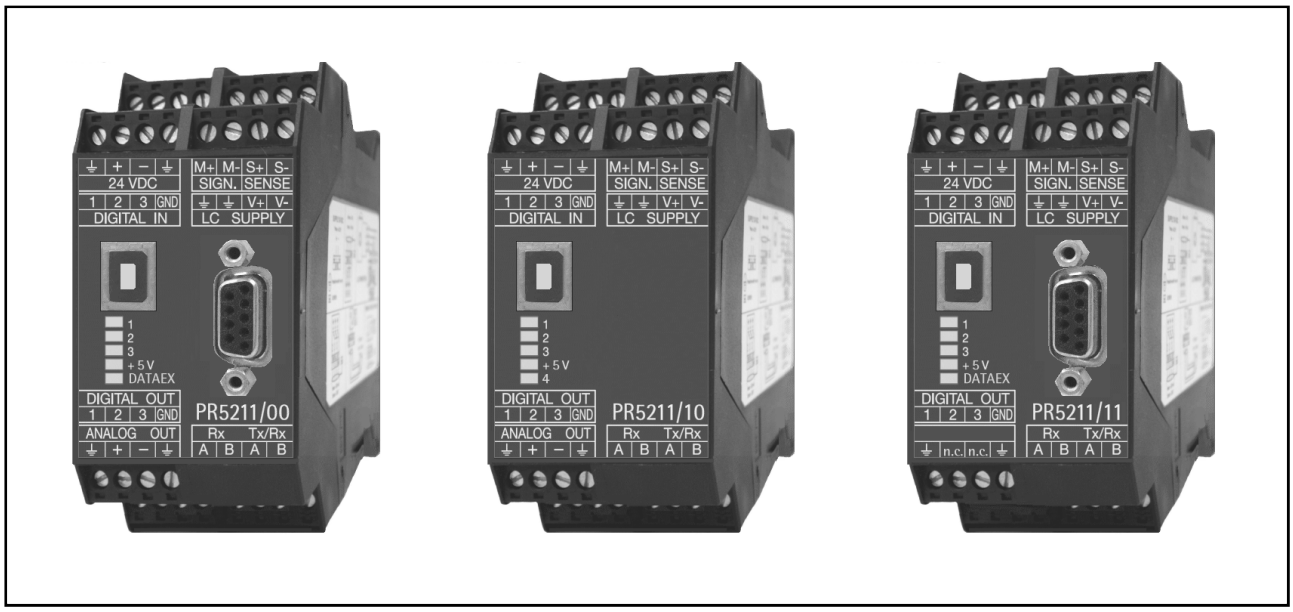
Minebea intec
The true measure

Instrument manual

Transmitter Series PR 5211



Translation of the original instrument manual 9499 050 52100 Edition 2.1.0 07/06/2018

Release 6.00

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Foreword

Must be followed!

Any information in this document is subject to change without notice and does not represent a commitment on the part of Minebea Intec unless legally prescribed. This product should be operated/installed only by trained and qualified personnel. In correspondence concerning this product, the type, name, and release number/serial number as well as all license numbers relating to the product have to be cited.

Note

Table of contents

1 Introduction

1.1 Read the manual

- Please read this manual carefully and completely before using the product.
- This manual is part of the product. Keep it in a safe and easily accessible location.

1.2 This is what operating instructions look like

1. - n. are placed before steps that must be done in sequence.

▶ is placed before a step.

▷ describes the result of a step.

1.3 This is what lists look like

- indicates an item in a list.

1.4 This is what menu items and softkeys look like

[ ] frame menu items and softkeys.

Example:

[Start]- [Applications]- [Excel]

1.5 This is what the safety instructions look like

Signal words indicate the severity of the danger involved when measures for preventing hazards are not followed.

⚠ DANGER

Warning of personal injury

DANGER indicates death or severe, irreversible personal injury which will occur if the corresponding safety measures are not observed.

▶ Take the corresponding safety precautions.

⚠ WARNING

Warning of hazardous area and/or personal injury

WARNING indicates that death or severe, irreversible injury may occur if appropriate safety measures are not observed.

▶ Take the corresponding safety precautions.

⚠ CAUTION

Warning of personal injury.

CAUTION indicates that minor, reversible injury may occur if appropriate safety measures are not observed.

▶ Take the corresponding safety precautions.

NOTICE

Warning of damage to property and/or the environment.

NOTICE indicates that damage to property and/or the environment may occur if appropriate safety measures are not observed.

▶ Take the corresponding safety precautions.

Note:

User tips, useful information, and notes.

1.6 Hotline

Phone: +49.40.67960.444

Fax: +49.40.67960.474

eMail: help@minebea-intec.com

2 Safety instructions

2.1 General notes

⚠ CAUTION

Warning of personal injury.

This device has been built and tested in compliance with the safety regulations for measuring and control equipment.

The product was in perfect condition with regard to safety features when it left the factory.

▶ To maintain this condition and to ensure safe operation, the user must follow the instructions and observe the warnings in this manual.

2.2 Intended use

The device is intended for use of the analysis device for weighing functions.

Product operation, commissioning and maintenance must be performed by trained and qualified personnel who are aware of and able to deal with the related hazards and take suitable measures for self-protection.

The device reflects the state of the art.

No warranty is given that the product is free of faults, especially not in conjunction with third-party software and hardware components required for operation.

The manufacturer does not accept any liability for damage caused by third-party system components or due to incorrect use of the product. The use of this product signifies recognition of the stipulations listed above.

2.3 Initial inspection

Check the contents of the consignment for completeness. Check the contents visually to determine whether any damage has occurred during transport. If there are grounds for rejection of the goods, a claim must be filed with the carrier immediately. The Minebea Intec sales or service organization must also be notified.

2.4 Before operational startup

NOTICE

Perform visual inspection.

▶ Before operational startup as well as after storage or transport, inspect the device visually for signs of mechanical damage.

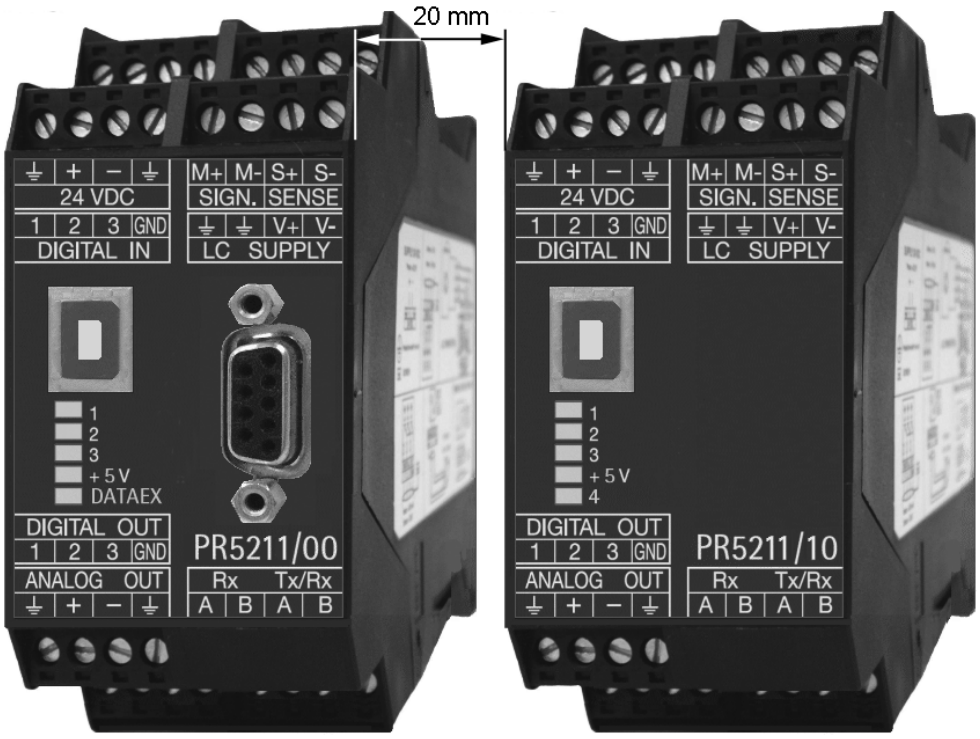
2.4.1 Installation

The device is designed for mounting rail installation (35 mm, as per DIN 46277).

NOTICE

Excessive heat may reduce the device lifetime.

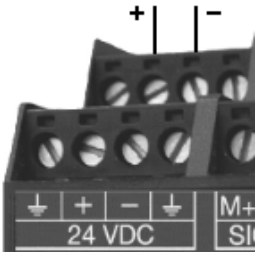
- When mounting on the rail, make sure that the distance from other instruments left and right of the device is at least 20 mm.



The device has to be installed in an EMC-compliant manner, see Chapter 4.3.

2.4.2 Supply voltage connection

The supply voltage is 24 V DC +10 %/-15 %.



The maximum power consumption is 8.2 W.

For a connection to 230/115 V alternating current, an external power supply is required.

2.4.3 Protective ground connection

The protective ground connection is made via the support rails.

2.5 RF interference suppression

The device is intended for use in an industrial environment. Operation of this device in a residential environment is likely to cause radio frequency interference, see Chapter 11.5.3. In this case, the operator may be required to take appropriate measures.

2.6 Failure and excessive stress

If there is any reason to assume that safe operation of the device is no longer ensured, shut it down and make sure it cannot be used.

Safe operation is no longer ensured if any of the following is true:

- The device is physically damaged.
- The device does not function.
- The device has been subjected to stresses beyond the tolerance limits (e.g., during storage or transport).

2.7 Important note

Make sure that the construction of the device is not altered to the detriment of safety. In particular, leakage paths, air gaps (of live parts) and insulating layers must not be reduced.

Minebea Intec cannot be held responsible for personal injury or property damage caused by a device repaired incorrectly by an operator or installer.

2.8 Repairs and maintenance

2.8.1 General information

Repairs are subject to inspection and must be carried out at Minebea Intec.

In case of defect or malfunction, please contact your local Minebea Intec dealer or service center for repair.

When returning the device for repair, please include a precise and complete description of the problem.

Maintenance work may only be carried out by a trained technician with expert knowledge of the hazards involved and the required precautions.

2.8.2 Electrostatically sensitive parts

This device contains electro-statically sensitive components. Therefore, potential equalization must be provided when working on the device (antistatic protection).

2.8.3 Replacing fuses

The device does not have any replaceable fuse.

The load cell supply is protected against short circuit.

In case of loss of load cell supply, disconnect the device from the supply voltage, find out the cause and eliminate it.

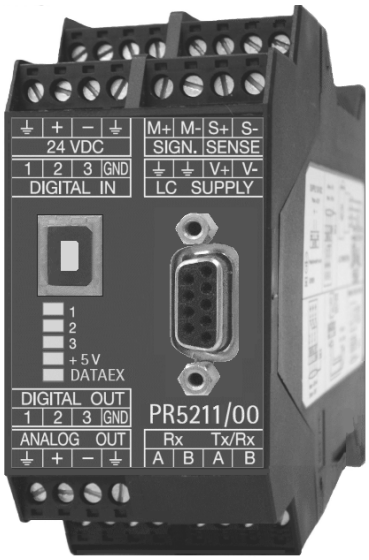
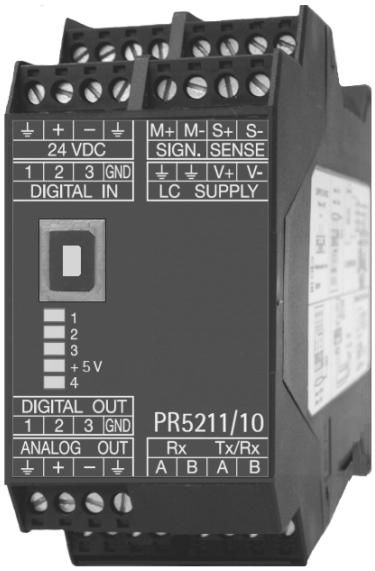
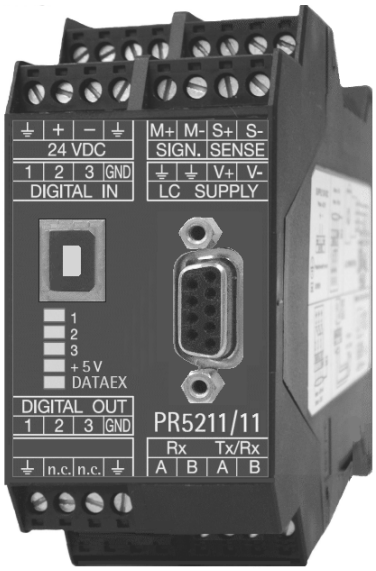
After a cool down time of approx. 3 minutes, the supply voltage can be switched on again.

3 Device description

3.1 Transmitter versions

3.1.1 General information

The transmitter of the PR 5211 series exists in 3 versions. A later extension of the version is not possible. Each type is clearly fixed by the corresponding number. The front overlays are adapted to the corresponding type.

PR 5211/00	PR 5211/10	PR 5211/11
		

3.1.2 PR 5211/00

This is the fully equipped version. It has digital inputs and outputs as well as an analog output and a USB-B port for configuring the device.

The serial output can be used to connect, e. g. a remote display.

This version has a Profibus connection as well.

3.1.3 PR 5211/10 (without ProfiBus-DP)

This version has digital inputs and outputs as well as an analog output and a USB-B port for configuring the device. The serial output can be used to connect, e. g. a remote display.

This version does not have a Profibus connection. The respective menus in the operating tools have been adapted to this version.

3.1.4 PR 5211/11 (without analog output)

This version has digital inputs and outputs as well as a USB-B port for configuring the device. This serial output can be used to connect, e. g. a remote display.

This version has a Profibus connection, but no analog output. The respective menus in the operating tools have been adapted to this version.

3.2 Overview of the instrument

- Accuracy 6000 d @ 6 measurements/sec
- Internal resolution 4.8 million counter steps
- Linearity <0.002%
- Measure rate is configurable: 6 to 100/sec
- Digital filter with adjustable characteristic line
- Electrically isolated interfaces
- 3 programmable pairs of limits
- 24 V DC supply voltage connection
- Connection via plug-in terminal blocks
- Female connector for ProfiBus
- USB-B port for PC
- Connection cable (1.8 m) for PC (USB 2.0; A>B)
- The device is snapped to a mounting rail.
- 5 status indicator LEDs for power supply, communication, error detection

The menu-guided calibration and configuration of the device are carried out on a notebook/PC.

- Calibration using weights according to the mV/V method or using load cell data (smart calibration)
- Analogue output 0/4 to 20 mA, configurable for gross/net weight
- Analog value via ProfiBus (PR 5211/00 only)
- 3 digital inputs, electrically isolated
- 3 digital outputs, electrically isolated

3.2.1 Communication protocols

For the internal RS-485:

- Remote display protocol
- SMA protocol

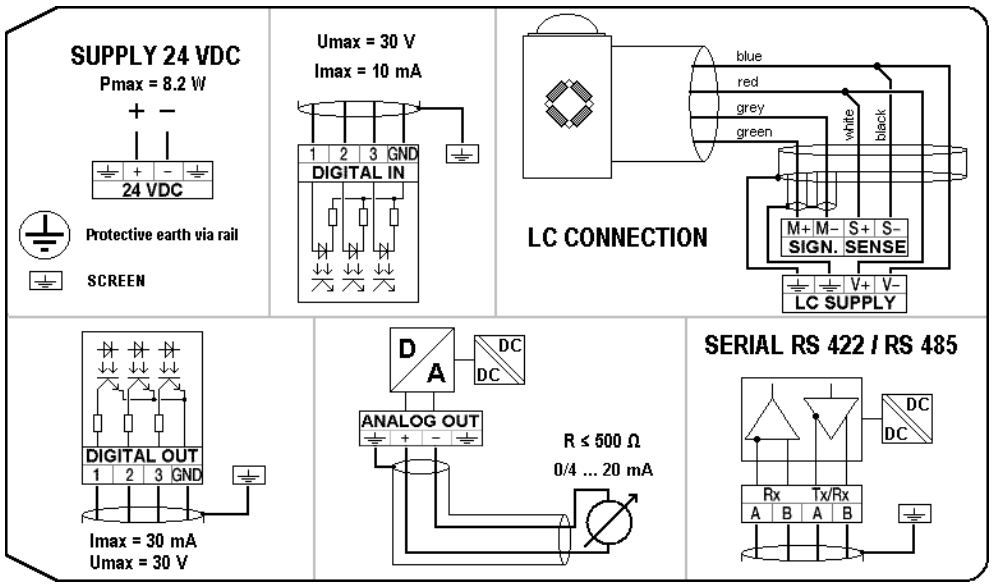
Field bus (slave):

- PR 5211/00 ProfiBus-DP
- PR 5211/11 ProfiBus-DP

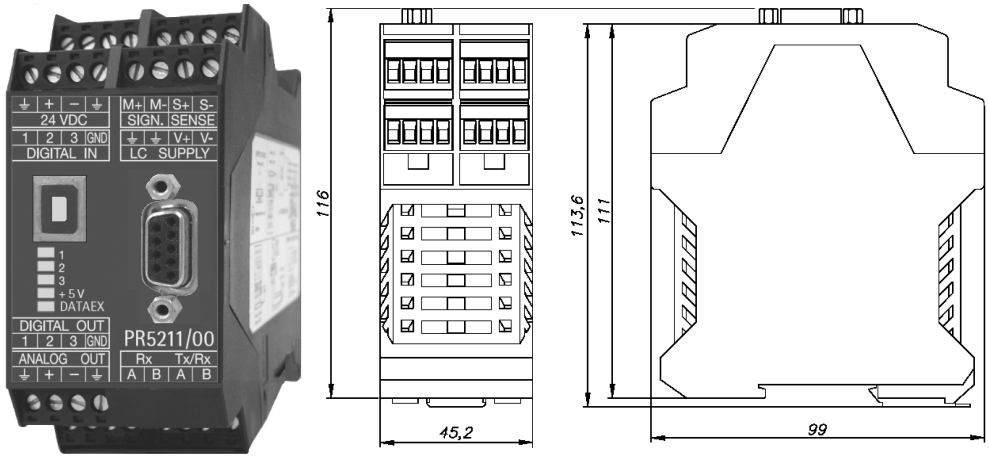
3.3 Housing

3.3.1 Sticker

The connection diagram is located on the side of the housing.



3.3.2 Dimensions



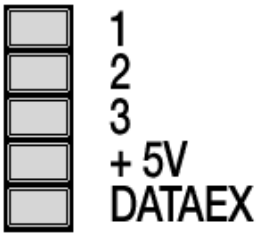
All dimensions in mm

3.4 Display and operating elements

3.4.1 General information

The transmitter of the PR 5211 series can only be operated by Notebook/PC.

3.4.2 LEDs



The device has 5 green LEDs for the following status displays:

- Operational status
- Error status

Power supply, bus connection

LED	Power on	Bus	Bus connection not provided
1			
2			
3			
+5V	lit		
DATAEX		lit*	flashing 1 Hz

* The LED for bus activity (PR 5211/00 and PR 5211/11) lights up as soon as there is a connection.

Note:

The LED remains lit, even if there is no communication or the physical connection is interrupted.

Weight status

LED	Standstill	± Null	< Null or > FSD**
1	lit		
2		lit	
3			lit
+5V			
DATAEX			

** FSD (Skalenendwert)

Note:

For weight error status, see Chapter 10.1.

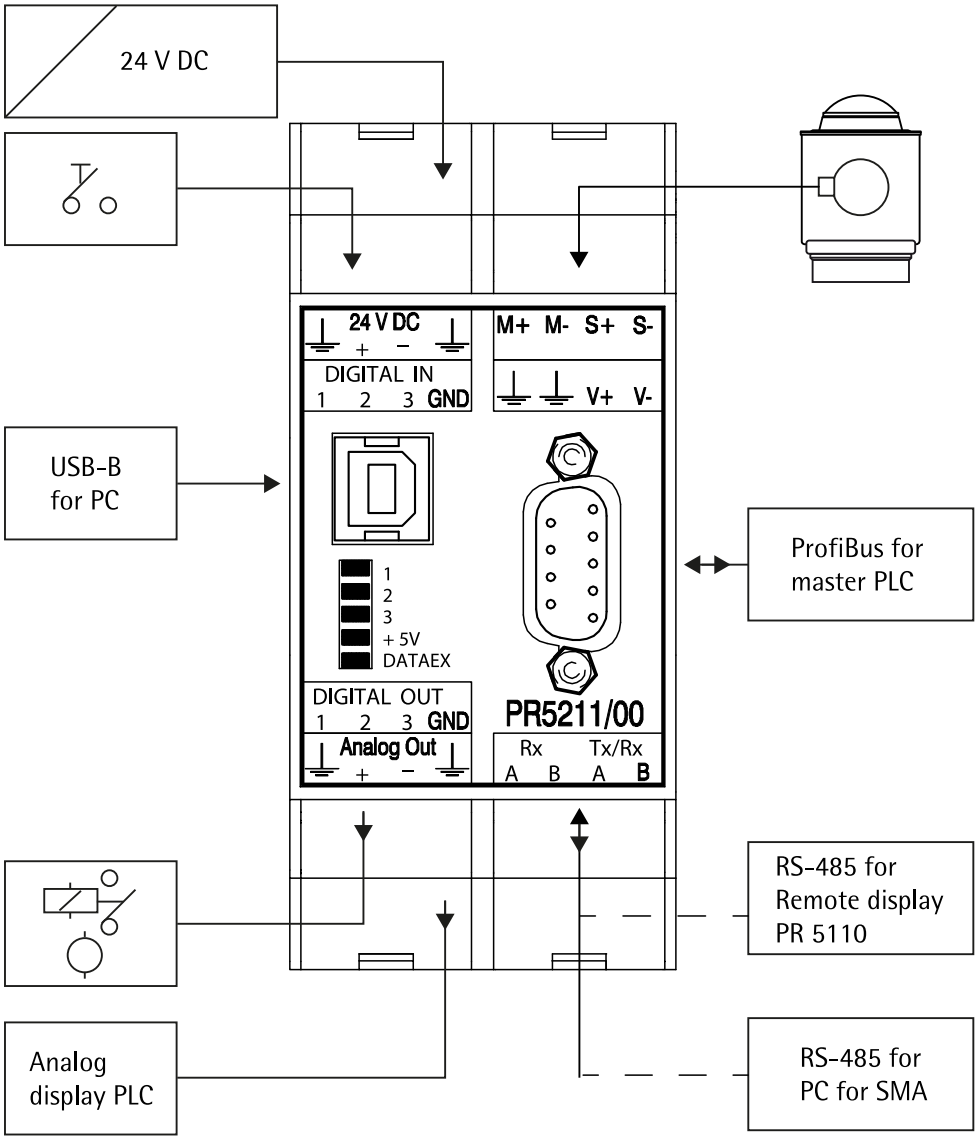
3.4.3 ConfigureIt!

The configuration and calibration of the transmitter is done via the "ConfigureIt!" program.

Installation, see Chapter 5.6

Operation, see Chapter 5.7 to Chapter 5.15

3.5 Overview of connections



4 Device installation

4.1 General notes

Before starting work, please read Chapter 2 and follow all instructions.

⚠ WARNING

Warning of hazardous area and/or personal injury

▶ All cable connections must be protected from damage.

Note:

- Measurement cables should be kept away from power equipment.
- Signal cables and measurement cables should be installed separately from electric power lines.
- Measurement cables should be laid in separate cable conduits.
- Network cables should be crossed perpendicularly.

Further procedures:

- Check the consignment: make sure that all components are present.
- Safety check: inspect all components for damage.
- Make sure that the on-site installation is correct and complete including cables, e.g. power cable fuse protection, load cells, junction box, data cables, console/cabinet, etc.
- Follow all device installation instructions related to application, safety, ventilation, sealing and environmental influences.
- Connect the cable from the junction box or platform/load cell.
- Connect additional data cables/network cables etc. as needed.
- Connect the power supply.
- Check the installation.

4.2 Mechanical preparation

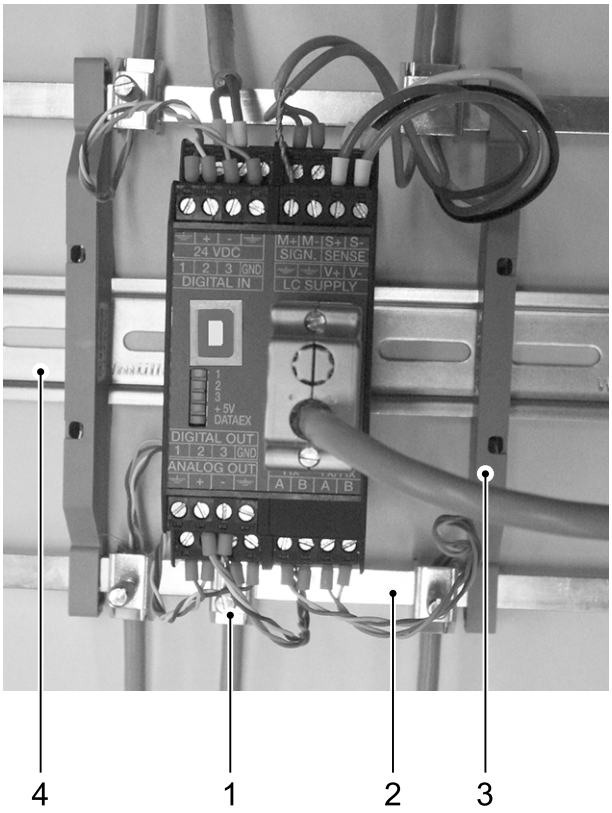
Have all required parts, technical documents, and tools at hand for control cabinet installation.

Other procedure:

- Install the device.
- Secure the cable at the place of installation, e.g. using cable ties.
- Remove the insulation from the cable ends and keep the strands short.
- Connect the screens to the screen clamping rail using screen terminals; see Chapter 4.3.
- Establish grounding/equipotential bonding between devices/system components.

4.3 EMC-compliant installation

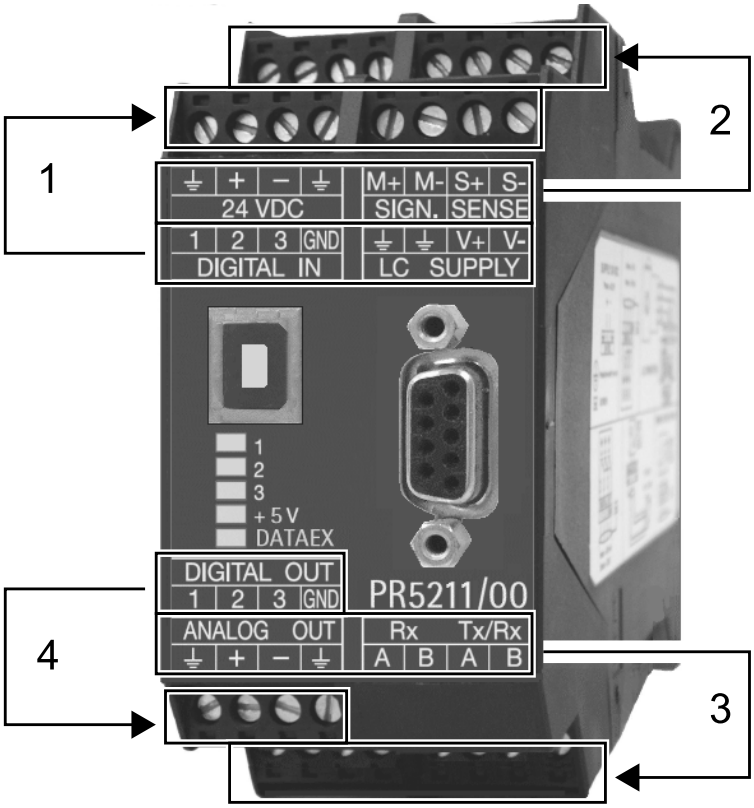
- Only use screened data cables.
- Connect screens to ground on both sides.
- Keep unscreened cable ends short.
- Establish a low-resistance connection between the screen clamping rail and the cabinet/housing.
- Use a metallic or metalized connector housing.
- Establish equipotential bonding between devices/system components (this is essential for Ex applications).
- Use a standardized reference potential.
- Connect the mounting rail to protective ground.
- Keep measurement and data cables away from power cables.



No.	Description
1	Screen clamp (e.g. Phoenix SK8-D)
2	Screen clamping rail (e.g. Phoenix NLS-CU 3/10)
3	Rail connector (e.g. Phoenix AB-SK 65D)
4	Mounting rail (35 mm)

4.4 Hardware construction

4.4.1 Notes on the connections



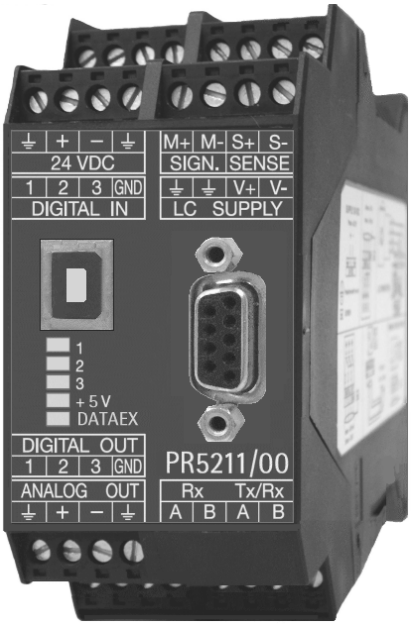
The labeling on the front side of the transmitter is assigned to the terminals as follows:

- bottom row to the front terminals (1)
- top row to the rear terminals (2)
- bottom row to the rear terminals (3)
- top row to the front terminals (4)

4.4.2 RS-485 interface

The device is equipped with an integrated RS-485 interface. The interface can be configured by software.

The RS-485 interface serves for the connection of the remote display and PC for data transfer using the SMA protocol.



Technical data

Description	Data
Connection	Terminal, 4-pin
Number of channels	1
Type	RS-485, full duplex
Transmission rate [bit/s]	300, 600, 1200, 2400, 4800, <9600>, 19200
Bits/Stopbit	Remote display: 7/1 SMA protocol: 8/1
Parity	Remote display: <even> SMA protocol: <None>
Signals	TxA, RxA (R-), TxB, RxB (R+)
Potential isolation	yes
Cable type	Twisted pair, screened (e.g., LifYCY 2×2×0.20)
Cable gauge	1.5 mm^2
Cable length	max. 1000 m

<...> = preset values (factory settings)

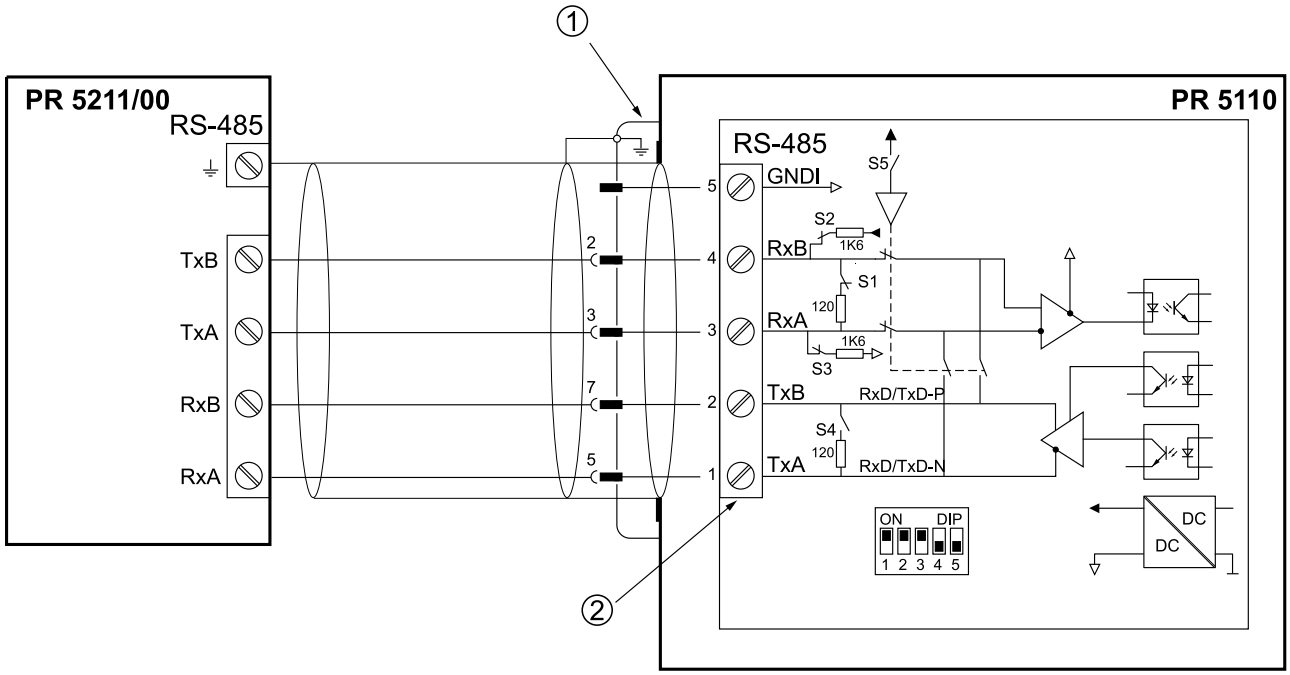
The RS-485 receiver (Rx) has an internal terminating resistor of 120 Ω and 1.6 Ω for internal bus power supply (- on RxA + on RxB).

4.4.2.1 Connecting a PR 5110 remote display

The PR 5110 remote display can be connected via the RS-485 interface.

Four-wire transmission, point-to-point connection, full duplex (simultaneous sending and receiving) is possible with the remote display.

Example:



① 9-pin D-Sub male connector

② 5-pin plug-in screw terminal

Configuration PR 5211	PR 5110 configuration
[Parameters] - [Communication] - [Remote display]	[Setup] - [oP 10] - [LInE] - [rS485] [Setup] - [oP 12] - [tokEn] - [oFF] [Setup] - [oP 13] - [SEndModE] - [SEnd] [Setup] - [oP 14] - [WEIght] - [FolloW] [Setup] - [oP 15] - [WPkEy] - [SElEct]

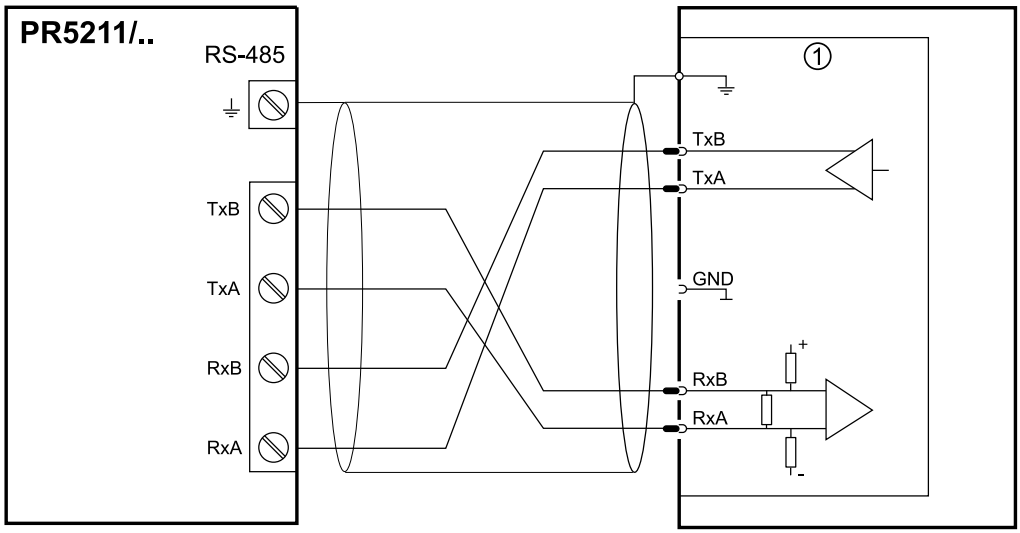
The following operations are possible from the connected remote display:

- Display current weight mode
- Set tare
- Reset tare
- Set zero

4.4.2.2 Connecting to a PC or an RS-485 converter

Point-to-point connection for the SMA protocol

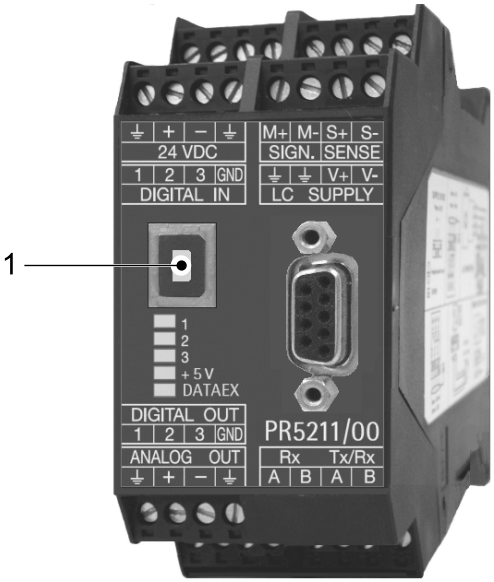
Example:



Configuration
[Parameters] - [Communication] - [SMA protocol]

4.4.3 USB interface

Configuration and calibration is performed using the "ConfigureIt!" software (version 6.00 or higher) via the USB interface; see Chapter 5.6 and 5.7.



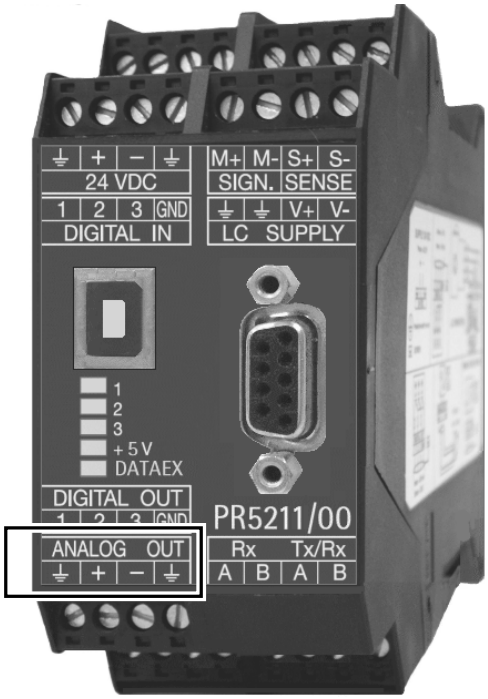
Technical data

Description	Data
Connection	USB-B port
Connection cable	USB 2.0 A>B

Description	Data
Cable length	Max. 5.0 m

4.4.4 Analog outputs

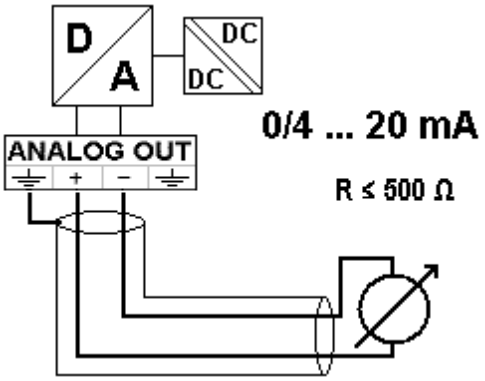
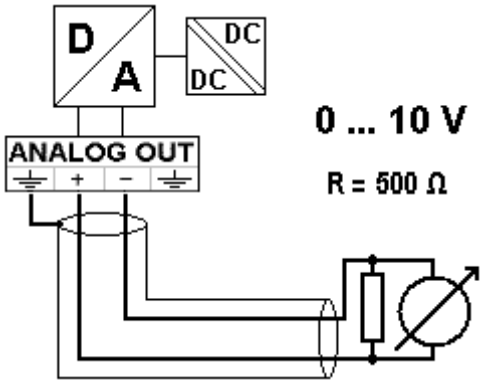
An analog output is integrated into the device (in PR 5211/00 and PR 5211/10 only). The interface can be configured by software.



Technical data

Description	Data
Connection	Terminal, 4-pin
Output: Number	1 current output: Output voltage via an external resistor
Output: Function	Gross/net weight
Output: Range	0/4... to 20 mA, configurable
Output: Resolution	e. g. 0...20 mA in max. 40,000 counts
Output: Linearity error	@ 0 to ...20 mA: <0.05% @ 4 to ...20 mA: <0.025%
Output: Temperature error	<100 ppm/K
Output: Load	Max. 0... to 500 Ω
Output: Protected against short-circuit	yes

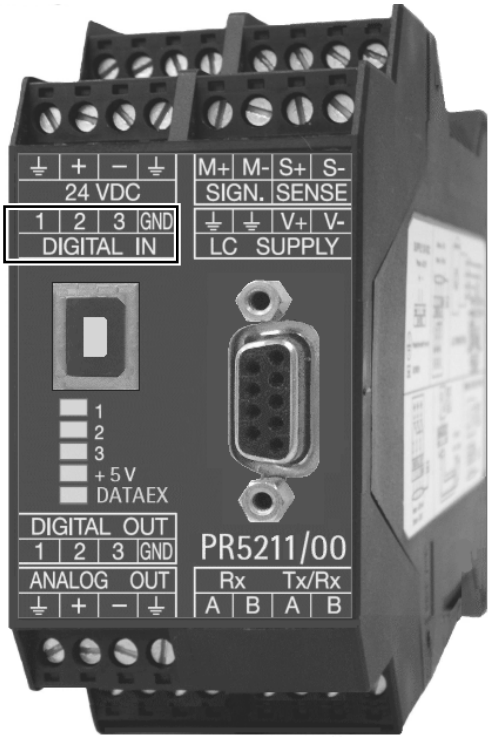
Description	Data
Output: Potential isolation	yes
Cable type	Screened twisted pair (e. g., LifYCY 2x2x0.20)
Cable length	<150 m screened

Analog signal "current output"	Analog signal "voltage output"
	
Current is supplied directly via the terminal contacts.	The voltage level corresponds to the voltage drop at the external 500 Ω resistor.

4.4.5 Digital inputs

3 passive opto-decoupled inputs are permanently built into the device. The interface can be configured by software.

All inputs have a common GND (-).

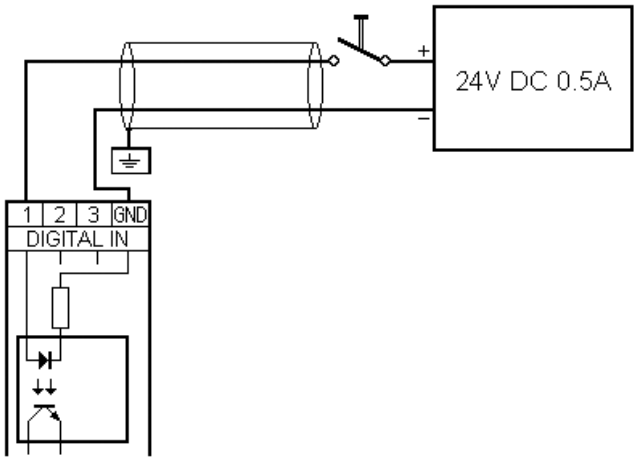


Technical data

Description	Data
Connection	Terminal, 4-pin
Number of inputs	3
Input voltage	Low: 0 to 5 V DC High: 10 to 30 V DC Passive, external power supply required
Input current	≤11 mA @ 24 V DC ≤5 mA @ 12 V DC
Signals	GND (-) common for all inputs
Potential isolation	Yes, via optocoupler
Cable length	Max. 50 m screened

Example:

Contact input

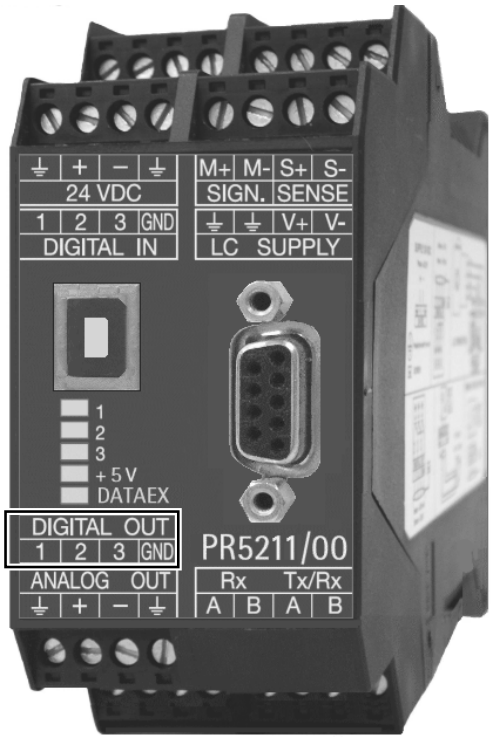


If the voltage at terminals (in this example: 1-GND) is 10 V DC, input 1 is active (true).

4.4.6 Digital outputs

3 passive opto-decoupled outputs are permanently built into the device. The interface can be configured by software.

All outputs have a common GND (-).

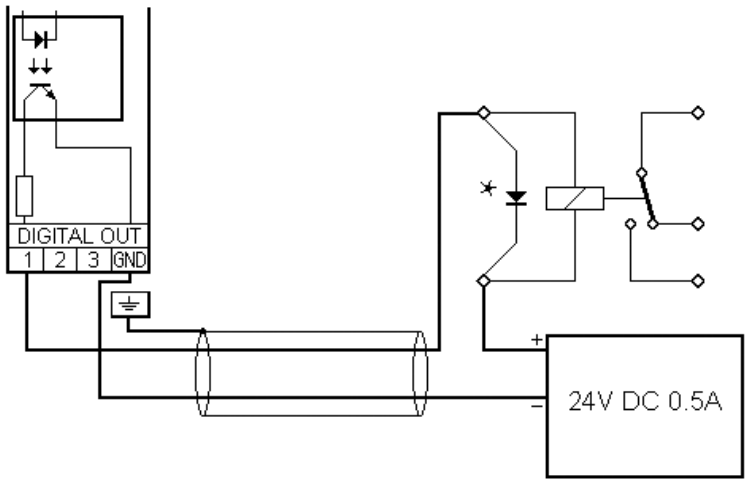


Technical data

Description	Data
Connection	Terminal, 4-pin
Number of outputs	3
Supply voltage	Max. 24 V +10%, external
Switching current	Max. 30 mA
Signals	GND (-) common for all outputs
Potential isolation	Yes, via optocoupler
Cable length	Max. 50 m screened

Example:

Relay control (power output)



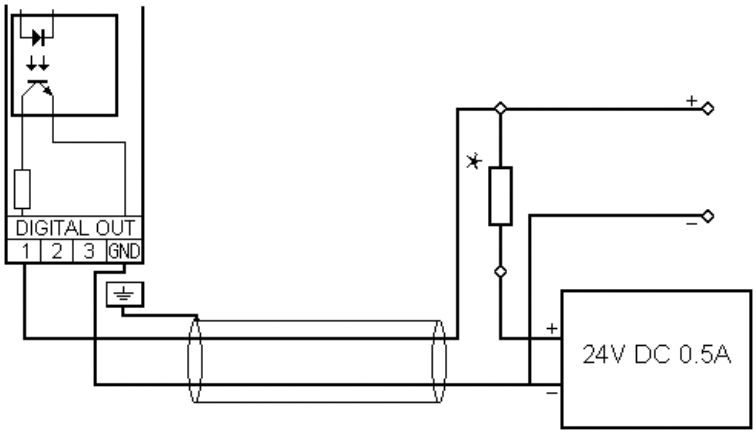
* Inductive load for free-wheel diode

The relay switches when the output 1 is active (true).

To protect the output circuit, relays must be equipped with free-wheel diodes.

Example:

Voltage output



When the output 1 is active (true), the output voltage drops from 24/12 V DC to <3 V DC.

* The load resistance must be 2.2/1 kΩ.

4.4.7 Connection of analog load cells and weighing platforms

4.4.7.1 General information

Load cells can be connected to the device doing the following:

- One load cell directly, see Chapter 4.4.7.2 and 4.4.7.3
- several load cells in the junction box via connecting cable, see Chapter 4.4.7.4 and 3.3.1

Note:

The colors listed here apply for the Minebea Intec load cell and connection cables of type "PR ..."

Color code

bk	=	Black
bu	=	Blue
gn	=	Green
gy	=	Gray
rd	=	Red
wh	=	White

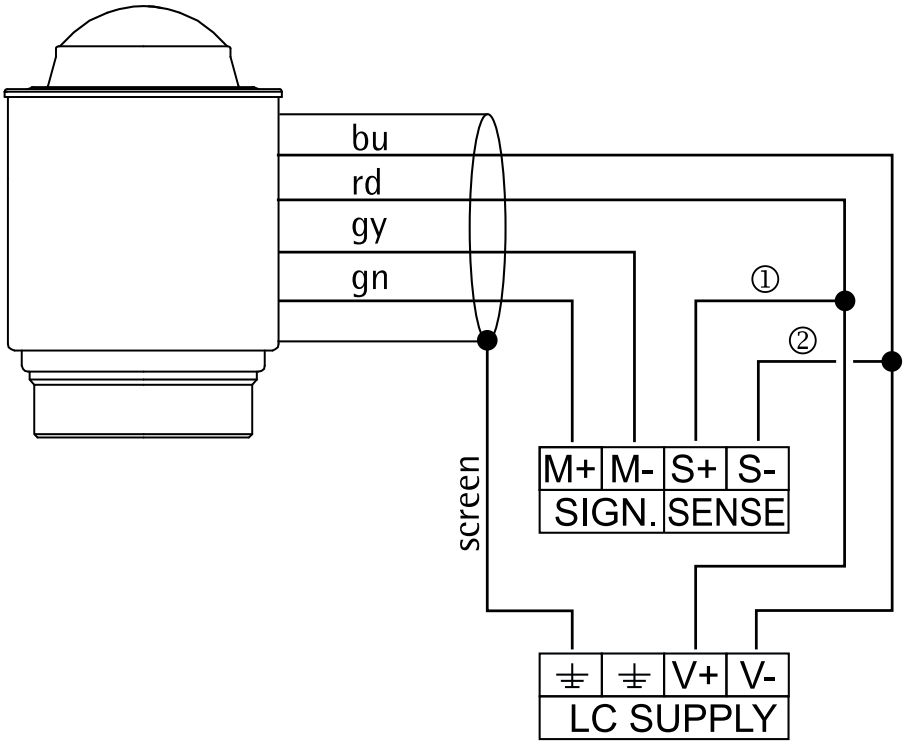
For additional information on the connection of load cells and cable junction boxes, refer to the corresponding installation manuals.

4.4.7.2 Connecting a load cell with a 4-wire cable

The following links between the terminal contacts are provided:

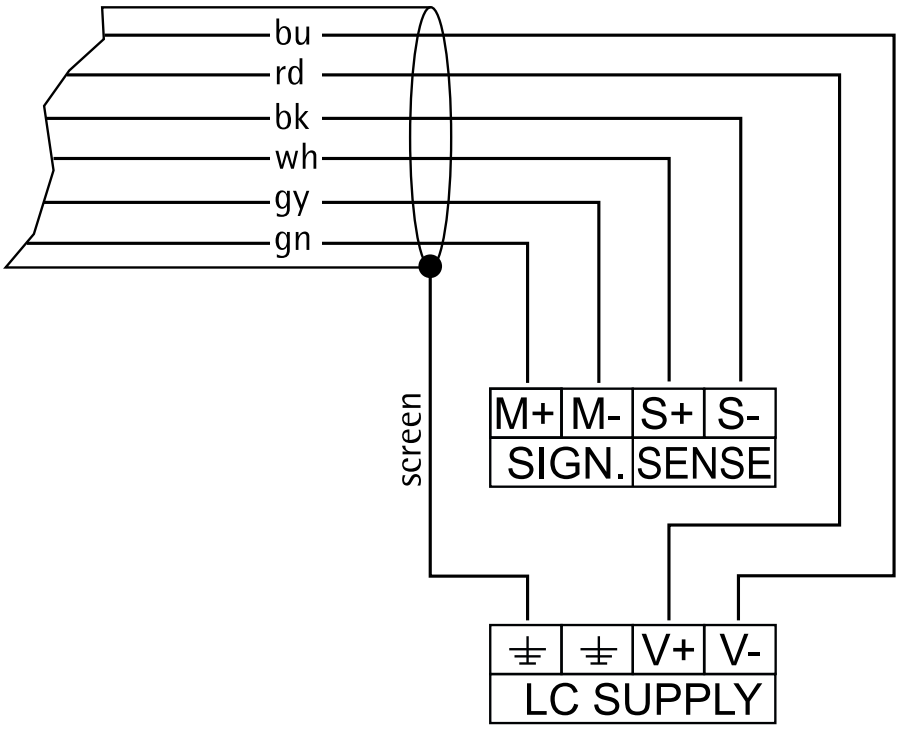
① from SIGN. SENSE S+ to LC SUPPLY V+

② from SIGN. SENSE S- to LC SUPPLY V-



Terminal	Connection/color code	Description
SIGN. M+	+ Meas./gn	+ Measuring voltage (load cell output)
SIGN. M-	- Meas./gy	- Measuring voltage (load cell output)
SENSE S+	+ Sense	+ Sense voltage
SENSE S-	- Sense	- Sense voltage
LC SUPPLY V+	+ Supply/rd	+ Supply voltage
LC SUPPLY V-	- Supply/bu	- Supply voltage
LC SUPPLY ⏚	Grounding	Screen (ground)

4.4.7.3 Connecting a load cell with a 6-wire cable



Terminal	Connection/color code	Description
SIGN. M+	+ Meas./gn	+ Signal (LC output)
SIGN. M-	- Meas./gy	- Signal (LC output)
SENSE S+	+ Sense/wh	+ Sense
SENSE S-	- Sense/bk	- Sense
LC SUPPLY V+	+ Supply/rd	+ Supply (excitation)
LC SUPPLY V-	- Supply/bu	- Supply (excitation)
LC SUPPLY ⏚	Grounding	Screen (ground)

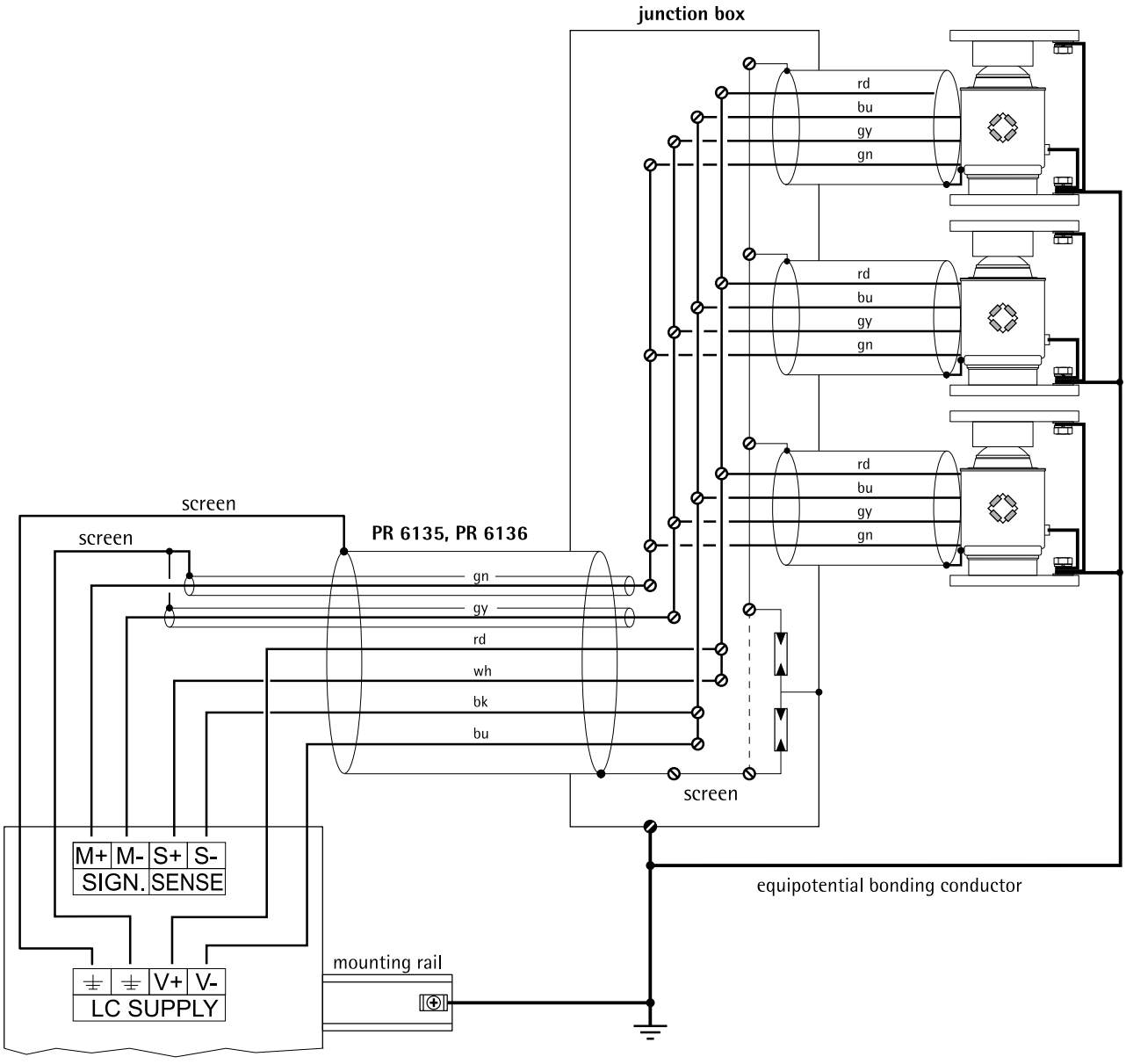
4.4.7.4 Connecting between 2 and8 load cells (650 Ω) using a 6-wire connection cable

Connections are made via cable junction box PR 6130/.. using connection cable PR 6135/.. or PR 6136/... .

Load cell supply circuit

- Load resistance of load cell circuit ≥75 Ω, e.g., 8 load cells of 650 Ω each
- The supply voltage is fixed at 12 V DC and protected against short circuits.

For further technical data, see Chapter 11.6.1.



4.4.7.5 Connecting load cells of type series PR 6221

See installation manuals of PR 6221 and PR 6021/08, -/68.

4.4.7.6 Testing the measuring circuit

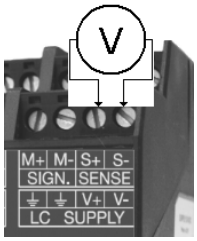
A simple test with the load cells connected can be carried out with a multimeter.

Note:

In the case of an external load cell supply voltage or use of an isolating unit, the internal load cell supply is not relevant.

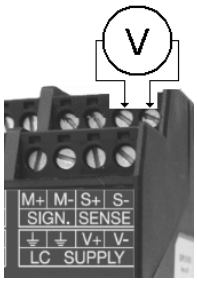
Supply voltage

12 V ±0.8 V (symmetrical to housing ground)



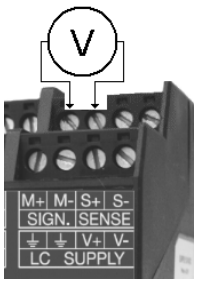
Sense voltage

12 V ±0.8 V (symmetrical to housing ground)

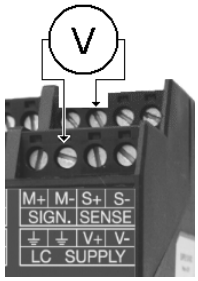


Measuring voltage

0–12 mV @ LC with 1.0 mV/V
0–24 mV @ LC with 2.0 mV/V



Measuring voltage



0 V ±0.5 V

4.4.7.7 External supply to load cells

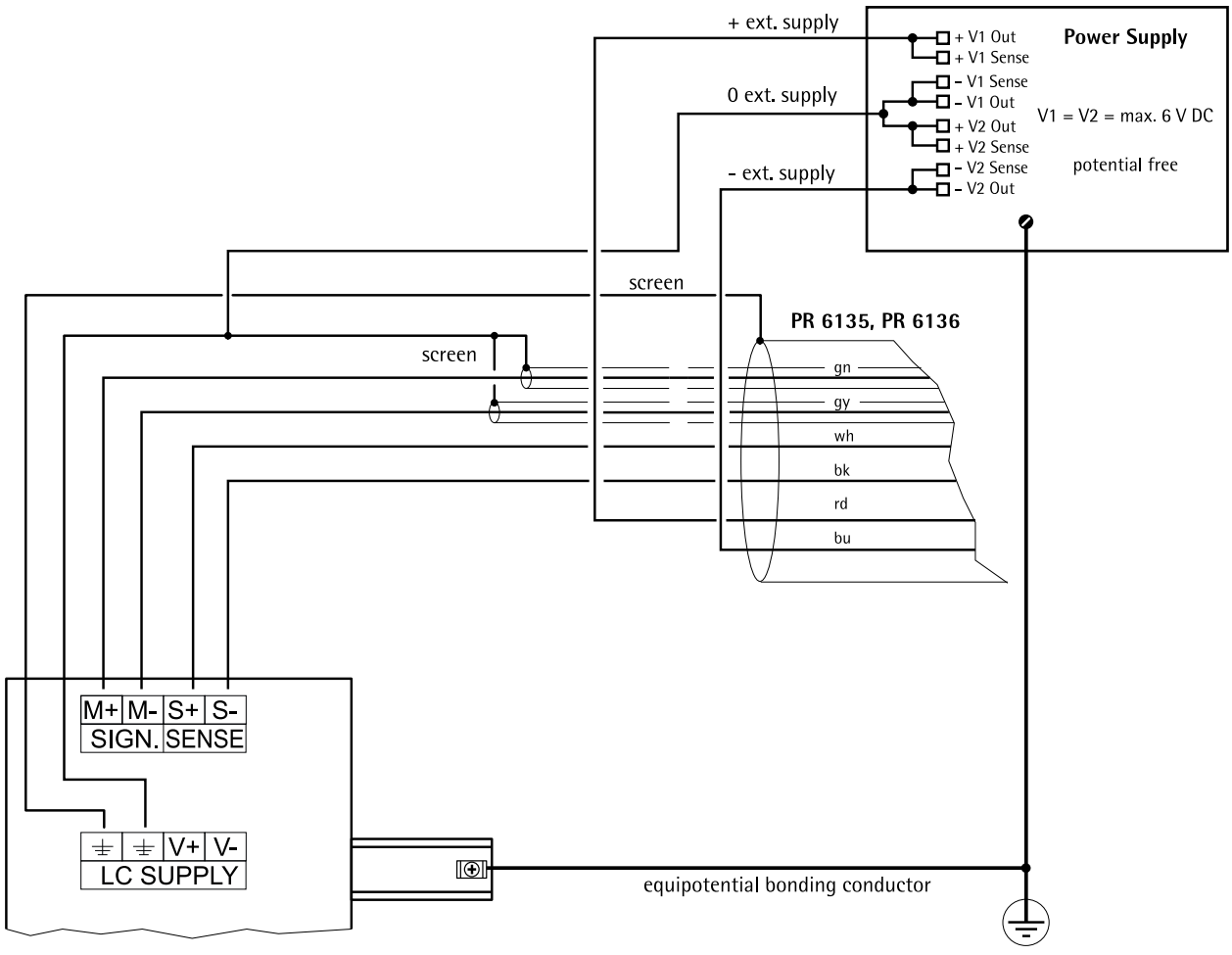
If the total resistance of the load cells is ≤75 Ω (e.g., more than 4 load cells with 350 Ω), an external load cell supply is required. In this case, the internal supply is replaced by a potential-free external supply.

The center of the external supply voltage (0 ext. supply) should be connected to ground to ensure that the voltage reacts symmetrically to 0.

External supply specifications:

6 V DC +5%, -30%; ripple max. 50 mVpp; asymmetry max. ±3%.

The internal supply is not connected.



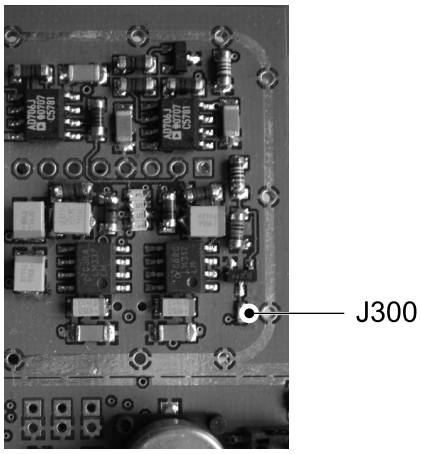
4.4.7.8 Connection to relay PR 1626/6x

The connection is made via the connecting cable PR 6135/.. .

The internal load cell power supply (V+, V-) of the PR 5211 must **not** be connected.

If supply voltage of <8 V DC is required for the load cells, the following settings must be done:

Device	Component	Action
PR 5211/xx	Solder jumper J300 (see Figure)	must be open on the A/D converter Print (remove 0 Ω impedance).



Note:

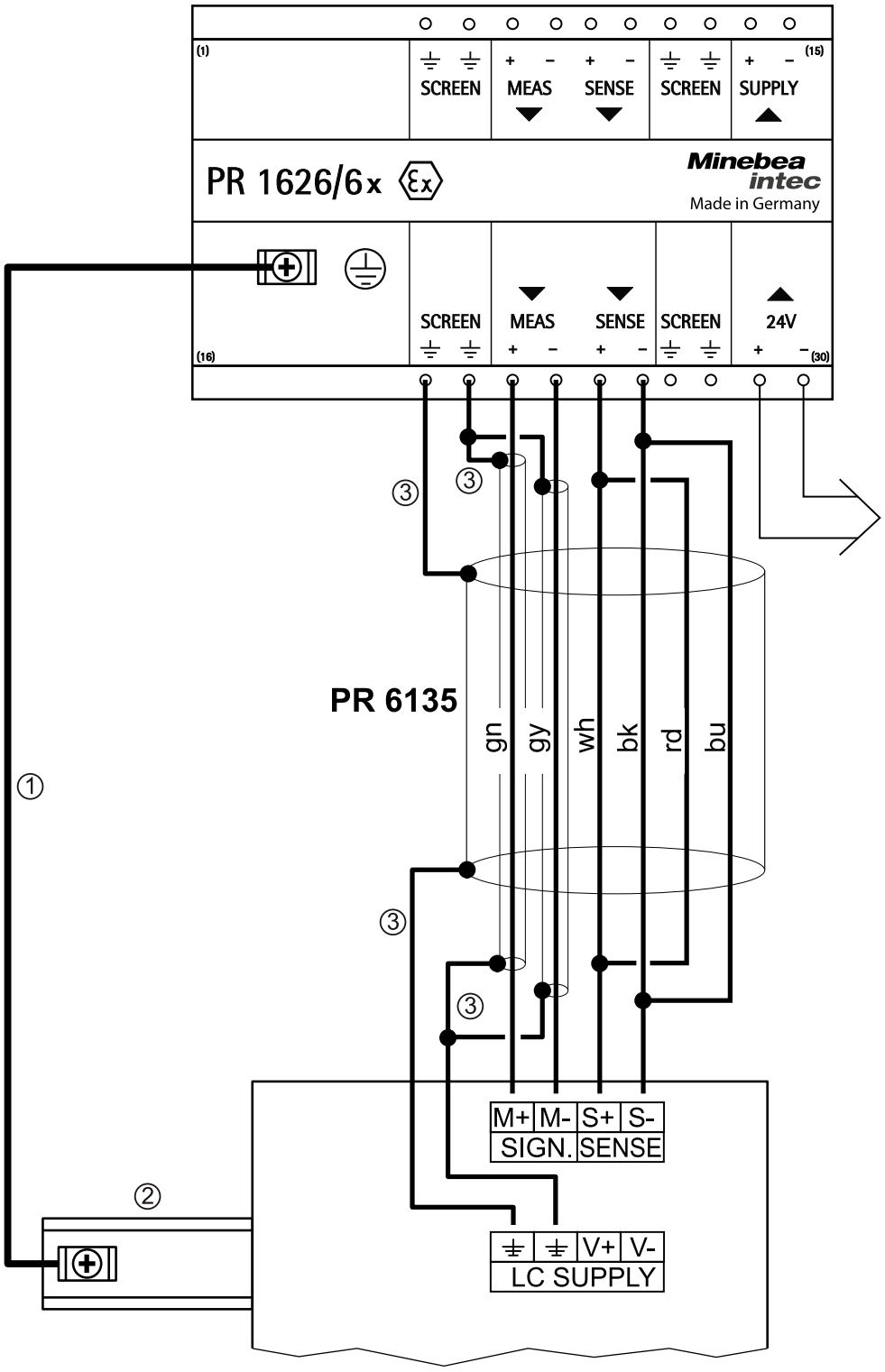
In the factory setting, the solder jumper is closed by a 0 Ω impedance.

By opening J300 the sense voltage monitoring will be switched off!

NOTICE

Installation in the Ex zone

- The screen of the load cell cable and the screen of the connecting cable must not be connected inside the junction box, if connection of both ends is not permissible according to the regulations for installation in the ex-zone.



① Equipotential bonding conductor

② Mounting rail

③ Screen

NOTICE

Metrological problems may occur.

- Make sure there is equipotential bonding between PR 1626/6x and the mounting rail.

4.4.7.9 Connecting an analog weighing platform (CAP... series)

You can connect an analog weighing platform to the device.

NOTICE

The cable colors shown here are valid, for example, for a CAPP4 500 x 400 and a CAPP1 320 x 420.

- The assignments of cable colors are listed in the relevant weighing platform operating instructions.

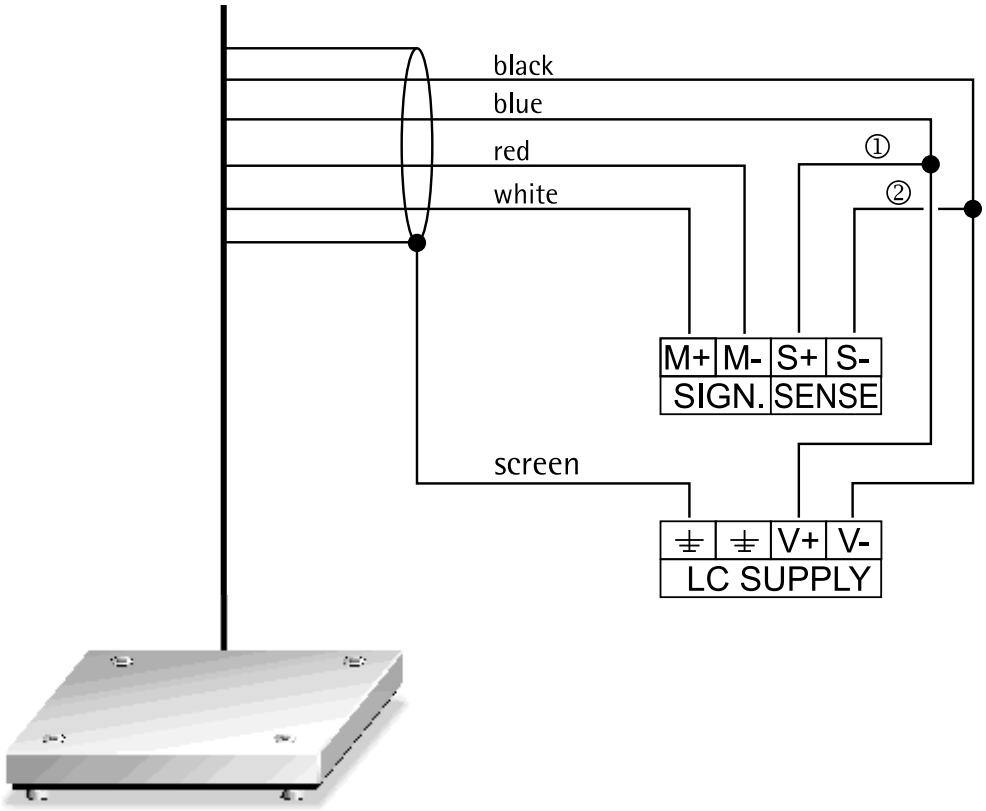
Connection designations

Combics 1 to 3 devices	PR 5211
BR_POS	V+ LC SUPPLY
SENSE_POS	S+ SENSE
OUT_POS	M+ SIGN.
OUT_NEG	M- SIGN.
SENSE_NEG	S- SENSE
BR_NEG	V- LC SUPPLY

The cable screens must be connected to the grounding terminal of the device. If the measuring lines (+M, -M) are screened individually, these screens must be connected to the grounding terminal as well (see also Chapter 4.3).

Example:

Platform with 4-wire connection



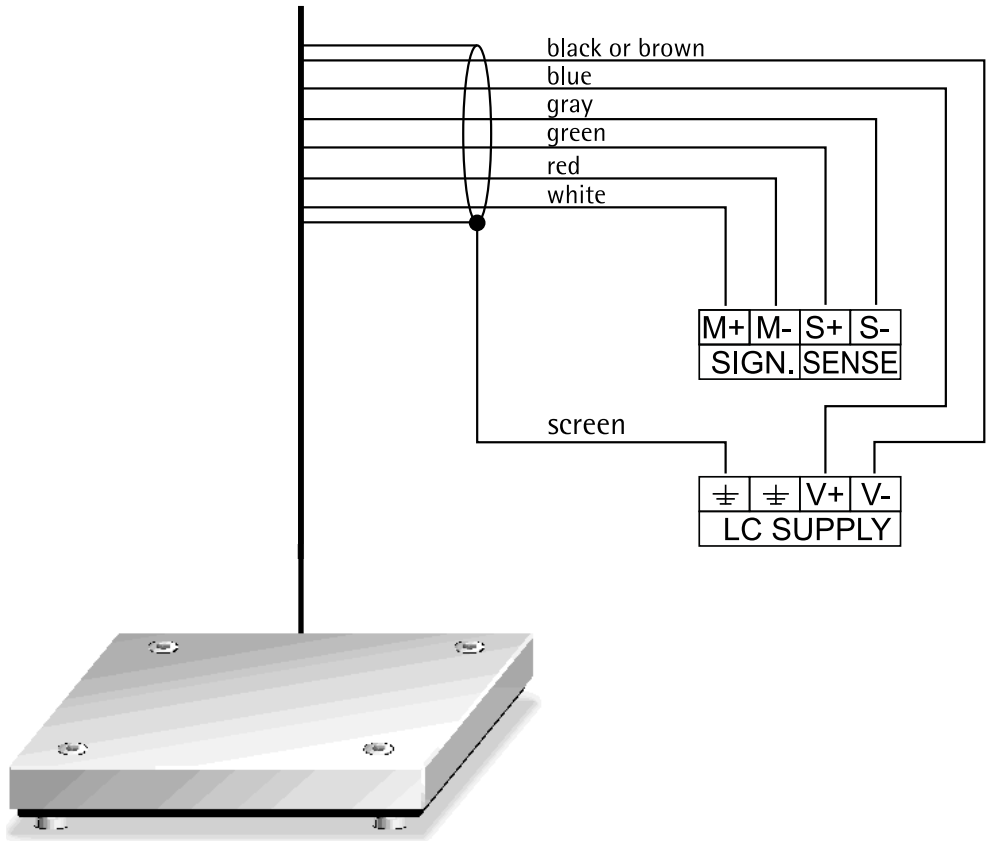
The following links between the terminal contacts are provided:

① from SIGN. SENSE S+ to LC SUPPLY V+

② from SIGN. SENSE S- to LC SUPPLY V-

Example:

Platform with 6-wire connection

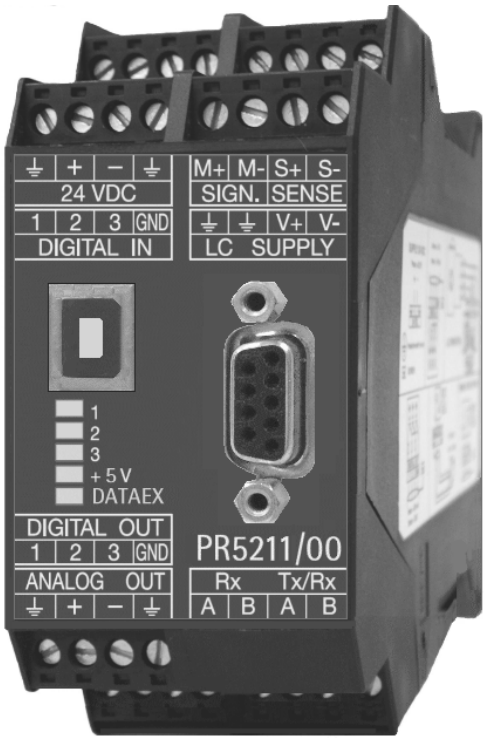
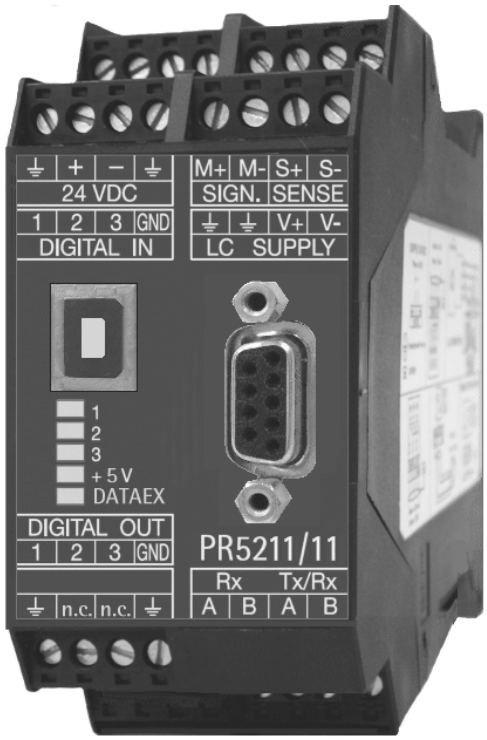


4.4.8 ProfiBus DP interface

The ProfiBus DP interface has the type designation PR PR 5211/00 and PR PR 5211/11.

Communication protocols and syntax comply with the ProfiBus-DP standard to IEC 61158, with transfer rates up to 12 Mbit/s.

Connection to the ProfiBus is established using the 9-pin D-Sub female connector on the front of the device.

PR 5211/00	PR 5211/11
	

Technical data

Description	Data
Transfer rate	9.6 kbit/s to 12 Mbit/s, baud rate auto-detection
Connection mode	ProfiBus network, connections can be made/released without affecting other stations.
Protocol	PROFIBUS-DP-V0 SLAVE to IEC 61158 - Master and slave devices, max. 126 nodes possible. - Watchdog Timer
Configuration	GSD file "gwt_5210.gsd"
Potential isolation	Yes, optocoupler in lines A and B (RS-485)
Bus termination	The bus termination in the last device is implemented via the integrated terminating resistor in the ProfiBus plug.
Cable type	ProfiBus "special"; color: violet; screened twisted pair cable
Cable impedance	150 Ω
Cable length	The max. distance of 200 m can be extended at 1.5 Mbit/s by means of an additional repeater.
Certificates	Profibus test center Comdec in Germany and PNO (Profibus User Organization). Industry-compatible CE, UL, and cUL

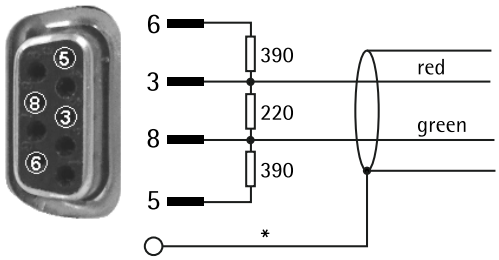
Note:

The GSD file is stored on the CD supplied with the device (fieldbus directory of the respective device). The current file is also available to download online:

http://www.minebea-intec.com

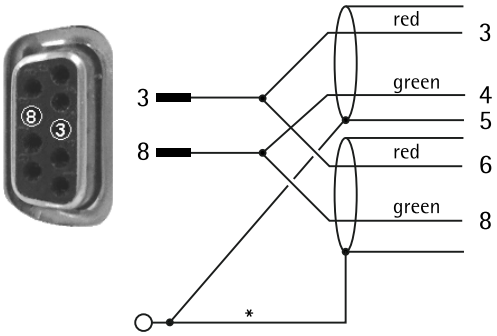
ProfiBus connection

The device is the only/last slave in the bus:



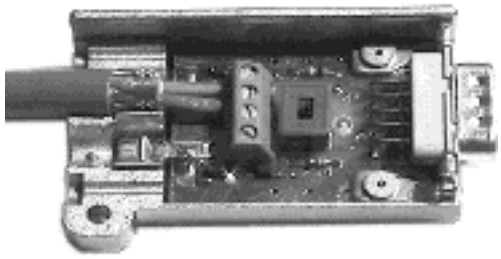
* screen on connector housing

The device is not the only/last slave in the bus:



* screen on connector housing

e.g.: D-Sub bus plug SIMATIC NET PROFIBUS FAST CONNECT



Allocation of the 9-pin D-sub female connector

Pin assignment	Signal	Color	Description
Housing ----------	S		Screen
1			Not connected
2			Not connected
3 ----------	RxD/TxD-P (positive) according to RS-485 specification	Red	Send/receive data Data core B/D (P)
4 if required	RTS		"Request To Send" (only when using a repeater)
5 ----------	DGND		Insulated GND to RS-485 side
6 ----------	VP		Insulated power supply +5 V to RS-485 side
7			Not connected

Pin assignment	Signal	Color	Description
8 ----------	RxD/TxD-N (negative) according to RS-485 specification	Green	Send/receive data Data core A/D (N)
9			Not connected

Note:

Only plug connections with integrated terminating resistors may be used.

5 Getting started

5.1 Power failure/Data backup/Restart

5.1.1 Power failure

If the grid power fails, all entered configuration and calibration parameters are saved.

5.1.2 Data backup

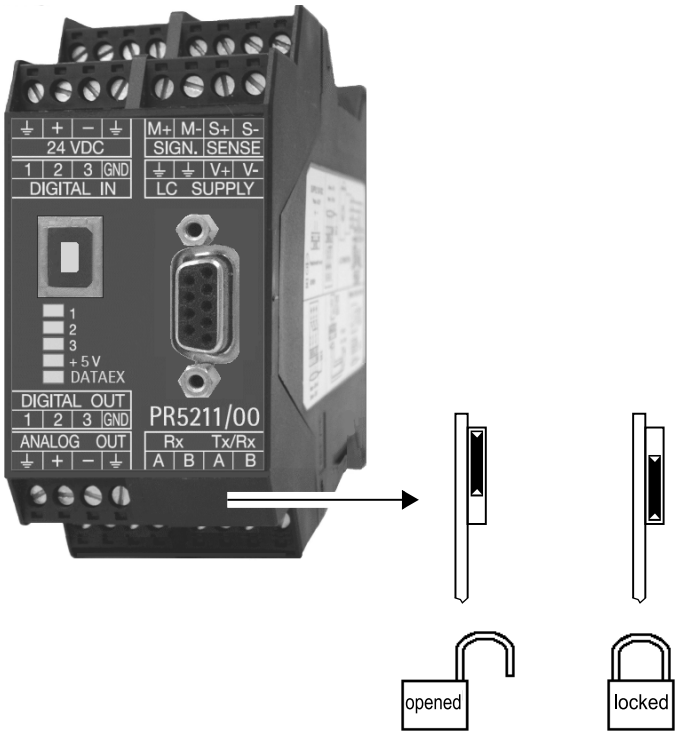
Additional write protection is provided for calibration data and parameters (see Chapter 5.1.3.1).

5.1.3 Overwrite protection

5.1.3.1 CAL switch

The CAL switch protects the calibration data and parameters against unauthorized access.

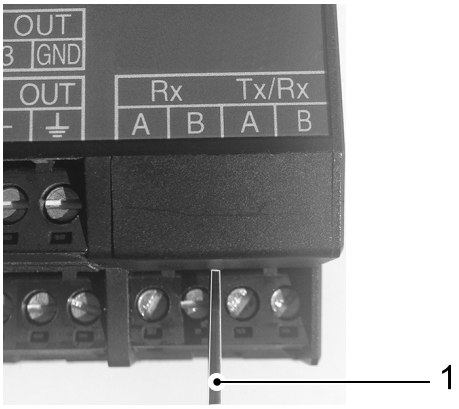
The CAL switch is located under a cover that can be opened by means of a knife, see Chapter 5.1.3.2.



When the CAL switch is in "opened" position, the calibration data and parameters can be changed using the PC program or via the ProfiBus connection.

With the CAL switch in the "closed" position, the calibration data (e.g. dead load, SPAN) and parameters (measuring time, zero tracking etc.) cannot be changed.

5.1.3.2 Removing the cover



Remove the cover as follows:

1. Insert a knife (1) into the slot below the cover and press until it is released.
2. Remove the cap.

5.1.3.3 Factory settings

Calibration data <default>	Calibration parameters <default>
Full Scale (FSD) (Max) <3000> <kg>	Measurement time (M) <320> ms
Scale interval <1>	Measuring rate <160> ms
Dead load <0,000000> mV/V	Standstill time <1> M
SPAN <1,000000> mV/V	Standstill range <1,00> d
	Standstill timeout <8> M

Calibration parameters <default>	Test mode <absolute>
Overload (range over Max.) <9>d	Zero range <50.00> d
W&M node <off>	Zerotrack range <0,25> d
Digital filter <off>	Zerotrack step width <0,25> d
Frequency <1,56 Hz>	Zerotrack time interval <0> M

In the original condition as delivered from the factory, the calibration data and parameters are set to default values (Factory setting).

If a new calibration is started, the calibration data will be set to default (the parameters remain unchanged).

5.2 Switching on the device

The device can be set up as follows:

- Via a notebook/PC with the supplied program "ConfigureIt! 6.00" (or higher).
- The ProfiBus interface allows access to individual parameters.

The weight display is shown.

5.3 Switching off the device

The device is switched off/disconnected from power supply by pulling the plug.

5.4 Warm-up time

The device requires a warm-up time of 30 minutes before calibration.

5.5 Installing driver for USB chip

If necessary, download the USB chip driver from the internet.

1. Open the internet browser.

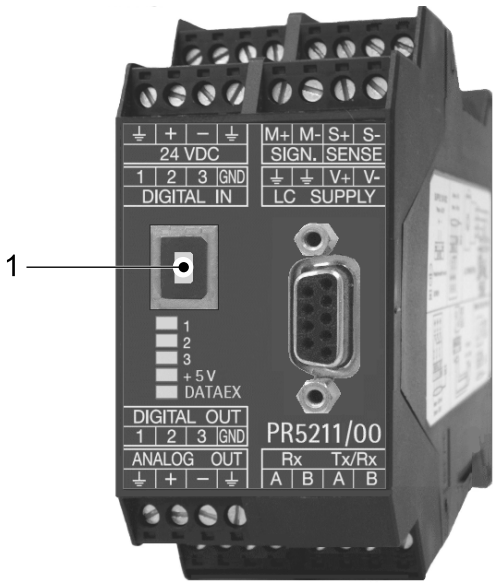
Note:

Please note, the internet address may have changed. In that case please contact Minebea Intec.

2. Type the URL [www.ftdichip.com/Drivers/VCP.htm] and confirm.
   ▷ The web page is displayed.
3. Click on the link of the appropriate operating system in the table (e.g. [2.08.28]).
   ▷ A ZIP folder is downloaded.
4. In the menu of the opened ZIP folder, select [Commands] - [Unzip to specific directory...], choose the target directory and click OK.
5. Click the link "Installation Guides" to open the installation instructions.
6. Install the driver as described in the installation instructions.

5.6 Installing ConfigureIt!

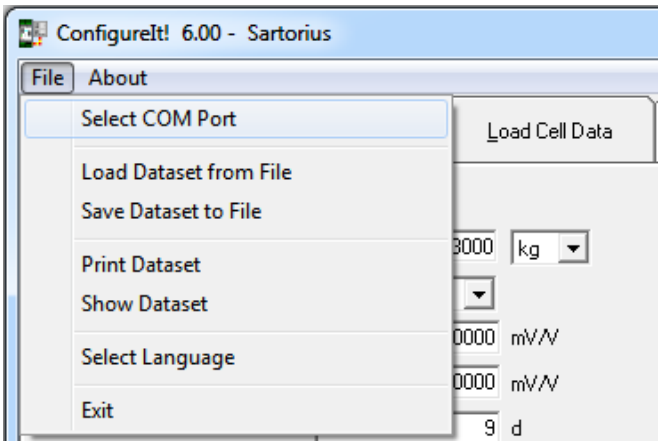
The program "ConfigureIt!" for the configuration and calibration of the transmitter is provided on the CD-ROM and it can be run on Windows 7 or Windows 10.



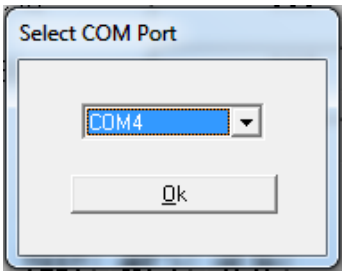
1. Connect the notebook/PC to PR 5211 via the USB port (1) using the PC connecting cable USB A/B and switch on.

2. If the required driver for the USB interface is not found, download it from the internet as described in Chapter 5.5.
3. Check: Are all the necessary Administrator rights to install executable programs given?
   ▷ Run the "ConfigureIt! 6.00 Setup.exe" file.
4. Follow the instructions.
5. Select the destination directory for the installation (e.g.: [C:] - [Programs] - [Minebea Intec] - [PR5211]).
   ▷ On successful installation, this message will appear: "Installation completed".
6. Start the program on the desktop of the notebook/PC.

The link of "ConfigureIt!" to the program is stored on the desktop in the form of an icon during installation.



7. Select [File] - [Select COM Port].
   ▷ The program searches for free serial interfaces and presents them for selection.



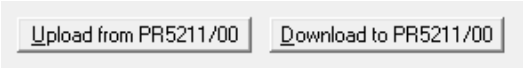
8. Select the interface and then click [OK]. The connection to the transmitter will be established.

5.7 Load and save the settings and configuration

5.7.1 Data in PR 5211

The current dataset can be loaded from the PR 5211 to "ConfigureIt!", it can be edited and again saved in the PR 5211.

The datasets can be loaded and saved in the menu [ADU] and [Parameter].



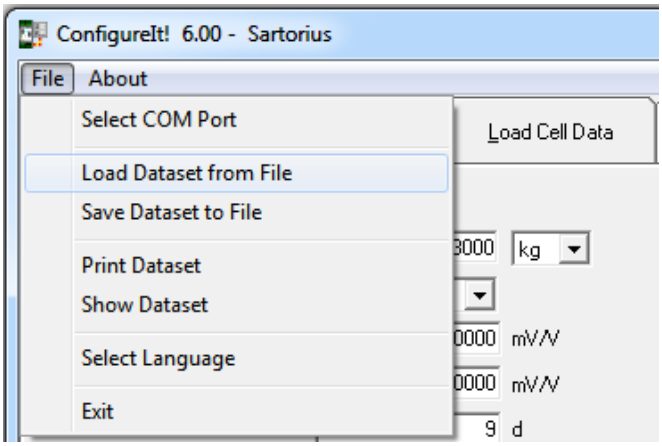
All data will always be loaded or saved.

In case of changes, there will always be a prompt when changing the page or quitting the program, whether these changes should be saved in the PR 5211 or discarded.

If an access code has been set, it will be required now.

5.7.2 Archive data in the PC

The dataset currently loaded in "ConfigureIt!" can be stored as a file on the PC and loaded again. This way, the configuration data can be archived on the PC.



Load dataset

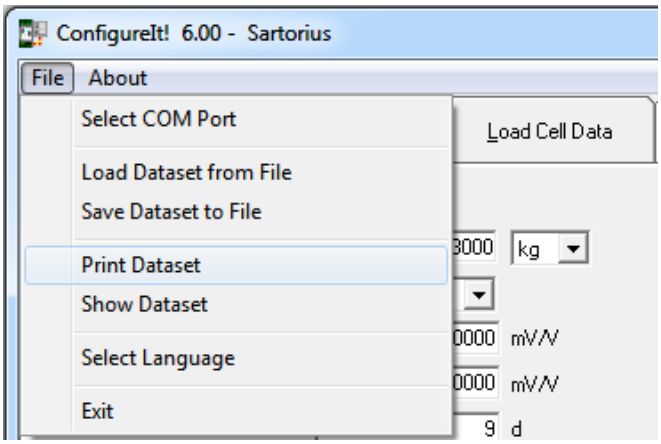
1. Select [File] - [Load Dataset from File].
   ▷ The default values (factory settings) will be loaded in the DEFAULT.DAT file for "ConfigureIt!".

> **Note:**
>
> The default dataset cannot be overwritten. To store a new configuration, the name must be changed.

Save dataset

2. Save the modified dataset under a name other than DEFAULT.DAT.

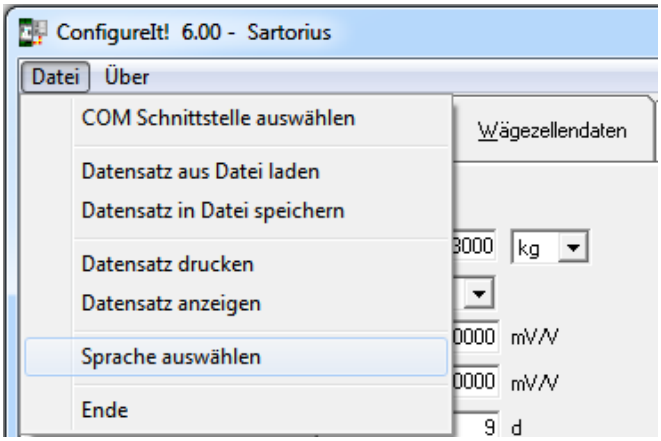
5.8 Print dataset



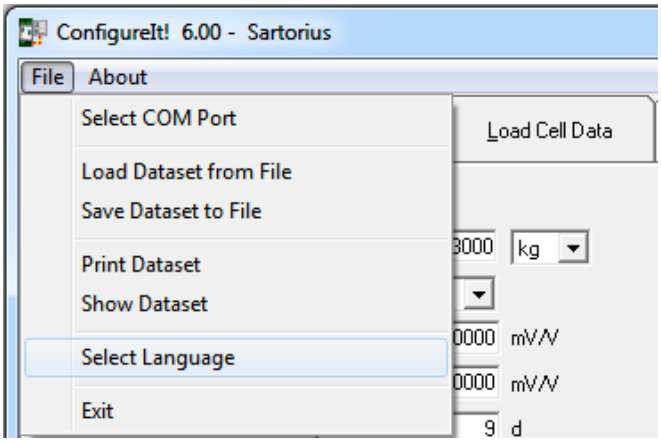
The current calibration data and all parameters will be printed on the printer assigned as the default printer.

5.9 Select language

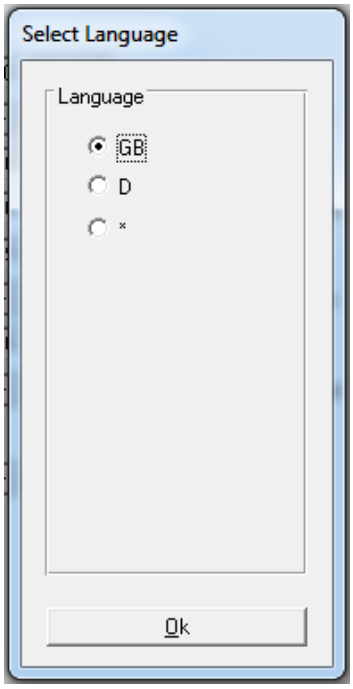
If the program was set to German [D]:



If the program was set to English [GB] (automatically set at the first start of the program):



1. Select [File] - [Select Language].
   ▷ A selection window opens.



2. Select the desired language.

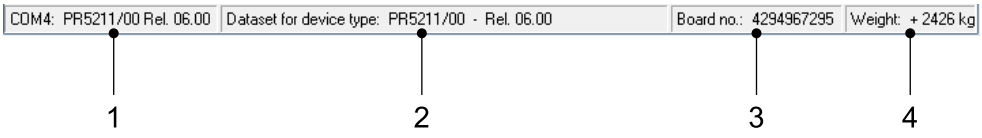
Note:

The languages D, GB and * can be selected.

The * stands for the user-specific (translated) definitions, i.e., the text defined by the user will be shown here.

5.10 Status Line

The bottom line of ConfigureIt is the status line.



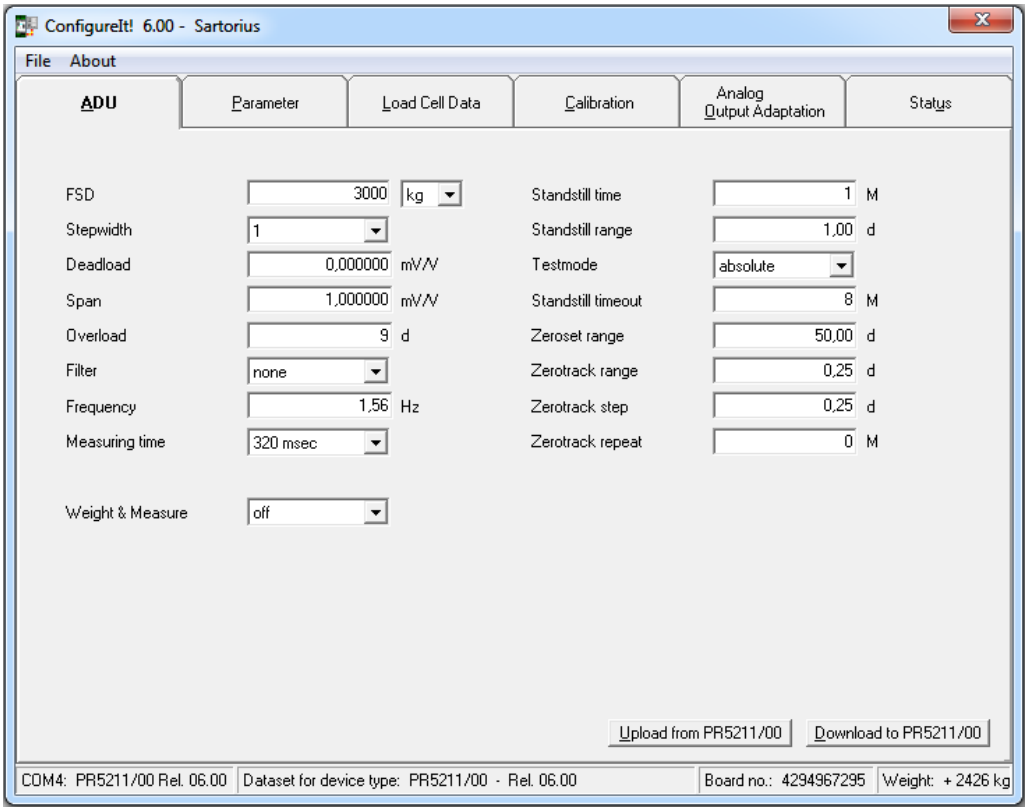
No.	Description of the example
1	The program has established a communication connection using the PC interface COM4 with a PR 5211 of version (release) 06.00.
2	A dataset for the device type PR 5211/00 is loaded.
3	The device has the board number 4294967295.
4	The current weight is +2426 kg.

5.11 ADU

Using this menu the calibration data can be read out and entered again.

Note:

However, the calibration of the configuration of the scale is done using the [Calibration] menu, see Chapter 5.13



[FSD] Full scale deflection (Max)

The full scale deflection (FSD) determines the maximum weight which can be measured.

Overall weight range: from 0.100 ... 9999900

Mass units: mg, g, kg, t or lb.

The value must be divisible by the scale interval [Stepwidth] and can have max. 5 digits after decimal point.

The default value is 3000 kg.

[Stepwidth] Scale interval

The scale interval is adjustable and applies to the entire range:

1, 2, 5, 10, 20 or 50; default: 1.

Increased resolution: (10-fold)

During calibration the display resolution can be increased by factor 10.

[Span]

During calibration it has to be decided:

- To set SPAN by weight (load the scale with the calibration weight and enter the value of the calibration weight)

- To enter the SPAN in mV/V (through calculation using the following formula or if the value is known from previous calibration)

Calculating SPAN

SPAN indicates the equivalent input voltage in mV/V related to the maximum capacity (Max) of the scale. It is calculated as follows:

SPAN [mV/V] = maximum capacity x load cell sensitivity C_n [mV/V] / load cell capacity (maximum capacity E_{max} x number of load cells)

load cell sensitivity C_n = rated output C_n (see technical data for the load cell)

[Dead load]

During calibration it has to be decided:

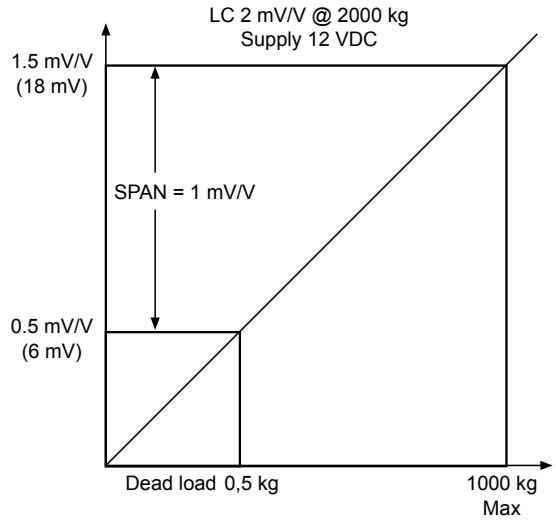
- whether to use the empty scale as dead load (normal case)
- or to enter the SPAN in mV/V (if the scale cannot be unloaded or if the value is known from previous calibration).

Calculate dead load

The input voltage in mV/V equivalent to the dead load can be calculated by using the dead load rather than the maximum capacity in the formula specified above.

Normally, calculation of the dead load (scale without load or empty vessel) is not necessary.

Subsequent dead load correction can be used for later re-determination of the dead load, when the scale or vessel is empty.



Example

- 1 load cell with rated output C_n = 2 mV/V
- At maximum capacity 2000 kg
- Maximum capacity 1000 kg
- Dead load 500 kg
- Load cell supply voltage 12 V DC

[Overload]

Enter in d, maximum permitted range 0 d to 9999999 d, default = 9 d. In case of weight value over FSD + overload, an error message will be generated. The overload range

prevents the scale from going into error state, if the weight value exceeds the FSD only negligibly.

[Filter]

Configurable, select from: no filter, Bessel, aperiodic, Butterworth.

The digital filter (low-pass, 4th order) is located behind the ADU, a new value is calculated in intervals of the measuring rate.

When the digital filter is activated, the cutoff frequency (see [Frequency]) must be set. Weight values to be displayed are generated behind the digital filter.

- After changing the filter parameters, the maximum accuracy should be reestablished through re-calibration.

[Frequency]

The range of the filter cutoff frequency depends on the measuring rate (see Table). The frequency is used only if the digital filter has not been set to "none".

Measurement time	Min. frequency	Max. frequency
10 ms	0.25 Hz	1.84 Hz
20 ms	0.12 Hz	1.98 Hz
40 ms	0.06 Hz	1.83 Hz
80 ms	0.03 Hz	1.97 Hz
160 ms	0.02 Hz	1.56 Hz
>160 ms	0.02 Hz	1.56 Hz

[Measurement time]

The measurement time indicates the time in which the weight value is measured.

Input: 10 ... 1920 msec, default = 320 msec.

Up to 160 ms the measurement time equals the conversion time for the analog/digital converter.

Over 160 ms, the conversion time of the analog/digital converter remains at 160 ms; but the average weight is presented in the entered time.

[Standstill time]

The standstill detection requires two parameters to determine the mechanical standstill of the scale.

Within a defined period of time (standstill time, to be expressed in multiples of measurement time), the weight value of the scale must be within defined limits (standstill range) for the scale to be in standstill.

Input: 'Number of measurement times', permitted range: 1 ... 9, default: 1.

[Standstill range]

Permitted range: 0.00 ... 50.00 d, default: 1.00 d.

[Test mode]

It can be specified whether the test measurement should be displayed full scale (absolute) or the deviation (relative) in relation to the full scale. Example: FSD = 3000, result: Should be 3000 for absolute, should be 0 for relative.

The calibration (with/without weights) is completed with a test measurement. The result is scaled. The full scale is displayed.

Default: absolute.

[Standstill timeout]

If a tare- or Zero-set-command cannot be executed within time n (n = multiples of measurement times), e. g. because the scale does not fulfill the standstill condition, the transmitter generates a message (e. g. no standstill) and the function is aborted.

The time should be entered in multiples of measurement time, from 1 ... 100, default: 8.

[Zeroset range]

Here, a +/- range is defined around the calibration zero, within which

- the displayed gross weight can be set to zero (by an external command), or
- the automatic zero tracking is active (see [Zerotrack repeat]).

Permitted range: 0.00 ... 500.00 d, default: 50.00 d.

[Zerotrack range]

This function is only valid if the repeat interval of Zerotrack is not set to 0 (see [Zerotrack repeat]).

Zerotrack works only as long as the weight signal is within the set zero signal.

Permitted range: 0.00 ... 500.00 d, default: 0.25 d.

[Zerotrack step]

Permitted range: 0.00 ... 10.00 d, default: 0.25 d.

The scale interval of the automatic Zerotrack must be smaller than the standstill range.

This function is only valid, if the repeat interval of Zerotrack is not set to 0 (see [Zerotrack repeat]).

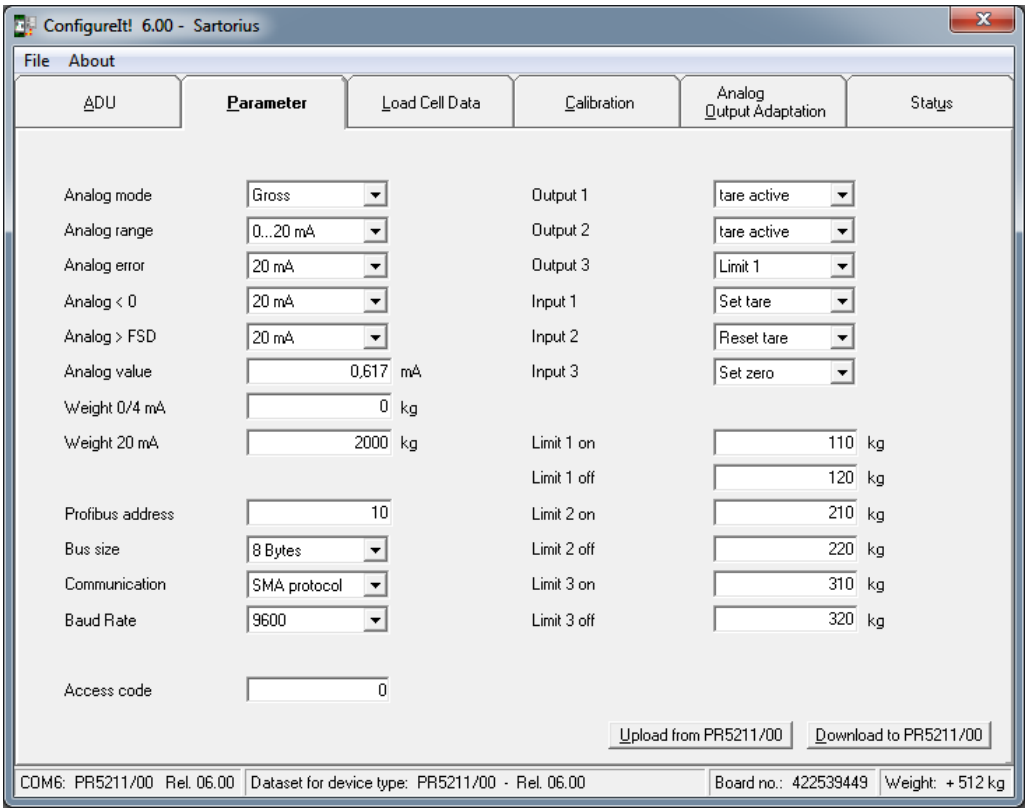
[Zerotrack repeat]

With the scale in standstill condition and the gross weight within the zero range, the automatic zero tracking is done step-by-step in adjustable time intervals.

Enter multiples of the measurement time. The permitted range: is: 0 ... 100, default: 0 (automatic Zerotrack = off)

- Automatic Zerotrack can be switched off by setting Zerotrack repeat = 0.

5.12 Parameter



Note:

The parameters for the analog output are applicable only for PR 5211/00 and PR 5211/10.

[Analog mode]

The following settings are possible:

Off	Analog output is not used
Transparent	Analog output is controlled via PLC (e. g. to set the mixer speed)
Gross	Gross weight value is linked to the analog output.
Net	Net weight value is linked to the analog output (if not tared: gross weight).

[Analog range]

The following can be set:

0 ... 120 mA	Analog output range
4 ... 120 mA	Analog output range

[Analog error]

The following settings are possible:

hold	In case of error the analog output keeps the last value.
0 mA	In case of error the analog output goes to 0 mA.
4 mA	In case of error the analog output goes to 4 mA.
20 mA	In case of error the analog output goes to 20 mA.

[ADU < 0]

Behavior when the weight value is below zero. The following settings are possible:

linear	In case of negative weight the analog output continues (only possible, if the output value for zero weight is greater than 0 mA)
0 mA	In case of negative weight the analog output goes to 0 mA.
4 mA	In case of negative weight the analog output goes to 4 mA.
20 mA	In case of negative weight the analog output goes to 20 mA.

[ADU < FSD]

Behavior when the weight value is above Full scale deflection (FSD). The following settings are possible:

linear	In case of weight value above FSD the analog output continues (only possible, if the output value for FSD is less than 20 mA)
0 mA	In case of weight value above FSD the analog output goes to 0 mA.
4 mA	In case of weight value above FSD the analog output goes to 4 mA.
20 mA	In case of weight value above FSD the analog output goes to 20 mA.

[Analog value]

The analog output can be set to a fixed analog value. The analog mode has to be set to: [transparent].

If the PLC has written the analog value, it is displayed on the screen [Parameter] Tool.

[Weight value for 0/4 mA]

Enter the weight value at which the analog output shall show 0 mA (or 4 mA, if the analog range is set to 4 ... 20 mA).

[Weight value for 20 mA]

Enter the weight value at which the analog output signal shall show 20 mA.

[ProfiBus address]

The address on the ProfiBus has to be defined here, valid addresses are in the range 1, 2 ... 126, Default: 10.

[Bus size]

The normal bus size is 8 bytes.

10 byte bus size is required for a coded data transfer.

Default: 8.

[Communication]

The serial interface can be used for data communication with a remote display (e. g. PR 5110) or an SMA data protocol.

Default: 'off', see also Chapter 4.4.2.

[Baud rate]

The baud rate can be selected as 300, 600 and ... 19.200. Care must be taken to ensure that the same transfer speed is set also on the remote display/terminal.

Default: 9600, see Chapter 4.4.2.

[Access code]

The access code may consist of maximum 9 decimal digits. If the access code is set to 0, no check is done on the code. Once an access code has been set (it has to be entered twice for security reasons), data and parameters cannot be altered, without entering this code. As long as the user has got access, he is allowed to change the access code.

Default: 0.

[Outputs]

The following settings are possible for each of the three digital outputs:

Transparent	The PLC controls the output.
ADU error	The output is set if ADU is in error state.
Limit 1	Result of comparison of limit 1 values with actual weight (see [Limits]).
Limit 2	Result of comparison of limit 2 values with actual weight (see [Limits]).
Limit 3	Result of comparison of limit 3 values with actual weight (see [Limits]).
Tare active	The output is set, if the transmitter is in net mode.

[Inputs]

The following settings are possible for each of the three digital inputs:

none	Input is not used for transmitter control.
Set zero	The transmitter will be set to zero (see Chapter 5.11[Zero range]). (Standstill has to be fulfilled, else the standstill timeout error message will be given (see Chapter 5.11[Standstill range] and [Standstill timeout]).
Set tare	The transmitter will be switched to net mode. (Standstill has to be fulfilled, else the standstill timeout error message will be given (see Chapter 5.11[Standstill range] and [Standstill timeout]).
Reset tare	The transmitter will be switched to gross mode.

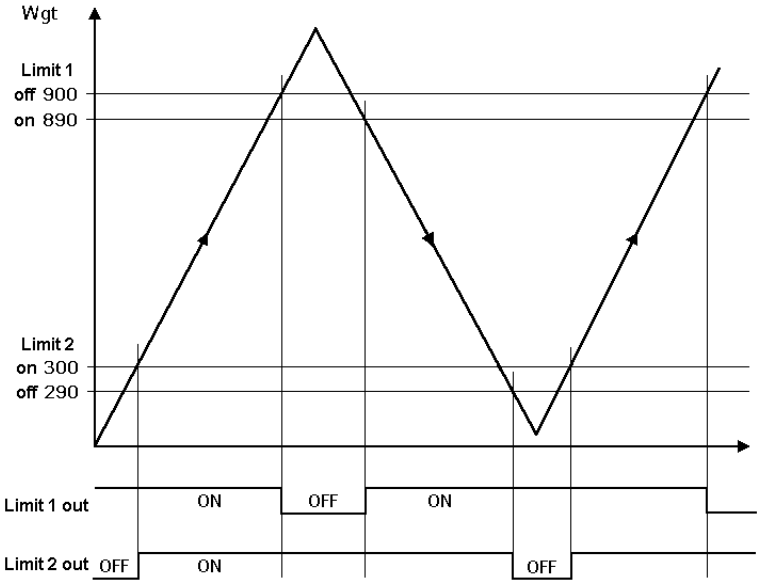
[Limits]

3 pairs of limits can be set to get e. g. information on the fill levels or to generate signals.

Each limit has two weight values: the values for limit on and limit off. These two values are compared with the actual weight. If they are same, an output signal is generated, which can be linked to one of the 3 outputs.

Examples (detection of fill level, lower and upper limit):

Example 1:



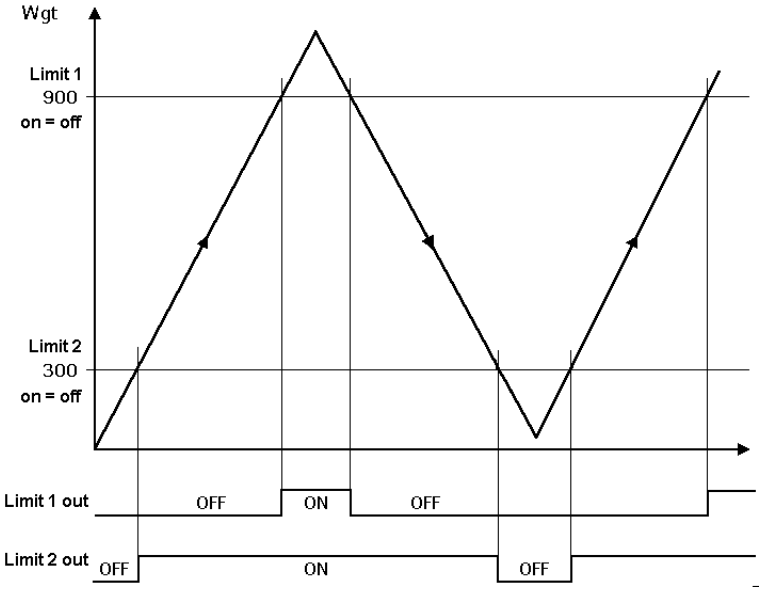
The output signal (Limit 1 out) of limit 1 switches OFF above a weight (Wgt) of 900 kg.

The output signal (Limit 2 out) of Limit 2 switches OFF below 290 kg.

The two limit values have a hysteresis of 10 kg.

In the event of a power failure both outputs turn to "off" ("OFF"), thus indicating underfill and overfill simultaneously.

Example 2:



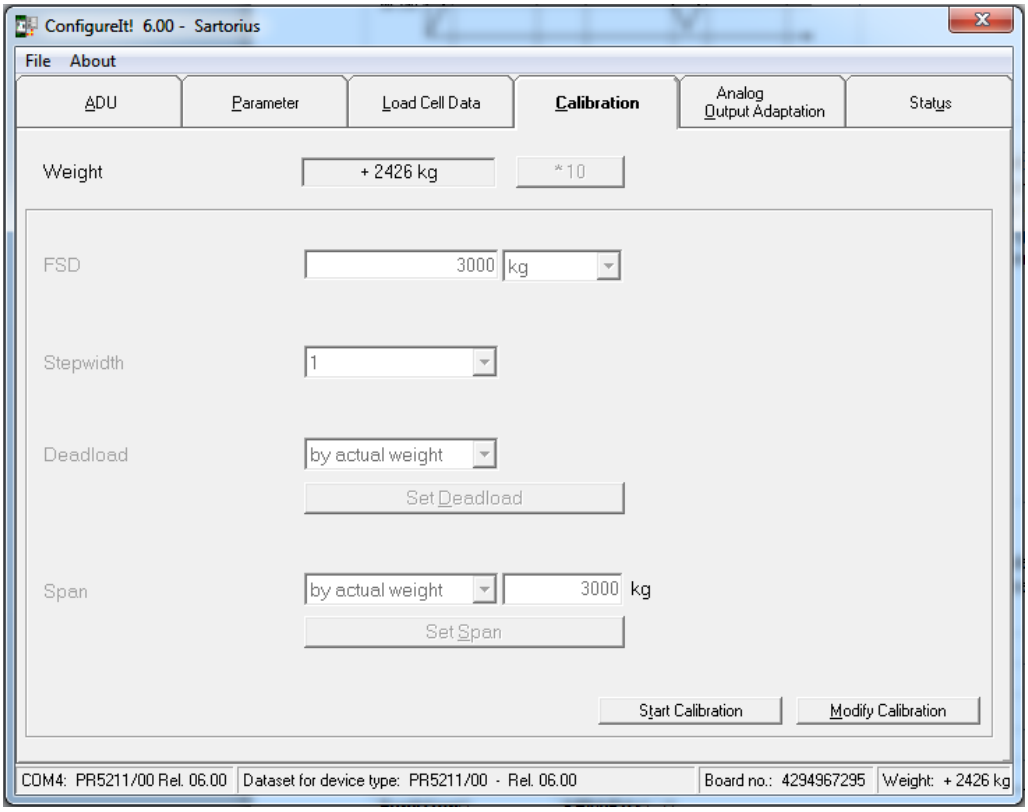
If the Limits 1 and 2 are the same for "On" and "Off" (on = off),

- switches output 1 (Limit 1 out) ON if the weight (Wgt) exceeds the value.
- switches output 2 (Limit 2 out) OFF if the weight falls below the value.

The default values for the limits (Limit 1 ... Limit 3) are 0 kg.

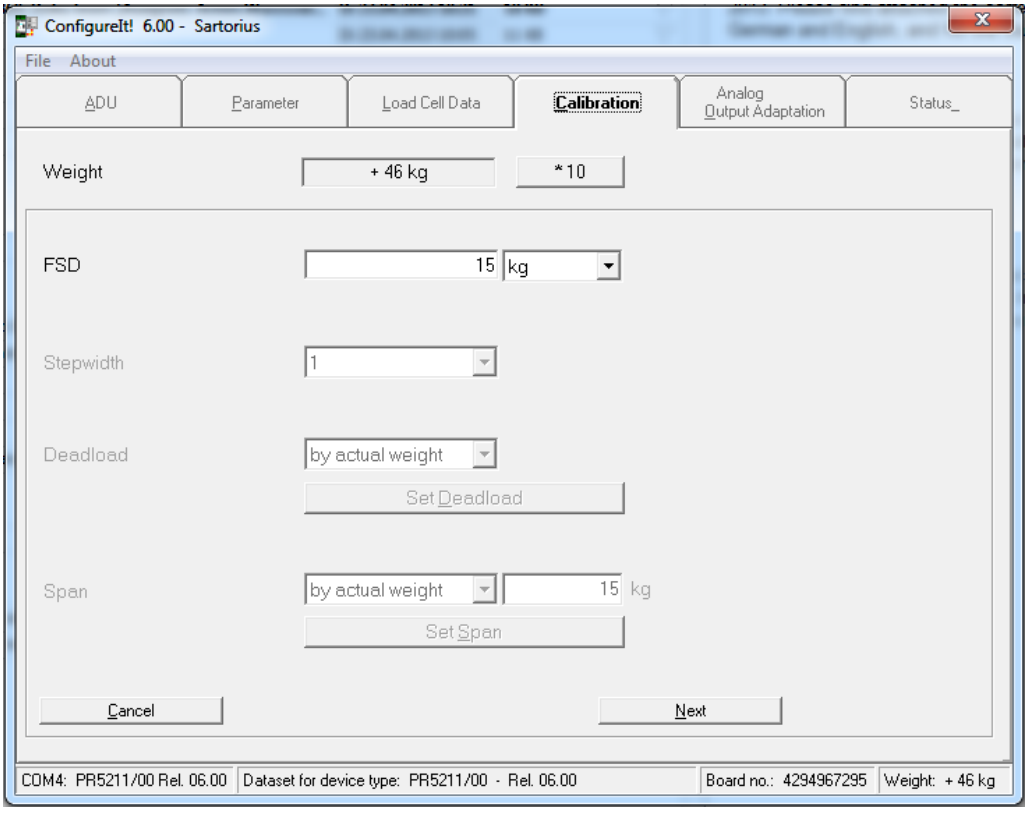
5.13 Calibration

In this menu item, the calibration of the weighing point is performed.



With [Start Calibration] a new calibration will be done.

With [Modify Calibration] an existing calibration can be changed.



During calibration the display resolution (scale interval) can be increased by factor 10 using the [* 10] button.

With the [Next] button you can go to the next step in the calibration. The calibration is done in several steps. Press [Next] after each entry.

Press the [Cancel] button if you need to cancel the selection.

The process in 5 steps:

1. Enter the full scale deflection (FSD).

   Maximum weight (maximum load) on the scale.

2. Enter the scale interval.
3. Enter the dead load. Then press [Set Deadload].

   The dead load is the empty weight of the scale.

   The scale must be completely empty when entering the weight.

   When entering in , enter the mV/V value which corresponds to the weight of the empty scale.

4. Enter the calibration weight or the SPAN in mV/V or the load cell data (Smart Calibration).

   When entering the weight, the scale is loaded with a known calibration weight. This weight value may be smaller than the full scale deflection and will be entered. Then press [Set Span].

   When entering in mV/V, the mV/V value for the full SPAN (zero to FSD) will be entered.

   By selecting "by load cell data", the data of the load cells will be used for the calibration (see Chapter 5.13.1).

5. Press [Save Calibration] to save the calibration.

   Using the [Previous] button you can go to the previous step in the calibration.

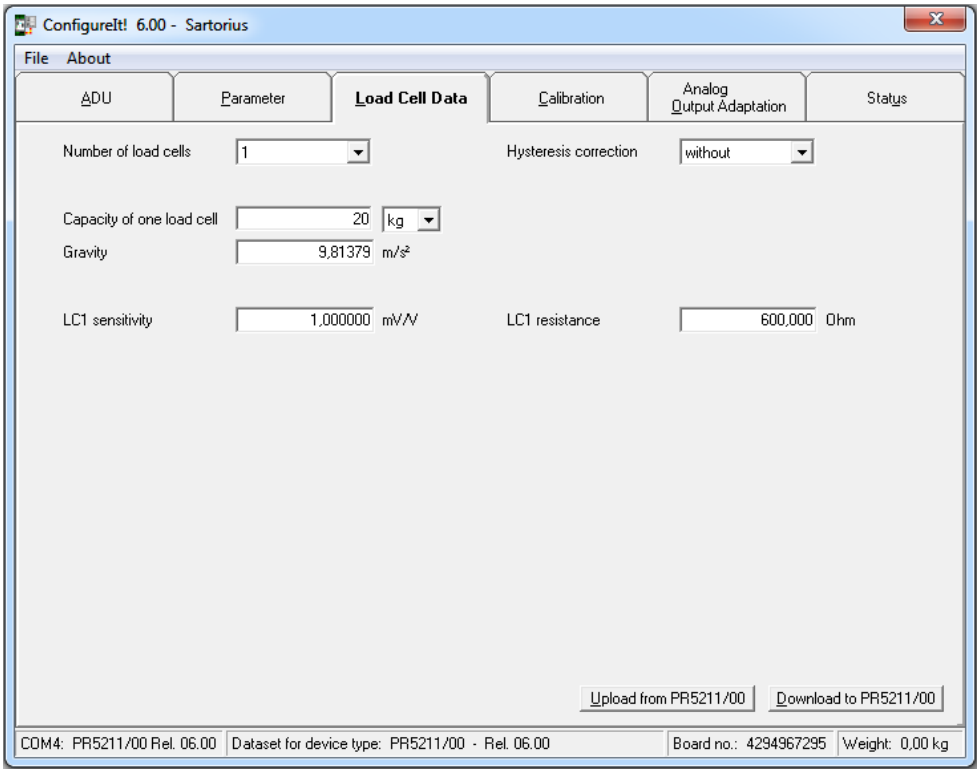
5.13.1 Smart calibration

If the scale to be calibrated is not used in legal metrology, calibration can be performed with the data of the load cell(s).

Before starting the calibration the load cell data have to be entered and saved to the PR 5211.

Prerequisite:

- The software ConfigureIt! 6.00 is installed; see the header of the following figure.
- The instrument software 6.00 is installed; see the status bar of the following figure.



1. Select [Load Cell Data].
2. Enter the desired settings.

   [Number of load cells]

   Number of load cells connected in parallel (1, 2 ... 10).

   [Capacity of one load cell]

   Maximum capacity (E_{max}) of a load cell (not the total maximum capacity of the scale, not the weighing range)

   [Gravity]

   Gravity at the place of installation; default is the value for Hamburg, Germany : 9.81379 m/s^2.

   [LC 1...10 sensivity]

   For this data refer to the 'Calibration Certificate' of the load cells.

   In [sensivity], enter the data of the 'Rated output'.

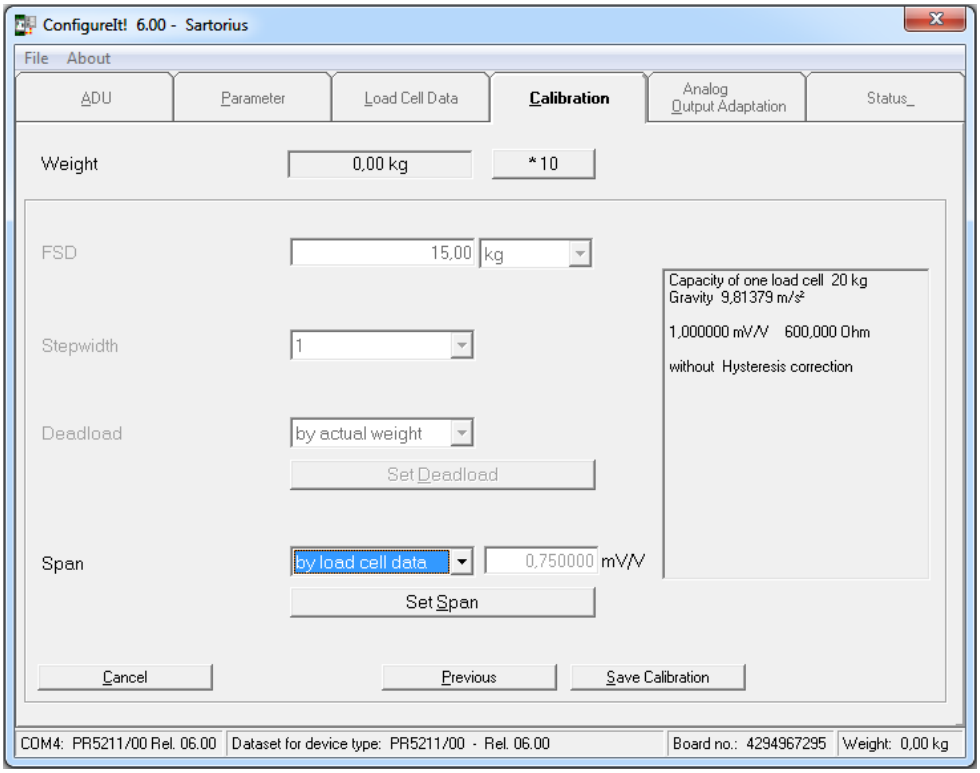
   [LC 1...10 resistance]

   For this data refer to the 'Calibration Certificate' of the load cells. In [resistance], enter the data of the 'output impedance'.

   [Hysteresis correction]

   Only if [with] has been selected, the values for [Correction A/B] must be entered. For this data refer to the load cell certificate.

3. Press [Download to PR5211/00] to save the data in PR 5211.

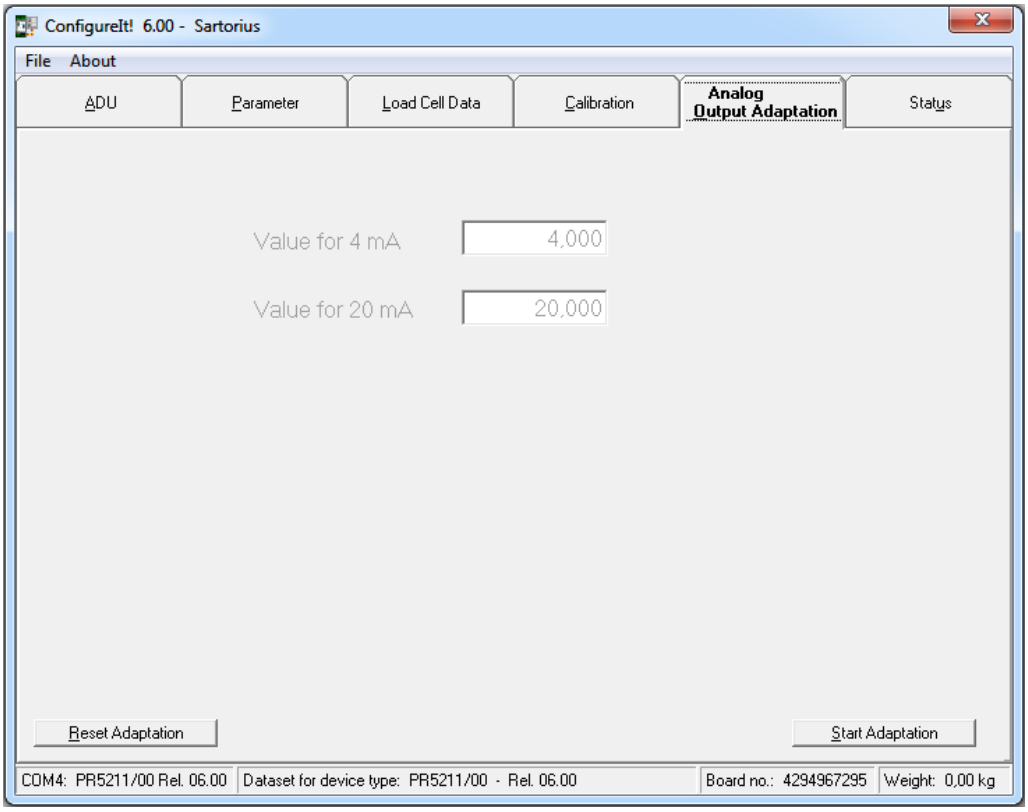


4. Select [Calibration].

   The sequence has to be performed as described in Chapter 5.13, only in Step 4 [by load cell data] has to be selected.

5.14 Analog output current adaption

For PR 5211/00 and PR 5211/10 only.



The analog output current on the receiving end is generally fed through a resistor, measured as a voltage and then digitized. The errors occurring in this transfer chain can be compensated in the instrument.

From this menu, the points for 4 and 20 mA can be individually adapted, so that they match precisely again at the receiver side.

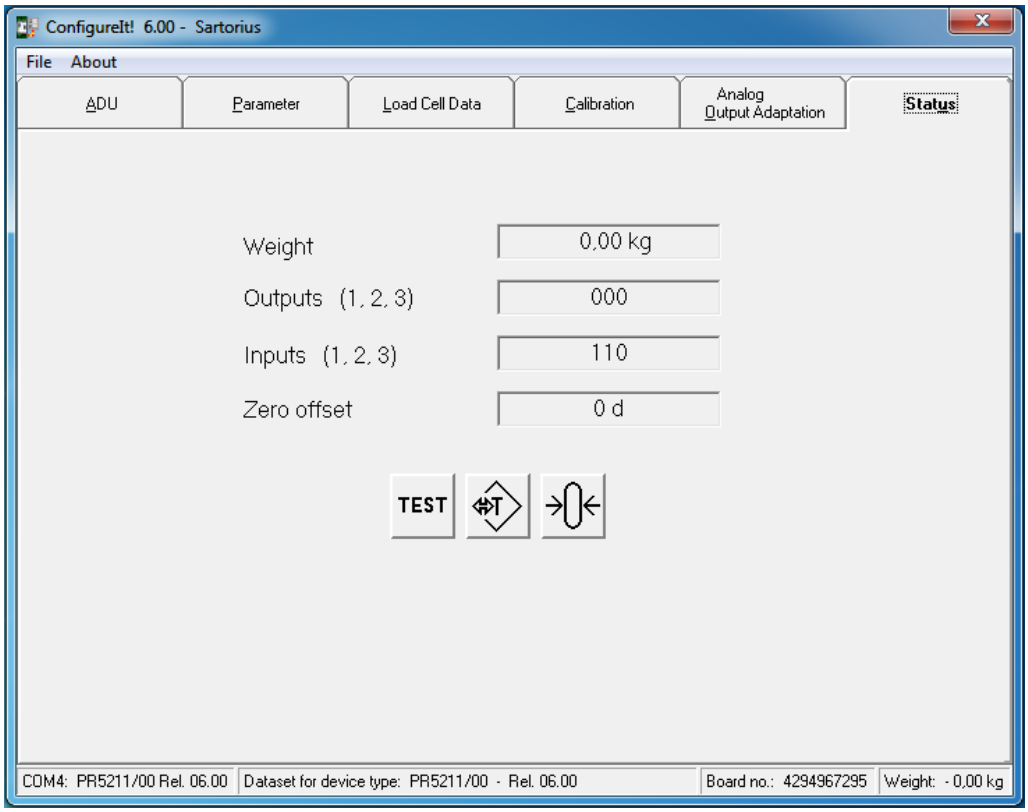
The adaption is done in the following steps:

1. Press [Start Adaption].
   ▷ The analog output is set to 4 mA.
2. Measure this current at the receiver side and enter the value of the measured current, e..g. 4.002 mA.
3. Press [Next].
   ▷ The analog output is set to 20 mA.
4. Measure this current at the receiver side and enter the value of the measured current, e..g. 20.003 mA.
5. Press [Next].
   ▷ The current on the receiver side is now corrected to 4,000 mA and 20,000 mA.

   With [Reset Adaption] the values are reset to [4,000] and [20,000].

5.15 Status

In this menu, the current status of the weight and the digital inputs and outputs is displayed. The scale can be tared, set to zero and switched to the test mode.



[Weight]

current weight.

[Outputs]

status of the digital outputs 1 ... 3.

[Inputs]

status of the digital inputs 1 ... 3.

[Zero offset]

Zero offset from the calibrated zero point (dead load). By pressing the Set zero key, the new zero point will differ from the calibrated zero point.

Use TEST to switch on and switch off the test mode.

Use  to tare the scale and reset tare.

Use  to set the scale to zero.

6 SMA protocol

6.1 General information

The protocol of the "Scale Manufacturers Association" (SMA) provides a simple access to the scale. It can be used for reading data, or for executing functions.

The RS-485 interface is used as an interface.

Fixed interface settings are 8 bits, no parity and 1 stop bit.

The commands to the transmitter are printable ASCII characters starting with <LF> = 0A hex and ending with <CR> = 0D hex.

The transmitter sends a reply on each received command after approx. 100 µs. With commands that wait for standstill of the weight value, the reply can be delayed by the timeout.

The following commands are supported:

W, Z, D, A, B, <ESC>, H, P, Q, R, S, T, M, C, I, N

7 ProfiBus interface

For PR 5211/00 and PR 5211/11 only.

7.1 General notes

Concept definition

Term/Abbreviation	Description
Master	Field bus master, usually an SPS
Slave	Field bus device
MOSI	Master Out Slave In = data is written from the SPS via the field bus to the device.
MISO	Master In Slave Out = data is returned from the device via the field bus to the SPS.

7.2 Profibus interface protocol

The interface works with an 8-byte write window and an 8-byte read window for each weighing point.

The Profibus exchanges its data cyclically with each slave. That means: In each cycle, 8-bytes are written and 8-bytes are read, even if there are no changes to the data content.

The Profibus protocol ensures the data transport between Profibus master and the 2 x 8-byte data windows. The interface protocol runs under the Profibus and manages the access to the most varying data via the 8-byte read and write windows.

Note:

All fieldbus data is only valid, if 'Read_Value_Selected' has been reflected.

7.2.1 Data exchange range

Overview

Byte	0, 1, 2, 3	4	5	6, 7
MOSI	Write data	Read_Value_Select	Write_Value_Select	Control bits (control bits)
MISO	Read data	Read_Value_Selected	Status bits (status bits)	Status bits (status bits)

Write window (MOSI)

Byte	Field	Description
0	Write data (MSB)	Contains the data to be written, e.g., analog output.
1	Write data	
2	Write data	

Byte	Field								Description
3	Write data (LSB)								
4	Read_Value_Select								Selects the function for reading data.
5	Write_Value_Select								Selects the function for writing data.
6	free	free	free	free	free	free	free	free	In direct access, control bits are independent of the write or read request. "Free" bits are application specific.
7	free	free	Res Power	Res Test	Set Test	Res Tare	Set Tare	Set Zero	
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	

Field	Size	Function
Write data	4 bytes	Data to be written as a binary 32-bit value with plus or minus sign. Data type: DINT
Read_Value_Select	1 byte	Function for selecting the read request
Write_Value_Select	1 byte	Function for selecting the write request
ResPower	1 bit	**PowerFail** is reset.
ResTest	1 bit	The **test** operating mode is finished.
SetTest	1 bit	The **test** operating mode is started. Now the test value can be read out by reading the gross weight.
ResTare	1 bit	Tare is reset.
SetTare	1 bit	The weighing point is tared.
SetZero	1 bit	The weighing point is set to zero.

Read window (MISO)

Byte	Field	Description
0	Read data (MSB)	Contains the data to be written, e.g. gross value.
1	Read data	
2	Read data	
3	Read data (LSB)	
4	Read_Value_Selected	**Read_Value_Select** (function) from the write window is mirrored if the data in "Read data" is available.

Byte	Field								Description
5	Write Active	Power Fail	free	free	free	free	free	free	In direct access, status bits are independent of the write or read request. "Free" bits are application specific.
6	Cmd Busy	Cmd Error	free	free	free	Tare Active	Cal Changed	Test Active	
7	OutOf Range	Stand-still	Inside ZSR	Center Zero	Below Zero	Over-load	Above Max	ADU Error	
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	

Field	Size	Function
Read data	4 bytes	Data to be read as a binary 32-bit value with plus or minus sign. Data type: DINT
Read_Value_Selected	1 byte	Acknowledgment of the transmitted function number.
WriteActive	1 bit	The function selected with **Write_Value_Select** has been executed once. This bit is deleted if **Write_Value_Select** is set to 0.
PowerFail	1 bit	Is set when switching on the device. Is reset by **ResPower** with transition from 0→1.
CmdBusy	1 bit	The device is busy executing a function (e.g., waiting for a standstill for taring)
CmdError	1 bit	The device has interrupted the execution of a command (e.g., **standstill** could not be reached within the defined standstill time). The error number can be read from "LASTERROR", see Chapter 7.2.5.5.
Tare_Active	1 bit	The scale has been tared.
Cal_Changed	1 bit	The device has been calibrated. When this bit is 1, the weighing point parameters (EXPO/UNIT/STEP+FSD) must be read again. Set after "Power on" and reset after reading the FSD.
Test_Active	1 bit	The device executes the ADC test. The read weight value is not the gross value, but the test value.
OutOfRange	1 bit	Below zero or above max. (FSD).
Standstill	1 bit	The scale is stable.
InsideZSR	1 bit	The gross weight value is within the zero setting range.
CenterZero	1 bit	The weight value is within **center zero** (0 ±0.25 d).
BelowZero	1 bit	The weight value is negative (gross < 0 d).
Overload	1 bit	The weight value has exceeded the measuring range. No valid weight data is specified (gross > FSD+overload).

Field	Size	Function
AboveMax	1 bit	The weight value has exceeded the max. (FSD), but is still within max. + permissible overload (gross ≤ FS-D+overload).
ADUError	1 bit	AD conversion error, see Chapter 7.2.5.2.

7.2.2 Reading and writing data with function numbers

7.2.2.1 Reading data

Procedure:

1. Write the function number as **Read_Value_Select** in byte 4 of the write window (e.g., 9 = net weight).
2. Wait until **Read_Value_Selected** in byte 4 of the read window is equal to **Read_Value_Select** of the write window.
   ▷ The requested value is available in bytes 0-3.

Action of the master	Slave reaction
Write function number to **Read_Value_Select**.	
	Write requested data in **Read_Data** (bytes 0-3).
	Copy **Read_Value_Select** to **Read_Value_Selected**.
Wait until **Read_Value_Selected** = **Read_Value_Select**.	
Read requested data in **Read_Data** (bytes 0-3).	

7.2.2.2 Writing data

Procedure:

1. Wait until **Write_Active** = 0 in the read window (slave is ready to receive new data).
2. Write value in bytes 0-3 of the write window.
3. Write the function number as **Write_Value_Select** in byte 5 of the write window (e.g., "Basic" application: 190 = analog output 1).
4. Wait until **Write_Active** = 1 in the read window.
5. Write 0 in byte 5 (**Write_Value_Select**).
   ▷ **Write_Active** is reset.

Action of the master	Slave reaction
Write value in **Write_Data** (bytes 0-3).	
Write function number to **Write_Value_Select**.	
	Read data from **Write_Data** (bytes 0-3).
	Set the **Write_Active** bit.
Wait until **Write_Active** has been set.	
Write 0 in **Write_Value_Select**.	
	Reset the **Write_Active** bit.

7.2.2.3 Writing bits

In addition to the control bits in bytes 6/7, further bits can be set and, if necessary, reset directly with **Write_Value_Select**.

To set bits 80 to 127, the corresponding function number is written to **Write_Value_Select** (see Chapter 7.2.5).

To reset bits 80 to 89, the corresponding function number +128 (208 to 217) is written to **Write_Value_Select**.

Action of the master	Slave reaction
Writing the bit address as a function number to **Write_Value_Select**.	
	The bit from **Write_Value_Select** is set and the corresponding function carried out.
	Set the **Write_Active** bit.
Wait until **Write_Active** has been set.	
Write 0 in **Write_Value_Select**.	
	Reset the **Write_Active** bit.

7.2.2.4 Reading bits

Reading individual bits which are not contained directly in the read window is only possible with a corresponding function number and the data in **Read_Data** (Byte 0-3) of the read window. In those bytes, the bits must be evaluated individually.

The procedure is the same as that described in Chapter 7.2.2.1.

7.2.3 Reading and writing bits directly

For reading status bits and for writing direct control bits, no procedure is required. The general status bits are always provided and need not be requested. The direct control bits are also available continuously.

7.2.3.1 Reading status bit

The status bits in bytes 5-7 of the read window are always available and can be read directly by the master.

7.2.3.2 Writing control bits

Some device functions can be executed by setting bits directly in bytes 6 and 7 (control bytes) of the write window.

Action of the master	Slave reaction
Set bits in the **control byte**.	
	Function is executed.
Reset bits in the **control byte**.	

7.2.4 Waiting for the result of the action

When an action requiring more time is started, the end of execution can also be waited for.

Action of the master	Slave reaction
For setting bits, see Chapter 7.2.2.3 or 7.2.3.2.	
	Set the **CmdBusy** bit.
	Function is executed.
	In the event of an error: Set the **CmdError** bit and the **LastError** byte.
	If the function is executed or timeout: reset the **CmdBusy** bit.
Wait until **CmdBusy** = 0.	
Check the **CmdError** bit.	
If **CmdError** is set: Evaluate the **LastError** (for function number 4, see Chapter 7.2.5.5)	
Set the **ResetError** bit (for function number 121, see Chapter 7.2.5.14).	
	The **ResetError** bit is reset.
	The **CmdError** bit is reset.

7.2.5 Function numbers

Function numbers are written to MOSI by the master (SPS) and reflected in MISO by the PR 5211.

- Funktionsnummer 0: I/O status bits (read), see Chapter 7.2.5.1
- Function number 1: scale status (read), see Chapter 7.2.5.2
- Function number 4: calibration information, error byte (read), see Chapter 7.2.5.5
- Function number 5: device type and software version (read), see Chapter 7.2.5.6
- Function number 6: serial number of the weighing point (read), see Chapter 7.2.5.7
- Function numbers 8 to 15: weight data (read), see Chapter 7.2.5.9

- Function numbers 80 to 89: state-controlled action bits (write), see Chapter 7.2.5.13
- Function number 112 to 119; 121: transition-controlled action bits (write), see Chapter 7.2.5.14

7.2.5.1 Function number 0: I/O status bits (read)

Dynamic status

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0						Input 3	Input 2	Input 1
Byte 1						Output 3	Output 2	Output 1
Byte 2						Limit 3	Limit 2	Limit 1
Byte 3								

7.2.5.2 Function number 1: scale status (read)

Dynamic status

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	OutOf Range	Standstill	Inside ZSR	Center Zero	Below Zero	Overload	Above Max	ADU Error
Byte 1					E6	E1	E3	E7
Byte 2						PowerFail	CmdBusy	CmdError
Byte 3						Tare Active	Cal Chan-ged	Test Active

Note:

Byte 0 corresponds to byte 7 in the output area. Weight error in byte 1, see table in Chapter 10.1.

Field	Function
ADUError	AD conversion error (OR function of bits E1, E3, E7).
AboveMax	The weight value has exceeded the Max (FSD), but is still within Max + permissible overload (gross ≤ FSD+overload).
Overload	The weight value has exceeded the measuring range. No valid weight data is specified (gross > FSD+overload); **error 2**.
BelowZero	The weight value is negative (gross < 0d).
CenterZero	The weight value is within center zero (0 ± 0.25 d)
InsideZSR	The gross weight value is within the zero setting range.
Standstill	The scale is stable.
OutOfRange	Below zero or above max. (FSD).
E7	The measuring signal is negative (inverse conversion); **error 7**
E6	Sense voltage not present or too low; **error 6**

Field	Function
E3	The measuring signal is >36 mV (no end of conversion); **error 3**
E1	Arithmetic error (overflow); **error 1**
CmdError	Error during execution (CmdError); e.g., the "taring" operation is not processed, because the scale is not at a standstill. The error is stored in **LastError** (function number 4). The bit is reset with the **ResetError** bit (function number 121, see Chapter 7.2.5.14).
CmdBusy	The device is busy executing a function (e.g., waiting for downtime for taring).
PowerFail	Power failure; is always set after power on. The **PowerFail** bit is reset with the **ResetPWF** bit (function number 85, see Chapter 7.2.5.13) "Reset power failure".
Test_Active	The device executes the ADC test. The read weight value is not the gross value, but the test value.
Cal_Changed	The device has been calibrated. When this bit is 1, the weighing parameters (EXPO/UNIT/STEP) must be read again. Set after "Power on" and reset after reading the FSD (Full scale deflection).
Tare_Active	The scale has been tared.

7.2.5.3 Function number 2: For internal use only.

7.2.5.4 Function number 3: For internal use only.

7.2.5.5 Function number 4: calibration information, error byte (read)

Byte	Description
0: EXPO	One byte for the position of the decimal point; content in decimal form: 0 to 255.
	0 = 000000
	1 = 00000.0
	2 = 0000.00
	3 = 000.000
1: UNIT	One byte for the weight unit; content in decimal form: 0 to 255
	1 = mg (milligrams)
	2 = g (grams)
	3 = kg (kilograms)
	4 = t (tons)
	5 = lb (pounds)
	6 = l (liter)

Byte	Description
2: STEP	One byte for the scale interval; content in decimal form: 0 to 255
	1 = scale interval "1"
	2 = scale interval "2"
	5 = scale interval "5"
	10 = scale interval "10"
	20 = scale interval "20"
	50 = scale interval "50"
3: LASTERROR	Last error byte; see also **CmdError** bit, number of LASTERROR:
	30 = weight smaller than dead load
	31 = no standstill was achieved (e.g., when taring).
	33 = negative weight value when taring and W&M mode on.
	35 = weight exceeds allowed range
	40 = CAL switch locked
	41 = transmitter not in calibration mode
	42 = calibration active, transmitter is in calibration mode
	46 = tare active (can occur at start calibration)
	47 = no zero setting; weight not within zero setting range.
	50 = invalid scale interval (step width)
	51 = not enough counts/d
	53 = calibration weight >FSD (Full scale deflection)
	55 = arithmetic overflow
	57 = entered unit does not comply with FSD weight unit
	58 = SPAN above maximum
	59 = fullscale cannot be divided by scale interval (stepwidth)
	102, 103 = EAROM error (command SaveProcess, function number 2)
	104 = wrong access code
	106 = baudrate of remote display cannot be altered
	107 = no standstill with **GetFixTare.**
	108 = parameter not valid (at entering via PLC)

7.2.5.6 Function number 5: device type and software version (read)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	TYPE MSB							
Byte 1	TYPE LSB							
Byte 2	MAINVERSION							
Byte 3	SUBVERSION							

e.g.: PR 5211 Rel 1.23 = 52200123_{hex}

7.2.5.7 Function number 6: serial number of the weighing point (read)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Serial number MSB							
Byte 1	Serial number							
Byte 2	Serial number							
Byte 3	Serial number LSB							

e.g.: 148388723 = $08D83B73_{hex}$

7.2.5.8 Function number 7: For internal use only.

7.2.5.9 Function number 8 to 15: weight data (read)

The gross, net, and tare weight are stored as a DINT fix point. The real data value is derived from DINT and EXPO as follows:

$Value_{Real} = reading_{DINT} \times 10^{(-EXPO)}$

Function number 8	Current gross value
Function number 9	Current net value, if tared; otherwise gross
Function number 10	Current tare value, if tared; otherwise 0
Function number 11	Reserved for internal use.
Function number 12	Reserved for internal use.
Function number 13	Reserved for internal use.
Function number 14	Max (Full scale deflection)
Function number 15	Reserved for internal use.

7.2.5.10 Function number 20 and 21: Parameter channel (Read/Write)

Function number 20	Parameter value
Function number 21	Parameter index

7.2.5.11 Function number 22...27: Limit value (Read/Write)

Function number 22	Limit 1 on
Function number 23	Limit 1 off

Function number 24	Limit 2 on
Function number 25	Limit 2 off
Function number 26	Limit 3 on
Function number 27	Limit 3 off

7.2.5.12 Function number 30, 31: Fixed values (Read/Write)

Function number 30	Fixed value for analog output, value (num) 0...20000 corresponds to 20 mA
Function number 31	Fixed value for preset tare, see also **SetFixTare**, **GetFixTare** in Chapter 7.2.1.

7.2.5.13 Function number 80...93: state-controlled action bits (write)

Note:

For setting bits, see Chapter 7.2.2.3 .

Only setting and resetting of single bits is possible.

When changing a bit from 0 to 1, the corresponding action starts. After handling the command, the bit must be reset. Application: The master writes cyclically.

The bit is set as **Write_Value_Select** with the specified number (see Chapter 7.2.2.3).

The bit is reset at the specified number +128.

Function number 80	SetZero	Set the gross weight to zero.
Function number 81	SetTare	The weighing point is tared.
Function number 82	ResetTare	Reset tare.
Function number 83	SetTest	Start the ADC test.
Function number 84	ResetTest	Finish the ADC test.
Function number 85	ResetPwf	Reset the **PowerFail** bit (function number 1; the bit was set after "power on").
Function number 86	SetFixTare	Taring with weight in numerical address D31 "FixTare".
Function number 87	GetFixTare	The current gross weight is copied to the numerical address D31.
Function number 89	ResetError	The **CmdError** error bit is reset.
Function number 90	SaveProcess	The process data are saved in EAROM. Limits (function number 22...27) Fixed analogue output value (function number 30) Preset tare (function number 31)

Function number 91	SetParam	Write parameters (value R20 after Parameter R21)
Function number 92	GetParam	Read parameters (value R21 after R20)
Function number 93	SaveConfig	The configuration parameters are saved in EAROM. Analog output (parameter 1...3) I/O parameters (parameter 4, 6) Input/Output configuration (parameter 5, 7) Access control (parameter 99)

7.2.5.14 Function number 112...119, 125: transition-controlled action bits (write)

For setting bits, see Chapter 7.2.2.3 .

As soon as the bit has been set, it is reset internally and the process is carried out; this process is transition-controlled (for one write operation).

The bit is set as **Write_Value_Select** with the specified number (see Chapter 7.2.2.3).

Function number 112	SetZero
Function number 113	SetTare
Function number 114	ResetTare
Function number 115	SetTest
Function number 116	ResetTest
Function number 117	ResetPwf
Function number 118	SetFixTare (function number 86, see Chapter 7.2.5.13).
Function number 119	GetFixTare (function number 87, see Chapter 7.2.5.13).
Function number 121	ResetError
Function number 122	SaveProcess
Function number 123	SetParam
Function number 124	GetParam
Function number 125	SaveConfig

Note:

To prevent frequent writing to the EAROM, the write interval should be no shorter than 15 seconds.

7.2.6 Example: reading the gross weight

Input range (MISO)

Byte	Value	Description
0		
1		
2		
3		
4	08	Read the gross weight (for function number 8, see Chapter 7.2.5.9)
5		
6		
7		

Output range (MISO)

Byte	Value								Description
0	00								Gross weight - byte 0 (MSB)
1	00								Gross weight - byte 1
2	04								Gross weight - byte 2
3	D2								Gross weight - byte 3 (LSB)
4	08								Gross weight request detected.
5	Write Active	Power Fail							In direct access, status bits are independent of the write or read request.
6	Cmd Busy	Cmd Error				Tare Active	Cal Active	Test Active	
7	OutOf range	Stand-still	Inside ZSR	Center Zero	Below Zero	Over-load	Above Max	ADU Error	
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	

The gross value (hex:000004D2 <=> 1234) can be read from bytes 0...3.

Negative values are output in the second complement.

7.3 ProfiBus parameter numbers

All configuration and calibration data can be written in the transmitter or can be read from it with the following parameters.

The rest of the parameters belong to the advanced configuration, which can be found on separate pages.

Values marked as (factory settings) are data in the original condition as delivered from the factory.

One parameter always uses 4 bytes (DINT format)

7.3.1 Configuration parameters

7.3.1.1 Parameter 1: Analog output

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2	Range				Output mode			
Byte 3			ADU in errorstate		ADU below zero		ADU above FSD	

FSD = Full scale deflection

Analog output			
Description	**Range/Signal**		**Factory setting**
Output mode	off, (func. 30)*, Gross, Net	0, 1, 8, 9	0
Analog range	0...20 mA 4...20 mA	0 1	1
ADU in error state**	hold 0 mA 4 mA 20 mA	0 1 2 3	1
ADU below zero	Linear *** 0 mA 4 mA 20 mA	0 1 2 3	0
ADU above SKE	Linear*** 0 mA 4 mA 20 mA	0 1 2 3	3

* Output value 1 means that the value in function number 30 is written to the analog output.

** The ADU error state is only valid if output value is set to gross (8) or net (9).

*** The linear selection can be used to get a proportional output signal outside the range 0 ... FSD.

7.3.1.2 Parameter 2: Scaling weight value for 0/4 mA output

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	WEIGHT MSB							
Byte 1	WEIGHT MSB							
Byte 2	WEIGHT MSB							
Byte 3	WEIGHT LSB							

The weight value at which the analog output shall show 0mA or 4 mA will be saved.

Default = 0

7.3.1.3 Parameter 3: Scaling weight value for 20 mA output

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	WEIGHT MSB							
Byte 1	WEIGHT MSB							
Byte 2	WEIGHT MSB							
Byte 3	WEIGHT LSB							

The weight value at which the analog output shall show 20 mA will be saved.

Default = 3000

7.3.1.4 Parameter 4: Communication

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3							COM 2^1	COM 2^0

The transmission to a remote display (e. g. PR 5110) or the SMA protocol can be switched on or off.

COM = 0: off,

COM = 1: remote display (e. g. PR 5110) switched on,

COM = 2: SMA protocol switched on,

default = 1

7.3.1.5 Parameter 5: Digital outputs

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1						Output 1, default = 0		
Byte 2						Output 2, default = 0		
Byte 3						Output 3, default = 0		

Description	**Value**
Transparent*	0
Aduerr	1
Limit1**	2
Limit2**	3
Limit3**	4
Tare active	5

* Transparent mode means that the PLC is writing directly to the outputs.

** Limit (x) means that the transmitter is writing the output limit directly to the outputs.

7.3.1.6 Parameter 6: RS-485 interface

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2					Baud rate			
Byte 3					Parity		Stop bits	Bits

Baud rate	0 = 300, 600, 1200, 2400, 4800, 9600, 6 = 19200	default = 9600
Bits	0 = 7 bit, 1 = 8 bit	default = 0
Stop bits	0 = 1 stop bit 1 = 2 stop bits	default = 0
Parity	0 = no parity, 1 = odd parity, 2 = even parity	default = 2

Invalid parameters will not be transferred. e. G.: the SMA protocol always has 8 bits and no parity.

7.3.1.7 Parameter 7: Digital inputs

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1							Input 1, default 0	
Byte 2							Input 2, default 0	
Byte 3							Input 3, default 0	

Description	**Value**
None	0
Set zero	1
Set tare	2
Reset tare	3

The PLC can read the status of the inputs at any time.

7.4 Calibration

7.4.1 Procedure

To modify calibration data and parameters (parameter 21...53), first of all, P20 must be set to "Start", then P20 must be set to "Save" or "Undo" (to show that the changes are invalid).

Accessing parameter 21...53 will give an error message, if CalActiv has not been set.

P21 - P24 and P27 can only be written. While reading, the error code 108 is generated.

The calibration data (parameter 21...27) are written in a fixed sequence.

The calibration data (parameter 40...53) can be written in any sequence.

1. Example of a new calibration with mV/V:

- Parameter 20 = 1
- Write all parameters (P40 ... P53)
- Parameter 20 = 5
  - Set SPAN= 1.000000 mV/V;
  - Dead load = 0.000000 mV/V;
  - FSD (Full scale deflection) = 3000 kg;
  - Step =1
- Parameter 21 = 0x000FA013 ⇔ 400.0 kg
- Parameter 22 = 2 ⇔ 2 scale interval
- Parameter 25 = 5670 ⇔ 0.00567 mV/V
- Parameter 26 = 1234500 ⇔ 1.23450 mV/V
- Parameter 20 = 3
- save and exit Calibration.

After each step, always check for errors.

2. Example of a new calibration with weights:

- Parameter 20 = 1
- Write all parameters (P40 ... P53)
- Parameter 20 = 5
  - Set SPAN= 1.000000 mV/V;
  - Dead load = 0.000000 mV/V;
  - FSD (Full scale deflection) = 3000 kg;
  - Step = 1
- Parameter 21 = 0x000FA013 ⇔ 400.0 kg
- Parameter 22 = 2 ⇔ 2 scale interval

Empty the scale

- Parameter 23 = 1 ⇔ the current weight will be transferred as the dead load.

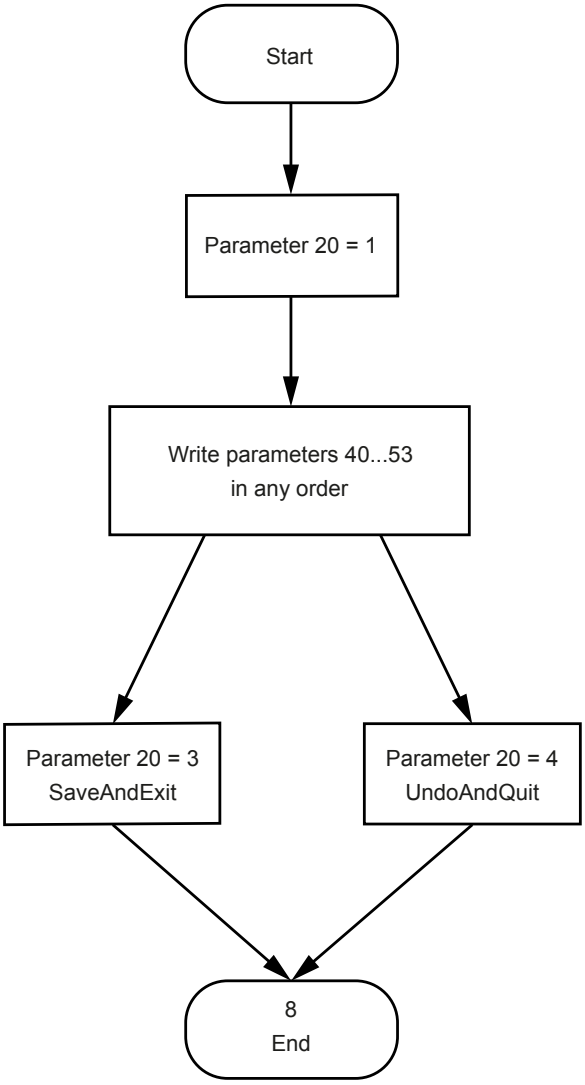
Load the scale with a known calibration weight (e. g. 250.0 kg)

- Parameter 24 = 2500 ⇔ 250.0 kg
- Parameter 20 = 3
- save and exit Calibration.

After each step, always check for errors.

7.4.2 Parameter 20: Calibration start/stop (Write)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3						Function		



Function

1	StartCal Test the CAL switch, set CalActiv.
2	Factory settings The calibration data and parameters are reset to the original condition as delivered from the factory (see Chapter 5.1.3.3).

3	SaveAndExit The calibration data and parameter 21...53 are stored in the EAROM. CalActiv is reset.
4	UndoAndQuitCal All changes made since Start Calibration are rendered invalid. CalActiv is reset.
5	SetDefaultSpan Is used for starting a calibration process: all calibration data are reset, scale is in 'not calibrated' status. FSD (Full scale deflection) = 3000 kg, Scale interval = 1, SPAN = 1.000000 mV/V, Dead load = 0.000000 mV/V.

7.5 ADU Parameters

7.5.1 Parameter P21: SetFullScale (Write)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	FSD MSB							
Byte 1	FSD MSB							
Byte 2	FSD LSB							
Byte 3	EXPONENT				UNIT			

FSD	3 bytes for the full scale
EXPONENT	(4-bit) Number of decimal places
UNIT	(4-bit) Weight unit (as in function number 4)

7.5.2 Parameter P22: Scale interval (Step width, Write)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3	Scale interval							

Scale interval: 1, 2, 5, 10, 20, 50

7.5.3 Parameter P23: SetDeadload with weight (Write only)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3								1

When writing into this parameter, the current weight will be saved as dead load.

7.5.4 Parameter P24: SetSpan (Write)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Weight MSB							
Byte 1	Weight MSB							
Byte 2	Weight LSB							
Byte 3	Exponent				Unit			

Calibration using weights

Weight	3 bytes for the weight value
Exponent	Number of decimal places
Unit	Weight unit (as in function number 4)

7.5.5 Parameter P25: Set/GetDeadloadMvpv (Write/Read)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Dead load MSB							
Byte 1	Dead load MSB							
Byte 2	Dead load MSB							
Byte 3	Dead load LSB							

DEAD LOAD in mV/V (value in mV/V) x 10^6

7.5.6 Parameter P26: Set/GetSpanMvpv (Write/Read)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	SPAN MSB							
Byte 1	SPAN MSB							
Byte 2	SPAN MSB							
Byte 3	SPAN LSB							

SPAN in mV/V (value in mV/V) x 10^6

7.5.7 Parameter P27: CalcTest (Write)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3								1

Calculate test value

7.5.8 Parameter P40: Digital filter

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3						Filter		

FILTER 0 = off, 1 = Bessel, 2 = aperiodic, 3 = Butterworth, default = off

7.5.9 Parameter P41: Filter frequency

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3	FREQ							

FREQ: The value has to be entered in Frequency x 100. Example: for 1.56 Hz enter 156.

The frequency range depends on the measurement time; see Table in Chapter 5.11[Frequency].

Applicable only if the digital filter has not been set to [off].

If the digital filter is switched on, the measurement time is max. <=160 ms.

7.5.10 Parameter P42: Measurement time

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2	TIME MSB							
Byte 3	TIME LSB							

TIME: Measurement time msec 10 ... 1920, default = 320 msec

Applicable only if the digital filter has been set to [off].

The parameter P53 will be set accordingly.

10...160 ms –> P53: 4 ... 0

320 ... 1920 ms –> P53: 0

7.5.11 Parameter P43: Test operating mode

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3								MODE

MODE 0 = absolute, 1 = relative, default = 0

7.5.12 Parameter P44: Standstill time

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3					STIME			

Time expressed in multiples of the measurement time at which a standstill is detected.
STIME: 1 ... 9 times the measurement time, default = 1

7.5.13 Parameter P45: Standstill range

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2	SRANGE MSB							
Byte 3	SRANGE LSB							

Limit to define the weight to be in standstill.
SRANGE: 0 ... 10.00 d, default = 1 d
Value = d x 100

7.5.14 Parameter P46: Standstill timeout

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3	TIME							

Number of measurement times, during which the standstill condition should be reached.
TIME: 0 ... 100 M (measurement times), default = 8

If the standstill timeout is exceeded in a function which needs the standstill condition, the function will be aborted (taring parameters, set zero, calibration, 'P'-command of the SMA-protocol). In addition, the error code 31 and the 'CmdError' bit will be set.

7.5.15 Parameter P47: Zero range

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2	RANGE MSB							
Byte 3	RANGE LSB							

RANGE: 0 ... 500.00 d, default = 50 d

Value = d x 100

7.5.16 Parameter P48: Zerotrack range

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2	RANGE MSB							
Byte 3	RANGE LSB							

RANGE: 0 ... 500.00 d, default = 0.25 d

Value = d x 100

7.5.17 Parameter P49: Zerotrack step

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2	STEP MSB							
Byte 3	STEP LSB							

STEP: 0 ... 10.00 d, default = 0.25 d

Value = d x 100

7.5.18 Parameter P50: Zerotrack repeat

Repeat interval of Zerotrack

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3	REPEAT							

REPEAT: 0 ... 100 measurement times, default = 0 (Zerotrack is off)

7.5.19 Parameter P51: Overload

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	OVL MSB							
Byte 1	OVL MSB							
Byte 2	OVL MSB							
Byte 3	OVL LSB							

OVL Overload in d 0 ... 9999999, default = 9 d

7.5.20 Parameter P53: A/D converter sample time (measuring rate, read only)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2								
Byte 3					SAMPLETIME			

SAMPLETIME	0:	6.25 Hz	==	160 ms = default
	1:	2.5 Hz	==	80 ms
	2:	25 Hz	==	40 ms
	3:	50 Hz	==	20 ms
	4:	100 Hz	==	10 ms

7.5.21 Parameter P99: Access code (Write)

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	CODE MSB							
Byte 1	CODE MSB							
Byte 2	CODE MSB							
Byte 3	CODE LSB							

CODE: If an access code has been set in the configuration tool, parameters and function numbers for limits can be written only if the access code is also present in parameter P99. The parameter P99 can always be written. To activate protection, P99 must be set again to –1. If the CODE is set to 0, no access control checks will be performed.

8 Maintenance/repairs/soldering work/cleaning

8.1 Maintenance

Maintenance work may only be carried out by a trained technician with expert knowledge of the hazards involved and the required precautions.

8.2 Repairs

Repairs are subject to inspection and must be carried out at Minebea Intec.

In case of defect or malfunction, please contact your local Minebea Intec dealer or service center for repair.

When returning the device for repair, please include a precise and complete description of the problem.

8.3 Soldering work

No soldering work is permitted on the device; an exception is the solder switch (see Chapters 4.4.7.7 and 4.4.7.8).

8.4 Cleaning

NOTICE

Property damage caused by unsuitable cleaning utensils/agents.

Damage to the device.

- ▶ Prevent moisture from penetrating the interior.
- ▶ Do not use aggressive cleaning agents (solvents or similar agents).
- ▶ For use in the food industry, use a cleaning agent suitable for that particular working environment.
- ▶ Use soft sponges, brushes and cloths.
- ▶ Spraying with water or blasting with compressed air is not permitted.

1. Unplug device from mains supply, disconnect any data cables.
2. Clean the device with a cloth lightly moistened with a soap solution.
3. Wipe down the device with a soft, dry cloth after cleaning.

9 Disposal

If the packaging is no longer required, please take it to your local waste disposal facility and/or a reputable disposal company or collection point. The packaging largely consists of environmentally friendly materials which can be used as secondary raw materials.

It is not permitted—even for small businesses—to dispose of this product with the regular household waste or at collection points run by local public waste disposal companies.

EU legislation requires its Member States to collect electrical and electronic equipment and dispose of it separately from other unsorted municipal waste so that it can then be recycled.

Before disposing of or scrapping the product, any batteries should be removed and taken to a suitable collection point.

Please see our T&Cs for further information.

Service addresses for repairs are listed in the product information supplied with the product and on our website (www.minebea-intec.com).

We reserve the right not to accept products that are contaminated with hazardous substances (ABC contamination) for repair.

Should you have any further questions, please contact your local service representative or our service center.

Minebea Intec GmbH

Repair center

Meiendorfer Strasse 205 A

22145 Hamburg, Germany

Phone: +49.40.67960.666

service.HH@minebea-intec.com

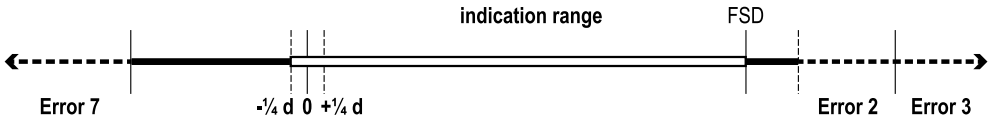
10 Error messages

10.1 Weight error status

LED	Error 1 Arithmetic	Error 7 (negative)	Error 2 Overload	Error 3 (>36 mV)	Error 6 Sense control
1	Flash. 1Hz	Flash. 1Hz			Altern. flash. 1Hz
2	Flash. 1Hz			Flash. 1Hz	Altern. flash. 1Hz
3	Flash. 1Hz	Flash. 1Hz	Flash. 1Hz	Flash. 1Hz	Altern. flash. 1Hz
+ 5V					
DATAEX					

Note:

In all other messages, the top status LED will flash.



FSD = Full scale deflection

11 Technical data

11.1 Equipment supplied

- CD-ROM
- PC connection cable USB A/B; length 1.8 m

11.2 Note on using "free software"

The firmware on the PR 5211 device contains "free software" that is licensed under the

- GNU General Public License (GPL) Version 2, June 1991, and
- GNU Lesser General Public License (LGPL) Version 2.1, February 1999.

This "free software" developed by third parties is copyrighted and is provided free of charge. The license terms and conditions of Free Software Foundation, Inc. in English are included in the delivery of the device. The source text for the terms and conditions can be found on the CD-ROM included.

11.3 Decoding the serial number

30 252 00015		
30	252	00015
Location no.: 30 = Hamburg	Code for the year/month: 252* = April 2010	Current number

* Is increment according to the year group table of Minebea Intec.

11.4 General data

The following characteristics are valid after a warm-up time of at least 30 minutes (reference temperature: 23 °C).

Values specified without tolerances are average values and are only used for information.

11.4.1 Supply voltage

Supply voltage	24 V DC +10 %/-15 %
Power consumption	8.2 W

11.5 Effect of ambient conditions

11.5.1 Ambient conditions

Temperature range	Reference temperature	23 °C
	Ambient temperature for operation	-10...+55 °C
	Power-on temperature	0...+55 °C
	Limits for storage/transport	-40...+70 °C

Moisture	<95%, non-condensing (acc. to IEC 60068-2)
Protection class	IP20
Vibrations	pursuant to IEC 68-2-6, Test Fc

11.5.2 Electromagnetic Compatibility (EMC)

All data in compliance with NAMUR NE 21 and EN 61326.

Housing	High frequency electromagnetic fields (80...3000 MHz)	EN 61000-4-3	10 V/m
	Electrostatic discharge (ESD)	EN 61000-4-2	6/8 kV
Signal and control lines	Fast transients (burst)	EN 61000-4-4	2 kV
	Peak voltages (surge) 1.2/50 µs	EN 61000-4-5	2 kV
	Conducted disturbances by high frequency coupling (0.15...80 MHz)	EN 61000-4-6	10 V
Mains inputs	Fast transient disturbances (Burst)	EN 61000-4-4	2 kV
	Peak voltages (surge) 1.2/50 µs	EN 61000-4-5	1/2 kV
	Conducted disturbances by high frequency coupling (0.15...80 MHz)	EN 61000-4-6	10 V
	Voltage fluctuations	NAMUR NE21	100 %-0 %-100 %, 2 s-1 s-2 s 100 %-40 %-100 %, 2 s-1 s-2 s
	Voltage interruptions	NAMUR NE21	0 %, 20 ms

11.5.3 Interference suppression

Electromagnetic emission		EN 55011, Group 1, Limit class A, for industrial areas

11.6 Weighing electronics

The weighing electronics are suitable for connection of strain-gauge load cells.

11.6.1 Load cells

Load cell type	Strain gage load cells, 6 or 4-wire connection possible.	
Load cell supply	U = ±6 VDC for I_{max} = 160 mA, protected by Multifuses.	
Supply voltage	12 V DC	- for max. 8 load cells, each with 650 Ω - for max. 4 load cells, each with 350 Ω

Max. load	≥75 Ω

11.6.2 Principle

Principle	Direct current, Delta-Sigma converter, ratiometric to load cell supply voltage
Measurement time	Min. 10 ms ... max. 1920 ms
Analog filter	Low-pass, 1st order, cutoff frequency 70 Hz
Digital filter	Active, 4th order (low-pass) Bessel, aperiodic or Butterworth, cutoff frequency, adjustable (max. 0.25/measuring rate or approx. 1.56 Hz)

11.6.3 Accuracy and stability

Accuracy	Complies with OIML R76 class III
Min. measurement signal	6000 d: 0.25 mV/V @ 12 V supply [0.5 µV/V]
Linearity error	<0.002 %
Zero point stability error	TK_0 <0.02 µV/K RTI
SPAN stability error	TK_{span} <±2 ppm/K

11.6.4 Sensitivity

Sensitivity	0.5 µV/d [0.2 µV/d]
Resolution internal	Approx. 4.8 million internal steps at 36 mV
Input voltage (measuring signal + dead load)	0 ... max. 36 mV
Dead load range	36 mV - (max. measuring signal); entry/calibration via software

11.7 ProfiBus DP

Standards	EN 50 179 volume 2, PROFIBUS DIN 19245: PROFIBUS, Process field bus (part 1 and 3)
Baud rates	9.6; 19.2; 93.75; 187.5; 500 [kBps], 1.5; 3.0; 6.0; 12.0 [MBps], automatic detection
Buffer size	8 bytes
I/O data	8 bytes
UserPrm	no
Sync	yes
Freeze	yes

Clear	yes
Set-Slave-Add	no

11.8 Mechanics

11.8.1 Type

Polyamide housing, black, flammability class V0 (UL 94)

Protection class according to DIN 40050 IP 20

11.8.2 Dimensions

Housing	Dimensions
Width	45 mm
Height	99 mm
Depth	116 mm

11.8.3 Weights

Net weight	0.30 kg
Shipping weight	0.45 kg

11.9 Documentation on the CD included

The documents and manuals listed in the appendix (see Chapter 12.2) can be found on the PR 5211 CD.

12 Appendix

12.1 Replacement parts

Spare part no.	Spare part designation
5312 264 48012	Connector, 4-pin
5312 321 28052	PC connection cable USB A/B; 1.8 m
5312 447 98005	Dummy cap

12.2 Certificates

Ser. no.	Description	Document no.
1	EU-Declaration of Conformity	MEU17026
2	Declaration of Conformity	MDC17004
3	Certificate of Conformity TR CU 020	RU Д-DE.A303.B.06727

The documents listed in the table can be found on the PR 5211 CD.

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The true measure