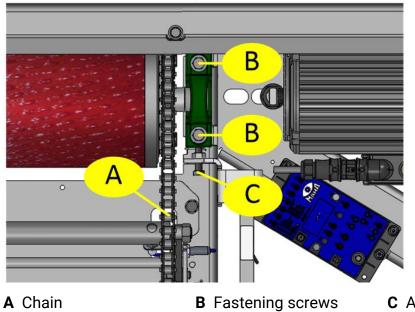


Compact roller set





Split roller set



ws **C** Adjusting screw

Tightening torques of the bearing screws



# CAUTION

Check the strength labelling on the screws before using them.

Test stand type	Thread	Strengt h	Tightenin g torque	Position	Required for chain tension
C_MBT 3.5/4.0/5.0	M10	8.8	50 Nm	Roller	Yes
	M16	8.8	120 Nm	Motor bearing	No
	M18x60	10.9	400 Nm	Roller	Yes
C_MBT 13.0	M18x100	12.9	400 Nm	Roller	Yes
	M20x70	8.8	400 Nm	Motorlager	nein

Test stand type	Thread	Strengt h	Tightenin g torque	Position
C_MBT 3.5/4.0/5.0	M8	12.9	40 Nm	Range spring
C_IMB1 3.3/4.0/3.0	M10	12.9	85 Nm	Range spring
C_MBT 13.0	M10x60	12.9	70 Nm	Range spring
	M10x40	8.8	50 Nm	Range spring arm

#### Tightening torques of the set screws

M6x0.75	SW 3	6 Nm	M10x1,25	SW 5	26 Nm
M8x1	SW 4	14 Nm	M12x1,5	SW 6	42 Nm

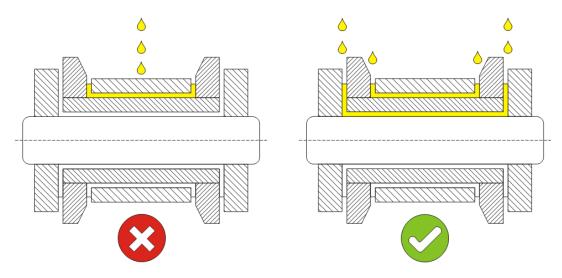
#### 8.4.4 Lubricating the Chains

#### Info:

The service life of the chain is directly dependent on the lubrication. If the lubricating film is permanently maintained, the wear of the chain can be reduced to a minimum.

Suitable lubricant: LongLub adhesive lubricant (MAHA Art. No. 35 1020)

• Lubricate the chain along its entire length, while continuing to turn the rollers by hand. **Important: The lubricant must get into the chain joint!** 



Inadequate lubrication can be recognised on the basis of the following signs:

- Increased noise
- Stiff joints
- Increased power consumption
- Fretting corrosion in the chain links

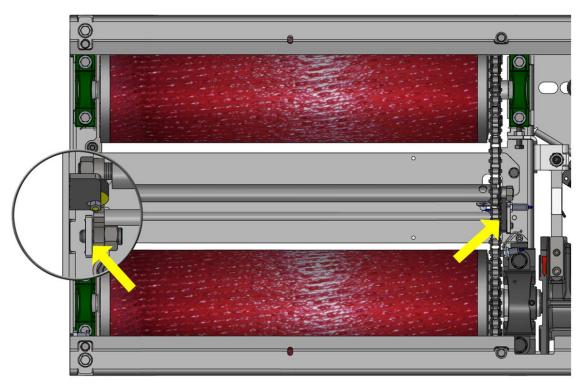
In the case of inadequate lubrication, proceed as follows: Clean the chain with a very low-viscosity oil. This will flush fretting corrosion, old lubricant and other dirt out of the joint. After the cleaning, lubricate again with a suitable lubricant.

### 8.4.5 Lubricating the Sensing Roller Hinges

#### Info:

Maintenance interval: 200 operating hours / 12 months

- 1 Remove cover plate from roller set.
- 2 Treat lubrication points (arrow) with sprayable lubricant. While doing this, move the sensing roller up and down. Carry out the procedure on both sensing rollers.
- 3 Re-mount the cover plate on the roller set.



# 9 Troubleshooting

# 9.1 Safety Instructions



# WARNING

- The control cabinet must be positioned in such a way that the emergency stop main switch or the emergency stop pushbutton (optional) is located in the immediate vicinity of the test stand at a height of 0.6...1.7 m above the stand level and can be assigned to the correct test stand in the case of test halls with several systems. This is necessary in order to fulfil the emergency stop function according to DIN EN ISO 13850. The "Control On" status light shall be fully visible from the test site.
- Electrical work must only be performed by a specialist electrician in compliance with the national regulations, directives and standards. Accordingly, an electrical test/measurement must also be carried out and recorded.
- All parts of the electrical equipment must be protected from moisture and humidity.
- Even when the main switch is switched off, parts of the optional control cabinet heater (components, terminals, cores, cables, etc.) are still live.
- During service work, the system must be depressurised and de-energised.
- For all work in the roller set, it must be ensured that the main switch is switched off and secured against being switched back on and, where applicable, that the motor circuit breakers are switched off.
- For work in the control cabinet or on the roller sets, be aware of the (optional) heater or hot parts.
- Due to the coordination used in accordance with IEC 60947, the switching elements (contactors) in the associated circuit must be replaced after a short-circuit/ housing short-circuit, and also if the B10d value of 1,300,000 switching cycles in accordance with DIN EN ISO 13849-1/-2 is exceeded. Before connecting the supply cable, it must be ensured that it is deenergised and, among other things, that the 5 safety rules are observed.
- Safety goggles must be worn when working on hydraulic/pneumatic components.

# 9.2 Error Codes

Description:

Error codes have a 5-digit notation according to the scheme "YY0XX"

- YY stands for the error code group (e.g. 32 "Speed sensor of the left sensing roller)
- 0 serves here as separator
- XX stands for the subcategory of the respective error code group (e.g. 00 for short circuit, 01 for cable break)
- Complete exemplary error code: 32001 "Cable break at the speed sensor of the left sensing roller"

Info:

- All error codes are written to a log file and can be read out if required, see section "Operation > Settings > Event logging".
- On a C\_MSA analogue display, only the error code group is indicated by the two pointers; the complete 5-digit error code must be taken from the log file.

Error code	01000			
Description	Incomplete adjustment of brake force			
Possible solution	Carry out adjustment of brake force			
Error code	02000			
Description	Incomplete adjustment of weighing device			
Possible solution	Carry out adjustment of weighing device			
Error code	03000			
Description	Incomplete adjustment of side-slip tester			
Possible solution	Carry out adjustment of side-slip tester			
Error code	10002			
Description	CAN bus error			
Possible solution	Check CAN cable between ZM X1 and IFM X1 Check CAN address at IFM			
Error code	10003			
Description	CAN bus error			
Possible solution	Check CAN cable between ZM X2 and radio receiver X4			
Error code	10005			
Description	UART error			
Possible solution	Check supply voltage at X1 Perform software update			
Error code	10006			

Description	CAN bus error			
Possible solution	Check CAN addresses at the IFM			
Error code	10007			
Description	CAN bus error			
Possible solution	Check configuration "Split roller set" in MBT options Check CAN addresses at the IFM			
Error code	10008			
Description	IFM error			
Possible solution	Check number of connected IFMs			
Error code	10009			
Description	IFM error			
Possible solution	Check CAN cable between ZM X1 and IFM X1			
Error code	10011			
Description	Adjustment error			
Possible solution	Check sensitivity values in Brake force adjustment menu			
Error code	10012			
Description	Adjustment error			
Possible solution	Check sensitivity and offset values in Brake force adjustment menu			
Error code	10013			
Description	Adjustment menu			
Possible solution	Check offset values in Brake force adjustment menu			
Error code	10016			
Description	MSD communication error X17			
Possible solution	Check RS232 connection between MSD and IFM MSD axle damping tester can be disabled in the service menu			
Error code	14000			
Description	Emergency stop pushbutton			
Possible solution	Release emergency stop pushbutton			
Error code	14003			
Description	Emergency stop			
Possible solution	Drive from test stand Perform restart of test stand			

Error code	14006			
Description	Emergency stop Test stand driven on one side			
Possible solution	Drive from test stand and drive on both sides			
Error code	14007			
Description	Emergency stop Vehicle does not match configuration			
Possible solution	Correct vehicle configuration			
Error code	14012			
Description	Emergency stop Radio remote control			
Possible solution	Release emergency stop on radio remote control			
Error code	14013			
Description	Emergency stop Incorrect IFM configuration			
Possible solution	Check number of IFMs and CAN addresses			
Error code	14027			
Description	Emergency stop Voltage supply IFM and radio receiver			
Possible solution	Check CAN connection between ZM X1 and IFM X1 Check voltage supply at radio receiver X7			
Error code	14028			
Description	Emergency stop Communication error to radio receiver			
Possible solution	Check CAN connection to radio receiver			
Error code	14035			
Description	Emergency stop Initialisation error			
Possible solution	Check connectors X4 and X5 on the IFM			
Error code	14040			
Description	Emergency stop Motor contactor query			
Possible solution	Check contactor for defects			
Error code	14050			
Description	Emergency stop Pit safety device			
Possible solution	Acknowledge pit safety			
Error code	14051			
Description	Emergency stop Overfloor protection			
Possible solution	Release overfloor protection			
Error code	14060			
Description	Emergency stop No radio remote control paired			
Possible solution	Pair radio remote control with radio receiver			

Error code	22000			
Description	Motor circuit breaker has tripped			
Possible solution	Drive from test stand Set motor protection switch to "ON"			
Error code	32000			
Description	Speed sensor left sensing roller X9			
Details	Short circuit			
Error code	32001			
Description	Speed sensor left sensing roller X9			
Details	Cable break			
Error code	34000			
Description	Speed sensor right sensing roller X10			
Details	Short circuit			
Error code	34001			
Description	Speed sensor right sensing roller X10			
Details	Cable break			
Error code	35000			
Description	Speed sensor left test roller X11			
Details	Short circuit			
Error code	35001			
Description	Speed sensor left test roller X11			
Details	Cable break			
Error code	35002			
Description	Speed sensor left test roller X11			
Possible solution	Check sensor distance to sprocket (approx. 2 mm)			
Error code	37000			
Description	Speed sensor right test roller X12			
Details	Short circuit			
Error code	37001			
Description	Speed sensor right test roller X12			
Details	Cable break			
Error code	37002			
Description	Speed sensor right test roller X12			
Possible solution	Check sensor distance to sprocket (approx. 2 mm)			

Error code	40000			
Description	Zero point error Brake force			
Possible solution	Restart test stand Check range spring clearance Check connectors X7 and X8 on IFM			
Error code	40001			
Description	Zero drift brake force left > 5 daN			
Possible solution	Check strain gauge play			
Error code	40002			
Description	Zero drift brake force right > 5 daN			
Possible solution	Check strain gauge play			
Error code	40003			
Description	Zero drift brake force between left and right > 5 daN			
Possible solution	Check strain gauge play			
Error code	40004			
Description	Deviation from adjusted zero point left too large			
Possible solution	Check strain gauge play Contact service			
Error code	40005			
Description	Deviation from adjusted zero point left too large			
Possible solution	Check strain gauge play Contact service			
Error code	40006			
Description	Zero point drift left not normal: Brake tester locked			
Possible solution	Check strain gauge play Turn off main switch and back on again Contact service			
Error code	40007			
Description	Zero point drift right not normal: Brake tester locked			
Possible solution	Check strain gauge play Turn off main switch and back on again Contact service			
Error code	41000			
Description	Drive-on sensor left X4			
Details	Short circuit			

Error code	41001			
Description	Drive-on sensor left X4			
Details	Cable break			
Error code	41002			
Description	One-side drive-on detected on the left			
Possible solution	Drive on test stand on both sides Check sensor distance of sensor X4			
Error code	42000			
Description	Drive-on sensor right X5			
Details	Short circuit			
Error code	42001			
Description	Drive-on sensor right X5			
Details	Cable break			
Error code	42002			
Description	One-side drive-on detected on the right			
Possible solution	Drive on test stand on both sides Check sensor distance from sensor X5			
Error code	50000			
Description	Zero point error Weighing device			
Possible solution	Unload the weighing device Perform restart of test stand			
Error code	50001			
Description	Zero point error Weighing device left			
Possible solution	Unload the weighing device Perform restart of test stand			
Error code	50002			
Description	Zero point error weighing device right			
Possible solution	Unload the weighing device Perform restart of test stand			
Error code	50003			
Description	Zero drift scale left > 10 daN			
Possible solution	Unload the weighing device			
Error code	50004			
Description	Zero drift scale right > 10 daN			

Possible solution	Unload the weighing device			
Error code	50005			
Description	Zero drift scale between left and right > 10 daN			
Possible solution	Unload the weighing device			
Error code	50006			
Description	Deviation from adjusted zero point left too large			
Possible solution	Unload the weighing device Contact service			
Error code	50007			
Description	Deviation from adjusted zero point right too large			
Possible solution	Unload the weighing device Contact service			
Error code	50008			
Description	Zero point drift left not normal: Brake tester locked			
Possible solution	Dessible solution Unload the weighing device Turn off main switch and back on again Contact service			
Error code	50009			
Description	Zero point drift right not normal: Brake tester locked			
Possible solution	Unload the weighing device Turn off main switch and back on again Contact service			
Error code	51000			
Description	Vehicle on test stand when switching on			
Possible solution	Drive from test stand (exit aid is enabled 1x)			
Error code	60000			
Description	Different firmware			
Possible solution	Update firmware of ZM safety controller (update cable required) Update firmware of IFM safety controller (update cable required) Restart the entire system			
Error code	61000			
Description	Different firmware			
Possible solution	Update firmware of radio receiver Restart the entire system			

Description	Zero point error Side-slip tester			
Possible solution	Test plate must not be driven on Perform restart of test stand			
Error code	71000			
Description	Collision sensor Side-slip tester X19			
Details	Short circuit			
Error code	71001			
Description	Collision sensor Side-slip tester X19			
Details	Cable break			
Error code	72000			
Description	Drive-off sensor Side-slip tester X20			
Details	Short circuit			
Error code	72001			
Description	Drive-off sensor Side-slip tester X20			
Details	Cable break			

# 10 Repairs

# 10.1 Safety Instructions

See section "Installation > Safety Instructions".

# 10.2 Configuring the Control Unit

In the spare parts case, the central module is not configured. Configuration is carried out during initial commissioning as described below.

The following is required for replacing the control unit of the central module:

- SN of the test stand
- Replacement control (ZM)
- Software key (technician key/token)
- Software image

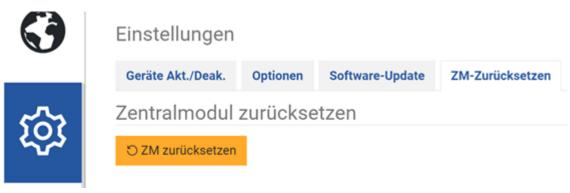
#### NOTICE

The technician key must not be older than the software image! It is recommended to always download key and software at the same time. Both can be downloaded from

https://www.maha.de/de/software CONNECT DOWNLOADS.

The following steps must be observed when replacing the control unit:

- 1 If the central module to be replaced is still responsive, save the test stand settings: Settings/General: "Backup settings" The file is saved in the local download folder and contains all set parameters and settings. Filename: MAHA\_C\_MBT\_Configuration\_S/N\_yyy-mm-dd-hhmm
- 2 If necessary, reset the old central module to the "delivery status" By resetting to the delivery status, all error entries and the event recording are deleted together with the software installed in the central module. To do this, register as a fitter!



#### Info:

If the central module has never been installed, a reset is not necessary and also not possible.

3 Replace the central module with the main switch turned off.

After replacing the central module, switch the system on again.
 If necessary, reconnect to the test stand ("maha-mbt" or via LAN cable with IP address 192.168.201.1) and log in as a fitter.
 Logging into the fitter menu (see section "Operation > Settings > Login fitter menu") is no longer possible online, but only via a software key (maha-key).

Start screen of a new or reset board:

i≡ and the second se	Ò	Мана
UART-Fehler (10005)		
Kommunikation innerhalb des Zentralmoduls ist gestört.		
Lösung: - Neustart mit Hauptschalter durchführen. - Unvollständige Software auf dem ZM. - Versorgungsspannung X1 prüfen. - Service benachrichtigen.		

### After opening the Settings (Technician menu):

		System- Einstellungen
	Sprache	
$\bigcirc$	C Deutsch	
	🛞 🔂 English	
-	🛞 🝚 Polskie	
А	🛞 🕒 Čeština	
	S () Italiano	
	🛞 🌀 Português	
	🛞 🖶 Slovenščina	
	S Español	
	🛞 🥶 Slovenčina	

Service technician login is possible only with offline activation.

		МанА
•	Online Freischaltung Monteurmenü Seizerunner – I Der Anmeldeserver konnte nicht erreicht werden. Bitte überprüfen Sie die Internetverbindung des Prüfstands, oder nutzen Sie die Offine-Freischaltung.	
ß	Offline-Freischaltung Monteurmenü Bite wilden Sie Rev (maha kay Cette aus	Autochim

5 Carry out the software update: click on the button "Select" under "Upload update" and navigate to the desired .swu file. Upload with "Open".

				МанА
•	Aktuelle Software			
9	Name		Version	
-	Web-Ansicht		C_MBT_4.2.5	
	Steuerung		**	
<u>×</u>	Verfügbare Software			
	Keine Verbindung zum Update-Server. Bitte Updat	e hochladen.		
2	Update hochladen			
	Bitte wählen Sie Ihre '.swu'-Datei aus			Auswählen
	Firmware-Update			
	Name CAN ID	Aktuelle Firmware	Verfügbare Firmware	Update

- 6 Click on  $\checkmark$  to start the update after it has been uploaded.
- 7 After the software update, the test stand must be restarted for the settings to take effect. Afterwards, all further work steps can be carried out in the same way as for commissioning.

		Manda San Angela
0	Aktuelle Software	Version
v	Web-Ansicht	C_MBT_42.5
1	Steverung	
≚	Update abgeschlossen O Update anwenden und neu starten	
0	Bitte überprüfen Sie nach dem Neustart, ob unter "Externe Geräte" zusätz!	
$\sim$	bibe ubergrunen sie nach dem Neussant, ob unter "Externe Gerate Zusatz	on en sontware-update nut en externes uerat durchgerunit werden muds.

8 If necessary, the previously exported settings can be adopted again: "Settings/General/Support". For this purpose, registration as a fitter is necessary!

### Einstellungen importieren

Der Import überschreibt alle Optionen und Einstellungen.

Bitte wählen Sie Ihre '.json' Datei aus Auswählen

# 10.3 Checking the Sensor Function



# WARNING

- During the test of the sensor functions, the main switch may only be operated by authorised and trained personnel.
- Make sure that there are no other persons in the danger zone.
- Only press the sensing rollers individually, never simultaneously.

**Diagnostic menu:** The mechanical brakes are automatically released when opening the Diagnostic menu.

Einste	llungen	Optionen	Kalibrieren E	remskraft	Kalibrieren Wiege	einrichtung	Diagnose		
							🔒 Zum Testen der A	usgänge bitte anmelden	
Ser	sordia	gnose							
Br	emskra	aft links						Bremskraft rechts	
							2049 Digits		2047
Bren	nskraft						0 daN	Bremskraft	
Pr	üfrolle	links						Prüfrolle rechts	
							177 Digits		2503
Ges	chwindigkeit						0.0 km/h	Geschwindigkeit	0.
Та	strolle	links						Tastrolle rechts	
							242 Digits		3122
Ges	chwindigkeit						0.0 km/h	Geschwindigkeit	0.
Be	fahren	links						Befahren rechts	
							245 Digits		247

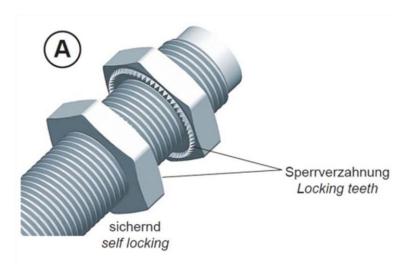
Function	Sensor
Press sensing roller	LED of the Occupied sensor must light up, left + right
Rotate sensing roller	Speed sensor of the sensing roller must flash, left + right
Rotate brake roller	Speed sensor of test roller must be flashing, left + right (also see section "Repairs > Releasing Motors with Mechanical Brake".)
Check range spring signal	Load the brake roller or motor in one direction and check whether the measured values on the test stand display change. This is only a function check!
Check weighing sensors	Load the test stand at each corner and observe a change in the measured value via the service technician screen. This is only a function check!

# **10.4** Adjusting the Switching Distance of the Sensors

All 6 Namur sensors are identical and have a switching distance of max. 4 mm. To ensure safe operation, it is important that the sensors are correctly adjusted. A switching distance of 2...3 mm is recommended for safe and fault-free operation.

# NOTICE

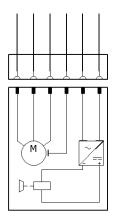
The locknuts have locking teeth to prevent rotation (see Fig. A). Tighten the locknuts gently, do not overtighten. If at hand, a torque wrench can also be used (tightening torque: 10 Nm).



# 10.5 Releasing Motors with Mechanical Brake

The brake motors are equipped with a flange-mounted spring-applied brake. When the voltage is switched off, the motor is blocked. A special motor connection cable can be used to release the brake and allow the motor to be rotated by hand for service purposes.

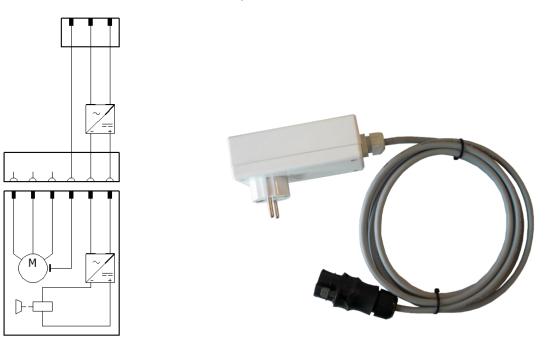
Installation only in the switched-off state, taking into account the 5 safety rules. Motor connection with mechanical brake:



# **Option 1 for brake release** Equipment needed: Brake release adapter MAHA # 1404314

Connect as follows:

- 1 Disconnect the motor supply cable plug from the motor in the roller set.
- 2 Connect the motor plug of the brake release adapter to the motor.
- 3 Connect the shockproof plug from the brake release adapter to 230 VAC; 50/60 Hz; L, N, PE shockproof socket (max. B16A, 30 mA RCD).
- 4 Test roller can be rotated by hand.
- 5 Remove the brake release adapter after use.

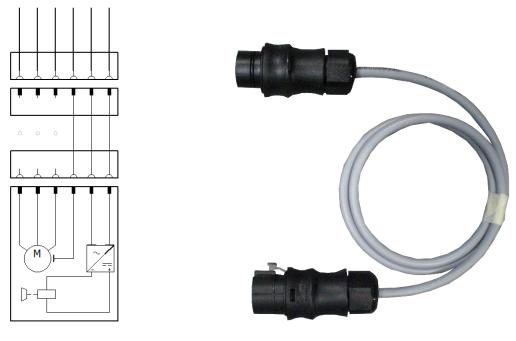


#### Option 2 for brake release

Equipment needed: Brake release adapter MAHA # 1403248

Connect as follows:

- 1 Disconnect the motor supply cable plug from the motor in the roller set.
- 2 Connect the motor plug from the brake release adapter (jack) to the motor.
- 3 Connect the motor supply cable plug to the brake release adapter (pins). Intermediate piece in motor supply line.
- 4 Select and enable the required test roller side via the Service technician menu.
- 5 Test roller can be rotated by hand.
- 6 Remove the brake release adapter after use.



### **Option 3 for brake release**

Unlocking the mechanical brake via software (without fitter key)

- 1 Open installer menu
- 2 When "Calibration Brake Force" or "Diagnosis" is opened, the mechanical brake automatically unlocks (left and right brake) as long as you remain in this menu.

When leaving the menu, the mechanical brake locks again automatically.

Unlocking the mechanical brake via software (with fitter key)

- 1 Open installer menu
- 2 Log in with fitter key
- 3 When "Brake force adjustment", "Diagnostics" or "Input, output test" is opened, the mechanical brake automatically unlocks (left and right brake) as long as you remain in this menu. When leaving the menu, the mechanical brake locks again automatically.

# **10.6** Enabling the Test Rollers via the Service Technician Button

When selecting and confirming the required test roller side in the Service technician menu, this can be started for service purposes even if the vehicle is not in the roller set. An additional confirmation by means of a Service technician button is necessary for this.



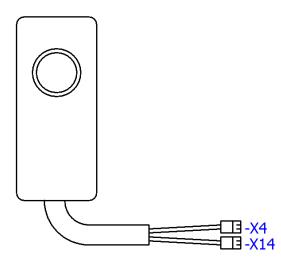
# WARNING

- When switching on the control cabinet with the main switch, make sure that the control cabinet door is closed. Cable feed for Service technician button via dummy screw connection on the underside of the control cabinet.
- Before and during the operation of the Service technician button, make sure that no other persons are present in the danger zone.
- Keep your distance from the roller set while pressing the Service technician button. Danger of being drawn in by rotating test rollers, chains, etc.
- The Service technician button may only be used by authorised and trained technicians for the period of time absolutely necessary. Then unplug again immediately.

Equipment needed: Service technician button MAHA # 1402226

Connect as follows:

- 1 If necessary, disconnect the existing plugs at the central module ZM -X4 and -X14.
- 2 Connect the two 2-pin plugs of the Service technician button to the central module ZM -X4 and -X14. Interchanging the two plugs of the Service technician button at -X4 and -X14 does not have a negative effect.
- 3 The Service technician button can be used as specified in the Service technician menu.
- 4 After use, remove the Service technician button.
- 5 If necessary, reconnect the previously existing plugs on the central module ZM -X4 and -X14.





# 11 Decommissioning, Dismantling and Disposal

Observe the product and safety data sheets of the lubricants used. Avoid environmental damage. If the device is to be disposed of, it must be disposed of in an environmentally responsible manner in accordance with local legislation. Sort all dismantled materials according to type and take them to a suitable recycling point. Collect operating materials such as grease, oil, coolant, cleaning fluids containing solvents etc. in suitable containers and dispose of them in an environmentally responsible manner.

Alternatively, you can take your device to a waste management company. They will ensure that all parts and fluids are disposed of properly and ecologically.

Safety goggles must be worn when working on hydraulic/pneumatic components. Suitable working scaffolds/platforms must be used when working at height.

# 12 Accessories

# 12.1 C\_MSA (MAHA Universal Analogue Display)

### 12.1.1 Description

The C\_MSA (CONNECT\_MAHA simultaneous display) is used to display measured values generated by a brake tester.

The LEDs are used for user guidance and indicate whether the display is in operation and connected, and whether the pointers refer to the small or the large measuring range.

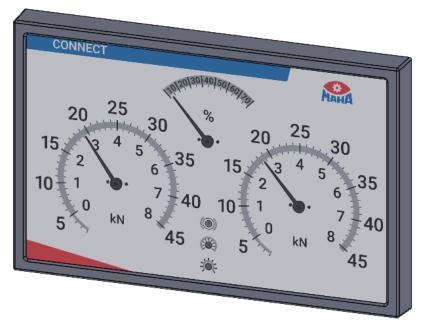
Simultaneous displays are used in workshops or test centres, especially in the truck sector where vehicles are so long that the driver has already passed the primary display while other axles are to be tested.

Some workshops operate the test stand outdoors, here the robustness of the analogue display with regard to humidity and temperature is required as well as the high contrast of the display (e.g. in sunlight) compared to a PC/TV monitor, which is usually the primary display.

The data connection of the C\_MSA to the brake tester can be established either via a network cable or via a WiFi connection.

Inside the C\_MSA is a control board that controls three stepper motors and three LEDs. The board is equipped with interfaces for the power supply (wide range input 12...24 V DC / < 1 A current consumption), an RJ45 network socket and an SMA connector for the WiFi antenna.

Power is supplied via a commercially available plug-in power supply unit with hollow plug (5.5/2.1 mm).



MAHA universal analogue display

### 12.1.2 Scope of Delivery

- Universal analogue display with three hand clocks, model: C\_MSA
- 2 m network patch cable
- 1 plug-in power supply unit 12 V DC / 2 A

#### 12.1.3 Technical Data

- W x H x D approx. 910 x 585 x 70 mm
- Splash-proof design for outdoor operation
- Anti-reflective PMMA lens (plastic)
- Mount VESA standard 200 x 100 mm
- Weight without bracket 13 kg
- Display range 0 8 kN and 0 45.5 kN
- Difference display 0 70 %
- 3 LEDs for status, (small measuring range / large measuring range / ready for braking), the LED for small and large measuring range is also the mains ON lamp)
- Power supply via plug-in power supply unit 12 V DC, current consumption < 1 A</li>

### NOTICE

Only use power supplies with e.g. 12 V DC / 5 W according to IEC 62368-1.

• Data interface LAN or WiFi (2.4 GHz)

#### 12.1.4 Installation

The C\_MSA can be installed either on a wall mount or on a stand. Suitable working scaffolds/platforms must be used when working at height.

#### Installing the wall mount

The hole pattern for mounting a display unit conforms to the following VESA standard: 100 x 100; 200 x 100; 100 x 200; 200 x 200

# NOTICE

If a wall mount according to VESA standard is provided by the customer, it must be ensured that the selected mount is suitable for the weight of the analogue display.

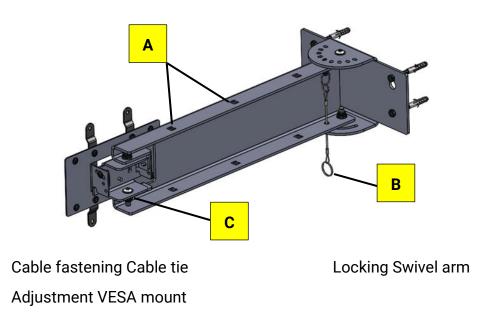
The wall mount is suitable for holding all MAHA-CONNECT display units as well as the most common TV screens/Smart TV according to the specified VESA standard. The swivel arm can be locked to the wall bracket by means of a locking bolt with pull cable. On the VESA mount, two self-locking nuts can be used to adjust the sluggishness of the rotation.

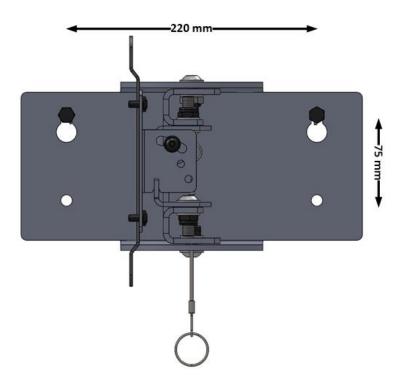
Installation accessories:

- 4 pcs. hex wood screws 8x70 mm, MAHA # 22 0571 08070 1
- 4 pcs. 10 mm anchors, model: Fischer-DUOPOWER 10 x 50, MAHA # 1405584

#### NOTICE

These anchors are suitable for concrete, solid brick, sand-lime brick. For other materials, suitable fastening systems must be used on site!





- 1 Mark the upper drill holes on the selected wall according to the sketch and using a spirit level. Drill to a depth of at least 70 mm using a suitable 10 mm masonry drill bit.
- 2 Insert the upper anchors and screws into the holes and screw them in at a distance of 10 mm from the wall.
- 3 Hang the wall mount on the pre-installed screws via the keyholes, align with a spirit level if necessary and tighten the screws.
- 4 Drill the lower drill holes to a depth of at least 70 mm using a suitable 10 mm masonry drill bit. Insert anchors with screws and tighten.

### NOTICE

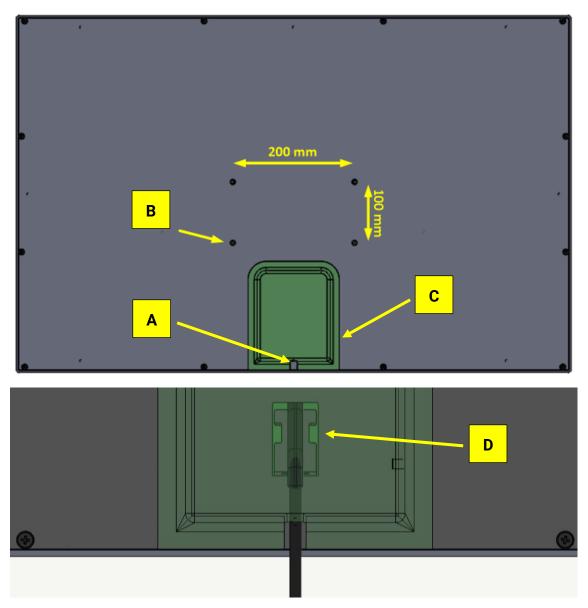
Check wall mount for tight fit after installation! Observe local and countryspecific specifications with regard to installation height (e.g. impact protection, escape route).

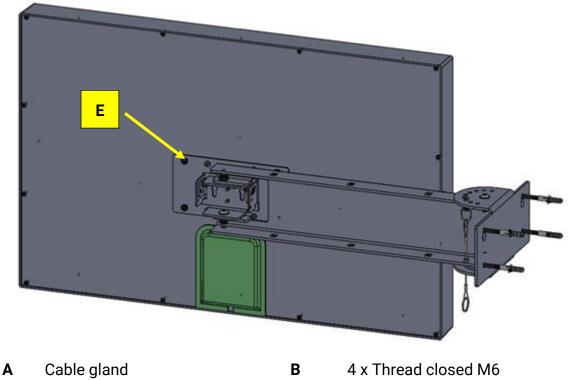
5 After installing the wall mount, the pointer display can be installed.

#### Installing the pointer display

- Hole pattern of the pointer display is identical to VESA standard 200 x 100 (VESA = Video Electronics Standards Association).
- 4x fastening holes M6 internal thread, max. 10 mm screw-in depth
- 4 pcs. M6x12 fastening screws are supplied with the optional MAHA wall mount.
- Weight of the display is approx. 13 kg.
- Display is fixed to the bracket via the 4 threads of the VESA wall mount.

• After completion of commissioning, self-adhesive cover is glued on with the cable gland facing downwards to protect against moisture and dust. Adhesive surface must be free of dust and grease.



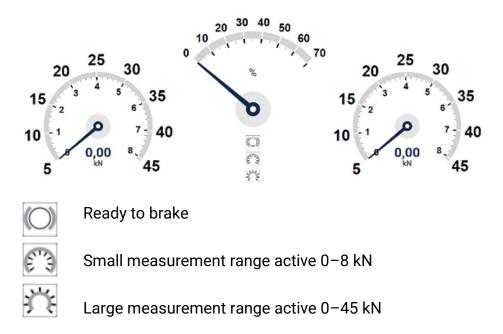


- С Self adhesive cover
- Е 4 x M6 x 12 mm

- D Strain relief with cable tie

#### 12.1.5 Status-LEDs

### Meaning of the LED status display



System status	LED Ready to brake	LED Small measure- ment range	LED Large measure- ment range
No WiFi connection	Fast flashing	Off	Off
WiFi connection being established	Slow flashing	Off	Off
No connection to central module ZM	Off	Fast flashing	Off
Connection to ZM being established	On	On	On
Initialised	Off	On	Off
Error	Fast flashing	Fast flashing	Fast flashing
Test stand in 4WD mode	Off	On	Fast flashing
If vehicle on side-slip tester or MSD, or System settings active	Off	Slow flashing	Off
Test stand in System settings	Off	Slow flashing	Off

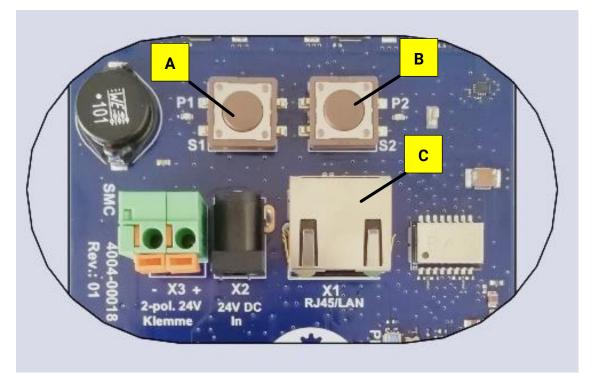
# 12.1.6 Setup

### **Board overview**

A WPS button

**B** Pairing button

### **C** LAN connection



#### Establishing a WiFi / LAN connection

• **Option 1**: Direct LAN connection to the central module

Connect the analogue display to the MAHA port (X13) of the central module using a LAN cable.

### NOTICE

- A network hub is recommended for commissioning with the "LAN connection" variant. The network hub enables the simultaneous connection of the analogue display and the service PC for coupling with the control board ZM (central module) at the X13 port.
- Alternatively, the RJ45 socket X12 "External" can be used on the control board ZM (central module), if not assigned.
- If a network socket of the control board is connected to the house network, the analogue display can also be connected to the test stand via the house network.
- **Possibility 2**: Connection via a WiFi router connected to the central module.

### • Possibility 2.1: LAN

Connect the analogue display to the test stand via a WiFi router using a patch cable:

- 1 Plug one end of the network cable into the RJ45 socket (C) of the display.
- 2 Plug the other end into a free RJ45 socket of the router.
- 3 Connect the router to the control board of the test stand (ZM) via the RJ45 socket X13 "MAHA".
- 4 After the successful network connection, the fast flashing LED "Ready to brake" changes to the fast flashing LED "Small measurement range".

This completes the LAN connection. Continue with step "Pairing with central module".

#### • Possibility 2.2: WiFi

- 1 Press the WPS button on the WiFi router or enable the WPS function.
  - This varies depending on the router, see product documentation.
  - If using the "TP-Link" router, *briefly* press the "WPS/Reset" button.
- 2 Briefly press the WPS button (S1) on the analogue display.
- 3 After successful connection, the LED "Small measurement range" stops flashing, and in the "External devices" overview the analogue display appears with status "Free".

This completes the WiFi connection. Continue with step "Pairing with central module".

#### Result

After successful connection, the "LED small measuring range" stops flashing and the analogue display appears in the "External devices" view with the status "Free".

Externe Geräte		
Geräte koppeln Funktionstest		
Gerät suchen (ID)		
Gerätetyp Name	ID	Status Identifizieren Justieren Update
Analoganzeige default	C_BRAKE_ANALOG_1445D6286F24	● Frei

#### Coupling (pairing) with central module

- Call up the test stand website using a smart device, PC or laptop (standard: http://maha-mbt.maha, alternative: http://192.168.201.1).
- Call up the system settings (click on the MAHA logo).
- Under "General", select the tab "External devices" (no login required). All accessible analogue displays in the network including status are shown there (possible: Connected, Busy, Pairing active or Free):

$\bigcirc$	Allgemein			
(i)	Support Netzwerk Externe Ge	räte Ereignisaufzeichung Prüfpe	otokoll Maschinendaten	
0	Externe Geräte Geräte koppele Funktionsntext Gerät suchen (ID)			
((ip))	Gerätetyp Name	ID.	Version Status	Identifizieren Justieren Update
«I»	Analoganzeige	C_MSA_246F28D646CC	15531 ● Frei	

- Activate coupling of the test stand by pressing the button "Couple devices".
  - A field appears with a counter showing how long the test stand is still in pairing mode.
  - After the countdown has elapsed or when you exit the menu, the pairing is terminated.
- Leave the menu open and go to the analogue display.
- Briefly press the pairing button on the display. To do this, briefly press the button S2 on the circuit board on the back of the display. The connection is established: "Coupling active"

Externe Geräte		
Geräte koppeln Funktionstest		
Gerät suchen (ID)		
Gerätetyp Name	ID	Status Identifizieren Justieren Update
Analoganzeige default	C_BRAKE_ANALOG_1445D6286F24	Q Koppiung aktiv

#### Result

The analogue display is initialised ("LED small measuring range" is permanently lit) and in the "External devices" view the analogue display has the status "Connected".

Externe Geräte					
Geräte koppeln Funktionstest					
Gerät suchen (ID)					
Gerätetyp Name	ID	Status	ldentifizieren	Justieren	Update
Analoganzeige default	C_BRAKE_ANALOG_1445D6286F24	SVerbunden	۳	Ľ	2

• The pairing can be cancelled/terminated at any time by pressing the button "End pairing" and the system settings can be exited.

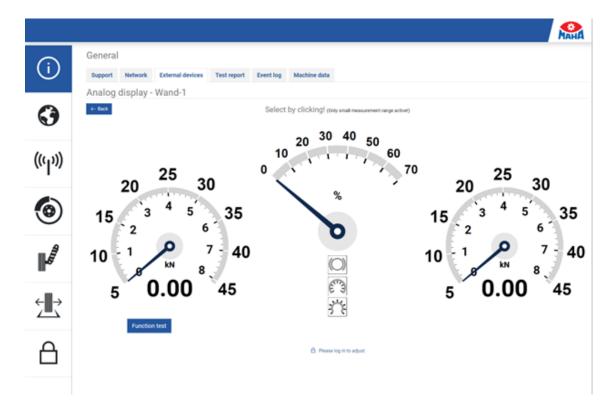
Externe Geräte							
Vortlebende Zeit Im Kooplungsmodus: 545							
Koppking beenden Gerät suchen (0)							
Gerätetyp Name	10	Version	Status	Identifizieren	Justieren	Update	
Analoganzeige	C_MSA_246F28D646CC	15531	O Verbunden	8	8		

- Once a connection has been made to a particular test stand, the display will always reconnect to it.
- After connecting, the name of the analogue display can be changed under "Names". To do this, write any name in the field provided. Press the "Enter" key to accept the changed name.

#### Checking the function of the LEDs

- Click on the "Adjust" button in the "External devices" view
- Between the left and right hands are three buttons for the respective LEDs of the analogue display.
- The LEDs can be switched on and off by clicking the buttons:
- If an LED on the analogue display is on, the corresponding button is coloured blue.

If an LED is off, the button is **white**.



#### **Function test**

The function of the pointers and LEDs of the analogue display can be checked with a function test. The function test can be started either via the "External devices" view or via the adjustment menu of the analogue display.

#### Sequence of a function test

- All LEDs go out
- Pointer initialisation (pointers move to mechanical zero point and then to 0 kN / 0 %)
- LED small measuring range goes on
- Move pointer to 4 kN / 35 %
- Pointer move to 8 kN / 70 %
- Move pointer to 0 kN / 0 %
- "LED ready to brake" of the analogue display flashes three times

#### Adjusting the pointers

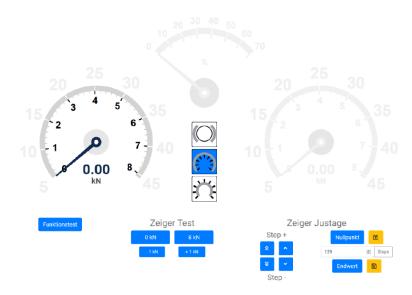
• Log in to the fitter menu.

Click on the "Adjust" button in the "External devices" view.

Externe Geräte		
Geräte koppeln Funktionstest		
Gerät suchen (ID)		
Gerätetyp Name	ID	Status Identifizieren Justieren Update
Analoganzeige default	C_BRAKE_ANALOG_1445D6286F24	🛛 Verbunden 🔉 🖸 🞜

- The analogue display now carries out a pointer initialisation.
- Select the desired pointer by clicking on it.

- The zero point or end value of the right and left pointer corresponds to 0 kN and 8 kN respectively.
- The zero point or end value of the differential display corresponds to 0 % or 70 % respectively.



### Adjusting the zero point

- Click on the "Zero point" button if the pointer in the WebApp is not set to 0 kN/0 %.
- Move the pointer of the analogue display to 0 kN/0 % by repeatedly clicking the "Step +" and "Step –" buttons. Small or large steps can be taken (single or double arrow).

It is also possible to approach a step position of the motors by entering it in the "Steps" field and then clicking the "Steps" button, in order not to have to click the "Steps" buttons too often in case of large deviations.

• If the pointer of the analogue display is at 0 kN/0 %, this position can be saved by clicking the save symbol to the right of the zero point button.

#### Adjusting the end value

- Click on the "End value" button if the pointer in the WebApp is not set to 8 kN/70 %.
- Move the pointer of the analogue display to 8 kN/70 % by repeatedly clicking the "Step +" and "Step –" buttons. Small or large steps can be taken (single or double arrow).

It is also possible to approach a step position of the motors by entering it in the "Steps" field and then clicking the "Steps" button, in order not to have to click the "Steps" buttons too often in case of large deviations.

• If the pointer of the analogue display is at 8 kN/70 %, this position can be saved by clicking the save symbol to the right of the end value button.

#### Checking zero point and end value

The adjustment can be checked by moving to the zero point and end value by clicking the "Zero point" and "End value" buttons.

#### 12.1.7 Software Update

If a software update is available for the analogue display, an update button appears in the "External devices" view. After clicking on this button, a window appears with the currently installed and available software version.



After confirming this window by clicking on "Continue", the update is carried out. After a successful update, the analogue display restarts.

### 12.1.8 Other

### Reset (delete) WiFi connection

- Press the WPS button (S1) on the analogue display for at least 5 seconds.
- Analogue display then restarts (recognisable by pointer initialisation).

### Reset (delete) connection to central module

- Press the pairing button (S2) on the analogue display for at least 5 seconds.
- Analogue display then restarts (recognisable by pointer initialisation).

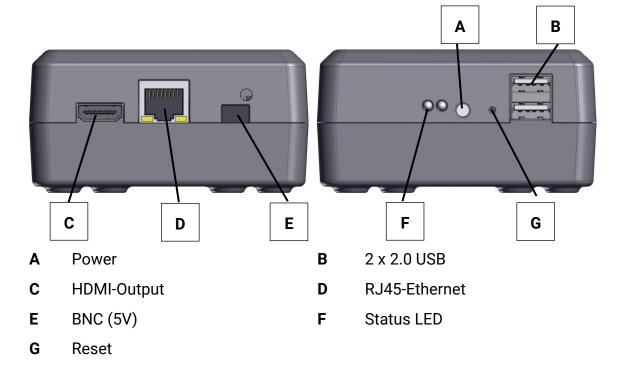
# 12.2 C\_BOX

### 12.2.1 Description

The C\_BOX is the digital counterpart to the analogue display. It serves as an interface between a standard TV set or a monitor and a brake tester of the CONNECT series.

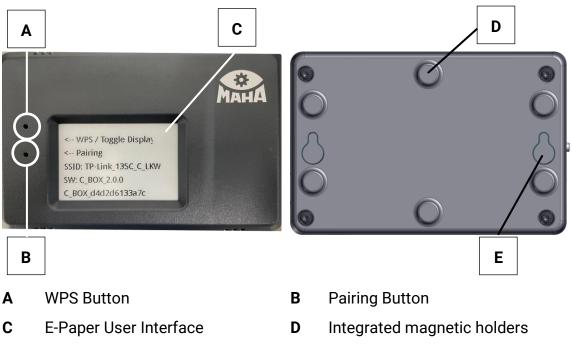
The displays can be connected to the C\_BOX via an HDMI cable, which in turn is connected to the test stand via LAN cable or WiFi. In this way, the user interface of the test stand is displayed.





### **Side connections**

#### Connections on top side/bottom side



E 2 keyholes for alternative mounting

### 12.2.2 Scope of Delivery

- Network module (LAN/WiFi), model: C\_BOX
- 2 m network patch cable
- 1 plug-in power supply unit 5 V DC

### 12.2.3 Technical Data

Operating temperature range	+5 °C+45°C
Operating voltage	230 V/0,5 A AC-Input
Current consumption max	5 V/0,3 A DC-Output
Plug power supply	Hollow plug 5.5/2.1
IP protection class	IP 20
Dimensions [W x H x D]	90 x 135 46 mm
Weight without packaging approx.	ca. 350 g
Data interface cable	Gigabit Ethernet – RJ45
Data interface radio	2.4 GHz WLAN

#### 12.2.4 Display Requirements

The TVs or monitors used as displays must have an HDMI input.

### NOTICE

It is recommended

- to use displays with a minimum resolution of 1920\*1080 (Full HD).
- to use a native HDMI cable, as there is no guarantee of correct display when using an adapter.

#### 12.2.5 Installation

### NOTICE

Observe correct sequence!

- 1 Connect C\_BOX and display using an HDMI cable.
- 2 Switch on the display and, if necessary, select the HDMI port used as the input.
- 3 Plug the power supply unit into the C\_BOX and connect it to a power socket. A green LED on the right side of the C\_BOX starts to light up.
- 4 C\_BOX starts up, please wait. It may take up to 2 minutes for the configuration page to appear on the display.
- 5 The C\_BOX is ready for operation as soon as a blue LED lights up on the left side.

#### **Configuration page**

		Мана
Connect Info		
Bremsprüfstand 🗸	Version	
Land C_BRAKE_TESTER_0123456789	2 12345 (C_BOX_1.0.0)	
Verbundener Bremsprüfstand	Version der ConnectBox	
IP-Adresse	Update hochladen	
• 10.10.10.10	Bitte wählen Sie Ihre '.swu' Datei aus	Browse
IP-Adresse der ConnectBox		
WLAN-Name		
Maha_Connect		
Name des verbundenen Netzwerks		
Pairing		
& 420		

- Brake tester displays the name of the brake tester as soon as a coupling was successful (see menu item "External devices").
   If there is a connection to the test stand, a check mark is displayed next to "Brake tester".
- **IP address** displays the WiFi IP address of the C\_BOX (default: 192.168.203.1).
- WiFi name specifies the SSID of the connected WiFi.

- **Pairing** shows the remaining time in seconds when the C\_BOX is actively searching for a test stand.
- **Version** specifies the version of the C\_BOX.

#### 12.2.6 Connecting the C\_BOX with the Brake Tester

To connect a C\_BOX with a brake tester of the CONNECT series, two steps are necessary. These steps are identical for new and already set up devices.

- 1 Integrate the C\_BOX into the network of the test stand.
- 2 Couple the C\_BOX with the test stand.

#### Establishing a network connection

The network connection can be established in two ways:

- wirelessly via WiFi. This requires a WiFi router with WPS functionality connected to the test stand, e.g. the TP-Link of the test stand (see section "Establishing a WiFi connection").
- wired via network cable (min. CAT 5).

### Establishing a WiFi connection

- 1 Press the WPS button on the WiFi router or activate the WPS function.
  - This varies depending on the router, see the respective product documentation.
  - When using the TP-Link, **briefly** press the "WPS/Reset" button.
- 2 Briefly press the WPS button on the C\_BOX. To do this, press with a thin object into the **upper** opening.
- 3 Please wait (currently no visual feedback in the user interface or on the display).
- 4 After a few minutes, the name of the test stand WiFi (SSID) appears in the "WiFi name" field on the configuration page, and the IP address updates accordingly.

### Establishing a LAN connection

- 1 Connect the C\_BOX to the test stand via LAN cable.
  - Plug one end of the network cable into the RJ45 socket of the C\_BOX.
  - Plug the other end on the control board ZM preferably into the RJ45 socket X13 "MAHA". If a router with free ports is already connected to this, connect the LAN cable there.
- 2 The C\_BOX is configured as a DHCP client and thus automatically receives an IP address from the control board.



- A network hub is recommended for commissioning with the "LAN connection" variant. The network hub enables the simultaneous connection of C\_BOX and service PC for coupling with the control board ZM (central module) at the X13 port.
- Alternatively, the RJ45 socket X12 "External" can be used on the control board ZM (central module), if not assigned.
- If a network socket of the control board is connected to the house network, the C\_BOX can also be connected to the test stand via the house network.
- If no DHCP server reports in the connected network (e.g. house network) for 30 seconds, the C\_BOX starts its own DHCP server, assigns itself the IP 192.168.204.1 and distributes IP addresses in the connected network.

#### 12.2.7 Coupling with the Brake Tester

- Call up the test stand website using a smart device, PC or laptop (standard: http://maha-mbt.maha, alternatively: http://192.168.201.1).
- Call up the system settings (click on the MAHA logo).
- Under "General", select the tab "External devices" (no login required). All accessible C\_Boxes in the network, including their status, are displayed there (possible: Connected, Busy, Pairing active or Free):

Prüfstands ID: C_MBT_0123456789       Geräte koppeln     Funktionstest       Ø     Gerät suchen (ID)												
Gerätetyp	Name	ID	Version	Status	Identifizieren	Justieren	Update					
Analoganzeige	Wand 1	C_MSA_0123456789	4.2.11	⊘ Verbunden	<u></u>	ď	0					
Analoganzeige	Säule	C_MSA_3265981526	1234	⊘ Verbunden	<i></i>	ď	0					
ConnectBox	Monitor-rechts	C_BOX_0123456789	1.1.0	⊘ Verbunden			0					
ConnectBox	Fernseher-links	C_BOX_70953908317		⊖ Frei								

# NOTICE

- Each C\_BOX has a unique ID that is displayed on the built-in ePaper display of the C\_BOX
- Activate coupling of the test stand by pressing the button "Couple devices".
  - A field appears with a counter showing how long the test stand is still in pairing mode.
  - After the countdown has elapsed or when you exit the menu, the pairing is terminated.
- Leave the menu open and go to the C\_BOX.

- Briefly press the pairing button on the C\_BOX.
  - To do this, press a thin object into the lower opening.
  - The pairing field of the C\_BOX appears with a counter. After the countdown has elapsed, the pairing is automatically terminated.
- The C\_BOX couples with the test stand and loads the test stand website.
- As soon as a connection has been established with a particular test stand, the C\_BOX always connects to it again.
- In the menu item "External devices" of the test stand, the C\_BOX is now displayed as "Connected". The pairing can be completed by pressing the button "End pairing" and leaving the installer menu.

ConnectBox	Monitor-rechts	C_BOX_0123456789	1.1.0	⊘ Verbunden		C	
------------	----------------	------------------	-------	-------------	--	---	--

- After connecting, the name of the analogue display can be changed under "Names" in the field provided. This name is also used as Host name.
- Press the "Enter" key to accept the changed name.

#### 12.2.8 Error Handling

#### Open configuration page

The configuration page is only displayed if no connection to the test stand could be established yet. If the test stand view is already displayed, it is possible to navigate to the configuration page by holding the WPS button on the C\_BOX for at least 7 seconds. By holding the WPS button again for at least 7 seconds, it is possible to switch back to the test stand page. No settings are lost in the process.

#### C\_BOX is not displayed in the list of external devices?

- Check connection (WiFi, LAN).
- Restart C\_BOX (press button on the right side).

#### NOTICE

The coupling in the device overview is blocked if another test stand already has an active coupling in the same network. This prevents unwanted coupling.

### 12.2.9 Software Update

- 1 Download update from the support area of the MAHA homepage www.maha.de.
- 2 Connect C\_BOX to PC/notebook via LAN cable.
  - The network interface of the computer must be configured as a DHCP client. This means that the options "Obtain IP address automatically" and "Obtain DNS server address automatically" must be activated in the properties of the corresponding Ethernet connection in the "Internet protocol, version 4" element.

Eigenschaften von Ethernet	× Eigenschaften von Internetprotokoll, Version 4 (TCP/IPv4) ×
Netzwerk Freigabe	Allgemein Alternative Konfiguration
Verbindung herstellen über:	IP-Einstellungen können automatisch zugewiesen werden, wenn das Netzwerk diese Funktion unterstützt. Wenden Sie sich andernfalls an den
Intel(R) Ethemet Connection I217-LM	Netzwerkadministrator, um die geeigneten IP-Einstellungen zu beziehen.
Konfigurieren           Diese Verbindung verwendet folgende Elemente:	P-Adresse automatisch beziehen
Pocap Packet Driver (NPCAP)     Pocap Packet Driver (NPCAP) (Wi-Fi)     Opcap Packet Driver (NPCAP) (Wi-Fi)	IP-Adresse:
Internetprotokoll, Version 4 (TCP/IPv4)	Subnetzmaske:
<ul> <li>✓ Microsoft-LLDP-Treiber</li> <li>✓ Internetprotokoll, Version 6 (TCP/IPv6)</li> </ul>	
<	Folgende Divs-serveradressen verwenden:
Installieren Deinstallieren Eigenschaften	Bevorzugter DNS-Server:
Beschreibung TCP/IP, das Standardprotokoll für WAN-Netzwerke, das den	Alternativer DNS-Server:
Datenaustausch über verschiedene, miteinander verbundene Netzwerke ermöglicht.	Einstellungen beim Beenden überprüfen
	Erweitert
OK Abbrechen	OK Abbrechen

- 3 In the browser, navigate to http://connect-box.maha.
- 4 Click the "Select" button in the "Upload update" input field.

Version 12345 (C_BOX_1.0.0) Version der ConnectBox Update hochladen	<b>MAH</b>
Image: Participation     Image: Participation       Version der ConnectBox	
Image: Participation     Image: Participation       Version der ConnectBox	
Version der ConnectBox	
Update hochladen	
Bitte wählen Sie Ihre '.swu' Datei aus	Auswählen
¢ Name	Update
C_BOX_1.1.1_20201201_0912_13461	

5 Select and confirm the update (C\_BOX\_xxx.swu) in the dialogue box that opens.

CONNECT Visual × +		- 0 >
→ C ▲ Not secure   connect-box.maha/		± , ★ <b># Θ</b>
	Datei wird geprüft	Мана
Connect Info		
Bremsprüfstand	Version	
格	<b>3</b> 12345 (C_BOX_1.0.0)	
Verbundener Bremsprüfstand	Version der ConnectBox	
IP-Adresse	Update hochladen	
• 192.168.203.1	Bitte wählen Sie Ihre '.swu' Datei aus	Auswählen
IP-Adresse der ConnectBox	Finite appliede	
WLAN-Name		
<i>en</i>		
Name des verbundenen Netzwerks		

- 6 The update is uploaded and checked, please wait.
- 7 When the update has finished uploading, the version number is displayed in the "Name" field.
  - $\circ~$  If the wrong file has been uploaded, another update can be selected by clicking in the input field again.
  - Once the desired version has been uploaded, click the blue "Update" button.
- 8 Confirm security prompt.



9 The update is started, a progress bar appears. Please wait.

a CONNECT Visual x + → C A Not secure   connect-box.maha/	- a > * * 0
Upda	ate wird installiert 💦 🎧
Connect Info	
Bremsprüfstand	Version
윰	12345 (C_BOX_1.0.0)
Verbundener Bremsprüfstand	Version der ConnectBox
IP-Adresse	Update Fortschritt
• 192.168.203.1	
IP-Adresse der ConnectBox	System bitte nicht ausschalten. Software wird aktualisiert. Dieser Vorgang kann mehrere Minuten dauern
WLAN-Name	•
<i>en</i> -	
Name des verbundenen Netzwerks	

10 After a successful update, press the button to restart.

Connect Info	
Bremsprüfstand	Version
몹	<b>}</b> 12345 (C_BOX_1.0.0)
/erbundener Bremsprüfstand	Version der ConnectBox
P-Adresse	Update abgeschlossen
• 192.168.203.1	Update anwenden und neu starten
P-Adresse der ConnectBox	
WLAN-Name	
rg -	

11 The board will now reboot and the update will be applied. This reboot takes a little longer than a normal reboot.

# NOTICE

Do not disconnect the C\_BOX from the power supply during the reboot!

- 12 The update is complete when the configuration page appears in the browser. The version field contains the new version.
- 13 Browser tab can be closed and the LAN connection disconnected.
- 14 Reconnect the C\_BOX to the test stand network:
  - $\,\circ\,\,$  If a WiFi was previously configured, the C\_BOX automatically reconnects to it.
  - $\circ~$  If the C\_BOX was connected to the test stand via LAN, plug the LAN cable back in.

# 12.3 Configuration of WiFi Router

### 12.3.1 Requirements

- WiFi router with WPS function
- Example here: TP-Link WR841N with power supply
- MAHA C\_MBT CONNECT
- Ethernet cable (sufficiently long)
- Notebook or tablet

### 12.3.2 Purpose

Correct configuration puts the TP-Link WR841N in a state where it can be operated together with the MAHA C\_MBT CONNECT. After configuration, it is possible to access the MAHA C\_MBT CONNECT with mobile devices such as notebooks, smartphones, tablets, etc. via WiFi using the TP-Link WR841N.

### 12.3.3 Carrying out the Configuration

### NOTICE

The steps must be carried out exactly in the sequence described here. Otherwise, correct interaction of the TP-Link WR841N with the MAHA C\_MBT CONNECT cannot be guaranteed.

### Connect to TP-Link WR841N

The setup of the connection to the WiFi of the TP-Link WR841N is shown using Windows 10 as an example; the concrete procedure will differ under other operating systems.



- Supply power to the TP-Link WR841N; no network cable should be connected to the TP-Link during this process.
- Turn on the power switch on the back of the router, if present.
- Wait until TP-Link WR841N is started. The two LEDs on the left side of the TP-Link then show green steady light.
- Determine the WiFi name (SSID) of the TP-Link
   WR841N. This name is indicated on the underside of the device.
- The name of this network usually looks like "TP-Link\_0000", but instead of 0000 there is a combination of numbers and letters.



•

Mobilfunk

WHA-SECURE

TP-Link\_EEAE

MAHA\_Connect\_SD

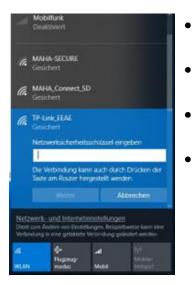
(a

là

- determine "Wireless Password/PIN" for network of TP-Link WR841N, this is also indicated on the back panel.
- Open the network overview under Windows, under Windows 10 by clicking on the icon with the red border.
  - Click on the network name of the TP-Link WR841N, this is similar to "TP-Link\_0000".

• Remove the check mark from "Connect automatically" and click on "Connect".

		20	02.2019 7.40
도 Ver	haintra bunden		
	billunik Attiviert		
MG Ges	link_EEAE ichert Automatisch v	verbindlen	
		w	rbinden.
IA MA	HA-SECURE ichert		
IR MA	HA_Connect_S	D	
Netzwerk Dart zum Verbindung	- und listemet listen von Eisele in eine geteiltete	einstellungen lungen Beispiel Verkindung gei	nomine karro eine Istiert werden

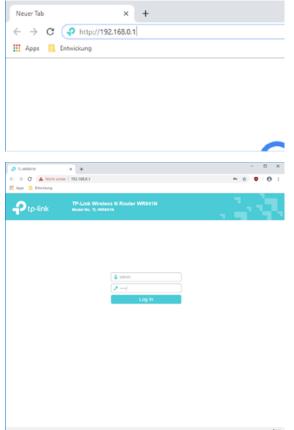


- If necessary, "Wireless Password/PIN" of the TP-Link.
- Enter WR841N as the "Network Key" and click "Next".
- A "network key" is usually at least 8 characters long.
- After this step, the WiFi connection should have been established, otherwise a Windows message will appear stating that the network key is not correct.

## Logging on to the administration interface

The TP-Link WR841N can be configured using a web browser (such as Microsoft Edge, Google Chrome or Mozilla Firefox). The following steps indicate how to reach the interface for configuration.

• Open web browser as usual.



- In the browser address bar, type http://192.168.0.1 and press Enter.
- In the delivery state, the TP-Link WR841N can be reached at this address.
- Enter the user name "admin" on the configuration interface of the TP-Link WR841N.
- Enter password "admin".
- Click on "Log In".

← → C @ mitesid	twr   192.168.0.1		** 0 0
apps 📙 Betwikung			
			100 C
A			
- tp-link			
Siatua			
Quick Britsp			
Operation Mode	556.4		Status Help
Network			The Status ange deplace the Router's
Weekes	Formulae Vensue	018 1 8 10 40001.0 State 100119 Rec352404	correct status and configuration. All
Guest Metwork	Hamboare Version	TL-098841N eV) 00000001	information is read-only.
DHCP			LAN - The toloxing parameters apply to the
Forwarding	LAN		LAN port of the Router. You can configure them
Security			on the Network > LAN
Parental Controls		TC BR-CA PS-EE AE	· MAC Address -
Access Control	(P Address)	1952 1986 () 1	The physical
Advanced Routing	Subnet Mark	396-266-265-0	Althest of the Router, as seen
(handwrath Control			Institle LAR IF Address - The
IP & MAC Bredrig	Wheeless 2:4GHz		UN IP address of the Router
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dystem Toole	Nerres30(D)	TPUR, ELAE	Wheelers - These are the
1.0201	Made	Hitige mixed	durrent pattergs in information for
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	and by		mode which the device is warking
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	0" Address	8.0.0.0 Dynamic (P)	Neture of the Router is enabled
	Dybret Main:	4.14.0	er dasbad. Nome(\$50)
	Pode & Common	AAAA 1018 and a contracted	The SSID of the

After successful login the displayed website appears.

## **Set Operation Mode**

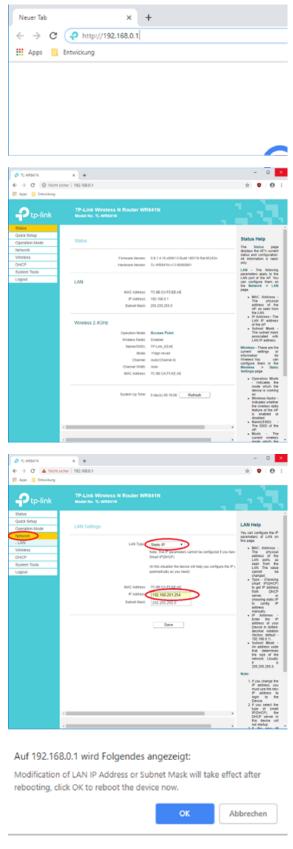
The login to the administration interface of the TP-Link WR841N is done, see section "Login to administration interface".

Abbrechen



- First click on "Operation Mode" in the left menu bar.
- Then select "Access Point" on the page that opens.
- Click on "Save".

- Now a message appears that the TP-Link WR841N must be restarted.
- Confirm with "OK".
- The system restarts.
- If the computer does not automatically reconnect to the WiFi, repeat the steps in the section "Connecting toTP-Link WR841N".



- In the browser, navigate back to the address http://192.168.0.1.
- If necessary, log in again as described in the section "Logging into the administration interface ".
  - The interface of TP-Link WR841N has become much clearer after performing the steps from section "SetOperation Mode".

- Click on the "Network" menu item.
- After that the "LAN Type" is set to "Static IP".
- Under "IP Address" enter the address 192.168.201.254.
- Click on "Save

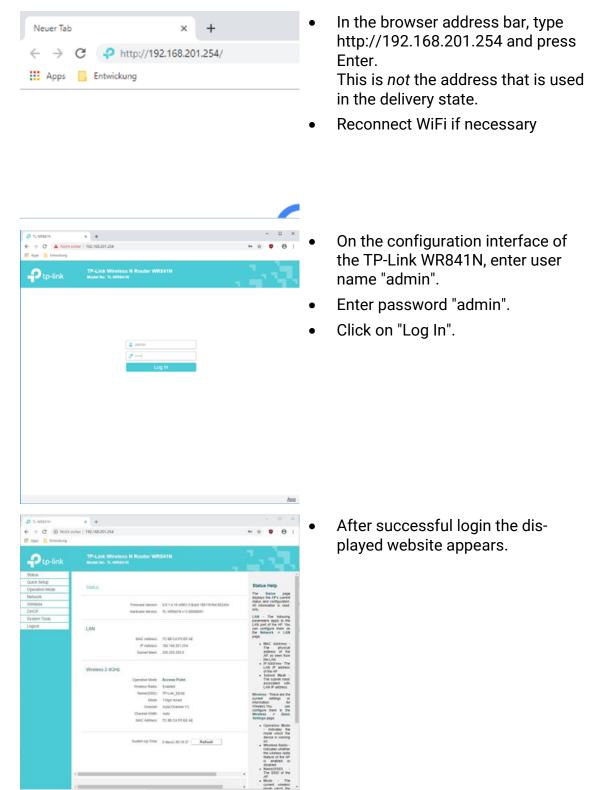
- Confirm message with "OK".
- The TP-Link WR841N restarts.
- After startup, the TP-Link WR841N can be reached at http://192.168.201.254.

### Logging on to the administration interface (with changed IP)

The MAHA C\_MBT CONNECT is supposed to manage its network, so the TP-Link WR841N is not allowed to do so. First, reconnect to the TP-LinkWR841Nnetwork as described in the "Connecting to TP-Link WR841N" section.

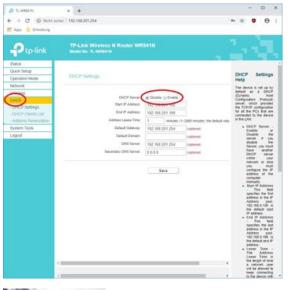
Then log in on the TP-Link WR841N with the changed address:

• Open web browser as usual.



### **Disable DHCP server**

First, reconnect to the network of the TP-LinkWR841Nas described in the section "Connecting to TP-Link WR841N".



- In the menu on the left, the entry "DHCP" is selected, then the displayed page appears.
- set "DHCP Server" to "Disable".
- Click on "Save".



• Turn off the TP-Link WR841N on the back panel.

### Connection test with MAHA C\_MBT CONNECT





- Connect TP-Link WR841N to MA-HA C\_MBT CONNECT via network cable.
- On the MAHA C\_MBT, plug the cable into the X13 "MAHA" socket.
- On the TP-Link WR841N, use any of the orange jacks.
- Turn on TP-Link WR841N on the back panel.
- Switch on the MAHA C\_MBT CON-NECT.
- Connect computer to TP-Link WR841N's WiFi as described in section "Connecting to TP-Link WR841N".
- Open a browser.



- Enter the name of the C\_MBT CONNECT in the address line of the browser: http://mahambt.maha
- If the displayed website is shown, the configuration was successful!

# 12.4 Radio Remote Control RECO S

## 12.4.1 Description

The RECO S radio remote control is considered to be an "operator's station" and enables presettings to be made in the test stand. In addition, it can also be used to manually start the test rollers, as is required in some countries, especially for truck brake testers. An emergency stop switch on the remote control ensures that the motors are stopped safely at all times.

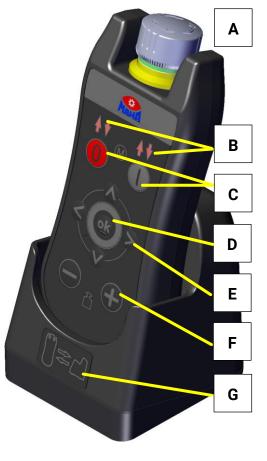
Emergency stop switch with light in the head of the switch
 Switch head lights up red =
 Emergency stop active
 Switch head grey = Emerg. stop

inactive Switch head flashes red = no connection to receiver

**B** LED indicator light in the shape of an arrow

Display of the test direction: "Standard" ( $\uparrow \uparrow$ ) or "Counter-rotation" ( $\uparrow \downarrow$  or  $\downarrow \uparrow$ )

- **C** Motor: I = On, 0 = Off
- **D** Confirmation: ok
- E Navigation: < = Left, > = Right,  $\land$  = Up,  $\lor$  = Down
- F Load simulation:+ = Increase load, = Reduce load
- **G** NFC Reader (Option)



# 12.4.2 Coupling with the Receiver (Pairing)

In order to use a radio remote control, it must first be paired with a receiver. In the process the radio channel to be used is set and the unique ID of the remote control is read out.

Basically there are two possibilities to do this, depending on the existing version of the charging box. This is available in a simple version (without NFC) and optionally in a version with an integrated NFC reader.

NFC stands for "Near Field Communication" and is known from using credit cards by placing them on a reader.

- Pairing with NFC
- a. Hold the NFC symbol at the bottom of the back of the remote control against the corresponding symbol on the charging box. A signal tone sounds to indicate that the remote control has been paired.
- b If the NFC symbol of the remote control is held against the symbol on the charging box again, the pairing is released and another remote control can be paired. Two beeps sound in succession, signalling that the remote control has been uncoupled.
- c. If a remote control is already paired and you hold the NFC symbol of another remote control against the symbol on the charging cradle, three signal tones sound in succession to indicate that a remote control is already paired.

# NOTICE

- As long as a pairing exists, no other remote control can be paired.
- If the test stand is switched off by main switch, the existing pairing is automatically deleted. After each start the remote control must be paired again.
- The working channel is set as usual on the radio receiver via DIP switch.

## • Pairing without NFC

- a. Establish a browser connection to the test stand and open "Radio/radio diagnostics/display unconnected radios" in the system settings
- Place the RECO S remote control in the charging cradle and wait until it is in charging mode (LED on the MAHA symbol flashes steadily).
   The emergency stop LED is off.
- c. Then press the button (0) for at least 3 s until the arrow LEDs change to fast treadmill mode. The pairing mode is then active for 18 s.
- d. Once the remote control is in pairing mode, it must be removed from the charging cradle.
- e. Then press the "Pairing" button in the line of the radio remote control in the browser on the opened page of point "a".
- f. The status line now displays "Radio is being paired". As long as this is displayed, the radio receiver is in pairing mode.
- g. If the pairing process was successful, "Pairing successful" is displayed in the status bar.

If "Pairing failed" is displayed, the process must be repeated.

h. If the pairing process was successful, the complete line of the remote control is automatically moved from "show unconnected radios" to the display of connected radios.

i. Now the radio remote control must be placed briefly in the charging cradle

to activate it. The status of the remote control then changes to 🧌.

j. When the remote control is removed from the charging cradle and "OK" is pressed, the emergency stop lamp on the remote control lights up,

indicating that it is ready for use. The status then changes to 🧹.

### 12.4.3 Operation with RECO S

If a remote control is registered and paired with the test stand, it must be activated by pressing the <OK> button after removal from the charging box.

### • Burger menu

The burger menu is automatically highlighted on the display. Pressing the (OK) button opens the burger menu and navigation with the Up( $\land$ ), Down( $\lor$ ), Left (<) und Rechts (>) buttons is possible.

The burger menu can be exited by pressing the Left (<) buttons.

- a. After opening the Burger menu, the symbol for the brake tester is always highlighted. Use the Up( $\land$ ), or Up( $\land$ ), keys to scroll between the tester icons.
- b. Use the Right (>) key to switch to the functions of the desired tester.
- c. Use the Up( $\land$ ), Down( $\lor$ ), Left (<) und Rechts (>) keys to scroll between functions.
- d. Press the (OK) button to confirm the selected function. Functions that are locked and cannot be selected are greyed out
- e. If a function is selected with the (OK) button, the burger menu closes automatically
- f. The burger menu can be exited by pressing the Left (<) or Right (>) button when the cursor is on one of the tester icons.

## Load simulation

a Pull-down device

The (+) button is used to retract the cylinders, thereby increasing the pull on the vehicle frame.

The (-) button is used to extend the cylinders, thereby reducing the pull on the vehicle frame.

b Roller set lift

The (+) button is used to extend the cylinders, which in the case of tandem axles increases the weight of the axle under test.

The (-) button is used to retract the cylinders, which in the case of tandem axles reduces the weight of the axle under test.

## • Emergency stop

Once the active emergency stop switch is actuated, the motors switch off immediately and the head of the emergency stop switch is flashing red.

- a The emergency stop is active, if
  - the remote control is switched on and connected to the receiver (pairing).

- b The emergency stop is inactive, if
  - the remote control is not logged on to the test stand.
  - the remote control is in the charging box.
  - the remote control is out of range of the radio link.
  - the battery of the remote control is discharged.

### • Preselection in the burger menu

Before entering the brake tester, pre-selections can be made (test direction, single wheel, all wheel, pre-trigger etc.).

The LEDs for the direction of rotation display on the remote control show the same behaviour as the direction of travel arrows in the status line (synchronous)!

a. Main direction of rotation (= default) Sequence of motor start as standard: first left motor, then right motor.
By default, the selection in the burger menu is set to "Main direction of rotation".

If a different setting is desired, it can be selected using the navigation keys  $Up(\land)$ ,  $Down(\lor)$ , Left (<) und Rechts (>). Confirm with (ok).

- b. Rotation/measurement direction reversal Selection in the burger menu "Rotation/measurement direction reversal" by means of navigation keys and confirmation with (ok).
- c. Single wheel left Selection in the burger menu "Single wheel left" using the navigation keys Confirm with (ok).
- d. Single wheel right Select "Single wheel right" in the burger menu using the navigation keys and confirm with (ok).
- e. All-wheel/counter-rotation Selection in the burger menu "All-wheel" using navigation buttons Up( $\land$ ), Down( $\lor$ )and confirmation with (ok).
- f. Automatic roller start (observe national regulations!) Select "Automatic roll start" in the burger menu using the navigation keys and confirm with (ok).
- g. Pre-trigger Selection in the burger menu "Pre-trigger" using the navigation keys and confirmation with (ok).

### • Manual motor start when driving on the test stand

If the roller set is occupied on both sides and the motor start button (I) is pressed on the remote control, a pop-up window "Confirm motor start with (ok)" appears on the screen. If the (ok) button is pressed, the rollers start according to the preselected direction of rotation. The aim is to avoid unintentional starting.

By pressing the motor stop button (0) on the remote control, both motors are switched off <u>immediately</u>. The test stand is then always in the operating mode "manual roller start"

After the motors have stopped, it is possible to restart the motors by pressing the motor start button (I), the pop-up window "Confirm motor start with (ok)" appears again on the screen.

## • Repeat/overwrite Car axle

Pressing the Up ( $\land$ ) or Down ( $\lor$ ) navigation buttons will scroll to the "Car axle/brake assignment" field. The cursor automatically jumps to the active brake type. By means of the Left (<) or Right (>) navigation buttons you can scroll between the three brake types FA, PB, RA.

Pressing the (ok) button switches to the corresponding brake type and assigns the next braking operation to this selection.

Exiting the field is possible by pressing the Up ( $\land$ ) or Down ( $\lor$ ) navigation buttons.

### • Repeat/overwrite Car axles

Pressing the Up( $\land$ )or Down( $\lor$ )navigation buttons scrolls to the "Car Axle/Brake Assignment" field.

The cursor automatically jumps to the brake type VA (front axle). Using the navigation keys left (<) or right (>), you can scroll between the three storage options VA, FSB (parking brake) and HA (rear axle).

Pressing the (OK) button switches to the corresponding axle and assigns the next braking to this selection.

Exiting the field is possible by pressing the navigation keys Up( $\land$ )or Down( $\lor$ ).

### • Assign/overwrite truck axle and brake type

After the brake test has been carried out, the cursor automatically jumps to the



Confirm with (OK), the dialogue window "Assign braking result" opens

By pressing the navigation keys, the corresponding axis and brake type can be selected and confirmed with (OK).

The cursor automatically jumps to the "Save" button and can be confirmed with (OK).

The window closes and the measurement screen enables the next brake test. The cursor is automatically placed on the burger menu again.

# 12.5 Radio Remote Control MRC 1100

### 12.5.1 Description

The radio remote control is used exclusively to operate the roller set lift for passenger cars, where there may only be one remote control per test stand. Thus, the use of the remote control in combination with C\_RECO is also not permitted.

### Warnings

- No persons may be present in the danger zone while the roller set lift is being operated.
- The roller set lift can also be operated when the test rollers are rotating. Make sure that the vehicle/trailer is not lifted out of the roller set or falls off.
- Before entering and leaving the roller set, make sure that the roller set lift is in the down position.
- Only lift the roller set when there is a test vehicle/trailer in it.

### 12.5.2 Transmitter

°	<b>Open</b> (relay 1)	Channel/ Frequency:	1 channel /868.30 MHz
		Power supply:	1x3V battery, type CR2032
	<b>Down</b> (relay 2)	Operation:	Transmitter transmits as long as button is pressed (max. 36 s)
		Protection class:	IP54

### 12.5.3 Radio Receiver



Mode of operation:Dead man's control (each<br/>relay switches as long as<br/>the corresponding button<br/>is pressed (max. 36s)Setting:Jumper J1 in position 1-2Antenna:Antenna is located inside<br/>the control cabinet,<br/>therefore a direct line of<br/>sight from the vehicle to<br/>the control cabinet is

necessary.

### 12.5.4 Teaching the Transmitter

Briefly press the programming button TA1 (for relay 1) or TA2 (for relay 2) (< 1.6 s).</li>

The programming mode is activated as soon as the LED flashes.

- Press a button on the transmitter and keep it pressed. As soon as the code has been saved, the LED lights up for 4 s and then flashes again. Release the transmitter button.
- Switch to operating mode by briefly pressing the programming button TA1 or TA2 again (< 1.6 s).

### 12.5.5 Setting on the Option Module in the Control Cabinet



- S1: 2
- S2: 0-15
- S3: TERM only on last module

# 12.6 RCD 50 Radio Pressure Converter

## 12.6.1 **Description**

The pressure sensor is suitable for pneumatic pressure values up to 20 bar. The compressed air connection is designed as an NW5 coupling head, and data is transmitted via 433 MHz radio. The pressure sensor has an internal battery that is charged via the MAH RCD LB 1 charging station or the RCD 30 charging box.



RCD 50 radio pressure converter (Mat. no. 1405094) with test port adapter (Mat. no. 1239150)

### 12.6.2 Pairing with the Receiver

- 1 In the system settings, choose "Radio > Radio diagnostics > Show disconnected radio devices".
- 2 Choose "User guidance" and carry out the pairing process for the radio sensor as described.

User guidance pairing			×
Remote control	+	<u>۱</u>	Pedal force meter
Remove pressure sensor from charging station	Put pressure sensor back into charging station and wait until LED is flashing green	3 Click on the subutton	To activate it, briefly remove pressure sensor from charging station and put it back in

### 12.6.3 Signal LEDs

The display on the pressure sensor can take on three colours: red, yellow and green.

### a. Pressure sensor outside the charging box

Display	Significance
Green LED on.	Sensor measurement values are queried.
Green LED briefly on every 5 s.	Ready-to-receive.
Red LED briefly on every 5 s.	Ready-to-receive, offset error* at the sensor.
Red LED on.	Sensor measurement values are queried, offset error* at the sensor.
Green/red (= yellow) LED on.	Sensor measurement values are queried, but receiver is not ready.

\* See following section "Offset Error".

### b. Pressure sensor inside the charging box

Display	Significance
Green LED on.	Battery fully charged.
Green LED flashing.	Configuration running.
Green/red (= yellow) LED flashing with 5 Hz.	Performing a reset.
Red LED flashing with 1 Hz.	Charging the battery.

## 12.6.4 Offset Error

If an offset error is present at the sensor, the sensor must first be unpaired (via the trash button). A new offset adjustment can then be started by re-pairing. When removing the sensor from the charging box, no pressure must be applied to the pressure connection as long as the red LED is lit.

							Мана
$\bigcirc$	Radio						
$\bigcirc$	Options Radio diagnostics						
	Radio diagnostics						
$\mathbf{O}$	Show disconnected radio devices						i
	Radio device	Status	Value	Battery charge	Signal strength	SW version	Pair Delete
	Radio receiver - 12 CH	$\checkmark$				1.08.410	_
((( <sub>1</sub> )))	Remote control	C <del>j</del> O	-	<b>I</b> 00%	N.	1.02.090	1
	Pedal force1	•	-		N.	1.01.000	Û
٢							
≙							

# 12.7 Roller Cover C\_MBT C/S 3.5/4.0/5.0 W220/W250/W280

The roller cover allows the test stand to be driven over gently. The covers can be operated either removably or hinged outwards.



# CAUTION

Wear personal protective equipment when folding or removing the roller cover. When mounting and handling the roller cover, be sure to use the handle holes provided. Danger of pinching and crushing!

### 12.7.1 Technical Data

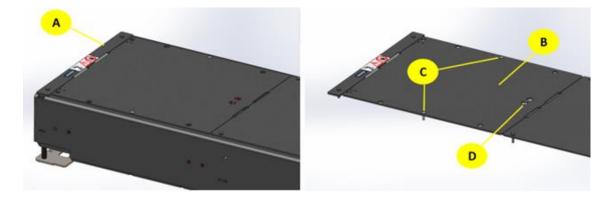
- Roller cover W220 & W250 with 4 t traversable
- Roller cover W280 with 5 t traversable
- Weight of roller cover (W220/W250/W280) approx. 21 / 26 / 30 kg

### 12.7.2 Scope of Delivery

- 2x roller cover
- 2x bearing cover with hinge cutouts
- 4x hinge incl. fixing material (for foldable operation)
- 4x flat head screw (for removable operation)
- 2x tether with key ring
- 2x sticker rolls warnings
- 2x sticker direction arrow
- 1x tap M8

### 12.7.3 Mounting Pluggable Roller Cover

- 1 Leave standard bearing cover (without hinge cutouts) on test stand.
- 2 Cut two M8 threads per roller cover.
- 3 Mount the flat head screw.
- 4 For easier handling, mount the retaining rope and key ring in the double hole of the roller cover.

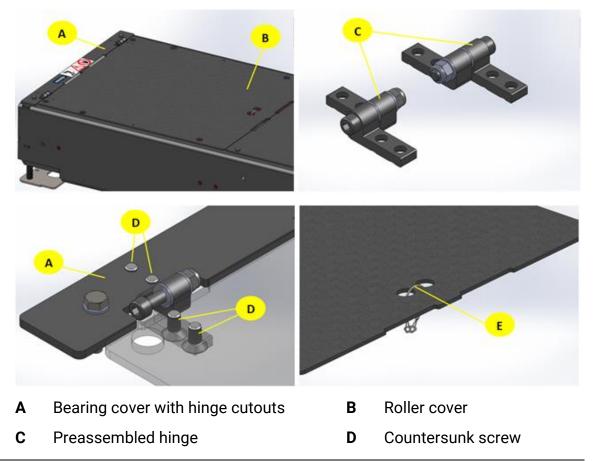


- A Standard bearing cover (without hinge **B** Roller cover cutouts)
  - LFK screw **D** Retaining rope with key ring

### 12.7.4 Mounting Hinged Roller Cover C(ompact)

С

- 1 Use bearing cover with cutouts for the hinge.
- 2 Cut 4x M8 threads in each of the bearing and roller covers to fasten the hinges.
- 3 Preassemble the left and right variants of the hinge.
- 4 Fasten preassembled hinges to bearing and roller cover with countersunk screws.
- 5 For easier handling, mount the retaining rope and key ring in the double hole of the roller cover.



**E** Retaining rope and key ring

## 12.7.5 Mounting Hinged Roller Cover S(plit)

The assembly of the individual components is identical to the Compact variant.

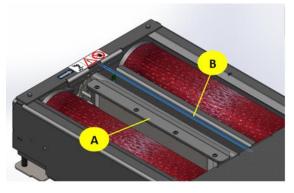


- A Bearing cover with cutouts B Roller cover
- **C** Standard bearing cover (without hinge cutouts)

# 12.8 Drive-over and Lowering Threshold C\_MBT C/S 3.5/4.0/5.0 W220/W250/W280

The drive-over and lowering threshold is used for gentle driving over and controlled lowering of the vehicle into the roller set by means of a light barrier.

The overrun and lowering threshold is lowered automatically after an adjustable delay by interrupting the photoelectric barrier, but can also be activated manually.



A Crossing and lowering sleeper

B Beam of the light barrier



# CAUTION

The pneumatic supply line must be depressurized before any work is carried out on the roller set. Risk of jamming!

# NOTICE

- Do not use in locations where there is direct exposure of the photosensitive • surface to ambient light or outdoor light.
- Avoid turning the "Operating mode" selection switch (Light-on, Dark-on) as • well as the sensitivity control with too much force or even over-tightening it.
- keep the light-sensitive surface of the light barrier and reflector clean, clean • if necessary.

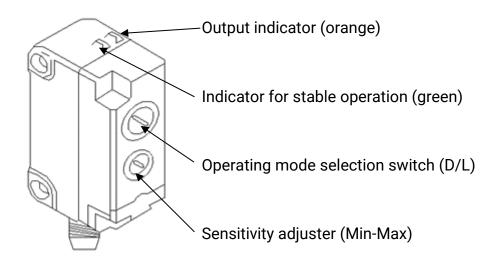
### INFO

In Germany, no roller cover is required according to BG.

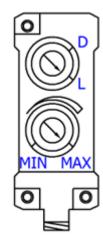
### 12.8.1 **Technical Data**

- Compressed air connection 6 10 bar
- For W220 and W250 max. axle load 4000 kg
- For W280 max. axle load 5000 kg

### 12.8.2 Light Barrier of the Lowering Threshold



### 12.8.3 Settings on the Light Barrier in the Roller Set



- Select operating mode L.
  - The operating mode can be set at the D-L rotary switch
  - When the operating mode is changed, the ON/OFF states are reversed: L=Light-on, D=Dark-on
- Select MAX. sensitivity setting.

The Green LED must always be on to ensure stable operation. It lights up as soon as enough reflected light falls back into the lens of the light barrier or (in the case of an interrupted light beam) little to no (scattered) light.

Thus, the green LED lights up only when the received light intensity on the lens differs significantly between the two switching states.

If this is not the case, the light sensitivity must be changed at the "Min-Max" setting control.

The orange LED only lights up if no object is detected and consequently the emitted light is reflected at the reflector and falls back into the lens of the light barrier.

The reflector consists of polarized single cells so that other reflecting surfaces do not trigger a reaction.

### 12.8.4 Setting on the Option Module in the Control Cabinet



Address (CAN ID) of the OM: **S1:** 0-15, if **S2** is set to 0 (down) **S1:** 16-31, when **S2** is set to 1 (up) **S3**: Term only on the last module **Setting according to specification as per circuit diagram** 

### 12.8.5 Settings in the CONNECT Technician Menu

Enable lowering threshold in the options overview of the "Brake tester" (login required)



### 12.8.6 Diagnostics in the CONNECT Technician Menu

- Open diagnosis of the "brake tester".
- Display in diagnostics menu lights up green when object is detected by the light barrier:

Lichtschranke	
---------------	--

• Display in diagnostics menu lights up gray if no object is detected by the light barrier:

Lichtschranke

-> <u>Light beam interrupted</u>: green LED lights up, diagnostics menu green

-> <u>Light beam reflected</u>: orange & green LED illuminated, diagnostics menu grayed out

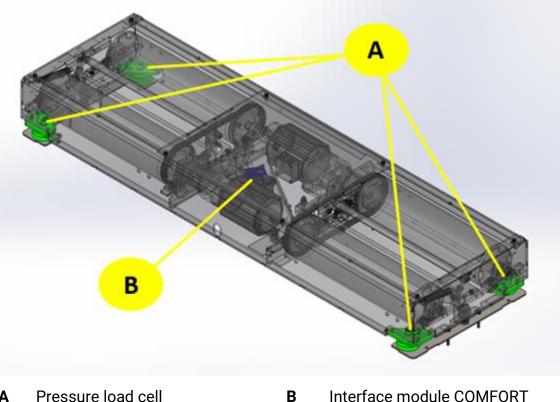
### 12.9 Weighing Device Static/Dynamic for C\_MBT C (Compact)

### 12.9.1 Description

The static/dynamic weighing device can be used to determine the axle weight of the test vehicle. The evaluation can be set statically or dynamically via the service menu.

### INFO

- The weighing device eliminates the need for stepless height adjustment • (245 - 300 mm) for the C\_MBT C/S 3.5/4.0/5.0 test stands. The height of these floor groups with weighing device is always 280 mm!
- The COMFORT interface module is required to operate the weighing device!



Pressure load cell Α

Interface module COMFORT

### 12.9.2 **Scope of Delivery**

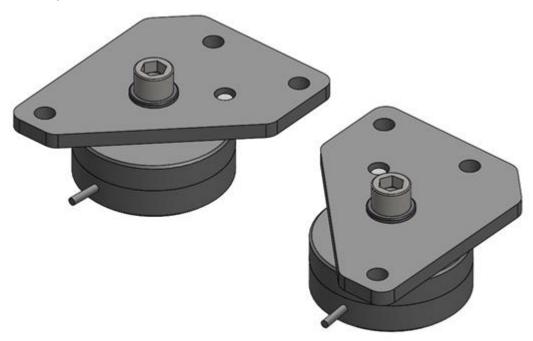
- 4x pressure cell with cable and plug incl. mounting material
- 1x COMFORT interface module (required for retrofitting)

### 12.9.3 **Technical Data**

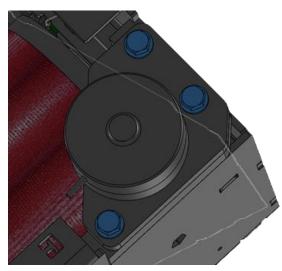
Cable length pressure cell 3 m •

### 12.9.4 Installation

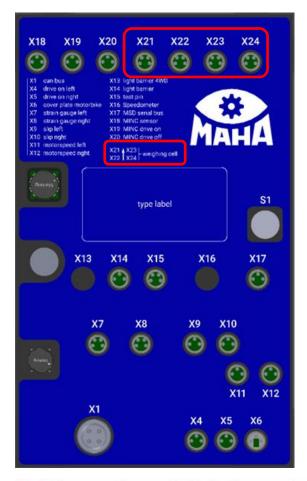
 Screw the pressure cells mechanically to the support plates (1x hexagon socket head screw, M16x30, tightening torque = 206Nm, 1x washer A17). The carrier plate is not symmetrical, so care must be taken on which side the pressure cell is screwed.

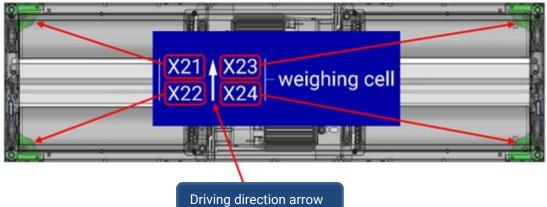


2 Screw the pre-assembled pressure cells to the test stand frame (3x hexagon head screw M12x30, tightening torque = 84Nm, 3x washer A13).



- 3 Route the cables of the pressure measurement sockets to the interface module and fasten them properly with cable ties. If the cable length is not sufficient, extension cables with plug and socket must be used.
- 4 Plug the connectors of the pressure cells into the terminals X21 X24 of the interface module. Each pressure cell is assigned to a specific connection.





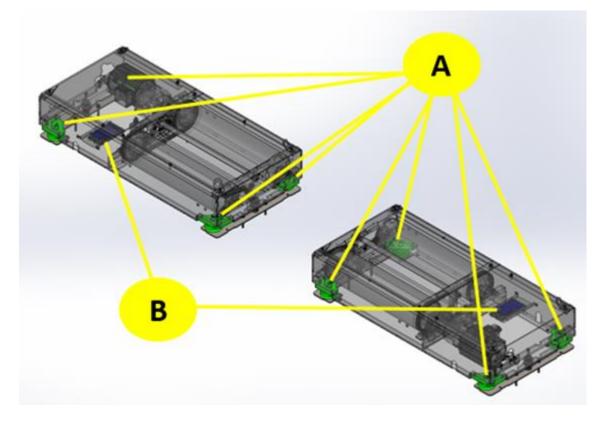
# 12.10 Weighing Device Static/Dynamic for C\_MBT S (Split)

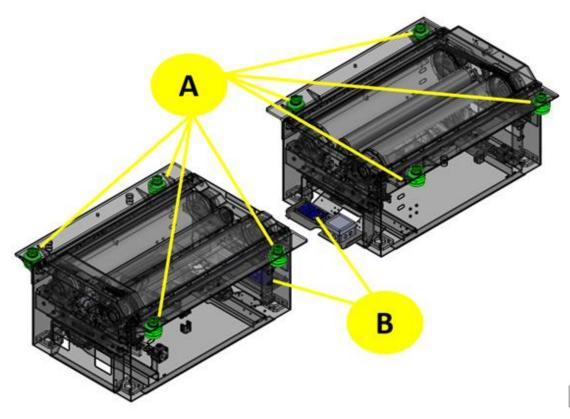
### 12.10.1 Description

The static/dynamic weighing device can be used to determine the axle weight of the test vehicle. The evaluation can be set statically or dynamically via the service menu.

### INFO

- The weighing device eliminates the need for stepless height adjustment (245 300 mm) for the C\_MBT C/S 3.5/4.0/5.0 test stands. The height of these floor groups with weighing device is always 280 mm!
- The COMFORT interface module is required to operate the weighing device!





Pressure load cell **B** Interface module COMFORT

### 12.10.2 Scope of Delivery

Α

- 8x pressure cell with cable and plug incl. mounting material
- 2x COMFORT interface module (required for retrofitting)

### 12.10.3 Technical Data

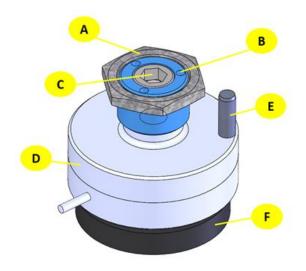
• Cable length pressure load cell 3m

### 12.10.4 Installation

In the static/dynamic weighing system for C\_MBT S (Split), there are two different mechanical versions of the load cells, which is why the assembly is presented in 2 variants.

For the test stands C\_MBT S 3.5/4.0/5.0 the mechanics and also the mounting are identical to the Compact version (see paragraph "Weighing device static/dynamic for C\_MBT C (Compact)"). Only the number of pressure cells (8) and the interface module (2) is doubled.

There is a separate mechanical assembly for the C\_MBT S 13.0/15.0/18.0/20.0 test stands. This allows the test stand to be leveled via the pressure cell and thus compensate for unevenness.



- A Hexagon nut
- C Cheese head screw with hexagon socket D
- E Dowel pin

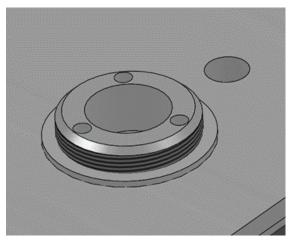
**B** Threaded bush

F

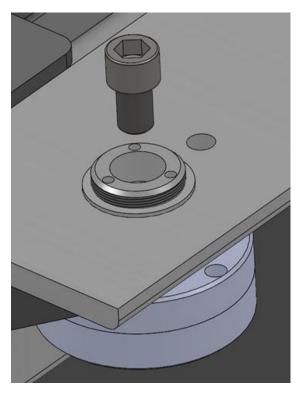
- Pressure load cell
- hardened support plate

The assembly is carried out in the following steps:

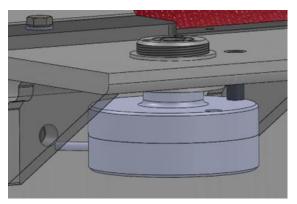
1 Screw the threaded bushing into the weighing bracket.



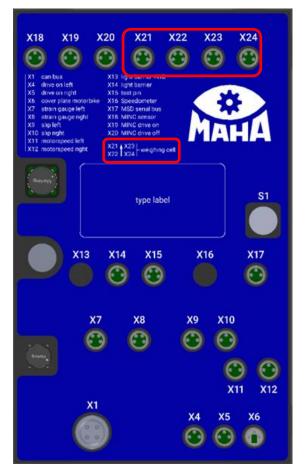
2 Place the pressure cell on the underside of the weighing bracket and tighten it slightly with the hexagon socket head screw (M16x25) so that the pressure cell can still be turned.



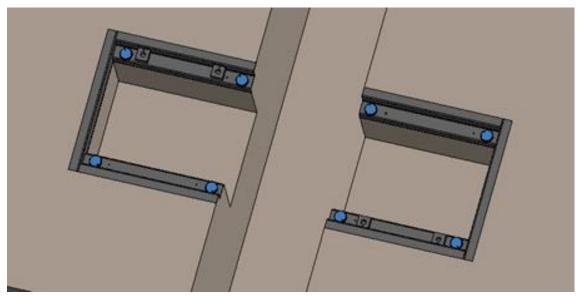
3 Align the pressure cell so that the cable can be laid directly in the opening provided in the frame and the cylindrical pin can be mounted to prevent rotation.



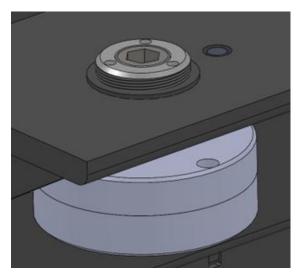
4 Route the cables of the load cells to the interface module and fasten them properly with cable ties. If the cable length is not sufficient, extension cables with plug and socket must be used. Plug the connectors of the scale measuring boxes into the connectors X21 - X24 of the interface module. Each load cell is assigned to a specific port.



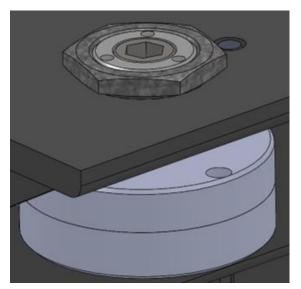
5 Place the hardened support plates on the designated position of the lost formwork in the foundation. Lift the two test stand halves into the foundation and place them with the pressure cells on the hardened support plates.



- 6 Adjust the height of the pressure cells via the threaded bushing so that the test stand rests on all four pressure cells.
- 7 Tighten the hexagon socket head screw to 206Nm.



8 Secure the threaded bushing with the hex nut.



# 12.11 Two Test Speeds

## NOTE

- If the ramp-up time is set too short, the internal bypass contacts close before the motor has reached the rated speed. This can cause damage to the bypass relays.
- Make sure that the specified switching frequency is not exceeded! After each start-up, the power semiconductors must be given sufficient time to cool down. Starting processes in a short time sequence can destroy the power semiconductors!

Operation in the bridged state also allows the power semiconductors to cool down!

### 12.11.1 Description

This option can be executed in two different variants:

Variant I: Switchable via smart device, C\_RECO S or PC

**Variant II:** Switchable via illuminated pushbutton on the control cabinet, the status of the setting is indicated via the LED integrated in the pushbutton. To switch, press the button briefly until the LED indicates the desired mode (note that not all modes are always possible/selectable).



- Passenger car: LED lights up permanently
- Truck: LED does not light
- Motorcycle: LED flashes

With the "two test speeds" option, soft start devices are always required.



### 12.11.2 Setting

There are 3 potentiometers on the front panel that can be used to make the following settings:

Parameter	Potentiometer	Setting range
Start-up time	t_~-	Start-up time adjustable from 0.5 to 10 s
Start voltage	UStart	40 to 80% of the nominal voltage
Run-down time	t-~_	adjustable from 0.25 to 10 s

Factory preset, see electrical circuit diagram.

### 12.11.3 Display

There are two LEDs on the front of the device which indicate the following operating states:

LED	Operating status
green	Device connected to mains voltage
yellow	Start-up completed, device bridged
yellow - flashes with increasing or decreasing frequency	Soft start / soft stop
yellow - flashes with constant frequency	Malfunction

### 12.11.4 Procedure

Before entering the roller set, the inspector can change the vehicle type. The functionality of the pushbutton switches is identical to the "Car/Truck" switchover in the burger menu. Both switchovers are possible at the same time. This means that all parameters are changed over when pressing the Car/Truck pushbutton in the same way as when selecting Car/Truck in the burger menu.

### 12.11.5 Function Test

With the option preselected, switch from Car to Truck by means of illuminated pushbutton, switch from Truck to Car by means of burger menu, switch back again from Car to Truck by means of illuminated pushbutton (and vice versa).

### 12.11.6 Malfunction Description

Error	LED	Operating status
1	Yellow LED flashes 1x repeatedly with short pause	Supply voltage error or load too low
2	Yellow LED flashes 2x repeatedly with short pause	Heat sink temperature too high/device thermally overloaded,
3	Yellow LED flashes 3x repeatedly with short pause	Electronic error
4	Yellow LED flashes 4x repeatedly with short pause	Phase / ignition fault in phase 1
5	Yellow LED flashes 5x repeatedly with short pause	Phase / ignition fault in phase 3
6	Yellow LED flashes 6x repeatedly with short pause	Motor phase fault / power semiconductor defective in phase 1
7	Yellow LED flashes 7x repeatedly with short pause	Motor phase fault/power semiconductor defective in phase 3
8	Yellow LED flashes 8x repeatedly with short pause	general synchronization error Mains or motor circuit faulty

### 12.11.7 Troubleshooting

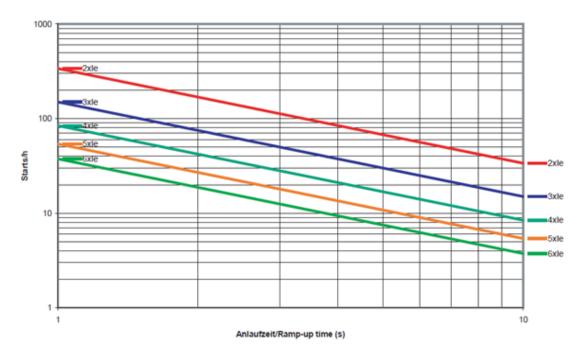
Error 1:	Electronics supply or motor too small.
Error 2:	Check the starting frequency and the starting current or max. ambient temperature. Allow the device to cool down.
Error 3:	Defect in the internal control electronics.
Error 4/5:	Power supply failed, motor cable interrupted, power semiconductor defective, motor defective. Check motor and wiring.
Error 6/7:	Power supply failed, power semiconductors do not ignite. Engine power too small. Power semiconductor defective.
Error 8:	Mains or motor wiring interrupted. Power semiconductor defective. Check wiring.

#### 12.11.8 Reset Malfunction

Switching the supply voltage off and on again - upstream motor protection switch off/on or main switch off/on.

#### 12.11.9 Start Frequency

With factory parameter setting, the start frequency is limited to < 40x per hour. When changing the parameter settings (only by authorised service technicians), the following diagram can serve as an aid.



VersiStart II 400-32

### 12.11.10 Two Test Speeds Light Truck

With the option "Two test speeds Light Truck" frequency inverters and an additional configuration file are required.



### 12.12 Signal Display for Radio Pressure Converter

#### 12.12.1 Description

Since it can happen in the course of truck testing that a radio pressure converter is forgotten on the vehicle, the absence of a radio pressure converter should be signaled to the user.

#### 12.12.2 Procedure

Scenario 1: If one (or more) radio pressure converter(s) is/are removed from the charging box, the signal lamp lights up or flashes (depending on the design of the signal tower). Only when all radio pressure converters are back in the charging box does the signal tower switch off.

Scenario 2: If one (or more) radio pressure converter(s) is/are removed from the charging box, monitoring is performed to determine whether all sensors that are outside the charging box are still in the transmission range. If a sensor is no longer in the transmission range and not back in the charging box, the signal tower switches on.

The behaviour of the signal display can be set in the Technician menu and is located under the "Radio" options.

#### 12.12.3 Signal Display of Radio Pressure Converters

Signal tower ON with radio pressure converter out of the charging box.

Signal tower ON when radio pressure converter is out of reception range (= default).

Signal tower is implemented via an option module to which a signal tower is connected.

#### 12.12.4 Function Test

With the radio system logged on, remove the radio pressure converter from the charging box and test scenario 1 or 2, depending on the setting.

For the correct function of the signal light, all radio receivers must be returned to the charging box before the system is switched off. At system startup, it cannot be determined whether the sensor is in the charging box or still on the truck.

### 12.13 Weight Simulators

See operating instructions BA042501 "MLS Weight simulators".

### 12.13.1 Pull-down Device

**Hydr. weight simulator, 1-fold HD cylinder (pull-down device)** Type: MLS 1100; Scope of delivery: Hydraulic power unit etc. Type: MLS 2100 (VZ 985052) / MLS 2150 (VZ 985018) Operation via MRC 1100 radio remote control (not for MLS 2300)

### 12.13.2 Roller Set Lift

Roller set lift integrated, mechanical-hydraulic for C\_ MBT 13.0 /15.0 Operation via smart device, C\_RECO S or PC (FFB not included) Roller set lift in angle iron frame mechanical-hydraulic, for C\_MBT 13.0 - 20.0, Operation via smart device, C\_RECO S or PC (FFB not included)

### 12.13.3 Control for Load Simulators

For operating the roller set lift or pull-down device via smart device, C\_RECO S or PC

Info: Remote control not included.

VZ xxxxxx, VZ yyyy, VZ zzzzz Roller set lift or MLS xxxx required (includes the option module, contactors, etc. in the control cabinet)

### 12.13.4 Multifunction Control

via smart device, C\_RECO S or PC

via illuminated pushbuttons on the electrical control cabinet

includes VZ 935280 multifunction control via smart device or PC

- Synchronous operation in main and opposite direction of travel, both wheels rotating forwards and backwards respectively

- Counter-rotation operation in main and reverse direction for all-wheel drive test axlewise left forward / right reverse rotation or vice versa

- Single wheel operation only in main direction of travel only one wheel rotating forward at a time

Info: Remote control not included.

### 12.14 Pit Safety GSQ



### WARNING

- The controller is not active before/when commissioning! Only after commissioning and testing of the safety device by authorized service personnel is a functioning safety function given.
- Before acknowledging the triggered safety function, make sure that no one is present in the danger zone (incl. pit).
- The button for acknowledging the triggered safety function must be installed outside the pit protection.

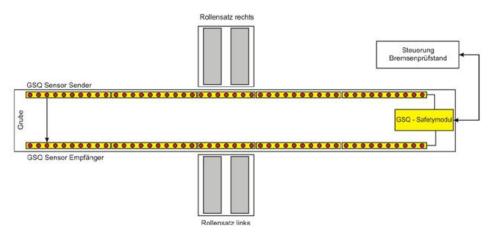
### NOTICE

- Do not place or fasten any objects on the pit safety device!
- Do not step on the housing of the pit safety device!

#### 12.14.1 Description

The pit safety device transverse (GSQ) is used to safeguard working pits equipped with a brake tester. The pit safety device consists of a GSQ safety module (control module -A100 in the control cabinet), to which the GSQ sensors (transmitter -A10x.A and receiver -A10x.B) are connected. The GSQ safety module monitors the hazardous area and switches the brake tester to a safe state if a person enters the hazardous area. The GSQ sensors (transmitter and receiver) can be arranged in a row due to their modular design, so that the necessary hazardous area is covered for the various applications.

The sensors monitor the pit in the transverse direction and detect objects larger than 25 cm. This means, for example, that hose lines or the belts of a pull-down device do not trigger the pit safety device. After being triggered, the pit safety device must be acknowledged via an illuminated pushbutton on the control cabinet.



#### 12.14.2 Description of Acknowledgement

#### Scenario: Test stand is empty, no roller start

- Hazardous area is entered, pit safety device is triggered.
- LED of -S100 lights up red.
- The status bar shows "Pit safety triggered".
- Button -S100 for acknowledgement has no function and does not have to be pressed.
- If the danger zone is left, the LED of -S100 goes out, the test stand switches itself free and the message disappears in the status line.

#### Scenario: Test stand is occupied, no roller start

- Hazardous area is entered, pit safety device is triggered.
- LED of -S100 lights up red.
- The status bar shows "Pit safety triggered".
- If an attempt is now made to perform an motor start with the remote control, the following message appears:

	Grube	بالألامين وبالمالية ومراجع		H C A
15 20 25	30		15 20 25	30
		llenstart bloc	kiert	
1	Grub	ensicherung aus	gelöst!	3
kN			kN	
Ξ.				

- Button -S100 for acknowledgement has no function and does not have to be pressed.
- If the danger zone is left, the LED of -S100 goes out, the test stand switches itself free and the message disappears in the status line.

#### Scenario: Test stand is occupied, motors are running

- Perform roll start with remote control.
- When motors are started and the hazardous area is entered, the pit safety system is triggered.
- Motors stop immediately.
- LED of -S100 lights up red.
- The status bar shows "Pit safety triggered".
- If an attempt is now made to perform an motor start with the remote control, the following message appears:

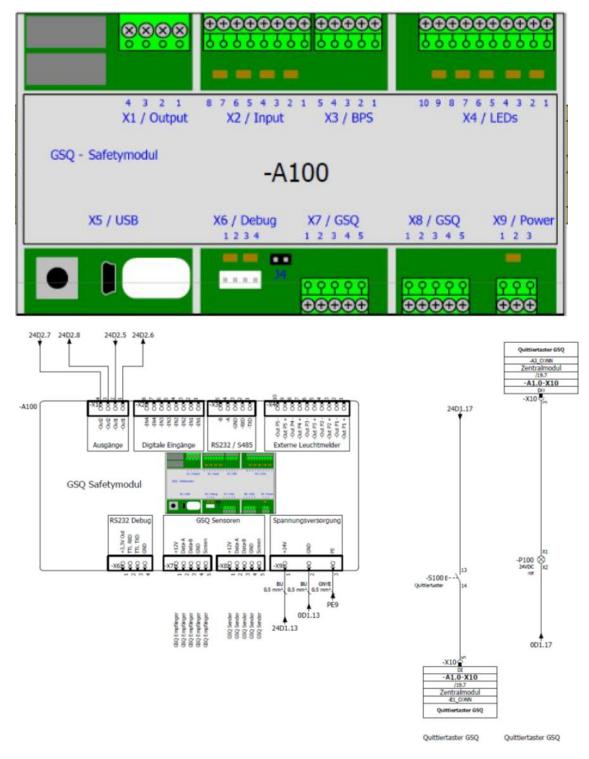


- Button -S100 for acknowledgement has no function as long as the hazardous area is entered.
- If the danger zone is left, LED -S100 starts to flash and "Acknowledge pit safety" is displayed in the status line.
- If an attempt is now made to perform an motor start with the remote control, the following message appears:

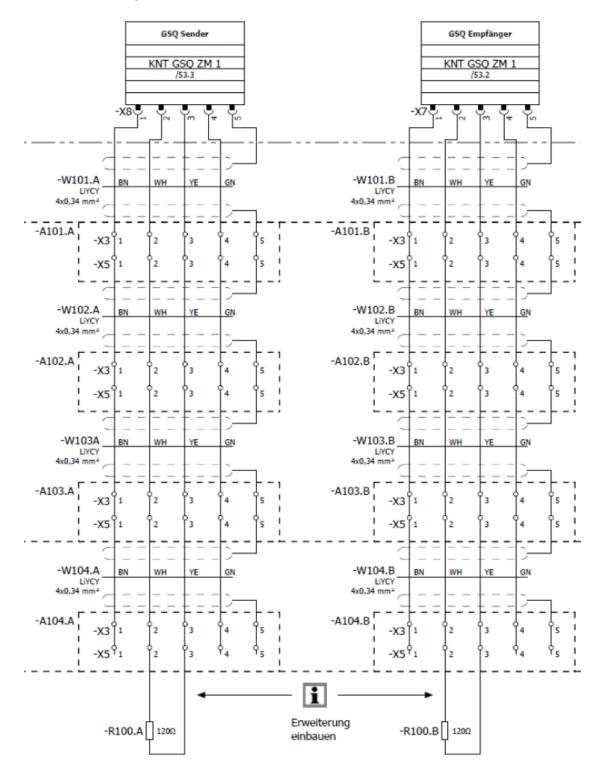


- The pit safety can be acknowledged by pressing button -S100 and the test stand is ready for testing again.
- Alternative: Drive off the test stand.

#### 12.14.3 Electrical Connection Diagram

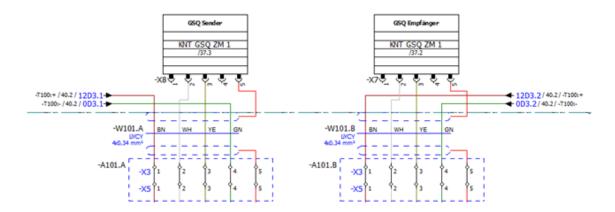


#### Connection diagram for a maximum of 7 modules/bars



#### Connection diagram for a maximum of 10 modules/bars

Additional power supply necessary to supply the modules/bars!



#### 12.14.4 Installation



## WARNING

The country-specific standards, regulations, directives regarding design/ installation/commissioning must be observed.

GSQ sensors (transmitter and receiver) are required for the installation of the pit safety system.

The GSQ sensors are always required in pairs as transmitter and receiver. The aluminum profiles of the sensors can be mounted directly in the pit and must be wired on site. All necessary connectors, connecting cables between the individual sensors and the necessary terminating resistors are included in the sensor package. The connection cables to the GSQ safety module are *not* included in the sensor package.

The aluminum profiles of the sensors are available in different lengths. The aluminum profile with 754 mm is mounted in the area of the brake tester roller set. The 1114 mm long aluminum profiles are mounted accordingly in front of and behind the roller set, depending on the application.

The GSQ I, II, III, IV and V sensor packages each include 2 matching cable sets that connect the sensors to each other.

The connection cable for connecting the sensor modules to the GSQ safety module is not included in the sensor packages, as the length varies depending on the installation. A shielded data cable with 4 x 0.34 mm<sup>2</sup> is required for the connection, e.g. Helukabel TRONIC-CY (LiY-CY 4x0.34). The maximum length between GSQ sensor module and GSQ safety module is 50 m.

Here in the example the cable set for the GSQ I is shown.

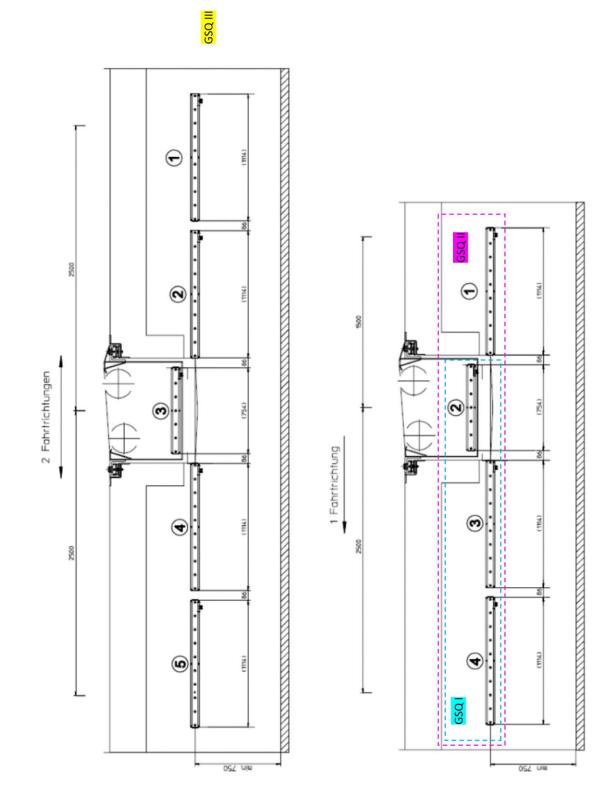
On the left side you can see the cover from the first GSQ sensor module. The unused cable gland is required for the connection cable to the GSQ safety module. On the right side you can see the cover for the last GSQ module (with blind plug). The bag contains the necessary screws, connectors and terminators.



The GSQ sensor elements must always be mounted in pairs (GSQ sensor transmitter with opposite GSQ sensor receiver) in the pit. The addresses of the GSQ sensor elements must always be set to the same value with its opposite transmitter/receiver by means of the **S3** rotary switch. Starting with the address 1, the address is increased by one with each following sensor pair.

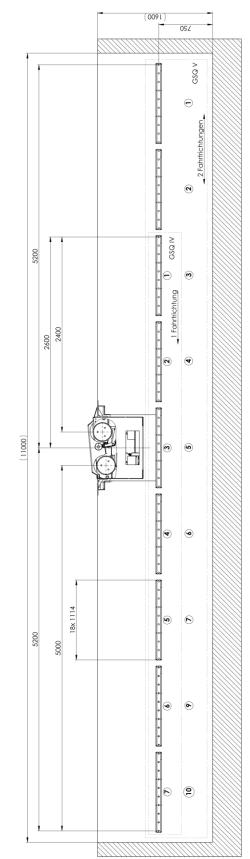
## NOTICE

Important exception: Address 8 must *not* be used! Address 7 must be followed by address 9.



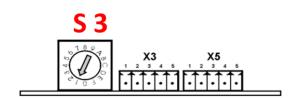
## Arrangement of GSQ I, II, and III sensor elements

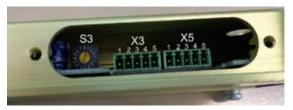
## Arrangement of GSQ IV and V sensor elements



#### Setting the address of the transmitter and receiver modules

Before mounting the transmitter and receiver modules, an address must be assigned to the individual modules (transoms). The address is set directly on the circuit board of the GSQ transmitter and receiver module. For this purpose the rotary switch **S3** must be turned to the respective address according to the position of the module.





#### Important:

#### Address 8 must not be used! Address 7 must be followed by address 9!

 f	Sensor pair	Address S3 GSQ trans- mitter	Address S3 GSQ receiver
	1	1	1
a n	2	2	2
	3	3	3
e x	4	4	4
i	5	5	5
t	6	6	6
i n	7	7	7
g		(8 – do not use)	(8 – do not use)
s	8	9	9
y	9	А	А
s t	10	В	В
е			

m is expanded to 8 or 9 transmitter and receiver modules, an additional 12V power supply must be installed in the control cabinet, which then takes over the supply of the GSQ transmitter and receiver modules!

The original power supply from the GSQ satellite module to the GSQ transmitter and receiver modules must then be disconnected!

• For connecting the power supply, see circuit diagram

The GSQ sensor modules must be mounted in the pit as shown below. Depending on whether the cable outlet of the GSQ sensor modules is at the bottom or at the top, make sure on which side the "GSQ SEND xxxx" or "GSQ EMPF xxxx" sensor modules are to be mounted. The individual sensors are connected with the supplied cable sets. Also, the cable outlets of the GSQ sensors must always be all down or all up. Preferably, all cable outlets should be downwards to ensure the tightness of the sensor modules.

For the connection between the first GSQ sensor modules and the GSQ safety module, a shielded data cable with 4x0.34 mm<sup>2</sup> is required, e.g. Helukabel TRONIC-CY (LiY-CY 4x0.34). The maximum length is 50 m.

The terminating resistor must be attached to each of the last GSQ sensor modules.

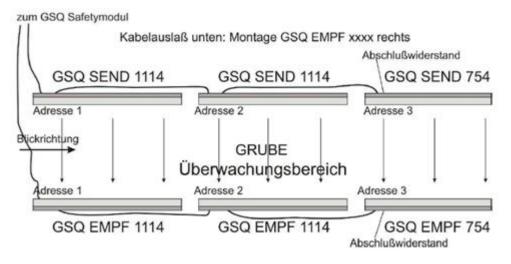
### Determination of the direction of view

The first thing to do is to determine the direction of view into the pit. This viewpoint results in the left and right assembly pit sides. The cable outlet of the first "GSQ EMPF xxx" module must point in the direction of the viewer.



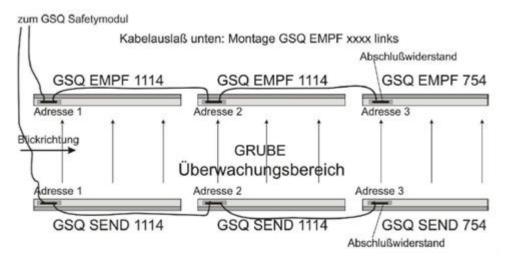
### Cable outlet downwards - "GSQ EMPF xxx" mounted on right side

All GSQ EMFP 1114 / GSQ EMFP 854 are to be mounted on the right side of the pit, starting from the viewing direction with GSQ sensor pair 1. All GSQ SEND 1114 / GSQ SEND 754 are to be mounted on the left side of the pit, starting with GSQ sensor pair 1.



### Cable outlet upwards - "GSQ EMPF xxxx" mounted on left side

All GSQ EMFP 1114 / GSQ EMFP 854 are to be mounted on the left side of the pit, starting from the viewing direction with GSQ sensor pair 1. All GSQ SEND 1114 / GSQ SEND 754 are to be mounted on the right side of the pit, starting with GSQ sensor pair 1.

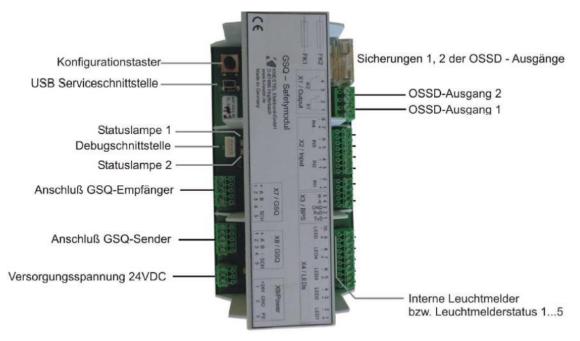


#### GSQ sensor terminating resistor

The enclosed plug with the terminating resistor must be connected to the last GSQ sensor element (transmitter and receiver).

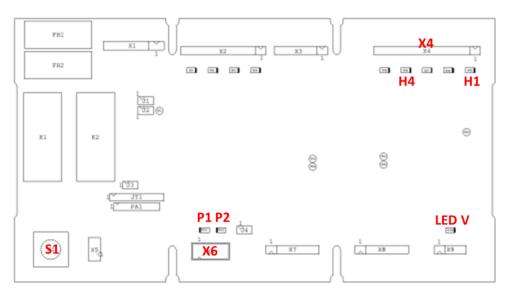


#### **Connector overview**



The GSQ safety module provides two decoupled relay outputs (OSSD) via the two OSSD outputs (Output Signal Switching Device, X1.1-4). Due to the redundant design with positively driven and monitored contacts, a safe shutdown signal is provided by the GSQ safety module. On the brake tester side, these two signals can be used for safe disconnection of the motors. The relays on the GSQ safety module are closed when there is no hazard. In all other cases (body > 25 cm detected, power failure, internal error in the central module) the relay contacts are open. The switching contacts of the relays are protected by the fuses FK1 and FK2. On the side of the brake tester, care must be taken to ensure safe disconnection.

### 12.14.5 Commissioning/Configuring the GSQ sensors Structure of GSQ safety module



#### INFO

- The **V LED** lights up as soon as the supply voltage (24V DC) is applied to the GSQ safety module
- The **H1** LED at **X4** flashes as soon as the GSQ safety module is in commissioning mode
- The H1 LED at X4 lights up as soon as the GSQ safety module is ready

### 12.15 Brief Instructions for Commissioning

• Initial situation: Test stand is switched off ("Main switch OFF")

Off = O		An = 🌑		Flashing = <b>*</b>	
Step	Process		LE D on X6	Comment	Section
1.	<b>Press and hold S1</b> (approx. 10s), switch on test stand until LED P2 flashes			Start commissioning program	c)
٦	Automatic check of the bus connection, readout of the participants	0	*	Error: LED P1 & P2 flash alternately, then continue with "1.9 Faults" Correct: LED P1 & P2 flash simultaneously, then continue with step 2.	d)
2.	Number of transmitter and receiver modules is output (blinking pattern)	*	*	Correct: Number of signaled module pairs matches the number of installed module pairs. e.g.: 5x flash, pause = 5 pairs Error: Number does not match; continue with "1.9 Faults"	d)
3.	S1 briefly press	0	*	Confirms the number of module pairs	d)
4.	<b>Start</b> verification program by <b>interrupting</b> the 1. Pair of eyes on the 1. Module (address 1) -Interrupt all pairs of eyes from the 1st to the last module -cover the last and the first eye simultaneously for 3s when two modules pass.	*	*	Checking the order: -P1 indicates by flashing how many modules have been detected -Complete checking of a module within approx. 30s. If timeout occurs, LED P1 & P2 start flashing alternately, continue with "1.9 Faults"	e)
٦	After covering the last pair of eyes, the configuration is finished.			LED P1 & P2 light up	f)

Off = O		An = 🌑		Flashing = <b>*</b>	
Step	Process		LE D on X6	Comment	Section
5.	<b>Press S1 for 5s</b> until LED P1 & P2 are off	0	0	Saving the configuration	f)
6.	After saving, <b>switch off the</b> test stand ("Main switch OFF")				
7.	Switch the test stand on again for operation ("Main switch ON")	0	0	-LED V lights up as soon as the supply voltage is applied to the GSQ safety module. -LED H1 at X4 lights up and the test stand is ready for operation	
8.	- Cover each individual eye of the transmitter/receiver modules - check whether the pit safety device trips			Checking the configuration	

### a) Starting the commissioning program

Initial situation: Test stand is switched off "Main switch OFF"

- Press and holdS1
- Switch on test stand (LED P1 & P2 light up)
- after approx. **10s** LED **P2** starts flashing.
- S1 release
- b) Checking the GSQ transmitter and receiver modules
- The P2 LED flashes while the bus connection is checked for connected modules.
- If an error is detected, LEDs P1 & P2 flash alternately. Continue with "g) Faults
- After the successful check of the bus connection, the status lamps **P1 & P2** start flashing simultaneously.
- The flashing indicates how many transmitters and receivers have been found.
- e.g.: Status lamp **P1 & P2** flash **5x**, then a pause = 5 module pairs detected.
- If the signaled number (blink code) matches the actual number of transmitter and receiver modules installed, press **S1** briefly to confirm the number.
- If the blink code signals an incorrect number, continue with "g) Faults".

- c) Checking sequence GSQ transmitter and receiver modules
- After confirmation with **S1**, the P2 status lamp flashes, the **P1** status lamp remains off until the start of the verification program.
- The verification program starts automatically as soon as the first eye of the first module is interrupted. The other sensors, starting with the first pair of eyes of the first module, must now be covered continuously (by your own body or a suitable object) until the last module.
- When transitioning two modules, the last eye of the current module and the first eye of the next module must be covered simultaneously for approx. **3s**.
- LED P2 flashes continuously and LED P1 flashes according to the modules passed through:

1x first module, 2x second module ..

- A module must be run through within approx. 30s.
   If timeout occurs, LED P1 & P2 flash alternately, then continue with "g) Faults"
- After the last eye has been covered on the last module, the verification program is automatically terminated. The LED **1&2**is lit.
- d) Saving the configuration
- To save, press and hold **S1** for approx. **5s** until the LEDs **P1 & P2** go out.
- After saving, de-energize the GSQ safety module ("main switch OFF").

 $\Rightarrow$  Configuration is finished

- If the test stand is switched on again ("Main switch ON")
- **LED V** lights up as soon as the supply voltage is applied to the GSQ safety module

LED H1 at X4 lights up and the test stand is ready for operation

### Checking the configuration

• Cover each individual eye of the transmitter/receiver modules and check whether the pit safety device trips.

#### e) Errors

If the P1 & P2 LEDs flash alternately, an error has occurred.

The LED H4 at X4 outputs a corresponding error code, see section "Error Code List".

If 8 or more modules are connected, but one module less is displayed than signaled by the blink code, the setting of all addresses must be checked. Make sure that address 8 has been omitted, see "**Setting the address of the transmitter and receiver modules**"!

The following things must be checked in case of malfunctions:

#### **ATTENTION:**

Always carry out troubleshooting with the test stand disconnected from the power supply (main switch OFF!)

- Check address setting on rotary switch S3 GSQ transmitter and receiver.
- Check wiring to transmitter and receiver modules.

- Check the terminating resistors.
- Check that the connecting wires are firmly seated.

If the error has been found and corrected, perform the configuration again.

### 12.15.1 Error Code List

Error code	Error description	Solution		
Error codes in normal operation				
1 to 15	Error GSQ sensor transmitter and/or GSQ sensor receiver (address)	Check switch setting of S3 in the GSQ sensor transmit- ters and receivers, also check all cable connections for tight fit and correct wiring, or notify Service		
Error codes i	in the teach-in program			
16	The address setting is not in order from 1 to the number of GSQ sensor transmitters / GSQ sensor receivers	Check switch setting of S3 in the GSQ sensor transmit- ters and receivers, also check all cable connections for tight fit and correct wiring, or notify Service		
17	No GSQ sensor receivers were detected	Check all cable connections for tight fit and correct wiring or notify Service		
18	The address setting does not start at setting 1	Check switch settings of S3 in the GSQ sensor transmit- ters and receivers, also check all cable connections for tight fit and correct wiring, or notify Service		
19	Sensor eye count does not match stored value	Perform installation proce- dure again, or notify Service		
20	System error configuration	Notify Service		
21	System error input 1	Notify Service		
22	System error input 2	Notify Service		
23	System error input 3	Notify Service		
24	System error input 4	Notify Service		
25	System error relay	Notify Service		
26	System error contactor monitoring	Notify Service		
27	System error voltage 24V	Notify Service		

Error code	Error description	Solution
28	System error voltage 10V	Notify Service
29	System error voltage 5V	Notify Service
30	System error self test	Notify Service
31	System error WDG	Notify Service
32	System error CPU	Notify Service
33	System error ROM	Notify Service
34	System error RAM	Notify Service
35	System error stack	Notify Service
36	System error WDG manual	Notify Service

### 12.16 Wiring Harness Extension

The standard length of the pluggable wiring harness is 14 m for the passenger car test stand (C\_MBT 3.5 - 5.0) and 24 m for the truck test stand (C\_MBT 8.0 - 20.0). The associated empty conduits in the foundation between roller set and control cabinet may be a maximum of 10 m (car test stand) and 20 m (truck test stand).

The cross-section of the motor cable wires is 1.5 mm<sup>2</sup> for the passenger car test stand and 4.0 mm<sup>2</sup> for the truck test stand. The optional cable harness extension for the 24-meter car test stand has a 1.5 mm<sup>2</sup> cross-section.

The maximum length of the CAN data cable should not exceed 35 m.



## WARNING

The loop resistance measurement/assessment must take into account, among other things, the upstream customer electrical protective device and the electrical protective devices installed in the control cabinet for the motor cables by a competent electrician. National standards and regulations must be observed.

### 12.17 Drive-out Aid, Static Brake (Mechanical Motor Brake)

#### 12.17.1 Description

The electromechanical motor brake enables easy and convenient drive-out from the roller set. In the process, the test rollers are held and secured against rotation when the test stand motors are deactivated. This function is also active when the test stand is de-energized and switched off.

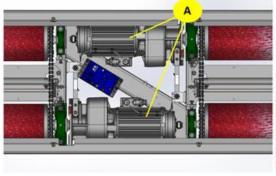
#### 12.17.2 Structure of Motor Counter Bearing, Compact Test standes

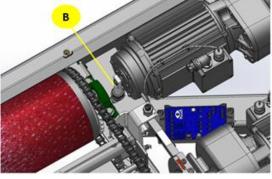
Since the motor has a longer design in a static brake, the motor counter bearing must be mounted in the second mounting hole.

### NOTICE

The motor counter bearing must be adjusted in height so that no distortions come onto the motor.

В





A Motor with mechanical brake

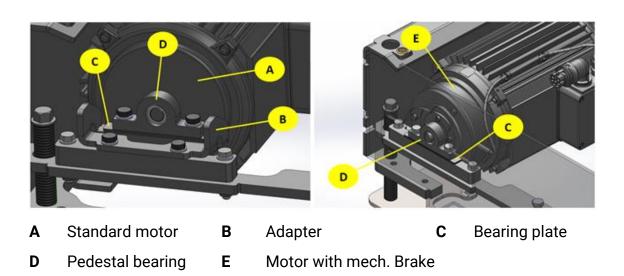
Motor counter bearing Compact

#### 12.17.3 Structure of Motor Counter Bearing, Split Test standes

The motor counter bearing of standard motor and motor with mechanical brake differs only at the adapter. This is not necessary with the extension aid option due to the longer design of the motor.

### NOTICE

The motor counter bearing must be adjusted in height so that no distortions come onto the motor. For this purpose, the pedestal bearing is underlaid with shims as required.



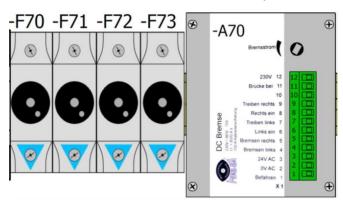
## 12.18 Drive-off Aid, Static Brake (DC brake)

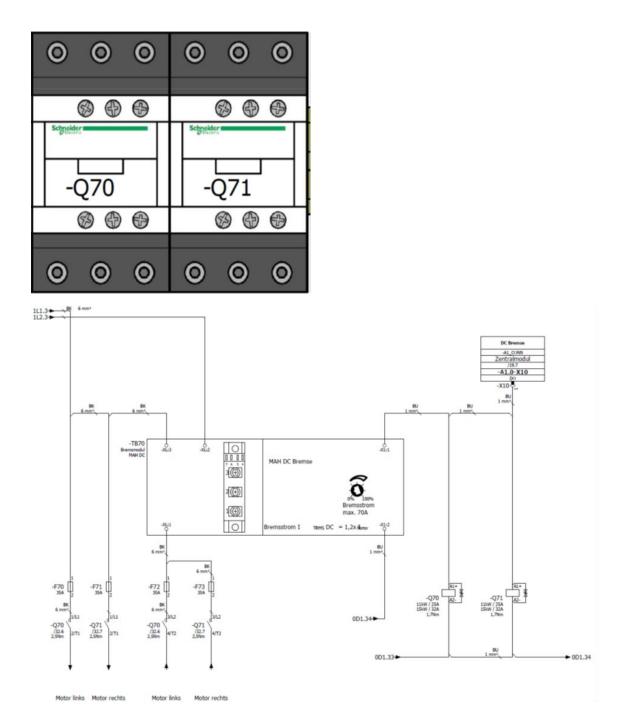
#### 12.18.1 Description

The DC brake (-A70) enables easy and convenient drive-off from the roller set. In the process, the test rollers are held against rotation when the test stand motors are deactivated. This is done by phase rectification and thus a restraining DC field in the motor winding.

Output A1 on the central module ZM (-X10:1) controls the brake contactors motor left (-Q70) and motor right (-Q71) as well as the brake module (-A70) when braking is required.

Fuses -F70 to -F73 are used for line protection during DC braking.





#### 12.18.2 Configuration



# DANGER

Risk of death or injury from electric shock! The braking current may only be adjusted by an authorised electrician. Pay attention to live parts.

A True RMS DC current clamp is required for professional adjustment of the braking current.

Attach the current clamp to a single wire of a motor cable. Use the setting potentiometer on the front panel of the DC brake module to set the required braking current using a screwdriver. Check braking current also at the second motor cable.

The braking current to be set is 1.2 times the rated motor current. The rated motor current is indicated on the nameplate of the installed motor.

### 12.19 Motorcycle Mode (Roller Cover with Sensor)

#### 12.19.1 Description

For two-wheel testing, the roller cover provided for this purpose must be firmly mounted on the brake tester for safety reasons. The motorcycle mode can be switched to active via a rotary switch on the operating terminal (in the burger menu). The roller cover is queried via a sensor and the motorcycle mode is enabled. Only one half of the test stand is active during the two-wheel test.

### NOTICE

• The motorcycle mode is also possible in conjunction with the overrun and lowering threshold.

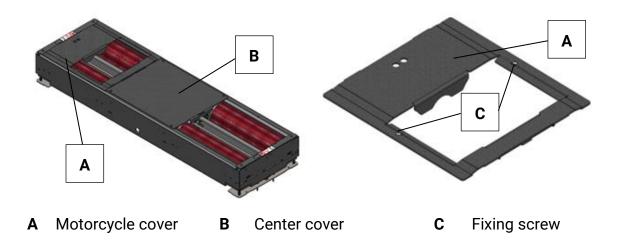
With this combination, the light barrier is interrupted by the roller cover and the overrun and lowering threshold remains in the lowered position!

 The COMFORT interface module is required to operate the motorcycle cover!



## CAUTION

- Before mounting the roller cover, it is imperative that the pneumatic supply line is depressurized. Risk of jamming!
- When handling the roller set cover, be sure to use the grip holes provided. Danger of pinching and crushing!



#### 12.19.2 Scope of Delivery

Motorcycle cover with locking pins

#### 12.19.3 Technical Data

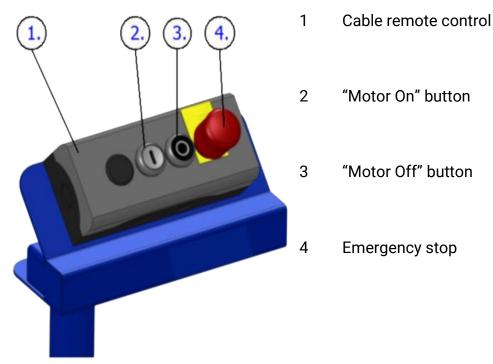
• Dimensions:

- W220: L x W x H approx. 720 x 660 x 60 mm
- W250: L x W x H approx. 885 x 660 x 60 mm
- W280: L x W x H approx. 1025 x 660 x 60 mm
- Width of test opening 350 mm
- Motorcycle cover made of diamond tread plate for anti-slip reasons
- Weight:
  - W220: approx. 15 kg
  - W250: approx. 20 kg
  - W280: approx. 24 kg

#### 12.19.4 Installation / Commissioning

- 1 Depressurise the drive-over and lowering thresholds.
- 2 Tap threads for fastening the two locking pins into the motorcycle cover (2xM8).
- 3 Screw in and tighten the locking bolts.
- 4 Position motorcycle cover between bearing cover and centre cover with as little play as possible. If necessary, loosen the bearing cover and move it towards the motorcycle cover.
- 5 Re-establish the compressed air supply to the drive-over and lowering thresholds.

## 12.20 Cable Remote Control for Motorcycle Mode



### 12.21 Roller Heating

#### 12.21.1 Description

The roller heater protects the test and sensing rollers from icing during winter operation.

#### NOTICE

- A separate installation plan must be requested in conjunction with a driveover and lowering threshold!
- The roller heating is not possible in connection with a roller set lifting!



## WARNING

The roller heater provides a source of heat. There is a danger of burns due to direct or indirect contact!



A Roller heating

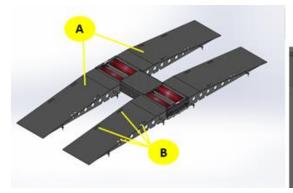
### 12.22 Drive-on Ramp Set for Above-Ground Operation

#### 12.22.1 Description

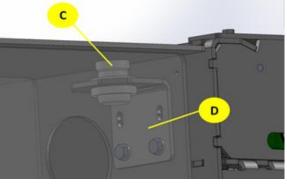
The drive-up ramp set is suitable for above-ground operation and can be used on the drive-up and/or drive-down side.

### NOTICE

• The drive-up ramp set cannot be used in conjunction with the static/dynamic weighing device, the roller heater and the drive-over and lowering threshold.



- A Access ramp
- **C** Fixing bolt



- B Transport cutout
- D Bracket

### 12.22.2 Technical Data

- L x W x H 2500 x 850 x 270 mm
- Weight per ramp approx. 170 kg
- Axle load max. 4000 kg

#### 12.22.3 Installation

The ramps are fixed by means of fixing bolts and the brackets mounted on the test stand.

If additional drive-over ramps are used, the drive-on ramp is attached to them using the same system.

In addition, the ramps can be fixed to the ground by means of four anchor rods.

#### NOTICE

• When transporting/placing the ramps, it is essential to use a suitable 4strand chain sling and the cutouts provided in the ramps for this purpose!



## CAUTION

• Wear personal protective equipment when transporting/placing the ramps!

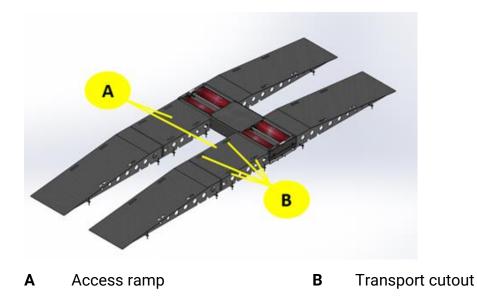
### 12.23 Drive-over Ramp Set

#### 12.23.1 Description

The drive-over ramp set is suitable for above-floor operation and can be used on the drive-up and/or drive-down side. The drive-over ramp set has a modular design and can thus be built several times in succession to create a level vehicle parking surface.

#### NOTICE

• The drive-over ramp set cannot be used in conjunction with the static/dynamic weighing device, the roller heater and the drive-over and lowering threshold.



#### 12.23.2 Technical Data

- L x W x H 1200 x 850 x 270 mm
- Weight per ramp approx. 120 Kg
- Axle load max. 4000 Kg

#### 12.23.3 Installation

The ramps are fixed by means of fixing bolts and the brackets mounted on the test stand. In addition, the ramps can be fixed to the ground by means of four anchor rods.

### NOTICE

• When transporting/placing the ramps, it is essential to use a suitable 4strand chain sling and the cutouts provided in the ramps for this purpose!



# CAUTION

Wear personal protective equipment when transporting/placing the ramps!

## 12.24 Universal Console C\_MCD

Controls in the universal console:

In case the control cabinet is located far away from the test stand, the control elements can be dismounted from the control cabinet door and placed laterally according to the following arrangement in the universal console C\_MCD:



The connection to the controls in the universal console corresponds to an extension.

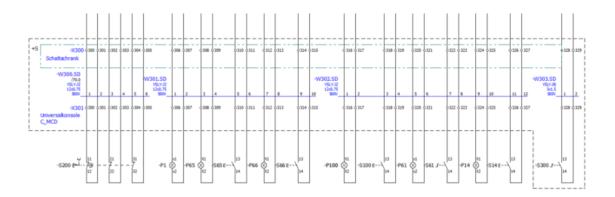
All wires and connections leading to the control elements in the door are placed on an additional terminal strip in the control cabinet door, with cables extended to the universal console. Another terminal strip is placed in the universal console to clamp the incoming cables and connect the controls in the side panels.

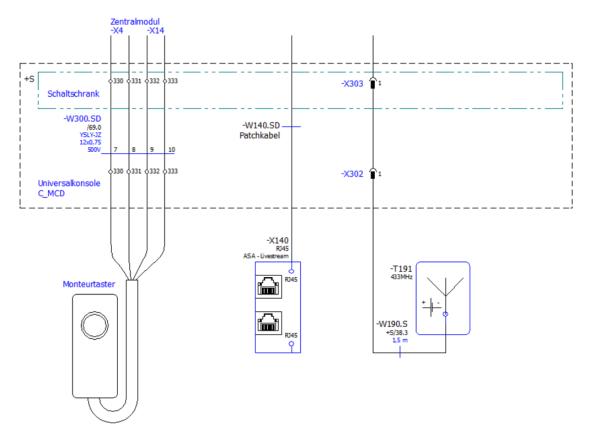
The ASA socket is connected with a longer LAN cable, the antenna is extended with its own BNC cable and appropriate adapters.

In addition, the assembly pushbutton must be extended, but the extension ends on the terminals in the universal desk. A key switch must be installed to cut off the power supply to the central module.

The key switch is used exclusively for activating the ZM and must not be used for switching off under load.

The maximum distance between the control cabinet and the universal console is limited to 15 m.





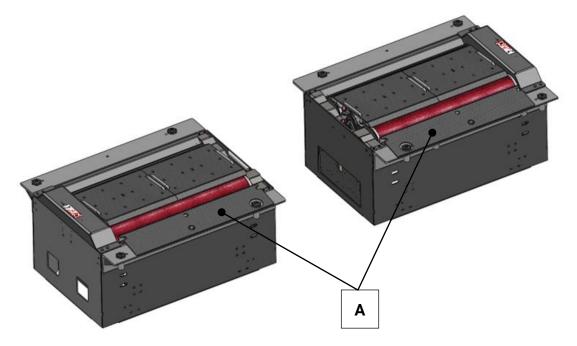
## 12.25 Drive-on Aid C\_MBT S 13.0/15.0 R100 MU

#### 12.25.1 Description

For better accessibility of the brake tester, the drive-on aid is optionally available. This must be firmly screwed to the frame.

#### Info:

The drive-on aid is not possible in conjunction with roller set lift VZ 935264.



A Drive-on aid

#### 12.25.2 Scope of Delivery

- Drive-on aid (2 pieces)
- 6x hexagon bolt M10x16
- 6x washer A10.5
- 2x hexagon head screw M16x25
- 2x washer A17

#### 12.25.3 Technical Data

- Dimensions: L x W x H approx. 980 x 202 x 40 mm
- Weight: approx. 11.5 kg per drive-on aid

### 12.26 Roller Set Cover C\_MBT S 13.0/15.0/18.0/20.0

#### 12.26.1 Description

For better traversability of the brake tester, the roller set cover is optionally available. The individual covers are placed in the roller prism and can be driven over with the respective permissible axle loads.



A Roller set cover

#### 12.26.2 Scope of Delivery

- C\_MBT S 13.0/15.0 R100: 4 piece
- C\_MBT S 18.0/20.0 R115: 4 piece
- C\_MBT S 18.0/20.0 R160: 6 piece

#### 12.26.3 Technical Data

• Dimensions:

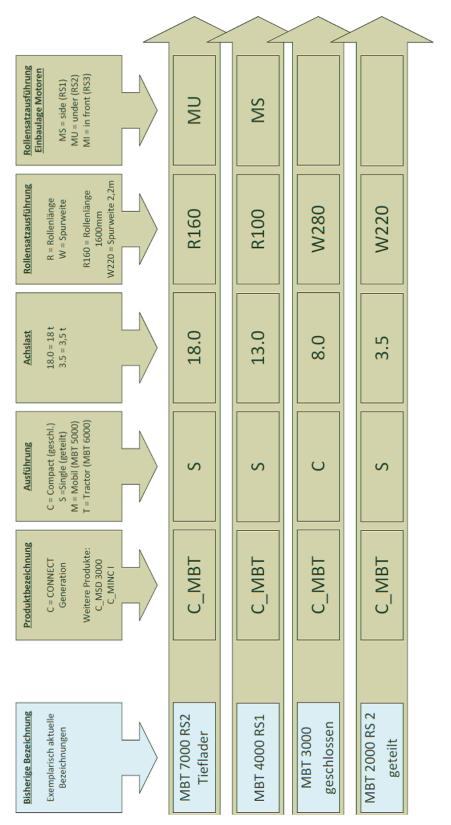
C_MBT S 13.0/15.0 R100	L x W x H approx. 490 x 460 x 130 mm
C_MBT S 18.0/20.0 R115	L x W x H approx. 550 x 500 x 150 mm
C_MBT S 18.0/20.0 R160	L x W x H approx. 550 x 500 x 150 mm / L x W x H approx. 450 x 500 x 150 mm

• Weight:

C_MBT S 13.0/15.0 R100	4x approx. 21 kg
C_MBT S 18.0/20.0 R115	4x approx. 23.5 kg
C_MBT S 18.0/20.0 R160	4x approx. 23.5 kg / 2x approx. 19.5 kg

## 13 Annex

### 13.1 Naming Convention



# 13.2 Declaration of Conformity

See following page(s).

Original-EG-Konformitätserklärung Original EC Declaration of Conformity

CE023001-de-en



#### MAHA Maschinenbau Haldenwang GmbH & Co. KG

erklärt hiermit als Hersteller in alleiniger Verantwortung, dass nachstehend bezeichnetes Produkt in Konzeption und Bauart den grundlegenden Sicherheits- und Gesundheitsanforderungen der hier genanten Richtlinien entspricht.

Bei Änderungen am Produkt, die nicht von oben genannter Firma genehmigt wurden, verliert diese Erklärung ihre Gültigkeit. herewith declares as a manufacturer its sole responsibility to ensure that the product named hereafter meets the safety and health regulations both in design and construction required by the directives stated below.

This declaration becomes void if any change is made to the product that was not approved by named company beforehand.

Seriennummer | Serial Number

#### Typ | Model

C\_MBT C/S 3.5 W220/W250 C\_MBT C/S 4.0 W220/W250 C\_MBT C/S 5.0 W280 C\_MBT C 13.0 W280 C\_MBT S 13.0 R100 MS/MU C\_MBT S 15.0 R100 MS/MU C\_MBT S 18.0 R115 MS/MU/MI C\_MBT S 18.0 R160 MS/MU C\_MBT M 18.0 W301 C\_MBT M 18.0 W360 C\_MBT S 20.0 R115 MU/MI C\_MBT S 20.0 R160 MU

#### Bezeichnung | Designation

Rollen-Bremsprüfstand

Optionen: Achsdämpfungsprüfstand C\_MSD C/S 2.5 W220/W250 C\_MSD C/S 13.0 W220/W250

> Radlauftester C\_MINC 2.5/4.0/18.0

#### **Richtlinien | Directives**

2006/42/EG; 2014/30/EU; 2014/53/EU (Option)

**Roller Brake Tester** 

Options: Shock Absorber Tester C\_MSD C/S 2.5 W220/W250 C\_MSD C/S 13.0 W220/W250

> Side-Slip Tester C\_MINC 2.5/4.0/18.0

2006/42/EC; 2014/30/EU; 2014/53/EU (Option)

#### Normen | Standards

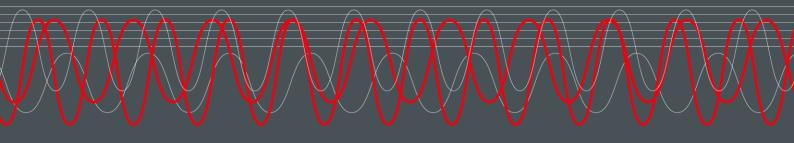
EN 60204-1:2018; EN ISO 13849-1:2016-06; EN ISO 12100:2010

#### Bevollmächtigter für die Zusammenstellung der technischen Unterlagen Person Authorised to Compile the Technical File

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Haldenwang, 2024-02-01

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