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Instrument Manual

X4 Process Controller
PR5510

Instrument Manual for PR5510/00	9499 050 50005 Release: 3.40	Edition 6	06.07.2012

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1 Safety hints, electrical protection class

This instrument was built and tested in accordance with the safety regulations for measuring and control instrumentation for protection class I (protective earth connection) according to IEC 1010/ EN61010-1 or VDE 0411. The instrument was delivered in safe condition. To maintain this condition and to ensure safe operation, the operator must follow the hints and warnings given in this documentation.

1.1 Application of the instrument

The instrument is intended exclusively for application in weighing and batching installations and is particularly suitable for tank and hopper weighing, weighbridges, platform scales, batching systems and as a weight indicator in intelligent control systems. Product operation, commissioning and maintenance must be done by trained and qualified persons who know the related risks and avoid them, or take measures to protect themselves.
The instrument is state of the art. No warranty is taken that the product is free of errors, especially with reference to the software and hardware required for operation and supplied by third parties. The manufacturer does not take any liability for damage caused by different parts of the installation or incorrect use of this product. Using this product implies recognition of the above-mentioned regulations.

1.2 Initial inspection

Check the contents of the consignment for completeness and note whether any damage has occurred during transport. If the content is incomplete or damaged a claim must be filed with the carrier immediately and a Sartorius sales or service organization must be notified.

1.3 Before commissioning

☑ **Visual inspection !**

Before commissioning, after storage and transport, the instrument must be inspected visually to preclude mechanical damage.

1.3.1 Installation

The instrument is provided for panel mounting and can be clamped against the front-panel cut-out from the panel rear by means of mounting rails (knurled screws). The housing is of aluminium and steel. Protection type is IP65 for the front panel and IP30 for the housing. Ensure perfect sealing between instrument front panel and panel cut-out. The instrument is suitable for mounting in any position. All electrical connections are made on the instrument rear panel. Before instrument commissioning, all unused instrument apertures must be closed with blind plugs. For cooling of the instrument, the air circulation must not be hampered. Heat influences, e.g. direct sun radiation, must be avoided. The environmental conditions specified in the technical data must be taken into account. The instrument is suitable for:
Panel mounting by easy clamping against the front-panel cut-out from the back panel.

1.3.2 Electrostatically sensitive components

This instrument contains electrostatically sensitive components. Therefore, potential equalization must be provided when working on the open instrument (antistatic protection).

1.3.3 Opening the instrument

CAUTION
DANGER TO LIFE !

Working on the switched on instrument can be dangerous to life. Disconnect the instrument from the supply voltage! When removing covers of parts by means of tools, live parts or terminals may be exposed. Capacitors in the unit may still be charged also after disconnecting the unit from all voltage sources.

1.3.4 Earthing

The instrument must be earthed via protective earth.

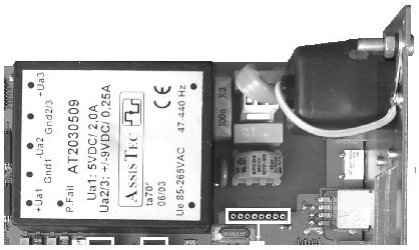
1.3.4.1 Protective earth PR5510/00

The connecting cable of the unit complies with the regulations in accordance with VDE 0411 or EN61010. The mains plug must contain a protective earth conductor, which must not be interrupted inside or outside this instrument (e.g. by using an extension cable without protective earth). The protective earth is connected with the housing back panel internally. Before commissioning, acceptance of the installation by a technically responsible expert is required.

1.3.4.2 Protective earth PR5510/01

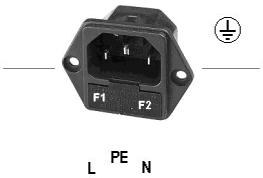
The back panel of the instrument housing has to be connected to the protective earth conductor.

1.3.5 PR5510/00 Mains connection



By means of plug-in 3-pole EURO connector,
with integrated G-fuse holder (primary fuses) on the back panel.
PR5510/00 is designed for connection to AC power supply 50/60 Hz with a wide voltage range: 115VAC ... 230VAC +10%/-15%
Frequency and input voltage range are adapted automatically.

☝ Manual adjustment is **not** possible.



The primary switched power supply is a compact component located on the left side of the main circuit board. It is protected against short circuit and switches off automatically in case of reaching temperature limits.
When triggered:

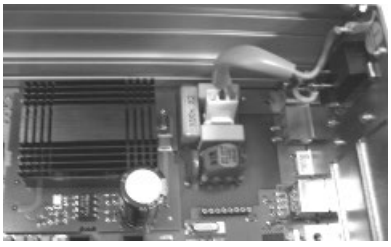
☛ Switch off the instrument, remove the cause, wait approx. 3min and switch it on again.

As the unit has no power switch, only the cutting supply connection.
It is immediately ready for operation when connecting a supply cable with voltage on.

☝ As there is no further internal optical signal "Voltage is supplied", **make sure** that the power connector was withdrawn !

The device is primary protected by means of two line G-fuses F1, F2.

1.3.5.1 Direct current supply 24 VDC PR5510/01



The version PR5510/01 is designed for 24 V direct current.

The supply is done with two screw terminals (- 24V +), the instrument is protected against wrong polarity.

The instrument is protected by a fuse in the + conductor on the back panel of the housing.

1.3.6 Failure and excessive stress

If the instrument is suspected of being unsafe, shut it down and protect it against accidental operation. This is the case when the unit

- is physically damaged,
- does not function any more,
- is stressed beyond the tolerable limits (e.g. during storage, transport).

1.3.7 For special attention

Make sure that the construction of the instrument is not altered to the detriment of safety. In particular, leakage paths, air gaps (of live parts) and insulating layers must not be reduced. The manufacturer cannot be held responsible for personnel injury or damage caused by an instrument repaired incorrectly by user or installer.

1.3.8 Fuse

PR5510/00

2 type G fuses (primary, both lines) integrated in the EURO mains socket can be replaced/checked easily by withdrawing the module (below the mains socket) **without** opening the instrument.

Use fuses of type: Wickmann No.19195, acc. to IEC 127-2/III DIN 41662
G type fuses 5x20mm 500 mA slow blowing / 250V

All other internal fuses , e.g. for the 12 V load cell supply and the PS2 keyboard, are electronic (self-recovering multifuse). Replacement after blowing is not necessary.

☛ **Switch off the instrument-wait approx.3min-switch it on again**

PR5510/01

1 type G fuse at the back panel of the instrument

Use fuse of type: Wickmann No.19195, acc. to IEC 127-2/III DIN 41662
G type fuse 5x20mm 1.6 AT, slow blowing / 250V

Fuses may be replaced only by a qualified person !
Using repaired fuses and short-circuiting of the fuse holder are not permitted.
Note that only fuses of the specified type and current rating in accordance with IEC 127 may be used for replacement.

1.4 Repair and maintenance

Repairs are subject to checking and can be carried out only at Sartorius. In case of defect or functional trouble, please, contact your local Sartorius organization for repair. When returning the instrument for repair, an exact and complete fault description must be supplied. Maintenance work may be carried out only by a trained technician aware of the involved hazards, whereby the relevant precautions must be taken.

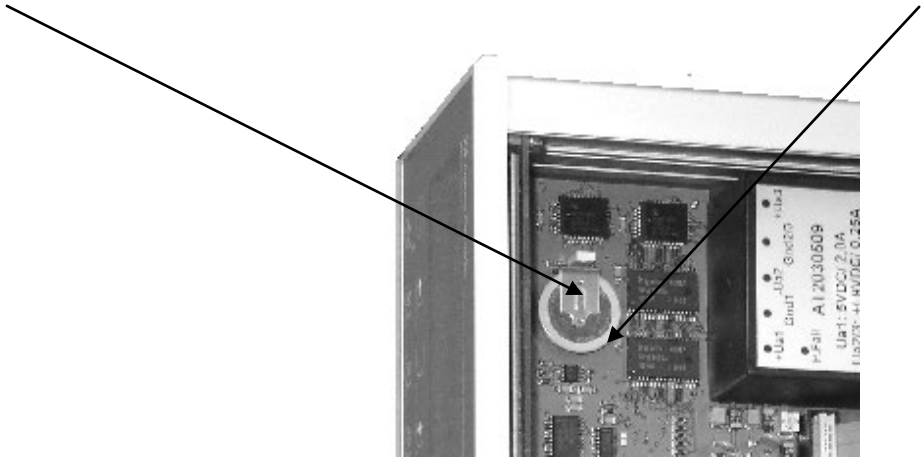
1.4.1 Soldering work

The basic unit PR5510 does not require any soldering work.

1.4.2 De-activating the battery

The otherwise volatile RAM data- and working memory are protected against power failure by a back-up battery. It is activated already (Jumper), only for very long storage periods (several months) before taking into operation, the battery must be de-activated.

Connecting the battery is done by means of a jumper, whereby the safety hints must be taken into account. Jumper X202 for the battery is located directly beside the battery on the main circuit board.



☑ To activate the battery, the jumper must provide a link between the two posts.

☞ The instrument is delivered with the battery already connected (opening is not necessary)!

After temporary battery de-activation, a cold start [COLD] is necessary and the clock must be set (date and time).

There are various possibilities to monitor the battery voltage automatically during operation.
When starting the instrument, can be displayed on the weight indicator. e.g. >>> Error-display Lo bAt
The battery lifetime is more than 5 years !

For function and adjustment of the 'Lo Bat' indication ☞ *see chapter 7.3.3*

1.4.3 Battery replacement

PR5510 contains a lithium battery for memory back-up (saving the data). When exceeding the specified minimum battery voltage, or in case of defect, the battery must be replaced by the Sartorius service or by an equivalent trained person and disposed of in accordance with the local regulations.
For details on the battery lifetime ☞ *see chapter 10.2.*

The batteries are available from the Sartorius service organization, order code: 5312 138 18013.

1.5 Disposal

Electronics scrap is special waste !

Please, follow your local disposal regulations.

1.6 Cleaning

If necessary, the front panel can be cleaned using a damp, soft cloth. Use only little water or isopropyl alcohol for moisturizing. Protection type IP 65 is only applicable to the front panel. No moisture must enter the instrument inside.

2 X4 Process Controller

The instrument is microprocessor controlled with a multitasking operator system consisting Bios and –Firmware. Equipped with a high precision fast weighpoint-AnalogDigitalConverter, Operator-Interface multiline VCF-display and a multi foil key keyboard at front side and the process-interface at rear side (after wards connectable plug-in option cards, flexible combinable). In addition to firmware are several Sartorius-Application programs (PRO, LOG, BATCH, FLOW, ...) loadable or own customized programs. Using e.g. BATCH, the instrument is a powerful system for control of weighing and batching processes. It combines the functions of a highly convenient operator interface, weighing and batching controller, PLC and interfaces. It is largely compatible with its predecessor PR1612/1613 and capable of direct mechanical replacement of these units. It combines the function of a weight and batch controller with a comfortable operator surface and a powerful SPS/PLC process-interface. The device is programmable conform to IEC 61131 standard (application examples see datasheet) With PR1750 it is possible to adapt PR5510 easily to custom applications.

2.1 Basic instrument survey

- One internal weighing point, accuracy 6000 d OIML
- 13mm fluorescent display for weight
- Additional 2-line 5mm dot matrix, each for 20-digit alphanum. text programmable for messages, operator guidance, values ...
- front panel controls, multi-function keys and softkeys.
- Closed aluminium-steel housing, front panel protection type IP 65, IP 30 for the rest of the instrument.
- Suitable for panel mounting (inserted through the panel cutout and easy to by clamped from rear)
- Plugable rear panel connectors for load cell, in-output, communication and supply
- Compact wide-range supply 115...230V for electronic and load cell supply

- An optional "normal" PC keyboard (PS2) instead of the front panel keypad can be connected.
- A simple serial RS 232 interface is built in (BuiltIn) and available on the DSUB-9 socket. Configurable for e.g. printer, remote display, terminal, communication and FlashIt (not for Modem).

- Arrangement of I/O interfaces by max 3 Options-Plugin cards in nearly any combination
- RS 232, analog output PR5510/06 and BCD output excepted, all outputs are galvanically isolated.

- 1MByte Flash EEPROM for Firmware and IEC 61131-Programms, not volatile
- 1MByte SRAM-memory for workdata including system, data, tables and ALIBI, volatile backup permanently by Lithium-Battery
- 2kByte EAROM-memory for CALIBRATION and Configuration-data, **none** volatile

Calibration and configuration are menu-guided via front-panel keys or external terminal resp. terminal emulation (e.g. MS-HyperTerminal) at the BuiltIn interface.

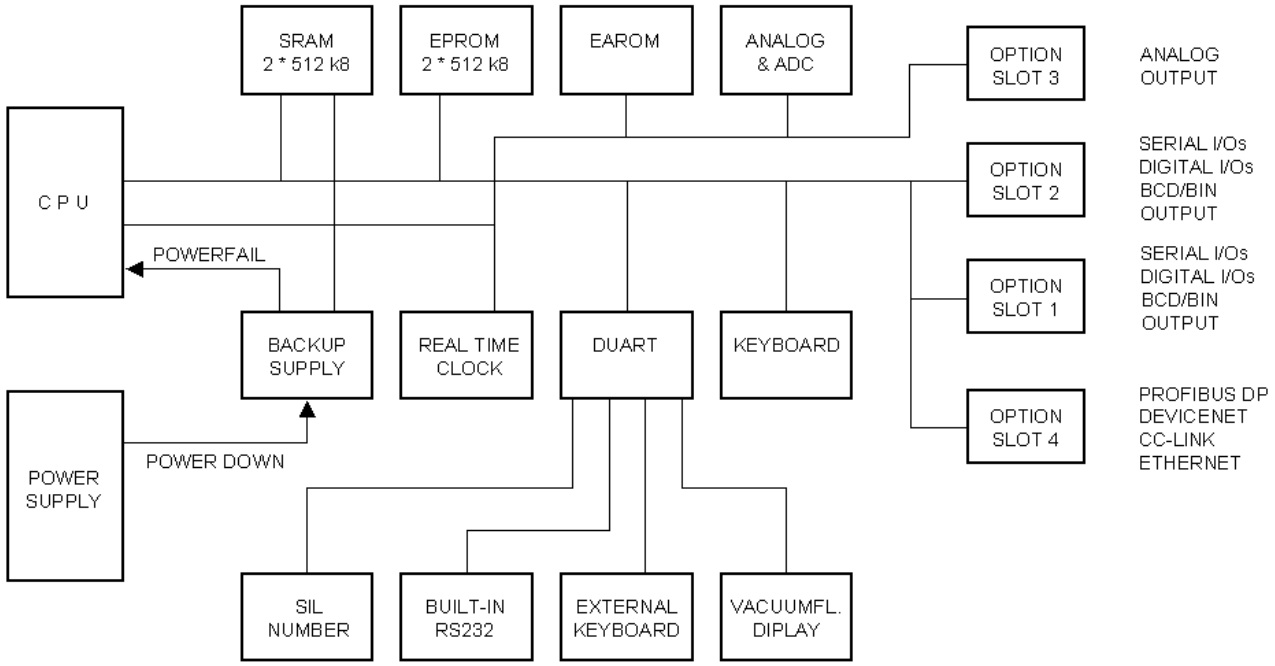
- Calibration by means of weights, or calculated according to the mV/V method or SMART using load cell data.
- Analog test for the analog-digital converter.
- Interface card configuration.

Hardware -System-Extension:	
possible by means of Optio-modules which must be bought separately: • PR5510/04 serial Interfaces RS232/422/485 • PR5510/08/09 digital IO-Interfaces (Binary, BCD) • PR5510/06/07 Analog-Inferfaces (0/4..20mA) • PR5510/14 Ethernet (100Mbit/s, TCP/IP) ModbusTCP • PR1721/3x Fieldbus-Slaves: ProfibusDP -InterbusS -DeviceNet -CC-Link	Internal connectable in SLOT1...4, to mount in rear panel cutout-1,2 resp. easily to plug-in (only for AO in SLOT3) each with connectors integrated in slotpanel

Software -System-Extension:	
possible by means of licenses which must be bought separately: • PR1740 recipe and report manager • PR1750 programmability • PR1791 DDE server • PR1792 OPC server	activation is via software by means of a license number provided by Sartorius, which is clearly related to the boardnumber of this instrument.

Communication protocols:	
via the internal RS 232 (BuiltIn) or the optional RS 232C or RS 422/485 PR5510/04 • XON/XOFF (software handshake) • RTS/CTS (hardware handshake) • Dust 3964R (master/slave) • JBus/ModBus (slave) • EW protocol (slave) • Remote display • Printer, or "legal for trade" printer • Modem • 2-wire * (only for IEC 61131 user written programs)	fieldbus options cards • Profibus-DP (slave) • Interbus-S (slave) • Device-Net (slave) • CC-Link (slave) • ModbusTCP (slave)

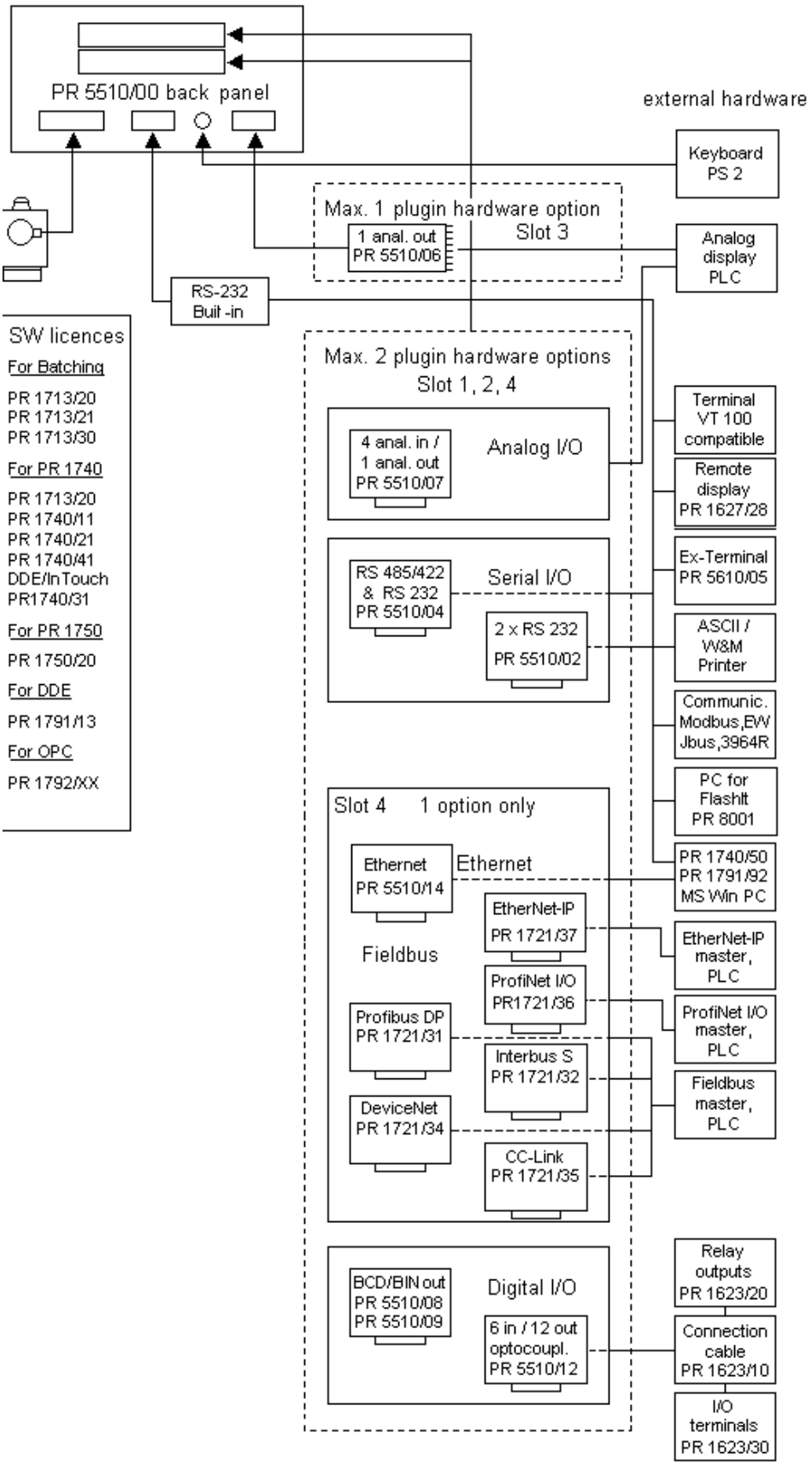
2.2 Electrical block diagram:



The wide-range power supply unit with low-voltage detection from > 90V mostly compensates voltage variations. Failure of a half wave (10msec at 50Hz) is suppressed by the instrument, i.e. is unnoticed by the user. In case of longer interruptions, the instrument falls into a safe power-off condition (without data loss), i.e. the CPU saves current data, interrupts e.g. the running program and sets the instrument into STOP condition (blinking lozenge). Dependent on application, the operator can react accordingly (e.g. with BATCH) via the keyboard by entry of:

A) Go On (from the point of interruption)
or
B) Abort (back to the initial condition)

2.3 Options


PR 5510/00 back panel
external hardware
Keyboard PS 2
Max. 1 plugin hardware option
Slot 3
1 anal. out PR 5510/06
Analog display PLC
RS-232 Buil -in
SW licences
For Batching
PR 1713/20
PR 1713/21
PR 1713/30
For PR 1740
PR 1713/20
PR 1740/11
PR 1740/21
PR 1740/41
DDE/InTouch
PR1740/31
For PR 1750
PR 1750/20
For DDE
PR 1791/13
For OPC
PR 1792/XX
Max. 2 plugin hardware options
Slot 1, 2, 4
4 anal. in / 1 anal. out PR 5510/07
Analog I/O
Terminal VT 100 compatible
Remote display PR 1627/28
RS 485/422 & RS 232 PR 5510/04
Serial I/O
2 x RS 232 PR 5510/02
Ex-Terminal PR 5610/05
ASCII / W&M Printer
Communic. Modbus,EW Jbus,3964R
PC for FlashIt PR 8001
Slot 4 1 option only
Ethernet PR 5510/14
Ethernet
PR 1740/50 PR 1791/92 MS Win PC
EtherNet-IP PR 1721/37
EtherNet-IP master, PLC
Fieldbus
ProfiNet I/O PR1721/36
ProfiNet I/O master, PLC
Profibus DP PR 1721/31
Interbus S PR 1721/32
Fieldbus master, PLC
DeviceNet PR 1721/34
CC-Link PR 1721/35
BCD/BIN out PR 5510/08 PR 5510/09
Digital I/O
Relay outputs PR 1623/20
6 in / 12 out optocoupl. PR 5510/12
Connection cable PR 1623/10
I/O terminals PR 1623/30

2.3.1 Functional extension by Software-Licenses

The following licenses can be enabled at PR5510 itself (internal) resp. in the Userprogram of e.g. PC (extern):

	License number	int.	ext	Function
1.	PR1713/20	x		single recipe batching function
2.	PR1713/21	x		multi recipe batching function or BATCH, IBC
3.	PR1713/30	x		standard batching
4.	PR1713/31	x		emulate old comm. commands in IEC 61131
5.	PR1713/AL	x		ALIBI memory library
6.	PR1781/13	x		Phase configurator
7.	PR1791/13	x		DDE server/client communication
8.	PR1792/13	x		OPC server/client communication
9.	PR1792/20	x		OPC database access Format : mdb MSACCESS
10.	PR1740/11	x		Production management single recipe
11.	PR1740/21	x		PR1740/21 production plan , stock control
12.	PR1740/31	x		DDE server
13.	PR1740/41	x		PR1740 remote control
14.	PR1750/NT00 R2.30		x	PR1750/NT dongle
15.	PR1750/NT20 R2.30		x	PR1750/NT single 1713 license
16.	PRIB/AUTO		x	InBatch: start batch automatic
17.	PRIB/MATPREVIEW		x	material preview
18.	Appl Lic: 103	(x)		Flow controlling and dosing
19.	Appl Lic: 104	(x)		PR5510/51 FILL
20.	Appl Lic: 107	(x)		PR5510/00 PRO
21.	Appl Lic: 108	(x)		PR5510/80 LOG

When ordering instruments with Sartorius application software such as BATCH, IBC, FILL, FLOW, PRO and LOG the licenses are already provided in the instruments.

For product details ☞ *see the relevant manual..*

2.3.2 Functional extension by Hardware-modules

1 analog output and max. 2 additional modules (IO, fieldbus or interfaces) can be mounted.

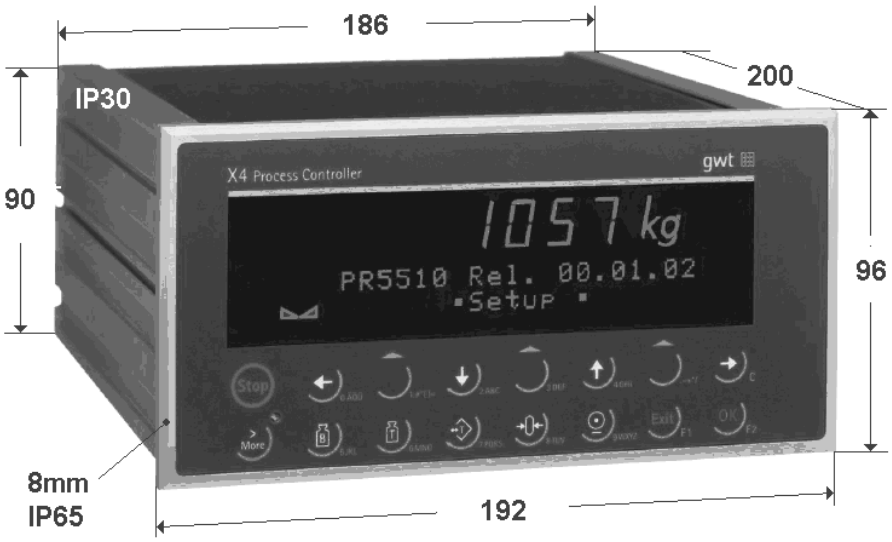
	INTERNAL SLOT:	>	1	2	3	4
Product	**Function**					
PR5510/04 1 serial RS 232 interface and 1 serial RS 422/ 485 interface	Protocol and interface parameters configurable in [SETUP]-[SERIAL PORT] adjustable by means of DIL switches on the module 422/ 485		**x**	**x**	-	-
PR5510/02 2 serial RS 232 interfaces	Protocol and interface parameters configurable in [SETUP]-[SERIAL PORT]		**x**	**x**	-	-
PR5510/06 1 analog output, galvanically isolated *(only one card possible)*	Output level configuration and calibration by software correction. Signal output analog 16 bits, 0/4 - 20 mA, 0/2...10 V with external resistor ☝ *max two active analog outputs possible*		**-**	**-**	**x**	**-**
PR5510/07 1 analog output 4 analog inputs	Output: as *PR5510/06.* Input: 4 channels with common ground, resolution 3000 d. 0 - 20 mA, 0...10 V , 0... 5 V adjustable by means of DIL switches on the module ☝ *max two active analog outputs possible*		**x**	**x**	-	-
PR5510/08 1 BCD output, open collector	5 decades BCD passive <default=> weight value> or 3 bytes binary (*application program required*) configurable by means of DIL switches on the module. collectors common to +pole (supply)		**x**	**x**	-	-
PR5510/09 1 BCD output, open emitter	5 decades BCD passive *as PR5510/08, but* emitters common to -pole (supply) configurable by means of DIL switches on the module		**x**	**x**	-	-
PR5510/12 6 optocoupler inputs and 12 open collector opto-coupler outputs	Digital interfaces galvanically isolated by opto-couplers. inputs and outputs passive, potential-free, 37-pole DSub socket (ext. IO units PR1623/10/20/30) Allocation configurable in [SETUP]-[I/O SLOTS]		**x**	**x**	-	-
PR5510/14 1 Ethernet *(only. one card possible)*	100Mbit/sec network with TCP/IP protocol (only for PR1740, PR1750, PR1791/92) ☝ *besides Ethernet card, only one analog output possible*		**-**	**-**	**-**	**x**
PR1721/3x slave 1 fieldbus interface max. transfer rate 1,5 Mbits *(only one card possible)*	Field busses • Profibus-DP • DeviceNet • Interbus-S • CC-Link • EtherNet/IP		**-**	**-**	**-**	**x**
	REAR SIDE-CUTOUT:	>	2	1	0	1

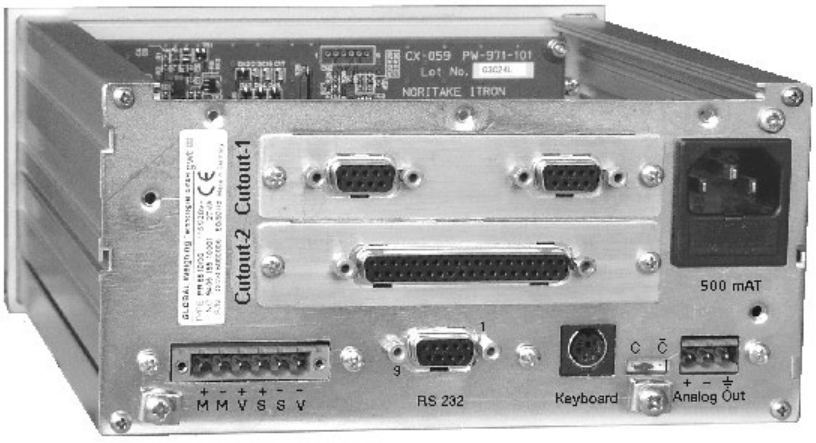
☝ activ=INTERNAL supply, passive= EXTERNAL power supplies required !

For product details ☞ *see chapter*

2.4 Housing

The instrument is accommodated in a module housing of aluminium-steel rear panel giving protection type IP 30 (front panel protection type is IP65). It is suitable for panel mounting. The housing can be opened at the top (insertable lid, release screws and withdraw backwards). The front panel with keyboard and display, the rear panel with the connectors, the side profiles and the bottom with the main circuit board form a unit.





All IO connectors including optional IOs plug into the instrument rear, incl. power supply (EURO socket) and load cell connection (screw connector).

☞ Sufficient space (200mm plus 60-80mm) for the connectors and cables must be provided !

Unused options cut-outs are or must be closed with dummy panels. During operation, the housing lid must be closed to avoid electromagnetic interference effects.

☞ The basic unit need **not** be opened for taking into operation !

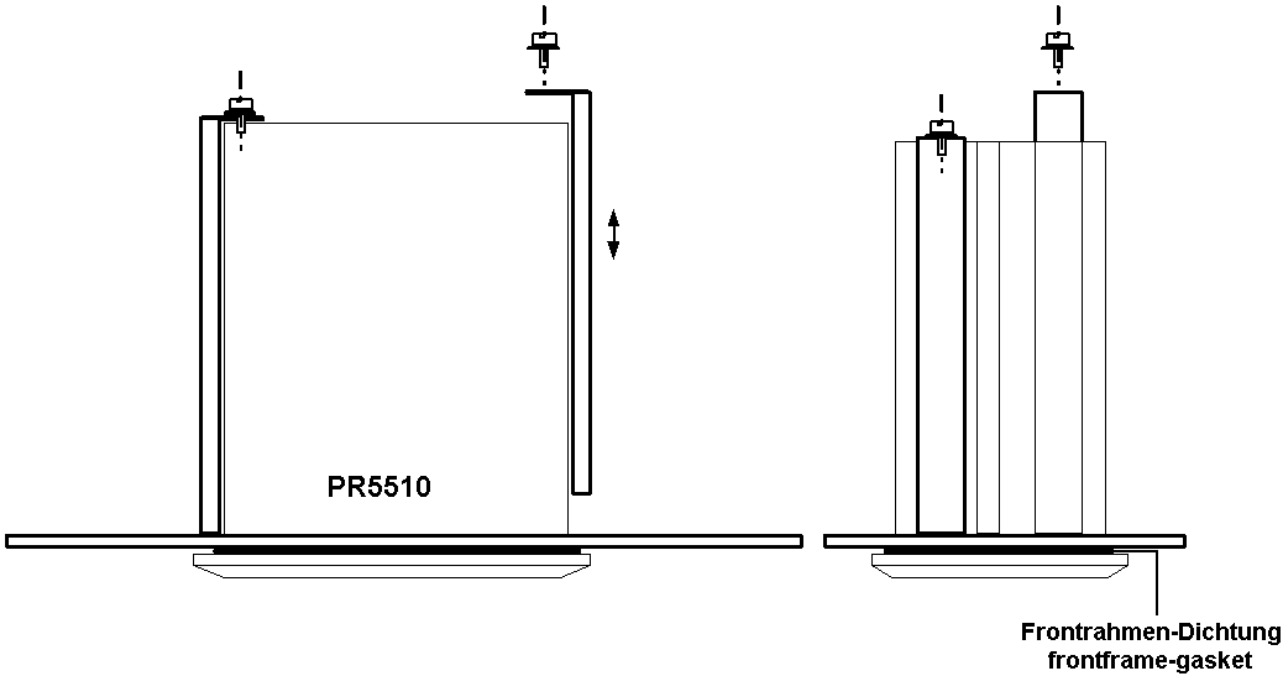
After delivery, the BAT jumper is already closed, the CAL switch (slide switch) is accessible from the outside. Internal solder switch, jumper or DIL switch adjustments in the basic unit are not necessary.
The unit needs to be opened only for installation of additional options cards !

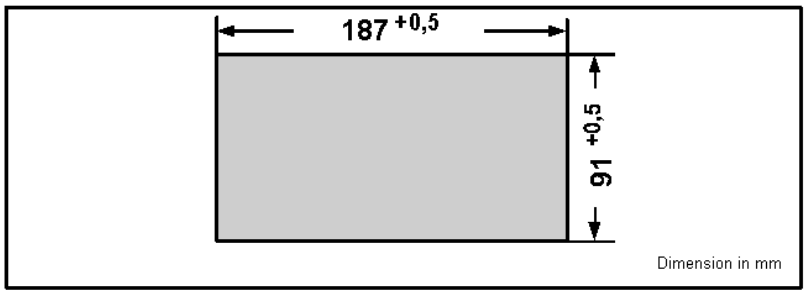
2.4.1 PR5510 Accessories:

Dimensions: (LxWxH):	200x186(192)x90(96)	**Accessories:**	inlet connector for non heating app.	3-pole EURO power connector
Weight:	approx. 2 kg		Rubber gasket	Front panel
			Load cell connector	6-pole Combicon (conn./screw)

2.4.2 Mounting

For panel mounting, a rectangular cut-out (187x91mm +0,5mm) is required.
(provided that panel stability/thickness are sufficient).

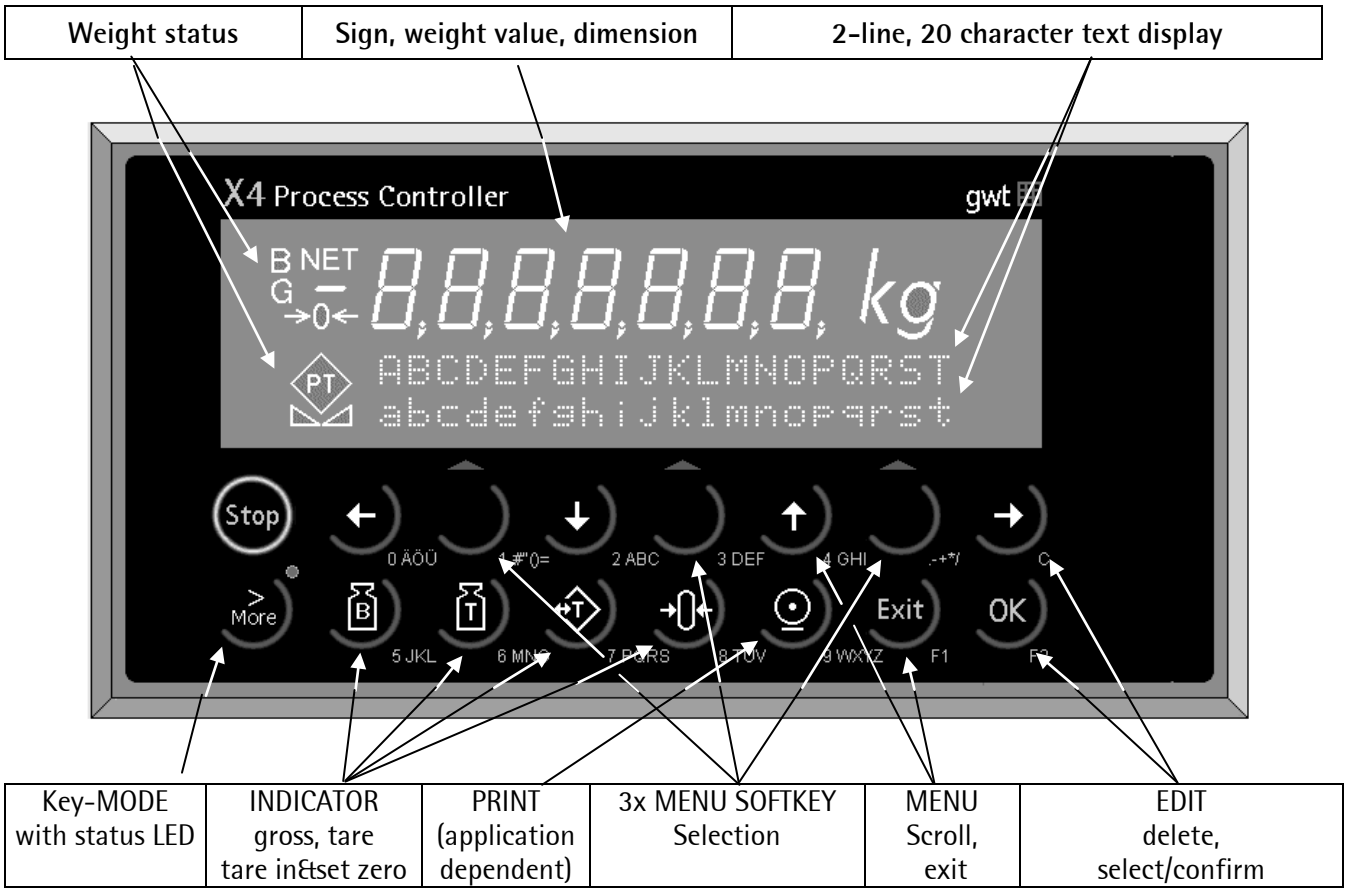




Mechanical construction:

- Remove the screws on the left/right of the rear panel.
- Withdraw the mounting rails from the guide profiles on the sides.
- Insert the unit with the front panel gasket (supplied with the instrument) into the panel cut-out from the front (take care that protection type IP65 is ensured).
- Re-insert the mounting rails and block them by tightening the knurled screws, slightly (not excessively)!

2.5 Displays and controls



2.5.1 Display

The large **weight display** permits 7-digit weight values with decimal point and polarity sign. Possible units are t, kg, g or lbs. In addition to the numeric weight value, two text lines for the operator dialogue are provided on the display (programmable to IEC 61131).

Status indicator	Description
B G	Gross weight is displayed **Gross = Net + Tare** (G only active in NTEP mode)
NET	Net weight is displayed (only if tared)
T	The stored tare weight is displayed temporarily. When taring (->), the current weight is stored and the net weight is set to zero.

Status indicator	Description
→0←	The weight value is within +/-¼d.
◺◿	Weight standstill* *configurable condition
◇	Batching is active (BATCH application)
✧	Blinking indicates an alarm or a manual component.

2.5.2 Front panel keypad

Each key is multifunctional and has two alternatively modes

- Mode-1 = CHAR-input
- Mode-2 = FUNCTION-call

Inside char-input (alphanum) are several letters (upper/lower case) and a digit allocated to each key (like a mobile phone: selection is by clicking several times in sequence)

2.5.3 Operating concept

To each front panel key 

are several alphanumeric characters (e.g. A,B,C a,b,c 2) allocated, but **alternatively also** a function (e.g. arrow down).

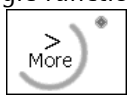
mode-1 :characters

2 ABC

mode-2 : function

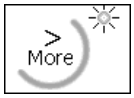
arrow (down)

Key mode switch-over is by means of key MORE (toggle function).

The status is indicated by the relevant lamp/LED : 

(statusLED: OFF) or (statusLED: ON).

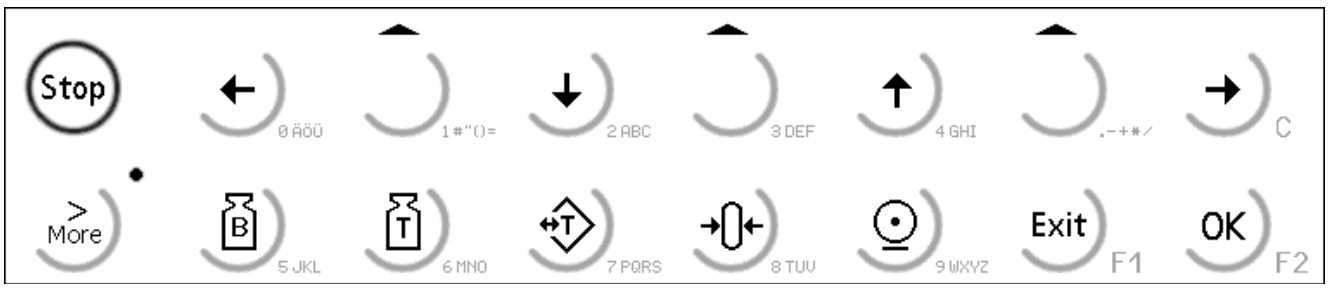
2.5.3.1 Key mode: FUNCTION [G,T,0, arrows, softkey...]

When statusLED: ON 

then press key-MORE **shortly** now it changes...

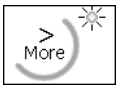
.... 

statusLED: OFF and the following inscriptions (shown in black in the figure below) are effective.

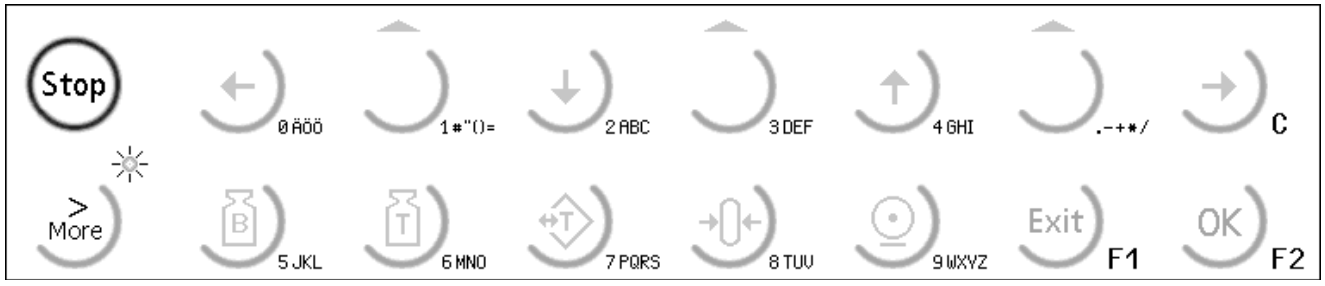


2.5.3.2 Key mode: CHARACTERS [A-Z, 0-9]

When statusLED: OFF 

press key **"longer" (1sec min.)** , until statusLED: ON 

changes....
... the following inscriptions (shown in black) are effective:

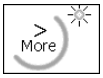


- **CHARACTER input (numeric, alphabetic or alphanumeric)**

When clicking once, the first character, e.g. 'A', is indicated in the cursor position. After clicking twice, 'B' and after clicking three times, 'C' is displayed. This is followed by the relevant lower case letters and the digit, i.e. for entry of digit '2', the key must be pressed seven times. When clicking once more, 'A' is reached again (loop).

When changing to another character key or a longer interrupt (click-rythmus), the input sequence of the previous character key is completed with storeing the last character displayed.

To delete the character left of the blinking cursor from the display, press delete key 

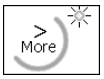
under (statusLED: ON) 

To displace the cursor left 

or right 

within the displayed value, press the key 

(statusLED: OFF) first to leave the character mode and return to the character mode to change the value.

When a completely numeric value is expected by the operating system, 

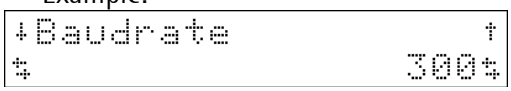
(statusLED: ON) is set automatically and the letters allocated to the keys are disabled. Therefore, input of values like 555 is possible directly by pressing key-5 three times. Accordingly, entry of 567 by pressing 5-6-7 is also possible.

- **Selection of menu trees (column) and predefined values (line)**

Key [↑ 4 GHI] and [↓ 2 ABC] can be pressed to scroll through the menu items.

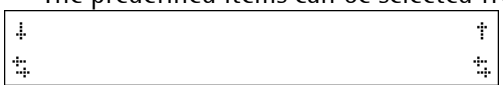
<<< indicates: selection from a list is possible by scrolling up/down

Example:



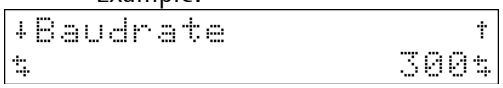
<<< selectable menu items: Protocol, Baudrate, Bits, ...

The predefined items can be selected from the list by pressing [← 0 ÄÖÜ] and [→ C]

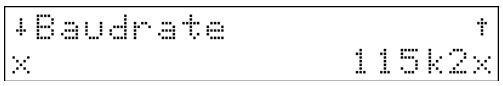


<<< indicates: selection from a list is possible by pressing left/right

Example:



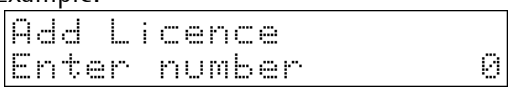
<<< selectable values: 300, 600, 1200, 2400, ...



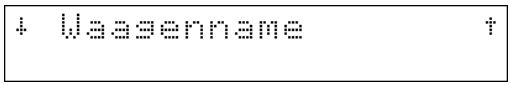
<<< value: X ... *not permitted* ... X >>> **(disabled)**

Press [↑ 4 GHI] or [↓ 2 ABC] or [OK F2] to store the entry or change.

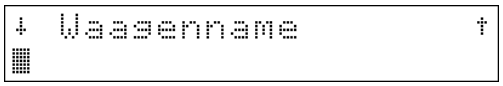
When input of a value is expected (blinking cursor ▦ in text display), the statusLED in key [> More] is lit. If the expected value is completely numeric, only digits are selectable. Letters on the key are disabled.
Example:



<<< compl. numeric 12345, statusLED ON and ~~ABC abc~~



For input of "user data" without list of predefined items, the (alphanumeric) entry must be started by pressing [> More]. The cursor is displayed in the first position.



Press [OK F2] to finish the entry. With configuration data , a prompt if the values are to be stored in non-volatile EAROM is displayed.

Reply YES or NO via softkey [1 "()+] ----- [.-+#/].

Press [Exit F1] if you want to cancel and repeat the input !

♦ Softkeys

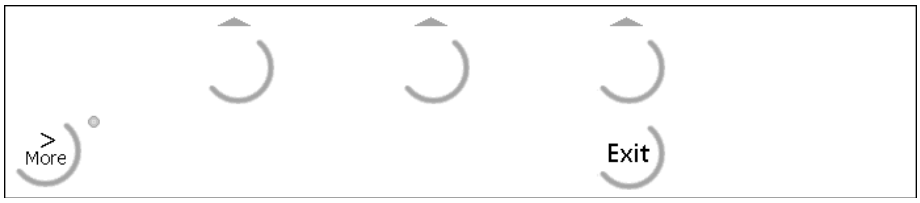
Instrument operation is menu-guided and via softkeys.

The three softkeys with the arrow up  can be pressed to call up various functions pre-defined by "software", which are displayed in the lower text line. I.e. the function is not marked on the key.

```
Funktionsüberschrift
SOFTKL▪SOFTKM▪SOFTKR
```
<<< 3 softkeys: left-middle-right (max. 3 columns of 6 char each)

Example

```
Calibration
New    %Modify%  Param
```
Software function:
<<< New-Modify-Param



<<< Select via softkey

Matrix text line 1 function: CALIBRATION
Matrix text line 2 softkey left-middle-right calls up sub-function: NEW-MODIFY-PARAM

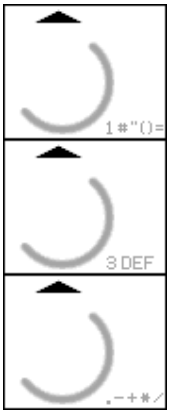
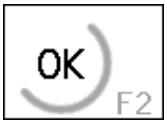
on the text display  means there are further softkeys for this function.

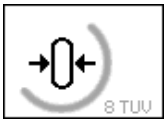
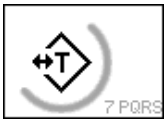
These are hidden in a further text line, but can be selected by pressing  or  .

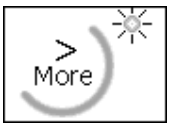
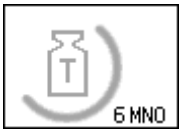
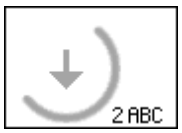
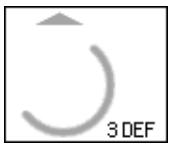
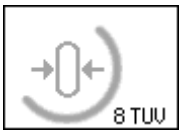
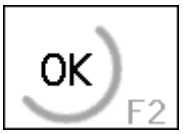
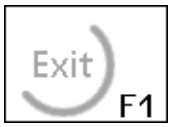
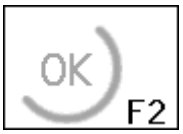
```
Calibration
New    %Modify%  Param
```
I.e., function CALIBRATION provides 5 selectable sub-functions: New-Modify-Param--Check-View
<<< New-Modify-Param

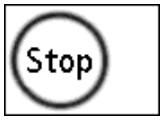
```
Calibration
      %Check   %View
```
<<< Check-View

2.5.4 Survey of front panel keys:

FUNCTION	*Description*	FUNCTION	*Description*
☞ *black inscription*		☞ *black inscription*	
	Column: Scroll up in menu tree		Displace cursor right during value selection or value input.
	Column: Scroll down in menu tree		Displace cursor left during value selection or value input.
	Softkeys:"Program" text indicates the function which can be called up 1st softkey: column LEFT 2nd softkey: column MIDDLE 3rd softkey: column RIGHT in the lower 20-char. text matrix line		
	Leave the menu item (to go to the next higher level)		Open the indicated menu item

INDICATOR	*Description*	INDICATOR	*Description*
	When pressing this key, the gross weight is displayed (*B – gross weight*).		Start print-out
	When pressing this key, the tare weight is displayed.		Set to zero , provided that: - weight standstill - weight within zero set range - not tared
	Set/reset tare (toggle function). The actual gross weight is stored in the tare memory, provided that: - weight standstill - display is not in error status - batching is not active		

CHARACTERS	*Description*	CHARACTERS	*Description*
☞ *black inscription*		☞ *black inscription*	Several functions allocated to the key: click, until required character is displayed Sequence: A,B,C,a,b,c, 0
	During value input: Backspace / delete (position left of the current cursor position)		
	Ä Ö Ü ä ö ü ß 0		J K L j k l 5
	# “ ( ) = $? ! % 1		M N O m n o 6
	A B C a b c 2		P Q R S p q r s 7
	D E F d e f 3		T U V t u v 8
	G H I g h i 4		W X Y Z w x y z 9
	- + * / : ; _ ’ & , < > .		Finish the input (SAVE) (store values)
	FUNCTION KEY 1 *allocated only to optional application/IEC 61131 prog.*		FUNCTION KEY 2 *Allocated only to optional application/IEC 61131 prog.*

	Stops the batch (only with BATCH, IBC FILL, ... dependent on application)		Dependent on MORE status (STOP can always be actuated directly)

The ♫ `signal` (beep) when pressing the front panel keys serves as an audible feedback.
It can be set in menu: [SETUP]-[Software Parameter]-keyclick duration&volumes (loud/silent, long/short, on/off)
☞ *see chapter*

3 Installing the instrument and options

Before starting any work, read "Safety hints, electrical protection class" and follow all hints! ☞ *see chapter 1*

3.1 Mechanical preparation:

When mounted in a panel, PR5510 needs a stable front panel with a rectangular cut-out ☞*see chapter 2.4.2*

☝ Keep all parts, technical documentation and tools accessible for starting.

♦ **Sequence (shortform)**

step-1 (install)

- Take the cable towards the place of installation and fix it.
- Strip the cable insulation at the cable ends and keep the wires short.
- Mount the connector (PR5510 accessories), taking care not to impair the strain relief and screening.

step-2 (unpack)

- Inspect the consignment: Unpack all parts pertaining to the project.
- License-forms available?
- Documentation available?

- Safety check: Damaged (packing, unit, accessories) ?
- Ensure that the installation is correct and complete including cables, e.g.
  power cable,
  power connection with fuse,
  load cells,
  cable junction box,
  data cable,
  console/cabinet, etc.
- The instructions for installation of the unit (related to application, safety, ventilation, sealing, external effects) must be followed!

step-3 (PR5510 unit)

3.2 Electrical preparation:

Opening the instrument: (only necessary for mounting additional options cards).

- Release 3 screws on the rear panel.
- Withdraw the lid backwards completely from the guide profile.
- Select the SLOT/CUTOUT which must be used.
- Unscrew and remove the dummy in cutout 1,2 .
- Insert and mount the options module and the flat cable by means of screws and connect SLOT 1...4
- Re-insert the lid and mount it by means of screws.

Connecting the instrument (on the rear panel outside, all plug-in type):

- Connect the potential compensation at the terminal provided for this purpose on the rear panel.
- Connect the load cell cable and screenings with utmost care (screw/plug-in terminal).
- Connect the data cable and screenings (Dsub connector) **and** secure them (screws).
- Connect the power cable (EURO connector).
- Check the installation statically: e.g. by "a ringing test" and measuring the signals.

Taking the instrument into operation

- Switch on the supply voltage.
- Make a COLD START (Cold) (indispensable).
- Check if the instrument starts up correctly (watch the display).
- Put the CAL switch 
- Adjust/calibrate the scale (note warm-up time), save.
- Set the CAL switch 
- Set the parameters and make the settings (SETUP), save them.
- If necessary, enter the licenses.
- Note or print out all settings.
- Make a WARM START (power OFF/ON).
- Check, if the instrument starts up correctly (watch the display).
- Check, if the displayed weight value is alive and plausible.
- Modul-Testlevel: check subfunctions/processsteps
- End-Testlevel: Check main program functions.

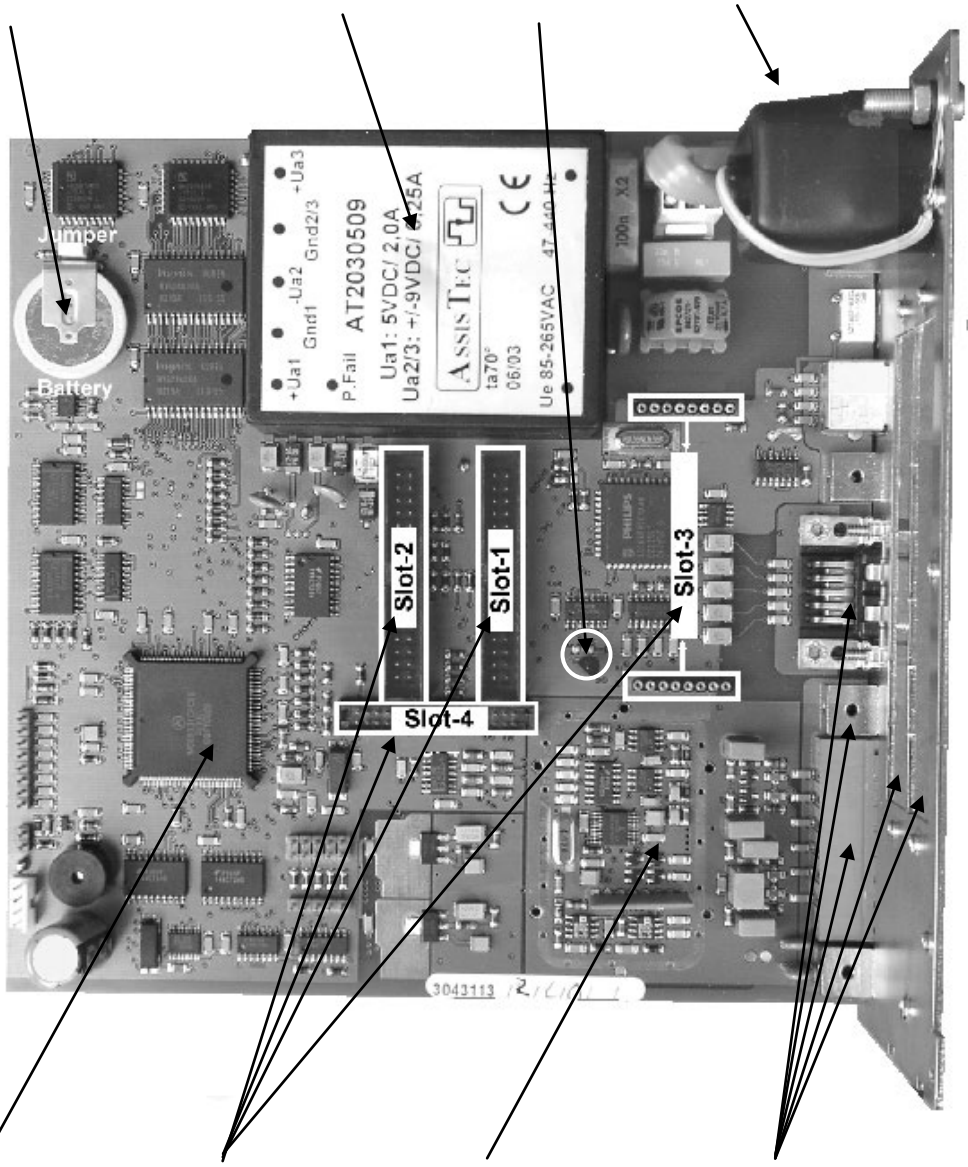
3.3 Hardware construction

The overall electronics is accommodated beside the display board, on a circuit board which is connected to front panel VCF display and keypad by means of two plug-in 9/2-pole flexible cables, a 4-wire power supply cable and a ground cable. A 3-wire power cable plugs into the EURO socket on the rear panel. The protective wire is connected directly to the housing and to the main circuit board inside the instrument. The compact encapsulated power supply with mains filters, high-accuracy analog circuitry, microprocessor with various memory modules (flash EPROM, EAROM and SRAM with battery back-up) and four options slots 1...4 (partly physically dedicated) are accommodated on the main circuit board.

The chip with the unique board number (SIL chip) is similar to a transistor
For service purposes it is removable (socket).

☝ All software licenses relate only to the board number pertaining to this instrument in the SIL chip.

Battery with Jumper compact powersupply SIL-Chip EURO-PowerConnector with fuse CAL-switch



CPU options slots analog circuitry-ADC Rear panel with all IO connections
LC terminal, BuiltIn, PS2-keyboardoptions

(cutout 1,2)

3.3.1 Installing options

Hardware options are electrical modules consisting of flat-cable connector, circuit board and integrated mounting plate, with one exception: the analog output option PR5510/06 is a circuit board with two-row multi-pin connectors for in-line sockets. All IO connections are taken to the instrument rear panel in the mounting plates (further exception: the 3-pole AnalogOut connector for PR5510/06 is integrated in the rear panel as standard and need not be mounted).

However, **only two mechanical mounting positions** [cutout 1,2] are provided in the rear panel, although the main circuit board is provided with three electrical flat-cable connectors [SLOT 1, 2, 4] plus two related in-line sockets [SLOT 3] especially for only one analog output option PR5510/06. Consequently:

☝ Max. 3 options modules are possible (mech. limited), whereby 2 modules can be selected freely, whilst the 3rd module must be a PR5510/06 AnalogOut. Electrical are 4Slots existing, mechanical only 3 mounts.

Take care to plug the flat cable in correct direction into the AO circuit board (polarizing pin on the connector), don't use force! Do not cross or distort cables.

☝ In addition to the physical assignment (connector: wide, narrow, inline), there are also program assignments = **logic** assignments to SLOTS 1...4, which are determined by the program.

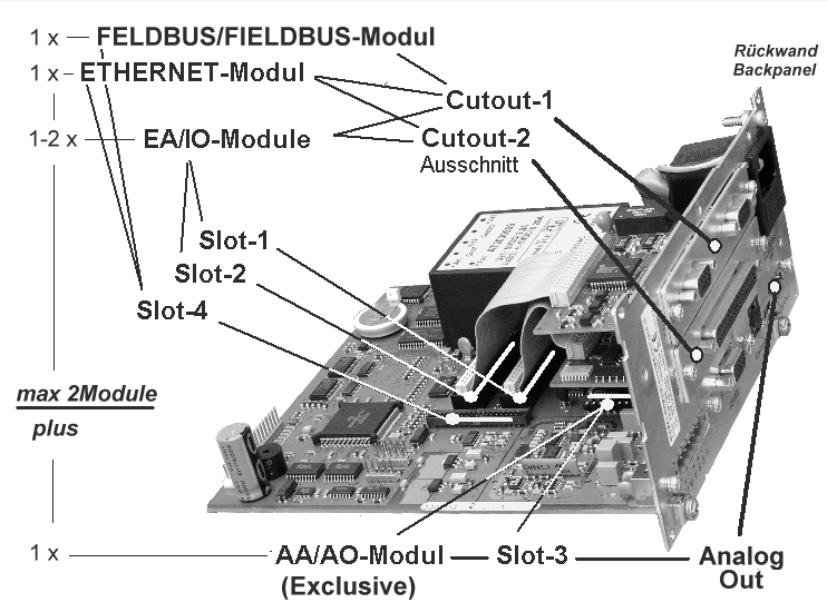
The display in the relevant configuration procedures in SETUP or TERMINAL is always related to this assignment (SLOTS-1...4) (i.e. not to the mechanical mounting position in the rear panel cutout 1,2 resp. AnalogOut).

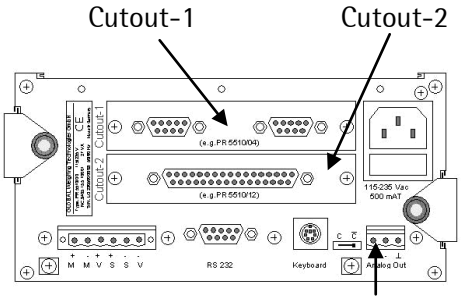
E.g. when the instrument is closed, the internal SLOT allocation status can be displayed:

A) directly in [SETUP]-[I/O-SLOTS]–SLOT 1...4
or
B) with terminal* in SERVICE – SHOW HARDWARE

For each selected SLOT 1...4, the detected options card type no., e.g. PR5510/12, is displayed with further details including the bit states.

* When using the terminal, static testing of the individual IOs is possible additionally (IO testing when taking the instrument into operation). However, the running PLC tasks should be "killed" temporarily for this purpose (also in PROLOG in the terminal).





Rear view, shown e.g.:
Cutout 1 : PR5510/04
serial RS232/485
Cutout 2 : PR5510/12
dig. IO 37-pole
AnalogOut: PR5510/06 not visuable
(connector always fitted)

Mounting	**rearside Cutout**	**1**	**2**	**AOut**	**1**

Product	**FieldBus function**				
PR1721/31	ProfiBus DP slave				X
PR1721/32	InterBus slave				X
PR1721/34	DeviceNet slave				X
PR1721/35	CC-Link slave				X

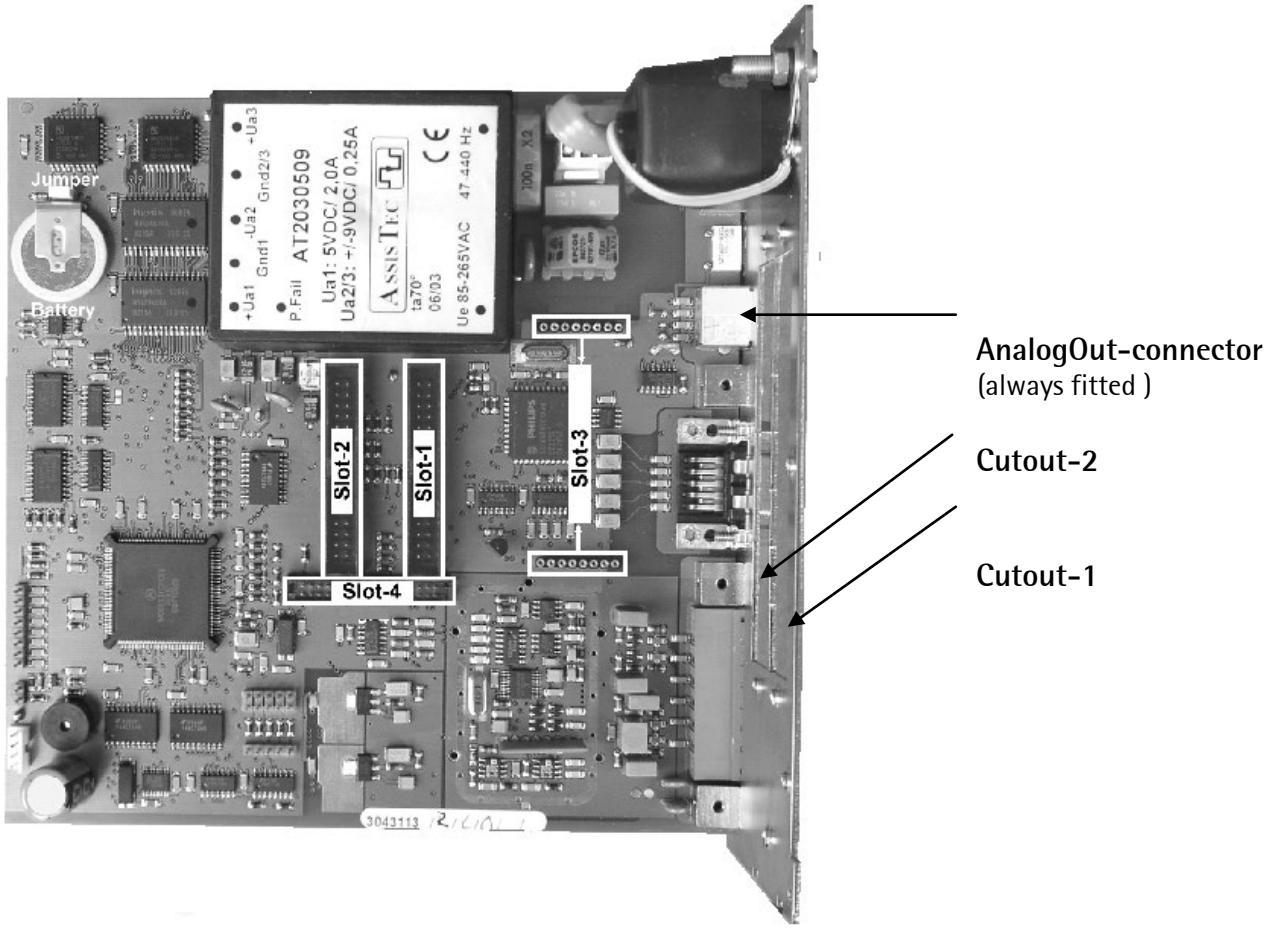
Product	**I/O function (electronic)**				
PR5510/04	Serial I/O 1x RS 232C + 1x RS 422/485	X	X		
PR5510/06	1x analog output 0/4...20mA			X	
PR5510/07	1x analog output + 4x input 0/4...20mA	X	X		
PR5510/08	BCD output / open emitter	X	X		
PR5510/09	BCD output / open collector	X	X		
PR5510/12	12x dig. output + 6x opto-coupler input (*PR1623/10/20/30 connectable)*	X	X		
PR5510/14	Ethernet 100Mps, RJ45				X

Product	**I/O function (field interface)**				
PR1623/10	4m connecting cable towards PR1632/x0 standard mounting rail	(x)	(x)		
PR1623/20	12x output terminal + 6x input terminal with LEDs	(x)	(x)		
PR1623/30	12x output-change-over relay + 6x input terminal with LEDs	(x)	(x)		

Electrical	**Main circuit board connector:**	**Slot 1**	**Slot 2**	**Slot 3**	**Slot 4**

Please, note the possibilities for combination!

☝ For space reasons, a fieldbus option must be fitted in the upper cutout 1 !



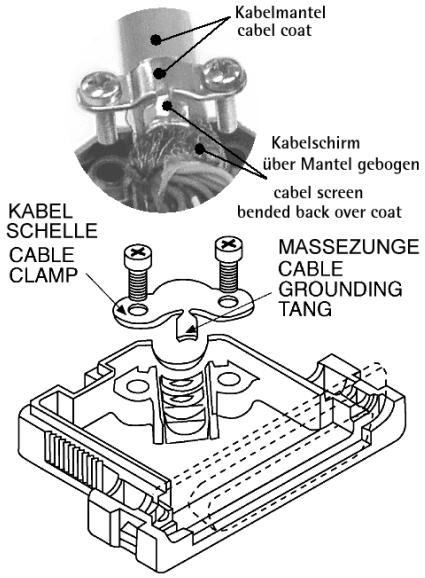
In order for the program to detect the fitted options cards, a COLD START* is required !
The instrument generates a continuous beep.

* Note:
When retro-fitting, it is **indispensable to save** data/databases, e.g. Material & Recipe or Alibi, which are already
provided. Otherwise, they are **deleted definitely** by this action.
Exception: calibration, configuration and licenses are not lost (correct storage after entry provided).

3.3.2 Cable connection in the DSUB connector counterparts (accessories)

All connections, incl. load cell cable (screw/plug-in terminal) are of the plug-in type. The conductors taken to the terminals should be as short as possible. The conductors of each cable should be tied together by means of a cable strap shortly before the terminal block. Connector housings are conducting (metal-plated), i.e. they are included in the screening. They have to be mounted in the rear panel accordingly by means of screws.

Mounting a cable:



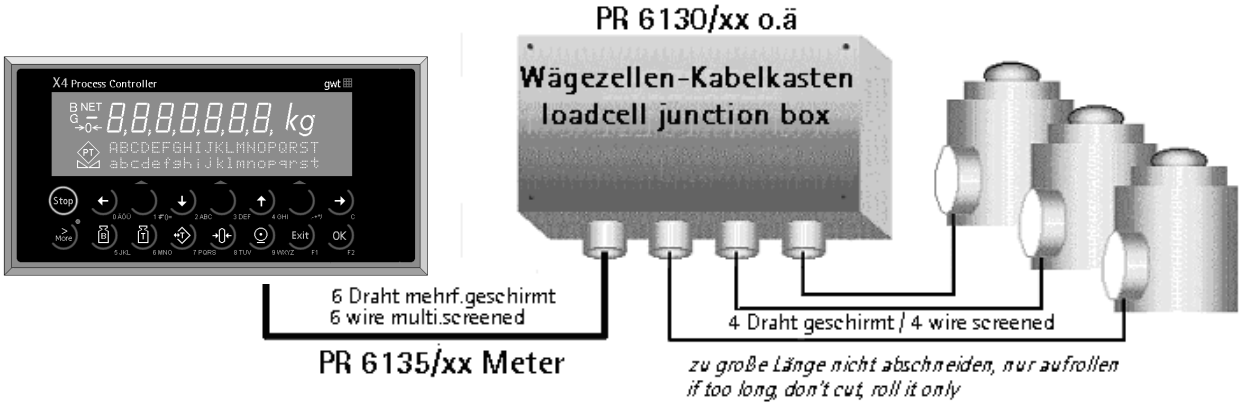
- Open the connector housing (catches).
- Release and open the cable clamp.
- Remove insulation by approx. 50-60mm.
- Cut screening except 5mm and bend it backwards over the cable sheathing.
- Remove conductor insulations by 3mm and fix them by soldering.
- Insert the pin block.
- Put the cable under the clamp. The screening is pressed down by the tongue, the cable sheathing is pressed down by the clamp.
- Close and tighten the clamp.
- Check the strain relief.
- Insert the connector mounting screws on both sides.
- Close the connector housing (catches click in position).

Both ends of the cable screenings must be connected with the metal housings!

3.4 Load cell cable / cable junction box

Connection of max. 8 load cells (600 Ohm) in 6-wire technology:

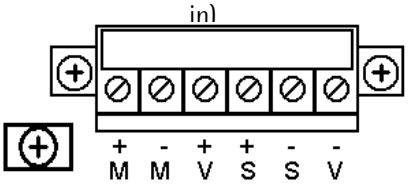
with specific cable junction box PR6130 and measuring cable PR6135 (also Ex versions available):



☛ **We recommend:** - laying the cable in a steel pipe, which is connected to earth potential.
- at a min. distance of 1 m **from high voltaqe cables**

The measuring signal from the strain gauge load cells is a highly delicate low-voltage signal (max. approx. 24mV at full load (deadload + actual load)) and must be protected very carefully against electromagnetic interference effects.
Use only fixed clamping screws, avoid using thermocouple forming transitions in the clamping facilities, and prevent humidity from penetrating into the inside. Use stabilized power supply, i.e. provided sense lines for voltage drop correction!

Terminal LC
LC terminal block WZ (screw a. plug-in)

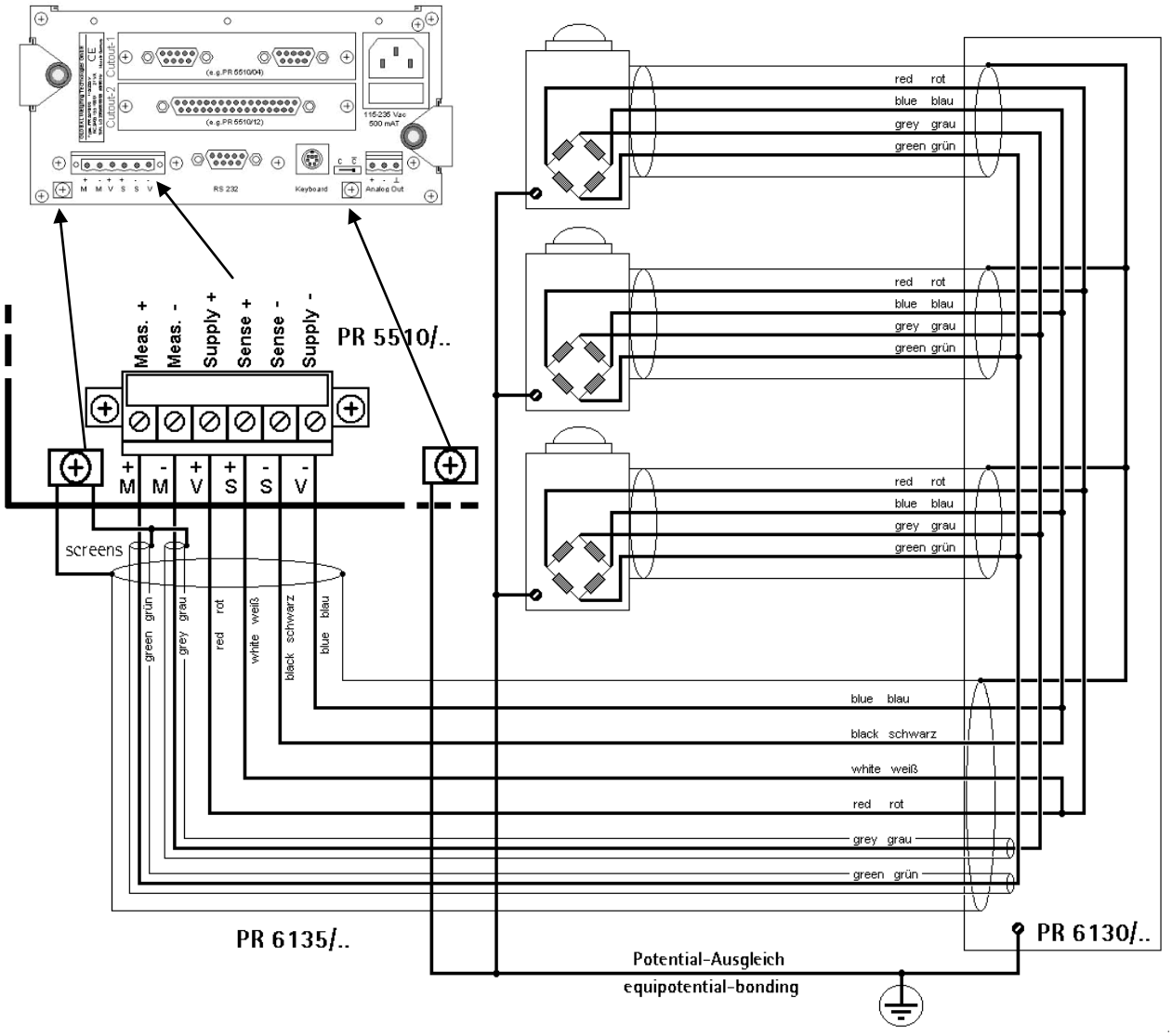


LC terminal block	Connection	Description
M +	+ $U_{Meas.}$	+ Signal / LC output
M -	- $U_{Meas.}$	- Signal / LC output
V +	+ U_{Supply} 6 V	+ Supply / excitation
S +	+ U_{Sense}	+ Sense
S -	- U_{Sense}	- Sense
V -	- U_{Supply} 6 V	- Supply / excitation
	Screw terminal	Screening / ground

The cable colours mentioned in this manual are valid only for the **PR62xx series** Sartorius load cells and extension cable PR6135. When using Sartorius platform scales or different load cells, the signification of cable colours can be different!

For this reason, the relevant load cell manual / data sheet should be consulted for the cable colour signification before connection!

3.4.1 Load cell connection in 6-wire technology:



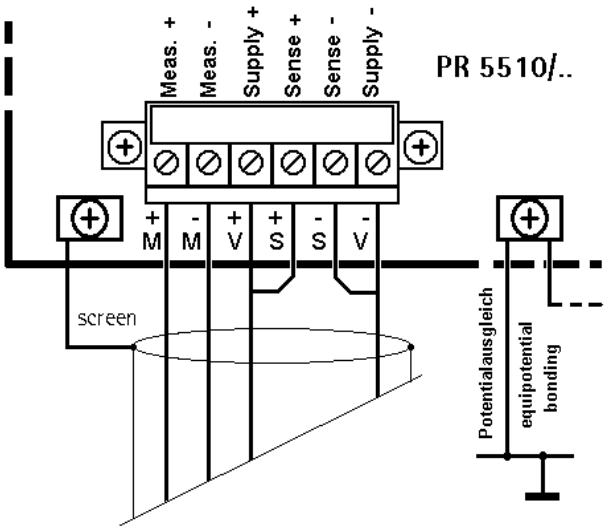
Load cell supply circuit:

Load resistance of load cell circuit $\geq$ 75 Ohm, e.g. 8 load cells of 600 Ohm each or 4 load cells of 350 Ohm each, Firmly adjusted to 12 V (+/-6V), internal protection by means of multi-fuses *(☞ see chapter 1.3.8).*

3.4.2 For connection of PR6221 load cells

☞ *see PR6021/08, -/68 operating manual* (differences in screening and bonding)

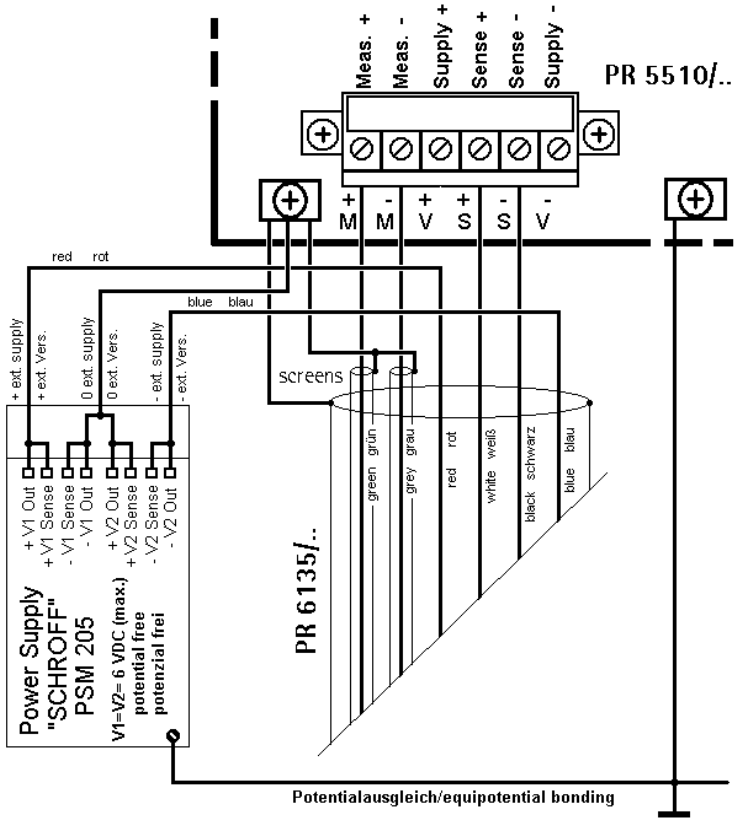
3.4.3 Connection of a load cell in 4-wire technology:



The sense lines **must** be connected, don't leave it open !

3.4.4 Connecting Load Cells with External Supply

When the load of the load cells is <75 Ω (e.g. more than 4 load cells with 350 Ω), external load cell supply is required. In this case, the internal supply is replaced by a potential-free external supply. The neutral wire of the external supply voltage (0 ext. supply) must be connected to the instrument housing to ensure that the voltage is symmetrical to 0. The internal supply is not connected!



Caution!

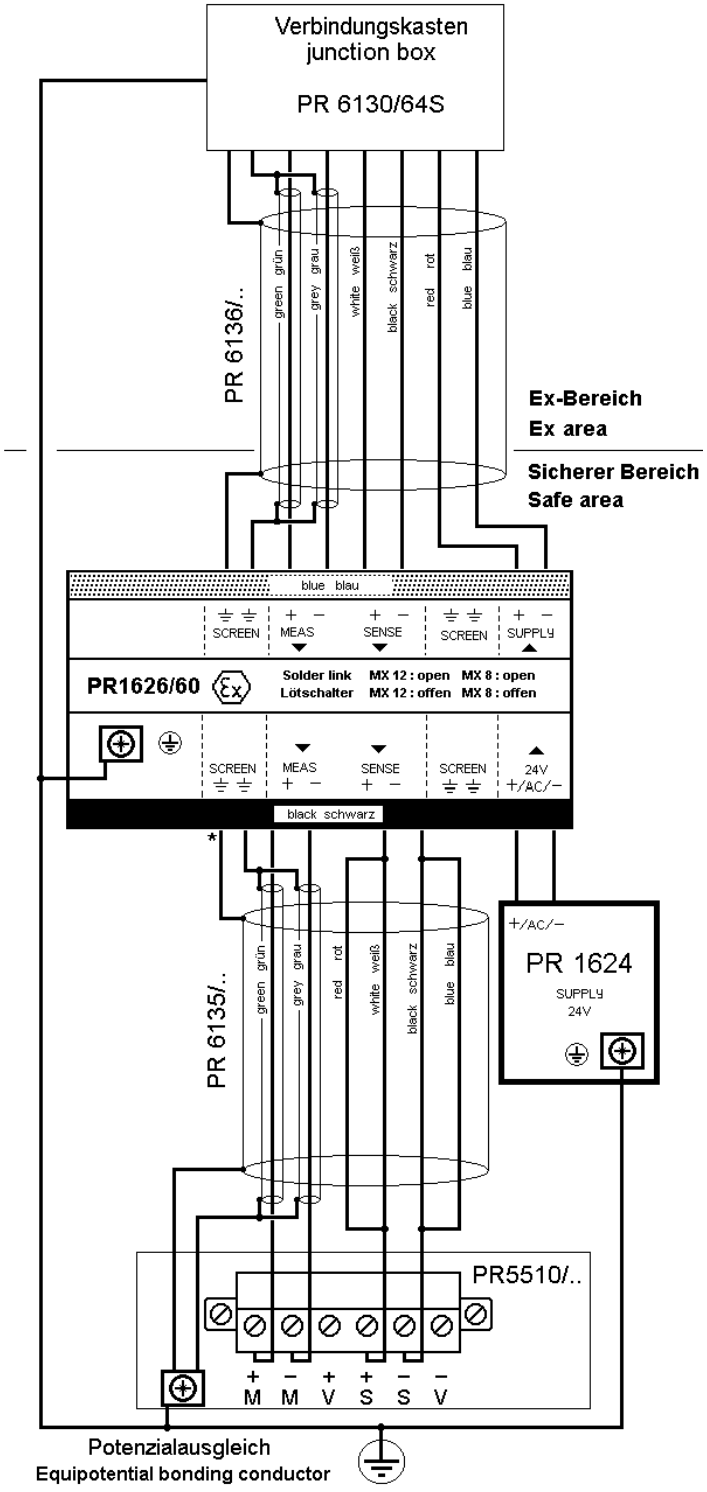
The cable colors shown above are applicable to the connecting cable PR6135/36.
Before connecting, check the assignment of cable colors in the load cell manual.

3.4.5 Connection via PR1626/60 (intrinsically safe power supply)

This unit provides intrinsically safe load cell power supply, whereby PR5510 and PR1626/60 must be installed in the safe area. Only the load cells/ junction box are installed in the explosion-hazarded area.

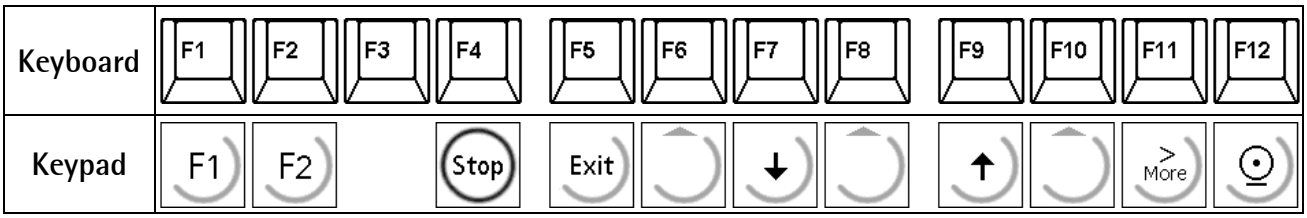
Connection to PR1626/60 is as shown below. For the general connections, refer to the ☞ *PR1626/60 manual.*

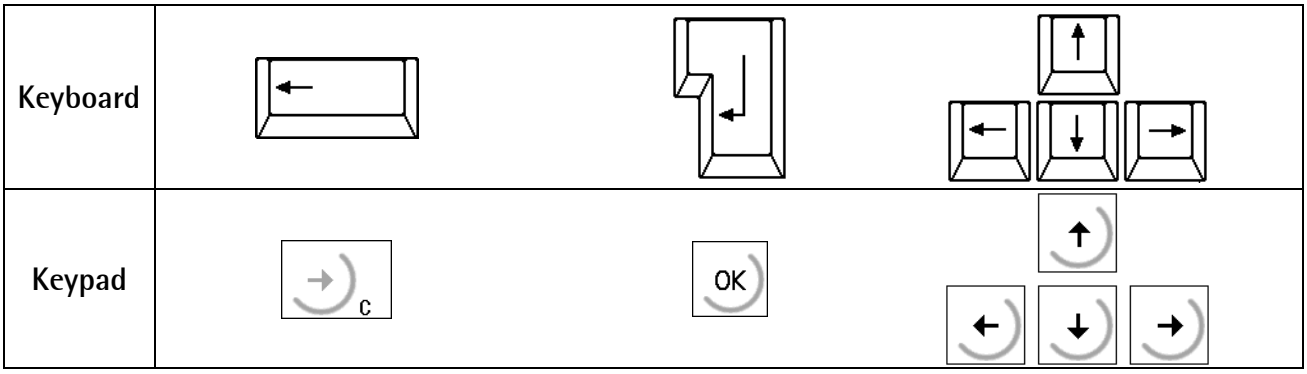
⚠ Potential compensation in compliance with the regulations is required !



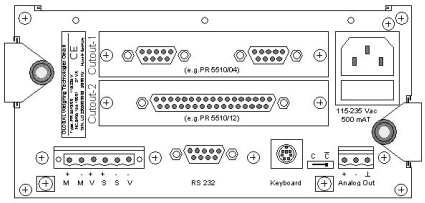
3.5 External PC keyboard

In addition to the alphanumeric front panel keypad, the instrument is provided with a PS/2 socket for an external keyboard on the rear panel. The two functions are equivalent and can be used alternatively.





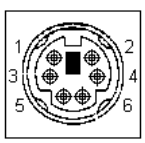
Factory setting of the external keyboard is for **US keyboard** . For using a German keyboard, the character set can be changed into GERMAN by pressing [Strg][F2]. Press[Strg][F1] to return to factory setting.
☝ The LEDs of the PC keyboard are not lit!



We recommend using the cherry keyboard with 104/5 keys of type 'Classic Line' G83-6300 LPNDE/US (with PS2 connector, 35mA)

⚠ Before connecting the keyboard, make sure that the power consumption does not exceed **50 mA @ 5 V** . ☞ Otherwise, an internal multi-fuse will be blown.

PS/2 socket pin allocation



1	KBD Data
2	nc
3	GND
4	+5V
5	KBD Clock
6	nc

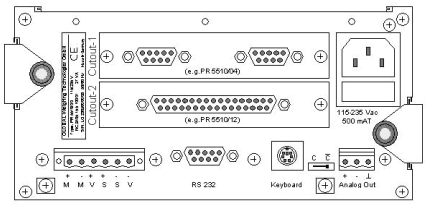
For keyboards with DIN connector adaptor

5-pole DIN socket

6-pole
PS/2 connector

3.5.1 Barcode reader (Typ: Wedge)

As an alternative to an external keyboard, a barcode reader can be connected at the standard PS/2 connector.



Laser scanner
Keyboard connected in a loop
Type: WEDGE code

Opticon OPL 6735 **Wedge**

Before connecting the reader, make sure that the power consumption does not exceed **50 mA @ 5 V.**
☞ Otherwise, a multi-fuse will be blown.

Basic adjustment of the barcode reader (Opticon OPL 6735 Wedge) is by scanning in the relevant barcodes from the relevant scanner manual. Default values are marked with (d).

Opticon CPL 6735 wedge	
Linker:	AT wedge
Keyboard layout:	with keyboard (d)
Keyboard language:	US (d) * ☞ *see* PC keyboard [Strg][F2]
Intercharacter delay f. wedges:	Delay = 10
Set suffix:	Clear all suffixes
Read mode options:	Single read
Redundancy:	3 times redundant

Barcode readers Syntech (Cipher 1021G) and Gryphomn (M-100) can also be used.

For safe readings, we recommend adjusting **3 redundant read operations**. For confirmation of each read operation via the keyboard, the automatic CR function of the reader must be switched off.

WEDGE readers send the same keyboard code as generated by pressing keys on a normal keyboard, i.e. when PR5510 expects an input (normal front-panel keypad), the expected "date" can also be scanned in.
When using an Y cable, barcode reader and keyboard can be connected in a loop for being used alternatively.

3.6 Data interfaces

Apart from the digital-analog interfaces, there are various data interfaces, some of which can be retro-fitted optionally. There is **no** parallel Centronics printer port.

serial:

RS 232	as BuiltIn
RS 232C(V24) and RS422/485	as PR5510/04 option

or

Ethernet	as PR5510/14 TCP/IP-protocol
Fieldbus	as PR1721/3x several protocols

3.6.1 Logical names (IEC 61131)

In firmware/application program IEC 61131, the serial interfaces are given **logic names**, which are allocated to the physical BuiltIn / slot 1 / slot 2 on the main circuit board.

Operator device at...	**BuiltIn**		**Slot 1**		**Slot 2**	
	----	----	RS 422 / 485	*OPR*	RS 422 / 485	*OPR*
	RS 232	*OPR*	RS 232	*OPR*	RS 232	*OPR*

Printer device at...	**BuiltIn**		**Slot 1**		**Slot 2**	
	----	----	RS 422 / 485	*PRN*	RS 422 / 485	*PRN*
	RS 232	*PRN*	RS 232	*PRN*	RS 232	*PRN*

Remote device at...	**BuiltIn**		**Slot 1**		**Slot 2**	
(Firmware function)	----	*xxx*	RS 422 / 485	*xxx*	RS 422 / 485	*xxx*
	RS 232	*xxx*	RS 232	*xxx*	RS 232	*xxx*

	BuiltIn		**Slot 1**		**Slot 2**	
	----	----	RS 422 / 485	*TTY1*	RS 422 / 485	*TTY3*
	RS 232	*CON*	RS 232	*TTY2*	RS 232	*TTY4*

A report written with WRITE (PRN...) can be allocated to all interfaces via "Printer_device_at", i.e. the physical printer connection is selectable freely. An application program with e.g. WRITE (TTY2...) can be processed only purposefully by means of option PR5510/04 in SLOT 1, via RS232.

Operator device (service terminal) - and remote device (for PR5510/05) are supplied with data by the firmware, access from the IEC 61131 application level is not possible.

♦ RS 232C (V24)

Bi-directional serial asynchronous communication interface between <u>two</u> communicating units (point_to_point). The in fact data transmission takes place via signals Tx (transmit) and Rx (receive), whereby the so called DTE-DTE-connection (null modem) the signals crossover links., means Rx-Tx and Tx-Rx.
As example: PR5510<->PC/Notebook or PR-devices interconnection (PR5510<->PRxxxx).
Opposite : the DTE-DCE connection (Modem) where signals Rx-Rx and Tx-Tx are directly linked (PR5510<->Modem). For dataflow-control are used ("hardware like") the two signals CTS (clear to send) and RTS (ready to send) or alternativly ("software like") XON/XOFF-character. With this 4 signals most of the "easy" RS 232 interfaces could be made. But the allowed cabellength is strong limited (max 15m in clean EMC-environment and depending to baudrate).

RTS/CTS shorting links in connector/socket are required only for older DOS drivers on the PC side, or are requested explicitly by the instrument manual (e.g. printer).

BuiltIn and PR5510/04 **comply with the standard allocation**, i.e. they are identical in the following connecting diagrams. *To this fact in this manual the RS232-connection is only once and here descript and not repeated with PR5510/04 Option.* ☞ *see chapter 4.1.1*

Attention::

A) Exchange from Tx, Rx (Pin-2, 3) from 9 to 25PIN-Connector at PC/Terminal

Typ:	**DTE-1**	**DTE-2**		**DTE-1**	**DTE-2**		
PR5510	>>> send	PC/Term.		PR5510	<<< receive	PC/Term.	
	Tx >	**> Rx**		**Rx <**	**< Tx**		
DSub-9	PIN-2	2-PIN		PIN-3	3-PIN	DSub-9	Extension-cable 9/9 (1:1 direct)
aber		!!!			!!!		
DSub-9	PIN-2	3-PIN		PIN-3	2-PIN	DSub-25	Null modem-cable 9/25 (cross)

with PR-interconnection (9pole) , you have t o use a always a null modem cable !

PR5510	>>> *send*	PR5510		PR5510	<<< receive	PR5510	
	Tx >	**> Rx**		**Rx <**	**< Tx**		
DSub-9	PIN-2	3-PIN		PIN-3	2-PIN	DSub-9	null modem-cable 9/9 (cross)

B) At DTE-DTE (null modem) is always Tx to Rx (crosover) and vive versa in opposite to ...
... DTE-DCE (modem) is Tx to Tx (direct) and Rx to Rx

Typ:	**DTE-1**	**DCE-1**		**DTE-1**	**DCE-1**		
PR5510	>>>	Modem		PR5510	<<<	Modem	
	Tx >	**> Tx**		**Rx <**	**< Rx**		
DSub-9	PIN-2	2-PIN		PIN-3	3-PIN	DSub-25	special modem-cable (accessory)

3.6.2 BUILTIN – RS 232

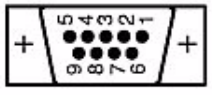
A simple RS232 interface called BuiltIn is firmly fitted in the instrument. It is accessible from outside via DSUB-9 socket and should be considered more or less as a **service interface:**

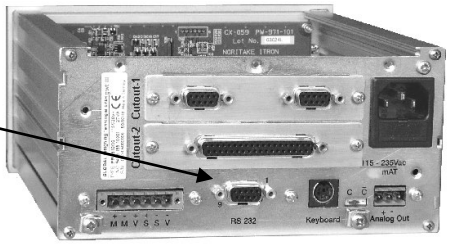
A) For loading firmware programs via FlashIt (Power tools PR8001).
B) Using a connected terminal/PC with terminal program (terminal emulation), calibration, configuration and additional service functions can be realized easily.
C) The interface is also provided for IEC 61131 programming by means of the PR1750 tool.
D) However, the interface can be used also freely (instead of a PR5510/04 options card) and can be configured e.g. for communication with PLC, PC remote display or printer.

Technical data:

Connection mode:	DSUB 9 socket on the rear panel	**No. of channels:**	1
Type:	RS 232C full duplex	**Speed:**	300 to 19K2 bits/sec
Data bit:	7 / 8 bits	**Parity:**	None, odd, even
Number of signals: *Non RS232C incomplete !*	2 output signals (TXD, RTS) 2 input signals (RXD, CTS) *no extended modem signals*	**Output signal level:**	Logic 1 (high) - 5 ... - 15 V Logic 0 (low) + 5 ... + 15 V
Input signal level:	Logic 1 (high) - 3 ... - 15 V Logic 0 (low) + 3 ... + 15 V	**Potential isolation:**	none
Cable type:	Pairwisely twisted, screened (e.g. LifYCY 3x2x0,20), 1 conductor pair for ground *or RS232C standard cable*	**Cable length:**	max. 15 m
Accessories:	1x counterplug (male) incl. screening hood		

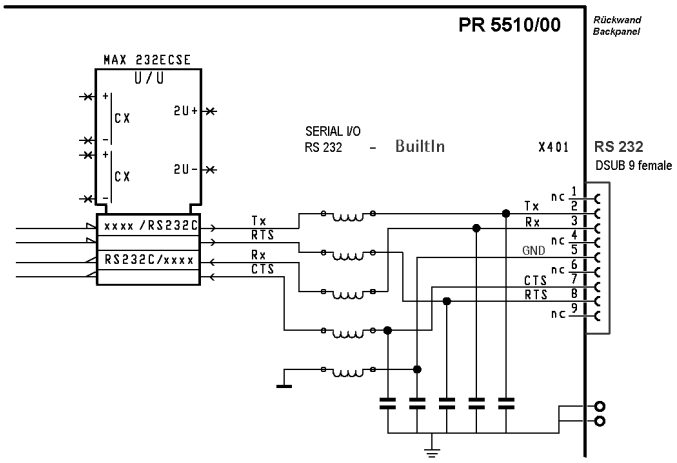
Attention to: The **limited** permitted cable length! (dependent on the EMC environment/baudrate)





Interface
Builtin is located on the main circuit board.

The socket is provided on the rear panel

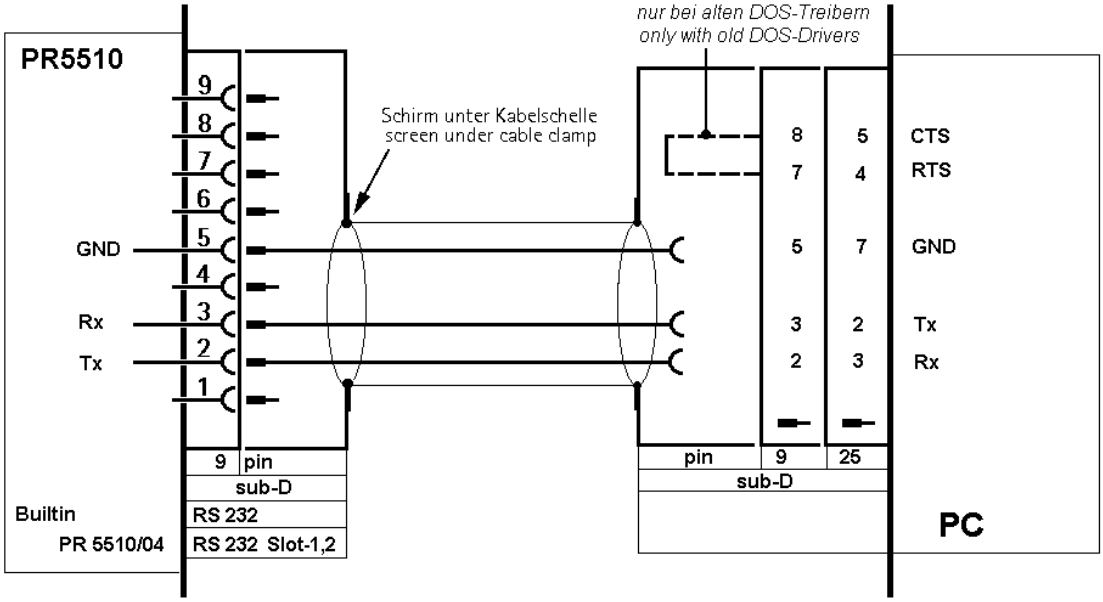


3.6.3 RS 232 - Connections

3.6.3.1 PC / Notebook – Connecting 9/9 cable

BuiltIn and PR5510/04 comply with the standard allocation, i.e. they are equall except for the modem signals in the following connecting diagrams.

For applications such as: FlashIt, RecoverIt, DisplayIt, AccessIt
PR1740, PR1750, PR1791/92
Terminal (emulation) e.g. MS HyperTerminal



Note the different PIN allocation (PIN 2, 3, in particular) with 9/25-pole connectors.

Description: 9-pole D-sub connector/socket V24-connecting/extension cable 1:1 (not null modem)

3.6.4 PR8001 [FLASHIT]

Function:
Firmware and Bios loading,
application and customized programs,
Language and print layout adaptations

☑ For PR5510: use with FLASHIT-Program release R2.22.x or higher

- RS 232 Connecting cable as described above: *(☞ see chapter 3.6.3.1)*

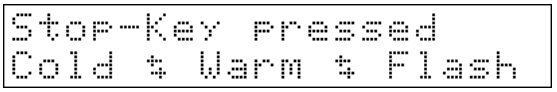
Start FLASH function at PR5510:

Power OFF, keep stop key 

pressed and power ON
(QUIT via warm softkey, without data loss)

only with CAL switch 

possible



When [Flash] was called up (softkey: FLASH), **no further adjustment** at the instrument is necessary. The parameters are automatically set in the instrument and cannot be changed. On the PC, all adjustments are also made automatically when starting the FLASHIT program (#), manual selection of PC interface COM1 or COM2... according to the plugged-in connecting cable excepted.
Only point_to_point- Connection RS323/422, no selection of addresses possible.

A special loading protocol is running (from Firmware, cannot be selected here)

~~SETUP~~	~~SERIAL PORTS~~	Cannot be called up via SETUP => STOP&QUIT
	BuiltIn RS232, RS232 Slot-1, RS232 Slot-2	Action on selected interface:
	~~Operator ... device at : none~~	
	~~Printer ... device at : none~~	
	~~Remote ... device at : none~~	
A) Stop & power	FLASH (softkey)	← Keep STOP pressed and power OFF-ON or
B) Stop & Quit	FLASH (softkey)	← STOP&QUIT pressed **simultaneously** (longer)
~~Protocol~~		#
~~Baudrate~~		# ("high speed", with short high quality cable)
~~Bits~~		#
~~Parity~~		#
~~Stopbits~~		#
~~Slave-Adr~~	~~default A (...Z)~~	# only point_to_point is possible

fixed settings* from the operating system (not changeable).
Marked ~~xyz~~ : selection is excluded or has not to be done

☛ ~~Take over same settings to the PC-application~~ (made by FlashIt itself).

* temporary, as long as FlashIt is active. Subsequently, the previous setting is active again.

FLASHIT is only possible via **serial interfaces** (prefered BuiltIn), **not** via Ethernet or Fieldbus

3.6.4.1 PR8001 [RECOVERIT]

Function:
Saves **all** settings (incl. EAROM e.g. CAL- and Config-data)
and **all** USER-data in RAM in a file uploaded on the PC

A binary file (HEX-dump) with user definable name is generated.
No sense for displaying, do not edit the file in any way.

- RS 232 Connecting cable as described above: *(☞ see chapter 3.6.3.1)*

SETUP	**SERIAL PORTS**	Remarks
	BuiltIn RS232, RS232/485 Slot 1/ Slot 2	Action on selected interface:
	~~Operator ... device at : none~~	
	~~Printer ... device at : none~~	
	~~Remote ... device at : none~~	
Protocol	EW-COM-V3	← *select* (V3 required)
Baudrate	default 9600	*user dependent*
Bits	**8**	**# all ASCII, incl. special characters 128...**
Parity	even	**#**
Stopbits	1	**#**
Slave-Adr	default A (...Z)	*Device address (user-dependent)*

fixed settings* from the operating system (not changeable).
Marked ~~xyz~~ : selection is excluded or has not be done

☛ Take over same settings to the PC-application.

☞ RECOVERIT apart from the **serial interfaces** (prefered BuiltIn), also possible via Ethernet, but not via Fieldbus.

Can be used as a "general" BACKUP-RESTORE of all actual "user"-data from the instrument. This should be done regularly and, in particular, after changes. Saves also CALIBRATION and CONFIG stored seperatly in EAROM

RESTORE always only to the **identical firmware version** from which the BACKUP is generated !!!
Firmware change inbetween BACKUP and RESTORE makes the BACKUP unusable.

3.6.4.2 PR8001 [DISPLAYIT]

Function:
Complete display and remote operation in a PC window
(PR5510-front panel complete mirrored).

- RS 232 Connecting cable as described above: *(☞ see chapter 3.6.3.1)*

SETUP	SERIAL PORTS	Remarks
	BuiltIn RS232, RS232/485 Slot-1/ Slot-2	Action on selected interface:
	~~Operator ... device at : none~~	
	~~Printer ... device at : none~~	
	~~Remote ... device at : none~~	
Protocol	EW-COM-V3	← *select* (V3 required)
Baudrate	default 9600	
Bits	**8**	# all ASCII, incl. special characters 128...
Parity	even	**#**
Stopbits	1	**#**
Slave-Adr	default A (...Z)	*Device address (user-dependent)*

fixed settings* from the operating system (not changeable).
Marked ~~xyz~~ : selection excluded or has not to be done

☛ Take over same settings to the PC-application.

☞ DISPLAYIT apart from the **serial interfaces** (prefered BuiltIn), also possible via Ethernet, but not via Fieldbus.

3.6.4.3 PR8001 [ACCESSIT]

Function:
Up/downloading of all available internal table data (IEC 61131 type)
Into a PC file in MS ACCESS format, e.g. Mat/Rec/Truck/Customer... excl.ALIBI

☞ * Be careful, if changed data are not plausible any more, they **are not checked** further in the instrument when receiving the tables (relations)

- RS 232 Connecting cable as described above: *(☞ see chapter 3.6.3.1)*

SETUP	**SERIAL PORTS**	Remarks
	BuiltIn RS232, RS232/485 Slot-1/ Slot-2	Action on selected interface:
	~~Operator ... device at : none~~	
	~~Printer ... device at : none~~	
	~~Remote ... device at : none~~	
Protocol	EW-COM-V3	← *select* (V3 required)
Baudrate	default 9600	
Bits	8	# all ASCII, incl. special characters 128...
Parity	even	**#**
Stopbits	1	**#**
Slave-Adr	default A (...Z)	*Device address (user-dependent)*

fixed settings* from the operating system (not changeable).
Marked ~~xyz~~ : selection excluded or has not to be done

☛ Take over same settings to the PC-application.

☞ ACCESSIT apart from the **serial interfaces** (prefered BuiltIn), also possible via Ethernet, but not via Fieldbus.

3.6.4.4 EW-COMMUNICATION

Used by Sartorius-Applications [PR1740, PR1750, PR1791, PR1792, PR8001]
Sartorius applications on MS WINDOS NT based personal computer

EW-COM (E_lectronic W_eighing communcation) is a "standard" protocol in use since a long time in compliance with the ISO1745 standard (multidrop, master-slave polling), extended by weighing commands.

- RS 232 Connecting cable as described above: *(☞ see chapter 3.6.3.1)*

SETUP	**SERIAL PORTS**	Remarks
	BuiltIn RS232, RS232 Slot-1, RS232 Slot-2	Action on selected interface:
	~~Operator ... device at : none~~	
	~~Printer ... device at : none~~	
	~~Remote ... device at : none~~	
Protocol	EW-COM-V3 *	← *select see below*
Baudrate	default 9600	
Bits	8	# all ASCII, incl. special characters 128...
Parity	even	#
Stopbits	1	#
Slave-Adr	default A (...Z)	*Instrument address (user-dependent)*

fixed settings* from the operating system (not changeable).
Marked ~~xyz~~ : selection excluded or has not to be done

☛ Take over same settings to the PC-application.

a >>> message **Startup/Shutdown Communication** is generated when selecting/leaving the interface.

* EW protocol driver versions:
EW-COM-V1: only one instrument (point_to_point) outdated generation (exception)
PR1713, PR1730/00 R1 or older standalone-Programs or Testtools

EW-COM-V2: simultaneous communication (multidrop) incl. DDE
PR1713>R1.xx , PR1730/00R2/01R1, PR1740<R6, PR1750R1

EW-COM-V3: simultaneous communication (multidrop) incl. OPC and InBatch
PR1713R2, PR55/56/5710, PR1730R3, PR1740>R5, PR1750R2, PR1791/92, PR8001

Protocol	EW-COM-V1 *with V1 special settings*	PR1740, PR1750
Baudrate	default 9600	
Bits	7/8	# with or **without** special characters 128...
Parity	even	#
Stopbits	1	#
Slave-Adr	default A (...Z)	*# Device address (user-dependent)*

The listed EW commands are "internal" instrument-specific commands and not published any further. "Old" EW commands required for projects can be realized partly by means of IEC 61131 programming using license PR1713/31.

3.6.4.5 Console or service terminal

Function:
for commissioning or service,
- calibration, config
- test (IO, memory...) and
- IEC 61131 debug (support)
- console

- RS 232 Connecting cable as described above: *(☞ see chapter 3.6.3.1)*

SETUP	**SERIAL PORTS**	Remarks
	BuiltIn RS232, RS232/485 Slot-1/ Slot-2	Action on selected interface:
	Operator ... device at : ...	← *select*
	~~Printer ... device at : none~~	
	~~Remote ... device at : none~~	
Protocol	XON/XOFF	# Monitoringt: buffer overflow
Baudrate	9600	#
Bits	8	# all ASCII characters, incl. special characters 128...
Parity	none	#
Stopbits	1	#
~~Slave-Adr~~	~~default A (...Z)~~	*# only point_to_point*

fixed settings* from the operating system (not changeable).
Marked ~~xyz~~ : selection excluded or has not to be done

☛ Take over same settings to the PC-application.

a >>> message **Startup/Shutdown Operating** is generated when selecting/leaving the interface.

When [Operator device at...] a further setting for the allocated interface on PR5510 is not is possible, a fixed setting is made automatically (#). When trying to contact the interface, >>> message **locked by oper** is generated.

When a real terminal (VT100-compatible) is not available, such a terminal can be emulated on a PC by means of an application, e.g. MS Windows accessory HYPERTERMINAL. ☞ *see chapter 9.2.2*

The SETUP can be used only **alternatively** on PR5510 or on the terminal, otherwise >>> message **configuration is active .** on the instrument, or a similar message on the terminal, is output.

3.6.4.6 Printer device at [printer]

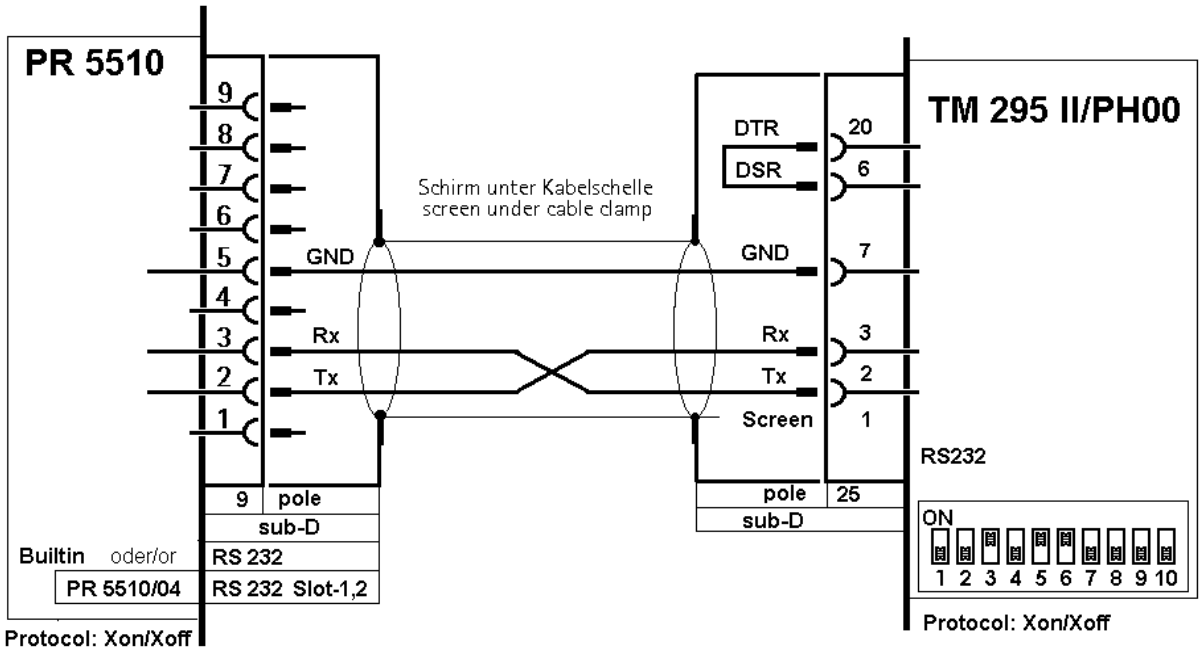
Examples for ticket printer TM295II:

The interface parameter adjustment **is individual** in compliance with the printer
☞ *see also printer manual.*

In application program IEC 61131, the serial interfaces are given logic names "PRN" for printer outputs, which can be allocated to the **physical ones** BuiltIn / Slot-1 / Slot-2 aon the main circuit board via [Printer device at...]-.

♦ **A) XON/XOFF software handshake [ticket printer TM295II/PH00]**

XON/OFF-setting interrupts data sending during power on, self-test and error status (no paper...).



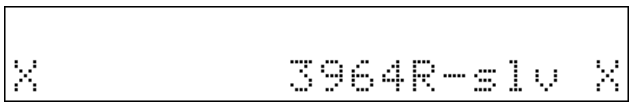
SETUP	**SERIAL PORTS**	Remarks
	BuiltIn RS232, RS232/485 Slot-1/ Slot-2	Action on selected interface:
	~~Operator device at : none~~	
	Printer device at : ...	← *select*
	~~Remote device at : none~~	
Protocol	XON/XOFF	as printer with software handshake
Baudrate	9600	
Bits	8	all ASCII characters, incl. Special characters 128...256
Parity	even	Safety of transmission
Stopbits	1	
Devtype	Raw	The program controls all print character directly
Echo	disable	*uncritical, no function*

Free settings corresponding with the printer manual, these must be adjusted accordingly on the printer. TM295 printer configuration is via the 10 DIP switches in the bottom of the instrument 512 bytes (SW-3).

Marked ~~xyz~~ : selection excluded or has not to be done

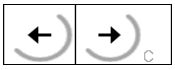
☛ Take over same settings to the printer

If e.g. 3964 is selected by mistake for the protocol, the following message is displayed:



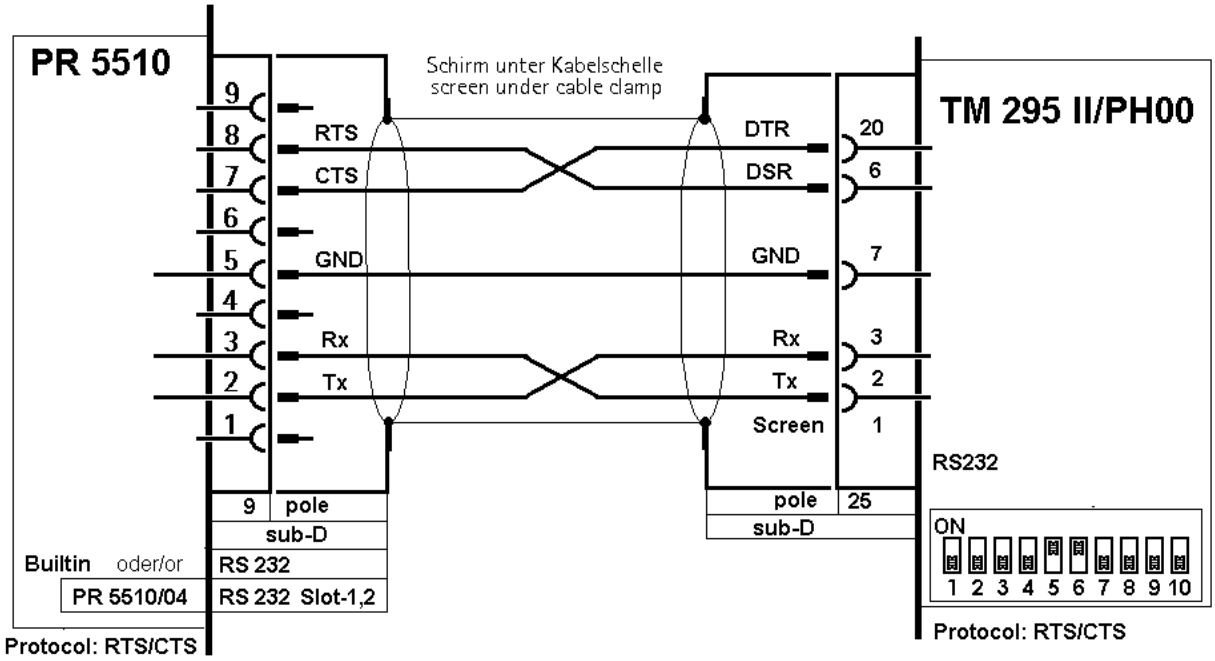
whereby X ..... X indicates that the selection is permitted. Only none, **Xon/off**, RTS/CTS, W&M are permitted.

In case of confirmation with OK despite this, >>> message: **line in use for prn** is displayed.

Go on by pressing 

♦ **B) RTS/CTS hardware handshake [Ticket printer TM295II/PH00]**

RTS/CTS or DTR/DSR setting stops data sending during power on, self-test and error status (no paper...). As XON/XOFF, but additional cable break detection due to missing CTS is provided.

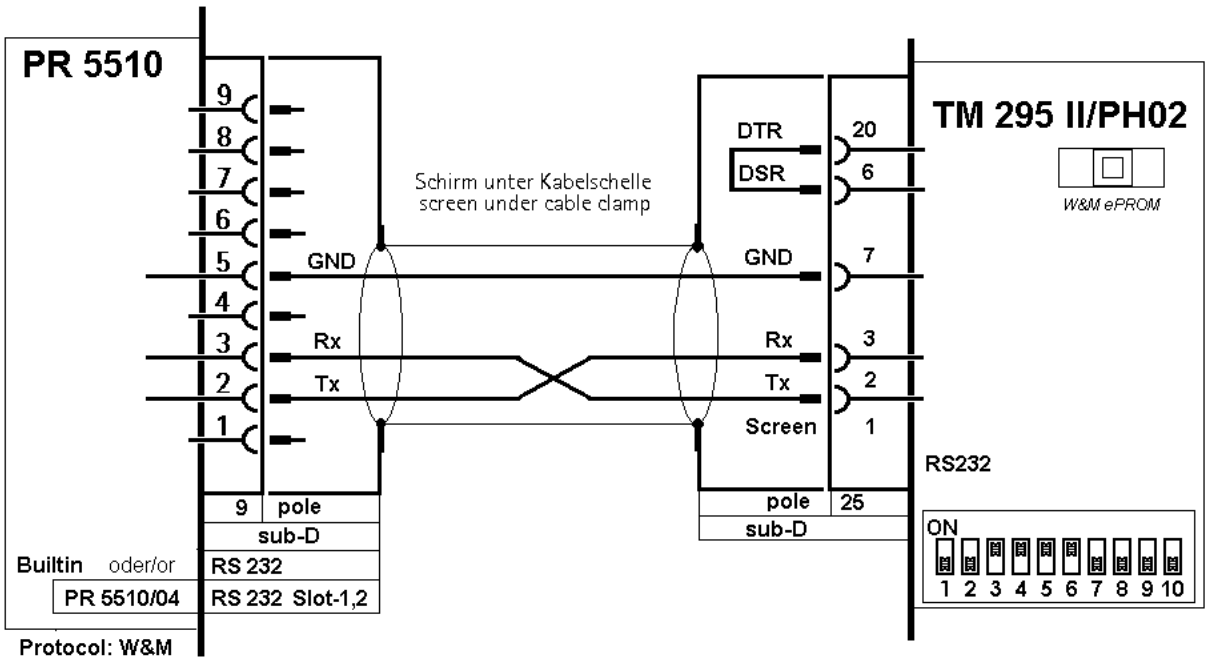


SETUP	SERIAL PORTS	Remarks
	Builtin RS232, RS232/485 Slot-1/ Slot-2	Action on selected interface:
	~~Operator device at : none~~	
	Printer device at : ...	← *select*
	~~Remote device at : none~~	
Protocol	RTS/CTS	As a printer with hardware handshake
Baudrate	9600	
Bits	8	# all ASCII characters, incl. Special characters 128...
Parity	even	#
Stopbits	1	#
Devtype	Raw	Program controls all print characters
Echo	disable	*uncritical, no function*

Free settings in compliance with the printer manual, must be adjusted accordingly on the printer. TM295 printer configuration is via the 10 DIP switches in the bottom of the instrument. Data buffer 512 bytes (SW-3)

♦ **C) Weight & Measures (W&M) compliant [only with ticket printer TM295II/PH02]**

Ticket printer TM 295II/PH02 is provided with an additional EPROM memory module for **W&M** print-out. For safety reasons (legal for trade systems), print data are packed/transmitted in a special report rather than being sent out uncontrolledly without feedback (bidirectional).
According to PTB, this is required especially, when the print-out cannot be compared directly with the displayed weight (remote printing). All measured weight values G/T are printed out with symbol, e.g. < B 1234,56 kg >.



SETUP	SERIAL PORTS	Remarks
	BuiltIn RS232, RS232/485 Slot-1/ Slot-2	Action on selected interface:
	~~Operator device at : none~~	
	Printer device at : ...	← *select*
	~~Remote device at : none~~	
Protocol	W&M Print	← *select* As a remote printer in legal for trade mode
Baudrate	default 4800	
Bits	7	# standard ASCII characters, excl. of special char28...
Parity	Even	# Transfer safety
Stopbits	1	#
Devtype	Raw	Program controls all print characters directly
Echo	Disable	*uncritical, no function*

fixed settings from the program, have to be adjusted accordingly on the printer. TM295 printer configuration is via the 10 DIP switches in the bottom of the instrument. Data buffer 512 bytes (SW-3)

3.6.4.7 Remote device at terminal] [PR5610/05 (Ex)

Function:
Mirrors all PR5510/00 front-panels displays and keys 1:1 on terminal PR5510/05 (Ex) for remote operation. I.e. all operating functions can be used from this terminal (e.g. installed in the hazardous area).

- RS 232 Connecting cable as described above: *(☞ see chapter 3.6.3.1)*

SETUP	SERIAL PORTS	Remarks
	BuiltIn RS232, RS232/485 Slot-1/ Slot-2	**Action on selected interface:**
	~~Operator device at : none~~	
	~~Printer device at : none~~	
	Remote device at : ...	← *select*
Protocol	XON/XOFF	# Monitoring: buffer overflow
Baudrate	9600	#
Bits	8	# all ASCII characters, incl. special characters128....
Parity	none	#
Stopbits	1	#
Devicetyp	Ansi	*# uncritical, no function*
Echo	disable	*# uncritical, no function*

fixed settings* from the operating system (not changeable).
Marked ~~xyz~~ : selection excluded or has not to be done

☛ Take over same settings to the Terminal
(☞ read PR5510/05 install-manual also for overall configuration)

a >>> message **Startup/Shutdown Remote** is generated when selecting/leaving the interface.

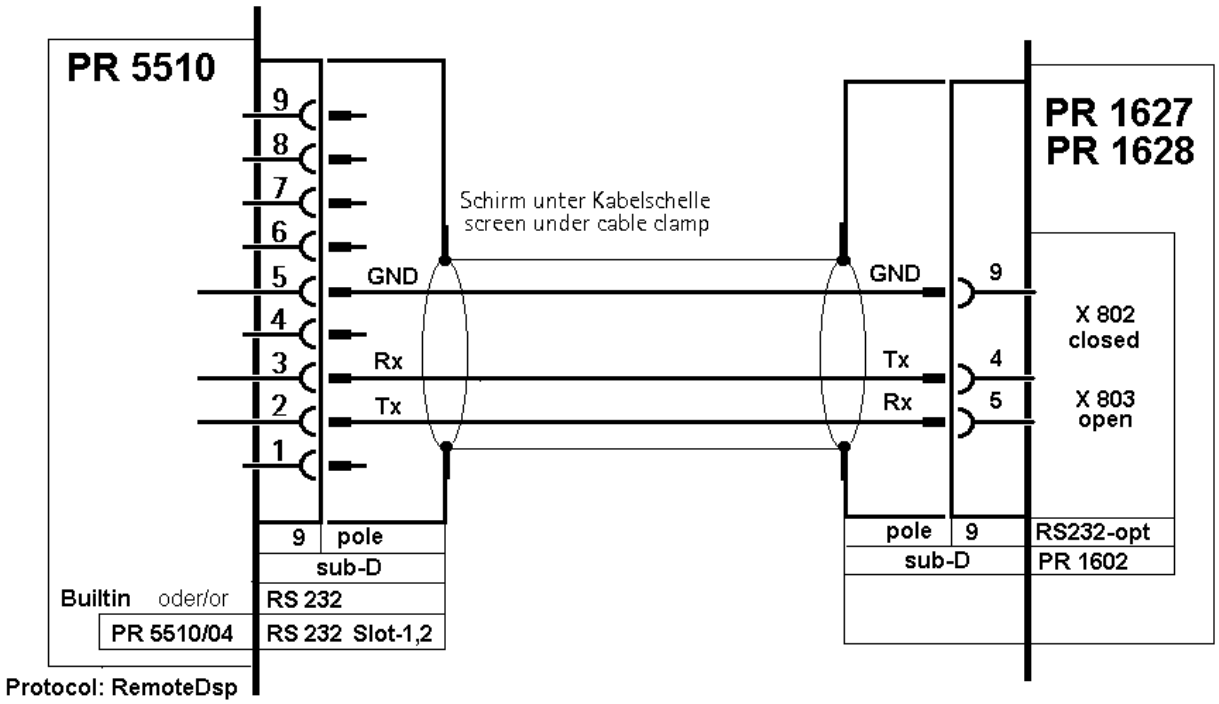
When [Remote device at] was selected, no further adjustment for the allocated interface is possible on PR5510. Fixed settings are made automatically (#). When making an attempt for access to the interface set-up >>> message: **locked by rem** is generated

3.6.5 RemoteDsp protocol

[Remote PR1627 Terminal PR1628/29]

Remote display PR1627 or keyboard PR1628 (Ex) can also be connected as a terminal to the RS 232 interfaces.

However, special attention must be given to the cable length = max. 15m. Otherwise, RS 422/485 must be used, which is possible only with options PR5510/04 in slot-1, 2 rather than with BuiltIn.



SETUP	SERIAL PORTS	Remarks
	BuiltIn RS232, RS232/485 Slot-1/ Slot-2	Action on the selected interface:
	~~Operator device at : none~~	
	~~Printer device at : none~~	
	~~Remote device at : none~~	
Protocol	RemoteDsp	← select Remote display string STX...ETX
Baudrate	default 4800	*with PR1627 cold start*
Bits	7	# no ASCII special characters
Parity	even	#
Stopbits	1	#
Devicetyp	Ansi	*uncritical, no function*
Echo	disable	*uncritical, no function*

fixed settings* from the operating system (not changeable).
Marked ~~xyz~~ : selection excluded or has not to be done

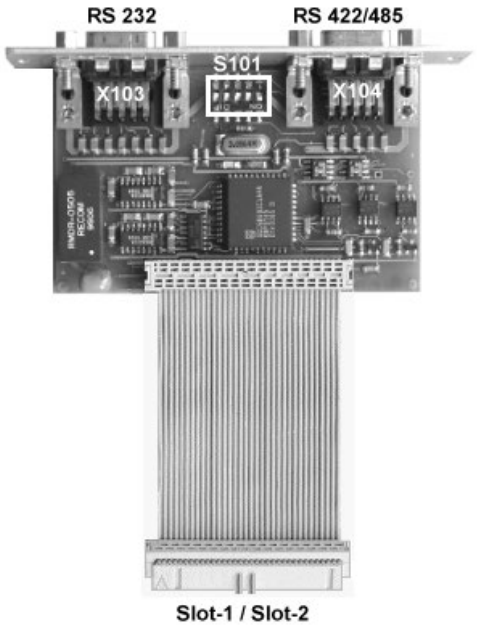
☛ Take over same settings to the PR-units

4 Hardware-Options

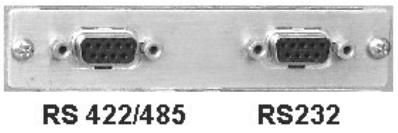
4.1.1 PR5510/04 serial I/O

The module contains two channels (1x RS 232 and 1x RS 422/485*) which can be used simultaneously and largely* independently. The RS 422/485 interface is galvanically isolated. Up to two PR5510/04 modules can be plugged in (SLOT 1, 2). The relevant interface parameters are adjusted by "software configuration" in [SETUP]-[SERIAL-PORTS] , whereby the RS 422/485 require additional "hardware configuration" by means of DIL switch* S101 on the module during installation.

*Each module provides only one timeout , i.e. communication protocols with character "timeout" are not possible simultaneously on the two channels of a module (concerns: EW-KOMM, J/MODBUS, DUST-3964).



Dimensions.: (LxWxH):	86 x 52 x 15 mm
Weight:	33 g

Connection mode:	2x DSUB 9-pole socket (female)
X103= RS 232, X104= RS 422/485	
Number of channels:	1x RS 232, 1x RS 422/485
Type:	RS 232 full duplex RS 422/485 full duplex (4-wire) * RS 485 half duplex (2-wire) *
Transfer rate:	300 to 9600 to 19k2 bits/sec
Signals RS 232C (V24)	Output: TXD, RTS, DTR Input: RXD, CTS, DCD, RI
Signals RS 422/485:	TxA, RxA, TxB, RxB
Potential isolation:	RS 232 no, RS 422 / 485 yes
Cable length:	max. 15m with RS 232 max. 1000 m with RS 422 / 485
Cable type:	pairwisely twisted, screened (z.B. LifYCY 3x2x0,20), 1 conductor pair for (GND).
Accessories:	2x connector counterpart DSUB9 (male) incl. screening hoods

Don't mix up RS 232 with RS 422/485 connectors!

☑ After installation of the card, a COLD start is necessary, otherwise a >>> continuous beep is output. Already existing data must have been saved **previously**, calibration and configuration are not lost!

♦ IEC 61131- direct addressing (special programs)

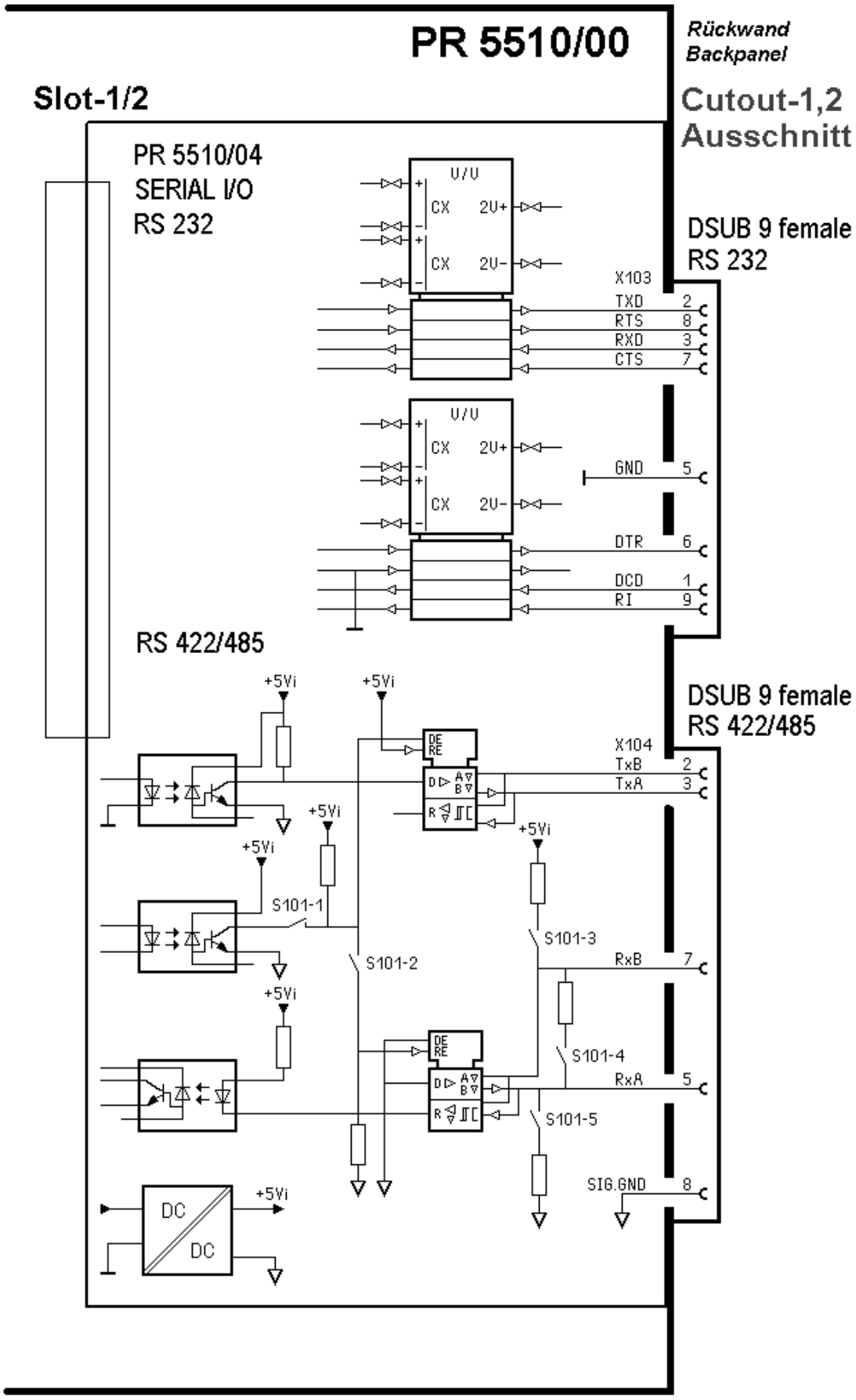
Logic names:

Slot 1	*log. name*
RS 422 / 485	*TTY-1*
RS 232	*TTY-2*

Slot 2	*log. name*
RS 422 / 485	*TTY-3*
RS 232	*TTY-4*

with

Printer device at...	*log. name*
	PRN
	PRN


PR 5510/00
Rückwand
Backpanel
Slot-1/2
Cutout-1,2
Ausschnitt
PR 5510/04
SERIAL I/O
RS 232
U/U
CX
2U+
CX
2U-
DSUB 9 female
RS 232
X103
TXD 2
RTS 8
RXD 3
CTS 7
GND 5
DTR 6
DCD 1
RI 9
RS 422/485
DSUB 9 female
RS 422/485
X104
TxB 2
TxA 3
RxB 7
RxA 5
SIG.GND 8
+5Vi
S101-1
S101-2
S101-3
S101-4
S101-5
DE
RE
D
R
A
B
DC
DC

4.1.2 PR5510/04 RS 232 C (V24)

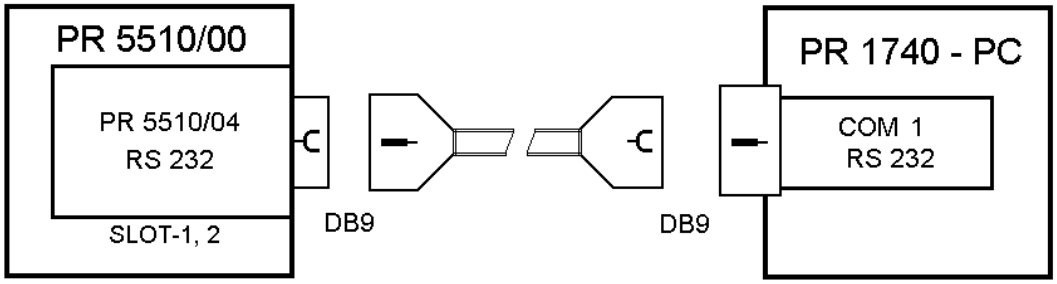
For RS 232, "DIL" settings on the module are not necessary.
It can be used only as a point_to_point connection (instrument<->instrument). The cable length must not exceed 10-15m (dependent of EMC environment), otherwise, also RS 422/485 must be selected.
Commercially available RS232/RS485 converters can be used as external instruments or as an internal PC card.

Related to the RS 232 channel, PR5510/04 is equivalent to the BuiltIn interface, however, it provides additional MODEM signals DTR, CTR, RI, which are only active with additional protocol = modem selected.

☛ *The remaining functions are also identical, i.e. all BuiltIn connecting diagrams /settings are also fully applicable (☞ see chapter 3.6.3)*

4.1.2.1 PR1740

Connections to COM1 (9-pole)

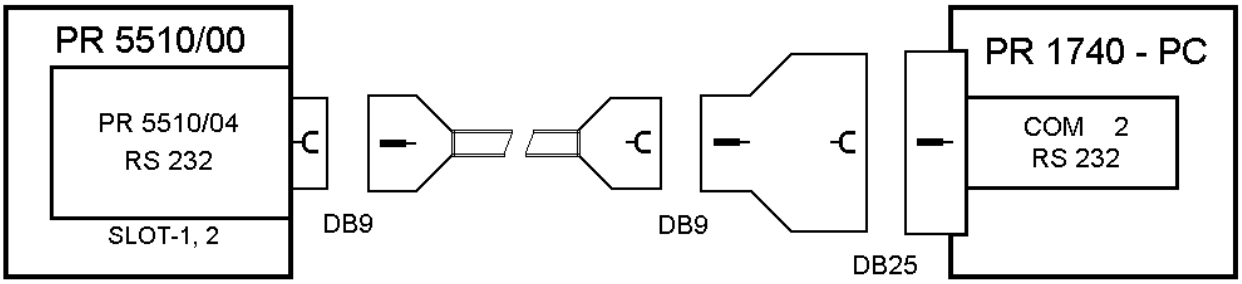


with pre-fabricated "serial" cable (as a 1:1 extension, not null modem)

PR5510 / 04		serial cable	PR1740 - PC	
DB9		DB9 - DB9	DB9	
Signal	No.	Signal direction	No.	Signal
* DCD	1	1 -------- 1	1	DCD
TxD	2	2 -------- > -------- 2	2	RxD
RxD	3	3 -------- < -------- 3	3	TxD
free/n.c.	4	4 -------- 4	4	DTR
GND	5	5 ---------- 5	5	GND
* DTR	6	6 -------- 6	6	DSR
* CTS	7	7 -------- 7	7	RTS
* RTS	8	8 -------- 8	8	CTS
* RI	9	9 -------- 9	9	RI
Housing	o	o---- Screening ----o	o	Housing

* inactive with protocol: EW_COMM_Vx

Connections to COM2 (25-pole)



with pre-fabricated "serial cable" (as a 1:1 extension, not null modem)

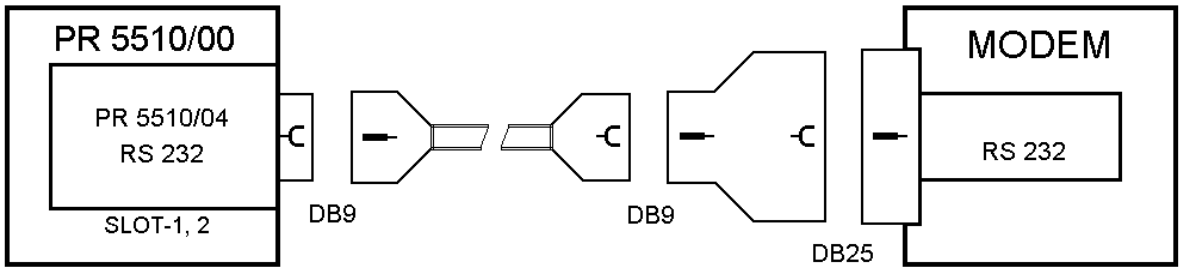
PR5510 / 04		serial cable	Adaptor	PR1740 - PC	
DB9		DB9 - DB9	DB9-DB25	DB25	
Signal	No.	Signal direction	No. No.	No.	Signal
* DCD	1	1 -------- 1	1 ------ 8	8	DCD
TxD	2	2 ------ > ------- 2	2 --->--- 3	3	RxD
RxD	3	3 ------- < ------ 3	3 ---<--- 2	2	TxD
free/n.c	4	4 -------- 4	4 ----- 20	20	DTR
GND	5	5 ---------- 5	5 ------- 7	7	GND
* DTR	6	6 -------- 6	6 ----- 6	6	DSR
* CTS	7	7 -------- 7	7 ----- 4	4	RTS
* RTS	8	8 -------- 8	8 ----- 5	5	CTS
* RI	9	9 -------- 9	9 ----- 22	22	RI
Housing	o	o---- Screening ----o	o ------- o	o	Housing

* inactive with protocol: EW_COMM_Vx

4.1.2.2 MODEM

In addition to BuiltIn, PR5510/04 also provides modem signals (DTR, DCD, RI) for a MODEM connection, which, however, are only active with selection Protocol= Modem .

In addition to the protocol, an IEC 61131 customized program for the "data" is required.



PR5510 / 04		RS232C cable	Adaptor	Modem	
DB9		DB9 - DB9	DB9 – DB25	DB25	
Signal	No.	Signal direction	No. No.	Nr.	Signal
DCD	1	1 ------- < ------- 1	1 --------- 8	8	CD
TxD	2	2 ------- > ------- 2	2 --------- 2	2	TxD
RxD	3	3 ------- < ------- 3	3 --------- 3	3	RxD
free/n.c.	4	4 ------ 4	4 ----- 6	6	DSR
GND	5	5 ---------- 5	5 --------- 7	7	GND
DTR	6	6------- > --------6	6 -------- 20	20	DTR
CTS	7	7------- < --------7	7 --------- 5	5	CTS
RTS	8	8------- > --------8	8 --------- 4	4	RTS
RI	9	9------- < --------9	9 -------- 22	22	RI
Housing	o	o---- Screening ----o	o----------o	o	Housing

Procedure:

RTS to modem (wants to send data)

DTR to modem (transmission ready)

Rx (receive data)
Tx to modem (send data)
* only in "auto answer mode"

DSR to PR5510/04 (switched on and ready)
CTS to PR5510/04 (ready to transmit data)
CD to PR5510/04 (carrier frequency detected)

RI to PR5510/04 (call signal pending) *
Tx to PR5510/04(send data)
Rx (receive data)

a) automatic answer switched on (auto answer = on)
This parameter is stored in modem register 's0'. The command is ats0=1.

b) DCD = on Data Carrier Detect is always on. The command is at&c0.

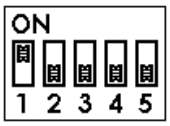
c) Hang on, when DTR is off (hang up on DTR off)
The modem goes to command status, when DTR changes from on to off. The command is at&d1. Other modems than Elsa Microlink 33.6TQV may require at&d2 (hang on, when DTR changes from on to off). If this parameter is false, automatic answering does not function or the modem does not hang on.

☛ *Please, use the AT commands given in the operating manual of the relevant modem!*

4.2 PR5510/04 - RS 422/485

☑ The RS 485/422 interface requires additional hardware configuration on the module by means of DIL switch S102 during installation.

RS 422 can be used only as a point_to_point connection (instrument<->instrument). I.e. RS 485 is obligatory, if a multi-point connection (bus) is required (instrument<->several instruments).
(additional tri-state status). However, RS 485 can be used also as a point_to_point connection (instrument<->instrument). Like 2-wire or 4-wire, this is dependent of other communication partners.
2-wire is a half duplex connection, whereby simultaneous sending and receiving is not possible, which makes corresponding driver programming necessary. (☞ *see relevant instrument manual*).

Factory setting	DIP switch S101		Settings for RS 422/ 485	
	1:	Tristate enable:	OFF - RS 422	ON - RS 485
	2:	Rx:enable	OFF – 4-wire	ON – 2 Draht
	3:	Rx pull-up resistor:	OFF – not connected	ON - (RxB 1k54 +V)
	4:	Rx bus termination:	OFF – not connected	ON - (RxA 205E RxB)
	5:	Rx pull-down resistor	OFF – not connected	ON - (RxA 1k54 -V)

Survey of which DIL switches have to be closed for which mode (ON) :

Connection PR5510 with PR5510 or PR5510 as a SLAVE (*IEC 61131 special programming necessary*)

HALF / FULL DUPLEX	2-wire (H)	4-wire (V)
1. PR5510/04 MASTER	S101	S101
RS 422	2, 3, 4, 5 = on	3, 4, 5 = on
RS 485	1, 2, 3, 4, 5 = on	1, 3, 4, 5 = on

Point to point

2. PR5510/04 single SLAVE		
RS 422	2 = on	3, 4, 5 = on
RS 485	1, 2 = on	1, 3, 4, 5 = on

Bus

2...n-1. PR5510/04 first/further SLAVE		
RS 422	----------	----------
RS 485	1, 2 = on	1 (default) = on

Bus

n. PR5510/04 last SLAVE		
RS 422	----------	----------
RS 485	1, 2, 3, 4, 5 = on	1, 3, 4, 5 = on

Survey of which DIL switches (ON) and solder links (CLOSE) must be closed for which mode:

Connection : PR5510/04 with PR1604 option in instruments: PR1613 or PR1730 resp. PR1626, PR1627/28...

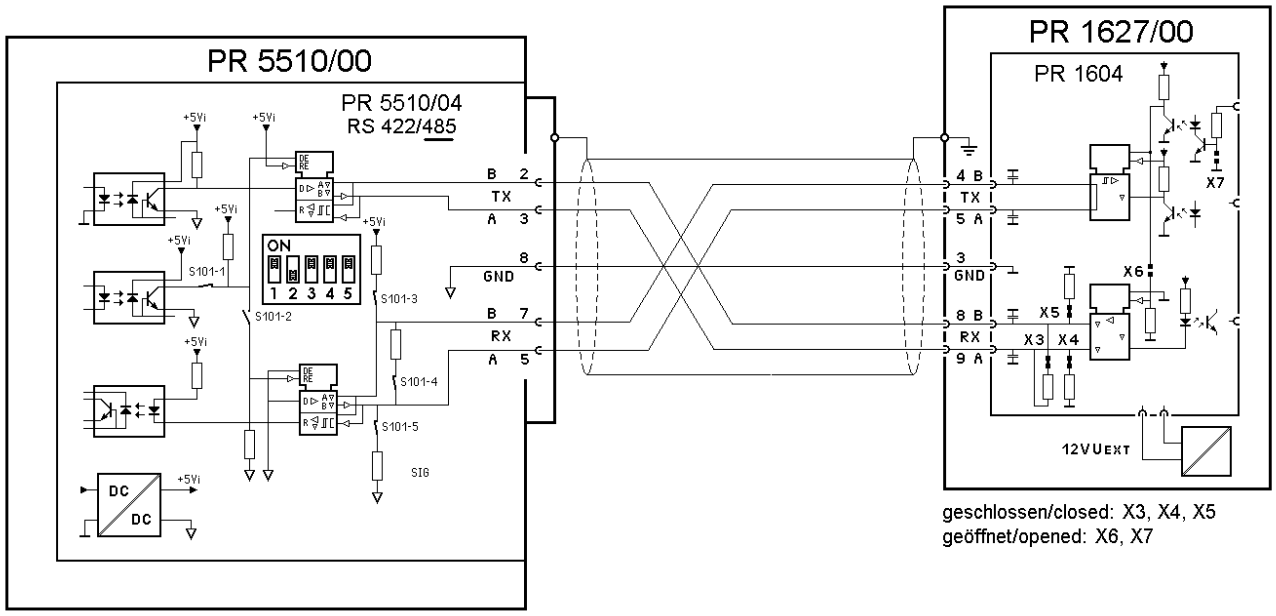
HALF / FULL DUPLEX		2-wire (H)	4-wire (V)
1. PR5510/04	MASTER	S101	S101
	RS 422	2, 3, 4, 5 = on	3, 4, 5 = on
	RS 485	1, 2, 3, 4, 5 = on	1, 3, 4, 5 = on
Point to point			
2. PR1604	single SLAVE		
	RS 422	X6, X7 close	X3, X4, X5, X7 close
	RS 485	X6 = close	X3, X4, X5 close
Bus			
2...n-1. PR1604	first/further SLAVE		
	RS 422	----------	----------
	RS 485	X6 = close	all open
Bus			
n. PR1604	last SLAVE		
	RS 422	----------	----------
	RS 485	X6 = close	X3, X4, X5 close

4.2.1 RS422/485 - Connections

4.2.1.1 RS 485 point-to-point connection (4-wire)

4-wire transmission mode: full duplex (simultaneous sending and receiving possible)

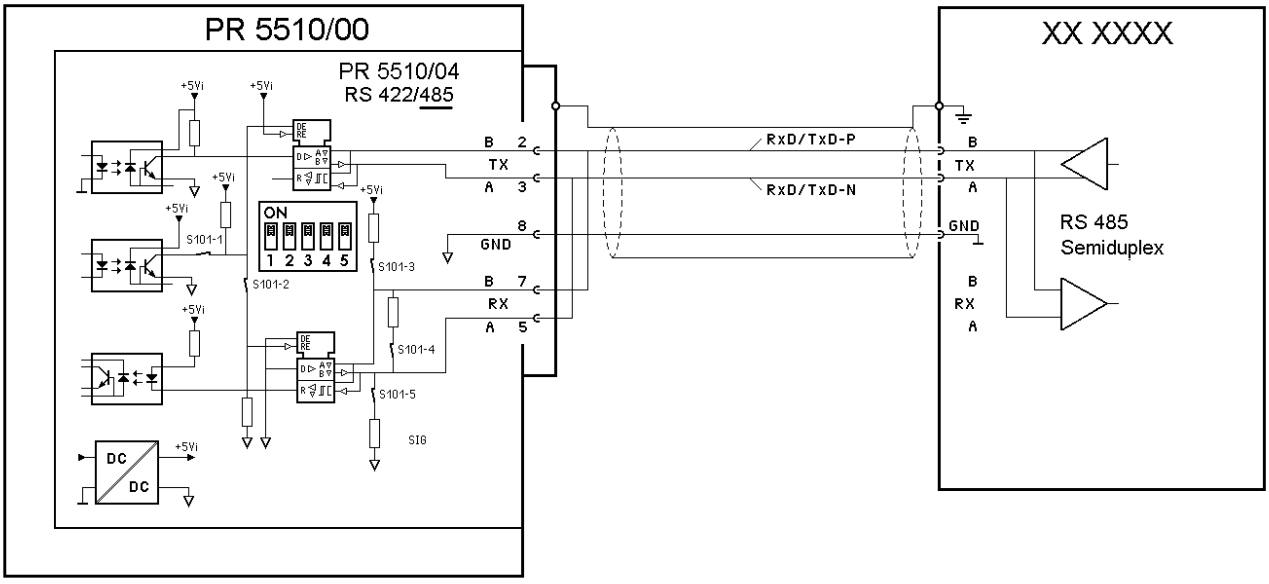
- **with PR1627/00 remote display**



PR5510 configuration : [SETUP]-[SERIAL PORTS]-Slot1/2-RS 485 protocol: RemoteDsp

4.2.1.2 RS 485 Point-to-point connection (2-wire)

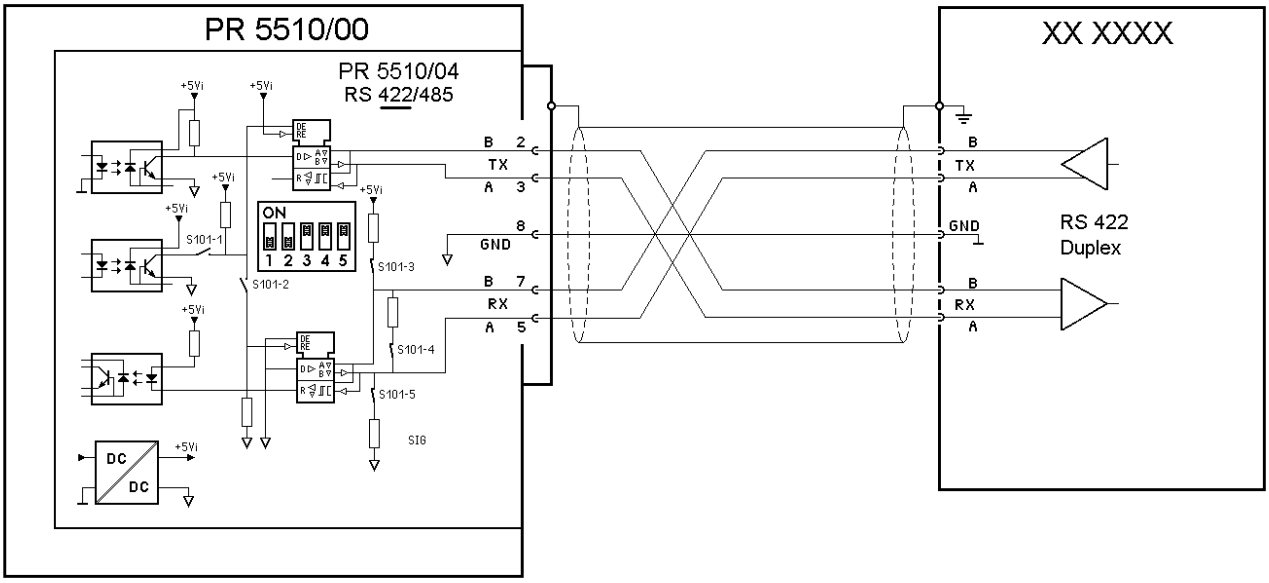
2-wire transmission mode: half duplex (only alternate sending and receiving possible)
Remark: instrument-dependent, not freely selectable (☑ must be descript accordingly in the manula)



PR5510 configuration : [SETUP]-[SERIAL PORTS]-Slot1/2-RS 485 protocol: all except EW-Comm

4.2.1.3 RS 422 Point-to-point connection (4-wire)

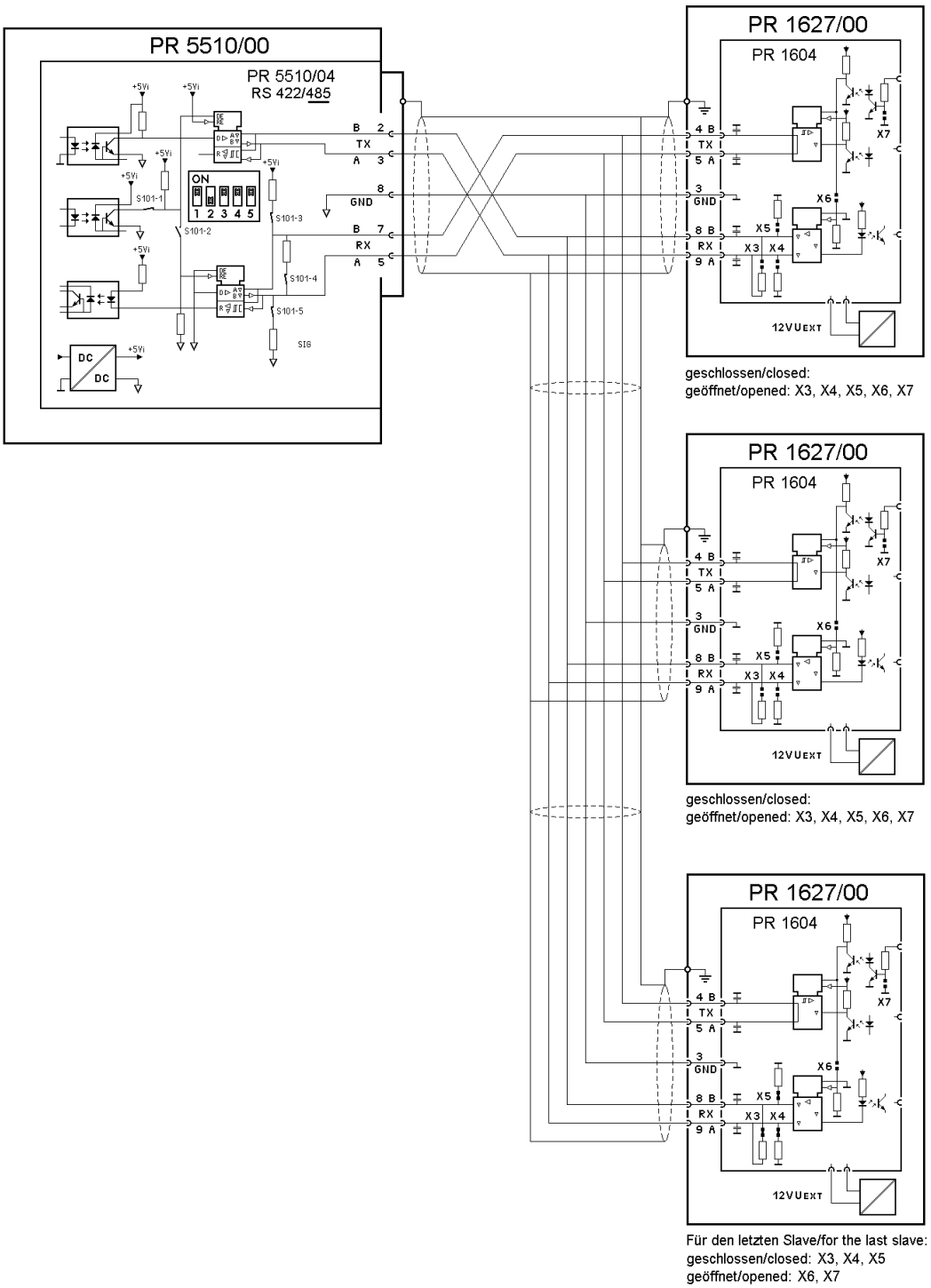
4-wire transmission mode: full duplex (simultaneous sending and receiving possible)
RS 422 can be used exclusively for point_to_point connection (instrument<->instrument).



PR5510 configuration : [SETUP]-[SERIAL PORTS]-Slot1/2-RS 485 protocol: all

4.2.1.4 RS 485 Multi-point connection (4-wire)

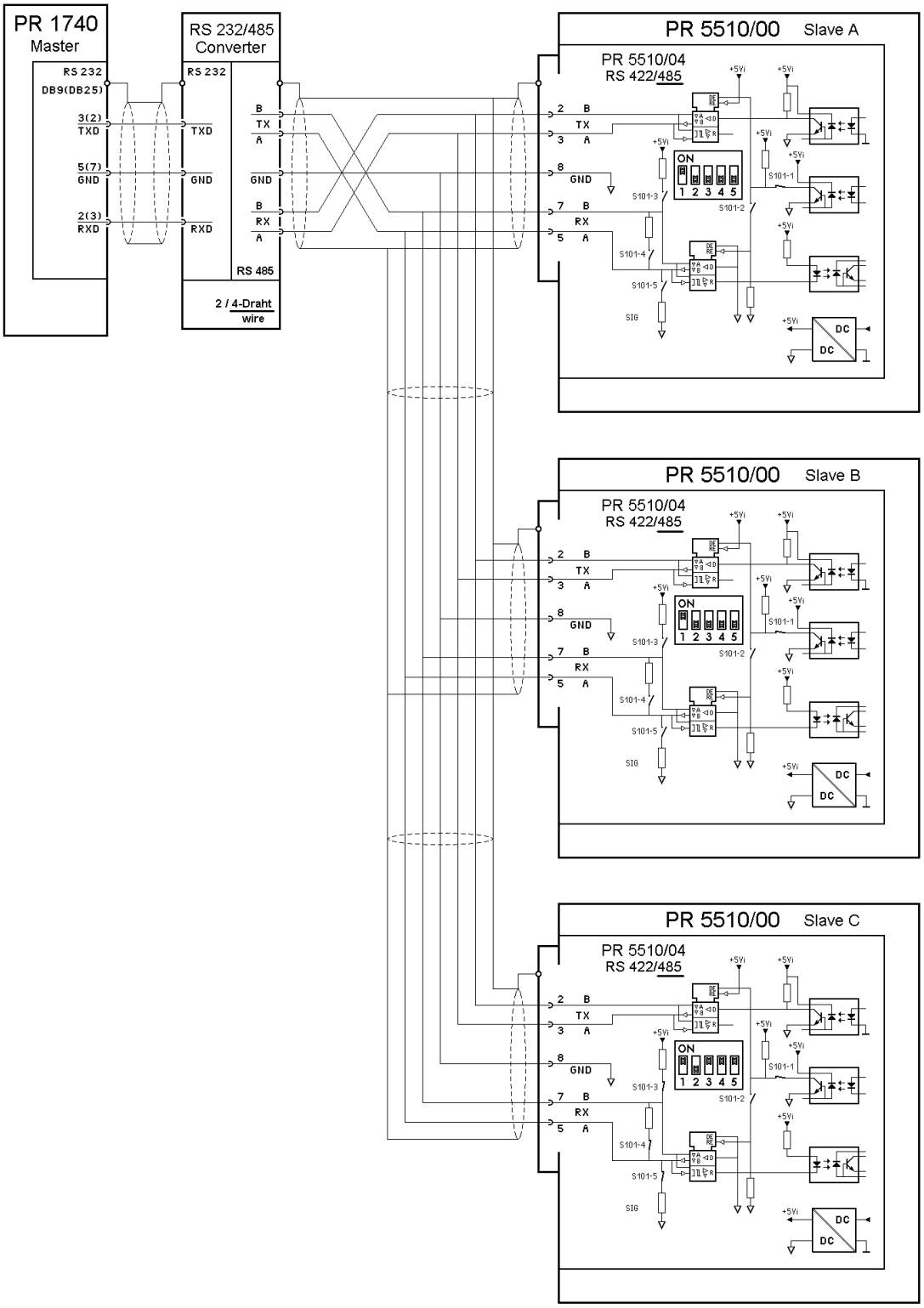
- PR1627 Remote Displays



Remark: The example requires special programming PR1750 (master-slave telegrams to PR1627)

♦ PR1740 Master-Slave

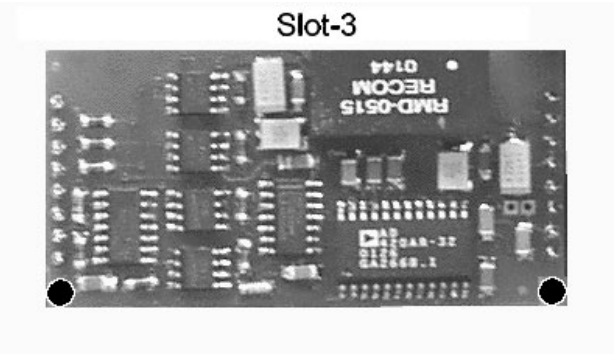
Example: "standard" EW communication (master-slave) of recipe manager PR1740 (master) with the three connected PR5510/00 weighing points (RS 485 multi-point communication, slave A, B, C).
A RS 232 / RS 485 converter is required, because PC-COM1, 2 are available only as RS 232.

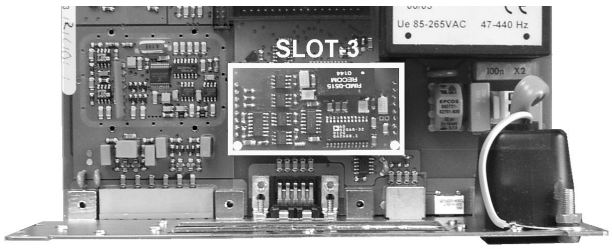


PR5510 configuration : [SETUP]-[SERIAL PORTS]-Slot1/2-RS 485 protocol: EW-COM V3

4.2.2 PR5510/06 analog output card

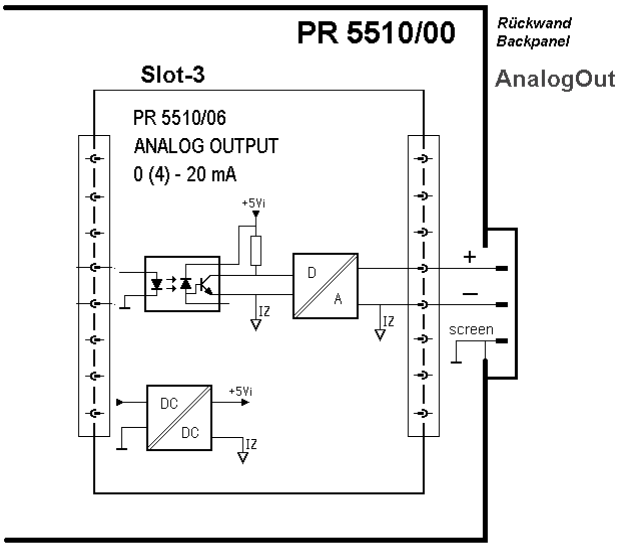
The module is used application-dependently (e.g. PRO-X4) for analog value output of the displayed weight (gross/net) or, with batching license (BATCH-X4), for set-point output of an A1 component (batch mode). With additional special programming, the module is also used for output of analog signals to external instruments and controllers.

<table>
<tr><td colspan="2" rowspan="2">Circuit board plugs directly into the InLine socket, without further mechanical facilities, flat cable or connector
 

Note that the correct plug-in direction is indispensable!
 
</td><td>Connection mode:</td><td>3-pole Combicon Connector:AnalogOut (already mounted in the basic instrument)</td></tr>
<tr><td>X603</td><td> 
</td></tr>
<tr><td colspan="2" rowspan="13"></td><td>Number of outputs:</td><td>1 current output 20mA,
(10 V output only with external 500Ohm resistor</td></tr>
<tr><td>Output:</td><td>Gross, net weight or application-dependent</td></tr>
<tr><td>Range:</td><td>0/4 ... 20mA, configurable and adaptable via software</td></tr>
<tr><td>Resolution:</td><td>16 bits binary, 20.000 internal divisions for e.g. 0 - 20 mA</td></tr>
<tr><td>Linearity error:</td><td>@ 0 - 20mA: 0,04 %
@ 4 - 20 mA: 0,02 %</td></tr>
<tr><td>Temperature effect:</td><td>< 100 ppm/K</td></tr>
<tr><td>Zero error:</td><td>0,05 %</td></tr>
<tr><td>FSD error:</td><td>< 0,1 %</td></tr>
<tr><td>Load:</td><td>max. 0 ... 500 Ohm</td></tr>
<tr><td>Short circuit proof:</td><td>yes</td></tr>
<tr><td>Potential isolation</td><td>yes</td></tr>
<tr><td>Dimensions (LxWxH):</td><td></td><td>Cable length (screened):</td><td>150 m (current output)</td></tr>
<tr><td>Weight:</td><td></td><td>Accessories:</td><td>3-pole plug-in/screw type Combicon socket</td></tr>
</table>

This options card **can be plugged only into SLOT 3 (two Inline sockets).** No further mounting in the rear panel is necessary, because the 3-pole connector (screw terminals): AnalogOut is already fitted in the basic instrument.
The adaptation of the 4 and 20 mA output current is possible via software, see chapter 4.2.2.1

☑ After installation of the card, a COLD start is necessary. Otherwise, a >>> continuous beep is output. Already existing data must have been saved **previously**, calibration and configuration are not lost!

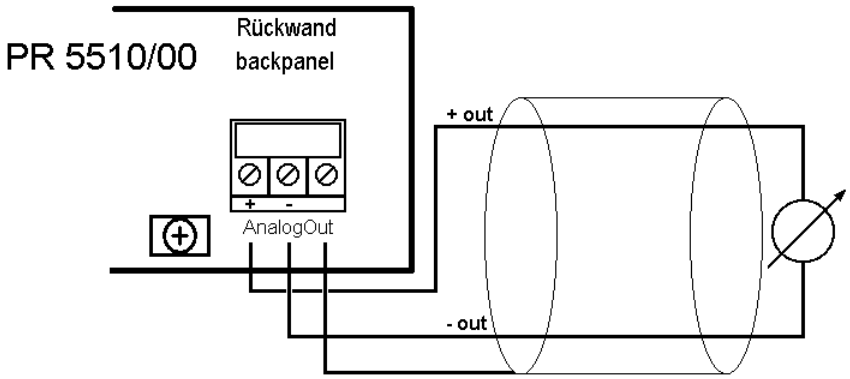


Configuration (modes, error handling) is in the relevant application program during [SETUP]-[CONFIG] OUTPUT-SLOT3 .

Current/voltage change-over is external by connecting a resistor.

After a factory setting, or after erasure of the EAROM [Erase], the output is pre-set to 4...20 mA and gross weight.

Current output:

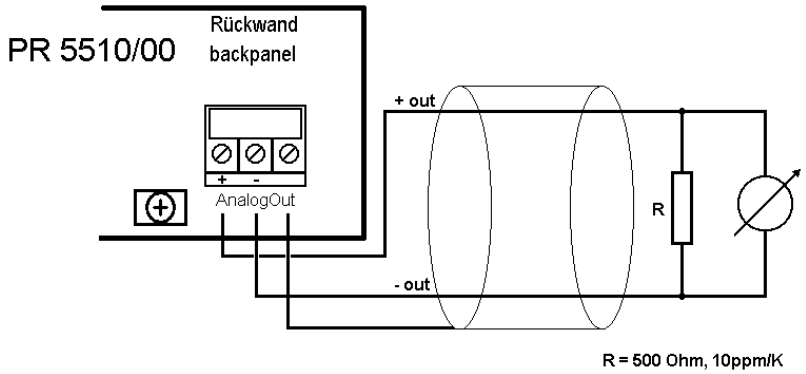


0/4 ... 20mA

Analog signal,
current output

The current is provided directly from the terminals.

Voltage output (external resistor required):



0/2 ... 10V

Analog signal,
voltage output.

The voltage level corresponds to the voltage drop at the 500 Ohm resistor.

Special analog values (0, 4, 20mA) during error condition and with the weight value range exceeded can also be configured (ADC error, weight below ZERO / above FULL SCALE)

☝ In addition to PR5510/06, **one** PR5510/07 analog (4 input channels and 1 output channel) in SLOT 1 or 2 is possible, but only **unless an Ethernet option** PR5510/13 in slot 4 is fitted.

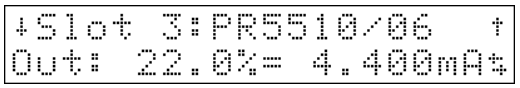
4.2.2.1 Analog output adaptation

The current of the analog output can be adapted in the range of ±1 mA.
This adaptation is necessary, if due to subsequent conversion(s) small deviations occur.

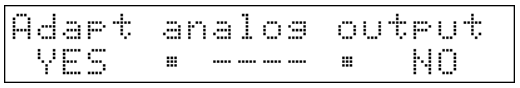
Prerequisites are :
PR5510/06 analog output card or PR5510/07 analog input/output card
The application (e.g. BATCH, IBC) has to support the analog output !

Adaptation sequence
The menu can be reached with [Setup]-[I/O Slots]

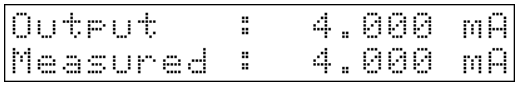
Select with ↓/↑ the slot in which the e.g. PR5510 card is fitted



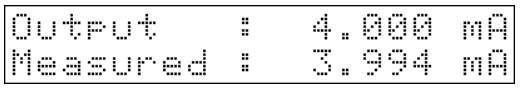
Press first the **left** ↺ **and following within 2 s** OK.
The instrument asks for safety confirmation



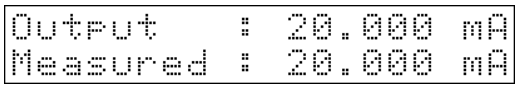
If [YES] is selected the value for 4 mA appears:
If [No] is selected, return to the previous menu



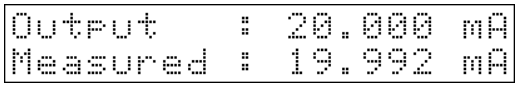
In the field [measured] the value can be overwrittten by the measured value deviating (±1 mA) from 4 mA and confirmed by OK



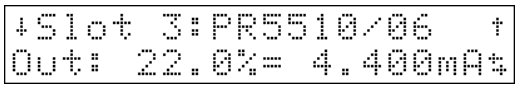
The value for 20 mA appears



In the field [measured] the value can be overwrittten by the measured value deviating (±1 mA) from 20 mA and confirmed by OK

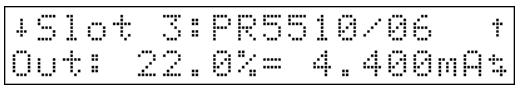


The correction values are calculated and stored, instrument returns to the previous menu

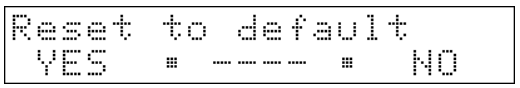


Restore default settings

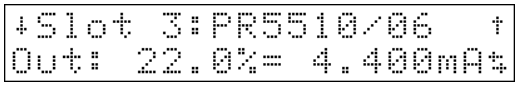
Select with ↓/↑ the slot in which the e.g. PR5510 card is fitted



Press first the **right** ↻ **and following within 2 s** OK.
The instrument asks for safety confirmation



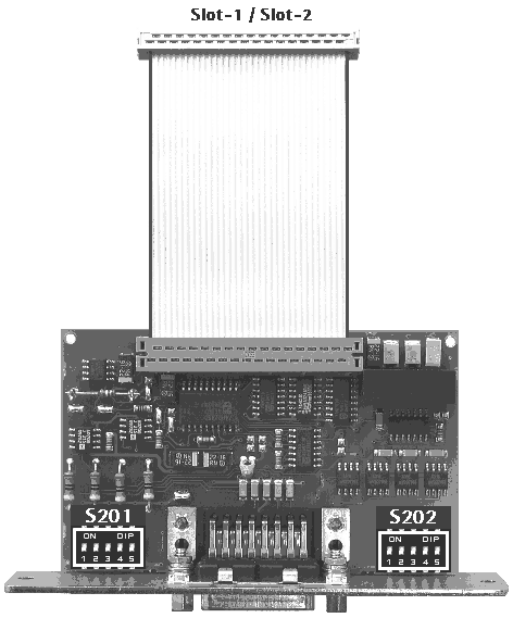
With [Yes] the factory settings are stored back,
with [No] the adapted values are kept

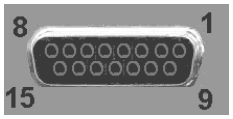
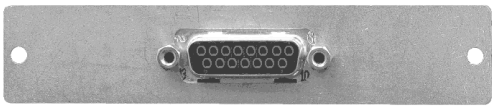


If at [Setup]-[Reboot]-[Bios] the function [Erase] is done, the entered adaptation is lost and replaced by the factory settings!

4.2.3 PR5510/07 Analog Input/Output

Circuit board module for mounting in the instrument, with 15-pole SubD socket for 5 analog channels,
Built as 1x analog output (active) and 4x analog inputs (passive)
The module is mounted mechanically in rear panel cutout-1 or 2, and inserted electrically into SLOT-1 or 2 on the main circuit board by means of the flat cable.



Connection type (internal):	34-pole multi-pin connector on flat cable only for Slot-1 or 2
Connection type (external):	Two row 15-pole SubD socket in the mounting plate
	
Output:	1 current output, voltage by use of external resistor (for spec.: Refer to o PR1713/06).
Inputs:	4 channels for current or voltage input
Range, input:	0 ... 20 mA, input resistance 250 Ohm 0 ... 10 V, input resistance 100 kOhm 0 ... 5 V, input resistance >10 MOhm
Resolution, input:	3,000 internal counts represent e.g. 0 - 20 mA / 0 ... 10 V
Accuracy, input:	0.2 %
Linearity error, input:	< 0.03 %
Temperature error, input:	< 50 ppm/K
Dimension (LxWxH):	
Weight:	
Potential isolation:	Yes for output, no for inputs
Range reserve, input:	+- 15%, i.e. -1.5V ... +11.5V
Accessories:	1 Connector SubD 15-pole

If slot-4 is fitted with a Ethernet card PR5510/04, use of a 2nd .analog output (active) is not allowed.
Max two active analog output-channels are possible! Reason: power supply load

☑ After installation of the card, a COLD start is necessary, otherwise a >>> continuous beep is output.
Already existing data must be saved **previously,** calibration and configuration data are not lost!

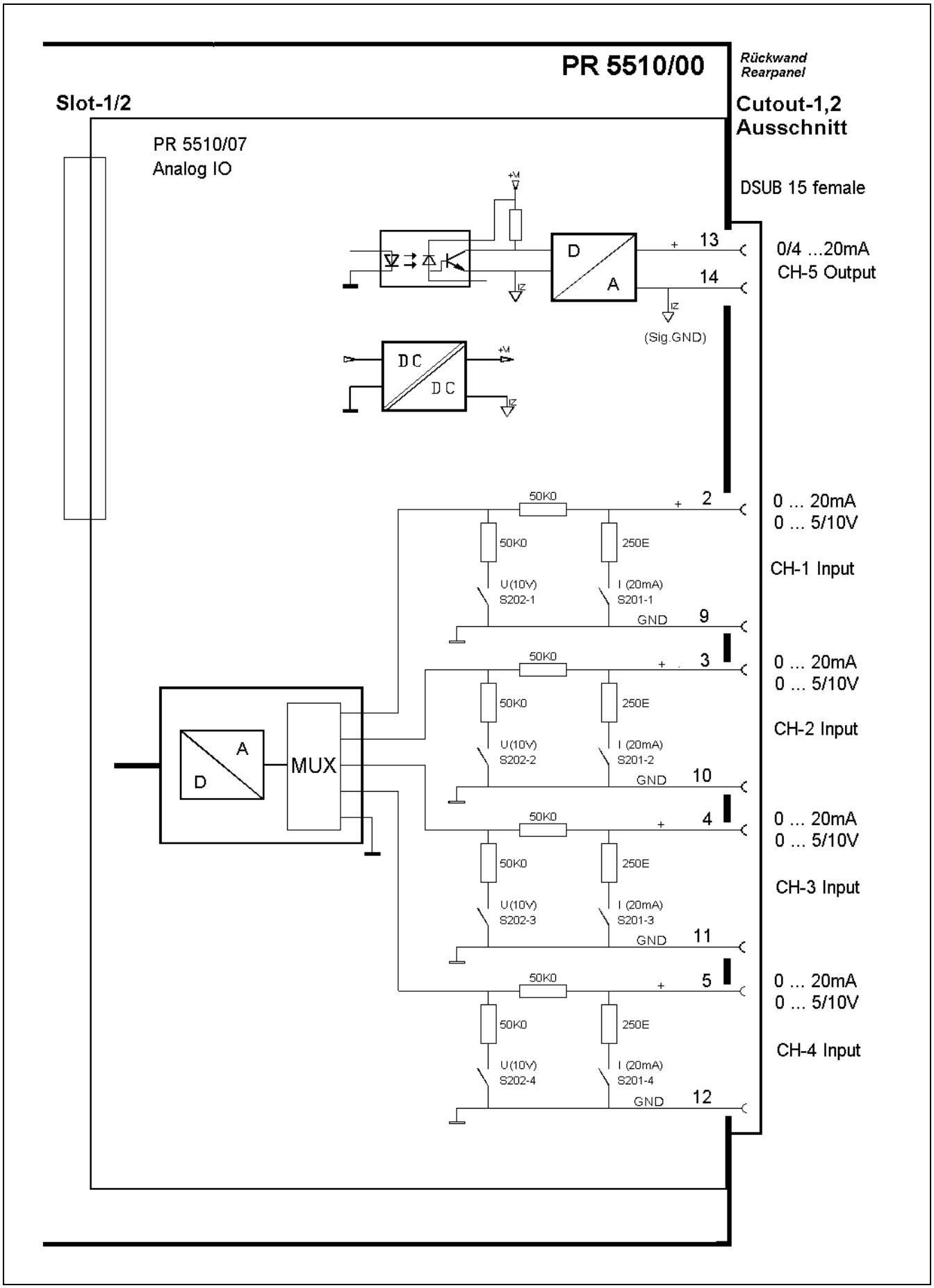
The **analog output** circuitry is identical with the output of **PR5510/06** *(☞ siehe PR5510/06.)*
The adaptation of the 4 and 20 mA output current is possible via software, see chapter 4.2.2.1

The **analog input** has **4 channels** with common ground, **no galvanic isolation** between internal and external electronics.

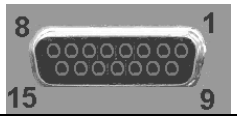
The analog channels have no „standard" functionality, means they have to be customized by additional IEC 61131 special-programming. Except by use of application-software like:

- FLOW from R2.1x are I/O-channels configurable as setpoint-AI and /or setp-,flow-,gross-AO
- BATCH by use of analog component A1,A2 with related SPM_IO-addresses

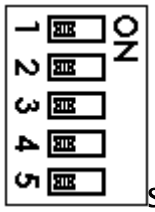
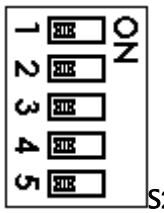
(☞ details see appropriate application manuals)


PR 5510/00
Rückwand
Rearpanel
Slot-1/2
Cutout-1,2
Ausschnitt
PR 5510/07
Analog IO
DSUB 15 female
D
A
13
14
0/4 ...20mA
CH-5 Output
(Sig.GND)
DC
DC
50K0
250E
U(10V)
I (20mA)
S202-1
S201-1
GND
2
9
0 ... 20mA
0 ... 5/10V
CH-1 Input
S202-2
S201-2
3
10
CH-2 Input
S202-3
S201-3
4
11
CH-3 Input
S202-4
S201-4
5
12
CH-4 Input
MUX

Connection layout of DSUB 15 socket

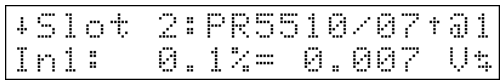
DSUB 15	**Input** 4 channel	PIN2 + CH1	PIN9 GND	PIN3 + CH2	PIN10 GND	PIN4 + CH3	PIN11 GND	PIN5 + CH4	PIN12 GND
DSUB 15 	**Output** 1 channel	PIN13 I +	PIN14 I - GND (ext.)						

Configuration of analog Inputs (current or voltage-signal):

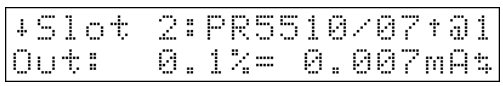
Analog input signal selection	Input channel	**Current 0...+ 20mA DC**	**Voltage 0...+ 10V DC**	**Voltage 0...+ 5V DC**	**Not used**
		Setting of switches:			
 S201	CH1	ON	OFF	OFF	ON
	CH2	ON	OFF	OFF	ON
	CH3	ON	OFF	OFF	ON
	CH4	ON	OFF	OFF	ON
	----	----	----	----	----
 S202	CH1	OFF	ON	OFF	ON
	CH2	OFF	ON	OFF	ON
	CH3	OFF	ON	OFF	ON
	CH4	OFF	ON	OFF	ON
	----	----	----	----	----
Input impedance		250 Ohm	100 kOhm	> 10 MOhm	

Configuration of analog output (current 0...20mA or 4...20mA, scaling) only by related applications e.g. FLOW, BATCH... possible *(☞ details see appropriate application-manuals ...)*

Testfacilities: In [Setup-I/O Slots]



Selection of used slots-1 or 2
all analog input channels available: In1...In4



Analog output channel available: Out

4.2.4 PR5510/08 BCD output

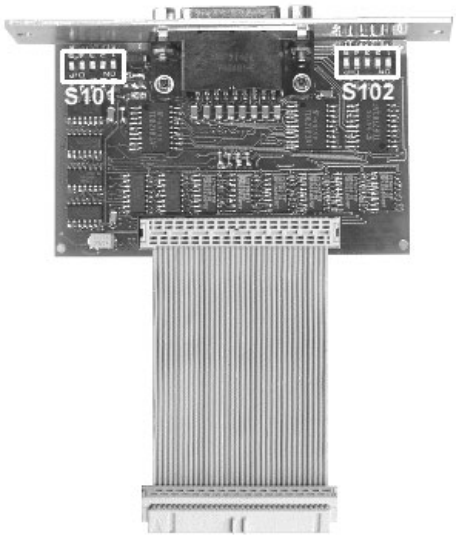
(open emitter, collector at common supply voltage)

Alternatively: open Collector" see PR5510/09, function is equal!

The module is used for BCD-coded weight value (5+1 decades) output as standard (factory setting).
Alternatively, it may be used as a BINARY uncoded pure digital IO card (1 input / 24 outputs).
Selection/adjustment is in [SETUP]-[CONFIG]-[OUTPUT CONFIG]-SLOT1/2 of the relevant application program.

- BCD: cyclical 5-decade weight value output, following the weight display, as gross/net/tare, with 4-bit weight status (sign, standstill, error). The 6-decade value is always consistent in itself and can be output freely, or held by a digital input DATA_IN.
- BINARY: cyclical 24-bit output with a 1-bit input. Configuration is similar to digital IO PR5510/12, with slot number and with the SPM bit addresses freely assignable to the individual IO numbers.

With additional IEC 61131 special programming, the module can be used also for output of other variables to external instruments and controllers or as a parallel interface to the PLC.



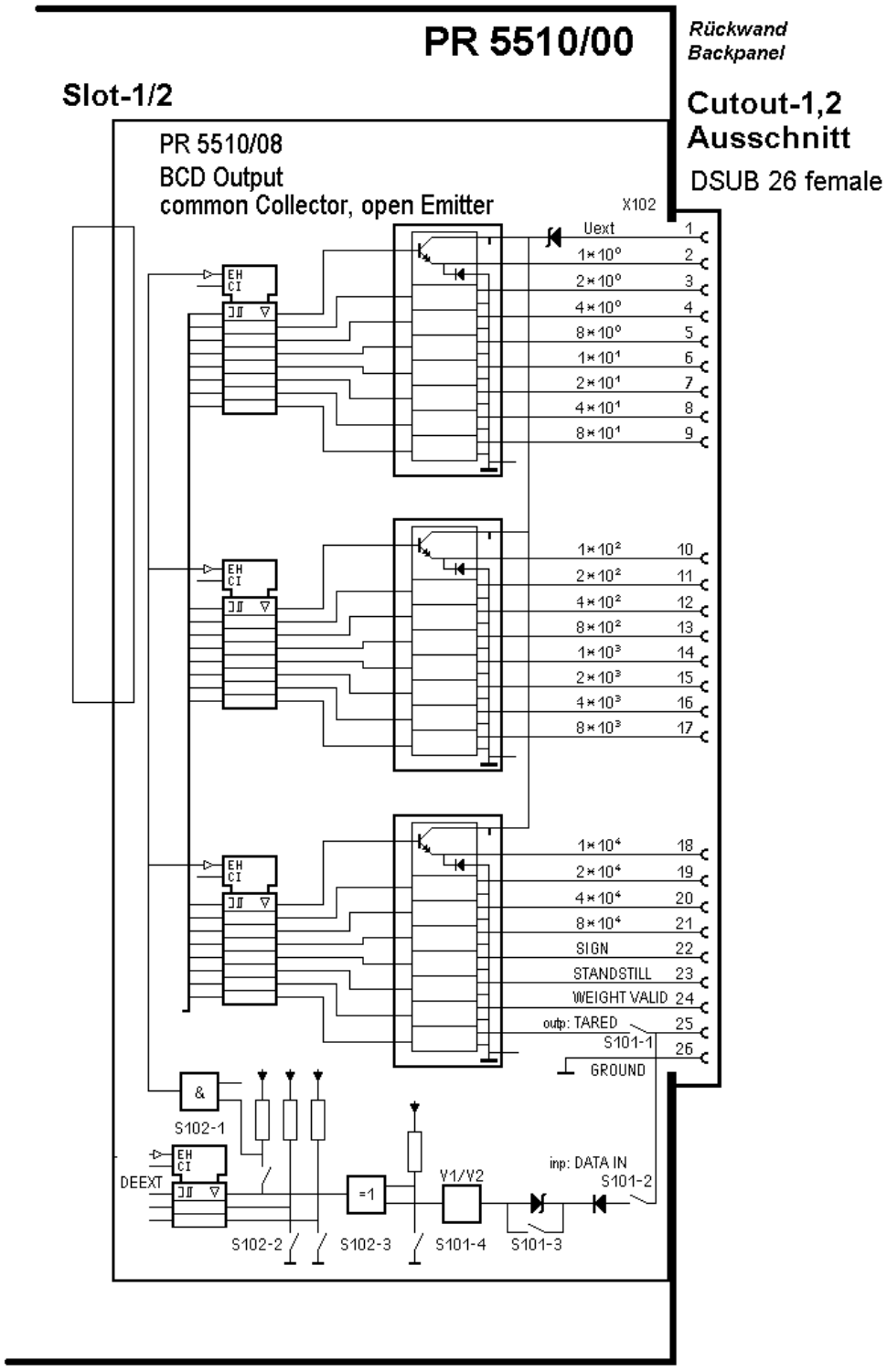
Slot-1 / Slot-2

		Connection mode:	1x DSUB 26-pole socket (female)
		X102	
		Number of outputs: **Number of inputs:**	Output: 6 digits BCD or 24 bits binary (with I/O config), Input: 1 bit (DATA IN)
		Output stage:	Common collector at +Uext., open emitter (load->ground)
		External supply:	+5 V ... +24 V, max. 32 V
		Voltage drop:	Approx. 1.7 V
		Output current:	Max. 50 mA
		Input (enable):	5 V / 24 V adjustable via DIL-S101 @ 5 V high > 3.1 V, low < 1.5 V @ 24 V high > 16 V, low < 10V protected against wrong polarity
		Potential isolation:	No
Dimensions: (LxWxH):	60x106x22	**Cable length (screened):**	Max. 50 m
Weight:	55g	**Accessories:**	1x connector counterpart DSUB26 (male) incl. screening hoods
		Optional:	3m pre-fabricated connecting cable with DSUB26, the other end is open

The options card plugs into SLOT 1 or SLOT 2 and must be mounted in cut-out 1, 2 in the rear panel.
When mounting, additional "hardware" settings on DIL switches S101,102 are necessary.

☑ Card installation must be followed by a COLD start. Otherwise, a >>> continuous beep is output. Already existing data must have been saved **previously**, calibration and configuration are not lost!

The card can be used only in conjunction with an application package or a special program in IEC 61131. The "program" must convert binary data, if output in BCD format is required.



External supply required : PIN 1 - Uext, reference potential PIN 26 – GND

Avoid ground loops to GROUND !

- Outputs PIN 2 .... 24(25*)

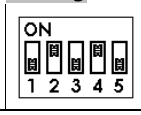
of module PR5510/08 operate with **common supply voltage** as reference potential (collectors) and open emitter outputs: a passive output is of high impedance, an active output means that a voltage which is by approx. 1,7V lower than the supply voltage is applied.

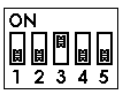
The load is connected across the emitter output [pin 2 ... 24, (25*)] and GND [pin 26]

- PIN 25* as an input

DATA_IN controls all 23 outputs . For the output data, the input function is "free/hold/tristate" and configurable for TTL/24V active (high/low) signal additionally. It is applied to pin 25 – DATA_IN of the 26-pole connector and is effective only with DIL switch S101-2 = ON.
DATA_IN can be used also as a "normal" dig. input in the pre-selected BINARY mode,
via [SETUP]-[IO-SLOTS] with SlotNum-IOChannel-SPMbit

***PIN 25 is both an OUTPUT or INPUT (dependent on DIL switch S101-1, 2 alternative)**

			Factory setting 	**S101**	**-1**	**-2**	**-3**	**-4**	**-5**
				Selector for:	*DA*	*DE*	*Level*	*Level*	-
OUTPUT DO	TARED			Pin 25	ON	OFF	x	x	x
INPUT DI	DATA_IN			Pin 25	OFF	ON			x
If DI	DATA_IN	5V-TTL	active HIGH	Pin 25	OFF	ON	ON	ON	x
If DI	DATA_IN	5V-TTL	active LOW	Pin 25	OFF	ON	ON	OFF	x
If DI	DATA_IN	24V	active HIGH	Pin 25	OFF	ON	OFF	ON	x
If DI	DATA_IN	24V	active LOW	Pin 25	OFF	ON	OFF	OFF	x

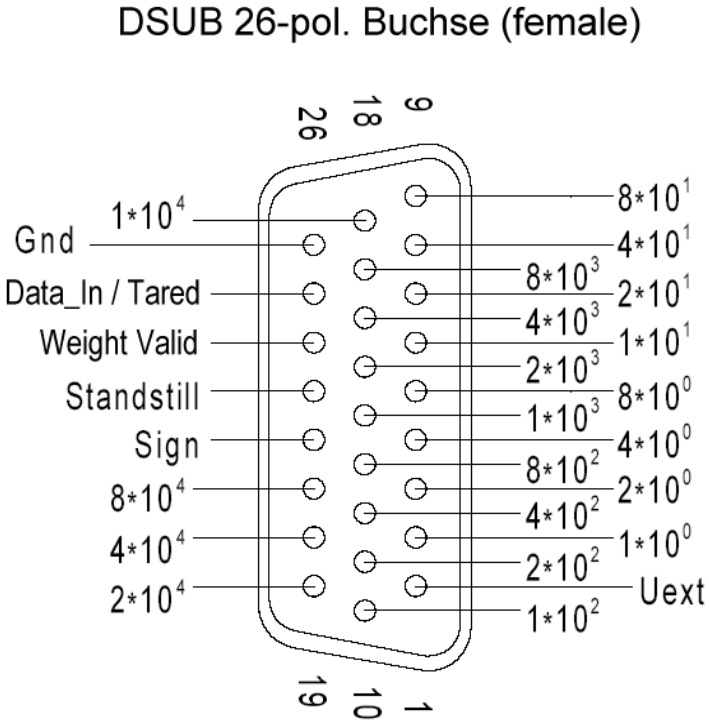
			Factory setting 	**S102**	**-1**	**-2**	**-3**	**-4**	**-5**
				Selector for:	*Function*	*Function*	*Function*	-	-
Pin25 DO	TARED	follow	follow	Pin 2...24	OFF	OFF	OFf	x	x
		passive	*active*						
Pin25 DI	DATA_IN	follow	hold	Pin 2...24	OFF	OFF	ON	x	x
	DATA_IN	tristate	follow	Pin 2...24	ON	ON	OFF	x	x
	DATA_IN	tristate	hold	Pin 2...24	ON	ON	ON	x	x

Combination: output=input (S101-1 ON and S101-2 ON) is not permitted!

Signal level:

DATA IN (PIN25)		Logic level	Input current
high	5 V mode	> 3.1 V	0,5 mA
low	5 V mode	< 1.5 V	0,3 mA
high	24 V mode	> 16 V	1,0 mA
low	24 V mode	< 10 V	0,5 mA

PR5510/08 connector, pin allocation, connecting cables (PR5510/08 option), second cable end open :

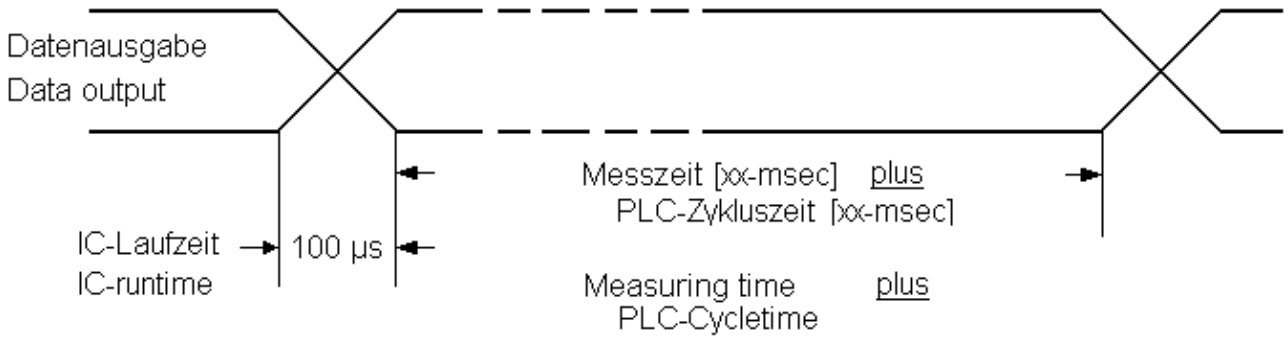


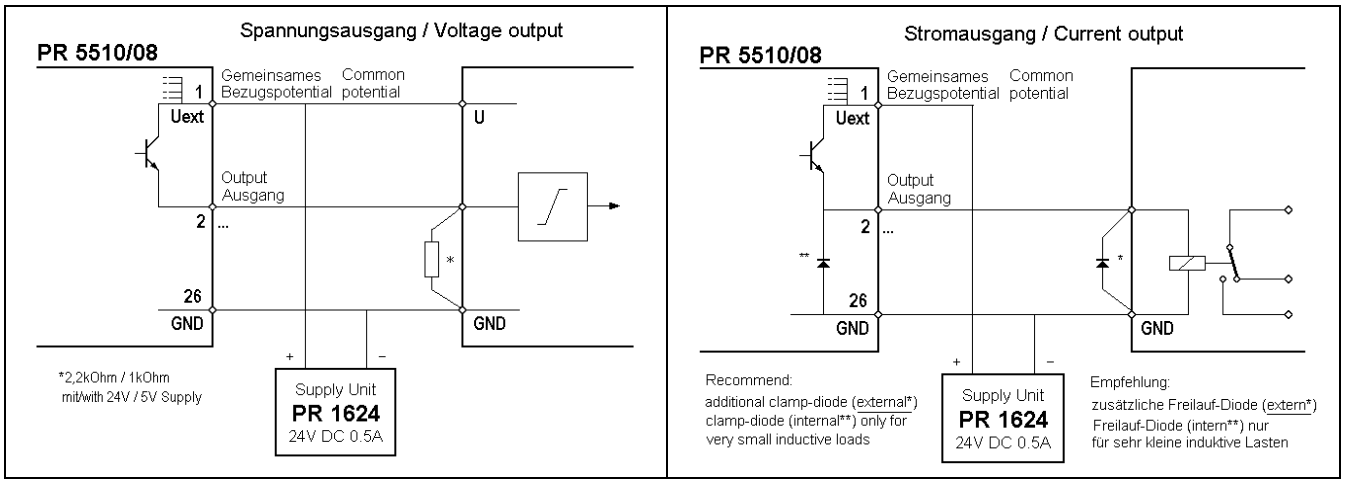
Configured as a BCD output (weight value)

4.2.4.1 Application

Module PR5510/08 can be set for various output modes by combination of S101 and S102 DIL switch positions. Complete BCD card control is by the firmware. Cyclical* value output, i.e. actual BCD conversion, is by the IEC 61131 application software, which must be taken into account with special IEC 61131 programs. All other functions are handled by the driver modules on the options card.
*at intervals of 20msec with batching systems (BATCH, IBC, FILL...), otherwise (PRO, LOG...) intervals of 50msec.
Due to the asynchronous measuring time/PLC cycle, the times must be summed up: measuring time+cycle

BCD data output is always consistent, i.e. all 6 decades indicate one value. Driver runtimes 100µs are negligible. I.e. a special STROBE signal is not provided!





♦ SETUP - Addressing ([SETUP]-[CONFIG] input/output config...) in BINARY mode :

The displayed module address corresponds to the internal socket: SLOT-n , whereby only n= 1 or 2 is possible physically for PR5510/08. The module address is displayed automatically during [SETUP]-[IO_SLOTS] after card detection (cold start). In the application-dependent [SETUP]-[CONFIG] the numbers of the relevant IO channels are:

No.1 for inputs and no.1 ... 23 for outputs

A function = SPM address from the valid range must be allocated to each individual IO channel.
As factory setting, there is an application-dependent "standard" allocation after initial start, which can be left unchanged or changed permanently (saved in EA-ROM after SAVE command).

♦ IEC 61131- direct addressing (special programs)

The module address corresponds to the SLOT position: n , whereby only n= 1 or 2 is possible for PR5510/12 .
The SPM address (debug address) is a function of SLOT no. and bit no. [slot.bit].

For outputs 1 to 24:	%MD42	5dec.BCD+4bit STATUS	
For outputs 1 to 24:	%MB168 ... %MB171	bytewise	
For input 1:	%IX n.0	bitwise	with Slot n = 1 or 2

♦ List peripheral modules

There are no special peripheral modules for the PR5510/08 module.
The optional cable is provided for parallel connection to other instruments, e.g. an external PLC. Fitted with DSUB connector at one end, the other end is open.

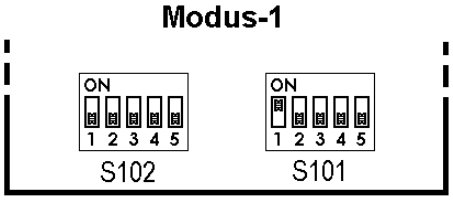
4.2.4.2 Output-modes

♦ **Mode 1 : continuous data output (follow), no DATA_IN (hold/tristate):**

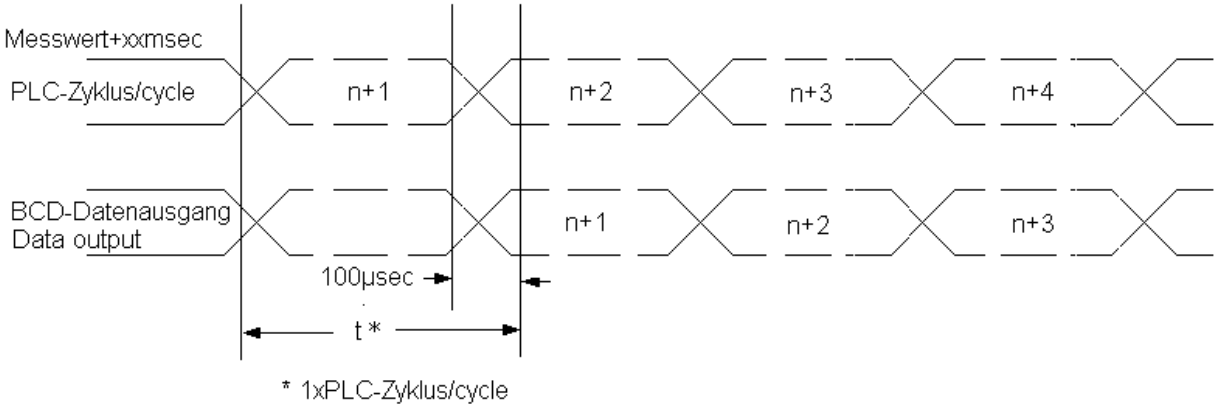
Continuous, free output of consistent data, without request.
Can be used only as a point_to_point (instrument->instrument) connection, e.g. as a remote display (BCD indicator).

- Data are output at each PLC cycle (IEC 61131 application program)
- The driver modules are always enabled.
- PIN25 is IEC 61131 application output (standard=TARED)

Hardware settings :



Timing diagram:

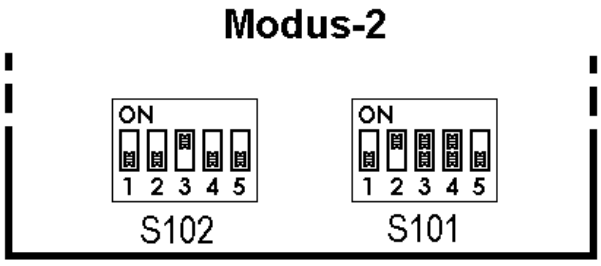


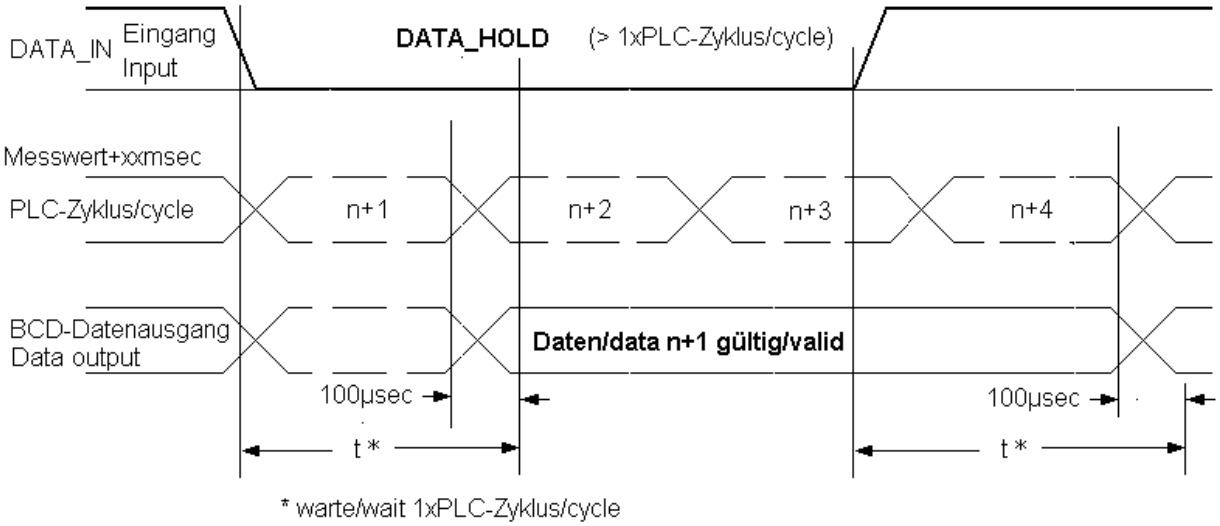
♦ Mode 2 : data output on external request DATA_IN (hold):

Output of consistent data in "hold" condition, otherwise free.
Can be used only as a point_to_point (instrument->instrument) connection, e.g. to the PLC.

- Data are output during each PLC cycle (IEC 61131 application program), as long as DATA_IN is active, the last output value is "held".
- The driver modules are always enabled.
- PIN25 DATA_IN is Data-hold (level ☞ *S101-3*, polarity ☞ *S101-4*, application-dependent)

Hardware settings :





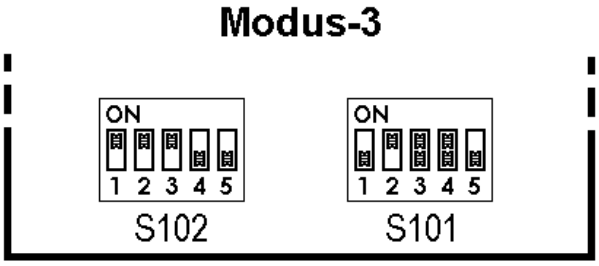
*** Note:**
Internal data transfer (data change) to the output memory may be at the moment, when the ext. request signal changes from "Data Hold" to "Data valid". This means that the requesting instrument has to wait during 100 µs, until data can be considered as valid.

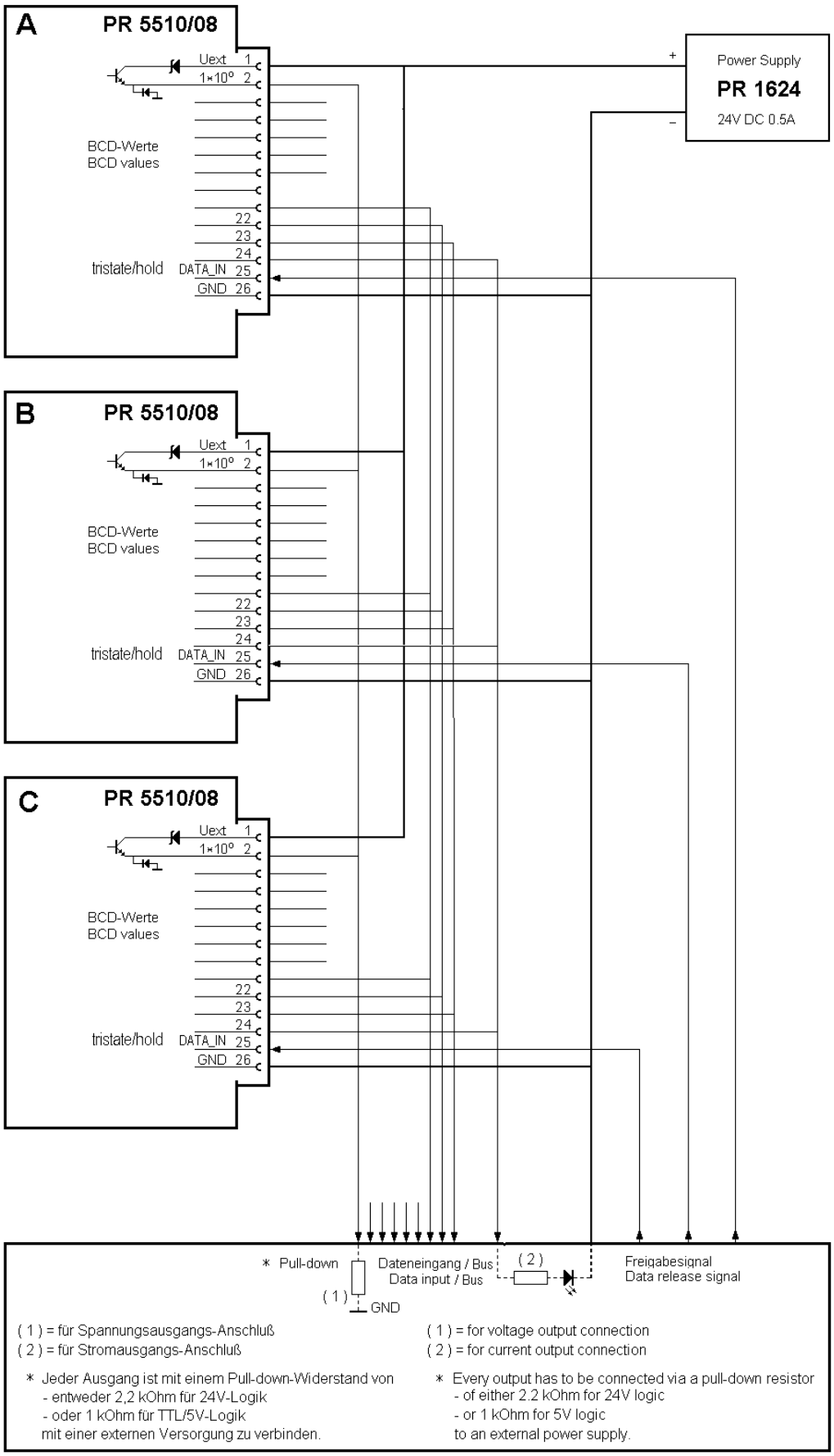
♦ Mode 3 : parallel BUS system (tristate), external request DATA_IN (hold):.

Parallel connection of x PR5510/08 modules, controlled via the DATA_IN (tristate/hold) input.
Output of consistent data in "hold" condition on request, otherwise Tristate (high impedance).

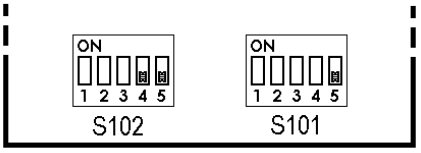
- Data are output at each PLC cycle (IEC 61131 application program),
  as long as DATA_IN is active, the last output value remains held (hold)
- The driver modules are enabled only (not Tristate), when DATA_In (hold) is active.
- PIN25 DATA_IN is Data-enable+hold (level ☞ *S101-3*, polarity ☞ *S101-4*, application-dependent)

Hardware settings :

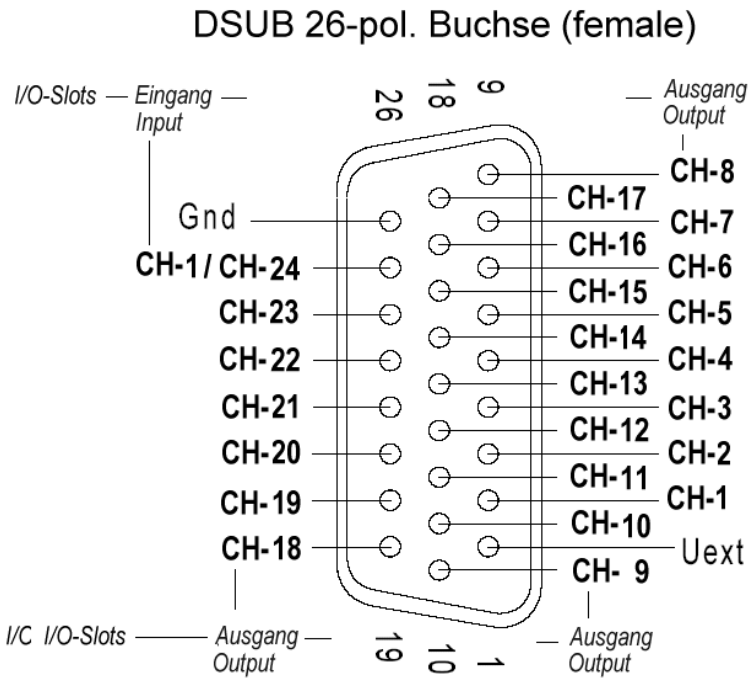



A
PR 5510/08
Uext 1
1×10° 2
BCD-Werte
BCD values
22
23
24
tristate/hold
DATA_IN 25
GND 26
+
Power Supply
PR 1624
24V DC 0.5A
–
B
PR 5510/08
Uext 1
1×10° 2
BCD-Werte
BCD values
22
23
24
tristate/hold
DATA_IN 25
GND 26
C
PR 5510/08
Uext 1
1×10° 2
BCD-Werte
BCD values
22
23
24
tristate/hold
DATA_IN 25
GND 26
* Pull-down
(1)
GND
Dateneingang / Bus
Data input / Bus
(2)
Freigabesignal
Data release signal
(1) = für Spannungsausgangs-Anschluß
(2) = für Stromausgangs-Anschluß
* Jeder Ausgang ist mit einem Pull-down-Widerstand von
- entweder 2,2 kOhm für 24V-Logik
- oder 1 kOhm für TTL/5V-Logik
mit einer externen Versorgung zu verbinden.
(1) = for voltage output connection
(2) = for current output connection
* Every output has to be connected via a pull-down resistor
- of either 2.2 kOhm for 24V logic
- or 1 kOhm for 5V logic
to an external power supply.

[PR5510/08 open emitter] interface configuration sheet (BCD)

Modus 				Debug addr. Output: %MD42 Output: %MB168-170 Output: %MX336-360 .Bit no.-			**Slot-no. [n]:** [n = 1 ... 2] **Ausschnitt [n]:** **Cutout**
Address SPM-	Ident	Logic active 1/0 not noted =1		DB26 pin no.	Channel no. CH-		Instrument, actuator, sensor, target description, drawing ...
Value.	Function / description					Wire colour	Remark
6-dec. BCD outputs			**>**				
10*0 /10*1			%MB168				
1			0	2	1	brown	
2			1	3	2	green	
4			2	4	3	yellow	
8			3	5	4	grey	
10			4	6	5	pink	
20			5	7	6	blue	
40			6	8	7	red	
80			7	9	8	black	
10*2 /10*3			%MB169				
100			8	10	9	violet	
200			9	11	10	grey-pink	
400			10	12	11	red-blue	
800			11	13	12	white-green	
1000			12	14	13	brown-green	
2000			13	15	14	white-yellow	
4000			14	16	15	yell.-brown	
8000			15	17	16	white-grey	
10*4 / (10*5)			%MB170				
10000			16	18	17	grey-brown	
20000			17	19	18	white-pink	
40000			18	20	19	pink-brown	
80000			19	21	20	white-blue	
-			20	22	21	brown-blue	
-			21	23	22	white-red	
-			22	24	23	brown-red	
-			23	25	24	white-black	
1 input (DATA_IN)			**<**				
			%IXn.0				
-			0	25	1	white-black	
Common potential							
+U external				1		white	
GND				26		brown-black	

- **Mode 4 : Continuous single bit output (23xDA), DATA_IN (1xDE):**



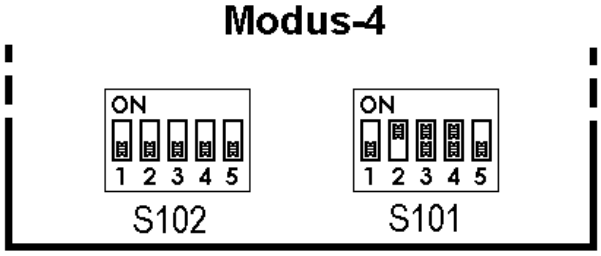
Configured as single bit IO (IO-SLOTS config)

Continuous output of allocated SPM bits to the IO channels, free without request e.g. application IO interface (1xIN, 23xOUT, configurable in [SETUP]-[IO-SLOTS] On/Off-CH-No-SPMbit)

Can be used only as a point_to_point (instrument->instrument) connection, e.g. for COMPONENT signals (BATCH-X4) and DATA_IN as STOP charge.

Data are output at each PLC cycle (IEC 61131 application program).
The driver modules are always enabled.
PIN25 is IEC 61131 application input (e.g. Stop)

Hardware settings :

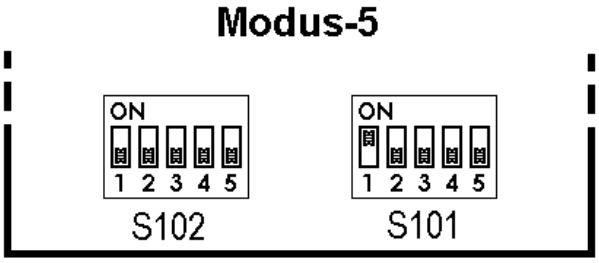


- **Mode 5 : Continuous single bit output (24xDA), no DATA_IN:**

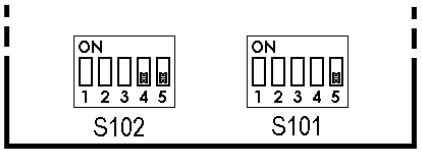
Continuous output of allocated SPM bits to the IO channels, free without request e.g. application IO interface (24xOUT, configurable in [SETUP]-[IO-SLOTS] On/Off-CH-No-SPMbit).
Can be used only as a point_to_point (instrument->instrument) connection, e.g. for COMPONENT signals (BATCH-X4), no DATA_IN.

Data are output during each PLC cycle (IEC 61131 application program).
The driver modules are always enabled.
PIN25 is IEC 61131 application output (e.g. COMPONENT 24)

Hardware settings :



[PR5510/08 open emitter] interface configuration sheet (BINARY)

Modus 				Debug addr.: Output: %MD42 Output: %MB168-170 Output: %MX336-360 .Bit no.-			**Slot-no. [n]:** [n = 1 ... 2] **Ausschnitt [n]: Cutout**	
Address	Ident	Logic active 1/0 *blank means* 1		DB26 pin no.		Channel no. CH-	Instrument, actuator, sensor, target description, drawing ...	
SPM-	Function / description					Wire colour		Remarks
23/24 Outputs			>					
			%MB168					
-			0	2	1	brown		
-			1	3	2	green		
-			2	4	3	yellow		
-			3	5	4	grey		
-			4	6	5	pink		
-			5	7	6	blue		
-			6	8	7	red		
-			7	9	8	black		
			%MB169					
-			8	10	9	violet		
-			9	11	10	grey pink		
-			10	12	11	red-blue		
-			11	13	12	white-green		
-			12	14	13	brown-green		
-			13	15	14	white-yellow		
-			14	16	15	yell.-brown		
-			15	17	16	white-grey		
			%MB170					
-			16	18	17	grey-brown		
-			17	19	18	white-pink		
-			18	20	19	pink-brown		
-			19	21	20	white-blue		
-			20	22	21	brown-blue		
-			21	23	22	white-red		
-			22	24	23	brown-red		
-			23	25	24	white-black		
1 Input (DATA_IN)			<					
			%IXn.0					
-			0	25	1	white-black		
Common potential								
+U external				1		white		
GND				26		brown-black		

4.2.5 PR5510/09 BCD output

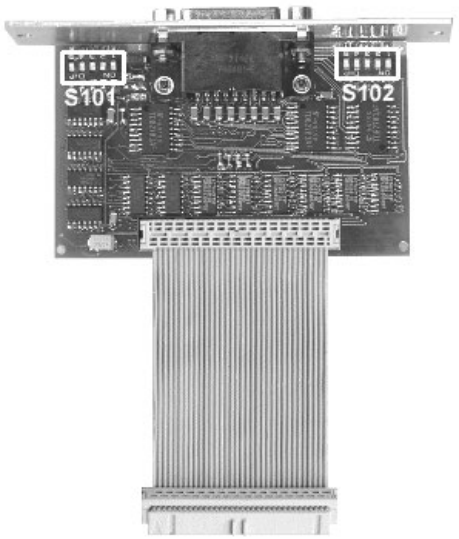
(open collector, emitter at common ground)

Alternativly: "open Emitter" see PR5510/09, function is equal!

The module is used for BCD-coded weight value (5+1 decades) output as standard (factory setting). Alternatively, it may be used as a BINARY uncoded pure digital IO card (1 input / 24 outputs). Selection/adjustment is in [SETUP]-[CONFIG]-OUTPUT CONFIG-SLOT1/2 of the relevant application program.

- BCD: cyclical 5-decade weight value output, following the weight display, as gross/net/tare, with 4-bit weight status (sign, standstill, error). The 6-decade value is always consistent in itself and can be output freely, or held by a digital input DATA_IN.
- BINARY: cyclical 24-bit output with a 1-bit input. Configuration is similar to digital IO PR5510/12, with slot number and with the SPM bit addresses freely assignable to the individual IO numbers.

With additional IEC 61131 special programming, the module can be used also for output of other variables to external instruments and controllers or as a parallel interface to the PLC.

<table>
<tr><td colspan="2" rowspan="2"> 

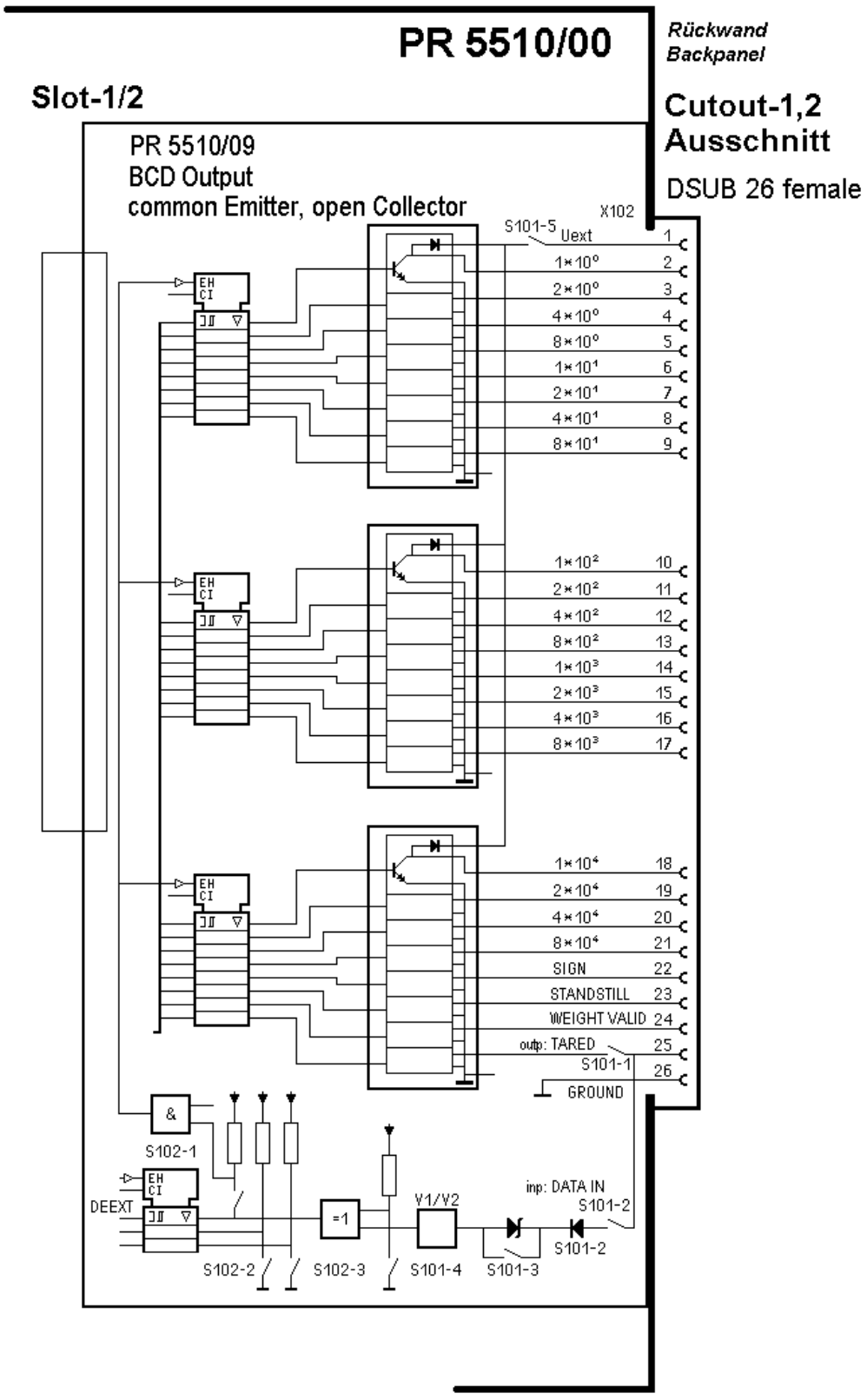
Slot-1 / Slot-2</td><td>Connection mode:</td><td>1x DSUB 26 pole socket (female)</td></tr>
<tr><td>x102</td><td>  </td></tr>
<tr><td colspan="2" rowspan="8"></td><td>Number of outputs:

Number of inputs:</td><td>Output: 6 digits BCD or
24 bits binary (Config),
Input 1 bit</td></tr>
<tr><td>Output stage:</td><td>Common emitter at ground,
open collector (load->Uext)</td></tr>
<tr><td>External supply:</td><td>+5 V ... +24 V, max. 32 V</td></tr>
<tr><td>Voltage drop:</td><td>Approx. 1.7 V</td></tr>
<tr><td>Output current:</td><td>Max. 50 mA</td></tr>
<tr><td>Input (enable):</td><td>5 V / 24 V adjustable via DIL-S101
@ 5 V high > 3.1 V, low < 1.5 V
@ 24 V high > 16 V, low < 10V
protected against wrong polarity</td></tr>
<tr><td>Potential isolation:</td><td>No</td></tr>
<tr><td>Dimensions: (LxWxH):</td><td>60x106x22</td><td>Cable length (screened):</td><td>Max. 50 m</td></tr>
<tr><td>Weight:</td><td>55g</td><td>Accessories:</td><td>1x connector counterpart
DSUB26 (male) incl. screening hoods</td></tr>
<tr><td></td><td></td><td>Optional:</td><td>pre-fabricated 3m connecting cable
with DSUB26, the other end is open</td></tr>
</table>

The options card plugs into SLOT 1 or SLOT 2 and must be mounted in cut-out 1, 2 in the rear panel.
When mounting, additional "hardware" settings of DIL switches S101, 102 are necessary.

☑ Card installation must be followed by a COLD start. Otherwise, >>> a continuous beep will be output.
Already existing data must have been saved **previously**, calibration and configuration are not lost!

The card can be used only in connection with an application package or a special program in compliance with IEC 61131. For output in BCD code, the "program" must provide conversion of binary data.



External supply voltage required : PIN 1 - Uext, reference potential PIN 26 – GND

Avoid ground against GROUND!

- Output PIN 2...25*

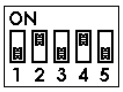
of module PR5510/09 operate with **with common ground** as reference potential and open emitter inputs: A passive output is of high impedance, whilst a voltage by approx. 1,7 V lower than the supply voltage is applied to an active one.

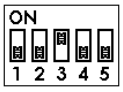
The load is connected across the collector input [pin 2 ... 24,(25*)] and Uext [pin 1]

- PIN 25* as an input

DATA_IN **controls all 23 outputs**. It provides function „"free/hold/tristate" for the output data and is configurable for TTL/24V active (high/low) signal additionally. It is applied to pin 25 – DATA_IN of the 26-pole connector and is effective only with DIL switch S101-2 = ON. DATA_IN can be used also as a "normal" dig. input in the pre-selected BINARY mode, via [SETUP]-[IO-SLOTS] with SlotNum-IOChannel-SPMbit

*** Pin 25 is both an OUTPUT or an INPUT (dependent of DIL switch S101-1, 2 alternative)**

			Factory setting 	**S101** *Selector for:*	**-1** *OU*	**-2** *IN*	**-3** *Level*	**-4** *Level*	**-5** *Dio de*
As OUTPUT	TARED			Pin 25	ON	OFF	x	x	x
As INPUT	DATA_IN			Pin 25	OFF	ON			x
If INPUT	DATA_IN	5V-TTL	Active HIGH	Pin 25	OFF	ON	ON	ON	x
If INPUT	DATA_IN	5V-TTL	Active LOW	Pin 25	OFF	ON	ON	OFF	x
If INPUT	DATA_IN	24V	Active HIGH	Pin 25	OFF	ON	OFF	ON	x
If INPUT	DATA_IN	24V	Active LOW	Pin 25	OFF	ON	OFF	OFF	x
Clamp diode	internal								ON
Clamp diode	internal								OFF

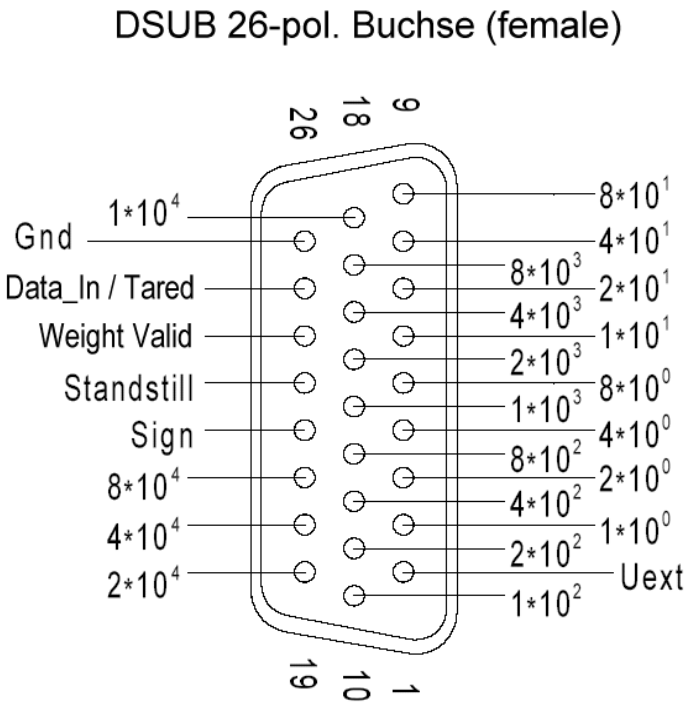
			Factory setting 	**S102** *Selector for:*	**-1** *Funct ion*	**-2** *Funct ion*	**-3** *Funct ion*	**-4** -	**-5** -
Pin25 OUTPUT	TARED	follow	follow	Pin 2...24	OFF	OFF	OFf	x	x
		passive	*active*						
Pin25 INPUT	DATA_IN	follow	hold	Pin 2...24	OFF	OFF	ON	x	x
	DATA_IN	tristate	follow	Pin 2...24	ON	ON	OFF	x	x
	DATA_IN	tristate	hold	Pin 2...24	ON	ON	ON	x	x

Combination: output=input (S101-1 ON and S101-2 ON) is not permitted!

Signal level:

DATA IN (PIN25)		Logic level	I input
high	5 V mode	> 3.1 V	0,5 mA
low	5 V mode	< 1.5 V	0,3 mA
high	24 V mode	> 16 V	1,0 mA
low	24 V mode	< 10 V	0,5 mA

PR5510/09 connector, pin allocation, connecting cables (PR5510/09 option), second cable end open :

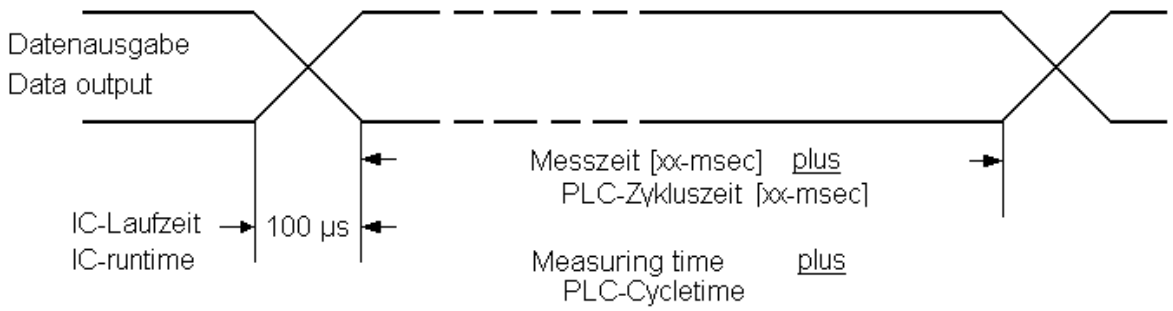


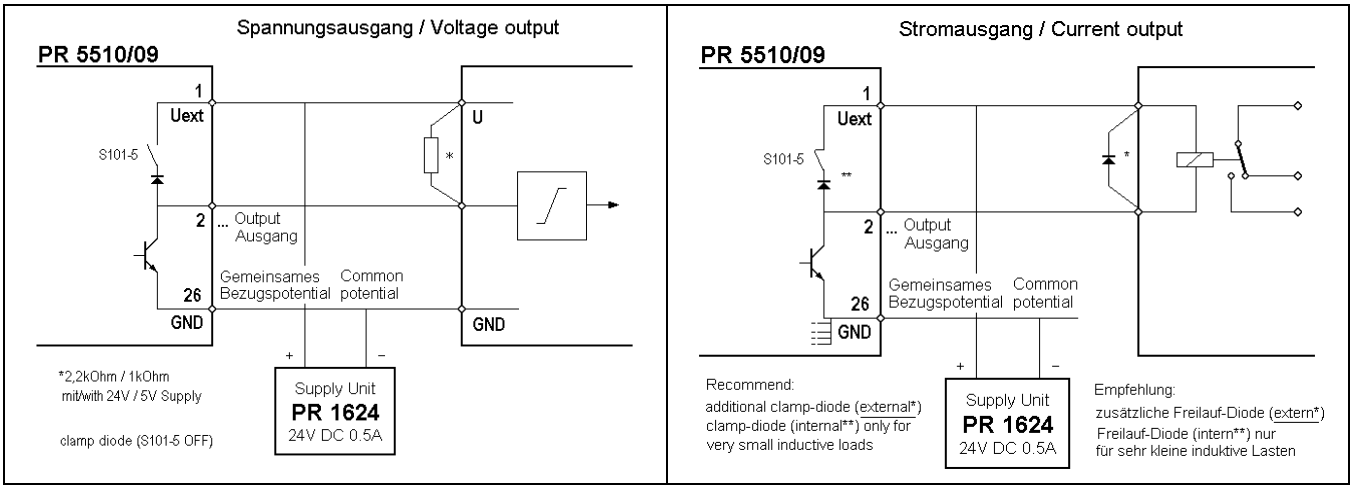
Configured as a BCD output (weight value)

4.2.5.1 Application

Module PR5510/09 can be set for various output modes by combination of S101 and S102 DIL switch positions. Complete BCD card control is by the firmware. Cyclical* value output, i.e. actual BCD conversion, is by the IEC 61131 application software, which must be taken into account with special IEC 61131 programs. All other functions are handled by the driver modules on the options card.
*at intervals of 20msec with batching systems (BATCH, IBC, FILL...), otherwise (PRO, LOG...) intervals of 50msec.
Due to the asynchronous measuring time/PLC cycle, the times must be summed up: measuring time+cycle

BCD data output is always consistent, i.e. all 6 decades indicate one value. Driver runtimes 100µs are negligible. I.e. a special STROBE signal is not provided!





♦ SETUP - Addressing ([SETUP]-[CONFIG] input/output config...) in BINARY mode :

The displayed module address corresponds to the internal socket: SLOT-n , whereby only n= 1 or 2 is possible physically for PR5510/08. The module address is displayed automatically during [SETUP]-[IO_SLOTS] after card detection (cold start). In the application-dependent [SETUP]-[CONFIG] the numbers of the relevant IO channels are:

no.1 for inputs and no.1 ... 23 for outputs

A function = SPM address from the valid range must be allocated to each individual IO channel.
As factory setting, there is an application-dependent "standard" allocation after initial start, which can be left unchanged or changed permanently (saved in EA-ROM after SAVE command).

♦ IEC 61131- direct addressing (special programs)

The module address corresponds to the SLOT position: n , whereby only n= 1 or 2 is possible for PR5510/12 .
The SPM address (debug address) is a function of SLOT no. and bit no. [slot.bit].

For outputs 1 to 24:	%MD42	5dec.BCD+4bit STATUS	
For outputs 1 to 24:	%MB168 ... %MB171	bytewise	
For input 1:	%IX n.0	bitwise	with Slot n = 1 or 2

♦ List peripheral modules

There are no special peripheral modules for the PR5510/08 module.
The optional cable is provided for parallel connection to other instruments, e.g. an external PLC. Fitted with DSUB connector at one end, the other end is open.

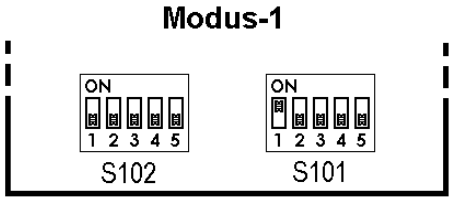
4.2.5.2 Output-modes

♦ **Mode 1 : continuous data output (follow), no DATA_IN (hold/tristate):**

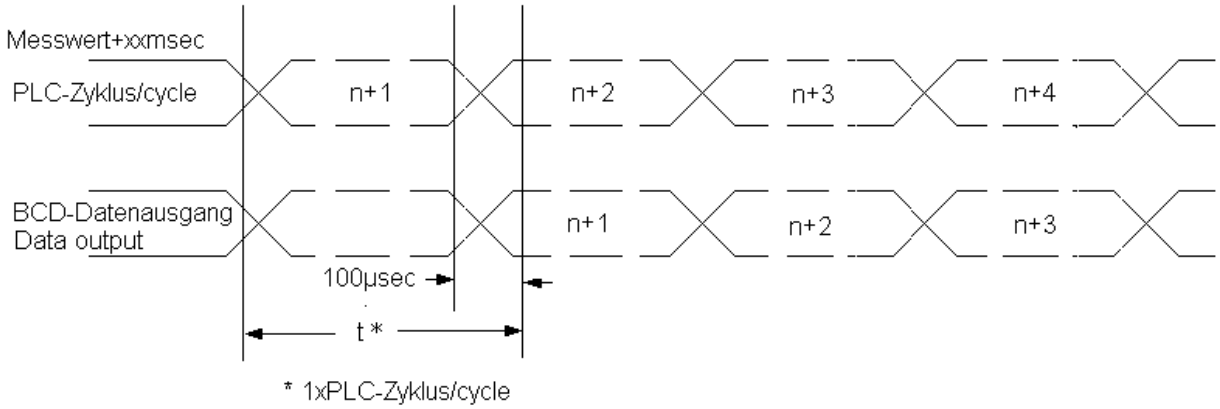
Continuous, free output of consistent data, without request.
Can be used only as a point_to_point (instrument->instrument) connection, e.g. as a remote display (BCD indicator).

- Data are output at each PLC cycle (IEC 61131 application program)
- The driver modules are always enabled.
- PIN25 is IEC 61131 application output (standard=TARED)

Hardware settings :



Timing diagram:

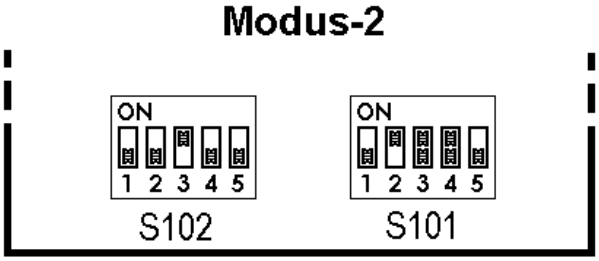


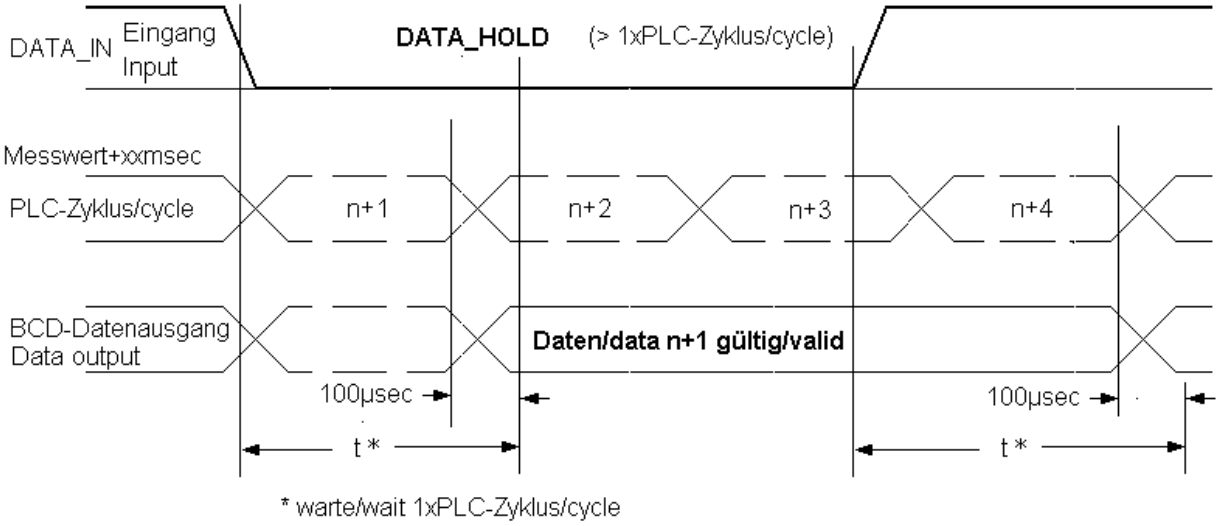
♦ Mode 2 : data output on external request DATA_IN (hold):

Output of consistent data in "hold" condition, otherwise free.
Can be used only as a point_to_point (instrument->instrument) connection, e.g. to the PLC.

- Data are output during each PLC cycle (IEC 61131 application program), as long as DATA_IN is active, the last output value is "held".
- The driver modules are always enabled.
- PIN25 DATA_IN is Data-hold (level ☞ *S101-3*, polarity ☞ *S101-4*, application-dependent)

Hardware settings :





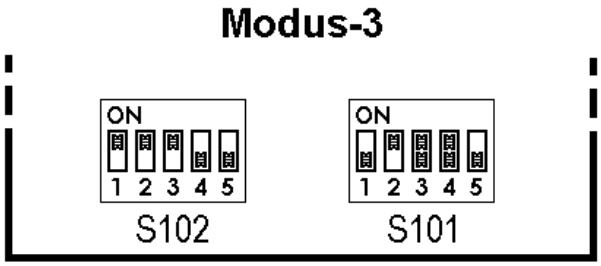
*** Note:**
Internal data transfer (data change) to the output memory may be at the moment, when the ext. request signal changes from "Data Hold" to "Data valid". This means that the requesting instrument has to wait during 100 µs, until data can be considered as valid.

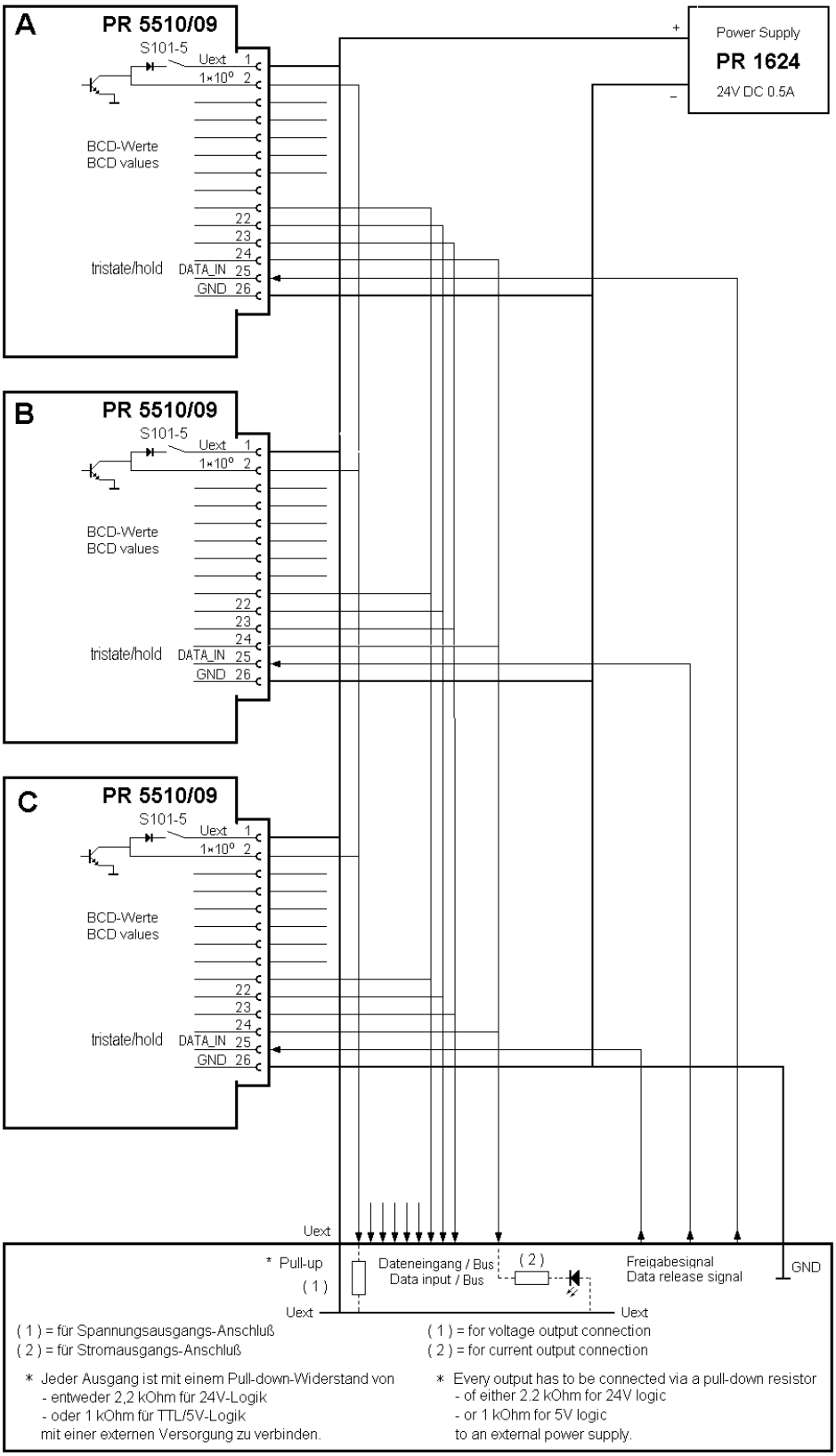
♦ Mode 3 : parallel_BUS system (tristate), external request DATA_IN (hold):.

Parallel connection of x PR5510/08 modules, controlled via the DATA_IN (tristate/hold) input.
Output of consistent data in "hold" condition on request, otherwise Tristate (high impedance).

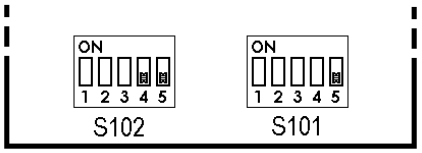
- Data are output at each PLC cycle (IEC 61131 application program),
  as long as DATA_IN is active, the last output value remains held (hold)
- The driver modules are enabled only (not Tristate), when DATA_In (hold) is active.
- PIN25 DATA_IN is Data-enable+hold (level ☞ *S101-3*, polarity ☞ *S101-4*, application-dependent)

Hardware settings :

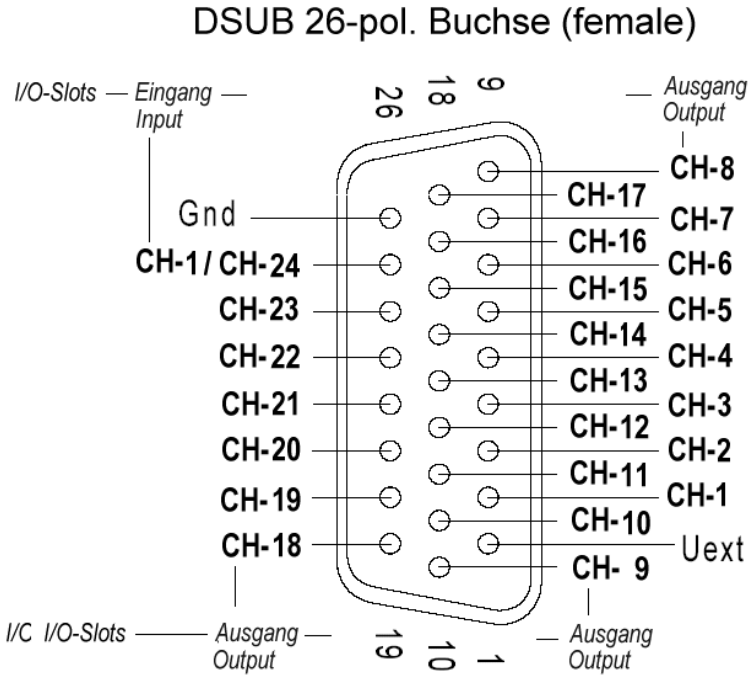



A
PR 5510/09
S101-5
Uext 1
1×10° 2
BCD-Werte
BCD values
22
23
24
tristate/hold DATA_IN 25
GND 26
B
PR 5510/09
S101-5
Uext 1
1×10° 2
BCD-Werte
BCD values
22
23
24
tristate/hold DATA_IN 25
GND 26
C
PR 5510/09
S101-5
Uext 1
1×10° 2
BCD-Werte
BCD values
22
23
24
tristate/hold DATA_IN 25
GND 26
+
Power Supply
PR 1624
24V DC 0.5A
–
Uext
* Pull-up
(1)
Uext
Dateneingang / Bus
Data input / Bus
(2)
Freigabesignal
Data release signal
GND
Uext
(1) = für Spannungsausgangs-Anschluß
(2) = für Stromausgangs-Anschluß
* Jeder Ausgang ist mit einem Pull-down-Widerstand von
- entweder 2,2 kOhm für 24V-Logik
- oder 1 kOhm für TTL/5V-Logik
mit einer externen Versorgung zu verbinden.
(1) = for voltage output connection
(2) = for current output connection
* Every output has to be connected via a pull-down resistor
- of either 2.2 kOhm for 24V logic
- or 1 kOhm for 5V logic
to an external power supply.

[PR5510/09 open collector] interface configuration sheet (BCD)

Modus 				Debug addr.: Output: %MD42 Output: %MB168-170 Output: %MX336-360 .Bit no.-			**Slot-no. [n]:** [n = 1 ... 2] **Ausschnitt [n]: Cutout**	
Address SPM-	Ident	Logic active 1/0 *blank means* 1		DB26 pin no.			Instrument, actuator, sensor, target description, drawing ...	
Value	Function / description					Channel no. CH-	Wire colour	Remarks
6-dec. BCD outputs			**>**					
10*0 /10*1			%MB168					
1			0	2	1		brown	
2			1	3	2		green	
4			2	4	3		yellow	
8			3	5	4		gray	
10			4	6	5		pink	
20			5	7	6		blue	
40			6	8	7		red	
80			7	9	8		black	
10*2 /10*3			%MB169					
100			8	10	9		violet	
200			9	11	10		grey-pink	
400			10	12	11		red-blue	
800			11	13	12		white-green	
1000			12	14	13		brown-green	
2000			13	15	14		white-yellow	
4000			14	16	15		yellow-brown	
8000			15	17	16		white-grey	
10*4 / (10*5)			%MB170					
10000			16	18	17		grey-brown	
20000			17	19	18		white-pink	
40000			18	20	19		pink-brown	
80000			19	21	20		white-blue	
-			20	22	21		brown-blue	
-			21	23	22		white-red	
-			22	24	23		brown-red	
-			23	25	24		white-black	
1 input (DATA_IN)			**<**					
			%IXn.0					
-			0	25	1		white-black	
Common potential								
(+U external)				1			white	
GND				26			brown-black	

- **Mode 4 : Continuous single bit output (23xDA), DATA_IN (1xDE):**



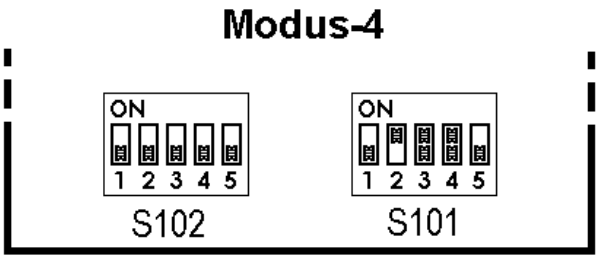
Configured as single bit IO (IO-SLOTS config)

Continuous output of allocated SPM bits to the IO channels, free without request e.g. application IO interface (1xIN, 23xOUT, configurable in [SETUP]-[IO-SLOTS] On/Off-CH-No-SPMbit)

Can be used only as a point_to_point (instrument->instrument) connection, e.g. for COMPONENT signals (BATCH-X4) and DATA_IN as STOP charge.

Data are output at each PLC cycle (IEC 61131 application program).
The driver modules are always enabled.
PIN25 is IEC 61131 application input (e.g. Stop)

Hardware settings :

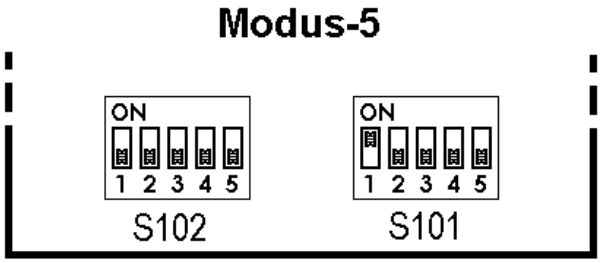


- **Mode 5 : Continuous single bit output (24xDA), no DATA_IN:**

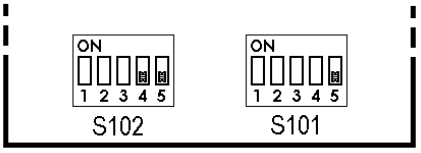
Continuous output of allocated SPM bits to the IO channels, free without request e.g. application IO interface (24xOUT, configurable in [SETUP]-[IO-SLOTS] On/Off-CH-No-SPMbit).
Can be used only as a point_to_point (instrument->instrument) connection, e.g. for COMPONENT signals (BATCH-X4), no DATA_IN.

Data are output during each PLC cycle (IEC 61131 application program).
The driver modules are always enabled.
PIN25 is IEC 61131 application output (e.g. COMPONENT 24)

Hardware settings :



[PR5510/09 open collector] interface configuration sheet (BINARY)

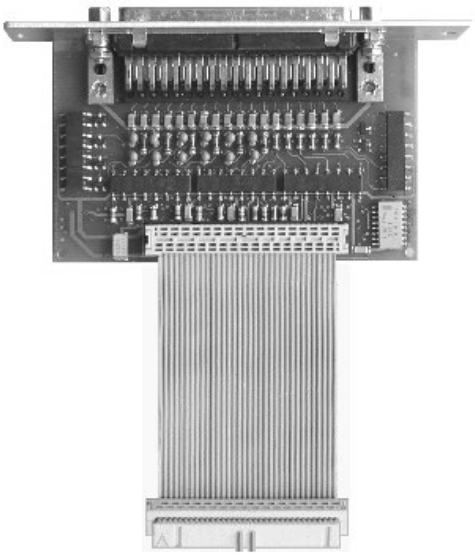
Modus 			Debug addr.: Output: %MD42 Output: %MB168-170 Output: %MX336-360 .Bit no.-				**Slot-no. [n]:** [n = 1 ... 2] **Ausschnitt [n]:** **Cutout**
Address	Ident	Logic active 1/0 *blank means* 1		DB26 pin no.	Channel no. CH-		Instrument, actuator, sensor, target description, drawing ...
SPM-	Function / description					Wire colour	Remarks
23/24 Outputs			**>**				
			%MB168				
-			0	2	1	brown	
-			1	3	2	green	
-			2	4	3	yellow	
-			3	5	4	grey	
-			4	6	5	pink	
-			5	7	6	blue	
-			6	8	7	red	
-			7	9	8	black	
			%MB169				
-			8	10	9	violet	
-			9	11	10	grey-pink	
-			10	12	11	red-blue	
-			11	13	12	white-green	
-			12	14	13	brown-green	
-			13	15	14	white-yellow	
-			14	16	15	yellow-brown	
-			15	17	16	white-grey	
			%MB170				
-			16	18	17	grey-brown	
-			17	19	18	white-pink	
-			18	20	19	pink-brown	
-			19	21	20	white-blue	
-			20	22	21	brown-blue	
-			21	23	22	white-red	
-			22	24	23	brown-red	
-			23	25	24	white-black	
1 Input (DATA_IN)			**<**				
			%IXn.0				
-			0	25	1	white-black	
Common potential							
(+U external)				1		white	
GND				26		brown-black	

4.2.6 PR5510/12 6 opto-coupler inputs / 12 opto-coupler outputs

This module converts the external binary process signals into the internal signal levels of the weighing controller or vice versa (**D**IGITAL **I**NPUTS or **D**IGITAL **O**UTPUTS, in short DIO).

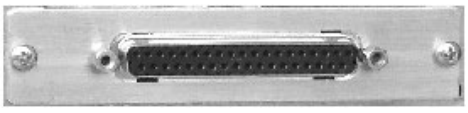
12x outputs, digital output for process control, galvanically isolated
with passive opto-coupler outputs (max. 25 mA)
each with two pole potentialfree output.

6x inputs, digital input for process control.
galvanically isolated by means of opto-couplers.
The input signal is logic "0" with open input.
each with two pole potentialfree input.



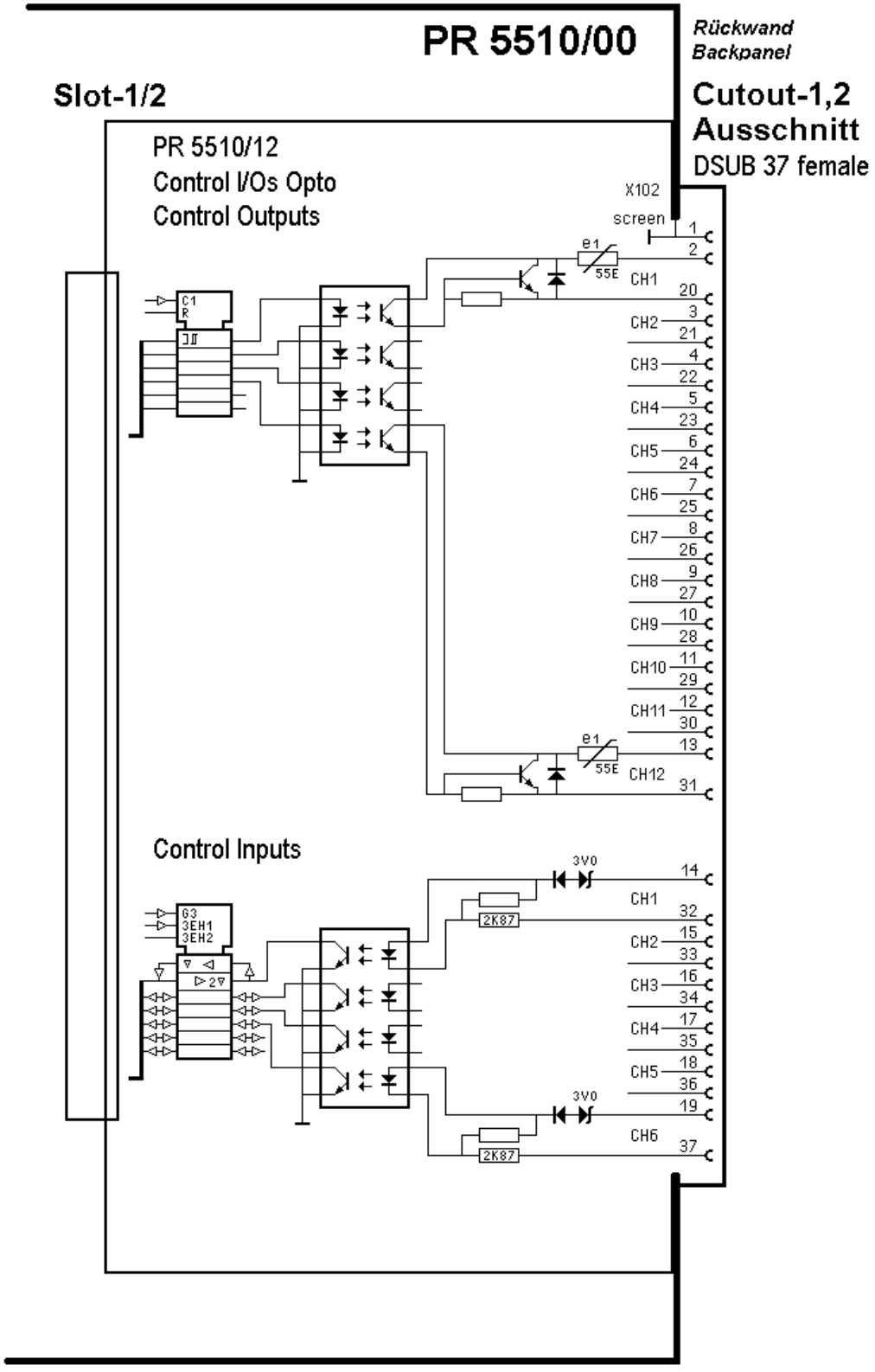
Slot-1 / Slot-2

Dimensions: (LxWxH):	
Weight:	33 g

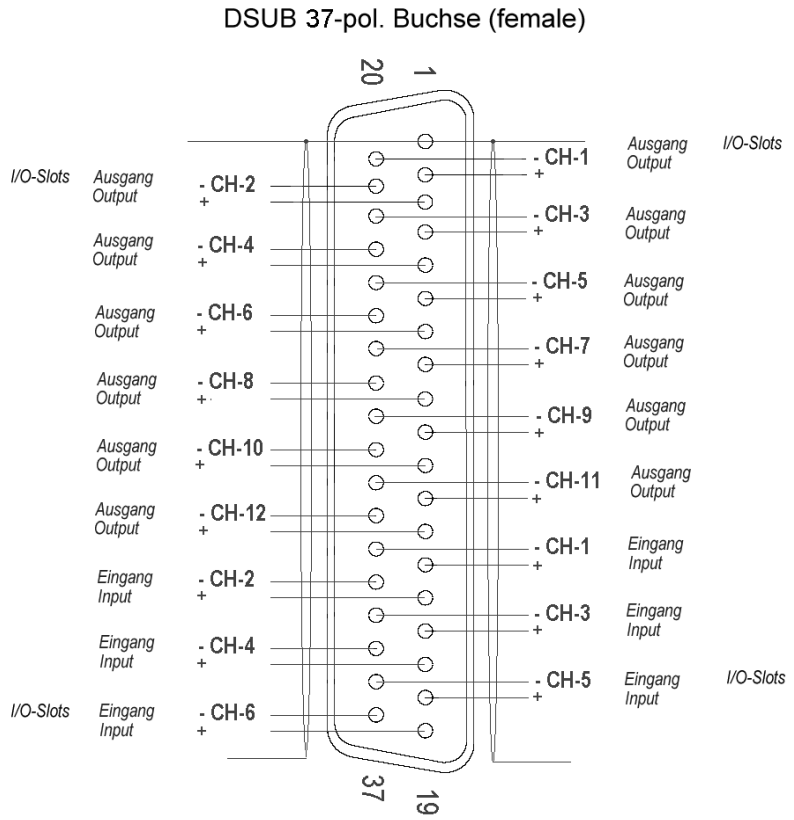
Connection mode:	37 pole socket (female)
X102	
Number of inputs/outputs:	Inputs: 6 , outputs: 12
Input signal:	Low: 0 ... 5V or open High: 10 ... 31 V **passive** external power supply required
Input current:	< 7 mA @ 24 V < 3 mA @ 12 V protected against wrong polarity
Output:	Max. switching voltage: 32 V Max. switching current : 25 mA Voltage drop @ 25 mA: 3 V protected against wrong polarity **passive** external power supply required
Potential isolation:	Yes, via opto-coupler
Cable length (screened):	Max. 50 m
Accessories:	1 connector counterpart DB37 (male) including screening hood
Optional:	PR1623/10 4m connecting cable PR1623/20 relay-terminal unit PR1623/30 terminal unit

The options card plugs into SLOT 1 or SLOT 2 and must be mounted in cut-out 1, 2 in the rear panel.

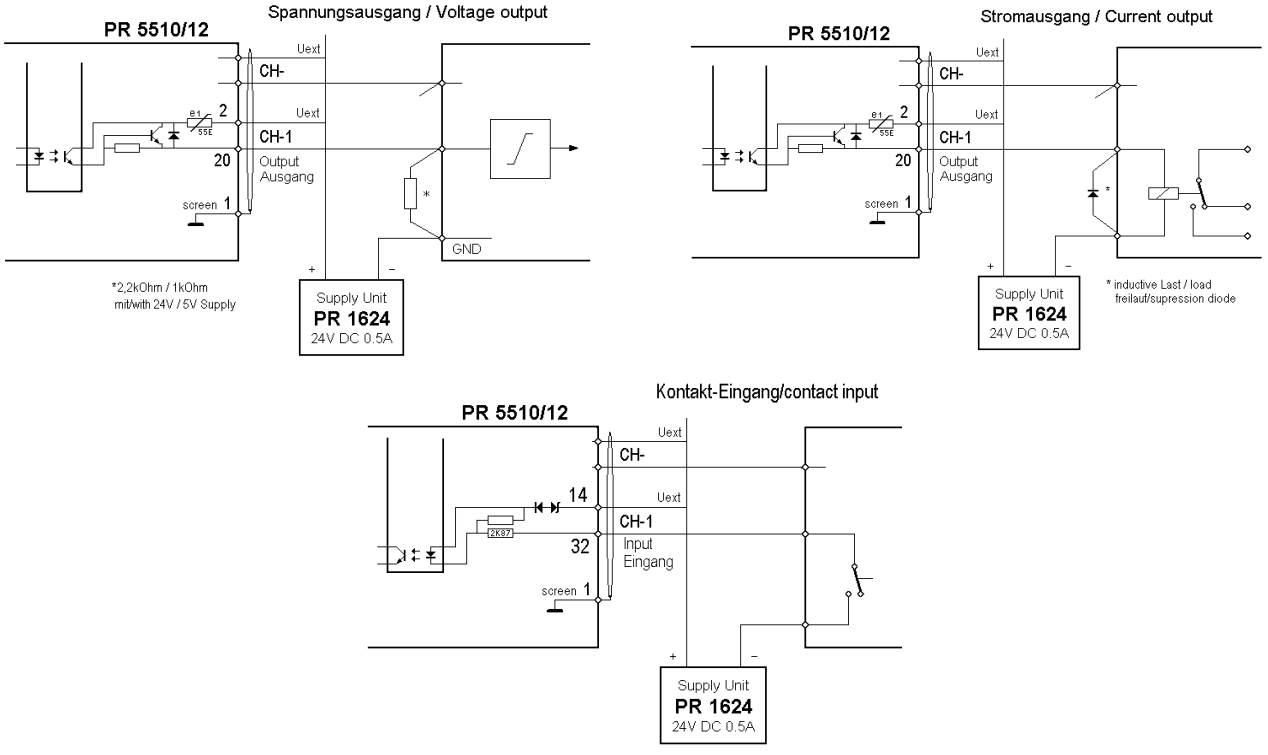
☑ Card installation must be followed by a COLD start. Otherwise, a >>> continuous beep is output. Already existing data must have been saved **previously,** calibration and configuration are not lost!



passiv: External power supply required (per DIO channel, potential-free, no common reference potential)



4.2.6.1 Application



♦ SETUP - Addressing ([SETUP]-[CONFIG] input/output config...) :

The displayed module address corresponds to internal socket SLOT-n , whereby n= 1,2 is possible for PR5510/12. It is displayed automatically in [SETUP]-[IO-SLOTS] after card detection (cold start). In the application-dependent SETUP-CONFIG, the relevant IO channel numbers are:

no.1...6 for inputs and no.1 ... 12 for outputs

A function = SPM address from the valid range must be allocated to each individual IO channel.
After initial start, an application-dependent standard allocation is factory set and can remain unchanged or can be changed permanently (saved in EAROM after a SAVE command).

For outputs 1 to 12: SLOT-n output 1 ... 12 n = 1 or 2
For inputs 1 to 6: SLOT-n input 1 ... 6 n = 1 or 2

♦ IEC 61131- direct addressing (special programs)

The displayed module address corresponds to the internal socket: SLOT-n , whereby n= 1,2 is possible for PR5510/12. The SPM address (debug address) [slot.bit] is a function of SLOT no. and bit no.

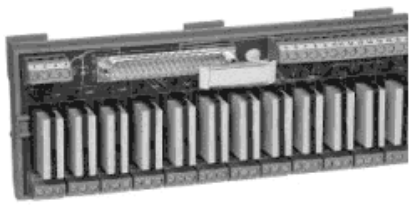
For outputs 1 to 12: %QX n.0 ... %QX n.11 n = 1 or 2
For inputs 1 to 6: %IX n.0 ... %IX n.5 n = 1 or 2

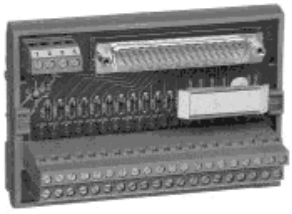
♦ List of peripheral modules

Options are available for PR5510/12 as a process interface (small relay or terminals) including a pre-fabricated connecting cable with connectors at both ends. With these options, only a power supply is required additionally.

PR1623/10	9405 316 23101	4m connecting cable with DB37 from PR5510/12 to PR1623/20 or PR1623/30)
PR1623/20	9405 316 23201	I/O terminal module for 12 relay outputs and 6 inputs
PR1623/30	9405 316 23301	I/O terminal module for 12 outputs and 6 inputs

PR1624/00 24 V DC power supply for PR1623/20 or PR1623/30





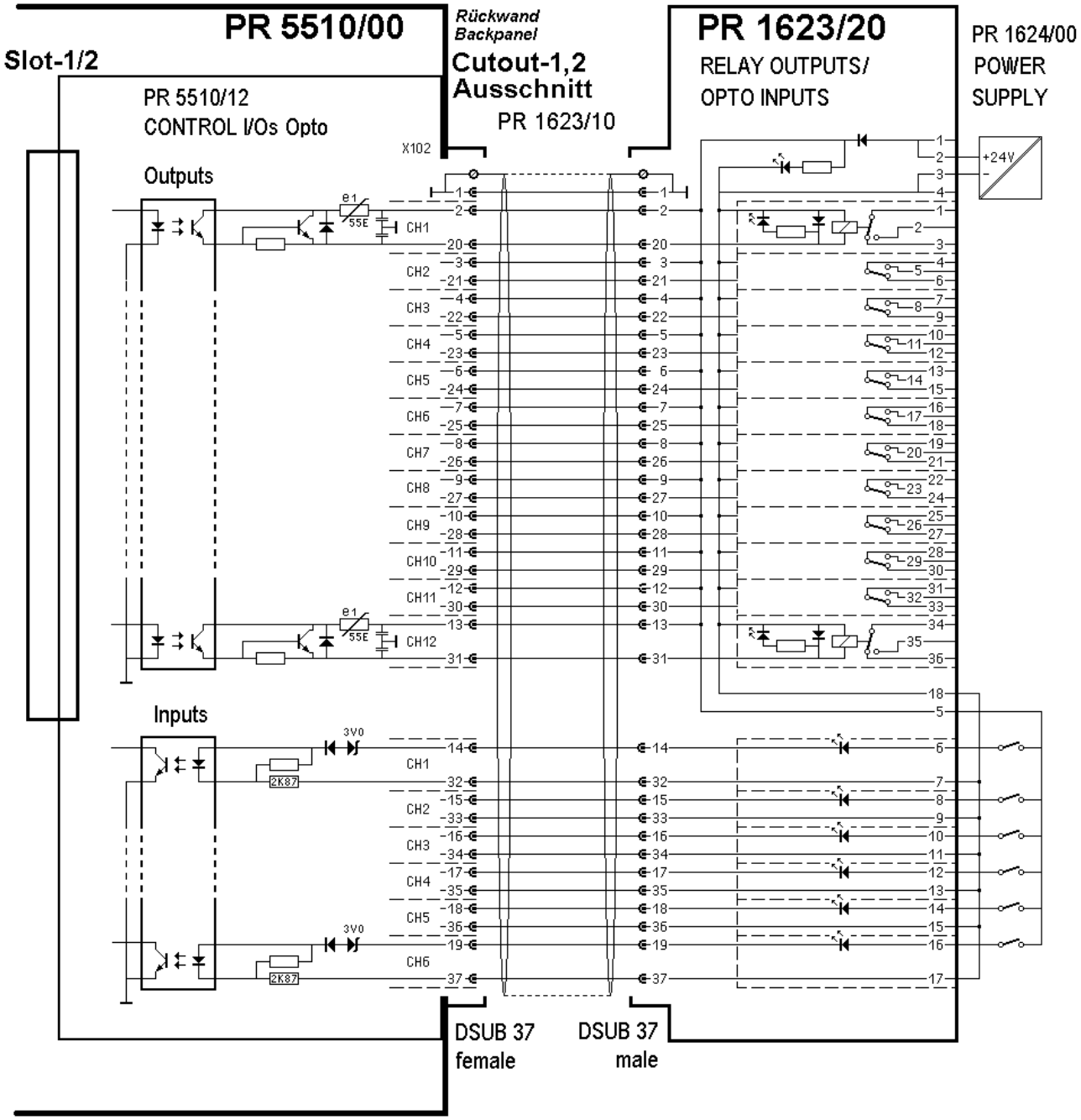
Standard rail modules for cabinet mounting snap-on rail to DIN 15, 32, 35mm
Plug-in relays with potential-free change-over contact max. 250V AC, 1250VA, 5A resp. 30VDC, 5A

For further details ☞ *see data sheet*

[PR5510/12 opto-coupler IO] - mounting socket DSUB-37 (direct)

			Debug-Addr.: Output: %MD42 Output: %QXn. Output: %IXn.				**Slot-no. [n]:** [n = 1 ... 2] **Ausschnitt [n]:** **Cutout**	
Address	Ident	Logic active 1/0 *blank means* 1	Bit no.-	DB37 pin no.-	Channel no CH-		Instrument, actuator, sensor, target description, drawing ...	
SPM-	Function / description					Wire colour	Remarks	
12 dig. outputs			**>**					
-			0	2 20	1	<: br >: rs/br		
-			1	3 21	2	<: gn >: gr/bl		
-			2	4 22	3	<: ye >: br/bl		
-			3	5 23	4	<: gr >: gr/rd		
-			4	6 24	5	<: rs >: br/rd		
-			5	7 25	6	<: bl >: wt/bk		
-			6	8 26	7	<: rd >: br/sw		
-			7	9 27	8	<: sw >: gr/gn		
-			8	10 28	9	<: vi >: ye/gr		
-			9	11 29	10	<: wt/rs >: rs/gn		
-			10	12 30	11	<: rd/bl >: ye/rs		
-			11	13 31	12	<: wt/gn >: gn/bl		
6 dig. inputs			**<**					
-			0	14 32	1	<: br/gn >: ye/bl		
-			1	15 33	2	<: wt/ye >: gn/rd		
-			2	16 34	3	<: ye/br >: ye/rd		
-			3	17 35	4	<: wt/gr >: gn/bk		
-			4	18 36	5	<: gr/br >: ye/bk		
-			5	19 37	6	<: br/gn >: ye/bl		

Current flow diagram PR5510/12 – PR1623/10 –PR1623/20 relay:

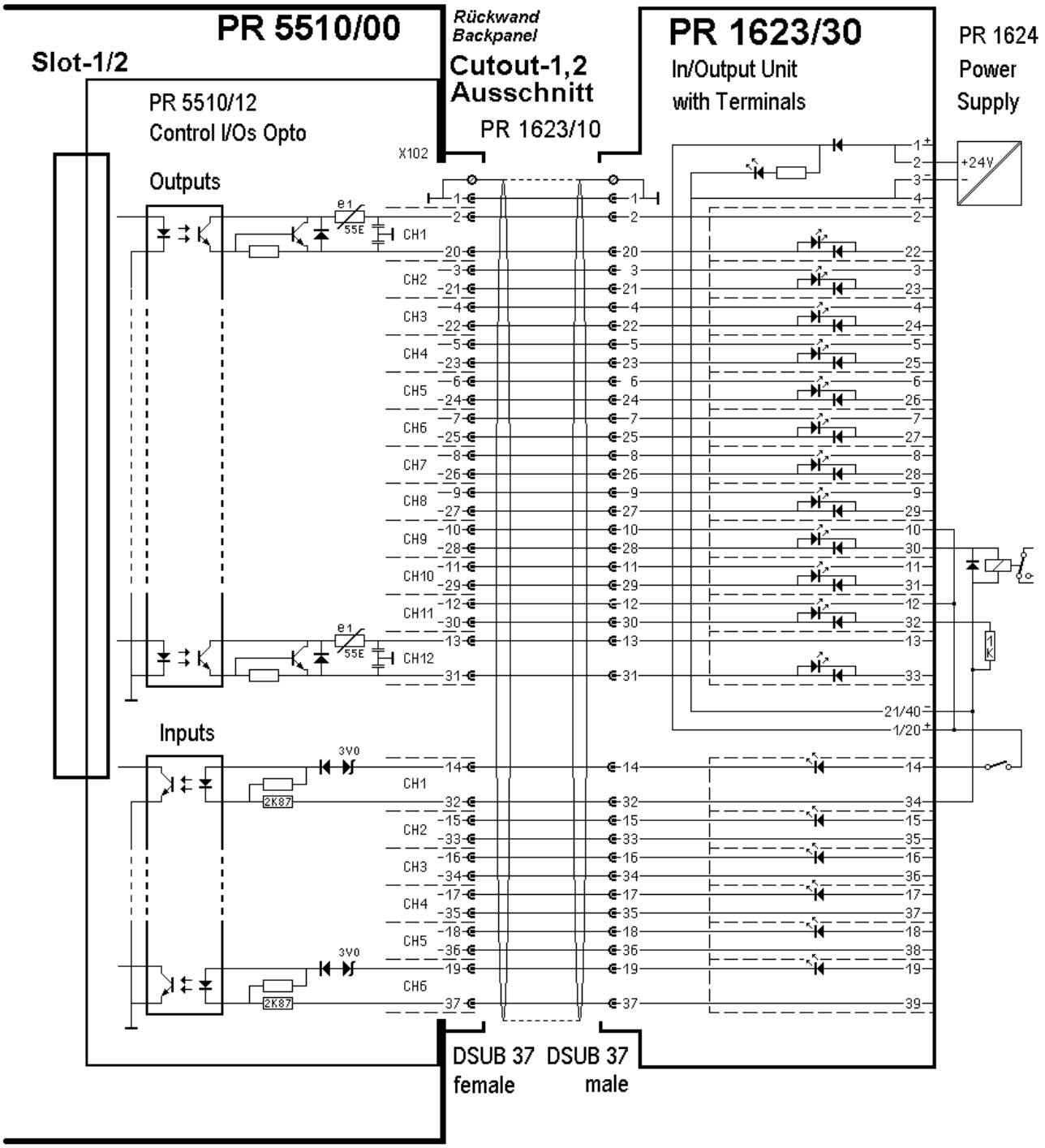


[PR5510/12 opto IO] –> PR1623/10 cable –> PR1623/20 relay

				Debug addr.: Output: %MD42 Output: %QXn. Output: %IXn.			**Slot-no. [n]:** [n = 1 ... 2] **Ausschnitt [n]:** **Cutout**	
				Bit no.-				
Address	Ident	Logic active 1/0 *blank means* 1			DB37 pin no.	Channel no. CH-		Instrument, actuator, sensor, target description, drawing ...
SPM-	Function / description						Terminal-	Remarks
12 dig. outputs							**X1-X12**	
-			0	2 20	1		s: 01-02 ö: 01-03	
-			1	3 21	2		s: 04-05 ö: 04-06	
-			2	4 22	3		s: 07-08 ö: 07-09	
-			3	5 23	4		s: 10-11 ö: 10-12	
-			4	6 24	5		s: 13-14 ö: 13-15	
-			5	7 25	6		s: 16-17 ö: 16-18	
-			6	8 26	7		s: 19-20 ö: 19-21	
-			7	9 27	8		s: 22-23 ö: 22-24	
-			8	10 28	9		s: 25-26 ö: 25-27	
-			9	11 29	10		s: 28-29 ö: 28-30	
-			10	12 30	11		s: 31-32 ö: 31-33	
-			11	13 31	12		s: 34-35 ö: 34-36	
6 dig. inputs							**X14**	
			0	14 32	1		<: 6 >: 7	
			1	15 33	2		<: 8 >: 9	
			2	16 34	3		<: 10 >: 11	
			3	17 35	4		<: 12 >: 13	
			4	18 36	5		<: 14 >: 15	
			5	19 37	6		<: 16 >: 17	

Note: s = normally open ö = normally closed

Current flow diagram PR5510/12 – PR1623/10 –PR1623/30 terminals



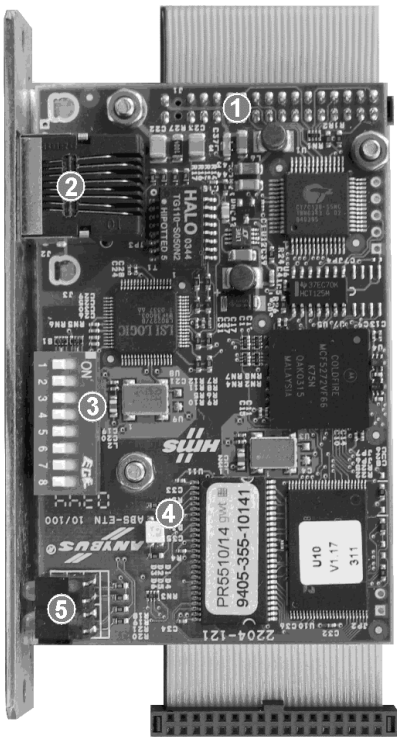
[PR5510/12 opto-IO] –> PR1623/10 cable –> PR1623/30 terminal

			Debug addr.: Output: %MD42 Output: %QXn. Output: %IXn.			**Slot-no. [n]:** [n = 1 ... 2] **Ausschnitt [n]:** **Cutout**	
Address	Ident	Logic active 1/0 *blank means* 1	Bit no.-	DB37 pin no.-	Channel no CH-		Instrument, actuator, sensor, target description, drawing ...
SPM-	Function / description					Terminal-	Remarks
12 dig. outputs						**X1**	
-			0	2 20	1	<: 2 >: 22	
-			1	3 21	2	<: 3 >: 23	
-			2	4 22	3	<: 4 >: 24	
-			3	5 23	4	<: 5 >: 25	
-			4	6 24	5	<: 6 >: 26	
-			5	7 25	6	<: 7 >: 27	
-			6	8 26	7	<: 8 >: 28	
-			7	9 27	8	<: 9 >: 29	
-			8	10 28	9	<: 10 >: 30	
-			9	11 29	10	<: 11 >: 31	
-			10	12 30	11	<: 12 >: 32	
-			11	13 31	12	<: 13 >: 33	
6 dig. inputs						**X1**	
-			0	14 32	1	<: 14 >: 34	
-			1	15 33	2	<: 15 >: 35	
-			2	16 34	3	<: 16 >: 36	
-			3	17 35	4	<: 17 >: 37	
-			4	18 36	5	<: 18 >: 38	
-			5	19 37	6	<: 19 >: 39	

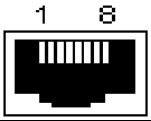
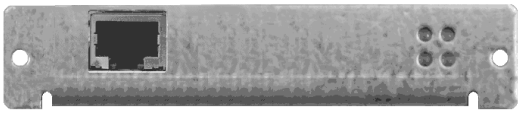
Note: current flow < towards (+) , > from (-) Opto-coupler

4.2.7 PR5510/14 Ethernet-TCP/IP

Circuit board module for installation in the instrument, with standard RJ45 socket for Ethernet connection. The module contains powerful circuitry for connection to TCP/IP and ModBus-TCP with transmission rates of 10 and 100 Mbit/s. The module is mounted mechanically into rear panel cut-out 1 or 2, and inserted electrically with the flat cable into SLOT-4 on the main circuit board.



Slot-4

Connection type (internal)	34-pole multi-pin connector on flat cable for slot-4
Connection type (external) 	RJ-45 connector socket on mounting plate 
Transmission rate	10 Mbit/sec (10BaseT , Ethernet) and 100 Mbit/sec (100BaseTx, Fast Ethernet) autosense (10/100, HalfDX/FullDX)
Connection mode	LAN-network
Protocol	EW_COMM, Modbus/TCP
Cable	Twisted pair, screened e.g. patch cable CAT5 dependent on application (straight/crossover)
Cable impedance	150 Ohm
HMS-Certificates	Compatible according to: ModBus organization to ModBus-TCP standard industrial suitable CE, UL & cUL

Dimens. (LxWxH)	87 x 55 x 15 mm	**Potential isolation**	Yes, opto-coupler and DC/DC converter
Weight	125 g	**Cable length to HUB**	Max. 30 m

PR5510/14 **cannot** be used, if two active **analog outputs** (Reason: power supply load) are already provided in the instrument or if another option is already fitted on SLOT-4 !

The Ethernet card is supported from PR5510 firmware release R3.12.

☑ After installation of the card, a COLD start is necessary, otherwise a >>> continuous beep is output.
Already existing data must be saved **previously,** calibration and configuration data are not lost!

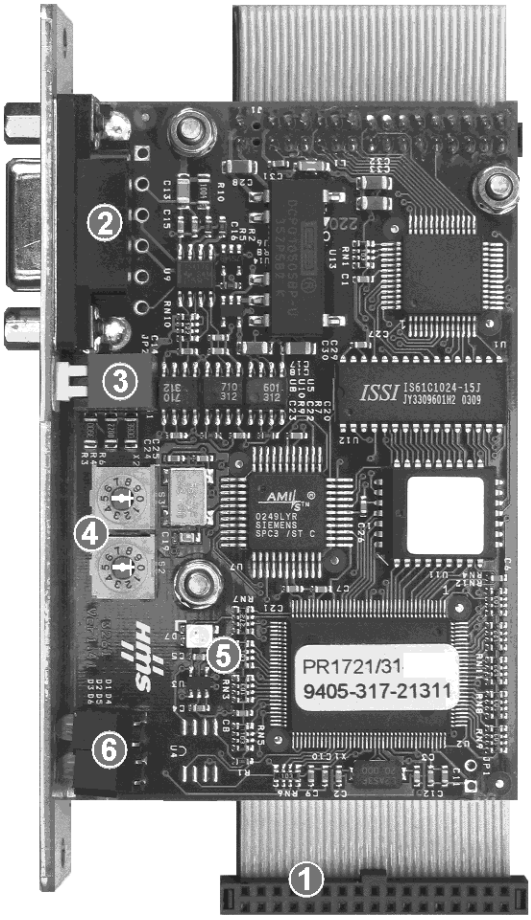
Application: typical for transmission of large quantities of data with high throughput.
Applicable for the following Sartorius products in specific Sartorius applications :

- PR8400 ProBatch Plus,
- PR1750 development tool,
- PR1791 DDE server, PR1792 OPC server
- PR8001 Powertools (DisplayIt, AccessIt, FlashIt)
- PR5510 instrument cross communication
- ModBus-TCP (as a field bus interface)

☞ *for more details see fieldbus manual*

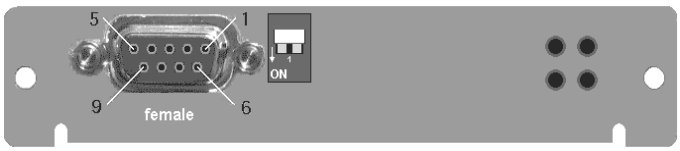
4.2.8 PR1721/31 ProfiBus-DP (Slave)

Circuit board module for installation in the instrument, with standard 9-pole D-Sub socket for ProfiBus connection. The module contains powerful circuitry for connection to ProfiBus-DP according to IEC 61158, ASIC SPC3 chip technology with transfer rates up to 12 Mbit/s.
The module is mounted mechanically in rear panel cut-out 1 or 2, and inserted electrically into SLOT-4 on the main circuit board by means of the flat cable, see Chapter 3.3.1.



Slot-4

Connection type (internal)	34-pin connector ❶ on flat cable for Slot 4
Connection type (external)	9-pole D-Sub socket ❷ in the mounting plate



Transfer rate	9.6 kbit/s up to 12 Mbit/s, baud rate auto-detection
Connection mode	Profibus-Network , Connect/disconnect without to other stations
Protocol	ProfiBus-DP-V0 SLAVE to EN 50 170 (DIN 19245) Mono- or multi-master systems are supported. Master and slave devices, max. 126 knots are possible. Watch-Dog Timer
Configuration	GSD file (PR1721/31 specific)
Cable	'Special' Profibus, colour: violet twisted pair, common screening
Cable impedance	150 Ω
Bus termination	Yes, DIL-switch from outside activable.
Certificates	Profibus Test-center Comdec in Germany and PNO (Profibus User Organisation) industrial suitable CE, UL & cUL

Dimensions (LxWxH)	87 x 55 x 15 mm	**Potential isolation**	Optocoupler in lines A and B (RS-485)
Weight	125 g.	**Cable length**	Max. distance 200 m can with 1.5 Mbit/s extendable with additional repeater.

☝ Using PR1721/31 is **not** possible, if another option is already fitted on SLOT-4!
The Profibus card is supported from PR5510 firmware release R3.12.

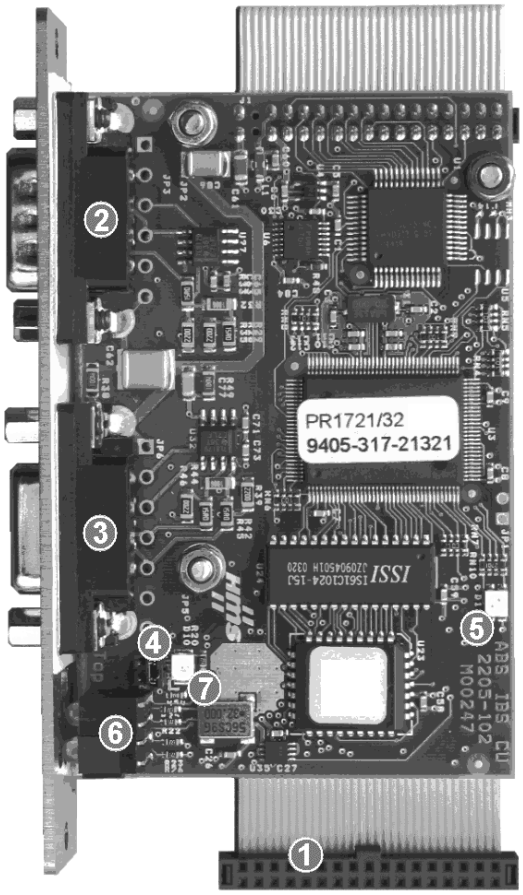
☑ After installation of the card, a COLD start is required, otherwise, a >>> continuous beep will be output. Already existing data must be saved **previously,** calibration and configuration data are not lost!

PR1721/31 is not suitable for active connection of I/O modules (acts as passive slave), but only as a "FIELDBUS" data interface ☞according to description of the pre-defined data types and interface handling !

☞ *for more details see fieldbus manual*

4.2.9 PR1721/32 InterBus-S (Slave)

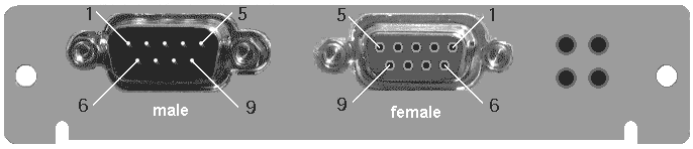
Circuit board module for installation in the instrument, with 2 x standard 9-pole D-Sub socket+plug for Interbus connection. The module is based on the latest Phoenix Contact Interbus chip technology with transfer rates of 500 kbits/s and 2Mbits/s.
The module is mounted mechanically in rear panel cut-out 1 or 2, and inserted electrically into SLOT-4 on the main circuit board by means of the flat cable, see Chapter 3.3.1.



Slot-4

Connection type (internal)	34-pin connector ❶ on flat cable for Slot 4
Connection type (external)	Standard IBS 9-pole D-Sub socket_OUT and plug_IN in the mounting plate

Bus IN ❷ Bus OUT ❸



Transfer rate	500 kbit/s or 2 Mbit/s, selectable
Topology	Point_to_point, as a closed ring
Protocol	InterBus-S master-slave fixed telegram length, deterministic cyclical process data transmission with max. 10 words I/O.
Cable	Interbus , colour: green 3x 2 twisted pairs, common screening
Cable impedance	150 Ω
Bus termination	Not necessary because it is an active ring
Certificates	By the INTERBUS CLUB e.V.: compatible with the Interbus standard Standard IEC 61158 (parts 3 to 6) EN 50254 (DIN 19258) industrial suitable CE, UL & cUL

Dimensions (LxWxH)	87 x 55 x 15 mm	**Potential isolation**	Yes, optocoupler and DC/DC converter
Weight	125 g	**Cable length**	400 m (between two units connected on the field bus) total length: 13 km

☝ Using PR1721/32 is **not** possible, if another option is already fitted on SLOT-4!

The Interbus card is supported from PR5510 firmware release R3.12.

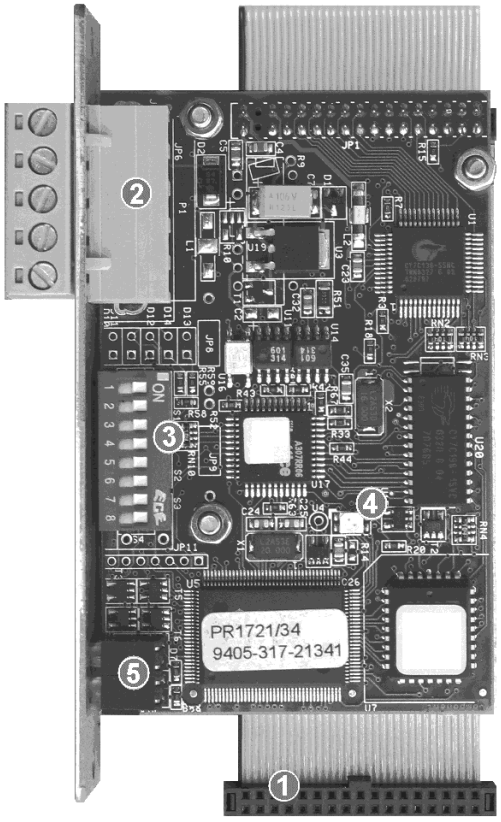
☑ After installation of the card, a COLD start is required, otherwise, a >>> continuous beep will be output. Already existing data must be saved **previously,** calibration and configuration data are not lost!

PR1721/32 is not suitable for active connection of I/O modules (acts as passive slave), but only as a "FIELDBUS" data interface ☞according to description of the pre-defined data types and interface handling !

☞ *for more details see fieldbus manual*

4.2.10 PR1721/34 DeviceNet (Slave)

Circuit board module for mounting in the instrument, with 5-pole plug-in terminal block for DeviceNet connection. It is a complete DeviceNet adaptor (Slave) with CAN controller and transfer rates up to 500 kbits/s. The module is mounted mechanically in rear panel cutout-1 or 2, and inserted electrically into SLOT-4 on the main circuit board by means of the flat cable, see Chapter 3.3.1.



Slot-4

Connection type (internal)	34-pin connector ❶ on flat cable for Slot 4
Connection type (external)	5-pole screw terminal block ❷ (plug-in type) in the mounting plate.

Transfer rate	125, 250 and 500 kbit/s
Topology	Point_to_point, parallel bus
Protocol	DeviceNet master-slave polling method (Polled IO) CRC error detection to IEC62026 (EN50325) max. 64 station nodes max. data width 512 bytes Input&Output
Configuration	EDS file (PR1721/34 specific) MAC-ID (1...62)
Certificates/ conformity	Compatible with DeviceNet specification Vol 1: 2.0, Vol 2: 2.0 ODVA certificate according to conformity test software version A-12 industrial suitable CE, UL & cUL
Cable	DeviceNet color: petrol-green 2x 2 twisted pairs, screened
Cable impedance	150 Ω
Bus termination	120 Ω at the lead ends required
Busload	33 mA
Potential isolation	Yes, optocoupler and DC/DC converter

Dimensions (LxWxH)	87 x 55 x 15 mm
Weight	125 g

Using PR1721/34 is **not** possible, if another option is already fitted on SLOT-4.

The DeviceNet card is supported from PR5510 firmware release R3.12.

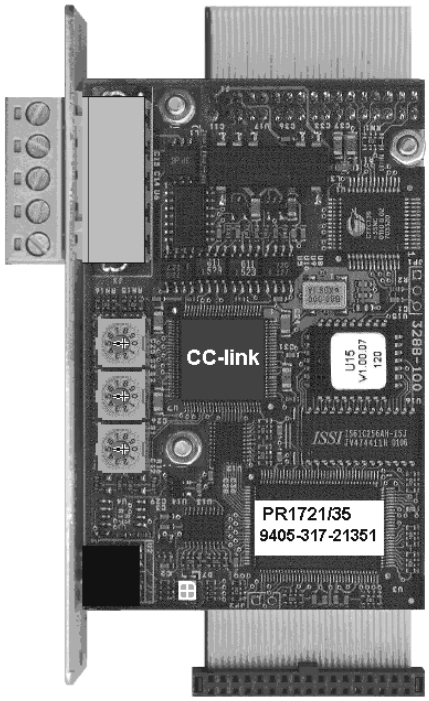
☑ After installation of the card, a COLD start is necessary, otherwise a >>> continuous beep is output. Already existing data must be saved **previously**, calibration and configuration data are not lost!

PR1721/34 is not suitable for active connection of I/O modules (acts as passive slave), but only as a "FIELDBUS" data interface ☞according to description of the pre-defined data types and interface handling !

☞ *for more details see fieldbus manual*

4.2.11 PR1721/35 CC-Link (Slave)

Circuit board module for mounting in the instrument, with 5-pole plug-in terminal block for AnyBus-S CC-Link. It contains all functionality to represent a complete CC-Link Slave with transfer speed up to 10Mbps. The module has to be mounted in rear panel cut-out 1 or 2, and connected to SLOT-4 on the main circuit board by means of a flat cable, see Chapter 3.3.1.



Slot-4

Dimensions (LxWxH):	87 x 55 x 15mm	**Potential isolation:**	Yes, opto-coupler and DC/DC converter
Weight:	125 g.	**Cable length:**	100m @ 10Mbps, 1200m @ 156 kbps

Connection type (internal):	34-pole multi-pin connector on flat cable only for Slot-4
Connection type (external):	5-pole screw terminal block (plug-in type) in the mounting plate

Transfer rate	156, 625 kbps, 2,5, 5, 10Mbps
Topology:	Parallel bus
Protocol:	CRC Fehlererkennung, 128 I/O Bits und 16 (32 Bit) Worte, max. 64 stations
Cable:	2x2 twisted pairs, screened
Bus termination	110 Ohm at the lead ends required
Bus load	100 mA
Configuration	CSP-file (PR1721/35- specific)
Certificates/ conformity	CLPA Report BTP 03047. CC-Link Version 1.10.

Connector terminals	
PIN	**Signal**
1	Communication line (DA)
2	Communication line (DB)
3	Digital GND (DG)
4	Screen
5	Frame ground (FG / PE)

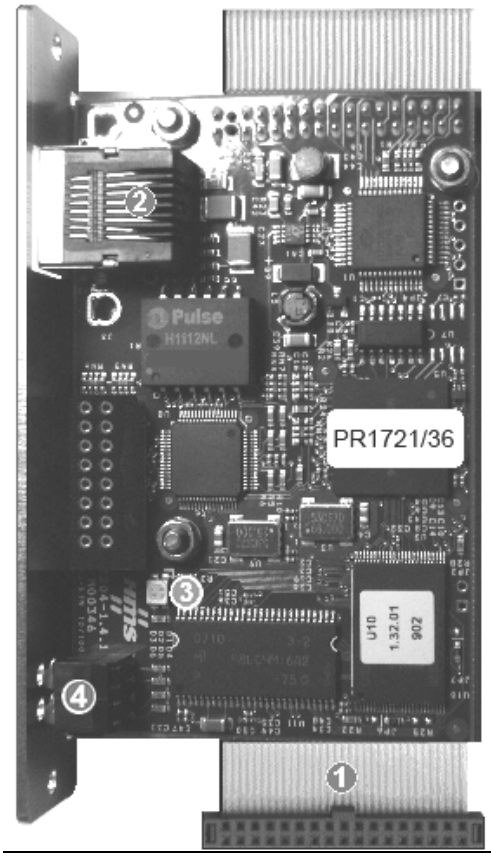
Status LEDs				
LED	**Col.**	**Sig.**	**ON**	**OFF**
1	grün	RUN	Normal function	Timeout, no comnnection
2	rot	ERRL	CRC Fehler, nicht zulässige Station oder Baudrate	Normal function
3	grün	RD	Data received	No data reception
4	grün	SD	Data sent	No data transmission
All LED 'off' = No power on the module				

The three selection switches (Station No. und Baudrate) have to be set to 9, settings are done via software. Further information and the CSP File (PR1721_1.csp) can be found in the manual for PR1721/35 (Japanese).

PR1721/35 is not suitable for active connection of I/O modules (acts as passive slave), but only as a "FIELDBUS" data interface ☞according to description of the pre-defined data types and interface handling !

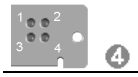
4.2.12 PR1721/36 ProfiNet I/O

It is a plug-in card for installation in the instrument, with a standard RJ-45 socket for network connection. The module contains a powerful UDP/IP connecting circuitry with transfer rates of 10 and 100 Mbit/s.
The module is mounted mechanically in rear panel cut-out 1 or 2, and inserted electrically into Slot 4 on the main circuit board by means of the flat cable, see instrument manual.



Connection type (internal)	34-pin connector ❶ on flat cable for Slot 4
Connection type (external)	❷ RJ-45 connecting socket in holding plate
1 8 	
Transfer rate	10 Mbit/sec and 100 Mbit/s, Autodetection (10/100, HalfDX/FullDX)
Connection mode	Network
Protocol	ProfiNet/IO
Configuration	XML file (PR1721/36 specific)
Cable	Twisted pairs, screened e.g. patch cable CAT5 Autolink (straight oder crossover)
Cable impedance	150 Ω
Cable length to HUB	Max. 115 m
Certificate	ProfiBus Nutzerorganisation e.V. for HMS Industrial Networks AB Certificate No.: Z10006 Report: PN005-1, 12.02.2007.
Dimens. (LxWxH)	87 x 55 x 15mm
Weight	125 g
Potential isolation	Yes

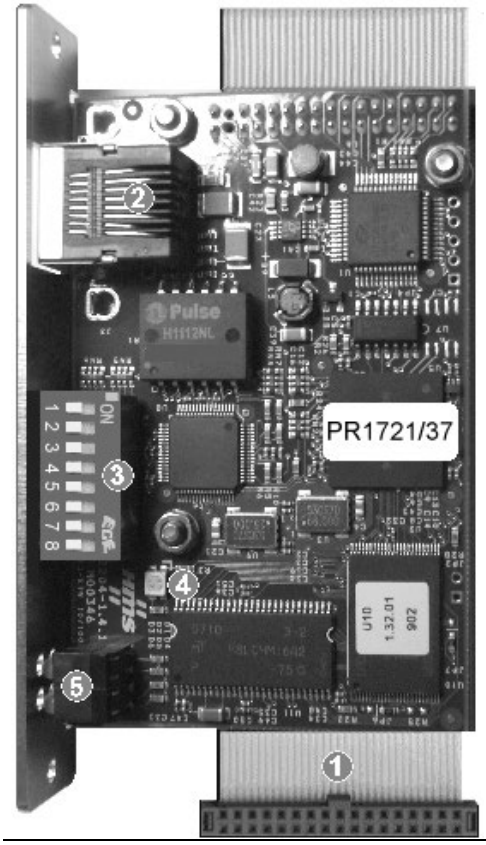
The ProfiNet I/O card is supported from PR5510 firmware release 3.40.

 ❹	LED 1	LED 2	LED 3 Not used	LED 4
Off	No connection (HW)	Off line, no connection		Not initialized
Lighted green	Connection (HW)	Online, connection established		Initialized, no error
Flashing green 1 Hz	Receiving/Transmitting data	Online, in STOP		
Flashing green 4 Hz				Used by engineering tool for identification
Flashing red				Configuration error No station name or IP-Address, internal error

 ❸	Watchdog LED
Flashing 1 Hz green	Module initialized and running without problems.
Flashing 2 Hz green	Module not initialized.
Flashing red	RAM, ROM or ASIC check error

4.2.13 PR1721/37 EtherNet-IP

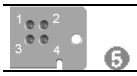
The EtherNet-IP interface is a plug-in card for installation in Slot 4. The card is fitted with a standard RJ-45 socket for Ethernet connection and contains a powerful TCP/IP and EtherNet-IP connecting circuitry with transfer rates of 10 and 100 Mbits/s.



Connection type (internal)	34-pin connector ❶ on flat cable for Slot 4
Connection type (external)	❷ RJ-45 connecting socket in holding plate
1 8	
Transfer rate	10 Mbit/sec and 100 Mbit/s, Autodetection (10/100, HalfDX/FullDX)
Connection mode	Network
Protocol	EtherNet-IP
Configuration	EDS file (PR1721/37 specific)
Cable	Twisted pairs, screened e.g. patch cable CAT5 Autolink (straight oder crossover)
Cable impedance	150 Ω
Cable length to HUB	Max. 115 m
Certificate	EtherNet-IP Specification ODVA File No. 10286 Test Date: 06.09.2005 Vendor ID 90 See also: www.odva.org Tested according to: CE, UL & cUL
Dimens. (LxWxH)	87 x 55 x 15mm
Weight	125 g
Potential isolation	Yes

The EtherNet/IP card is supported from PR5510 Firmware Release 3.30 onwards.

❸ Take care, that switches 1 - 8 are set to (OFF)

 ❺	LED 1	LED 2	LED 3	LED 4
Off	No connection (HW)	No power		No power o. No IP Address
On green	Connection (HW)	Controlled by a scanner		Online, connection established
Flasching green		Not configured o. scanner in idle state	packet is received or transmitted	Online, no connection established
On red		Major unrecoverable fault		IP Address double, fatal error
Flashing red		Minor recoverable fault		Connection timeout
Alternat. red/green		Self test in progress		Self test in progress

❹	Watchdog LED
Flashing 1Hz green	Modul initialized and running without problems
Flashing 2Hz green	Modul not initialized
Flashing red	RAM, ROM or ASIC test error

5 Commissioning

The instrument is taken into operation via front-panel keyboard or via serial interface (e.g. BuiltIn) by means of a terminal (VT100-compatible) or as a PC application program in "Terminal emulation" (e.g. MS-HYPERTERMINAL included in the accessories).

After switching on for the first time, the following >>> error message can be displayed:

```
No valid RAM (    )
 Cold ↯ Erase↯ Flash
```

☑ Please, check, if the RAM back-up battery jumper is fitted (factory setting), or if the battery is defective or empty. A **cold start** [Cold] is necessary. We recommend checking again after trouble shooting, if the above message is not displayed any more after power OFF-wait-ON.

☝ Recommendation: taking into operation should always begin with a COLDSTART [Cold]!

✋ An additional [Erase] for deleting the EAROM is **not** necessary when using new instruments for the first time. CALIBRATION and CONFIGURATION DATA are already set to default values.
Note that already existing software LICENSES* supplied with the instrument would be deleted.

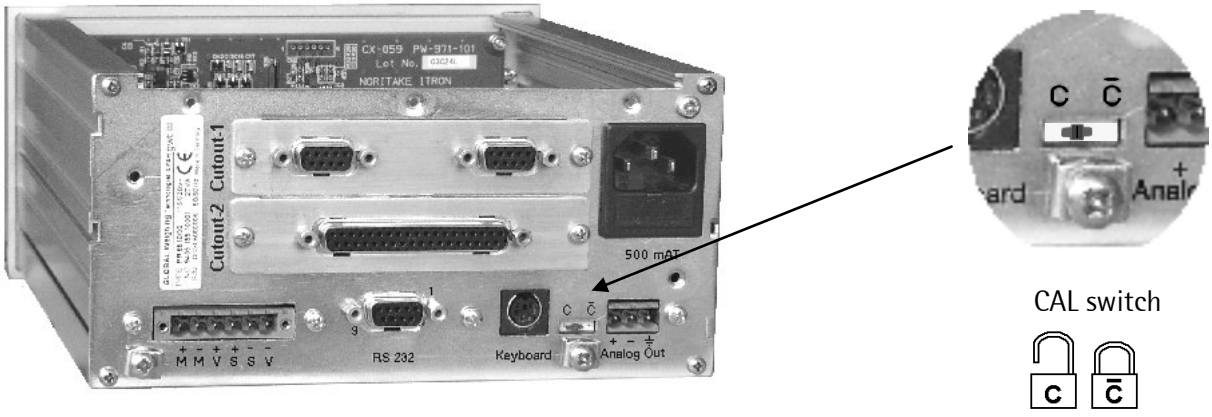
* Please, check,
if all required license documents are available accordingly as A4 form sheets for re-entry at the site ☑.
It is indispensable to store these documents safely in an archive! ☑

5.1 Data safety / power failure

Configuration data, calibration data and licenses are stored in a separate, non-volatile EAROM memory. Data storage is only on: SAVE direct or at the end of SETUP.

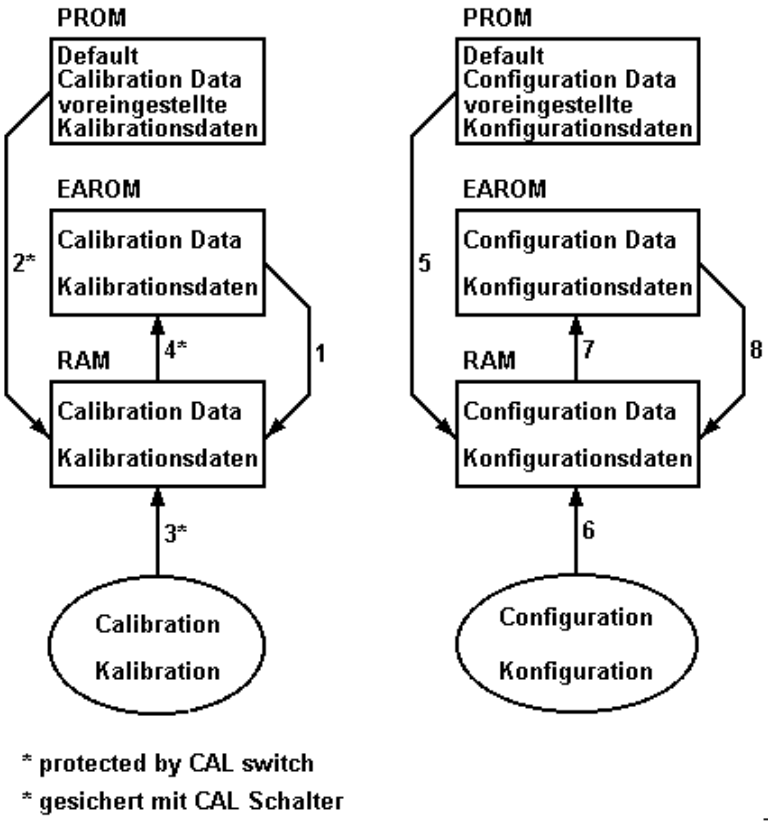
A power failure is recorded with a system event (variable: Powerfail) and can be evaluated in IEC 61131 progr.

Additional **mechanical** write protection for calibration data is provided (CAL switch on the rear panel).



CAL switch C̄ overwrite with command: SAVE not possible = **operating position** ☑

CAL switch C overwrite with command: SAVE possible = calibration position



5.1.1 Calibration data

Adjusting the full scale values/measuring time/weighing parameters. Storage of the calibration parameters at the end is indispensable (command: SAVE) ! Moreover, the calibration parameters can be protected against accidental overwriting by CAL switch position

☑ Calibration should be done only with the instrument warmed up (approx. 60min after switch- on, lid closed).

1. After Power 'on', the calibration data from the EAROM are uploaded into RAM (working memory).
2. Function [SETUP]-[WEIGHINGPOINT]-[New] >>> [Reset all to default] - [YES], the default calibration data are uploaded from the PROM into RAM.
3. In the course of calibration, the calibration data are modified in the RAM.
4. [Exit calibration]-[SAVE] saves the modified calibration data from RAM into EAROM.

5.1.2 Configuration data

The settings for serial interface/communication, fieldbus parameters are also stored in EAROM by means of command: SAVE. They are independent of the CAL switch, i.e. access to the configuration settings is always possible.

5. After power 'On', the configuration data are loaded from EAROM into RAM.
6. With the EAROM erased by command: ERASE, the default values are loaded into RAM (working memory).
7. In the course of configuration, the configuration data are modified in the RAM.
8. Reply >>> [Save software conf ?] - [YES] to store the modified configuration data from the RAM working memory in EAROM.

5.2 Download with PR1750 (IEC 61131-Programm)

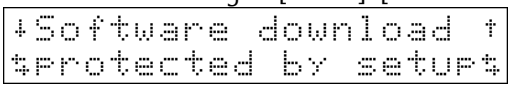
Setting Protocol: EW-COM_Vx can be used for direct on-line "downloading" (in the volatile working memory) of IEC 61131 application and special programs from the PR1750 development tool.

☑ For PR5510: use development tool PR1750 release R2.30 or higher

- RS 232 Connecting cable as described above: *(☞ see chapter 3.6.3.1)*

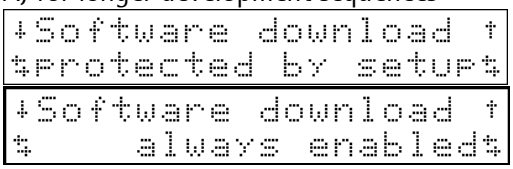
☝ An individual programming license for the specific instrument, or an OEM dongle must be provided.

Enable downloading in [SETUP]-[SOFTWARE PARAMETER])



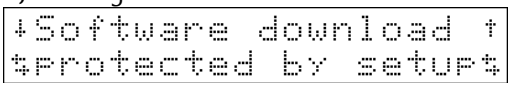
Operating condition: [protected by setup],
enable a download temporarily with B)
Press ← → to select: [protected by setup], always enabled

A) for longer development sequences

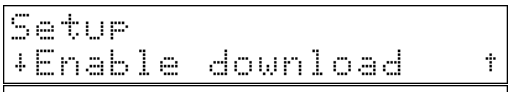


Press ← → to select: always enabled
Caution:
Permanent condition **until resetting to:** [protected by setup]

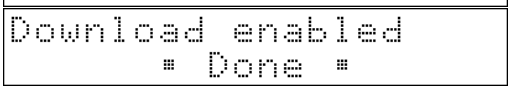
B) for single downloads



Pre-requisite: [protected in setup] is selected
This menu item is available only with this selection.



Call up <<< with OK = download is enabled



Press <<< softkey : [Done] after downloading to finish.

☝ Also as protection against unmeant downloads from PR1750 in networks resp. multidrop RS485-Buslines

5.3 Load with FLASHIT

ONLINE download of operating programs
into non-volatile "flash" EEPROM is possible
with powertool PR8001 FLASHIT

☑ For PR5510: use FLASHIT release R2.30 or higher

- RS 232 Connecting cable as described above: *(☞ see chapter 3.6.3.1)*

Operating program can be:

- only the "pure" firmware <*.HEX file>
  Remark:
  no operating level provided without IEC 61131 application or special program
- Firmware (HEX file) **plus** IEC 61131 application or special programs <*.P32 file>
- **plus** (optional) language adaptation <*.LTXT file>
  or layout adaptation <*.LBLS file>

For ONLINE download into the instrument, the individual packages must be merged. For this, two alternative methods are provided:

A) direct= from FlashIt (all sources only marked) without generating an "intermediate" file (MRG file).

B) indirect= by generating an independent MRG file by means of FlashIt first, which is downloaded (only this source is marked) in a second step (advantage: complete project data saving possible).

Operating program downloading="flashing" of operating programs is possible only with the CAL switch in position C. After downloading the file, **the instrument** checks if valid single/OEM license information is included. Unless this is the case, >>> Bad License is displayed after starting.

Interface setting: Connect the selected serial port with the PC. the port parameters are set automatically during loading.

STOP-Key pressed Cold ↕ Warm ↕ Flash	Press ← BACK → C to select: Cold, Erase, [Flash*], Test
Select the required function with ↕.	☞ Following the detailed hints given above is indispensable!

⚠ If *[Flash] is selected (data destroying !)
followed by an obligatory termination with [Cold], EXIT or warm start not possible !!!

Preparing PR5510: Open menu [Setup]-[Reboot]-[Bios], wait for >>> message Doing Bios..., Bios ready.
Select the menu item [Flash], select the serial port:

```
Start FlashIt!
↓Builtin     ↑
```

```
Start FlashIt!
↓Slot2 RS485↑
```

```
Start FlashIt!
↓Slot2 RS232↑
```

Select the serial port for program loading.
If the serial port "Builtin" is busy, ↓ or ↑ can be pressed to select the interface (available only, if a serial I/O card PR5510/04 is fitted).

Preparing the PC: Now, FlashIt!32 must be started on the connected PC. COM port

- Select the firmware file from the list in the window.
- Press the flash button.
  When >>> message No communication No prompt from device is displayed, the possible causes are: faulty COM port selected or cable between PC and instrument not connected, or connected incorrectly.
- Wait for >>> message completed .

During firmware loading, various status messages are displayed:

```
Loading...
Call...
Erasing...
Blank test...
Blank test. passed
Flashing    8A5000
```

Subsequently, the boot menu with the status line is displayed again:

```
Flash complete
 Cold ↓Erase ↓ Flash
```

Initializing with [Cold] is indispensable.

[Flash] deletes the flash EEROM itself, do **not execute** [Erase],which deletes the EAROM with CAL-Data!

Subsequently, the following >>> messages can be output:

Firmware too old, i.e. a more recent BIOS which is not compatible with this firmware version is provided in the instrument.
*Action: reload relevant BIOS.
or, vice versa,

Bios too old, i.e. a more recent firmware was loaded to an earlier Bios version provided in the instrument.
*Action: reload relevant Bios.

***) The BIOS may be reloaded only on request by the firmware load operation:**
„flash" procedure : always flash the FIRMWARE first, then "re"-flash the BIOS, **but only when requested** .

THE BIOS LOAD OPERATION MUST NEVER BE INTERRUPTED, OTHERWISE THE INITIAL LOAD PROGRAM IS DESTROYED AND CANNOT BE RESTORED. IN THIS CASE, THE INSTRUMENT MUST BE RETURNED FOR REPAIR!

5.4 Displays and controls

5.4.1 Function keys

- Functions set zero, set/reset tare (toggle function),
- Selection of the weight display mode [gross], net and tare
- Print key (application-dependent) e.g. weight value with time stamp
- Functions of keys F1 and F2 must be realized by means of special programs to IEC 61131 when necessary.

5.4.2 Dialogue language

The instrument is configured only in English language. For system operation, two languages are available. **Main language is English**. With standard instrument version, the second language is German (factory setting). Switch-over is by means of the front panel keys [Setup]-[Software-Parameter] ☞ *see chapter* 5.4.2

5.4.3 Configuration / calibration

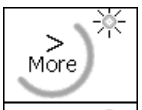
Operator dialogue		in English
Operation		via front-panel keypad,
	or	via terminal VT100 (compatible) or by means of PC terminal emulation e.g. HYPERTERMINAL

5.4.4 Operation

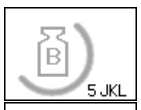
Operator dialogue		in 2 languages (English or local alternative [standard=German])
Operation		via front-panel keypad
	or	with ext. PC keyboard and front-panel display
	or	via terminal VT100 (compatible) resp. with PC terminal emulation e.g. HYPERTERMINAL

5.4.4.1 Multi-function keys

Character input
(e.g. 5 JKL)



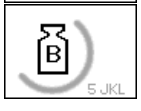
Press MORE during more than 1sec until LED status: ON



The inscription shown in black is valid.

Function input
(e.g. GROSS display

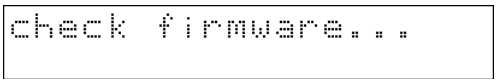
Press MORE shortly until LED status: OFF



The inscription shown in black is valid.

5.5 Main menu

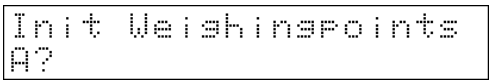
After switching on the supply voltage, the following boot procedure is displayed:

1) 

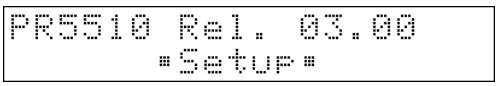
Automatic "hardware" check

2) 

All displays are lit during several seconds for "lamp testing".

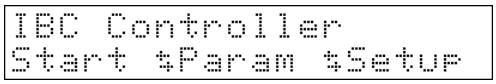
3) 

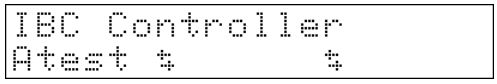
Initializing the ADC processors
if ok, ? changes into ✓

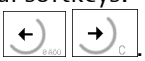
4a) 

Boot menu: (instrument type, release information)
With firmware without additional IEC 61131 application, only a basic softkey = SETUP is provided.

All other softkeys which may be provided are from additionally loaded application packages, e.g. PRO, IBC, BATCH ... controller resp. IEC 61131 –IEC 61131 special programs.

4b) 



IBC application package with 3 additional softkeys:
Start, Param, Atest can be selected with  .

5) Now, the instrument waits for operation:

- Basic position. The instrument can be configured with Param, Setup first.
- IBC application software waits for a separate START command - [start] for execution.

Survey of main menu items

Menu item	Description
[Setup]	Firmware-dependent: configuration, calibration, interface definition, initial data
all other [xx]	application-dependent (☞ *see operating manual)*
[Setup] - Config	Menu item: configuration [Config], is not provided with sub-menu items, as long as no application is loaded. When actuating, message: >>> CONFIG not found is output. Config menu items are application-dependent (☞ *see operating manual).*

5.5.1 Menu tree

5.5.1.1 [Setup] settings

[Setup]

- Config	**Depending on application package** ☞ *see relevant manual*
- Weighingpoint	Calibration, open CAL switch for this purpose
- Set Clock	☝ *Indispensable with ALIBI memory and FLOW !*
- Serial Ports	BuiltIn, PR5510/04 option (if fitted)
- Software Parameter	Firmware and application software settings
- Show Boardnumber	Unique reference number of this instrument
- License Setup	System extension: application package, enable functions
- Print Setupdata	If printer, complete Config/cal data print-out (documentation)
- Print Last fault	Service/debugging
- Refresh Display	Maintenance/service (elements are lit continuously)
- I/O Slots	Service and test
- Show Version	Display of current software versions
- enable download	PR1750/FlashIt disable for downloading new versions
- Reboot	Service, commissioning, trouble-shooting

5.5.1.2 *Weighing point* calibration

[Setup]	Details
- [Weighingpoint]	internal ADC : one weighing point described WP-A
- New	With **first calibration** during commissioning
- Reset all to default	YES or NO Reset->default="factory setting" 3000 kg ,1kg
- Set Fullscale	0.000100 ...<3000>... 9999900 <kg>, t, lb, g
- Set Stepwidth	<1>, 2, 5, select with [More] 10, 20, 50 , current stepwidth in ><
- Set Deadload	[Load] or [mV/V]
Enter Deadload	<0.000000 mV/V>
- Set Span	[Data] or [Load] or [mV/V]
Enter LC-Data	[Setup] or [Enter] or [calc]
- Setup	No of LC, Nom.load, Gravity, Hysteresis, Certified Data
- Enter	LC sensitivity, LC resistance
- Calc	Calculate mV/V
Enter current load	0.0001 ... 9999900 kg, t, lb, g
Enter Span	<1.000000 mV/V>
- Calculate test	Test: Calculate test figure
- Exit calibration	YES [Save] or [Undo], NO
- Modify *see New*	When **changing an already configured** scale
- Param	
- Measuretime	0,01, 0.02...0,16…<0.32 s>...1,28 s
-* Digital filter	*Only with M.time </= 160ms <off>, bessel, aperiod., butterw., tscheby
* FCUT	max: 10ms: 40Hz, 20ms: 20Hz, 40ms: 10Hz, 80ms: 5Hz, 160ms: 2,5 Hz
- Test mode	<Absolute>, Relative
- W & M	<none>, OIML, NTEP, NSC
- Standstill time	0.01 s ... <0,50 s> ... 2,0 s
- Standstill range	0.00 d ... <1,00 d> ... 10,00 d
- Tare timeout	0.1 s ... <2,5 s> ... 25,0 s
- Zeroset range	0.00 d ... <50.00 d> ... 500.00 d
- Zerotrack range	0.00 d ... <0.25 d> ... 500.00 d
- Zerotrack step	0.00 d ... <0.25 d> ... 10.00 d
- Zerotrack time	<0,0 s > ... 25,0 s
- Overload	0 d ... <9 d> ... 9999999 d
- Don't print below	0 d ... <50 d> ... 9999999 d
- Multirange mode	<off>, on
* Multirange limit 1	0 d ... 50000 d, crossover from small to medium stepwidth
* Multirange limit 2	as Multirange limit 1
- Check	Only NTEP counter: no of calibration and configuration changes
- View	(Display, changing not possible)
- Fullscale (kg, d)	
- Stepwidth (kg)	
- Deadload (mV/V, kg)	
- Sensitivity (µV/d, cnt/d)	
- see Param list	

5.5.1.3 *Setup* parameter

Setup	Details
- Set Clock	
	[Time] and [Date]
- Serial Ports	
- Operator device at	[Builtin RS232], none, Slot 1 .. 2 RS485, Slot 1 ... 2 RS 232 (select)
- Printer device at	[none], Builtin RS232, Slot 1 .. 2 RS485, Slot 1 ... 2 RS 232 (select)
- Remote device at	[none], Builtin RS232, Slot 1 .. 2 RS485, Slot 1 ... 2 RS 232 (select)
- Serial port setup	
* Builtin RS 232	Protocol, Baudr., Bits, Parity, Stopbits, Devtype, Echo * falls nicht als operator dev.
** Slot 1 RS 232/485	Protocol, Baudr., Bits, Parity, Stopbits, Devtype, Echo ** falls eingebaut
** Slot 2 RS 232/485	Protocol, Baudr., Bits, Parity, Stopbits, Devtype, Echo ** falls eingebaut
- Software Parameter	
- Language	<English>, Local Language
- Frontkey timeout	1 s, <2 s>, 3 s
- Low battery check	<on>, 1min, off
- Report to	<none>, communication, application, communic. & appl., application +Prod., none
- Tare key	<enabled>, disabled
- Set zero key	<enabled>, disabled
- Quit in mainlevel	<enabled>, disabled
- Reset on stop+exit	<1 s>, 5 s, disabled
- S88.01 Interface	<off>, on
- Software download	<protected by setup>, always enabled
- Lines per recipe	1, 2, ...<10> ... 255
- Recipe simulation	<enabled>, disabled
- Subrecipe	enabled, <disabled>
- Keyclick duration	0-(Aus), 10, 20, 30, <40>, 50, 100 200, 400 ms
- Keyclick volume	0, 5, 10, 20, 30, 40 ,<50>, 60, 70, 80, 90, 100 %
- Automatic refresh	<on>, off
- Refresh time at	Select time (only hour)
- Show Boardnumber	Show: Board number, needed for license order
- License setup	Show, Add, Delete
- Print Setupdata	Printout compl.setup at the selected interface, Error: no printer device
- Print last fault	Printout from internal Error buffer (Debug), Error: no printer device
- Refresh Display	Highlight all segments (until leaving the Menu again), Maintenance/Service
- I/O Slots	Show: Slot 1 ...4, card type or empty, @ Task Nr.
- Show Version	Show: Firmware-Version, Application, BIOS-Version
- * Enable download	Download enabled * only if [Software download] is set to [protected by setup]
- Reboot	
- Cold	Cold start ☝ clear complete RAM: loosing all User-Data !!! => Backup ???
- Warm	Warm start clear only System data, no lost of User-Data
- Bios	No exit or warm start possible !!! Exit only with data lost
- Cold	clear RAM
- Erase	clear EAROM
- Flash	load operating system
- Test	Test ROM, RAM, EAROM,

5.6 Start-up ("boot") menu

Access to the boot menu is by:

- Keeping key Stop pressed during power ON (warm start)
- By selecting menu item [Setup]-[Reboot]

- As a last possibility **in cases of emergency** (no operation possible, e.g. fatal error):
  Press keys Stop + Exit simultaneously during more than 1s or 5 s, according to the selections made during SETUP, in which this function can also be disabled.
  (no warm start possible any more, data must be destroyed [Cold, Erase] !)

♦ **Warm start & stop key:**

```
STOP-Key pressed
 Cold ↕ Warm ↕ Flash
```

Press ↻ to select the required function.

[Cold] The RAM working memory is deleted ✋ Data loss !
[Warm] System parts of the RAM working memory are deleted
[Flash] operating program loading.
[Test] instrument hardware testing
👍 Following the hints given below is indispensable !

♦ **[Setup]-[Reboot] menu:**

(e.g. if warm start is not possible due to the system conditions)

```
Setup
↓Reboot                  ↑
```

```
Reboot ?
 Cold ▪ Warm ▪ Bios
```

```
Bios ready
 Cold ↕ Erase↕ Flash
```

Press ↻ to select the required function.

[Cold] The RAM working memory is deleted ✋ Data loss !
[Warm] The system parts of the RAM working memory are deleted.
[BIOS]
[Erase] Deletes the EAROM (if the CAL switch = open).
[Flash] The operating program is loaded.
[Test] Instrument hardware testing

⚠ If [Bios] is selected (destroying data):
Because EXIT or [Warm] start are not possible any more!

👍 Following the detailed hints given below is indispensable!

♦ **Stop & exit key**

use only in urgent cases (user data are destroyed):

```
StopExit reset
 Cold ↕ Erase↕ Flash
```

Press ↻ to select the required function.

[Cold] The RAM working memory is deleted ✋ Data loss !
[Erase] Deletes the EAROM (with CAL switch = open).
[Flash] Loads the operating program.
[Test] Tests the instrument hardware.

⚠ If selected (destroying data):
Because EXIT or [Warm] start are not possible any more!

👍Following the detailed hints given below is indispensable!

♦ **Important hints:**

[Cold] ☝ !!! Erases the RAM working memory irrevocably !!! ☑ data back-up existing?
i.e. all user data / databases are lost. Dependent on application (BATCH, IBC, TRUCK, PRO...), these data can be important recipes, components, truck, customer tables .... and, last not least, alibi data, or only temporarily loaded IEC 61131 programs.
Saved (command: SAVE) calibration, configuration and license data in the EAROM memory remain unchanged and are automatically reloaded into the working memory after deleting.

```
Doing Coldstart...
Check firmware...
Firmware Coldstart...
```

>>> messages:
The firmware checksum is tested.
A cold start is made.

[Warm] Deletes / resets all internal program variables, pointers and flags.

All programs and data in the RAM working memory and EAROM memory remain unchanged.

```
Doing Warmstart...
Check firmware...
Firmware Warmstart...
```

>>> messages:
The firmware checksum is tested.
A warm start is made.

[Erase] ☝ !!! Erases the EAROM irrevocably !!! ☑ license documents and CAL reports provided?
i.e. stored calibration and configuration data are lost. They are set to default values.
Already included licenses are also deleted.

```
Erase all data?
 YES  ▪ ---- ▪  NO
```

Safety prompt:
[YES] Data are overwritten.
[NO] All data remain unchanged.

>>> Messages:

```
Erase...
Erase done
Check firmware...
Firmware Coldstart...
```

An erase operation is done.

The firmware checksum is tested.
A cold start is done.

☝ The CAL switch position C̄ protects against accidental erasing!

```
Erase not possible
CAL-Jumper closed
```

```
Erase canceled
 Cold & Erase& Flash
```

In the boot menu, various >>> messages are displayed:

```
Bios ready
Flash complete
Flash cancelled
Fatal error reboot
No valid firmware!
BIOS too old
```

A restart from operating level was done.
Loading of a new software was finished.
Loading of a new software was canceled.
Fatal error before restarting
The firmware checksum is faulty.
Wrong BIOS version* : too old, detected after firmware reloading

5.6.1 [Test]

```
StopQuit reset
Test   ↕       ↕
```

Select the required function with .

Press to select options:
[Cold], Erase, Flash, Test

Following the above detailed hints is indispensable !

Test

`Test: ↕Rom-Checksum↕`	Hardware test menu: Press to select [Rom-Checksum], *[Fast RAMtest], *[Deep RAMtest], [SIL-Nr-Check], *[EAROM-Check], [KBD-Check 32/PC], [DSP-Check]	

ROM checksum	Press to select	Result: BIOS passed, firmware passed	Press to leave
Fast RAM test	Press to select	Result: RAM=100000	Press to leave, then [Cold]*
Deep RAM test	Press to select	Result: RAM= counts 1048576 bytes	Press to leave, then [Cold]*
SIL-no. check	Press to select	Result: boardnr: 20060984	Press to leave
EAROM check	Press to select	Result: EAROM passed	Press to leave, then [Erase]*
KBD check 32	Press to select	For test, press e.g. Result: FFFFFFEFF 0008 0148	Press & simultaneously to leave
KBD check PC	Press to select	Result:	Press to leave
DSP check	Press to select Press check 2 (weight display): Press dig.: 1 Press dig.: 2 Press dig.: 3 Press and followed by	Result: all display elements are lit  Result 1: blink, B - 1713 kg Result 2: blink, G 1234567 t Result 3: NET, AbCdEFG lb Result 4: 2x20 text display indicates all displayable characters	Press to leave

If *[Fast RAMtest], *[Deep RAMtest], *[EAROM check] is selected , this is followed by an obligatory termination with [Cold] or [Erase] (= destroying data !), no EXIT or warmstart possible anymore !!!

5.6.2 Procedure:

Example for "power-on" sequence

Check firmware...	Firmware checksum is being tested.
Firmware Warmstart...	Warm start is busy.
	Display (lamp) test

5.6.2.1 Weighing point initialization

[Erase] or [Cold] or [Warm] or Power On are followed by weighing point ADC initialization.
This ensures that the physical weighing point provides valid weight values.
Unless valid weight values are provided, an error message is generated.

Init Weighingpoint A?	Weighing point initialization, '?' is displayed during initialization, '✓' if the WP is ready.
Init Weighingpoint A✓	WP is ready
An error message is output, if weighing point is not ready after 5 seconds.	Init weighingpoints WP A failed

5.6.2.2 Waiting for operation

PR55....1..... ▪Setup ▪	Moving characters on display (need not be awaited, press key...)
PR5510 Rel. 03.00 ▪Setup ▪	Instrument in main menu (here, only FIRMWARE without application)

6 Calibration

6.1 Introduction

Calibration of the ADC / weighing point by means of weights or mV/V is possible via the front-panel keypad or a connected terminal/PC *(☞ see chapter 9.3.3)*

Apart from calibration by means of weights or by mV/V input, PR5510 offers the "SMART" version for calculation of mV/V by input of load cell data.

During input of the load cell mV/V value, data correction for the local gravitation may be necessary.

The Sartorius "STAR" load cell data are based on the gravitation valid for Hamburg: 9.81379

The measuring rate of the sigma-delta analog converter in the PR5510 is equal to the measuring time within 10ms and 160ms. Higher measuring times within 320ms ... 1280ms lead to mean value formation of several measurements at a rate of 160 ms.

An analog filter for "peak interference" suppression is integrated in the ADC input circuit.

The digital filter is applicable only for measuring times smaller than/equal to 160msec. For cutoff frequency fcut , only defined maxFCUT values are permitted dependent on the measuring time: 10ms: 40Hz, 20ms: 20Hz, 40ms: 10Hz, 80ms: 5Hz, 160ms: 2,5 Hz, 320ms:---

Command: SAVE stores the calibration data in non-volatile EAROM.

The calibration data are write protected by a CAL switch 

, which must be sealed for legal for trade applications.

The calibration data can be adjusted or changed only with the CAL switch in position 

.

- **Resolution magnifier:** ****10***

During calibration the display resolution (scale interval) can be increased by factor 10.

During calibration, key 

can be pressed for activating a 10-fold magnifier (toggle function).

- ***Fullscale*** **(full scale deflection): *FSD***

The full scale deflection (FSD)determines the maximum weight which can be measured.
overall weight range
within 0.100 and 9999900
in mg, g, kg, t or lb.
The value must be divisible by the step width and can have max. 3 digits behind the decimal point/comma.
The default value is 3000kg.

- ***Stepwidth*** **(scale interval): *Step***

The scale interval which is valid for the total scale range has to be selected: 1, 2, 5, 10, 20, 50,
default is 1.

- ***Deadload*** **(empty scale):**

The value of the unloaded scale / empty hopper is the deadload. The input voltage equivalent to this weight value is displayed/ stored in mV/V.

For calculating the voltage for deadload the same formula is applied as for span (Full scale has to be replaced by dead load)

Default is 0.000000 mV/V

During calibration it has to be decided:

- **To use the empty scale as deadload (normal case)**
- **To enter the deadload in mV/V (if the scale cannot be unloaded, or the value is known from previous calibration)**

If the deadload has to be changed later (due to weight decrease or increase of the empty scale), it can be done without influence on the other data like span.

- ***Span*** **(full scale):**

The span indicates the equivalent input voltage in mV/V related to the scale FSD (full scale):

$span\ [mV/V] = \frac{full\ scale \cdot load\ cell\ sensitivity\ C\ [mV/V]}{load\ cell\ capacity\ (sum\ of\ all\ load\ cells)}$	Span in [mV/V] Full scale as a weight value Load cell sensitivity C [mV/V] Load cell capacity (= sum of all load cells) as a weight value

Default is 1.000000 mV/V

During calibration it has to be decided:

- **Set span by weight (load the scale with the calibration weight and enter the value of the calibration weight)**
- **Enter the span in mV/V (from calculation of above formula resp.SMART by menu-function or if the value is known from previous calibration)**

6.1.1 Description of measurement circuit parameters

♦ *Measuretime*:

This parameter is only relevant, if the filter is set to none. In other cases the measuring time equals the measuring rate! The measuring time is the time at which a new weight value is presented.
Enter 10 to 1280 ms

default = 320 ms.

♦ *Filter* Digital filter:

Select between none or Bessel, Aperiodic, Butterworth. The digital filter (low-pass, 4-th order) is located behind the ADC, in intervals of the measuring rate a new value is calculated.
With digital filter activated, the cutoff frequency has to be defined. Weight values to be displayed are generated behind the digital filter.

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

♦ Filter: Frequency

The range of the filter cutoff frequency [fcut] is depending on the measuring rate (*see table*), it is only used if the filter is not set to none!

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

6.1.1.1 Standstill detection:

The standstill detection requires the two following parameters to determine the mechanical standstill of the scale. During a defined period of time (standstill time), the weight value of the scale must be within defined limits (standstill range). In this case, the scale is in standstill condition.

♦ *Standstill range*

Permissible range ... 10:

♦ *Standstill time* :

During this time, all weight values must be within the specified standstill range.
Permissible range 32xmeasuring time

♦ *Tare timout* :

Unless the tare command can be handled within this time n, e.g. because the scale was not in standstill condition, the weighing point module generates a >>> message (no standstill noStAnd).

Permissible range: ...25:

6.1.1.2 Zero correction

Determination of a +/- range around the calibration zero, within which the displayed gross weight can be set to zero by pressing the set zero key (or by a corresponding external command) or within which automatic zero setting is active.

♦ *Zeroset range* :

Definition of a +/- range around the calibration zero, within which

- the displayed gross weight can be set to zero (by a corresponding external command), or
- automatic zero tracking is active

Permissible range: ... 500:

6.1.1.3 Automatic zero tracking

In case of change of the empty scale (hopper weight) e.g. due to loss (dead load reduction) or formation of slag (dead load increase) by only a very low amount, automatic zero tracking ensures that the scale is reset to zero automatically.

Automatic zero tracking is defined with the following parameters. With the scale in standstill condition and the gross weight within the zero set range, automatic zero tracking is done stepwisely (step width) at defined intervals.

♦ *Zerotrack range* :

This function is only valid, if Zerotrack repeat is not set to 0 !
The zero tracking does only work as long as the weight signal is still in the zero set range.

Permissible range: ... 500:

♦ *Zerotrack step* :

This function is only valid, if Zerotrack repeat is not set to 0 !

- For W&M applications, the correction must not be above 0.5 d/sec.
- The automatic zero tracking stepwidth must be smaller than the standstill range also for non W&M applications.

Permissible range ... 10:

♦ *Zerotrack time*

Switching off the automatic zero tracking is with interval equal to 0.
Switching on the automatic zero tracking is with interval unequal to 0.

Permissible range ... 25:

- ***Overload*** **Maximum permissible overload:**

Weight values above FSD + overload are generating an error message. The overload range prevents the scale from going into error condition in case that the weight is only some digits above the FSD range.
For 'legal for trade' applications this value must not be greater than 9e.

Permissible range ... 9999999

- ***Don't print below*** **(lowest weight limit for print-out):**

Permissible range ... 9999999:

- ***Testmode:*** **Analogtest**

Determination, whether the test measurement displays *FullScale* (absolute) or the deviation related to *FullScale* (relative) is made. Example: FSD = 3000, result: Should be 3000 for absolute, should be 0 for relative.
Calibration (with/ without weights) is completed with a test measurement and the result is scaled so that FullScale is displayed.

default = absolute

6.1.1.4 *W&M* Weight and Measures

Parameter with legal for trade operation

The parameter can be set / changed only with the CAL switch in position 

.

The following selection is possible:

[none]
If the parameter was set to [none] for all allocated weighing points, gross (B), net (N) and tare (T) are displayed with weight unit.

[OIML]
With a weighing point set to OIML, the weight value for Diff, Flow, Setp and User are displayed without weight unit. For further details, see table.

[NTEP] or [NSC]
With a weighing point set to NTEP or NSC, the weight values for Diff, Flow, Setp and User are displayed without weight unit. For further details, *see table*.

	none	OIML	NTEP	NSC
Weight negative (<-1/4d)	with unit	without unit	with unit	without unit
Weight in range (-1/4d ... SKE)	with unit	with unit	with unit	with unit
Weight > FSD	without unit	without unit	with unit	without unit
Weight > FSD+overload	ERROR 2	ERROR 2	ERROR 2	ERROR 2
Gross weight display	B	B	G	G
Diff weight	with unit	without unit	without unit	without unit
Flow	with unit	without unit	without unit	without unit
Setp	with unit	without unit	without unit	without unit
User	with unit	without unit	without unit	without unit

6.1.1.5 Multi-range scale

The multirange function is controlled by three parameters in menu [Setup]-[Weighingpoint]-[Param]:

With [Multirange mode] = ON, scale 3 has different resolutions:
Trigger points Multirange-limit 1 and Multirange-limit 2 are the range limits.

If the gross weight is above range 1, the next higher range with the next higher step width is selected (1->2->5->10->20->50). With the gross weight <= 0,25 d of range 1, the scale in standstill condition and not tared, the scale returns to range 1.

The displayed ranges are marked by quotation marks or dashes before the weight value

' 1234,1 kg range 1, " 2345,2 kg range 2, Ξ 3456,5 kg range 3

☝ During calibration, the multirange function is always switched off.

'Legal for trade' applications require fitting of a label for Max., Min. and e for each range

- **Multirange mode**

With Multirange mode= ON the scale is provided with three ranges with different solution.

- **Multirange limit**

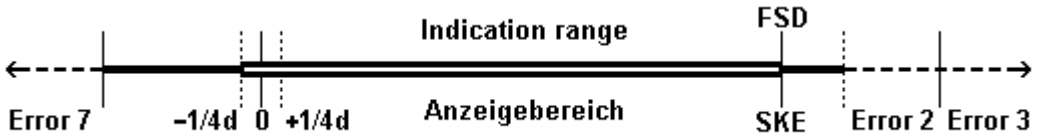
are the range limits.

Permissible range ... 50000:

6.2 Error messages on the weight display

The instrument can generate error messages which are output on the weight display.
The messages are displayed in encoded form as 'Error X' .

Error messages on the weight display	
Error 1	Internal arithmetic overflow (faulty calibration values)
Error 2	Input voltage is above FSD + overload
Error 3	Input voltage is above the permissible range of 36 mV. However, an error in the analog section, a defective load cell, or a cable break are also possible.
Error 4	Weight value exceeds display digits.
Error 5	Weight is not available, e.g. weighing point is busy.
Error 6	No voltage, or polarity error at sense
Error 7	Input voltage is negative or incorrect load cell connection.
Error 8	ADC error, e.g. internal ADC defective or overloaded.
Error 9	No communication with the weighing point
Error 11	Weight is not available



FSD = (fullscale)

6.3 Calibration procedure

Calibration start with [Setup]-[Weighingpoint]

```
Setup
↓Weighingpoint          ↑
```

Press [OK] to select.

6.3.1 Error messages at calibration start

When calling up the calibration, various error messages can be output:

```
Can not calibrate
Jumper is closed
```

The CAL switch is [C].

>>> Message:

```
Can not calibrate
Tare active
```

PR5510 is tared => reset tare !.

```
Configuration is
active
```

PR5510 is connected to a terminal/a PC, where this function is already active.

6.3.2 Calibration / configuration counter

Menu [Setup]-[Weighingpoint]-[Check] provides two 5-digit counters (max. 65000):

Counter for NTEP

```
Calibration   : 00005
Configuration: 00011
```

When saving the calibration, data are compared. If the value for span (in mV/V) is changed, the calibration counter is incremented. If one of the remaining values (including fullscale, deadload, stepwidth, measuring time, standstill, etc.) is changed, the **configuration counter** is incremented. The two counters are stored together with the calibration data.
This procedure serves to provide evidence of calibration and/or configuration data changing (NTEP request). These counters are always included (independent of selected [W&M] mode). They can be neither reset nor modified. Counter display is possible with the CAL switch closed and taring activated.

[Erase] or loading from BIOS resp. firmware does not affect the counters.

6.3.3 Calibration data display/checking

```
Calibration
New    ↑Modify↓ Param
```

Further functions can be displayed by pressing keys [←] [→].

```
Calibration
       ↑Check ↓ View
```

Select [View]

All calibration parameters and data are displayed in the form in which they were entered / determined during calibration.

6.3.4 Possible error messages:

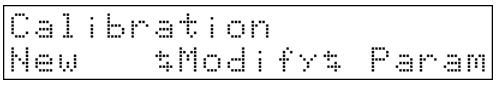
>>> Bad Weight	e.g. dimension was not specified
>>> Status Arithmetik overflow	e.g. specified weight too high
>>> Status Above phymax	calculated input voltage: > 36 mV
>>> Too many d	resolution too low: < 0,8 c/d
>>> Status Below Cal	value is below calibration point
>>> Illegal Fullscale	e.g. with 0.0001234 t

6.3.4.1 Scale calibration

Select Calibration [New], when the scale is calibrated for the **first time** after installation.

Select [Modify] only, if you want to make fine adjust/correction of the mV/V-Values for deadload/span or only if the deadload has to be adjusted afterwards. Changes of stepwidth and span are due to dependance of all CAL-parameters mostly not possible and thus only with [New] to do.

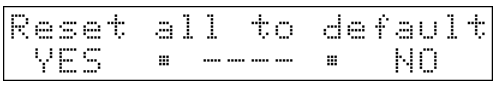
6.3.4.2 Select the calibration mode



Select [New] for completely NEW calibration (from default values).
Select [Modify] for a marginal change of an existing calibration.
Select [Param] for configuration of ADC parameters.

Press  to select the required function.

[New]



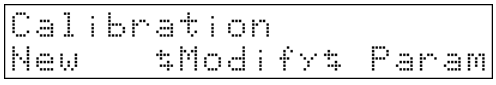
A safety prompt is made: Reset to default?
Reply [YES] for reset to the default values as start values.
Reply [NO] to leave selection without changes.

Press  to select the required function.

default values for [New]:

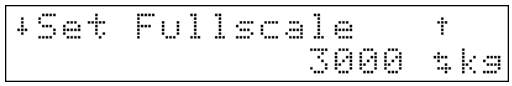
Fullscale	3000 kg
Stepwidth	1
Deadload	0.000000 mV/V
Span	1.000000 mV/V
[Param]	All parameters remain unchanged !

[Modify] ⚠ This menu should only be used for small changes, in other cases [New] has to be selected.

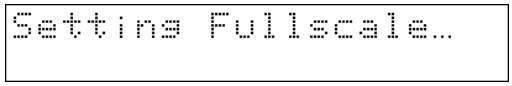


Select [Modify] for changing existing calibration data.
(Full scale, weight unit, step width, deadload and span)
Procedure as for New, but without reset to default values, i.e. already existing values remain unchanged.

♦ Set *Fullscale*



Fullscale value with/without decimal point:
Press More to select the unit in [kg], t, lb, g
Press More to select digit input: value
Then OK

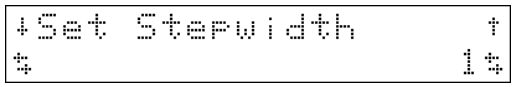


is processed...

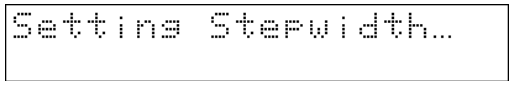
☛ Particularities of MORE key operation:
Press key MORE for switch-over to "digit" input (LED status: ON) "long" (approx. 3sec) => 3000
Switch over to unit selection (LED status: OFF), then press MORE "shortly" => g, kg, t, lb .

During initial calibration [New], step width and mV/V may have to be increased for a permissible number of scale intervals. When changing [Modify], an >>> error message is output, if an inadmissible value is entered.

♦ Set *Stepwidth*



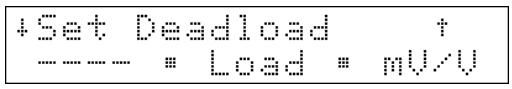
Set stepwidth
Press ← to select:
[1]-2-5-10-2-50
Then OK / ↓ ↑



is processed ...

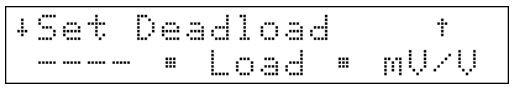
♦ Set *Deadlod*

Deadload= weight of the empty scale construction. The deadload is also applied to the load cells and must be suppressed because only the actually applied load is to be measured.

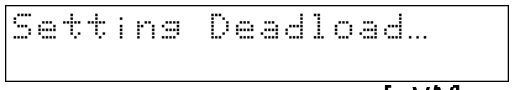


The two methods of suppression are:
A) by means of real weight [load] or
B) by means of calculated or known value [mV/V]

[Load]



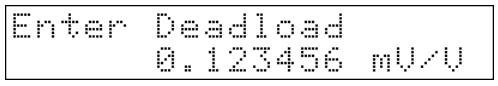
Unload the scale completely
(only the weight of the empty load cells)
Press [Load] to store the deadload.



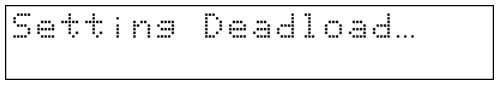
is processed ....

[mV/V]

Select the deadload input by pressing [mV/V].



Press More to select digit input: *value*
Then OK



is processed ....

- Set *Span*

```
Set Span by...      ↑
Data ▪ Load ▪ mV/V
```

Press [...] to select the required function.

3 possible methods: 1.0) Apply the calibration weight [Load] .
or 2.1) Enter a known value [mV/V]
or 2.2) By "calculation" from LC data "Smart"
For determining the span

[Data]

```
Span by LC-Data
Setup▪ Enter ▪ Calc
```

Press [...] to select the function.

Span from load cell data:
[Setup] input of the load cell configuration
[Enter] input of load cell values
[Calc] evaluation of entries and calculation of the mV/V value

[Setup]

```
↓Number of loadcell↑
%                  4%
```

Number of load cells:
Press [←] [→] to select: [4]-5-6-7-8-9-10-1-2-3 Then [OK]
or [↓] [↑]

```
↓Nominal load       ↑
            3000 kg
```

Press [More] to select the unit [kg], t, lb, g
Press [More] to select digit input: *value*
Then [OK]

```
↓Gravity            ↑
       9.81379 m/s^2
```

Acceleration due to gravity (Hamburg-based):
Press [More] to select digit input: 9...10: *value* Then [OK]

```
↓Hysteresis error   ↑
%     not specified%
```

Hysteresis error:
Press [←] [→] to select: [not specified], specified

if [specified] was selected

Corrective value A:
Press [More] to select digit input: [+/2:] *value* Then [OK]

if [specified] was selected

Corrective value B:
Press [More] to select digit input: [+/2:] *value* Then [OK]

```
↓Certified data     ↑
%       all LC same%
```

Valid technical data:
Press [←] [→] to select: [all LC same], Then [OK]
specify each LC or [↓] [↑]

[Enter]

```
↓LC  1 sensitivity ↑
       1.000000 mV/V
```

Load cell (LC) sensitivity value:
Press [More] to select digit input: [0.1...5.0:] *value* Then [OK]

```
↓LC  1 resistance  ↑
         600.000 Ohm
```

Internal load cell (LC) resistance value:
Press [More] to select digit input: [40...2400:] *value* Then [OK]

[Calc]

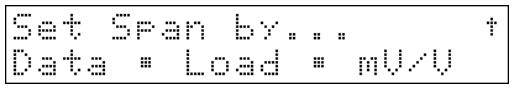
```
Calculating mV/V
```

Evaluation of entries and display during calibration

```
Span = 0.250000 mV/V
Accept▪ ---- ▪Change
```

Display of SMART result:
Press [...] [Accept] to store the calculated value.
Press [...] [Change] to repeat the SMART calibration.

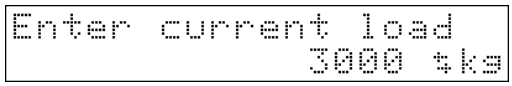
[Load]



If possible, apply full load to the scale.
(calibration weight applied to the load cells)

Press [Load] to store calibration weight.

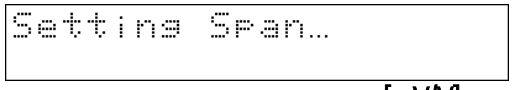
Specify the value of the applied CAL weight.



Press More to select the unit in [kg], t, lb, g

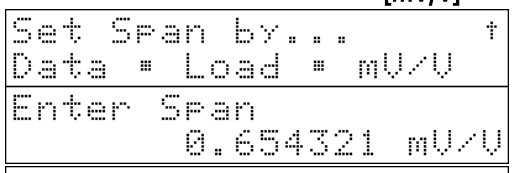
value

Press More to select digit input: *value* Then OK



is processed ....

[mV/V]



Press to select Span input with [mV/V].

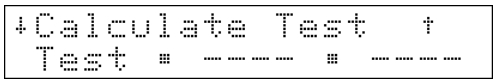
Press More to select digit input: *value* Then OK

is processed ...

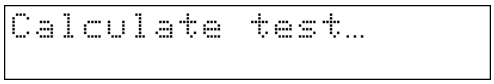
♦ Calculate *Test* figure

The system calculates the test figure required for the TEST.

[Test]

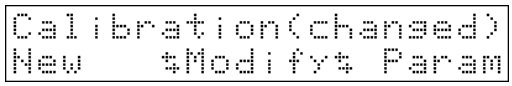


Press to select [Test].



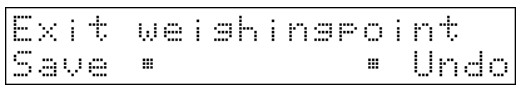
is processed ...

♦ Finishing the calibration



is displayed automatically at the end of menu items.

Press Exit to leave.

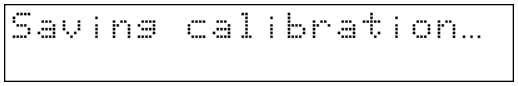


Press [Save] to store the CAL values in non-volatile EAROM.

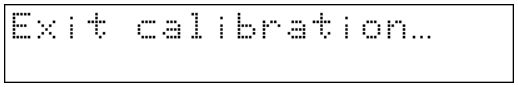
Press [Undo] to leave the CAL menu **without** changes.

Press to select the required function.

[Save]

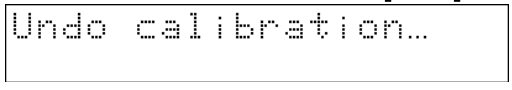


is processed ...



The calibration menu is finished automatically.
Is the displayed weight plausible? ☑ Please, check!

[Undo]



☑ Set the CAL switch safe position: C̄ !

When [Exit] was pressed during calibration e.g. in [Set Deadload]:

A safety prompt is displayed:

```
Exit calibration?
 YES  ▪ ---- ▪  NO
```

[key] [YES] abort, back to menu start (repeat?)

[key] [NO] repeat the current item

[YES]

```
Calibration(changed)
New   ↕Modify↕ Param
```

Note:
several values were already changed (in the working memory, but not saved in EAROM yet)

Press [key] to select the required function.

[NO]

```
↓Set Deadload    ↑
 ---- ▪ Load ▪ mV/V
```

In this case, repeat only the current menu item.

6.3.4.3 Error messages during calibration

```
Set stepwidth failed
Fsd no mult. of Step
```

Full scale value cannot be divided by the step width, input values for full scale or step width remain unchanged.

```
Set deadload failed
Signal above max
```

Deadload plus span is > 3.0 mV/V

```
Set span failed
To many d for signal
```

Span is < 0,3 mV/V for 3000 e, (W&M = OIML or NTEP)
Span is < 0,03 mV/V for 3000 d, (W&M = none)

```
Set span failed
Signal above max
```

Span plus deadload is > 3.0 mV/V

```
Set fullscale failed
Fsd below cal weight
```

Full scale value smaller than calibrated weight (span)

```
↓Measuretime       ↑
X              10msX
```

Standstill cannot be higher than 32 x Measuretime.
Message: < Standstilltime/32

6.3.4.4 Set *Parameters*

```
Calibration
New    %Modify% Param
```

Select ADC parameter input by pressing [Param].

[Param]

```
↓Measuretime          ↑
%              320ms%
```

Measurement time
Press ← → to select:
10-20-40-80-160-[320]-640-1280msec
Then OK or ↓ ↑

```
↓Digital filter       ↑
%                  off%
```

Condition: Measuretime max 160ms

Select filter characteristic: *(☞ see)*
Press ← → to select:
[off], bessel, aperiod., butterw., tscheby.
Then OK or ↓ ↑

```
↓Fcut                 ↑
0.1...5.0:    2.00 Hz
```

Condition: digital filter=ON :

Cutoff frequency[Hz]
Press More to select digit input:
Range [0.1...5.0*:] *dependent of measurement time *value*
Then OK

```
↓Testmode             ↑
%            Absolute%
```

Select the test mode:
Press ← → to select
[Absolute], FSD, Relative, 0
Then OK or ↓ ↑

```
↓W & M                ↑
%                 none%
```

WEIGHTS AND MEASURES (legal for trade):
Press ← → to select
[none], OIML, NTEP,NSC *(☞ see)*
Then OK or ↓ ↑

```
↓Standstill time      ↑
...  2:          0.50 s
```

Time for standstill detection :
Press More to select digit input:
Range [...2:] *value*
Then OK

```
↓Standstill range     ↑
...  10:          1.00 d
```

Enter the range for standstill detection
Press More to select digit input:
Range [...10:] *value*
Then OK

```
↓Tare timeout         ↑
...25:             2.5 s
```

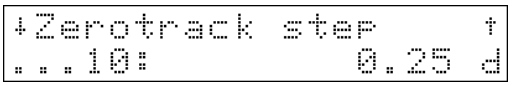
Timeout of non-executable tare/zero set action
Press More to select digit input:
Range [...25:] *value*
Then OK

```
↓Zeroset range        ↑
...500:         50.00 d
```

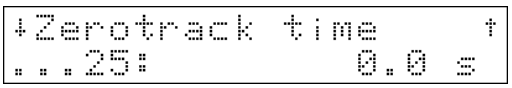
Enter the range for zero set and zero track
Press More to select digit input:
Range [...500:] *value*
Then OK

```
↓Zerotrack range      ↑
...500:          0.25 d
```

Enter the range for automatic zero tracking to compensate zero.
Press More to select digit input:
Range [...500:] *value*
Then OK

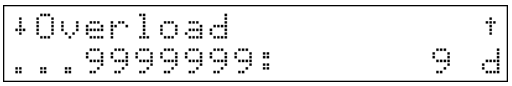


Enter the stepwidth for zero tracking
Press More to select digit input:
Range [...10:] *value* Then OK

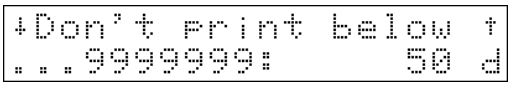


0.0 = Zerotrack time AUS

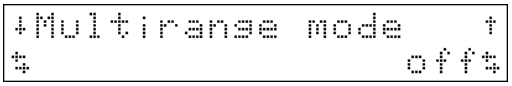
Cycle time for automatic zero tracking
Press More to select digit input:
Range [...25:] *value* Then OK



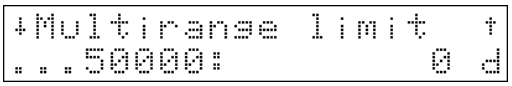
Permissible range above fullscale:
Press More to select digit input:
Range [...9999999:] *value* Then OK



Lower limit for weight print-out:
Press More to select digit input:
Range [...9999999:] *value* Then OK

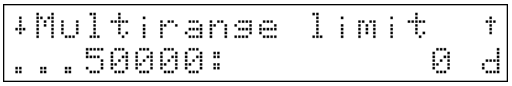


Multirange mode (max. 3 ranges)
← → Select: [off], on *(☞ see)*
Then OK
or ↓ ↑



Condition: Multirange mode = on

Switch-over point from range 1_' to range 2_"
Press More to select digit input:
Range [...50000:] *value* Then OK
or ↓ ↑

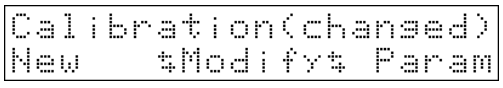


Condition: Multirange mode = on

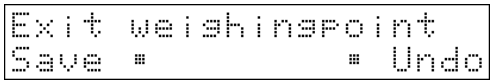
Switch-over point from range 2_" to range 3_E
Press More to select digit input:
Range [...50000:] *value* Then OK
or ↓ ↑

♦ Leaving the 'Set parameter' menu

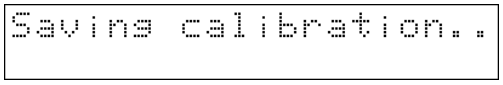
Press key Exit for leaving the menu [Param]:



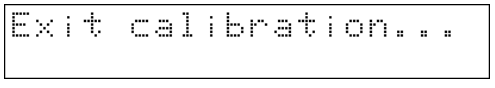
Press Exit to leave (possible at each sub-item in the tree).



A safety prompt is displayed:
[Save] the parameters are stored in EAROM.
[Undo] Leave the menu [Param] without changes.



[Save] is processed...

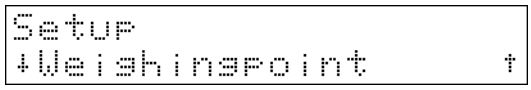


6.3.5 Correcting the Zero of an Empty Scale

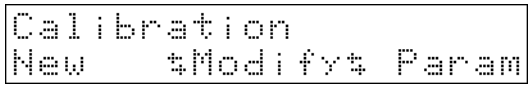
Following a subsequent dead load correction is described.

The parameter can be changed only with CAL switch position C!

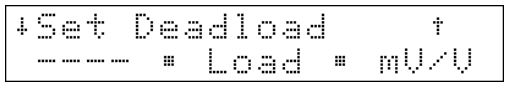
The sequence starts with [Setup]-[Weighingpoint].



Press OK F2 to select the item.

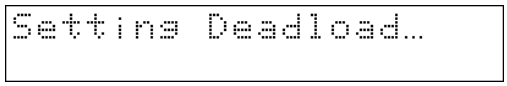


Press ... to select [Modify].

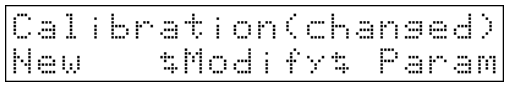


Unload the scale to determine the current weight as deadload.

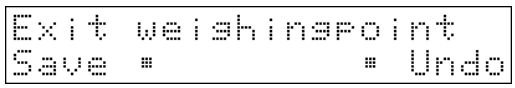
Press ... to select [Load].



Calculate the deadload value.



Complete the change with Exit F1.



Press ... to select [Save]. The CAL values are stored in non-volatile EAROM.

At the end of the sequence, set the CAL switch into the safe operating position C.

7 Instrument configuration

Configuration of all parameters which are **not** related to the weighing point is divided into several [SETUP] sections

PR5510 Firmware settings:
Press ↓ ↑ to select:
Config (application-dependent *(☞see manuals)*
Weighingpoint *(☞see above description)*
Set Clock
Serial ports
Software Parameter
Show Boardnumber
License Setup
Print setupdata
Print last fault
Refresh display
I/O-Slots
Show Version
Enable download
Reboot

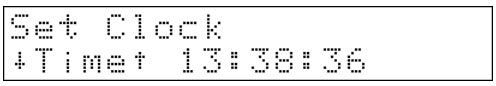
Press OK to select

7.1 *Set Clock*

For adjusting date and time, select [Setup]-[Set Clock]:
Used as time stamp (ALIBI, print-outs...).

For changing the time HH:MM:SS:

Press OK

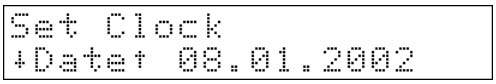


Press More to select digit input: *value* Then OK
or ↓ ↑

Enter colon (:) with .-+/.

For changing the time TT.MM.JJJJ:

Press OK

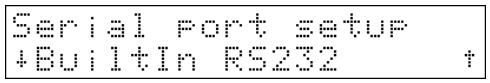


Press More to select digit input: *value* then OK
or ↓ ↑

Enter the point (.) with .-+/.

7.2 Serial Ports

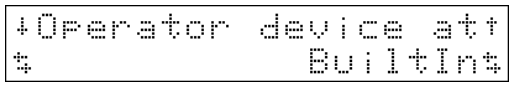
For configuration of serial interfaces, select [Setup]-[Serial Ports].



Setup for serial interfaces

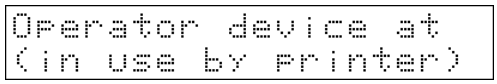
Press ↓ ↑ to select
[BuiltIn], Slot-1* RS232/485, Slot-2* RS232/485 Then OK

7.2.1 [Operator device at]



Front panel keypad switch-over to:
a terminal / PC with terminal program,
connected via serial interface
Press ← → to select:
[BuiltIn], Slot*-1,2, none *optional PR5510/04
incl. RS232 / RS485 selection

Then OK
or ↓ ↑

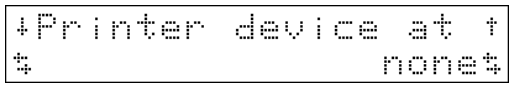


Unless a serial interface is fitted on the selected socket, an error message is displayed.
If the serial interface was already assigned to another instrument (e.g. printer), an >>> error message is displayed.

When the operating console was determined, the interface parameters, which **cannot** be changed, are set to

[Protocol]: XON/XOFF, [Baudrate]: 9600, [Bits]: 8, [Parity]: None, [Stopbits]: 1, [Devtype]: Ansi, [Echo]: Enabled.

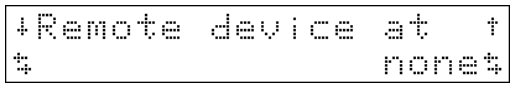
7.2.2 [Printer device at]



Printer for data: CAL, config data, reports
connected via the serial interface
Press ← → to select:
[none], BuiltIn, Slot*-1,2, *optional PR5510/04
incl. RS232 / RS485 selection

Then OK
or ↓ ↑

7.2.3 [Remote device at]



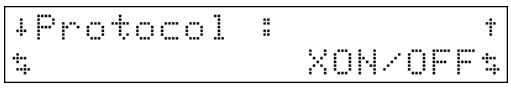
Remote terminal PR5510/05 (Ex)
(reflects the PR5510 front panel):
connected via serial interface
Press ← → to select:
[none], BuiltIn, Slot*-1,2, *optional PR5510/04
incl. RS232 / RS485 selection

Then OK
or ↓ ↑

The interface parameters which cannot be changed are fixed to:

[Protocol]: XON/XOFF, [Baudrate]: 9600, [Bits]: 8, [Parity]: None, [Stopbits]: 1, [Devtype]: Raw, [Echo]: Disabled.

7.2.4 [Serial port setup]

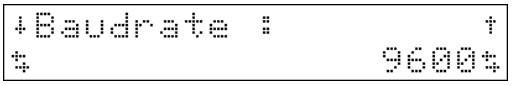


*Each communication protocol can be selected only once per instrument. If an allocation was already made, further selection is not possible.
Moreover, such a protocol can run only on one channel per PR5510/04 module (only one Char-timeout)

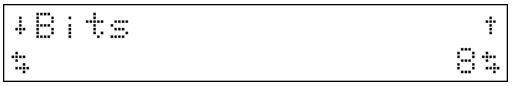
Communication protocol:
Press ← → to select:

XON/XOFF	Software Handshake
3964R-slv	*Siemens S5 Slave
3964R-mas	*Siemens S5 Master
3964RS5sl	*Siemens S5 Slave +Header
3964RS5ms	*Siemens S5 Master +Header
EW-COM V1	*ELECTRONIC WEIGHING- V1 (old)
EW-COM V2	*EW V2 (PR1730..R2, 1740..R5)
EW-COM V3	*EW V3 (PR1730R3, 1740, 1791/92, 5510, 5610, 5710 P8001)
RTS/CTS	Hardware Handshake
JBUS/ModB	*JBus/ModBus
RemoteDsp	Remote display PR1626, 1627/28
W&M Print	*Legal for trade printer
FX880PH02	
Modem	optional with PR5510/04
2-wire	Half duplex 2-wire, for user written IEC 61131 programs, rel. 03.16.03 onwards
None	

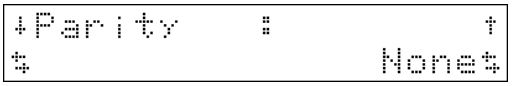
Then OK or ↓ ↑



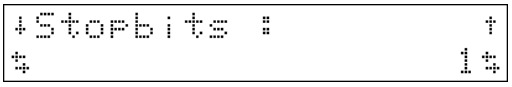
Baudrate:
Press ← → to select:
[9600], 19k2, , 300, 600, 1200, 2400, 4800
Then OK or ↓ ↑



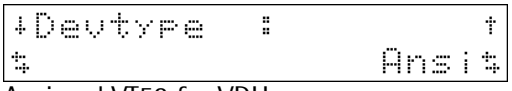
Data bits per character: ASCII, ASCII-extended.
Press ← → to select [8], 7
Then OK or ↓ ↑



Parity bit
Press ← → to select
None, Odd, [Even]
Then OK or ↓ ↑

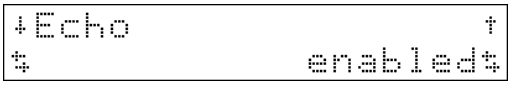


Number of stopbits:
Press ← → to select: [1], 2
Then OK or ↓ ↑

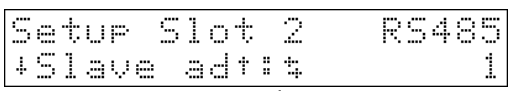


Ansi and VT52 for VDUs,
Raw for printer, remote displays and comm.

Device type
Press ← → to select:
[Ansi], VT52, Raw
Then OK or ↓ ↑

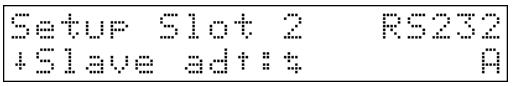


Echo
Press ← → to select:
[enabled], disabled
Then OK or ↓ ↑



with JBus/ModB

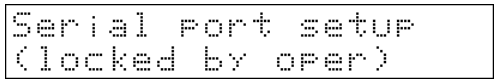
Instrument address (slave)
Press ← → to select: 1...127
Then OK or ↓ ↑



with EW communication

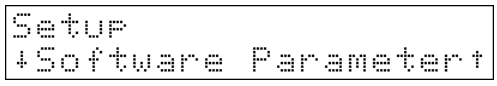
Instrument address (slave)
Press ← → to select: A...Z

Then OK
or ↓ ↑



>>> error message:
The user has tried to allocate the serial port, although it was already assigned to Printer Device or Operator Device.

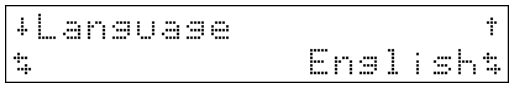
7.3 Software Parameter



Firmware parameter:
Press ↓ ↑ to select
Language,
Frontkey timeout
Low battery check
Report to
Tare key
Set zero key
Quit in mainlevel
Reset on Stop&Exit
S88.01 interface
Software download
Lines per recipe
Recipe simulation
Subrecipe
Keyclick duration
Keyclick volume

Then OK
or ↓ ↑

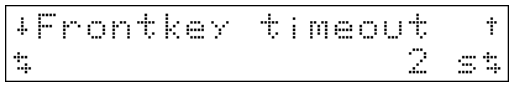
7.3.1 Dialogue language



Language of application-dependent prompt texts (in firmware, always in English, cannot be altered):
Press ← → to select:
English, Local (German or "Translation LTXT")

Then OK
or ↓ ↑

7.3.2 Key timeout



for net or gross mode key

Display time for showing net or gross after releasing the relevant key
Press ← → to select: [2], 3,1

Then OK
or ↓ ↑

7.3.3 Low Battery Check

```
↓Low battery check ↑
$                  on$
```

With low battery voltage, >>> message:
`Lo bAt` is displayed.

Battery test (RAM buffer):

Press ← → to select:
[ON], OFF,1min

Then OK
or ↓ ↑

7.3.4 Report to

```
↓Report to         ↑
$                None$
```

only for (BATCH, IBC, FILL applications)

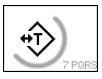
Print report locally, accumulate internally, send:
Press ← → to select:
none (neither printer nor PR1740)
Communication (PR1740)
Application (local printer)
Communic.& appl (local printer&PR1740)
Application +prod (local printer+product)

Then OK
or ↓ ↑

Configuration item for the reports generated by the application (e.g. IBC controller). The buffer memory for the reports is limited to max. 10 entries. In case the reports could not be sent, a prompt if the earliest report should be deleted is displayed.

7.3.5 Tare key

```
↓Tare key          ↑
$              enabled$
```

Disable tare key  on the front panel?
Press ← → to select:
[enabled], disabled

Then OK
or ↓ ↑

7.3.6 Set zero key

```
↓set zero key      ↑
$              enabled$
```

Displable the set zero key  on the front panel?
Press ← → to select:
[enabled], disabled

Then OK
or ↓ ↑

7.3.7 Quit in mainlevel

```
↓Quit in mainlevel ↑
$              enabled$
```

Only with a terminal connected

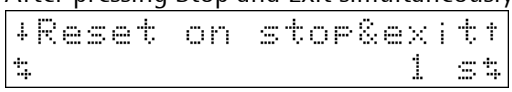
Disable Q_uit command from Terminal ?
Press ← → to select:
[enabled], disabled

Then OK
or ↓ ↑

If the instrument was configured via terminal or PC, command Q_uit can be used to finish the communication. The communication can be re-activated by [Setup]-[Serial Ports]-[Operator device at]-[Builtin RS232] or a warm start.

7.3.8 Reset on stop + exit

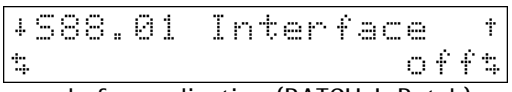
After pressing Stop and Exit simultaneously, the boot menu is displayed *(☞ see chapter 5.6)*



Disable front panel key combination Stop & Exit F1 for "rebooting" or selection of pressing time?
Press ← → to select:
[1s], 5s, disabled

Then OK F2
or ↓ ↑

7.3.9 S88.01 Interface



only for application (BATCH-InBatch)

S88 interface (phase control) active?
Press ← → to select: [on], off

Then OK F2
or ↓ ↑

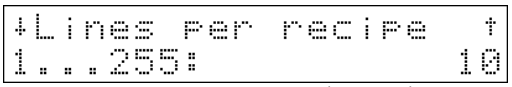
7.3.10 Software download

Enable for PR1750 download

Disable IEC 61131 program download?
(with network connections, in particular)
Press ← → to select:
[protected by setup], always enabled

Then OK F2
or ↓ ↑

7.3.11 Lines per Recipe

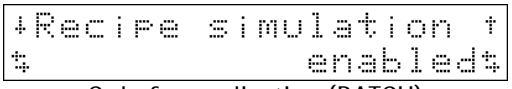


Only for application (BATCH)

Number of recipe lines (longest+reserve) for memory space organization
Press More to select digit input *value* range: [1...255:] [10]

Then OK F2
or ↓ ↑

7.3.12 Recipe simulation



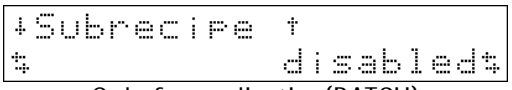
Only for application (BATCH)

Recipe simulation check before starting?:
Press ← → to select:
[enabled], disabled

Then OK F2
or ↓ ↑

Calculation whether the actual load (gross) plus sum of set-points (comp. with total flag=1) of the recipe exceeds the scale range. If yes, >>> Error 19 is generated and the operation is **not** started.

7.3.13 Subrecipe



Only for application(BATCH)

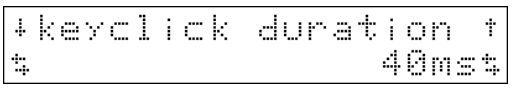
Use subrecipe function?:

Press ← → to select:
[enabled], disabled

Then OK
or ↓ ↑

A subrecipe is useful, if defined component sequences are used in several recipes. Call-up is like with a component in a recipe.

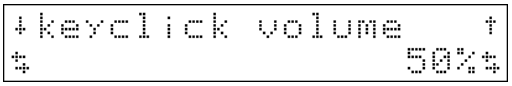
7.3.14 Keyclick



Feedback duration with front-panel keyclick:

Press ← → to select:
[40ms], 50,100, 200, 400, 0=off, 10, 20, 30

Then OK
or ↓ ↑

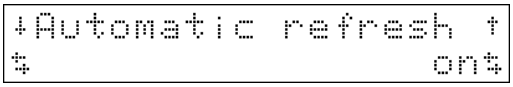


Feedback sound volume with front-panel key click:

Press ← → to select:
[50%],60,70, 80, 90, 100, 0=off, 5, 10, 20, 30,40

Then OK
or ↓ ↑

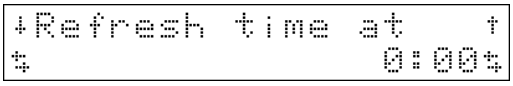
7.3.15 Refresh



Use refresh?:

Press ← → to select:
[on], off

Then OK
or ↓ ↑



Set refresh time:

Press ← → to select the refresh time (only hour).

Then OK
or ↓ ↑

This menu item is used to activate all segments once a day for a duration of two minutes. Thus irregular wear of individual segments is prevented.

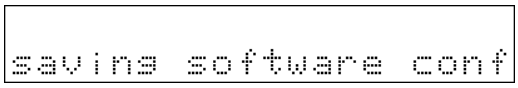
Subsequently, you can restart menu Software Parameter (loop) from the beginning, or quit with Exit F1.

If software parameters were changed

A safety prompt is displayed:

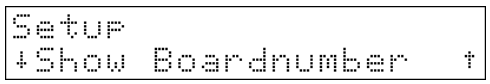
↑ **[YES]** the parameters are saved in EAROM.

↑ [NO] leave the menu [software parameter] without changes (all values as when calling up)

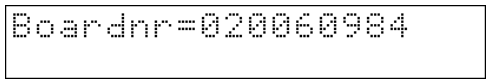


[YES] is processed...

7.4 Show Boardnumber



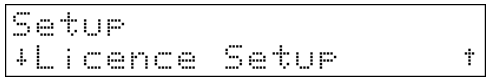
Display of the instrument boardnumber:
Press OK to select.



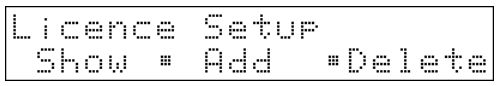
This 9-digit number (unique) is required to order a software license.

Then OK
or ↓ ↑

7.5 License Setup



License input (number of license document):
Press OK to select.



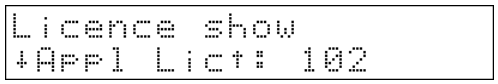
[Show] status display of a license list:
[Add] entry of new license numbers
[Delete] deletion of license numbers

Press ↔ to select the required function.

Application licenses (Appl Lic) and general licenses (PR17xx) can be activated: *see*

Show

Press ↓ or ↑ to select the license.
License type: general and the status is displayed with [Enabled] or [Disabled].

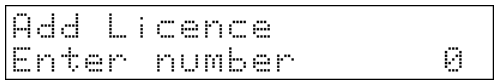


Press ↓ or ↑ to select the license.
License type: application package is displayed.

Press Exit to quit

Add

Enter 7-digit Sartorius license number:



Press More to select digit input value

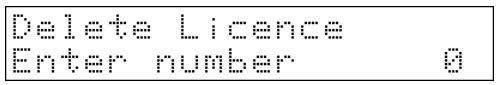
Then OK

With a valid number, message 'PR17XX/XX enabled' is output, otherwise >>>message 'wrong License number' is displayed.

Press Exit to quit

Delete

Deleting the 7-digit Sartorius license number:



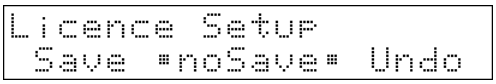
Press More to select digit input value

Then OK

With a valid number, message 'PR17XX/XX enabled' is displayed, otherwise >>>message 'wrong License number' is output.

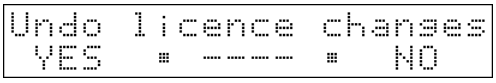
Press Exit to quit

EXIT

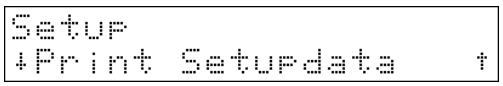


[Save] save in (EAROM)
[noSave] with temporary changes (RAM),
[Undo] no changes.
This safety prompt is displayed after [Undo]:
[YES] no changes
[NO] changes shall be valid.

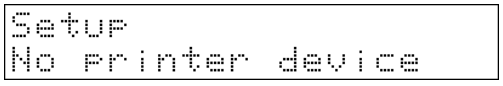
Press Exit F1 to quit



7.6 Print Setup data



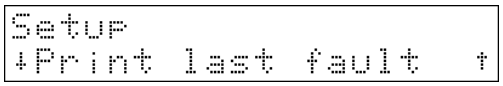
For printing the initialization data via the selected interface in [Setup]-[Serial Ports]-[Printer device at]
Press OK F2 to select.



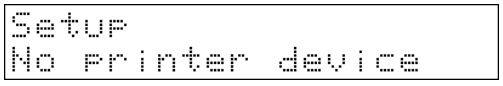
This >>> error message is displayed, unless an interface was selected for the printer.

7.7 Print last fault

If you inexplicable "software" problems with the instrument repeatedly, sending the saved debug information to the Sartorius Technical Support can be helpful.



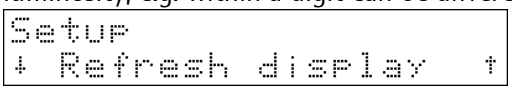
Print the debug status data via the selected interface in [Setup]-[Serial Ports]-[Printer device at]
Press OK F2 to select.



This >>> error message is displayed, unless an interface for the printer was selected.

7.8 Refresh Display

Refreshes the weight display luminosity manually.
The weight display elements, which are used very rarely, gradually lose their brightness. Consequently, the luminosity, e.g. within a digit can be different. However, regeneration of the display luminosity is very easy.

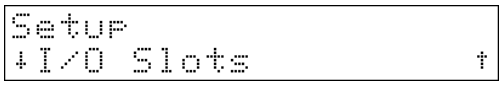


Refresh all front-panel display elements:
Press OK F2 to select.

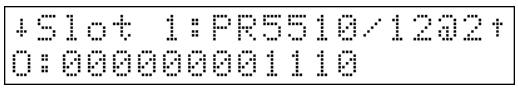
Press Exit F1 to quit

7.9 I/O slots

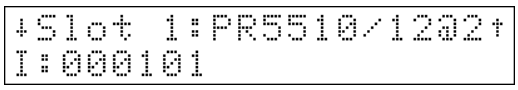
Can be used for tests during commissioning and service



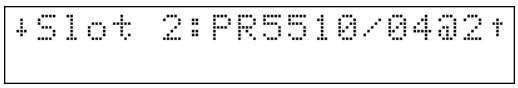
Display of interface options fitted in SLOT1...4:
Press OK to select, press ↓ ↑ for scrolling.
Dependent of options type, different information is displayed.



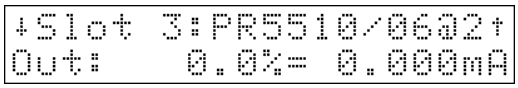
Example: PR5510/12 was installed on slot1,
Task no. 2 is displayed with @.
Outputs: logic 0 (CH.12), 0 (10) 1 (4), 1 (3), 1 (2), 0 (1)



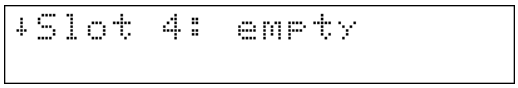
Press ← → for switch-over to and returning to
Inputs: logic 0 (CH.6),1(5), 0 (4), 1 (3), 0 (2), 1 (1)



Example: PR5510/04 was installed on slot 2,
@ Task Nr. 2



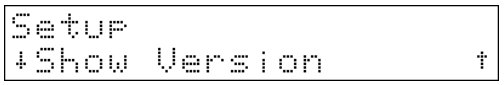
Example: PR5510/06 was installed on slot 3,
@ Task no. 2



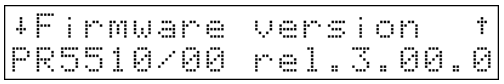
Press Exit to quit

7.10 Show Version

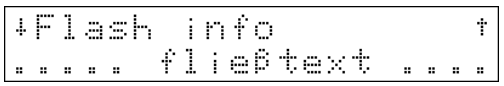
The currently used software package and versions can be displayed.
BIOS-FIRMWARE-APPLICATION



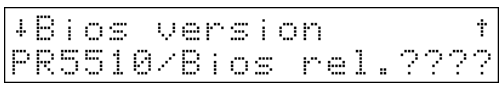
Display of loaded software versions:
Press OK to select, press ↓ ↑ for scrolling.



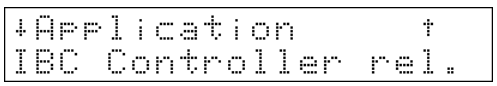
Release, version and date are displayed as flow text. the flow text can be read step by step



When the software packages were loaded



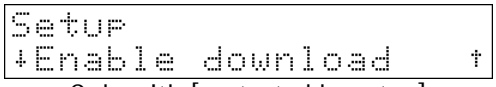
Release, revision and date are shown as flow text.



Application package type (e.g. IBC controller) and release are shown as flow text.

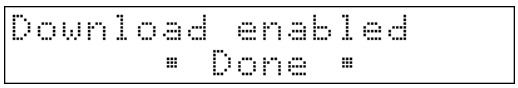
Press Exit to quit

7.11 Enable download



Only with [protected by setup]

Enable PR1750 download into RAM:
Press OK to select.



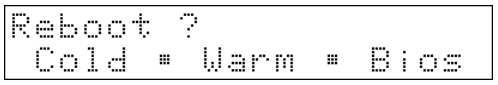
Download remains enabled until ...
[Done] was pressed or Exit was pressed to quit.

Press Exit to quit.

Unless [Software download] was activated with setting [protected by setup] and [Download enabled], an error message is displayed on PR1750 (Download disabled) and download is blocked.

7.12 Reboot

(☞ see)
Press OK to select.



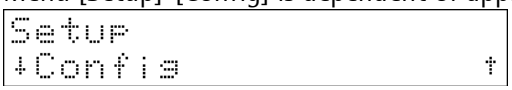
[Cold] for cold start (✋ erases all data, but not the EAROM)
[Warm] for warm start (does not delete user data)
[Bios] for Bios starting (booting).

Press ... to select the required function.

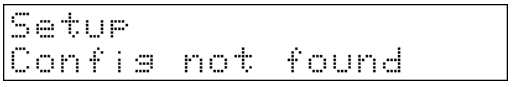
Press Exit to quit.

7.13 Config

Menu [Setup]-[Config] is dependent of application package *(☞ see relevant manual).*



PR5510 application settings:



>>> message with OK unless an application was loaded.

8 Communication

The protocols must be selected in [Setup]-[Serial Ports] *(☞ see).*

8.1 EW protocol

Internal "standard" protocol (ELECTRONIC WEIGHING) for data transmission with Sartorius products :

PR1740, PR1750, PR1791/1792, PR8001

The applied commands are **not** disclosed, i.e. they can't be used by customer-programmed applications!
Commands such as a <WGA>command "read gross weight" of earlier products, e.g. PR1613 are (partly) available only with **special programming according to** IEC 61131 and with license.

It is a "Polling" protocol (master<->slave) with max. 26 addressable partners (A-Z), control characters (ASCII) acc. to **standard ISO1745**, extended by Sartorius by specific weighing commands.

8.1.1 Interface configuration

The Baudrate excepted, the required parameters such as Data-8bit, parity-even, 1 stop bit are set automatically when selecting Procol=EW_COMM_Vx *
SLAVE address <A> is defined and must be set accordingly as **unique** address for each instrument on several units by the user (A-Z).

- Select EW_COMM_Vx standard=V3 : for PR1730R3, PR1740R6, PR1791, PR1792, PR8001
- V1 PR1730R0
- V2 PR1713R1, PR1730R1, PR1740bisR5

Selection list for protocol	For interface details ☞ *see chapter* 7.2.4 Explanation	
Selectable on all available serial ports	BuiltIn, PR1713/04 in Slot1, 2 (RS232/RS485)	
line protocol	8 bit, even parity, 1 stop bit	
Slave add	A-Z (default A)	PR5510 is always SLAVE
Telegram size	2...128 bytes (even number), **binary** data	
Time-out	>/= 100msec for characters	
Data safety	Parity and XOR-BCC	

8.1.2 Control Characters

Character	hex value	decimal	Explanation
SOH	1H	1	First signal for communication build-up
'p'	70H	112	Poll sequence
STX	2H	2	in front of data field
ETX	3H	3	behind data field
DLE	10H	16	1. STX is accepted 2. Prefix for DLE in data field 3. End of data field, followed by ETX
ENQ	5H	5	Control handed over to slave
ACK	6H	6	Positive reaction: no error during transmission
NAK	15H	21	Negative reaction: error during transmission
EOT	4H	4	Terminates the communication

8.2 MODBUS / J-BUS protocol

8.2.1 Procedure

The implemented MODBUS/J-BUS protocol permits quick, simple and reliable communication between a PC or a PLC and max. 127 instruments. It can be used for SPM exchange (SCRATCHPADMEMORY with binary data) between several PLCs, with specification of start address and data length.

Only the RTU mode (not the ASCII mode) with purely binary data and selected functions such as: 1, 2, [3], 4, 5, 6, 8 (sub-function 0), 15 and [16] is supported.

J-BUS is a French 'clone' of the MODBUS. There is only a small difference: J-Bus addresses count from 0 (rather than 1) to hex FFFF (rather than dec. 9999). Some Modbus masters subtract 1 automatically before sending a message and some Modbus slaves subtract 1 to get the requested address. So it may happen that an access to an address shifted by 1 is made, but this is the only problem which must be taken into account. In practice, there should not be any other problems when connecting J-Bus equipment to Modbus equipment.

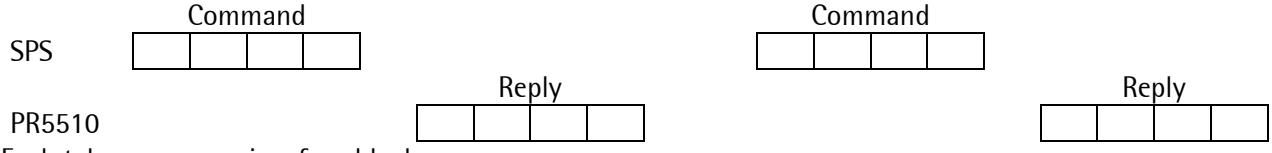
8.2.2 Configuration

Selection list for protocol	Explanation
Selectable on all available serial ports	BuiltIn, PR5510/04 in Slot1, 2, (RS232/RS485)
J-Bus/ModBus	PR5510 is always ModBus slave
Line protocol	8 bit, even/odd, 1 stop bit
Slave addr	1...127 (default=1)
Telegram size	2...128 bytes (even number), binary data
Time-out	550msec for reaction reply, 220ms for characters
Data safety	Parity and CRC-32 (Cyclic Redundancy Check 32bit)

For interface details ☞ *see chapter* 7.2.4

8.2.3 Protocol

The protocol is used for transmission of binary data from and to the PR5510 SPM. Each data exchange includes two telegrams: a command from the PLC to PR5510 and a reply from PR5510 to the PLC.



Each telegram comprises four blocks:

1. Device address
2. Function code
3. Data (addresses, length and values)
4. CRC check word

All 2-byte values (16-bit values/word) have Motorola notation. Sequence: MSB – LSB, MSB- LSB...

A reply is sent on each faultless command. At 9600 the reply time is typical 4 ms and max. 8 ms. A faulty command received by PR5510 (e.g. parity error in the data or CRC error) is **ignored and no reply** is sent.

The pauses between the individual characters in a command must not be longer than 3,5 times a character length: otherwise, PR5510 detects an early end of command (timeout).

If the received command is faultless, but cannot be handled (e.g. faulty address, faulty data), reply is with an ERROR TELEGRAM.

A telegram to SLAVE= 0 is handled by all PR5510 units, but not replied by anyone.

The telegram syntax includes only BYTE and WORD (=2 BYTES), but not e.g. double word or long word... etc., i.e. addresses* from the IEC 61131 SPM area must be specified accordingly in the command and provided with the relevant data length:

* SPM according to IEC 61131 is numbered bit, byte, word, double word wisely *(☞see annex).*
Only the firmware knows the actual memory address and translates these specifications accordingly.

Example WPA-READ (raw weight value, non-scaled, without sign and decimal point) :

Acc. to SPM list: %MD16 double word with length=1 type DINT
specify as: %MW32 and number of words=2

For command[3], this means: Addr of word= 00,32 and number of words= 00,02 (byte specification)

Command	Device address	Function number	Address of 1st word	Number of words	CRC 16
	1 byte	1 byte	2 bytes	2 bytes	2 bytes
Range	1...127	3,4	0...2047	1...125	

Command	1	3	0	32	0	2	CRC	CRC

8.2.4 Function commands

The following commands are implemented in PR5510 as part of all specified commands:

8.2.4.1 Function 1 or 2: read n bits

Command	Device address	Function number	Address of 1st bit	Number of bits	CRC 16
	1 byte	1 byte	2 bytes	2 bytes	2 bytes
Range	1...127	1, 2	0,8,16...	8,16,24...	

The bit address must always be the 1st bit of a byte. the number of bits to be read must not be lower than 8 and must be a multiple of 8.

Reply	Device address	Function number	Number of read bytes	Value of 1st byte	Value of 2nd byte	..	Value of last byte	CRC 16
	1 byte	1 byte	1 byte	1 byte 8th ... 1st bit	1 byte		1 byte last bit	2 bytes

If the address of a bit to be read is beyond the permissible range (0...32760), an error message is sent as a reply.

Example of function 1 for reading the scale status bit

Command	1	1	2	56	0	8	CRC	CRC

Reply	1	1	1	X	CRC	CRC

The read byte X is interpreted as follows:

Bit 0 = bit 575 of SPM = sign bit
Bit 1 = bit 574 of SPM = tara switched on
:
Bit 6 = bit 569 of SPM = zero within ¼ d
Bit 7 = bit 568 of SPM = standstill

8.2.4.2 Function 3 or 4: read n successive words

Command	Device address	Function number	Address of 1st word	Number of words	CRC 16
	1 byte	1 byte	2 bytes	2 bytes	2 bytes
Range	1...127	3,4	0...2047	1...125	

Reply	Device address	Function number	Number of bytes	Number of words	CRC 16
	1 byte	1 byte	1 byte	n bytes	2 bytes

MSB	LSB	MSB	- - - - - -	MSB	LSB
1st word				last word	

If the address of a word to be read is beyond the permissible range (0..2047), an error message is sent as a reply.

Example of function 3 for gross weight reading (893 kg)

Command	1	3	0	32	0	2	CRC	CRC

Reply	1	3	4	0	0	3	125	CRC	CRC

The individual bytes are shown.

8.2.4.3 Function 5: write a bit

Command	Device address	Function number	Bit address	Bit value	always 0	CRC 16
	1 byte	1 byte	2 bytes	1 byte	1 byte	2 bytes
Range	0...127	5	0...32760	0 or 255	0	

If the device address is 0, the command is handled by all connected instruments, but no reply is sent.

Reply	Device address	Function number	Bit address	Bit values	Always 0	CRC 16
	1 byte	1 byte	2 bytes	1 byte	1 byte	2 bytes

If the bit address is beyond the permissible range (0...32760), an error message is sent as a reply.

Example of function 5 for setting bit 140 (taring)

Command	1	5	0	140	255	0	CRC	CRC

Reply	1	5	0	140	255	0	CRC	CRC

The individual bytes are shown.

8.2.4.4 Function 6: write a word

Command	Device address	Function number	Word address	Word value	CRC 16
	1 byte	1 byte	2 bytes	2 bytes	2 bytes
Range	0...127	6	0...2047		

If the device address is 0, the command is handled by all connected instruments, but no reply is sent.

Reply	Device address	Function number	Word address	Word value	CRC 16
	1 byte	1 byte	2 bytes	2 bytes	2 bytes

If the address is beyond the permissible range (0...2047), an error message is sent as a reply.

8.2.4.5 Function 8: diagnosis

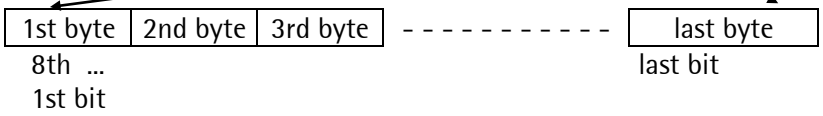
Command	Device address	Function number	Sub-function	Any value	CRC 16
	1 byte	1 byte	2 bytes	2 bytes	2 bytes
Range	1...127	8	0		

This function is used for communication testing.
Only sub-function 0 is supported.
The received command is sent as a reply.

Command	Device address	Function number	Sub-function	Command value	CRC 16
	1 byte	1 byte	2 bytes	2 bytes	2 bytes

8.2.4.6 Function 15: write n successive bits

Command	Device address	Function number	Address of 1st bit	Number of bits	Number of bytes	Bit value	CRC 16
	1 byte	1 byte	2 bytes	2 bytes	1 byte	n bytes	2 bytes
Range	0...127	15	0...32760	8,16, 24	1,2,3...		



If the device address is 0, the command is handled by all connected instruments, but no reply is sent.
The bit address must be always the 1st bit of a byte. The number of bits to be read must not be smaller than 8 and must be a multiple of 8.

Example of function 15

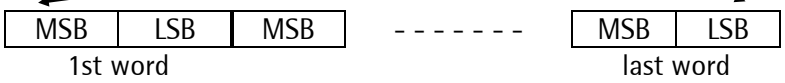
Command	1	15	0	64	0	8	1	3	CRC	CRC

Reply	1	15	0	64	0	8	CRC	CRC

The individual bytes are shown.

8.2.4.7 Function 16: write n successive words

Command	Device address	Function number	Address of 1st word	Number of words	Number of bytes	Word value	CRC 16
	1 byte	1 byte	2 bytes	2 bytes	1 byte	n bytes	2 bytes
Range	0...127	16	0...2047	1...123	2...246		



If the device address is 0, the command is handled by all connected instruments, but no reply is sent.

Reply	Device address	Function number	Address of 1st word	Number of words	CRC 16
	1 byte	1 byte	2 bytes	2 bytes	2 bytes

If the address is beyond the permissible range (0...2047), an error message is sent as a reply.

Example of function 16 for writing of limit value_1 switch-on point with value 893:

Command	1	16	0	48	0	2	4	0	0	3	125	CRC	CRC

Reply	1	16	0	48	0	2	CRC	CRC

The individual bytes are shown.

8.2.5 Error messages

With a correctly transmitted command, which, however, cannot be handled, because e.g. the address is too high, an error message is sent as a reply on the command.

The error message has the following format:

Device address	Function number +128	Error number	CRC 16
1 byte	1 byte	1 byte	2 bytes

The 2nd byte contains the received function number and the most significant bit is set additionally.
The signification of the error number is:

1 Function number unknown
2 Address not within valid range
3 Faulty data format (e.g. more data written than specified in number)

Example for an error message, which was generated by an invalid function number.

Command	1	9	0	0	0	0	CRC	CRC

Reply	1	137	1	CRC	CRC

The individual bytes are shown.

(The command set of earlier instruments according to the EW protocol with e.g. WGA (gross weight request) via special addr=256 is not supported any more)!

8.2.6 Word addresses

32	Gross weight, 1st byte (MSB)	Gross weight, 2nd byte
33	Gross weight, 3rd byte	Gross weight, 4th byte (LSB)
34		

35	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575

Address	Signification
Read bits:	
568	standstill
569	within ¼ d
570	weight below zero or above FSD
574	tare active
575	sign
Write bits:	
139	set zero
140	set tare
141	reset tare

Note: Further addresses are given in the help file for PR1750NT (FBFUN001.HLP).

8.3 DUST-3964R communication

The implemented 3964 protocol permits quick, simple and reliable communication between a PC or a PLC (original: Siemens) with max. 1 instrument.
The protocol is used for SPM data exchange (SCRATCHPADMEMORY with binary data) between PLCs, with specification of start address and data length.

There are several versions with insignificant differences, matched to the PLC series.

3964 is a point_to_point protocol (instrument-1 <-> instrument-2) . Both sides can send directly (no poll protocol) and the receiver must listen and respond before its own request can be handled. In case of conflict (if both sides try to send **simultaneously**), the master has priority, whilst the slave has to wait.

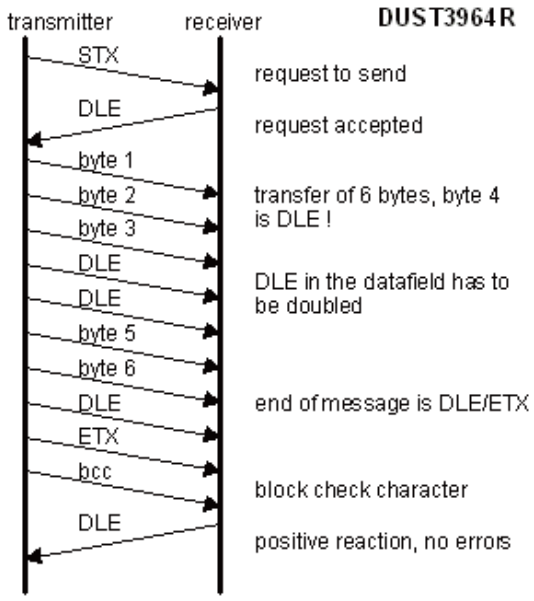
☝ Preferably, PR5510 should be declared as master.

8.3.1 Interface configuration

Selection list for protocol	**Explanation**
Selectable on all serial ports	BuiltIn, PR5510/04 in slot1, 2 (RS232/RS485)
3964R-slv 3964R-mas	3964R with PR5510 as a slave (DUST) 3964R with PR5510 as a master (DUST)
3964RS5sl 3964RS5ms	3964R with PR5510 as a slave special S5 header(RK512) 3964R with PR5510 as a master special S5 header(RK512) special S5 header(RK512): 10 additional bytes in the telegram for type and address information
line protocol	8 bits, even parity, 1 stop bit
Slave addr	Omitted, since only point_to_point communication is possible (instrument<->instrument)
Telegram size	2...128 bytes (with 3964RS5, the number must always be even), **binary** data
time-out	550msec for reply, 220ms for characters
Data safety	Parity and XOR-BCC (BlockCheckCharacter)

For interface details ☞ *see chapter* 4.1.1

8.3.2 Protocol



The protocol sequence with additional control characters

8.3.3 Control characters

Character	hex value	decimal	Explanation
STX	2H	2	First signal to build up communication
ETX	3H	3	First character behind the data field
DLE	10H	16	1. STX is accepted 2. Prefix for DLE in the data field 3. End of the data field, followed by ETX
NAK	15H	21	negative reaction: error during transmission

8.3.3.1 Telegrams

Command telegrams are either of type SEND (send data) comprising header (target, number) + 1...128 data
or FETCH (fetch data) comprising only the header (source, number).

They are always followed by a

Reaction telegram (within a timeout) which includes information on command processing.

PLC (S5) RK512	PR5510
(Send data) SEND telegram [header(10)+data] -->	
	<-- REACTION telegram [header(4]

(Fetch data) FETCH telegram [header(10)] -->	
	<-- REACTION telegram [header(4)+with data]

Remark:
For write/read operation by PLC/PC (server) into/from PR5510 (client) via an accordingly configured interface (protocol: 3964R...), special programming to IEC 61131 is not a prerequisite. Vice versa, however, i.e. if PR5510 is the server and the PLC/PC is the client, this is a prerequisite (e.g. also with a PRxxxx connected).
(don't mix up with master/slave protocol !)

S5 SEND telegram

STX		Header 10bytes	Data 1...128bytes	DLE	ETX			DLE						DLE
	DLE					DLE	STX		Reaction 4bytes		DLE	ETX		

S5 FETCH telegram

STX		Header 10bytes	DLE	ETX			DLE							DLE
	DLE				DLE	STX		Reaction 4bytes	Data 1...128bytes		DLE	ETX		

S5 telegram header(10bytes)

			described	*- in detail -*	*- on the --*	*following*	*page*		
1	2	3	4	5	6	7	8	9	10
Ident 00/FFh	00h*	Command I/O	Command D*	Target/source(hi)	Target/source(lo)	Number(hi)	Number(lo)	CPU no.	KM

S5 reaction

1	2	3	4
Ident 00/FFh	00h*	00h*	Error number

Identification: 00h = start telegram FFh= following telegram (with more than 128 data bytes)
Command: 'A' = SEND 'E'= FETCH
fixed values

☞ *all other details are given in the relevant 3964R descriptions.*

♦ PR5510 telegram syntax (interpreter)

- The replies of the correctly handled commands start with <q...>
- Error messages start with <e...>
- Transmission in binary protocol, i.e. 1 byte= 1 binary character

FETCH telegram (PLC ---> PR5510)

					Command-depending (default= 1)	Command-depending only with w, a, o	with w, a, o
Command type <x>	Operation <y>	Type <z>	SPM no.(hi) <aa>	SPM no.(lo) <aa>	Number of bytes, words <nn>	Data bytes <dd>	Databytes ... <dd>
ascii*	ascii	ascii	hex	hex	hex	hex	hex
m	r	d	00	10	(01)	--	--
m	r	w	00	08	02	--	--
m	r	b	00	08	04	--	--

* Note lower case letters !

Command type
m Memory command

Operation
- r read access
- w write access
- a AND
- o OR
- s set
- c reset

Type
- x SPM bit
- b SPM byte
- w SPM word
- d SPM double word

Status:
- q acknowledgement
- e error

Reaction telegram (PR5510---> PLC)

				Command-depending only with w, a, o			with w, a, o
Status	Command <x>	Operation <y>	Type <z>	Data bytes(hi) <dd> (msb).....	Databytes(lo) ... <dd> ...	Databytes(hi) ... <dd> ...	Databytes(lo) ... <dd> (lsb)
ascii	ascii*	ascii	ascii	hex	hex	hex	hex
q	m	r	d	xx	xx	xx	xx
q	m	r	w	xx	xx	xx	xx
q	m	r	b	xx	xx	xx	xx
e	uu	vv	ww	--	--	--	--

8.3.4 3964R command set

Command	Reply	Function
mrx<aa><aa>	qmrx<0q>	Read an SPM bit
mrb<aa><aa>	qmrb<dd>	Read an SPM byte
mrw<aa><aa>	qmrw<dd><dd>	Read an SPM word
mrd<aa><aa>	qmrd<dd<dd><dd><dd>	Read an SPM double word
mrb<aa><aa><nn>	qmrb<dd>...	Read SPM bytes
mrw<aa><aa><nn>	qmrw<dd>...	Read SPM words
mrd<aa><aa><nn>	qmrd<dd>...	Read SPM double words
msx<aa><aa>	q	sets a bit
mcx<aa><aa>	q	deletes a bit
msb<aa><aa>	q	sets a byte
mcb<aa><aa>	q	deletes a byte
msw<aa><aa>	q	sets a word
mcw<aa><aa>	q	deletes a word
msd<aa><aa>	q	sets a double word
mcd<aa><aa>	q	deletes a double word
mwx<aa><aa><0q>	q	write into an SPM bit
mwb<aa><aa><dd>	q	write into an SPM byte
mww<aa><aa><dd><dd>	q	write into an SPM wordt
mwd<aa><aa><dd><dd><dd><dd>	q	write into an SPM D-word
mwb<aa><aa><nn><dd>...	q	write into nn SPM bytes
mww<aa><aa><nn><dd><dd>...	q	write into nn SPM words
mwd<aa><aa><nn><dd><dd><dd><dd>..	q	write into nn SPM Dwords

The number <nn>=1 can be omitted with 3964R, but not with 3964RS5.

In case of error, reply is with **e**<uu><vv><ww>.

uu	vv	ww	Remark
01			General error
01	01	nn	Unknown command
01	02	nn	Format error. Command detected, but too many/not enough parameters
01	03	nn	Parameter error. Parameter not within permitted range
01	04	nn	Not executed
01	05	nn	No hex character

Example

```
e0103 11     in binary code
   |   |__ error in position 11 in data telegram
   |_____ parameter error
```

♦ **Legend**

(<xx> is one binary-coded character/byte)

m	memory command, binary	<aa><aa>	address (high byte, low byte)
r, w, a, o, s, c	read, write, AND, OR, set, clear	<dd>	data byte
x,b,w,d	bit, byte, word, double word	<nn>	number of data bytes, words,Dwords...
q	acknowledgement	<0q>..	1 bit
		<dd>..	several data bytes

for PLC address (SCRATCHPADMEMORY) <aa> <aa>

According to IEC 61131, the SPM is numbered bit, byte, word, double, longword-wisely.
Starting from 0 and overlapping.

LongW:ML 0=> doubleW:MD 0,1:=> word:MW 0,1,2,3=> byte:MB 0,1,2,3,4,5,6,7=> bit:MX 0,1,2....63

Only the firmware knows the actual memory address and translates <aa> accordingly.
Values are always decimal numbers in the SPM list and must be converted into hexadecimal numbers according to the applicable rules, or by means of a pocket calculator.

♦ **Examples:**

- **Read 1 * 32 bit value**: e.g. WPA gross weight 10,00 kg as Dword/wwords/bytes

  length: 1 double word, SPM MD16 Dword 16 =
  2 words MW32 word 32-33 =
  4 bytes MB64 bytes 64–67

  Command as Doubleword-request:
  mrd<aa><aa><nn> dez: mrd<00><16><01> mrd=ascii-code, adr <00> = 00hex not ascii <30>

  Convert to HEX: 'm'=6Dhex,'r'=72hex,'d'=64hex 16dez =10hex, 32dez= 20hex, 64dez= 40hex
  key in on *Testtool(e.g. COMINTER) hex: <6D><72><64><00><10><01> send.data: 6D7264001001

  z.B. 10,00kg dez. hex.
  Grossgewicht 1000 3E8

	MSB			LSB
gross	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 1 1	1 1 1 0 1 0 0 0
32		33	34	35

  Answer:
  qmrd 000003E8 hex-Display*: 71 6D 72 64 00 00 03 E8 receiv.data: 716D7264000003E8

- **Read a bit** e.g. tare set ? MX 574 574 dec=13E hex

  Command
  mrx013E mrx<aa><aa> hex: <6D><72><78><01><3E> send.data: 6D7278013E

  Answer e.g.
  qmrx0 oder qmrx1 hex-Display*: 71 6D 72 78 00 oder 71 6D 72 78 01

9 Commissioning with terminal

One of the serial interfaces, e.g. RS 232 Builtin, can be defined for the SYSTEM CONSOLE. The system console can be used for calibration, configuration, testing and operation. Moreover, the complete CONFIGURATION incl. CALIBRATION can be printed out, or saved in a file in the terminal PC, if no printer is connected to PR5510 (documentation/archiving at the end of commissioning).

The system console can be a terminal or a PC as a terminal emulator.
Connection is to the "RS 232 interface Builtin" (similar to slot 1,2). : ☞*see chapter* 3.6.2

For system console operation, the following settings are required:

Setup ↓Serial ports ↑

Press OK to select.

↓Operator device at ↕ Builtin RS232↕

Press ← → to select:
[none], BuiltIn-RS232, Slot-1,2(optional)

The interface parameters **cannot** be changed. They are fixed to:

FIX: [Protocol]: XON/XOFF, [Baudrate]: 9600, [Bits]: 8, [Parity]: None, [Stopbits]: 1, [Devtype]: Ansi, [Echo]: Enabled

☝ The interface parameters of the PC/terminal must correspond to the settings in the instrument!

9.1 Terminal "Hardware"

Funktion:
„Service"-Operation station
VT100 compatible z.B. DEC VT320 Monitor and keyboard

9.1.1 Establishing communication

The terminal could be connected via RS232-Interface at BuiltIn

- RS 232 Connecting cable 9/25 as described: *(☞ see chapter 3.6.3.1)*

9.2 Terminal "emuliert" on PC

Function:
„Service"-Operator station
MS-Windows PC as accessory-programm
emulates a not existing hardware-Terminal

Today are „hardware"-Terminals substituted by „software"-Terminals, means terminal-emulated available as PC-User program.

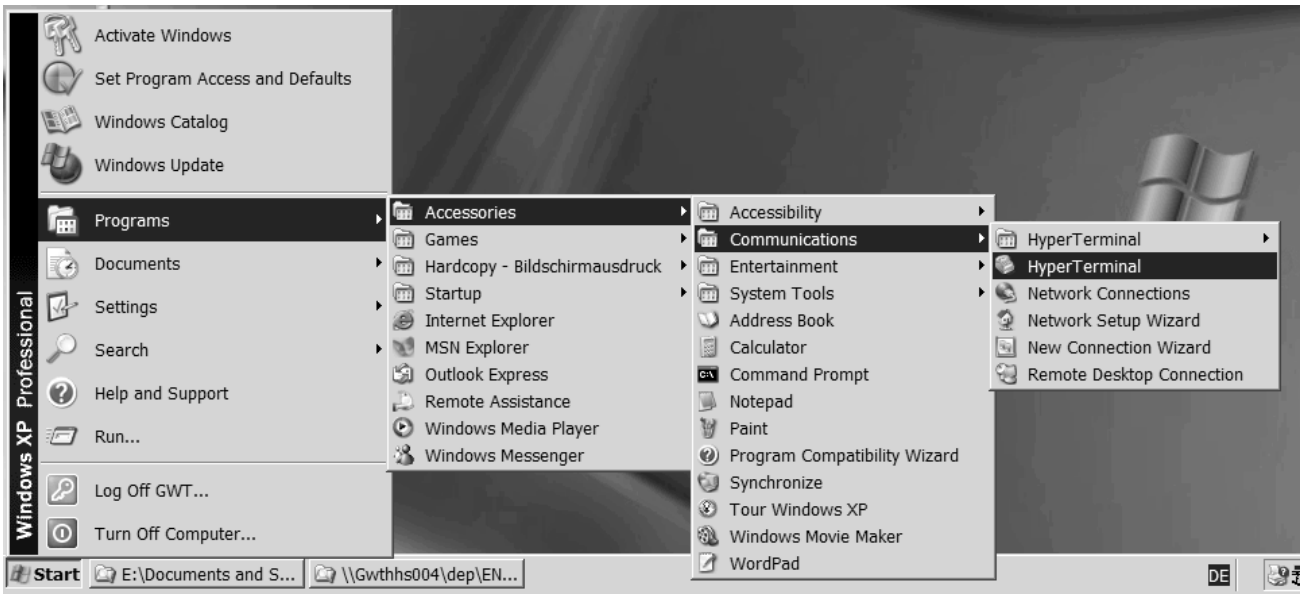
9.2.1 Establishing communication

The PC bas to be connect via a free COM-port to the Builtin

- RS 232 Connection cable 9/9 as described: *(☞ see chapter 3.6.3.1)*

9.2.2 Terminal program

A terminal emulation program, e.g. the MS-Windows 'HyperTerminal' described below is included in the "communication ACCESSORIES" and can be called up from the start bar. Unless this program is available, proceed accordingly with a comparable terminal program.



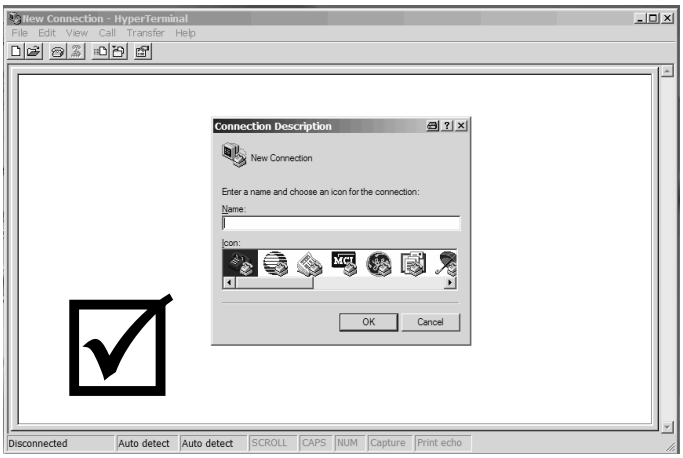
Terminal programs of various origins can be used for commissioning on many operating systems, provided the min. prerequisites of a VT100 terminal are met and adjustment to the required parameters is possible. The settings must be identical to the interface configuration.

9.2.2.1 'HyperTerminal' configuration

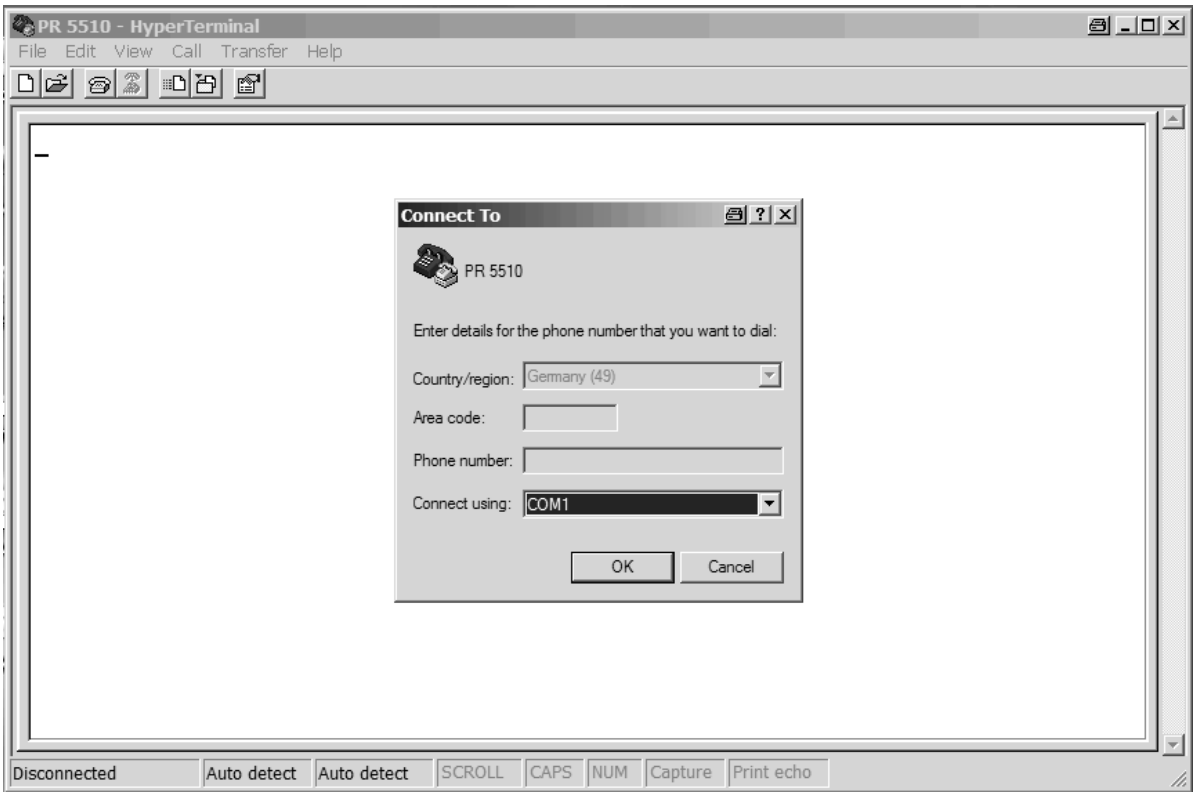
Direct COM-RS232 rather than a telephone or modem communication is to be built up ,
i.e. **no** location information -> cancel-YES-OK, i.e. follow-up messages should also be ignored.

- Subsequently, a window {Connection description} opens. Specify a NAME, e.g. PR5510, and select one of the ICONS. The settings to be done will be stored under these icons later. Calling up for the next time is possible directly by means of ICON-PR5510 from the window with the stored settings.

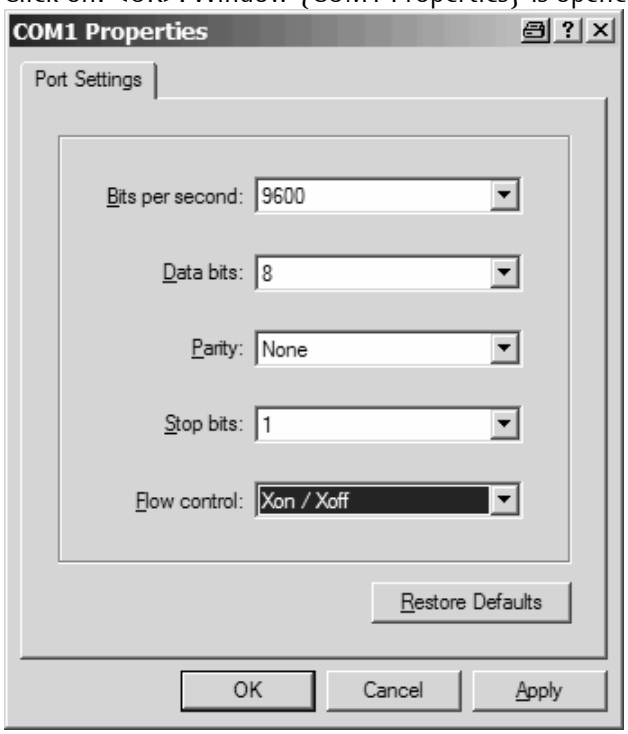
No location information -> Cancel-OK, i.e. the following messages must be ignored.
or
fill in "dummy" data (no follow-up messages), but these data are not needed !?!

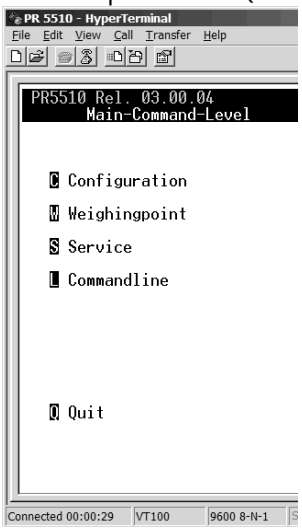


A window {Connection description} opens. Specify a NAME, e.g. PR5510 and select one of the ICONS. The settings to be done will be stored under these icons later. Calling up for the next time is possible directly by means of ICON-PR5510 from the window with the stored settings.



Listbox: "Connection using": select COM1 (2...? in which the cable is plugged in) rather than the modem.
Click on: <OK>. Window {COM1 Properties} is opened. Store the default interface parameters (*see* above):

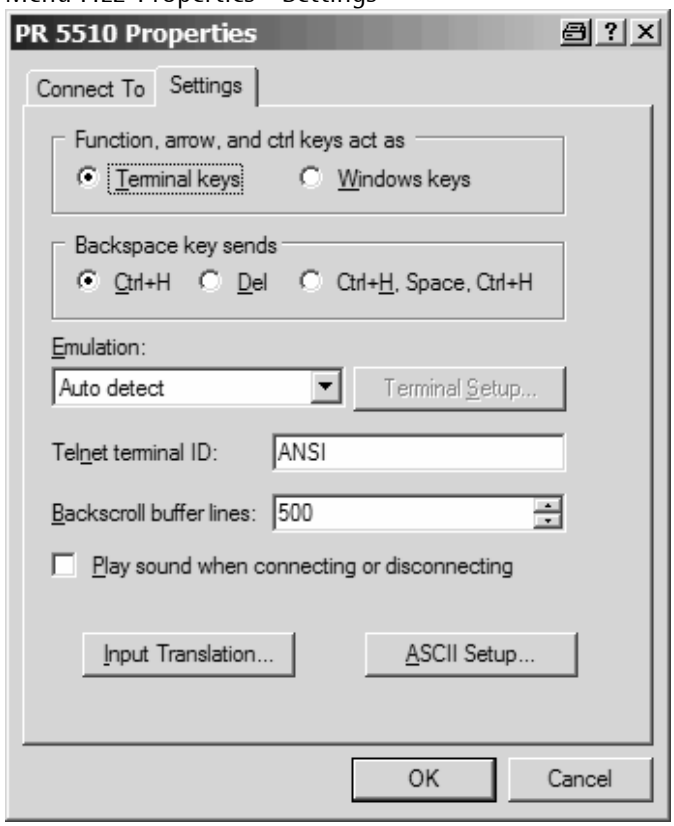




When clicking on <OK>, the start screen should appear. Unless this is the case:
Press the space key on the PC keyboard
or carry out a PR5510 warm start (power off/on).
Remark: when plugging in the cable, in particular, a terminal "hang-up" due to destroyed character sequences threatens, which also applies to PR5510.

In case of problems, please, check:

Menu FILE-Properties - Settings



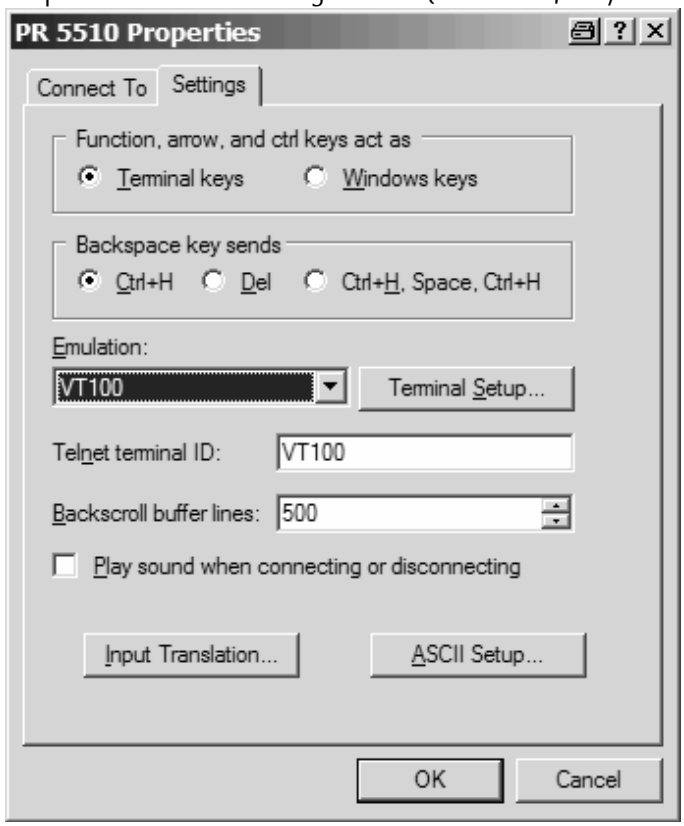
When calling up for the first time, listbox "Emulation" was set to Auto-detect

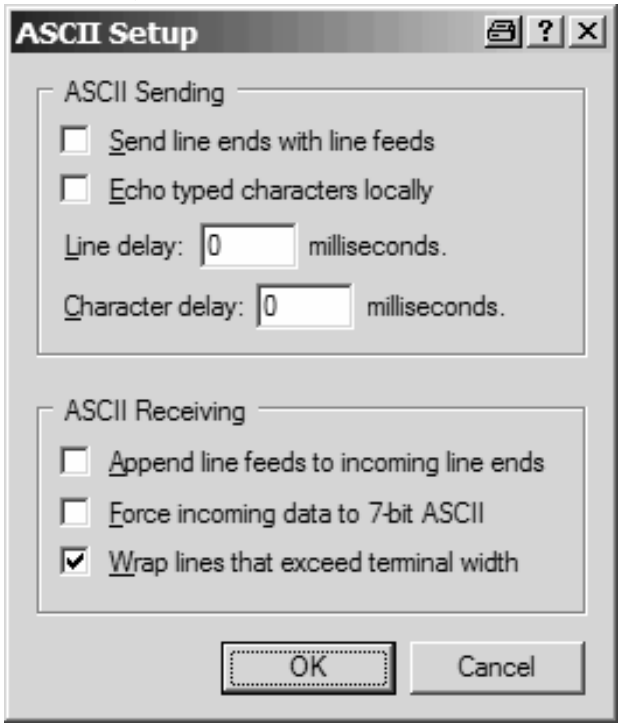
Now, ANSIW was detected, but **VT100 compatible mode** is required and must be set manually.

All other settings remain unchanged as default after installation. ☑ Please, compare again with the information documented here.

E.g. Font can be adapted dependent on personal preference.

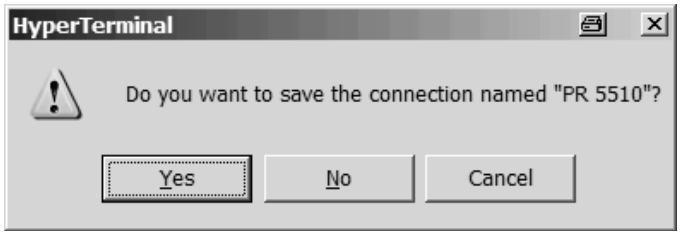
Properties and ASCII configuration: (all default, only emulation= VT100)





9.2.2.2 Saving when closing

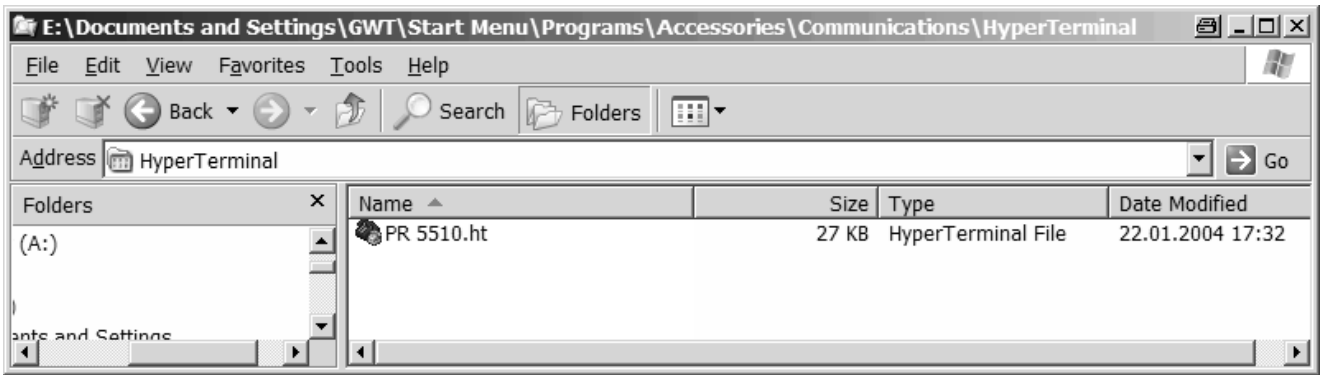
When all functions are running correctly, a prompt if the connection should be saved under the predefined name, e.g. PR5510, is displayed when closing HyperTerminal resp. when cutting the active connection.



Reply <YES>. When calling up next, just click on ICON PR5510.HT. Further settings are not required.

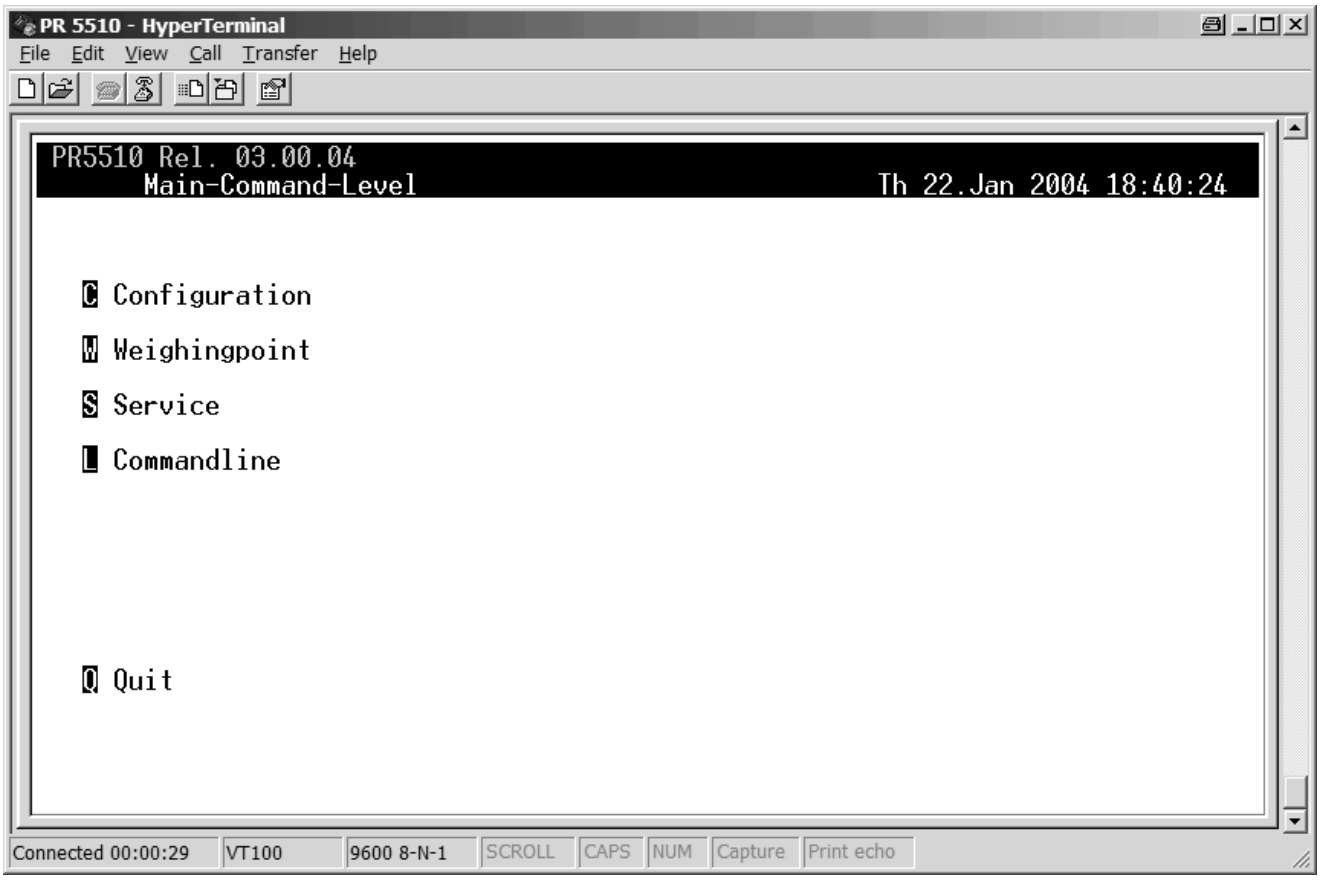
(location informationen -> Cancel-YES-OK, i.e. follow-up messages should also be ignored).

9.2.3 HyperTerminal-calling up



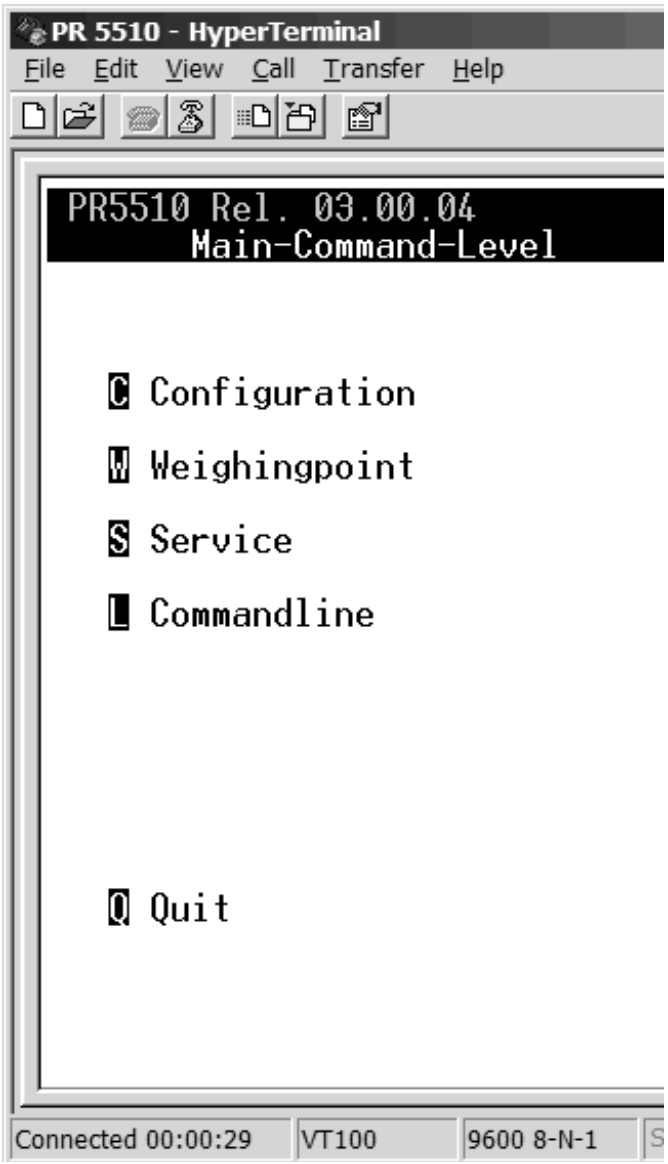
Display after switching on the instrument

- the initialization message
- followed by the main screen page: instrument and version number, date/time,



Q can be disabled. With [Setup]-[Software Parameter]-[Quit in mainlevel] set to [disabled], the menu item for Quit is not shown. With setting [enabled](default) and command Q entered via the keyboard, however, **the terminal communication is stopped.**

To re-activate the communication, go into [Setup]-[SerialPorts]-[Operator device at] and select the interface, e.g. [Builtin], again or do a warm start.



Q Quit
Really quit [Y/N]?

if you reply [Y] **the terminal task in PR5510 is finished** rather than HyperTerminal itself! PR5510 only restarts the task with a warm start (power off/on). This option can be disabled in PR5510-SETUP-Software-Parameter (=disable).

```
↓Quit in mainlevel ↑
↕  enabled/disabled↕
```

Finish HyperTerminal by means of Windows click ☒ at the top right or Alt-F4... rather than by QUIT !

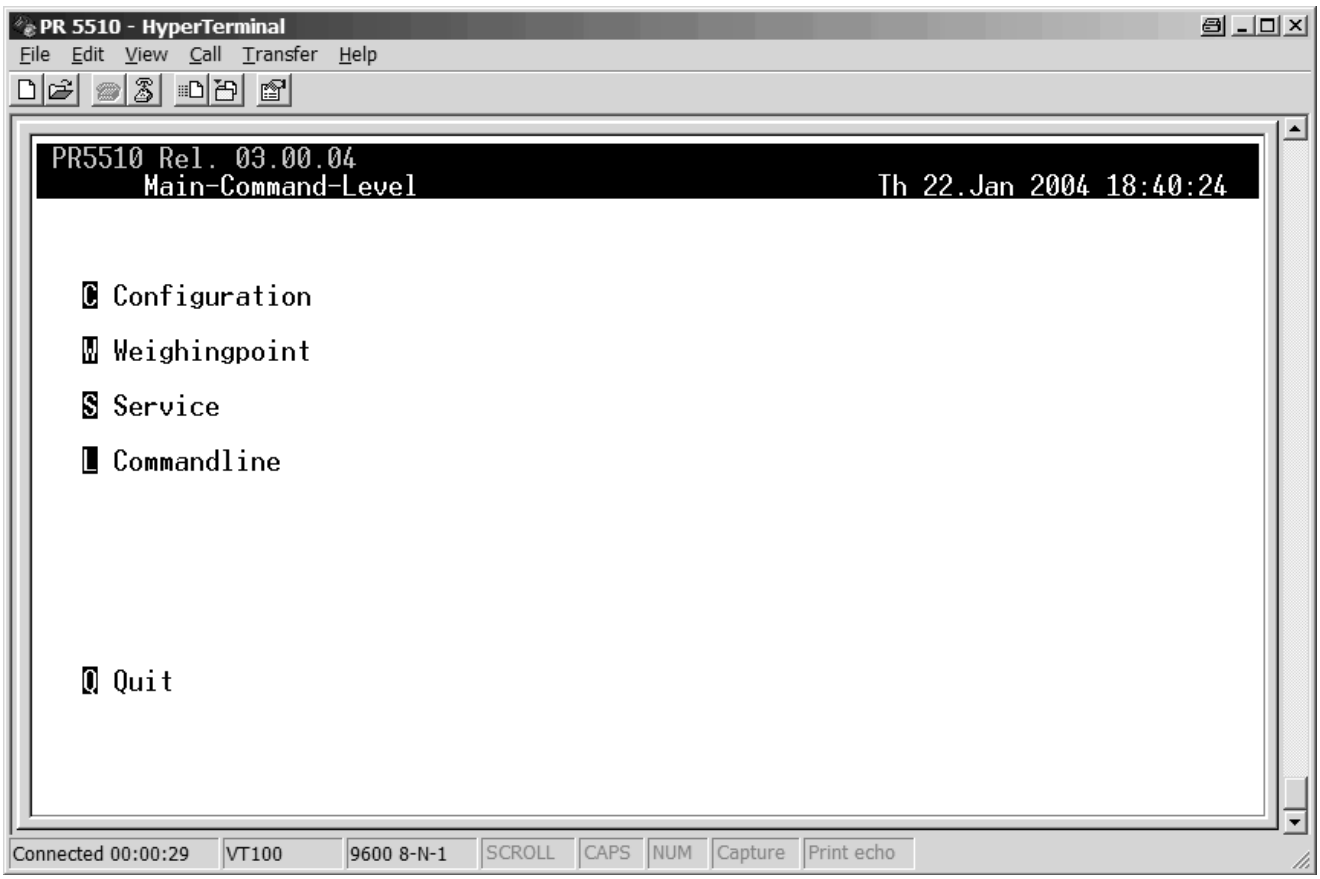
9.2.4 Terminal - finishing

Before switching off the PC or before closing the terminal emulation program,
return to the main menu !

If the PC is switched off in a sub-menu rather than a main menu, the mask displayed when re-starting the terminal emulation program may be incomplete.
In particular, information on operating and editing possibilities may be missing.

For full display of the mask (refresh), press the **[SPACE]** key.

9.3 Main-Command-Level



Various input masks (*for survey, see below: Table of menu structure*) are accessible via sub-menus from the *Main-Command-Level*). To call up the required sub-menu, press the relevant key [C], [W], [S] or [L].

- Configuration `C Configuration`
- Weighing point `W Weighingpoint`
- Service `S Service`
- Command line `L Commandline`
- Quit main menu `Q Quit` (PR5510 configuration-dependent)

When a production is active in the instrument, configuration is disabled and cannot be called up:
>>> Production is active, no configuration possible. Hit any key to continue

or
when SETUP was already selected on the instrument, configuration is disabled:
>>> Configaration is active, no configuration possible. Hit any key to continue

Press any key to remove this message.

9.3.1 Menu tree

Basically, this menu tree is not different from the trees for "direct" input SETUP-xxxx on PR5510 !
The functions are also identical and need not be described again in this chapter. However, some menu items/functions (Service, Commandline) which are accessible only via this terminal are different.

Main-Command-Level	
- C Configuration	Configuration data
- D Set date	Enter date
- T Set time	Enter time
- C Change serial port parameter	Change port parameters
- L Add, delete, show license	License handling
- S Set software configuration	Configuration data
- U Set units	Entry of user-defined units
- P Print all configuration data	Print
- E Exit	Return to higher level
- W Weighingpoint	Weight display and function keys
- 0 Set Zero	Set gross weight to zero
- I Tare In	Set tare
- 0 Tare Out	Reset tare
- T Tare	Display tare weight
- G Gross	Display gross weight (B, G if [W&M]=[NTEP])
- N Net	Display net weight
- ? Test	Test
- F Flow	Display weight change/minute
- Z Zeroset	Display zero set (actual zero – initial zero)
- D Diff	Display difference weight
- S Setp	Display setpoint
- P Print	Print
- C Calib/Config	Access calibration (configuration) mask
- E Exit	Return to higher level
- S Service	*exclusive from this terminal screen*
- H Show hardware configuration	Display hardware configuration
- M Show available memory	Display memory occupation
- T Test Inputs/Outputs	Test I/Os in slot 1 – 4
- F Show last fault	Show last fault
- B show Bios version	Show bios version
- P Print all configuration data	Print configuration data
- E Exit	Return to higher level
- L Commandline	*exclusive from the terminal screen*
- H help	for entering possible IEC 61131 commands
- Q Quit	Terminate terminal mode

♦ General hints for operation

The language of all items used in the masks is English (firmware) and **cannot** be translated by the user. In this description of the individual items, the corresponding *English term* or display text is shown with a different font.

There are several methods for leaving a sub-mask, which are always shown in the lower part of the mask, e.g.

E Exit	save and quit
Q Quit	quit without saving

Using the **automatic repeat function** of the keyboard can cause a crash of the terminal emulation program. In case of trouble, the following measures may be taken:

1. Close the terminal emulation program under Windows.
2. Open the terminal emulation program under Windows.
3. Re-activate the communication with [Setup]-[Serial Ports]-[Operator device at] and select the interface, e.g. [Builtin] or carry out a warm start.

♦ Editing functions in masks

The possible editing functions are shown in the lower part of several masks.

```
Previus / Next ....
+/- change parameter
Undo changes for ....
```

Editing functions

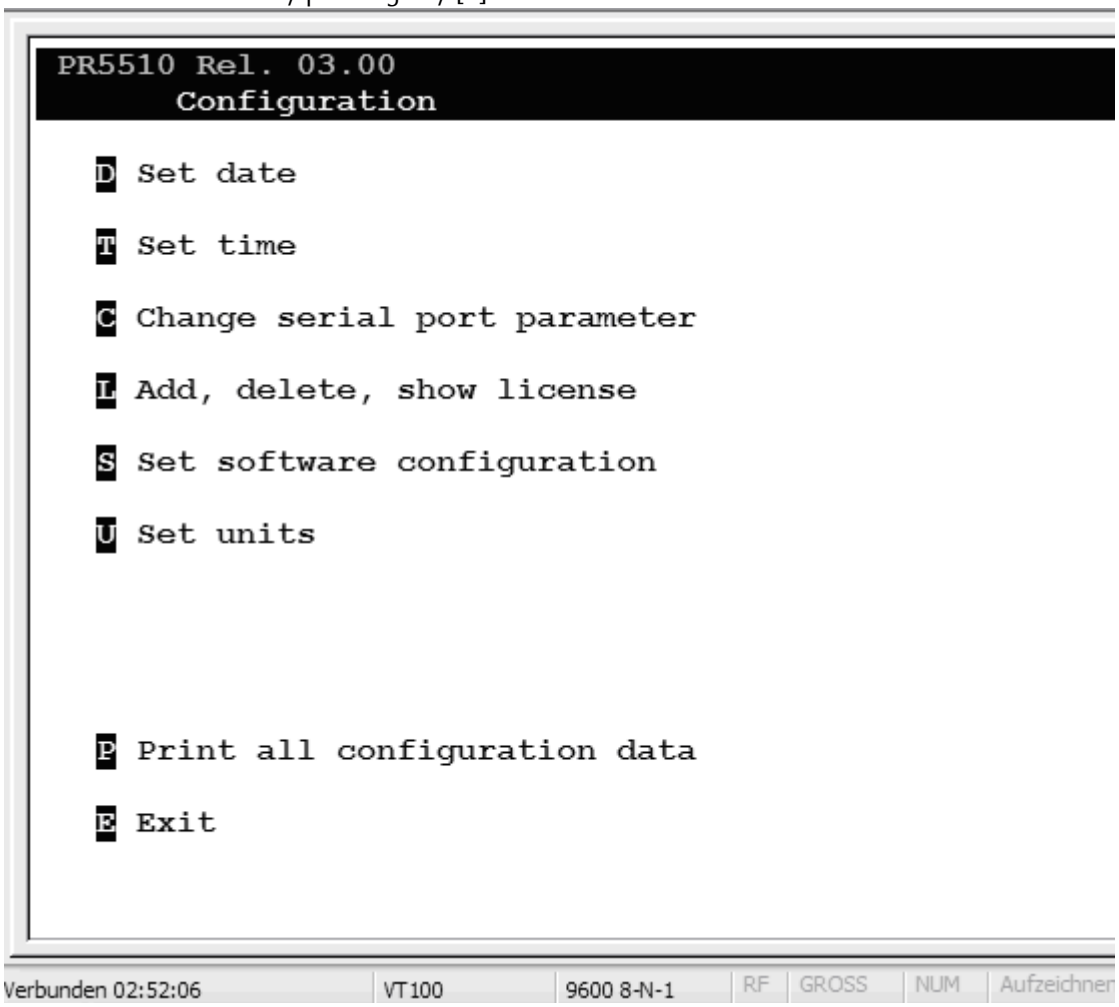
- Display previous/next selection by pressing keys P or N
  Previous / Next ....

Select the input field by means of cursor keys [↑] and [↓]. [+] / [-] change parameters
+ / - change parameter
Selection is from 2 or more possible values.

- Undo changes for these selections
  Undo changes for ....

9.3.2 [C] *Configuration* level

Main-Command-Level by pressing key [C] :



When a production is active, the configuration is disabled and cannot be called up.
>>> Production is active, no configuration possible. Hit any key to continue
This message will disappear if you press any key.

Survey of functions:

- Set date — *D Set date*
- Set time — *T Set time*
- Change serial port parameters — *C Change serial port parameter*
- Add, deletes and show licenses — *L Add, delete, show license*
- Change and display software configuration — *S Set software configuration*
- Enter user-defined units — *U Set units*
- Print out all configuration data — *P Print all configuration data*
- Leave the configuration menu — *E Exit*

9.3.2.1 [D] Set date

```
PR5510 Rel. 03.00
     Configuration                          Mo 06.Sep 2003 09:31:51

  D Set date
  T Set time
......


Enter new date [30.11.2001]:
```

- Press the key [D]
- The following message is displayed on the screen: *Enter new date [30.11.2001]: _*
- Re-enter date TT.MM.JJJJ, e.g.: *02.12.2001*
- Press the enter key [↵]. If the input is correct, the line disappears. With faulty input, the following message is displayed: *(bad date) enter new date [30.11.2001]: _*
- ☑ Check by means of the title line (top right).

9.3.2.2 [T] Set time

```
PR5510 Rel. 03.00
     Configuration                          Mo 06.Sep 2003 09:31:51

  D Set date
  T Set time
......

Enter new time [13:06:16]:
```

- Press the key [T]
- The following message is displayed on the screen: *Enter new time [13: 06:16]:*
- Enter the time, e.g.: *13: 07: 00*
- Press the Enter key [↵], the message disappears.
- ☑ Check by means of the title line (top right).

9.3.2.3 [C] *Change serial port*

Call up the mask for configuration of the serial interface *Change serial port parameter* from sub-menu *Configuration* by pressing key [C].

```
PR5510 Rel. 03.00
     Serial Ports                              Mo 06.Sep 2003 09:31:51

Operator device: Builtin RS232 (protected)
Printer device :           none
Remote device  :           none

Builtin: CON  RS232   (locked by operating)
Slot  1: -no serial-
         -no serial-
Slot  2:TTY3 RS485
        TTY4 RS232
Slot  3: -no serial-
         -no serial-
```

```
PR5510 Rel. 03.00
     Slot 2  RS485 (TTY3)                       Mo 06.Sept 2002 09:31:51

Port     :Slot 2  RS232  (TTY3)
Protocol :XON/XOFF
Baudrate : 9600
Bits     :  8
Parity   :None
Stopbits :  1
Devicetyp:Ansi
Echo     :Enabled
```

Whilst this mask is displayed, communication is interrupted!

Select the serial interface in the first mask and adjust the interface parameters in the second mask. The editing possibilities are displayed at the bottom.

- Store the configuration *Exit and save*
  If changes were made, the system displays the following prompt : *Save Slot 2 RS485 ? (Y/N) Press [Y] or [N]*

The changes will be valid only after *Exit* and they will also be stored in EAROM.

List of parameters (details for selection *(see chapter 7.2)*

- Select the serial interface: (*Serial IO*): *1, 2, ... 7*
- Select the previous/next serial interface: *Previous / Next serial I/O*
- Protocol*: None XON, 3964R ..., EW-COM V1...3, RTS, JMOD-Bus, RemoteDisplay, W&M, Modem*
- Number of data bits (*Bits*): *7, 8*
- Parity check (*Parity): None, Odd, Even*
- Number of stop bits (*Stopbits): 1, 2*
- Baudrate (*Baudrate*): *300, 600, 1200, 2400, 4800, 9600, 19k2.*
- Slave address of PR5510 *(Slave-adr): <space>, A to Z*
- Terminal type (Devicetyp): Raw, Ansi, VT52
- Echo *(Echo): Disabled, Enabled*

9.3.2.4 [L] *Add, delete show License*

Call up mask *License configuration* from sub-menu *Configuration* by pressing key [L].

```
PR5510 Rel. 03.00
     License Configuration                          Mo 06.Sep 2003 09:31:51

  Boardnumber: 8409060

  S88 Disabled

 A Add a License               Appl-license                    101
                     PR1713/20 Single component batching      Disabled
                     PR1713/21 Multi component batching       Disabled
 D Delete a License  PR1713/30 Standard batching phases      (Disabled)
                     PR1713/31 Open communication             Disabled
                     PR1713/OB Onboard weighing               Disabled
                     PR1713/SM SMS Messaging                  Disabled
 P Print License     PR1713/AL ALIBI Memory  Disabled
                     PR1740/11 Production control and superv.Disabled
                     PR1740/21 Production plan                Disabled
                     PR1740/31 DDE transfer                   Disabled
                     PR1740/41 PR1740 Remote control          Disabled
                     PR1781/13 Phase configuration           (Disabled)
                     PR1791/13 DDE-Server communication       Disabled
                     PR1792/13 OPC-Server communication       Disabled
 E Exit              PR1792/20 OPC-Databae access             Disabled
```

The **license numbers to be entered must relate to the boardnumber** shown in the upper part of the mask.

The status of all licenses is displayed: *enabled* or *disabled.* Licenses which cannot be used are shown in brackets (e.g. dependent on S88 status).

Editing possibilities

- Add a license — *A Add a License*
- Delete a license — *D Delete a License*
- Print out licenses — *P Print License*
- Leave the license mask — *E Exit*

After pressing the relevant key ([A] or [D]), the system requests input of a license number: *Enter License number: _*

The system checks the license number. Unless it is accepted by the system, the following >>> message is displayed : *Not a License number* or: *Wrong License number.*

If the license number is unknown, delete the wrong license number by pressing the backspace key and press the enter key to finish the entry.

9.3.2.5 [S] *Set software configuration*

Call up mask *Set software configuration* from sub-menu *Configuration* by pressing key [S].

```
PR5510 Rel. 03.00
      Software Configuration                    Mo 06.Sep 2003 09:31:51

Language             :English
Frontkey timeout     :2sec
Low battery check    :   on
Report to            :none
Tare key             :enabled
Set zero key         :enabled
Quit in mainlevel    :enabled
Reset on stop+exit   :   1 s
S88.01 Interface     :  off
Software download    :protected by setup
Lines per recipe     : 10
Recipe simulation    :enabled
Subrecipe            :disabled
Keyclick duration    : 40msec
Keyclick volumen     : 50%
```

- Details for selection *(☞ see chapter 7.3)*

9.3.2.6 [U] *Set units*

```
PR5510 Rel. 03.00
     Configuration                          Mo 06.Sep 2003 13:06:16

  U Set units

  F Set fieldbus configuration
  E Exit

Enter new units : u1u2u3u4u5u6u7u8
```

For using the IEC 61131 firmware functions MAKE_WEIGHT und SET_WEIGHT_UNIT, 8 different units can be defined. Every unit comprises 2 characters.

- Press key [U]
- A string (16 characters) of the 8 current units of 2 characters each is displayed on the screen: *Enter new units: u1u2u3u4u5u6u7u8*

The cursor is positioned behind the 16th character.

- Move the cursor using the arrow keys. The backspace key deletes characters (line editor).
- Enter the required characters (units).
- Press the enter key. If the entry is correct, the line disappears. With faulty input, the following message *(must be 16 characters): lbcmdm* and the data entered so far are displayed.

9.3.2.7 [P] *Print* PR5510-Configuration

♦ **on PR5510 printer**

All parameters are printed out via the serial interface configured for the printer.
Unless a printer is connected or selected, the following >>> message is output:

No printer device selected *or* *No Printing*

☞ *Alternative unless a PR5510 printer is connected, but only a*

♦ **on PC printer**

- "Printing" in the terminal window (PC screen page)

HyperTerminal remains configured as described above **(no changes necessary)**
An exception may be the font size/style, to prevent line overrun.

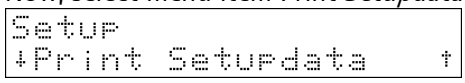
FIX: [Protocol]: XON/XOFF, [Baudrate]: 9600, [Bits]: 8, [Parity]: None, [Stopbits]: 1, [Devtype]: Ansi, [Echo]: Enabled

The connecting cable is plugged in. **Re-start** HyperTerminal (-> the screen is empty at first)

Define a (virtual) printer in PR5510: [Setup]-[Serial Ports]:

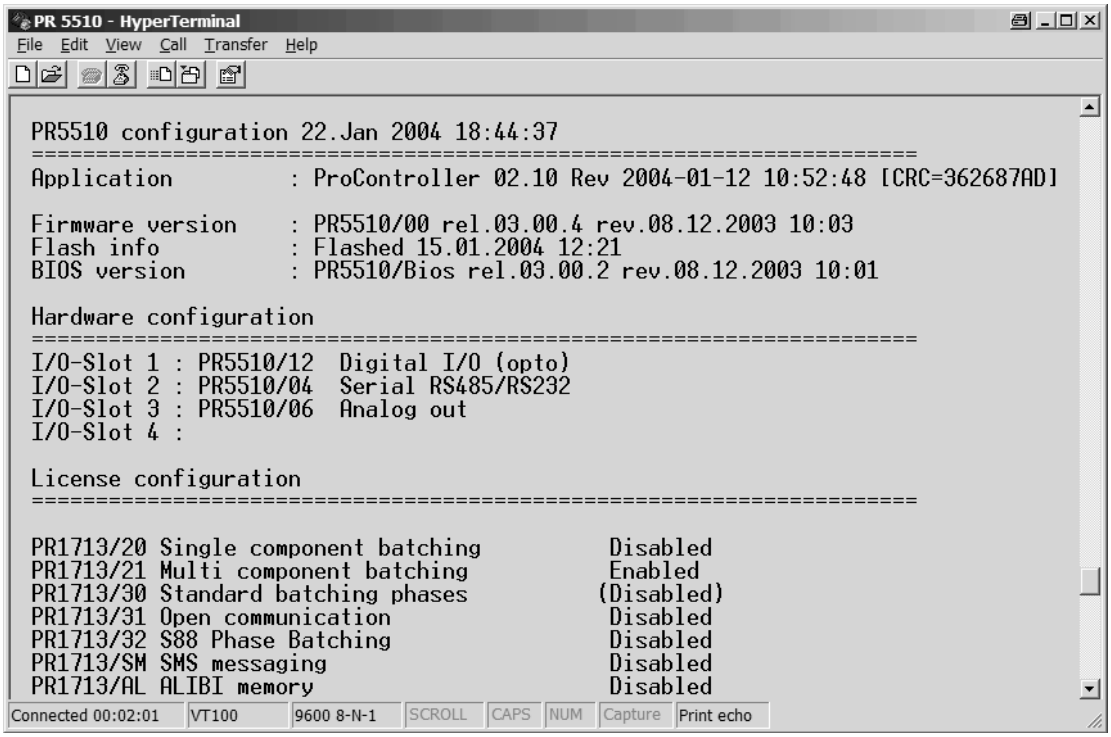
- Set Operator devices at = [Builtin-RS232] to <none>, and, instead of this, set
- Printer device at = [Builtin RS232]
- Store the above parameters in Builtin-RS232 (no automatic setting)

Now, select menu item *Print Setupdata* (HyperTerminal is started)



Press OK to start

Print data in the terminal window:

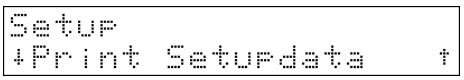


- Printing the terminal window (PC print)

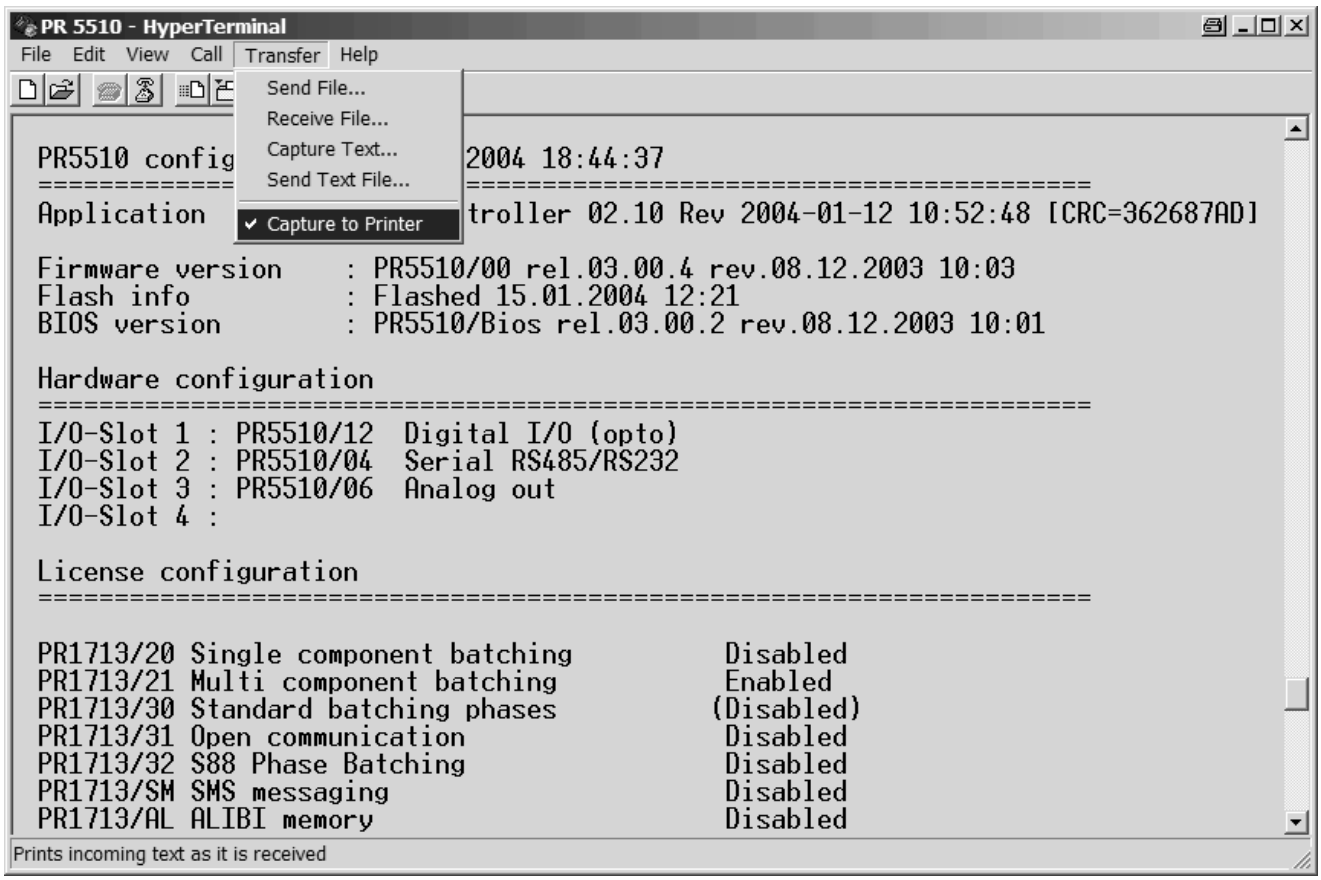
All settings as <Laden ins Terminalfenster> above.

The PC is provided with an installed and connected printer.

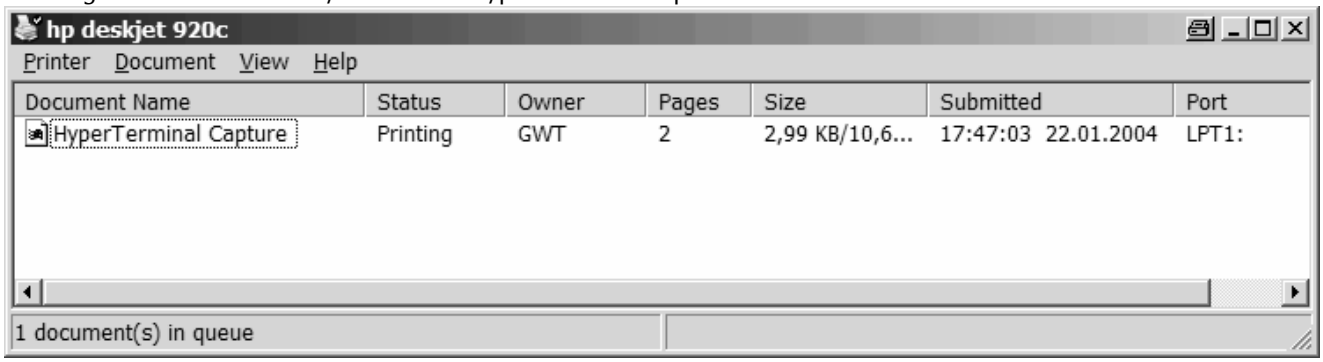
Select HyperTerminal menu item: [Transfer] = ☑ Capture to Printer



Press OK to start.



Printing starts automatically. Print file: HyperTerminal Capture

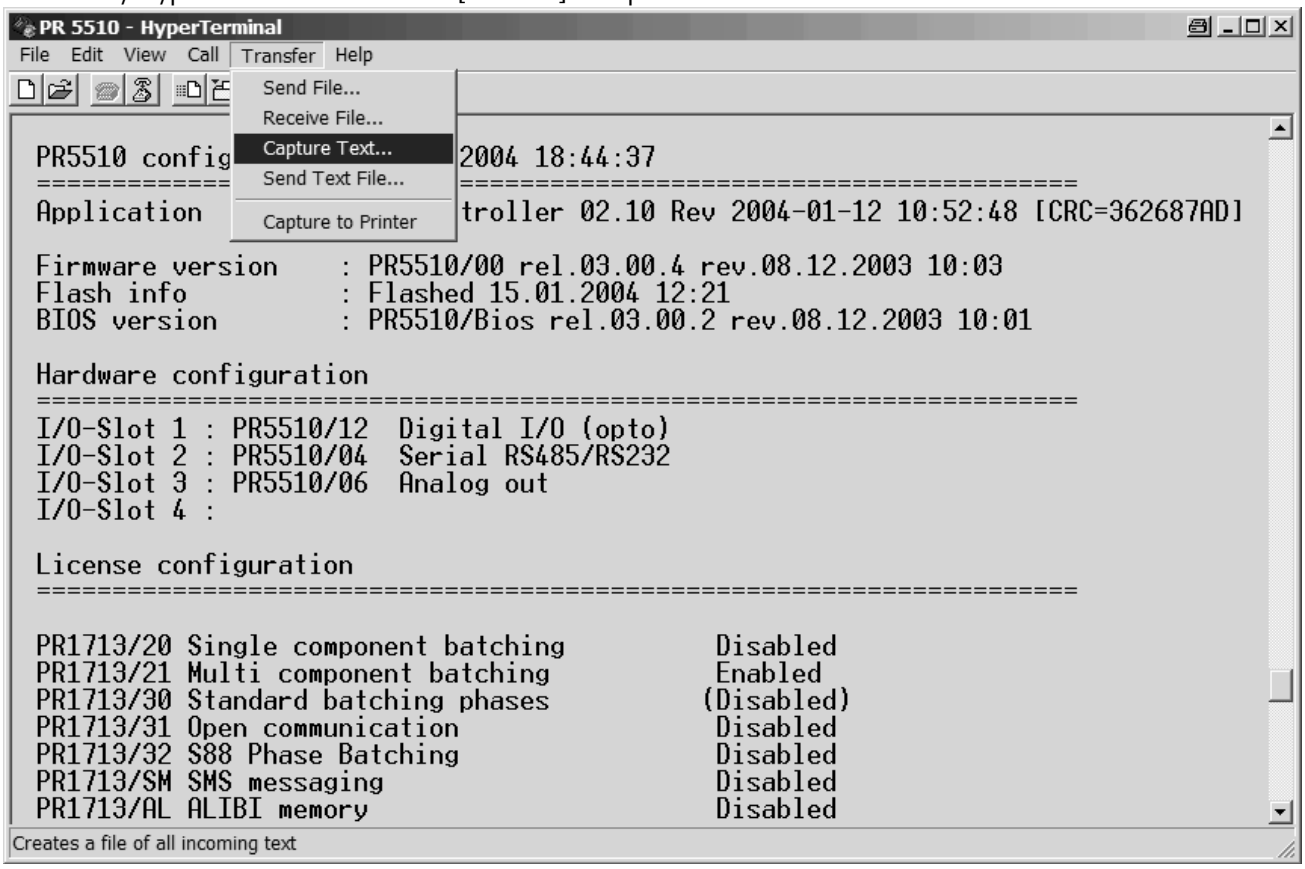


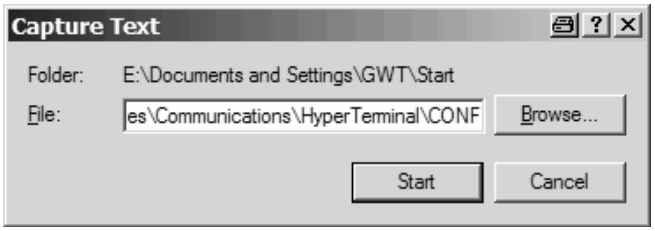
De-select menu item: [Transfer] = ☒ Capture to Printer

- Saving the terminal window (PC file)

All settings as above, *see chapter 9.2.2.1.*

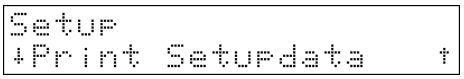
Select only HyperTerminal menu item: [Transfer] – Capture text





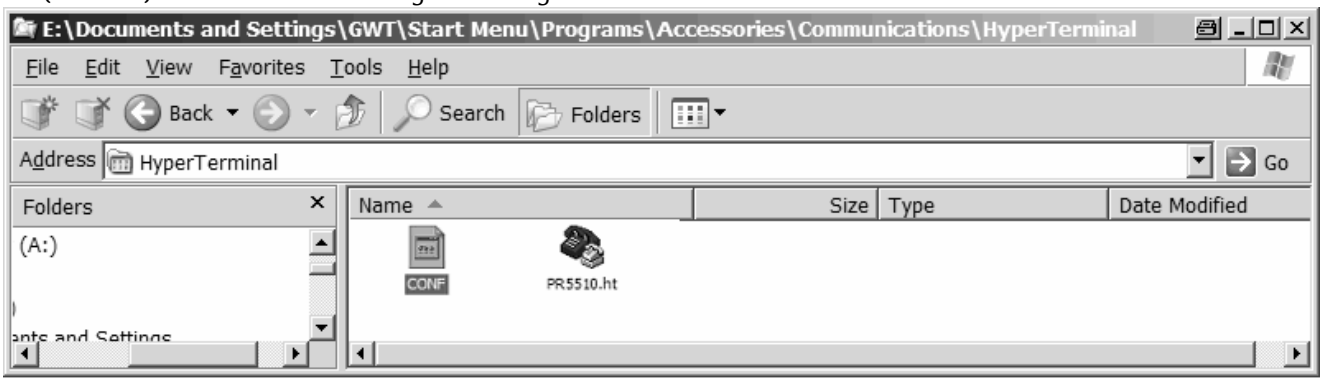
Specify the path and name for storage of the file.

Click on button <Start>
then ...

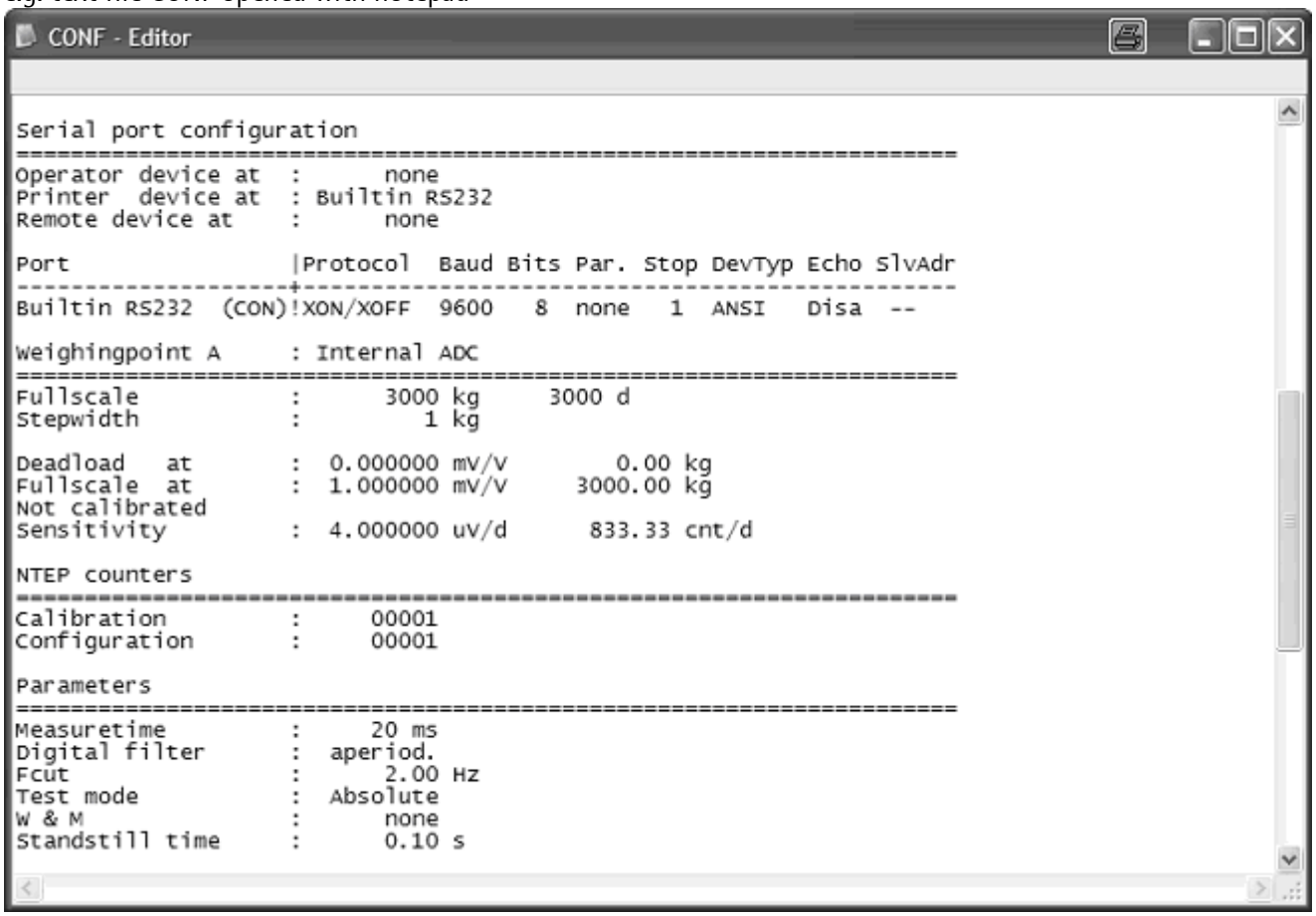


Press OK to start.

An (editable) text file with name e.g. CONF is generated.



e.g. text file CONF opened with notepad



Save this file and put the document into an archive.

9.3.3 [W] *Weighingpoint*

♦ **Description**

Call up mask *Weighingpoint* from the *Main Command Level* by pressing key [W].

The functions of the mask are:

Large weight display

- WP identification — weighing point A (single WP with PR5510)
- sign for standstill — < > with zero detection < 0 > if within 1/4d
- [G]/[N]/[T] — gross/net/tare

Function keys via the terminal keyboard (similar to PR5510 front keys):

- [0] — set zero
- [I/O] — set tare, reset tare
- [T/G/N] — weight display tare, gross, net
- [?/F/Z] — Test, flow, zero set
- [D/S] — display of diff weight, set-point *(only with batching application)*
- [P] — print *(application-dependent)*

Call up sub-menus/masks:

- [C] — calibration with configuration (parameters)
- Press [E] *Exit* — to return to the main menu.

♦ Function keys

- Gross / net / tare weight display is done by pressing key *[G]/[N]/[T] Select display*
  With the scale in tared condition, the relevant key can be pressed to display the gross, net or tare weight. For this purpose, the relevant letter is displayed.

- Zero setting is done by pressing key *[0] set zero*
  With the scale at zero, the weight value is preceded by display **>0<**.

- For setting or resetting the tare memory, press keys [I] or [0] *I/0 Tare In/out*
- Press key [?] to start the analog test.
  The test sum and reply line *Toggle Testmode Status OK* are displayed instead of the weight. Press key [?] once again to display the previous weight value.

- Press key [P] to print out the instantaneous weight value on the defined printer port, if the weight is higher than the adjusted limit value [default= 50 d].
  ☞ *see chapter*

♦ Calibration data: modify, save, protect

This chapter describes how to change, save and protect the calibration data. The calibration determines the relationship between analog input signal (or digital: of measured counts) to the weight value.
For a description of calibration data, input procedure, weighing point configuration and weighing point calibration, see the following two paragraphs.

The weighing point can be configured and calibrated in mask *Calib/Config* .

An additional **mechanical** write protection (CAL switch on the rear panel) is provided for calibration data.

CAL switch C overwriting with command: SAVE is possible = calibrating position

CAL switch C̄ overwriting with command: SAVE not possible = operating position ☑

☝ Evaluation of the switch position **is done once when calling up** mask *Calib/Config,* i.e.
Subsequent re-positioning of the CAL switch is without effect.

The instantaneous access possibility is also displayed in the mask (☞ *see chapter 9.3.3*).

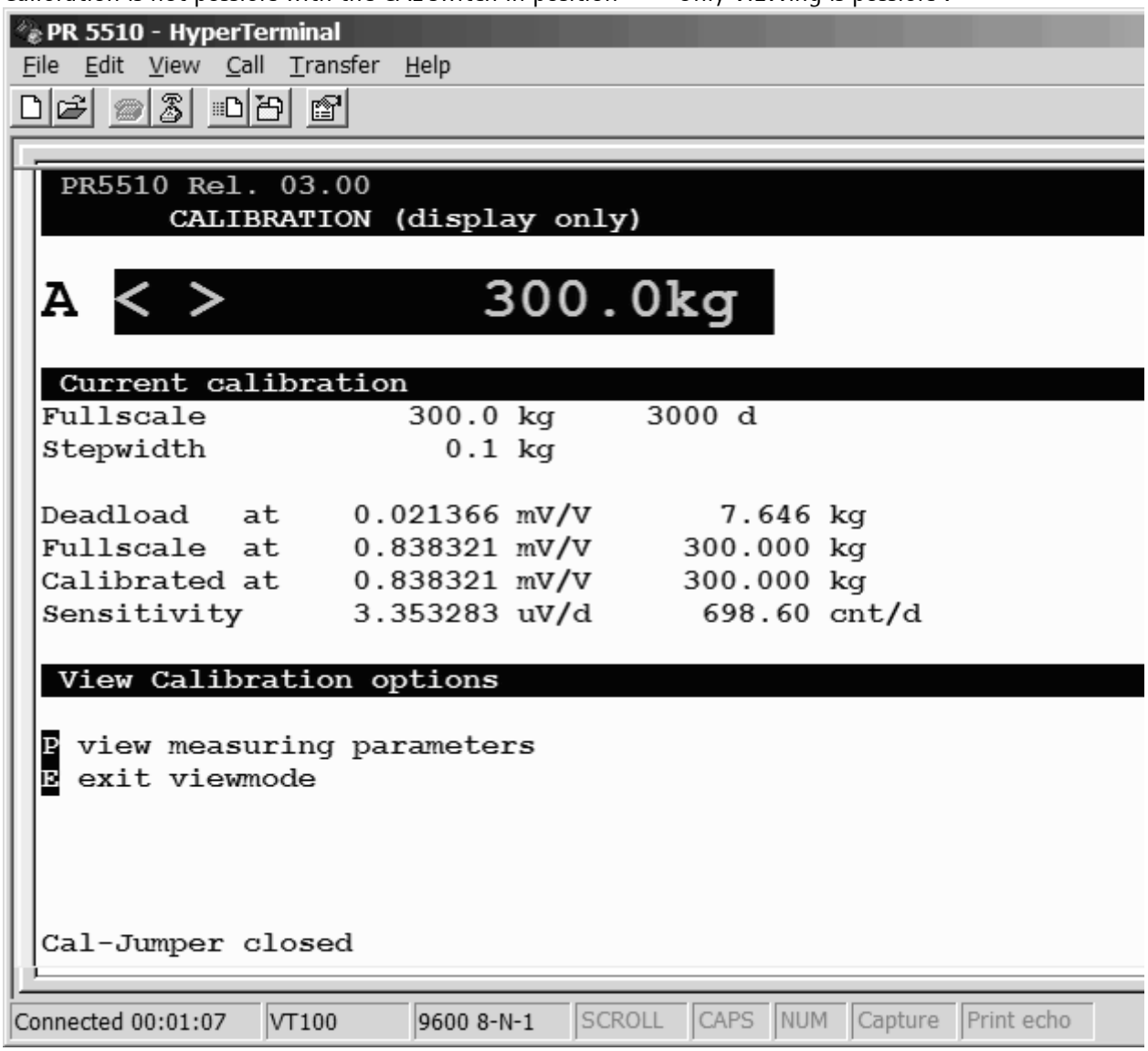
9.3.3.1 [C] *Calib/config*

When calling up mask *Calib/Config* with the CAL switch closed, the calibration data are protected. In this mask - *Calib/Config* the calibration data are only displayed.

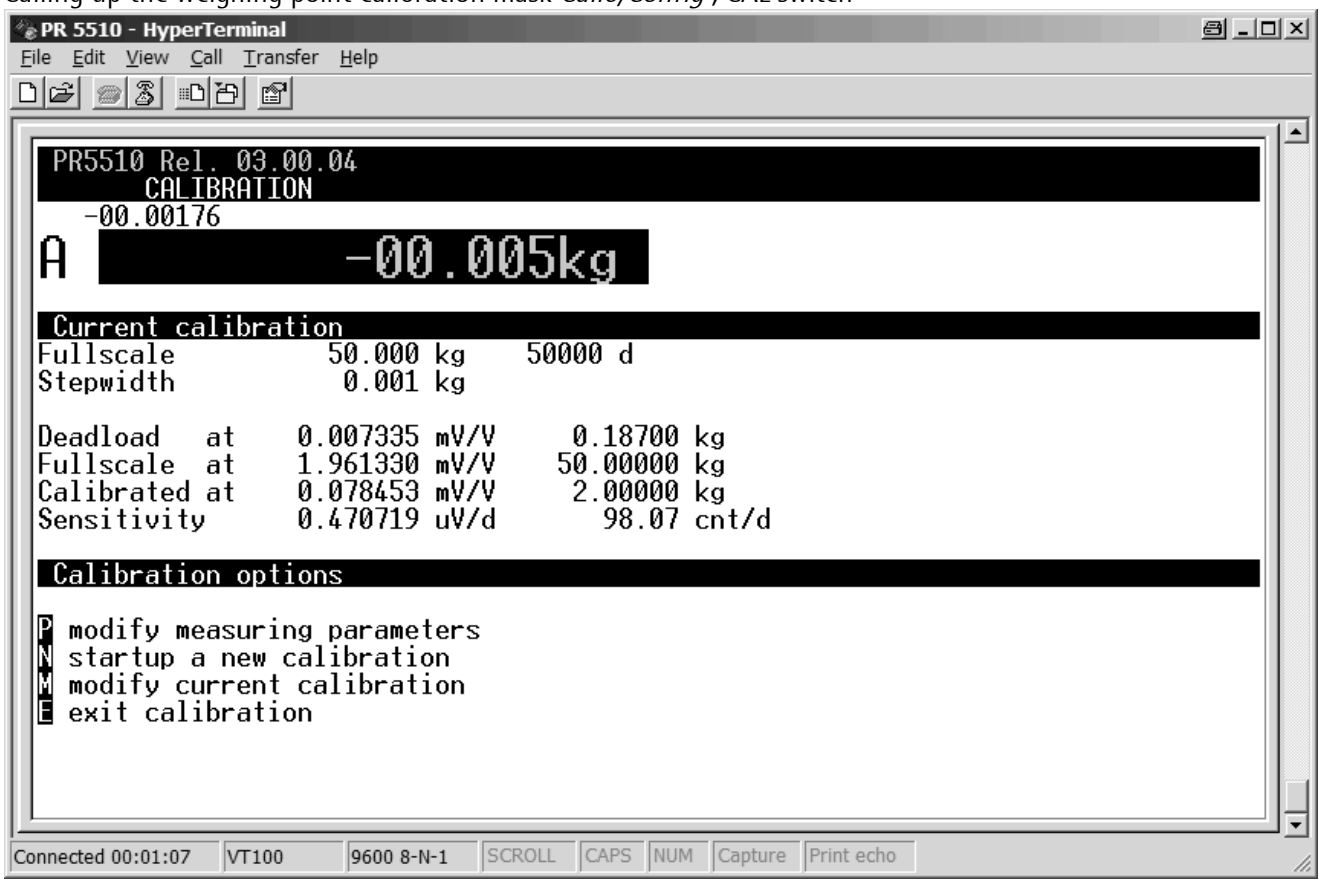
Display remains disabled, when

- a production (BATCH) is busy >>> message: WP is in use
- the scale is tared (NET display) >>> message: WP is tared

Calibration is not possible with the CAL switch in position  Only VIEWing is possible !



Calling up the weighing point calibration mask *Calib/Config* , CAL switch 



The zero set memory is erased, i.e. a zero correction done by pressing  is lost! Therefore, [Set Deadload] should be used in the calibration procedure.

Moreover, the following functions are disabled during calibration:
[Test], automatic zero tracking, taring and zero setting.

Note: Weight display e.g. 1345 kg is done with additional 100-fold magnifier e.g.1345.21 (centi _d)

Recommendation for the calibration procedure:

The displayed order P->N->M->E should be met.
(Subsequent parameter changes can have minor effectson the calibration values, e.g. filter.

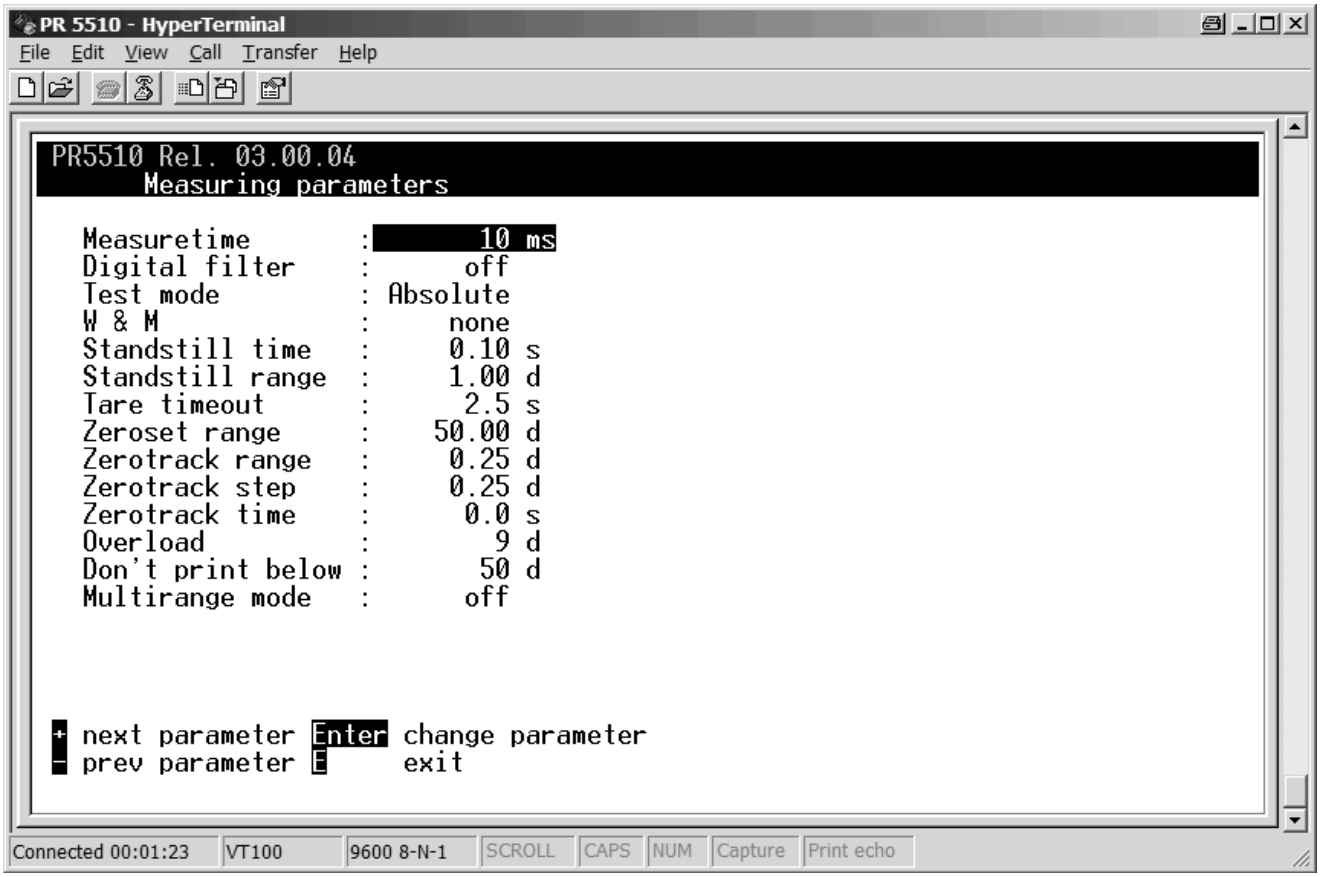
Select New calibration *[new]* , if the scale is to be calibrated **for the first time** after installation.
Select a modification *[modify]*, if you want to make minor changes of an already calibrated scale.

- **[P]** *Modify Measuring Parameter*

- Description of measuring parameters

see chapter

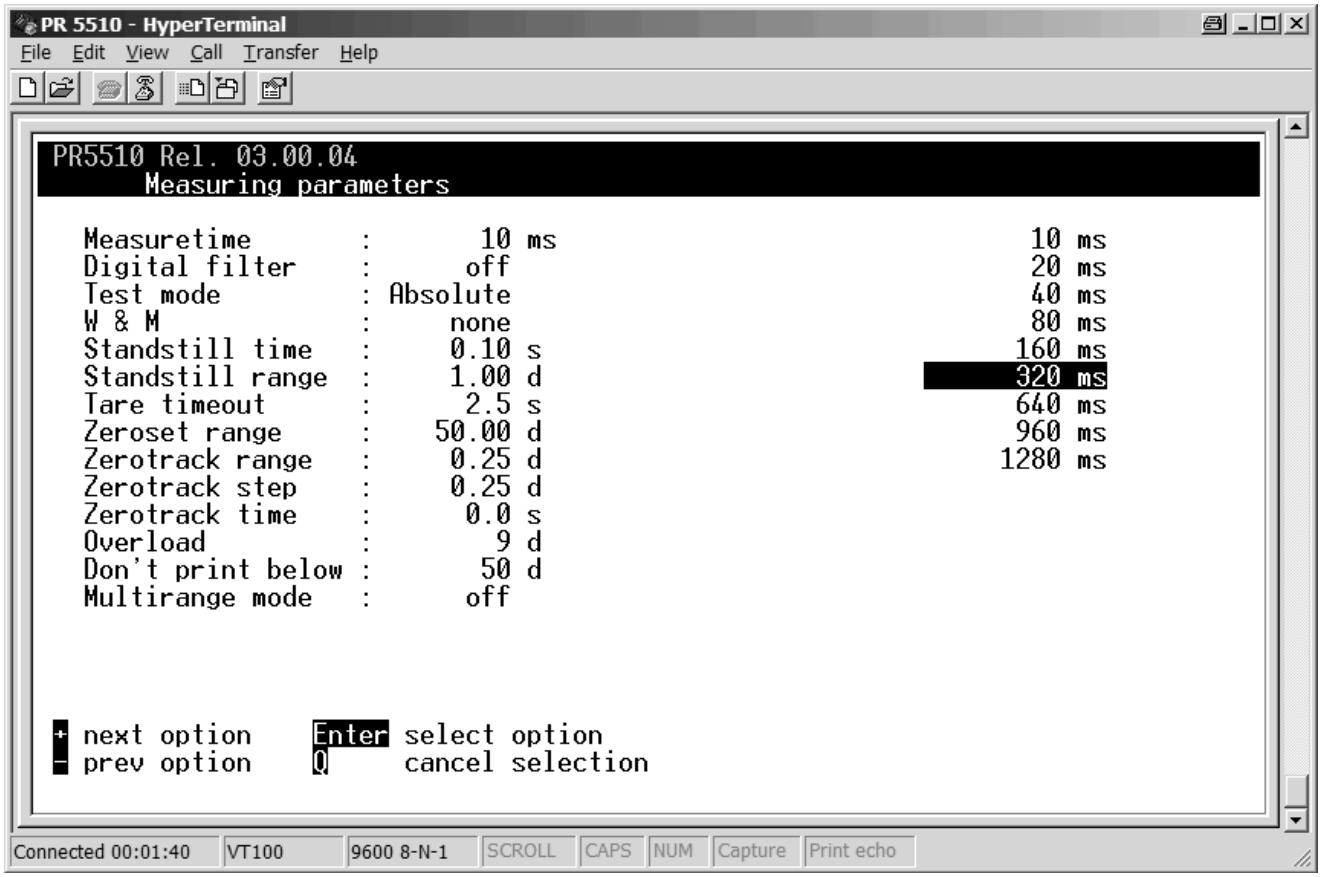
The following parameters can be changed
(displayed values= default values e.g. after ERASE).



Parameter selection (next parameter) is by means of cursor keys [↑] and [↓] or [–] and [+]. Selection (change parameter) is by pressing [Enter]. Thereby, display of the selected field inverse .

Remark: digital filter is not shown here, because measuretime higher than 160ms is selected !

Pressing Enter is followed by display of the selection list on the right:



Entry/change of the parameter values:
The entry/change is dependent on the input field. The two entry/change modes are:

- Selection field: select list parameters by pressing keys [+] and [-]

  Selection fields are: e.g. Measuretime, Dig.*Filter, W&M, Testmode* and Stepwidth (scale interval)
  All other fields are normal input fields:

- **Input field:** enter the required parameter value.
  During entry, the numbers are shifted from left to right. Point or comma are part of the mask (cannot be entered). During entry, the field content is **underlined.** The entry can always be canceled by pressing the space key [_]. The old values remain unchanged.

  Parameter input is completed with key [↵] [Enter].

  Subsequently, the input is checked:
  If the input is **within** the permitted range, the value is stored, the underlining disappears.
  If the input is **not** within the permitted range, the entered value is replaced by the next permitted value. The value remains underlined.

  The operator has the following possibilities:
  - He can confirm this next value by pressing the Enter key [↵].
  - He can enter a new value, or
  - Retrieve the previous value by pressing the space key [_]

♦ Calibrationprocedur at Terminal

Select Calibration [New], when the scale is calibrated for the **first time** after installation.

Select [Modify] only, if you want to make fine adjust/correction of the mV/V-Values for deadload/span or only if the deadload has to be adjusted afterwards. Changes of stepwidth and span are due to dependance of all calibration-parameters mostly not possible and thus only with New to do.

☝ Wait, until the instrument has warmed up (min. 60 min.).

During calibration it has to be decided:

- **To use the empty scale as deadload (normal case)**
- **To enter the deadload in mV/V (if the scale cannot be unloaded, or the value is known from previous calibration)**

If the deadload has to be changed later (due to weight decrease or increase of the empty scale), it can be done without influence on the other data like span.

The span indicates the equivalent input voltage in mV/V related to the scale FSD (full scale):

$span\ [mV/V] = \frac{full\ scale\ \cdot\ load\ cell\ sensitivity\ C\ [mV/V]}{load\ cell\ capacity\ (sum\ of\ all\ load\ cells)}$	Span in [mV/V] Full scale as a weight value Load cell sensitivity C [mV/V] Load cell capacity (= sum of all load cells) as a weight value

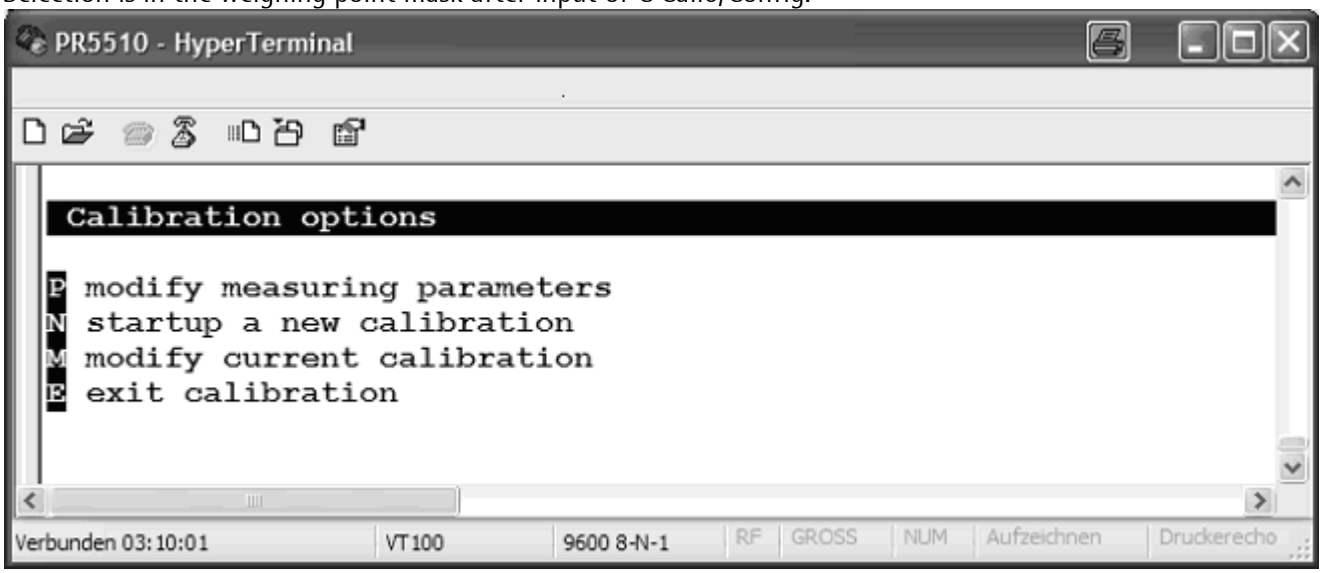
Default is 1.000000 mV/V

During calibration it has to be decided:

- **Set span by weight (load the scale with the calibration weight and enter the value of the calibration weight)**
- **Enter the span in mV/V (from calculation of above formula or if the value is known from previous calibration)**

- [N, M] *Startup a new* or *Modify current calibration*

Selection is in the weighing point mask after input of C Calib/Config.



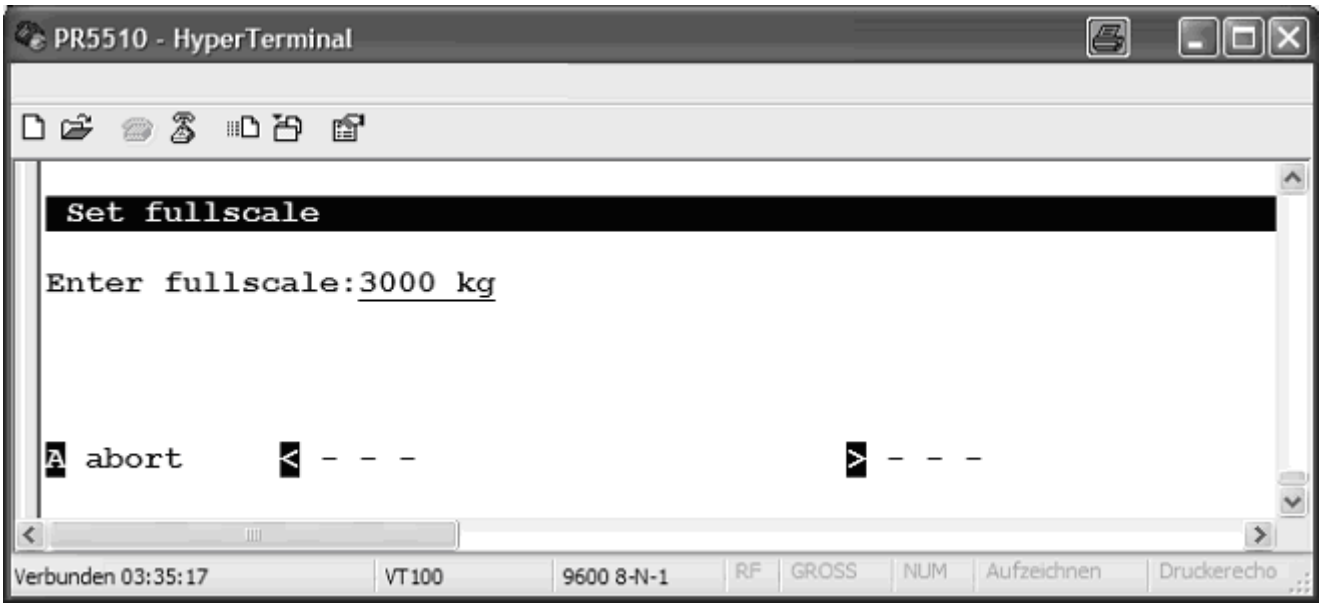
[M] ⚠ This menu should only be used for small changes, in other cases [N] has to be selected.

Default values for [New]:

Fullscale	3000 kg
Stepwidth	1
Deadload	0.000000 mV/V
Span	1.000000 mV/V
[Param]	All parameters remain unchanged !

- Enter fullscale: *Fullscale*

Field *Fullscale* can be used to enter the fullscale (FSD) .



- Enter/modify parameters
  Enter the required parameter value: value with decimal point + dimension
- Modify the input by overwriting.
  (select character by pressing the cursor keys). Delete by means of backspace [←] and re-enter.

- Storage
  Complete the input by pressing the Enter key [↵].

Subsequently, the input is checked.

A prompt for entry of the measurement value is displayed: *Enter new fullscale [3000kg]*

The old measuring range with dimension [in square brackets] is shown (default: *3000 kg*).
The instrument expects the following entries:

- measuring range, with comma (or point), if necessary
- no or one or several spaces
- dimension (g, kg, lb or t)

Press the Enter key [↵] to complete.

PR5510 checks the entries for plausibility:
If the fullscale is lower than the calibration weight specified during calibration (*Calipoint*) or if the calculated input voltage for the specified fullscale exceeds the permissible limits, the new fullscale is rejected. The fullscale is rejected, if less than 0,8 counts/d are provided.

If the entry is accepted, message *Status OK* is displayed during approx. 1 s

Possible error messages:

>>> Bad Weight	e.g. dimension was not specified
>>> Status Arithmetik overflow	e.g. specified weight too high
>>> Status Above phymax	calculated input voltage: > 36 mV
>>> Too many d	resolution too low: < 0,8 c/d
>>> Status Below Cal	value is below calibration point
>>> Illegal Fullscale	e.g. with 0.0001234 t

Leave the input field without changing the old measurement value (with faulty input):

If necessary, delete the entries: Bring the cursor into leftmost position with the cursor key [←]. Delete all entries using the delete key [del].

Enter key [↵]: the old measuring range remains unchanged.

- Scale interval: *Stepwidth*

  - Enter/modify parameters
    Enter the required parameter size: number without decimal point

  - Modify the entry by overwriting
    Delete by means of the backspace key [←] and repeat the entry.

  - Storage
    Complete the input by pressing the Enter key [↵].
    Subsequently, the entry is checked.

Prompt for input of the scale interval: *Enter stepwidth: 1*

The instrument expects the following entries:

- 1, 2, 5, 10, 20, 50

Complete by pressing the Enter key [↵].

PR5510 checks the specifications for plausibility:
If the entry is accepted, message *Status OK* is displayed during approx. 1 s

Possible >>> error messages:

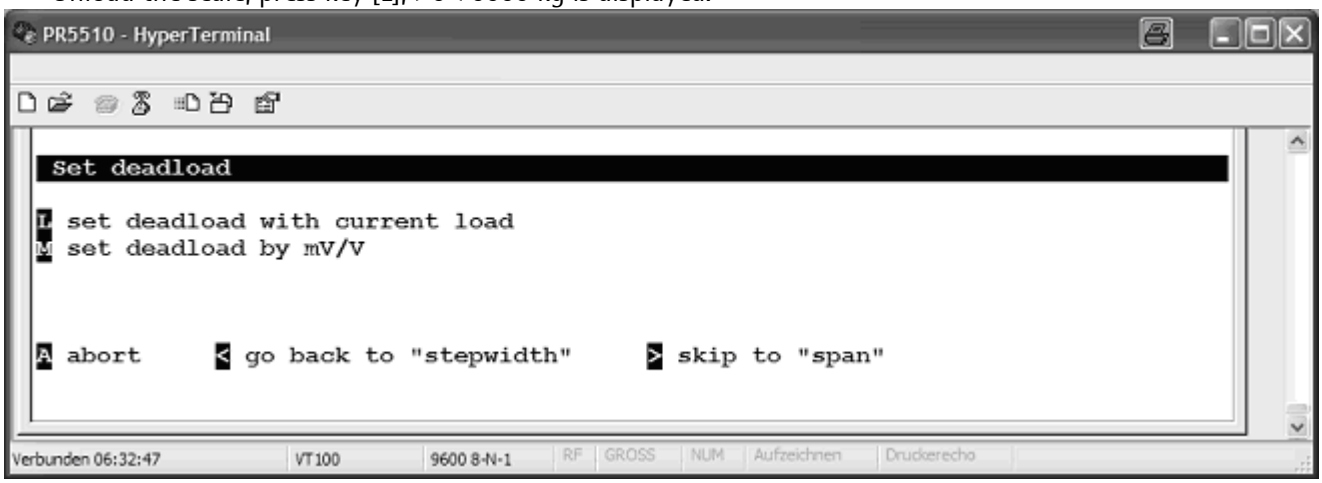
Invalid stepwidth	only selection from 1, 2, 5, 10, 20, 50 is permitted
ERROR FSD no mult. of step	fullscale e.g. 12345 kg is not possible with stepwidth 2

♦ A) Calibration in one step with weights

1. With "new" calibration, load the *default values* with [N].
   With "modify" calibration, use [M] or (or with [N], if required, e.g. with large deviations)
2. Allow the instrument to warm-up (min. 60 min.).
3. Set the CAL into position C for access to the calibration data.
4. Call up the weighing point calibration mask.
5. Enter the weighing point configuration parameters.
   Check/modify the (default) parameter *Filter*
   If this parameter is changed subsequently, re-calibration is recommendable.
   All other parameters can also be changed subsequently.
6. Determine the fullscale: *Fullscale*
7. Determine the stepwidth: *stepwidth*
8. Select the calibration mode *with current load*

A) With DEADLOAD suppression

- Unload the scale, press key [L], >0< 0000 kg is displayed.



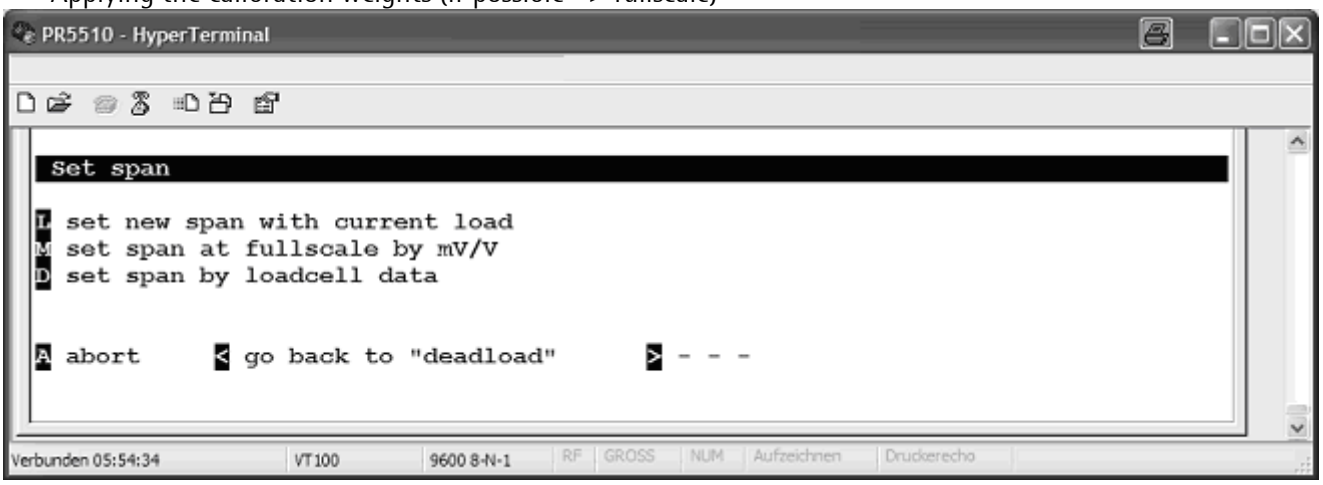
with weight (real scale construction) *...load:* press key [L] .

The instrument evaluates the data. Now, the display in the command line of the weighing point calibration mask is :

Setting deadloads ... The system saves the data. Then:
Setting deadloads ... Status OK The message is displayed during approx. 2 seconds.
The weight value display goes to: *0000 kg*

In case of error, repeat deadload setting. ☞ *see chapter*

- Applying the calibration weights (if possible => fullscale)



with weights (weight stones, calibration weights) ...*load:* Press key [L].

The following command line is displayed in the weighing point calibration mask:
Enter calibration point ***5000kg:***
The fullscale value (e.g. 5000 kg) is proposed as a calibration weight.

Enter the applied known (e.g. 4000 kg) calibration weight (=calibration point)
Weight with comma (or point), if necessary
- no resp. one or several spaces
- dimension (g, kg, lb or t)
- press Enter [↵] to complete

The following command line is displayed in the weighing point calibration mask:
Enter calibrationpoint ***5000kg:*** *4000 kg*

If the values are within the permitted range, the following message is displayed after a few seconds:
Setting unit ... Status OK
Setting weight ... Status OK The message is displayed during approx. 2 seconds.

>>> Possible error messages:
Setting weight ... Bad Weight e.g. dimension missing

Setting weight ... Status Above Scale specified weight too high

Setting weight ... Status Above phymax input voltage > 36 mV

- Saving calibration data

1. Save data in EAROM, complete with SAVE command.
2. Set CAL switch back to position  = calibration data protected

♦ B) Weighing point calibration without weights by means of mV/V

If the scale to be calibrated is **not subject to the verification laws** and if calibration with weights is not possible or not required for reasons of accuracy, "theoretical" weighing point calibration without real weights is possible. We recommend subsequent checking by means of a known real weight.

A) Values mV/V-*deadload* and mV/V-*span* are e.g. taken over from a report document of from an instrument of the same type e.g. in case of service.

B) *New:* "SMART"calibration from load cell configuration

C) A corresponding calculation is available.

- To A) Taking over

Read/print out the calibration data in the source instrument (same type as target instrument).

Open the weighing point calibration mask. Due to CAL switch position  , only the VIEW mode is active.

The following values are required:
Fullscale *Fullscale*
Scale interval *Stepwidth*
Deadload *Deadload-mV/V*
Span *Span-mV/V*

Enter the values read from the source instrument into the target instrument. For this, the CAL switch must be in position  .

- To B) New SMART calibration

For internal calculation, enter mV/V-*span* from the specified load cell data (Hamburg-based earth gravity). For locations with other gravity, the gravity can be entered.

Set the CAL switch into position  , open the weighing point calibration mask and press key [D] to select *set span by load cell data* in the *span* mask.

Required data (scale construction and technical data from the load cell manuals):
Number of load cells
Nominal load of load cells
Gravitation
Load cell data

A span-mV/V value is calculated and can be taken over directly.

- To C) calculation

As a prerequisite, however, the load cell sensitivity and output resistance (of each individual load cell, if possible) must be known. This information can be used to determine the Span.

- Calculation of *load cell sensitivity*

If load cell sensitivity C and output resistance Ra of the individual load cells 1 to n are different, the mean load cell sensitivity CAvr is calculated as follows:

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

This formula is simplified, if output resistance Ra is nearly equal for all load cells:

$$CAvr = \frac{1}{n} \sum C$$

- Calculation of *span*

The span indicates the equivalent input voltage in mV/V related to the scale FSD (full scale):

$span\ [mV/V] = \frac{full\ scale \cdot load\ cell\ sensitivity\ C\ [mV/V]}{load\ cell\ capacity\ (sum\ of\ all\ load\ cells)}$	Span in [mV/V] Full scale as a weight value Load cell sensitivity C [mV/V] Load cell capacity (= sum of all load cells) as a weight value

- Calculation of *deadload*

The value of the unloaded scale / empty hopper is the deadload. The input voltage equivalent to this weight value is displayed/ stored in mV/V.

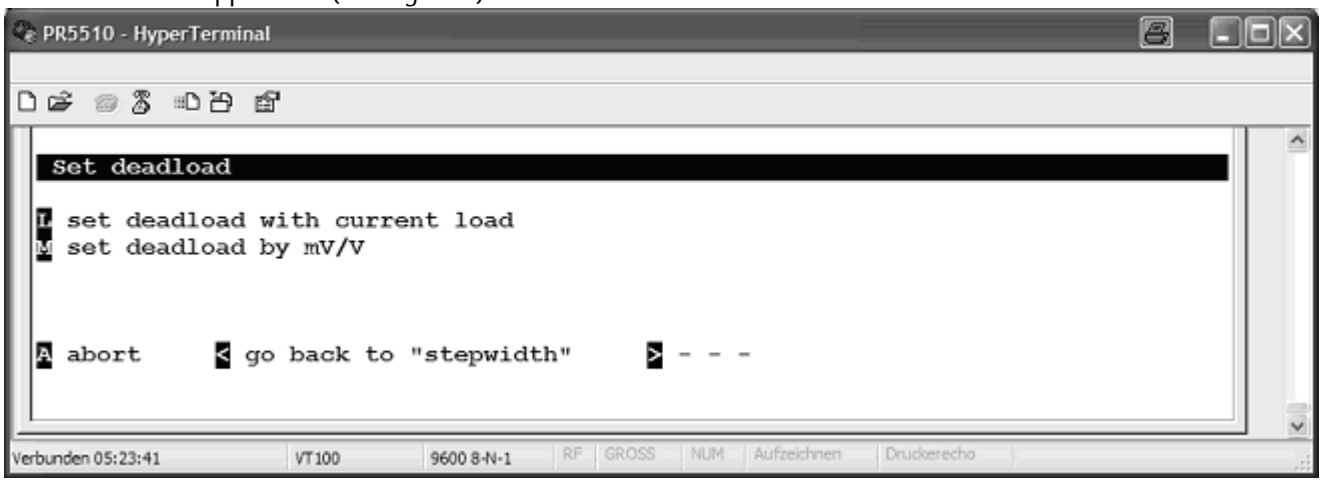
For calculating the voltage for deadload the same formula is applied as for span (*Full scale has to be replaced by dead load*), ☞ *see* Subsequent zero correction

♦ **For calibration without weights, proceed as follows:**

Basically, the procedure is identical to A,B,C, except for the origin of the *span*-mV/V value, which must be entered directly.

9. "New" calibration, press [N] to load *default* values .
10. Wait, until the instrument has warmed up (min. 60 min.).
11. Open CAL switch - Pos. $[C]$ to enable access to calibration data.
12. Call up weighing point calibration mask.
13. Enter the weighing point configuration parameters.
    Check / modify the (default) parameters for *Filter* .
    With subsequent changes of this parameter, recalibration should be preferred.
    All other parameters can be changed subsequently.
14. Determine the fullscale: *Fullscale*
15. Determine the scale interval: *stepwidth*
16. Select the calibration mode *with current load or by mV/V*

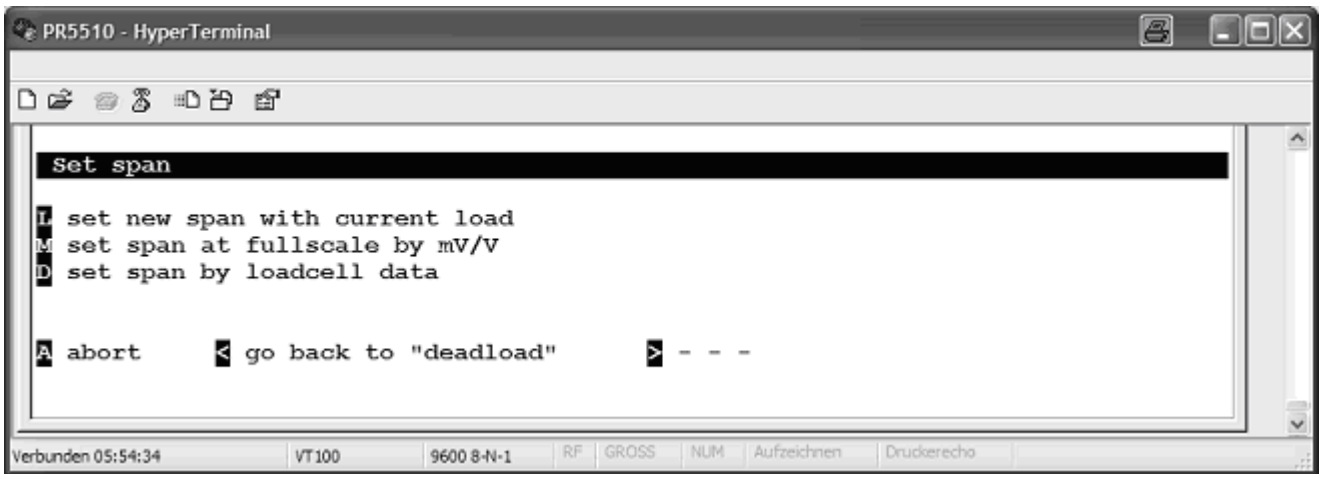
- DEADLOAD suppression (analog zero)



without weight (theoretical data/taken over from report) ...*mV/V:* press key [M].

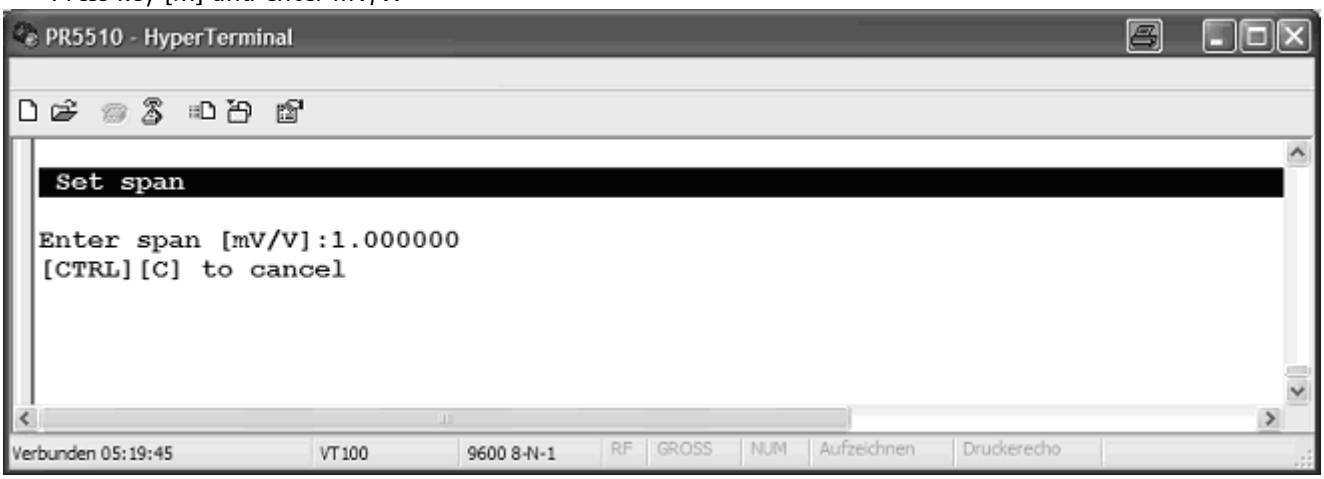
This entry is done, if the *deadload*-mV/V is known (subsequent determination by means of weight is also possible), otherwise, enter mV/V= 0,000000 / leave unchanged.

- SPAN



without weights (theoretical data/taken over from report	...*mV/V:*	press key [M].
without weights (taken over from load cell data, SMART)	...*mV/V:*	press key [D].

- Press key [M] and enter mV/V.



The system requests entry of span: *Enter span [mV/V]: 1. 000 000*

The existing span is displayed (default: 1.000000).
The instrument expects the following entries:

- Value with comma (or point), if necessary 0.000001... 2.000000...3.000000

Press key Enter [↵] to complete.

PR5510 checks the entries for plausibility:
If an entry is accepted, message *Status OK* is displayed during approx. 1 s

Signification of the following >>> error messages:

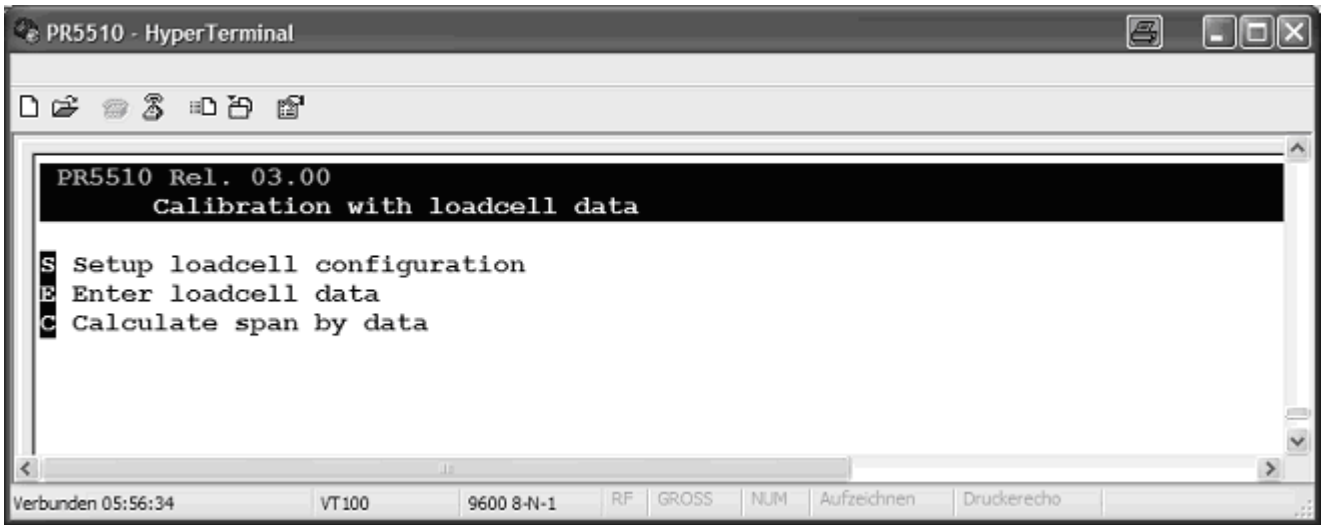
ERROR signal above max	values too high
Invalid mV/V	e.g. 5mV/V values much too high, cannot be calculated
too many d	e.g. 0mV/V or very low values, calculation results in too high resolution

Leave the input field without changing the existing measuring range (with operating error):

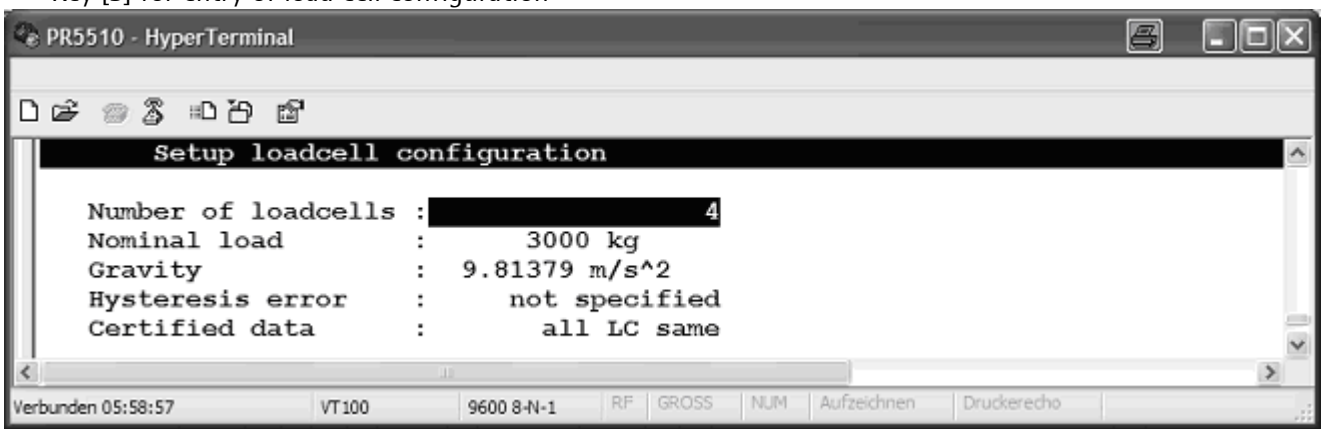
If necessary, delete the entries: Bring the cursor into leftmost position by means of the cursor key [←]. Press the delete key [Del] to delete all entries.

Enter key [↵]: The existing measuring range remains unchanged.

♦ **[D] "SMART" – mV/V calculation**



- Key [S] for entry of load cell configuration



* Selection fields: display selection list, mark the field and press Enter [↵] to select

Number of load cells: Selection*: 1 ... 4 ... 10 from list (default: 4)
Nominal load: weight value with comma (or point), if necessary
- no resp. one or several spaces
- specify the dimension (g, kg, lb or t)
- press Enter [↵] to complete.

Possible >>> error messages:

Setting weight ... *Bad Weight* e.g. dimension not specified

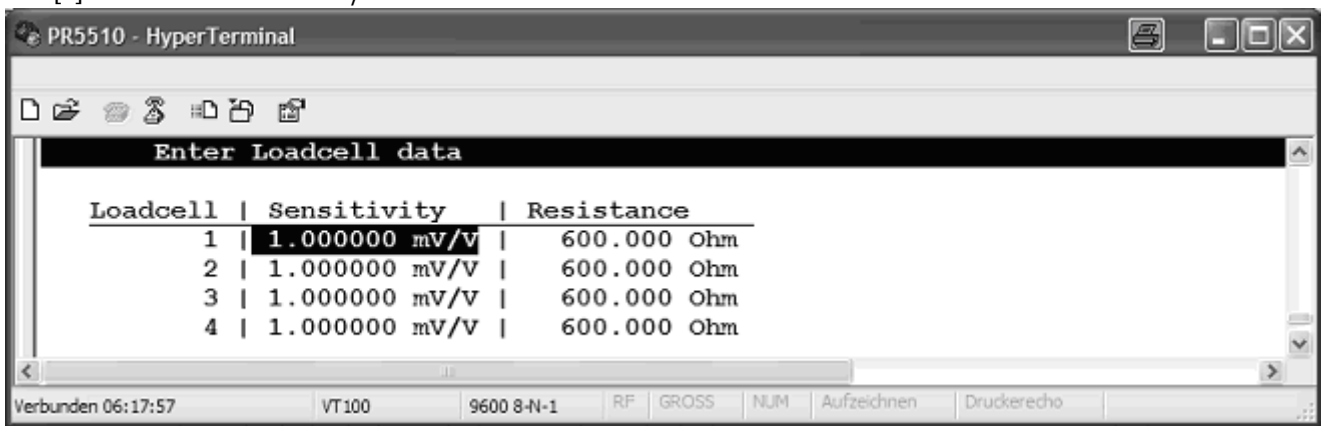
Setting weight ... *Status Above Scale* specified weight too high

Setting weight ... *Status Above phymax* input voltage > 36 mV

Gravitation: local value (PTB liste, etc.) (Standard Hamburg 9,81379)
Hysteresis: *presently not supported*
Certified data: Selection*: All LC same or *each LC specific* (affects only the load data mask)

- Key [E] exit to leave the mask

- [S] for *load cell data* entry



Previous selection was: *each LC specific* therefore, 4 table lines with number of load cells=4

Sensitivity:
The instrument expects the following entries (from the available load cell certificate):

- Value with comma (or point), if necessary 0.000001... 2.000000...3.000000 *(standard 1.000000mV/V)*
- *without dimension mV/V*

Press Enter [↵] to complete.

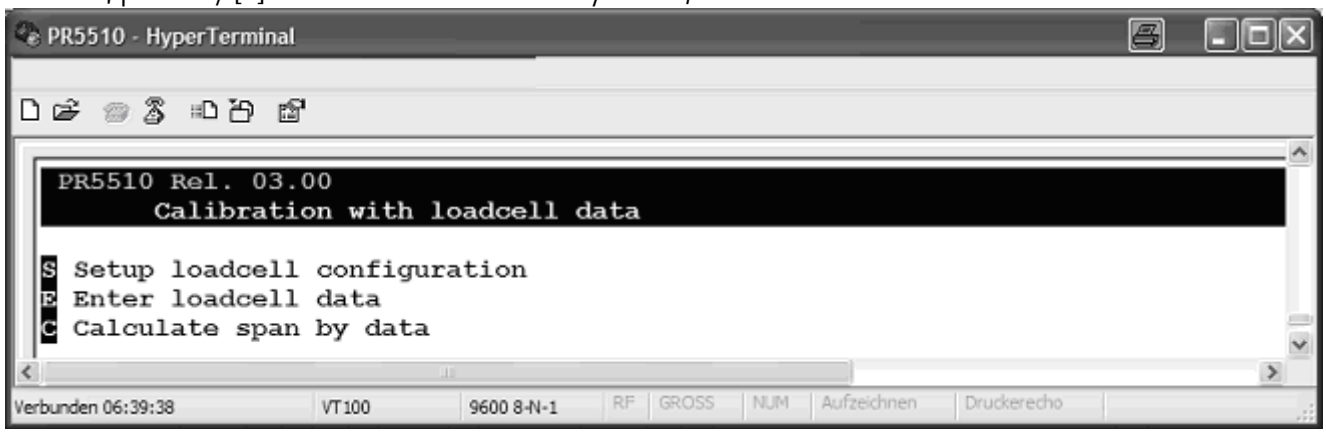
Internal resistance *Resistance:*
The instrument expects the following entries:

- Value with comma (or point), if necessary ... 600.000 ... (*standard 600 Ohm)*
- *without dimension Ohm*

Press Enter [↵] to complete.

- [E] exit to leave the mask

- Now, press key [C] to start calculation of the *span*-mV/V value.

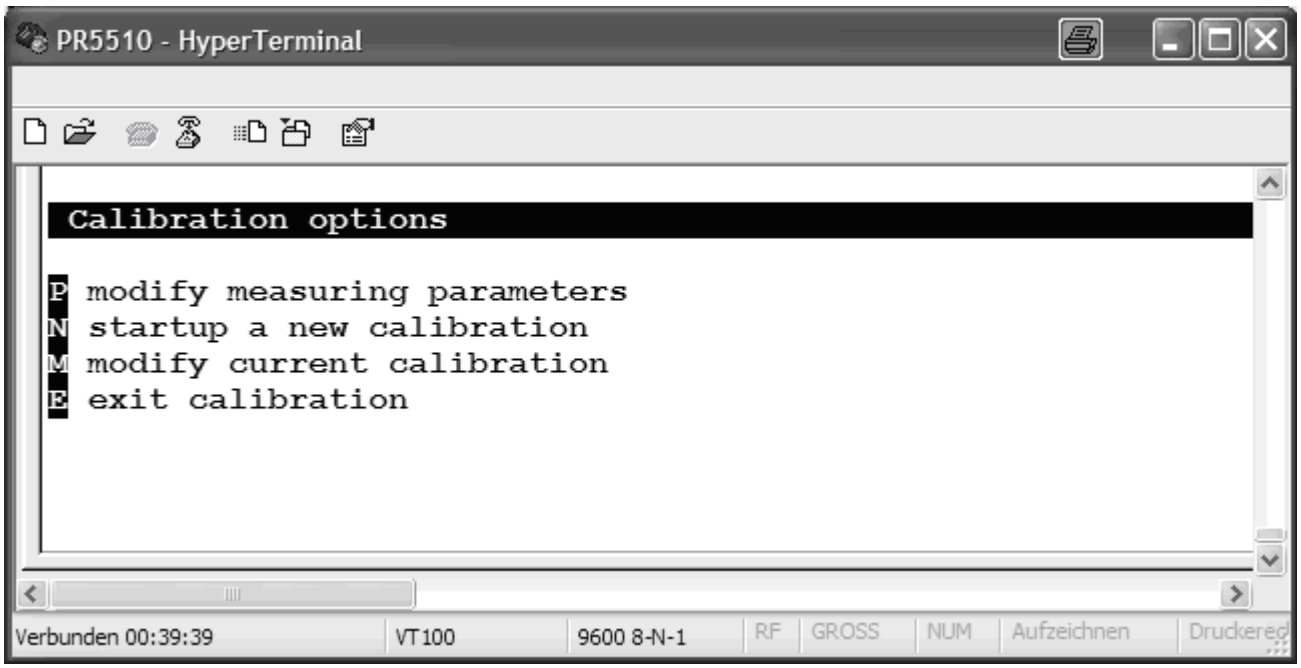


- Reply [Yes] to accept the calculated value and store it as *span*-mV/V.

When pressing [E] to leave the mask, a "calibration test" is done.

If all data are plausible, a message Status=OK is output and the weighing point mask is displayed again.

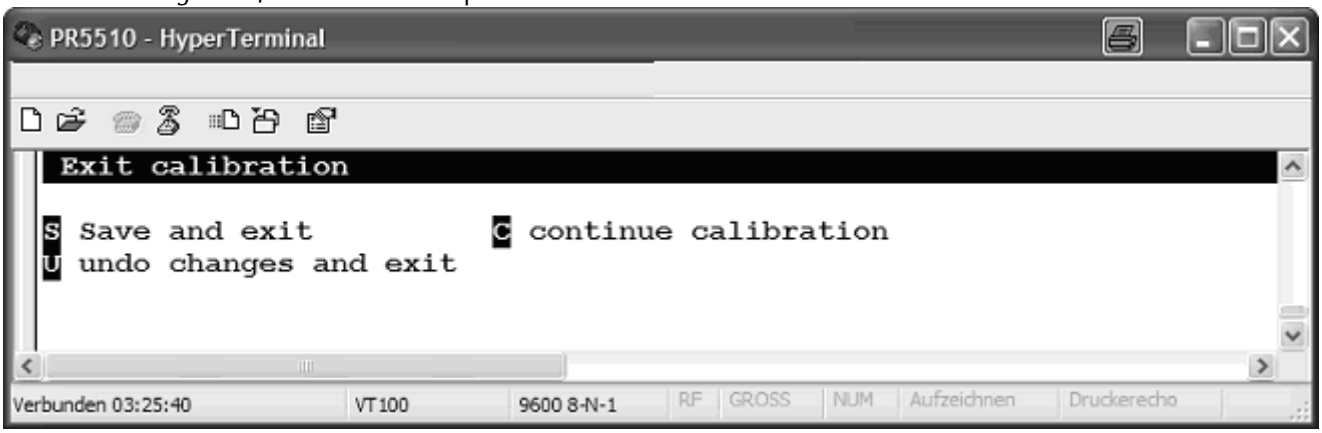
- The data are saved in EAROM.



- **Always leave this mask by pressing [E]** *Exit calibration*

  rather than by Windows click ☒ at the top right.

In the following mask, decision how to proceed with the entered calibration data must be made.



Mask *Exit calibration* offers the following selections:

- **S Save and exit**
- **C** continue calibration
- U undo changes and exit

- Saving the calibration data in EAROM

After weighing point configuration and calibration, all relevant calibration data can be saved in an additional EAROM, where they are protected in case of power failure and cold start.
The data are saved in non-volatile EAROM (also after power failure without back-up battery).

Save calibration data by means of **S Save and Exit** with the CAL switch in position C.

In case of early interruption of the procedure, CAL data are stored temporarily in the working memory and can be lost.

Recommendation (don't forget):

Set the CAL switch now into position C and check (power off – wait – on), whether the displayed weight is equal to the previously displayed weight, i.e. the CAL data were saved correctly ☑ !

♦ Subsequent zero correction

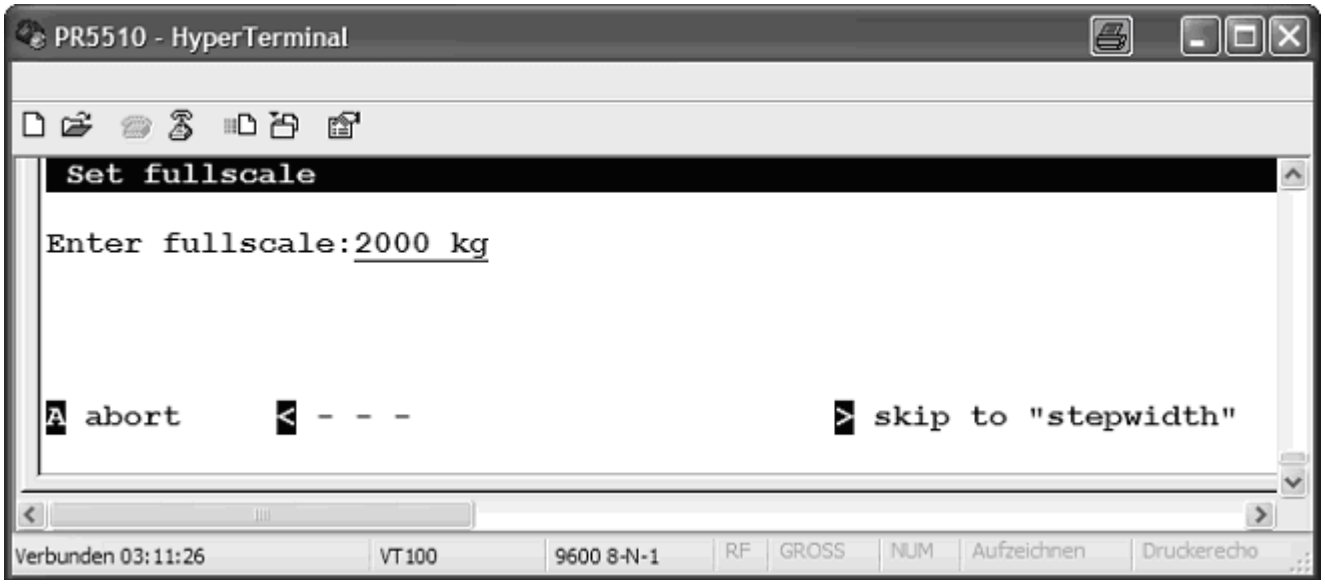
If the hopper weight changes e.g. due to loss (deadload reduction) or slag (deadload increase) by an amount which is higher than the zero set range, the automatic zero tracking and manual zero setting will not function any more. In these cases, subsequent zero correction is possible, **without having to re-calibrate the weighing point.**

For this, call up the weighing point calibration, skip *Fullscale* and *stepwidth* and set only the deadload. Subsequently, the actual calibration (*span*) must also be skipped.

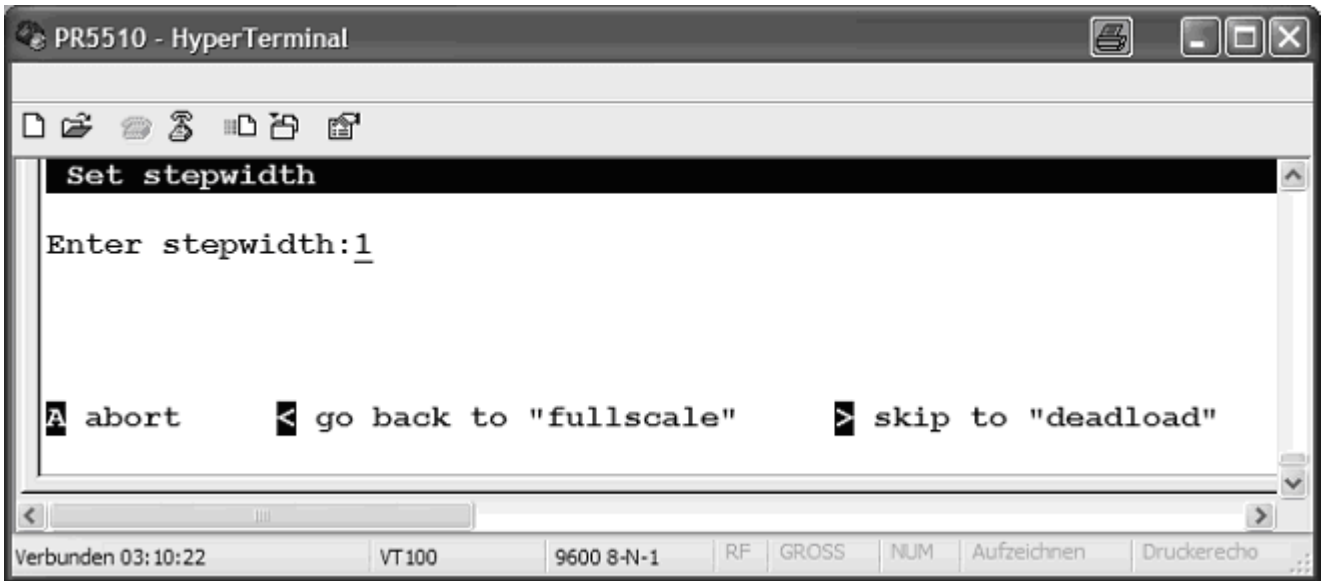
For zero correction, proceed as follows:

"Modify" calibration with [M] *modify*

Wait, until the instrument has warmed up (min. 60 minutes).
Open CAL switch, Pos.[C]: to permit access to the calibration data.
Call up the weighing point calibration mask.



Without further entry, press key [>] skip to select scale interval *stepwidth.*

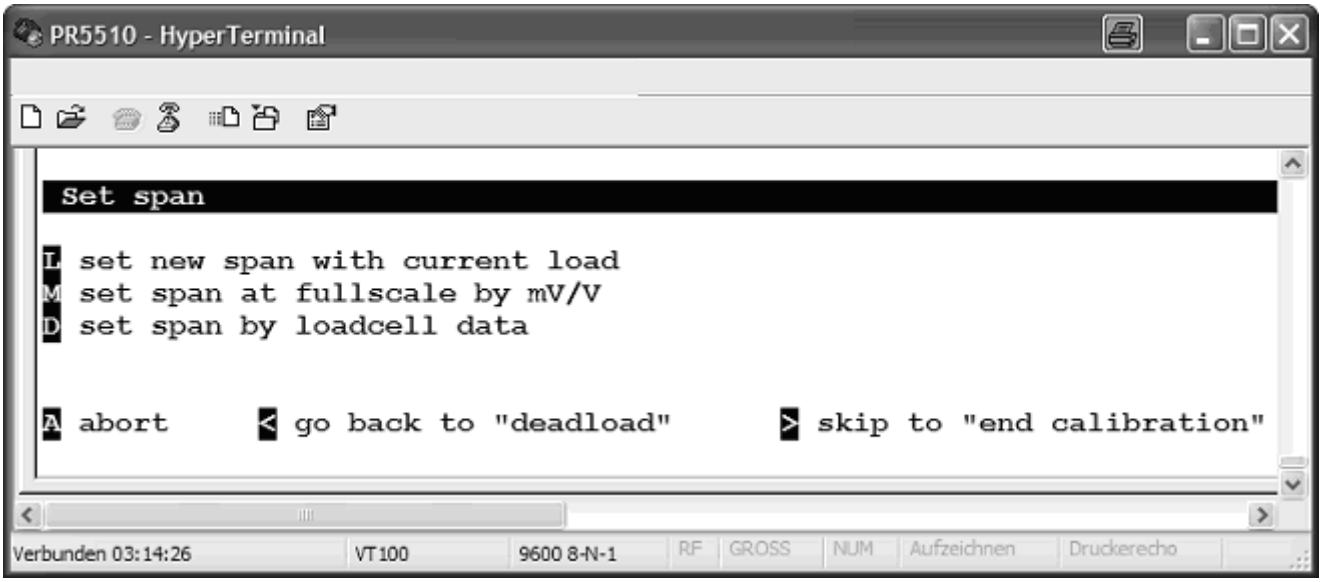


- Without further entry, press key [>] skip to select *deadload*
- Unload the scale, press key [L], >0< 0000 kg is displayed

with weight (real scale construction) ...*load:* press key [L].

The instrument evaluates the data. Now, the command line of the weighing point calibration mask shows:
Setting deadloads ... the system saves the data. Subsequently:
Setting deadloads ... Status OK the message is displayed during approx. 2 seconds
The weight display shows: *0000 kg*

>>> In case of error, repeat deadload setting. ☞ s*ee*

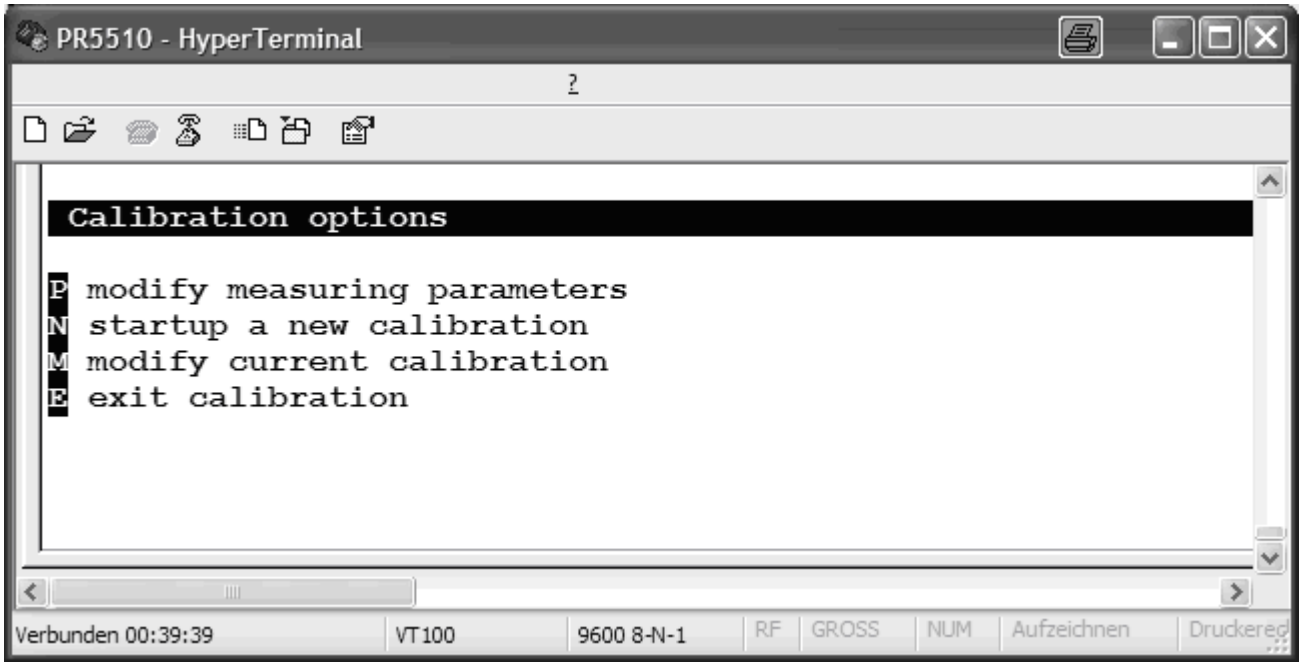


- Without further entry, press key [>] skip to select *end calibration.*

When leaving the mask [E], the "calibration test" is done.

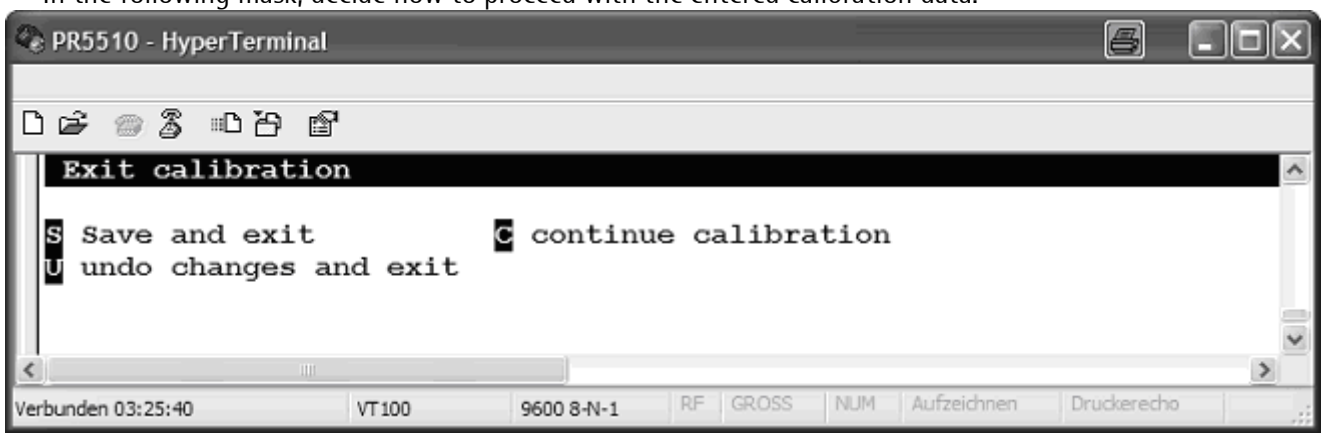
If all data are plausible, message Status=OK is output and the weighing point mask is displayed again.

- The data are saved in EAROM.



Always leave this mask by pressing [E] *Exit calibration* rather than by Windows click ☒ at the top right.

In the following mask, decide how to proceed with the entered calibration data.

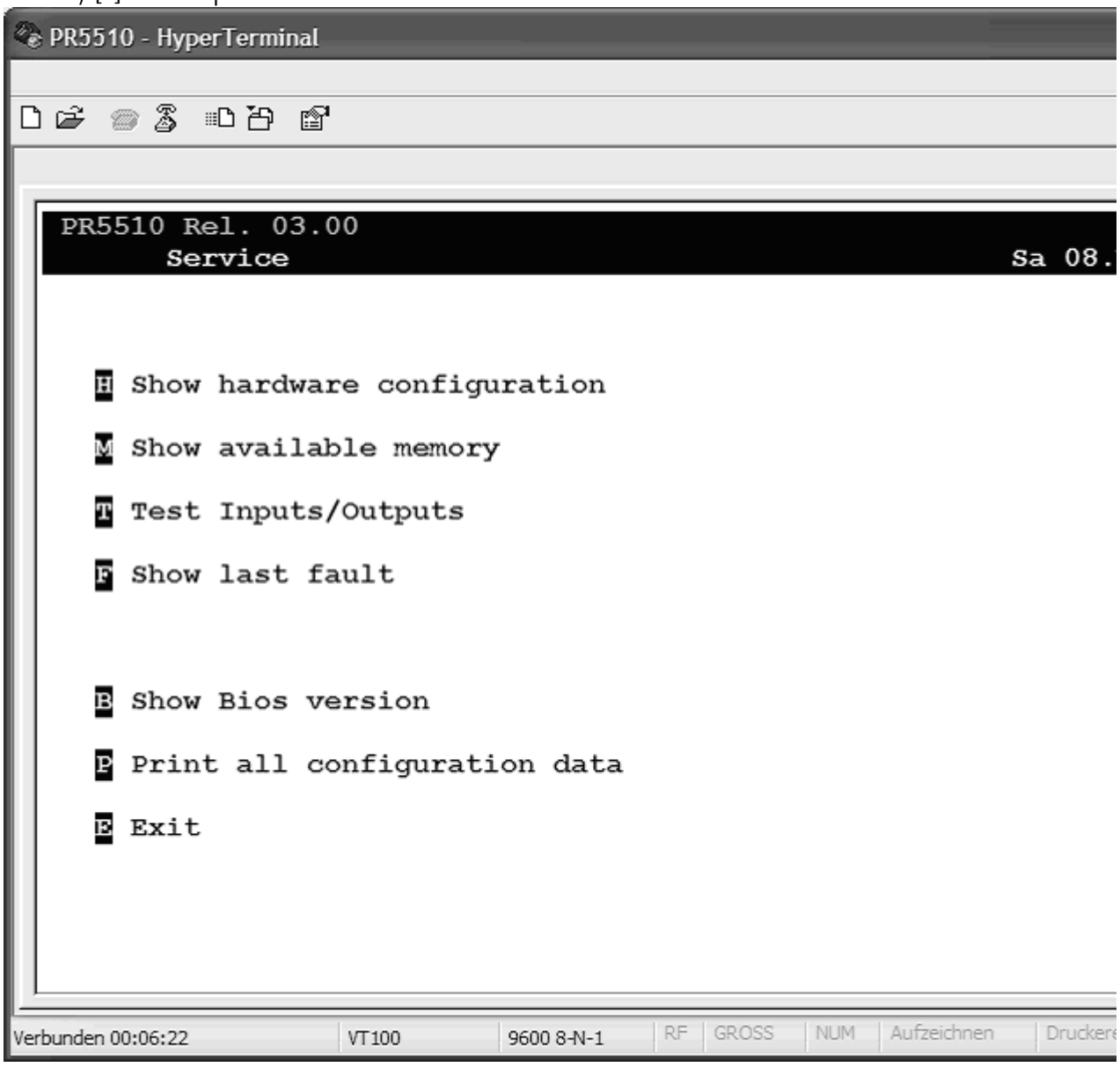


The following selections are offered in mask *Exit calibration* :

- **S save and exit**
- **C** continue calibration
- U undo changes and exit

9.3.4 [S] *Service*

Press key [S] to call up mask *Service* from the main menu *Main-Command-Level*.



Press the relevant key to call up the following menu items:

- *H Show hardware configuration*
- *M Show available memory*
- *T Test Inputs/Outputs*
  If a production is active, the module test (T) is disabled and cannot be called up:
  >>> Production is active, testmode is not possible
  Hit any key to continue
  Press any key to remove this message.

- Hex dump of the last "fatal system error" — *F Show last fault*
- Current Bios version — *B show Bios version*
- Print all configuration data — *P Print all configuration data*
- Quit sub-menu Service — *E Exit*

9.3.4.1 [H] *Show hardware configuration*

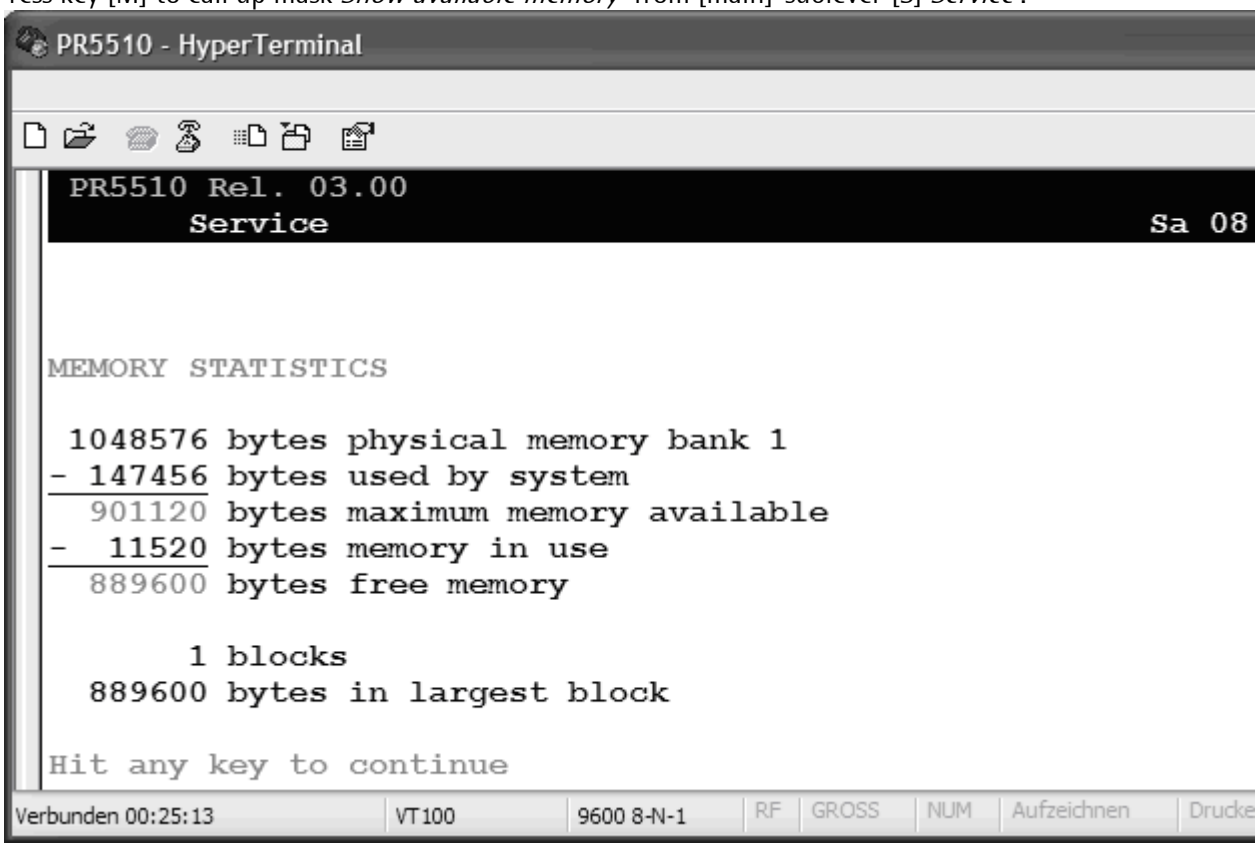
Press key [H] to call up mask *Show hardware configuration* from sub-menu *Service*.

```
PR5510 Rel. 03.00                                                    |
   Show hardware configuration              Mo 06.May 2002 09:31:51

I/O-Slot 1 : PR5510/04 Serial Interface RS232 and RS485
I/O-Slot 2 : PR5510/12 Digital I/O (opt)
I/O-Slot 3 : PR5510/06 Analog Out
I/O-Slot 4 :

Hit any key to continue
```

The options modules detected by the system software are displayed.
If modules contain firmware, the software version is also displayed.

9.3.4.2 [M] *Show available memory*

Press key [M] to call up mask *Show available memory* from [main]-sublevel-[S] *Service*.



Display includes

1. Standard memory bytes *physical Memory Bank 1*
2. Used system memory bytes *used by system*
3. Maximum available memory bytes *maximum memory available*

4. Used memory bytes *memory in use*
5. Free memory bytes *free memory*

6. Number of available blocks *blocks*
7. Largest available block bytes *bytes in largest block*

Press any key to leave this mask *Hit any key to continue*.

9.3.4.3 [T] *Test Inputs/Outputs*

☝ When testing, no outputs are set by the internal PLC programs, i.e. the PLC programs continue, the inputs are read, but the output commands are not transmitted to the process!

Press key [T] to call up mask *Test Inputs/Outputs* from menu *Service* :

```
PR5510 Rel. 03.00                                                |
     Test Inputs/Outputs                    Mo 06.May 2002 09:31:51

1  I/O-Slot 1 : PR5510/04 Serial Interface RS232 and RS485
2  I/O-Slot 2 : PR5510/06 Analog Out
3  I/O-Slot 3 : PR5510/12 Digital I/O (opt)
4  I/O-Slot 4 :

E Exit
```

The (cold start?) modules on sockets 1 –3 and 4 detected by the system software are displayed.

- Select and test the module

The mask corresponding to the module type can be displayed by entry of slot number 1...4.

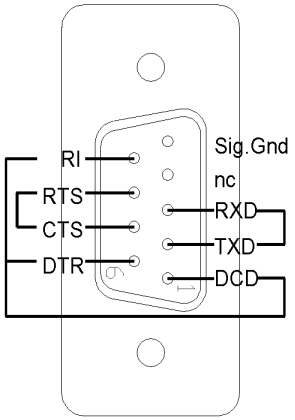
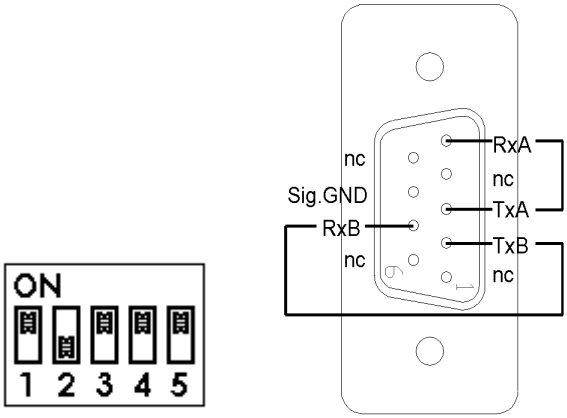
☞ *The module-specific tests are described in the following sub-paragraphs.*

- Leave sub-menu 'Test Input/Output' *E Exit*

After leaving this mask (E), sub-menu 'Service' is displayed again.
This is the prerequisite for reset of all outputs set during the test, and the PLC program output commands are retransmitted to the process.

♦ Testing the serial input and output modules PR5510/04

For testing, sender and receiver must be connected directly (wire links).
Fit the following wire links in the connector sockets:

Wire links for test connector : RS232	RS485
	

The interfaces are given logic names in the order of slot allocation.
In this example, a single card is always detected as TTY1 –RS485 and TTY2 –RS232.

Display if test passed:

```
PR5510 Rel. 03.00                                                    |
     Test PR5510/04 Slot-Number 1          Mo 06.May 2002 09:31:51

   RS485:
        Send with RTS ON : passed
        Send with RTS OFF: passed (nodata)
        Send with RTS ON : passed

   RS232:
        TxD-RxD    : passed
        RTS-CTS    : passed
        DTR-DCD/RI : passed
```

>>> Display if test failed (example):

```
PR5510 Rel. 03.00                                                    |
     Test PR5510/04 Slot-Number 1          Mo 06.May 2002 09:31:51

   RS485:
        Send with RTS ON : failed (nodata)
        Send with RTS OFF: passed (nodata)
        Send with RTS ON : failed (nodata)

   RS232:
        TxD-RxD    : failed (nodata)
        RTS-CTS    : pattern failed
        DTR-DCD/RI : pattern failed
```

♦ Analog input/output module test

The test is possible for PR5510/06 .

```
PR5510 Rel. 03.00                                                    |
     Test PR5510/06  Slot-Number 3        Mo 06.May 2002 09:31:51

   Current Analog Output Value:  Dec: 75.0% = 15.000 mA (9FAD)
   Enter decimal output 0..100%: _
   Set Output:
   D Decimal-Input-Format 0..100% for Output-Value
   C Current-Input-Format 0.000..24.000 mA for Output-Value

   E Exit
```

The slot number is displayed in the mask header: *Test PR5510/06 Slot Number 3*

- Enter the analog output value

The analog output value can be entered in various formats.
Selection is by entry of the relevant letter.
Decimal input 0...100% *D Decimal-Input-Format 0...100% for Output-Value*
Current input 0.000 - 24.000 mA *C Current-Input-Format 0.000 24.000 mA for Output-Value*
☞ *The dialogue line for decimal entry is shown as an example in the figure.*

The actual analog output value is displayed in the two formats.
☞ *See figure* Line: *Current Analog Output Value* decimal *Dec: 75.0%* Current 15.000 mA

- Leave mask 'Test PR5510/06' *E Exit*

After leaving this mask (E), submenu *Test Inputs/Outputs* is displayed again.

☝ The entered output values remain set until returning to *menu Service*!

♦ Digital module test

PR5510/12 can be tested.

```
PR5510 Rel. 03.00                                                    |
     Test PR5510/12  Slot-Number 1                                   |

   Inputs: I1= 1  I2= 0  I3= 1  I4=  1   I5=   I6=
   Outputs: Dec: 11     Hex: B    Bin:  1011

   Set Outputs:
   D Decimal-Input-Format for Output-Value
   H Hexadecimal-Input-Format for Output-Value
   S Set Bit   Bit-Nr. 0..n
   R Reset Bit Bit-Nr. 0..n

   E Exit
```

- Display of slot number

Display is in the mask header: *Test PR5510/12 Slot-Number 1*

- Display of current digital input values

Display is on line: *Inputs: I1= 1 I2= 0 I3= 1 I4= 1 I5= I6=*

- Input of output values

The output values can be entered in various formats.
Selection is by entry of the relevant letter.

  - Set all outputs simultaneously:

  Decimal input format *D Decimal-Input-Format for Output-Value*
  Hexadecimal input *H Hexadecimal-Input-Format for Output-Value*

  - Set/reset single outputs:

  Set a bit, bit no. 0...n *S Set Bit Bit-Nr. 0 ... n*
  Reset a bit, bit no. 0...n *R Reset Bit Bit-Nr. 0 ... n*

  Example for the set bit dialogue line: *Enter Bit-Number for Set: 3*

- Display of output values

Display is in three formats. *See* following line in the mask: *Outputs:*

Decimal	*Dec:*	*11*
Hexadecimal	*Hex:*	*B*
Binary (MSB left, LSB right)	*Bin:*	*1011*

- Leave mask 'Test PR5510/12' with *E Exit*

After leaving this mask (E), sub-menu *Test Inputs/Outputs:* is displayed again.

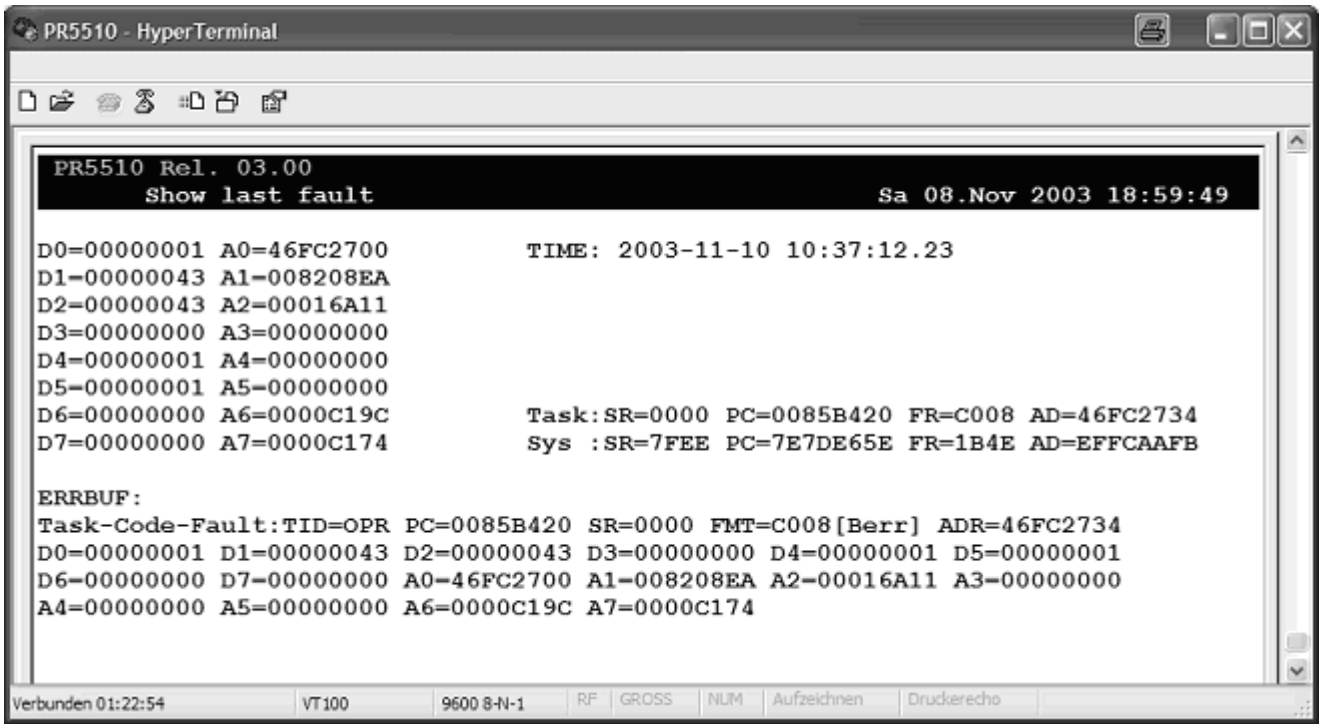
☝ The entered output values remain set until returning to *menu 'Service'* !

- **BCD output test**

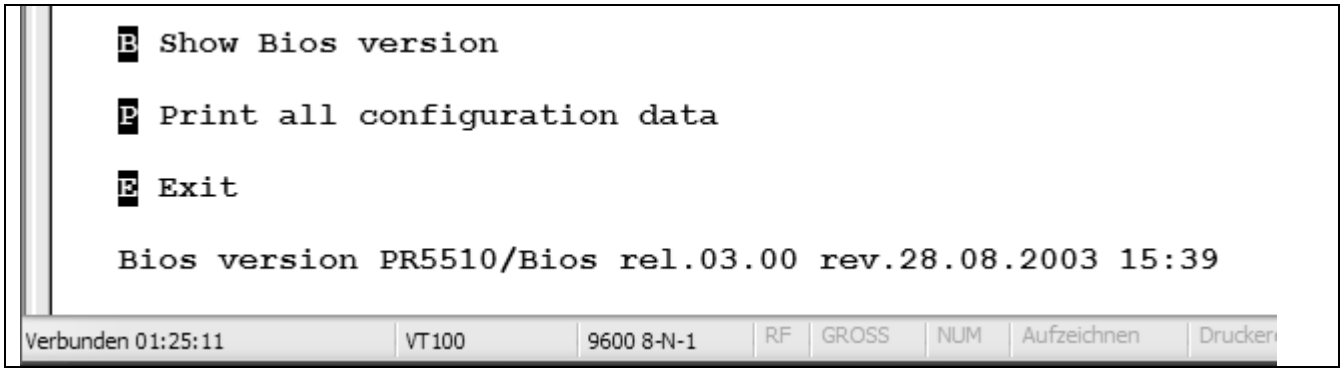
When cards PR5510/08 and PR5510/09 were detected in the system (cold start?), a corresponding screen mask is displayed.

The actual input and output values are displayed in binary form and also in hex- and decimal notation for the output. Single output bits may be changed by 'Set Bit' or 'Reset Bit'. You may enter output data in BCD or HEX format. By means of S101-2, the output is controlled via the DATA_IN input, e.g. HOLD.

9.3.4.4 [F] *Show last fault*



9.3.4.5 [B] *Show Bios version*



9.3.4.6 [P] *Print all configuration data*

Press key [P] to call up:

Printing out is done via the serial interface configured for the connected printer.

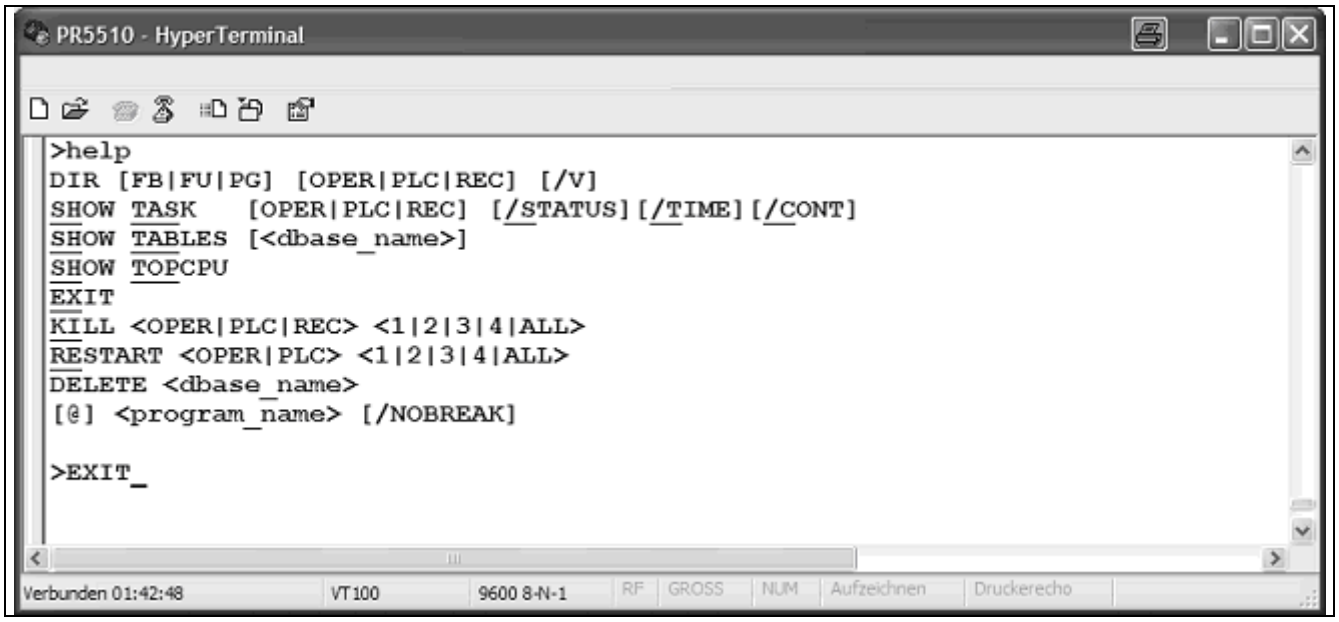
Alternatively, the terminal function can be used, unless a printer is connected to PR5510.
☞ *see chapter*

9.3.5 [L] *Commandline* main-sublevel

IEC 61131 operating level
Commandline is called up from the main menu *Main-Command-Level* by pressing key [L].

An empty screen with the [prompt sign '>'] is displayed.
The cursor is positioned beside '>'. the operating level expects input of a command.

By entry of command e.g. ***help***, a short-form description of possible commands is displayed.
Subsequently, the system waits again for entry of a command:
Press key Enter [↵] to complete.



The command signification is given in the PR1750 manual.

These commands should be used only by trained personnel, exception SHOW ... !

- Leaving the IEC 61131 operating level

To return to main menu *Main-Command-Level* , enter command *Exit* (type in the word, upper/lower case unimportant).

10 Technical data

The characteristic data are valid after a min. warm-up time of 60 minutes (reference temperature 23° C). Values specified without tolerances are average values and only used for information.

10.1 Analog part, A/D conversion

Principle	DC voltage, delta-sigma converter, ratiometric to te load cell supply voltage
ADC resolution	2.5 million steps internal for 1mV/V

10.1.1 Characteristics

Nominal measuring range (deadload + span)	3 mV/V = 36mV
Measuring range SPAN	max. 36mV without deadload
Measuring range SPAN for 6000e OIML R76/ EN 45501	=/> 0.25mV/V = 3mV corr. to 0.5uV/e
Measuring range SPAN for 3000e OIML R76/ EN 45501	=/> 0.125mV/V = 1.5mV
Measuring range SPAN for 3000d not legal for trade	=/> 0.06mV/V
Adjustment	via software
Deadload range	0...36mV (less SPAN)
Adjustment	via software
Measuring times	10, 20, 40, 80, 160, 320, 640, 1280 ms
Digital filter	Active 4th order (low-pass) Bessel, aperiodic, Butterworth, Tschebyscheff Cutoff frequency adjustable (max. 0.25/meas. rate or approx. 1.56 Hz)
Sense input voltage	+/- 6V diff.
Load cell connection	all strain gauge load cells, in 6 or 4 wire connection
Voltage	12 VDC, symmetrical to internal zero, short circuit proof
Load	Imax = 160mA, corresponding to > 75 Ohm, for 8 load cells of 600 Ohm each or 4 load cells of 350 Ohm each

10.1.2 Error limits

Linearity error	< 0.003%
Zero stability error (Tko)	< 0.05 uV/K,RTI = /< 0.004%/10K at 1mV/V
Span stability error (Tkspan)	< +/- 4 ppm/K

10.2 Equipment

♦ Digital part

Processor:	MC68331 with 16 MHz
FLASH EPROM:	1 Mbyte
SRAM:	1 Mbyte
EAROM/EEPROM:	2 kB

♦ Back-up battery

Type	Lithium, 3V CR2354	
	Battery not activated	10 years
Lifetime:	Battery activated, instrument under supply voltage	10 years
	Battery activated, instrument not under supply voltage	5 years

♦ Display

VACUUM FLUORESCENCE DISPLAY with serially connected data interface.

Weight display	(top)	7 digits (height) 13 mm for weight, dimension and status
Dialogue display	(bottom)	2 lines each with 20 characters (5 mm dot matrix) for text.

♦ Keypad

For the entry, the front panel is provided with an alphanumeric keypad with 16 keys.
Can be used for letters (upper, lower case)+digits, switch-over to function call-up B-N-T... via software.
Audible feedback

♦ External keyboard

External PC keyboard, max. 50 mA current consumption (additional instruments e.g. with Y cable not possible!).
Can be used also for barcode scanner (type Wedge) (Note the current consumption)
The socket is protected by a multi-fuse element.
PS2 socket on the rear panel.

♦ Builtin RS 232 interface

9-pole Sub-D socket	with standard pin allocation on the rear
Mode	RS 232 with Tx,Rx, and RTS,CTS control signals
Baudrate	300 - 19200 Bd
Databits	7/ 8 bits
Parity	none, odd, even

10.3 Options

PR5510/xx modules	flat cable connector, circuit board and mounting plate with DSUB connector
Mounting position (mechanical)	Max. 2 cut-outs in the rear panel. Additionally, a 3-pole connector for *PR5510/06 analog output must be fitted (electr.) Flat cable end plugs into slots 1, 2, 4 on the main circuit board. An additional InLine socket as slot 3 only for PR5510/06
Quantity	2+1* in combination, but only one fieldbus or Ethernet card *one PR5510/06 specifically

10.4 Power supply PR5510/00

Compact wide-range power supply	no adjustment		
Nominal power supply range	115 V ... 230 V ac	+10% / -15%	47-63 Hz
Power supply range (limits for operation)	90V ... 265 V ac		
Primary fuse	500mAT 5x20 mm	plugs into mains connector, built-in	2-pole
Min. power consumption (without options)	10 W/ 17 VA		
Max. power consumption (with options)	17.5 W/ 26.5 VA		

10.4.1 Power supply PR5510/01

Nominal power supply range	24 VDC	+ / -20%	
Primary fuse	1.6 AT 5x20 mm	plugs into supply connector, built-in	1-pole
Max. power consumption	13 W		

- **Safe condition**

The software is monitored by a watchdog timer. In case of error, reset occurs, whereby digital and analog outputs are reset to a defined condition. The load cell input is checked, if the error leads to an unplausible measurement value. The digital inputs and outputs or the analog output are not checked for failure.

- **Environmental effects**

Power voltage sags	>10 ms at 100% sag, without reaction of the instrument >20 ms at 50% sag, " " " "

10.5 Environmental conditions

Temperature range	
Ambient temperature (operation) PR5510/00	-10... +55 °C
Ambient temperature (operation) PR5510/01	-10... +40 °C
Ambient temperature (operation) for 6000e	-10... +40 °C
Switch-on temperature	≥0
Storage / transport	-40... +70 °C
Humidity	< 95 %, no condensation (acc. to IEC 68-2)
Protection type DIN 40050	IP 30, front panel IP65
Vibration	acc. to IEC 68-2-6, test Fc

♦ Electromagnetic compatibility (EMC)

All data in compliance with NAMUR NE 21 and EN 45501

Housing	Radio frequency electromagnetic fields (26 – 1000 Mhz)	EN 61000-4-3	3 V/m
	Radio frequency electromagnetic fields (80 – 3000 Mhz)	EN 61000-4-3	10 V/m
	Radio frequency electromagnetic fields (900 MHz pulse-modulated)	EN 61000-4-3	10 V/m
	Electrostatic discharge (ESD)	EN 61000-4-2	6 / 8 kV
Signal and control lines	ElectricalFast transients (Burst)	EN 61000-4-4	1 kV
	Peak voltage (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
	Conducted common mode disturbance (0 – 150 kHz)	EN 61000-4-16	10 V
Mains inputs	Electrical fast transients (Burst)	EN 61000-4-4	1 / 2 kV
	Peak voltage (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
	Conducted common mode disturbance (0 – 150 kHz)	EN 61000-4-16	10 V
	Voltage variations	EN 61000-4-11	40% / 0%
	Voltage dips	EN 61000-4-11	20 msec

♦ RF interference suppression

Electromagnetic emission	acc. to EN55011 group 1, limit value class B

10.6 Mechanical data

♦ Construction type

All-metal housing of aluminium and steel (zinc-plated) for panel mounting

♦ Dimensions

Housing	Dimensions
Width	192 mm
Height	96 mm
Depth	220 mm

Rectangular panel cutout	Dimensions
Width	187+0,5 mm
Height	91+0,5 mm

♦ Weight

Net weight	2.12 kg
Shipping weight	4 kg

♦ Connection

All connections are made via connector/socket on the instrument rear panel.
3-pole Euro power supply connector
Plug-in screw terminals for load cells and analog output
2 cutouts for options modules (connectors in the options)

10.7 Accessories

Installation manual on CD-ROM.		
Rubber front bezel gasket		
Euro connector, female	3-pole	accord. to Euro standard
Load cell connector	6-pole	Combicon

Optional
Installation manual as hardcopy (English)
Installation manual as hardcopy (German)
W&M sealing labels, (for PR17xx series, X4)

10.8 EC certificate of conformity

☞ *see Documentation-CD [Folder 2-Certificates – Zertifikate]*

10.8.1 Electromagnetic Compatibility: PR5510/x0 Process Controller

☞ *see [PR5510_x0 CE-Konformitätserklärung.pdf]*

10.8.2 Electromagnetic Compatibility: Option PR5510/07 Analog-IO

☞ *see [PR5510_07 CE-Konformitätserklärung.pdf]*

10.8.3 Nonautomatic electromechanical weighing instrument

☞ *see [5510 CE nach 90384.pdf]*

10.9 EC-Typ approval certificate: Sartorius SARTICS-Scale

☞ *see [SARTICS_D04-09-015_0Rev_de-eng.pdf]*

For a scale based on the instrument, the certificate of type approval no. D04-09-015 by Physikalische-Technische Bundesanstalt (PTB) for non-automatic weighing machines (EN45501) has been issued, i. e. the instrument meets the prerequisites for approval by the local authorities in all countries of the European community.
☑ For 'legal for trade' applications the W&M mode has to be set to **OIML (NTEP** for US, **NSC** for Australia**) !**

10.10 Test certificate: PR5510/xx Indicator

☞ *see [PR5510 1.Revision D09-04.07 d e.pdf]*

10.10.1 Location of seals for PR5510

☞ *see [PR5510 1.Revision D09-04.07 d e.pdf]*

We recommend using a fibre-tipped pen with water and ultraviolet light resistant ink, e. g. type Staedtler PANCOLOR EAM 4007817-32116. for the inscription on the labels.

11 Annex

11.1 Spare parts

Description	Service code number
Back-up battery	5312 138 18013
Display circuit board	5312 216 98344
Main circuit board	5312 216 98345
Kit of mounting brackets	5312 256 98004
3-pole connector	5312 264 48014
Load cell connector, 6-pole	5312 264 48013
MODE/CAL switch	5322 276 70106
Foil-covered front panel	5312 448 28036
Kit of knurled screws	5312 505 18006
Sealing gasket	5312 532 58013

11.2 Other manuals

Further information about option cards and application programs can be found in PDF-format on the CD-ROM delivered with the instrument. The relevant operating manuals can be ordered in paper.

Product		Application-Description
PR5510/00		X4-X5-X6-PRO
PR5510/20		X4-X5-X6-BATCH
PR5510/30		X4-X5-X6-IBC
PR5510/40		X4-X5-X6-FLOW
PR5510/50		X4-X5-X6-FILL
PR5510/80		X4-X5-X6-LOG

11.3 SPM layout

Direct access to the SPM (SCRATCH PAD MEMORY is a term used in the PLC world) is possible via DDE, OPC, EWCOM, DUST or ModBus.
Areas MB 0 ... MB 127, MB 704 ... MB 1023 are allocated to firmware functions and are mostly only readable for the user. Exception: Set zero, set/reset tare.

Free SPM areas for special programming to IEC 61131 will probably (present application programs like BATCH, FILL, IBC, PRO, LOG, FLOW taken into account) be available only from MX 4096, MB 512, MW 256, MD 128, ML 64. Please, check the application program accordingly in PR1750.

Weights from the firmware are raw values as (DINT), not scaled , i.e. without dimension and decimal point. Only the firmware/basic functions (which are always provided) are listed below. Additional application functions are given in the relevant application manual, in particular, weights as REAL in 'kg' or 'lb', dependent on scale configuration and with additional status information.

Address	**MSBit in MX**	**Format**	**Name**	Description
----------	-------	----------	----------	*Firmware range:*
MX 139	139	BOOL	*WPA_SET_ZERO*	WP-A set zero
MX 140	140	BOOL	*WPA_SET_TARE*	WP-A set tare
MX 141	141	BOOL	*WPA_RES_TARE*	WP-A reset tare
MX 568	568	BOOL	*WPA_STAND*	WP-A is in standstill
MX 569	569	BOOL	*WPA_ZERO*	WP-A within ¼ d
MX 570	570	BOOL	*WPA_INZSR*	WP-A is in zero set range
MX 574	574	BOOL	*WPA_TARE*	WP-A is tared
MX 575	575	BOOL	*WPA-SIGN*	WP-A is negative
MD 16	512	DINT	*WPA_READ*	WP-A weight value (raw without sign)
---------	-------	----------	----------	See below for usual application " standard":
MD 32	1024	Array BOOL		Slot 1 digital outputs
MD 33	1056	Array BOOL		Slot 2 digital outputs
MD 35	1120	Array BOOL		Slot 1 digital inputs
MD 36	1152	Array BOOL		Slot 2 digital inputs
MW 80	1280	UINT	*anain1*	Analog input 1 of 1st analog input card
MW 81	1296	UINT	*anain2*	Analog input 2
MW 82	1312	UINT	*anain3*	Analog input 3
MW 83	1328	UINT	*anain4*	Analog input 4
MW 85	1344	UINT	*anaout*	Analog output of 1st analog output card
MD 42	1344	UDINT	*bcdout*	BCD output

12 Glossary

The following terms are used in this document:

ADC	Analog digital converter, internal ADC (LC signal converter)
CAL	Single in line switch for data protection
KALTstart	(COLD) All programs and tables loaded in the RAM are erased
Warmstart	Initialization, all data remain unchanged
DDE	Microsoft communication protocol (Dynamic Data Exchange)
OPC	Microsoft communication protocol (Dynamic Data Exchange)
PR1791	Additional Sartorius product: DDE server *(☞ see data sheets available from Sartorius)*
PR1792	Additional Sartorius product: OPC server *(☞ se data sheets available from Sartorius)*
HyperTerminal	Microsoft terminal emulation (VT100) (accessory range)
EW protocol	Serial communication protocol for Sartorius batching systems, version V1/ V2/ V3
Flash	Program loading (also parts)
P8001	Additional Sartorius product: *Powertool (☞ see data sheets available from Sartorius)*
FlashIt	Additional Sartorius product as part of P8001: operating program loading tool
DisplayIt	Additional Sartorius product as part of P8001: front-panel display
RecoverIt	Additional Sartorius product as part of P8001: tool for data saving
LayoutIt	Additional Sartorius product as part of P8001: report format tool +NiceLabelExpress (SAG)
TranslateIt	Additional Sartorius product as part of P8001: prompt text translation tool
AccessIt	Additional Sartorius product as part of P8001: tool for database loading/reading in *.mdb-file
PR5610/05	Additional Sartorius product:
FSD	*fullscale*
GND	Zero potential, ground or earth connection
InBatch	Wonderware Batch Control System
Interbus-S	Standard communication protocol
ISA S88.01	ISA standard for Batch Control (phase control, single comp. batching)
IEC 61131	Standard PLC programming language for resources PLC, OPR, REC
PR1750	Additional Sartorius product: programming tool for internal PLC of PR5510 acc. to IEC 61131
Profibus DP	Standard communication protocol
Recipe	Recipe (*see* ISA S88)
PR1740	Additional Sartorius product: recipe and report manager *(☞ see data sheets available from Sartorius)*
SPM	Scratch Pad Memory area of the internal PLC
EAROM	Non-volatile special memory for calibration, configuration and license data
RAM	Volatile working memory (with back-up battery)

Data Terminal Equipment: PC oder ein anderes Endgerät (PR5510)	DTE
Data Communication Equipment: Modem oder Multiplexer	DCE
„software"-Handshake durch Senden zusätzlicher ASCII-CHAR: XOFF #19, XON #17 Notwendig, wenn der Empfänger die eintreffenden Daten nicht mehr schnellgenug verarbeiten kann und somit Empfangs-Bufferüberlauf entstehen könnte (besonders z.B. Drucker)	XON/XOFF
"hardware"-Handshake durch zusätzliche (Steuer)Leitungen (neben TX, Rx, GND) Eingesetzt wie Xon/off, aber hier wird auch noch Leitungsbruch erkannt. RTS ready to send DTE möchte Daten senden CTS clear to send DCE bin bereit Daten zu empfangen Kreuzweise verbinden	RTS/CTS
DCE Modem hat Verbindung, Trägerfrequenz erkannt	DCD
	DTR/DSR
Ring indikator DCE Modem: im AutoAnswerMode wurde gerade angerufen	RI
AMERICAN STANDARD CODE FOR INFORMATION INTERCHANGE - ein genormtes Text-Format, zum Austausch zwischen verschiedenen Betriebssystemen. In den 128 definierten Zeichen des ASCII-Formates fehlen jegliche Sonderzeichen, aber auch die deutschen Umlaute. Die Weiterentwicklung ist das **ANSI**-Textformat.	ASCII
Amerikanisches Normierungsgremium (AMERICAN NATIONAL STANDARDS INSTITUTE). Der ANSI-Zeichenatz ist eine Erweiterung des **ASCII**-Standards Codes 176 bis 223 sind die früher oft verwendeten "DOS-Grafikzeichen". VT100-Modus (der z.T. "ANSI"-Modus genannt wird). Wandelt automatisch Char CR in zwei CR, LF	ANSI
Weitverbreiteter Terminal „standard" der Fa. DEC für die Cursor-Steuerung (ESCape sequenzen) der Bildschirm-Darstellung Beim VT100-Terminal werden Steuersequenzen durch den sogenannten Control Sequence Introducer (CSI) eingeleitet. Besteht aus den Zeichen ESC [(Escape + eckige Klammer auf). Die VT52-Sequenzen beginnen mit ESCAPE (chr(27)), direkt gefolgt einem Kennbuchstaben für die Funktion, anschließend ein oder zwei Parameter jeweils als einzelne Buchstaben (keine mehrziffrigen Dezimalzahlen !). VT52 kann als Alternative zur VT100 verwendet werden. Das Original-VT100-Terminal von DEC unterstützt ebenfalls VT52, und viele Anwendungen die angeblich "VT100"-Sequenzen verwenden arbeiten in Wirklichkeit im VT52-kompatiblen Modus.	VT52/VT100
„Roh"-Daten direkt wie programmiert als reine ASCII-Zeichen, keine weitere Modifikationen zum Ausdruck d.h. 100% Steuerung aus dem Programm	RAW
spiegelt z.B. den Tastendruck direkt auf den Bildschirm zurück (zeigt die gedrückte Tatse an)	ECHO

Symbol	
	Caution: Danger to life and health
	Caution: Hazard of damage, wrong settings can result to problems
☞	Action: Please, read, when necessary
🖐	Note:
☛	Action: to be done
☑	Action: please, check, if OK
👍	Already provided: no further action

13 Index

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