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OPERATING AND INSTALLATION MANUAL

Air suspension scale

# LFW-ESP-DIN

Model: DIN

| | |
|---|---|
| **Document** | EA-BA-31102026-LFW-ESP-DIN-EN |
| **Device** | LFW-ESP-DIN |
| **Version** | V311026 |
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# 1 General description

The LFW-ESP-DIN is a stand-alone weighing system designed for installation in a DIN slot in the truck cab. The display can also show the values of a trailer received via Wi-Fi (see section 2.3). It is operated with the four keys on the front of the unit.

As a rule, the unit is configured for the vehicle's equipment before delivery, so the fitter does not have to change the configuration.

If the system is to be transferred to another vehicle or, for example, the warning weights have to be adapted to legal requirements, this is only possible via the app.

## Connectable sensors

In the basic version, the display unit is supplied with two pressure sensors. The following sensors can be connected at most:

| Quantity | Sensor type | Examples / range |
|---|---|---|
| 5 | Pressure sensors | 0 – 10 bar |
| 4 | Analogue sensors | 0 – 5 V (displacement sensor, hydraulic pressure sensor, angle sensor) |
| 1 | Strain gauge sensor (DMS) | — |
| 5 | Angle sensors (gyro) | RS485 |

**Note**

Depending on the vehicle configuration, the sensor equipment must be adapted to the vehicle. Please state the exact vehicle configuration when ordering.

**Connection with M5 and smartphone – app “LFW_V2”**

An M5 as well as Android and iOS smartphones can be connected to the system. All displays and settings can also be made via the smartphone.

The app “LFW_V2” can be downloaded free of charge from the Google Play Store (Android) and the Apple App Store (iPhone).

Operation of the app is described in a separate manual.

**Note on the display language**

The display of the LFW-ESP-DIN shows its texts in German only. In this manual, German display texts are given as they appear on the display, followed by their English meaning in brackets where needed.

# 2 Operation

## 2.1 Control keys

*Fig. 1 – Control keys on the display*

**Short key press**

| Key | Label | In the display | In the menu |
|---|---|---|---|
| Key 1 | ← SET | Tare | Back.<br>Calibration menu: skip axle. |
| Key 2 | ▲ FID | Display brighter | Increase value.<br>Calibration menu: “loaded”. |
| Key 3 | ▼ AID | Display darker | Decrease value.<br>Calibration menu: “unloaded”. |
| Key 4 | ⏻ OK | Display on/off | Confirm value. |

**Press key for longer than 2 seconds**

| Key | Label | Function |
|---|---|---|
| Key 1 | ← SET | Open the calibration menu. |
| Key 2 | ▲ FID | Set the company ID (FID) (for the connection to the trailer). |
| Key 3 | ▼ AID | Set the trailer ID (AID) (for the connection to the trailer). |
| Key 4 + key 1 | ⏻ OK + ← | Hold key 4, at “OTA” add key 1: operating mode and network key (sect. 2.4). |
| Key 4 + key 2 | ⏻ OK + ▲ | Hold key 4, at “OTA” add key 2: zero the sensors (SensReset, sect. 5.1). |

*Labels: FID = company ID, AID = trailer ID (see section 2.3 for an explanation).*

## 2.2 Display during operation

During operation, the total weight and the axle loads of the vehicle are displayed automatically.

If a trailer is connected, the total weight and the axle loads of the trailer are also displayed.

**Brightness:** In the basic display, the brightness of the display is adjusted with the two middle keys: key 2 (▲) brighter, key 3 (▼) darker.

## 2.3 Connection to the trailer (company ID and trailer ID)

Truck and trailer exchange their weight data via their own radio link (Wi-Fi). So that the truck finds “its” trailer, both are given the same identifier. Think of it like two radios: they can only talk to each other when they are set to the same channel.

The identifier consists of two parts:

- **Company ID (FID):** forms the first two digits of the network name, adjustable from 1 to 99
- **Trailer ID (AID):** forms the last two digits of the network name, adjustable from 1 to 99

From both together, the unit forms the name of the Wi-Fi network (SSID). It always begins with **`LFW_`**, followed by four digits, e.g. **`LFW_0102`** for company ID 01 and trailer ID 02.

> **Important**
>
> All devices of a truck combination (display unit in the truck, measuring unit in the trailer, M5, smartphone) must be in the same network. Truck and trailer must therefore have the same company ID (FID) and the same trailer ID (AID). Only then are the trailer weights shown in the truck.

### How to set up the network

- Always set up the network starting from the trailer.
- All trailers of a company are given the same company ID and each its own trailer ID (preferably in ascending order).
- When changing trailers, only the trailer ID on the truck is then changed to that of the new trailer. This makes the change quick.

| Combination | Truck | Trailer | Wi-Fi network (SSID) |
|---|---|---|---|
| Truck 1 | FID 01, AID 01 | FID 01, AID 01 | LFW_0101 |
| Truck 2 | FID 01, AID 02 | FID 01, AID 02 | LFW_0102 |

**How to set the identifier:**

- Company ID: press key 2 (▲ FID) for longer than 2 seconds.
- Trailer ID: press key 3 (▼ AID) for longer than 2 seconds.

On delivery, the company ID and trailer ID are set to 10. This setting should be adapted to the company during initial commissioning.

> **Note**
>
> For truck, trailer, M5 and smartphone to communicate with each other, the operating mode and the network key must also be set correctly (section 2.4).

> **Optional equipment: external antenna**
>
> For a greater radio range, e.g. if poor reception of the trailer data is to be expected, the unit can be equipped with an external antenna.
>
> For this, the unit is modified at the factory: the internal antenna is omitted and the unit is given a connection for the external antenna. Therefore, please specify the external antenna when ordering.

## 2.4 Setting the operating mode and network key

Each device must be set to where it is installed and what role it has in the network (operating mode). The unit in the truck works as an access point (AP): it sets up the Wi-Fi network, similar to a Wi-Fi router at home. All other devices (measuring unit in the trailer, M5, smartphone) connect to this unit.

**Operating modes (display “AP/Station”)**

| Value | Installation location | Meaning |
|---|---|---|
| 1 | Truck (access point) | The unit is installed in the truck and works as an access point. Other devices (trailer, M5, smartphone) connect to this unit. |
| 2 | Trailer | The unit is installed in the trailer and connects to the unit in the truck. A direct connection to the smartphone is not possible in this operating mode. |
| 3 | Trailer (access point) | The unit is installed in the trailer and works as an access point itself. A smartphone can connect directly to this unit. The values are shown on the smartphone as trailer. |
| 4 | Wi-Fi off | Wi-Fi is switched off. There is no communication with other devices. |

On the LFW-ESP-DIN in the truck cab, operating mode 1 is usually set.

**Network key (code)**

The network key encrypts the Wi-Fi connection. It can be set from 0 to 999. At 0, the connection is not encrypted. All devices of a truck combination must have the same network key.

**How to change the settings**

1. Press and hold **OK** (key 4) until “OTA” appears on the display.
2. Keep holding key 4 and at the same time press **SET** (key 1). “AP/Station” appears on the display.
3. Select the operating mode 1 to 4 with key 2 (▲) or key 3 (▼) (see table above).
4. Press **OK** (key 4) to move on to the network key.
5. Set the network key 0 to 999 with key 2 (▲) or key 3 (▼).
6. Save with **OK** (key 4).

> **Connecting a smartphone with an active network key**
>
> When connecting with the smartphone, you are asked for the Wi-Fi password. To get it, pad the network key with leading zeros to 8 digits.
>
> Example: network key on the unit = 25 → password on the smartphone = 00000025. With the M5, the padding is done automatically.

> **Example for a truck combination**
>
> Unit in the truck: operating mode 1, network key e.g. 25
>
> Measuring unit in the trailer: operating mode 2, network key 25
>
> In addition, the same company ID and trailer ID on both units (section 2.3).

## 2.5 Tare

The **SET** key (key 1) sets the payload display to zero. This is normally done with the vehicle empty.

## 2.6 Overload

If a weight exceeds the set overload threshold, the value concerned is shown in yellow.

> **Note**
>
> The overload threshold can be set via the smartphone app.

## 2.7 Display in case of sensor failure

If a sensor fails, a red exclamation mark with the number of the sensor is shown instead of the weight on the axle to which this sensor is assigned.

| Example | Display on the 3rd axle |
|---|---|
| Sensors S3 and S4 are assigned to the 3rd axle; sensor S4 fails. | ! / 4 (in red) |

**Caution**

As long as a sensor failure is displayed, the weight of the axle concerned is not available. In this case, please contact customer service (section 7).

# 3 Installation

> **Caution: alignment of the sensors**
>
> Correct and precise alignment of the sensors is very important for the weighing system to work correctly. Even small deviations lead to incorrect weight readings.
>
> Therefore always mount the sensors exactly as described in this manual.

## Scope of delivery

Depending on the configuration, the scope of delivery includes:

- Display unit with built-in pressure sensors
- Mounting frame for the DIN slot
- for leaf-sprung axles: displacement sensor with linkage or angle sensors (gyro)
- T-connector with reducer and 4 mm air line
- Cable for the power supply
- Installation and operating manual

## 3.1 Display unit

The display unit is mounted in a free DIN slot (1-DIN) in the cab.

## 3.2 Power supply

The power supply is connected to terminal 15 (ignition) of the vehicle with the cable supplied:

| Cable no. | Connection |
|---|---|
| 1 | Terminal 15 |
| 2 | GND |

## 3.3 Sensor equipment of the vehicle

In principle, every control circuit of the suspension must be sensed. Which sensor is used depends on the suspension of the respective axle:

| Axle | Var. | Suspension | Sensor | Sect. |
|---|---|---|---|---|
| Front axle | 1 | Air | Pressure sensor in the display unit | 3.4 |
| Front axle | 2a | Leaf | Displacement sensor | 3.5 |
| Front axle | 2b | Leaf | Angle sensors (gyro) on the anti-roll bar | 3.6 |
| Front axle | 2c | Leaf | Angle sensors (gyro) on the spring leaves | 3.7 |
| Rear axles | 1 | Air | Pressure sensors in the display unit | 3.4 |
| Rear axles | 2 | Leaf | Angle sensors (gyro) on the wishbones | 3.8 |

How many sensors are needed:

- Front axle: one pressure sensor (air-suspended) or one displacement sensor or angle sensors (leaf-sprung).
- 2-axle vehicle: one sensor each on the left and right of the rear axle.

For 3-, 4- and 5-axle vehicles there are different requirements, depending on the vehicle manufacturer and equipment, as to where and how many sensors must be installed. Some examples:

| Vehicle | Sensors |
|---|---|
| 6×4 MAN, Mercedes, IVECO, DAF | 2 sensors left and right |
| 6×4 / 6×2 Scania | 1 sensor on the 2nd axle, 1 sensor on the 3rd axle |
| 6×4 / 6×2 Volvo | 2 sensors left / right on the 2nd axle, 2 sensors left / right on the 3rd axle |
| Tridem MAN, Mercedes | 2 sensors left / right on one of the drive axles and 2 sensors left / right on the tag axle |

> **Note**
>
> Which variant and how many sensors are installed results from the vehicle configuration. Please state the exact vehicle configuration when ordering.

## 3.4 Air-suspended axles: pneumatic connection

Applies to the front axle (variant 1) and the rear axles (variant 1). The pressure sensors are built into the display unit and therefore do not have to be mounted on the vehicle.

To supply the pressure sensors, a 4 mm plastic line must be laid from each air suspension control circuit to the display unit.

- The connection to the air suspension circuit is made with T-push-in fittings and a reducer to 4 mm.
- Connect the lines to the ports of the display unit as printed on the label of the display unit (S1, S2 ...).
- Suitable T-pieces are included with every installation kit.

## 3.5 Leaf-sprung front axle (variant 2a): displacement sensor

The displacement sensor is clamped to the underside of the frame with the universal clamp holder. The linkage connects the lever of the sensor to the axle and is attached, if possible, in the middle of the axle.

- Choose the location so that the sensor does not collide with any vehicle parts, even when the vehicle is fully compressed.
- Adjust the length of the linkage so that the lever does not “snap over” when the chassis is fully extended.

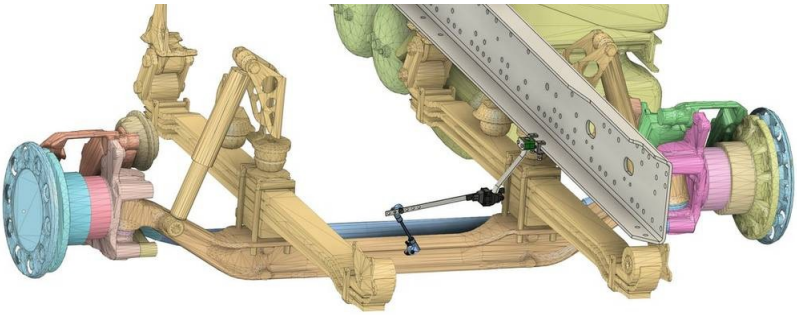

*Fig. 2 – Displacement sensor on the leaf-sprung front axle*

**Measuring range**

The measuring range of the sensor is 45° upwards and 45° downwards from the longitudinal axis.

## 3.6 Leaf-sprung front axle (variant 2b): angle sensors on the anti-roll bar

Two angle sensors (gyro) are used for indirect measurement of the spring travel on the front axle:

- **S0 – reference sensor:** mount on the vehicle frame, parallel to the measuring sensor S1.
- **S1 – measuring sensor:** mount centred on the torsion tube of the anti-roll bar with a hose clamp (parallel to the tube axis).

*Fig. 3 – Angle sensors S0 (frame) and S1 (anti-roll bar)*

**Important mounting instructions**

1. Avoid frame offsets: The reference sensor S0 must not be located in the area of frame bends or frame offsets, as the alignment of the sensor is not correct there and the measurement is falsified.
2. Check the alignment: Both sensors (S0 and S1) must be aligned transversely to the direction of travel. The cable outlets of S0 and S1 must point in opposite directions (antiparallel alignment for correct signal polarity).

## 3.7 Leaf-sprung front axle (variant 2c): angle sensors on the spring leaves

The angle sensors (gyro) are mounted with a holder directly on the spring leaves of the front axle, just in front of the spring eye.

**Mount the sensors crosswise**

1. The two sensors are mounted crosswise, i.e. diagonally opposite each other on the two spring leaves (see Fig. 4).
2. The cable outlets of the two sensors must point towards each other.

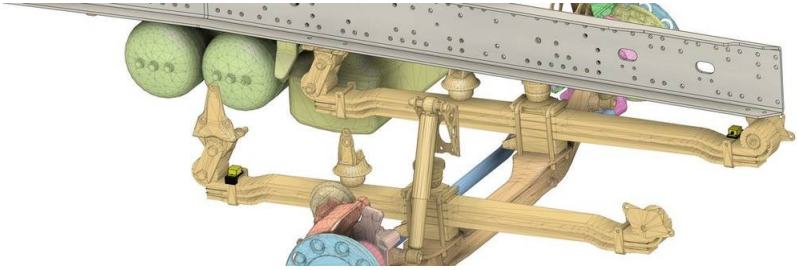

*Fig. 4 – Angle sensors on the spring leaves (overview)*

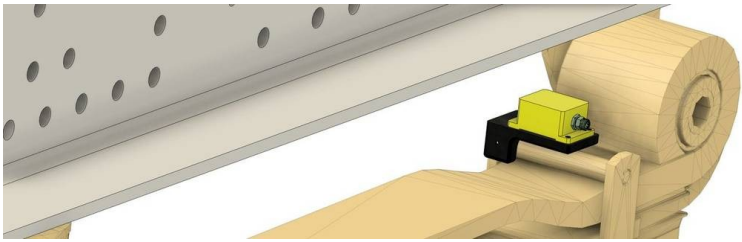

*Fig. 5 – Angle sensor with holder on the spring leaf (detail)*

## 3.8 Leaf-sprung rear axles (variant 2): angle sensors on the wishbones

The angle sensors S3 and S4 are mounted with hose clamps on the wishbones (triangular links) of the drive axles: S3 on the front drive axle, S4 on the rear drive axle.

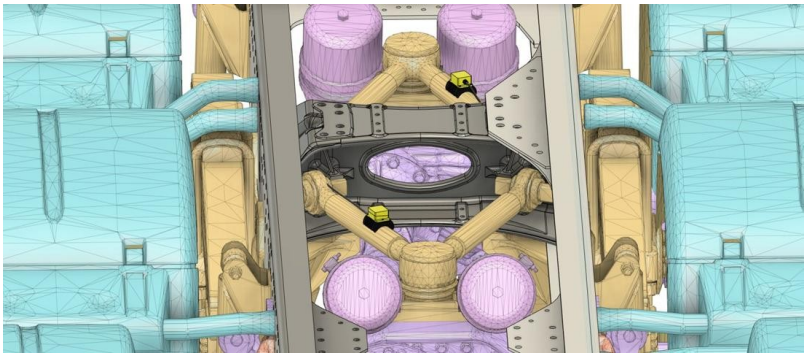

*Fig. 6 – Position of the angle sensors S3 and S4 on the wishbones (top view)*

**Mount the sensors as shown**

1. The cables of both sensors must point towards the cross member, i.e. towards each other.
2. The top of the sensors must be parallel to the road surface (transverse to the vehicle – horizontal). Check with a spirit level (see Fig. 7).

### Checking the horizontal alignment

Place a small spirit level on the sensor transverse to the vehicle. The sensor is correctly aligned when the air bubble is exactly in the middle. Only then tighten the hose clamps firmly.

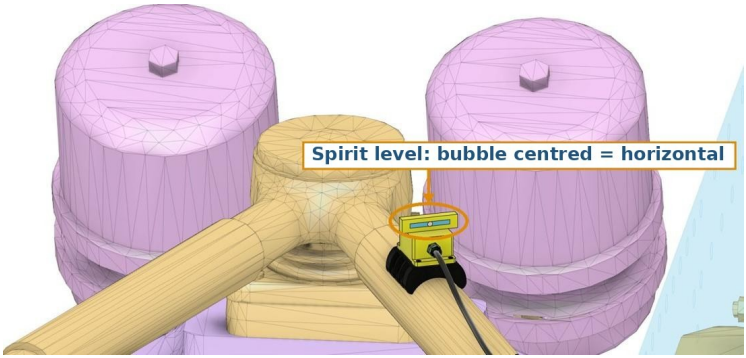


*Fig. 7 – Checking the horizontal alignment with a spirit level*

# 4 General notes on calibration

For the display unit to work correctly, each axle must be calibrated in the loaded and in the unloaded condition before commissioning.

To do this, determine the weight of each axle using axle weighing pads or a weighbridge. Immediately after weighing, enter the values into the display unit as described in section 5.

## Requirements

- Vehicle free of tension: parking brake released and gearbox in neutral.
- Vehicle stands on a level surface.
- Any lift axles or pusher and tag axles are lowered.

These requirements also apply to every weighing during operation.

The accuracy of the system depends essentially on the care taken during calibration and on the condition of the mechanical parts of the vehicle.

> **Note**
> For calibration in the loaded condition, the vehicle should be loaded as fully as possible.

> **Caution**
> The system is not approved for legal-for-trade (verified) weighing!

# 5 Calibration

## 5.1 Zeroing the sensors (SensReset)

After installation and before the first calibration, the sensors (displacement sensor or angle sensors) are brought into a defined state with the vehicle empty: the current sensor value is set to a fixed value.

1. Park the vehicle empty (see section 4 for the requirements).
2. Press and hold **OK** (key 4).
3. As soon as “OTA” appears on the display, also press key 2 (▲).
4. Confirm the following message “SensReset” *(sensor reset)* with **OK** (key 4).

> **Replacing a sensor**
>
> If a sensor has to be replaced during later operation, zeroing can be carried out again with the vehicle empty. A new calibration (section 5.2) is then not strictly necessary.

## 5.2 Calibration procedure

1. Press the **SET** key (key 1) for longer than 2 seconds. The calibration menu opens.
2. Select the load condition: key 2 (▲) for “loaded” or key 3 (▼) for “unloaded”.
3. Enter the previously determined weight of the 1st axle with the arrow keys. The value changes in 100 kg steps.
4. Confirm with **OK** (key 4). The value is saved and the menu jumps to the next axle.
5. Repeat steps 3 and 4 for all axles. After the last axle, the message **„Gespeichert“** *(saved)* appears.

### Skipping an axle

If the value of an axle is not to be saved, jump to the next axle with key 1. Only the axles confirmed with OK are saved.

### Ready for operation

The system is only ready for operation once the calibration has been carried out in both the unloaded and the loaded condition.

The order (loaded first or unloaded first) does not matter.

The data remains stored even when the display unit is disconnected from power.

# 6 Technical data LFW-ESP-DIN

| Feature | Value |
|---|---|
| Power supply | 12/24 V, terminal 15 |
| Current consumption in operation | < 100 mA |
| Current consumption in standby | 20 mA |
| Installation size | 1-DIN, 180 × 50 mm |
| Display | 2.8″ TFT display |
| Display language | German |
| Pressure sensors | max. 5 pressure sensors 0 – 10 bar |
| Analogue sensors | max. 4 analogue sensors 0 – 5 V |
| Strain gauge (DMS) | 1 strain gauge sensor (optional) |
| Angle sensors (gyro) | max. 5 angle sensors, RS485 (optional) |
| Communication | Wi-Fi, operating mode 1 – 4, network name LFW_<FID><AID>, network key 0 – 999 |
| Connection | M5, smartphone (Android and iOS) with the free app “LFW_V2” |
| Optional equipment | external antenna for greater radio range (factory option: antenna connection instead of internal antenna) |

# 7 Contact

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