NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

Table of contents

Subject to technical change.   We assume no liability for typing errors.

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT
LEVEL CONTROL

Safety notes / Technical support

Notes

- Installation, maintenance and commissioning must be carried out only by qualified technical personnel.
- The product must be used only in the manner outlined in this instruction manual.

Special attention must be paid to warnings and notes as follows:

⚠️	**WARNING** Relates to a caution symbol on the product and means, that a failure to observe the necessary precautions can result in death, serious injury and/ or considerable material damage.
!	**WARNING** Relates to a caution symbol on the product and means, that a failure to observe the necessary precautions can result in death, serious injury and/ or considerable material damage. This symbol is used, when there is no corresponding caution symbol on the product.
CAUTION	A failure to observe the necessary precautions can result in considerable material damage.

Safety symbols

In manual and on product	Description
⚠️	CAUTION: refer to related documents (manual) for details.
⏚	Earth (ground) Terminal
⏚	Protective Conductor Terminal

Technical support

Please contact your local supplier (see www.uwt.de for address). Otherwise you can contact:

UWT GmbH
Westendstr. 5
87488 Betzigau
Germany

Tel. 0049 (0)831 57123-0
Fax. 0049 (0)831 76879
info@uwt.de
www.uwt.de

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT LEVEL CONTROL

Overview

Level monitoring and visualisation via web server

- Standardized system up to 50 silos

- Visualisation and operation via standard internet browser software

- Software language german, english or dutch

- Password protected

- Worldwide remote enquiry of the level

- Data in percentage, height, volume or weight

- Trend display, data storage, export via csv-file

- Evaluation of the analogue 4-20 mA signals of any sensors, as well as Modbus RTU of the UWT-systems

- Different input signals within the same system is possible

- Implementation of full detectors

- Fill control via full alarm signal (buzzer)

- Indication of warnings/ reports
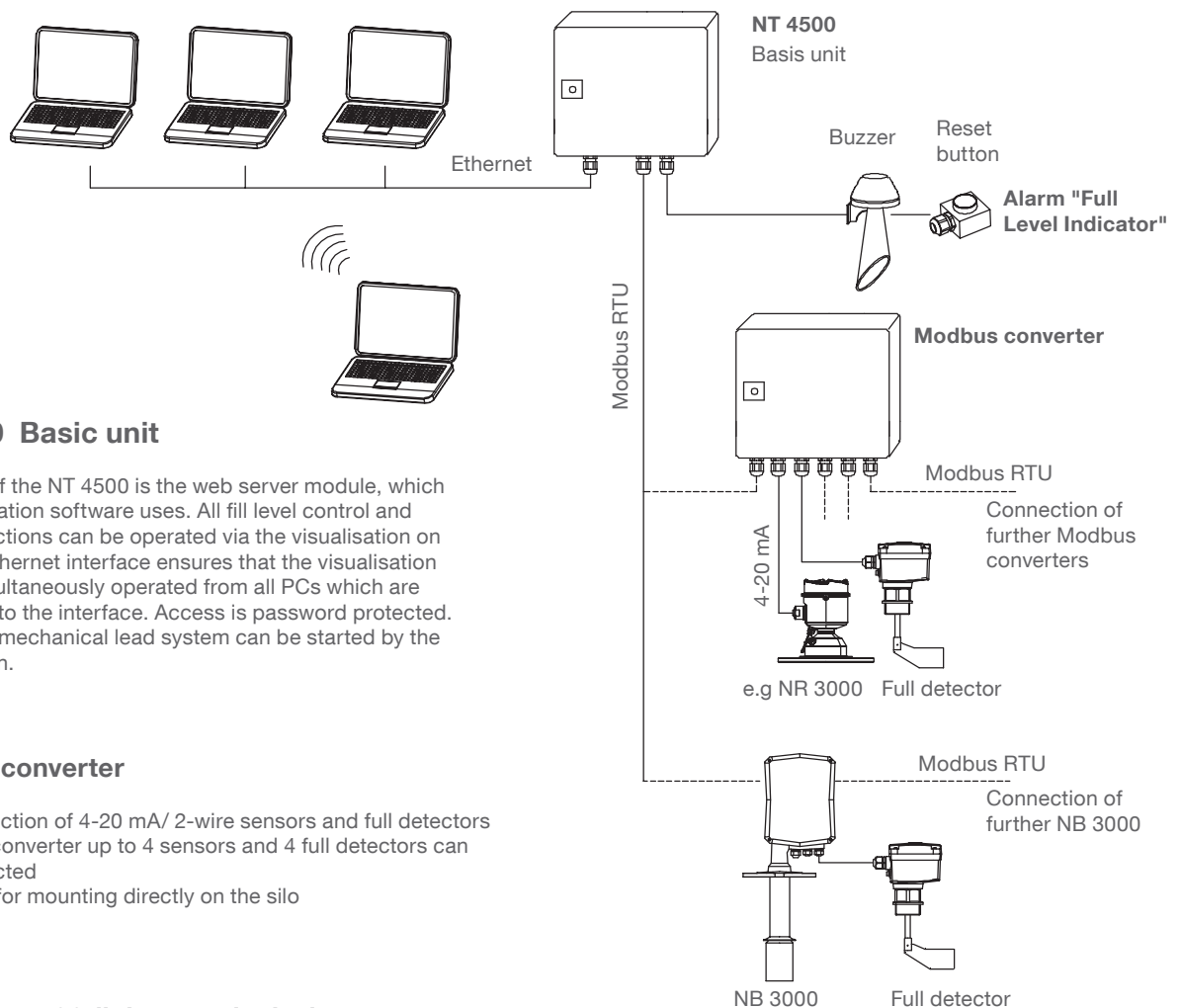
NT 4500 Basic unit

The heart of the NT 4500 is the web server module, which the visualisation software uses. All fill level control and display functions can be operated via the visualisation on a PC. An Ethernet interface ensures that the visualisation can be simultaneously operated from all PCs which are connected to the interface. Access is password protected. The electromechanical lead system can be started by the visualisation.

Modbus converter

- For connection of 4-20 mA/ 2-wire sensors and full detectors
- On each converter up to 4 sensors and 4 full detectors can be connected
- Provided for mounting directly on the silo

Integration of full detector incl. alarm

- Flashlight-buzzer with reset button (supplied loose, for outdoor mounting)
- One unit for all connected silos
- Alarm happens, if one of the silos gets full
- Reset of the alarm "Full Level Indicator
- Provided for mounting directly on the silo

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT LEVEL CONTROL

Technical Data / Accessories
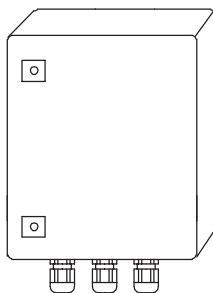
Technical data

Dimensions	NT 4500, Modbus converter:	300 x 300 x 210 mm (W x H x D
Mounting	NT 4500, Modbus converter:	wall mounting
Material	NT 4500, Modbus converter:	steel plate
Ingress protection	NT 4500, Modbus converter:	IP65
Ambient temperature	NT 4500:	0 .. +55°C
	Modbusumsetzer:	-25 .. +70°C
Power supply	NT 4500, Modbus converter:	115 V or 230 V 50/60 Hz (integrated power converter 24 V DC)
	NR 3000:	supplied by Modbus converter
	NB 3000/ NB 4000:	115 V or 230 V AC, connection is made on site
	Full detector:	Connection either on NB 3000/ NB 4000 resp. Modbus converter. In this case the supply voltage must be equal to NB 3000/ NB 4000 resp. Modbus converter. Alternative it is possible to connect on site.
Power consumption	NT 4500, Modbus converter:	20 VA
	Connected level sensors:	see documentation of the respective sensors
Signal output full detector	Floating contact is required	

Technical data of the used Wago Controllers:
see www.wago.com, search for 750-8202

Terminal box

Intermediate terminals for the wires leading to the silo (mounting e.g. on the silo frame).
Applicable for cables of level (Modbus or 4-20 mA), limit switch, buzzer, reset button

Technical data

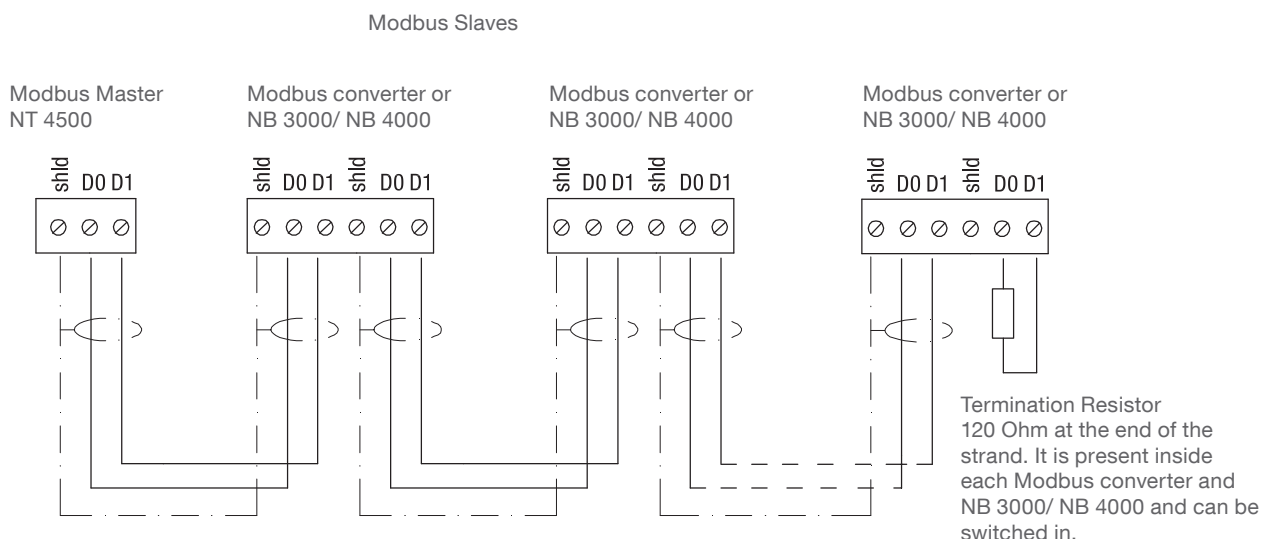|	
Dimensions	200 x 300 x 120 mm (W x H x D), for wall mounting
Material	steel plate
Ingress protection	IP65
Ambient temperature	-25 .. +60°C
Terminal blocks	15 pieces grey, 5 pieces blue, 5 pieces green/ yellow; each terminal implements 3 cable inlets 2.5 mm^2, mounted on top hat rail
Cable glands	6 pieces M20 x 1.5 2 pieces M25 x 1.5

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT
LEVEL CONTROL

Electrical installation

❗ Safety Instructions

Handling	In case of improper handling or handling malpractice, the electric safety of the device cannot be guaranteed.
Installation regulations	The local regulations or VDE 0100 (Regulations of German Electrotechnical Engineers) must be observed.
Fuse	Use a fuse as stated in the connection diagrams.
RCCB protection	In case of a fault, the supply voltage must be automatically switched off by a RCCB protection switch to protect against indirect contact with dangerous voltages.
Power supply switch	A voltage disconnection switch must be provided near the device.
Wiring diagram	The electrical connections are made in accordance with the wiring diagram.
Supply voltage	Compare the supply voltage applied with the specifications given on the name plate before switching the device on.
Cable gland	Make sure that the screwed cable gland safely seals the cable and that it is tight (danger of water intrusion). Cable glands that are not used have to be sealed with a blanking element.
Field wiring cables	All field wirings must have insulation suitable for at least 250 V AC. The temperature rating must be at least 80°C (176°F).
Installation in Hazardous Locations	The NT 4500 and the Mobus converter are not permitted for installation in Hazardous Areas. Observe the valid regulations for wiring in Hazardous Areas, if the NB 3000/ NB 4000 is installed in Hazardous Areas.

Modbus network

General wiring of a Modbus network

Modbus Slaves

Modbus Master
NT 4500

Modbus converter or
NB 3000/ NB 4000

Modbus converter or
NB 3000/ NB 4000

Modbus converter or
NB 3000/ NB 4000

shld D0 D1

Termination Resistor
120 Ohm at the end of the strand. It is present inside each Modbus converter and NB 3000/ NB 4000 and can be switched in.

Other used notations:
D0 = Rx-/Tx- = A
D1 = Rx+/Tx+ = B

Terminals D0 as well as D1 are internally connected.

Note:
If required it is possible to split the Modbus network into two strands. Both strands are wired in parallel at the Modbus Master. A termination resistor must be present at the end of each strand.

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT
LEVEL CONTROL

Electrical installation

Cable recommendations for Modbus network

Shielded cable
Functionality up to 50 m
Manufacturer: Lapp, Type UNITRONIC LiYCY 2x0.34, Art.no: 0034502

Twisted pair cable
Functionality up to 1,000 m
Manufacturer: Lapp, Type UNITRONIC BUS CAN 1x2x0.34, Art.no: 2170263
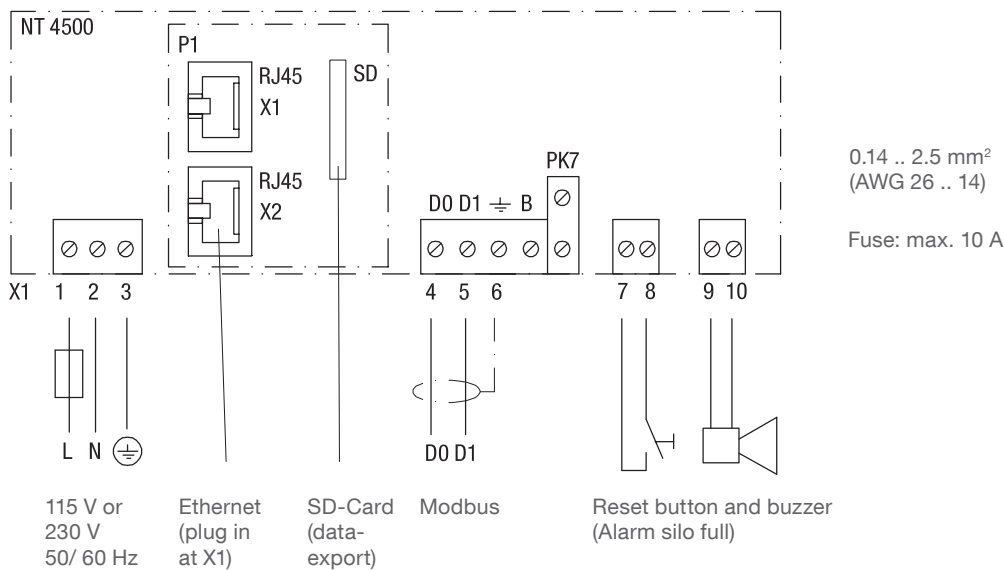
UV-protection hose with threaded hose coupling M20 x 1.5
UV protection for Modbus cable
Manufacturer: Flexa, Type Rohrflex PA6, Art.no: 0233.202.012 and Type RQG1-M, Art.no: 5020.055.018

ATEX-protection hose with threaded hose coupling M20 x 1.5
For installation of Modbus cable in ATEX Zone 21
Manufacturer: PMA, Type ESX, Art.no: ESXT-12B.50 and Type END, Art.no: BEND-M202GT

NT 4500

0.14 .. 2.5 mm² (AWG 26 .. 14)

Fuse: max. 10 A

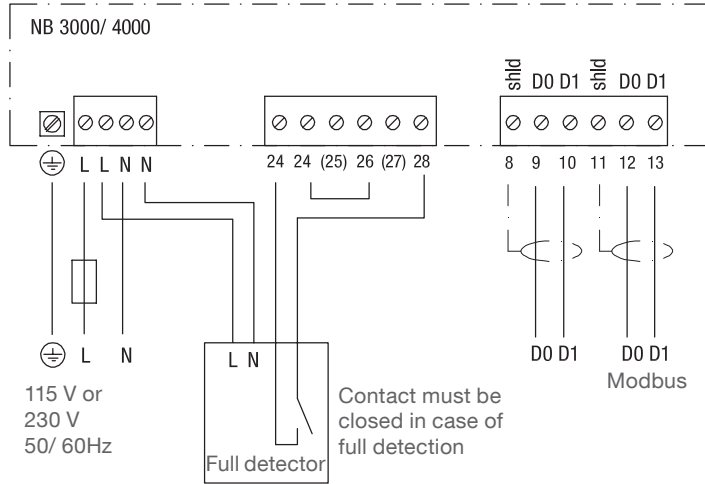| 115 V or 230 V 50/ 60 Hz | Ethernet (plug in at X1) | SD-Card (data-export) | Modbus | Reset button and buzzer (Alarm silo full) |

Note:
- The sliding swith on the controller is set to RUN and must not be changed.
- The csv-file for data-export is written on a SD-card.
  The SD-card hast to rest in the controller for continoous recording.

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT
LEVEL CONTROL

Electrical installation

NB 3000/ NB 4000

0.14 .. 2.5 mm^2
(AWG 26 .. 14)

Fuse: max. 10 A

NivoTec®

Level monitoring system
NT 4500
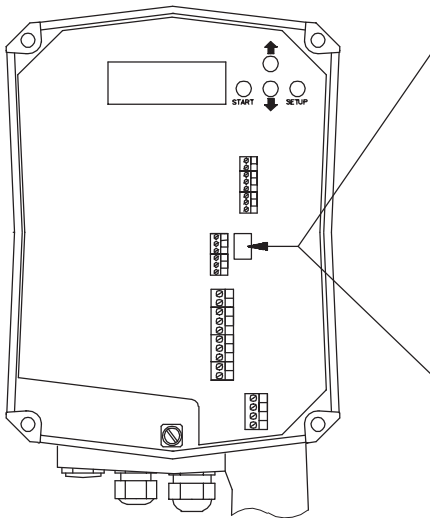Technical information / Instruction manual

UWT
LEVEL CONTROL

Electrical installation

Setting: Biasing and Termination Resistor

For use of NB 4000 units in a external Modbus network, it is possible to set Biasing and Termination Resistor on each unit as required.

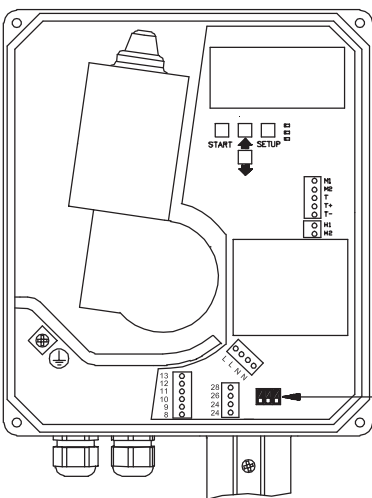**NB 3000**

Version with Jumper

Biasing	OFF*	OFF	ON
Termination Resistor	OFF*	ON	ON

Version with DIP switch

Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON

*factory provided

DIP Switch position:

Top view   Side view

NB 4000

Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON

*factory provided

DIP Switch position:

Top view   Side view

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT LEVEL CONTROL

Electrical installation

Modbus converter

Modbus converter

Max. 4 sensors
4-20 mA/ 2-wire

Max. 4 full detectors

Modbus

115V or
230V
50/ 60Hz
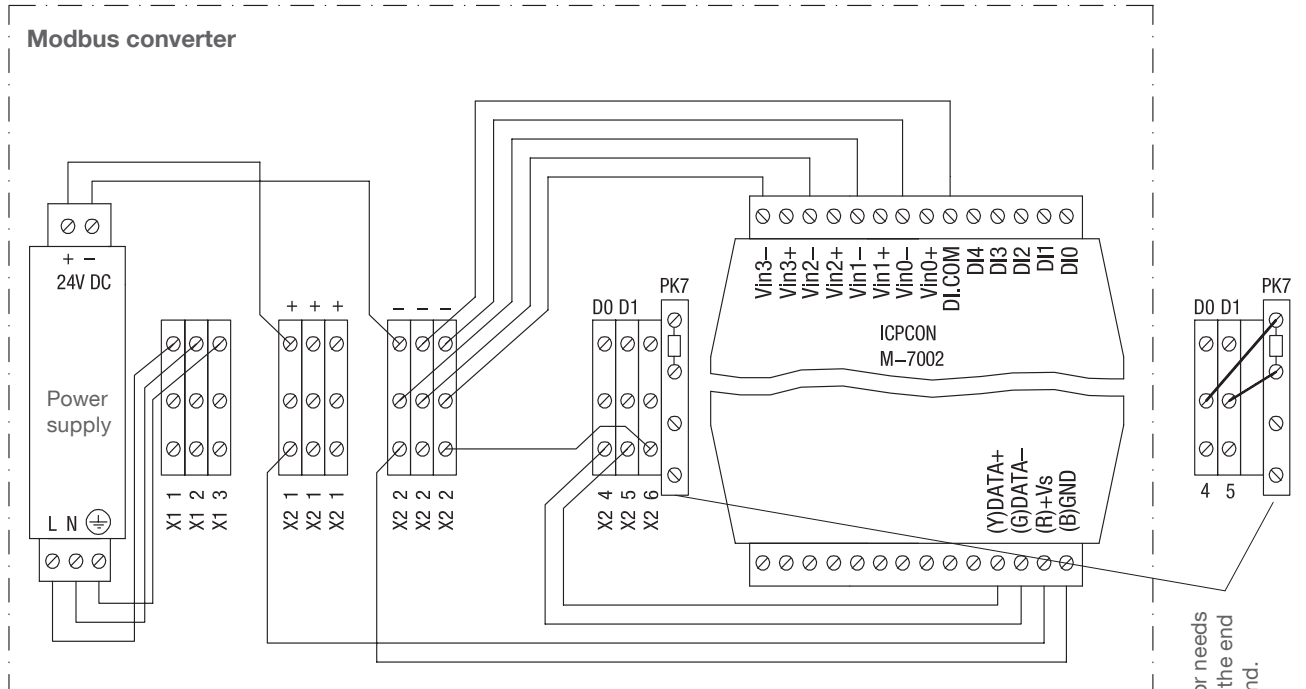
Termination Resistor needs
to be connected at the end
of the Modbus strand.
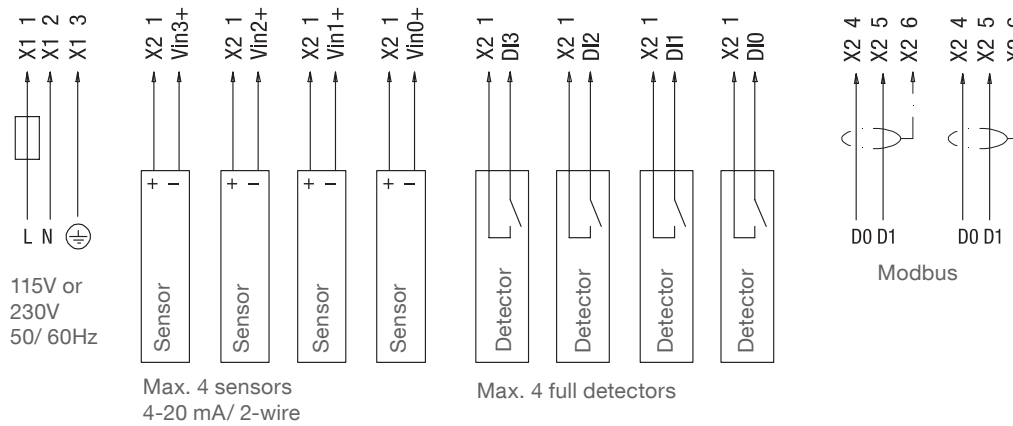
Fuse: max. 10 A

Terminals M-7002: 0.14 .. 1.5 mm² (AWG 26 .. 16)
Other terminals: 0.14 .. 2.5 mm² (AWG 26 .. 14)

The stated wiring inside the Modbus converter is factory provided.

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT
LEVEL CONTROL

Commissioning

1. Generation of a synoptical table

Commissioning is facilitated if an overview of the connected sensors is made in advance.
The table shows an example of a project with 11 silos and mixed configuration of Nivobob® NB 3000 and NR 3000 radar
as well as implementation of full detectors:

Silo	Sensor	Modbus ID	Modbus converter Channel*	Modbus converter Terminal of sensor	Modbus converter Terminal of full detector
1	NB 3000	3	n/ a	n/ a	n/ a
2	NB 3000	4	n/ a	n/ a	n/ a
3	NB 3000	5	n/ a	n/ a	n/ a
4	NB 3000	6	n/ a	n/ a	n/ a
5	NR 3000	1	0	Vin0+	DI0
6	NR 3000	1	1	Vin1+	DI1
7	NR 3000	1	2	Vin2+	DI2
8	NR 3000	1	3	Vin3+	DI3
9	NR 3000	2	0	Vin0+	DI0
10	NR 3000	2	1	Vin1+	DI1
11	NR 3000	2	2	Vin2+	DI2

* see page 17f. under "Modbus RTU"/ "Full Detector"

2. Check the wiring

Make sure that the Modbus network is wired, set the Modbus Termination Resistor (and for NB 3000/ NB 4000 the Biasing), check that
the Ethernet connection is available (see "Electrical installation" from page 5 onwards).

Note: All units are presetted to 19200 Baud. Thus no setting is required.

3. Web server configuration

CAUTION: The configuration should be done by the network administrator only.

The web server is preset to the IP address 192.168.10.70. It must be changed to a company's own IP address as follows:

• Use a PC, which is connected via Ethernet to the Web server. Set in the system control the TCP/ IP to address 192.168.10.xxx,
   whereas xxx can be any number between 0 and 255 (the access to the Web server requires the number 192.168.10., the last
   numberblock is not relevant).

• An up to date version of Internet browser must be installed.

• Open the Internet browser and type the IP address 192.168.10.70 of the web server in the command bar. The overview page
   "Home" of the visualisation opens (see page 11).

• Click the "Login" button and set the user name to "Admin" with the password "admin". The "System Config" button will appear in the
   menu bar.

• Click on this button. The configuration page of the web server will open (see page 13ff.).

• Enter the number of silos, language, date and time, your IP address, sub net mask and gateway.

• Then reset to your TCP/ IP address in the system control of your PC.

4. Perform the basic settings of the connected sensors

With the following settings, the connected sensors are addressed via the visualisation and give a real measurement result. For this
settings the above mentioned synoptical table is helpful. On the overview page "Home", click into the desired silo. There you have to edit
the following settings:

• On page "Setup" (see page 17f.) the data under "Silo Data", "Modbus RTU" and "Level Limit Sensor".

• On page "Volume Calculation" (see page 19) the data under "Silo Shape" and "Silo Data".

5. Perform further user settings

Enter the required user specific settings according to the "Visualisation - Operation" from page 11 onwards.

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

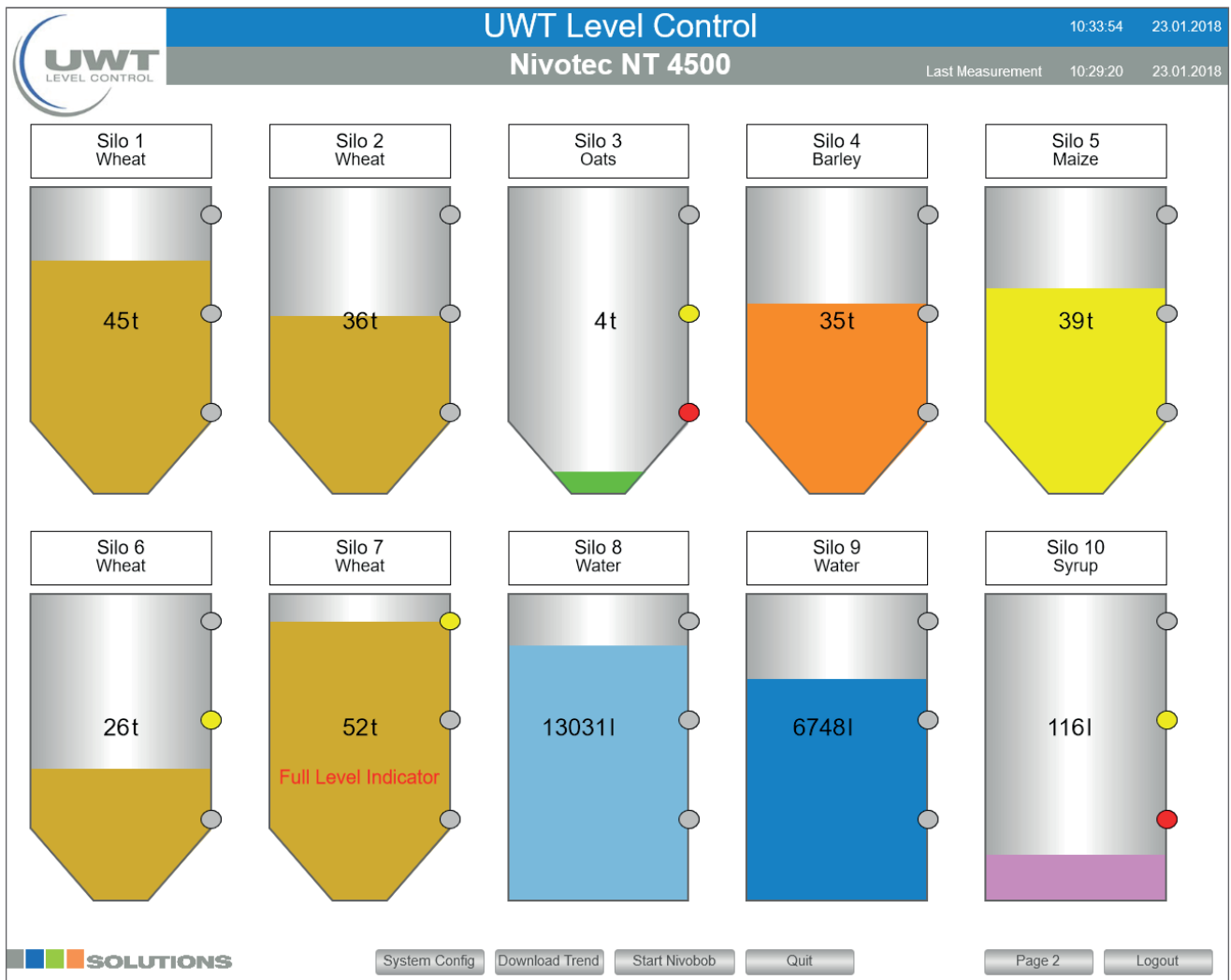## Visualisation - Operation

Start of the Visualisation

By entering the IP address in the browser (according to the web server configuration) the visualisation starts.
After sucessful start the overview page "Home" appears.

Overview page (Home)

Display of level, level limit sensors, information regarding silo and error messages
All user names

The selected number of silos (see page "System Config" -> Number of silos) is presented. If more than 10 silos are defined, a button appears for progression to the next page.

Note: If a distorted image on the PC is present, it should not be viewed in full screen mode, thus the window can be drawn in an undistorted view.

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual
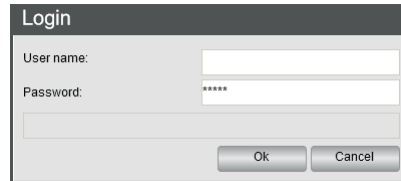
UWT
LEVEL CONTROL

Visualisation - Operation

The following selections appear depending on the setted user name:

Login Logout
Using the Login button, you can change tio other user names with additional privilegs:

User (password: user)
- Page "Silo Single View"
- View of Event List
- Page "System Config"
- Download of trend data
- Start Nivobob®
- Reset of the full signal (buzzer) and of error messages
- Logout

Login
User name: [   ]
Password: [*****]
[   ]
Ok   Cancel

Purchase (password: purchase)
Similar to User, additional:
- On page "Silo Single View": page "Logistics Department"

Admin (password: admin)
Similar to Purchase, additional:
- On page "Silo Single View":
          - Page "Setup"
          - Page "Volume Calculation"
- On page "System Config":
          - Page "Number of silo - Date - Time - Language - Trend"
          - Page "Network"
          - Page "E-Mail"
          - Release User Settings

The button Logout is used to logout.

Silo Single View (click on a silo)
The single view for the respective silo will open (see page 16).

System Config
See page 13 ff.

Download Trend
Issue of trend data for all silos as csv-file. The level values are stated in the unit as defined under "Volume Calculation" (see page 19).

Start Nivobob®
Starts the measurement of all connected Nivobobs. If more than 10 silos are defined, the measurements of the silos not displayed on the screen are started as well. As long as the measurement is running, a green arrow appears in each silo.

Quit
Reset of the full signal (buzzer) and of error messages.

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT
LEVEL CONTROL

Visualisation - Operation

Page "System Configuration"

Display of Softwareinformations, navigation to extended user settings
All user names

The following selections appears depending on the setted user name:

Number of Silo - Date - Time - Language - Trend
See page 14.

Network
See page 15.

E-Mail
See page 15.

Reset User Settings
The button "Change Password" will be shown for 5 minutes (independent from logged in user name).

Change Password
A popup to change the password of the actually logged in user name will be shown.

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT
LEVEL CONTROL

Visualisation - Operation

Page "System Config" Button "Number os Silo - Date - Time - Language - Trend"

Setting of date, time, menu language of software, number of silos, writing interval for trend and reset of trend .csv file
User name Admin

Number of Silo
The number of silos to be displayed on Overview page (Home) is set here. Per page a maximum of 10 silos will be shown, additional silos will be shown on a following page. The maximum amount of shown silos is limited to 25 or rather 50 silos, depending on device configuration.

Tend
The trend on the pages "Silo Single View" and "Logistics Department" consist in total of 200 measurement points per silo. The oldest measurement point will be deleted, if an actual value is added. By editing the "Interval Writing", the total time of the trend can be determined. The trend saving takes place in this interval (hours : minutes : seconds). By changing the Iinterval writing, the existing trend will be deleted, to ensure a linear display of the trend.

Trend CSV File
The trend data is written continuous to a csv-file on SD-card. By using the button "Download Trend", the csv-file can be downloaded (see page 11f.). To avoid large data-files, the csv-file can be reseted manually by using the button "Delete". Hint: When changing the number of silos, the csv-file will be deleted also.

Event CSV File
The event data are stored continuously to the SD-card for diagnostics. Per quarter and silo, one file is created. There are files for the prior and for the actual quater up to the actual date available for download. Older files are deleted automatically.

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT LEVEL CONTROL

Visualisation - Operation

Page "Ethernet Configuration"

Setting of parameters for the network interface
User name Admin

Hint: If you make a mistake at configuration or loose the settings, the controller can be addressed on connector X2 (see page 6) with IP address 192.168.30.70.

Setup Network Nivotec	
Current IP Adress	192.168.10.70
Current Sub Net Mask	255.255.255.0
Current Gateway	192.168.10.20
New IP Adress	
New Sub Net Mask	
New Gateway	
Save	

Page "Send an E-Mail"

Setting of receiver for notes per email when full detector, demand detector, empty detector and failure
User name Admin

Send an E-Mail 10:53:57 23.01.2018
Nivotec NT 4500

E - Mail Receiver	
Receiver 1	
Name	Admin
E-Mail Adress	admin@uwt.de
Receiver 2	
Name	Logistics Department
E-Mail Adress	logistics@uwt.de
Receiver 3	
Name	
E-Mail Adress	
Receiver 4	
Name	
E-Mail Adress	
Receiver 5	
Name	
E-Mail Adress	

Send an E-Mail at

Receiver	Full Detector	Demand Detect	Empty Detector	Failure	Test Mail
Admin				(green)	Transmit
Logistics Department		(green)	(green)		Transmit
					Transmit
					Transmit
					Transmit

State	
Client 1	OK
Client 2	OK
Client 3	OK
Client 4	OK
Client 5	OK

SOLUTIONS

Config   Home

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT
LEVEL CONTROL

Visualisation - Operation

Page "Silo Single View"

### View of details and settings of the sensors for a silo
User name User, Purchase and Admin

Clicking on a silo in the Overview page (Home) opens the Silo Single View.

The level is displayed in the unit as defined under "Volume Calculation" (see page 19), in addition as a percentage.
The colored points display the full, demand and empty detection. The color of the filling can be set on page "Setup" (see page 17f.) to the demand of the filling.

The trend stores a total of 200 data points per silo. The oldest point is deleted when a new value is stored.

Events are displayed in a table. The selection "+" opens the list of the last 11 events. In case of a alarm, above the table up to 3 notifications will be shown additional.
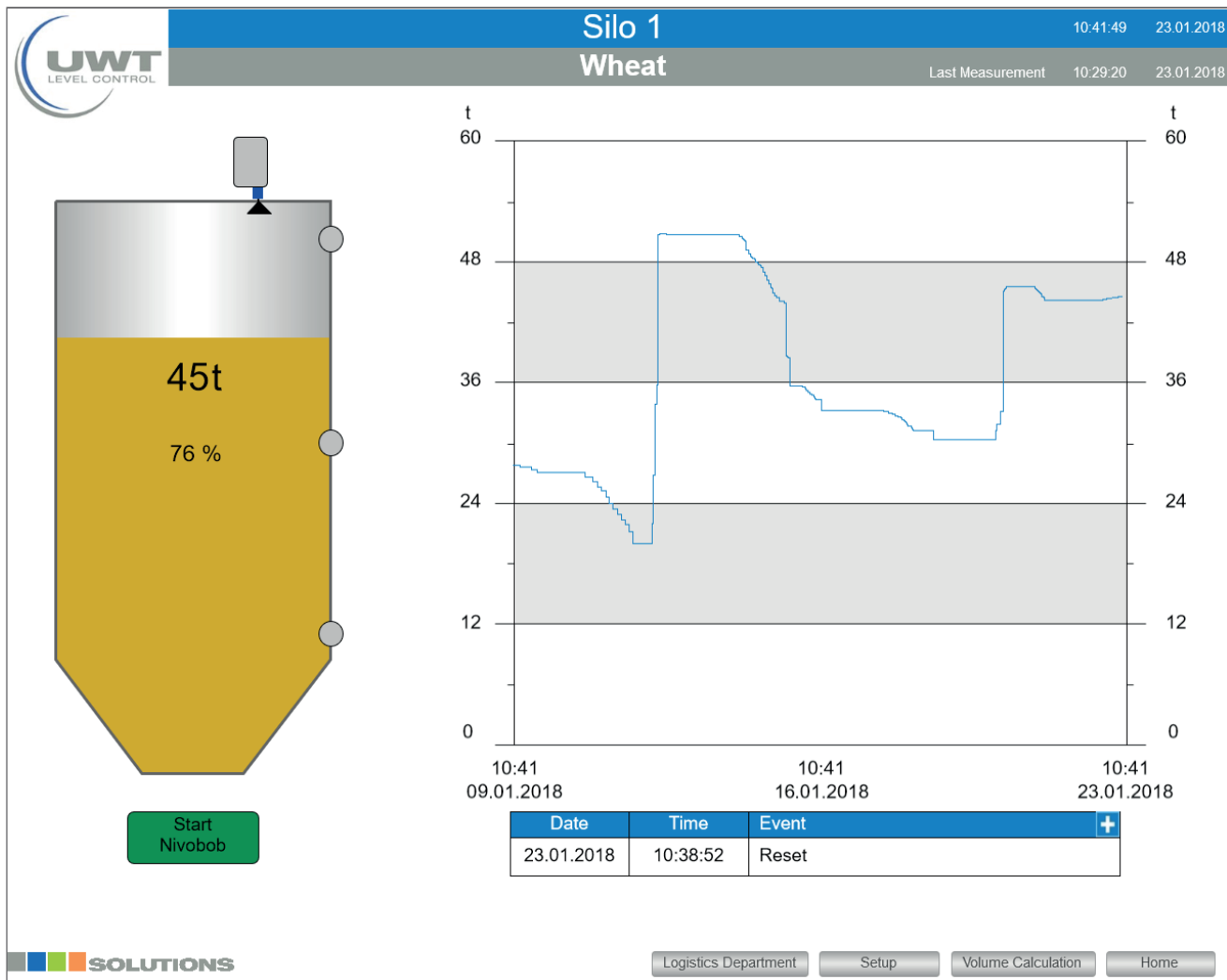
Nivobob® Start
Starts the measurement of the Nivobob® for this silo. During the measurement, the button appears gray. When the measurement is completed, the color changes back to green.
The button appears only if the detected sensor is a Nivobob®.

Disposition
Leads to the page "Logistics Department" of this silo (see page 20).

Setup
Leads to the page "Setup" of this silo (see page 17ff.).

Volume Calculation
Leads to the page "Volume Calculation" of this silo (see page 19).

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

Visualisation - Operation

Page "Setup"

Detail settings for the respective measurement point
User name Admin

View if connected sensor is a Novobob®:

The following selections appears under topic Nivobob®, if according sensor is connected:

Enable
The measurement start can be blocked by deactivation of this field, e.g. when a silo si filled up.

Automatic Power Measurement Start
After rebooting the webserver or blackout, the Nivobob® will start automatically, if this field is activated. The filling level is then immediately actual (Nivobob® looses measusement values after blackout, until measurement is started).

Interval Start, Interval Time, Starttime Interval
If the field "Interval Start" is activated, measurement starts of the Nivobob® take place automatically. The starts take place daily, first-time at "Starttime Interval" (hours - minutes - seconds), then with periodic repeated interval time" (hours - minutes - seconds).

Start Time 1 to 4
Additional/ alternative to the Interval Start up to 4 individual Start Times can be set per day (hours - minutes - seconds).

Start Full Detector
If the field "Start Full Detector" is activated, measurement start of the Nivobob® takes plase automatically, if the full detector of the corresponding silo is actuated. From actuation to measurement start is a delay of 10 minutes.

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT LEVEL CONTROL

Visualisation - Operation

View if connected sensor is connected via Modbus converter:

Setup Silo 5	11:04:32 23.01.2018

Maize

Silo Data

Silo Name	Silo 5
Silo Content	Maize
Article Number	

Modbus RTU

Adress	1
Active	
Channel	0	1	2	3

Level Limit Sensor

Full Detector

Value	55 t
Modbus	

Demand Detector

Value	20 t

Empty Detector

Value	10 t

Silo color

Current color	Switch

Silo Daten
The silo shown can be labeled with any text for silo name, content and article number.

Modbus RTU
Setting of the Modbus address of the conected hardware.
If a Modbus converter is connected to the selected address, the Nivotec detects this automatically. A field to select the channel number for the 4-20 mA sensor and the full detector appears:
Channel 0 is allocated to the terminal Vin0+ and DI0 (see electrical installation on page 9)
Channel 1 is allocated to the terminal Vin1+ and DI1
Channel 2 is allocated to the terminal Vin2+ and DI2
Channel 3 is allocated to the terminal Vin3+ and DI3

Hint for defining the Modbus addresses:
The Modbus address of the Nivobob® is setted in the Nivibob communication menu (see manual Nivobob®). It is reasonable to use the address 1 for the first device, then ascending to 2, 3, etc. With mixed use of Modbus converters the first addresses of the Modbus converters are already preset (see below), the Nivobob® addresses must then be allocated above these. Optional (with selection code 33) the Nivobob® devices are delivered with already preset address.
The Modbus converters are factory presetted to address 1 for the first Modbus converter, then ascending to 2, 3, etc. The settings can not be changed. A label with the Modbus address is present inside the Modbus converters on the implemented module M-7002.

Grenzstansmelder
If a full detector is connected, it is read with setting to "Modbus".
If "value" is selected, the message for full is activated, when the entered value (in accordance to the unit set on page "Volume Calculation", see page 19) is exceeded by the material level. The message for demand and empty is activated, when the material level is below the entered values. The demand and empty message can only be acticated via the input "value".
Hint: When changing the unit on page "Volume Calculation", the values for full, demand and empty detector have to be adapted accordingly.

Silo color
The chromatic illustration of the filling can be adapted to the filling.

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT LEVEL CONTROL

Visualisation - Operation

Page "Volume Calculation"

Settings for volume related measurement display and setting of the silo dimensions
User name Admin

Silo Profile and Silo Data
With the setted data the software calculates the actual content:

Programming of the sensors
For the correct measurement display the connected sensors must be set as follows:

• **Nivobob® NB 3000/ NB 4000:**
The value "Move Distance Nivobob®" must equal the silo hight to use the full measurement range down to 0%.
Values can be exchanged with the Nivobob® via the buttons "Read from Nivobob®" and "Transmint to Nivobob®".

• **4-20 mA sensors** (connected via Modbus converter):
4 mA must correspond to the value 0% given above
20 mA must correspond to the value 100% given above
Note: All sensors needs to have a linear level signal (relation between the signal output and level in the silo).
The volume-based calculation is performed in the visualisation only.

Unit/ Density
The selected unit is used in the visualisation. When selecting a mass unit (kilograms, tons, US tons), the entered bulk denstiy is used for calculation of the mass.

Calculated values
Display of the calculated maximum content (according to the entered Silo Profile and Data) and the actual content.
Both values are shown in the above selected unit.

SOLUTIONS

NivoTec®

Level monitoring system
NT 4500
Technical information / Instruction manual

UWT LEVEL CONTROL

Visualisation - Operation

Page "Logistics Department"

View and setting of silo content, article number and density, as well as view of maximal content, current content and current free space
User name Purchase and Admin

gi290920
NT 4500