Operation Manual

# X SERIES
# PR 5220
# ETHERNET TRANSMITTER

**PR 5220/00 Ethernet Transmitter**
**PR 5220/01 Ethernet Transmitter with Profibus**
**PR 5220/04 Ethernet Transmitter with DeviceNet**


51209

Revision 4 04/2018

# AMENDMENT RECORD

## X Series
## PR5220 Ethernet Transmitter

## Document 51209

Distributed by Fairbanks Scales Inc.
821 Locust
Kansas City, Missouri 64106

| | | |
|---|---|---|
| Created | 10/2008 | |
| Revision 1 | 12/2008 | Documentation Release |
| Revision 2 | 05/2011 | Corrected Table of Contents |
| Revision 3 | 11/2016 | Updated the instrument overview |
| Revision 4 | 04/2018 | Added ModBus protocol |

# Disclaimer

Every effort has been made to provide complete and accurate information in this manual. However, although this manual may include a specifically identified warranty notice for the product, Fairbanks Scales makes no representations or warranties with respect to the contents of this manual, and reserves the right to make changes to this manual without notice when and as improvements are made.

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# Table of Contents

# Section 1: Safety Information

The instrument was in perfect condition with regard to safety features when it left the factory. To maintain this condition and to ensure safe operation, the operator must follow the instructions and observe the warnings in this manual.

## 1.1. Intended Use

The instrument is intended for use as an indicator 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 instrument reflects the state of the art. The manufacturer does not accept any liability for damage caused by other system components or due to incorrect use of the product.

## 1.2. Initial Inspection

Check the content of the consignment for completeness and inspect it visually for signs of damage that may have occurred during transport. If there are grounds for rejection of the goods, a claim must be filed with the carrier immediately and the sales or service organization must be notified.

## 1.3. Before Commissioning

Visual inspection:
Before commissioning and after and storage or transport, inspect the instrument visually for signs of mechanical damage.

### *1.3.1. Installation*

The instrument is designed for mounting on standard rails (35 mm, acc. to DIN 46277).

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

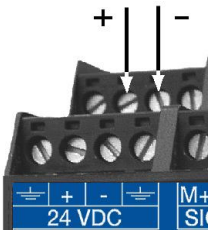
### *1.3.2. Electrostatically Sensitive Components*

This instrument contains electrostatically sensitive components. For this reason, an equipotential bonding conductor must be connected when working on the open instrument (antistatic protection).

### 1.3.3. Protective Earth

Connection to protective earth must be performed via the mounting rail.

### 1.3.4. Supply Voltage Connection




The supply voltage is 24V DC +10% / -15%.
Max. power consumption of /00 version: 6.5 W; /01 and /04 version: 8.5 W
For connection to 230 / 115 V AC, an external power supply (e.g. PR 1624/00 or Phoenix Mini Power) is required.

### 1.3.5. Failure and Excessive Stress

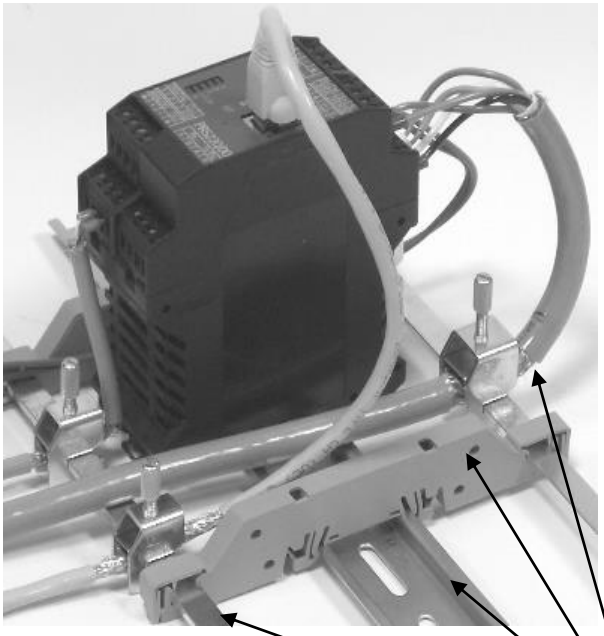
If there is any reason to assume that safe operation of the instrument is no longer ensured, shut it down and make sure it cannot be used. Safe operation is no longer ensured if any of the following is true:

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

### 1.3.6. Fuse

This instrument does not have a replacable fuse. The load cell supply voltage is protected against short circuit. In case of failure of the load cell supply voltage, disconnect the instrument from the supply voltage, determine the cause and take remedial measures. Subsequently, the supply voltage can be switched on again.

### 1.3.7. EMC-Compliant Installation



Use only screened data cables

- Connect screens on both ends with ground
- Keep unscreened cable ends short
- Connect screen rail to cabinet / housing with low impedance
- Use metal or metalized connector housings
- Establish equi-potential bonding between instruments / system modules (Mandatory for Ex-applications)
- Use standard reference potential
- Connect mounting rail to protective earth Install measure and data cables separately from power cables

Screen clamp (z.B. Phoenix SK8-D)
Rail connection (z.B. Phoenix AB-SK 65D)
Mounting rail (34mm)
Screen rail (e.g. Phoenix NLS-CU 3/10)

# Section 2: PR 5220 Ethernet Transmitter Series

## 2.1. The Transmitter Versions

Three PR 5220 series transmitter versions are available; subsequent extension of the version is not possible.

The version is determined unambiguously by the type number. The front foils are adapted to the version.

PR 5220/00 PR 5220/01 PR 5220/04




### *2.1.1. PR 5220/00 Version*

This version has digital inputs and outputs as well as an analog output and a LAN adaptor for configuration and operation of the instrument. Connecting e.g. a remote indicator is possible via the serial output.

### *2.1.2. PR 5220/01 Profibus*

In addition to PR 5220/00, the instrument is provided with a Profibus port.

### *2.1.3. PR 5220/04 DeviceNet*

In addition to PR 5220/00, the instrument is provided with a DeviceNet port.

# 2.2. Overview of the Instrument

- EC test certificate / type approval applied for
- Accuracy 10,000 e @ 6 samples/sec
- Internal resolution: 7.5 million counts
- Linearity: < 0.002%
- Sampling rate: 6 ... 100/sec selectable
- Digital filter with selectable characteristic
- Electrically isolated interfaces
- 3 programmable pairs of limit values
- 24 VDC supply voltage connection
- Connection using plug-in terminal blocks
- Socket for LAN adaptor
- Port for Profibus (/01)
- The instrument is provided for snap-on mounting on a standard rail.
- 5 status LEDs für supply voltage, communication, error detection


Calibration and configuration of the instrument are menu guided using a PC, or by Profibus commands (PR 5220/01 only).

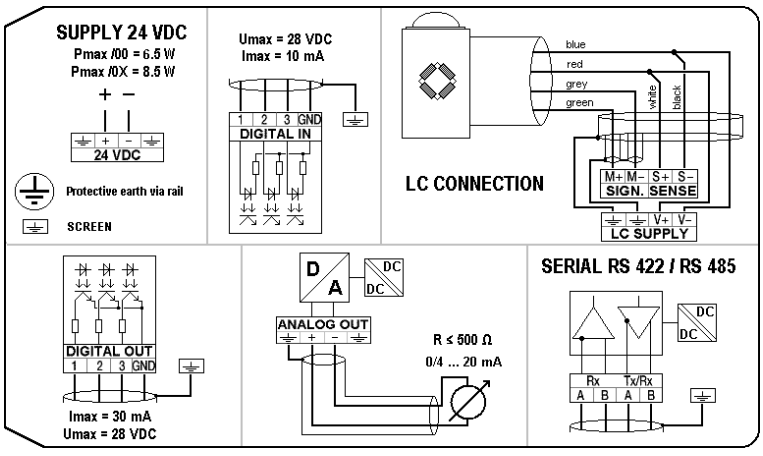
- Calibration with weight, using the mV/V method or with load cell data (“smart calibration”)
- 0/4 ... 20 mA analog output, configurable for gross/net weight
- Analog value via Profibus (PR 5220/01 only)
- 3 digital input channels, electrically isolated
- 3 digital output channels, electrically isolated
- Excitation – Fixed 12 VDC

Communication protocols:

- RS-422 for remote display
- RS-485 for SMA protocol
- Profibus-DP (PR 5220/01 only)
- DeviceNet (PR 5220/04 only)

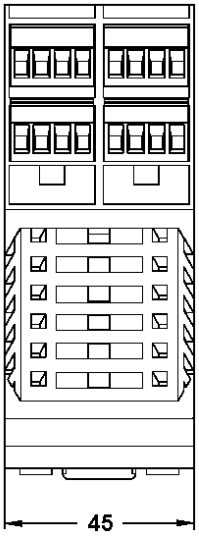
# 2.3. Label on the Housing

A label with the wiring diagram is located on one side of the instrument:

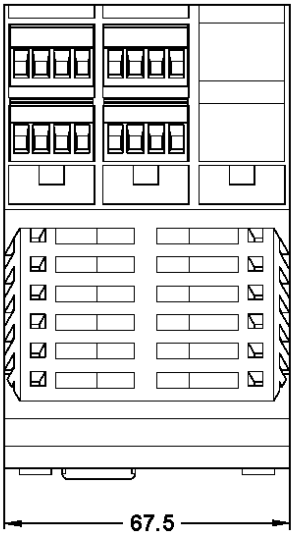


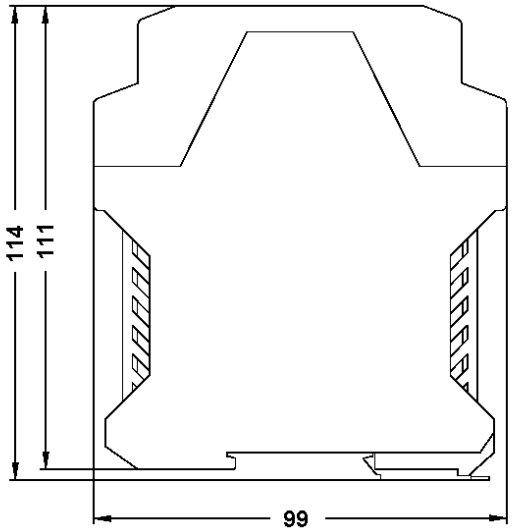
# 2.4. Housing Dimensions


PR 5220/00




PR 5220/01, -/04



# 2.5. Operation Using the VNC program

## 2.5.1. Status Symbols

| | |
|---|---|
| B<br>G | Gross weight display<br>(G with NTEP or NSC mode) |
| NET | Net weight display |
| T,PT | Tare weight or fixtare display |

| | |
|---|---|
| -0- | The weight value is within +/- ¼ d of zero |
| | Stability of the weight value |
| | |

## 2.5.2. Transmitter Keys

| | |
|---|---|
| Setup | Instrument settings, set-up |
| T | Taring, the current gross weight is stored in the tare memory, provided that:<br>- weight value is stable<br>- indicator not in error status<br>(function dependent on configuration) |
| B | Gross weight |
| T | Tare weight |

| | |
|---|---|
| | Start printing (without function) |
| | Set gross weight to zero, provided that:<br>- weight value is stable<br>- weight within zero setting range |
| Test | Analog test, weighing function |
| | |

## 2.5.3. Navigation Keys, Other Keys

| | |
|---|---|
| → | Move cursor right when editing; selection |
| ← | Move cursor left when editing; selection |
| ↓ | Scroll down in the menu |
| ↑ | Scroll up in the menu |
| Fn | Function key |
| Info | Information key |

| | |
|---|---|
| Exit | Exit from current menu |
| OK | Enter / confirm |

## 2.5.4. Selection Using the Navigation Keys

Press the down arrow key ↓ to scroll down, or the up arrow key ↑ to scroll up in a menu. Press OK to select a menu item. To choose the desired setting for the selected menu item, press ← or → .

Press the Exit key to exit a menu and continue the operation on the next higher level.

An arrow ▸ in front of a menu item indicates that there are menu sublevels. The menu item selected by pressing ↑/↓ is shown inversely.

| Info |
|---|
| ▸ Show version |
| ▸ Show status |

Press the OK key to select an item.

If the list of menu items is long, a vertical bar graph on the left (black and gray) shows which part of the list is displayed.

| WP A/Calibration | |
|---|---|
| Measuretime | ⇵ 320 m |
| Digital filter | off |
| Test mode | absolute |
| W & M | none |
| Standstill time | 0.50 s |
| Standstill range | 1.00 d |

Availability of settings options (selectable with ← or → ) is indicated by preceding double arrows ⇵ .

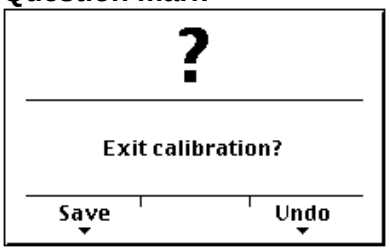
| WP A/Calibration | |
|---|---|
| Measuretime | ⇵ 640 ms |

Press ←/→ to select the measuring time.

## 2.5.5. System Messages during Input

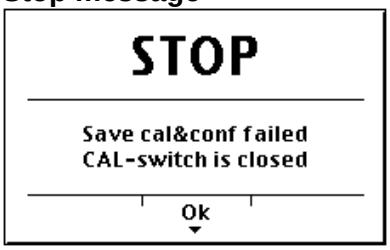
The following types of messages are displayed as confirmation prompts / warnings during input:

**Question mark**



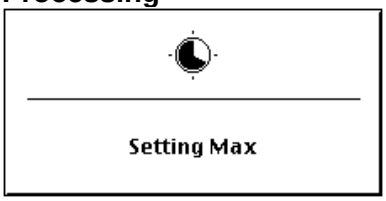

A **question mark** indicates that a choice of options (e.g. [Save] for saving or [Undo] for cancelling) is available.

**Stop message**



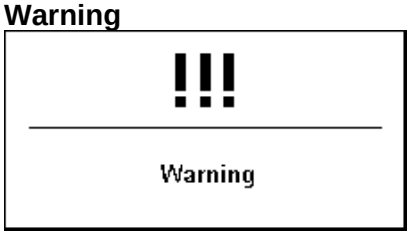

An important indication that an **action cannot be executed** (e.g., if saving is not possible because the CAL switch is closed). Read the description and press [OK] to continue:

**Processing**



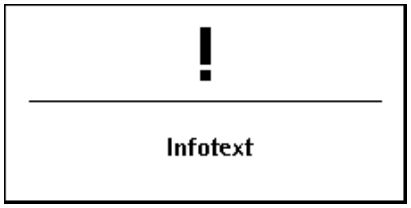

If an action takes a long time (e.g., Max for setting the full scale deflection), a **clock symbol** is shown.

**Warning**



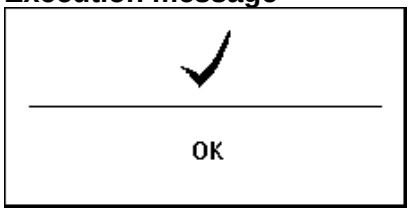

A **warning** is marked by three exclamation points.

**Informational text**




An **informational text** is marked by one exclamation point.

**Execution message**




**Successful execution** of an action is indicated by a checkmark.

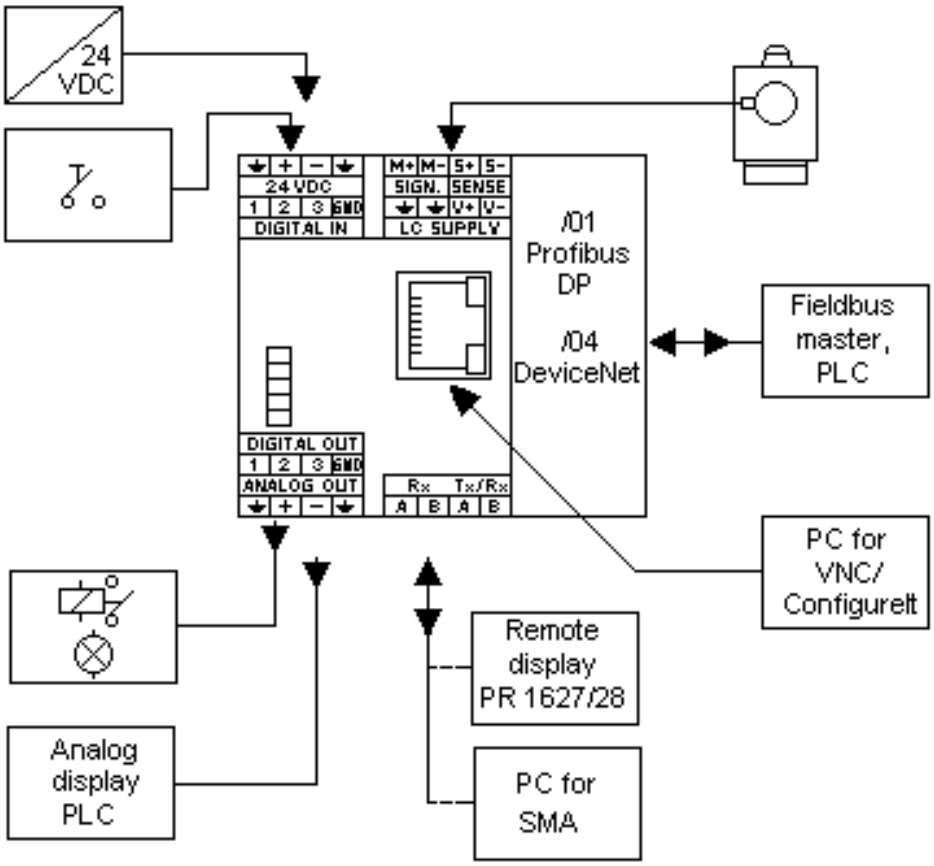
The graphics are not always included when system messages are depicted in this manual.

# Section 3: Installing the Instrument

Before starting work, please read Chapter 1 and follow all instructions.

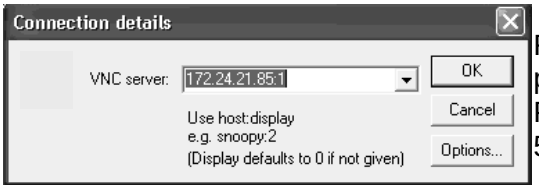
**Further procedures:**

- Check the consignment: unpack the components specific to the application.
- Safety check: inspect all components for damage.
- Make sure the on-site installation is correct and complete including cables, e.g. power cable fuse protection, load cells, cable junction box, data cable, console/cabinet, etc.
- Follow the instructions for installation of the unit relating to application, safety, ventilation, sealing and environmental influences.
- Connect the cable from cable junction box or platform/load cell.
- If applicable: connect other data cables, network cables, etc.
- Connect the instrument to the supply voltage.
- Check the installation.



# 3.1. Network Port

The network port is built in as standard equipment. The LEDs on the connector indicate whether the port is functioning.




Remote operation of the instrument from the PC is possible; install VNC program version 3.3.7 on the PC. For setting the network address, see Chapter 5.2.2.


| | |
|---|---|
| Transfer rate: | 10 Mbit/sec, 100Mbit/sec, full/half duplex, auto-detection |
| Connection method: | Point to point |
| Cable: | CAT 5 patch cable, shielded twisted pair |
| Cable impedance: | 150 ohms |
| Connection: | RJ45 socket on top of housing |

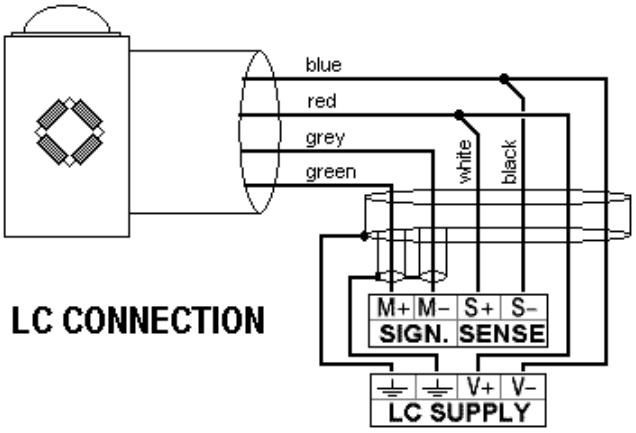
# 3.2. Connections

## *3.2.1. Load Cell Connection*

| | |
|---|---|
| ⚠ | The cable colors shown in this chapter are applicable to the PR 62XX series load cells.<br>Before connecting other types, please, carefully follow the information related to the assignment of load cell / platform cable colors. |

## *3.2.2. Connection Using 6-Wire Technology*

See also label on the housing outside (Chapter 2.3) and manual of the cable junction box.



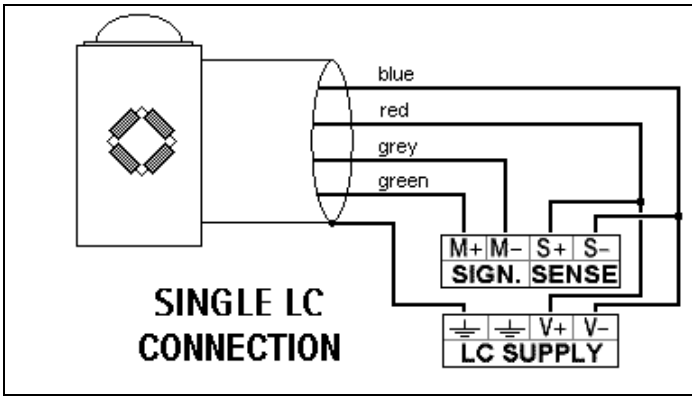

| Terminal | Description |
|---|---|
| SIGN. M+ | + signal / LC output |
| SIGN. M- | - signal / LC output |
| SENSE S+ | + sense |
| SENSE S- | - sense |
| LC SUPPLY V+ | + supply / excitation |
| LC SUPPLY V- | - supply / excitation |

Recommendations: - Install cable in steel pipe connected to earth potential
- Min. distance to high-voltage cables: 1m

Load cell supply circuit:
The load cell supply voltage is fixed to 12VDC and protected against short circuit
Load resistance of load cells ≥ 75 ohms, e.g. 8 load cells of 650 ohms each

### 3.2.3. Connection of a Load Cell in 4-Wire Technology

Note that links between SENSE S+ and LC SUPPLY V+ and between SENSE S- and LC SUPPLY V- directly at the transmitter must be provided.



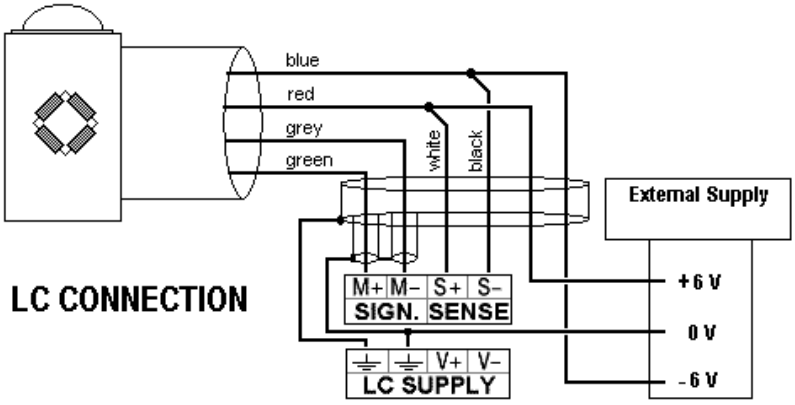

| Terminal | Description |
|---|---|
| SIGN. M+ | + signal / LC output |
| SIGN. M- | - signal / LC output |
| SENSE S+ | + sense |
| SENSE S- | - sense |
| LC SUPPLY V+ | + supply / excitation |
| LC SUPPLY V- | - supply / excitation |

### 3.2.4. Connecting PR 6221 Load Cells

See PR 6021/08, -/68 operating manual.

### 3.2.5. External Load Cell Supply

The internal load cell supply voltage of PR5220 (V+, V-) is not connected.
The common line of the symmetrical external supply must be connected to the same terminal of PR 5220 as the shield of the load cell / extension cable.

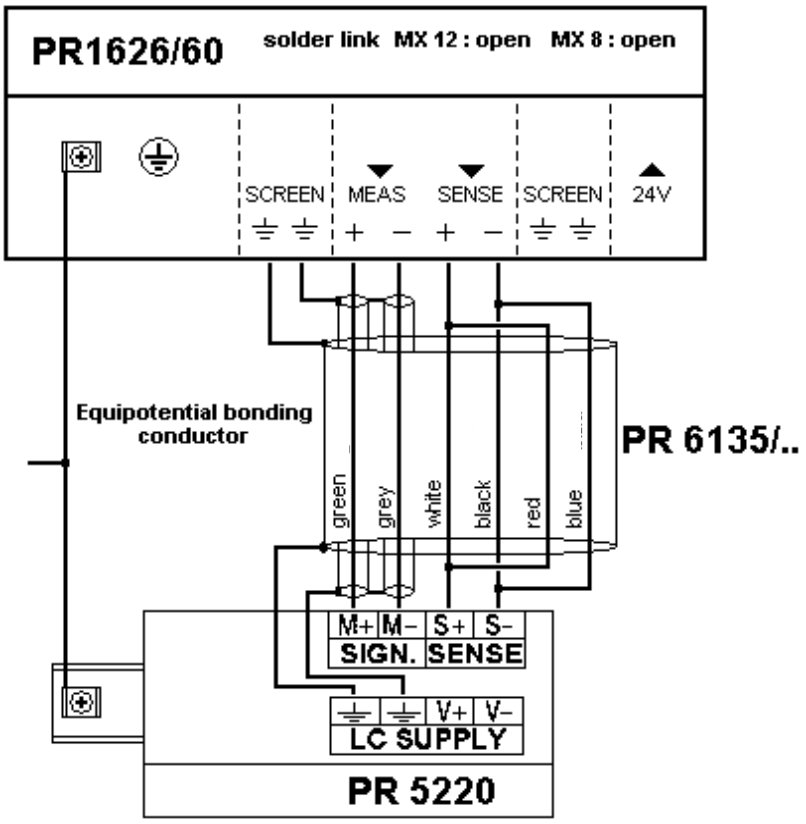



Specification of external supply: +/- 6 VDC + 5%, -30%; max ripple. 50 mVpp; max. asymmetry +/- 3%. An external supply voltage smaller than 8 VDC (+/- 4 VDC) must be set under Setup-[Calibration]-[Param]-[External supply].

### *3.2.6. Connection via PR 1626/60*

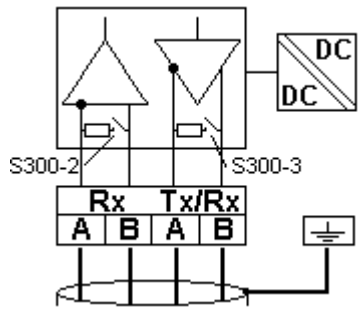
Connect the instrument to PR 1626/60 as described below. For additional connections, refer to the PR 1626/60 manual. The internal load cell supply voltage of PR5220 (V+, V-) is not connected.

If MX8 is closed, [below 8VDC] must be set under Setup-[Calibration]-[Param]-[External supply].



### 3.2.7. RS-422/485 Interface

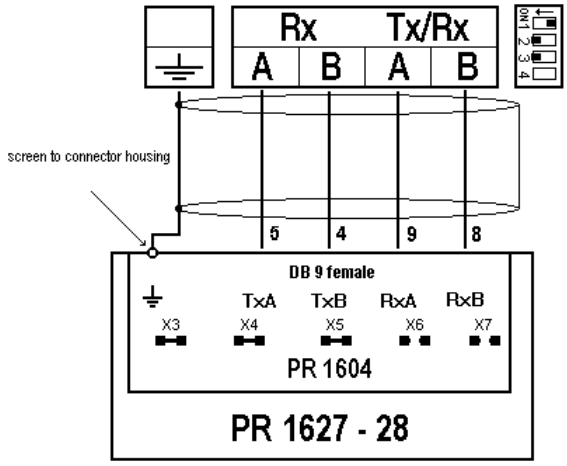
The interface is intended for connecting a PR 1627 type remote display, a PR 1628 terminal or a PC for data transmission using the SMA protocol.




| | |
|---|---|
| Connection method: | 4-pin plug-in terminal block |
| Number of channels / type: | 1 RS-422 / RS-485 , full / half duplex |
| Transfer rate (Bits/s): | 300, 600, 1200, 2400, 4800, <9600>, 19200 |
| Bits / stop bits: | <8 / 1> or 7 / 1 |
| Parity: | <even>, <none> |
| Signals: | RxA (R-), RxB (R+), TxA, TxB |
| Electrical isolation: | Yes |
| Cable length: | Max. 1000m |
| Cable type: | Shielded twisted pair (e.g. LifYCY 2x2x0.20) |

<...> = default settings (factory settings)

Connection of a PR 1627 remote display or of a PR 1628/00, -/60 or -/24 terminal (over the PR 1604 interface)




The following operations are possible from the connected terminal / display:

Test
Set tare
Reset tare
Set zero

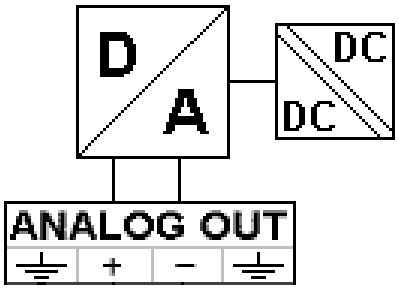
S300

ON <-----
2-wire connection
(d) Receiver terminating resistor 'ON'
(d) Transmitter (rec.) terminating resistor 'ON'
Calibration data and parameters secured

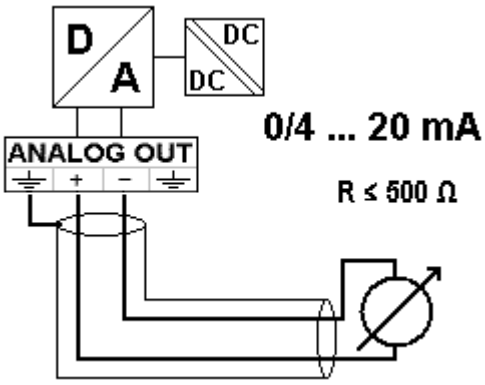
OFF ----->
(d) 4-wire connection
Receiver terminating resistor 'OFF'
Transmitter (rec.) terminating resistor 'OFF'
(d) Calibration data and parameters not secured

(d) - default = factory setting

## 3.2.8. Analog Output



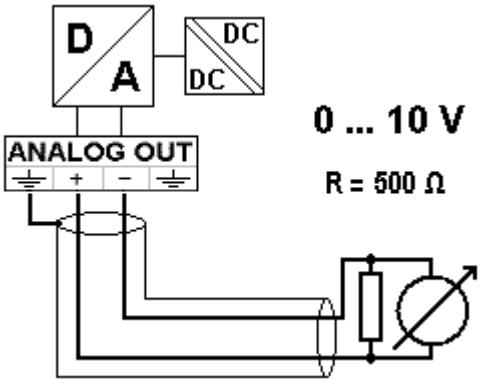

| | |
|---|---|
| Connection method: | 4-pin plug-in terminal block |
| Number of outputs: | 1 current output, output voltage via external resistor |
| Output: | Gross, net weight or via Profibus |
| Range: | 0/4 ... 20mA, configurable |
| Resolution: | E.g. 0 - 20 mA in max. 40,000 counts |
| Linearity error: | @ 0 - 20mA: <0,05 %<br>@ 4 - 20 mA: <0,025 % |
| Temperature effect: | < 100 ppm/K |
| Load: | 0 ... max. 500 ohms |
| Protected against short circuit: | Yes |
| Electrical isolation: | Yes |
| Cable length (shielded): | 150 m (current output) |




0/4 ... 20mA

Analog signal,
current output.

The current is supplied directly via the terminals.



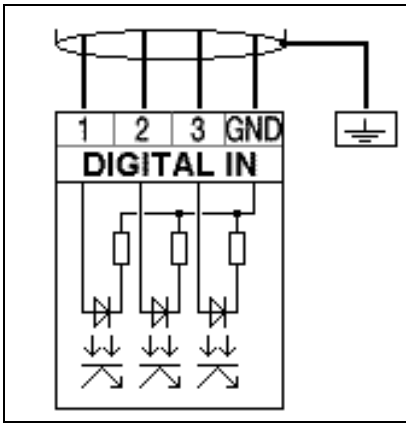

0 ... 10V

Analog signal,
voltage output

The voltage level corresponds to the voltage drop across the 500-ohm-(10 ppm/K) resistor.

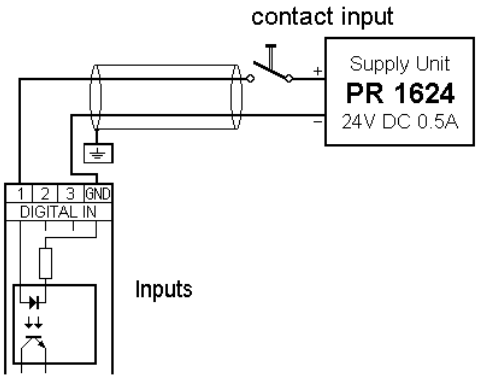
### 3.2.9. 3 Optocoupler Inputs

The optocoupler inputs have one common potential (GND) for the input group that is separated from the common potential of the output group.




| | |
|---|---|
| Connection method: | 4-pin plug-in terminal block |
| Cable: | Shielded, max. 50 m |
| Number of outputs: | 3 |
| Input signal: | External supply required<br>10 ... 28 V DC for 'high' level<br>0 ... 5 V DC for 'low' level |
| Input voltage: | Max. 28 V DC |
| Input current: | < 11 mA @ 24 V DC<br>< 5 mA @ 12 V DC |
| Electrical isolation: | Yes; a common minus potential for the group of 3 inputs |

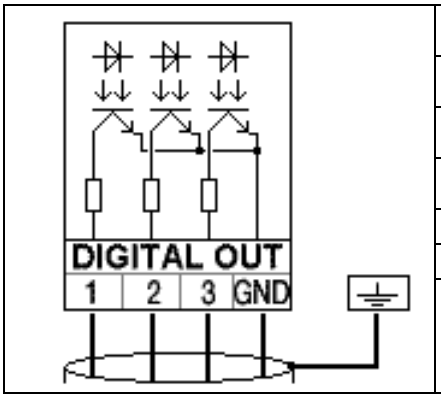
Example: contact input connection




When a voltage >= 10 VDC is applied to the terminals (in the example :1-GND), input 1 is active (true).

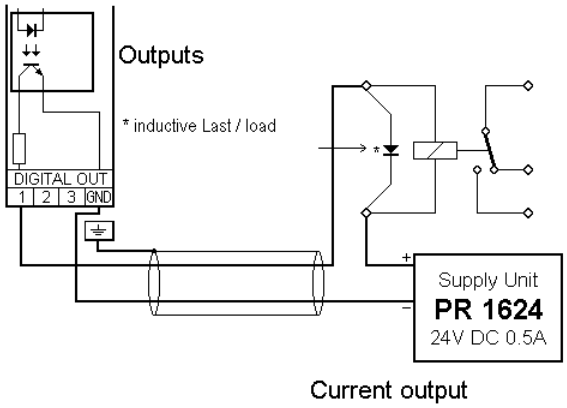
## *3.2.10. 3 Optocoupler Outputs*

The optocoupler outputs have one common potential (GND) for the output group that is separated from the common potential of the input group.




| | |
|---|---|
| Connection method: | 4-pin plug-in terminal block |
| Cable: | Shielded, max. 50 m |
| Number of outputs: | 3 |
| Output signal: | External supply required |
| Output current: | Max. 30 mA |
| Output voltage: | Max. switching voltage: 28 VDC |
| Electrical isolation: | Yes; a common minus potential for the group of 3 outputs |

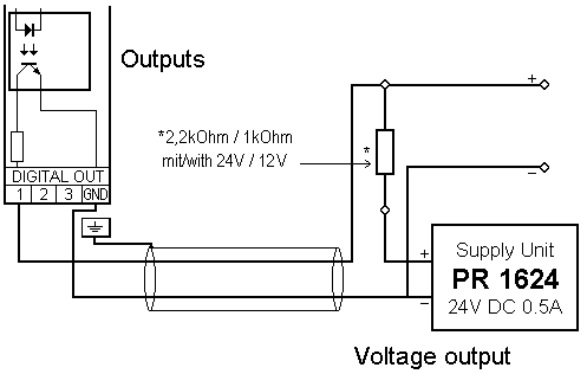
Example: relay control connection




Current output

When output 1 is active (true), the relay switches. For protection of the output circuit, relays with free-wheel diode must be provided.

Example: voltage output connection




Voltage output

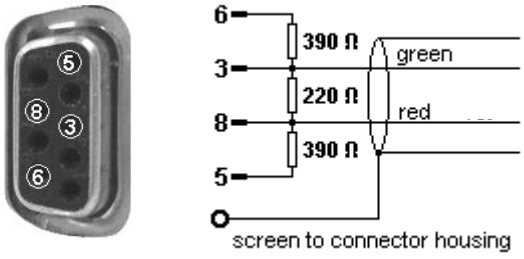
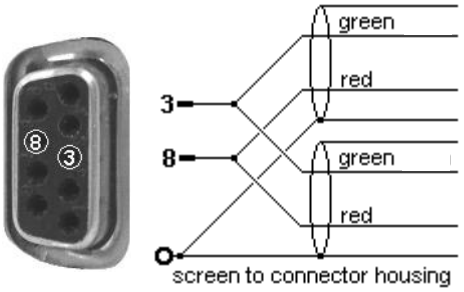
When output 1 is active (true), the output voltage changes from 24 /12 VDC into < 3 VDC. A load resistance of 2.2 /1 kohms must be provided.

## *3.2.11. Profibus Interface (PR 5220/01 only)*

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


| | |
|---|---|
| Transfer rate: | 9.6 kbit/s to 12 Mbit/s, baud rate auto-detection |
| Protocol: | PROFIBUS-DP-V0 slave to EN 50 170 (DIN 19245), mono or multi-master systems are supported. Master and slave devices, max. 126 nodes possible. Watchdog timer |
| Transport: | EIA RS-485 , Profibus DIN 19245 Part 1 |
| Cable: | Profibus special colour: violet<br>Shielded twisted pair cable |
| Cable impedance: | 150 ohms |
| Certificates: | Profibus test center Comdec in Germany and PNO (Profibus User Organization).<br>Suitable for industrial applications to CE, UL and cUL |
| Electrical isolation: | Optocoupler in lines A and B (RS-485) |
| Cable length: | Max. distances 200m can be extended with 1.5 Mbit/s by means of additional repeater |

Connection to the Profibus is using the 9-contact plug-in socket on the front panel.

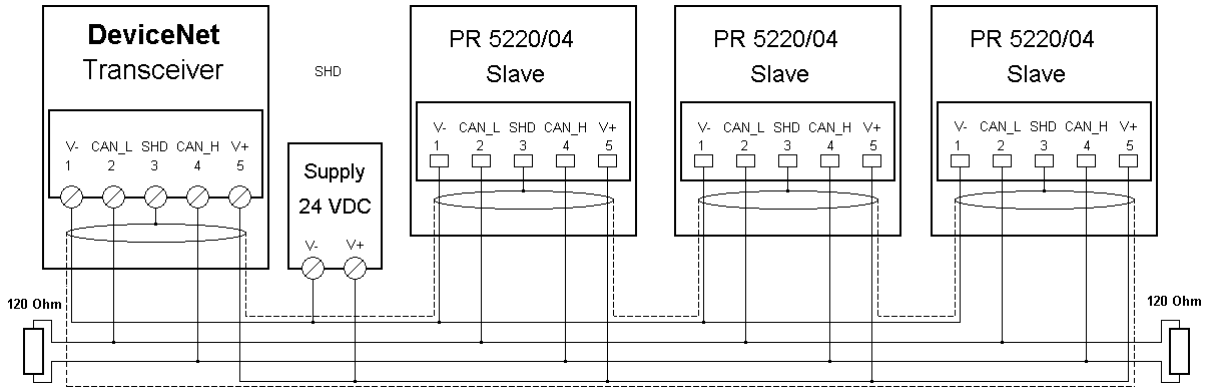
| The transmitter is the only or last slave on the bus | The transmitter is not the only or last slave on the bus | PIN | Signal |
|---|---|---|---|
|  |  | 3<br>4<br>5<br>6<br>8 | RxD/TxD-P<br>CNTR-P<br>DGND<br>VP<br>RxD/TxD-P |

## 3.2.12. DeviceNet Interface (PR 5220/04 only)

It is a complete DeviceNet adapter (SLAVE) with CAN controller and transfer rates of up to 500 kbit/s.


| | |
|---|---|
| Connection: | 5-contact screw terminal block (plug-in) |
| Transfer rate: | 125, 250 and 500 kbit/s |
| Topology: | Parallel bus |
| Protocol: | DeviceNet master/slave<br>Polling method (polled I/O)<br>CRC error detection<br>to IEC 62026 (EN50325)<br>Max. 64 station nodes<br>Max. data width 512 bytes input & output |
| Transport: | EIA RS-485 |
| Configuration: | EDS file<br>MAC-ID (1…62) |
| Certificates/ conformity: | Compatible with DeviceNet specification<br>Vol 1: 2.0, Vol 2: 2.0<br>ODVA certificate in accordance with conformity test software version A-12<br>Suitable for industrial applications to CE, UL and cUL |
| Cable: | DeviceNet, color: petrol-green<br>2x2 shielded twisted pair |
| Cable impedance: | 150 ohms |
| Bus termination: | 120 ohms at the cable ends |
| Electrical isolation: | Yes, optocoupler and DC/DC converter |

Connecting diagram for a master with three slaves



# Section 4: Controls

## 4.1. Status Indicator LEDs

The instrument has 5 green LEDs for indication of the operating or error status.

Power supply, bus connection

| | Power on | Bus | Bus connection not provided |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| + 3.3V | lit | | |
| 4 | | lit | blinks 1 Hz |

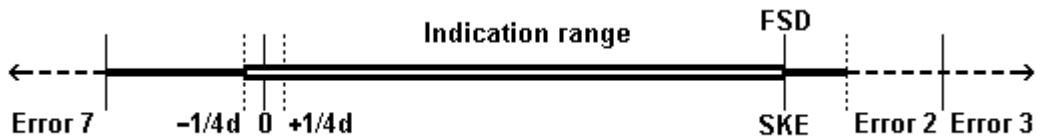
* The LED for the bus activity (PR 5220/01 a. PR 5220/04) is lit as soon as there is a connection. It continues being lit, also when there is no communication, or when the physical connection is cut.

Weight status indicator LED

| | Standstill | Center zero | Below zero or above max. capacity |
|---|---|---|---|
| 1 | lit | | |
| 2 | | lit | |
| 3 | | | lit |
| + 3.3V | | | |
| 4 | | | |

### *4.1.1. Weight error status:*

| | Error 1 Arithmetic | Error 7 (negative) | Error 2 Overload | Error 3 (> 36 mV) | Error 6 Sense monit. |
|---|---|---|---|---|---|
| 1 | blinks 1 Hz | blinks 1 Hz | | | Alternate bl. 1Hz |
| 2 | blinks 1 Hz | | | blinks 1 Hz | Alternate bl. 1Hz |
| 3 | blinks 1 Hz | blinks 1 Hz | blinks 1 Hz | blinks 1 Hz | Alternate bl. 1Hz |
| + 3.3V | | | | | |
| 4 | | | | | |



# Section 5: Commissioning

The meaning of indicator LEDs and the operating concept are described in Chapter Section 4:.

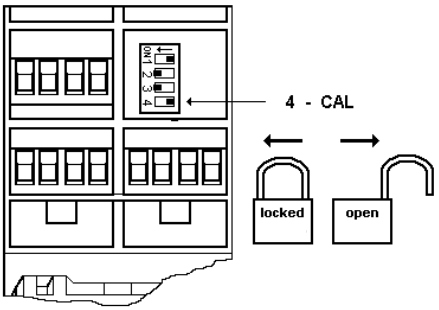
## 5.1. Data Backup/Power Failure

The calibration data and parameters as well as all configuration and interface data are stored in a non-volatile (EAROM) memory. Unauthorized data changing can be prevented by an access code. Additional write protection is provided for calibration data and parameters (CAL switch, see Chapter 5.1.1).

### *5.1.1. CAL Switch*

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

When the CAL switch is in 'open' 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 (e.g. measure time, zero tracking etc.) cannot be changed.




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

For 'legal-for-trade' applications, set the CAL switch (4) to the left position and seal the cover.

### *5.1.2. Factory Settings*

| | |
|---|---|
| Calibration data <default> | Calibration data <default> |
| Full scale (Max) <3000> <Kg> | Measure 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 |
| | Tare timeout <8>M |
| Calibration parameters <default> | <Absolute> test mode |
| Overload (range above Max) <9>d | Zero-setting range <50.00>d |
| * W & M mode <off> | Zero-tracking range <0.25>d |
| Filter <off> | Zero-tracking step <0.25>d |
| Frequency <1.56 Hz> | Zerotrack repeat <0>M |

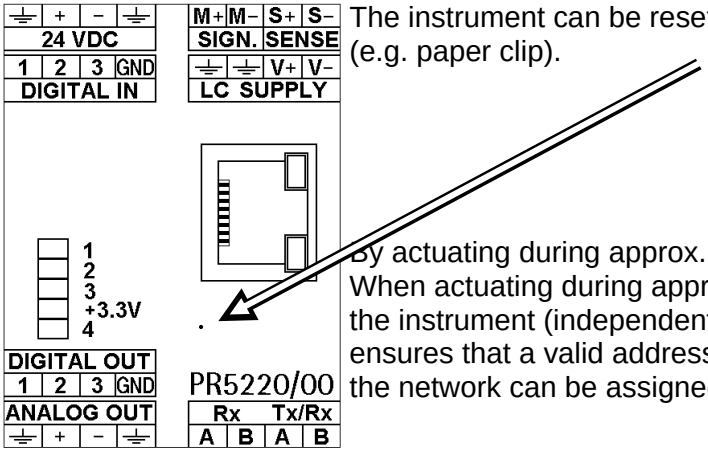
* Parameter W&M must be set to 'on' or 'off' prior to input of the calibration data, see Chapter 5.4.19.

.

# 5.2. Switching on the Instrument

The instrument can be put into operation and calibrated using a PC with the VNC program (on the CD packed with the instrument), an Internet Browser or the ConfigureIt program.

## *5.2.1. Resetting the Instrument, Activating 'DHCP'*



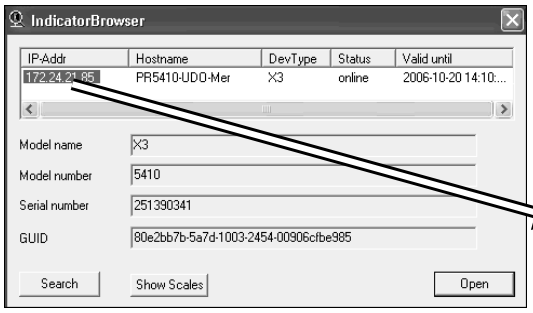

The instrument can be reset using a pin with a diameter of 1.0 mm (e.g. paper clip).

By actuating during approx. 1 second, the program is re-started. When actuating during approx. 3 seonds, 'DHCP' is activated in the instrument (independent of the previous settings). This ensures that a valid address for identification of the instrument in the network can be assigned to the instrument by a server.

### *5.2.2. Searching the Instrument in the Network Using 'IndicatorBrowser'*

The address can be determined using the 'IndicatorBrowser' (in a directory on the CD-ROM packed with the instrument) program.


Install and start the 'IndicatorBrowser'.

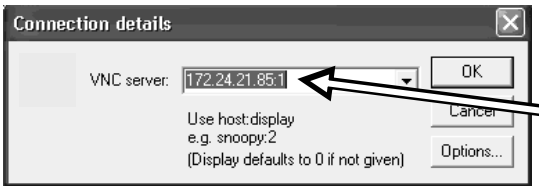



When the instrument is connected to a network, it is “default” in the DHCP mode, i.e. an address is assigned to it by the server. This address, e.g. 172.24.21.85, can be determined using the IndicatorBrowser’ program.

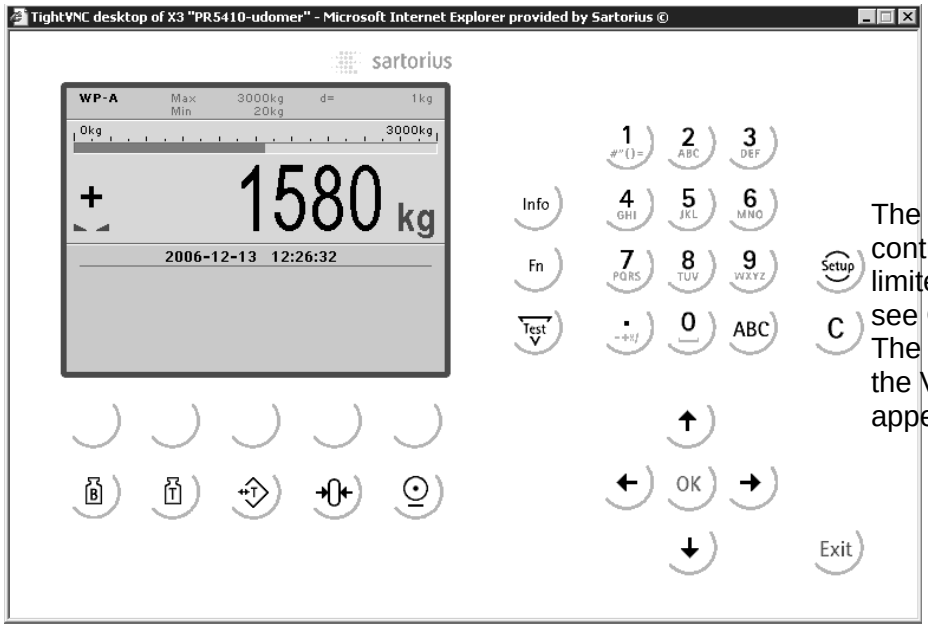
# 5.3. Operation Using a PC

### *5.3.1. Operation Using the VNC Program*

VNC stands for 'virtual network computing' and is a program for remote operation of computers.
The program distinguishes between the VNC server and VNC client (viewer). The server program is part of the instrument software. The client program (viewer) must be installed and executed on the PC to be used for operating the instrument.



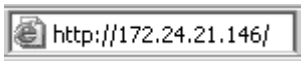

For direct operation using the VNC program, the IP address (extended by :1) must be specified when you run the program, e.g. 172.24.21.85:1.




The address range of the controlling PC can be limited in the instrument; see Chapter 5.6.5.
The operator interface of the VNC program appears:

## *5.3.2. Operation Using Internet Browser*

With the Internet browser, the **IP address** must be filled in.

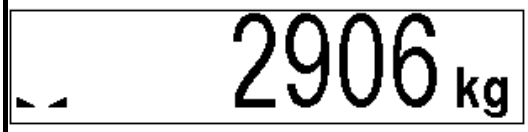
Example: 


PR5220 Ethernet Transmitter
(PR5220-udomer)

- Remote Configuration (VNC)

- Remote control (VNC) Popup Window
- Indicator
- Indicator Popup Window
- Configuration Printout
- Logfiles
- Screenshot
- Show error Log

For instrument operation using the VNC program without additional installation of VNC, see Chapter 5.3.1 .

| | |
|---|---|
|   | The weight value is displayed with the unit and status symbols. |

**[Configuration Printout]**
Can be used for printing the configuration data as a text file.

**[Logfiles]**

**[Screenshot]**
Device display for saving the display

**[Show error Log]**
Display of the error messages

### *5.3.3. INFO Function*

When you press Info, the program releases and status messages are displayed. The Info key also has other functions; see Chapters 5.4.2 and 5.4.14.

| Info |
|---|
| Show version |
| Show status |
| Show HW-slots |

For operation, see application manual.

When you select [Show version], the installed program releases and the board number are displayed:

| Info/Version | | |
|---|---|---|
| Firmware | Rel. 01.00.00<br>2006-12-02 10:50 | Firmware release and creation date |
| Appl-DEFAULT | Rel. 01.00.00<br>2006-12-02 10:50 | Application release and creation date |
| Bios | Rel. 01.00.00<br>2006-12-02 10:50 | BIOS release and creation date |
| Boardnumber | 251398426 | Main board identification number (different from the device serial number) |

When you select [Show status], instrument status information is displayed:

| Info/Status | | |
|---|---|---|
| Free system RAM | 6328 of 15212 kb | |
| CAL-Switch | closed | (opened if CAL switch is open) |

When you select [Show HW-slots], the installed plug-in cards are displayed:

| Info/HW-Slots | | | |
|---|---|---|---|
| | Builtin | RS 232 | Standard serial interface |
| Slot 1 | PR 5510/04 | RS 485/232 | |
| Slot 2 | | -empty- | |
| Slot 3 | Builtin | Digital I/O | Standard interface, digital I/Os |
| Slot 4 | | Profibus-DP | |

### 5.3.4. Setup Function (VNC)

Press Setup to configure the main operating parameters. The instrument configuration depends on the application and the plug-in cards installed.

Calibration is in a simple dialogue. Compliance with the relevant (verification) standards must be checked by the person commissioning the instrument or the verification officer. To protect the calibration data from overwriting, close the CAL switch on the back panel of the instrument. On legal-for trade instruments, the CAL switch must be sealed in the closed (write-protected) position; see Chapter 5.1.1.

### 5.3.5. Setup Menu

Setup

| | |
|---|---|
| - Serial ports parameter | |
| - Remote display | <none>, Builtin RS232 |
| - SMA | not used <none>, Builtin RS232, Slot 1 .. 2 RS485, Slot 1 ... 2 RS 232 |
| - Param | Builtin RS232, Assigned to, Protocol, Baud rate., Bits, Parity, Stop bits, |
| - Operating parameter | |
| - AccessCode | Access code for changes |
| - SetTareKey | Tare&reset tare, tare&tare again, disabled |
| - SetZeroKey | Only when not tared, reset tare on zeroset , disabled. |
| - Fieldbus parameter | Only for PR 5220/01 and /04, see Chapter 5.6.4 |
| - Network parameter | Hardware address (read only), Instrument name, IP address, Subnet mask, Standard gateway, VNC-Client (access restriction) |
| - Calibration | New, Modify, Param, see Chapter 5.3.6 |
| -Limit parameter | |
| - Limit 1/2/3 on/off | Limit 1/2/3 'on'/ 'off', Action, Condition; see Chapter 5.7.5 |
| -Digital I/O parameter | |
| - Output 1/2/3 | Configuring outputs; see Chapter |
| - Limit 1/2/3 on/off | Inputs, Action, Condition; see Chapter 5.7.4 |
| - Analog output parameter | Gross, Net, Select, Transparent; see Chapter 5.8 |

## 5.3.6. Calibration Menu

| | |
|---|---|
| - Calibration | Calibration of weighing electronics |
| - New | |
| Reset Span and deadload | Contin, Cancel |
| - Max | 0.00001 ...<3000>... 999999 <kg>, t, lb, g |
| - Scale interval | <1>, 2, 5, 10, 20, 50 |
| - Deadload at | <0.000000 mV/V> or [by load] |
| - Max at | <1.000000 mV/V> or [by load] |
| by load | 0.00001 ... 999999 <kg>, t, lb, g |
| - Calibrated at | (Display only) |
| - Sensitivity (µV/d) | (Display only) |
| - Test | Determine test value |
| Exit calibration | Save or cancel changes |
| - Modify | Only for minor modifications/ setting new dead load, otherwise [New |
| see New | |
| - Param | |
| - Measuretime | 5 ms, 10, 20, 40, 80, 160, <320>, 640, 960, 1280, 1600ms |
| - Digital filter | <off>, Bessel, aperiod., butterw., tscheby. |
| - External supply | <8 -12 VDC>, below 8 VDC |
| - * Fcut | Cut-off frequency, only unless filter 'off', 0.1 - 80.0 Hz |
| - Test mode | <Absolute>, relative |
| - W & M | <none>, OIML, NSC, NTEP |
| - Standstill time | 0.01 s…<0.50 s> ... 2.0 s (range is dependent on response time) |
| - Standstill range | 0.00 d ... <1.00 d> ... 10.00 d |
| - Tare timeout | 0.1 s ... <2.5 s> ... 25 s, timeout due to instability |
| - Zeroset range | 0.00 d ... <1.00 d> ... 10.00 d |
| - Zeroset range | 0.00 d ... <1.00 d> ... 10.00 d |
| - Zerotrack step | 0.00 d ... <1.00 d> ... 10.00 d |
| - Zerotrack time | <0.0 s> ... 25 s |
| - Overload | 0 d ... <9 d> ... 999900 d |
| - Min | 0 d ... <50 d> ... 999900 d, minimum weight |
| - Range mode | <Single range>, multiple range, multi-interval |
| - * Range limit 1 | In weight, unit same as Max, transition from small to medium scale interval, *only for multiple range or multi-interval |
| - * Range limit 2 | In weight, unit same as Max, transition from medium to high scale interval, *only for multiple range or multi-interval |
| - View(when - View(when CAL switch closed) | |
| - Max | (Display only) |
| - Scale interval | (Display only) |
| - Deadload at | (Display only) |
| - Max at | (Display only) |
| - Calibrated at | (Display only) |
| - Sensitivity (µV/d) | (Display only) |
| - Param | Items as for Param. (display only) |

# 5.4. Calibration

Calibration using weights, mV/V or load cell data can be done using the VNC program. During calibration, the instrument must be set to gross weight display (reset tare, if necessary).

For a 'legal-for-trade' application, set the mode under Setup-[Calibration]-[Param] to [W&M] before starting calibration; see Chapter 5.4.19. Select [New] to go to the maximum capacity [Max] (see chapter 0), select the scale interval and determine the dead load. Now calibrate the maximum capacity by applying a calibration weight, in mV/V or with load cell data. After determining the test value, the menu can be closed as described in Chapter 5.4.17, in order to save the new settings. Calibration data can be protected by the CAL switch (see Chapter 5.1.1), which must be sealed in the closed (write-protected) position for 'legal-for-trade' applications.

## *5.4.1. Displaying Calibration Data*

| | |
|---|---|
| Cannot calibrate!<br>CAL_switch is closed | When the CAL switch is closed, the following message is displayed; only data display possible with [Param]: |
| Cannot calibrate!<br>Scale is tared | If the scale was tared, the following message is displayed, data display with [View], reset tare with [Res.tar.], return with [Cancel]: |

With [View], the calibration data can be displayed, but not changed.

| WP A/View Calibration | | | |
|---|---|---|---|
| Max<br>kg | 3000 d | 3000 | Number of scale intervals and max. capacity |
| Scale interval<br>1 kg | 3000 d | | Scale interval |
| Deadload at<br>0.000000 mV/V | 0.00 kg | | Dead load in weight and mV/V |
| Max at<br>mV/V | 3000.00 kg | 1.000000 | Weight and mV/V for maximum capacity |
| Calibrated at<br>1.000000 mV/V | 3000.00 kg | | Test load* and corresponding mV/V |
| Sensitivity<br>4.000000 µV/d | 833.33 cnt/d | | Number of internal counts and voltage per scale interval |
| Param | | | |

The calibration data and parameters (press [Param]) are displayed in the format entered/determined during calibration.
* After input with mV/V, the maximum capacity and the mV/V value entered are displayed.

### 5.4.2. Increased Resolution (10-Fold)

In the Setup-[Calibration] menu, the weight is displayed with 10-fold resolution (also with the CAL switch closed) when you press the key Info, and marked as an invalid weight with ⚠ above the weight unit. After 5 s, the display returns to normal resolution, or you can press the key ↓ to return to normal display immediately.

### 5.4.3. Selecting the Calibration Mode

You can choose between [**New**] and [**Modify**] with the softkeys:

| New | Modify | Param | | |
|---|---|---|---|---|

### 5.4.4. New Calibration

Open the menu via Setup-[Calibration].
When you press [New], the data is set to default first and calibration is started.

| SPAN and deadload will be reset |
|---|

You are prompted to confirm.
Press [Continue] for the default settings, or [Cancel] to cancel the selection.

Default settings with [New]:

| WP A/Calibration | | | | |
|---|---|---|---|---|
| Max | 3000 | d | 3000 | kg |
| Scale interval | 3000 | d | 1 | kg |
| Deadload at | | | 0.000000 | mV/V |
| Max at | | | 1.000000 | mV/V |
| Not calibrated | | | | |
| Sensitivity | 833.33 | cnt/d | 4.000000 | µV/d |
| | | | | Test |

### 5.4.5. Changing the Calibration

[Modify] may be used only for minor changes (e.g. changing the dead load, adapting mV/V values for dead load and/or Max); otherwise, always use [New].

Open the menu via Setup-[Calibration]-[Modify].

| WP A/Calibration | | | | | |
|---|---|---|---|---|---|
| Max | 3000 | d | 3000 | kg | |
| Scale interval | 3000 | d | 1 | kg | |
| Deadload at | 1.07 | kg | 0.000358 | | mV/V |
| Max at | 3000.00 | kg | 1.000000 | | mV/V |
| Calibrated at | 3000.00 | kg | 1.000000 | | mV/V |
| Sensitivity | 833.33 | cnt/d | 4.000000 | | µV/d |
| by load | by mV/V | | | Test | |

For setting a new value for Dead load, press ↑/↓ to select [Deadload] and either enter a new mV/V value with [by mV/V] or discharge the scale/hopper and press [by load].

| | |
|---|---|
| Exit calibration without CalcTest? | When closing the menu with Exit you are prompted whether the menu should be closed without calculation of the test value: Reply [Yes] to close the menu. |

### *5.4.6. Determining the Maximum Capacity (Max)*

The maximum capacity (Max) determines the maximum weight without dead load of the weight to be measured and the displayed number of digits behind the decimal point. Normally, Max is less than the load cell capacity (nominal capacity x number of load cells). Permissible values are:
[Max] from 0.00010 to 999999, with ABC in kg, t, g or lb
Max must be an integer multiple of the scale interval. It may have up to 6 digits and is entered as a numeric value with or without decimal point.

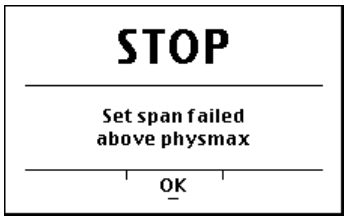
| WP A/Calibration | | |
|---|---|---|
| Max | 3000 d | 3000 kg |
| | | |

The weight unit can be changed from kg into t, g or lb by pressing ABC.

After pressing OK or ↓ confirmation of the change is displayed with:

| |
|---|
| Setting Max |

**Error messages**




The maximum capacity is too high (the calculated input voltage for the specified maximum capacity exceeds 36 mV).

| | |
|---|---|
| Set Max failed<br>below calibration | Subsequent changing of the maximum capacity is possible; if you decrease the capacity, a message is displayed if the new maximum capacity is lower than the test load ([Calibrated at]): |
| Set Max failed<br>too many digits | The selected resolution is so high that less than 0.8 internal counts per scale interval (d) or 0.5 µV/e for legal-for-trade acc. to OIML/NSC are available. |
| Set Max failed<br>Max not multiple of scale interval | The maximum capacity is not an integer multiple of the scale interval. |

| | |
|---|---|
| Set Max failed incompatible units | Weight units do not match, e.g. subsequent change of [Max] from kg to lb |

After you press [OK], the input value for the maximum capacity is canceled.

### 5.4.7. Determining the Scale Interval

| WP A/Calibration | | | |
|---|---|---|---|
| Max | 3000 d | | 3000 kg |
| Scale interval | 3000 d | ⇵ | 1kg |

The scale interval 1, 2, 5 10, 20 or 50 can be set by pressing ← / → .

The weight unit is taken from [Max] and cannot be changed here.
The number of digits behind the decimal point must be determined already when entering [Max] as well.

| | |
|---|---|
| Set Scale interval | After pressing OK or ↓ confirmation of the change is displayed with: |
| Set scale interval failed Max not multiple of scale interval | The maximum capacity is not an integer multiple of the scale interval. |

### 5.4.8. Determining the Dead Load

| WP A/Calibration | | | | |
|---|---|---|---|---|
| Max | 3000 d | | 3000 | kg |
| Scale interval | 3000 d | | 1 | kg |
| Deadload at | 0.00 kg | | 0.000000 | mV/V |
| Max at | 3000.00 kg | | 1.000000 | mV/V |
| Not calibrated | | | | |
| Sensitivity | 833.33 | mV/d | 4.000000 | µV/d |

by load | by mV/V | Test

To use the empty scale/hopper as dead load (normal case):
- discharge the scale/hopper
- press [by load]

| | |
|---|---|
| Set deadload | After OK or ↓ confirmation of the change is displayed: |

If the mV/V value of the dead load was calculated, or if it is known from the previous calibration, the value can be overwritten by pressing [by mV/V].

| WP A/Calibration | | | | |
|---|---|---|---|---|
| Max | 3000 | d | 3000 | kg |
| Scale interval | 3000 | d | 1 | kg |
| Deadload at | 0.00 | kg | 0.000000 | mV/V |
| Max at | 3000.00 | kg | 1.000000 | mV/V |
| Calibrated at | 3000.00 | kg | 1.000000 | mV/V |
| Sensitivity | 833.33 | mV/d | 4.000000 | µV/d |
| by load | by mV/V | | | Test |

### 5.4.9. Possible error messages

| | |
|---|---|
| Set deadload failed above physmax | The dead load entered in mV/V plus maximum capacity in mV/V is higher than 3 mV/V ( = 36 mV). |
| Set deadload failed no standstill | The scale is not stable.<br>Remedial action: Check the mechanical function of the scale; adapt the filter setting; reduce the resolution; if necessary, adapt the stability conditions. |
| Set deadload failed deadload < -0.1mV/V | Measurement signal is negative (load cells connected with wrong polarity or defective) when determining the dead load with [by load]. |
| Set deadload failed overflow in arithmetics | The dead load entered in mV/V is higher than 5mV/V. |

### 5.4.10. Calibration with Weight (by Load)

Select [by load] for calibration using weight.

| Place CAL weight on the scale and enter value | |
|---|---|
| 2000 | kg |

The weight value for the calibration weight must be entered in a separate window.

After applying the weight, enter the weight value and confirm with OK. The weight unit for the calibration weight (press ABC to change) may differ from the unit in the instrument; conversion is automatic.
Afterward, the following message is displayed:

| |
|---|
| Setting SPAN by load |

Weight value, weight unit and measuring signal in mV/V corresponding to this value are displayed in the [Calibrated at] line.

| WP A/Calibration | | | |
|---|---|---|---|
| Max | 3000 d | 3000 kg | |
| Scale interval | 3000 d | 1 kg | |
| Deadload at | 165.11 kg | 0.057920 | mV/V |
| Max at | 3000.00 kg | 1.052369 | mV/V |
| Calibrated at | 2000 kg | 0.701579 | mV/V |
| Sensitivity | 876.97 cnt/d | 4.209600 | µV/d |
| by load | by mV/V | by data | Linear. | Test |

| | |
|---|---|
| Set SPAN failed<br>No stability | The scale is not stable.<br>Remedial action: Check the mechanical function of the scale; adapt the filter setting; reduce the resolution; if necessary, adapt the stability conditions. |
| Set SPAN failed<br>Load below deadload | The weight on the scale is less than the dead load after input of the weight value. |

The next step is calculation of the test value with [Test] (see Chapter 5.4.16), and calibration is completed with Exit (see Chapter 5.4.17).

### *5.4.11. Determining span without weight*

| WP A/Calibration | | | |
|---|---|---|---|
| Max | 3000 d | 3000 kg | |
| Scale interval | 3000 d | 1 kg | |
| Deadload at | 3.00 kg | 0.001000 | mV/V |
| Max at | 3000.00 kg | 0.000000 | mV/V |
| Not calibrated | | | |
| Sensitivity | 833.33 cnt/d | 4.000000 | µV/d |
| by load | by mV/V | by data | Linear. | Test |

### *5.4.12. Calibration with mV/V Value*

The scale can be calibrated without weights. During input of the load cell mV/V value, the acceleration of gravity at the place of installation can be taken into account. The STAR load cell data is based on the acceleration of gravity effective at Hamburg, Germany: 9.81379 m/s².

**Calculation of the average load cell sensitivity:**
With D1 specification load cells, the use of sensitivity C given in the data sheet is sufficient. The average load cell sensitivity $C_{Avr}$ is calculated as follows:

$$C_{Avr} = \frac{\frac{C1}{Ra1} + \frac{C2}{Ra2} + \ldots + \frac{Cn}{Ran}}{\frac{1}{Ra1} + \frac{1}{Ra2} + \ldots + \frac{1}{Ran}}$$

The formula is simplified when the output resistance Ra for the load cells is almost equal:

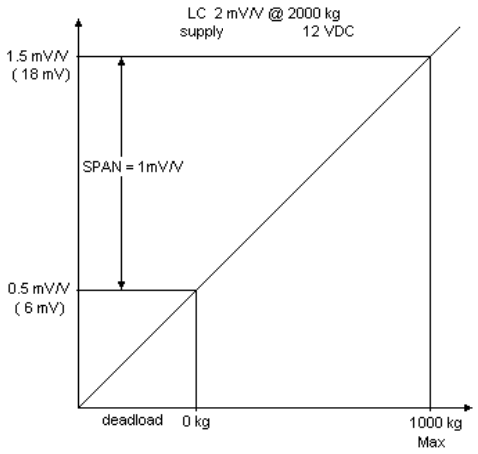
$$C_{Avr} = \frac{1}{n} \sum C$$

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

$$\text{SPAN [mV/V]} = \frac{\text{maximum capacity} * \text{load cell sensitivity } C_{Avr} \text{ [mV/V]}}{\text{load cell capacity (nominal load} * \text{number of load cells)}}$$

**Dead load:** Calculation of the equivalent input voltage in mV/V
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/empty hopper) is not necessary. Subsequent dead load correction (as described in Chapter 5.4.14) can be used for later re-determination of the dead load, when the scale/hopper is empty.

**Example:** Load cell(s) with rated output of 2mV/V at nominal load of 2000 kg, dead load 500 kg, load cell supply voltage 12 VDC




The calibration dialog provides an overview of all settings:

| WP A/Calibration | | |
|---|---|---|
| Max | 1000 d | 1000 kg |
| Scale interval | 1000 d | 1 kg |
| Deadload at | 500.00 kg | 0.500000 mV/V |
| Max at | 1000.00 kg | 1.000000 mV/V |
| Calibrated at | 1000.00 kg | 1.000000 mV/V |
| Sensitivity | 2500.00 cnt/d | 12.000000 µV/d |

After selecting [mV/V], the values for the Max and for the dead load (if necessary) can be entered.

The next step is calculation of the test value with [Test] (see Chapter 5.4.16), and calibration is completed by pressing Exit (see Chapter 5.4.17).

## 5.4.13. Calibration with Load Cell Data ("Smart Calibration")

If the scale to be calibrated is not legal for trade, it can be calibrated without weights. The simplest method is with load cell data and without calculation; another method (with mV/V) is described in Chapter 5.4.12.

| WP A/Calibration | | | | |
|---|---|---|---|---|
| Max | 3000 d | 3000 kg | | |
| Scale interval | 3000 d | 1 kg | | |
| Deadload at | 3.00 kg | 0.001000 mV/V | | |
| Max at | 3000.00 kg | 0.000000 mV/V | | |
| Not calibrated | | | | |
| Sensitivity | 833.33 counts/d | 4.000000 µV/d | | |
| by load | by mV/V | by data | Linear. | Test |

Start by pressing [by data].

| WP A/Calibration/Loadcell configuration | | |
|---|---|---|
| Number of loadcells | ⇵ | 4 |
| Nominal load | | 3000 kg |
| Gravity | | 9.81379 m/s² |
| Hysteresis error | | not specified |
| Certified data | | all LC same |
| LC sensitivity | | 1.000000 mV/V |
| Enter | Calc | |

| WP A/Calibration/Loadcell configuration | | |
|---|---|---|
| LC resistance | ⇵ | 600.000 Ω |
| Enter | Calc | |

**[Number of loadcells]**
Number of load cells connected in parallel (1, 2...<4>...9, 10)

**[Nominal load]**
Nominal load $E_{max}$ of a load cell (not the overall nominal weight of the scale).

**[Gravity]**
Acceleration of gravity at the place of installation; default is the value for Hamburg, Germany, 9.81379 m/s².

**[Hysteresis error]**
When switching from [Not specified] to [Specified], values for [Correction A/B] must be filled in. The data is given on the load cell certificate.

**[Certified data], [LC sensitivity], [LC resistance]**
With [all LC same], only 1 value for the sensitivity [LC sensitivity] and the output resistance [LC resistance] must be filled in. With [each LC specific], individual values for each load cell are requested.

**[Calc]**
The mV/V value is calculated and after confirmation with [OK], the calculated mV/V value is stored in the calibration data.

## *5.4.14. Subsequent Dead Load Correction*

If the hopper/platform weight changes by an amount that is higher than the zero-setting range; e.g., due to dead load reduction, dead load increase or mechanical changes, the functions for automatic zero tracking and manual zero setting no longer work. To view the range which is already utilized by zero tracking or zero setting, select [Calibration] and press Info; this also activates 10-fold increased resolution of the weight value. Press Info again to return to the previous state:

| Current zero setting: 0.123 kg |
|---|

If the entire zero-setting range is already utilized, you can still correct the dead load (CAL switch must be open) without affecting other calibration data/parameters.

To do this, select Setup-[Calibration]-[Modify] and determine the dead load with [Dead load at]-[by load] (see Chapter 0).

## *5.4.15. Linearization*

After selecting Setup-[Calibration]-[New]/[Modify] and after completing calibration, select the linearization menu with softkey [Linear.]:

| by load | by mV/V | by data | Linear. | Test |
|---|---|---|---|---|

When you press [Linear], the menu shown below appears:

| WP A/Calibration/Linearisation | | | | |
|---|---|---|---|---|
| Max at | 3000.00 kg | | 1.000000 mV/V | |
| | | | | |
| Add | | | by mV/V | by load |

To add a new linearization point, press [Add], fill in the weight value, apply the weight and press [by load]. Then fill in the corresponding value in mV/V for the weight. After pressing [mV/V], the value can be entered directly.

Up to 3 linearization points can be determined.
A linearization point can be added with [Add], removed with [Delete] and changed with [Change].

| WP A/Calibration/Linearisation | | | | |
|---|---|---|---|---|
| 1. Lin. point | 750 | kg | 0.250010 | mV/V |
| 2. Lin. point | 1500 | kg | 0.500020 | mV/V |
| 3. Lin. point | 2250 | kg | 0.750040 | mV/V |
| Max at | 3000.00 | kg | 1.000000 | mV/V |
| Add | Change | Delete | by mV/V | by load |

A linearization point can be selected with ↑/↓, changed with [Change] and deleted with [Delete].

## *5.4.16. Test Value Determination/Display*

Press [Test] to activate test value calculation. The maximum capacity (Max) is displayed with the designation **TST** without a weight unit.

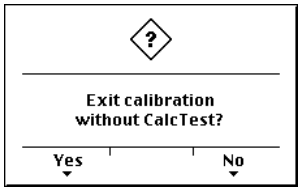
| WP A/Calibration | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | Test |

Depending on the setting under Setup-[Calibration]-[Param]-[Test mode], either is shown when you press Fn to view the test data.


- the maximum capacity with [Absolute], or
- the deviation from the test value with [Relative]

## *5.4.17. Finishing/Saving the Calibration*

Finish the calibration with Exit.




You are prompted to confirm whether calibration should be closed without determining the test value.

| | |
|---|---|
| Calibration not complete<br>Exit calibration? | If not data all was determined when calibrating with [New] (e.g. dead load not set/entered), this message is shown.<br><br>Press [Yes] to confirm and then press Exit again; another prompt is displayed: |
| Exit calibration ? | Press [Save] to save changes in calibration data.<br>If you press [Undo], changes are not saved and the display returns to the selection menu for the weighing points. |
| Saving calibration | Confirm, or |

| Exit calibration | close the menu. |
|---|---|

After finishing the calibration, set the CAL switch to the closed position; see also Chapter 5.1.1.

### *5.4.18. Parameter Input*

Open the menu via Setup-[Calibration]-[Param].

| WP A/Calibration | |
|---|---|
| Measuretime | 160 m |
| Digital filter | bessel |
| External supply | 8 - 12 VDC |
| Fcut | 3.00 Hz |
| Test mode | absolute |
| W & M | none |
| Standstill time | 0.50 s |
| Standstill range | 1.00 d |

This line is shown only if the filter is on.

**[Measuretime]**
Select the measuring time; possible values: 5, 10, 20, 40, 80, 160, 320, 640, 960, 1280, 1600 ms. In 'legal-for-trade' mode select <= 1 s.

**[Digital filter]**
The digital filter can be switched on only with the measuring time set to <= 160 ms.
Select the filter characteristic [off], [bessel], [aperiod.], [butterw.], [tscheby.].

**[External supply]**
With external load cell supply (e.g. 7.5 VDC via 1626/60 with MX8 = closed), [below 8 VDC] can be selected to adapt the sense voltage monitoring to the lower supply voltage.

**[Fcut]**
Enter the cut-off frequency for the filter (0.1 – 80 Hz); the setting is dependent on the measuring time.

**[Test mode]**
With [Absolute], the test value is calculated when the test is called. With [relative], the deviation from the initially stored test value is displayed; see Chapter 5.4.16.

**[W & M]**
Setting for 'legal-for-trade' mode; select [none], [OIML], [NTEP] (for USA) or [NSC] (for Australia), see Chapter 5.4.19.

**[Standstill time]**
Settings [Standstill range] and [Standstill time] are required for determining the mechanical stability of the scale. Input in seconds; permissible range 0.01 bis 2 sec. (max. measuring time x 32). If 0 is set, stability is not checked. The stability time must not be less than the measuring time and not greater than 32 times the measuring time.

**[Standstill range]**
The scale is stable as long as any changes in the weight value are within this range; permissible range: 0.01d to 10.00d. In 'legal-for-trade' mode select <= 1 d.

| WP A/Calibration | | |
|---|---|---|
| Tare timeout | 2.5 | s |
| Zeroset range | 50.00 | d |
| Zerotrack range | 0.25 | d |
| Zerotrack step | 0.25 | d |
| Zerotrack time | 0.0 | s |
| Overload | 9 | d |

**[Tare timeout]**
Enter a timeout value between 0.1 and 25 s for a taring/zero set command that cannot be executed (e.g., if scale mechanically unstable, filter settings faulty, resolution too high, stability condition too narrow).

**[Zeroset range]**
Determine a +/- range around the zero point determined by the dead load during calibration; within this range:
- the displayed gross weight can be set to zero by pressing the zero-setting key (or by a corresponding external command), and
- automatic zero tracking is active

Available range: 0.00 d to 10000.00d
In 'legal-for-trade' mode a value <= 2 % of Max. must be entered. Example: 60 d for 3000e, class III.

**[Zerotrack range]**
Range within which automatic zero tracking compensates deviations; 0.25 to 10000.00d. In 'legal-for-trade' mode a value of 0.25 d has to be entered.

**[Zerotrack step]**
Step for automatic tracking; 0.25 to 10d. In 'legal-for-trade' mode a value of 0.25 d has to be entered.

**[Zerotrack time]**
Enter a time interval for automatic zero tracking within 0.0 (tracking switched off) and 25 s. In 'legal-for-trade' mode a value of 0.25 d has to be entered.

**[Overload]**
Weighing range above the maximum capacity (Max), without error message. Available range: 0 to 9999900 d. In 'legal-for-trade' mode max. 9 d=e has to be entered.

| WP A/Calibration | | |
|---|---|---|
| Min | 50 | d |
| Range mode | Single range | |

**[Min]**
Minimum weight at which a print command can still be executed. Range is 0 to 9999900 d. In 'legal-for-trade' mode min. 20 d has to be entered.

## 5.4.19. Legal-for-Trade Operation

Under Setup-[Calibration]-[Param]-[W&M] you can choose between: [none] and a legal-for-trade mode [OIML], [NTEP] or [NSC].

| | [none] | [OIML] | [NTEP] | [NSC] |
|---|---|---|---|---|
| Gross weight display | B | B | G | G |
| Min. meas. signal | 0.125 mV/V at 30000 d | 0.125 mV/V at 3000 e | 0.125 mV/V at 3000 e | 0.125 mV/V at 3000 e |
| | 0.25 mV/V at 60000 d | 0.25 mV/V at 6000 e | 0.25 mV/V at 6000 e | 0.25 mV/V at 6000 e |
| | | 0.42 mV/V at 10000 e | 0.42 mV/V at 10000 e | 0.42 mV/V at 10000 e |

If legal-for-trade operation is selected, the parameters (zero tracking etc.) must be set accordingly; they are not checked. The relevant CAL switch (see Chapter 5.1.1) must be sealed in the closed position.

## 5.4.20. Multiple Range Scale/Multi-Interval Scale

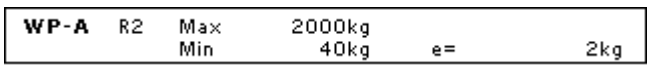
Range selection is controlled by three parameters under Setup-[Calibration]-[Param].

| WP A/Calibration | | |
|---|---|---|
| Range mode | Multiple rang | Select [Multiple range] or [Multi-interval] |
| Range limit 1 | 1000 kg | Switch point from range 1 to 2 |
| Range limit 2 | 2000 kg | Switch point from range 2 to 3 |

Multiple range scale (cl. III, or cl. I and II single range scale with variable scale interval)
With [Range mode] = [Multiple range], the scale has up to 3 ranges with different resolutions. The switch points [Range limit 1] and [Range limit 2] are the range limits. As soon as the gross weight exceeds range 1, the next higher range with the next higher interval becomes valid (1->2->5->10->20->50->100->200). When reducing the weight, the interval of the previous range is kept. When the gross weight is <= 0.25 d of range 1 and the scale is stable and not tared, the scale returns to range 1 with the corresponding interval.

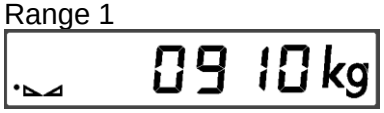
Multi-interval scale (cl. III, or cl. I and II single range scale with variable scale interval)
With [Range mode] = [Multi-interval], the scale has up to three ranges with different resolutions. Each range has the corresponding interval. Unlike [Multiple range], switching the interval is also triggered by weight reduction; i.e., when the weight drops below the range limits.

During calibration, the multiple range/multi-interval function is always switched off.
The weight display header (VNC) includes the current range (R1, R2, R3), Max, Min and d (or e with legal-for-trade instruments) (Example: multiple range scale in range 2):

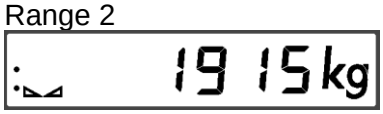



The ranges are marked by points on the left side of the display.

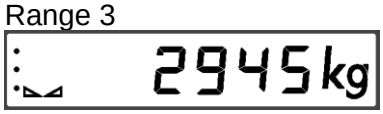
Range 1




Range 2




Range 3

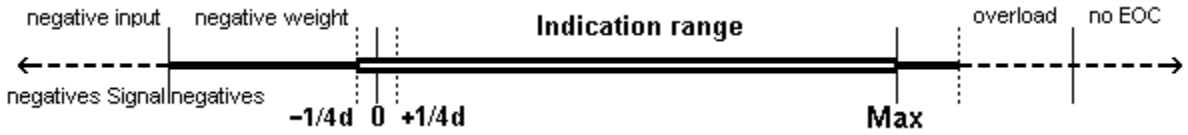


# 5.5. Error Messages

## 5.5.1. Measuring Circuit Error Messages

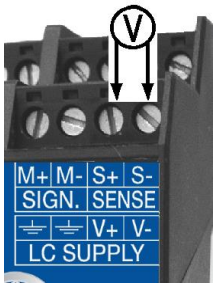
The weighing electronics can generate error messages, which are output on the weight display.

| VNC Text | Cause |
|---|---|
| Arith err | Internal arithmetic overflow (faulty calibration values) |
| Overload | Input voltage is higher than Max + (x d) |
| No EOC | Input signal is higher than the permissible range of 36 mV. However, the trouble cause can also be due to an error in the analog section, to a defective load cell or to a cable break |
| No sense voltage | Sense line or supply line is interrupted or connected with wrong polarity or sense voltage is low |
| Negative Input | Input voltage is negative (e.g. wrong polarity of load cell signal or supply voltage) |



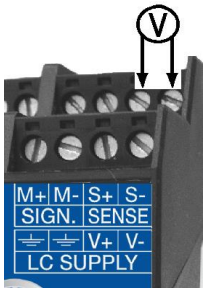

## 5.5.2. Testing the Measuring Circuit

A simple test with the load cells connected can be carried out using a multimeter (not with external supply or intrinsically safe load cell interface):



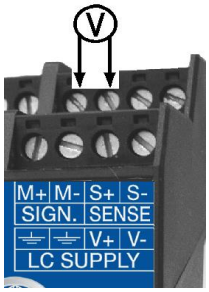

12 V +/- 0.8 V (symmetrical to housing GND)

Supply voltage




12 V +/- 0.8 V (symmetrical to housing GND)

Sense voltage




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

Measuring voltage

# 5.6. Configuring General Parameters

The configuration of parameters which are not related to the weighing electronics is divided into several sections (see Chapter 5.3.5).

## *5.6.1. Serial Ports*

To configure the serial interfaces, select Setup-[Serial ports parameter].

| Setup |
|---|
| ▸ Serial ports parameter |
| ▸ Operating parameter |

Select [Serial ports parameter] with ↑/↓ and OK

| Setup/Serial ports | | |
|---|---|---|
| Remote display | ⇵ | Builtin RS48 |
| SMA | | none |
| | | |
| Param | | |

[**Remote display]**
Select the serial interface to which the remote display is connected and then select [Param] to define the [Baudrate].

| Setup/Serial ports/Builtin RS485 | | |
|---|---|---|
| Assigned to | | Remote display |
| Protocol | | Remote display |
| Baudrate | ⇵ | 9600 bd |
| Bits | | 7 |
| Parity | | even |
| Stopbits | | 1 |
| Mode | | single transmitter |

Select [Baud rate] with ↑/↓ and set the baud rate with ←/→

You can only set the baud rate to 300, 600, 1200, 2400, 4800 or 9600. The other parameters (displayed in light-gray) cannot be changed.
If only 1 instrument is connected to a PR1627 or PR1628 (normal case), [Mode] must be set to [single transmitter].

| Save settings |
|---|

### *5.6.2. SMA Protocol*

Select an RS-485 interface under Setup-[Serial ports parameter].

| Setup/Serial ports | |
|---|---|
| Remote display | none |
| SMA | Builtin RS48 |
| Param | |

Only the baud rate is adjustable; the other parameters are fixed.

| Setup/Serial ports/Builtin RS485 | |
|---|---|
| Assigned to | SMA |
| Baudrate | 9600 bd |
| Bits | 8 |
| Parity | none |
| Stopbits | 1 |

Press ↑/↓ to select [Baudrate] and set the baud rate with ←/→

The SMA protocol is described in Chapter 5.7.

### *5.6.3. Operating Parameters*

Define the basic operating parameters under Setup-[Operating parameter].

| Setup/Operating parameter | |
|---|---|
| AccessCode | 0 |
| SetTareKey | tare **&** reset tare |
| SetZeroKey | only when not tared |

**[AccessCode]**
The access code can be used to protect the [Setup] from unauthorized operation. Enter a number with up to 6 digits. As long as you are in this menu, the value can be overwritten as required. When [AccessCode] is set to 0, no access code ist prompted.

**[SetTareKey]**
The SetTare function can be configured (VNC operation / Internet browser).
[tare & reset tare]: the scale is tared if it was not tared previously; otherwise, tare is reset.
[tare & tare again]: when you press the [Tare] key, the current value is stored in the tare memory and a net weight of 0 is displayed.
[disabled]: The tare key has no function.

**[SetZeroKey]**
The SetZero function (VNC operation / Internet browser) can be limited to gross mode with [only when not tared] or switch the scale to gross mode automatically with [reset tare on zeroset]. If the zero-setting key with these settings has no effect, the configured zero-setting range (around the zero-point set with the dead load) is already utilized due to a previous zero-setting operation and/or automatic zero setting.
[disabled]: The key has no function.

| Save changes ? |
|---|

To close the menu, press Exit. Press [Yes] to save the data, or [No] to close the menu without changing data.

### *5.6.4. Fieldbus Parameters*

| Setup |
|---|
| ▸ Serial ports parameter |
| ▸ Operating parameter |
| ▸ Fieldbus parameter |

Press ↑/↓ and OK to select [Fieldbus parameter]

This menu item can only be selected if the instrument is a PR5220/01 or a PR5220/04 version.
The instrument version automatically determines the corresponding protocol: [Profibus-DP] for PR5220/01 and [DeviceNet] for PRPR5220/04.
Dependent on the interface type, additional parameters are required:

**[Profibus-DP]**

| Setup/Fieldbusparameter | |
|---|---|
| Protocol | Profibus-DP |
| Profibus-DP Address | 1 |

**[DeviceNet]**

| Setup/Fieldbus | |
|---|---|
| Protocol | DeviceNet |
| DeviceNet baudrate | 500k |
| DeviceNet MAC-ID | 1 |

Press ←/→ to select 500, 250 or 125 k.
Select address 1 ... 62

**Closing the menu**

| Save changes ? |
|---|

To close the menu, press Exit. Reply [Yes] to save the data, or [No] to close the menu without changing data.

### *5.6.5. Network Parameters*

You can configure settings for the network connections (built-in LAN adaptor) under Setup-[Network parameter].

| Setup/Operating Parameter | | |
|---|---|---|
| HW address | 00:90:6C:FB:E9:85 | Fixed address determined by the instrument. |
| Hostname | PR5220-UDOWEIGH | The device name can be defined* by the user. |
| Use DHCP | ☑ | The address is assigned by the server |
| IP Address | 172.24.21.82 | Address assigned by the server |
| Subnetmask | 255.255.240.0 | Mask for the permissible IP address range |
| Standardgateway | 0.0.0.0 | IP number for the gateway |
| Remote access | | |
| VNC-Client | 255.255.255.255 | Permitted client for instrument operation |

*The [Hostname] is subject to the following restrictions:
Minimum number of characters: 2, maximum number of characters: 24
1. The first character must be a letter. Spaces are not permitted.
0-9, A-Z (upper and lower case letters are not distinguished) are permitted.
- or . may be included, but neither at the end nor in succession.

When setting [IP address], [Subnetmask] and [Standardgateway], please consult with your network administrator.

You can configure access permissions for the address specified under [VNC client]:

| | | |
|---|---|---|
| VNC client | 0.0.0.0. | Access over VNC not permitted |
| VNC client | 172.24.21.101 | Access only from client machine with this address |
| VNC client | 172.24.21.255 | Access from any client with address within range 172.24.21.1 to 254 |
| VNC client | 255.255.255.255 | Access from client with any address |

# 5.7. Limit Values, Digital Inputs and Outputs

## *5.7.1. Conditions for Limit Values and Digital Inputs, States for Outputs*

The limit values and digital inputs can be combined with conditions that must be met before an action is executed. With outputs, these conditions can be output as states directly. Selection is from the following list:

| Selection list for [condition] Function | SPM bit(dec) | Explanation Condition is met, if not true (=0) or if true (=1) |
|---|---|---|
| no condition | ----- | No condition |
| actual diginp1 | X00=0/1 | Digital input 1 |
| actual diginp2 | X01=0/1 | Digital input 2 |
| actual diginp3 | X02=0/1 | Digital input 3 |
| actual limit 1 | X16=0/1 | Limit signal 1 |
| actual limit 2 | X17=0/1 | Limit signal 2 |
| actual limit 3 | X18=0/1 | Limit signal 3 |
| ADC error | X32=0/1 | Error in load cell/ ADC area, negative/ far outside scale |
| above Max | X33=0/1 | Weight above Max |
| overload | X34=0/1 | Weight above (Max plus the range which is still permissible) |
| below zero | X35=0/1 | Weight below zero |
| center zero | X36=0/1 | Within 1/4 d of zero |
| inside ZSR | X37=0/1 | Within zero-setting range |
| standstill | X38=0/1 | Mechanical stability of the scale |
| dimmed | X39=0/1 | Weight below zero or above Max |
| command error | X48=0/1 | Command was no executed; e.g. zero-setting command, but the weight is out of the zero-setting range |
| command busy | X49=0/1 | Command is being executed |
| power fail | X50=0/1 | Set after power-on (=power failure) |
| test active | X56=0/1 | Analog test was started |
| cal active | X57=0/1 | Calibration was started |
| tare active | X58=0/1 | Tare step is active |
| marker bit 1 | X64=0/1 | Marker bit 1; after power-on, the markers are set to '0' |
| marker bit 2 | X65=0/1 | Marker bit 2, |
| marker bit 3 | X66=0/1 | Marker bit 3, |

### 5.7.2. Configuring Digital Inputs and Outputs

Under Setup-[Digital I/O parameter], you can open the configuration menu for outputs and inputs:

| Setup/Digital I/O parameter | | |
|---|---|---|
| Output 1 | marker bit 1 | X64=1 |
| Output 2 | marker bit 2 | X65=1 |
| Output 3 | marker bit 3 | X66=1 |
| Input 1 on | -no action- | |
| Input 1 off | -no action- | |
| Input 2 on | -no action- | |
| Input 2 off | -no action- | |
| Input 3 on | -no action- | |
| Input 3 off | -no action- | |

### 5.7.3. Configuring Outputs

Configure the required function for [Output 1] to [Output 3] by selecting a signal from the list; see Chapter 5.7.1. The output goes to the corresponding state.

Example:

| Setup/Digital I/O parameter | | |
|---|---|---|
| Output 1 | below zero | X35=1 |
| Output 2 | above Max | X33=0 |
| Output 3 | center zero | X36=1 |
| Input 1 on | -no action- | |

**[Output 1]** is true (active), when the weight value drops below zero (X35=1).
**[Output 2]** remains (active), as long as the weight is not above Max (X33=0).
**[Output 3]** is true (active), when the weight is zero +/- 1/4 d (X36=1).
5.7.3.1.1

## *5.7.4. Configuring Inputs*

An action both for signal change from 0 to 1 (on) and from 1 to 0 (off) can be determined for each of the three inputs. The action may be dependent on another condition which must be met.

| Setup/Digital I/O parameter | | |
|---|---|---|
| Output 1 | marker bit 1 | X64=1 |
| Output 2 | marker bit 2 | X65=1 |
| Output 3 | marker bit 3 | X66=1 |
| Input 1 on | ↕ set tare | X113=1 |
| Condition | no condition | ----- |
| Input 1 off | -no action- | |
| Input 2 on | -no action- | |
| Input 2 off | -no action- | |
| Input 3 on | -no action- | |
| Input 3 off | -no action- | |

**5.7.4.1.1 1. Determining an action**

Determine the action for the rising edge of input 1 under [Input 1 on] from the following list (here: When the input signal changes from 0 to 1, a tare command is generated). Accordingly, an action for the falling edge can be determined.

5.7.4.1.2 Selection list for actions of the inputs [Input 1/2/3 on/off]

| Function | SPM bit | |
|---|---|---|
| -no action- | ----- | No function |
| set marker 1 | X64=1 | Set marker 1 |
| set marker 2 | X65=1 | Set marker 2 |
| set marker 3 | X66=1 | Set marker 3 |
| select net | X72=1 | Select net |
| set zero | X112=1 | Set zero |
| set tare | X113=1 | Set tare |
| reset tare | X114=1 | Reset tare |
| set test | X115=1 | Activate the analog test |
| reset test | X116=1 | Finish the analog test |
| reset PWF | X117=1 | Reset power fail |
| set fixtare | X118=1 | Set fixtare (use the value in address D31 as a tare value) |
| get fixtare | X119=1 | Save gross value as fixtare in address D31 |
| set print | X120=1 | Activate a print order |
| clr marker 1 | X64=0 | Clear marker 1 |
| clr marker 2 | X65=0 | Clear marker 2 |
| clr marker 3 | X66=0 | Clear marker 3 |
| select gross | X72=0 | Save the gross weight in address D11 |

## 2. Determining a condition

The selected action of each digital input can be combined with a condition that must be met for signal change from 0 to 1 (on) or for signal change from 1 to 0 (off). Select the condition from the list; see Chapter 5.7.1. No condition is defined when selecting [no condition]; the action is executed directly.

Example: Taring via digital input, only if the instrument is set to gross:

| Setup/Digital I/O parameter | | |
|---|---|---|
| Output 1 | marker bit 1 | X64=1 |
| Output 2 | marker bit 2 | X65=1 |
| Output 3 | marker bit 3 | X66=1 |
| Input 1 on | set tare | X113=1 |
| Condition | ⇵tare active | X58=0 |
| Input 1 off | -no action- | |
| Input 2 on | -no action- | |
| Input 2 off | -no action- | |
| Input 3 on | -no action- | |
| Input 3 off | -no action- | |

When input 1 changes from 0 to 1 [Input 1 on], a taring signal is activated only, if the condition under [Condition] is met (here: the scale was not tared previously; this is determined by [tare active X58=0]).

## 5.7.5. Configuring Limit Values

Each limit value consists of a switch-on and a switch-off point for definition of a hysteresis. The three pairs of values must be entered according to the same principle. The limit values always refer to the gross weight. Values between -0.01 x Max and 1.01 x Max of the relevant scale are permissible.

| Setup |
|---|
| ▸ Serial ports parameter |
| ▸ Operating parameter |
| ▸ Fieldbus parameter |
| ▸ Network parameter |
| ▸ Calibration |
| ▸ Limit parameter |
| ▸ Digital I/O parameter |

Press ↑/↓ and OK to select [Limit parameter]

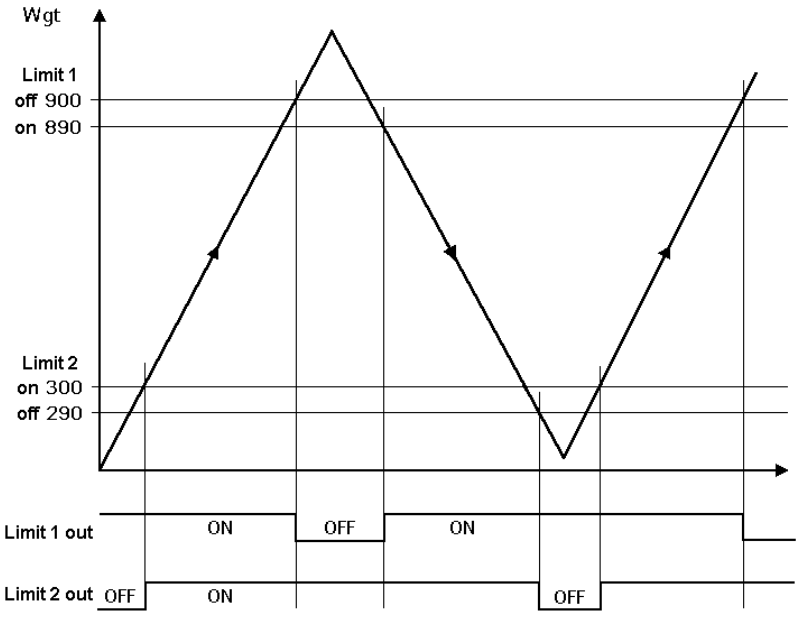
| Setup/Limit parameter | | |
|---|---|---|
| Limit 1 on | | 890 kg |
| | Action | -no action- |
| Limit 1 off | | 900 kg |
| | Action | -no action- |
| Limit 2 on | | 300 kg |
| | Action | -no action- |
| Limit 2 off | | 290 kg |
| | Action | -no action- |

Determine the limit values

| Setup/Digital I/O parameter | | |
|---|---|---|
| Output 1 | limit 1 out | X16= 1 |
| Output 2 | limit 2 out | X17= 1 |

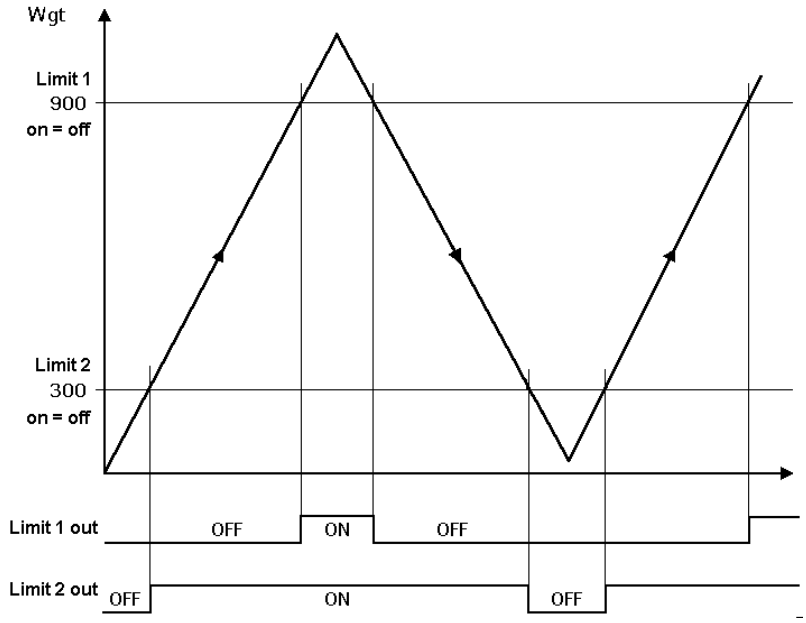
Assign the outputs

Example:




The output signal (Limit 1 out) of limit 1 switches OFF above a weight of 900 kg. The output signal (Limit 2 out) of limit 2 switches OFF below a weight of 290 kg. Both limit values have a hysteresis of 10 kg.

In the event of a power failure, the two outputs go to OFF, thus indicating underfill and overfill at the same time.




If the limits (Limit 1 and Limit 2) for 'On' and 'Off' are equal (on = off), output 1 (Limit 1 out) switches ON, when the weight (Wgt) exceeds the value and output 2 (Limit 2 out) switches OFF, when the weight drops below the value.

| Setup/Limit parameter | | | |
|---|---|---|---|
| Limit 1 on | | | 900 kg |
| | Action | ⇵set marker 1 | X64=1 |
| | Condition | no condition | ----- |

**1. Determining an action**

Determine the action for the rising edge of the reference signal under [Limit 1 on] from the following list (here: Marker 1 is set when 900 kg are exceeded).
Accordingly, an action for [Limit 1 off] can be determined.

| Function | SPM bit | |
|---|---|---|
| -no action- | ----- | No function |
| set marker 1 | X64=1 | Set marker 1 |
| set marker 2 | X65=1 | Set marker 2 |
| set marker 3 | X66=1 | Set marker 3 |
| select net | X72=1 | Select net |
| set zero | X112=1 | Set zero |
| set tare | X113=1 | Set tare |
| reset tare | X114=1 | Reset tare |
| set test | X115=1 | Activate the analog test |
| reset test | X116=1 | Finish the analog test |
| reset PWF | X117=1 | Reset power fail |
| set fixtare | X118=1 | Set fixtare (use the value in address D31 as a tare value) |
| get fixtare | X119=1 | Save gross value as fixtare in address D31 |
| set print | X120=1 | Activate a print order ? |
| clr marker 1 | X64=0 | Clear marker 1 |
| clr marker 2 | X65=0 | Clear marker 2 |
| clr marker 3 | X66=0 | Clear marker 3 |
| select gross | X72=0 | Save the gross weight in address D11 |

**2. Determining a condition**

Additionally, a condition [Condition] can be assigned to the signal; see Chapter 5.7.4.

# 5.8. Analog Output

Determine the analog output under Setup-[Analog output parameter].

| Setup |
|---|
| ▸ Serial ports parameter |
| ▸ Date & Time |
| ▸ Fieldbus parameter |
| ▸ Network parameter |
| ▸ Calibration |
| ▸ Limit parameter |
| ▸ Digital I/O parameter |
| ▸ Analog output parameter |

Press ↑/↓ and OK to select [Analog output parameter]

| Setup/Analog output parameter | | |
|---|---|---|
| Analog mode | ⇵ | no output |
| Analog range | | 0 ... 20 mA |
| Output on error | | 0 mA |
| Output if < 0 | | 0 mA |
| Output if > Max | | 20 mA |
| Weight at 0/4 mA | | 0 kg |
| Weight at 20 mA | | 3000 kg |

| | | |
|---|---|---|
| [Analog mode] | [no output] | The analog output is not used |
| | [Gross D08] | Output of the gross weight |
| | [Net D09] | Output of the net weight |
| | [Select D11] | Output of the value on the display |
| | [Transparent D30] | Output of the value in D30 |
| [Analog range] | [0...20 mA] | Output of 0... 20 mA |
| | [4...20 mA] | Output of 4... 20 mA |
| [Output on error] | [0 mA] | Set the output to 0 mA |
| | [4 mA] | Set the output to 4 mA |
| | [20 mA] | Set the output to 20 mA |
| | [hold] | The last output value is held |
| [Output if < 0] | [0 mA] | Set the output to 0 mA |
| | [4 mA] | Set the output to 4 mA |
| | [20 mA] | Set the output to 20 mA |
| | [linear] | The output drops below 4 mA up to the limitation (at 4 .. 20 mA) |
| [Output if > Max] | [0 mA] | Set the output to 0 mA |
| | [4 mA] | Set the output to 4 mA |
| | [20 mA] | Set the output to 20 mA |
| | [linear] | The output exceeds 20 mA up to the limitation |
| [Weight at 0/4 mA] | | Weight value for 0/4 mA output |
| [Weight at 20 mA] | | Weight value for 20 mA output |

Press Exit to return to the previous menu [Configuration].

### *5.8.1. Adapting the Analog Output*

The output current can be adapted in small ranges. This is required, if small deviations from the nominal value occur in a connected PLC.
Open the menu with Info [Show HW-slots]-[Slot 1/2 PR5510/07 analog I/O]:

| Info/HW-Slots | | |
|---|---|---|
| | Builtin | RS 232 |
| Slot 1 | PR 5510/04 | analog I/O |
| Slot 2 | | -empty- |
| Slot 3 | Builtin | Digital I/O |
| Slot 4 | | Profibus-DP |

PR 5510/07 is fitted in Slot 1

Select [PR 5510/07 analog I/O] and confirm with OK

| Info/HW-Slots | |
|---|---|
| PR5510/07 on slot | 1 |
| In use by PLC task | 2 |
| Analog output | 0.0000 mA |

Select with ↑/↓

Stop PLC | Stop I/O | Adjust | Reset

Press [Adjust]

Adapt analog output ?

Safety prompt: Reply [Yes] to start adapting.

| Info/HW-Slots/Adjust Analog Output Slot 1 | |
|---|---|
| Output | 4.000 mA |
| Measured | 4.004 mA |

Enter e.g. the value for 4 mA measured by the connected PLC under [Measured].
After pressing OK, the 2nd value (20 mA) is displayed:

| Info/HW-Slots/Adjust Analog Output Slot 1 | |
|---|---|
| Output | 20.000 mA |
| Measured | 20.010 mA |

Enter e.g. the value for 20 mA measured by the connected PLC under [Measured].

Save settings ?

Reply [Yes] to save the data,
or [No] to keep the previous values.

If you want to return to the factory settings (4 mA and 20 mA):
Press [Reset]: A safety prompt is displayed:

Reset to default ?

Reply [Yes] for reset to the factory settings, or
[No], if you want to keep the entered values unchanged.

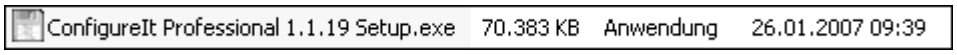
# 5.9. ConfigureIt Professional

The ConfigureIt Professional program has the following features:

- Searching for an instrument in a network
- Creating and modifying an instrument configuration
- Entering the parameters of an instrument
- Calibration of an instrument using the following methods:
  - with test weights
  - by mV/V
  - using the load cell data (‘smart calibration’)
- Loading an instrument configuration from an instrument
- Storing an instrument configuration in an instrument or in a file
- Copying instrument configurations (cloning)
- Creating a document (PDF, XLS, etc.) with the instrument configuration

## *5.9.1. Installation*

The installation is done from the CD-ROM delivered with the instrument. It is recommended to close further application programs running on the PC. For installation, approx. 150 Mbytes are required on the hard disk. The minimum is 256 Mbytes working memory; a 2GHz processor needs approx. 5 minutes installation time.
Start the program ConfigureIt Professional ... Setup.exe:



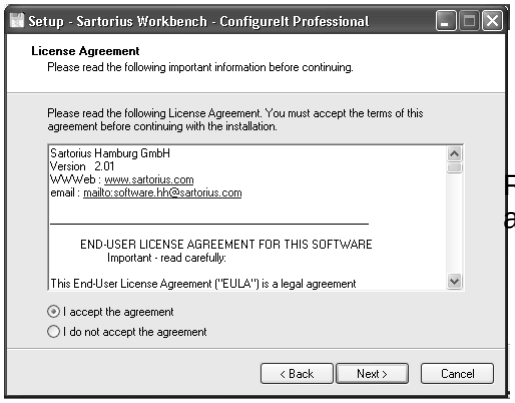


Next step for installation

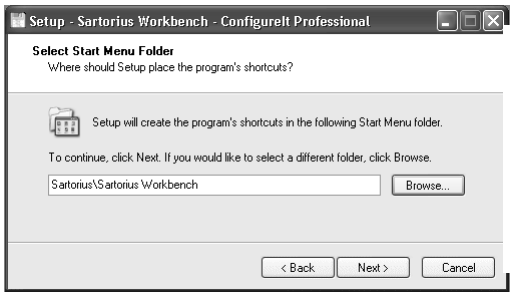
Return to previous step

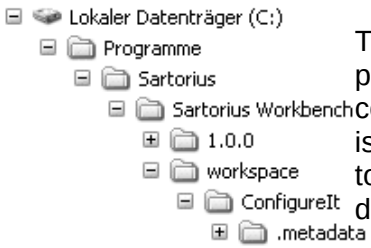
Cancel the installation process


Instructions for closing further application programs

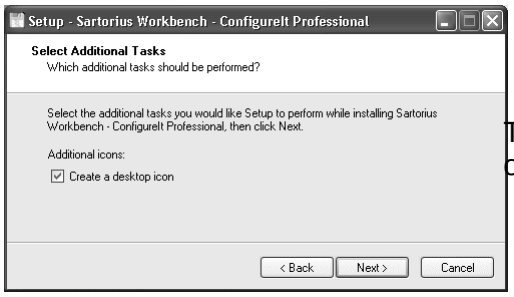



Read the license agreement and click [I accept the agreement] to confirm acceptance.

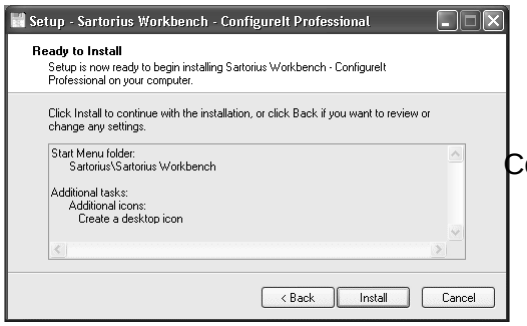


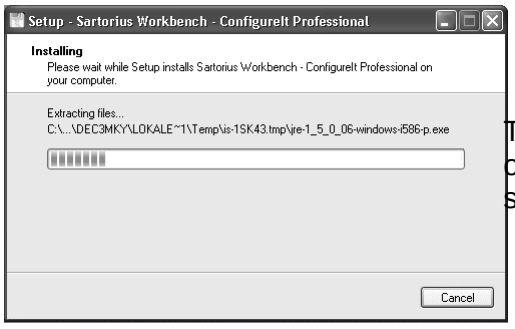

The folder in which the programs and configurations are stored is shown. Click [Browse] to search and define a different folder.




To create an icon on the PC desktop for easy starting of the program the box must be activated.




Continue the installation with [Install].



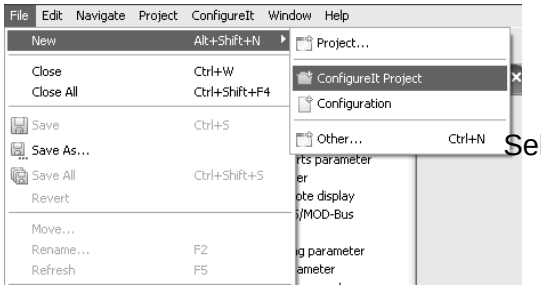

The progress of installation is displayed; depending on the PC performance, the installation may take some minutes.


f the start box is activated, ConfigureIt Professional can be started directly by pressing [Finish].

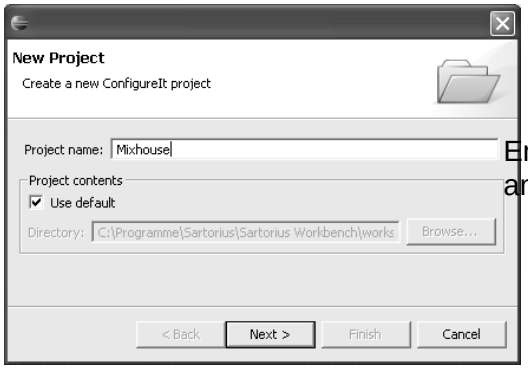
### 5.9.2. Starting the Program


If the program has already been installed previously (see Chapter 5.3), it can be started using the icon on the desktop:

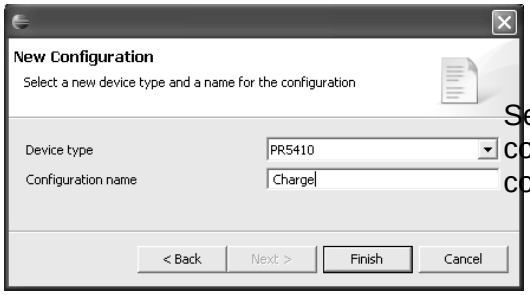
### 5.9.3. Creating a New Project




Select [File]-[New]-[ConfigureIt Project].

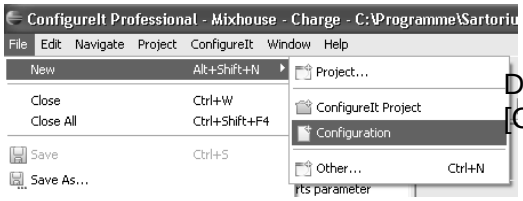



Enter the project name (this is the name of the folder) and press [Next >].

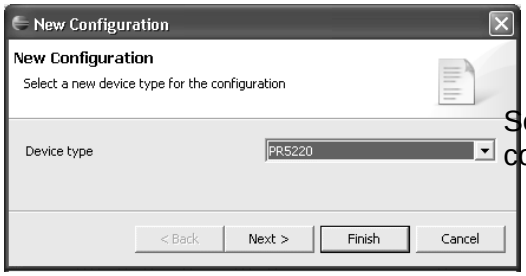



Select the device type: define PR5220 and a configuration name (file) and press [Finish] to continue.

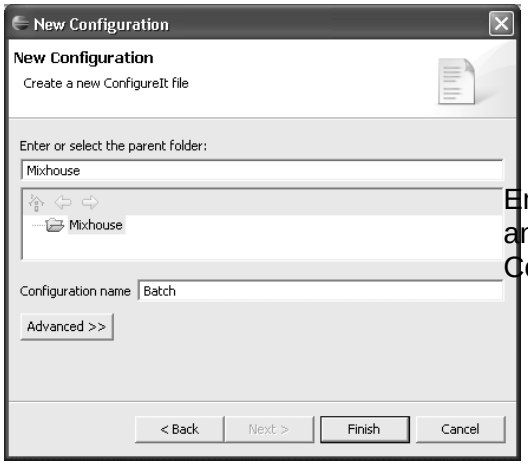
## 5.9.4. Defining a New Configuration



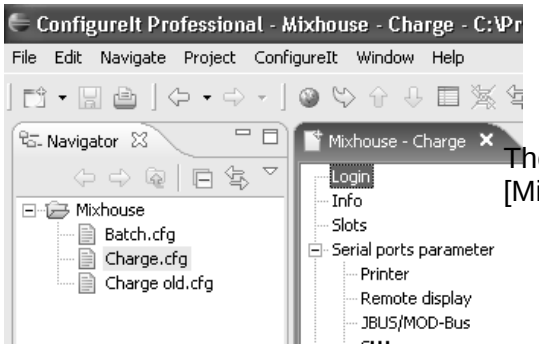

Define a new configuration with [File]-[New]-[Configuration].




Select device type PR 5220 and click [Next >] to continue.

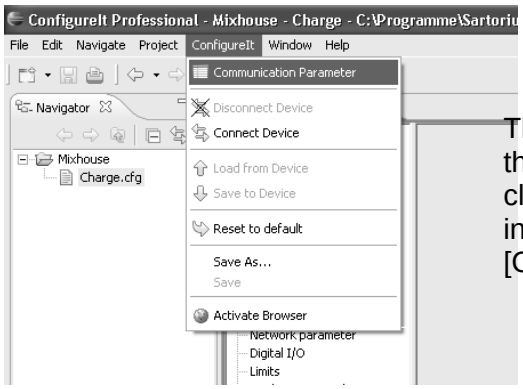



Enter or select the folder for saving the configuration and enter the name for the configuration file. Complete by clicking [Finish].

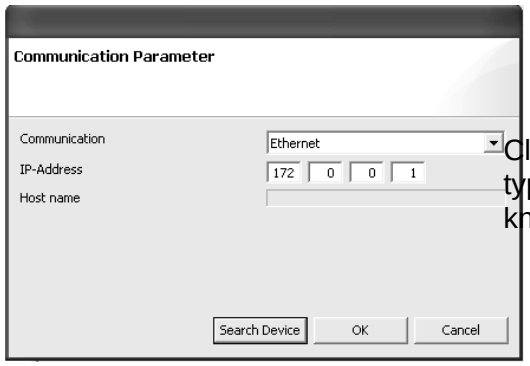



The new configuration [Batch.cfg] is listed in folder [Mixhouse] of the Navigator.

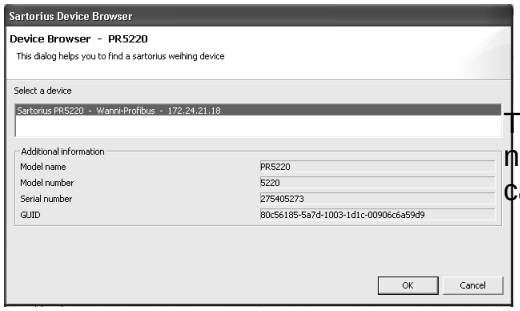
## 5.9.5. Establishing the Communication to the Instrument



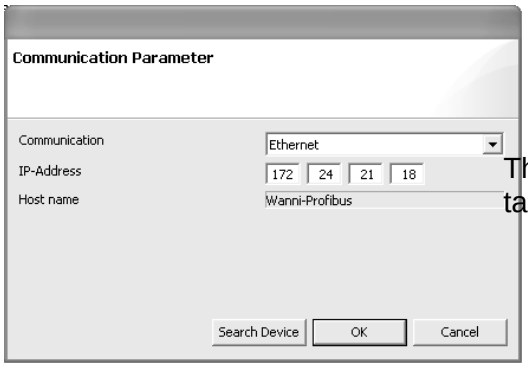

The Navigator area contains the 'Mixhouse' folder with the configuration file 'Charge.cfg'. After double clicking [Charge.cfg] and clicking [Login] once the interface can be selected via [ConfigureIt] - [Communication Parameter].



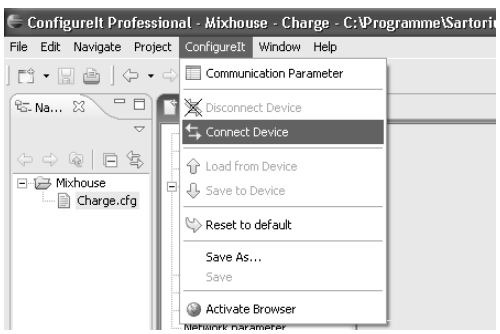

Click [Search Device] to find all devices of the same type in the network. If the address of the instrument is known, it can be entered directly into [IP-Address].




The instruments of the selected type found in the network appear and the instrument to be configured can be selected; press [OK] to continue.




The Ethernet address of the selected instrument is taken over.

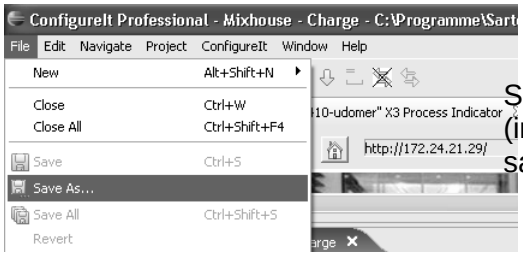



Select [ConfigureIt]-[Connect Device] to start the communication to the instrument.

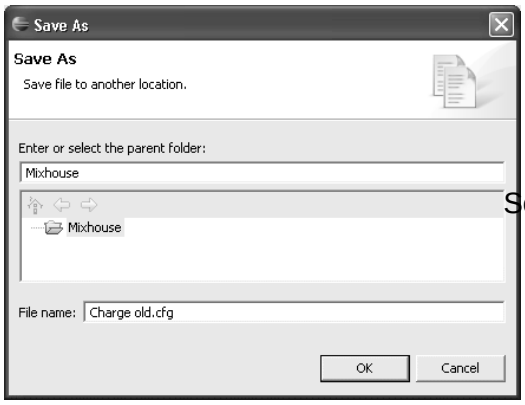
### 5.9.6. Transferring a Data Set from the Instrument to the PC


Click [ConfigureIt]-[Load from Device]. The complete data set (including the calibration data and parameters) is transferred from the instrument to the PC.

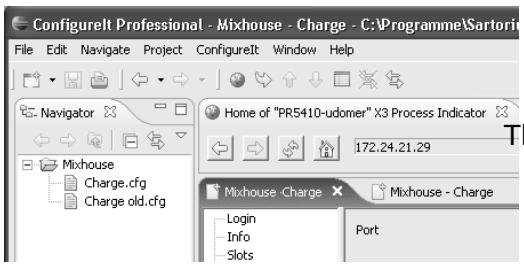
### 5.9.7. Saving the Current Data Set on the PC




Select [File]-[Save as]; the complete data set (including the calibration data and parameters) is saved in a file.



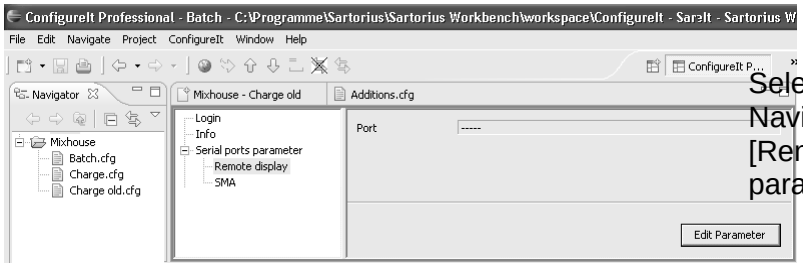

Select a folder and define a new name for the file.



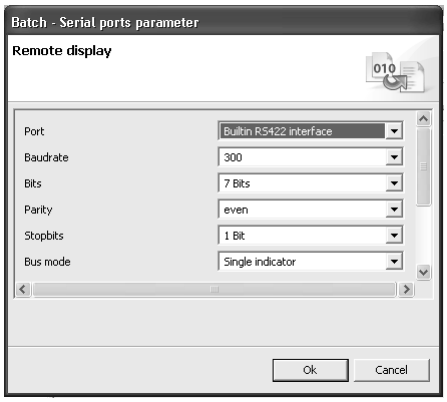

The file [Charge old.cfg] is added under [Mixhouse].

The configuration can be found e.g. in the following folder on the PC using the Explorer:

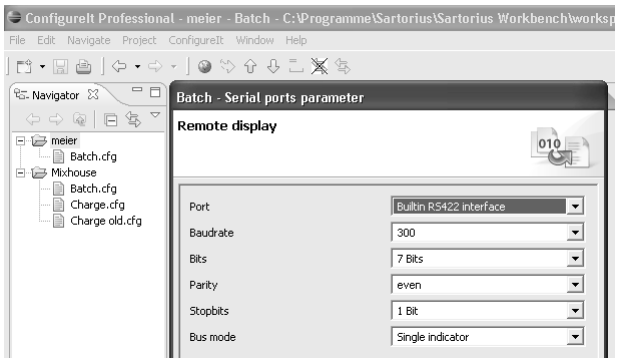
## 5.9.8. Modifying a Data Set



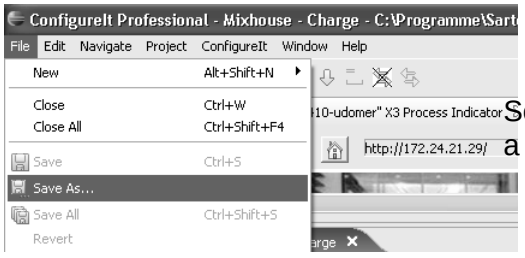

Select the configuration in the Navigator. Then select e.g. [Remote display]. Select [Edit parameter] to start changing.



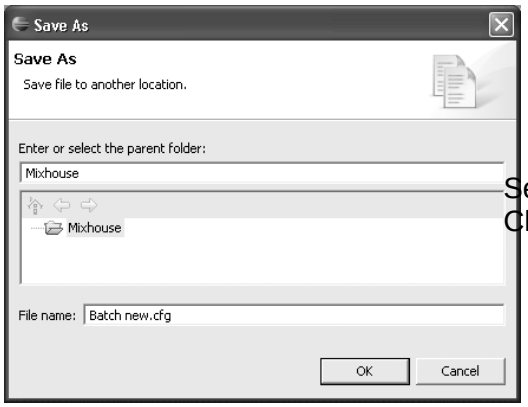

After selecting the port to which the printer of the instrument is connected, the transmission parameters can be changed. Click [OK] to complete.




The new parameters are shown.

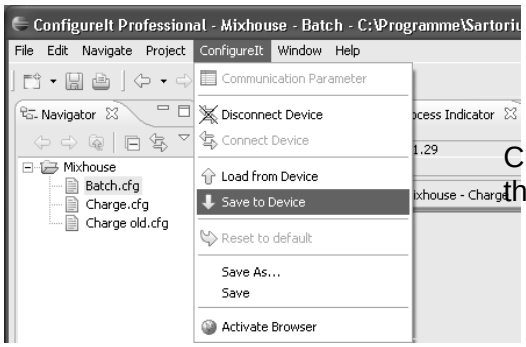



Select [File]-[Save As] to save the modified data set in a file.




Select a folder and define a new name for the file. Click [OK] to complete.

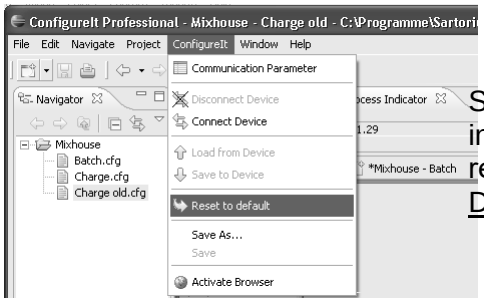
### 5.9.9. Transferring the Current Data Set or Selected Parameters to the Instrument




Click [ConfigureIT]-[Save to device] to save parts of or the overall configuration in the instrument.

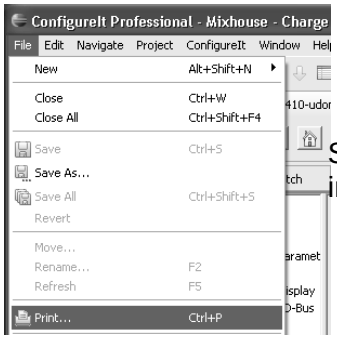

After selecting, define the parameters to be transferred by clicking [>] or [>>] (for all parameters).
Click [OK] to start the transfer.

### 5.9.10. Resetting the Instrument to Default

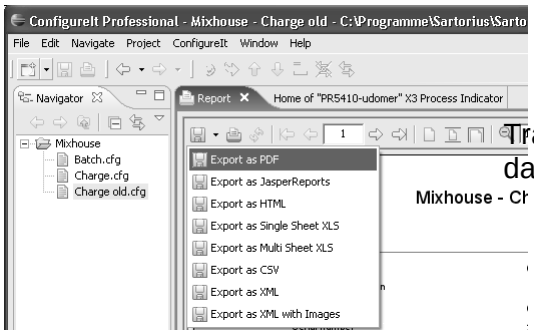



Select [ConfigureIt]-[Reset to default] to reset the instrument to default. For transferring to the instrument, return to the previous section “Transferring the Current Data Set or Selected Parameters to the Instrument”.

### 5.9.11. Exporting a Data Set as a Printable File

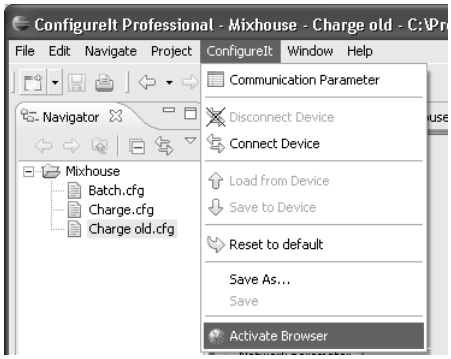



Select [File]-[Print] to transmit the data set to a printer, or to save it in a file.

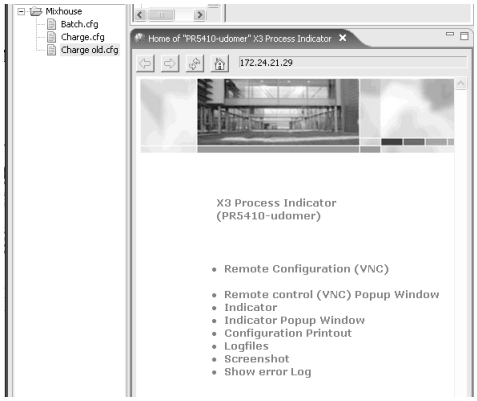



Transmitting the print file to a printer or selecting the data format of the data set for saving.

## *5.9.12. Operating the Instrument Using the Browser (VNC Program)*




Start the browser with [ConfigureIt]-[Activate Browser].

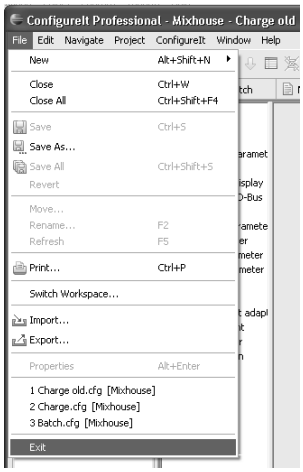



The program can be operated in the same manner as if started directly; see Chapter 5.3.2.

## *5.9.13. Closing the Program*

Before closing the program, make sure that:

- The correct configuration was saved in the instrument
- The configuration of the instrument was saved as .CFG file
- The configuration data were filed as a print-out (e.g. PDF), or printed




To close the program, select [File]-[Exit], or click: 

# Section 6: SMA Protocol

## 6.1. General

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. 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 instrument sends a reply on each received command after approx. 100 µs. With commands that wait for stability of the weight value, the reply can be delayed by the waiting time.

## 6.2. Description of Used Symbols

All characters used in this protocol are printable ASCII characters. Characters <CR> <LF> <SPACE> and <ESC> are excepted.

| | |
|---|---|
| < > | The symbols < and > are used to put communication fields and non-printable ASCII characters into brackets. These symbols are never part of any communication message. |
| <LF> | A data set starts with a line feed character (line feed = 0A hex). |
| <CR> | A data set ends with the carriage return character (carriage return = 0D hex). |
| '_' <space> | The underscore or space character is used to mark an ASCII space character (20 hex). |
| <ESC> | The 'escape' character (1B hex) is used to cancel a command. |
| '!' | An ASCII exclamation mark (21 hex) is used for communication errors. |
| ':' | An ASCII colon is used as a field delimiter. |
| '-' | ASCII minus sign (2D hex) |
| '?' | An ASCII question mark (3F hex) is used for unknown or non-supported commands. |
| 'c' | Command character. All printable ASCII characters are permitted. |
| <s><r><n> | Scale status indicator characters; ASCII letters or spaces |
| <m><f> | For details, see Chapter 6.6.1. |
| <r><e> | Scale diagnostics indicator characters; upper case ASCII letters or spaces. |
| <c><m> | For details, see Chapter 6.6.4. |
| <xxxxxx.xxx> | Weight data including minus sign (right-adjusted) and a decimal point (if any). If necessary, leading spaces are introduced with a leading zero before the decimal point. The entire field is always 10 characters long. With some error states, the field is filled up with minus signs '-'. Examples: <_ _ _ _ _0.000>; <_ _ _ _11.120>; <_ _ _ _ -1.000>; <- - - - - - - - - -> |
| <yyyyyy> | Text field of printable ASCII characters; for transporting scale information. The field has max. 25 characters. |
| <uuu> | Abbreviation of the used unit. The field is always 3 characters long; it is left-adjusted and filled up with spaces. |

# 6.3. SMA Command Set

The SMA command set is intended for requesting weight values and status information as well as for control of the scale. The commands start with <LF> and end with <CR>.
Format: <LF>c<CR>

## 6.3.1. Requesting a Weight

Command: <LF>W<CR>
Reply: The scale immediately returns the weight and status: gross weight if not tared, net weight if tared.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
For details, see section: *Standard Reply* (below)

## 6.3.2. Requesting the Weight with Stability

Command: <LF>P<CR>
Reply: The scale returns the weight and the status only, when the stability condition is met: Gross weight if not tared, net weight if tared.
For this function, the stability condition must be met. The maximum waiting time for stability is set under [Tare timeout]; see Chapter 5.4.18.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
After elapse of the waiting time without reaching stability, the following reply is sent:
<LF><_><1><n><_><f><---------><___><CR>
For details, see section: *Standard Reply* (below)

## 6.3.3. Requesting Weight Continuously

This is a command which generates non-requested replies, because it does not function according to the strict pattern of command and reply. After the command, the scale repeats the reply continuously.

Command: <LF>R<CR>
Reply: The scale repeats the weight and status information continuously until another command is received.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
For details, see section: *Standard Reply* (below)

Dependent on the used baud rate, the repetition rate of reply telegrams is roughly as follows:
19200 bd ⇨ 100ms
9600 bd ⇨ 110ms
4800 bd ⇨ 170ms

## 6.3.4. Requesting the High-Resolution Weight

Command: <LF>R<CR>
Reply: The scale immediately returns the high-resolution (10x) weight and status: Gross weight if not tared, net weight if tared.
Note: The <n> gross/net status is shown in lower-case letters while the high-resolution weight is sent.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
For details, see section: *Standard Reply* (below)

### 6.3.5. Requesting the High-Resolution Weight with Stability

Command: <LF>Q<CR>
Reply: The scale returns the weight and the status only, when the stability condition is met: Gross weight if not tared, net weight if tared.
For this function, the stability condition must be met. The maximum waiting time for stability is set under [Tare timeout]; see Chapter 5.4.18.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
After elapse of the waiting time without reaching stability, the following reply is sent:
<LF><_><1><n><_><f><---------><___><CR>
For details, see section: *Standard Reply* (below)

### 6.3.6. Requesting the High-Resolution Weight Continuously

This is a command which generates non-requested replies, because it does not function according to the strict pattern of command and reply. After the command, the scale repeats the reply continuously.

Command: <LF>S<CR>
Reply: The scale repeats the weight and status information continuously until another command is received.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
For details, see section: *Standard Reply* (below)

Dependent on the used baud rate, the repetition rate of reply telegrams is roughly as follows:
19200 bd ⇨ 100ms
9600 bd ⇨ 110ms
4800 bd ⇨ 170ms

### 6.3.7. Requesting the Tare Weight

Command: <LF>M<CR>
Reply: The scale returns the tare weight and signals the 'tared' status in the <n> status character.
<LF><s><r><T><m><f><xxxxxx.xxx><uuu><CR>
For details, see section: *Standard Reply* (below)

### 6.3.8. Request for Taring of the Scale

Command: <LF>T<CR>
Reply: The scale makes a taring attempt and signals the tared status in the <s> and <n> characters.
For this function, the stability condition must be met. The maximum waiting time for stability is set under [Tare timeout]; see Chapter 5.4.18.
<LF><s><r><N><m><f><xxxxxx.xxx><uuu><CR>
For details, see section: *Standard Reply* (below)

### 6.3.9. Request for Taring with Fixtare Value

Command: <LF>T<xxxxxx.xxx><CR>
Reply: The scale makes a taring attempt using the fixtare value <xxxxxx.xxx> and signals the tared status in the <s> and <n> characters.
<LF><s><r><N><m><f><xxxxxx.xxx><uuu><CR>
For details, see section: *Standard Reply* (below)

### 6.3.10. Request for Zero Setting of the Scale

Command: <LF>Z<CR>
Reply: The scale makes a zero setting attempt and signals the zero status in the <s> character.
For this function, the stability condition must be met. The maximum waiting time for stability is set under [Tare timeout]; see Chapter 5.4.18.
<LF><Z><r><n><m><f><xxxxxx.xxx><uuu><CR>
For details, see section: *Standard Reply* (below)
Unless the scale is in the zero setting range, an error reply is generated.

### 6.3.11. Request for Tare Resetting

Command: <LF>C<CR>
Reply: The scale deletes the tare weight and signals the tare reset status in the <n> status character. The scale tare is reset.
<LF><s><r><G><m><f><xxxxxx.xxx><uuu><CR>
For details, see section: *Standard Reply* (below)

### 6.3.12. Scale Diagnosis

Command: <LF>D<CR>
Reply: The scale starts the diagnosis and returns a diagnosis reply.
<LF><r><e><c><m><CR>
For details, see section: *Standard Reply* (below)

# 6.4. Scale Data

## *6.4.1. Scale Data – First Line*

Command: <LF>A<CR>
Reply: The scale sends the first line of its scale data.
<LF><SMA>:<yyyyyy><CR>
For details, see section: *Standard Reply* (below)

## *6.4.2. Scale Data – Other Lines*

Command: <LF>B<CR>
Reply: The scale sends additional lines of its scale data.
<LF><MFG>:<yyyyyy><CR>
For details, see section: *Standard Reply* (below)

# 6.5. Scale Information

## *6.5.1. Scale Information - First Line*

Command: <LF>I<CR>
Reply: The scale sends the first line of its scale information.
<LF><SMA>:<yyyyyy><CR>
For details, see section: *Standard Reply* (below)

## *6.5.2. Scale Information – Other Lines*

Command: <LF>N<CR>
Reply: The scale sends additional lines of its scale information.
<LF><TYP>:<yyyyyy><CR>
For details, see section: *Standard Reply* (below)

## *6.5.3. Escape Command*

Command: <ESC>
Reply: This is the only command which does not work according to the <LF>c<CR> protocol principle. It does not have a reply. The <ESC> character is detected at any time and cancels any current command.

# 6.6. SMA Reply Messages

In this section, the replies are described in detail. The data format of each reply has a fixed length. The communication error is the only exception from this pre-definable format. Thus the controlling computer can check each reply according to fixed rules, because each data field is in a fixed position.

### 6.6.1. Standard Reply

With most commands, the reply format is as described below:
Exceptions are the commands: 'D', 'A'/'B' and 'I'/'N'.

<LF> <s> <r> <n> <m> <f> <xxxxxx.xxx> <uuu> <CR>

Reply format and meaning:

| | | |
|---|---|---|
| <LF> | | Start of reply message |
| <s> | Scale status | Definition / example |
| | 'Z' | Zero within 1/4d <xxxxxx.xxx>= 0.000 |
| | 'O' | Above Max <xxxxxx.xxx>= +weight |
| | 'U' | Below zero <xxxxxx.xxx>= - weight |
| | 'E' | Zero setting error |
| | 'T' | Taring error |
| | <space> | None of the above conditions<br>Note: For 'E', 'I', 'T' error conditions<br><xxxxxx.xxx>= ———————— (minus sign)<br>and 'Z', 'O', 'U' are overwritten. |
| <r> | Range | ('1', '2', '3', etc.) always '1' for single range scales |
| <n> | Gross/net | Status |
| | 'G' | Gross weight |
| | 'T' | Tare weight (as reply from 'M' command) |
| | 'N' | Net weight |
| | 'g' | High-resolution gross weight |
| | 'n' | High-resolution net weight |
| <m> | Stability status | |
| | 'M' | The scale is not stable |
| | <space> | The stability-of-scale condition is met |
| <f> | Reserved for future extensions | |
| <xxxxxx.xxx> | Weight value; the field has always 10 characters | |
| <uuu> | Unit of the weight value | |
| <CR> | End of the reply message | |

Example:

| Command | Reply |
|---|---|
| <LF>W<CR> | <LF> <_> <1> <G> <_> <_> <_ _ _ _ 5.025> <lb_> <CR> |
| <LF>W<CR> | <LF> <_> <1> <N> <_> <_> <_ _ _ _ 100000> <lb_> <CR> |
| <LF>H<CR> | <LF> <_> <1> <g> <_> <_> <_ _ _ _5.0025> <lb_> <CR> |
| <LF>Z<CR> | <LF> <Z> <1> <G> <_> <_> <_ _ _ _ _0.000> <lb_> <CR> |
| <LF>R<CR | <LF> <_> <1> <G> <_> <_> <_ _ _ _ 7.025> <kg_> <CR> |

>

<LF> <_> <1> <G> <M> <_> <_ _ _ _ 7.650> <kg_> <CR>
... repeat...
<LF> <_> <1> <G> <_> <_> <_ _ _ _ 7.650> <kg_> <CR>
The scale repeats the weight, until another command is received.

### *6.6.2. Reply with Unknown Command*

<LF> ? <CR> A command from the controlling computer that is not implemented, or invalid, is replied with an ASCII '?'.

### *6.6.3. Reply in Case of Communication Error*

<LF> ! <CR> A command from the controlling computer that is unknown to the scale due to a communication error is replied with an ASCII '!'. This includes parity error or frame error (if any).

### *6.6.4. Reply with Diagnosis Command*

When a diagnosis command is given, the scale makes a test and gives a status reply.
<LF> <r> <e> <c> <m> <CR>
Reply format and meaning:

| | |
|---|---|
| <LF> | Start of diagnosis reply |
| <r> | 'R' = RAM or ROM error, '_' = OK, |
| <e> | 'E' = EEPROM error, '_' = OK |
| <c> | 'C' = calibration error, '_' = OK |
| <m> | Always: '_' = OK |
| <CR> | Start of the diagnosis reply |

Example: without error status

| Command | Reply |
|---|---|
| <LF>D<CR> | <LF> <_> <_> <_> <_> <CR> |

### *6.6.5. Reply with ‘A’ and ‘B’ Command*

Reply format with ‘A' and 'B' commands (variable length):
<LF><xxx>:<yyyyyy><CR>
The reply format and meaning are:

| | |
|---|---|
| <LF> | Start of reply from 'A'/'B' command |
| <xxx> | The field name is three characters long, left-adjusted and filled up with spaces on the right, if necessary.<br>The following fields are sent:<br>“SMA” level/revision<br>(reply from ‘A’ command)<br>“MFG” manufacturer marking<br>(reply from the 1st ‘B’ command)<br>“MOD” product / model identification<br>(reply from the 2nd ‘B’ command)<br>“REV” software version<br>(reply from the 3rd ‘B’ command)<br>“SN_“ serial number<br>(reply from the 4th ‘B’ command)<br>“END”: This is always the last inscription field<br>(reply from the last ‘B’ command) |
| ‘:’ | Separator between field name and field content. |
| <yyyyyy> | The data field has up to 25 characters.<br>The SMA field contains <level/revision><br>with the following meaning: level= (1, 2, etc.); revision= (1.0, 1.1, etc.) |
| <CR> | End of reply from 'A'/'B' command |

Example:

| Command | Reply |
|---|---|
| <LF> A <CR> | <LF>SMA:1/1.0 <CR> |
| <LF> B <CR> | <LF>MFG:Sartorius <CR> |
| <LF> B <CR> | <LF>MOD:PR5220 <CR> |
| <LF> B <CR> | <LF>REV:01.01.9 <CR> |
| <LF> B <CR> | <LF>SN_:148388723 <CR> |
| <LF> B <CR> | <LF>END: <CR> |

Note: If the controlling computer sends another 'B' command:
<LF> B <CR> <LF> ? <CR>

### 6.6.6. Scale Reply with ‘I’ and ‘N’ Commands

Reply format with  and 'N' commands (variable length):
<LF><xxx>:<yyyyyy><CR>
Reply format and meaning:

<LF> Start of reply from 'I'/'N' command

<xxx> The field name is three characters long, left-adjusted and filled up with spaces, if necessary.
The following fields are sent:
“SMA” level/revision
(reply from ‘I’ command)
“TYP” Scale type: ‘S’= scale
(reply from the 1st ‘N’ command)
“CAP” Max, unit, scale interval and decimal position, separated by ‘:’
Meanin
g:
yyyyyy= uuu:c..c:n:d
uuu= unit
n= scale interval (e.g. 1, 2, 5,10,20…) without decimal point
d= decimal point position
‘0’= without, ‘1’= xxxx.x, ‘2’= xxx.xx, ‘3’= xx.xxx , ... etc.
(reply from the 2nd ‘N’ command)
“CMD” Supported SMA commands
(reply from the 3rd ‘N’ command)
“END” This is always the last inscription field
(reply from the last ‘N’ command)

‘:’ Separator between field name and field content.

<yyyyyy> The data field has up to 25 characters.
The SMA field contains <level/revision>
Meaning: level= (1, 2, etc.); revision= (1.0, 1.1, etc.)

<CR> Start of reply from 'I'/'N' command

Example: 6000kg x 1kg platform scale

| Command | Reply |
|---|---|
| <LF> I <CR> | <LF>SMA:2/1.0 <CR> |
| <LF>N<CR> | <LF>TYP:S <CR> |
| <LF>N<CR> | <LF>CAP:kg_:6000:1:0 <CR> |
| <LF>N<CR> | <LF>CMD:HPTMCR <CR> |
| <LF>N<CR> | <LF>END: <CR> |

Example: 5000g x 1g, 10000g x 2, 25000g x 5  multiple range / multi-interval

| Command | Reply |
|---|---|
| <LF> I <CR> | <LF>SMA:2/1.0 <CR> |
| <LF>N<CR> | <LF>TYP:S <CR> |
| <LF>N<CR> | <LF>CAP:g_:5000:1:0 <CR> |
| | <LF>CAP:g_:10000:2:0 <CR> |
| | <LF>CAP:g_:25000:5:0 <CR> |
| <LF>N<CR> | <LF>CMD:HPTMCRQ <CR> |
| <LF>N<CR> | <LF>END: <CR> |

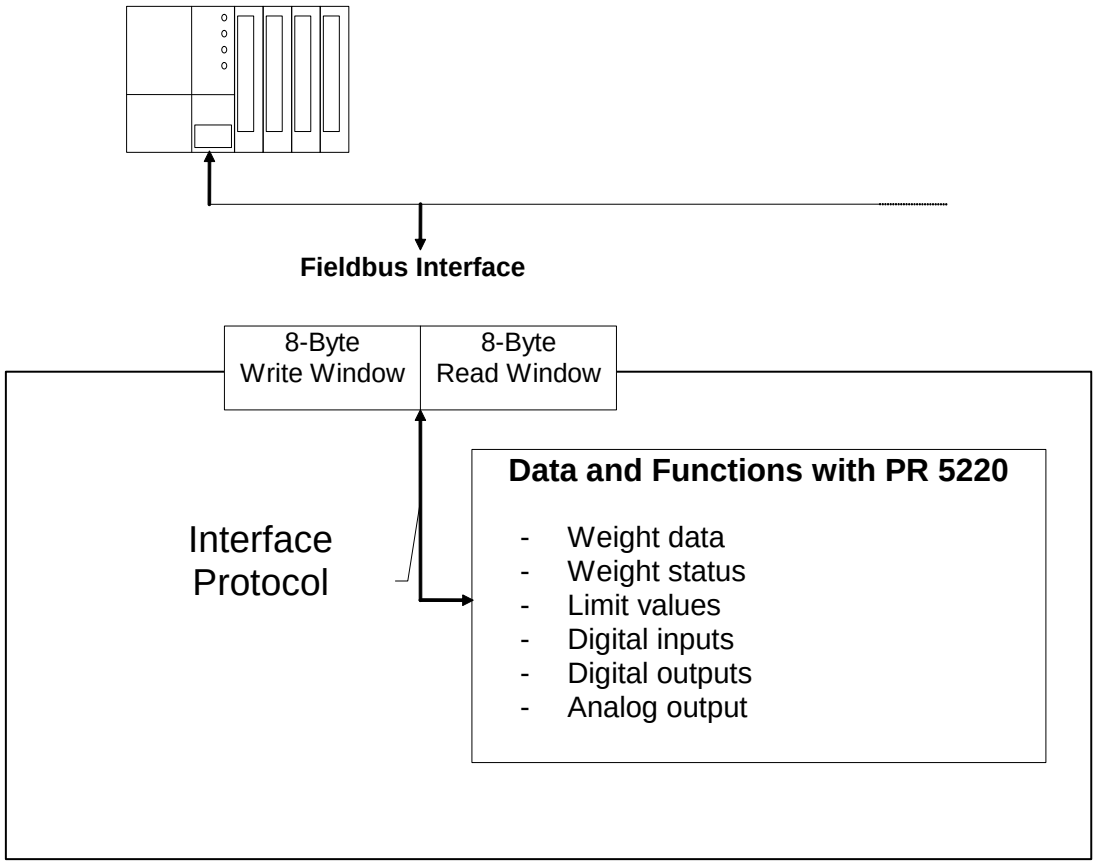
## 6.7. Communication Error

When a communication error due to a parity error or a frame error (if used) was detected, the scale sends an ASCII ‘!’ character. The only other error is the detection of an unknown or non-supported command. In this case, an ASCII '?' character is sent as a reply. Dependent on the error messages, the controlling computer must decide how to continue the scale operation.

# Section 7: Fieldbus Interface

## 7.1. Fieldbus Interface Protocol

The interface works with an 8-byte write window and an 8-byte read window. The fieldbus exchanges its data cyclically with each slave. This means: In each cycle, 8 bytes are written and 8 bytes are read, also if the data content is unchanged.
The fieldbus protocol ensures the data transport between the fieldbus master and the 2 x 8-byte data windows.
The interface protocol runs under the fieldbus and manages the access to a multitude of different data.



### 7.1.1. Write Window (Input Area)

Data transmission from the master to the slave (PR 5220) is in this window.
The first four bytes are used only for writing a data value.
The register number is in byte 5.

Bytes 6 and 7 contain bits in direct access independent of the write data.
The command is executed after a 0-1 transition of the corresponding bit.

| | |
|---|---|
| Byte 0 | Write data: MSB |
| Byte 1 | " |
| Byte 2 | " |
| Byte 3 | Write data: LSB |
| Byte 4 | Read_Value _Select |
| Byte 5 | Write_Value _Select |
| Byte 6 | Direct control bits |
| Byte 7 | Direct control bits |

### 7.1.2. Read Window (Output Area)

Data transmission from the slave (PR 5220) to the master is in this window.
The first four bytes are used for reading a data value.

The register number of data is mirrored in byte 4 by the write window, when data is available.

Bytes 5, 6 and 7 contain status bits independent of the read data.

| | |
|---|---|
| Byte 0 | Read data: MSB |
| Byte 1 | " |
| Byte 2 | " |
| Byte 3 | Read data: LSB |
| Byte 4 | Read_Value _Selected |
| Byte 5 | General system bits:<br>- Write_Active<br>- power_fail<br>- analog error... |
| Byte 6 | Status bits |
| Byte 7 | Status bits |

### 7.1.3. Reading and Writing Data

The number of data exceeds the size of the read/write window by far. For this reason, data is addressed with Write_Value_Select and Read_Value_Select. To do this, the first six bytes of the write window and the first five bytes of the read window are required. These can be used by the master to write data in PR 5220: e.g., a limit value is set to 100kg. The master can also read out weight values or other data from the PR 5220. For this purpose, the write and the read window are always required. Safe data exchange is ensured by a write and a read procedure.
For reading status bits, and for writing direct control bits, however, no procedure is required. The general system bits and the status bits are always provided and need not be requested. The direct control bits are also available continuously.

7.1.3.1.1 Procedure for reading data:
1. Writing the register number as Read_Value _Select in byte 4 of the write window (e.g. net weight).
2. Waiting, until the Read_Value _Selected in byte 4 of the read window is equal to the Read_Value _Select in byte 4 of the write window.
3. Now the value is available in bytes 0 to 3.

7.1.3.1.2 Procedure for writing data:
1. Waiting, until Write_Active = 0 in the read window (ready to receive new data).
2. Writing the value in bytes 0 to 3.
3. Writing the register number in byte 5 (Write_Value_Select).
4. Waiting, until Write_Active = 1 (acknowledges data reception)
5. Writing 0 in byte 5 (Write_Value_Select) -> Write_Active goes to 0.

# 7.2. Description of the I/O Area (Read / Write Window)

## *7.2.1. Input Area*

Data transmission from the master to the PR 5220 (slave) is via the input area.
Weight or data requests are transmitted to the slave by the master.
The master has write access; the slave has read access.

| Byte | Name | | | | | | | | Description |
|---|---|---|---|---|---|---|---|---|---|
| 0 | Write_Value (MSB) | | | | | | | | e.g. limit value |
| 1 | ::: | | | | | | | | " |
| 2 | ::: | | | | | | | | " |
| 3 | Write_Value (LSB) | | | | | | | | " |
| 4 | Read_Value_Select | | | | | | | | e.g. gross weight |
| 5 | Write_Value_Select | | | | | | | | Write: Limit 1 On |
| 6 | free | free | free | free | free | outp. 3 | outp. 2 | outp. 1 | Free / digital outputs |
| 7 | Get FixTare | Set FixTare | Res Power | Res Test | Set Test | Res Tare | Set Tare | Set Zero | Control byte, response to 0->1 transition |
| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 3 | Bit 1 | Bit 0 | |

The control byte activates the corresponding action in the instrument with a set bit.
After execution of the operation, the bit should be reset.

| Variable | Function |
|---|---|
| **Write_Value** | The weight value is transmitted as a binary 32-bit value with plus or minus sign.<br>Data type: DINT |
| **Read_Value_Select** | For selecting the value sent by the instrument |
| **Write_Value_Select** | For selecting the function to be executed by the instrument |
| **GetFixTare** | The gross weight is copied into the fixtare memory. |
| **SetFixTare** | Taring is performed using the value stored in the fixtare memory. |
| **ResPower** | The Power_Fail bit in the output area is deleted. |
| **ResTest** | The test operating mode is finished. |
| **SetTest** | The test operating mode is started. Now the test value can be read out by reading out the gross weight. |
| **ResTare** | Tare is reset. |
| **SetTare** | The instrument is tared. |
| **SetZero** | The instrument is set to zero. |

### 7.2.2. Output Area

Data transmission from the PR 5220 to the master is via the output area.
The weight or data information requested by the master is transmitted to the master by PR 5220.
PR 5220 has write access, the master has read access.

| Byte | Name | | | | | | | | Description |
|---|---|---|---|---|---|---|---|---|---|
| 0 | Read_Value (MSB) | | | | | | | | e.g. gross value |
| 1 | ::: | | | | | | | | " |
| 2 | ::: | | | | | | | | " |
| 3 | Read_Value (LSB) | | | | | | | | " |
| 4 | Read_Value _Selected | | | | | | | | e.g. gross |
| 5 | Write Active | Power Fail | Out 3 | Out 2 | Out 1 | Limit 3 | Limit 2 | Limit 1 | Status |
| 6 | Cmd Busy | Cmd Error | Inp.3 | Inp.2 | Inp.1 | Tare Active | Cal Active | Test Active | Command status |
| 7 | Dimmed | Stand-still | Inside ZSR | Center zero | Below Zero | Over-load | Above Max | Adc Error | Device status |
| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 3 | Bit 1 | Bit 0 | |

| Variable | Function |
|---|---|
| **Read_Value** | The weight value is transmitted as a binary 32-bit value with plus or minus sign.<br>Data type: DINT |
| **Read_Value_Selected** | Acknowledgement of the transmitted value. |
| **Write_Active** | The function selected with Write_Value_Select is executed once.<br>This bit is deleted, when Write_Value_Select is set to 0. |
| **Power_Fail** | Is set when switching on the instrument.<br>Is reset by ResPower with transition from 0→1. |
| **Cmd_Busy** | The instrument is busy executing a command (e.g. the instrument has received a taring command and waits for stability). |
| **Cmd_Error** | The instrument 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 at Lasterror. It is set only, if an action is executed. |
| **Tare_Active** | The instrument was tared. |
| **Cal_Active** | The instrument is / was configured. When this bit is 1, the scale parameters (Expo/Unit/Step) must be read again. Set after power On and reset after reading the Max. capacity. |
| **Test_Active** | The instrument executes the ADC test. The read weight value is not the gross value, but the test value. |
| **Dimmed** | Above Max. capacity or below zero |
| **Standstill** | The instrument is stable. |
| **InsideZSR** | The weight value is within the zero setting range. |
| **CenterZero** | The weight value is within center zero ( 0 +/- 0.25 d ) |
| **BelowZero** | The weight value is negative (gross< -0.25d) |
| **Overload** | The weight value has exceeded the Max. capacity, but is still within Max + permissible overload (gross <= max. capacity+overload) |
| **AboveMax** | The weight value has exceeded the Max. capacity, but is still within Max + permissible overload (gross <= max. capacity+overload) |
| **AdcError** | A/D conversion error. (Details are given in register 1, Read_Value_Select = 1) |

### 7.2.3. Reading and Writing Register via Fieldbus

### 7.2.4. Reading Data: Read_Value, Read_Value_Select, Read_Value_Selected

When the master has to read from the instrument, the register number is transmitted in Read_Value_Select in the input area. The result is specified with Read_Value_Selected in the output area.

| Action of the master | Response of PR 5220 |
|---|---|
| Writing register no. in Read_Value_Select | |
| | Writing the selected register in Read_Value |
| | Copying Read_Value_Select into Read_Value_Selected |
| Waiting, until Read_Value_Selected = Read_Value_Select | |
| Reading Read_Value | |

### 7.2.5. Writing Data: Write_Value, Write_Value_Select, Write_Active

When the master has to write into the instrument, the required action is transmitted into the input area with Write_Value_Select together with the data. Execution is indicated by bit Write_Active in the output area.

| Action of the master | Response of PR 5220 |
|---|---|
| Writing value in Write_Value | |
| Writing the register number in Write_Value_Select | |
| | Writing Write_Value in the selected register |
| | Setting bit Write_Active |
| Waiting, until Write_Active was set | |
| Writing 0 in Write_Value_Select | |
| | Resetting bit Write_Active |

### 7.2.6. Setting Bit: Action_Select, Write_Active

Single bits can be set or reset directly with Write_Value_Select.
For setting, the bit number (80.. 127) is written in Write_Value_Select.
For resetting, the bit number + 128 (208..255) is written in Write_Value_Select.

| Action of the master | Response of PR 5220 |
|---|---|
| Writing the register number in Write_Value_Select | |
| | Writing Write_Value in the selected register |
| | Setting bit Write_Active |
| Waiting, until Write_Active was set | |
| Writing 0 in Write_Value_Select | |
| | Resetting bit Write_Active |

### 7.2.7. Reading Bit

Single bits can be read only by reading a register. The procedure is described in Chapter 0.

### 7.2.8. Control Byte

Some instrument functions can be executed by setting bits in the input area directly.

| Action of the master | Response of PR 5220 |
|---|---|
| Setting bits in the control byte | |
| | The operation is handled |
| Resetting bits in the control byte | |

7.2.8.1.1

### 7.2.9. Waiting for the Result of the Action

When an action taking a longer time was started, the end of execution can be waited for after starting (see Chapter 7.2.6 and Chapter 7.2.8).

| Action of the master | Response of PR 5220 |
|---|---|
| Setting bits as in Chapters 7.2.6 or 7.2.8 | |
| | Acknowledging the set bit as in Chapter 7.2.6 |
| | Setting the CmdBusy bit |
| | The operation is handled |
| | In the event of an error: Setting the CmdError bit and the LastError byte |
| | Resetting the CmdBusy bit |
| Waiting, until CmdBusy was reset | |
| Checking the CmdError bit | |
| When set, reading LastError (see Chapter 0) | |

This is applicable to taring, zero setting etc. over the fieldbus.

### 7.2.10. Example: Reading the Gross Weight

The master writes value 8 in Read_Value_Select (byte 4) of the input area.

**Input area**

| Byte | Value | Description |
|---|---|---|
| 0 | | |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | **8** | Gross |
| 5 | | |
| 6 | | |
| 7 | | |

The master waits, until value 8 was reflected in Read_Value_Selected (byte 4) of the output area.

**Output Area**

| Byte | Value | | | | | | | | Description |
|---|---|---|---|---|---|---|---|---|---|
| 0 | **00** | | | | | | | | Gross value |
| 1 | **00** | | | | | | | | " |
| 2 | **4** | | | | | | | | " |
| 3 | **D2** | | | | | | | | " |
| 4 | **8** | | | | | | | | Gross weight request was detected |
| 5 | | | | | | | | | Status |
| 6 | | | | | | | | **Test active** | Command status |
| 7 | | Stand-still | Inside ZSR | Center zero | Below zero | **Over-load** | Above Max | **Adc error** | Device status |
| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 3 | Bit 1 | Bit 0 | |

The gross value (hex:000004D2 <=> 1234) can be read from bytes 0...3. When the 'Overload', 'Test Active' or 'ADC error' bits are set, the read value is invalid.
Negative values are output in two's complement.

# 7.3. Feldbus Register

## 7.3.1. Register 0: I/O Status Bits for Reading

Dynamic status, only reading is permitted

| | 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 | | | | | | | | |

## 7.3.2. Register 1: Scale Status

Dynamic status, only reading is permitted

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| Byte 0 | DIM | STND | INZSR | CZERO | BELOW0 | OVL | >Max | ADCERR |
| Byte 1 | | | | | E6 | E1 | E3 | E7 |
| Byte 2 | | | | | | PowerFail | ActionActive | CmdError |
| Byte 3 | | | | | | TareActive | CalChanged | TestActive |

Byte 0 corresponds to byte 7 in the output area; for weight error, see also the table in Chapter 5.5.1.

| | |
|---|---|
| ADCERR | Error of analog conversion/ load cell circuit (OR function of the E1,E3,E7 bits) |
| >Max | Gross value is higher than Max (maximum capacity); the full scale deflection was exceeded. |
| OVL | Scale overload; Gross > Max + overload, Error 2 |
| BELOW0 | Gross weight is negative (< 0-1/4 d) |
| CZERO | Center of zero; weight within 0 +/- 1/4 d |
| INZSR | The gross weight is within the zero setting range |
| STND | The scale is stable |
| DIM | The gross weight has exceeded the full scale deflection (0-1/4 d > weight value > Max+overload), (OR function of bits BELOW0, OVL). |
| E7 | The input signal is negative (inverse conversion), Error 7 |
| E6 | No sense voltage, or Sense voltage is low, Error 6 |
| E3 | The input signal is > 36mV (no end of conversion), Error 3 |
| E1 | Arithmetic error (overflow), Error 1 |

| | |
|---|---|
| CmdError | Error during execution (cmdError); e.g. the 'taring' operation is not handled, because the scale is not stable. The error is stored in LastError (register 4). The bit is reset with the ResetError bit (register 2). |
| ActionActive | The operation is handled; handling is busy |
| PowerFail | Power failure; is always set after power on. The PowerFail bit is reset with the ResetPWF bit (register 2) 'Reset power failure'. |
| TestActive | The analog test is busy |
| TareActive | The instrument was tared. |

### 7.3.3. Register 2: State of State-Controlled Action Bits

Only reading is permitted; the signal state is shown.

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| Byte 0 | | | | | | | | |
| Byte 1 | | | | | | | | |
| Byte 2 | 87: GetFixTare | 86: SetFixTare | 85: ResetPWF | 84: ResetTest | 83: SetTest | 82: ResetTare | 81: SetTare | 80: SetZero |
| Byte 3 | | | | | | | 89: ResetError | 88: Print |

### 7.3.4. Register 3: State of Edge-Controlled Action Bits

Only reading is permitted; it is always 0.

### 7.3.5. Register 4: Calibration Information, Error Byte

Only reading is permitted.

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| Byte 0 | EXPO | | | | | | | |
| Byte 1 | UNIT | | | | | | | |
| Byte 2 | STEP | | | | | | | |
| Byte 3 | LASTERROR | | | | | | | |

| | |
|---|---|
| EXPO | One byte for the position of the decimal point; content in decimal form 0 ... 255<br>0 = 000000<br>1 = 00000.0<br>2 = 0000.00<br>3 = 000.000<br>4 = 00.0000<br>5 = 0.00000 |
| UNIT | One byte for the weight unit; content in decimal form: 0 ... 255<br>2 = g, grams 3 = kg, kilograms<br>4 = t, tons 5 = lb, pound |
| STEP | One byte for scale interval; content in decimal form: 0 ...255<br>1 = scale interval '1', 2 = scale interval '2', 5 = scale interval '5'<br>10 = scale interval '10', 20 = scale interval '20', 50 = scale interval '50' |
| LASTERROR | Last error byte; see also CmdError bit, number of 'last error':<br>31 = no stability was reached (e.g. when taring)<br>33 = negative weight value when taring and 'legal-for-trade' mode on<br>47 = no zero setting; weight not within zero setting range<br>107 = no stability with Getfixtare |

### 7.3.6. Register 5: Device Type and Software Release

Only reading is permitted.

| | 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. 5220 Rel 1.23 = $52200123_{hex}$

### 7.3.7. Register 6: Board Number

Only reading is permitted.

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| Byte 0 | Board number MSB | | | | | | | |
| Byte 1 | "" | | | | | | | |
| Byte 2 | "" | | | | | | | |
| Byte 3 | Board number LSB | | | | | | | |

E.g. 148388723 = $08D83B73_{hex}$

### 7.3.8. Register 7: (Reserved)

### 7.3.9. Register 8 ...15: Weight Data

Only reading is permitted.
The gross, net and tare weight are stored as DINT fixpoint.
The real data value is derived from DINT and EXPO as follows :

$$Value_{Real}=reading_{DINT}*10^{(-EXPO}$$

| | |
|---|---|
| Register 8 | Current gross value |
| Register 9 | Current net value, if tared; otherwise gross |
| Register10 | Current tare value, if tared, otherwise 0 |
| Register11 | Value on the front-panel display |
| Register12 | Reserved |
| Register13 | Reserved |
| Register14 | Max (FSD) |
| Register15 | Reserved (free) |

### 7.3.10. Register 22 ... 27: Limit Values (Read/Write)

| | |
|---|---|
| Register 22 | Limit 1 on |
| Register 23 | Limit 1 off |
| Register 24 | Limit 2 on |
| Register 25 | Limit 2 off |
| Register 26 | Limit 3 on |
| Register 27 | Limit 3 off |

### 7.3.11. Register 30, 31: Fixed Values (Read/Write)

| | |
|---|---|
| Register 30 | Fixed value for analog output; value (num) 0... 20000 corresponds to 20mA |
| Register 31 | Fixed value for fixtare; see also SetFixTare, GetFixTare ( see Chapter 7.3.3) |

### 7.3.12. Register 80 ... 89: State-Controlled Action Bits (Write)

For setting bits, see Chapter 7.2.6.
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 7.2.6); the bit is reset at the specified number +128.

| | | |
|---|---|---|
| Register 80 | SetZero | Set the gross weight to zero |
| Register 81 | SetTare | Execute taring |
| Register 82 | ResetTare | Reset tare |
| Register 83 | SetTest | Start the ADC test |
| Register 84 | ResetTest | Finish the ADC test |
| Register 85 | ResetPwf | Reset the PowerFail bit (Register 1; the bit was set after power on) |
| Register 86 | SetFixTare | Taring with weight in numerical address D31 'Fixtare' |
| Register 87 | GetFixTare | The current gross weight is copied into numerical address D31. |
| Register 89 | ResetError | The CmdError error bit is reset |

### 7.3.13. Register 112 ... 121: Transition-Controlled Action Bits (Write)

For setting bits, see Chapter 7.2.6.
As soon as the bit was set, it is reset internally and the operation is handled; this is transition-controlled (for writing once).
The bit is set as Write_Value_Select with the specified number (see Chapter 7.2.6).

| | |
|---|---|
| Register 112 | SetZero |
| Register 113 | SetTare |
| Register 114 | ResetTare |
| Register 115 | SetTest |
| Register 116 | ResetTest |
| Register 117 | ResetPwf |
| Register 118 | SetFixTare |
| Register 119 | GetFixTare |
| Register 121 | ResetError |

# Section 8: ModBus Protocol

The ModBus protocol implemented in the instrument permits fast, simple and reliable communication between a PC or a PLC and up to 127 instruments.

## 8.1. SPM data in PR 1612 ModBus mode

For access via ModBus, the PR 1612 ModBus mode is switched on via the **SETUP** (button) [Serial ports]- [ModBus-RTU]- [Param]- [ModBus mode]- [PR 1612 ModBus].

**Read data**

| **Byte address** | **Weight in 32-bit integer format** |
|---|---|
| 60…63 | Gross weight |
| 64…67 | Net weight (gross if not tared) |
| 68…71 | Tare weight (0 if not tared) |
| **Read data** | |
| **Address** | Read “Word” (display in binary format) |
| W201 | 0E0000T 00000000<br>E: ADC error<br>T: Instrument is tared |
| W203 | 000S00MZ 00000000<br>S: Device is in setup mode.<br>M: Weight is stable (standstill)<br>Z: Weight within 1/4d of 0 |
| W204 | 0000D000 00000000<br>D: Gross weight <0 or >Max (dimmed) |
| W205 | TA000000 00000000<br>T: Instrument is tared.<br>A: Analog test is active. |
| W231 | 00021MRZ 00000000<br>2: Limit 2<br>1: Limit 1<br>M: Weight is stable (standstill)<br>R: Weight within zero-setting range<br>Z: Weight within 1/4 d of 0 |
| **Write data** | |
| **Bit address** | **Value in 32-bit integer format** |
| W100 | Zero device:<br>Write value 256 |
| **Bit address** | **Value in 32-bit integer format** |
| W101 | Tare device<br>Write Value 256<br>Reset the tare of the device<br>Write Value 512 |

# Section 9: Global SPM Variables

For communication via OPC, the following variables are available:

| | | | |
|---|---|---|---|
| BOOL | R | Digital input 1 | X 0 |
| BOOL | R | Digital input 2 | X 1 |
| BOOL | R | Digital input 3 | X 2 |
| BOOL | W | Digital output 1, transparent mode | X 8 |
| BOOL | W | Digital output 2, transparent mode | X 9 |
| BOOL | W | Digital output 3, transparent mode | X 10 |
| BOOL | R | Output Limit 1 | X 16 |
| BOOL | R | Output Limit 2 | X 17 |
| BOOL | R | Output Limit 3 | X 18 |
| BOOL | R | ADC error | X 32 |
| BOOL | R | Above Max | X 33 |
| BOOL | R | Overload, above (Max + plus the range that is still permissible) | X 34 |
| BOOL | R | Below zero | X 35 |
| BOOL | R | Zero +/- 1/4 d | X 36 |
| BOOL | R | Within the zero setting range | X 37 |
| BOOL | R | The weight is stable | X 38 |
| BOOL | R | Below zero or above Max | X 39 |
| BOOL | R | Load cell measuring signal negative | X 40 |
| BOOL | R | Load cell measuring signal > 36 mV | X 41 |
| BOOL | R | Internal arithmetic error; CAL data are perhaps faulty | X 42 |
| BOOL | R | ADC error, overload | X 43 |
| BOOL | R | Command error | X 48 |
| BOOL | R | Command active | X 49 |
| BOOL | R | Power fail signal | X 50 |
| BOOL | R | ADC test active | X 56 |
| BOOL | R | Calibration active | X 57 |
| BOOL | R | Instrument is tared | X 58 |
| BOOL | R/W | Read / write marker bit 1 | X 64 |
| BOOL | R/W | Read / write marker bit 2 | X 65 |
| BOOL | R/W | Read / write marker bit 3 | X 66 |
| BOOL | W | Switch to net weight | X 72 |
| BOOL | W | Set the instrument to zero | X 112 |
| BOOL | W | Set tare of the instrument | X 113 |
| BOOL | W | Reset the tare of the instrument | X 114 |
| BOOL | W | Start the ADC test | X 115 |
| BOOL | W | Finish the ADC test | X 116 |
| BOOL | W | Reset the power fail signal | X 117 |
| BOOL | W | Set the fixtare value as tare | X 118 |
| BOOL | W | Store the current gross weight in the fixtare memory (D31) | X 119 |
| BOOL | W | Start printing | X 120 |
| BOOL | W | Reset error | X 121 |

| | | | |
|---|---|---|---|
| BYTE | R | Transmitter status | B 4 |
| BYTE | R | ADC status | B 5 |
| BYTE | R | Command status | B 6 |
| DINT | R | Current gross weight | D 8 |
| DINT | R | Current net weight | D 9 |
| DINT | R | Current tare weight | D 10 |
| DINT | R | Max weight (FSD) | D 14 |
| DINT | W | Weight limit 1 on | D 24 |
| DINT | W | Weight limit 1 off | D 25 |
| DINT | W | Weight limit 2 on | D 26 |
| DINT | W | Weight limit 2 off | D 27 |
| DINT | W | Weight limit 3 on | D 28 |
| DINT | W | Weight limit 3 off | D 29 |
| UDINT | W | Analog output for 'transparent' mode | D 30 |
| DINT | W | Write the value in the fixtare memory | D 31 |

# Section 10: Configuration Print-Out

Configuration of PR5220
==========
Printed :2006-11-17 17:24:47
Firmware (Beta) : Rel. 00.25.02.2774
2006-11-15 08:15
Appl-DEFAULT : Rel. 00.90
2006-11-08 15:52
Bios (Beta) : Rel. 00.25.02.1921
2006-11-13 12:10
Boardnumber : 251390341

HW-Options
==========
Slot 1 -empty-
Slot 2 PR5510/12 digital I/O
Slot 3 Builtin digital I/O
Slot 4 -empty-

Operating parameter
==========
AccessCode : 0
SetTareKey : tare & reset tare
SetZeroKey :only when not tared

Limit's
==========
Limit 1 on
Action : -no action-
Limit 1 off : 0 kg
Action : -no action-
Limit 2 on : 0 kg
Action : -no action-
Limit 2 off : 0 kg
Action : -no action-
Limit 3 on : 0 kg
Action -no action-
Limit 3 off : 0 kg
Action : -no action-

Digital I/O
==========
Output 1 :limit 1 out X16=
Output 2 :limit 2 out X17=
Output 3 :limit 3 out X18=
Input 1 on :set zero X112=1
Condition :no condition -----
Input 1 off : -no action-
Input 2 on :set zero X113=1
Condition :no condition -----
Input 2 off : -no action-
Input 3 on :reset tare X114=1
Condition :no condition -----
Input 3 off : -no action-

Serial assignment
==========
Remote display : - none -
SMA : - none -

Serial port Builtin RS232
==========
Protocol : XON/XOFF
Baudrate : 9600 bd
Bits : 8
Parity : none
Stopbits : 1
Output mode : raw

Network settings
==========
HW-address : 00:90:6C:FB:E9:85
Hostname : PR5220-UDO-Mer
IP address : 0.0.0.0
Subnet mask : 255.255.240.0
Default gateway : 0.0.0.0
VNC-Client : 255.255.255.255

Calibration
==========
Max : 3000 kg
3000 d
Scale interval 1 kg
Deadload at : +0.000000 mV/V
Max at : +1.000000 mV/V
Not calibrated
Sensitivity : 833.33 cnt/d
: 4.000000 uV/d

Parameters
---
Measuretime : 160 ms
Digital filter : aperiod.
Fcut : 2.00 Hz
Test mode : Absolute
W & M : none
Standstill time : 0.50 s
Standstill range : 1.00 d
Tare timeout : 2.5 s
Zeroset range : 50.00 d
Zerotrack range : 0.25 d
Zerotrack step : 0.25 d
Zerotrack time : 1.0 s
Overload : 9 d
Min : 20 d
Range mode : Single range

# Section 11: Repairs and Maintenance

Repairs are subject to inspection and must be carried out at. In case of defect or malfunction, please contact your local dealer or service center for repair. When returning the instrument for repair, please include a precise and complete description of the problem. Maintenance work may be carried out only by a trained technician with expert knowledge of the hazards involved and the required precautions.

## 11.1. Solder Work

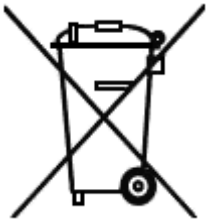
Soldering work on the instrument is neither required nor permitted.

## 11.2. Cleaning

- ***Disconnect the instrument from the supply voltage and remove connected data cables.***
- ***Prevent moisture from penetrating the instrument***
- ***DO NOT use aggressive cleaning agents (solvents, etc.).***
- ***DO NOT wash down the equipment with water or dry it with compressed air; this is NOT permitted.***

# Section 12: Disposal

If you no longer need the packaging after successful installation of the equipment, you should discard it by the local facilities for waste disposal. The packaging is made of environmentally friendly materials and is a valuable source of secondary raw material.



Place discharged batteries in local collection boxes (not in the household waste). In Germany, corresponding collection boxes are made available by GRS (Stiftung Gemeinsames Rücknahmesystem Batterien) on request with.

For scrapping of the instrument, please contact your local authorities. Prior to scrapping, any batteries should be removed. In takes care of the return and legally compliant disposal of its equipment on its own.
In other countries, please consult with the local authorities.

# Section 13: Specifications

## 13.1. Instructions for Use of 'Free Software'

The firmware in the PR 5220 instrument contains free software that is licensed under GNU General Public License (GPL) Version 2, June 1991, and GNU Lesser General Public License (LGPL) Version 2.1, February 1999.

This software, developed by third parties, is protected by copyright and is supplied free of charge.

The license terms and conditions of Free Software Foundation, Inc in English are enclosed in the delivery of the instrument.

The source text written under the above conditions is contained on the CD-ROM delivered with the instrument.

## 13.2. General Data

The following characteristics are valid after a warm-up time of at least 60 minutes (reference temperature: 23°C).

### *13.2.1. Power Supply*

| | | |
|---|---|---|
| Supply voltage | 24 VDC | +/- 20 % |
| Power consumption | 6 Watts | |
| Power consumption (with fieldbus option) | 8 Watts | |

## 13.3. Effect of Ambient Conditions

### *13.3.1. Environmental Conditions*

| | | **Temperature Range** |
|---|---|---|
| **Reference temperature** | | 23 °C |
| **Ambient temperature for operation** | 10,000 e | -10... +40 °C |
| | 'not legal for trade' | -10... +50 °C |
| **Power-on temperature** | | 0... +50 °C |
| **Storage/transport** | | -40... +70 °C |
| **Humidity** | | < 95 %, no condensation, (acc. to IEC 68-2) |
| **Protection type to DIN 40050** | | IP30 |

### 13.3.2. Electromagnetic Compatibility (EMC)

All data in compliance with EN 61326 industrial area

| | | | |
|---|---|---|---|
| Housing | Radio frequency electromagnetic fields (80 – 1000 MHz) | EN 61000-4-3 | 10 V/m |
| | Radio frequency electromagnetic fields (1.4 – 2.0 GHz) | EN 61000-4-3 | 3 V/m |
| | Radio frequency electromagnetic fields (2.0 – 2.7 GHz) | EN 61000-4-3 | 1 V/m |
| | Electrostatic discharge (ESD) | EN 61000-4-2 | 6 / 8 kV |
| Signal and control lines | Fast transients (burst) | EN 61000-4-4 | 1 kV |
| | Peak voltages (surge) 1.2/50 µs | EN 61000-4-5 | 1 kV |
| | Conducted disturbances by radio frequency (0.15 – 80 MHz) | EN 61000-4-6 | 10 V |
| Mains input | Fast transients (burst) | EN 61000-4-4 | 2 kV |
| | Peak voltages (surge) 1.2/50 µs | EN 61000-4-5 | 1 / 2 kV |
| | Conducted disturbances by radio frequency (0.15 – 80 MHz) | EN 61000-4-6 | 10 V |

### 13.3.3. RF Interference Suppression

| | |
|---|---|
| Electromagnetic emission | In acc. with EN 61326, limit value class A, industrial area |

## 13.4. Weighing Electronics

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

### 13.4.1. Load Cells

| | | |
|---|---|---|
| Load cell type | Strain gauge, 6 or 4-wire connection possible | |
| Supply voltage | U= 12V DC | for $I_{max}$= 160 mA |
| | | for up to 8 load cells of 650 Ω each<br>or 4 load cells of 350 Ω each |
| Sense voltage monitoring | Sense voltage below + 4VDC -- -4VDC is detected; can be switched off | |
| Max. load | ≥ 75 | |
| Cable length | Max. 500 m | |

### 13.4.2. Principle

| | |
|---|---|
| Principle | DC voltage, delta-sigma converter, ratiometric to the load cell supply voltage |
| Conversion / measurement time | 5, 10, 20, 40, 80, 160, 320, 640, 960, 1200, 1600 ms |
| Digital filter | Selectable, active 4th order (low-pass),<br>Characteristic: Bessel, aperiodic, Butterworth, Tschebyscheff |
| | Configurable cut-off frequency |

### 13.4.3. Accuracy and Stability

| | |
|---|---|
| Accuracy class | ≤ 10000 e (Cl. III) acc. to OIML R76 / EN 45501 |
| Min. measuring signal (OIML) | 0.5µV/e, i.e. 3 mV for 6000 e, 5 mV for 10000 e |
| Linearity error: | < 0.002 % |
| Zero stability error ($TK_0$) | < 0.02 µV/K RTI <= 0.004%/10K at 1mV/V |
| Span stability error ($TK_{Spn}$) | < +/- 2 ppm/K |

### 13.4.4. Sensitivity

| | |
|---|---|
| Sensitivity | 0.5 µV/e @ 10000e (Cl. III) OIML R76, |
| Resolution | 7.5 million counts at 3mV/V, not legal for trade |
| Input voltage (input signal + dead load) | 0 ... max. 36 mV DC, symmetrical to 0 |
| Dead load range | 36 mV DC (max. input signal); input/ calibration via software |

## 13.5. Mechanical Data

### 13.5.1. Construction

Polyamide housing for mounting on top-hat rail, black, flammability class V0 (UL94).

### 13.5.2. Dimensions

| **Housing:** | **PR 5220/00** | **PR 5220/01, -/04** |
|---|---|---|
| Width | 45 mm | 68 mm |
| Height | 99 mm | 99 mm |
| Depth | 116 mm | 116 mm |

### 13.5.3. Weight

| | | |
|---|---|---|
| Net weight | PR 5220/00 | PR 5220/01, -/04 |
| | 0.29 kg | 0.35 kg |

## 13.6. Use in Legal-for-Trade Mode

The Guide to Verification and further documents can be found on the Internet at

### 13.6.1. Documentation for Verification on the Enclosed CD

The enclosed CD has a directory containing the following PDF documents (in preparation):

- EC Declaration of Conformity to Council Directive 90/384/EEC
- Plates and markings (sealing and labels)
- Test certificate for the instrument
- EC type approval

### *13.6.2. Additional Instructions*

Information on the meaning of the CAL switch to be sealed can be found in Chapter 5.1.1 . Make sure when configuring the instrument (see Chapter 5.4.18 ) that the settings are in compliance with the legal requirements as well as with the requirements of the EC Type Approval and the EC Test Certificate. Furthermore, the settings and functions described under Item 7 of the EC Test Certificate (Orders and Conditions) must be checked. The person performing installation is responsible for selecting the legally permitted settings. The settings must be checked.

Manufactured by **Fairbanks Scale, Inc.**
821 Locust Street
Kansas City, MO 64106

**www.fairbanks.com**

# X-Series

## Transmission Series – PR5220

### Operation Manual – 51209