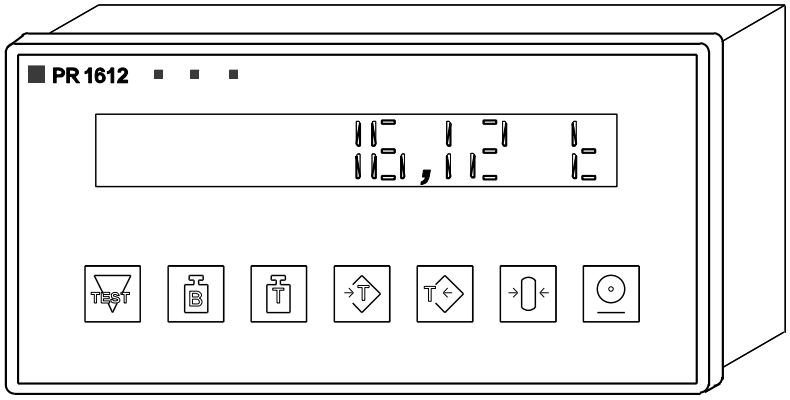
Weight indicator PR 1612/02

Operating manual



Philips
Weighing

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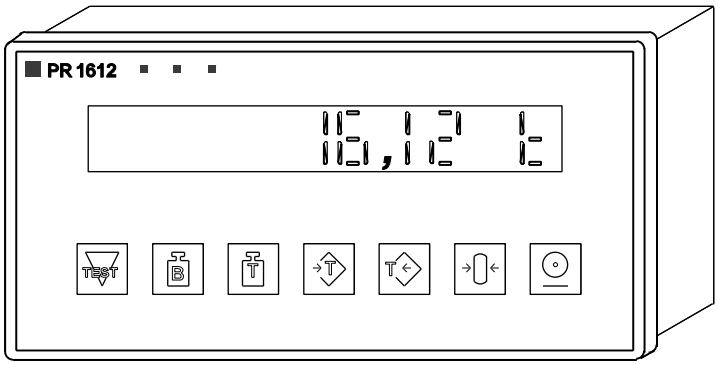
Weight indicator 1612/02

Operating manual



First edition
9499 050 37910
970106

PHILIPS

Please note
In correspondence concerning this instrument, please quote the type number and serial number as given on the type plate.

If available, also note the software release number, printed on the label at the EPOM's on the main print.

Bitte beachten
Bei Schriftwechsel über dieses Gerät wird gebeten, die Typennummer und die Gerätenummer anzugeben. Diese befinden sich auf dem Typenschild an der Rückseite des Gerätes.

Falls vorhanden, geben Sie auch die Software-Version an, die Sie auf dem Etikett der EPROMs auf der Leiterplatte im Gerät finden.

Noter s.v.p.
Dans votre correspondance et dans vos réclamations se rapportant à cet appareil, veuillez toujours indiquer le numéro de type et le numéro de série qui sont marqués sur la plaquette de caractéristiques.

Si disponible, veuille également indiquer le software rel. no que vous trouvez sur l'ètiquette des EPROMs qui se trouvent sur la platine principale.

Important
As the instrument is an electrical apparatus, it may be operated only by trained personnel. Maintenance and repairs may also be carried out only by qualified personnel.

Wichtig
Da das Gerät ein elektrisches Betriebsmittel ist, darf die Bedienung nur durch eingewiesenes Personal erfolgen. Wartung und Reparatur dürfen nur von geschultem, fach- und sachkundigem Personal durchgeführt werden.

Important
Comme l'instrument est un équipement électrique, le service doit être assuré par du personnel qualifié. De même, l'entretien et les réparations sont à confier aux personnes suffisamment qualifiées.

Printed in Germany

1st. edition 1. Ausgabe 1er tirage

CONTENTS

CONTENTS OF PART 1

1. P R E F A C E , D E S C R I P T I O N

Ladies and gentleman,

PHILIPS WEIGHING thanks you for the confidence shown by the acquisition of this instrument. As each of our instruments is submitted to severe quality checks before leaving the factory, you may be sure that you have bought a high-quality state-of-the-art product.
Moreover, this product is the result of extensive market research and meets the requirements of more than 40 countries in which Philips Weighing is present.

Our **quality system** fulfils the requirements of DIN ISO 9001 for quality assurance in design/development, production, installation and servicing.

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DIN ISO 9001
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production, installation and servicing

Philips Wägetechnik GmbH
Meiendorfer Strasse 205
D - 22145 Hamburg

For the PR 1612/02, certificate of type approval no. D93-09- 120 by Physikalische-Technische Bundesanstalt (PTB) in Braunschweig is available, i. e. the indicator meets the prerequisites for approval by the local authorities in all countries of the European community.

In order to facilitate weights & measures approval by the local authorities, labels and seals, which can be fitted on the indicators shown in the example in part 7.12 are enclosed in a plastic bag in the cover of this manual.

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.

If necessary, this pen is available under service code no. 5312 310 18045 from your local Philips Weighing sales or service organization.

1.1 INFORMATION ON THIS MANUAL

This operating manual for the indicator PR 1612/02 contains information for persons with and without previous knowledge entrusted with commissioning, use, project planning, installation and service of this instrument.

For commissioning without previous knowledge, we recommend following the instructions given in this manual step by step.

In case of problems or questions, you are invited to contact your local Philips Weighing sales and service organization, or agent respectively.

This manual is structured as follows:

1.2 SUPPLEMENTARY DOCUMENTATION

The indicator PR 1612/02 provides the functions mentioned in section 1.3.2.

Upon delivery the PR 1612/02 communicates with superordinate or subordinate instruments or systems by means of the Philips EW protocol.
For instruments or systems which do not 'understand' this EW protocol, the software option PR 1613/05 is available.

The special functions of this option require separate descriptions and are not described in this Operating Manual.

The operating instructions are delivered with the corresponding SW option.
This manual is also available from the local Philips Weighing organization or agents as follows:

- **Operating manual PR 1612/02** (This operating manual)	English German French	= = =	9499 050 37910 9499 050 37918 9499 050 37932
- **Application Information No. 6** (Communication possibilities with superordinate or subordinate equipment when using Philips Weighing Processors)	English	=	9499 059 36710
- **Application Information No. 13** (Philips Indicators/Batchers in connection with PLC's)	English	=	9499 059 37610

1.3 INSTRUMENT DESCRIPTION

1.3.1 General

The PR 1612/02 is a microcomputer-controlled weight indicator, which is designed especially for industrial Weights & Measures applications.
The instrument is particularly suitable for:
- platforms,
- weighbridges,
- tanks and vessels, and
- as weight indicator in intelligent control systems.

The PR 1612/02 can also be used as multi-range weight indicator by setting parameters C52 and C59 accordingly.

1.3.2 Special features and functions

- EC type approval,
- EC certificate of conformity acc. to directives 90/384/EEC and EN 45501,
- EC certificate of conformity acc. to directive 89/336/EEC (EMC),
- Various interface modules for serial and parallel connections
- Multi-range weighing applications can be realized easily
- Built-in self-test and analogue test functions,
- 2 adjustable limit values,
- Loadcell supply voltage 12 V or 20 V,
- Built-in software clock for printing time and date on reports,
- High long-term stability and reliability,
- Input signal filter can be switched on and off via software,
- Bright vacuum fluorescent displays,
- Sequences for easy calibration and configuration,
- Calibration without calibration weights possible,
- Subsequent deadload suppression without re- calibration,
- Calibration data can be stored in non-volatile EEPROMs, and protected against overwriting by switch,
- Configuration data are protected against power failure by back-up battery and can be protected against overwriting by code number.
- High RF interference suppression,
- Protection type IP 65,
- Various communication programs for connection to a PLC and to a superordinate or subordinate system,

The PR 1612/02 system weight indicator is mounted in a compact aluminium housing, which is suitable for panel mounting, but also for use of the instrument as table top version.
Operation is via 7 front-panel keys to which other functions are allocated during instrument adjustment.
Moreover, the instrument is suitable for complete remote control via a separate terminal or a supervisory system.

1.4 OPTIONS

1.4.1 SW-options

Upon delivery the PR 1612/02 communicates with superordinate or subordinate instruments or systems by means of the Philips EW protocol.
For instruments or systems which do not 'understand' this EW protocol, the software option PR 1613/05 is available.
It enables also the communication via SIEMENS DUST 3964R, 3964R-RK512, 3964R forTeleperm M, and J-BUS, or MOD-BUS
The options can be activated by means of a licence number which will be supplied together with the SW-option when buying.

1.4.2 HW-options

For easy matching of the PR 1612/02 indicator to various requirements, several interface modules are available as options can be plugged in.

- PR 1601 20 mA TX/RX current loop,
- PR 1602 RS 232 (V24),
- PR 1604 RS 422/485,
- PR 1606 0/2..10 V or 0/4..20 mA analogue output module,
- PR 1608/00 BCD/PLC output module with common supply,
- PR 1608/10 BCD/PLC output module with common ground,

Note !
None of the above listed modules are factory- fitted on the PR 1612/02 indicators.

CONTENTS OF PART 2

2. SAFETY INSTRUCTIONS

This apparatus has been designed and tested in accordance with Safety Class I requirements of IEC Publication 348, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. This manual contains some information and warnings which must be followed by the user to ensure safe operation and to retain the apparatus in a safe condition.

2.1 INITIAL INSPECTION

Check the contents of the consignment for completeness and note whether any damage has occurred during transport. If the contents are incomplete, or if there is a damage, a claim should be filed with the carrier immediately.
Also the local Organization of Philips Weighing has to be informed in order to facilitate the repair or replacement of the instrument.

2.2 BEFORE COMMISSIONING

2.2.1 General

Before putting the instrument into operation after storage or transport, visually check it for physical damage.

2.2.2 Mounting

The instrument is suitable for panel mounting. Heat influence, such as direct solar radiation etc., should be avoided. Please observe the required environmental conditions as given in the technical data.

2.2.3 Dismantling the instrument

When removing the housing, covers or other protecting parts, live parts or terminals will be exposed.

! CAUTION - DANGER TO LIFE !

Therefore setting the switched-on instrument must be performed only by trained personnel aware of the risks.

2.2.4 Type of protection

The instrument is protected according to class I (protective earth) of the IEC 348 or the German VDE 0411 regulations.
The connection cable must contain a protective earth conductor which must not be interrupted inside or outside the instrument (e.g. by using an extension cable without protective earth conductor).

2.2.5 Connection of supply voltages

The PR 1612/02 can be connected to nominal 110, 128, 220 or 238 V AC.
Upon delivery it is set to 220 V AC . Check whether it is adapted to the local nominal mains voltage.

For connecting the supply voltage cable (including protective earth or earth conductor) to the instrument, strictly observe the relevant Operating Manual. As the instrument has no switch, it will be in operation as soon as the supply voltage is applied.

2.2.6 Earthing

The instrument must be connected to earth by means of a special protective earth conductor (of the mains cord). The separate conductor must be connected to one of the clamps at the rear of the instrument.

2.3 REPAIR AND MAINTENANCE

2.3.1 Failure and excessive stress

If the instrument is suspected of being unsafe, take it out of operation and make sure it cannot be operated inadvertently. This is the case when the instrument
- shows physical damage
- does not function any more
- is stressed beyond the tolerable limits (e.g. during storage and transportation).

2.3.2 Repairs

Caution !
The instruments sold by Philips Weighing are subject to a repair procedure.
In case of defect or malfunction, please contact your local Philips Weighing organization for the required measures.

Important !
Maintenance or repairs must be performed only by trained personnel aware of the risks (see chapter 2.2.). Make sure that the construction of the instrument is not altered to the detriment of safety. Above all, leakage paths, air gaps, and insulation layers must not be reduced.

2.3.3 Replacing fuses

Replacing fuses is described in part 4.8.
Make sure that only fuses of the required current rating, and of the specified type to IEC 127 are used for renewal. The use of repaired fuses, and/or short-circuiting of fuse holders is prohibited. Fuses shall only be renewed by a qualified person who is aware of the hazard involved.

Warning:
The instrument must be disconnected from all voltage sources when a fuse is to be renewed, or when the instrument is to be adapted to a different mains voltage.

2.3.4 For special attention

When soldering on the circuit boards it is essential
a. to switch off the power, and
b. to use a low-voltage soldering iron, galvanically separated from the mains side.

Suitable soldering irons should have temperature control and different types of nozzles (pin point tips), e.g. Weller Magnastat WTCP or WECP, Ersa TC 70/24 V.

If a higher wattage-rating soldering iron is used, excessive heat can cause the printed circuit tracks to separate from the board base material, thus irreparably damaging the printed circuit board.

In general, use short time heating with high tip temperature at a small point, avoid long time heating.

2.3.5 Electrostatically sensitive components

The instrument contains electrical components which are susceptible to damage from electrostatic discharge. Servicing statically sensitive assemblies or components should be performed only at an antistatic work station by qualified service personnel.

2.3.6 Battery replacement

This instrument is equipped with lithium back-up batteries. When the battery voltage is below the specified value, or the batteries are defective, they must be replaced by a trained person, or by the Customer Support of the local Organization of Philips Weighing. For disposal, the local regulations must be followed.

CONTENTS OF PART 3

3. T E C H N I C A L D A T A

3.1 CHARACTERISTICS, SPECIFICATIONS

Values given with limits are guaranteed by the manufacturer, values without limits are average values and are used for information only. These characteristics are valid after a warm - up period of the instrument of at least 60 min (reference temperature = 23 C) . If nothing else is said, the relative and absolute tolerances refer to the adjusted measuring output value.

3.2 GENERAL DATA

Type	PR 1612/02
Order number	9405 116 12001
Measuring principle	integrating ADC, operating radiometrically to the loadcell supply voltage.
Housing	made of aluminium, designed for panel mounting, or table top use
MTBF	35000 h

3.3 ACCURACY AND STABILITY

Resolution	3000 d OIML class lll
Linearity	< 0.007 %, related to straight line through zero and final value
Zero-point stability	< 0.1µV/K, RTI < 8,5 ppm at 1 mV/V and 12V loadcell supply
SPAN stability	< 6 ppm/K
Noise	< 0.4 µV p-p, RTI

3.4 VOLTAGE SUPPLY

Nominal values	adjustable for 110, 128, 220, or 238 V AC
Permissible deviation	+ 10 % / - 15 %
Frequency range	50/60 Hz
Power consumption	25 VA, 19 W at 220 V and at max. load (all options inserted)
Fuses	200mA time delayed with 110/128 V AC, and 100mA time delayed with 220/238 V AC, inserted in the EURO type mains socket at instruments rear.

Mains voltage filter	fitted with built-in EMI type filter.
Safety class	I (protective earth) acc. to VDE 0411 and IEC 348.
Connections	by means of 3-pole EURO connector acc. to CEE-standards, with integrated mains fuse, positioned at the rear of the instrument.

3.5 ANALOGUE PART

A/D conversion	integrating, ratiometrically to the loadcell voltage supply.
Conversion time	50 ms

3.5.1 Loadcell connection

Method	via 6-pole screw terminals of max. 4mm² at the rear. Connection preferably by 6-wire technique.
Types of loadcell	all types of strain gauge loadcells with linear output.
Loadcell voltage supply	± 6 V (12 V DC), 150 mA, or ± 10V (20 V DC), 230 mA, with reference to ground, short circuit proof. External load cell supply possible.
Tolerance	6%
Maximum load	approx. 85 Ω = 6 loadcells 600 Ω each, connected in parallel (= 100 Ω), or 4 loadcells 350 Ω each, connected in parallel (= 87.5 Ω).

3.5.2 Supply voltage sensing

Method	by 6-wire technique, i.e. by measuring the loadcell supply voltage at the connecting point of the loadcell junction box. Differential input.
Sense voltage	± 6 V DC (12 V DC diff.), or ± 10V DC (20 V DC diff.)
Sense input impedance	10 MΩ

3.5.3 Measuring signal input

Range of input voltage (deadload + meas. signal)	0...36 mV = 3mV/V at 12V loadcell supply.
Range for meas. signal	2.4mV .. 36mV, or 0.12mV/V (20V) .. 3mV/V (12V) respectively

Measuring voltage input impedance	> 10MΩ
Maximum permissible voltage of the measuring input	15 V
Filtering of the measuring voltage	by an active Butterworth filter, cut-off frequency fc = 2 Hz, the filter can be switched off.
Common mode rejection ratio (CMRR)	>110 dB
Dead load range	0 mV .. 33.6 mV
Span and dead load adjustment	by firmware during CALIBRATION.

3.6 DIGITAL PART

Measuring time	0.1s to approx. 2s, adjustable at intervals of 0.1s.
Step widths	adjustable for 1, 2, 5, 10, 20 or 50.
Maximum scale value	99990, observe max. resolution (part 6.5.2).
Data protection	typical 16000 hours, by lithium batteries.

3.7 DISPLAY

Type	vacuum-fluorescent display module.
Elements	7 digit, 7 segment plus dimension signs and status indicators.
Height	digits and dimension signs 12.5 mm.
Colour	bright green.
Active digits	5 plus negative sign (-99990 at max.).
Active status indicators	Gross (B), Net (NET), Tare and tare active (T), standstill (⏥), within ±1/4 d (■), minus (-).
Dimension sign	settable for g, kg, t, or lb.
Decimal point	settable either as point or as comma during CALIBRATION for: 00000 00000 0000.0 0000,0 000.00 000,00 00.000 00.000

3.8 SERIAL INPUTS / OUTPUTS (available as options)

Number of serial lines	One. The corresponding interface module must be inserted - **either** into the 14-pole. socket of line 1(A), - **or** into the 14-pole socket of line 2(B). and by observing the following technical instructions.

3.8.1 Type of interface module(s)

3.8.1.1 Module PR 1601

Order number	9405 316 01001
Application	20 mA bidirectional, serial, opto-coupler isolated current loop interface for balanced transmission line. Galvanically separated from external devices. Optionally the interface can be equipped with a relay which prevents an interruption of the TX-current loop via more than one unit in case of a defect.
Supply of the loops measured	by non-regulated, internal 9..10 V DC from PR 1612/02 at 66 Ω in active mode; by external 12 .. 31 V DC in active mode.
Voltage drop via TX/RX	4V at minimum with 200 Ω burden and per loop.
Signal level	logic high (mark) = 18 .. 22 mA, logic low (space) = 0 .. 1 mA.
Baud rate	settable to 300, 600,1200, 2400, or 4800 baud.
Cable length	1000 meters at maximum, using a pairwisely twisted and screened cable.
Connecting external devices	via 9-pole female plug of e.g. type Philips F 161, or Cannon DB 9.

3.8.1.2 Module PR 1602

Order number	9405 316 02001
Application	bidirectional, serial RS232-communication interface module for unbalanced transmission line via signals TX and RX. With control signals CTS and RTS. No galvanic isolation from external devices !.
Supply	By internal PR 1612/02 voltage.
Level of output signals TX and RTS	± 5 V DC min. at $R_{loadTX} \geq$ 3kOhm

Level of input signals RX and CTS	≤ ± 30V DC
Baud rate	settable to 300, 600,1200, 2400, 4800, or 9600 b/s.
Cable length	30 meters at maximum, using a pairwisely twisted and screened cable.
Connecting external devices	via 9-pole female plug of e.g. type Philips F 161, or Cannon DB 9.

3.8.1.3 Module PR 1604

Order number	9405 316 04001
Application	bidirectional, serial, opto-coupler isolated interface module for balanced transmission line. Galvanically isolated from external devices via optocoupler.
Mode	either 4-wire connection in full duplex (RS 422/485), or 2-wire connection in half duplex (RS 485). Selectable by solder links on the module.
Supply measured	by non-regulated, internal 9..10 V DC from PR 1612/02 at 66 Ω.
Signal level	according to RS422/485 standard. Tri-state possible only with RS 485.
Baud rate	settable to 9600 b/s at maximum.
Cable length	1000 meters at maximum (recommended), using a pairwisely twisted and screened cable.
Connecting external devices	via 9-pole female plug of e.g. type Philips F 161, or Cannon DB 9.

3.9 CONTROL OUTPUTS

Number	Two
Features	opto-isolated. No common reference potential. Protected against wrong polarity.
Signal level/current	up to max. 32 V, 75 mA.
Voltage drop	I_{load} x 55 Ohm + 1V, spark suppression must be provided for inductive loads as close as possible to the load.

3.10 ANALOGUE OUTPUT MODULE PR1606 (available as option)

Order number	9405 316 06001	
Application	Interface module for analogue output signals of gross, or net, or tare weight values, or values as shown at the front display. Selection is possible via parameter C12 of the PR 1612/02 during configuration.	
Voltage output	0 .. +10 V, or 2 .. +10 V RL > 5 kOhm	} no galvanic isolation between internal and external electronics!
Current output	0 .. +20 mA, or 4 .. +20 mA Burden 0.. 500 Ohm	}
Resolution	4096 bit (provided f.s.d. ≥ 4096 divisions).	
Accuracy	approx. 1‰ (2‰ for current output)	
Connection	via 15 pol. female plug of e.g. Philips F161, or Cannon DB15.	
Default values:		
Output	gross weight	
Zero	= 0V and 0mA, or 2V and 4mA	
f.s.d. at 5000d	= 10V and 20mA	

3.11 BCD AND PLC OUTPUT MODULE PR 1608/00 with common supply (available as option)

Order number	9405 316 08001
Application	interface module for BCD or PLC output signals. Logic level selectable. No galvanic isolation between internal and external electronics!
Connection to external devices	via 26 pol. female plug of type DB-SUB
Accessories	1 x 26 pole connection cable of 3 m length equipped at one side with a 26 pole male plug of type AMP.

3.13.1 BCD mode:

Outputs:	23 (switching transistor to positive external supply).
Output signals	5 decades of gross, or net, or tare values, or automatically following the front display (gross, net, or tare), minus sign, standstill, and error (in/out of range).

Sampling rate at continuous data output	according to measuring time
Supply of outputs	by external +5V ... +24 V DC nominal, (+32 V at maximum).
Voltage drop via transistor	external voltage minus 1.5 V at 25 mA, if transistor is in 'on'-state (conducting).
I_{max}	25 mA For the control of LS-TTL inputs of follow-up instruments each output has to be equipped with a 1 kΩ pull-down resistor, and be supplied by external + 5 V. For 24 V logic inputs each output has to be equipped with a 2.2 kΩ pull-down resistor, and to be supplied by external + 24 V (nominal).
Logic level of output signal	logic selectable by solder link H on the module. H = open = logic '1' = switching transistor 'on' (conducting) H = closed = logic '1' = switching transistor 'off' (non conduct.)
Inputs:	One
Input signal	enable/hold for data outputs.
Level	selectable by solder links A and B onto the module

A	B	C	mode	data hold or $\overline{\text{enable}}$
c	o	c	5V/TTL	> 2.4 V
o	c	c	5V/TTL	< 0.4 V
c	o	o	24 V	> 10.0 V
o	c	o	24 V	< 6.0 V

I_{input}	0.76 mA for 24 V mode (C = open), 0.17 mA for 5 V mode (C = closed)

3.12 BCD AND PLC OUTPUT MODULE PR 1608/10 with common ground (available as option)

Order number	9405 316 08101
Application	interface module for BCD or PLC output signals with common ground. Logic level selectable. No galvanic isolation between internal and external electronics!
Connection to external devices	via 26 pol. female plug of type DB-SUB

Accessories — 1 x 26 pole connection cable of 3 m length equipped at one side with a 26 pole male plug of type AMP.

3.12.1 BCD mode

Outputs: — 23 (switching transistor to GND)

Output signals — 5 decades of gross, or net, or tare values, or automatically following the front display (gross, net, or tare), minus sign, standstill, and error (in/out of range).

Sampling rate at continuous data output — according to measuring time

Supply of external loads — by external voltage of nominal +5V ... +24 V DC, (+32 V at maximum).

Voltage drop via transistor

I (mA)	< 10	15	25	50
U (mV)	100	150	230	450

I_{max} — 50 mA.
For the control of LS-TTL inputs of follow-up instruments each output has to be equipped with a 1 kΩ pull-up resistor. With 24 V inputs each output has to be equipped with a 2.2 kΩ pull-up resistor.

Logic level of output signal — logic selectable by solder link H onto the module.
H = open = logic '1' = switching transistor 'on' (conducting)
H = closed = logic '1' = switching transistor 'off' (non conduct.)

Inputs: — 1 (with internal pull up resistor to + 5 V)

Input signal — enable/hold for data outputs.

I_{input} — < 0.7 mA max. (sink) at a voltage of < 0.4 V (or when connected to ground).

Level — selectable by solder links A and B on the module

A	B	mode	data hold or $\overline{\text{enable}}$
c	o	5V/TTL	> 2.4 V
o	c	5V/TTL	< 0.4 V
c	o	24 V	> 10.0 V
o	c	24 V	< 6.0 V

3.13 ENVIRONMENTAL CONDITIONS

The given data are valid only when the instrument has been checked according to the official test methods. Details concerning these tests and the error limits can be requested from the local Organization of Philips Weighing.

Ambient temperature:

Reference value	+ 23° C
Turn-on temperature range	0° C ... + 55° C

Nominal temperature range:

For W& M applications	- 10°C . . . + 40° C
For industrial applications	- 10° C ... + 55° C
Limit range for storage and transport	- 40° C ... + 70° C

Relative humidity:

Reference range	45 ... 75 % }	
Nominal operational range	20 ... 80 % }	
Operational limits	10 ... 90 % }	no condensation
Limits for storage and transport	5 ... 95 % }	

Type of protection: housing IP 30, front plate IP 65.

Mounting: designed for panel mounting or for table top use.

Warm-up time: approx. 60 min.

Interference voltage: acc. to DEUTSCHE-POST-VERORDNUNG VfG 243/91 and EN 55011, limit value B

3.14 ELECTROMAGNETIC COMPATIBILITY

Static discharges: acc. IEC 801-2, level 3 (8 kV with 5mJ)

Burst on line: acc. IEC 801-4, level 3 (2 kV), risetime 5ns, duration 50ns.

Burst on data line: acc. IEC 801-4, level 3 (1 kV), risetime 5ns duration 50ns.

Resistance to irradiation:

electrical fields: 10 kHz .. 500 MHz at 10V/m } influence less
500MHz .. 1 GHz at 2V/m } than 0.01%

magnetic fields: 60 A/m at 50 Hz

mains voltage sags: 100 % with > 10 ms }
50 % with > 20 ms } no failure
20 % with > 50 ms }

Rapid low-energy transients on line: 2 kV, risetime 5 ns, duration 100 ns

Slow high-energy transients on line:	2 kV; risetime 100 ns, duration 10 µs

3.15 DIMENSIONS AND WEIGHTS

Dimensions	96x192x229mm (HxWxD)
Weight	Net approx. 2.8 kg, Shipping approx. 5.2 kg

3.16 APPROVALS

The following EC certificates of conformity are available and can be requested at:
PHILIPS Wägetechnik GmbH, Meiendorfer Str. 205, D 22145 Hamburg, Department QM
Tel.: (++49) 040-67960-300, Fax.: (++49) 040-67960-608

EC type approval	No. D93-09-120 for non-automatic weighing machines, according to directives 90/384/EEC and EN 45501.
Certificate of conformity	according to a. m. EC type approval as sample for manufacturer of weighing machines in languages D, GB, and F.
EC certificate of conformity	according to directive 89/336/EEC including modifications (EMC).

3.17 ACCESSORIES

1 operating manual
1 gasket
1 label for multirange scale
1 spring washer M4
1 oval head screw M4x8
2 screws M2.5x12
1 cable clamp
1 set of W&M labels (in this manual)
1 mains connector
1 protective rubber sleeve for mains connector
1 label for 110V
1 label for 128V
1 label for 238V
2 fuses 200mA T (delayed action) for 110/128V
2 slide clamps } already at
2 milled knobs } the indicator

CONTENTS OF PART 4

4. MOUNTING AND INSTALLATION

During the installation of the instruments, some presettings can already been carried out without the mains supply switched-on.

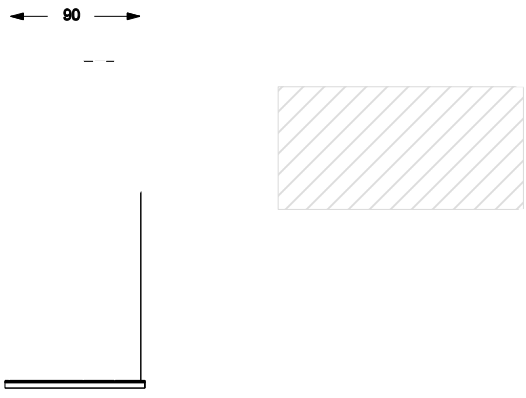
CAUTION
Before unpacking and operating the instrument,
the safety instructions in Part 2 must be observed

4.1 MOUNTING INSTRUCTIONS

The instrument is suitable for rack and panel mounting, or for table top use.

Taking the different protection classes between front (IP 65) and housing (IP 30) into account please take care for
- a proper isolation between both parts, and in conjunction with it
- a sufficient stability of the panel.

Mounting is to be done as follows:
- loosen the two clamp screws at the rear of the case until the slide clamps can be removed.
- working from the front of the panel, insert the indicator with the gasket mounted into the panel cut-out.
- insert slide clamps back onto the case, push them up tightly against the rear of the panel, and fix them by means of the two clamp screws. Do not overtighten them.
- position connectors and cables as required.

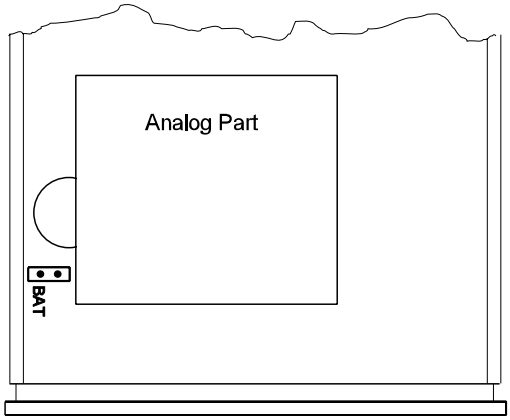


4.2 OPENING THE INSTRUMENT

- disconnect the instrument from the mains and all power sources,
- carefully remove the 6 self tapping screws at the rear panel of the instrument and keep them safely,
- pull out the inner unit from the housing carefully.

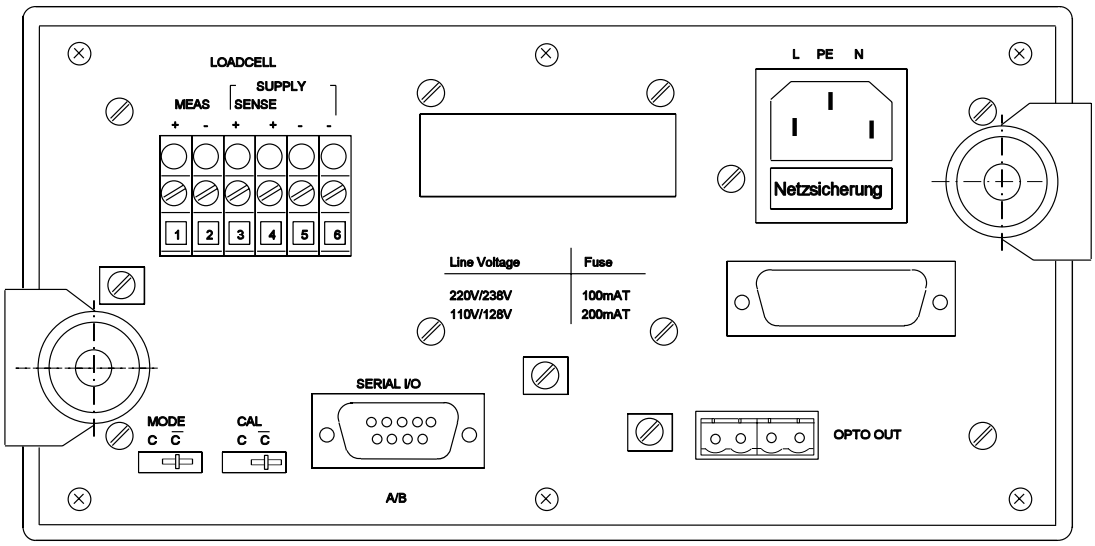
4.3 SWITCHING ON THE BACK-UP BATTERY

The PR 1612/02 is equipped with a lithium back-up battery for its RAM. It is switched off upon delivery.
In order to save the data of the RAM after having put the PR 1612/02 into operation, the battery must be switched on by closing solder link BAT on the main board before calibration.
Refer also to part 5.5.2.



4.4 CONNECTION POSSIBILITIES

All connection facilities are located at the rear of the instrument.



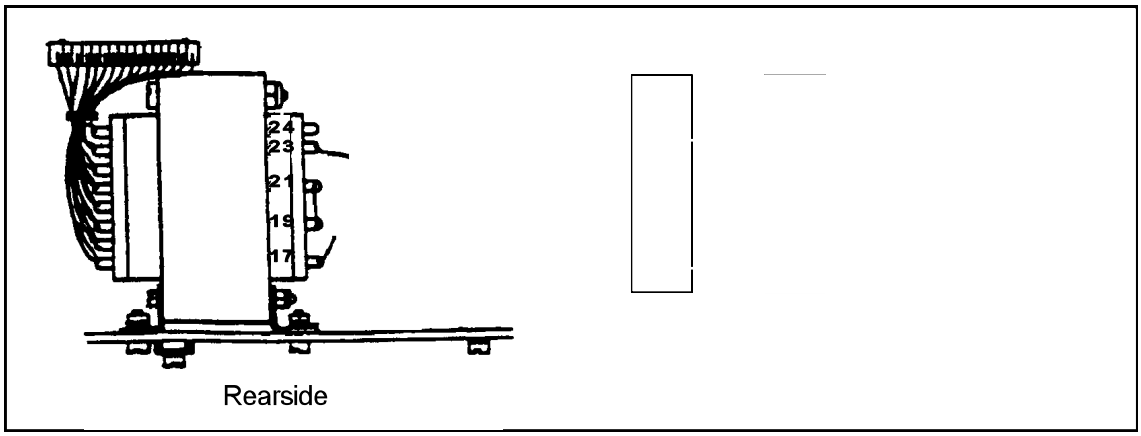
4.5 CONNECTION OF MAINS AND SUPPLY VOLTAGES

The PR 1612/02 is connected to the mains via the 3 -pole connector at the rear of the instrument.

Please note that the instrument has no mains switch, and therefore, is ready for operation as soon as the mains is connected.

The instrument operates at mains voltages of 110,128, 220 and 238 V AC and 50/60 Hz. Upon delivery it is set to 220 V AC.

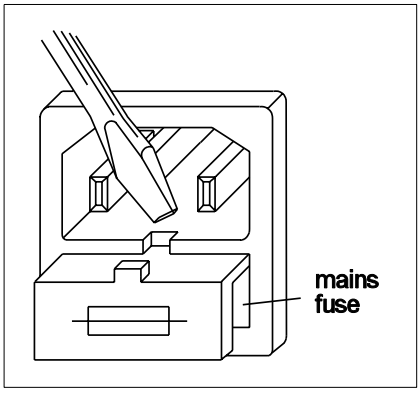
For changing of voltage, proceed as follows:
- disconnect the power,
- solder links on the transformer bobbin according to the following figure,
- replace the mains fuse inside the connector.



4.6 REPLACING FUSES

Before replacing fuses observe and follow the relevant safety instructions at para. 2.3 of this manual .

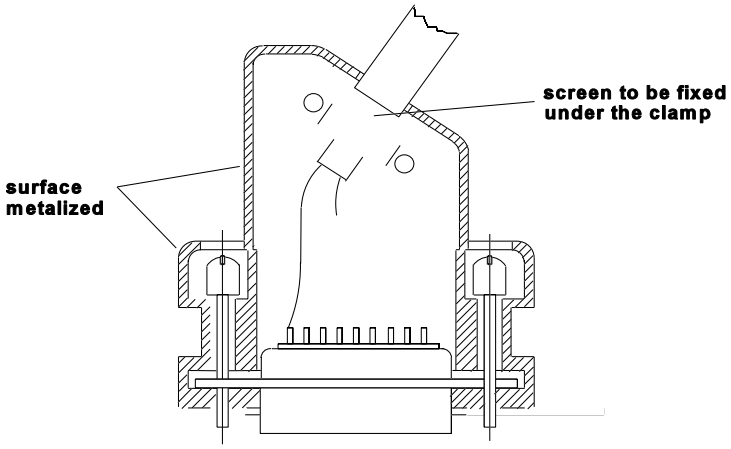
The instrument is protected by means of a mains fuse which is located in the mains socket as shown below.



nominal values	service code number
110/128 V = 200 mA T	4822 070 32001
220/238 V = 100 mA T	4822 070 31001

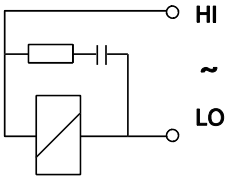
4.7 INSTALLATION INSTRUCTIONS FOR CONNECTING DATA CABLES

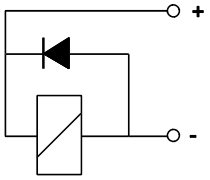
All cables transferring measuring data and control signals must be kept away from power cables and should be screened.
The screen must be connected to the housing of the connector (see fig. below), or to the clamps at the rear plate.



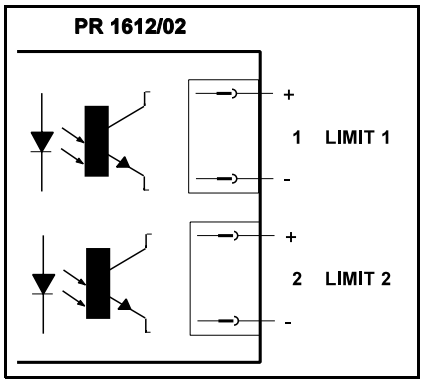
Relays and circuit breakers connected to the weighing system have to be spark suppressed as follows:

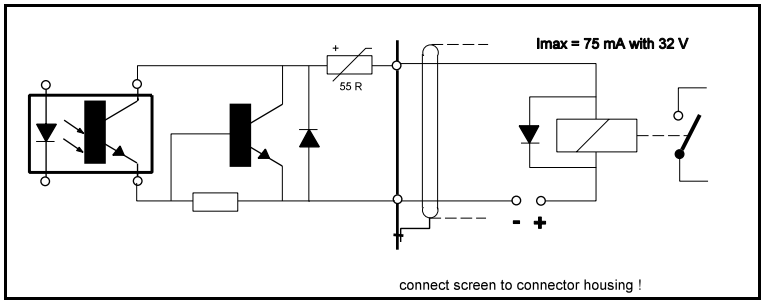
- AC relays by means of an R-C combination (R = 100...300 Ω, C~ 0.3 µF), connected in parallel and as near as possible to the relay coil;
- DC relays by a reverse biased spark suppressing diode (e.g. BYX 10) connected in reverse direction and in parallel and as near as possible to the relay coil.





4.9 CONTROL OUTPUTS





4.9 THE PARALLEL INTERFACE

The PR 1612/02 Weight Indicators has a parallel interface. It can be equipped with the interface options PR 1606, PR 1608/00 or PR 1608/10 (see also part 1.4.2) via which corresponding subordinate or supervisory systems like remote displays, printer, recorder, computer, or PLC's can be connected.

Mounting the interface options has to be performed as follows:
- open the indicator as described in part 4.3,
- plug in the required interface module into the socket of the parallel interface according to the advices in part 7, and
- during configuration set up the PR 1612/02 by means of parameter C10, C12, or C17 as described in part 6.

Connections are different from module to module and have to be made as described in part 7 of this manual.

4.10 THE SERIAL INTERFACE

The PR 1612/02 Weight Indicator has **one** serial interface, which can **only** be equipped with **one** of the following interface options **at the same time**:
- PR 1601 (20 mA current loop), **o r**
- PR 1602 (RS 232), **o r**
- PR 1604 (RS 422/485).

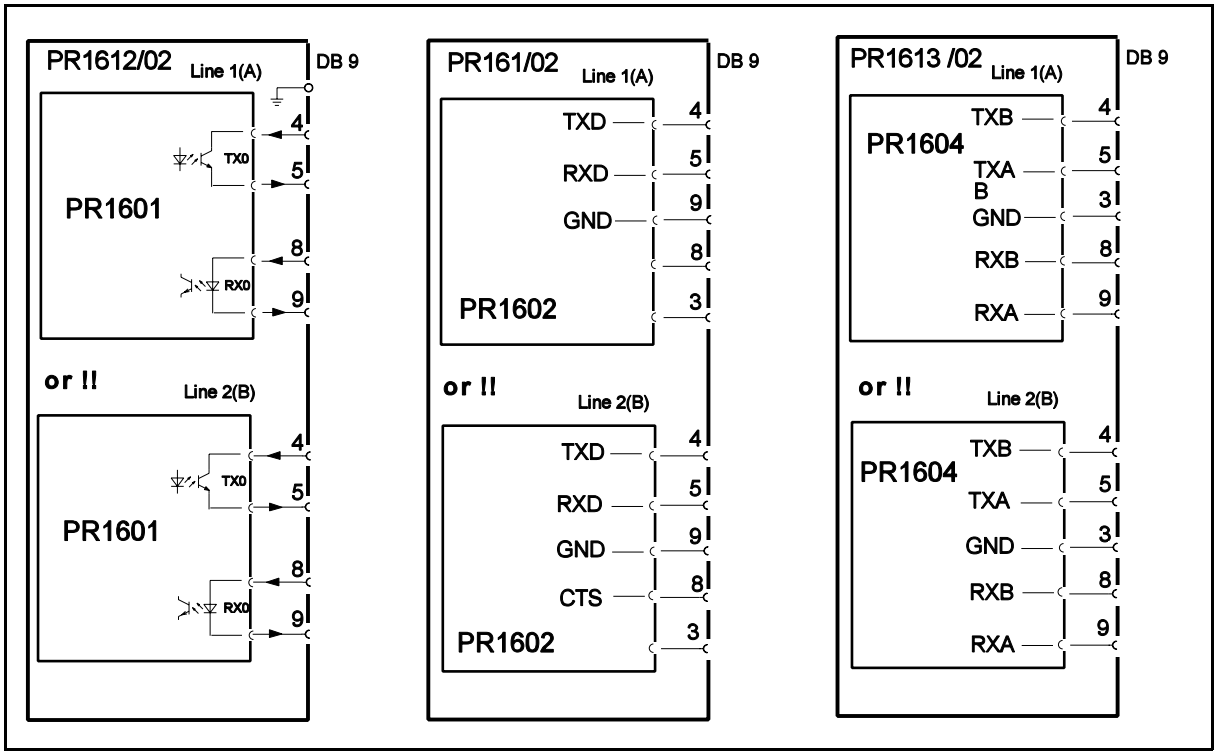
Via a.m. interfaces corresponding subordinate or supervisory systems like remote displays, printer, recorder, computer, PLC's can be connected.

Mounting the interface options has to be performed as follows:
- open the indicator as described in part 4.3,
- plug in the required interface module into the socket of line 1(A) **o r** line 2(B) according to the advices in part 7, and
- during configuration set up the PR 1612/02 by means of parameter C04 .. C06, C10, C14 .. C16, and C20 as described in part 6.

4.10.1 Connections

Connecting the serial interface and the inserted option must be performed via the 9-pol. connector (DB9) at the rear of the respective indicator.
Application examples are shown in part 7.

Note !
The interface modules can only be connected via the pins as drawn in the following sketch.



4.11 CONNECTING THE LOAD CELLS

When selecting loadcells for connecting to the PR 1612/02, mind the criteria as given under part 6.5.1 .
The loadcells must be connected by observing the following hints:

- Interconnecting loadcells and indicator of industrial weighing systems with cables of a diameter up to 3mm should be done by using the PR 6130/01 junction box.
  Type PR 6130/11 should be used in case of W&M approved systems.

- Before and during installation work make sure that no moisture enters the cables or connections, especially of the loadcells and extension (measuring) cables and the junction box (e.g. by water puddles, etc.).

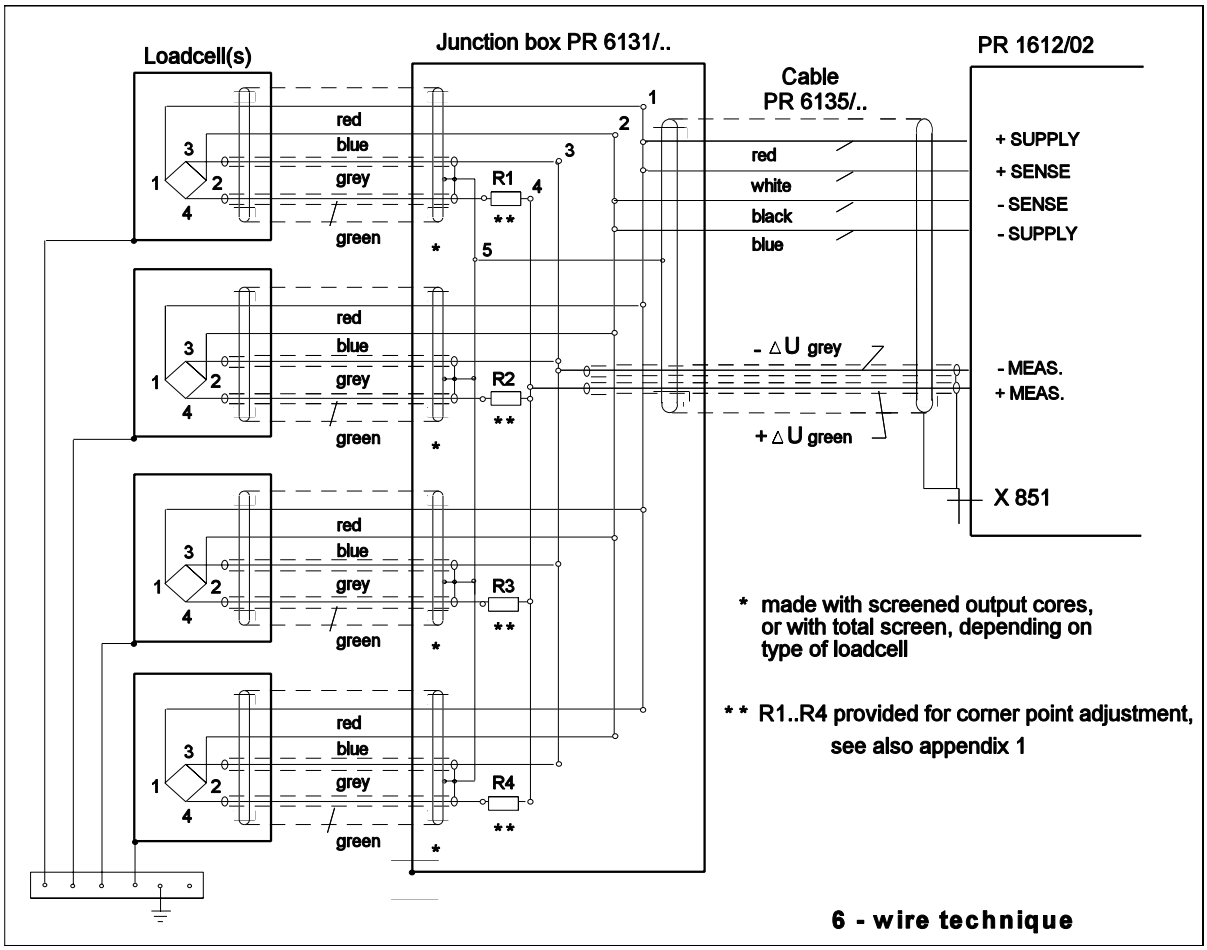
- The connection of loadcells has to be preferably performed in 6-wire technique. The cable must be connected to the instrument as shown in the diagram below.

- The screen(s) of the measuring cable has (have) to be taken to ground only at one side, at the indicator.

- For connecting cables with different colour codes consult the respective data sheet.

- The wire strands of the cable must be twisted. They should be fixed to the terminals without having been tinned or they should be provided with an appropriate crimp-type cable connection.

- The permissible length of the extension (measuring) cable between loadcell and indicator depends largely on the local conditions. According to the technical data the total length should not exceed 300m.



4.12 EARTHING AND POTENTIAL EQUALIZATION

4.12.1 Earthing

The PR 1612/02 is protected according to class I (protective earth) of the IEC 348 and/or VDE 0411 regulations. The connection cable must contain a protective earth conductor which has to be connected according to the respective local safety regulations.

4.12.2 Potential equalization

If a potential equalization conductor is required, it must be connected to one of the clamps at the rear of the instrument.
The diameter of the wire between indicator and the main equipotential bonding conductor should be ≥ 4mm².

CONTENTS OF PART 5

5. O P E R A T I N G

5.1 SWITCHING ON/OFF THE INSTRUMENT

5.1.1 Switching on

CAUTION !
Since the PR 1612/02 indicator has got no mains switch it can be operated and set-up as soon as the mains voltage is applied.

The instrument is protected by a mains fuse which is located in the housing of the mains connector (see page 4-3).
Before the PR 1612/02/00 is switched on for the first time, mains voltage adaptation and installation must be finished (see part 4).
Therefore, check

- if the mains voltage adjustment is correct (see part 4.5),
- if all connections are correct (see parts 4.4 and following),
- if the back-up battery is switched on (see part 4.3)

After switching on, the indicator performs an internal test at first.

In case of a defect or a malfunction the PR 1612/02 generates a corresponding error message.
An explanation of the particular messages can be found in part 5.4.

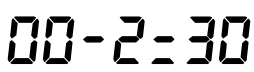
As part of the test the PR 1612/02 switches on all segments at its weight display module during approx. two seconds.

If the internal test is completed successfully, the display shows for some seconds the type of indicator.

For example:

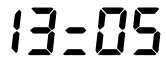
Then, for a couple of seconds, it shows the type of software inserted.

For example:



If enabled by means of a licence number, the corresponding 'SW-option' will be displayed now.

For example:



Thereafter, the program changes the weight value display over to the NORMAL WEIGHING MODE.

For example:

Symbol ⏥ appears as soon as the weight does not change any more (standstill display).

After about 60 minutes warm-up time, set-up and/or calibration work may begin.

5.1.2 Switching off

With obvious defects of the instrument, or with repairs/changes, the mains supply voltage must be disconnected by removing the mains connector.

In case of trouble, e.g. with the communication to superordinate or subordinate system components interrupted or blocked, we recommend interrupting the mains (supply) voltage in order to carry out a "warm" or "cold" start (refer to part 5.5).

5.2 DESCRIPTION OF THE OPERATING CONTROLS

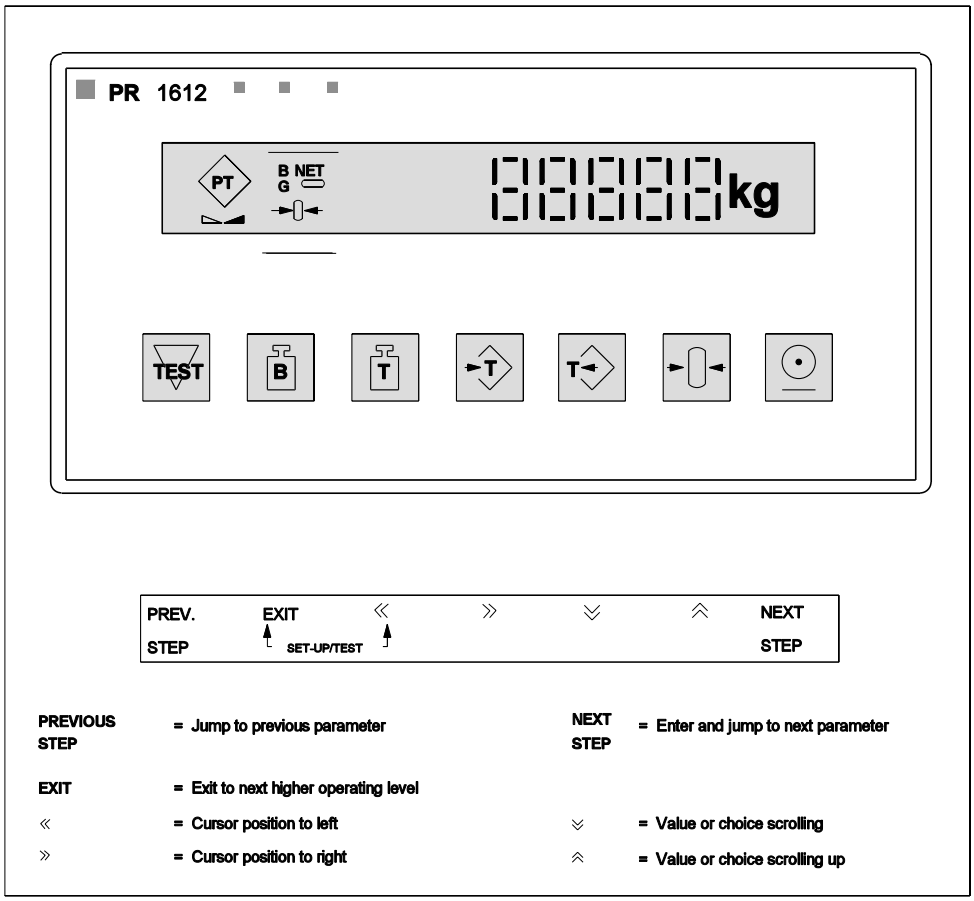
5.2.1 Keyboard

KEY	REMARK
	TEST Pressing causes an analog self-check, dependent of selected check mode either a - display of an analog test figure, or - display of the difference between F.S.D. and analog test number, or - the checksum of the EEPROM.
	GROSS MODE Switches display to gross weight as long as key is pressed. The gross weight display will be confirmed additionally by status indicator **B**.
	TARE MODE Switches display to tare as long as key pressed and provided it has previously been tared. This will be confirmed by a lit status indicator **T**. When releasing the key again, the actual net weight will be displayed, confirmed by lit status indicator **NET**.
	SET TARE Pressing moves the actual gross weight into the tare memory (taring), provided that: - the weight is in 'standstill', and the weight value is 'in range', i.e. < f.s.d. and > 0, - the instrument is not in failure mode, and - a test has not been activated. Consequently, the weight display changes automatically to NET mode, indicated by lit status indicators **NET** .
	RESET TARE Pressing clears the tare memory and switches the display to gross weight display.
	ZERO Pressing sets the gross weight to zero with an accuracy of ±1/4d, provided the weight is in standstill mode, - the gross weight is in the ZERO SET RANGE (selectable up to +/- 255d), i. e. the centre-of-zero status indicator →0← is lit.
	PRINT Print weighing document (configurable via parameter C10, C15 and C22).

5.2.2 Status indicators

- ■ for centre of zero indication, (within ± 1/4 d)
- ◺◿ standstill
- **B** gross on display
- **NET** net on display
- **T** tare on display

5.2.3 Front panel



5.2.4 Functions of the keys

The 7 keys below the weight value display have set-up function in addition to the operating function.

Please note:
A page with adhesive strips on which the additional functions of the keys are marked in various languages is included in this Instruction Manual.
If required, cut a strip in the required language, fit it below the keys and remove it after adjustment (configuration).

5.3. ANALOG TEST

During CALIBRATION of the indicator, an analog test value will be automatically determined and stored in the EEPROM (C46. .C49) . This value should also be written down (see also C58) in order to be able to compare it with the current test value.

When the analog test is activated, the measuring signal of the load cells will be disconnected from the input of the instrument.

If the test is performed by pressing key ■ the display will show the following values, depending on the initiated type of test:

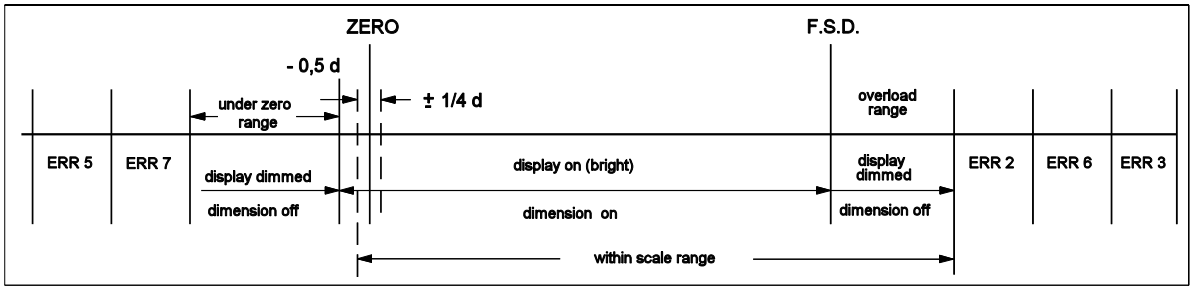
a. either the current test value (which is to be compared with the original value), or
b. the difference between the originally stored test value and the current test value, or
c. a checksum of the EEPROM (required inter alia for Switzerland).

If the test is automatically activated, it will be repeated after a period of 1 to 24 hours that can be preselected during calibration.

In case of an error, the test will be continuously repeated. If the deviation will still be too great, the instrument must be switched off and the Customer Support of the local Organization of Philips Weighing must be informed.

5.4 IN CASE OF AN ERROR

5.4.1 Display modes



5.4.2 Error messages

5.4.2.1 Error messages generated by wrong operation or defective components.

They will automatically be indicated, or when selecting parameter C29.

Display via parameter C29 e.g. H02 ,A=0

Error code	standard RAM	EPROM	EEPROM	
H= 00				
H= 01	X			
H= 02		X		
H= 03	X	X		
H= 04			X	
H= 05	X		X	
H= 06		X	X	
H= 07	X	X	X	X = faulty

Error code	cause / meaning
A = 1 (Err 1)	Internal number domain overflow, e.g. by wrong calibration, by the input voltage being too high, or because of a checksum error in a total weight buffer.
A = 2 (Err 2)	Measuring value higher than f.s.d. + overload.
A = 3 (Err 3)	Hardware error in the ADC (e.g. open measuring input or analog circuit disconnected from digital circuit, or analog circuit without voltage supply).
A = 4 (Err 4)	Checksum error during A/D conversion.
A = 5 (Err 5)	Internal number domain underflow, e.g. by wrong calibration, or by the input voltage being too low.
A = 6 (Err 6)	Overload of the ADC (measuring voltage too high or wrong SPAN adjustment).
A = 7 (Err 7)	Negative input voltage at ADC (wrong polarity of the measuring voltage).

A display of 

indicates that the actual board number in parameter C82 has been reset.
Please contact the Customer Support of your local Philips Weighing Organization.

5.4.2.2 Error messages after power-on

A display of 

indicates lost RAM data, because:
- battery not switched on via link BAT, or
- battery low voltage (should be > 3V), or
- battery defective, or
- of a program(EPROM) change, or
- of external disturbances.

Refer to hints in part 5.5.

A display of bAt

for approx. 6 seconds after power-on
indicates that the back-up battery has either not been switched-on, or that its voltage is too low, i.e. there is a risk of data loss.

The battery voltage has to be checked from time to time, or has to be checked by the Customer Support of the local Organization of Philips Weighing in connection with a system test.
If necessary, the battery must be replaced and to be disposed of acc. to the official regulations.

A display of boArd 00

indicates an interrupted access to the board number.
Please contact the Customer Support of your local Organization of Philips Weighing immediately, as the possibly activated SW option PR 1613/05 can not be used any more.

A display of EEProA00

indicates a malfunctioning or a physical defect of
the inserted EEPROM. Please contact the Customer Support of your local Organization of Philips Weighing.

5.4.2.3 Possible error messages during calibration

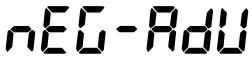
A display of CErr

indicates one of the following possible calibration errors:

Display	Remark	proceed with:	instrument in step:
CErr 1	**step:** C35 **error:** entered CAL weight > f.s.d. e.g. f.s.d. = 1500 kg cal. weight = 2000 kg		
CErr 2	**error:** meas. signal too low for calibration (< 0.2mV).		
CErr 3	**step:** C35 **error:** meas. signal too high. Sum of deadload signal and determined meas. signal are out of scale, or **step:** C37 error: zero point correction too far in pos. direction. With maximum meas. input the scale range will be exceeded.	NEXT STEP	weighing mode

Display	Remark	proceed with:	instrument in step:
CErr 4	**stop:** C35 **error:** too less measuring voltage per scale step, i.e. desired resolution too high.	NEXT STEP	weighing mode
CErr 5	**error:** no standstill during calibration		
CErr 8	**step:** C35 **error:** resolution too high (see also 6.5.2)		
CErr 9	**step:** C83 **error:** wrong license number. Only valid for SW-option PR 1613/05.		

A display of



appears when a calibration with
a negative measuring signal will be started.

5.4.2.4 Possible error messages on communication

Refer to part 8.3.7.1

5.4.3 General error conditions

condition	possible fault	how to solve
Display totally dark	• mains interruption • mains fuse defective • instrument defective	check, mind hints in part 2
Display confused	• RAM - error • processor disturbed • bad contacts	check battery, perform WARM-start, contact Service
No communication to supervisory or slave system(s)	• wrong interface module • wrong interface setting • no supply of the interfaces • incorrect connection • bad contacts	check
	• protocols not properly • bad contacts	see part 8. check connectors/ terminals.

condition	possible fault	how to solve
Communication to supervisory or slave system(s) disturbed	• C04..C14 not properly set • hang-up due to external disturbances. • protocols not properly • interface modules defective	check perform WARM-start. see part 8. contact Service
Weight display unstable	• mechanical problems at the weighing device • bad connections	check at pipes, bellows, hoses and constrainers for dirt. check connectors/ terminals.
	• not properly controlled air pressure conditions in container and pipes • loadcell(s) defective	check valves contact Service
Changed zero point	• mechanical modification at the weighing device	check and if so correct by means of C37
	• loadcell(s) defective/overloaded	contact Service
Weight display wrong	• calibration data lost	check position of switch CAL and the battery, compare settings by means of previous print-out (C58).
	• not properly controlled air pressure conditions in container • calibration changed • loadcell(s) defective	check valves, bellows, and pipes . perform new calibration contact Service
Set-up not possible	• switch CAL not in position C • code word in C21	check and correct enter correct one

5.5 WARM START / COLD START

A "WARM" or "COLD" start is always carried out when switching on the mains voltage. Whether "WARM" or "COLD" start, depends on the position of switches CAL and MODE on the instrument rear or bottom respectively.

During normal operation, switches MODE and CAL are normally in position $\overline{\mathbf{C}}$.

5.5.1 Warm start

A "WARM START" is purposeful e.g. with the instrument processor stopped due to external disturbances (display of Err..), or with the communication sequence to other system components interrupted.

- MODE position: **$\overline{\mathbf{C}}$** — instrument uses the **configuration** parameters entered last.
- CAL position: **$\overline{\mathbf{C}}$** — instrument uses the **calibration** parameters stored last.

5.5.2 Cold start (initial clear)

- MODE position: C
  1. INITIAL CLEAR, all data in RAM will be reset, and therefore
  2. the instrument uses the default **configuration** settings.
- CAL position: C — the instrument uses the default **calibration** settings.

For instance, a "COLD START" must be carried out with message

displayed after instrument switch-on.

This message indicates that RAM data are lost and that the instrument must be re-initialized by means of a cold start.

Possible causes are e.g.:
- jumper BAT on the main board not fitted, i.e. the back-up battery for the RAM is not connected (see following figure), and
  the RAM data are therefore not protected.
- back-up battery is empty or back-up battery voltage too low (see part 5.4.2.2).
- software was changed (e.g. by EPROM replacement), or
- RAM data lost due to external influences.

A 'cold start' has to be performed as follows:

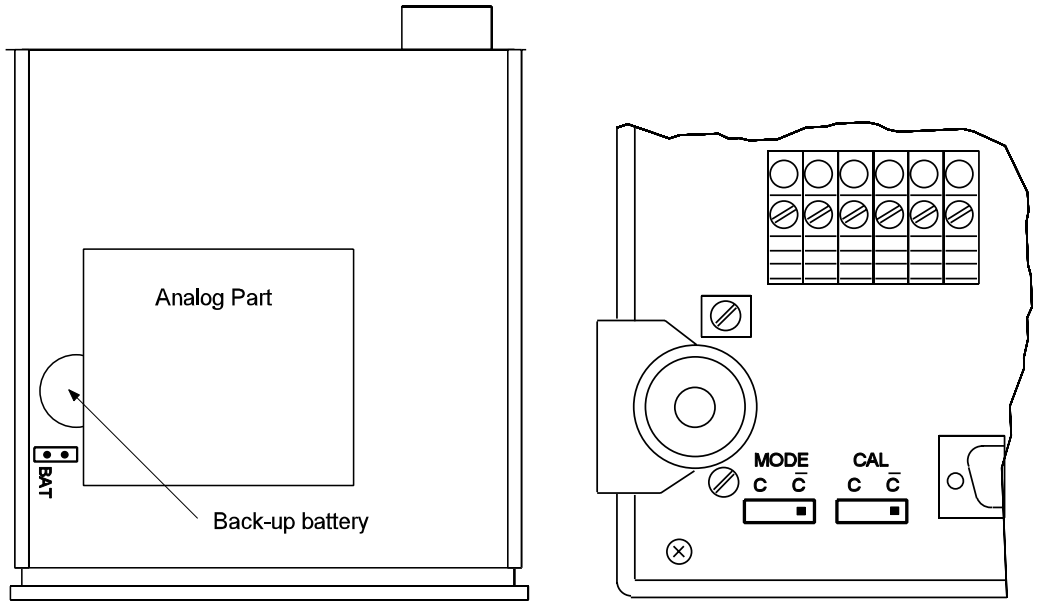
1. Open the instrument
2. Close jumper BAT
3. Select supply voltage for load cells (see chapter 6.5.1)
4. Close instrument
5. Switch MODE to position: C } default configuration parameters and
6. Switch CAL to position: C } default calibration parameters will be activated
7. Switch power-on
8. Switch MODE to position: **$\overline{\mathbf{C}}$**

9. Perform calibration after 60 minutes warm-up time (see next pages).
10. Store the entered parameter, see chapter 6.6
11. Switch CAL to position: **C̄**
12. Enter configuration parameter

Please note:
Very often malfunctions of the indicator can simply be removed by resetting the RAM.
For this
- move switch MODE to position C,
- keep switch CAL in position **C̄**, and
- switch off/on the mains supply.

All data in the RAM will be reset to its initial state.

Performing this kind of cold start the **calibration data** in the EEPROM will not be influenced, and consequently re-calibration will not be necessary.



5.6 REPLACING FUSES

Before replacing fuses follow the relevant instructions in parts 2.3 and 4.7 of this manual.

CONTENTS OF PART 6

6. SETTING THE INDICATOR

The indicator must be allowed to warm up during approx. 60 minutes before any settings are carried out

Setting the PR 1612/02 indicator will be performed by means of:
- **CONFIGURATION -** parameters, and
- **CALIBRATION** - parameters.

CONFIGURATION parameters contain non-system-specific data stored in RAM.
They are protected against mains failure by a back-up battery, the voltage of which must be checked from time to time.
Configuration parameters can also be protected against operator error (write-protected) by a code number in parameter C21. Data in parameter C01 (Year, date, and time) are not protected.

CALIBRATION parameters contain system-specific data, which can be stored in an EEPROM and thus be protected against mains failure.
Moreover they can be write protected when switch CAL at the instrument rear or bottom is in position **C̄** .

6.1 PROCEDURE

6.1.1 Selecting the set-up level

- move switch CAL and MODE to position C
- press keys **EXIT** and « (B+T) simultaneously
- display of: C01

6.1.2 Changing the parameter code

- display of e.g. 

- change to the next parameter by pressing key **NEXT STEP** , or
- move directly to the next desired parameter by:

- position the cursor (indicated by flashing digit •) by means of keys » and « to the desired decade. If the cipher does not flash, parameter is possibly write- protected (CAL on **c̄** , or C21 coded).

- change parameter code by means of key ^ or v

- accept parameter code by pressing key **NEXT STEP**

6.1.3 Changing the parameter value

- display of e.g. 

- position the cursor (indicated by flashing digit •) by means of keys » and « to the desired decade. If the digit does not flash, parameter is possibly write-protected (CAL on **c̄** , or C21 coded).

- select value by means of key ^ or v .
  Repeat that for each digit position (decade).

- accept parameter value by pressing key **NEXT STEP** .

6.1.4 Display of the next parameter code

- display of e.g.: 

- start again at point 2 (6.1.2)

6.1.5 Leaving the set-up level

- press key **EXIT** in order to leave the set-up level

Note:
If switch CAL in pos. **c̄** , the display changes immediately to the actual weight value,
if switch CAL in pos. C, follow hints at part 6.1.6.

6.1.6 Leaving the set-up level <u>and</u> storing the calibration data

- after pressing key **EXIT**

- during approx. 3 seconds display of: 

- then change to : 
- using key [⇈] modify into: 

  remaining on no means 'no storage of entered data' !

- press key **EXIT**
- display changes to: 
- set switch CAL to position **C̄**

6.2 SHORT SURVEY OF THE CONFIGURATION PARAMETER

C00	without function
C01	year, date, and time
C02	without function
C03	without function
C04°	line 1/A Baudrate
C05°	linie 1/A XON/XOFF
C06°	line 1 7/8 databit and parity
C07	without function
C08	without function
C09	without function
C10°	configuration of I/O data
C11	not used
C12°	configuration of PR 1606 and PR 1608
C13°	provided for PR 1613/05 only
C14°	remote display on/off
C15°	configuration of print out
C16°	setting number of weight ticket
C17°	analog output of PR 1606, 0/20mA (0/10V), or 4/20mA (2/10V)
C18	without function
C19	without function
C20°	controlling a W&M approved printer
C21	write-protection code number
C22°	instrument address A .. Z
C24°	disable key functions
C25°	limit 1, on value
C26°	limit 1, off value
C27°	limit 2, on value
C28°	limit 2, off value
C29	error display

° can be write-protected by a code number in parameter C21.

6.3 CONFIGURATION

In order to configure the instrument, no settings by means of switches must be carried out. If it should not be possible to modify parameter values, they perhaps are write-protected by a code number in parameter C21 (see also part. 6.3.1, C21).

By pressing keys **B** and **T** simultaneously, the program jumps from the normal weighing mode to the set- up level and displays the first parameter C00 (see also parts. 6.1.1 to 6.1.6).

Select the required parameter and enter the desired values/data by pressing the keys as specified below.

Selecting a specific parameter can also be done directly, i.e. independently of the order listed below. For this, change the displayed parameter digit into the required one and press key NEXT STEP (⊙) .

After set-up, store the data according to the instruction in part 6.6 and protect them against accidental alteration and mains failure by setting switch CAL into position **C̄**.

6.3.1 Sequence

Switch on back-up battery (refer to part 4.3)

press keys **EXIT** and « (B+T) simultaneously, in order to change from weighing mode to set-up level.

display of e.g. parameter
(• means flashing digit)

press key **NEXT STEP**

YEAR, DATE, and TIME

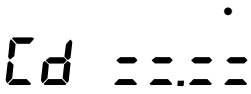
press key **NEXT STEP**

display of :

enter actual year, e.g:

press key **NEXT STEP**

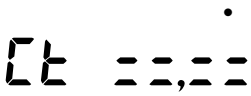
display of :



enter actual date in DD,MM, e.g.:

press key **NEXT STEP**

display of :



enter actual time between 00,00 .. 23,59, e.g.:

press key **NEXT STEP**

unrealistic data will not be accepted!

LINE 1: BAUD RATE C04.

press key **NEXT STEP**

Note:
If this parameter and the following ones are write-protected by means of a code number in parameter C21, digit 4 does not flash. If so, select parameter C21 directly and enter the correct code number.

In this case

display of parameter C21

press key **NEXT STEP**

enter correct code number

if correct, for some seconds display of: Good

if faulty, for some seconds display of: FAIL

Note !
If the correct number was lost or is not available
any more, contact your local Philips Weighing Customer Support.

When performing a 'cold start' (switch MODE in position C and power off/on), the code number in C21 can be cleared, but
all previously entered data protecte by C21 are also reset to the default data.

For setting parameter C21, refer to the following procedure.

press key **NEXT STEP**

display of parameter C22

by means of keys [»] [«] and [˄] [˅] go back to parameter C04 and continue with the configuration as follows:

Note:
Parameter marked with sign ° , will be write-protected if C21 is set accordingly.

Parameter	Function	Data	Default value
C04°	line 1: baud rate	300 .. 9600	4800bd
C05°	line 1: XON/XOFF	0=off, 1=on	0
C06°	line 1: 7/8 bit and parity	0 = 7 / even 1 = 8 / even 2 = 7 / odd 3 = 8 / odd 4 = 7 / none 5 = 8 / none	0
C10°	serial output functions	1 = printer via line 1(A) (witout hand shake mode), or remote display via line 2(B) 2 = printer via line 2(B) (with hand shake mode) 3 = Communication mode via line 1(A)	1

Note !

mode	C10	C14	C15	C20	C53
printer without hand shake via line 1(A)	1	off	on	on/off	off
or remote display via line 2(B)	1	on	off	off	off
printer with hand shake via line 2(B)	2	off	on	on/off	off
communication via linie 1(A)	3	off	off	off	on

Parameter	Function	Data	Default Value
C12°	analog output of PR 1606, or BCD output of PR 1608	0 = output of gross value 1 = output of net value 2 = output of tare value 3 = value as shown at front display (G or N or T) 4 = absolute net values with sign on SPM address 1.7. 5 = like 3, but with absolute net value like 4.	0

Note !
When using the PR 1606:
- only an output signal of positive weight values will be generated,
- if the gross weight will be > f.s.d + Amax, or at the indication of ERR1, 2, 3, or 6, the last valid output signal will be kept, until the value falls below a.m. limits again.

- if the gross weight is < ±¼ d, or with the indication of ERR4, 5, or 7, the output signal remains on 'zero' level signal as selected by C17, until < ±¼ d will be exceeded again.
- after taring in output mode 1 and 3 (weight display and output signal = net) the output signal will be kept at 'zero' level, if the net weight becomes negative.

Parameter	Function	Data	Default value
C13°	not provided for standard PR 1612/02 software, only for SW option PR 1613/05. Please refer to corresponding manual.		
C14°	type of remote display protocol	0 = off 1 = PR 1577/..- protocol on 2 = PR 1627/PR 1628 - protocol on	0
	Note: The remote display protocol runs only via an interface in line 2 (B).		
C15°	configuration of the weighing ticket. The sequence of the weight data can be defined and combined as mentioned.	0 = print out (00000) 1 = print out of gross weight 2 = print out of net weight 3 = print out of tare weight 4 = print out of date and time 5 = print out of current ticket number 6 = CR/LF 7 = address of device 'A...B' (observe C22)	41000

Note:
- In order to print net and tare values, the PR 1612/02 must be tared previously.

Examples of print out sequences (in W&M mode):

Configuration: 41000

```
26.03.1996 20:08   <01000 kg>N
```

Configuration: 41200

```
26.03.1996 20:10   <01000 kg>B  <00600 kg>N
```

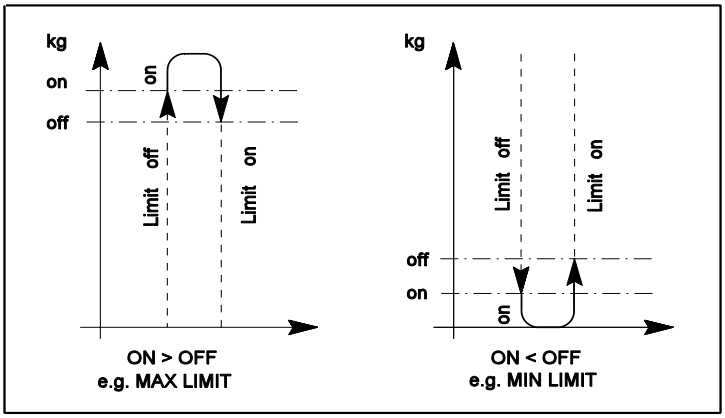
Configuration: 41230

```
26.03.1996 20:12   <01000 kg>B  <00600 kg>N  <01000 kg>T
```

Configuration: 41235

```
26.03.1996 20:08   <01000 kg>B  <00600 kg>N  <01000 kg>T  #00001
```

Parameter	Function	Data	Default value
C16 °	current number of weigt ticket, **or** configuration parameter for PR 1613/10.	0 .. 65536	000000
	The first print-out starts with the adjusted digit + 1.		
C17°	span of the analog output module PR 1606	0..20 mA, 0..10 V = 0 4..20 mA, 2..10 V = 1	0
C18	without function		
C19	without function		
C20°	W&M-approved printer on/off	0 = off, 1 = on	0
C21	write-protection code number	0001 .. 9999 0000 = no write protection	0000
	Note: - the write-protection will be activated after exit from the configuration level. - if write-protected the parameter values will be displayed, but cannot be modified. - in case of need follow hints as mentioned before parameter C04.		
C22°	address of the PR 1612/02 to a printer or remote display unit.	A .. Z	A
C23	not used		
C24°	disable key functions	0000 = all keys enabled 0001 = analog test } 0002 = gross weight } 0004 = tare weight } 0008 = tare set } 0016 = tare reset } disabled 0032 = zero setting } 0064 = print } 0128 = B+T } 0256 = without function }	0000
	e.g. 0097 = (1+32+64) = functions 'analog test + zero setting + print' will be disabled. **Note:** Disabled key functions can be released by a 'cold start'.		
C25 .. 28°	Limit values "LIM1/LIM2" (For connections refer to part 4.11.2)		



Note:
If the on value is set equal to off value, the following switching conditions are valid:

- LIMIT 1 output is active if weight > set value
- LIMIT 1 output is switched off if weight ≤ set value
- LIMIT 2 output is active if weight < set value
- LIMIT 2 output is switched off if weight ≥ set value

Parameter	Function	Data	Default value
C25°	Alarm switch-on threshold for limit value 1 (LIM 1)	00000 (off) .. scale end value	00000
C26°	Alarm switch-off threshold for limit value 1 (LIM 1)	00000 (off) .. scale end value	00000
C27°	Alarm switch-on threshold for limit value 2 (LIM 2)	00000 (off).. scale end value	00000
C28°	Alarm switch-off threshold for limit value 2 (LIM 2)	00000 (off) .. scale end value	00000
C29	Error messages	(see Part 5.4.2.1)	H00, A=0

Should the set-up level have to be left after having finished the configuration, press key B (EXIT) instead of key ⊙ (NEXT STEP).

The display moves automatically to the normal weighing mode.

Switch MODE (and CAL) must be set to position **C** after having left the set-up level !

6.4 SHORT SURVEY OF THE CALIBRATION PARAMETERS

C30°	Decimal point	C51°	Min. weight limit for print-out
C31°	Dimension kg/t/g/lb	C52°	Switch-over point of a multi-range scale
C32°	Step width	C53°	Communication protocol
C33°	Overload value	C54°	Slave address for communication mode
C34°	Measuring time	C55°	Weights & measures operation
C35°	Measuring range	C56°	without function
C36°	Display multiplied by 10, magnifier	C57°	Analog filter
C37°	Deadload suppression without re-calibration	C58	Configuration and calibration parameter print-out
C38°	Deadload suppression by mV/V-setting	C59°	Multi-range scale in gross/net mode
C39°	Calibration by mV/V-setting	C80	Display of the already used part of the 'zero setting range' C42.
C40°	Standstill range		
C41°	Standstill time	C82	Display of the 'board number'.
C42°	Zero setting range	C83	Entry of PR 1613/05 licence number
C43°	Automatic zero tracking range	C84	Reset of Licence number(s)
C44°	Automatic zero tracking step width	C85	without function
C45°	Autom. zero tracking interval time	C86	without function
C46°	TEST-mode of analog-test,	C90..95	without function
C47°	TEST-key function	C96	Test number for factory-internal use
C48°	Tolerance of test value	C99	Display of all enabled SW versions
C49°	Repetition time for an autom. test		
C50°	Generation of test value for an automatic test		

° will be write-protected by setting switch CAL to position $\overline{\mathbf{c}}$, and by a code number in C21

6.5 CALIBRATION

6.5.1 Input signal range (loadcell rating)

When selecting the loadcell(s) mind the following rating criteria:
- the PR 1612/02 can be set for 12 V or 20 V loadcell supply voltage (refer to 6.5.1.3),
- the signal from the loadcells (dead load signal plus measuring signal) may be 36mV at maximum,
- for OIML class C3 (III) the minimum measuring signal must be
  2.4 mV with 12V loadcell supply voltage, or
  6.0 mV with 20V loadcell supply voltage.

With PHILIPS load cells which are not installed in a hazardous area it is recommended to use a 20 V loadcell supply, provided the 36 mV input signal will not be exceeded.

CAUTION !
Loadcells in an hazardous area must be supplied by only 12 V.

6.5.1.1 How to determine the deadload signal

The deadload signal must not exceed 33.6mV.
If the value of the deadload signal is unknown, it can
- either be measured by means of a digital voltmeter at e.g. the loadcell connector,
- or it can be evaluated by using the PR 1612/02 itself, and as follows:
  switch on the PR 1612/02 with CAL switch in position C (**default values !**), and calculate by means of formula

$$\text{deadload [mV]} = \frac{\text{displayed value x 1mV/V x loadcell supply voltage [V]}}{3000}$$

Example:
- loadcell supply voltage: 20 V
- displayed deadload after cold start: e.g. 2000 kg

This corresponds to a deadload signal of 2000 x 12mV/ 3000 = 8 mV

6.5.1.2 How to determine the measuring signal

The measuring signal can be calculated by means of formula

$$\text{meas. signal [mV]} = \frac{\text{full scale deflection x loadcell sensitivity [mV/V] x loadcell supply voltage [V]}}{\text{nominal load of one loadcell x number of loadcells}}$$

Example:

- full scale	60000 kg
- loadcell supply voltage	20 V
- nominal load of one loadcell	20 t
- number of loadcells	4
- sensitivity of one loadcell	1 mV/V

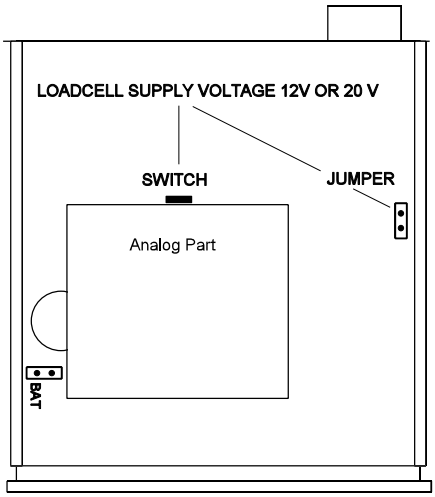
$$\text{measuring signal} = \frac{60000\ \text{kg} \times 1\ \text{mV/V} \times 20\ \text{V}}{20000\ \text{kg} \times 4} = 15\text{mV}$$

Result of the examples:
The maximum signal from the loadcells is 4 mV + 15 mV = 19 mV, and would therewith be within the range up to 36 mV as required !

6.5.1.3 How to set the loadcell supply voltage

Upon delivery from the factory the PR 1612/02 is set for 12 V supply voltage.

Note:
Take care that jumper on the main board and switch at the analog part are in the correct position (12V or 20V). The indicator will also work when jumper and switch are in different positions, but with lower accuracy.



	setting facilities	
voltage	jumper on PCB	switch at analog part
12 V	closed	in lower position
20 V	open	in upper position

6.5.2 Important advices for calibration

- The calibration of the indicator can be performed by different methods:
  - by means of calibration weights via the whole scale range (see part 6.5.3), or
  - by means of calibration weights and material, i.e by 'incremental calibration with make-up weights' (see part 6.5.5 and appendix A2), or
  - without calibration weights by entering the respective mV/V value (see part 6.5.7).

- The calibration weight must generate a measuring voltage of ≥ 0.2 mV. Otherwise the calibration will not be accepted by the indicator and an error message CErr 2 is generated.

  Example:

loadcell sensitivity	1mV/V
number of loadcells	3
nominal load of one l.c.	1000kg
loadcell supply	20V
calibration weight	120kg

$$\text{measuring signal} = \frac{120\ \text{kg} \times 1\ \text{mV/V} \times 20\ \text{V}}{3 \times 1000\ \text{kg}} = 0.8\ \text{mV (which is sufficient)}$$

- The following maximum resolutions of the scale range (f.s.d. : step width) are possible:

  - 3000d acc. to OIML class lll (EC type approval)
    or
    for industrial applications (not W&M approved)
  - 48000 counts with step width 1, or
  - 30000 counts with step width 2, or
  - 12500 counts with step width 5, or
  - 9999 counts with step width 10

  When exceeding the possible maximum resolutions an error message CErr 8 will be generated, and the calibration procedure will be aborted.

- During calibration the following error messages might be displayed:

Display	Remarks	proceed with	instrument in step
CErr 1	**step:** C35 **error:** entered weight value > f.s.d e.g. f.s.d = 1500 kg weight value = 2000 kg		
CErr 2	**error:** meas. signal too low for calibration (< 0,2mV)		
CErr 3	**step:** C35 **error:** meas. signal too high. Sum of deadload and determined meas. signal is out of scale, **or** **step:** C37 **error:** zero point correction too far in positive direction. With max. meas. input signal the scale range will be exceeded.	NEXT STEP	weighing mode
CErr 4	**step:** C35 **error:** too low measuring voltage per scale step, i.e. desired resolution too high.		
CErr 5	**error:** no standstill during calibration.		
CErr 8	**step:** C35 **error:** resolution too high		
CErr 9	**step:** C83 **error**: wrong license number. Only valid for SW option PR 1613/05.		

6.5.3 Calibration procedure

For the calibration of the PR 1612/02 set switch CAL on the instrument rear to position C. Otherwise a calibration is not possible, but only a display of the adjusted data (values) ! After setting, store the data according to the instruction in para. 6.6 and protect them against accidental alteration and mains failure by setting switch CAL into position **C̄** .

Move switch CAL to position C

Press keys **EXIT** and « (B+T) simultaneously, in order to change from weighing mode to set-up level.

display of e.g. parameter
(• means flashing digit)

by means of keys » « and ^ v modify into 

as switching on/off the analogue filter under C57 must be done **b e f o r e** starting the actual calibration!

press key **NEXT STEP**

select 0 = filter off, or 1 = filter on.

e.g. 

press key **NEXT STEP**

display of 

by means of keys » « and ^ v modify into

D E C I M A L P O I N T 

press key **NEXT STEP**

display of 

select decimal point or comma as follows:
0 = 0000000
1 = 000000.0
2 = 00000.00
3 = 0000.000
4 = 000000,0
5 = 00000,00
6 = 0000,000

e.g. 

press key **NEXT STEP**

D I M E N S I O N S I G N 

press key **NEXT STEP**

display of 

select 0 = kg, 1 = t, 2 = lb, 3 = g

e.g. 

press key **NEXT STEP**

S T E P W I D T H 

press key **NEXT STEP**

display of 

select 1 = 0001, 2 = 0002, 5 = 0005
10 = 0010, 20 = 0020, 50 = 0050

e.g. 

press key **NEXT STEP**

O V E R L O A D R A N G E 

press key **NEXT STEP**

display of 

select overload range in n x step width

e.g. 

press key **NEXT STEP**

M E A S U R I N G T I M E 

press key **NEXT STEP**

display of 

select measuring time between 1 .. 20 times 0.1 sec.

e.g. 

press key **NEXT STEP**

6.5.4 Calibration by means of calibration weights

F U L L S C A L E D E F L E C T I O N C35.

press key **NEXT STEP**

display shows the factory-set f.s.d. C 03000.

select desired f.s.d.
If the factory-set f.s.d should have to be kept,
one of the digits must be modified at least once !,

and e.g. back to C 03000.

Otherwise the program jumps immediately further to
step C36, after pressing key NEXT STEP.

Note:
The conditions listed in paragraph 6.5.1 must be met. Exceeding or falling below the given tolerance values results in error messages during this measuring range setting and thus, to blocking further setting. In this case, correct acc. to instructions given in para. 6.5.1 and restart with C35.

press key **NEXT STEP**

During approx. 2 seconds CSuPPLY

is displayed.
Subsequently, the display changes to the

loadcell supply voltage set last, e.g.: C 12

using key ⇈ select the supply voltage
of 12 V or 20 V as set at the PCB (see also part 6.5.1.3).

e.g. C 20

press key **NEXT STEP**

During approx. 2 seconds, the display shows: dEFAuLt

then it changes to C 1.

If a zero point correction (deadload suppression) is required, accept cipher 1 by pressing key **NEXT STEP**.

If no zero point correction is desired, enter 0 instead of 1.

Entering 0 is required, if a second correction of the measuring range setting has to be taken into account. For example during calibration of the system by means of weights and material (incremental calibration with make-up weights).

When pressing key **NEXT STEP** after having selected 0, the program will directly jump to step • • (see page 6-19).

Continue from step • • !

After having accepted 1 for zero correction,

display changes to 

Unload scale completely !

Subsequently, press key ⌃ (→0←)

Display shows: 

Note:
If desired, a 10 times higher resolution
of the selected f.s.d. can be selected with key T→0← in toggle mode now (also valid for a multi-range scale). This mode is limited to ≤ 6000 d.

Load scale with calibration weights by observing the required minimum calibration weight as mentioned in part 6.5.1. We recommend to load the scale with a calibration weight that should correspond at least to 2/3 of f.s.d. The more this weight corresponds to the final value, the more accurately the span will be adjusted.

press key **NEXT STEP**

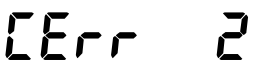
Display shows selected f.s.d, e.g. 

Enter correct weight value without
considering the possibly switched on higher resolution of x10,

e.g. 

press key **NEXT STEP**

After a calculation time, display must go to C36 (next parameter)

If the display indicates 

the used calibration weight is too low.

press key **NEXT STEP**

Display shows: 0000

press key **EXIT** (**B**)

display of: C35

mind values as mentioned in part. 6.5.1,
correct accordingly and start again with the calibration.

Note:
If calibration is finished now, and no further settings of other parameters are required any more, save data as described in part 6.6.

6.5.5 Incremental calibration with make-up weights

With larger weighing devices like tanks or silos, some small calibration weights are only available in relation to the total capacity. The calibration has to be performed in such cases by means of the relatively small amount of calibration weights plus a certain amount of dummy material like water, sand, etc. (make-up weight).
See also advices as given in appendix 2.

The first part of the calibration has to be performed according to the procedure as described in part 6.5.4.

After that display of: C36

- press key **NEXT STEP**

Display shows either the actual weight, or zero if the scale is unloaded.

Now load the scale with dummy material as closely as possible to the last calibration point. Add the available calibration weight.
For example: dummy material of 510 kg (acc. to display), plus a calibration weight of 500 kg.

press key **NEXT STEP**

display of: C37

press key **PREV STEP** **(■)** until C35 is reached

display of: C35

press key **NEXT STEP**

Display of selected scale end value, e.g.: C 03000

change at least one digit once, then

press key **NEXT STEP**

During approx. 2 seconds: C SUPPLY

is displayed.
Subsequently, the display changes to the

loadcell supply voltage set last, e.g.: C 12

using key ⌃ select the supply voltage
of 12 V or 20 V as set at the PCB (see also part 6.5.1.3).

e.g. C 20

press key **NEXT STEP**

During approx. 2 seconds, the display shows: DEFAULT

then it changes to C 1.

modify into C 0.

press key **NEXT STEP**

• • Display shows an undefined weight, e.g. 0152

press key **NEXT STEP**

Display shows selected f.s.d.,e g. C 03000.

enter correct weight value, i.e.
dummy material of 510 kg and calibration weight of 500 kg.

display of C 01010.

press key **NEXT STEP**

After a calculation time, the display must change to the next parameter C36

In case more calibration steps should be required, start again at point • .

Note:
If calibration is finished now, and no further settings of other parameters are required any more, save data as described in part 6.6.

If the calibration procedure is not finished, change from shown parameter C36 to C40 and continue.

6.5.6 Checking the linearity (accuracy) of the scale

LINEARITY/ACCURACY 

press key **NEXT STEP**

Display of e.g. 

Note:
If desired, a 10 times higher resolution can now be selected with key **in toggle mode**, as the value will be shown inclusive of its decade 10^{-1}.
By means of this feature the linearity of the scale (also if being a multi-range scale) can be proved, for example for tests of the W&M authorities.
This mode is limited to a scale resolution of ≤ 6000 d.

In this case the display could be e.g.: 

The weight value will be displayed in this mode without decimal point and dimension sign.

By pressing key a print-out of the **actual** weight value with dimension sign can be generated, provided a printing device has been connected properly, and the corresponding parameter was set correctly. Depending on C55, the print-out is or is not acc. to W&M's.

6.5.7 Setting, modifying, or re-entering zero point, scale end, and span value without calibration weights

Provided the mechanical conditions of the scale are 'ideal', as mistakes like force shunts will not be recognized and compensated, a calibration without weights is useful e.g.
- if no W&M approval is required,
- if many containers or tanks have to be installed,
- if calibration weights (masses) cannot be used easily,
- as preparation step for W&M approval, and
- for re-entering or later modification of a previously set zero point-, scale end-, or span-value.

The following parameter C37, C38, and C39 serve for setting and modification of zero point, scale end, and span value without calibration weights, or for re-entering these values if they are lost (e.g. due to a defective indicator).

In particular:

C37 for
- the modification of the zero point setting **with an empty scale**, as it could be required e.g. after a modification of its initial deadload, and
- a new setting of the zero point at **an empty scale** without influencing the span.

C38 for
- re-entering the last valid zero point setting **with a loaded scale** by entering the corresponding mV/V value, without influencing the span, as it could be required after e.g. the replacement of a defective indicator.

C39 for
- re-entering the last valid scale end and span value **with a loaded scale** by entering the corresponding mV/V value, without influencing the zero point, as it could be required after e.g. the replacement of a defective indicator, or
- setting scale end and span value **of an empty scale** (mV/V calibration).

Note:
In order to **re-enter** a.m. values it is necessary to have noted the corresponding scale and mV/V values of parameter C38 and C39 after the last valid calibration, or better to have them printed out them after the last valid calibration via parameter C58.

6.5.7.1 Modification of the zero point setting at an empty scale

select parameter 

press key **NEXT STEP**

During approx. 2 seconds 

is displayed.
Subsequently, the display changes to the

loadcell supply voltage set last, e.g.: 

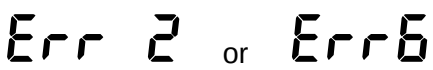
using key ⇈ select the supply voltage of 12 V or 20 V as set at the PCB (see also part 6.5.1.3).

e.g.: 

press key **NEXT STEP**

display of e.g.: 

or in case of an initial calibration with a higher input voltage than 12 mV:



unload the scale completely !

display of e.g.: 0 152

or still: Err 2 or Err6

press key ⌃ (→0←)

Display shows: 0000

press key **NEXT STEP**

display of parameter C38

6.5.7.2 Re-entering the last valid zero point setting with a loaded scale

select parameter C38

press key **NEXT STEP**

During approx. 2 seconds CSuPPLY

is displayed.
Subsequently, the display changes to the

loadcell supply voltage set last, e.g.: C 12

using key ⌃ select the supply voltage of 12 V
or 20 V as set at the PCB (see also part 6.5.1.3).

e.g.: C 20

press key **NEXT STEP**

During approx. 2 seconds, the display shows: C dEAdL

then it changes to the last, or factory-set
zero point value [mV/V]

e.g.: C 0.0290

enter deadload value as noted or printed-out after
the last valid calibration (see note above),

e.g. 0.3 mV/V C 0.3000

press key **NEXT STEP**

after some calculation time display of parameter C39

6.5.7.3 Re-entering the last valid scale end and span value with a loaded scale

select parameter

press key **NEXT STEP**

display shows the last, or factory-set f.s.d,

e.g.

If this value should have to be kept, one of the digits must be modified at least once, and changed back again, or

enter desired f.s.d., e.g. to:

press key **NEXT STEP**

During approx. 2 seconds

is displayed.
Subsequently, the display changes to the

loadcell supply voltage set last, e.g.:

using key ⌃ select the supply voltage of 12 V or 20 V as set at the PCB (see also part 6.5.1.3).

e.g.:

press key **NEXT STEP**

During approx. 2 seconds, the display shows:

then it changes to the last, or factory-set sensitivity (span) value [mV/V]

e.g.:

enter sensitivity (span) value as noted or printed-out after the last valid calibration (see note above),

e.g. 0.7675 mV/V

press key **NEXT STEP**

after some calculation time change to parameter C40.

Note:
If calibration is finished now, and no further settings of other parameters are required any more, save data as described in part 6.6.
If calibration procedure is not finished, continue with C40.

6.5.7.4 Setting zero point, scale end, and span value without calibration weights

For utmost accuracy of calibration without weights, check the certified values of
- sensitivity C, and
- output resistance R_a

of each used loadcell.

These values are normally documented in a Manufacturer Test Certificate according to DIN 55350-18-4.22 and are available for loadcell types D1, C2, and C3 acc. to OIML.

Calculate the sensitivity of a loadcell configuration by means of formula

$$\text{sensitivity [mV/V]} = \frac{\text{full scale deflection x sensitivity of one loadcell } (C_{avr}) \text{ [mV/V]}}{\text{nominal load of one loadcell x number of loadcells}}$$

As sensitivity per loadcell, enter
- either the correct loadcell sensitivity of one loadcell as indicated in a.m. certificate,
- or, with more than one loadcell and different sensitivities, their average value C_{avr}.

Example:

loadcell 1= 1.01 mV/V, loadcell 3= 1.03 mV/V } average value C_{avr}
loadcell 2= 1.02 mV/V, loadcell 4= 1.04 mV/V } = 1.025 mV/V

nominal load of one loadcell = 20 t
f.s.d. = 60 t

$$\text{sensitivity} = \frac{60 \text{ t} \times 1.025 \text{ mV/V}}{20 \text{ t} \times 4} = 0.7675 \text{ mV/V}$$

select parameter

press key **NEXT STEP**

During approx. 2 seconds

is displayed.
Subsequently, the display changes to the

loadcell supply voltage set last, e.g.:

using key ⌃ select the supply voltage of 12 V
or 20 V as set at the PCB (see also part 6.5.1.3).

e.g.:

press key **NEXT STEP**

display of e.g.:

or in case of an initial calibration with a higher input voltage than 12 mV:

Err 2 or Err6

unload the scale completely !

display of e.g.: 0 152

or still: Err 2 or Err6

press key ⏫ (→0←)

Display shows: 0000

press key **NEXT STEP**

display of parameter C38.

Skip parameter, and

select parameter C39

press key **NEXT STEP**

display shows the last, or factory-set f.s.d,

e.g.: C 03000

If this value should have to be kept, one of the digits must be modified at least once, and changed back again, or

enter desired f.s.d., e.g. to: C 60000

press key **NEXT STEP**

During approx. 2 seconds CSuPPLY is displayed.

Subsequently, the display changes to the

loadcell supply voltage set last, e.g.: C 12

using key ⏫ select the supply voltage of 12 V or 20 V as set at the PCB (see also part 6.5.1.3).

e.g.: C 20

press key **NEXT STEP**

During approx. 2 seconds, the display shows: C SPAn

then it changes to the last, or factory-set sensitivity (span) value [mV/V]

e.g.:

enter sensitivity (span) value as calculated (see note above),

e.g. 0.7675 mV/V

press key **NEXT STEP**

after some seconds of calculation time change to parameter C40.

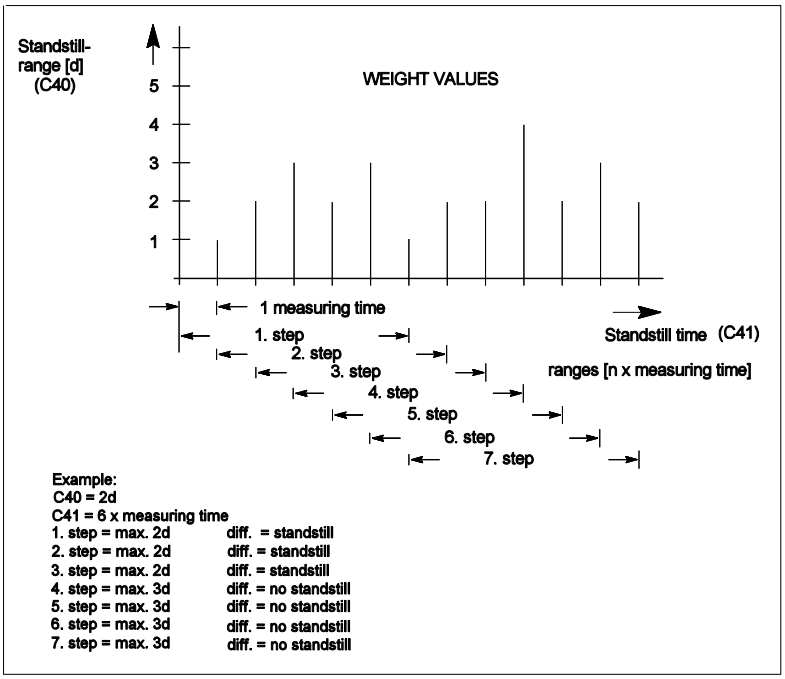
Note:
If calibration is finished now, and no further settings of other parameters are required any more, save data as described in part 6.6.

If the calibration procedure is not finished, continue with C40.

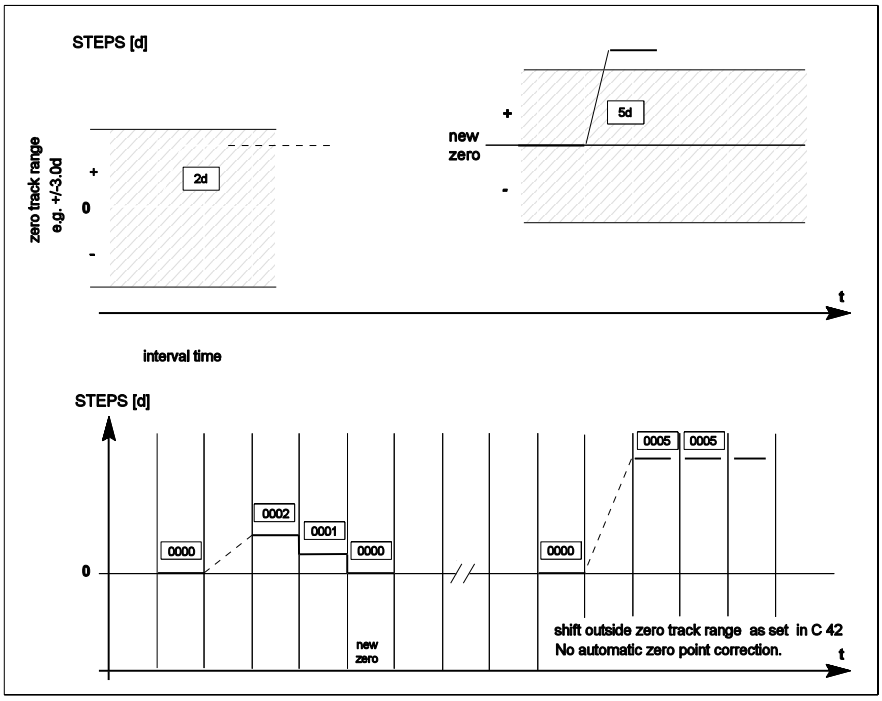
6.5.8 Continuation of the calibration procedure

Note:
Parameters marked with ° will be write-protected by setting switch CAL to position **C̄** , and by a code number in C21.

Parameter	Function/Description	Default value
C 40/41 °	**Standstill detection**	
C 40 °	**Standstill range** Adjustable for a range of 1.. 5 times the step width as adjusted in C32, in which a weight display standstill must be detected. Display standstill is as long as the difference between smallest and highest measured value of the time range as adjusted in C41 is smaller than the standstill range which must be adjusted.	1 (1d)
C 41 °	**Standstill time** Determination of a time range in addition to the STANDSTILL RANGE under C40, in which a weight display standstill must be detected. Standstill display is as long as the difference between smallest and highest measured value within the adjusted time range of 1 to 7 times the measuring time adjusted in C34 is not higher than the STANDSTILL RANGE. The standstill detection sequence is progressive. It re-starts with each measuring cycle (see following diagram).	1 (0.3 sec)



Parameter	Function/Description	Default value
C 42 °	**Zero setting range** Determination of a + range of 255 d or +/-15% around the zero point, within which a) the displayed gross weight can be set to zero by pressing key ->0<- (or by a corresponding external command), or b) the automatic zero tracking is active (see param. C43...45).	0060 (60 d)
C 43 .. 45 °	**Automatic zero tracking**	
C 43 °	**Automatic zero tracking range** Automatic zero tracking can be set for a ± range of 0.0d to 9.9d around the adjusted zero point. With C43 set to 0.0d, the automatic zero tracking will be performed in the overall zero setting range adjusted in C42 !!	0,0 (as C42)
C 44 °	**Step width of automatic zero tracking** Determination of the step width at which AUTOMATIC ZERO TRACKING will be performed stepwisely. The step width is adjustable within 0.0 and 9.9 d per correcting step. With adjustment 0.0, zero tracking is switched off.	0,0 (none)
C 45 °	**Interval time of automatic zero tracking** Definition of a time period between two correcting steps of automatic zero tracking. This delay time can be adjusted between 01 and 99 times the adjusted measuring time as set in C34. Adjustment 00 is not possible and will not be accepted.	01 (x C34)



Example: Zero tracking has to be performed within set interval time.
Settings: Automatic zero tracking range (C43) = 3,0 d
Step width of automatic zero tracking (C44) = 1,0 d
Interval time (C45) = 0 1 = 1x 0.3 sec

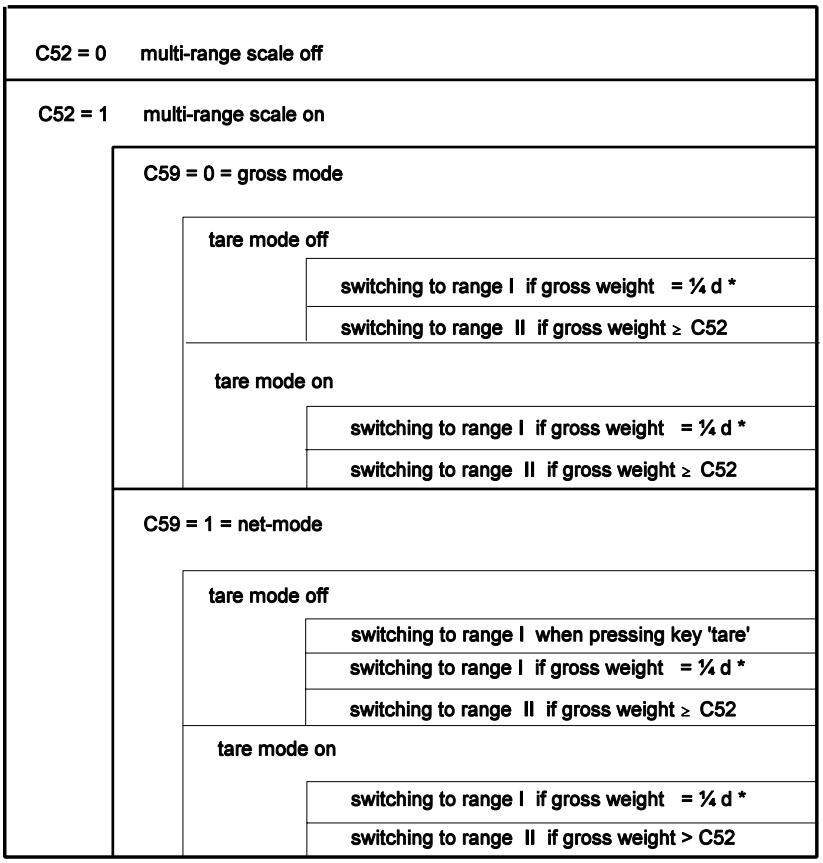
Parameter	Function/Description	Default value

C 46 .. 50 ° **Analog Test**
The test value defined here will be stored in the EEPROM and can be used for instrument function checking, if necessary. Therefore, it should be noted or printed out via C58 like the other parameter data.

C 46 ° **Test mode** 0 (f.s.d.)
The test value for the analog test is valid for the f.s.d.
The gain factor for its display is stored during calibration.
Two different test values are adjustable.
0 = display of an absolute test value.
No error = display of f.s.d.
1 = display of difference between the stored f.s.d. value and the actual test value.
No error = display of 00000.

C 47 ° **Test switch function** 0 (as C46)
Definition of test switch function mode, whereby 2 modes are selectable:
0 = when pressing key -TEST-, the test preselected below TEST MODE will be activated.
1 = when pressing key -TEST-, an EEPROM checksum is displayed.

Parameter	Function/Description	Default value
C 48 °	**Test value tolerance** Definition of an acceptable difference of 01 .. 15 d between the stored f.s.d. value and the actual test display. The TEST VALUE TOLERANCE is required for an automatic TEST REPETITION (C49). With out of tolerance, the weight display of the indicator will be switched off automatically and an error message is generated.	01 (1 d)
C 49 °	**Test repetition time** Definition of a repetition time of 1 to 24 hours within which an automatic test shall be repeated. With a setting to 00 hours, the test must be activated manually by pressing key -TEST- .	00 (0 hours)
C 50 °	**Test value generation** The test mode is switched on, and a test value corresponding to the f.s.d. value will be generated and stored.	actual value
C 51 °	**Min. weight limit for a print-out** Dependent of local calibration regulations, transmission of printer data can be disabled as long as the gross weight is between zero and the adjusted value up to 99 d. 00 = no disabling.	50 (50 d)
C52 °	**Multi-range scale** Definition of a switch-over point for a multi-range scale. Above the switch-over point, i.e. in the upper part of the scale, a lower resolution (next higher step width) is used. This is marked by two vertical dashes in front of the uppermost decade (II). With the weight below the switch-over point, the higher step width remains unchanged. As soon as the weight is within the zero setting range (marked by one vertical dash in front of the uppermost decade (I), the initial step width can be switched on again by pressing key ->0<-. With the weight accurately at zero (within the ± 1/4 d range), the initial step width will be switched on **automatically**, provided the display is in "standstill" and the instrument is not tared. Mode '10 times higher resolution' (see C36) can be used as long as scale end value / lowest step width ≤ 6000 d. <u>Example 1:</u> range 1 = 30 t, e1 = 10 kg (3000d) range 2 = 60 t, e2 = 20 kg (3000d) 60 t / 10 kg = 6000 d = ok <u>Example 2:</u> range 1 = 600 kg, e1 = 0.2 kg (3000d) range 2 = 1500 kg, e2 = 0.5 kg (3000d) 1500 kg / 0.2 kg = 7500 d = not ok The following table shows all conditions of a multi range scale, taking also into account a possible net mode as to be set in parameter C59.	00000 (none)



*** will be performed when pressing key 'set zero', with automatic zero setting, or when gross weight within ± ¼ d.**

Parameter	Function/Description	Default value
C 53 °	**Communication mode on/off** 0 = off, 1 = EW-protocol on For other than EW protocols, see part 8.2. **Note:** The communication mode can only be driven via the interface in line 1/A . With the communication mode activated, and if not selected otherwise, configuration 5 in C10 will automatically be switched on. With communication mode off, configuration 1 in C10 will be switched on automatically, if not selected otherwise!	0 (off)
C 54 °	**Instrument address** Definition of an address between A .. Z of the PR 1612/02 for the communication mode.	A

Parameter	Function/Description	Default value

C 55 ° **Weights & Measures mode on/off** YES (on)
YES = on, no = off

1. W&M mode on and negative gross weight:
   Weight display incl. negative sign dimmed, dimension sign off.
   No data transmission to remote display and/or printer.
2. W&M mode on and negative net weight:
   Weight display incl. negative sign bright, dimension sign on.
   Data transmission to remote display and/or printer.
   Print-out e.g.: <wwww.w kg> N
3. W&M mode off and negative gross weight:
   Same as mentioned below 1.
4. W&M mode off and negative net weight:
   Same as mentioned below 2., but
   print-out e.g.: wwww.w kg N

C 56 **without function**

C 57 ° **Analog filter on/off** 1 (on)
0 = filter off, 1 = filter on.
Switching the filter on or off must already be done when starting the calibration process (see C30).

C 58 **Parameter data print-out**

Note !!
The parameter data must be printed out after calibration and the print-out must be kept safely for a possible service case.
Print-out is possible only via an interface in line 1 / A and with parameter C10 set to 1.

For print-out example of the default values please refer to part 6.7

C 59 ° **Multi-range scale in gross/net weight display mode** 0 (off)
0 = off = no change with reference to C52.
1 = when tared, the weight display switches over to the smaller step width, or higher resolution (indication of I).
As soon as exceeding the value as adjusted in C52 the weight display switches over to the higher step width, or lower resolution (indication of II).
With the weight falling below the switchover point, the higher step width remains unchanged until conditions as indicated in the table at C52 are reached.

C 80 **Display of consumed zero set range** 00000
Display of that part of the zero set range adjusted in C42, which is consumed (suppressed) already by having pressed key ->0<-.

Parameter	Function/Description	Default value
C 82	**Display of "board" number** Needed for e.g. - ordering SW option PR 1613/05, or - resetting an entered SW licence number. In order to reset, the displayed board number has to be entered in C83.	different, e.g. 0492083
C 83 °	**Entry of licence number(s)** The valid licence number for SW option PR 1613/05 must be entered. When entering a wrong licence number CErr 9 will be displayed. In this case - press key NEXT STEP, - after the display of 0000000 press key EXIT = B, - enter the correct licence number, or - skip and change into next desired parameter ! If enabled by a correct licence number the used SW option will be displayed also after performing a 'WARM' start (see also part 5.5.1).	0000000
C84	**Reset of licence number** In order to enable temporary licence numbers in C83, select YES, and confirm by pressing key NEXT STEP. Due to this, an enabled <u>regular</u> licence number for PR 1613/05 will be reset **temporary** till the next warm start.	no
C85	**not used**	
C86	**without function**	no
C90 .. 95	**without function**	
C96	**Test figure for factory internal use** Without importance for operation. After display of FAIL, the program jumps to parameter C99.	different, e.g. 8141
C99	**Display of instrument type (PR 1612/02), embedded SW version, and all enabled SW options**	

Subsequently the program jumps automatically to parameter C00.

Note:
If calibration is finished now, and no further settings of other parameters are required any more, store (save) data as described in the following part 6.6.

6.6 PROTECTING/STORAGE OF ENTERED CALIBRATION DATA IN EEPROM

Switch CAL is in position C

Leave the set-up mode by pressing key **EXIT** (B)

During approx. 2 seconds, the display shows: StorE P

Then it changes to: C no

By means of key ⇈ change to yes
(when **no**, no storage of data) C YES

press key **NEXT STEP**

Display shows for 3 seconds: ALL dAt

Move switch CAL to position: **C̄**

6.7 S E T - U P L I S T

INSTRUMENT: PR 1612/02

FACTORY-NR.: LO

After setting the instruments, all calibration and configuration data as mentioned at the overleaf are to be noted, unless they have been printed-out via parameter C58. Moreover also the conditions as listed below have to be noted.

As data can be lost in case of defects or failures of the indicator, this list has to be kept carefully for possibly arising service actions.

FUNCTION	FACTORY	INSERTED / ADJUSTED
Mains voltage	220 V	
Software-version	2.3	

INTERFACE	FACTORY	INSERTED / ADJUSTED
Line 1/A	none	
Line 2/B	none	
Paralellport	none	

SWITCH	FACTORY	ADJUSTED
CAL	C	
MODE	C	
BAT	open	
12/20 V	12 V	

FURTHER INFORMATION:

DATE OF COMMISSIONING: **SIGN:**

PARAM	DEFAULT	SETTINGS
C 01	Year, Date,	
C 02	without function	
C 03	without function	
C 04	4800bd	
C 05	0	
C 06	0	
C 07	without function	
C 08	without function	
C 09	without function	
C 10	01	
C 11	unused	
C 12	0	
C 13	for SW-option PR 1613/05 only !	
C 14	0	
C 15	41000	
C 16	000000	
C 17	0	
C 18	4	
C 19	0003	
C 20	0	
C 21	0000	
C 22	A	
C 23	unused	
C 24	0000	
C 25	00000	
C 26	00000	
C 27	00000	
C 28	00000	
C 29	H00, A=0	
C 30	0	
C 31	0	
C 32	0001	
C 33	0009	
C 34	03	
C 35	03000 / 12	
C 36	act. test value	
C 37	act. weight	
C 38	12 / 0.0000	
C 39	03000/12/1.000	

PARAM.	DEFAULT	SETTINGS
C 40	1	
C 41	1	
C 42	0060	
C 43	0,0	
C 44	0,0	
C 45	01	
C 46	0	
C 47	0	
C 48	01	
C 49	00	
C 50	act. test value	
C 51	50	
C 52	00000	
C 53	0	
C 54	A	
C 55	YES	
C 56	without function	
C 57	1	
C 58	print-out	
C 59	0	
C 60..73	unused	
C 80	display of used zero set range	
C 81	unused	
C 82	display of board number	
C 83	entry of license number	
C 84	no	
C 85/86	without function	
C 87..89	unused	
C 90..95	without function	
C 96	test value for factory-internal test	
C 97/98	unused	
C 99	display of used software	

6.7.1 Print-out example of the default values:

PR1612/02-2.34.3

DATE: 27.11.1996 21:46

BOARDNR.: NO DAT
SOFTWAREOPTION: NOT ENABLED
HARDWAREOPTION:

BAUDRATE LINE 1: 4800 BD
XON/XOFF SYNC. : NO
DATA BIT : 7 ,EVEN PARITY

I/O CONFIGURATION: 01

COMMUNICATION: OFF
SLAVE ADDRESS: "A"
S5-ADDRESS: 00000

REMOTE DISPLAY: OFF

PRINTER PROTOCOLL ON #T: NO
PRINTER CONF. C15: 41000
SEQUENCE NR. C16: 00000

ANALOG-OUTPUT: 00
BCD/ANALOG-OUTPUT: GROSS
WEIGHT

RESTART-MODE: 4
CALMING TIME: 00003 sec
PROTECTION NUMBER 1: OFF

> LIMIT 1, ON: 0 kg
> LIMIT 1, OFF: 0 kg
< LIMIT 2, ON: 0 kg
< LIMIT 2, OFF: 0 kg

DISABLE KEYBOARD: NO

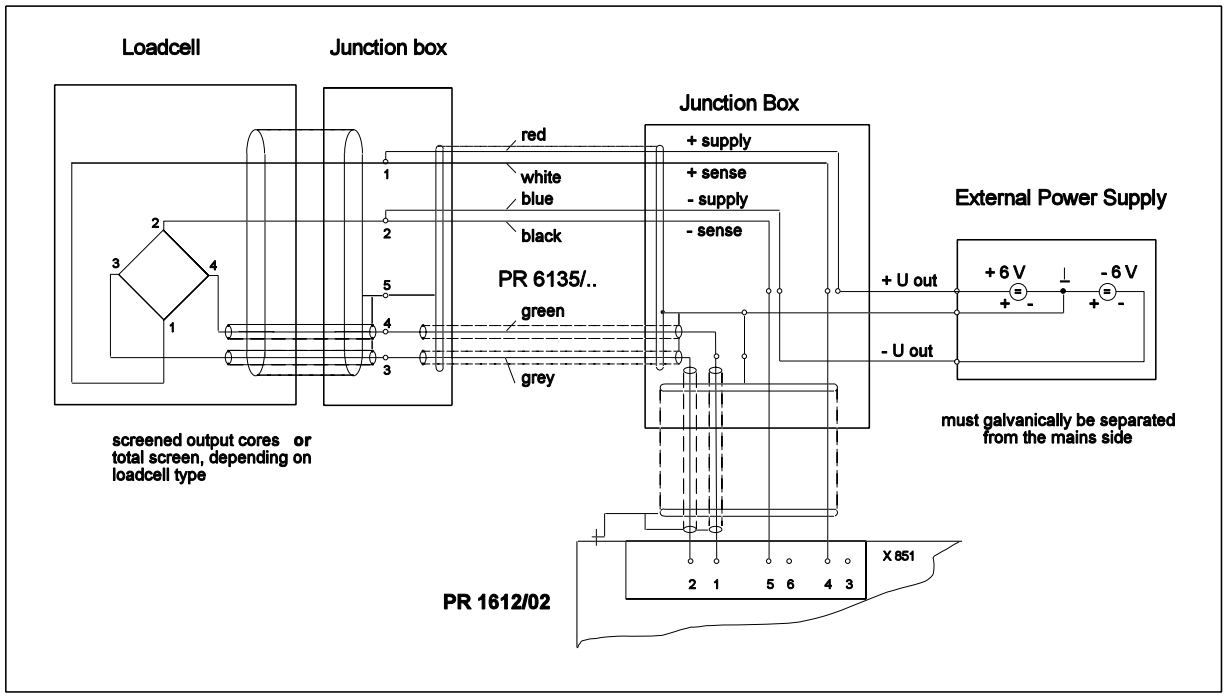
DECIMAL POINT: 0
DIMENSION: "kg"
STEPWIDTH: 1 kg
OVERLOAD: 0009 d
MEASURING TIME :0.300 s
MAX. : 3000 kg
SUPPLY: 12 VOLT
DEADLOAD: 0.0000 mV/V
SPAN: 1.0000 mV/V
STANDSTILL RANGE : 01 d
STANDSTILL TIME : 01 M
ZERO RANGE : 0060 d
AUTOZERO TRACK RANGE: 0.0 d
CORRECTION VALUE: 0.0 d
TIME INTERVAL: 01 M
CHECK MODE : 0
TESTKEY FUNCTION :0
CHECK TOLERANCE : 01 d
REPEAT CHECK IN :00 h
CHECKNUMBER : 00000
DON'T PRINT BELOW: 50 d

MULTI INTERVALL: NO
CHANGE STEP AT: 0 kg
CHANGE STEP AT: 0 kg

W & M - MODE: YES
ANALOG-FILTER: ON

CONTENTS OF PART 7

7.1 EXTERNAL LOADCELL SUPPLY (example)



** Applicable power supply units (for non-assized use) :

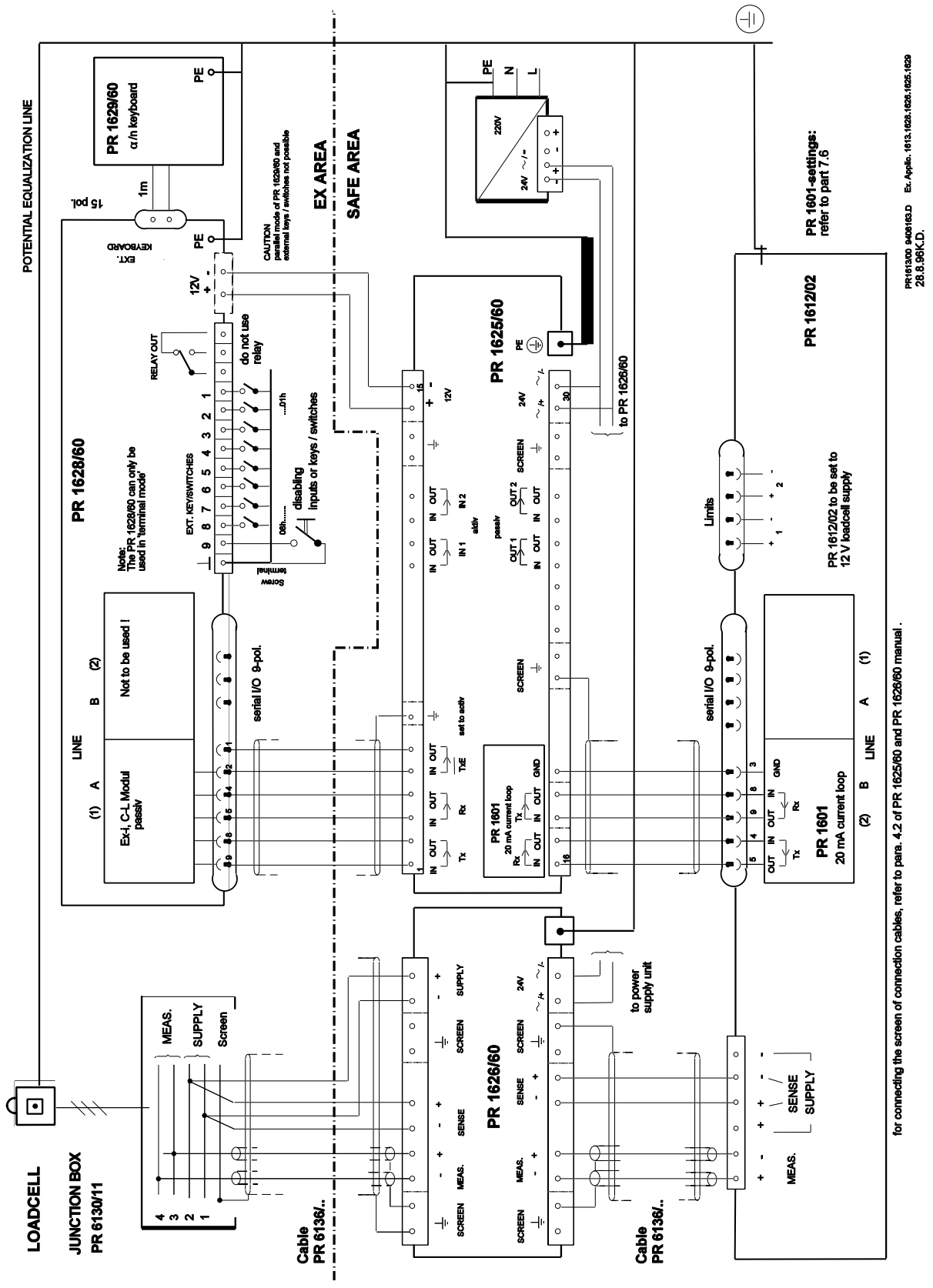
for ± 6 V supply e. g. 2 x type EWS-15-6 } of company "LAMBDA"
for ± 10 V supply e. g. 2 x type EWS-15-9 } connected in serie

or alternatively

for ± 6 V supply e. g. 1 x Typ PSK 205 } of company
for ± 10 V supply e. g. 1 x Typ PSK 212 } "SCHROFF"

The PR 1613 must be adjusted as described in the Operating Manual.

7.2 EX-APPLICATION (example)



7.3 CONNECTION OF REMOTE DISPLAYS

Upon delivery remote display units can be connected to the PR 1612/02 only via its serial interface at line 2 (B) by using interface modules PR 1601 (20 mA current loop TX/RX), or PR 1602 (RS232), or PR 1604 (RS422/485).

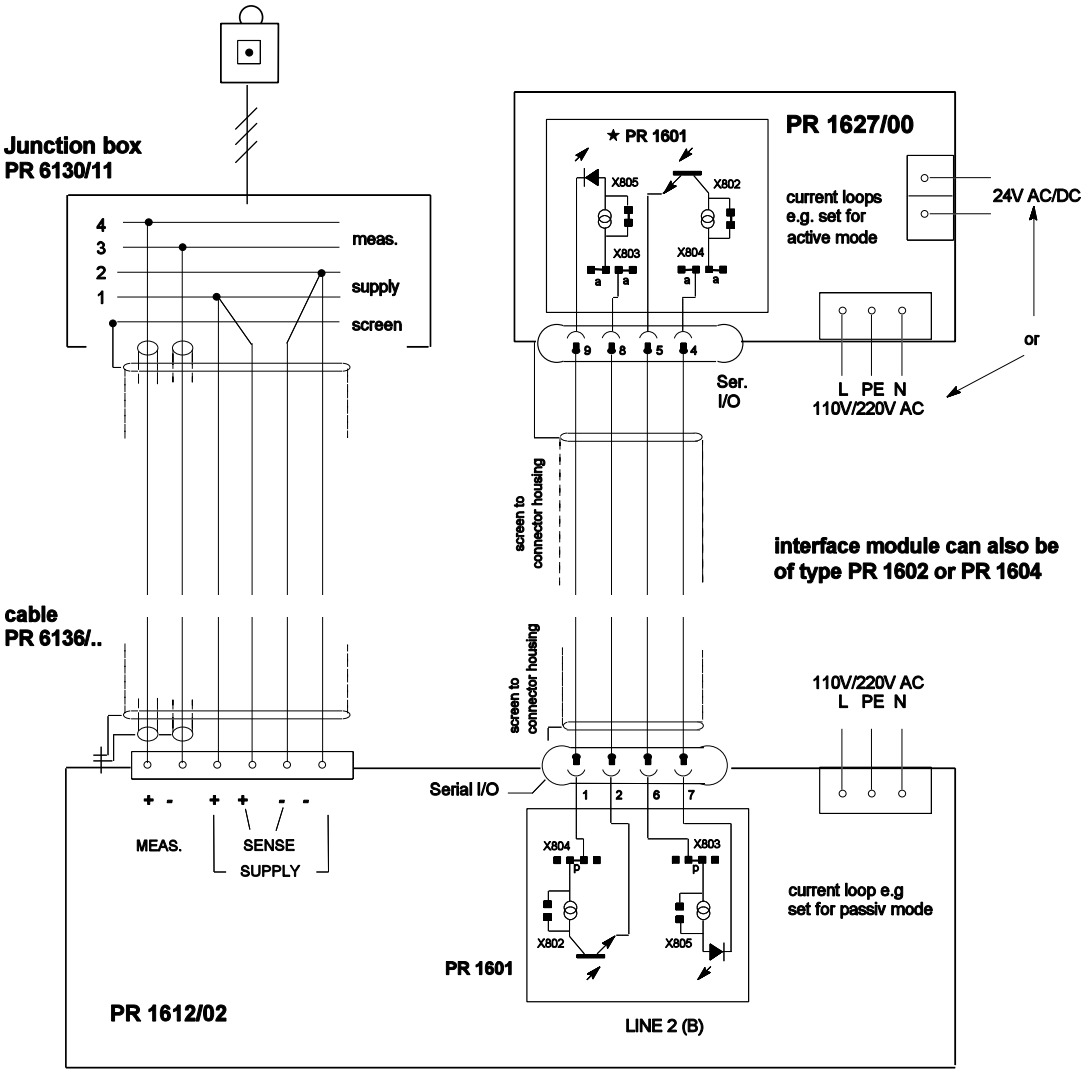
Above mentioned modules are to be set by means of their solder links, and as described below.
Respective settings at the PR 1612/02 for a display mode have to be made in parameters C07, (C08), C10, and C14.

The data transmission between indicator and remote display unit(s) runs as described in part 8.4, and will be started only after having left the set-up procedure.

The connection has to be performed via the 9-pole connector and as shown below.

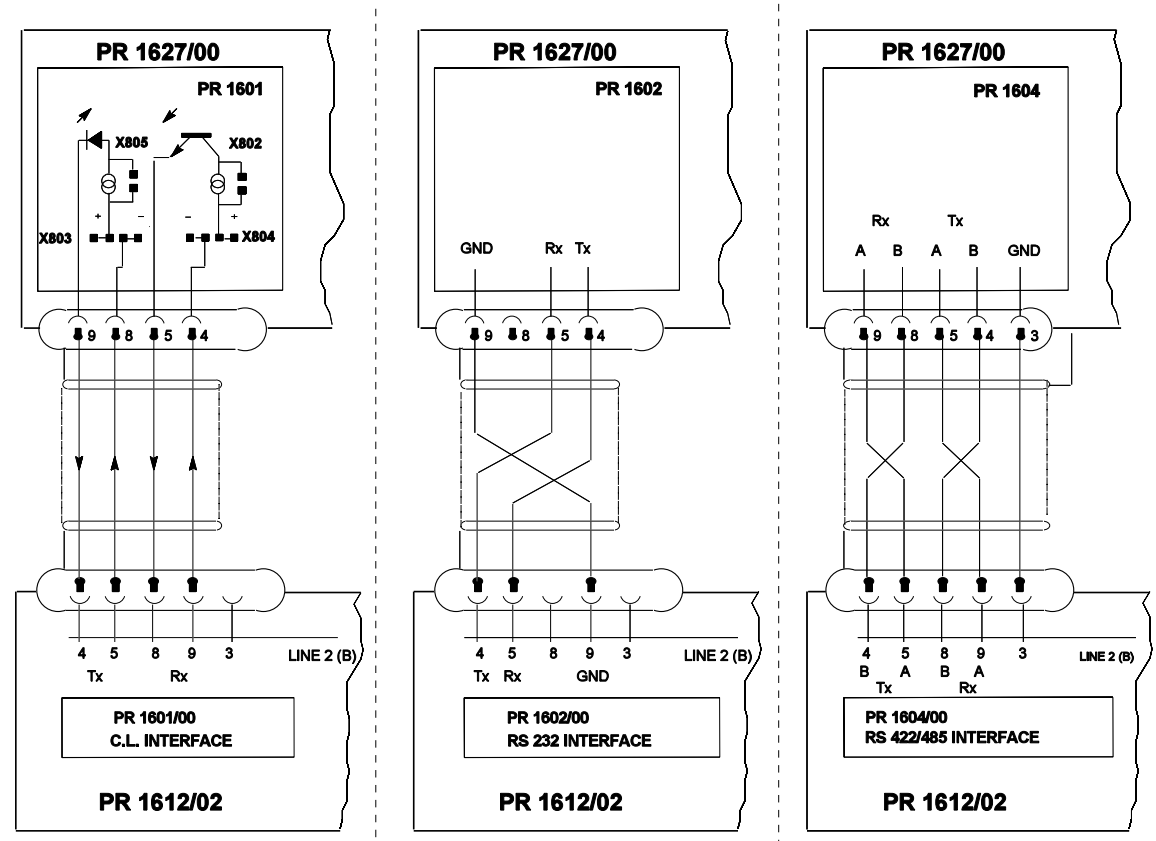
7.3.1 PR 1612/02 with PR 1627/00

7.3.1.1 Application example



PR 1627/00 connectable to the PR1612/02 only via its line 2(B)

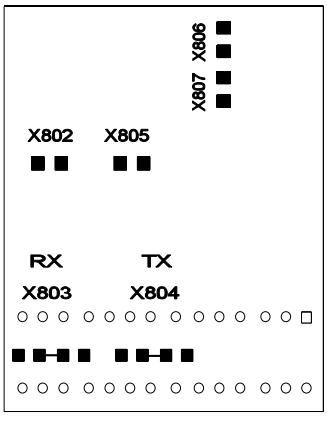
7.3.1.2 Connection via modules PR 1601, PR 1602, or PR 1604



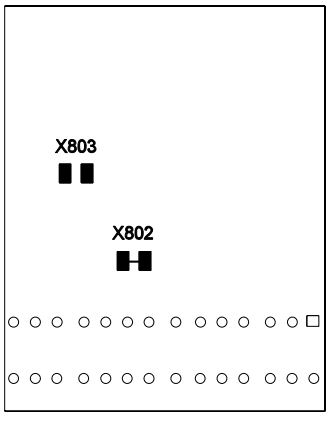
connect screen to housing of connector

connect screen to housing of connector

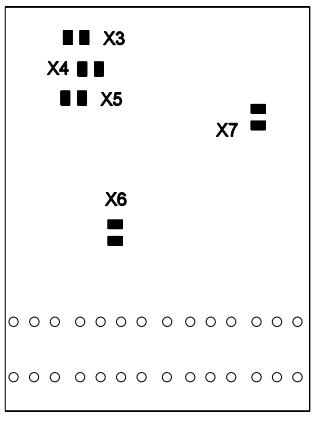
connect screen to housing of connector



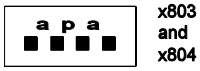
soldering side



soldering side



soldering side



x803 and x804

X802 to be closed

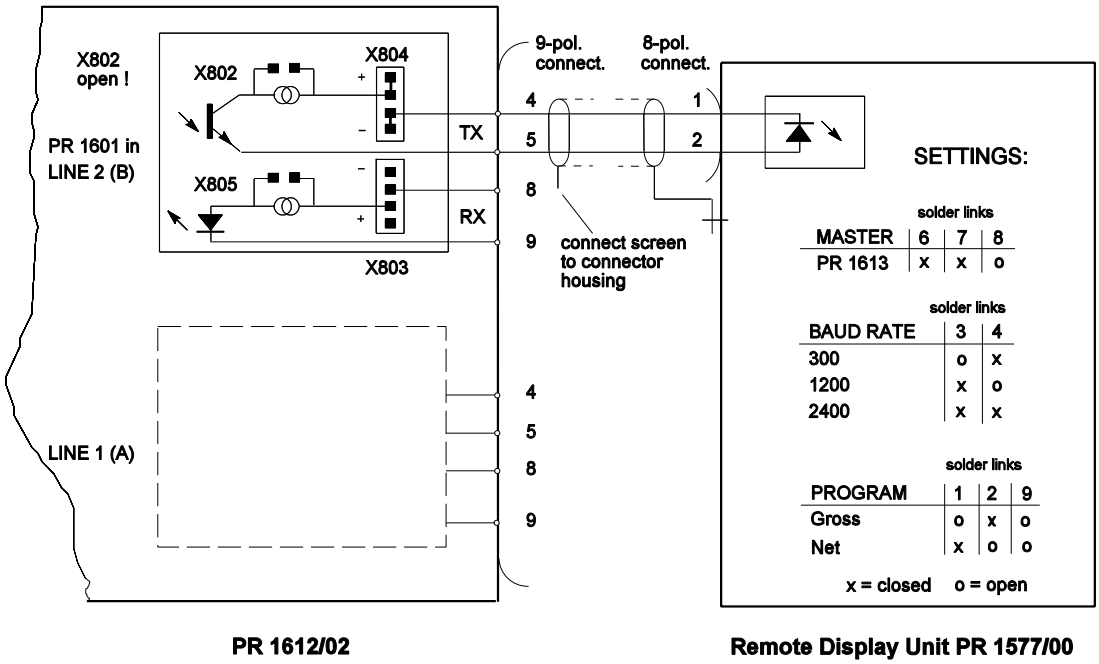
For setting the PR 1604, see part 7.8

a = active = internal supply of the loop
p = passive = external supply of the loop

X 802 and X 805 :
open = 20 mA c.l. regulator on
closed = 20 mA c.l. regulator off

7.3.2 PR 1612/02 with PR 1577/00

7.3.2.1 Application example



Note:
Remote display units are connectable to the PR 1612/02 only via its interface in line 2(B).

Required settings at the PR 1612/02:

1. baudrate (parameter C04) = 300, 600, 1200, or 2400 b/s
2. XON/XOFF (parameter C05) = 0 = off
3. bit and parity (parameter C06) = 0 = 7 / even
3. serial i/o configuration (parameter C10) = 1
4. remote display mode (parameter C14) = 1 = PR 1577-mode 'on'

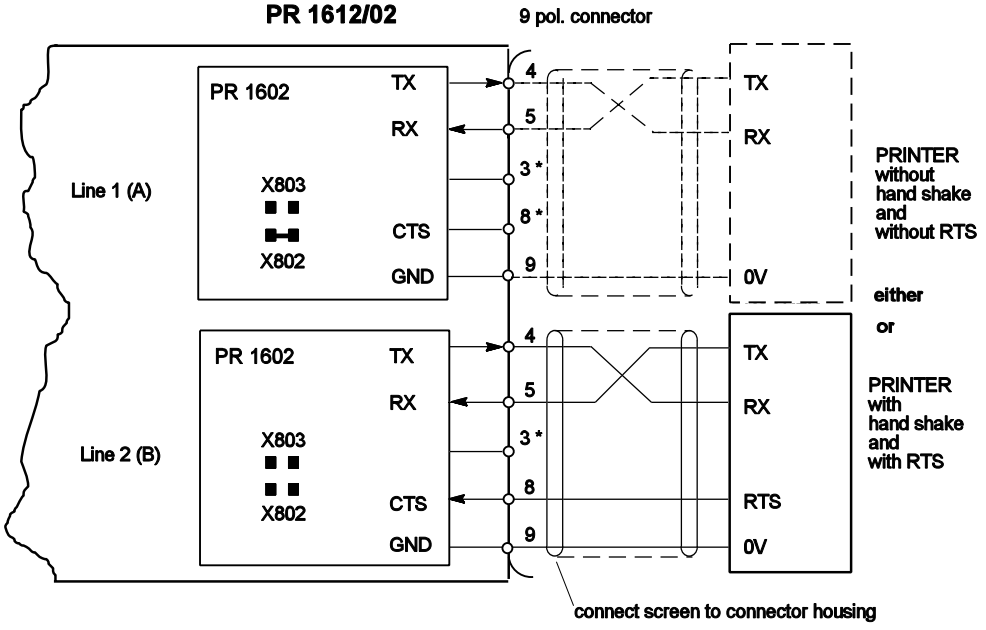
7.4 CONNECTION OF A PRINTER DEVICE

A printer device can be connected to the PR 1612/02 via the 9-pole connector at the rear of the indicator and as drawn below.
Corresponding settings have to be performed in parameters C10, C15, and possibly C20.

Following connections are possible:
1 printer via line 1(A) without hand shake mode, or
1 printer via line 2(B) with hand shake mode, or
1 remote display unit via line 2(B), or
1 instrument in communication mode via line 1(A).

The data transmission between indicator and printer device runs as described in part 8.3, and can be started only after having left the set-up procedure.
The following interface modules can be used:
PR 1601 (20 mA current loop TX/RX), or
PR 1602 (RS232), or
PR 1604 (RS422/485).

7.4.1 Application example with PR 1602



* Do not connect !

• • Handshake mode only possible from printer to PR 1612/02 and via line 2(B).
Solder link X802 closed = handshake mode off,
X802 open = handshake mode on.
Solder link X803 will not be controlled by the PR 1612/02 software.

7.5 SERIAL INPUT AND OUTPUT MODULES

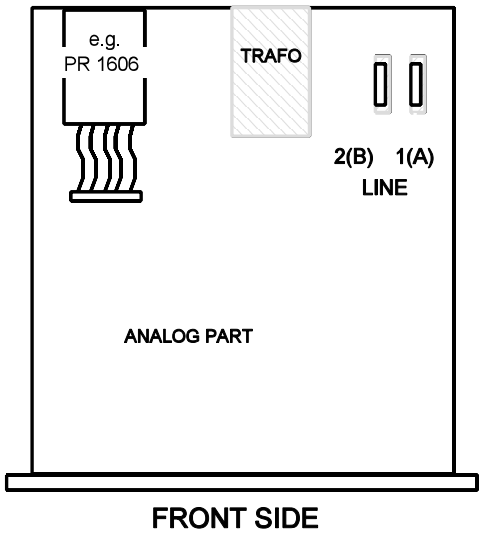
The serial I/O-modules PR 1601, PR 1602, or PR 1604 have to be inserted into the sockets of interface lines 1(A) and/or 2(B) onto the main PCB of the PR 1612/02 indicator depending on conditions as mentioned below (see also parts 7.2 .. 7.4).

Mode	PR 1601	PR 1602	PR 1604
communication or	1(A)	1(A)	1(A)
remote display or	2(B)	2(B)	2(B)
printer	1(A), 2(B)	1(A), 2(B)	1(A), 2(B)

Above mentioned serial I/O modules are to be connected via the 9-pole connector at the rear of the indicator and as desribed in the following parts.

Caution !
Sockets 1(A) and 2(B)
are connected in parallel.
Therefore only one interface module can be used at the same time.

Before installing the interface modules the PR 1612/02 must be switched off.



7.6 OPTION PR 1601 (20 mA current loop module)

7.6.1 Technical data

Refer to part 3.8

7.6.2 Description / Application

The PR 1601 is an optodecoupled bidirectional serial communication interface module for data transfer via 20 ma current loops (transmission loop and receiving loop) .
Transmitter, receiver and their reference potential are galvanically separated from the electronics of the PR 1612/02 by means of optocouplers and a separate winding of the mains transformer.
By means of solder links X804 and X 803 on the PR 1601 module its output and input can be set for active or passive mode.
In active mode the corresponding loop is supplied by a PR 1612/02 internal galvanically isolated voltage, whilst in passive mode the loop must be supplied by an external power supply unit of 12 to 31 V DC (e.g. of type PR 1624/00 from Philips) .
The interface module has got a 20 mA constant current regulator each in the receiving and in the transmission loop.

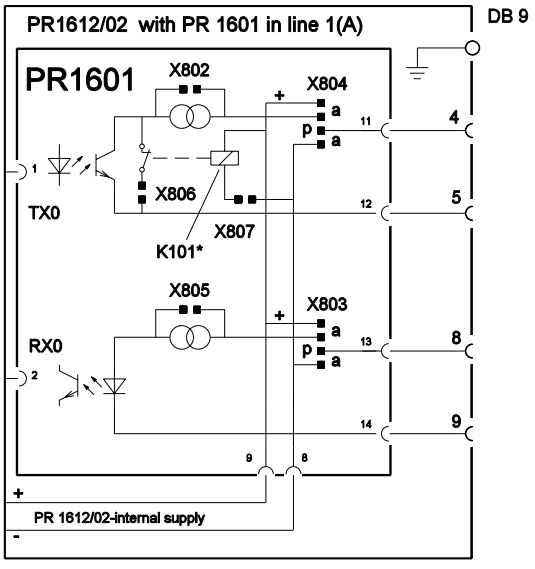
Note:
In case of several devices per loop only one current regulator per loop should be active.
In order to avoid malfunctions all non required regulators per loop and per PR 1601 have to be switched off by closing solder link X802 for the transmission loop, and X805 for the receiving loop.
Nevertheless the number of devices per loop is limited and can be calculated by:

$$n_{max} = \frac{\text{Supply voltage of loop - voltage drop via external devices}}{4V}$$

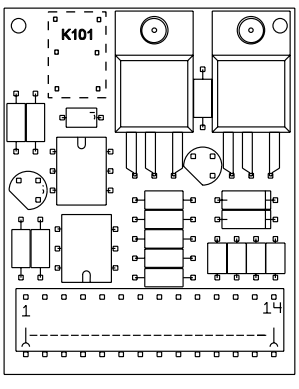
whereby 4 V is the voltage drop across the transmission or receiving input of the PR 1601 module inserted at the PR 1612/02 with solder links X802 and X805 opened.
The PR 1612/02-internal supply voltage is 8V, i.e. only one remote display unit can be connected in this case.
As only one current regulator per loop is required, all the other ones can be disabled by closing their solder links X802 and X805.

The maximum baud rate using a PR 1601 in a PR 1612/02 is 4800b/s.
As interconnection cable to connected devices a screened and pairwisely twisted cable like type LifYCY 2 x 2 x 0,5mm² of company METROFUNK can be used. Maximum cable length is 1000 meter.

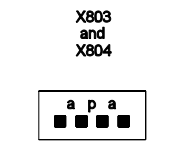
Solder link	Function
X 802	current regulator for TX-loop on/off.
X 803	RX-loop supplied internal (a closed), external (p closed).
X 804	TX-loop supplied internal (a closed), external (p closed).
X 805	current regulator for RX-loop on/off.
X 806	TX-loop can be short circuited by relay contact in case of power off.
X 807	supply of relay on/off.



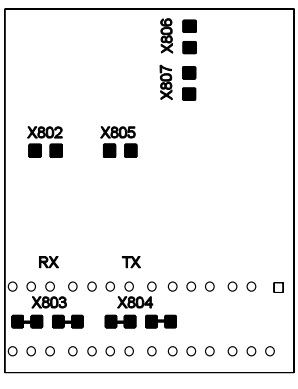
Note: Relay K101 is not fitted upon delivery



component side



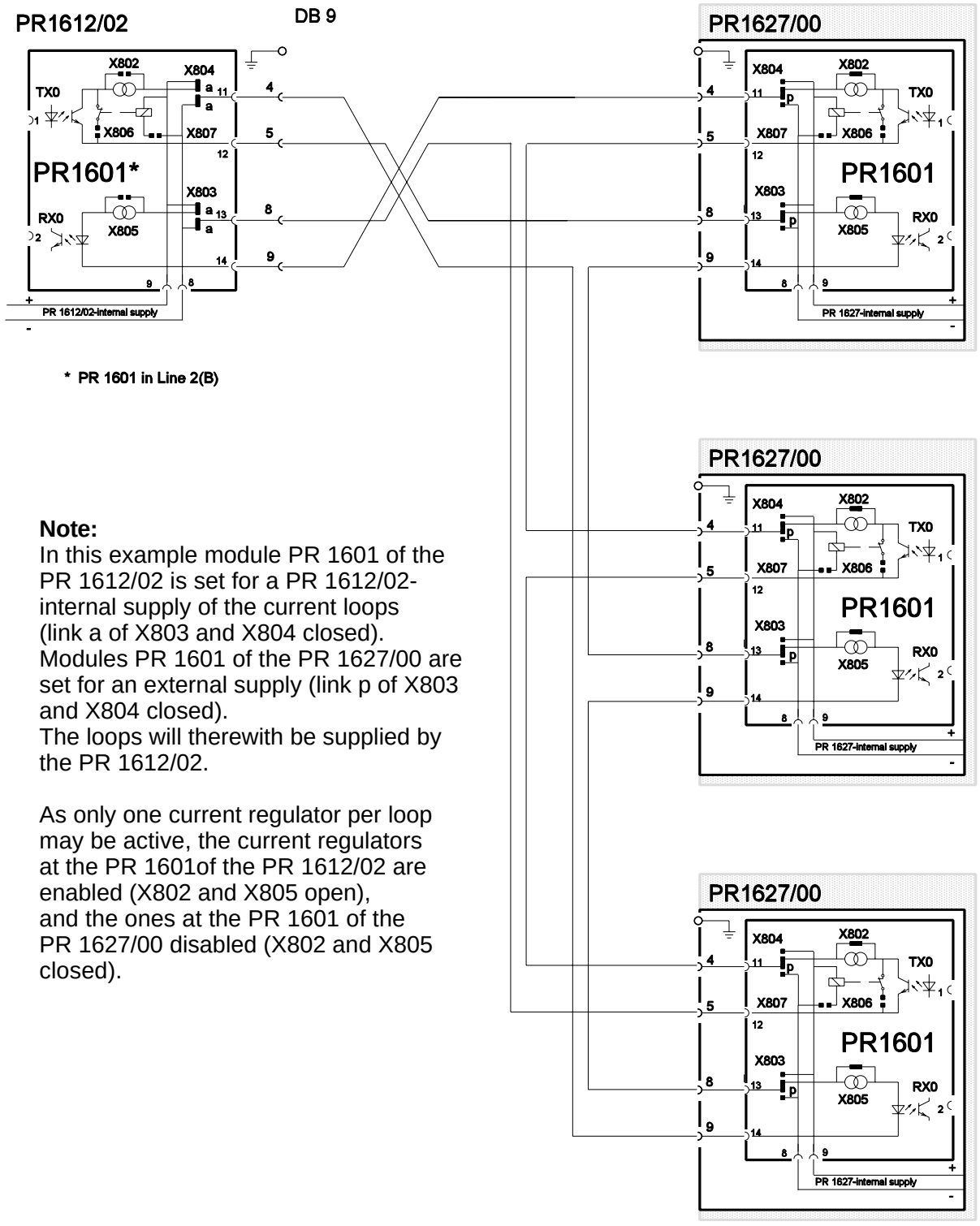
a = activ = internal supply
p = passiv = external supply



soldering side

7.6.2.1 Typical application example with PR 1601

(PR 1612/02 with 3 PR 1627/00 remote display units)



Note:
In this example module PR 1601 of the PR 1612/02 is set for a PR 1612/02-internal supply of the current loops (link a of X803 and X804 closed).
Modules PR 1601 of the PR 1627/00 are set for an external supply (link p of X803 and X804 closed).
The loops will therewith be supplied by the PR 1612/02.

As only one current regulator per loop may be active, the current regulators at the PR 1601of the PR 1612/02 are enabled (X802 and X805 open), and the ones at the PR 1601 of the PR 1627/00 disabled (X802 and X805 closed).

7.7 OPTION PR 1602 (RS 232 module)

7.7.1 Technical data

Refer to part 3.8

7.7.2 Description / Application

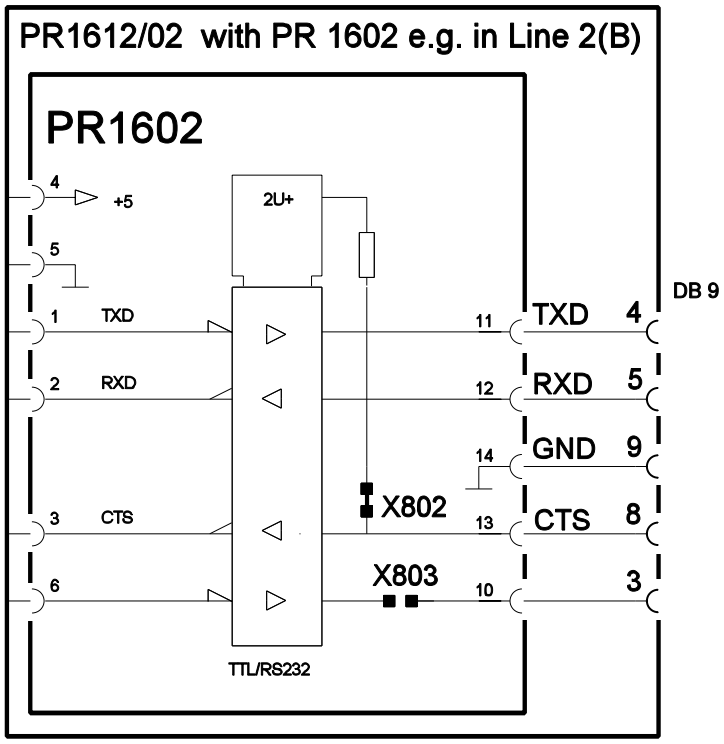
The PR 1602 is a bidirectional serial communication interface module for a data transfer according to the EIA RS 232C, or CCITT V.24 standard.
The data transfer is possible via inputs/outputs TXD, RXD. CTS (clear to send) serve for corresponding control.

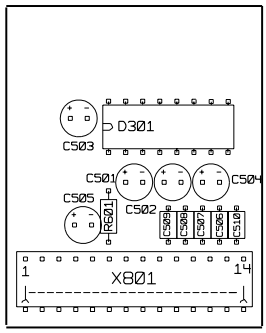
Output and inputs are not galvanically isolated from the inner electronics of the PR 1612/02.

As interconnection cable to connected devices a screened and pairwisely twisted cable like type LifYCY 2 x 2 x 0.5mm² of company METROFUNK can be used.
Maximum cable length is 15 meters.

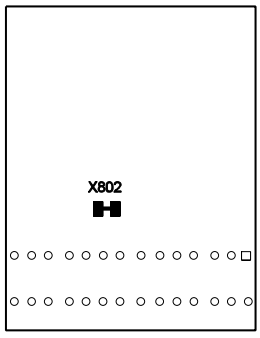
The maximum baud rate using a PR 1602 is 9600 b/s.

Typical application examples are shown in part 7.4., and in the following.





component side

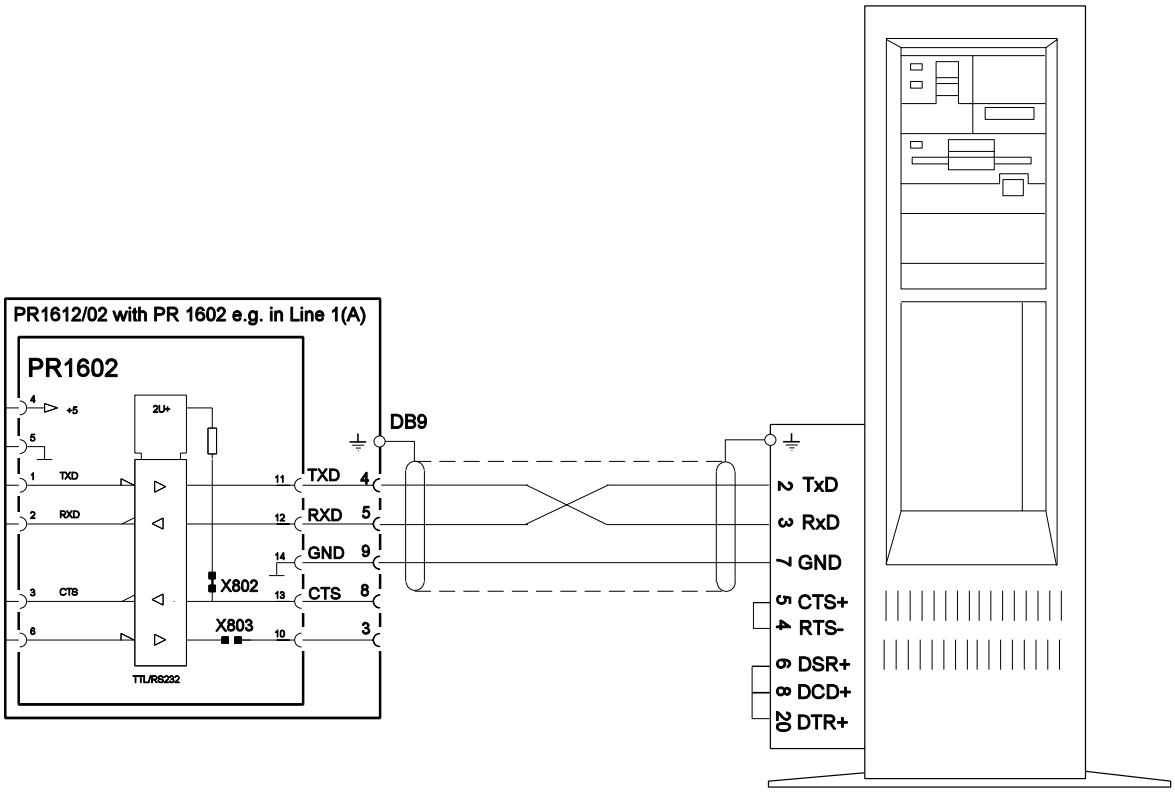


soldering side

Solder link	Function
X802 open	control by external CTS signal possible
X802 closed	CTS continuously (internal) enabled
X803	will not be controlled by PR 1612/02 software

7.7.2.1 Typical application example with PR 1602:

(PR 1612/02 connected to a PC)



Note:
A communication between PR 1612/02 and super or subordinate systems is possible only via line1(A) of the PR 1612/02.

Required settings at the PR 1612/02:

1. baudrate (parameter C05) = 300 ... 9600 b/s
2. bit and parity (parameter C06) = 0 = 7 / even
3. serial i/o configuration (parameter C10) = 3
4. communication mode (parameter C53) = 1 (for EW-protocol)
5. address of the PR 1612/02 (parameter C54) = A .. Z

7.8 OPTION PR 1604 (RS 422/485 module)

7.8.1 Technical data

Refer to part 3.8

7.8.2 Installation

Refer to part 7.5

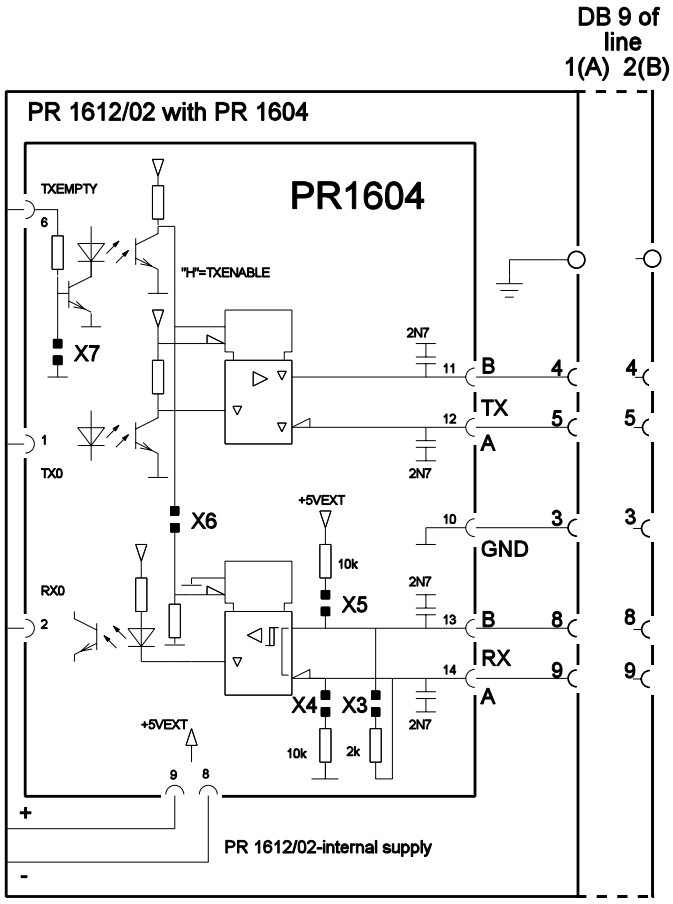
7.8.3 Description

The interface module PR 1604 permits the communication via a bus sytem which works according to the EIA RS 422, or the RS 485 standard.

RS 422 enables a communication between only two devices (point-to-point) in full duplex mode, i.e. via a 4-wire connection.

RS485 enables a communication between
two devices (point-to-point)
in full duplex mode via 4-wire connection ,
or in half duplex mode via 2-wire connection,
or between several devices via a bus connection.

Transmitter, receiver and reference potential are galvanically isolated from the inner electronics of the PR 1612/02 by separate tranformer winding and optodecouplers.



solder-links drawn as set upon delivery

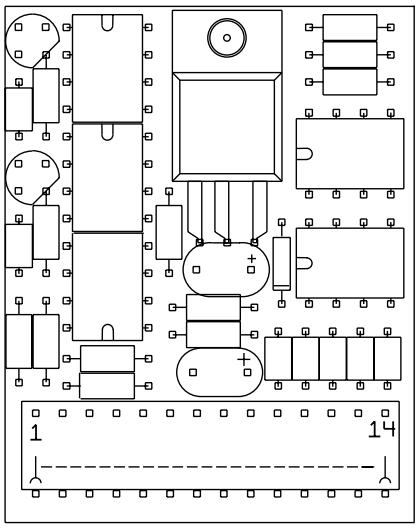
As interconnection cable use
a 3 - pair cable, pairwisely twisted and totally screened cable like type LifYCY 3x2x0.5mm². One pair can be used for the common ground.

The bus cable has to be taken as closely as possible to the particular instruments in order to keep the connection to the indicator (branch cable) as short as possible.
This connection between bus cable and indicator (branch cable) has to be made of the same kind of cable as the bus cable.

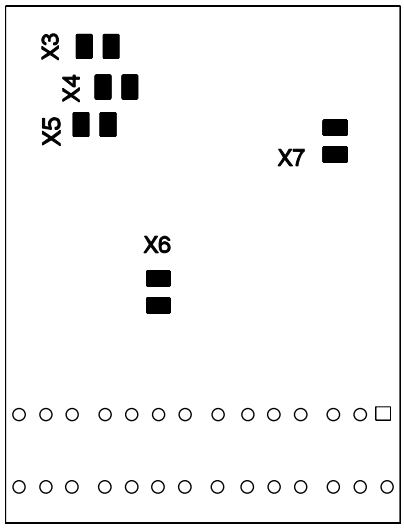
Maximum cable length is 1000 meters.

The maximum baud rate using a PR 1604 into a PR 1612/02 is 9600 b/s.

7.8.4 Settings



component side



soldering side

Solder link		Function	
X3	}	closed	} internal bus terminating resistors:
X4	}	closed	} bus by 205 Ω (X3),
X5	}	closed	} supply voltage by 2 x 1k54 kΩ (X4/5).
X6		open	RX continuously enabled
X6		closed	RX inhibited when TX enabled by PR 1612/02-internal control
X7		open	TX in tristate by PR 1612/02-internal control

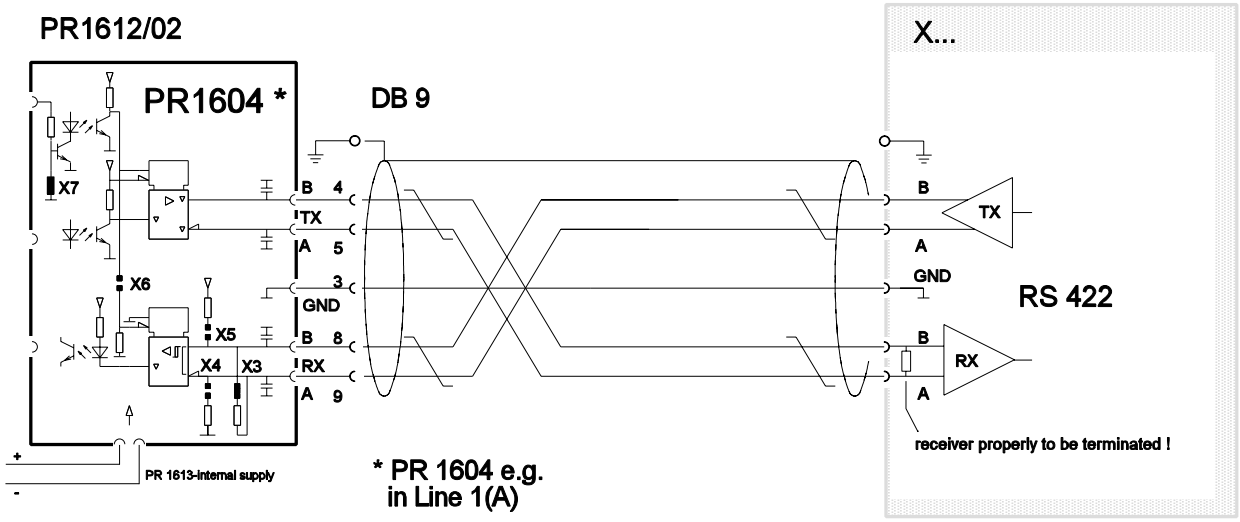
PR 1604	two-wire system		four-wire system	
status	point to point	bus	point to point	bus
master	RS 485 X3, X4, X5, X6	RS 485 X3, X4, X5, X6	RS 422 X3, X7	RS 485 X3, X4, X5
slave	RS 485 X6		RS 422 X3, X7	
other slaves		RS 485 X6		RS 485 none
last slave		RS 485 X6		RS 485 X3, X4, X5

Note: above mentioned solder-links have to be closed

7.8.5 Applications

7.8.5.1 RS 422 Master/Slave point to point connection (example)

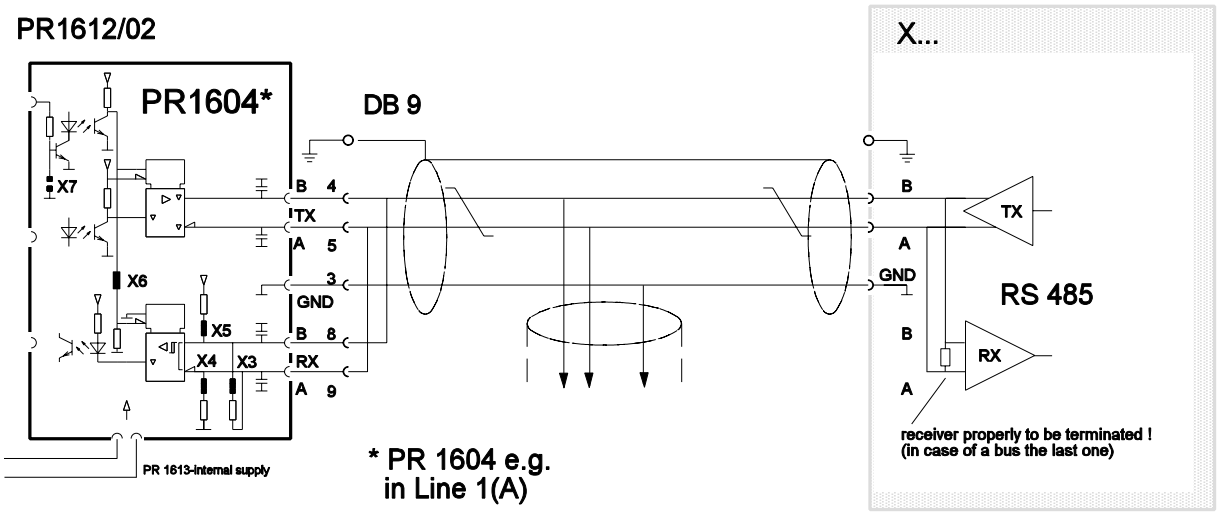
Connection of the PR 1612/02/.. (slave) with an external device (master) which consists of a RS422 interface. **The receiver of the external device must be terminated properly !**



Settings at the PR 1604: solder links X3, X7 closed, solder links X4, X5, X6 open

7.8.5.2 RS 485 2-wire point to point connection (example)

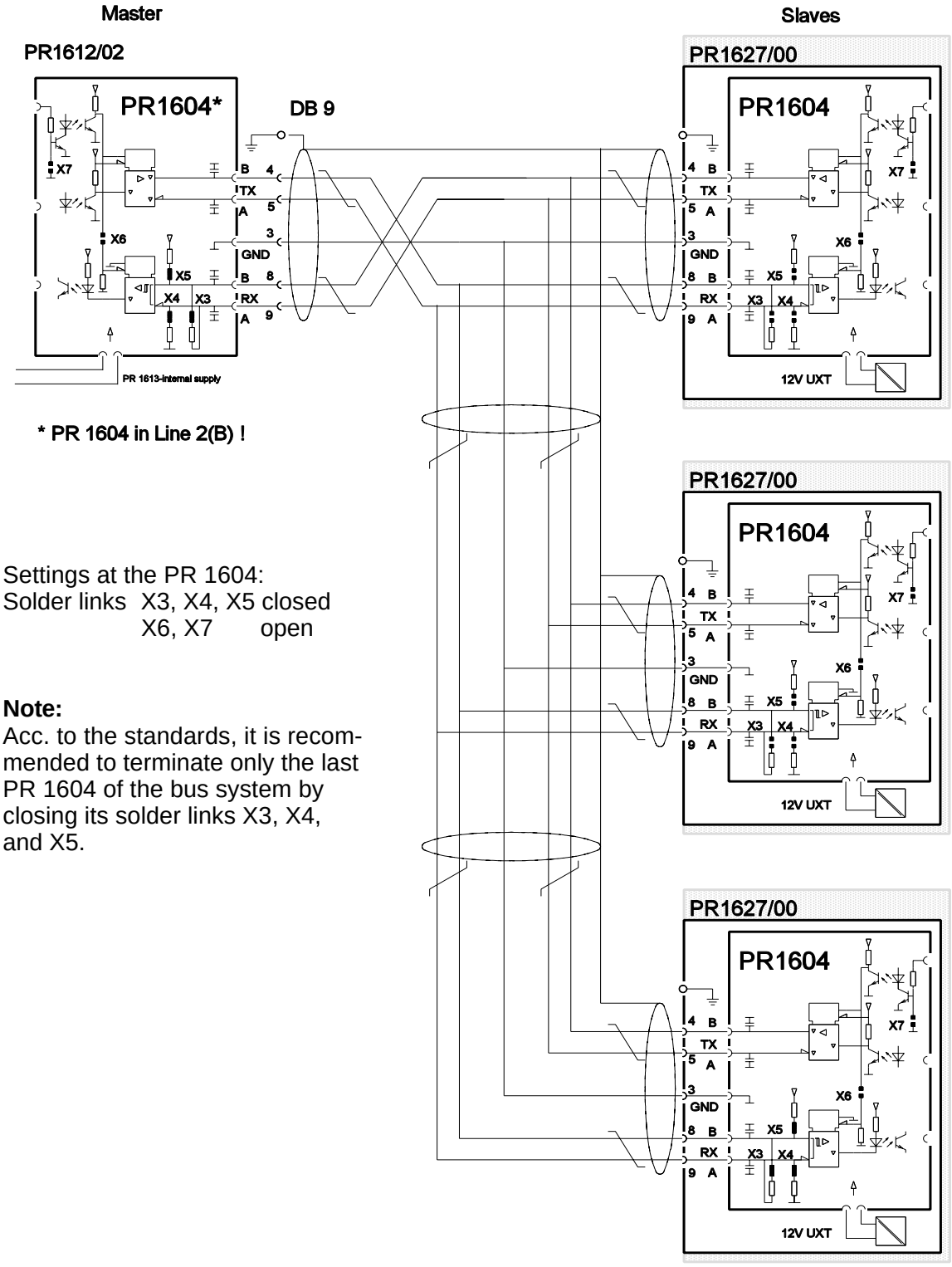
Connection of the PR 1612/02/.. with an external device (PLC) by means of e.g. MODBUS or JBUS in half-duplex mode. The respective devices can only communicate via a 2-wire connection. **The receiver of the external device must be terminated properly !**



Settings at the PR 1604: solder links X3, X4, X5, X6 closed, solder link X7 open

7.8.5.3 RS 485 Master/Slave multi-point connection (example)

Connection of a PR 1612/02/.. with three PR 1627/00-remote display units.
The PR 1612/02 function as Master in this case, and the three remote display units as slaves.



Settings at the PR 1604:
Solder links X3, X4, X5 closed
X6, X7 open

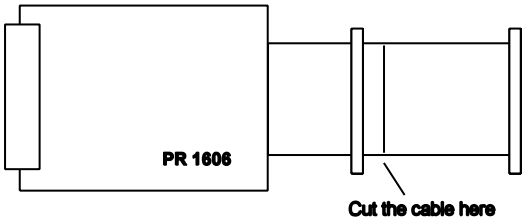
Note:
Acc. to the standards, it is recommended to terminate only the last PR 1604 of the bus system by closing its solder links X3, X4, and X5.

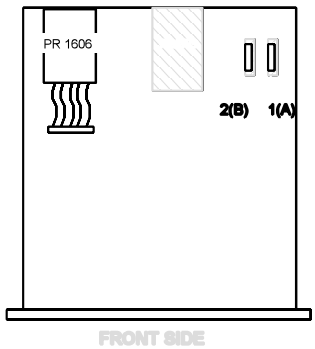
7.9 OPTION PR 1606 (analog output module)

7.9.1 Technical data

Refer to part 3.10

7.9.2 Installation





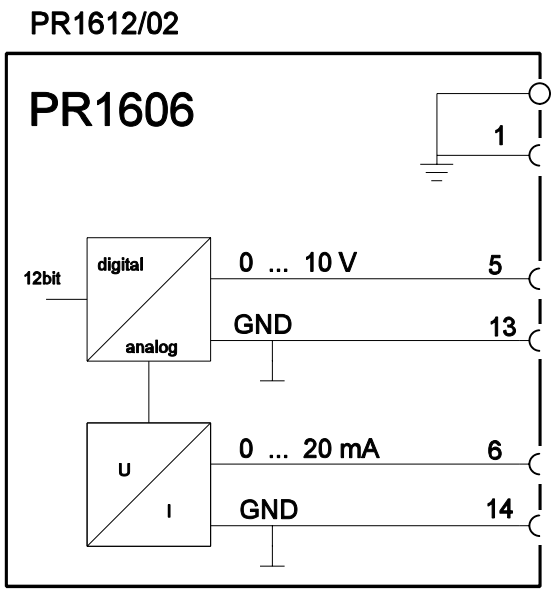
Before installing disconnect the mains voltage from the PR 1612/02 and cut the flat cable behind the first connector.

7.9.3 Description / Application

The PR 1606 converts the binary value of the PR 1612/02 into a respective analogue value.
The kind of value (gross, net, etc) can be defined by means of parameter C12 during configuration (refer to part 6.3.1, C12).

Upon delivery the instrument delivers
0 .. +10V DC, and
0 .. +20 mA
(both end values at f.s.d.).

By means of parameter C17 the offset can be set to
2 .. +10V DC, and
4 .. +20mA
during configuration (refer to part 6.3.1, C17).



Note:
When using the PR 1606:
- only an output signal of positive weight values will be generated,
- if the gross weight is > f.s.d. + Amax, or with the indication of ERR1, 2, 3, or 6, the last valid output signal will be kept, until the value falls below a. m. limits again.
- if the gross weight is < ¼ d, or with the indication of ERR4, 5, or 7, the output signal remains at 'zero' level signal as selected by C17, until < ¼ d will be exceeded again.
- after taring in output mode 1 and 3 (weight display and output signal = net) the output signal will be kept at 'zero' level, if the net weight becomes negative.

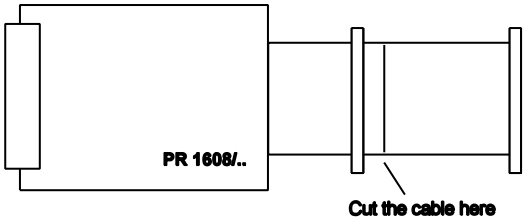
7.10 OPTION PR 1608/00 (BCD/PLC output module with common supply)

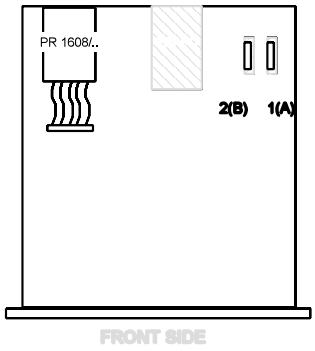
The BCD output values can be set according to the particular weight values by means of parameter C12 during configuration. Refer to part 6.3.1, C12.

7.10.1 Technical data

Refer to part 3.11

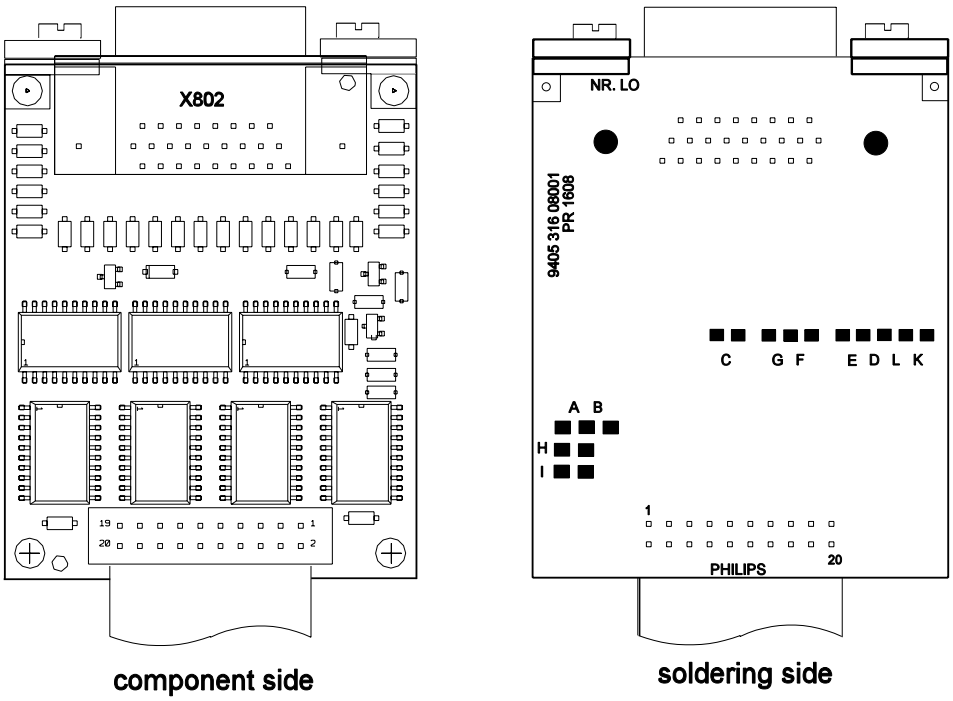
7.10.2 Installation

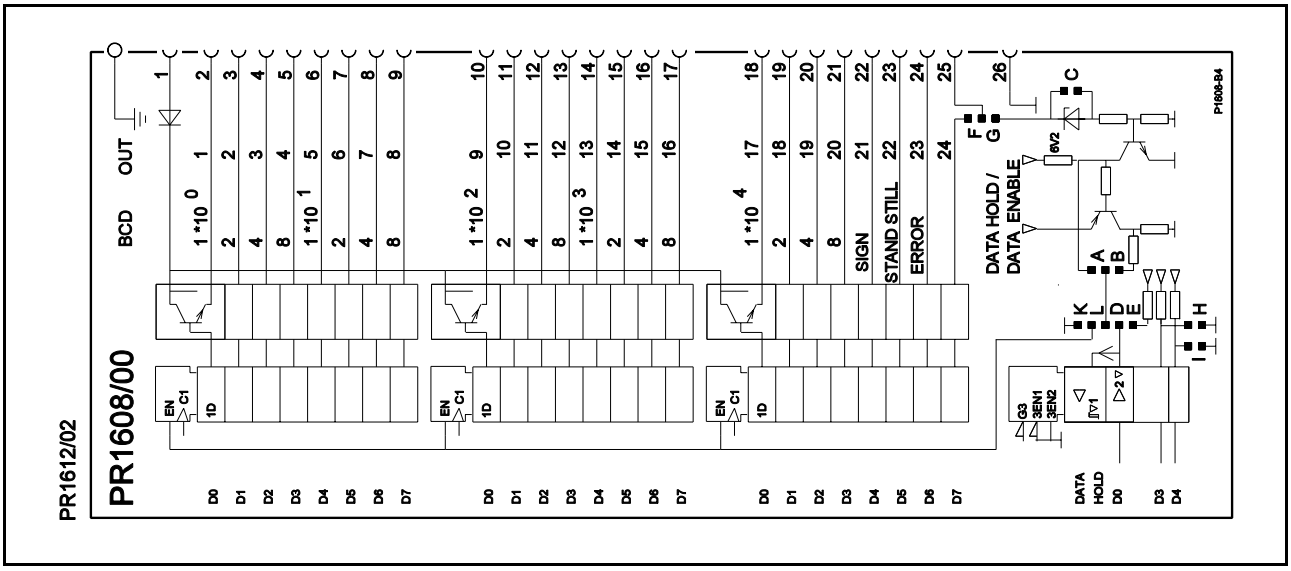




Before installing disconnect the mains voltage from the PR 1612/02 and cut the flat cable behind the first connector.

7.10.3 Settings





Solder link	Function
A closed (B open)	Input signal (data hold/enable) active high
B closed (A open)	Input signal (data hold/enable) active low
C closed	Input signal (data hold/enable) level 5V
C open	input signal (data hold/enable) level 24V
D closed (E open)	input active = DATA HOLD *
E closed (D open)	always actual weight data
F closed (G open)	pin 25 = PLC bit 24
G closed (F open)	pin 25 = input signal
H open	logic '1' = output transistor 'on' (coducting)
H closed	logic '1' = output transistor 'off ' (non-conducting)
I closed	PLC mode
I open	Weight mode
K closed (L open)	outputs are enabled
L closed (K open)	input active = ENABLE *

* It is possible to close both solder links D and L in order to perform the function as described in BCD mode 3.

Default setting: links A,D,G, and K closed (= output mode 2, for an active high input signal).
links B,C,E,F,H,I, and L open

7.10.4 Application

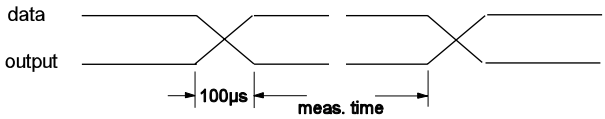
The module PR 1608/00 can be used for various output modes.

7.10.4.1 Output mode 1

Continuous weight data output, no external data enable signal required.

Set-up at PR 1608/00: solder links E, K closed / A, B, C, D, F, G, L, I opened,
solder link H depending on desired logic level (see 7.10.3)

Timing:



7.10.4.2 Output mode 2

Data Hold on external request.

Set-up at PR 1608/00:

solder links	G, K, D	closed
	E, F, L, I	opened
	A ,B, C, H	depending on desired logic level (see 7.10.3)

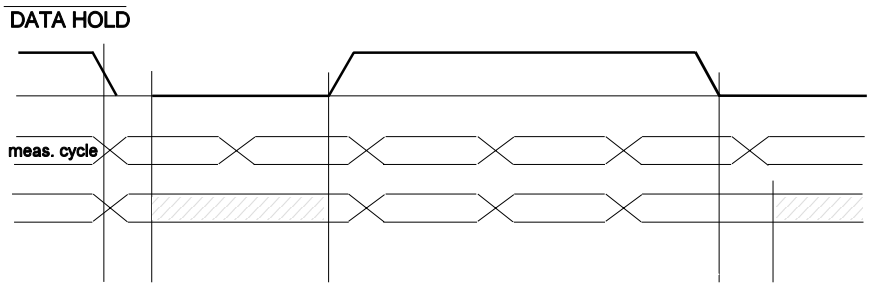
7.10.4.3 Output mode 3

Parallel bus system.
Several PR 1608 modules can be connected in parallel and be controlled by external data hold/enable signals. Data are available in 'frozen' condition.

Set-up at PR 1608/00:

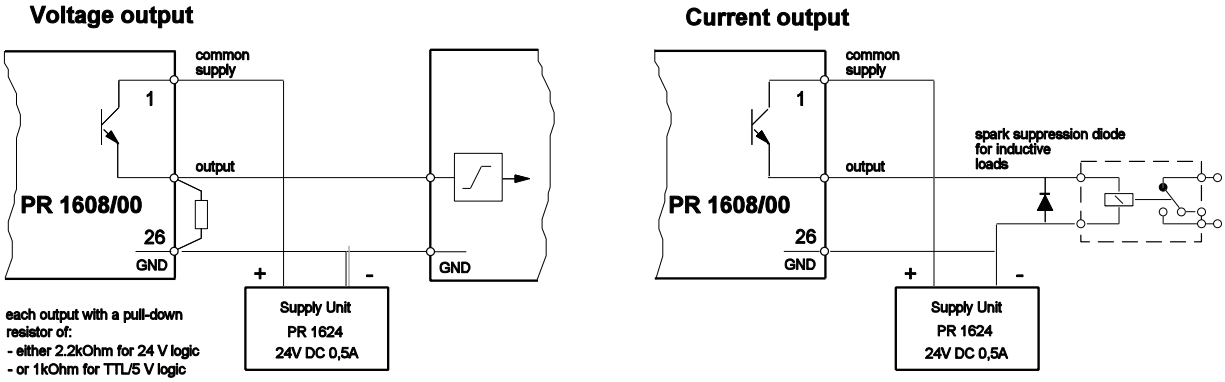
solder links	D, G, L	closed
	E, F, K, I	opened
	A ,B,C, H	depending on desired logic level (see 7.10.3)

Timing in exceptional cases (link B closed):



* NOTE:
It is possible that the internal write procedure has already been started when the external control signal changes from 'DATA HOLD' to 'DATA VALID'.
Therefore the external equipment should start reading the data with a delay of > 100 µs after 'DATA VALID' is active.

7.10.4.4 General connection examples

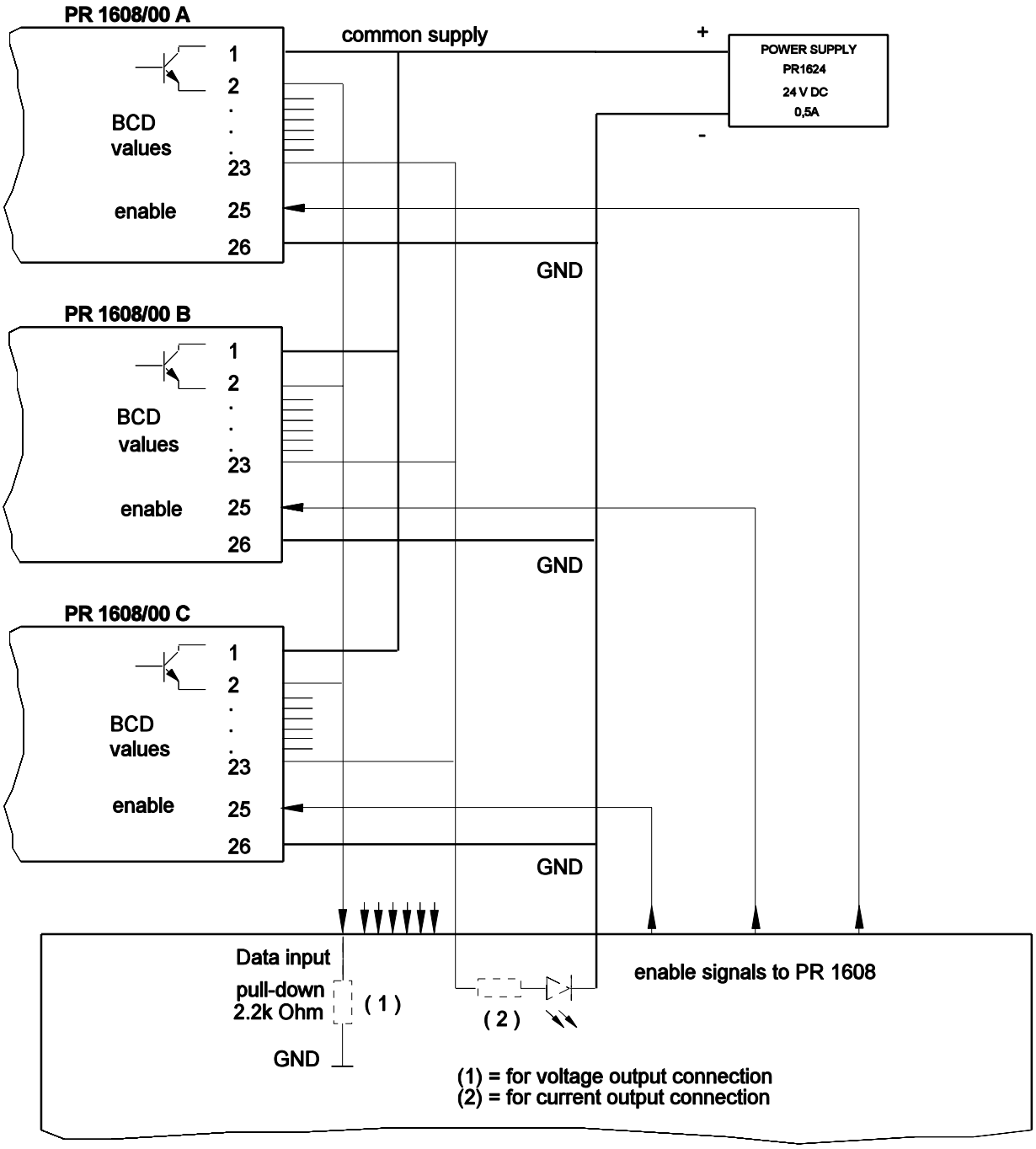


7.10.4.5 Pin allocation of the PR 1608/00 connection cable (part of the delivery scope)

PR 1608 cable connection			BCD value	
2	------>	brown	1 }	
3	------>	green	2 }	10E0
4	------>	yellow	4 }	
5	------>	grey	8 }	
6	------>	pink	1 }	
7	------>	blue	2 }	10E1
8	------>	red	4 }	
9	------>	black	8 }	
10	------>	violet	1 }	
11	------>	grey-pink	2 }	10E2
12	------>	red-blue	4 }	
13	------>	white-green	8 }	
14	------>	brown-green	1 }	
15	------>	white-yellow	2 }	10E3
16	------>	yellow-brown	4 }	
17	------>	white -grey	8 }	
18	------>	grey-brown	1 }	
19	------>	white-pink	2 }	10E4
20	------>	pink-brown	4 }	
21	------>	white-blue	8 }	
22	------>	brown-blue	minus sign	
23	------>	white-red	standstill	
24	------>	brown-red	error	
25	<-----	white-black	data hold/enable	
1	------>	white	+ Vext.	
26	------>	brown-black	GND	

For technical specifications of the cable please refer to part 3.11

7.10.4.6 Typical connection example to a PLC



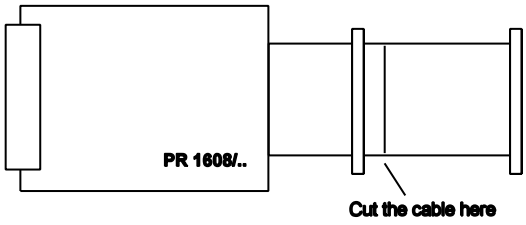
7.11 OPTION PR 1608/10 (BCD/PLC output module with common ground)

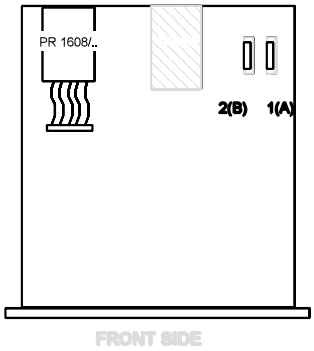
The BCD output values can be set according to the particular weight values by means of parameter C12 during configuration. Refer to part 6.3.1, C12.

7.11.1 Technical data

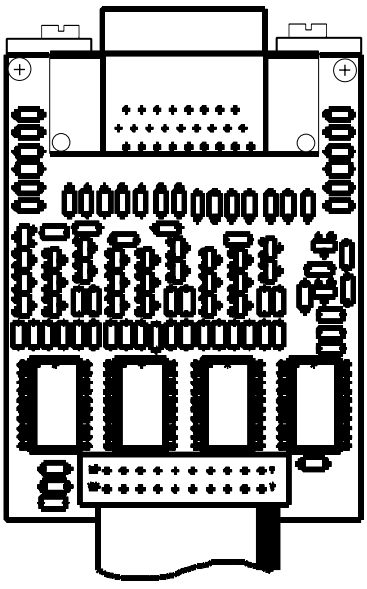
Refer to part 3.12

7.11.2 Installation

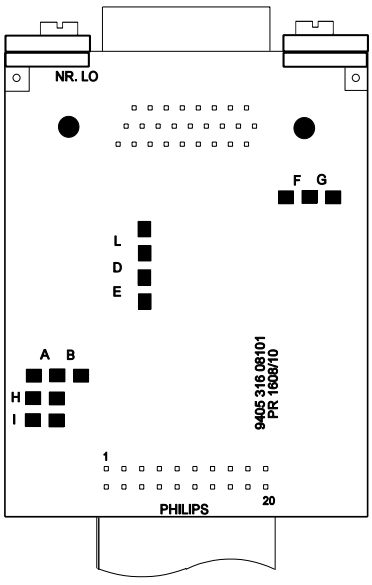




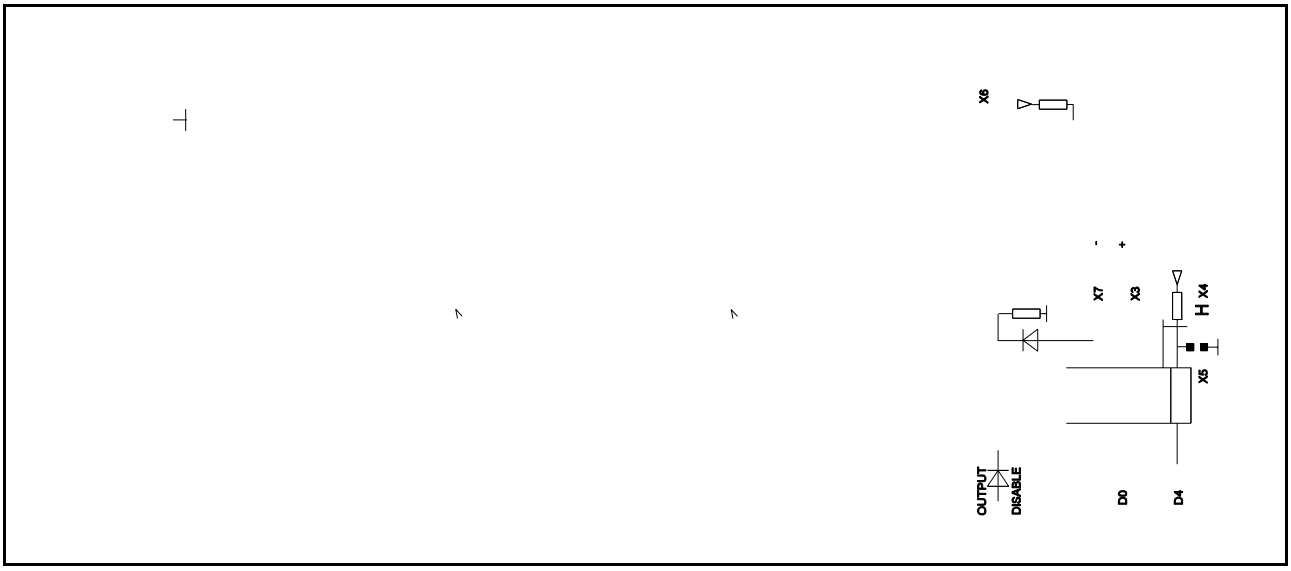
7.11.3 Settings



component side



soldering side



Solder link	Function
A closed (B open)	Input signal (data hold/enable) active high
B closed (A open)	Input signal (data hold/enable) active low
D closed (E open)	input active = DATA HOLD *
E closed (D open)	always actual weight data
F closed (G open)	pin 25 = PLC bit 24
G closed (F open)	pin 25 = input signal
H open	logic '1' = output transistor 'on' (coducting)
H closed	logic '1' = output transistor 'off ' (non-conducting)
I closed	PLC mode
I open	Weight mode
L closed (K open)	input active = ENABLE *

* It is possible to close both solder links D and L in order to perform the function as described in BCD mode 3.

Default setting: links B, D, G, and H closed (output mode 2, for an active low input signal),
links A, E, F, I and L open

7.11.4 Application

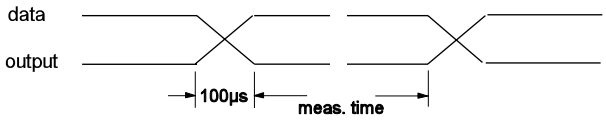
The module PR 1608/10 can be used for various output modes.

7.11.4.1 Output mode 1

Continuous weight data output, no external data enable signal required.

Set-up at PR 1608/10: solder links E, closed / A, B, F, G, D, L, I opened,
solder link H depending on desired logic level (see 7.11.3)

Timing:



7.11.4.2 Output mode 2

Data Hold on external request.

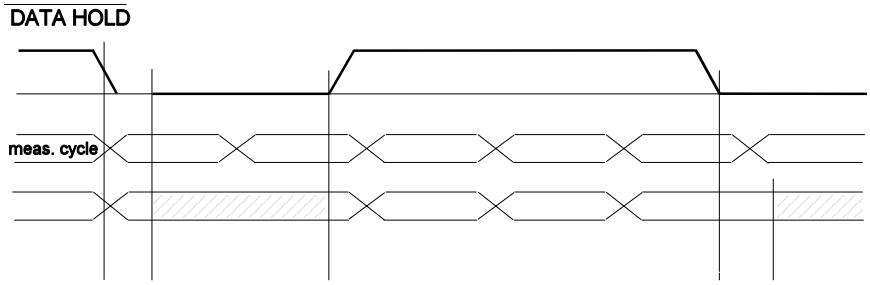
Set-up at PR 1608/10: solder links D, G closed / E, F, L, I opened
solder links A ,B, H depending on desired logic level (see 7.11.3)

7.11.4.3 Output mode 3

Parallel bus system.
Several PR 1608/10 modules can be connected in parallel and controlled by external data hold/enable signals.

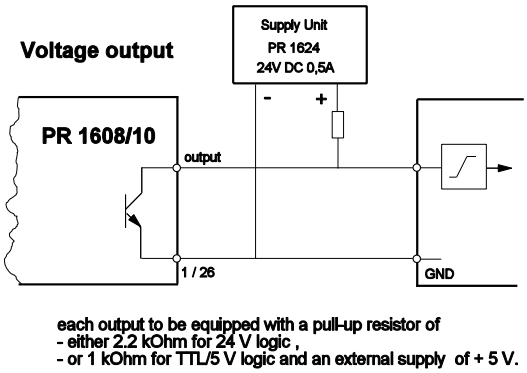
Set-up at PR 1608/10: solder links D, G, L closed
solder links E, F, I opened
solder links A ,B, H depending on desired logic level (see 7.11.3)

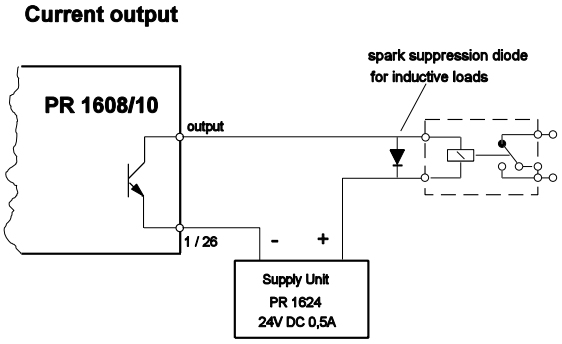
Timing in exceptional cases (link B closed):



* **NOTE:**
It is possible that the internal write procedure has already been started when the external control signal changes from 'DATA HOLD' to 'DATA VALID'.
Therefore the external equipment should start reading the data with a delay of > 100 µs after 'DATA VALID' is active.

7.11.4.4 General connection examples





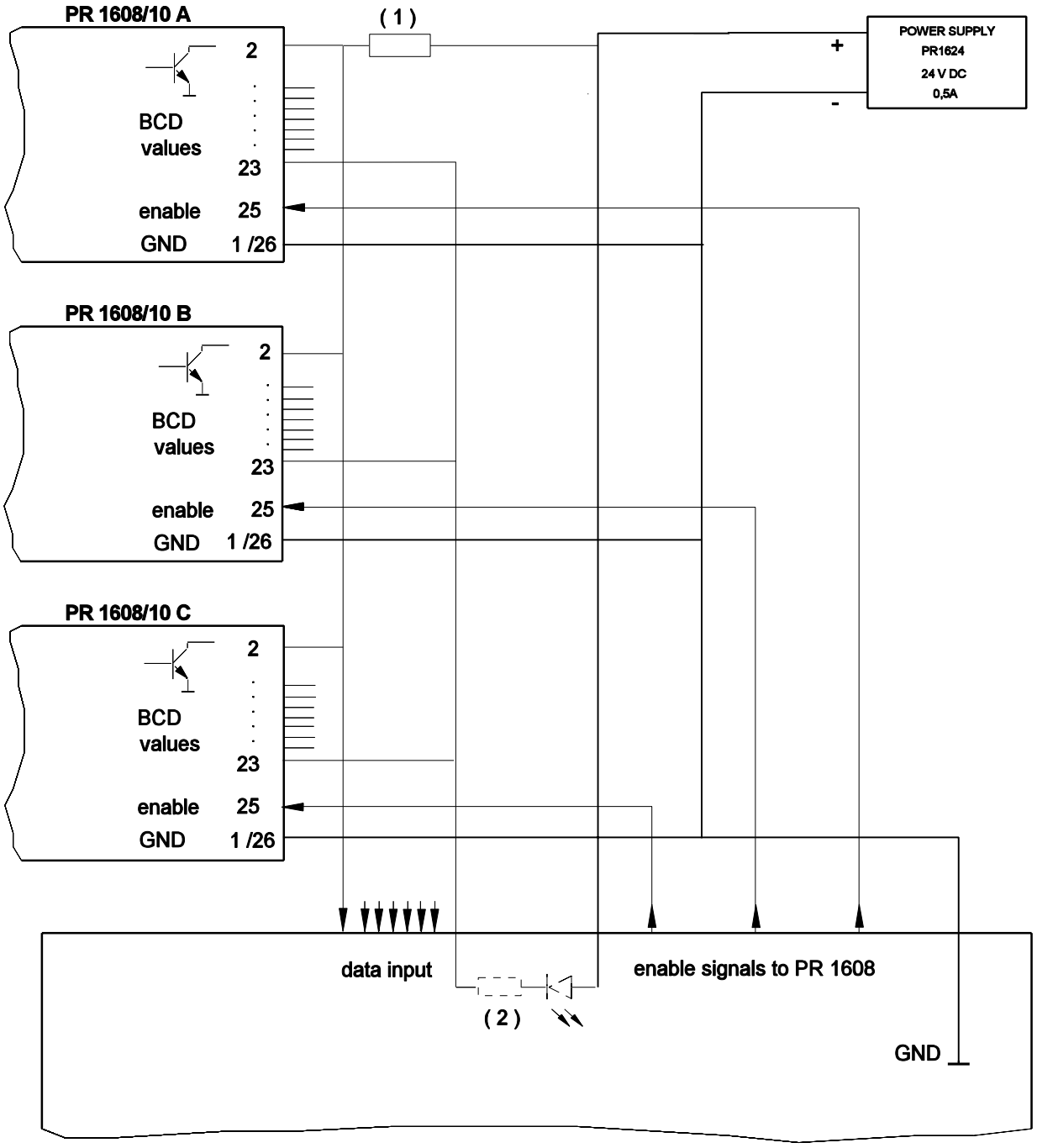
7.11.4.5 Pin allocation:

PR 1608/10

cable connection			BCD value	
2	------>	brown	1 }	
3	------>	green	2 }	10E0
4	------>	yellow	4 }	
5	------>	grey	8 }	
6	------>	pink	1 }	
7	------>	blue	2 }	10E1
8	------>	red	4 }	
9	------>	black	8 }	
10	------>	violet	1 }	
11	------>	grey-pink	2 }	10E2
12	------>	red-blue	4 }	
13	------>	white-green	8 }	
14	------>	brown-green	1 }	
15	------>	white-yellow	2 }	10E3
16	------>	yellow-brown	4 }	
17	------>	white -grey	8 }	
18	------>	grey-brown	1 }	
19	------>	white-pink	2 }	10E4
20	------>	pink-brown	4 }	
21	------>	white-blue	8 }	
22	------>	brown-blue	minus sign	
23	------>	white-red	standstill	
24	------>	brown-red	error	
25	<-----	white-black	data hold/enable	
1	------>	white	GND	
26	------>	brown-black	GND	

For technical specifications of the cable please refer to part 3.12

7.14.4.6 Typical connection to a PLC



each output to be equipped with a pull-up resistor of
- either 2.2 kOhm for 24 V logic,
- or 1 kOhm for TTL/5 V logic with an external supply of + 5 V.

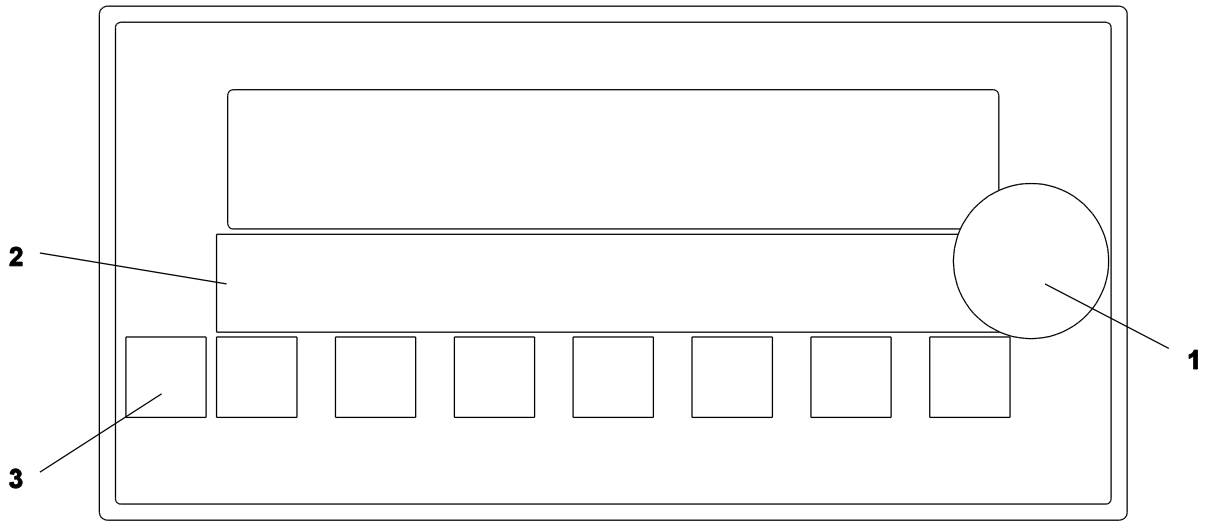
(1) = for voltage output connection
(2) = for current output connection

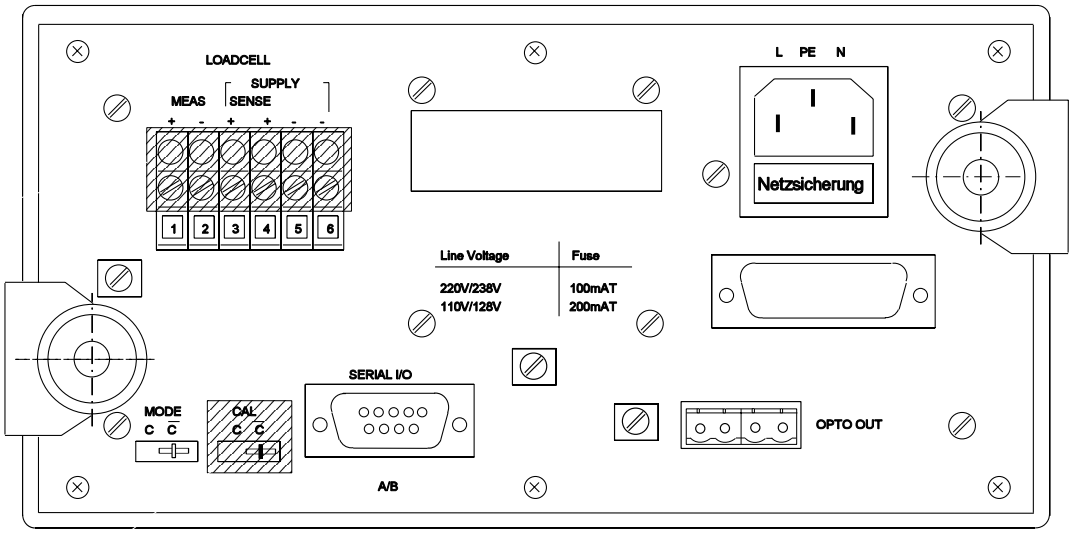
7.12 LOCATION OF SEALS (sealing plan)

In order to facilitate weights & measures approval by the local authorities, type approval labels and seals, which can be fitted on the indicator as shown in the following example are enclosed in a plastic bag in the cover of this manual.

The green and red M-label(s) is (are) to be placed acc. to the directives.

We recommend to use 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.
If required, this pen is available under service code no. 5312 310 18045 from your local sales or service organization of Philips Weighing.





switch CAL must be sealed in position $\bar{C}$

Seal 1
That seal is fitted by the local W&M authority.

Seal 2 (main identification label)
(If required, CE label and the green label are fitted by the local W&M authority).

CE

a. empty identification label

PHILIPS **PR1612/02** LO	MAX = MIN = e =	III **D93-09-120**

b. example for inscription on a single-range weight indicator:

PHILIPS **PR1612/02** LO	MAX = MIN = e =	III **D93-09-120**

c. example for inscription on a multi-range weight indicator:

PHILIPS **PR1612/02** LO	MAX = MIN = e =	W1	W2	III **D93-09-120**

Seal 3 (test function label)
(no requirement of EC type approval)

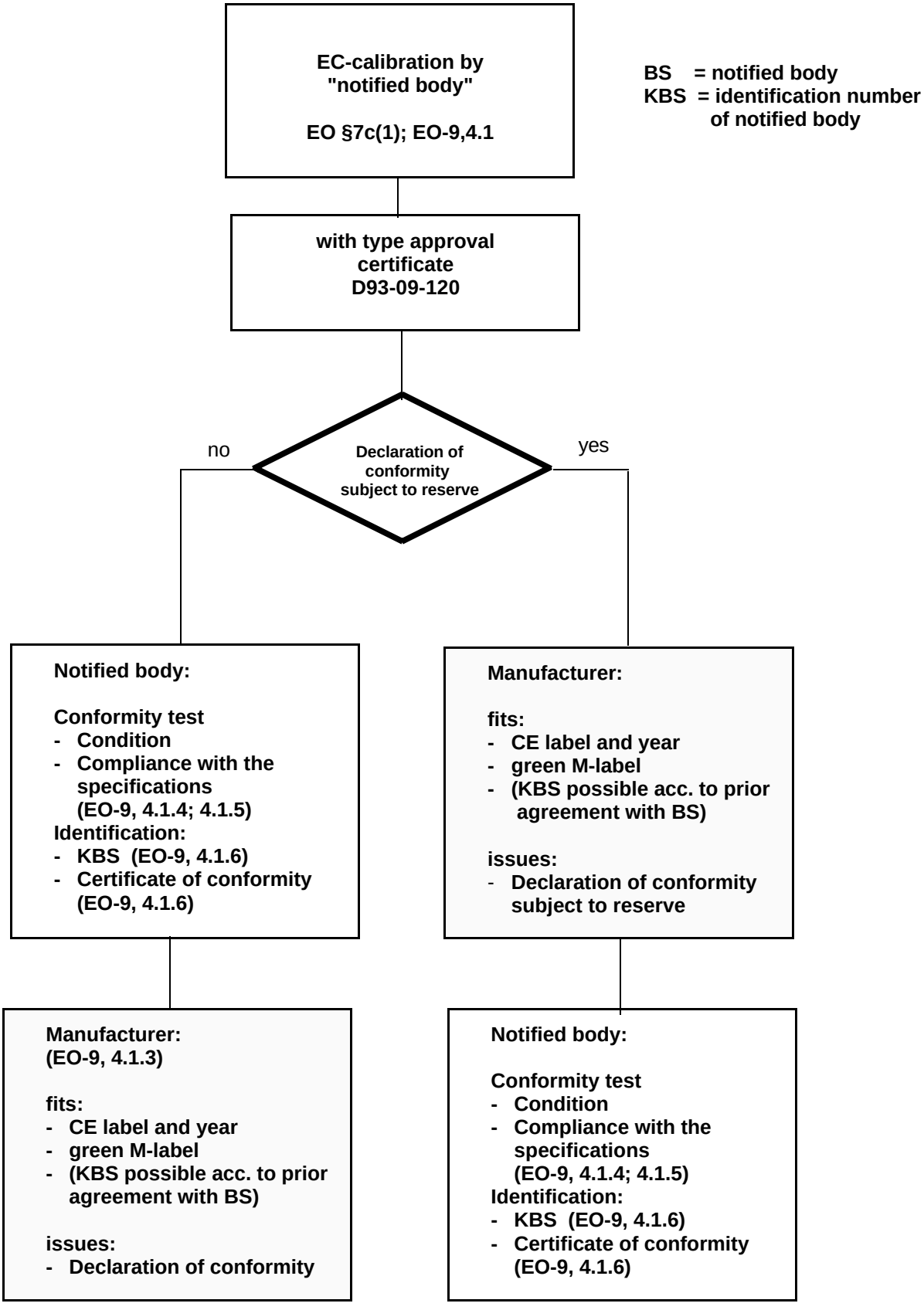
TEST=
Max

Seal 4 (protection seals, self-destroying adhesive mark)
(can be used by the local W&M authorities unless other facilities are available)

CAL
PR 1612/02

LOADCELL
PR 1612/02

7.12.1 Official calibration procedure according to EC-directive No. 90/384/EEC



CONTENTS OF PART 8

8. C O M M U N I C A T I O N

8.1 THE PR 1612/02 INTERNAL INTERFACE

Electrical specification	DUART controlled, usable for current loop-, RS232-, or RS422/485-interface modules, ASCII coded, full duplex, asynchronous.
Data rate	settable to 300, 600, 1200, 4800, 9600, or 19200 b/s.
Bits/character	settable for 7 or 8 bit
Start bit(s)	one
Stop bit(s)	one
Parity	settable for even, odd, or none

8.2 KIND OF PROTOCOLS

For being able to communicate between a PR 1612/02 and other super or subordinate devices, the following kind of protocols are already included in the main instrument program:
- the PHILIPS EW protocol,
- the SIEMENS DUST protocol with its subversions DUST 3964R, 3964R-RK512, and 3964R for Teleperm M,
- J-BUS, and
- MOD-BUS

Except of the PHILIPS EW protocol, all the others can only be driven when using the SW option PR 1613/05. This SW option can only be activated by means of a licence number. The relevant licence number is part of the delivery scope of the PR 1613/05.

A communication is possible only via one of a.m. interface modules, fitted to the socket of interface line 1(A). For more installation details please refer to part 7.5.

Note:

Do you desire more detailed information on
- communication procedures of "PHILIPS EW", "SIEMENS DUST", or J-BUS / MOD-BUS, or
- specific know how when connecting DUST, J-BUS or MOD-BUS systems to a PR 1612/02, or
- the driver for the Philips EW protocol ?

In this case please order our application notes

8.2.1 THE PHILIPS EW PROTOCOL

8.2.1.1 Setting the PR 1612/02 to PHILIPS EW protocol

In order to communicate by means of the PHILIPS EW protocol the following parameters at the PR 1612/02 are relevant and have to be set accordingly (please see also parts 6.3 and 6.5).

C04 = ≤ 4800 baud	(4800) *	
C05 = 0 = XON/XOFF off	(0) *	
C06 = 0 = 7 databits and parity even	(0) *	
C10 = 3 = serial interface to 'communication mode'	(1) *	
C53 = 1 = communication mode on	(0) *	
C54 = A .. Z = address of the transmitting PR 1612/02	(A) *	* default values

Note:
Setting a.m. parameters does not complete the configuration and calibration of the PR 1612/02. In order to do so please refer to part 6.

8.2.2 THE SIEMENS DUST PROTOCOL

8.2.2.1 Setting the PR 1612/02 to SIEMENS DUST protocol

In order to communicate by means of the SIEMENS DUST protocol SW option PR 1613/05 has to be enabled by a licence number.
The licence number is included when buying the SW-option and has to be entered as follows:

- switch off the PR 1612/02
- open its housing (refer to part 4.3)
- close jumper BAT on the main board in order to switch on the battery (see also part 4.9)
- set switches MODE and CAL at the rear or bottom of the indicator to position C
- switch on the PR 1612/02
- select parameter C83 and enter the correct licence number (refer to parts 6.1, and 6.5.8, C83).

Additionally the following parameters are relevant for setting the PR 1612/02 to SIEMENS DUST and have to be set accordingly (please refer also to parts 6.3 and 6.5).

C04 = ≤ 4800 baud	(4800) *	
C05 = 0 = XON/XOFF off	(0) *	
C06 = 1 = 8 databits and parity even	(0) *	
C10 = 3 = serial interface to 'communication mode'	(1) *	
C53 = 3 = DUST 3964R	(0) *	
= 4 = DUST 3964R-RK512		
= 5 = DUST-3964R for Teleperm M		
C54 = A .. Z, (use only A or B !)	(A) *	* default values
A =PR 1612/02 as master, B = PR 1612/02 as slave.		
Recommendation: A = PR 1612/02 being the master !		

Setting a.m. parameters does not complete the configuration and calibration of the PR 1612/02. In order to do so please refer to part 6.

8.2.3 J-BUS / MOD-BUS

8.2.3.1 Setting the PR 1612/02 to J-BUS / MOD-BUS protocol

In order to communicate by means of the J-BUS / MOD- BUS protocol SW option PR 1613/05 has to be enabled by a licence number which is included when buying the SW-option. The valid licence number has to be entered by selecting parameter C83 when setting the PR 1612/02.
Entering the licence number later has to be done as follows:

- set switch CAL at the rear of the indicator to position C,
- press keys B and T simultaneously,
- select parameter C83 and enter the correct licence number (refer to parts 6.1, and 6.5.8, C83).
- leave the set up mode by pressing key B and store data properly as described in para.6.6.

Note: If selected for J-BUS / MOD-BUS the PR 1612/02 works acc. to the RTU mode.

Additionally the following parameter are relevant and have to be set accordingly (please refer also to parts 6.3 and 6.5).

C04 = 4800 baud **at maximum !**	(4800) *	
C05 = 0 = XON/XOFF off	(0) *	
C06 = 5 = 8 databit and non parity	(0) *	
C10 = 3 = serial interface to 'communication mode'	(1) *	
C53 = 2 = J-BUS / MOD-BUS	(0) *	
C54 = A .. Z = 1 .. 26	(A) *	* default values

Note:
Setting a.m. parameters does not complete the configuration and calibration of the PR 1612/02. In order to do so please refer to part 6.

8.2.3.2 Particularities during the communication via J-BUS / MOD-BUS

Dependant of PLC or supervisory system manufacturer, the SPM addresses can be shifted by 1, i.e. the address area can start with 0 or 1.

Implemented are MOD-BUS functions 3 (read) and 16 (write). Optionally, function 8 (loop back test) is available.

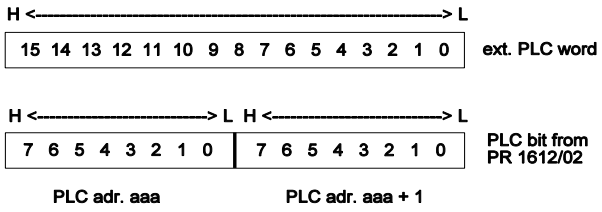
In addition to the commands valid for all protocols (see section 8.3 and following), direct access to the PR 1612/02 SPM is possible with J-BUS and MOD-BUS.

In addition to the commands valid for all protocols (see section 8.3 and following), direct access to the PR1613 SPM is possible with JBUS or MODBUS. The PR 1612/02 address area is 0 to 255. Each address contains one byte. According to MODBUS specification, the smallest data unit is a 2 byte word = 16 bits. With some PLCs, the smallest unit is 4 bytes = 32 bits. Uneven numbers of bytes must be filled with 0 accordingly.
The commands valid for all protocols are written into SPM address 256.
The reply on these commands must be read from the same SPM address 256.

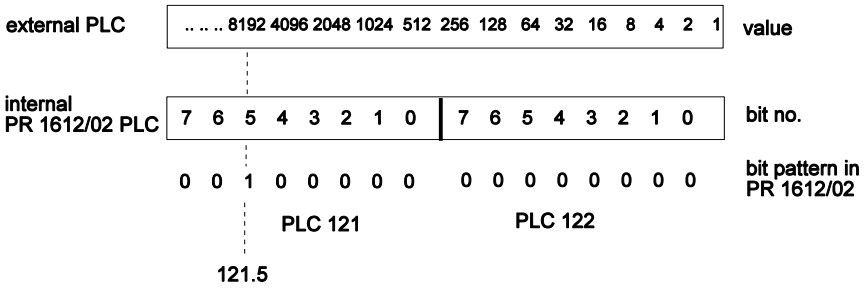
The most important information, e.g. gross and net weight, is available in the PR1612/02 SPM (see SPM address list).

The data format is given in the list. Thus e.g. the length of weight values is 4 bytes = 32 bits. Access is by means of function 3.

In its SPM, PR 1612/02 uses the Intel ® data format, i.e. the lower address contains the lower value. Usually, the Motorola processor data format is used for PLCs, i.e. the lower address contains the higher value.Therefore, inverting the byte order may be necessary with data exchange. The bit order within a byte is equal with both formats.



Example: Write command into the PR 1612/02 SPM, address 121 and value 8192



For setting bit 121.5 in PR 1612/02, value 8192 (bit 5 in the upper byte of the word is set) must be written into the SPM.

The weight values (from address 60) need not be inverted; they are already written in Motorola format in the SPM and can be read out as a 32-bit value.

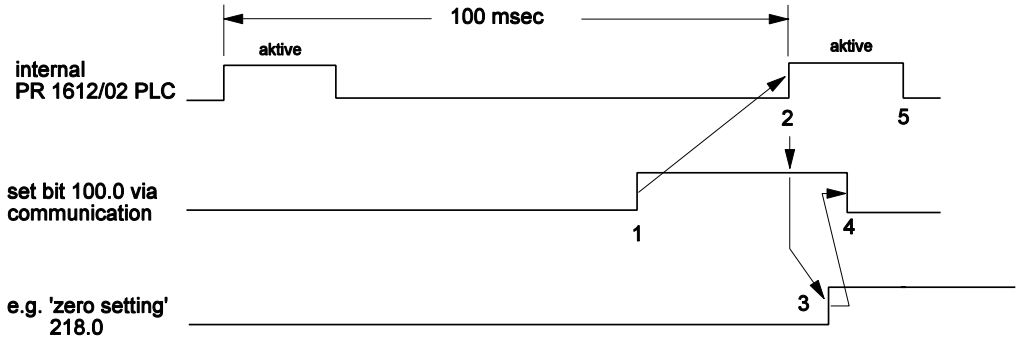
Note:
With this bit setting mode, 15 other bits in the PR 1612/02 SPM will also be changed ! Therefore, the normal method is reading the relevant word, modifying the required bit and returning it to the word in PR 1612/02. During this operation, another bit of the word may have been changed by the PR 1612/02 PLC program. The modification would be lost. Therefore, we recommend defining exchange areas in the PR 1612/02 SPM which are used exclusively for data transfer in one direction. One word in external PLC direction and one word for data from the PLC.

The reaction time at protocol level is based on interrupt in PR 1612/02. Therefore, a 100 ms timeout at 4800 Baud can be used.

If the PR 1612/02 updates the SPM with write or read access, the received telegram is replied by an error telegram. The error code is 4, i.e. access is not possible presently.

As communication and the internal PLC cycle (100 ms) are asynchronous, detection of short-time information by the PR 1612/02 program must be ensured.
For this, a simple handshake procedure can be used:
The PLC sets a bit which is reset by the PR 1612/02 PLC program during the next PLC cycle. The reset bit signals to the external PLC that the information was processed.

Example:
1. The external PLC writes into PR 1612/02 SPM 100.0.
2. The internal PR 1612/02 PLC starts evaluating.
3. The bit for setting 218.0 to zero is set (reset by the internal PLC after handling).



4. The internal PR 1612/02 PLC resets 100.0. This can be detected by the external PLC.
5. End of PLC cycle.

The pre set PR 1612/02 PLC program already contains 3 sequences which use this method:

```
IN 101.0
SB   218.2      ! Set tare
RB   101.0

IN 101.1
SB   218.5      ! Reset tare
RB   101.1

IN 100.0
SB   218.0      ! Set display to 0000
RB   100.0
```

Addresses for reading out weight:

60 ... 63	32-bit integer gross weight
64 ... 67	32-bit integer net weight = gross unless tared
68 ... 71	32-bit integer tare weight = 0 unless tared
72 ... 75	32-bit integer difference weight, only valid with batching

Recommendations:

1. Do not write undesired internal PR 1612/02 functions directly into predefined SPM-addresses.
   Reason: An address of the ext. PLC corresponds to 4 SPM-bytes (min. length). This means that other SPM-bits are also controlled.

   An individual SPM bit can be controlled using a special PLC-program.

   Single-bit controlled (edge-controlled) write function:

   Examples: R/S-flipflop
   IN 88.0 ! Must be set by ext. PLC (free user area)
   SB 218.2 ! Flipflop function, set when 88.0 was set by external PLC
   RB 88.0 ! The above procedure is handled only once
   IN88.1
   RB 218.2 ! Reset handled as in the above procedure
   RB 88.1

   The ext. PLC writes a double word into SPM-bytes 88, 89, 90 and 91.

   When 88.0 is set by the external PLC, 'flipflop' (SB 218.2) is set.

   SPM-bit 88.0 is set with command RB 88.0. This means that reception of the bit can be checked by the external PLC read function (SPM-bit was reset).

   Status-controlled function:

   Example:

   IN 88.1 Bit set or reset by ext. PLC
   OT 217.0 Batching stop with 217.0 = 0

   Recommendation:
   Use separate SPM-areas for edge-controlled functions and status-controlled functions, e.g.

   SPM - bytes 88 .. 91 for edge-controlled functions
   SPM - bytes 92 .. 95 for status-controlled functions

   The ext. PLC data set is transmitted once with edge-controlled PR1612/02 functions and repeatedly with status-controlled functions.

2. During calibration/configuration, no data exchange with the external PLC is permitted (communication and PLC will be stopped).

3. The PR 1612/02 CPU load is very high during communication via J-bus.
   We recommend communicating only for indispensable control functions, i.e. no permanent communication. Max. 4800 Baud should be used for data transmission.

8.3 COMMUNICATION COMMANDS

The following commands are valid for all kind of protocols.
Using the J-BUS / MOD-BUS an additional access possibility to the SPM of the PR 1612/02 is given. For more detailed description refer to part 8.2.3.2.

8.3.1 Summary of all communication commands used on PR 1612/02

Command	Mode	Program	Function	Reference
I	standard	standard	read scale information	8.3.2.7
LV	standard	standard	read software version and parameter	8.3.3.4
SGA	standard	standard	read gross and status	8.3.2.2
SNA	standard	standard	read net and status	8.3.2.2
V	system	standard	read software version	8.3.3.3
WFA	standard	standard	reset tare	8.3.2.5
WGA	standard	standard	read gross	8.3.2.1
WNA	standard	standard	read net	8.3.2.1
WSA	standard	standard	set tare	8.3.2.4
WTA	standard	standard	read tare	8.3.2.1
WZA	standard	standard	set to zero	8.3.2.3
ZS	standard	standard	set limit	8.3.2.6
ZSC	system	standard	reset communication	8.3.3.2
ZSD	system	standard	set date and time	8.3.3.1

8.3.2 Standard weighing commands of a PR 1612/02

A description of all abbreviations as mentioned in the following can be found in part 8.3.4.

8.3.2.1 Read weight

Command:

WGA	read gross weight
WNA	read net weight
WTA	read tare weight

Reaction:

QGA-wwwwwemz	gross weight
QNA-wwwwwemz	net weight
QTA-wwwwwemz	tare weight

or error message:

E100@0	general error, for @ see part 8.3.4, Error messages
E30000	BCC error
E50000	analog test active
E60000	weighing point unknown

8.3.2.2 Read status

Command:

SGA	status for gross
SNA	status for net

Reaction:

QSA 14 spaces 00000000E50000	status, if analog test active
QSA 14 spaces 00000000AG-wwwwwemz	status

or error message:

E100@0	general error, for @ see part 8.3.4
E30000	BCC error
E60000	weighing point unknown

Flags and their meaning:

m = 1 if standstill
z = 1 if indicator is tared or batching is active

8.3.2.3 Set to zero

Command:

WZA	set zero

Reaction:

Q	weighing point set to zero

or error message:

E100@0	general error, for @ see part 8.3.4, Error messages
E30000	BCC error
E60000	weighing point unknown
E70000	weighing point is tared or no standstill detected or out of zero range

8.3.2.4 Set tare

Command:

WSA	set tare
WSAwwwwwe	set fix tare

Reaction:

Q	tare set

or error message:

E100@0	general error, for @ see part 8.3.4, Error messages
E30000	BCC error or not acc. to W&M
E60000	weighing point unknown
E63000	fix tare > ts.d.
E70000	weighing point is already tared, or no standstill detected

8.3.2.5 Reset tare

Command:

WFA	reset tare

Reaction:

Q	tare reset

or error message:

E100@0	general error, for @ see part 8.3.4, Error messages
E60000	weighing point unknown
E70000	weighing point not tared

8.3.2.6 Set limits

Command:

ZS1Awwwwwewvwwwwe	LIMIT1 }	ZS1Awwwwwewwwwwe }	for setting see
ZS2Awwwwwewwwwwe	LIMIT2 }	ZS2Awwwwwewwwwwe }	6.3.1, C25..28

on-level off-level

Reaction:

QZS1A	limit 1 set
QZS2A	limit 2 set

or error message:

E20000	error at input string
E60000	weighing point unknown
E63000	limit > scale end value f.s.d)

8.3.2.7 Read f.s.d., decimal sign, dimension, and span in mV/V

Command:

I	read f.s.d, weight symbol(dimension), and SPAN in mV/V

Reaction:

QIwwwwwLkgssnnnnn	wwwww =	f.s.d. inclusive decimal point, variable length 4/5 decades, always with a space (L) at the end !
	kg =	dimension, can be g, kg, t, or lb
	ss =	step width; 01 = 1, 02 = 2, 05 = 5 10 = 10, 20 = 20, 50 = 50
	nnnnn =	SPAN e.g. 10000 (1.0000 mVM

Examples:

QI3000Lg0110000	f.s.d: 3000	dimension: g	step width: 01	span: 1.0000 mV/V
QI100.00Lg0508000	f.s.d: 100.00	dimension: g	step width: 05	span: 0.8000 mV/V
QI3000Llb0110000	f.s.d: 3000	dimension: lb	step width: 01	span: 1.0000 mV/V
QI100.00Llb0508000	f.s.d: 100.00	dimension: lb	step width: 05	span: 0.8000 mV/V
QI3000Lkg0110000	f.s.d: 3000	dimension: kg	step width: 01	span: 1.0000 mV/V
QI100.00Lkg0508000	f.s.d: 100.00	dimension: kg	step width: 05	span: 0.8000 mV/V
QI60.00Lt0205000	f.s.d: 60.00	dimension: t	step width: 02	span: 0.5000 mV/V
QI6000Lt0205000	f.s.d: 6000	dimension: t	step width: 02	span: 0.5000 mV/V

8.3.3 System commands, used on PR 1612/02

8.3.3.1 Set date and time

Command:

ZSDyyyyyyyyyyyy	set date and time in format ddmmyyyyhhmm

Reaction:

QZSD	date and time set

or error message:

E60000	error in input string (too long)
E20000	error in input string (too short)

8.3.3.2 Reset communication

Command:

ZCS	Reset communication and clear all buffers

Reaction:

QZSC	communication reset, all buffers and retry counter cleared

8.3.3.3 Read software version

Command:

V	read software version

Reaction:
QV1612/02-2.30

8.3.3.4 Read software version and parameter

Command:

LV	read software version and parameter

Reaction:
QLVxxxx/xx-x.xxaaaaaa␣dssmmmmmttttt

x = version
a = 5 digits for f.s.d with decimal point (length is variable; with decimal point 6 digits)
␣ = 1 space (ASCII = 32)
d = dimension g, kg, lb, or t (length is variable)
s = step width (01, 02, 05, 10, 20, or 50)
m = span (mV/V) x 10^{-4}
t = deadload (mV/V) x 10^{-4}

8.3.4 Summary of all abbreviations and error messages used for communication

8.3.4.1 Abbreviations

- \- = place for sign '-', or ''
- 0 = type of weight (G = gross, N = net, T = tare, D = difference)
- A = weighing point, for PR 1612/02 = 'A'
- a = address (spm - specified offset) (4digits)
  - position 1, 2, 3 = byte address
  - position 4 = bit address
- b = character string
- c = ident of component
- e exponent (0 .wwwww x 10 ^ e)
- v = name of variable (6 ASCII's) left-adjusted, unused positions filled by spaces
- w = weight (5 digits: 0.wwwwww x 10 ^ e)
- z = flag, 1 = request status, indicator tared, or batch is busy

Example for w:

```
w w w w w e
|  |  |  |  |  |
|  |  |  |  | +  =  exponent character
1  2  3  4  5  =  digit position (referred to the example in the following table)
```

expon.	char. e	scale [g]	scale [kg/lb]	scale [t]
-5	'+'	0,001 g		
-4	','	0,012 g		
-3	'-'	0,123 g		
-2	'.'	1,234 g	0,001 kg/lb	
-1	'/'	12,345 g	0,012 kg/lb	
0	'0'	123,45 g	0,123 kg/lb	
1	'1'	1234,5 g	1,234 kg/lb	0,001 t
2	'2'	12345 g	12,345 kg/lb	0,012 t
3	'3'	123450 g	123,45 kg/lb	0,123 t
4	'4'		1234,5 kg/lb	1,234 t
5	'5'		12345 kg/lb	12,345 t
6	'6'		123450 kg/lb	123,45 t
7	'7'			1234,5 t
8	'8'			12345 t
9	'9'			123450 t

8.3.8.2 Error messages

Independent of the data telegrams the following error messages can be generated:

E1xx@x	general error
E20000	error in command structure
E30000	DBASE, or BCC, or out of range error
E40000	selftest error
E50000	analog test active
E60000	parameter error

E63000	setpoint of component > f.s.d
E65000	unknown type of material
E70000	busy/not busy e.g. attempt to set tare if already tared
E80000	memory full
E90000	object does already/not exist
EC0000	report buffer full

Note:

@ = 1: calculation error
2: scale overload
3: ADC hardware error
4: BCC error in weight memory
5: calculation error
6: calculation error
7: calculation error

8.4 DATA TRANSMISSION TO (A) REMOTE DISPLAY(S)

Data transmission from the PR 1612/02 to one or several remote displays is only with transmission activated via parameter C14 and with the interface defined in parameter C10.

The following selection modes are possible:
0 = no remote display data transmission
1 = "PR 1577 mode"
2 = "PR 1627/1628 mode"

The data from PR 1612/02 to remote display(s) is sent in a remote display string (telegram) via the PR 1612/02 serial interface. The Baudrate is adjustable (configurable) for values from 300 to 2400 Baud for PR 1577/. . remote displays and from 300 to 9600 Baud for a PR 1627/00/ remote display.

Each byte (character) of a telegram comprises 7 (8) data bits,1 parity bit (even),1 start bit and 1 stop bit.
With different data format (including correct parity), the complete data telegram is considered as not received and displayed as a message ------- by the remote display.

The same applies, when the adjusted baud rates and data bits of PR 1612/02 and remote display do not correspond and when no new data are received continuously. Lead interruptions are displayed with 'L' on the remote display.

The transmission sequence is:

PR 1612/02 sends:

The data telegrams for setpoint, difference, tare and net weight are only available with defined modes, however, the gross weight telegram is always available with normal weighing mode.

With PR 1612/02 test mode (analog test), the test number is transmitted instead of the gross weight. As long as the number is displayed on the PR 1612/02, it is also displayed on the remote display. With PR 1627/00, and PR 1628/.. the dimension sign is switched off additionally.

Application examples are given in part 7.

8.4.1 'PR 1577/00 mode'

8.4.1.1 Structure ot a data transmission string (telegram) from PR 1612/02 to remote display

STX	MODE	STATUS	WEIGHT	ETX	
1	1	1 + 1	6	1	number of characters

STX: Start of text

Mode:
Hex 31 = weight is gross weight
Hex 32 = weight is net weight (only when tared or batch active)
Hex 33 = weight is tare (only when tared)
Hex 34 = weight is difference (only when batch active)
Hex 35 = This code is output as long as analog test is active.

Status code:
1 st character 011 ETSZ
2nd character 011 MKDD

E = set in case of error. Bits T S Z are reset. (= ASCII code '8')
T = 1 when tared
S = 1 with standstill
Z = 1 with zero within 1/4 d
M = 1 if the weight in these telegrams is identical with the displayed weight.

Example:
- displayed weight = net weight
- remote display telegram for net weight

K = 0 = with scale in 'kg'
K = 1 = with scale in 't'

DD = 00 = 0000
01 = 000,0
10 = 00,00
11 = 0,000

Weight: This data block comprises six characters. Dependent of scale range and mode, one or several characters can be spaces or a minus character.

ETX: End of text

8.4.2 'PR 1627/ PR1628 mode'

8.4.2.1 Structure of a data transmission string (telegram) from PR 1612/02 to remote display

STX	MODE	STATUS	WEIGHT	ETX	
1	1	1 + 1	6	1	number of characters

STX: Start of text

MODE: The upper nibble contains the address:
3 = weighing point A
4 = weighing point B
5 = weighing point C
6 = weighing point D

With PR 1627/00, storage and display (if selected) of the following weight value are only, if the received address corresponds to the address stored in EEPROM (warm start) or to address 3 (default value in EPROM with cold start).

The lower nibble contains the weight mode:
1 = gross weight
2 = net weight
3 = tare
4 = difference
5 = test number
6 = setpoint
7 = flow value (cannot be displayed on PR1627)
14 = recipe, component, line, batching mode (cannot be displayed on PR 1627)
15 = multi-range recognition and decimal point/ comma switchover

Weight modes 1 - 6 are stored in PR 1627 and displayed dependent of the selected mode. The gross weight is always contained in a transmission cycie, unless only the test number is transmitted.
The other weight modes are transmitted only, when available.

Display is with the following identifications:

Gross weight:	non tared : without identification
	tared : B
Net weight:	NET
Tare:	T
Difference:	d
Test number:	without identification and dimension
Setpoint:	S

STATUS: comprising 2 bytes: MC1 and MC2

MC1: MSB LSB
1 R V E T S Z

MC2: MSB LSB (with grossweight)
1 X K M K D D

The bits have the following signification:

V: 1 = negative, minus sign with special symbols with 6-digits weight values, otherwise, the minus sign is displayed before the most significant digit.
0 = The most significant weight digit must be considered. If it contains an ASCII "-", the weight is negative, otherwise, it is positive.
With negative values, the display is dimmed.

E: 1 = Analog error in the basic instrument, 'Error' is displayed independent of mode.

T: 1 = The basic instrument is tared.
With gross weight display, gross weight symbol 'B' is also displayed.
S: 1 = The standstill symbol is lit.
Z: 1 = The 1/4 d symbol is lit.
R: 1 = Recipe active, batching busy, the rhombus sign is lit.
K: The unit displayed on the basic instruments is coded by means of two bits.
00 = kg
01 = t
10 = g
11 = lb
All other codes are ignored and the overall string is declared invalid by PR 1627 and PR 1628.
M: 1 = This string contains the weight mode, which is displayed instantaneously on the basic instrument. This bit is evaluated in mode A.
D: These two bits characterize the position of decimal point/comma.
00 = no decimal point/comma
01 = XXXXX,X
10 = XXXX,XX
11 = XXX,XXX
X: don't care

In the string for difference weight and setpoint, MC2 is different:

MC2: MSB LSB (with difference weight)
1 K K M A A A

M: as above,
K: valve status of batching equipment (not evaluated in PR 1627)
A: batch alarms
000 = no alarm, in all other cases, the rhombus in the display blinks.

MC2: MSB LSB (with setpoint)
1 x x M x x x

M: as above
x unimportant (don't care)

WEIGHT: The weight value comprises six digits in the "new PR1627/00 - standard" remote display string. The least significant digit (extreme right) is transmitted last. Transmission is in ASCII format. If necessary, a minus character as ASCII '-' is transmitted in the most significant digit. The minus sign is displayed directly before the first digit. Suppressed digits on the basic instrument display are transmitted as space (hex 20).

ETX: End of text (hex 03)

8.4.2.2 Structure of a special information telegram from PR 1612/02 to remote display

This telegram is sent only, when required. The received data remain valid up to the next change.

STX	MODE	K	X1	X2	X3	...	Xn	ETX
(1)	(1)	(1)	(1)	(1)	(1)		(1)	(1)

STX: Start of text

MODE: upper nibble address lower nibble 15 Hex = special information multi-range recognition and decimal poin/comma switchover.

K: contains command M = multi-range scale in ASCII code

X1: 1 P000ba
P = 0 = decimal point, 1 = decimal comma
b = multi-range indication
0 = display I, 1 = display II in the most significant display decade
a = 0 = multi-range mode not active, 1 = multi-range mode active

X2: step width, not active in PR1627

X3..Xn: reserved for future requirements

8.4.2.3 Structure of a data transmission string (telegram) from remote display to the PR 1612/02

STX	MODE	K	ETX
(1)	(1)	(1)	(1)

STX: Start of text

MODE: The upper nibble contains the address as above. The lower nibble contains the command mode:
1 = indicator command
2 = batch command

K: contains command (in ASCII code)
indicator commands: T = taring
E = tare reset
N = set to zero
P = start print-out at basic instrument
A = start analog test

batch commands: are not sent by PR 1627

ETX: End of text

Transmission of a command from the remote display unit to PR 1612/02 is after the PR 1612/02 has sent the gross weight telegram to the remote display unit.

The transmission sequence is:

from PR 1613:

With several remote display units with identical address, only one remote display unit may reply to prevent bus conflict.
In these cases, the 2nd to the nth remote display unit, which are connected to a PR 1612/02 must be switched to passive during adjustment. With passive remote display units, remote operation is not possible. Therefore, ensure that not all remote displays connected to one PR 1612/02 are set for passive.
Disabling the remote control keys is also possible with remote displays set for active mode. In this case, the PR 1612/02 sends no comma.

A remote display unit sends a command directly after it has received a gross weight telegram .

If a remote display does not receive new data continuously, it will display (--------).

8.5 DATA TRANSMISSION TO PRINTER DEVICES

8.5.1 Standard printer

Transmission from PR 1612/02 to a printer is via the PR 1612/02 serial interface only with the transmission activated and configured via parameter C15, and with the interface defined via parameter C10.
A data transmission string (telegram) is freely configurabie. Setting modes and print-out examples are given in part 6.3.1. For application examples, see part 7.

The Baudrate is adjustable (configurable) for values from 300 to 2400 b/s when using a PR 1601 interface module, and from 300 to 9600 Baud with PR 1602. Data transmission is with 7(8) data bits, 1 parity bit (selectable), 1 start bit and 1 stop bit per character.

Transmission of weight values is only enabled by PR 1612/02 with
- the preset conditions met
- weight display standstill

- weight within the calibrated scale range,
- weight above the value adjusted in parameter C51,
- the instrument not in the setting and/or error mode, and
- provided that no analog test is activated.

8.5.2 W&M approved (remote) printer

When connecting an approved printer device the following has to be observed:

- the approval permits the connection of an EPSON FX 870 or TM 295, or any other printer device which has got an offcial EC approval.
- the transmission of data from PR 1612/02 to an approved printer has to be activated via parameter C20.
- the communication process between PR 1612/02 and printer will then be as follows:

not disturbed

PR 1612/02	printer
ENQ	
	ACK
STX	
D1	
.	
.	
Dn	
ETX	
BCC	
	ACK

Moreover all the prerequisites as mentioned above must be met.

disturbed (example)

PR 1612/02	printer
ENQ	
	NAK (EOT)
ENQ	
	ACK
STX	
D1	
.	
.	
Dn	
ETX	
BCC	
	NAK (EOT)
STX	
D1	
.	
.	
Dn	
ETX	
BCC	
	ACK

CONTENTS OF PART 9

9. SHORT FORM DESCRIPTION FOR INSTALLATION, SETTING, AND CALIBRATION

9.1 ADVICES FOR QUICK INSTALLATION

9.1.1 General

The advices as given in this chapter are provided for users who just want to test the indicator and its functions.

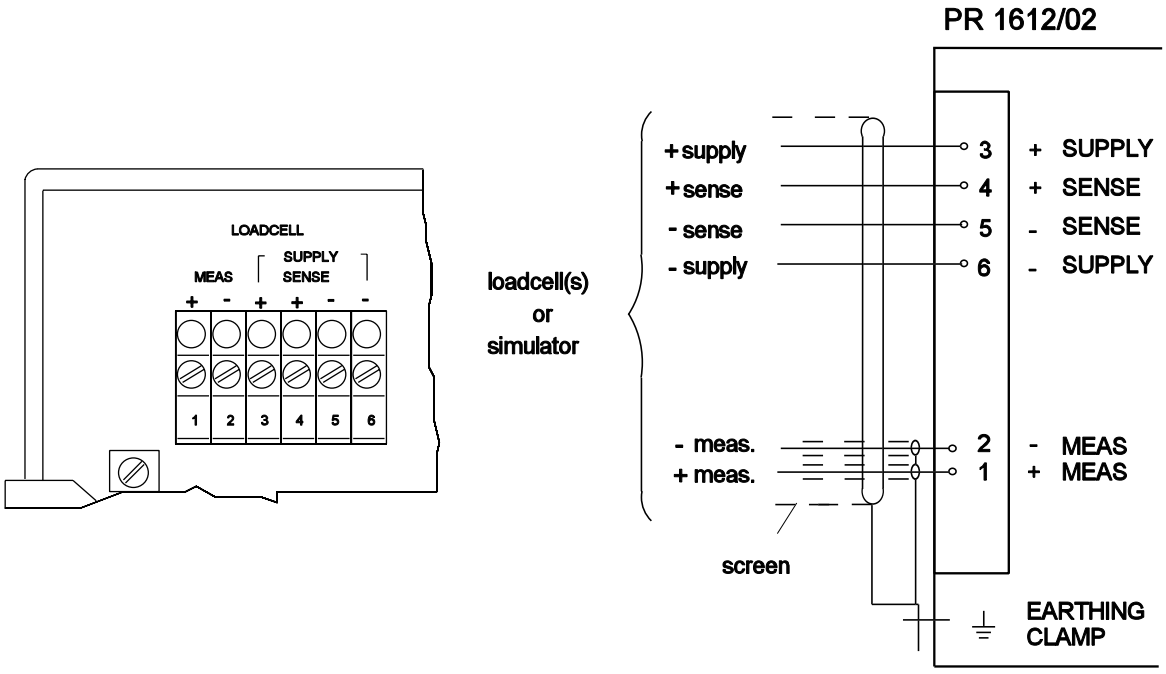
Specially for persons without previous knowledge we recommend to follow the instructions in parts 4, 5, and 6 successively when calibrating and configuring the indicator for the first time.

In addition, before carrying out any work at the indicator the safety instructions in part 2 must be observed.

9.1.2 Unpacking the indicator

Check the contents of the consignment for completeness and note whether any damage has occurred during transport. If the contents are incomplete, or if there is a damage, a claim should be filed with the carrier immediately.
Also the local Organization of Philips Weighing has to be informed in order to facilitate the repair or replacement of the instrument.

9.1.3 Connecting loadcell(s) or simulator



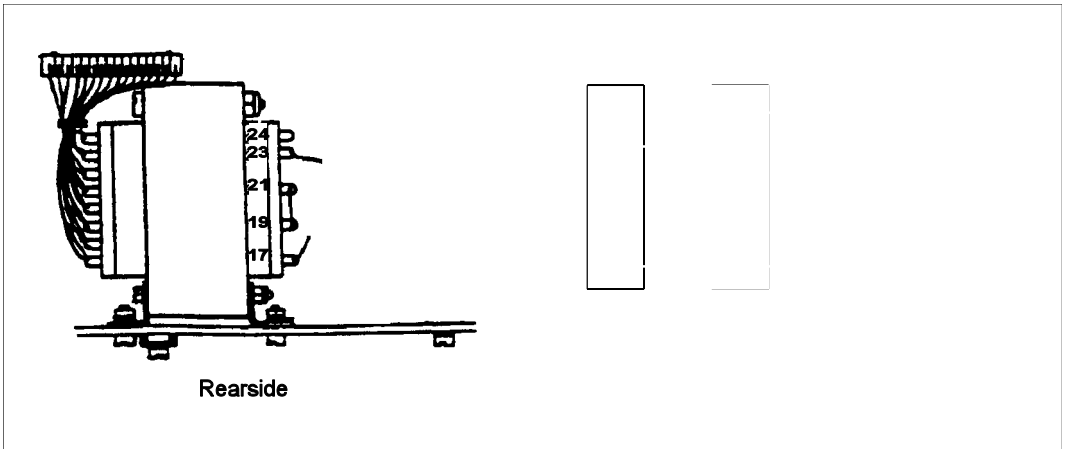
9.1.4 Connecting mains or supply voltages

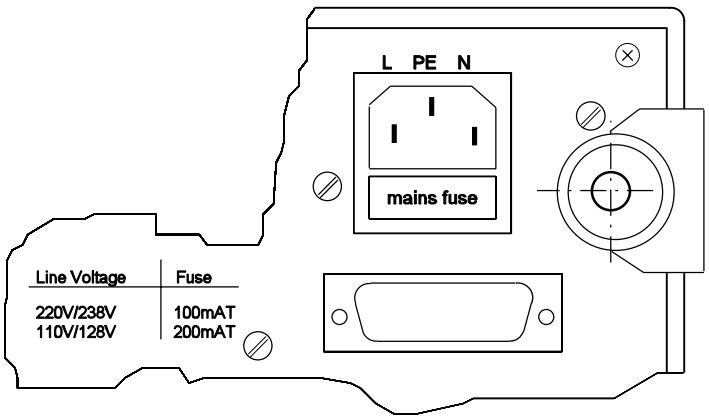
The PR 1612/02 is connected to the mains via the 3-pole connector at the rear.

Please note that the instrument has no mains switch, and therefore, is ready for operation as soon as the mains is connected.

The instrument operates at mains voltages of 110, 128, 220 and 238 V AC and 50/60 Hz. Upon delivery it is set to 220 V AC. For changing of voltage, proceed as follows:

- disconnect the power,
- solder links on the transformer bobbin according to the following figure,
- replace the mains fuse inside the connector.





9.1.5 Switching on the instrument

After switching on, first the indicators perform an internal test.

In case of a defect or a malfunction the generates a respective error message.
An explanation can be found in part 5.4.

As part of the test the indicator switches on all segments at its weight display module during approx. two seconds.

If the internal test will be completed successfully, the display shows the type of indicator during some seconds.

For example:

Then, for a couple of seconds, it shows the type of software inserted.

For example:

Provided enabled by the proper licence number, the instrument indicates the corresponding 'SW option'.

For example:

Subsequently, the weight value display changes over to the NORMAL WEIGHING MODE.

For example:

Symbol appears as soon as the weight does not move any more (standstill display).

After about 60 min warm up time set-up and/or calibration work may begin.

9.1.6 Changing instrument set-up

Upon delivery the indicator is loaded with default values which a.o. correspond to the following input conditions:

sensitivity of loadcell(s):	1mV/V
loadcell supply voltage:	12 V
scale end value (f.s.d.):	3000
dimension:	kg
step width:	1
dead load:	0000 kg

If those values have to be changed, specially the calibration instructions as mentioned under para. 6.5.3 have to be followed.

Detailed installation, operating, and set-up instructions are given in parts 4, 5, and 6.

In case of malfunctions please observe advices in part. 5.4.

9.2 SHORT FORM DESCRIPTION FOR SETTING AND CALIBRATION

9.2.1 General information

By means of the parameters described below, the indicator is settable according to the "on-site" requirements made on the weighing system.

Upon delivery, the parameters are set to default values so that the indicator is immediately ready for operation. These default values are stored in the EPROM memory.

Setting details (configuration/calibration), i.e. matching to the local requirements, are described in part 6 of this manual.

Setting the indicator is by means of:
- **configuration** parameter, and
- **calibration** parameter.

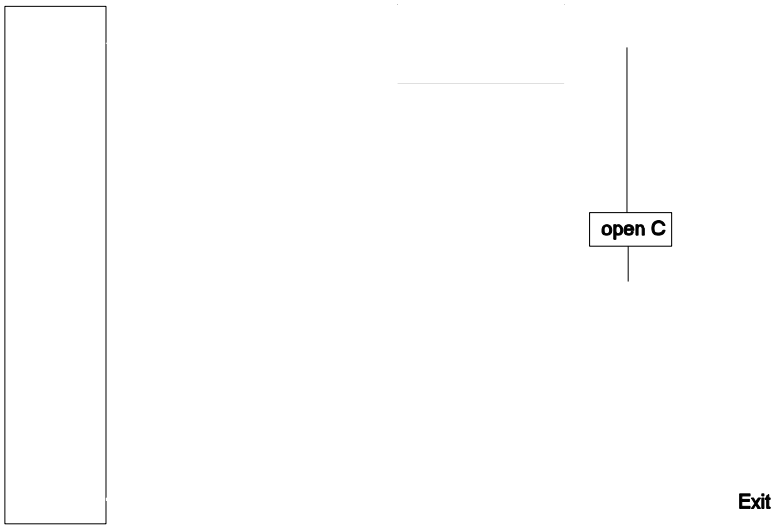
Configuration parameter contain non plant-specific data, and are stored in the RAM. Data in the RAM are protected against mains interruptions by means of a back-up battery the voltage of which must be checked from time to time.

With the exception of year, date, and time all configuration parameter as listed in the following can be protected against accidental overwriting additionally by means of a code number in parameter C21.

Calibration parameters contain plant specific data which can be loaded into a non-volatile EEPROM, where they are protected against mains interruptions. Protection against overwriting is possible by setting switch CAL to position **C̄** (refer also to part 6).

Configuration/calibration parameters, the values of which are unimportant for "on-site" operation of the weighing installation, can be skipped without changing during adjustment.

9.2.2 Adjustment procedure



Note !
- The indicator should be allowed to warm up for approx. 60 minutes before any settings are carried out.
- After adjustment of the unit, store the data in accordance with the instructions and protect them against accidental alteration by setting switches CAL and MODE on the instrument rear to position **C̄** .

9.3 DESCRIPTION OF CONFIGURATION AND CALIBRATION PARAMETER FUNCTIONS

° These parameters can be protected against overwriting by a code number in parameter C21.

9.3.1 Configuration parameters

Parameter	Function/Description	Default value
C 00	without function	
C 01 °	Year (YYYY), Date (DD.MM), and Time (HH,MM)	- - - -
C 02	without function	
C 03	without function	
C 04 °	Baud rate for interface 1 (line 1 /A), adjustable for 300/600/1200/2400/4800/9600 Bd	4800 bd
C 05 °	XON/XOFF for interface 1 (line 1/A), 0 = XON/XOFF off, 1 = on	0

Parameter	Function/Description	Default value
C 06 °	7 or 8 bits per character, and parity in the data telegram via line 1 (A) 0 = 7 / even 1 = 8 / even 2 = 7 / odd 3 = 8 / odd 4 = 7 / none 5 = 8 / none	0
C 07	without function	
C 08	without function	
C 09	without function	
C 10 °	Configuration of data inputs / outputs 1 = printer via interface in line 1(A) (without hand shake mode) or remote display mode via interface in line 2(B) 2 = printer via interface in line 2(B) (with hand shake mode) 3 = communication mode via interface in line 1(A)	1

Note:

mode	C10	C14	C15	C20	C53
printer without hand shake via line 1(A)	1	off	on	on/off	off
or remote display via line 2(B)	1	on	off	off	off
printer with hand shake via line 2(B)	2	off	on	on/off	off
communication mode via line 1(A)	3	off	off	off	on

Parameter	Function/Description	Default-value
C 12 °	Selection of weight value for output modules PR 1606 and PR 1608 0 = gross, 1 = net, 2 = tare, 3 = displayed weight (G,N,T) 4 = absolute net weight with sign on SPM address 1.7 5 = like 3, but with absolute net weight as 4 6 = analog set point (only valid in connection with PR 1640)	0

Parameter	Function/Description	Default value
	Note ! When using PR 1606: - only an output signal of positive weight values will be generated, - if the gross weight will be > f.s.d + Amax, or at the indication of ERR1, 2, 3, or 6, the last valid output signal will be kept, until the value falls below a.m. limits again. - if the gross weight is < ±¼ d, or at the indication of ERR4, 5, or 7, the output signal remains at 'zero' level signal as selected by C17, until < ±¼ d will be exceeded again. - after taring in output mode 1 and 3 (weight display and output signal = net) the output signal will be kept at 'zero' level, if the net weight becomes negative.	
C 13 °	Not provided for standard -software. Will only be activated using SW-option PR 1613/05.	
C 14 °	Data transmissions to a remote display unit on/off. 0 = off, 1 = PR 1577 telegram on, 2 = PR 1627/PR 1628 telegram on **Note:** The remote display protocol runs only via an interface in line 2 (B).	0
C 15 °	Data transmission to a printer. Configuration of weight ticket. The sequence of the print-out data can be defined and combined by means of the following figures: 0 = no print-out 1 = gross weight print-out 2 = net weight print-out 3 = tare print-out 4 = date and time print-out 5 = print-out current number 6 = CR/LF 7 = address of device 'A...Z'	41000
C 16 °	Current ticket number for weight ticket print-out Print-out starts with the adjusted digit + 1. Settable from 00000 to 65535.	00000
C 17 °	Analog output via module PR 1606 0 = 0 .. +10 V, 0..20 mA 1 = 2 .. +10 V, 4..20 mA	0
C 18	without function	
C 19	without function	

Parameter	Function/Description	Default value
C 20 °	W&M approved printer on/off 0=off, 1 =on	0
C 21	Write protection number 0001.. 9999 0000 = off	0000
	Note: If the correct number cannot be found any more, contact your local PHILIPS service organization.	
C 22 °	Instrument address A..Z for print-out and remote display	A
C 23	without function	
C 24 °	Disable key functions 0000 = all keys enabled 0001 = analog test } 0002 = gross weight } 0004 = tare weight } 0008 = taring on } 0016 = taring off } disabled 0032 = zero setting } 0064 = print } 0128 = B+T } 0256 = without function }	0000
	e.g. 0097 = (1 +32+64) functions 'analog test' +' zero setting' +' print' disabled.	
	Note: Disabled key functions can be released - by overwriting C24 with 0000, - by a control signal via PLC address 0.5, or - by a cold start.	
C 25 °	Alarm switch-on threshold for limit value 1 (> limit 1)	00000
C 26 °	Alarm switch-off threshold for limit value 1 (< limit 1)	00000
C 27 °	Alarm switch-on threshold for limit value 2 (> limit 2)	00000
C 28 °	Alarm switch-off threshold for limit value 2 (< limit 2)	00000
C 29	Error messages (see Part 5.4.2.1)	H00, A=0
C 90 .. 95	without function	

Should the set-up level have to be left after having finished the configuration, press key B (EXIT) instead of key ⊙ (NEXT STEP).

The display automatically changes to the normal weighing mode.

Switch MODE (and CAL) must be set to position **C̄** after having left the set-up level !

9.3.2 Calibration parameter

° These parameters are protected against accidental overwriting by setting switch CAL to position **C̄** , and can be protected additionally by a code number in parameter C21.

Note:
Switching on or off of the analog measuring voltage filter must be done before calibration. Therefore, select parameter C57 at first.

Parameter	Function/Description	Default value
C 57 °	Analog filter on/off 0 = off, 1 = on	1
C 30 °	Decimal point/comma 0 = 0000000 = without 1 = 000000.0 2 = 00000.00 3 = 0000.000 4 = 000000,0 5 = 00000,00 6 = 0000,000	0
C 31 °	Dimension symbol / weight unit 0 = kg, 1 = t, 2 lb, 3 = g	0
C 32 °	Step width (scale steps) Settable to step widths of 1, 2, 5, 10, 20, 50	1
C 33 °	Max. permissible overload value (Amax) above f.s.d. in n times step width (scale steps) [d]	9
C 34 °	Measuring time 1...20 times lowest measuring time of 0.1 sec.	03
C 35 °	Calibration of measuring range (f.s.d.) till max. 99990 in steps of 10 kg/t/lb/g. 60000 in steps of 5 or 2 kg/t/lb/g. 48000 in steps of 1 kg/t/lb/g. Simultaneous confirmation of the 12 V or 20 V load cell supply voltage selected previously by jumper and switch. Follow hints in part 6.5.1 !	03000 / 12

Parameter	Function/Description	Default value
C 36 °	Weight display times 10 (linearity check). By pressing key T (= toggle function) the resolution of the displayed weight value is multiplied by 10 up to max. ≤ 6000d without taking decimal point comma and dimension into account. Hereby linearity checking with a resolution of 1/10 d possible. By pushing key ⎙ protocol print-out possible. **Note:** Observe minimum measuring signal as mentioned under 6.5.1	actual test value
C 37 °	Subsequent zero correction without re-calibration with empty scale. For details, see 6.5.7.1.	actual weight
C 38 °	Subsequent zero correction without re-calibration with the scale loaded. For details, see 6.5.7.2.	12 V 0.0000mV/V
C 39 °	Measuring range (f.s.d.) calibration or adjustment without calibration weights, by entry of mV/V For details see 6.5.7.3.	03000 12 V 1.0000mV/V
C 40/41	Standstill detection	
C 40 °	Standstill range Adjustable for a range of 1 to 5 times the step width adjusted in C32, in which a weight display standstill must be recognized. Setting 0 is not possible.	1
C 41 °	Determination of a time range of 0 to 7 times the set measuring time in addition to the STANDSTILL RANGE, in which a weight display standstill must be recognized.	1
C 42 °	Zero setting range. Enter a range from ± 0 .. 255 d (15% of f.s.d. at max.)	0060
C 43 .. 45	Automatic zero tracking	
C 43 °	Range for automatic zero tracking The range for zero tracking can be between 0.0 ... 9.9 d. Setting 0.0 d, zero tracking takes place in the range as set in C42.	0,0
C 44 °	Step width of the automatic zero tracking. Enter a value between 0.0 ... 9.9 d. By setting to 0.0 the automatic zero tracking is switched off.	0.0
C 45 °	Interval time of the automatic zero tracking. Enter a value of 01 .. 99 times the set measuring time. A value of 0.0 will be not accepted.	01

Parameter	Function/Description	Default value
C 46 .. 50	Analog test	
C 46 °	TEST mode for analog test. 0 = the absolute value will be displayed, (if no failure, display of f.s.d.) 1 = the difference between the stored f.s.d. and the actual TEST figure will be displayed, (if no failure, display = 00000)	0
C 47 °	TEST key function for analog test. 0 = the analog test (corresponding to TEST mode) will be performed. 1 = checksum of the EEPROM will be displayed	0
C 48 °	Check tolerance for analog test. Enter acceptable deviation from the TEST figure (0 .. 15 d at max.).	01
C 49 °	Repeat check for analog test. Enter repeat time of 1 .. 24 h for automatic analog test. With 00 h, no automatic analog test will be performed.	00
C 50 °	Display of analog test value	act. value
C 51 °	Print-out inhibit. With 00 the print-out will not be inhibited.	50
C 52 °	Multi-range scale. Enter value from which the weight shall be displayed with the next higher step width. 00000 = no change of step width	00000
C 53 °	Communication 1 = EW protocol on 0 = communication off For other kind of protocols see part 8.2. **Note:** Communication only via interface in line1(A) possible.	0
C 54 °	Indicators address A .. Z for communication.	A
C 55 °	W & M mode YES = W&M mode on no = W&M mode off	YES
C 57 °	Analog filter 0 = filter switched off 1 = filter switched on	1
C 58	Print-out of configuration and calibration parameters #T	

Parameter	Function/Description	Default value
C 59 °	Multi range scale in gross/net mode. 0 = off, no change compared with C52. 1 = on, works only if is tared and C52 not zero.	0
C 80	Display the part of the 'zero set range' in (C42), which is consumed already by using key →0← .	
C 82	Display of 'board number'. Important only for - ordering licenced SW-option PR 1613/05, or - resetting the entered SW-licence number. In order to reset, the displayed board number must be entered in C83.	different e.g. 0492083
C 83	Entry of licence number. When entering a wrong licence number CErr 9 will be displayed. In this case: - press key NEXT STEP, - after the display of 0000000 press key EXIT = B, - enter the correct licence number, or - skip and change into next desired parameter ! If enabled by a correct licence number the used SW option will be displayed also after performing a 'WARM' start (see also part 5.5.1).	
C 84	Reset of licence number(s). In order to enable temporary licence numbers in C83, select YES, and confirm by pressing key NEXT STEP. Due to this, an enabled <u>regular</u> licence number for PR 1613/05 will be reset **temporary** till the next warm start.	no
C 85	unused	
C 86	without function	
C 90..95	without function	
C 96	Test figure for **factory-internal use**. Without importance for operation. After display of FAIL , the program jumps to parameter C99.	different, e.g. 8141
C 99	Display of instrument type, embedded SW version, and all enabled SW-options	

Subsequently, the program jumps to parameter C00.

Note:
Should the calibration be concluded now, and no further settings of other parameters be required any more, store (save) data as described in part 6.6.

PART 10, INDEX

10. I N D E X

CONTENTS OF APPENDIX

A P P E N D I X 1

A1. C O R N E R P O I N T A D J U S T M E N T

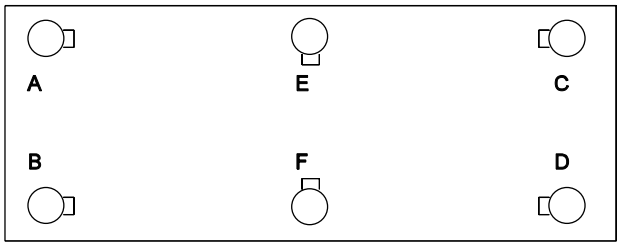
A1.1 GENERAL

When placing a defined weight on a weighbridge, the displayed value may change only within the locally tolerable limits. Untolerable deviations might be caused by

- either unevenness of the mechanical device (especially when placed to more than 3 load cells),
- or unequal sensitivity of the particular load cells.

A1.1.1 Mechanical adjustment

To ensure a balanced loading of all load cells underneath a weighbridge for example, it is recommended to compare their output voltages.

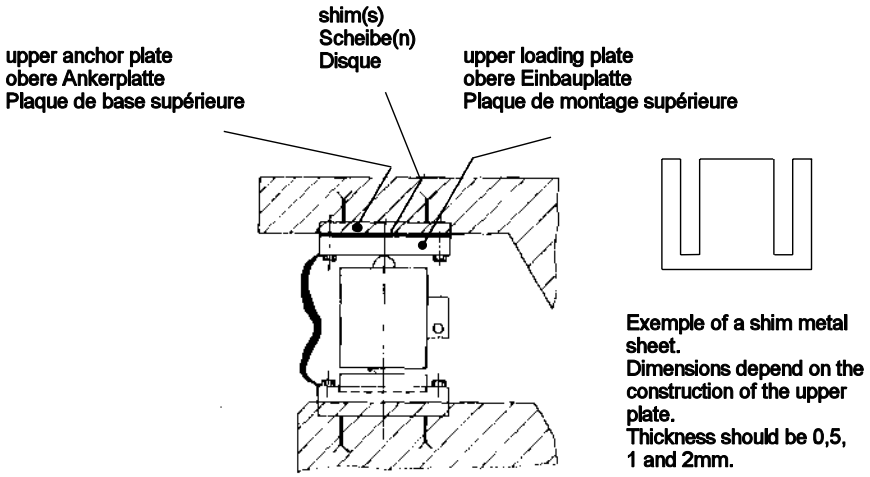


For this, all load cells must be supplied in parallel by means of the used indicator or transmitter, or a stable power supply unit of e.g. 12V DC.

The output voltage of each single load cell must then be measured with the aid of a good DVM.

There is no need for additional corner point load, except of the weight of the weighbridge itself.

If the deviation of the output voltages between the particular load cells is more than > 0.2 mV, those load cells with the lower output voltages must be shimmed, until the tolerable limit of ± 0.2 mV is reached.



For shimming, lift up the platform close to the respective load cell and put a shim of 0.5 mm up to 2 mm thickness between upper loading and anchor-plate as drawn above.

Observe that the edges of the shims are deburred. After adjustment, fix all mechanical parts properly, connect the load cells correspondingly, and ensure a faultless working weighing device.

A1.1.2 Electrical adjustment

With deviations due to unequal sensitivity at particular loadcells (mV/V), a serial resistor has to be put in one or both of the measuring signal wires of the respective loadcell.

Apply a definite weight to each cornerpoint of the weighbridge corresponding to f.s.d. divided by (n-1); whereby n means the number of loadcells. This is according to the German W & M rules (PTB).
Determine the correct indication by means of weights (or to be switching the weight display to factor 10 higher resolution in parameter C36) equivalent to 0.1 scale division and note the displayed value of each cornerpoint.
If the displayed value of the cornerpoints is deviating more than 1/2 of a scale division, insert resistors into the measuring signal line of the concerned loadcells (see drawing in part 4.13, R1 to R4).

The value of the particular resistor has to be calculated as follows:

$$\frac{\text{deviation x loadcell output impedance}}{\text{actual cornerpoint load}}$$

These resistors must be made of manganine wire, eg. 0.5 mm (2.1 Ohm/m = 476 mm/Ohm).

Note:
The adjustment resistors should only be fitted with the instrument switched off.
Does the calculated resistance value exceed 1 Ohm, it must be diveded in halve in order to keep the input of the loadcell symmetrically.
Each of this resistor must be put into the + and - measuring signal line of the respective loadcell correspondingly.

Example:

f.s.d.	60000 kg
1 scale division	20 kg
number of scale divisons	3000
loadcell impedance	610 Ohm/loadcell
number of loadcells (n)	6

$$\text{corner point load (nominal)} = \frac{\text{f.s.d.}}{\text{n-1}} = \frac{60\,000}{6\text{-}1} = 12\,000 \text{ kg}$$

The following values are being displayed for the diflerent corner points, for example:

A = 12 020, B = 12 000, C = 12 004, D = 12 016, E = 12 008, and F = 12 012

A. The indication 12 020 kg is one scale division higher than the lowest indication (12 000 kg). Therefore, the output of this loadcell must be attenuated by a resistor of 20 : 12000x610 = 1.0170hm

B. The indication 12 000 kg is the lowest.

C. The indication 12 004 is only 0.2 scale division too high but within the tolerable limits and therefore no attenuation is required.

D. The indication 12 016 kg is 0.8 scale division higher than the lowest indication. Therefore, the output of the loadcell must be attenuated by a resistor of 16 : 12000 x 610 = 0.813 Ohm

E. The indication 12 008 is only 0.4 scale division too high but still within the tolerable limits and therefore no attenuation is required.

F. The indication 12 012 is 0.6 scale division higher than the lowest indication. The output must be attenuated by a resistor of 12 : 12 000 x 610 = 0.61 Ohm

A P P E N D I X 2

A2. I N C R E M E N T A L C A L I B R A T I O N W I T H M A K E - U P W E I G H T

Calibrating this way is recommended when for the calibration procedure only a part of the calibration weight (e.g. < 50 % of the full scale) should be available, or due to the size of the weighing device no other alternative should be possible.

Example:

Scale:	weighbridge of 50 t
Resolution:	2500d
Calibration weights:	12 t (24 weighs of 500 kg)
Truck:	truck approx. 25 t, trailer approx. 12.5 t

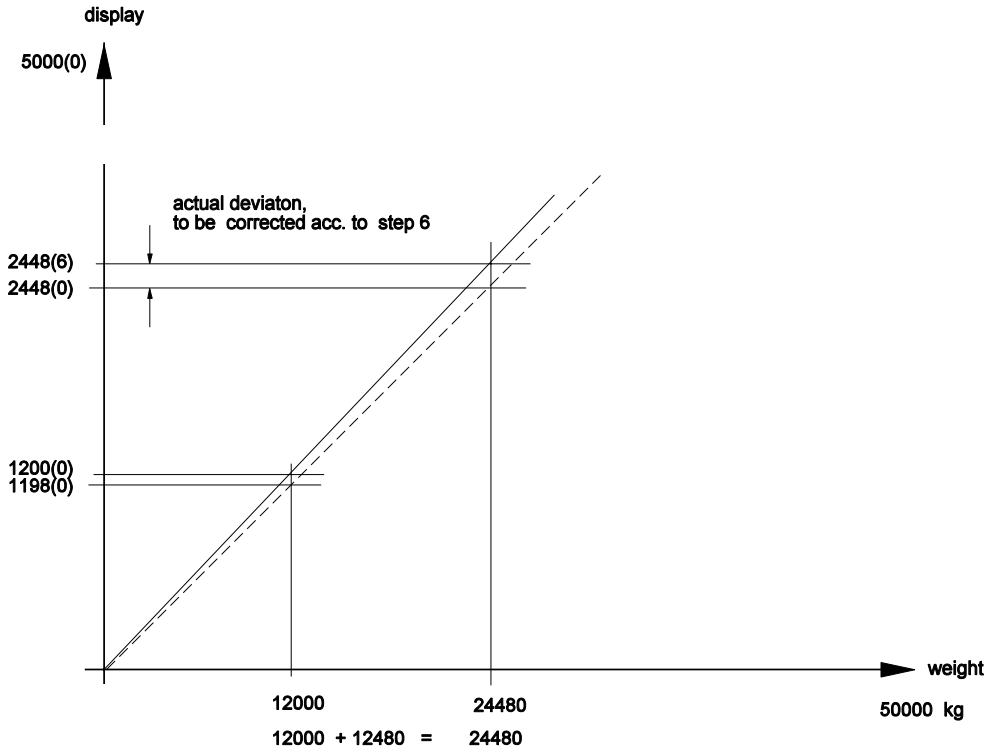
Note:
The calibration is made with a 10 times higher resolution.
Full scale is 50.00 t, step width is 20 kg. Due to the higher resolution the display shows a step width of 2 kg (000.00, 000.02...500.00).

A2.1 PROCEDURE TO OBTAIN THE REQUIRED FULL SCALE RANGE

Procedure	make-up weight + calibr. weight	display
1. Scale is empty, set zero		0000.00
2. Load calibration weights. Cal. weight must generate a meas. signal > 15% of f.s.d.	e.g: 12000 kg	e.g.: 0027.64
3. Enter value of calibr. weight (first calibr. step)		012.00
4. Remove calibration weight and load the scale with make-up (dummy) material close to the last calibration point		e.g.: 0124.80
5. load calibr. weights again	12480 + 12000 = 24480	0244.86
6. enter correct value (second calibration step)		024.48

The procedure must be continued now with removing the calibration weights and loading more make-up material with reference to step 4.

No further zero setting must be performed in between.


display
5000(0)
actual deviaton,
to be corrected acc. to step 6
2448(6)
2448(0)
1200(0)
1198(0)
weight
12000
24480
50000 kg
12000 + 12480 = 24480