Notes to the user

1.1 Validity
1.2 Symbols and conventions
1.3 Overview
1.4 System requirements
1.5 Explanation of the warnings

First steps

2.1 Installation
2.2 Uninstallation
2.3 Software update

Windows and tabs

3.1 The Start window
3.2 The Main window
3.3 Magnet tab
3.4 Output tab
3.5 Advanced settings tab

Menus

4.1 "File" menu
4.2 "Transducer" menu
4.3 "Settings" menu
4.4 "Help" menu
1.1 Validity

This guide describes installation and operation of the configuration software for the Micropulse Transducer BTL7-S510(B)-... / BTL7-S5 _ _ C-... / BTL7-S5 _ _ D-... (BTL7 USB-Configurable).

The illustrations in the manual are for the P style as an example. The software, however, may display another style, depending on which transducer is connected. Depending on the style, windows or menu elements may also be hidden if the connected transducer does not support the respective functions.

1.2 Symbols and conventions

Instructions are indicated by a preceding triangle. The result of an action is indicated by an arrow.

► Instruction 1
⇒ Action result

Action sequences are numbered consecutively:
1. Instruction 1
2. Instruction 2

Keys are set in angle brackets, e.g. “confirm by pressing <Enter>”.

Key combinations are buttons which are pressed simultaneously. These are joined by a plus sign, e.g. <Ctrl> + <O>.

Buttons are written in small caps, e.g. Update Transducer.

Menu commands are joined with a greater-than sign, e.g. “Settings > Options” stands for the menu command “Options” from the “Settings” menu.

1.3 Overview

The Micropulse Configuration Tool allows Balluff transducers type BTL7-S510(B)-... / BTL7-S5 _ _ C-... / BTL7-S5 _ _ D-... to be quickly and simply configured. The results of the configuration are displayed online.

The most significant features are:
- Online display of the current position of the magnet
- Graphical support for setting the functions and curves
- Display of information about the connected transducer
- Selectable number formats and units for display
- Resetting to factory settings is possible
- Demo mode without having transducer connected

1.4 System requirements

Installation requires administrator rights on the PC.

- Standard PC
- Windows 7/8 (32 and 64 bit)
- Screen resolution at least 1024 x 768 pixels
- 10 MB available hard disk space
- USB interface
- Java Runtime Environment (JRE) version 7 (1.7.0) or higher installed (download at http://java.com/getjava)

With 64-bit operating systems, the 32-bit Java version must be installed.

1.5 Explanation of the warnings

Always observe the warnings in these instructions and the measures described to avoid hazards.

The warnings used here contain various signal words and are structured as follows:

<table>
<thead>
<tr>
<th>SIGNAL WORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard type and source</td>
</tr>
<tr>
<td>Consequences if not complied with</td>
</tr>
<tr>
<td>► Measures to avoid hazards</td>
</tr>
</tbody>
</table>

The individual signal words mean:

DANGER

The general warning symbol in conjunction with the signal word DANGER identifies a hazard which, if not avoided, will certainly result in death or serious injury.
2 First steps

2.1 Installation

2.1.1 Installing and starting the Micropulse Configuration Tool

Installation is done using an Installation Wizard which guides you through the individual steps.

1. Make sure that the computer fulfills the system requirements.
2. Double-click on “ConfigTool_Setup_Vx_xx_xxx.exe” ⇒ The Installation Wizard starts.
3. Follow the instructions and accept the license contract. ⇒ The software is installed.
4. Follow the instructions for driver installation and accept the license contract.
   ⇒ The drivers are installed.
   ⇒ The software is entered in the Windows start menu and a link is created on the desktop.
   ⇒ Installation is complete.

If the Launch Micropulse Configuration Tool box is checked when finishing the installation, the program starts automatically. Alternatively, the program can be started manually at any point in time.

You can click on the Demo SSI button at any time to switch to Demo mode without having the communication box connected.

Connect the USB communication box to the PC using the USB cable.

2.1.2 Adjusting the Micropulse Configuration Tool

The Micropulse Configuration Tool is preset with default settings and can be adjusted in the “Options” window (see “Settings” menu on page 13).

► Select “Settings > Options”.
⇒ The “Options” window opens.

The following options can be adjusted:
– Response time for the online display
– Number format of the display
– Unit length of the display
– Display of increments
– User interface language

The Micropulse Configuration Tool starts with the most recently made settings.

2.2 Uninstallation

The software can be removed from the PC with the entry “Start > All Programs > Balluff > Micropulse Configuration Tool > Uninstall” in the start menu.

2.3 Software update

To download the current software, see page 14.

The software does not need to be removed in order to install a new version. The Installation Wizard updates the existing version.
3.1 The Start window

When starting, the Micropulse Configuration Tool establishes the connection to the communication box and to the connected transducer. The data and transducer configuration are read and displayed in the main window.

The individual steps are shown in the Start window:
- **Connecting...** Connection to the communication box is established.
- **Opening...** Connection to the transducer is established.
- **Reading...** Transducer data is read.

If the action can be successfully completed, the main window is displayed.

3.1.1 Establish a connection

If no connection to the communication box or to the transducer can be established, this message will appear on the start screen and the main window is not shown.

► Check the USB connection, unplug and plug in the cable on the PC, if necessary.
⇒ The Micropulse Configuration Tool attempts again to establish the connection.

► Check connection between the transducer and the communication box, reconnect if necessary.
⇒ The Micropulse Configuration Tool attempts again to contact the transducer.

► Switch to the Demo version.
⇒ A self-running demo is started. A transducer does not need to be connected.

► Quit program (Exit).
⇒ The Micropulse Configuration Tool is closed.

Please contact our service center if you still cannot establish a connection.

3.1.2 A connection cannot be made
3.2 The Main window

3.2.1 Online display of the LEDs

The LEDs indicate the operating states of the transducer.

**LED 1 (left LED)**

<table>
<thead>
<tr>
<th>Color</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Normal function (Magnet is within the limits).</td>
</tr>
<tr>
<td>Red</td>
<td>Error (No magnet or magnet outside the limits).</td>
</tr>
</tbody>
</table>

**LED 2 (right LED)**

<table>
<thead>
<tr>
<th>Color</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Synchronous operation(^1)</td>
</tr>
<tr>
<td></td>
<td>Internal measurement is synchronous to SSI query</td>
</tr>
<tr>
<td>Off</td>
<td>Asynchronous operation(^1)</td>
</tr>
<tr>
<td></td>
<td>Internal measurement is asynchronous to SSI query</td>
</tr>
<tr>
<td>Flashing green</td>
<td>Programming mode</td>
</tr>
<tr>
<td></td>
<td>Communication running (read, update)</td>
</tr>
</tbody>
</table>

\(^1\) Asynchronous operation is reached when the external sampling rate is \(> f_{\text{A,max}}\) or \(< 62.5\) Hz (only with BTL7-S510B-… or BTL7-S5_ _D-…).
3.2.2 Transducer information

The following transducer information is displayed:
- Type
- Serial number
- Firmware version
- Nominal length of the connected transducer
- Output: SSI

3.2.3 SSI status

<table>
<thead>
<tr>
<th>Clock period</th>
<th>Display of the SSI clock period $T_{CLK}$ or SSI clock frequency $f_{CLK}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.g. 2.00 µs</td>
<td>If an SSI communication error ($T_5$ or $T_m$ event) has occurred</td>
</tr>
<tr>
<td>Communication error</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Synchronization</th>
<th>If synchronous operation is active in the transducer</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Active</th>
<th>If the current position value has been queried via the SSI interface</th>
</tr>
</thead>
</table>

3.2.4 Connection

This symbol is displayed when the communication box is active.
- This symbol
  - Transducer is connected.
  - Transducer is not connected.

3.2.5 Menu bar

The menu bar contains the menu commands. The menu commands are described in Section 4 “Menus” starting on page 13.

3.2.6 Update transducer

Changed values for a configuration are indicated in the Micropulse Configuration Tool by blue numbers and letters and the Update Transducer button is active.

Clicking on Update Transducer sends the information to the transducer. Transmission takes a certain amount of time, since all the parameters are sent.

3.2.7 Tabs

Settings are made on the tabs.

Magnet:
- Select number of magnets.
- Online display of the configuration.

Output: function, number of bits, coding, upper/lower limits, scaling, and error value can be selected and the curve can be adjusted.

Advanced settings:
The operating mode of the SSI interface (synchronous/asynchronous operation), noise filter, and average filter can be set.

The following sections describe the tab elements and how to make or change settings.
3 Windows and tabs (continued)

3.3 Magnet tab

3.3.1 Number of magnets

Select the number of magnets used.

UPDATE TRANSDUCER does not need to be clicked on, clicking a radio button immediately updates the transducer and the graphic.

For the “2 magnets” setting there must be exactly two magnets on the transducer.

3.3.2 Assignment

Graphical display of the magnets and their output functions.

Boundary conditions for several magnets
- Two magnets can only be selected if the nominal length is ≥ 90 mm.
- The distance between two magnets must be ≥ 65 mm.

DANGER

Uncontrolled system movement

When starting up, if the position measuring system is part of a closed loop system whose parameters have not yet been set, the system may perform uncontrolled movements. This could result in personal injury and equipment damage.

The system must be taken out of operation before configuration.

Transducers may only be connected to the communication box for configuration.

The communication box must be removed after configuration.
3.4 Output tab

3.4.1 Function

You can select a function that will be shown in the curve. The following functions can be selected:

Position: Position in the measuring range.

Velocity: Velocity of the magnet, with the sign indicating the direction of motion. A movement from the starting point to end point is output with a positive sign; a movement from the end point to the starting point is output with a negative sign.

Velocity (no sign): Velocity of the magnet, but the direction of motion cannot be read.

Differential position: Distance between two magnets. Selection is only possible if two magnets have been selected (see Magnet tab on page 9).

Differential velocity: Relative velocity between two magnets. Selection is only possible if two magnets have been selected (see Magnet tab on page 9).

3.4.2 Data format

Setting the data format:

Number of bits: You can set values from 16 to 32 bits.

Coding: You can choose between binary code and Gray code.

Setting the data format

► Set values using the spin controls.

Or

► Enter values and confirm each by pressing <Enter>. 
3.4.3 Scaling
The resolution is specified by the curve gradient; the measuring range is specified by the start point and end point.

1: Start point of the curve with associated output value.
2: End point of the curve with associated output value.

**Read position:** The present position of the magnet is read (teach-in).

To set the values, see also “Setting the curve” in section 3.4.6.

### Setting the resolution
The curve gradient can be changed by fixed increments.

- Set value using the spin controls under Scaling.

### Setting the start points and end points
- For the start point and end point, the present position of the magnet on the transducer is read (teach-in).

Or

- Use the mouse to move the start point and end point in the graphical display.

Or

- Set values using the spin controls.

Or

- Enter values and confirm each by pressing <Enter>.

You might have to first adjust the limits and error value in order to set the scaling.

3.4.4 Limits and error value

Setting upper limit, lower limit, and error value

**Measuring range/limits:** The start and end points must lie on or within the limits and they must keep a minimum distance from the error value.

**Error value:** The error value must lie on or outside the limits. A minimum distance from the start or end point of the measuring range must be kept.

The error values “all data bits 1” and “MSB only” can only be selected if the bit number is \( \leq 25 \).

The error value “compatible with BTL5 (bit 21)” is only possible if the bit number is \( \geq 22 \).

### Setting limits and error value

- Set values using the spin controls.

Or

- Enter values and confirm by pressing <Enter>.

- Select the appropriate error value.

3.4.5 Blue bar
The selected function (see 3.4.1) is shown and the data format for the SSI interface (see 3.4.2) is displayed graphically in the blue bar over the output characteristics.

3.4.6 Output characteristics

Graphical representation of the curve as a function of the scaling.

- Offset and gradient are displayed when the mouse cursor is moved over the start point or end point.

### Setting the curve

- Use the mouse to move the points.

⇒ The curve and associated values will be changed.

- The characteristic curve can be inverted.

Note the following when making this setting:

- For “Position”, the distance between the start point and end point must be at least 4 mm (0.15 inches).
- For “Velocity”, the distance between the start point and end point must be at least 100 mm/s (4 inches/s).
- Identical values may not be selected for the start point and end point.
- The minimum nominal length of the transducer for the “Differential position” function is 90 mm.
- For the “Differential position” function, the minimum distance between two magnets is 65 mm.
- The maximum configurable velocity is 10 m/s.

Values and settings in blue text indicate changes to the configuration. UPDATE TRANSDUCER sends the configuration to the transducer.

### Check output

The results of the configuration are displayed online on the “Magnet” tab.

- Click on UPDATE TRANSDUCER.

⇒ The configuration is sent to the transducer.

- Switch to “Magnet” tab.

⇒ The set function is displayed.

⇒ The movements of the magnets and the LED signals are shown online.

Negative values can only be output in binary format if the bit number is \( \leq 25 \). Negative values in Gray format are only possible if the bit number is = 25.
3.5 Advanced settings tab

3.5.1 SSI interface

The following operating modes are available for selection:

- Asynchronous operation
  The external sampling frequency is independent of the internal sampling frequency of the transducer.

- Synchronous operation
  The internal sensing cycle adjusts itself to the external sampling cycle. The position delay is as short and constant as possible.

  ![Algorithm 1](Image)
  ![Algorithm 2](Image)

3.5.2 Noise filter

To prevent noise in the rest position, a noise filter can be activated. The filter levels available for selection range from 1 (weak) to 3 (strong).

3.5.3 Average filter

An average filter that calculates the average value of the last 2, 4, or 8 values (depending on setting) can be activated.
4 Menus

The menu commands can be called up via the menu bar or directly using key combinations (shortcuts).

---

4.1 “File” menu

4.1.1 Open <Ctrl> + <O>
Opens the “Open” dialog box. A saved configuration can be loaded (file extension “dat”).

If the type is identical, a prompt appears and the transducer can be updated.

If the prompt is not confirmed or the type is not identical, the Micropulse Configuration Tool switches to offline mode (see “Settings” menu, section 4.3).

4.1.2 Save <Ctrl> + <S>
Opens up the “Save” dialog box, a configuration can be saved as a file (file extension “dat”). The configuration currently present in the Micropulse Configuration Tool is saved, regardless of whether it was sent to the transducer or not.

4.1.3 Report <Ctrl> + <E>
Calls up a text file (temp.txt) that documents the information on the transducer and its current settings. It can be stored under a new name.

4.1.4 Exit <Control> + <X>
Exits the Micropulse Configuration Tool. If the transducer is not yet updated, a prompt appears. The exit process can be cancelled.

4.2 “Transducer” menu

4.2.1 Read <Ctrl> + <R>
The configuration of the connected transducer is read. Reading must be acknowledged. The current configuration in the Micropulse Configuration Tool will be overwritten.

4.2.2 Factory settings <Ctrl> + <F>
Resets the configuration of the connected transducer to the factory settings. Resetting must be confirmed.

4.3 “Settings” menu

4.3.1 Options <Ctrl> + <P>
Opens the “Options” dialog box.

Screen update: The time span in which the graphical representation of the magnets is updated can be changed.

Number format: Changes the number format of the representation.

Unit: You can choose mm or inch for the length unit display.

Display increments: You can choose decimal or hexadecimal as the basis for the increment display.

Language: One of the displayed languages can be selected for the Micropulse Configuration Tool. The language is changed without the need to restart the application.

When the Micropulse Configuration Tool is installed, number format, unit, display of increments, and language are preset depending on the operating system used. If the operating system language cannot be set, the Micropulse Configuration Tool will be started in English.
4.3.2 Offline/Online <Ctrl> + <L>
Switches from online mode to offline mode and vice versa.

Online: The transducer is connected to the Micropulse Configuration Tool and can be updated at any time. Data is continually sent, e.g. LED states and positions.

Offline: The transducer is not connected to the Micropulse Configuration Tool. The present configuration can be edited or a new configuration can be opened. You must switch to online mode to send the configuration.

Switching from “Online” to “Offline”:
► Call up “Settings > Offline” (<Ctrl> + <L>).
  ⇒ The Micropulse Configuration Tool switches to offline mode.

Switching from “Offline” to “Online”:
► Call up “Settings > Online” (<Ctrl> + <L>).
  ⇒ The Micropulse Configuration Tool switches to online mode.

If another transducer of the same type is connected in offline mode, a prompt with the following options appears when switching to online mode:
- Read: Read the transducer configuration. The current configuration in the Micropulse Configuration Tool will be overwritten.
- Update: The transducer is updated with the current configuration in the Micropulse Configuration Tool.
- Offline: Perform no action, remain in offline mode.

The current connection status is shown in the main window.

4.4 “Help” menu

4.4.1 Info <Ctrl> + <I>
Shows the current software version number and the service contact data.

4.4.2 Download <Ctrl> + <D>
Opens an Internet connection for downloading the latest software version. This requires that the PC be connected to the Internet.