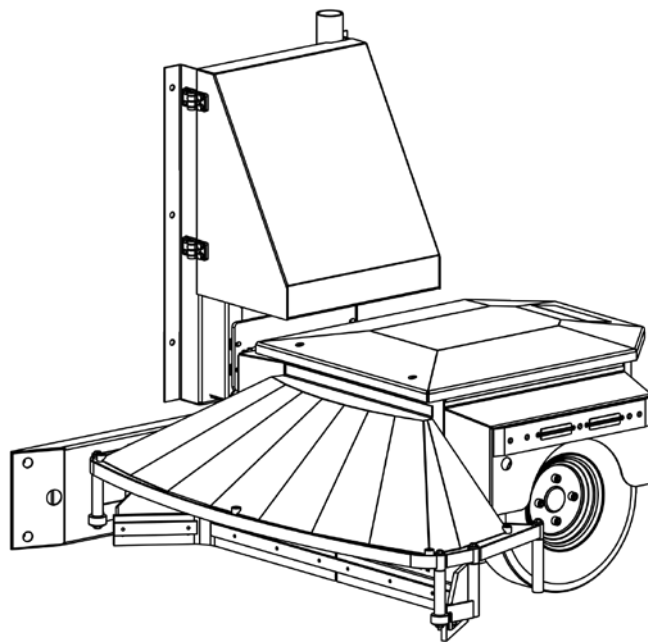


OPERATING INSTRUCTION

PRIBOT 100

AUTOMOBILE DUNG REMOVAL SCRAPER



To use the *PRIBOT* in an optimal way, read the operating instruction with care before commissioning!



INFORMATION

The figure- and graphic expositions in this operating instruction might deviate partially a little from your system, by virtue of technical modifications!

All the features, components or parts marked with a are options or accessories and because of that not available on each system!*

Instructions and descriptions for increments, additional components and -functions you can find in this operating instruction.

Please keep this operating instruction with care for further assignment!!

Original operating instruction

The german layout of this document is the original operating instruction

Translation of the original operating instruction

All non german versions of this document are translations of the original operating instruction.

Operating instruction for automobile dung removal scraper *PRIBOT*

4. revised version

Valid from software version 1.69

© 2013

Service addresses



Before you contact our service team, please note down the following...

- *the specific name and model of the machine (name plate)*
- *the serial number of the machine (name plate)*
- *ALL the displayed error messages*

In case of malfunctions and technical problems:

Phone: +49 (0)7336 - 961032 or E-Mail: service.entmistung@prinzing.eu

For spare part orders:

Phone: +49 (0)7336 - 96100 • Fax: +49 (0) 7336 - 961050 • E-Mail: entmistung@prinzing.eu

Postal address: Peter Prinzing GmbH - Siechenlach 2 - 89173 Lonsee-Urspring

Or contact your local dealer

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Table of contents

1.	Technical data	4
2.	General information.....	6
2.1.	Copyright.....	6
2.2.	Intended using.....	6
3.	Setup and function	7
3.1.	Setup of the Pribot	7
3.2.	Functions of the Pribot	8
4.	Safety	10
4.1.	General security advises.....	10
4.2.	Working on the electric system	11
4.3.	Other safety advises	11
6.	Transport	12
5.	Assembling.....	12
6.1.	Assemble the charging station PB-L	13
6.2.	Prepare the Pribot for the operation.....	14
7.	Commissioning	15
7.1.	Control elements and messages on the control unit.....	15
7.2.	Control elements on the manual control unit REMOTE	15
7.3.	Overview menu items.....	16
7.3.1	Menu RUN	17
7.3.2	Menu TEACH	18
7.3.3	Menu ROUTE	24
7.3.4	Menu SCHEDULE (TIMETABLE)	30
7.3.5	Menu SETTINGS	31
8.	Operation.....	33
8.1.	Manual operation	33
8.2.	Automatic operation with the Pribot	34
8.3.	Centralization - Information of the operation with the Pribot	34
9.	Maintenance, cleaning and servicing	35
9.1.	General measures for servicing and maintenance.....	35
9.2.	Maintenance intervals	35
9.3.	Cleaning	36
9.4.	Lubrication.....	37
9.5.	Set and change the dozer blade	38
9.6.	Maintenance of the storage battery.....	39
9.7.	Maintenance of the wheels	39
10.	Service	40
10.1.	Change the fuses	42
11.	Error messages - cause and deletion	43

* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

1. Technical data

These technical data apply for the typePribot 100
Machine number
Year of construction
Colourazure, RAL 5015

Battery-charging station (PB-L):

Voltage (input)230 V AC / 1~ / 50 Hz / PEN
Voltage (output)24 V DC
Charge current max.10 A
Weight (ca.)70 kg
Measurements with starting metal sheet (L x B x H)1500 x 470 x 1030 mm

Pribot (PB):

Weight (ca.)370 kg
Measurements (L x B x H)1200 x 1300 x 520 mm
Drive.....electric motor 1x per wheel
Number of wheels2x drive, 1x carrying wheel
Air pressure wheels drive.3,5 bar
Max. clearing with1200 mm
Speed.0 - 8 m/min
Control voltage.....24 V DC
Storage battery - type and numberCTM, gel-storage battery model CTC, 2 pieces
Storage battery capacity110 Ah
Charging time.4 h
Max. run time with complete loaded battery.....20 h
Measurement-system.....touch sensor / ultrasonic

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Assembling declaration

Corresponding the EC-machine-directive 2006/42/EC, annex II, no. 1 B

Hereby we declare, that the undermentioned control corresponds to the primary safety and healthy requirements of the EC-Directive 2006/42/EC, in its conception and building class as well as in its, from our side, circulated version. It is only allowed to setup the control, when it is assured, that the chosen control which should be attached, corresponds to the directive(2006/42/EC).

Manufacturer:

Peter Prinzing GmbH
Siechenlach 2
89173 Lonsee-Urspring (Germany)

Phone: +49 (0) 7336 / 9610-0
Internet: www.prinzing.eu
e-Mail: info@prinzing.eu

Description:

Type/model: Automotive dung removal robot Pribot-100
Consisting of: Dung removal robot incl. storage battery, control and battery-charging station
Function: Self consistent cleaning of walkways with slatted floor in a cattle stable
Serial number: see name plate

The accordance is explained, for the following statutory directives/definitions for the product:

- Transistent emissions: EN 55014-1:2006 + A1:2009
EN 61000-3-2:2006 + A1:2009 + A2:2009
- Immunity to interference: EN 55014-2:1997 + A1:2001 + A2:2008
EN 61000-3-3:2008

The special technical data sheets corresponding annex VII B have been prepared. They will be forwarded to the responsible national government agency, on a founded request, by an electronic version or by post.

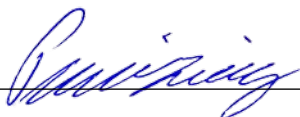
Place/Date:

Lonsee-Urspring, 16.02.2012

Signatory details:

Peter Prinzing, Manager

Signature:



Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

2. General information

Please read this operating instruction of the *PRIBOT* with care before commissioning. Thereby you are able to avoid mistakes during the assembling/operation and you can learn to use the characteristics and the function of the machine in an optimal way.

Original operating instruction

The german layout of this document is the original operating instruction.

Translation of the original operating instruction

All non german versions of this document are translations of the original operating instruction.

2.1. Copyright

The copyright for this installation and operating instruction belongs to the PRINZING Company. It is not allowed, neither entire, nor partially duplicate it, publish it or for unauthorized using in function of competition, and not to inform others. Deliberate infringements against this will be prosecuted

2.2. Intended using

The reliability of the automotive dung removal scraper *PRIBOT* (in the following only named *PRIBOT*) is only granted by intended using.



INFO!

The PRIBOT is an automotive dung removal scraper and is used to move the dung on the slated floor in the cattle stall. Therefor the slated floor has to be plane and without slope. Included is the PRIBOT (PB) and a battery charging station PB-L.

Do not use the PRIBOT to transport objects, animals or persons. It is not allowed to use the PRIBOT outside of slated floors on other surfaces.

To set/program the PRIBOT and during the manual operation and you need one person. During the auto mode, the PRIBOT works uncontrolled and self-dependent in the programmed working area. The persons who are working with the PRIBOT have to know about the operation of the PRIBOT as well as the possible emerging risks.

It is only allowed to use systems or components which are stated in the order confirmation and in the technical data. Unauthorized rebuildings and changes on the PRIBOT and on the battery-charging station are not allowed because of safety reasons! Changes on the hard- and software of the PRIBOT and on the battery-charging station are not allowed without the consent of the PRINZING company.

If the PRIBOT and its components (e.g. battery-charging station) are not used according to regulations (e.g. not used in the defined walkway), there is no safety operation with the machine guaranteed.

A secure operation can not be ensured, if the PRIBOT and its components are not used in this vein. Not the manufacturer but the operator is responsible for personal injury and property damage, which results of misapplication!

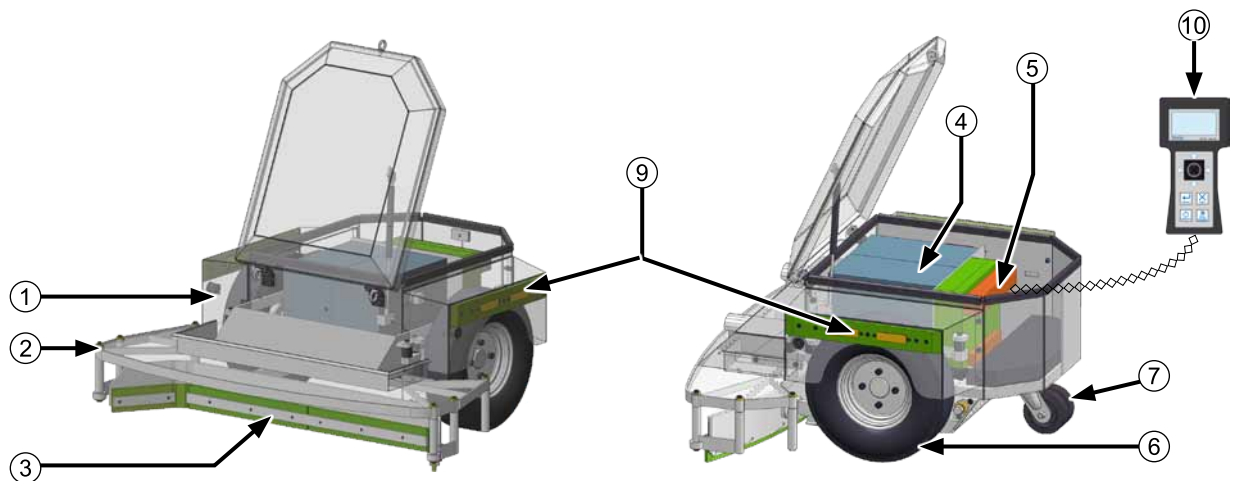
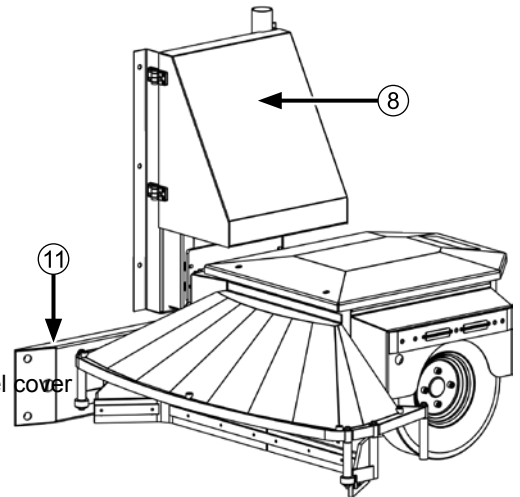
Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

3. Setup and function

3.1. Setup of the Pribot

The Pribot 100 consists of the following components:

- (1) Body out of sheet steel
- (2) Touch shield with sensors
- (3) Scraper with changeable clearing rubber ledge
- (4) 2x storage battery
- (5) Electronic control
- (6) 2x wheels with rubber tyre equipment, lateral mounted
- (7) 1x carrying wheel, mounted behind
- (8) Battery-charging station PB-L
- (9) Storage battery-loading contacts, on both sides inside the wheel cover
- (10) Manual control unit REMOTE in the inside of the PRIBOT
- (11) Starting metal sheet of battery-charging station



* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

3.2. Functions of the Pribot

The *PRIBOT* is an automotive dung removal scraper for cattle stalls on slatted floor. The *PRIBOT* is moving self-dependent during the clearing time and with a continuous speed along a learned way. The learning of the driving way will be made by the operator by the manual control unit.

The control of the drive happens by sensors on the touch shield by ultrasonic-sensors (boomer). Thereby the *PRIBOT* can drive round obstacles self-dependent.

The drive of the *PRIBOT* happens by direct current motors with single wheel drive. The power supply happens by 2 maintenance-free storage-batteries.

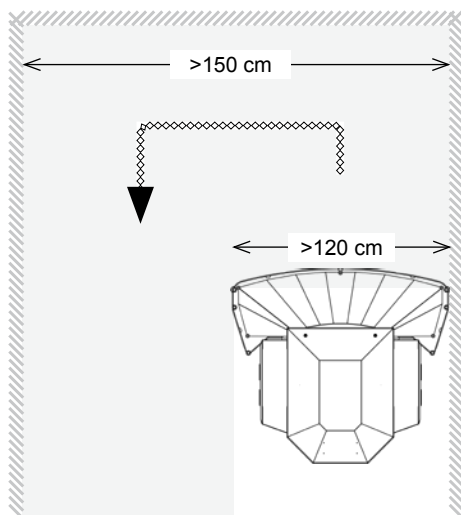
You are able to move the *PRIBOT* manual by a manual control unit (Remote). The auto mode can be started by the manual control unit (Remote) or software based by a schedule.

The control of the storage battery capacity happens automatically by the control of the *PRIBOT*. In case of low storage battery (< 1%) the *PRIBOT* stops and has to be moved manual to the battery-charging station by a joystick. The storage battery will load self-dependent on the battery-charging station PB-L 100 , after touching the contacts.

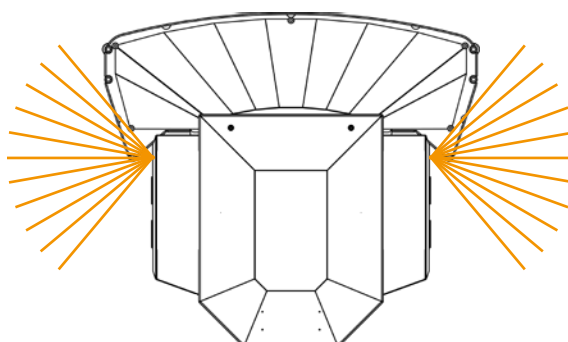
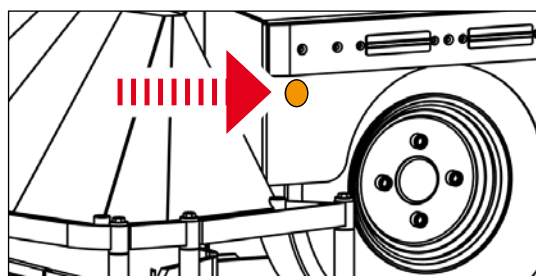
Preconditions for a failure-free operation:

- minimal walkway width to turn the *PRIBOT* = 150 cm
- minimum clearance of the upstand on the walkway = 10 cm
- lowest angle for edges = 80°
- distances for boomer-(ultrasonic) operation *PRIBOT* <> area: min. 100 cm, max. 250 cm
- minimum-capacity of the storage batteries for the auto mode = > 1%

The scraper width of the *PRIBOT* 100 is 120 cm (see fig. 8/1)



▲ 8/1 Pribot on the walkway

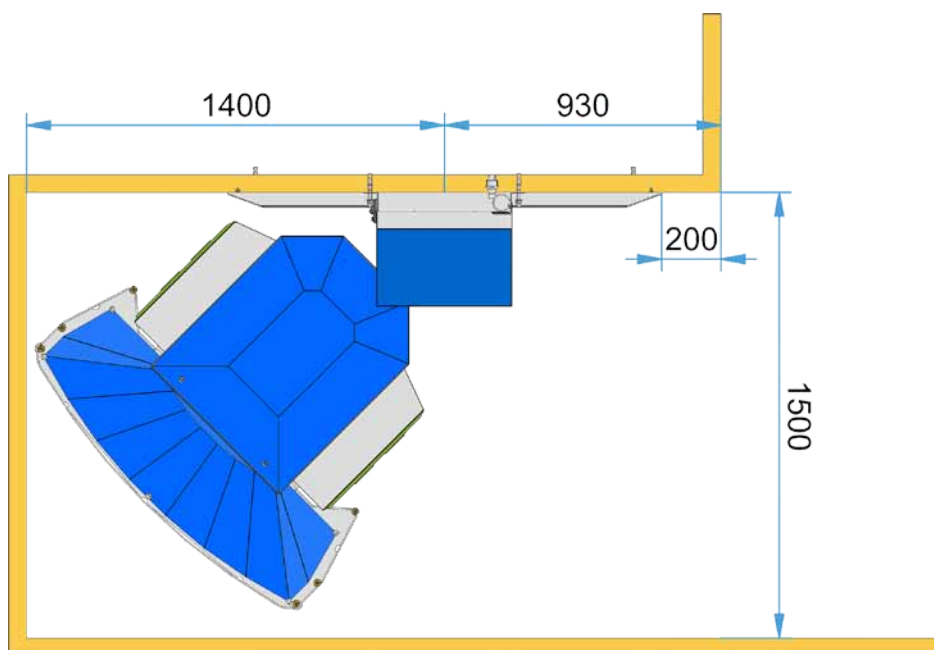
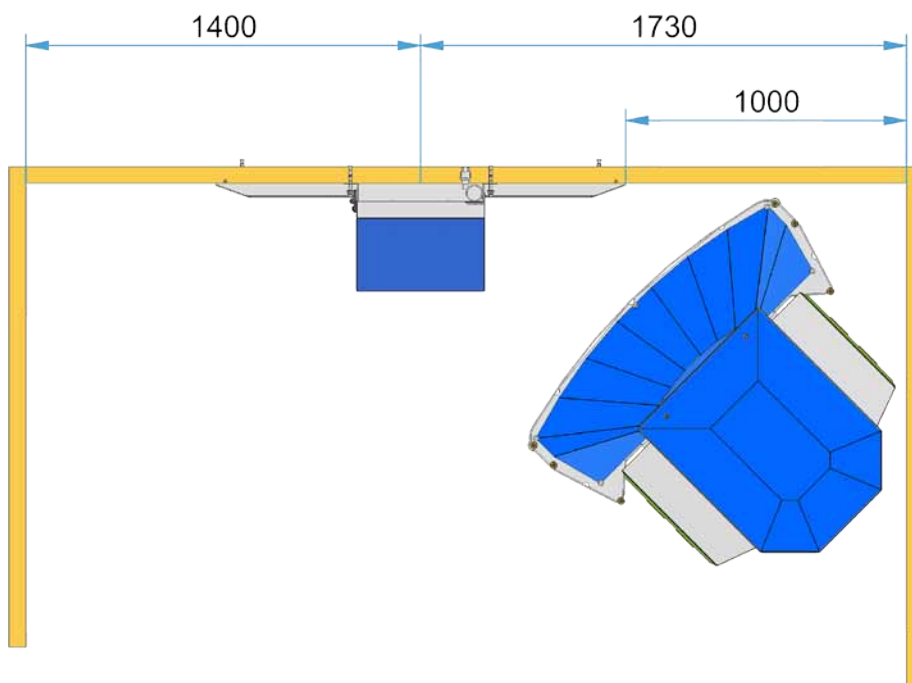


▲ 8/2 Ultrasonic sensors on the Pribot
During manual operation or programming (teaching) you have to choose the respective boomer (left or right).

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Minimum size for moving to the battery charging station



* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

4. Safety

4.1. General security advises

The following security advises are to avoid bodily injury and property damage.

The operator of the *PRIBOT* has to secure, that general security advises and regulations concerning setup, operation and disassembling will be considered and kept.

If there are any obscurities or if you need further information please refer to the P. PRINZING GmbH.



ATTENTION

Danger because of uncontrolled operation of the PRIBOT! By the uncontrolled operation of the PRIBOT there might be considerable dangerous situations as e.g.

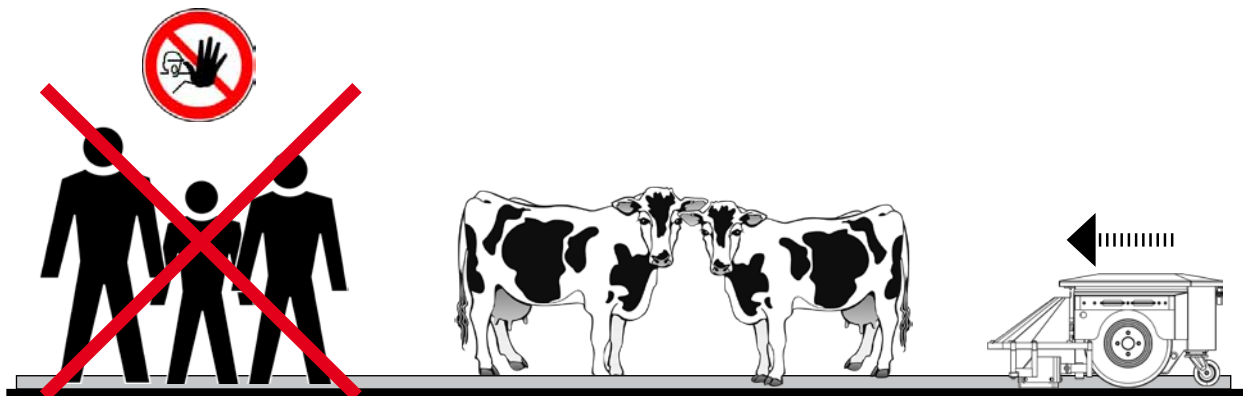
- *danger of injuries by the self-dependent moving of the scraper*
- *fire danger by damages on the machine*

Assure, that there is no safety risk because of the the operation of the PRIBOT. Keep the machine in optimal condition and do regularly checks on the entire machine. Keep the working area of the PRIBOT inaccessible for children and other unauthorized persons.



ATTENTION - Danger of being crushed!

Always keep enough distance to the PRIBOT. In the working area of the PRIBOT there is a high danger of being crushed. If there are persons in the working area of the PRIBOT, you have to stop the auto mode of the PRIBOT immediately.



▲ 10/1 No persons in the working area of the Pribot

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

4.2. Working on the electric system



ATTENTION

Connection-, repair- and maintenance works on electric systems of the *PRIBOT* and on the battery-charging station are only allowed to be done by authorized and specialized persons. Use for connection-, repair- and maintenance works only licensed electric tools for the respective voltage types (rotating current, directly voltage).

Pribot:

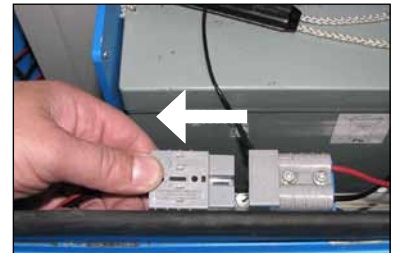
Be careful when doing works in the *PRIBOT*!

Cut the power supply (plug connection storage battery <> cut control - see fig. /1) before doing maintenance- or repair works in the *PRIBOT*

Be careful with the storage batteries - danger of short circuit and fire danger!

Battery-charging station:

Cut the feed line from the net before opening the battery-charging station!
(Pull the power plug)



▲ 11/1 Unplug the connector
Battery <> Control

4.3. Other safety advises

- ATTENTION Danger of being crushed when opening the cover plate of the *PRIBOT*. By animals in the walkway, the cover plate may bang suddenly.
- Keep enough distance to the *PRIBOT* when doing the setup with the manual control unit „Remote“



Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

6. Transport

Transport the *PRIBOT* only with a lifting device. Therefor there should be forks on the lifting device to pick up a transport pallet. Pick up the *PRIBOT* from the backside. Therefor move the transport forks slowly and very carefully below the *PRIBOT*. Do not crash against the clearing shield with the transport forks. Afterwards lift the *PRIBOT* carefully and transport it to the desired position.

The transport of the battery-charging station can be done manual. Thereby you can transport the starting metal sheet separate.

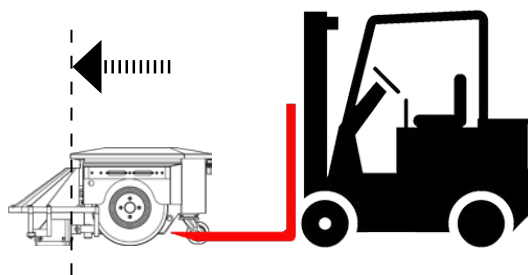


ATTENTION

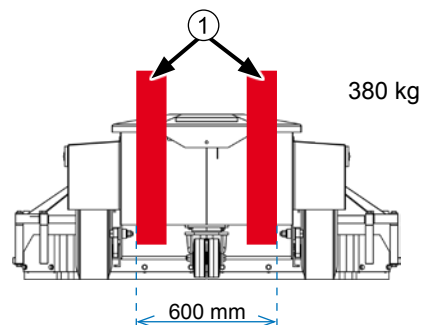
Never lift the *PRIBOT* on the touch shield !!! Thereby you might damage the sensors and a failure-free operation is not possible.

Be careful when transporting the *PRIBOT* and the battery-charging station. Avoid collisions and squash landings of the machines.

We assume no liability for damages resulting of improper transports!!



▲ 12/1 Pick up the *PRIBOT* from the backside

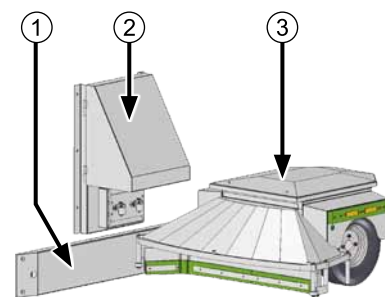


▲ 12/1 ;Maximum distance of the transport forks (1)

5. Assembling

Before commissioning the *PRIBOT* you have to mount all components orderly and prepare the *PRIBOT* for the operation. You have to...

- assemble the starting bar (1)
- assemble the charging station PB-L (2)
- connect the charging station to the mains supply by a Schuko-plug (230 V~)
- establish power supply on the *PRIBOT*, storage battery <> control
- check the air pressure of the wheels on the *PRIBOT* (ca. 4,5 bar)
- check the lubrication points in the *PRIBOT* (see [page 37](#))



▲ 12/1 Components

- (1) Starting bar
- (2) Charging station PB-L
- (3) Pribot

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

6.1. Assemble the charging station PB-L

You need the battery-charging station PB-L to load the storage batteries of the *PRIBOT*. To secure a correct loading process of the storage batteries, consider the following points when mounting the battery-charging station:

- Mount the battery-charging station right-angled on a solid, static wall
- The *PRIBOT* has to stand on a solid and plane floor during the loading process
- Mount the battery-charging station in a way, that the *PRIBOT* can move from both sides to the battery-charging station without problems. **Mounting examples/requirements/minimum dimensions see figure on page 13.**
- Turn the charging contacts corresponding the starting direction of the *PRIBOT* (fig.: 13/1)

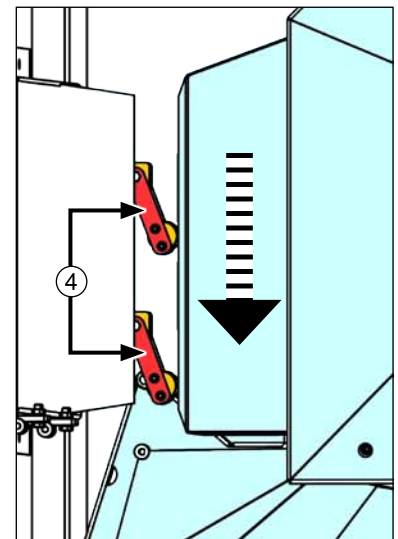
The power supply of the battery-charging station happens by a pre-assembled cable with safety plug 230 V / 1~. Therefor you should have a safety plug socket 230 V / 1~ / 10 round the battery-charging station.

Fixing the battery-charging station:

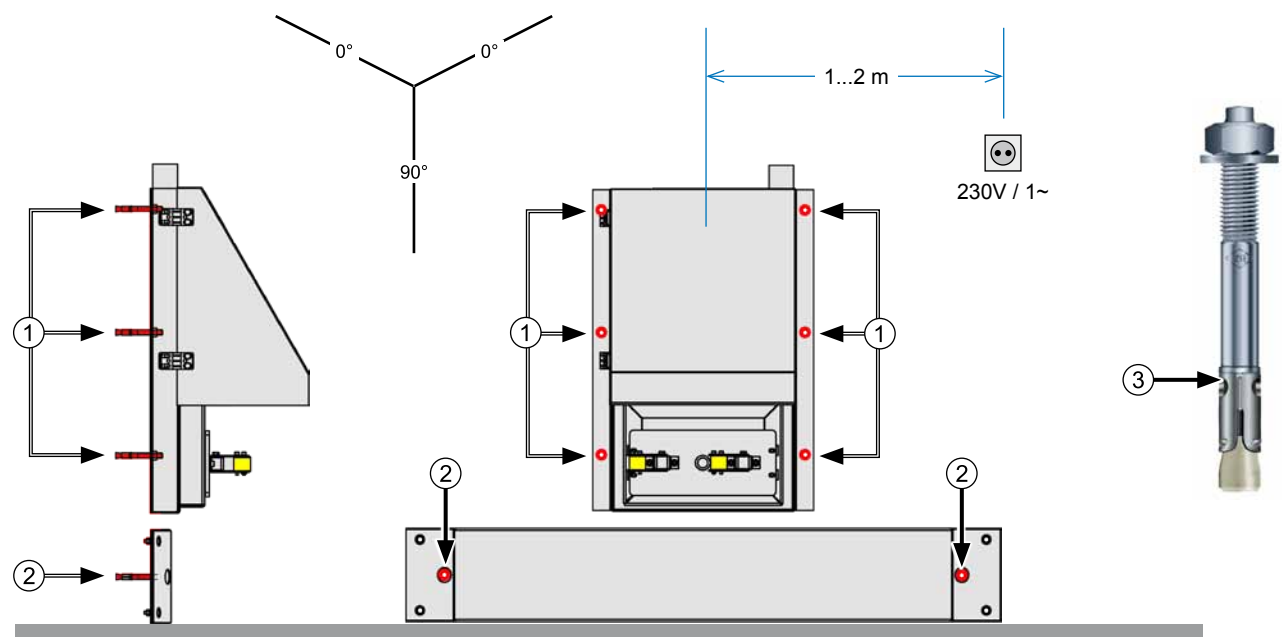
Do the fixing...

- by the lateral butt straps on the battery-charging station (1) with each 3 bores to fix the battery-charging station
- by the two bores on the outside of the starting bar (2)

Use min. 8 stud bolts M12 (3). Adjust the battery-charging station horizontal and vertical.

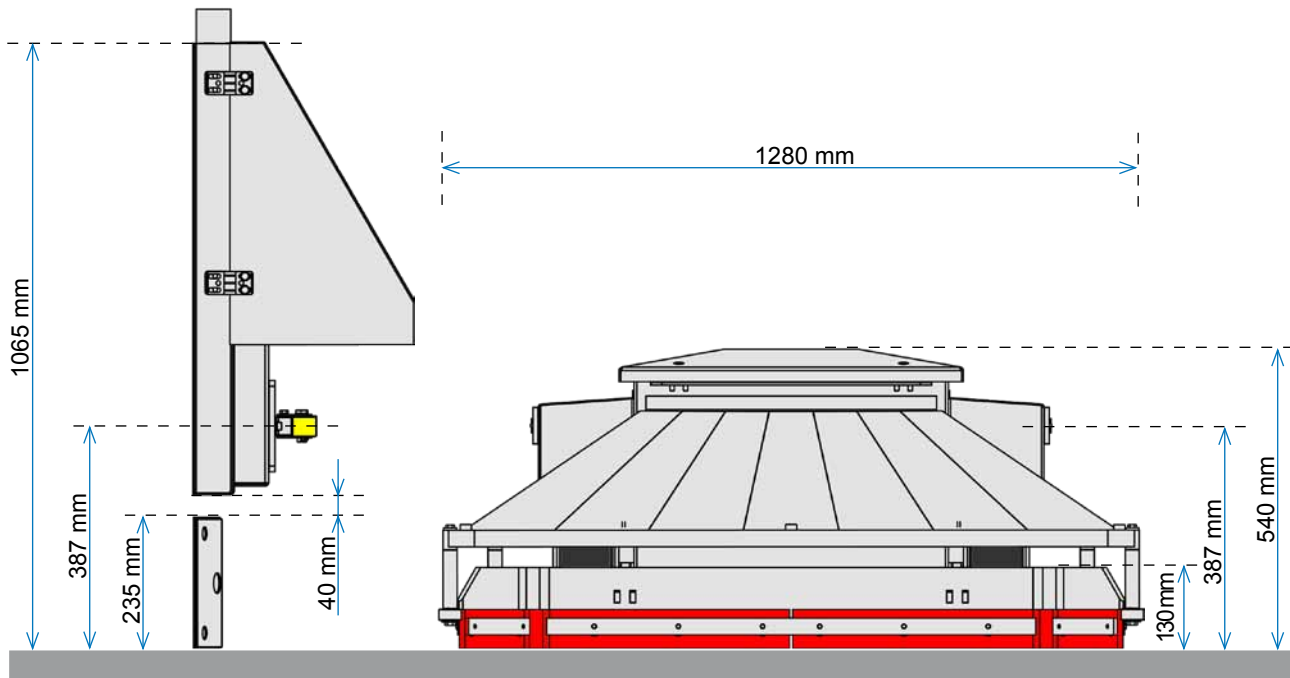


▲ 13/1 Position of the charging contacts (4)



* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)



▲ 14/1 Measurements PriBot 100 and battery-charging station (figure is not true to scale!)

6.2. Prepare the Pribot for the operation

The *PRIBOT* will be delivered completely assembled. After setup the *PRIBOT* in the desired walkway, you have to make a power supply contact between the storage batteries and the control.

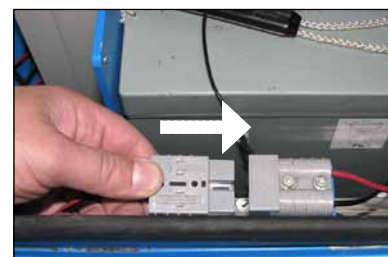
Make a power supply contact in the Pribot:

1. Open the cover plate of the *PRIBOT*
2. Connect the both plugs in the body (14/2)
3. The control starts automatically

*The display shows, the *PRIBOT* is now ready to use*

4. After a function test and the commissioning close the cover plate of the *PRIBOT*
5. Press "Run" to drive the *PRIBOT* on the charging station

*Depending on the selected charging side (left / right) the Pribot goes to the charging station and stops. The display show's: =/~, *PRIBOT* detect charging station (~ Pribot is charging)*



▲ 14/2 power supply with the control

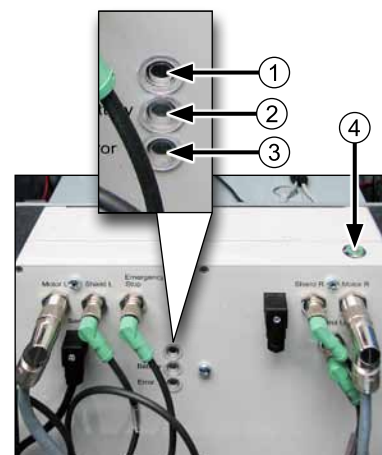
* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

7. Commissioning

7.1. Control elements and messages on the control unit

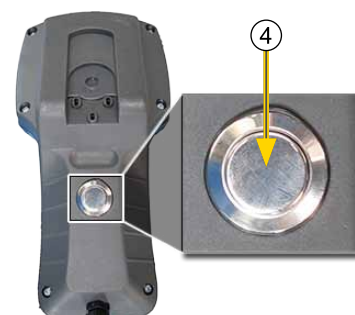
#	Element	Description
1	Operation display <i>Run</i>	glows when the <i>PRIBOT</i> is driving
2	Operation display <i>Battery</i>	glows when the charging condition of the battery is low (only manual operation is possible)
3	Error message <i>Error</i>	glows when there is a error on the <i>PRIBOT</i>
4	Push button	Press the push button... <ul style="list-style-type: none"> - to activate the standby mode of the <i>PRIBOT</i> (switch on) - to receipt an error message, therefor press: <ol style="list-style-type: none"> 1. ESC on the manual control unit 2. the push button(3) - to switch off the <i>PRIBOT</i>



▲ 15/1 Controller inside Pribot

7.2. Control elements on the manual control unit REMOTE

	Description
	<ul style="list-style-type: none"> - During the manual mode, to move the <i>PRIBOT</i> in the respective direction of arrow - During the setting mode to navigate trough the menu and to change values
	<ul style="list-style-type: none"> - opens a chosen menu item - opens a value to edit - saves a set value - changes to the next step - starts the drive in the menu „Run“ / menu „Path“
	<ul style="list-style-type: none"> - confirm a selection or a message - stepwise backward navigation in the menu - receipt of error messages
	Button to switch off the <i>PRIBOT</i>
	<ul style="list-style-type: none"> - Starts route „0“ for return to charging station (only „tentative wall following“ -TWF) - disconnects the scraper move (pause) - continues the scraper move after the pause
4	dead man-button - during the manual operation you have to keep pressed this button for the entire driving time (dead man operation)

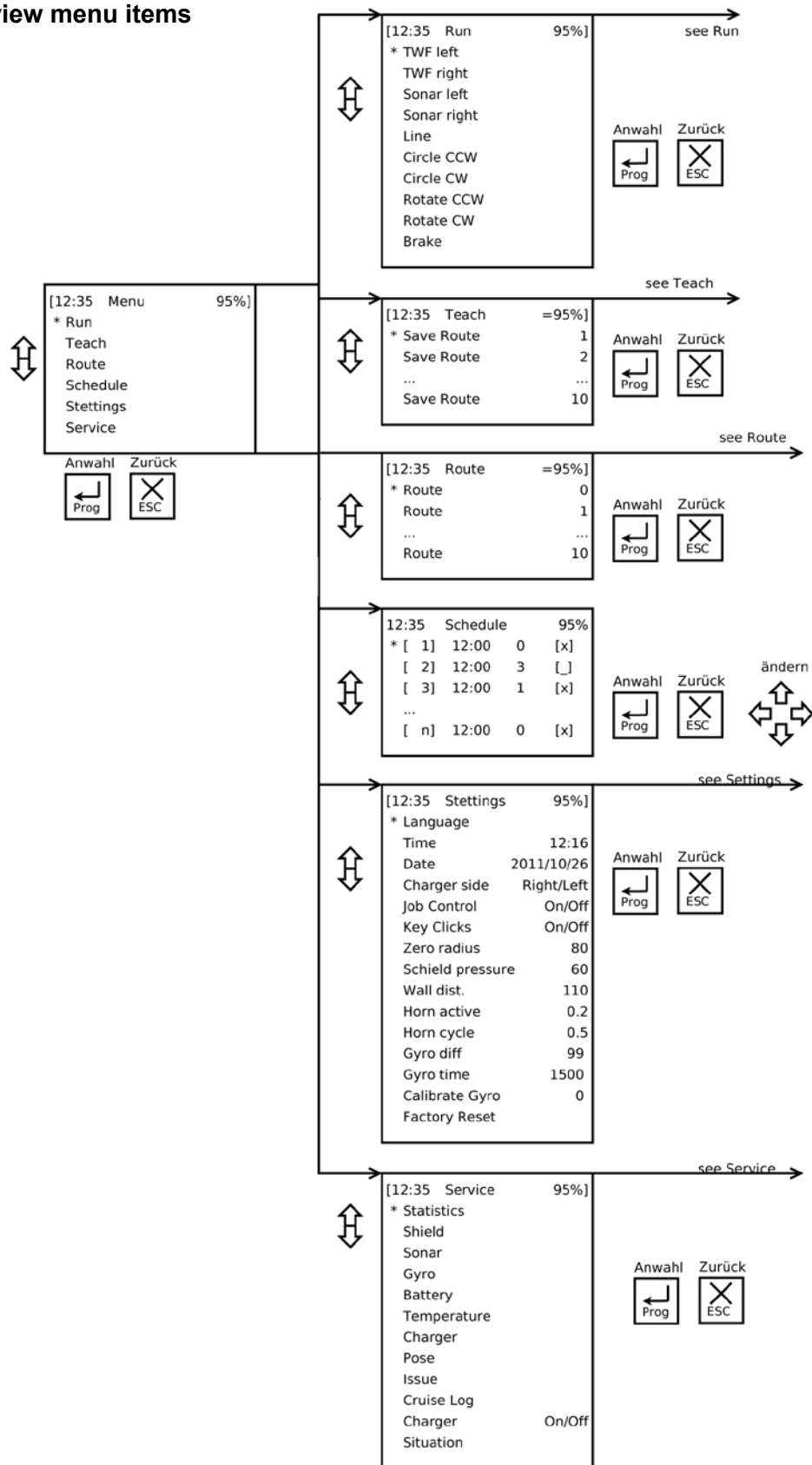


▲ 15/2 Manual control unit „Remote“
- Frontside (fig. above)
- Backside (fig. below)

* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

7.3. Overview menu items

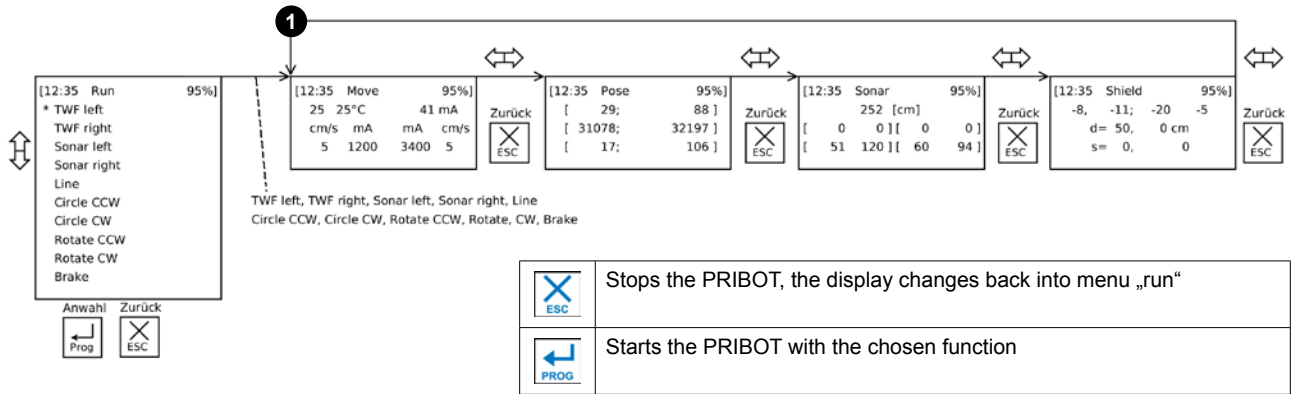


* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

7.3.1 Menu **RUN**

In the manu „Run“ you are able to test single route elements. This can be helpful during the setting process of the *PRIBOT* as well as for the calculation for a possible teaching strategy. ATTENTION - The *PRIBOT* is thereby moving!



Menu	Function	Description
TWF left	Tactile wall follow left	The wall is, or should be on the left side. If the robot is standing frontal to the wall and „TWF left“ is chosen, the robot turns to the right that the wall is on the left side of the robot.
TWF right	Tactile wall follow right	The wall is, or should be on the right side. If the robot is standing frontal to the wall and „TWF right“ is chosen, the robot turns to the left that the wall is on the right side of the robot.
Sonar left Sonar right	Follow the wall with preset distance on the base of ultrasonic measurements. (adjustable in the service menu)	If you deflect shield during the drive, the robot stops and „tries“ it again after 5 seconds. If the shield deflects after 5 trials again, the drive will be cancelled. When the drive was successful (without deflection of the shield) always one failure will be reset after 15 cm >>> after 4 failures and following drive of 31 cm you have got still 2 trials. ATTENTION: The distance will be measured from the wheel case to the wall and has to be also set in this way in the menu „Settings“.
Line	Straight-ahead driving	If you deflect shield during the drive, the robot stops and „tries“ it again after 5 seconds. If the shield deflects after 5 trials again, the drive will be cancelled. When the drive was successful (without deflection of the shield) always one failure will be reset after 15 cm >>> after 4 failures and following drive of 31 cm you have got still 2 trials.
Circle CCW Circle CW Rotate CCW Rotate CW	Rotation Counter ClockWise Rotation ClockWise Rotation Counter ClockWise Rotation ClockWise	Rotation of the robot counter clockwise with a defined radius Rotation of the robot clockwise with a defined radius Rotation of the robot on one point counter clockwise Rotation of the robot on one point clockwise If you deflect shield during the drive, the robot stops and „tries“ it again after 5 seconds. If the shield deflects after 5 trials again, the drive will be cancelled. If the rotation was successful (without deflection of the shield) always one failure will be reset after 10° : >>> after 4 failures and following rotation of 20° you have got still 2 trials.
Brake		Brake for both drive wheels (only for test purposes)
Submenu: Move, Pose, Sonar, Shield		Display of the actual value for the respective submenu
①	The display changes independent of the chosen route element. After choosing a route element there will be always the same display.	

* Option /depending on design

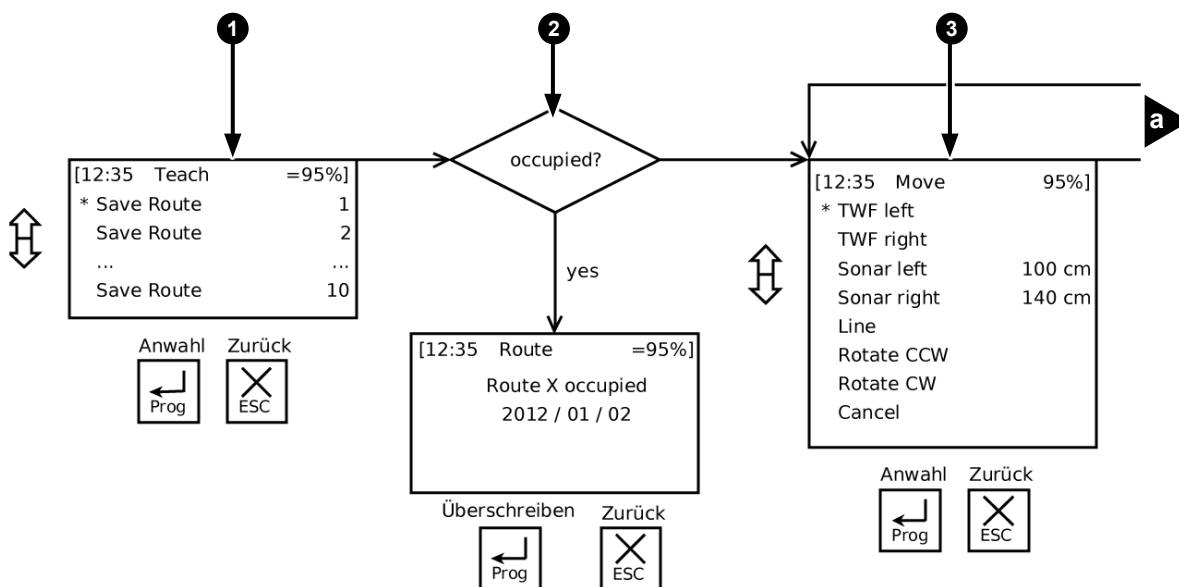
Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

7.3.2 Menu **TEACH**

Basically each route consists of many route elements as e.g. TWF, Sonar, Line, Rotate.... and so on. Again each route element will be stopped by a termination, defined in a teaching drive.

Start and stop point of a route is always the battery-charging station. Because of that, the termination of the last route elements has to be always the recognition of the battery-charging station. As the battery-charging station has to be always fixed on the wall, you must always use TWF (tactile wall following). Consequently the last route element has to be always TWF (tactile wall following), terminated by the battery-charging station.

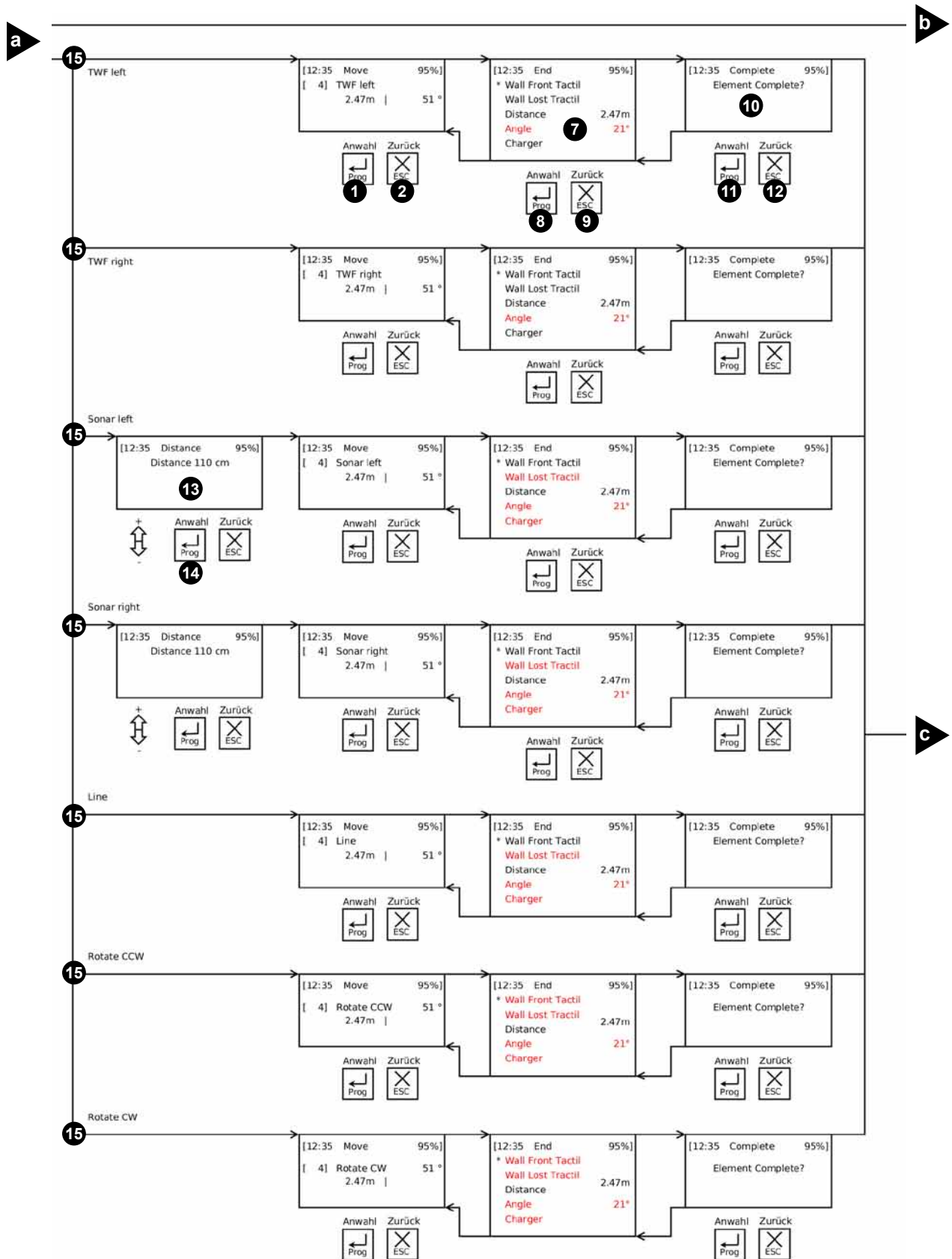
In the following you can find the description of single menu items out of the menu „Teach“. An overview of the menu „Teach“ you can find on [page 22](#)



#	Function	Description
①	Chose the route number	Chose route number, on which the teaching drive is saved or which you want to overwrite.
②	Info message	If the route number was already used, there will be a message with the date on which the route number was used last time. >>> with „Prog“ you can overwrite a route >>> with „Esc“ back into menu before (teach), without changes
③	Chose submenu	Chose the first / next route element. The <i>PRIBOT</i> starts the respective route element and moves. Description and behaviour of the route elements see menu „Run“

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)




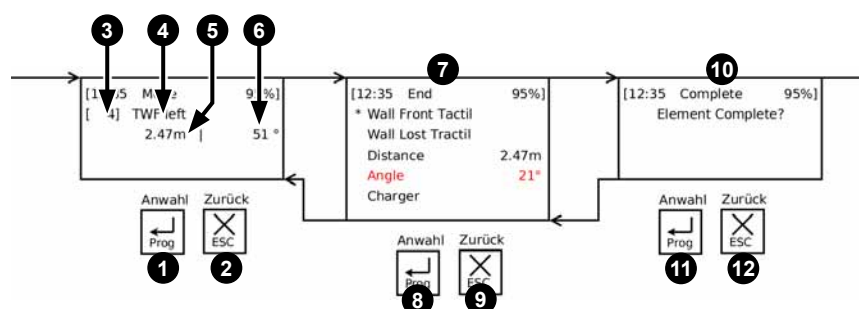
* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Prosecution 2 - Menu „Teach“

Description Menu „Teach“ (see overview page 19 and figure below)

#	Function	Description
1	Button	Stops the route element and enables an insert of a termination
2	Button	Within 2 sec you can stop the already running route element >>> back to element choosing
3	Display	Number of the current route element (will be counted upwards automatically)
4	Display	Name of the current route element
5	Display	Driven route by the current route element
6	Display	Rotation by the current route element
7	Chose You have to chose the termination.	<ul style="list-style-type: none"> - Wall Front Tactile >>> <i>PRIBOT</i> moves till he touches frontal a wall. - Wall Lost Tactile >>> <i>PRIBOT</i> moves till he leaves the lateral wall (wall has to be touched during the insert) >>> identification of outside corners. - Distance >>> <i>PRIBOT</i> drives the same route, which was driven in this element. - Charger: <i>PRIBOT</i> moves up to the battery-charging station. <p>Basically you can only chose terminations, which fit to the current route element. In this model, the terminations which can not be chosen are marked red. But on the display of the <i>PRIBOT</i> it is not possible to differentiate optical between selectable and not selectable terminations.</p>
8	Button	The robot continues the route element, till the set termination is identified..
9	Button	Interruption of the insert of a termination. The route element continuos till you press again PROG to insert a termination.
10	Display/Query	If the chosen termination was identified, the STOPS and demands with this message a confirmation of the identified termination.
11	Button	Confirmation of the termination >>> goes on to the insert of the next route element
12	Button	Termination will not be considered. The <i>PRIBOT</i> continuos the current route element till the chosen termination will be done again.
13	Display + Insert	<p>Insert of the desired distance to the wall. Change with joystick up/down, confirm with PROG</p> <p>The start value is equivalent to the current measured distance to the wall.</p> <p>ATTENTION: The distance will be measured from the wheel cover to the wall.</p> <p>When „Sonar parallel to the wall“ insert the value for the distance with max. +/- 10 cm difference to the displayed distance!</p>
14	Button	With PROG the route element starts with the set distance..
15		The <i>PRIBOT</i> starts the respective route element and moves. Behaviour patterns as described in menu „Run“.
		The functions apply always for all elements and functions in the entire column of the submenu.

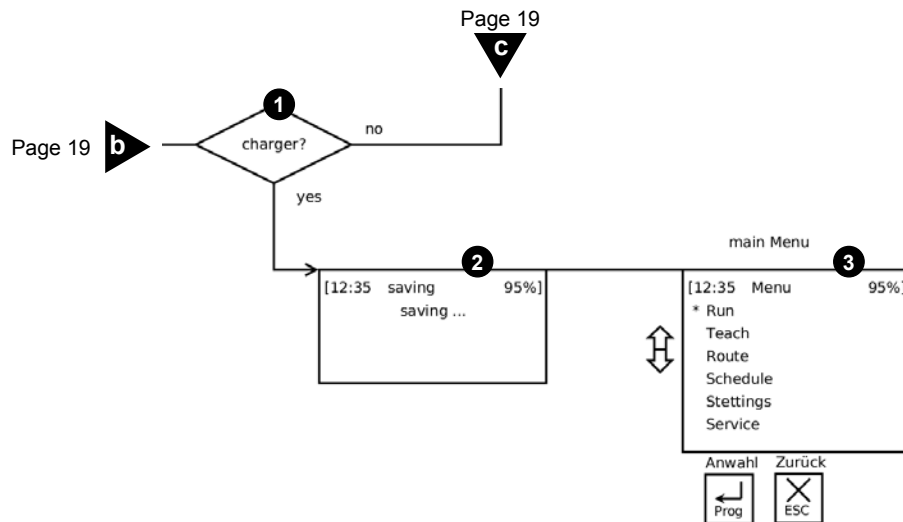


◀ 20/1 Figure - abridgement of page 19

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Prosecution 3 - Menu „Teach“

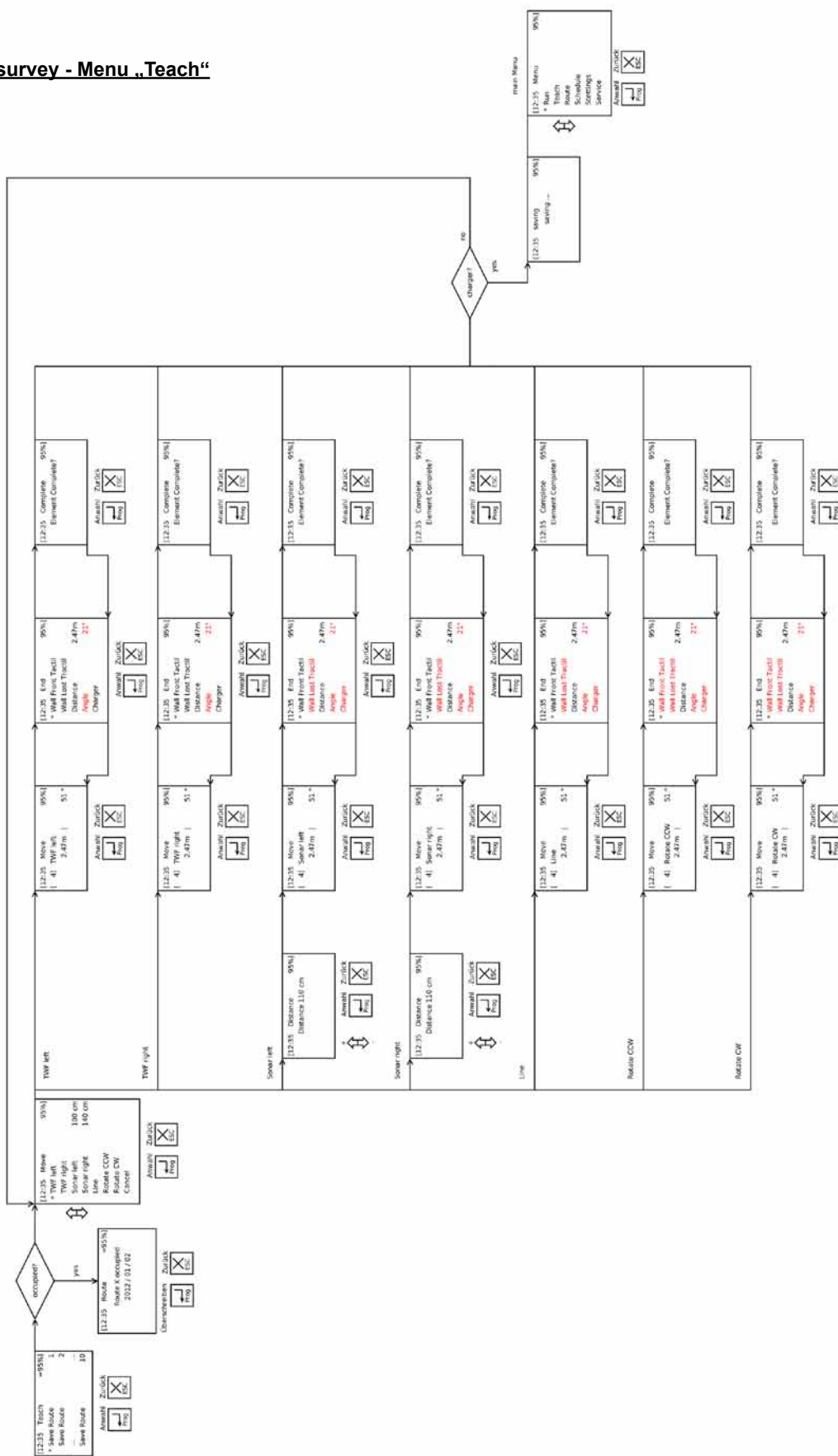


#	Function	Description
1	Display	If you chose the termination „Charger“, the <i>PRIBOT</i> moves up to the battery-charging station and was identified there. As the battery charging station is always at the start and at the end of a route, the teaching drive is used up and the route will be saved. >>> Display changes back to the main menu
2	Display	You can see the message only for short time during the saving process
3	Display	Main menu, chose further actions or close

* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

General survey - Menu „Teach“



* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)



INFO

During the teaching you have to move always a complete route. The start- and stop point is always the battery-charging station!

How to create a route in the menu „Teach“:

1. Open the menu „Teach“
2. Chose a route with the joystick (no.)
If a already existing route was chosen there will be a query.
3. Press the button „Prog“ to create a route
The submenu with the route elements opens.
4. Chose a route element with the joystick (e.g. TWF right)
Pribot starts
5. Press the button „Prog“ >>> the PRIBOT starts
Move the Pribot up to the desired position
6. Press the button „Prog“ on the desired position
The Pribot stops and the submenu with the route elements opens
7. Chose an element with the joystick (e.g. distance)
8. Press the button „Prog“ >>> query „element complete“
Press „Prog“ for YES >>> the element will be saved, display changes back to menu
Press „ESC“ for NO >>> display changes back to menu without saving, Pribot moves on
9. Repeat point 4...8 up to the next to last route element, to move all route elements
10. Chose the last element with the joystick „Battery-charging station“ (Charger)
The last route element before the battery-charging station has to be always TWF right/left (depending on the set in the menu „Settings“ and the position of the battery-charging station).
If the last element was saved with „Prog“, the submenu with the route elements opens.
Now the Pribot moves on up to the battery-charging station.
11. When the Pribot has reached the battery-charging station, there will be the query „Element complete“
12. Press „Prog“ to receipt the query
13. Press 2x the on/-off button on the control
The control switches off - and on again and the learned route is saved additional.

[12:35	Move	95%]
* TWF left		
TWF right		
Sonar left	100 cm	
Sonar right	140 cm	
Line		
Rotate CCW		
Rotate CW		
Cancel		

▲ 23/1 Menu route elements

[12:35	End	95%]
* Wall Front Tactil		
Wall Lost Tractil		
Distance	2.47m	
Angle	21°	
Charger		

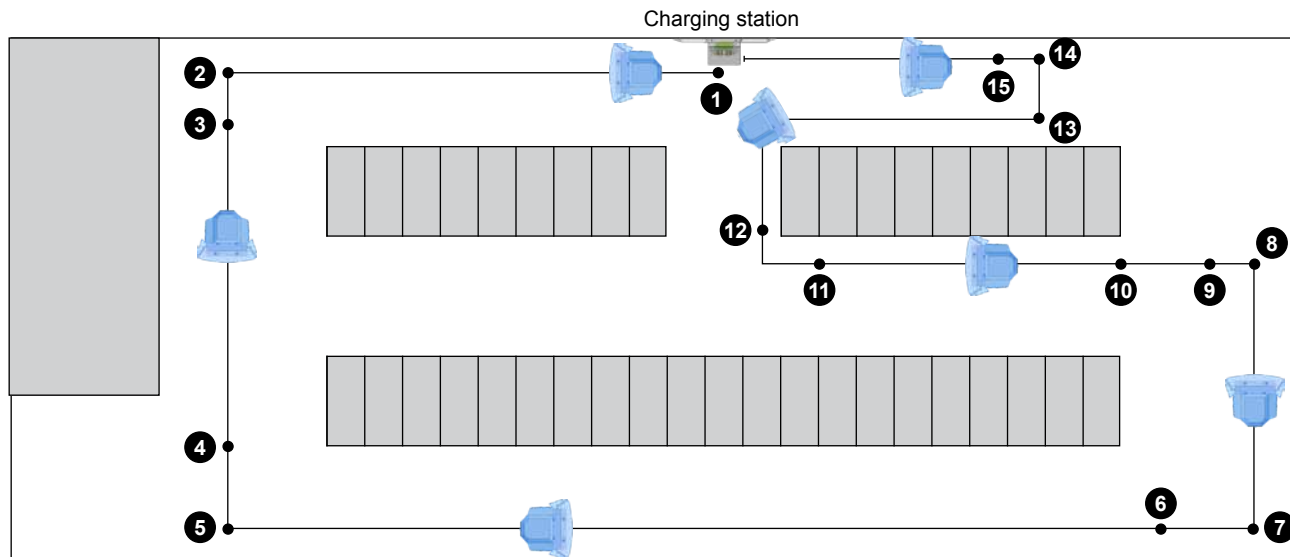
▲ 23/2 Submenu of route elements



▲ 23/3 Button on/off on the control

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Example teaching route:



- | | |
|---|---|
| (1) TWF right > distance | (9) Straight wall front shield |
| (2) Rotate counter clockwise (GuZ) > x° | (10) TWF right > distance |
| (3) Sonar right x cm > distance | (11) TWF right > wall lost shield |
| (4) Straight wall front shield | (12) TWF right > distance |
| (5) TWF right > distance | (13) Rotate counter clockwise (GuZ) > x° |
| (6) TWF right > wall front shield | (14) Straight wall front shield |
| (7) TWF right > distance | (15) TWF right > battery-charging station |
| (8) Rotate counter clockwise (GuZ) > x° | |

7.3.3 Menu **ROUTE**

With route you are able to start taught routes in advance. Start always from the battery-charging station The *PRIBOT* has to be connected with the battery-charging station..



INFO

*Route 0 is taken with tactile wall follow (TWF) up to the battery-charging station. It is not possible to overwrite this route.
If TWF right or left gives the setting value „Charger-Side“ in the menu „Settings“.*

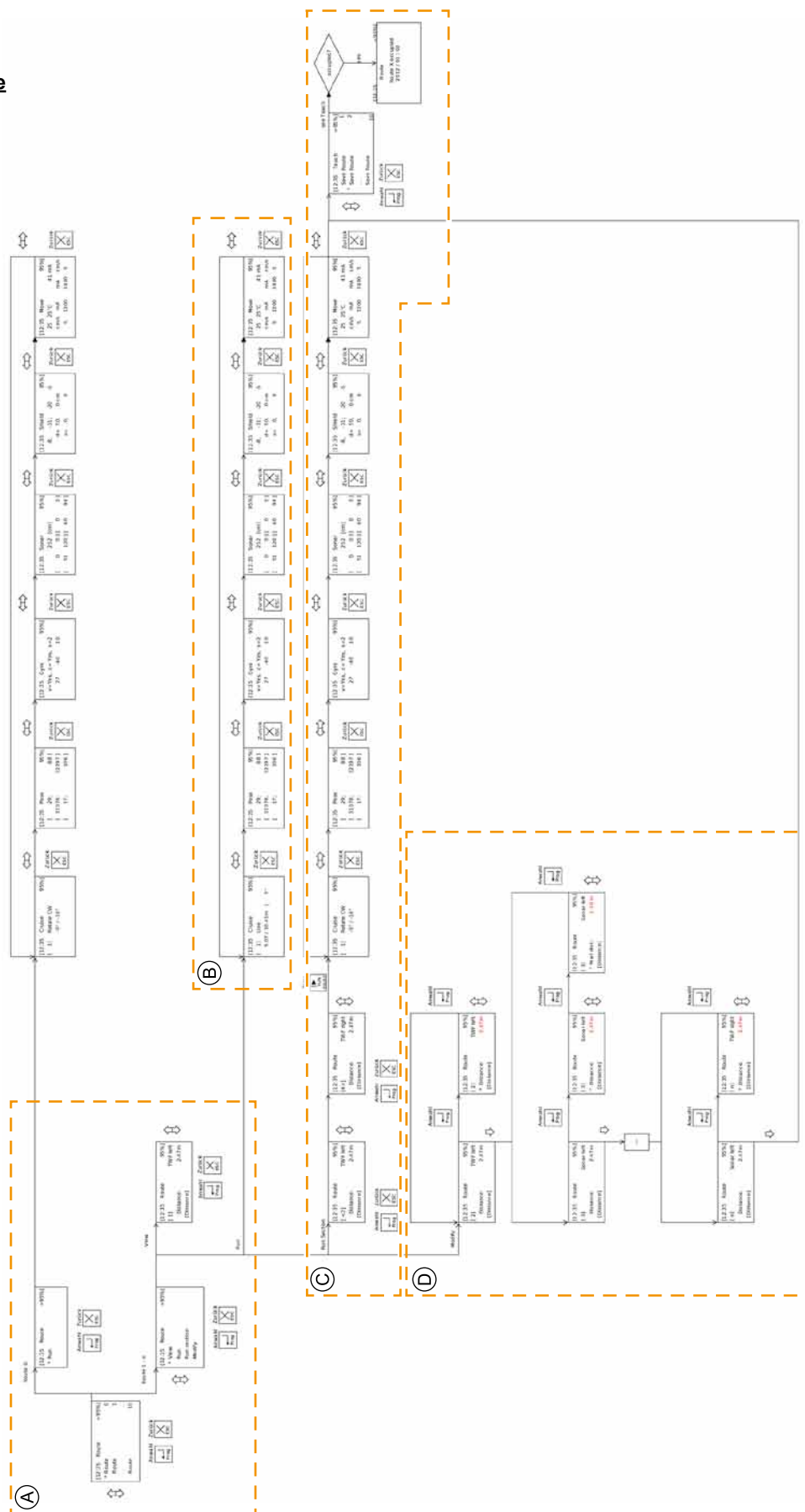
* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

General survey - Menu route

Description menu route

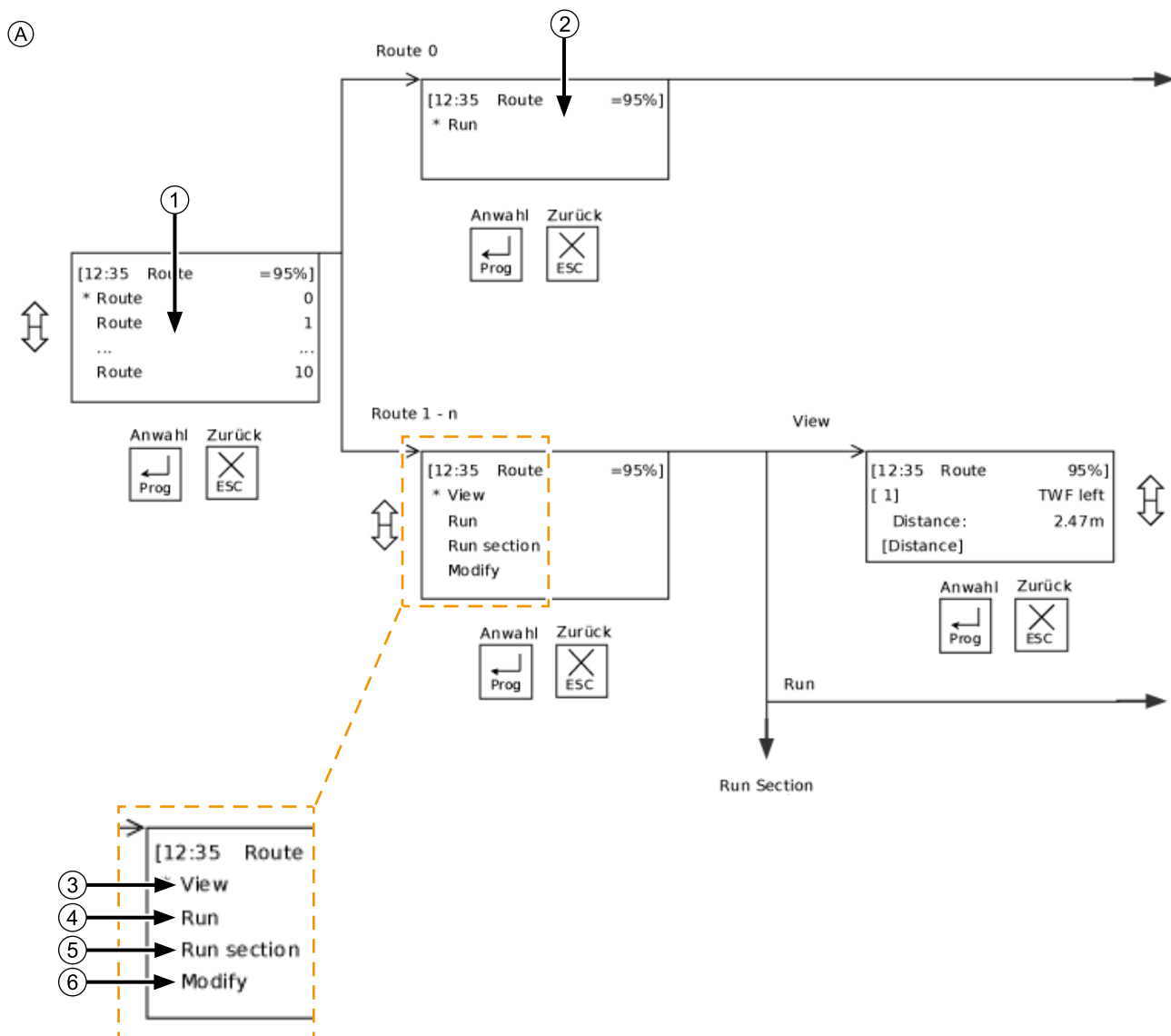
- (A) see page 26
- (B) see page 27
- (C) see page 28
- (D) see page 29



Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Description (A) of the menu route (see overview menu page 25)

#	Function	Description
1	Option	Chose the route
2	Option route 0	Chosen route moves only manual TWF left or right (corresponding charging side)
3	Option	Shows the teached route (all route elements)
4	Option	Drive the teached route after pressing on the Prog button description B
5	Option	Drive single route elements (press prog Prog button) description see below
6	Option	Edit of single route elements by manual choice - description see below

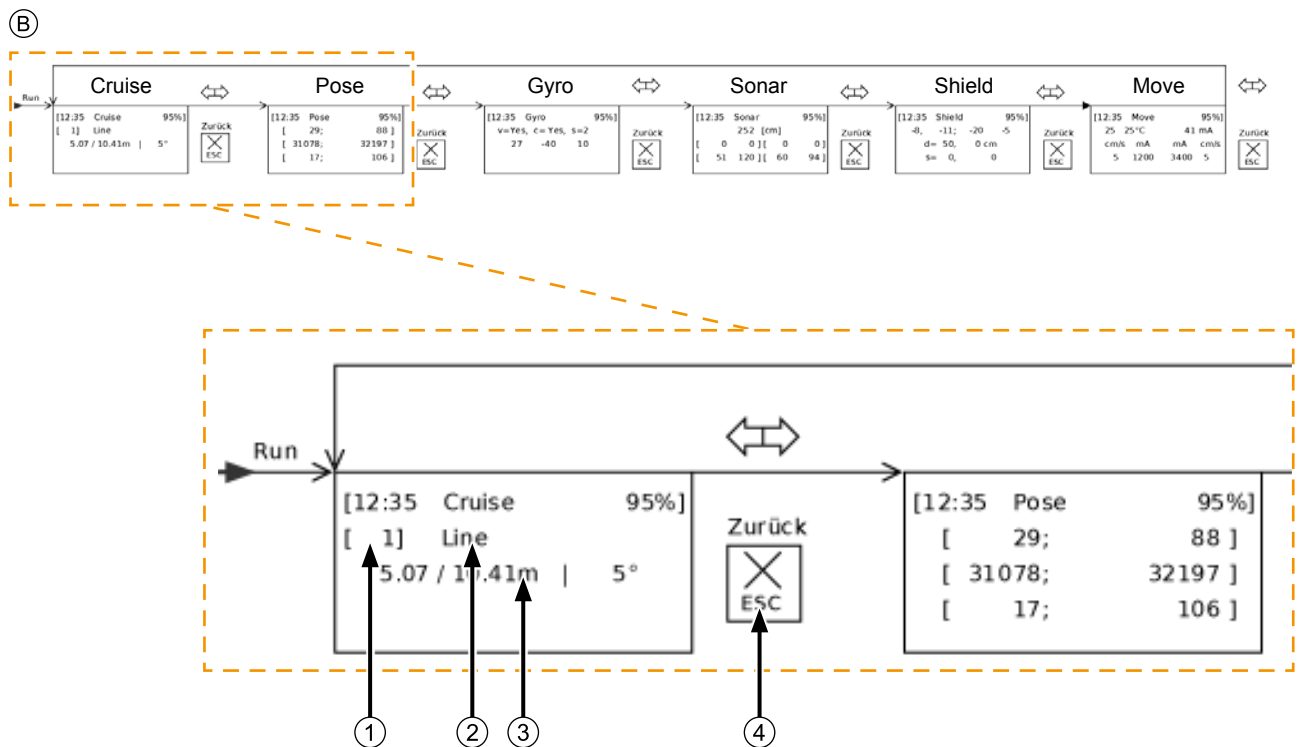


* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Description (B) menu route (see menu page 25)

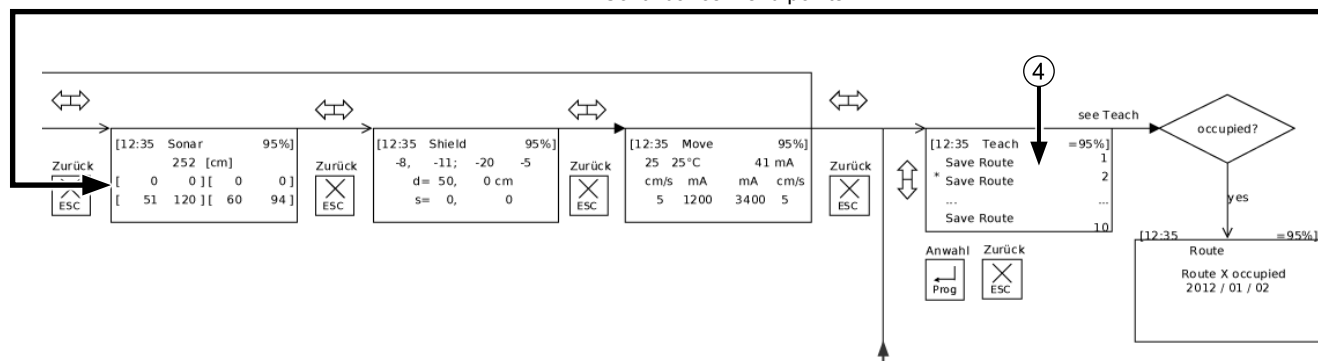
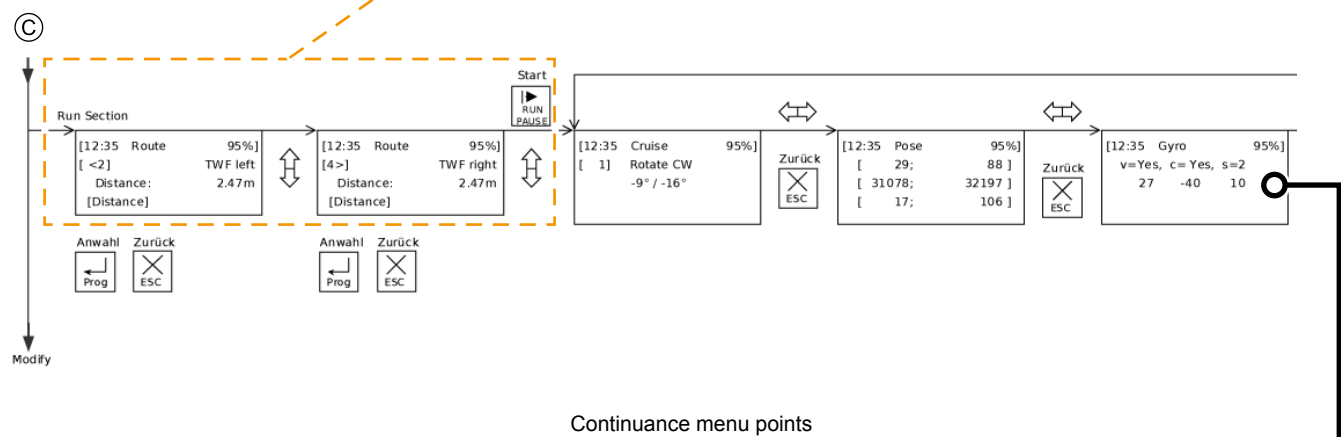
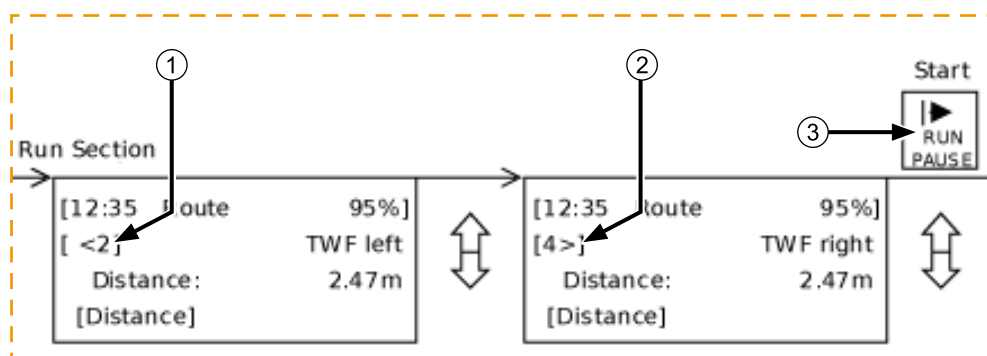
#	Function	Description
1	Display	current route element number
2	Display	description of the current route element
3	Display	driven distance, which was driven with the current route element
4	Display	<i>PRIBOT</i> stops, display changes back into main menu



* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

#	Function	Description
1	Insert	Starting point element (current position <i>PRIBOT</i>)
2	Insert	Endpoint element (target position <i>PRIBOT</i>)
3	Insert	Run-button starts the drive >>> <i>PRIBOT</i> starts from the starting point (1) up to the endpoint (2)
4	Insert	Save = change or overwrite the chosen route (use same route name) or teach a new route from this point on. You have to save the new route with a new route name. After saving it changes automatically to the teaching menu.



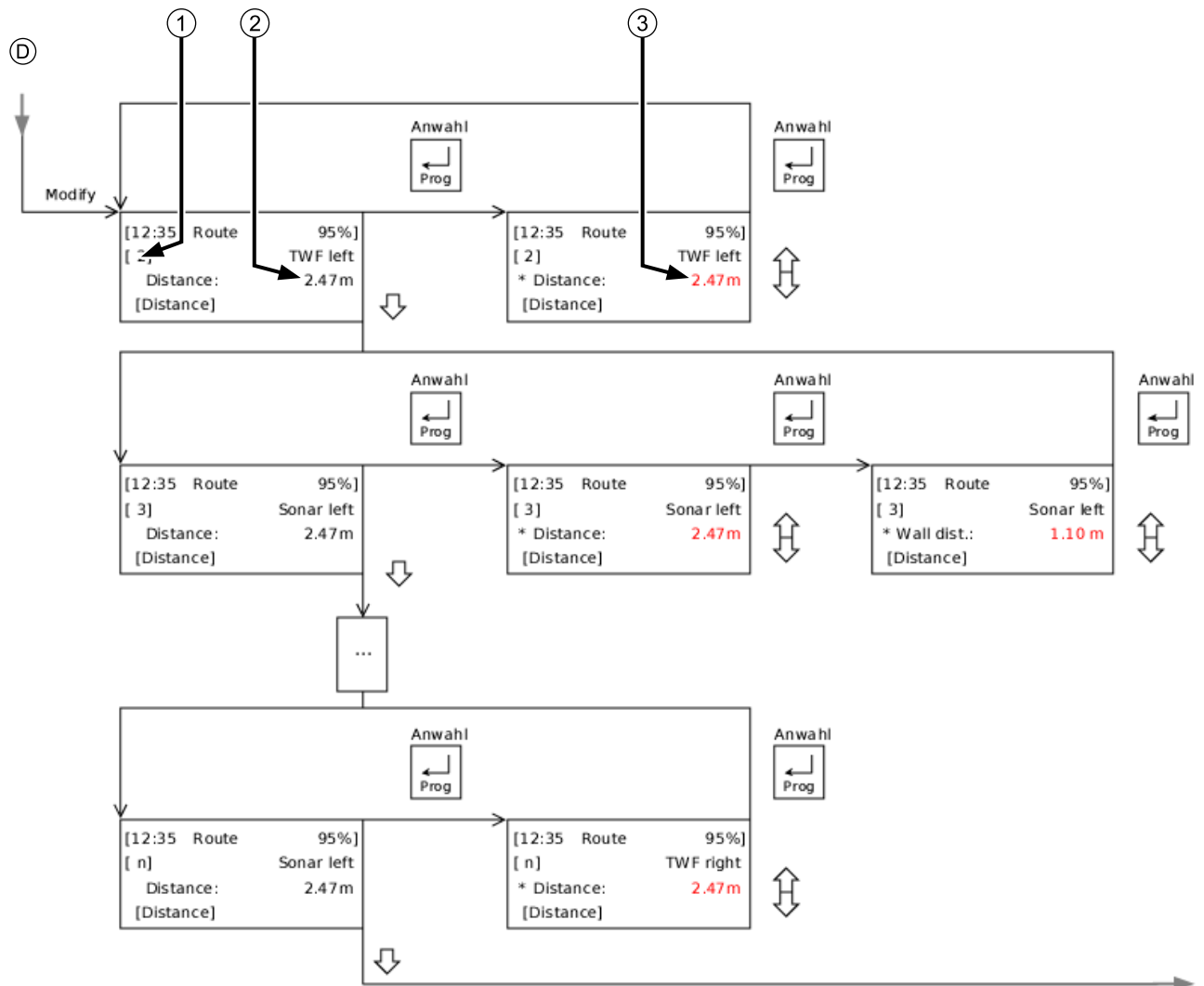
* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Description (D) menu route (see menu page 25)

Change single route elements by choosing the element

#	Function	Description
1	Display	Chosen route element
2	Display	Current value of the element
3	Insert	After pressing the prog-button you are able to edit the value in 5 cm steps by using the joystick. After again pressing the prog-button the new value will be saved and you are able to chose the next element by the joystick. To leave the menu, press the joystick till you can see the display SAVE. >>> Press the prog-button to save the settings. ESC = cancel entry, the changed values won't be saved.



* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

7.3.4 Menu **SCHEDULE** (timetable)

In the schedule the teached routes get a time. There are 40 starting times available.



INFO

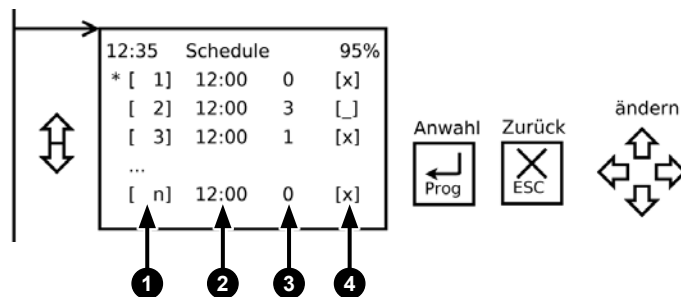
You are able to set starting times disordered (e.g. 6:00, 11:00, 8:00 o'clock) or delete out of the list (e.g. 6:00, 00:00, 8:00 o'clock). The **PRIBOT** starts always in the sequence of the sequenced times (e.g. 6:00, 8:00, 11:00 o'clock).

Avoid same starting times with different routes!

When there are changes on the switching status (on or off) you have to switch the control again off and on! Otherwise the changes won't be saved.

Information about the using with the schedule

- The **PRIBOT** starts only, when the storage batteries are load. Because of that the starting time may deviate from the set starting time
- Consider, when set the starting times, the driving time of the **PRIBOT** and a possibly necessary storage battery loading time. Example: starting time = 9:00 o'clock, driving time = 1h, loading time = 1h >>> next start 11:00 o'clock at the earliest
- That the **PRIBOT** starts automatically, you have to enter a route number for the respective time and sign the the starting time with an x (on) in the menu „Schedule“



#	Function	Description
1	Display	Numeration of the starting times
2	Display	Starting time of the route
3	Display	Route number
4	Display	[x] - active route [] - inactive route

How to program a starting time:

1. Chose a line with the joystick
2. Press „Prog“ for a entry/change in the line
3. Navigate on a value with the joystick (right/left)
4. Change the value with the joystick (up/down)
5. Navigate to the next value or close the insert with „Prog“
6. By „ESC“ you can delete the entry without saving.

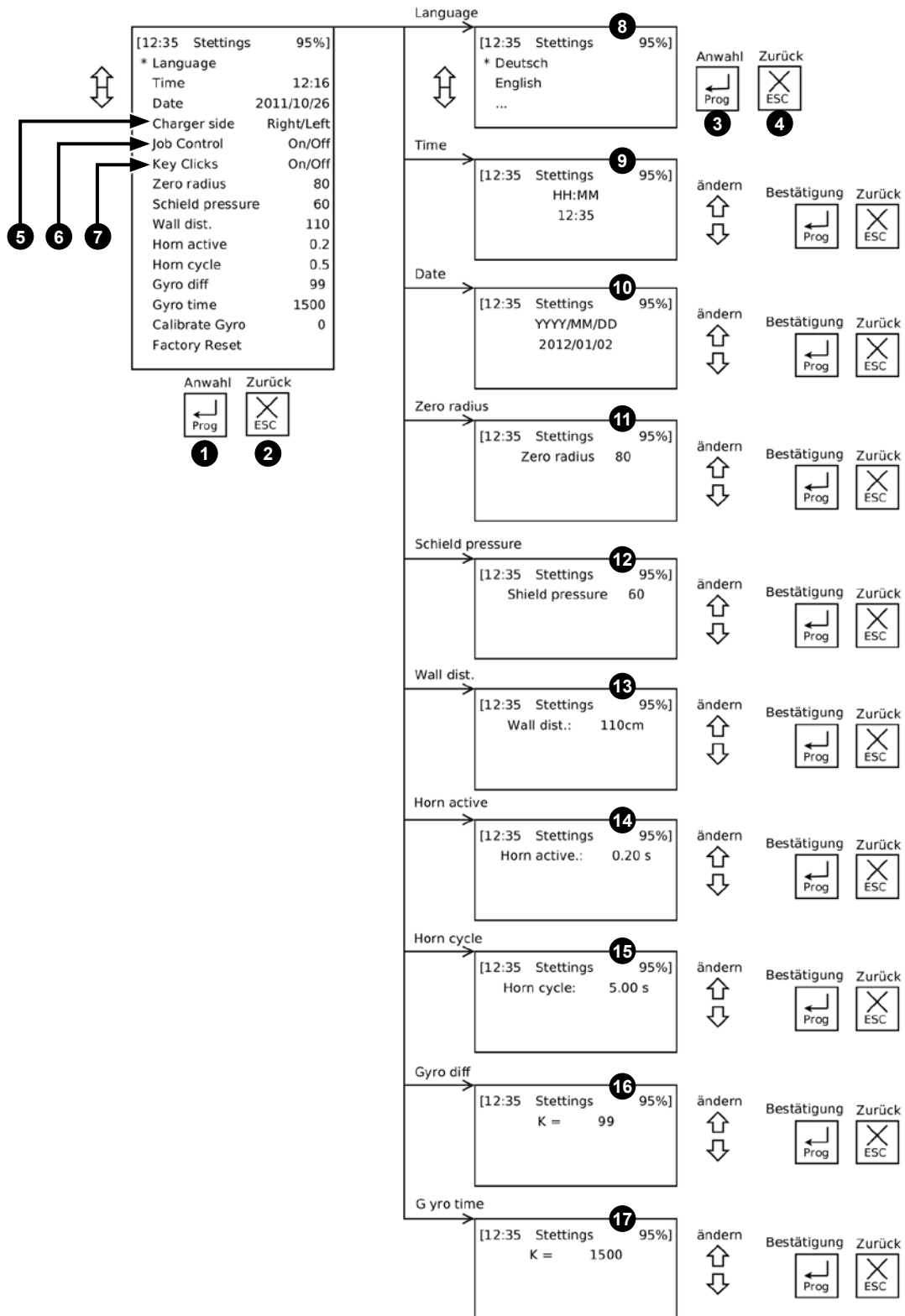
The display changes back into main menu

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

7.3.5 Menu **SETTINGS**

In the menu „Settings“ you do basically settings for the operation of the *PRIBOT*: (see description page 31)



* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Description of the menu **SETTINGS** (see left - page 30)

#	Function	Description
1	Button „Prog“	Opens the chosen menu item
2	Button „ESC“	Changes to the main menu
3	Button „Prog“	Save selection and back into menu
4	Button „ESC“	Stops selection and back into menu
5	Charging side	Insert, on which side (driving direction) of the <i>PRIBOT</i> the battery-charging station is
6	Job control	Here you can switch On/Off the auto mode of the <i>PRIBOT</i> <i>Info: when you set „Off“ you can operate the PRIBOT only manual</i>
7	Key clicks	Switch On/Off the key sound of the manual control unit (Remote)
8	Language	Selection of the operating language
9	Time	Set the time, hours + minutes
10	Date	Set the date, year - month - day
11	Zero radius	Ignorance radius of the joysticks. The robot reacts on the deflection of the shield which cause a bigger value. The value is no metric measure, but can be determined by the joystick alignment. ATTENTION! Do not change this values.
12	Shield pressure	Desired-deflection (pressure) of the shield during tactile wall following (TWF). If you change the value downwards, the shield reacts more sensitive and evasive manoeuvres are executed faster. The value is no metric measure! ATTENTION! Do not change this values.
13	Wall distance	Standard distance for the ultrasonic drive (Sonar) On this distance the <i>PRIBOT</i> adjusts is drive along the wall when seine „Sonar left / right“ is started in the submenu „Run“ <i>Info: Always the distance between the wheel cover and the wall will be measured.</i>
14	Horn active	Only when horn is installed - acoustic alarm signal-durable
15	Horn cycle	Only when horn is installed - acoustic alarm signal-interval (pause)
16	Gyro diff	Don't change the value
17	Gyro time	Slack time drive - don't change the value
18	Calibrate Gyro	Activate/deactivate gyroscope (sensor position detection) with prog-button
19	Factory setting	<i>Reset all settings on delivery status with button PROG</i>

Example - set time

1. Chose „Time“ with the joystick
2. Open the menu item „Time“ with the button „Prog“
3. Adjust the correct time with the joystick
4. Save/adopt the settings with the button „Prog“

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

8. Operation

You have two operation modes for the *PRIBOT*. You can switch off the auto mode in the menu „Settings“. Then only the manual operation is available. Consider during the operation with the *PRIBOT*,

- that there are no danger situations for people and animals
- that the *PRIBOT* will be used only corresponding the rules and in the designated area of the stall
- that the storage batteries of the *PRIBOT* are always load enough
- that the operator of the *PRIBOT* knows the functions and the operating elements



INFO

If the storage battery capacity of <1% is reached, the drive and the PRIBOT will stop. It is now only possible to move the PRIBOT to the battery charging station by the joystick. Automatic drives, e.g. driving a route or driving single route elements (e.g. Run-> TWF_left) are not possible.

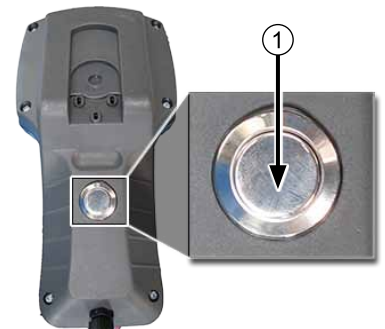
8.1. Manual operation

The manual operation of the *PRIBOT* happens with dead man operation, by help of the manual control unit „Remote“. You can control the *PRIBOT* by the joystick. For a secure operation of the *PRIBOT* you have to push the additional push button on the backside of the manual control unit. If you loose the push button (1) during the drive, the *PRIBOT* stops.



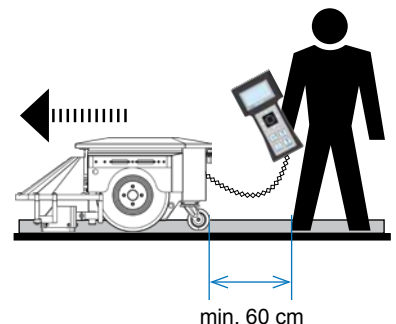
ATTENTION

To avoid a contact with the PRIBOT during manual drive, the operator should always be behind the PRIBOT, in a minimum distance of 0,6 m.



Manual operation with the Pribot:

1. Switch on the PRIBOT
2. Press the dead man button (1) on the backside of the manual control unit „Remote“
Keep the button pressed for the whole drive!
3. Press the joystick for the desired driving direction
The Pribot moves into the chosen direction.
4. Stop the Pribot
Loosen the push button on the backside or adjust the joystick in home position (middle).



Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

8.2. Automatic operation with the Pribot

You can start the automatic operation with the *PRIBOT*...

...by the schedule, if the following requirements are fulfilled:

- storage batteries are load minimum 1%
- programming and activation of the starting times (see fig. 34/1)
- *PRIBOT* is standing on the battery-charging station

...by the button „Run“ on the manual control unit „Remote“ (quick start)

The button „Run“ starts the *PRIBOT* directly out of the main menu, or a submenu. The *PRIBOT* then drives respective the set type done in „Settings - loading side“ >>> TWF right or TWF left up to the battery-charging station.

12:35	Schedule	95%
* [1]	10:00	2 [x]
[2]	11:00	3 [_]
[3]	12:00	1 [x]
...		
[n]	22:00	0 [x]

▲ 34/1 Schedule for automatic operation

Example for a manual start of a route:

1. Pribot is standing on the battery-charging station
2. Chose in the main menu the menu item „Route“ by the joystick
3. Press „Prog“ to open the menu item
4. Chose a route by the joystick
Route 0 = standard route respective „Settings“ TWF right / TWF left
Route 1...10 = teached routes
5. Press „Prog“ >>> the Pribot starts

[12:35	Route	=95%]
* Route		0
Route		1
...		...
Route		10

▲ 34/2 Submenu „Route“

8.3. Centralization - Information of the operation with the Pribot

- Define in the menu „Settings >>> Charge site“ the mounting side of the battery-charging station
- The *PRIBOT* starts only, when the storage batteries are load min. 1%. If the storage batteries are not load > 1% at the current starting time (schedule), the automatic operation starts not before the storage batteries are load.
- For the automatic start the *PRIBOT* has to be at the battery-charging station and on the loading contacts
- When starting with „Run“ the *PRIBOT* should stand into the direction which set in the menu in „Settings >>> Charge site“. Then the *PRIBOT* moves with TWF right or TWF left up to the battery-charging station.
- If you want to move the *PRIBOT* with sonar you have to place the *PRIBOT* parallel to a wall or another surface
- If the capacity of the storage batteries falls on 0% the program and the *PRIBOT* will stop. Then you have to move the *PRIBOT* manual to the battery-charging station by using the joystick.
- Before the storage batteries may will be damaged, also the drive with the joystick will be stopped. as the unloading won't be linear we can't forecast, how long a operation with the joystick is possible. Anyway you should only use it to move the *PRIBOT* to the battery-charging station.

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

9. Maintenance, cleaning and servicing



INFO

Cleaning-, lubricate- and maintenance works are only allowed to be done by authorized personnel and considering the maintenance manual as well as the statutory and operational accident prevention regulations!

Non-observance may lead to bodily injury and death of persons or to a considerable material damage on the PRIBOT!!

When replacing damaged parts use only original replacement parts or from the PETER PRINZING GMBH allowed standard parts..

Maintenance works on the Pribot have to be done:

- corresponding the given maintenance intervals (see chapter 8.2))
- after a longer stoppage of the PRIBOT (complete maintenance)
- after observable damages or faults on the PRIBOT

During every maintenance you have to do all checks, maintenances and lubrications professional and you have to journalize them.

9.1. General measures for servicing and maintenance

Barricade the workspace of the PRIBOT for unauthorized persons or for animals before you start maintenance or repair works! Mount a instruction plate which adverts to maintenance and repair works!

Consider the current statutory provisions and operational stipulations for maintenance and repair works!

Repair works on electric parts on the machine are only allowed to be done by skilled electronic specialists! Keep the control cabinet closed when don't work on it. Use for repair works only certificated and licensed power tools!

Take care, that after the maintenance works, tools cleaning cloths and other materials are removed from the PRIBOT. Remove all leaking fluids in proper forms and environmentally suitable. Check, if all safety arrangements on the PRIBOT are working faultless and that all protective coverings are mounted.

9.2. Maintenance intervals

Part	Interval	Maintenance measurements
Storage batteries	daily	Check the charging condition in the display of the manual control unit. When the batteries are low charge on the battery-charging station
	3-monthly	Battery check > see chapter 9.6
	yearly	Battery control and check > see chapter 9.6
Loading contacts on the PRIBOT and on the battery-charging station	daily	Cleaning the contact surface with a cleaning cloth, when there is strong dirt/oxidation clean contact surfaces with a steel brush
Set of tyres	monthly	Check air pressure (3,5 bar), check profile depth
Ultrasonic-sensors	daily	Check on cleanness, if necessary clean with a cleaning cloth
Lubricating points	monthly	Lubricate (see chapter „Lubrication“)
Rubber lip on slider	monthly	Check the abrasion of the rubber ledge, if necessary readjust the rubber ledge

* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

9.3. Cleaning

For a failure free operation and to enlarge the durability of the system you should clean the *PRIBOT* regularly. Especially the touch shield and the lateral ultrasonic sensors should be clean.

Clear with water and a brush/broom. You can spray-wash the *PRIBOT* with a water hose.



ATTENTION

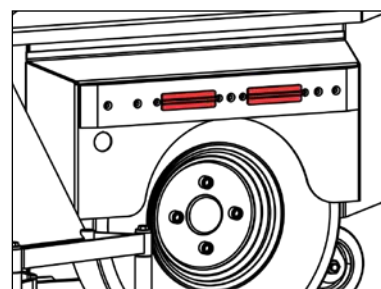
Do not use hard or sharp edged things, thereby you damage the paint layer of the PRIBOT. When using a high-pressure cleaner it may lead to damages of the paint layer and water could enter into the PRIBOT!

Do not use fluids with dissolver to clean the PRIBOT and its components.

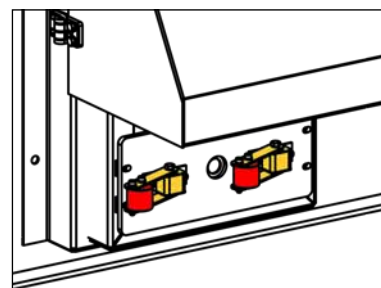
The manual control unit „Remote“ clean only with a wet cloth. Take care that no fluids can enter the electronic of the *PRIBOT*.

The loading contacts on the *PRIBOT* and on the battery charging station should be cleaned regularly to avoid corrosions. If there is corrosion on the loading contacts, there might be problems when loading the storage batteries. In this case you can clean the loading contacts with a steel brush.

The loading contacts of the battery-charging station are bedded elastic, to ensure a safe contact to the *PRIBOT*. Keep the mechanic clean that you can have a failure-free operation with the *PRIBOT*.



▲ 36/1 Loading contacts on *PRIBOT*
(both sides in the wheel arch)



▲ 36/2 Loading contacts on charging station

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

9.4. Lubrication

On the *PRIBOT* you have several lubrication points...

- on the hanger assembly of the tactile shield, right and left back the drive wheels (fig. 37/1)

Furthermore you should regularly lubricate the hanger assembly of the dozer blade (fig: 37/2). Thereby the vertical movement of the dozer blade is guaranteed.



INFO

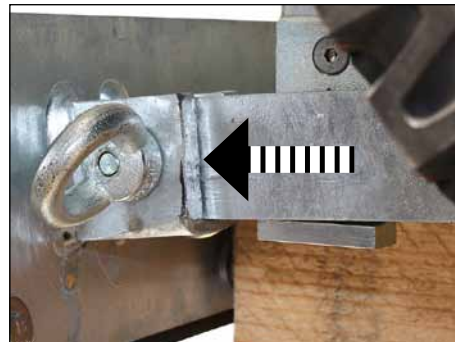
Recommended type of lubricating grease:

multifunctional grease according to DIN 51502 - K2K-2 e.g. manufacturer BP E4-LS2-15K

Lubrication interval: monthly



▲ 37/1 Lubrication point on the *PRIBOT*
Hanger assembly tactile shield right/left back
the drive wheels



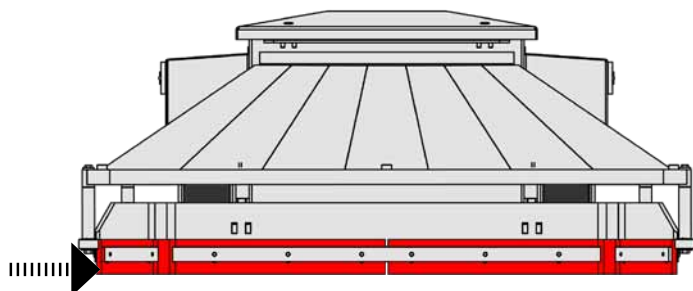
▲ 37/2 Lubrication point on the *PRIBOT*
Hanger assembly dozer blade right/left in front
of the drive wheels

* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

9.5. Set and change the dozer blade

The cleaning ledge is a component of the dozer blade. Depending on the model, the cleaning ledge is out of plastic or rubber. Through constant contact with the stable floor the cleaning ledge wears out should therefore periodically readjusted or with excessive wear changed.



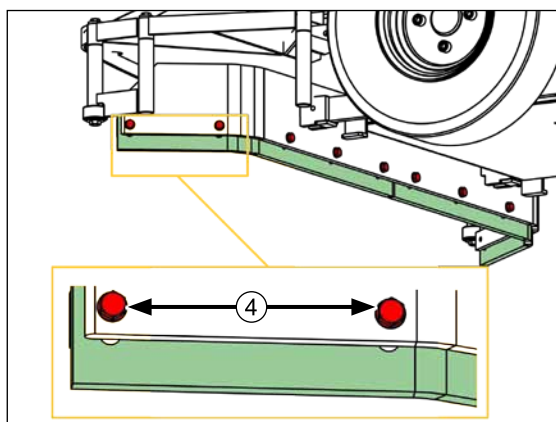
◀ 38/2 Cleaning ledge (changeable) on the PRIBOT

Set the cleaning ledge

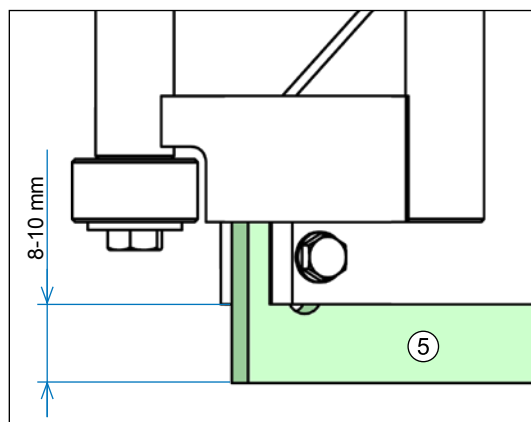
1. **Set the Pribot on a flat surface**
2. **Clamp a underlay under the lower edge of the dozer blade (flat rod, rail, or similar) with a height of 8-10 mm (3)**
Now the dozer blade is ca. 8-10 mm over the floor
3. **Loosen the screws (4) on the cleaning ledge**
4. **Press the cleaning ledge down on the floor**
Between the lower edge of the dozer blade and the lower edge of the cleaning ledge should now be a distance of 8-10 mm
5. **Retighten all screws (4)**
6. **Remove the underlay (flat rod, rail, or similar)**

Change the cleaning ledge

If the cleaning ledge is worn out in a way that it is not possible to readjust it, you have to replace it. For the replacement loosen all screws (3) on the dozer blade and extract the old cleaning ledge. Mount the new cleaning ledge and adjust it as described above.



▲ 38/3 Fitting screws (4) on the cleaning ledge (view from behind)



▲ 38/4 Distance lower edge dozer blade <=> floor (5) = cleaning ledge

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

9.6. Maintenance of the storage battery

The storage batteries in the *PRIBOT* are maintenance free gel-storage batteries and need no special maintenance measures. The control of the *PRIBOT* detects the loading condition of the storage batteries. When the charge condition is low (0%) the *PRIBOT* stops automatically and has to be moved manual by the joystick to the battery-charging station. If the storage batteries are completely discharged (e.g. longer downtime), you have to load the storage batteries with a mobile battery-charging device, that you can move the *PRIBOT* manual to the battery-charging station

Further information about the storage batteries:

- Keep the battery always clean and dry, to avoid creepage current.
- Clean plastic parts on the battery only with clean water. Do not use organic detergents. Avoid electrostatic charging

Minimum all 3 months after full charge and a downtime of minimum 5 h you have to measure and note down:

- Total battery voltage
- Voltage of each cell / each monoblock battery
- Surface temperature of the monoblocks and room temperature

If there are considerable changes to the measure before we recommend further checks or contact the after-sales service. If the surface temperature of the different monoblocks deviate more than 3 K from each other, you have to inform the after sales service.

Note down and measure yearly:

Insulation resistance of the *PRIBOT* and do a check of the battery by a specialist.

The insulation resistance should not fall below a value of 50 Ohm per volt nominal width. If you have batteries with a nominal with up to 20 V the minimum value should be 1000 Ohm.

Further information and the operating instruction for the storage batteries you can find enclosed to this operating instruction.

9.7. Maintenance of the wheels

Drive wheels:

The drive wheels on the *PRIBOT* are maintenance free. Check the wheel pressure (3,5 bar) regularly and the tire profile. If the tire profile is used up, you have to replace the wheels. Otherwise the wheels may wheel spin and the learned route can not be driven correctly. Change always both wheels.

Carrying wheel:

The carrying wheel avoid a tilting of the *PRIBOT* and keeps the *PRIBOT* in line.

Maintenance of the carrying wheel:

- clean regularly
- lubricate monthly the lubrication point

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

10. Service

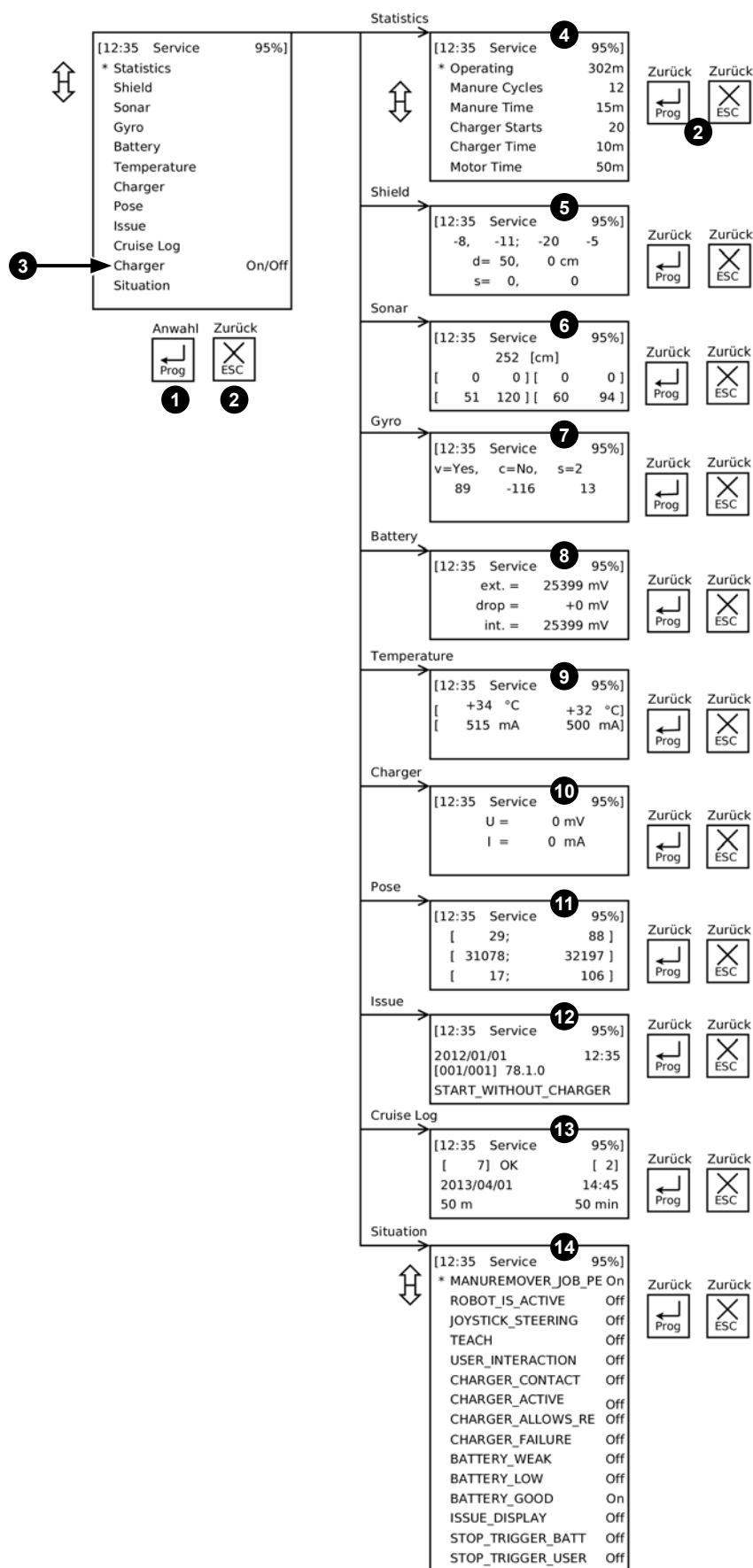
In the chapter service you can find...

- how you can change parameter- and system settings
- how to ask for system information of the control
- how to diagnose and delete faults on the *PRIBOT* by yourself

Description of the menu „Service“ (see right- page 39)

#	Name	Function	Description
1	Prog	Push button „Prog“	Open selection
2	ESC	Push button	Back to the main menu
3	Charger	Storage battery charging start/stop manual	When the Pribot is connected with the battery-charging station, it checks cyclic, if the current charging condition is charging successful. If the storage batteries are charged enough (> 79,5%), the charging don't start automatically. By this menu item you are able to start/stop the charging manual.
4	Statistics	Display	Display of the operating hours
5	Shield	Display shield	Here you can check and align the sensors on the touch shield. Settings only by specialized personal !
6	Sonar	Display of the ultrasonic measurements	Display of the different measurement points of the ultrasonic sensors. No setting by the user.
7	Gyro	Display	Display position absolute position transducer
8	Battery	Display for the storage batteries	Displays the battery voltage as well as the calculated internal battery voltage.
9	Temp.	Display temperature	Displays the temperature of the output stage of the motor.
10	Charger	Display battery-charging station	Displays the measured voltage on the loading contacts , as well as the current charging rate 0 mV = not in charging condition ca. 24 000 - 30 000 mV charging
11	Pose	Displays the position and the guidance of the Pribot	Positioning indicator
12	Issue	Display error list	Displays the errors with date, time, error number, error code and a short description of the error.
13	Cruise Log	Display	Log file of the driven route
14	Situation	Settings	Values are only allowed to be changed by the after sales service

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)



* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Consider the following information!

- Service works are only allowed to be done by authorized specialists considering this operating instruction as well as the statutory and operational accident prevention regulation! Nonobservance of the information and regulations can may lead to considerable bodily injury or material damage!
- Use for replacement of defective parts only original spare parts from the manufacturer or manufacturer approved / allowed standard parts.
- In case of malfunctioning of the electric system (eg cables, motors) debugging and troubleshooting by a qualified electrical operation, or a competent person must be performed.
- In case of any disturbances, disconnect the power supply between the batteries <> control and contact our service. So you can avoid any more damage on the *PRIBOT*.
- In case of unauthorized repair works and unauthorized intervention in the *PRIBOT* and its components the warranty expires! For damages caused by improper executed work we assume no liability.

Before contacting our service note down the following...

- the exact name of your equipment and the serial number (name plate in the box)
- the software-version (switch on/off the control >>> SW-version will be displayed)
- ALL messages on the display

10.1. Change the fuses

Changeable fuses you can find on the following positions:

Pribot

- In the box behind the batteries (fig: 42/1) - fuse size: 20 A
- In the control (fig: 42/2) - fuse size: **Charge** = 20 A, **Accu** = 20 A

Charging station

- In the box (fig: 42/3) - fuse size: **primary mains adapter** = 15 A, **secondary charging contacts** = 20 A

Fuse type

Standard-automotive blade fuse for vehicles



▲ 42/1 Fuse Pribot-box



▲ 42/2 Fuse Pribot-control



▲ 42/3 Fuses charging station Pribot

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

11. Error messages - cause and deletion

Error code	Cause	Deletion
MCU_ABNORMAL_RESET	Diagnosis cable connected	Disconnect diagnosis cable
KEY_STOP	<ul style="list-style-type: none"> - Emergency stop button pressed - Emerg.stop button not connected - Emergency stop line interrupted 	<ul style="list-style-type: none"> - Unlock the emergency stop - Connect the emergency stop - Check the line and if necessary replace it
POWER_LOGIC_FAILURE	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_SWITCH	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_LATCH_RESET	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_DELAY_RESET	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_DELAY_COUNT	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_BUTTON	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_BUTTON_LATCH	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_BUTTON_LATCH_RESET	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_SWITCH	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_SWITCH_LATCH	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_SWITCH_LATCH_RESET	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_BUTTON_PRESSED	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOP_SWITCH_OPENED	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_SUBSYSTEM_DISABLED	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_ERROR	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_STOPPED	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB

* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Error messages - cause and deletion

Error code	Cause	Deletion
POWER_MOTOR_CONNECTOR_MISSING	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
POWER_MOTOR_MAX_CURRENT_EXCEEDED	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
POWER_MOTOR_BATTERY_FAILURE	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
SAFETYAVR_I2C_BUS	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
SAFETYAVR_EXCEPTION_UNKNOWN	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
SAFETYAVR_EXCEPTION_WATCHDOG	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
SAFETYAVR_EXCEPTION_STOP_BUTTON	<ul style="list-style-type: none"> - Emergency stop button pressed - Emerg.stop button not connected - Emergency stop line interrupted 	<ul style="list-style-type: none"> - Unlock the emergency stop - Connect the emergency stop - Check the line and if necessary replace it
SAFETYAVR_FAILURE	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
BATTERY_LEVEL	Battery voltage too low	Move the robot manual to the battery-charging station
MOTOR_LEFT_HALL_SENSOR	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_LEFT_SPEED_CONTROL	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
MOTOR_LEFT_OVERCURRENT	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
MOTOR_LEFT_I2C_BUS	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
MOTOR_LEFT_BLDC_EXCEPTION_UNKNOWN	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
MOTOR_LEFT_BLDC_EXCEPTION_WATCHDOG	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
MOTOR_LEFT_BLDC_EXCEPTION_CURRENT_SOFT	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
MOTOR_LEFT_BLDC_EXCEPTION_CURRENT_HARD	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
MOTOR_LEFT_BLDC_EXCEPTION_HEAT	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
MOTOR_LEFT_BLDC_FAILURE_UNKNOWN	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Error code	Cause	Deletion
MOTOR_LEFT_BLDC_FAILURE_HALL_SENSOR_UNKNOWN	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_LEFT_BLDC_FAILURE_HALL_SENSOR_0	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_LEFT_BLDC_FAILURE_HALL_SENSOR_1	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_LEFT_BLDC_FAILURE_HALL_SENSOR_2	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_LEFT_BLDC_FAILURE_MOTOR_PHASE_UNKNOWN	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_LEFT_BLDC_FAILURE_MOTOR_PHASE_0	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_LEFT_BLDC_FAILURE_MOTOR_PHASE_1	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_LEFT_BLDC_FAILURE_MOTOR_PHASE_2	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_LEFT_BLDC_FAILURE_MCU_INTERNAL	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_LEFT_BLDC_FAILURE_HALL_CONFIG	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the left drive motor, restart the control - Change motor
MOTOR_RIGHT_HALL_SENSOR	<ul style="list-style-type: none"> - Contact of the left drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_SPEED_CONTROL	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
MOTOR_RIGHT_OVERCURRENT	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
MOTOR_RIGHT_I2C_BUS	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
MOTOR_RIGHT_BLDC_EXCEPTION_UNKNOWN	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
MOTOR_RIGHT_BLDC_EXCEPTION_WATCHDOG	Error on the control PCB	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
MOTOR_RIGHT_BLDC_EXCEPTION_CURRENT_SOFT	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
MOTOR_RIGHT_BLDC_EXCEPTION_CURRENT_HARD	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
MOTOR_RIGHT_BLDC_EXCEPTION_HEAT	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot

* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Error messages - cause and deletion

Error code	Cause	Deletion
MOTOR_RIGHT_BLDC_FAILURE_UNKNOWN	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_BLDC_FAILURE_HALL_SENSOR_UNKNOWN	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_BLDC_FAILURE_HALL_SENSOR_0	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_BLDC_FAILURE_HALL_SENSOR_1	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_BLDC_FAILURE_HALL_SENSOR_2	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_BLDC_FAILURE_MOTOR_PHASE_UNKNOWN	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_BLDC_FAILURE_MOTOR_PHASE_0	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_BLDC_FAILURE_MOTOR_PHASE_1	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_BLDC_FAILURE_MOTOR_PHASE_2	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_BLDC_FAILURE_MCU_INTERNAL	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
MOTOR_RIGHT_BLDC_FAILURE_HALL_CONFIG	<ul style="list-style-type: none"> - Contact of the right drive motor damaged - Left motor damaged 	<ul style="list-style-type: none"> - Check the plug connections of the right drive motor, restart the control - Change motor
BRIDGE_TEMPERATURE_RIGHT_EXCEEDED_SOFT	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
BRIDGE_TEMPERATURE_RIGHT_EXCEEDED_HARD	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
BRIDGE_TEMPERATURE_LEFT_EXCEEDED_SOFT	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
BRIDGE_TEMPERATURE_LEFT_EXCEEDED_HARD	<ul style="list-style-type: none"> - mechanical blockade - too high scraper power 	<ul style="list-style-type: none"> - clean touch shield - remove dung from the robot
CHARGER_BAD_CONTACT	<ul style="list-style-type: none"> - Loading contact soiled - Charging station without power 	<ul style="list-style-type: none"> - Clean loading contact - Connect charging station with mains voltage
CHARGER_ACK_TIMEOUT	<ul style="list-style-type: none"> - Loading contact soiled - Fuse "Charge" on main board is damaged - Fuse on charging station board is damaged - Fuse charging station is damaged 	<ul style="list-style-type: none"> - Clean loading contact - Change fuse

* Option / depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

Error code	Cause	Deletion
CHARGER_CURRENT_TIMEOUT	<ul style="list-style-type: none"> - Loading contact soiled - Fuse "Charge" on main board is damaged - Fuse on charging station board is damaged - Fuse charging station is damaged 	<ul style="list-style-type: none"> - Clean loading contact - Change fuse
CHARGER_LOST_CONTACT	<ul style="list-style-type: none"> - Loading contact soiled - Fuse "Charge" on main board is damaged - Fuse on charging station board is damaged - Fuse charging station damaged 	<ul style="list-style-type: none"> - Clean loading contact - Change fuse
CHARGER_CURRENT_LIMIT_EXCEEDED	<ul style="list-style-type: none"> - Short circuit of the loading contacts - Charging station damaged 	<ul style="list-style-type: none"> - Check loading contacts on short circuit (connection to each other/ connection with the box) - Change charging station
CHARGER_VOLTAGE_LIMIT_EXCEEDED	<ul style="list-style-type: none"> - Charging station damaged 	<ul style="list-style-type: none"> - Change charging station
START_WITHOUT_CHARGER	<ul style="list-style-type: none"> - During a drive with the joystick e.g. test drive there was a starting command on the schedule 	<ul style="list-style-type: none"> - Stop the auto mode / job control during clear drive
CRUISE_ELEMENT_FAILED	<ul style="list-style-type: none"> - Termination was not identified / identified wrong 	<ul style="list-style-type: none"> - Teach route again
CRUISE_ELEMENT_CHECKSUM_MISMATCH	<ul style="list-style-type: none"> - Error on the control PCB 	<ul style="list-style-type: none"> - Move robot in standby, disconnect the power supply and start again - Change control PCB
SHIELD_JOYSTICK0_DEFFECT	<ul style="list-style-type: none"> - Left joystick not connected - Left joystick damaged 	<ul style="list-style-type: none"> - Check the plug and the cable of the left joystick - Replace joystick
SHIELD_JOYSTICK1_DEFFECT	<ul style="list-style-type: none"> - Right joystick not connected - Right joystick damaged 	<ul style="list-style-type: none"> - Check the plug and the cable of the left joystick - Replace joystick

No error code but maloperation of the robot:		
Robot drives during ultrasonic drive not plausible	<ul style="list-style-type: none"> - Ultrasonic sensors solid - Earth cable not connected/ damaged 	<ul style="list-style-type: none"> - Clean ultrasonic sensors - Replace / connect earth cable
Robot sticks in the edges (wheel spin)	<ul style="list-style-type: none"> - Touch shield blocked - Measuring feeder of touch shield mounted wrong 	<ul style="list-style-type: none"> - Clean touch shield - Readjust measuring feeder (joysticks)
Robot does not turn to the wall during TWF	<ul style="list-style-type: none"> - Touch shield blocked - Measuring feeder of touch shield mounted wrong 	<ul style="list-style-type: none"> - Clean touch shield - Readjust measuring feeder (joysticks)

* Option /depending on design

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)









Operating instruction for valve-regulated lead-acid batteries

Type OGiV

Nominal data:

● Nominal voltage U_N	2,0 V x number of cells (12V/6V/2V)
● Nominal capacity C_{20}	20h discharge
● Nominal temperature T_N	20° C
● Factors of reduction	for ventilation (draft DIN/VDE 0510 part 1) factor $f_1 = 0,5$ $f_2 = 0,5$
● Nominal discharge current $I_N = I_{20}$	$C_{20}/20h$

Battery Type:	
Assembly by:	date:
Commissioned by:	date:
Security signs attached by:	date:
Yuasa order no.:	

	● Observe these instructions and keep them located nearby the battery for future reference! Work on the battery should only be carried out by qualified personnel!
	● Do not smoke! Do not use any naked flame or other sources of ignition. Explosion and fire hazards are present!
	● While working on batteries wear protective eye-glasses and clothing! Observe the accident prevention rules as well as DIN VDE 0510, VDE 0105 part 1!
	● Any acid splashes on the skin or in the eyes must be flushed with plenty of water immediately. Then seek medical assistance. Spillages on clothing should be rinsed out with water!
	● Explosion and fire hazard, avoid short circuits! Caution! Metal parts of the battery are always alive, therefore do not place items or tools on the battery!
	● Electrolyte is strongly corrosive and acidic. In normal working conditions the contact with electrolyte is nearly impossible; electrolyte may leak from the vent valves in case of over charging the battery or in case of mechanical damage to the container. In case of any contact with electrolyte please flush with water abundantly and get in touch with a physician.
	● Batteries/cells are heavy! Ensure adequate mounting security and always use suitable handling equipment for transportation!
Non-compliance with operation instructions, repairs made with other than original parts, or repairs made without authorization (e.g. opening of valves) render the warranty void.	
	Disposal of Batteries Batteries marked with the recycling symbol should be processed via a recognised recycling agency. By agreement, they might be returned to the manufacturer. Batteries must not be mixed with domestic or industrial waste.

Valve-regulated lead acid batteries consist of cells which do not require water topping during the operation.

M 5	M 6	M 8	M 10
2 – 3 Nm	4 – 5,5 Nm	5 – 6 Nm	14 – 22 Nm

1. Start up

Check all cells/blocks for mechanical damage, correct polarity and firmly seated connectors. The following torques apply for screw connectors:

Connect the battery with the correct polarity to the charger. The charger should not be switched on during this process, the load should not be connected (pos. pole to pos. terminal). Switch on charger and start charging following instruction no. 2.2.

2. Operation

For the installation and operation of the batteries, EN 50 272-2 is mandatory. Battery installation should be made such

that temperature difference between individual units does not exceed 3 degrees Celsius/Kelvin.

2.1 Discharge

Discharge must not be continued beyond the level specified for the specific discharge current. Deeper discharges must not occur unless specifically agreed with the manufacturer. Recharge immediately following complete or partial discharge.

2.2 Charging

Applicable are all charging procedures with their limit values according to DIN 41773 (IU-characteristic). According to the charging equipment specification and characteristics, alternating currents ($< 0,1C(A)$) flow through the battery superimposing into the direct current during charging operation. These alternating current and the reaction from the loads lead to an additional temperature increase of the battery, and strain the electrodes with

possible damages (see 2.5). Depending on the installation, charging (acc. to EN 50 272-2, draft) may be carried out in the following operations.

a) Standby Parallel Operation and Buffer Operation

Here the load, direct current source and battery are continuously in parallel. Thereby the charging voltage is the operation-voltage and at the same time the battery-installation voltage. With the standby parallel operation, the direct current source is at any time capable of supplying the maximum load current and the battery charging current. The battery only supplies current when the direct current source fails. The charging voltage should be set at $2,275V \pm 0,005V$ (at 20°C) x number of cells in series measured at the terminals of the battery. With buffer operation, the direct current source is not able to supply the maximum load-current at all times. The load-current intermittently exceeds the nominal current of the direct source. During this period the battery supplies power. The battery is not fully charged at all times but the float-charge voltage of $2,275 V/cell \pm 0,005 V$ (at 20° C) x number of cells in series provides a reasonable recharge duration under normal conditions. Dependent on load and number of cells in series, it is recommended to consult the battery manufacturer in any doubtful case.

b) Switchmode-Operation

When charging, the battery is separated from the load. To reduce the charging time, a three phase boost charge mode can be applied by charging the battery at $2,45 - 2,5 V/cell$ until the charging current drops to $0,07 C(A)$ (trip point for the first phase of charging t_1). The duration of charging of the first phase is measured by a timer so that the second phase should be half of the first phase ($t_2 = 0,5 t_1$) when the batteries are kept on charge at $2,45 - 2,5 V/cell$. After the total charging of $t = t_1 + 0,5 t_1$ has elapsed, the charger reduces the voltage to a normal float-charge level of $2,275 V/cell (\pm 0,005V)$ at 20° C.

c) Battery operation (charge/discharge operation)

The load is only supplied by the battery. The charging process depends on the application and must be carried out in accordance with the recommendations of the battery manufacturer.

2.3 Maintaining the full charge (float charge)

Devices complying with the stipulations under DIN 41773 must be used. They are to be set so that the average cell voltage is $2,275 V \pm 0,005V$.

2.4 Supplementary and Equalizing charge

To ensure maximum service life, a supplementary charge may be required prior to

Date:	14-08-2013	File name:	175_pb100-v04_EN	Pribot 100
Author:	Heiko Lange	Pages:	49	© P. Prinzing GmbH - 89173 Lonsee-Urspring (Germany)

installation on condition that the batteries have been in storage for more than 6 months or more, latest after 9 months age from the date of production and that the open circuit voltage is less than 2.1 Volts per cell. A supplementary charge should be applied in accordance with figures shown in the table:

Storage Period	Charge V/c at 20° C	Charge Time
less than 9 months	2,275 V/cell	more than 72 hours
up to 1 year	2,35 V/cell	48 – 144 hours
1 – 2 years	2,35 V/cell	72 – 144 hours

Batteries kept at normal float charge level within a string do not require any equalizing charge in case of partial replacement, in order to narrow the bandwidth of open-circuit voltages.

2.5 Alternating currents

On recharging up to 2.4 V/cell under operation modes 2.2 the actual value of the alternating current is for a very short time permitted to reach 0.1C(A) nominal capacity. In a fully charged state during float charge or standby parallel operation the actual value of the alternating current must not exceed 5 A/100 Ah nominal capacity.

2.6 Charging currents

During float charge or standby parallel-operation without recharging state the charging currents are not limited. The charging current should range between 10 A to 20 A/100 Ah nominal capacity.

2.7 Temperature

The nominal operation temperature range for lead-batteries is 10°C to 30°C (best 20°C ± 5 K). Higher temperatures will seriously reduce service life. All technical data are produced for a nominal temperature of 20°C. Lower temperatures reduce the available capacity. The absolute maximum temperature is 50°C and should not permanently exceed 40°C in service.

2.8 Temperature-related float charge voltage and boost charge

The float charge voltage of 2,275V/cell ± 0,005V/cell refers to a battery temperature of 20°C. Temperature compensated charging is required in order to avoid over-charge at high temperatures and under-charge at low temperatures. The recommended temperature compensation factor is -3m V/cell/°C for float charge operation. In order to avoid thermal runaway, it is mandatory to temperature-compensate the float-charge voltage for temperatures above 40°C.

The boost charge mode can be applied if a quick recharge is required on condition that the charging current does not exceed 0,25C(A) and constantly drops to 0,01C from where normal float charge voltage should be applied.

temperature [°C]	boost charging voltage [V/c]	maintenance charge voltage [V/c]
- 10	2,58	2,36
0	2,53	2,33
10	2,48	2,30
20	2,45	2,275
30	2,40	2,24
40	2,34	2,21

2.9 Electrolyte

The electrolyte is diluted sulphuric acid and is absorbed in glass-matt separator (CTL), GEL CT/CTC.

3. Battery maintenance and control

Keep the battery clean and dry to avoid leakage currents.

Plastic parts of the battery, especially containers, must be cleaned with pure water without additives, any organic solvents are prohibited.

At least every 6 months measure and record:

- battery voltage
- voltage of several cells/blocks
- surface temperature of several cells/blocks
- battery-room temperature

If the difference of the average float-charge-voltage/cell is exceeding ± 0.1 V/cell within a string or if the surface temperature-difference between cells/blocks is exceeding 5 K, the service-agent should be contacted.

Annual measurement and recording:

- voltage of all cells/blocks
- surface temperature of all cells/blocks
- battery-room temperature
- insulation-resistance according to DIN 43539 part 1

Annual visual check:

- screw-connections, any screw connections without locking devices have to be checked for tightness
- battery installation and arrangement
- ventilation

4. Tests

Tests have to be carried out according to IEC 896-2, DIN 43539 part 1 and 100(draft). Special instructions like DIN VDE 0107 and DIN VDE 0108 have to be observed.

5. Faults

Call the service agents immediately in case of faults in the battery or the charging unit. The availability of the recorded data described in point 3, will be very helpful to find the cause of failure. A service-contract simplifies trouble-shooting.

6. Storage and taking out of operation

To store or decommission cells/batteries for a longer period of time, they should be fully charged and stored in a dry frost-free room. To avoid damage, batteries should be regularly subjected to supplementary charge cycles in accordance with 2.4.

7. Transport

VRLA batteries, which by no means show any kind of damage, are classified as non-dangerous goods for transportation via rail, lorry or air (according to GGVS, GGVE and IATA Regulations) if they are safeguarded during transportation against short-circuiting, tossing about, slipping or any damage. Batteries to be classified under afore-mentioned paragraph must mandatorily not display any traces of electrolyte on the exterior of the battery container.

As for VRLA batteries being damaged, assumed to be leaking of electrolyte and to be transported under warranty, or assumed not to be tight in any aspect anymore, they are to be handled in accordance with exception regulations of dangerous goods transportation rules concerned.