BOSCHE

Smart shelf module
SHELF-i

Operating and Installation Manual

- Translation of the original -

(keep for future use)

Status: 2025-11-12

Bosche GmbH & Co. KG

Reselager Rieden 3
D-49401 Damme

Phone +49 5491 999 689 0
Fax +49 5491 999 689 9
Email info@bosche.eu
Web www.bosche.eu

This manual has been created on: 2025-04-09

Foreword

These operating and installation manual provide you with detailed information about the shelf module SHELF-i. It will instruct you on installation, connection and use.

These instructions contain safety instructions to guarantee safe use.

The manufacturer strives to improve their products on an ongoing basis. They reserve the right to carry out any and all modifications and improvements that they consider to be necessary. There is no obligation to retrofit already delivered load cells afterward.

Danger
Before using the shelf module, you must have read and understood the operating instructions and the safety regulations that they contain.

Note
Errors and omissions in the documentation reserved. If necessary, please inform the Bosche GmbH & Co. KG of any errors in the documentation. We would also be grateful for any suggestions for improvements that you may have.

The manufacturer's contact data is listed on the reverse of the title page. If you have any queries or problems, please contact the manufacturer without delay.

Note
If you have any questions for Bosche GmbH & Co. KG, please have the serial number to hand.

Table of contents

1 Safety

This chapter warns against possible risks when handling the load cell. The information for detection of risks contained in this chapter is intended to allow a save and correct operation.

It is important to read and adhere to this operating manual and particularly this chapter prior to operating this device.

1.1 For your safety

1.1.1 General

In addition to safety information, the operating manual includes:

- A general product description
- Information about installation and connection of the load cell
- Instructions to operate the load cell
- Maintenance and care instructions
- Troubleshooting and remedy instructions
- Technical data

Always keep this operating and installation manual and additional documents for your personnel at hand in the direct vicinity of the shelf module.

Always adhere to all information, notes, instructions and explanations contained in this manual! Avoid accidents caused by incorrect operations! Also adhere strictly to the valid legal regulations in addition to the safety instructions specified in this manual.

Prior to commissioning/start-up read the safety information/instructions and familiarise yourself with dangerous areas.

The load cell is constructed according to the current state of art and the valid safety regulations. However, there are risks in the event of incorrect operation or non-observance of the safety regulations:

- Danger to limb and life of operators, third persons and animals staying in the vicinity of the load cell.
- Danger to the load cell and other assets of the owner/user
- Danger to the efficient operation of the shelf module.

1.1.2 Safety symbols in this manual

The following symbols are used on all important positions in this manual. Particularly observe these notes and treat very carefully.

Danger
This note indicates the danger of injuries and/or danger to life, if specific behaviour rules are not observed.
When this symbol appears in the operating manual, please take all required safety measures.

Attention
This note warns against damage to assets as well as financial disadvantages and responsibility under criminal law (e.g. loss of the warranty, cases of third party risks, etc.).

Note
Important notes and information about efficient, economic and environmental friendly handling are specified here.

1.2 Intended use

The smart shelf module is used to determine the weight.

Any further use is considered as not in accordance with the intended use. The manufacturer does not assume any liability for resulting damage.

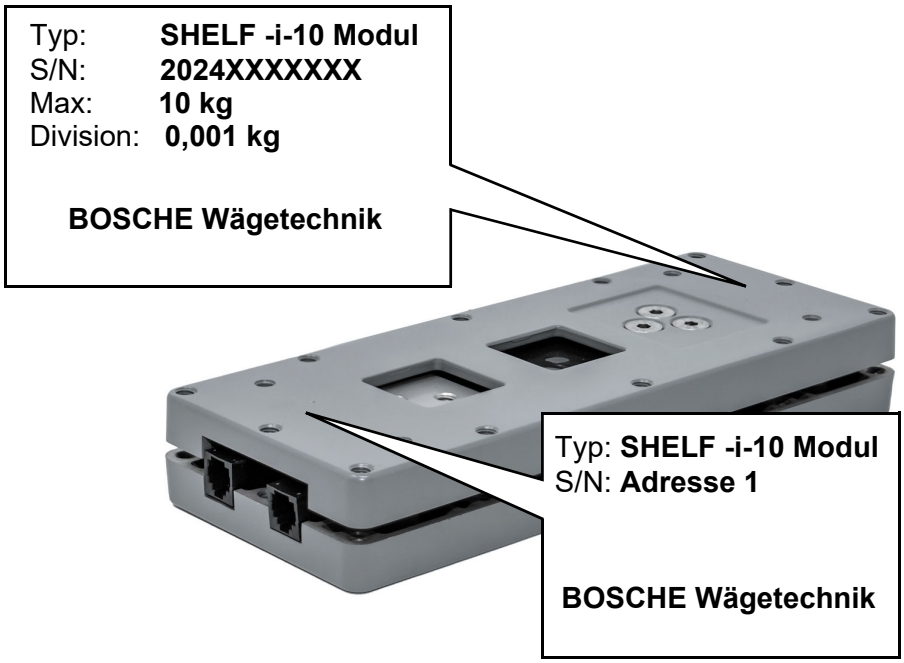
The intended use also includes:

- Observance of all notes, information, instructions contained in the documentation as well as in all manuals supplied by the manufacturer.
- Adherence of the maintenance and service conditions and intervals prescribed by the manufacturer and
- Observance of technical data.

Adhere to the attendant accident prevention regulations as well as other generally approved technical safety rules.

1.3 Type and information labels on the shelf module SHELF-i

The shelf module is equipped with type and information labels. Ensure that all labels remain in a readable condition.



XXXXXXX = 7-digit serial number

Note
Always refer to the serial number of your shelf module when making inquiries, orders, or service requests. This facilitates communication with the manufacturer and helps prevent processing errors.

1.4 Obligations of the owner/user

The owner/user obligates himself to only instruct people to work on the shelf module, who:

- are familiar with the basic rules concerning safety and accident prevention and are trained in the operation of the shelf module.
- have read and understood the operating and installation manual, the safety chapter as well as the warning notes.

Danger
The operator bears the ultimate responsibility for safety. This responsibility cannot be delegated.

1.5 Obligations of the operator

All people instructed to operate the shelf module obligate themselves:

- to always ensure the safety of other people,
- to read the operating manual, the safety chapter and the warning notes and
- only operate the shelf module SHELF-i when they are familiarised with its functions.

1.6 Description of the dangers

1.6.1 Danger of injury

- Before cleaning and maintenance work, the load cell must always be disconnected from the evaluation electronics and protected from overload.
- Do not change the contacts.
- Do not continue operating the shelf module if it is damaged or experiencing a malfunction.
- Do not operate the load cells in explosive environments (except for the corresponding ATEX versions).

1.6.2 Danger of damage

Ensure that the shelf module is used exclusively in the prescribed load direction. Otherwise, measurement results may be distorted, and the shelf module lifespan may be affected.

The shelf module SHELF-i is **NOT** suitable for:

- Safety-critical applications
- Suspended loads

1.7 Liability and warranty

The BOSCHE company offers a restricted warranty for components, which became faulty due to strain or material faults. The warranty starts with the date of delivery. The BOSCHE company retains the right to repair or replace components. Repair work executed during the warranty period will not extend the period of warranty. The warranty becomes null and void:

- In the event of incorrect use / use other than the intended use or incorrect installation
- Non-observance of the specifications in the operating manual
- Use outside the applications described
- Conversion, modification or opening of the shelf module
- Unintentional or mechanical damage and damage caused by media, liquids, natural wear.
- Improper mounting or electrical installation
- Overloading the measuring unit.

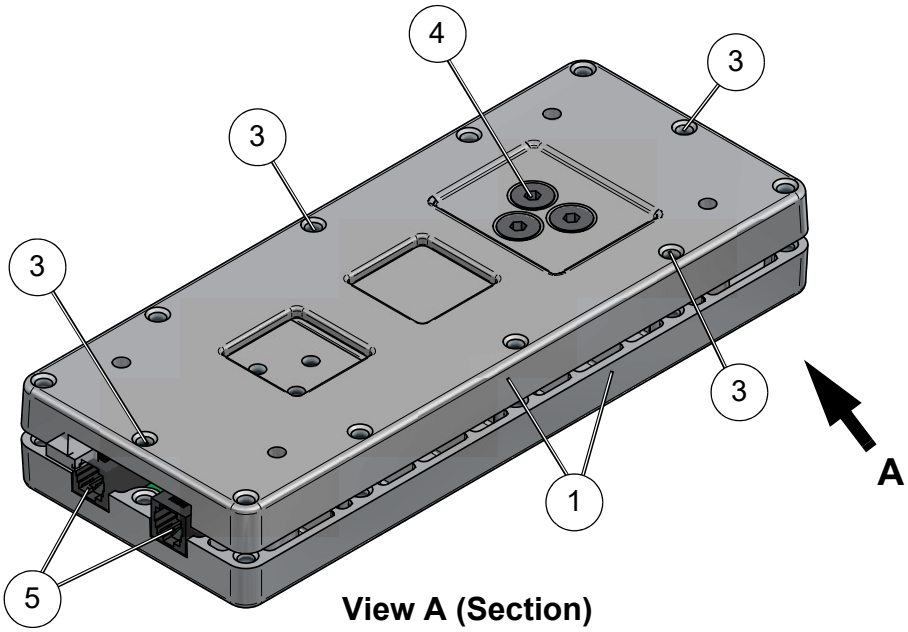
2 Description

2.1 General

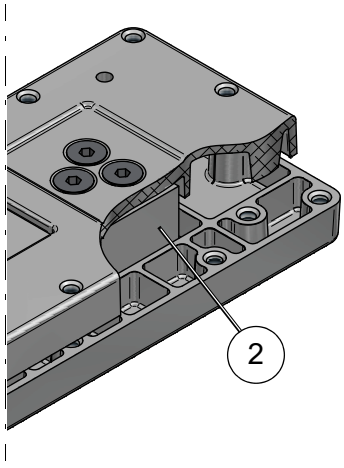
The shelf modules work according to the double bending beam principle. The design is insensitive to off-center force application.

Note
The shelf module may only be subjected to pressure. Otherwise, measurement results may be distorted, and the shelf module lifespan may be affected.

2.2 Smart shelf module SHELF-i



View A (Section)



Item	Designation
1	Mounting plates made of die-cast aluminium
2	Load cell H33A-D with an integrated A/D converter
3	M6 threaded holes (12 x per mounting plate) for fixing screws
4	Screw connection load cell
5	RJ11 / RJ12 connections

The shelf modules consist of a load cell (2) with integrated A/D converter, which is positioned between two robust mounting plates (1).
The mounting plates can be installed in many ways using the existing M6 threaded holes (3).

The RJ11/RJ12 connections (5) enable connection to existing networks. The data can be sent to up to 32 devices via RS485 bus.

2.3 Mounting

Attention
Never load the shelf modules against the specified load direction. This would lead to a distorted measurement result and impair the lifespan. Avoid lateral forces!

2.3.1 Notes on mounting the modules

- The mounting surface must be horizontal, flat, and clean. Dust, dirt, and other foreign objects must not accumulate, as they can restrict the shelf modules movement and distort measurement results.
- Position the load cells using a spirit level. Ensure that the specified load direction is followed during installation.
- The die-cast aluminium modules and the cables must be protected against chemicals.
- Do not lift or pull the modules by the cable.
- Avoid impact loads (falling, hard knocks).
- Welding or lightning currents can damage the shelf modules, so carry out all necessary welding work on the equipment before installing the modules.
- If the modules are to be used permanently in an aggressive environment, they should be fitted with additional mechanical protection (e.g. a metal cover).
- Avoid force shunts, i.e. make all supply and discharge lines (such as hoses, pipes, cables) as flexible as possible and couple them to the measurement object.

Temperature effects

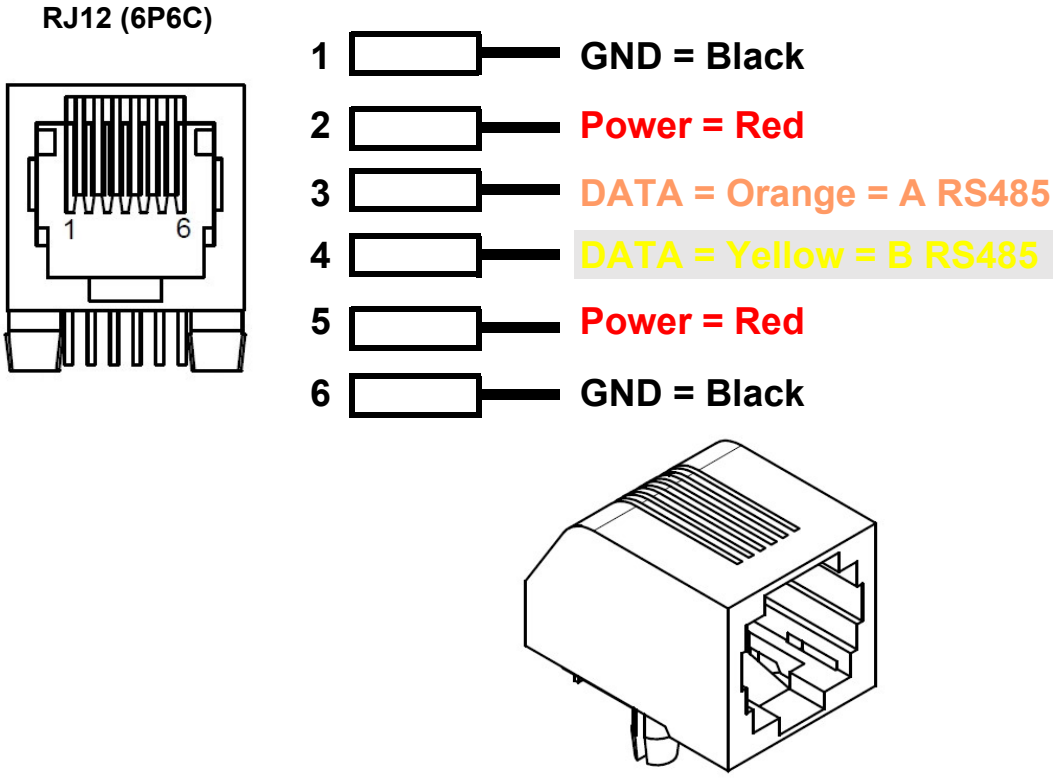
Significant temperature fluctuations can cause measurement deviations.
Solution: Protect the load cell from wind, sunlight, and/or heat radiation using protective covers, plates, or enclosures.

3 Connection

3.1 Electrical connections

The connection cable to the evaluation electronics is six-wire as standard.

Note
The voltage is 5 – 9 V DC.



Note
The maximum length of the connection cable is 10 meters.

3.1.1 Wind / shocks / vibration

Suitable mounting accessories are available for all load cells (see Chapter 7.6). These help compensate for flatness deviations of the support surfaces.

The system designer must take additional measures to prevent lateral displacement and tipping hazards concerning the following aspects:

- Shocks and vibrations
- Wind pressure
- Seismic classification of the installation area
- Consistency of the support surface

4 Communication protocol (en/de)

Connection settings *Verbindungseinstellungen*

Baudrate: 38.400 bps
Parity *Parität:* none *keine*
Stopbits: 1
Databits *Datenbits:* 8
Number of bus users *Anzahl der Busteilnehmer*: 128
Default address *Voreingestellte Adresse*: 00

Protocol description *Protokollbeschreibung*

direction	head (2 byte)	addr (1 byte)	command *Befehl* (1byte)	Data area (3 byte)	check (1 byte)
send out *Senden*	FE 7F	addr	cmd	data0data1data2	xor
reply Antwort	55 AA	addr	cmd	data0data1data2	xor

Explain *Erklärung*

1. XOR is used in protocol verification, and XOR is used for all data from the beginning of protocol header to the end of data area.
   XOR wird bei der Protokollüberprüfung aller Daten, vom Protokollkopf bis zum Ende des Datensatzes, verwendet.

2. The global address is 00 and the address range is 01~128.
   Die globale Adresse ist 00 und der Adressbereich ist 01~128.

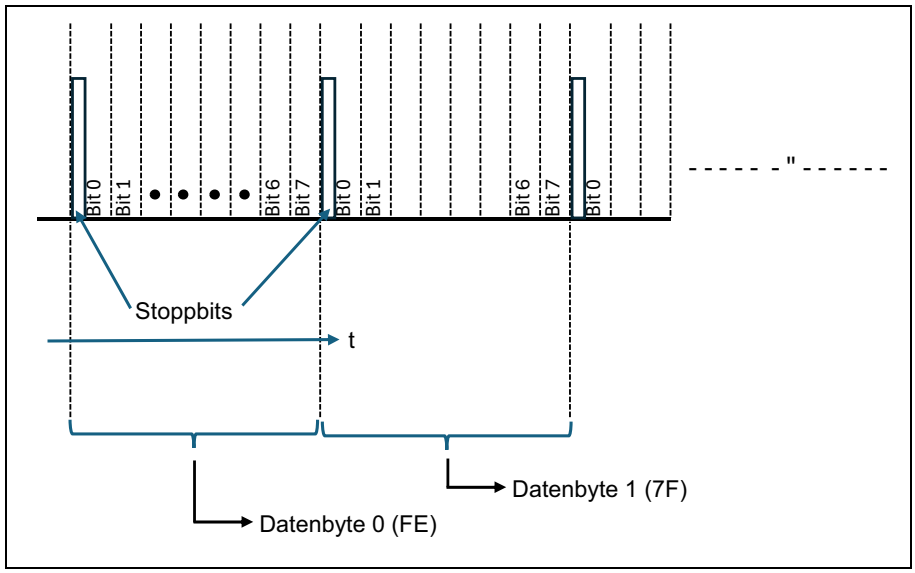
If required, configure the RS485 data transmission as follows:
Bei Bedarf die RS485 - Datenübertragung wie folgt konfigurieren:

For example: Command on the bus *Befehl auf dem Bus*=“FE 7F 01 81 01” (5x Data bytes *Datenbytes).*
Data transmission *Datenübertragung*
On the bus, this appears as follows (example): See also Figure 1.
Auf dem Bus stellt sich dies wie folgt dar (Beispiel): Siehe auch Abb.1.

* 1 x stopbit, followed by 8 x data bits: This applies to every transmitted data byte! *1 x stopbit, gefolgt von 8 x Datenbits: Dies gilt für jeden übertragenden Datenbyte!*

** 1 x Stopbit
** “FE“ Datenbyte
** 1 x Stopbit
** “7F“ Datenbyte
** 1 x Stopbit
.
.
** 1 x Stopbit
** “01“ Datenbyte

* Please note: For a data byte (consisting of 8 bits), the LSBit is transmitted first and the MSBit last!
** Bitte beachten: Bei einem Datenbyte (bestehend aus 8 Bits) wird das LSBit zuerst übertragen und zum Schluss das MSBit!*



Commissioning/start-up *Inbetriebnahme*

- First change the global address 00 to any address, see chapter "Write operation".
  Ändern Sie zuerst die globale Adresse 00 auf eine beliebige Adresse, siehe Kap. „Schreiben“.

Example of changing from address 00 to address 01:
FE 7F 00 06 01 01 86
Beispiel für den Wechsel von Adresse 00 auf Adresse 01:
FE 7F 00 06 01 01 86

- After the change, use only the newly selected address. For an example of address 01, see chapter "Read operation".
  Verwenden Sie nach dem Wechsel ausschließlich die Befehle neu gewählte Adresse. Beispiel für Adresse 01 finden Sie im Kap. „Lesen“.

Note
The global address 00 serves as an emergency address.
Do not use commands for address 00 in bus mode, as otherwise all participants of the bus would execute the command.

Hinweis
Die globale Adresse 00 dient als Notfalladresse.
Verwenden Sie im Busbetrieb keine Befehle für Adresse 00, da sonst alle Teilnehmer des Bus den Befehl ausführen würden.

Note
Resolve bus operation in the event of a problem by establishing a direct connection with the respective cells and communicating via emergency address 00.

Hinweis
Lösen Sie den Busbetrieb im Problemfall auf, indem Sie eine direkte Verbindung mit den jeweiligen Zellen herstellen und über die Notfalladresse 00 kommunizieren.

Write operation *Schreiben*

In the write operation, if the global address is used, the data area must be the same and not 0. Otherwise, it can only be operated on the corresponding address.
Wird bei der Schreibfunktion die globale Adresse verwendet, muss der Datensatz derselbe sein und darf nicht 0 sein. Andernfalls, kann nur mit der entsprechenden Adresse gearbeitet werden.

operation *Betrieb*	**command (hex)** *Befehl*	**example** *Beispiel*	**reply** *Antwort*
write *schreiben*	HEX	FE 7F addr cmd data0 data1 data2 xor	55 AA addr cmd data0 data1 data2 xor
set zero *Nullpunkt setzen*	0x03	FE 7F 00 03 02 02 02 80	55 AA 01 03 02 02 02 FF
Zero point calibration *Nullpunktkalibrierung*	0x04	FE 7F 00 04 01 01 01 84	55 AA 01 04 01 01 01 FB
Set address (1 - 128) *Adresse eingeben*	0x06	FE 7F 00 06 01 01 01 86	55 AA 01 06 01 01 01 F9
Set max weight (0-99999) *max. Gewicht eingeben*	0x08	FE 7F 00 08 10 27 00 BE	55 AA 01 08 10 27 00 C1
Set inc *Teilung setzen* (1,2,3,4,5,6,7) Is consistents with the settings *Entspricht den Einstellungen* *{1,2,5,10,20,50,100,200}*	0x09	FE 7F 00 09 01 00 00 89	55 AA 01 09 01 00 00 F6
Calibration weight 1 (0-99999) *Kalibriergewicht 1*	0x0b	FE 7F 00 0B E8 03 00 61	55 AA 01 0B E8 03 00 1E
Set filter num (0 - 40) *Filternummer eingeben*	0x10	FE 7F 00 10 01 00 00 90	55 AA 01 10 01 00 00 EF

Read operation *Lesen*

operation *Betrieb*	**command (hex)** *Befehl*	**example** *Beispiel*	**reply** *Antwort*
read *lesen*	HEX	FE 7F addr cmd xor	55 AA addr cmd data0 data1 data2 xor
1. read adress *Adresse lesen*	0x81	FE 7F 01 81 01	55 AA 01 81 01 00 00 7E
2. read weight *Gewicht lesen*	0x82	FE 7F 01 82 02	55 AA 01 82 85 13 1A F0
3. read ADSet address *ADSet Adresse lesen*	0x83	FE 7F 01 83 03	55 AA 01 83 53 50 10 6E
4. read max weight *max. Gewicht lesen*	0x84	FE 7F 01 84 04	55 AA 01 84 10 27 00 4D
5. read inc *Teilung lesen*	0x85	FE 7F 01 85 05	55 AA 01 85 00 00 00 7B
6. read version *Version lesen*	0x8c	FE 7F 01 8c 0c	55 AA 01 8C 7B 27 00 2E
7. read filter num *Filternummer lesen*	0x8d	FE 7F 01 8d 0d	55 AA 01 8D 14 00 00 67

Read No.1 address weight description: *Lesen Nr. 1 von Adresse und Gewicht*

Send : FE 7F 01 82 02 *Senden*

reply：55 AA 01 82 85 13 1A F0 *Antwort*

data：85 13 1A (weight: 0xA1385 = 660357, statue: 0x10)

data：85 13 21 (weight: 0x11385 = 70533, statue: 0x20 postive, normal, stable, non zero)

data：85 13 41 (weight: 0x11385 = 70533, statue: 0x40 postive, overload, unstable, non zero)

data：85 13 81 (weight: 0x11385 = 70533, statue: 0x80 negative, normal, unstable, non zero)

data：85 13 61 (weight: 0x11385 = 70533, statue: 0x60 postive, overload, stable, non zero)

Status description *Statusbeschreibung*

bit	**meaning** *Bedeutung*	**describe** *Beschreibung*
bit4	Zero position *Nullpunkt*	0-Non zero position 1-zero
bit5	stable *Stabil*	0-instable *Unstabil* 1-stable *Stabil*
bit6	overload *Überlast*	0-normal 1-overload
bit7	Weighing value indication *Positiv oder negatives Gewicht*	0-Positive 1- negative

5 Troubleshooting

5.1 In case of malfunction

In the event of a malfunction, the shelf module SHELF-i does not function.

Note
For error messages of the evaluation electronics and troubleshooting/error correction of the evaluation electronics, refer to the documentation for the evaluation electronics.

After replacing the shelf modules, please observe connection specifications (see chapter 3 "Connection").

5.2 Troubleshooting information

If uncertain or incorrect measurement values occur, the following points should be considered.

Note
Each of these points can have a significant impact on the measurement result.

- Check if the shelf module is free and not obstructed by unwanted force shunts (caused by pipes, cables, etc.).
- Check if the verify external conditions, such as contamination or heat radiation, that might affect measurements.
- Check if the proper installation of the shelf modules and the load introduction point, confirming their correct functionality.
- Check for moisture inside the junction boxes and check if the cables are damaged or incorrectly connected.

5.3 Contacting customer service

Bosche GmbH & Co. KG
Reselager Rieden 3
49401 Damme

Phone +49 (0)5491 9996890
Fax +49 (0)5491 9996899
E-mail info@bosche.eu

5.4 Information needed when contacting customer service

Opersting company	Information
Name of your company	
Name of a contact	
Contactdata Phone Fax E-mail	

Product	Information
Model name	
Serial number	
Date of purchase	
Name and location of supplier	

Note
Fill in the tables that are shown when you receive the shelf module so you can easily refer back to them at any time

Always return defective shelf modules with a clear and detailed error description.

Information about the problem:

Examples of necessary information that supports troubleshooting:

- Has the shelf module worked since being supplied?
- Has the shelf module been in contact with water?
- Has there been fire damage?
- Has there been a thunderstorm before/during the fault?

Note
Please include the entire prior history of the shelf module SHELF-i.

6 Maintenance, care, disposal

6.1 Cleaning

Attention
Do not use aggressive cleaning agents.

- Regularly remove contaminants from the shelf modules, mounting components, and freely moving parts of the scale.
- Remove dust and other dirt from the load cell using a damp cloth.
- Dust deposits can also be blown off with low-pressure compressed air.
- Rub all the surfaces with a dry cloth.

Note
Observe the cleaning instructions for protection class IP 20.

6.2 Maintenance, servicing

The shelf module SHELF-i requires minimal maintenance. However, contaminants on the load cells and accessories should be regularly removed as described in chapter 6.1.

Maintenance schedule

Note
The inspection interval for load cell accuracy (for legal-for-trade load cells) can be determined by the customer's internal quality assurance.

6.3 Disposal

The shelf module SHELF-i, any accessories, and their packaging must be disposed of in accordance with the applicable national and regional regulations.

7 Technical data

7.1 Technical data

Type	Capacity / Resolution	Max. platform size
SHELF -i 10	10 kg / 1 g	220 x 280 mm
SHELF -i 15	15 kg / 2 g	300 x400 mm
SHELF -i 30	30 kg / 5 g	350 x 450 mm

7.2 Ambient conditions

Feature	Value/Unit
Nominal temperature range B_T	- 10 to + 40 °C
Operating temperature range B_{tu}	0 to + 50 °C
Relative air humidity	max. 80 %, non-condensing
Protection class	IP 20

7.3 Data of the installed H33A-D load cell

Feature	Value/Unit
Recommended supply voltage U_{ref}	5 to 9 V DC
Insulation resistance	$\geq$ 2000 MΩ
Data transmission	RS 485 half-duplex-Interface
Inrush current	45 mA
Power consumption	20 - 50 mA

8 Declaration of Conformity

Bosche GmbH & Co. KG
Reselager Rieden 3
D-49401 Damme
Telefon: 0 54 91 / 999 689 - 0
Telefax: 0 54 91 / 999 689 - 9
E-Mail: info@bosche.eu
Internet: www.bosche.eu

EU-Konformitätserklärung Declaration of conformity • Déclaration de conformité Conformiteitsverklaring • Declaración de conformidad	
Typ / Modell Type /Model • Modèle Model • Tipo / Modelo	**Smartes Regalmodul SHELF-i** für nicht selbsttätige Waagen. Smart shelf module for non-automatic scales.• Module d'étagère intelligent pour balances non automatiques.• Slimme rekken module voor niet-automatische weegschalen.• Módulo de estantería inteligente para básculas no automáticas.
Seriennummer siehe Typenschild. For the serial number, see the nameplate.• Pour le numéro de série, voir la plaque signalétique. Voor het serienummer, zie het typeplaatje. • Para el número de serie, consulte la placa de identificación.	
Hersteller Manufacturer • Fabricant Fabrikant • Fabrikante	**Bosche GmbH & Co. KG**

Die alleinige Verantwortung für die Ausstellung trägt der Hersteller.
The sole responsibility for the issue carries the manufacturer. • La seule responsibilité de l'exposition porte le fabricant. • De verantwoordelijkheid voor de uitgifte draagt de fabrikant. • El único responsable de la publicación lleva el fabricante.

Der oben genannte Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungs-rechtsvorschriften der Union:
The above-mentioned object of the declaration complies with the relevant harmonization legislation of the Union • L'objet de la déclaration susmentionné est conforme à la législation d'harmonisation pertinente de l'Union • Het bovengenoemde voorwerp van de verklaring voldoet aan de relevante harmonisatiewetgeving van de Unie • El objeto de la declaración mencionado anteriormente cumple con la legislación de armonización pertinente de la Unión

2014/30/EU **EMV-Richtlinie** EMC Directive	**EN IEC 61326-1:2021** **EN IEC 61326-2-3:2021** **EN IEC 61000-6-3:2021** **EN IEC 61000-6-1:2019**
2011/65/EU RoHS	**EN IEC 63000:2018**

Unterzeichnet für und im Namen von Bosche:

Damme, 15.02.2023

Dipl. Ing. Jarmila Bosche, PhD.
Geschäftsführer • Managing Director
Directeur général • Directeur • Director general

BOSCHE
WÄGETECHNIK

BOSCHE GmbH & Co. KG
Reselager Rieden 3
49401 Damme
Germany

Tel 05491 999 689 0
Fax 05491 999 689 9
www.bosche.eu
info@bosche.eu