



# RAPIDOSCAN<sup>®</sup> CLASSIC

Rotary Encoder | EN

Version 0.1

## Table of Content

1 Preface .....	3!
2 Problem.....	4!
3 Incremental Encoder & General Information .....	5!
4 Connecting of the Encoder .....	5!
5 Enabling of the Encoder .....	6!
5.1 Connecting to the integrated Web-Server .....	6!
5.2 Enabling of the Encoder.....	6!
6 Accessing Encoder Data.....	9!
6.1 Modbus TCP .....	9!
6.2 Using the AutoSend Channel.....	10!
6.2.1 UDP   Client setup .....	11!
6.2.2 TCP   Server setup.....	12!
6.2.3 Encoder Data setup .....	12!
6.3 EtherCAT .....	12!

## 1 Preface

The RapidoScan is a very versatile measuring system with the ability for the integration of rotary encoder data per direct link with the RapidoScan itself.

Using that feature it becomes very easy to precisely combine object measurement data with movement data of conveyer belts. And so the conveyer belt speed and its dynamics will not influence the interpretation of measuring results.

This Application Note describes how to connect the encoder with the hardware, how the encoder can be activated per Web-interface and how to output the encoder data as part of the process data.

Offering that functionality the RapidoScan appears as a very interesting alternative for line camera based systems. And this turns the RapidoScan to an excellent solution when working together with PCs to maximize the real time behaviour of the control equipment.

## 2 Problem

Many applications have the needs for continuously scanning data from passing objects like on conveyer belts. In many cases it is assumed that feeders are running at a constant speed. Then and only then the height scanning data will give a good representation of the object through the available time stamps. But in the real world the conveyer speed varies due to bumpy operations, troubles along the transport roadway or during the initial period.

An external synchronization of measuring data with encoder data contains errors because of the uncertainty in time of both readings.

Precise synchronization of conveyer position with height or shape measurement data can be done easily if the scanner allows the direct linkage of encoder signals with the scanner. The RapidoScan can.

### 3 Incremental Encoder & General Information

Generally an encoder generates two signals A and B with a shift of 90° for determining the velocity and the rotation direction (Fig.: 3.1). Some versions output inverted signals (A + /A and B + /B) and in special cases a C-Signal for zero-crossing is available but the RapidoScan only uses the signals A (CH-A) and B (CH-B). Signals from 15V to 24V and frequencies up to 200 kHz can be processed. The RapidoScan handles encoder values using a 16-bit up/down-counter.

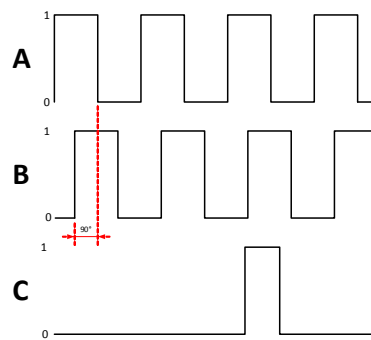


Fig.: 3.1

### 4 Connecting of the Encoder

The encoder can be connected to the RapidoScan using pins 2 and 4 of X2 which is a standard M12-Connector (M12-Connector (male), 5-pins, A-encoded).

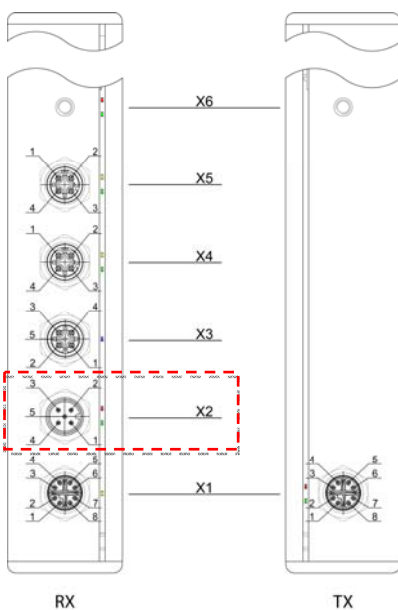


Fig.: 4.1

<b>X2</b>	1: P24VDC <sub>IN</sub>	brown	M12-Connector (male), 5-pins, A-encoded
	2: switching output-1 (DO) / CH-A (DI)	white	
	3: GND	blue	
	4: switching output -2 (C/Q) / CH-B (DI)	black	
	5: Trigger-input (DI)	gray	



Since pins 2 and 4 alternatively act as outputs too these pins must be parametrized for encoder usage prior to the physical connection of the encoder signals.

## 5 Enabling of the Encoder

The necessary parametrization can be done through the ConfigTool (PC-Software) or through the integrated Web-Interface of the RapidoScan. We recommend using the **Web-Interface** since it always correctly represents the actual functionality of the RapidoScan.

### 5.1 Connecting to the integrated Web-Server

First connect to the Web-Server of the RapidoScan using your standard browser. If you haven't changed the settings of the RapidoScan then its IP address will be **192.168.0.223** when using **LAN**.

If your RapidoScan provides WLAN too then you can use the built in Soft-AP functionality of the RapidoScan. Here the standard IP address is **192.168.1.1** and the network key of the **WLAN** is **87654321**.

Log in as **service** user. The default password is "**service**":

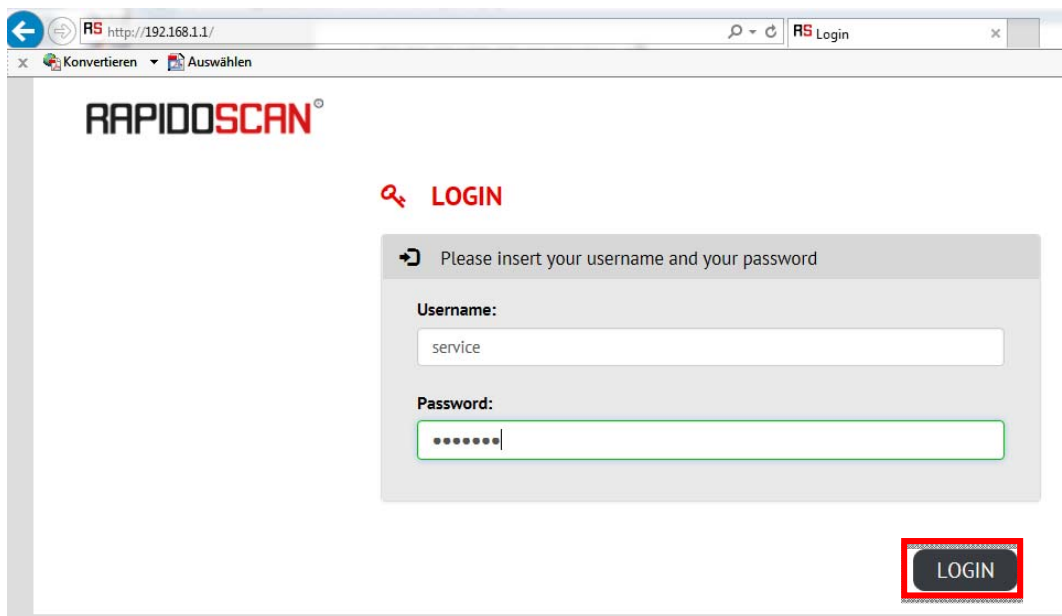


Fig.: 5.1

Next press **LOGIN** (Fig.: 5.1).

### 5.2 Enabling of the Encoder

The first task is the general enabling of the Encoder through the Digital I/O page which must be selected from the left side bar:



Fig.: 5.2

To enable the encoder interface the checkbox must be activated (Fig.: 5.3). Since Digital Outputs 1 and 2 share their two lines with the encoder inputs the functionality of the Digital Outputs 1 and 2 become disabled independent of their prior settings. The encoder setup overrules the Digital Output setup for these two outputs!

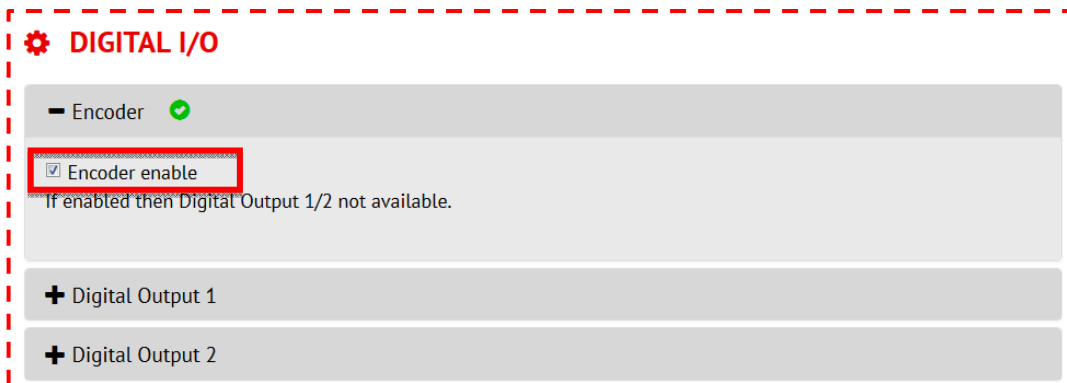


Fig.: 5.3

If Digital Outputs 1 and 2 were pre-enabled then they will keep their green check mark until you write the new setup to the RapidoScan and then re-read the setup.



Fig.: 5.4

The last step is making the new setup persistent on pressing the **SAVE** button in the upper left corner. Otherwise the new settings will be lost after a power-off/power-on cycle:

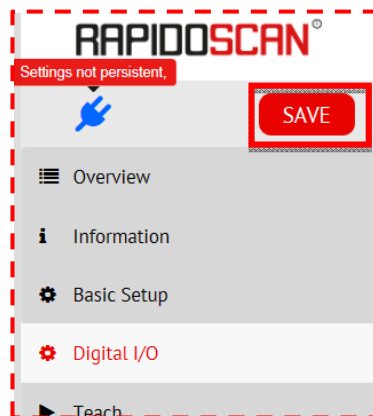


Fig.: 5.5

After doing so the blue connector symbol turns back to green and the warning disappears. From now on the encoder data will be read by the RapidoScan.



## 6 Accessing Encoder Data

Encoder data are handled as measuring data and can get accessed to through one of the various process data interfaces.

### 6.1 Modbus TCP

In case you are using Modbus TCP you have to navigate to the **Modbus TCP** page (Fig.: 6.1) for configuration.

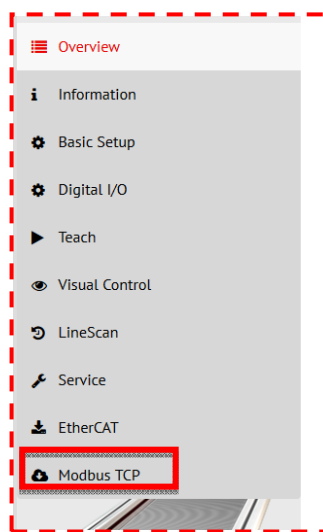


Fig.: 6.1

Set the focus on the **Modbus TCP** page. At this page you need to define the according TCP settings:

- **IP-Address of the RapidoScan:** 192.168.0.223 (default)
- **Default Gateway and** 192.168.0.1 (default)
- **Subnet Mask.** 255.255.255.0 (default)

The standard TCP **port** (Fig.: 6.2) for Modbus TCP is: **502**

Using this settings, the RapidoScan will do the Modbus Communication at: 192.168.0.223:502

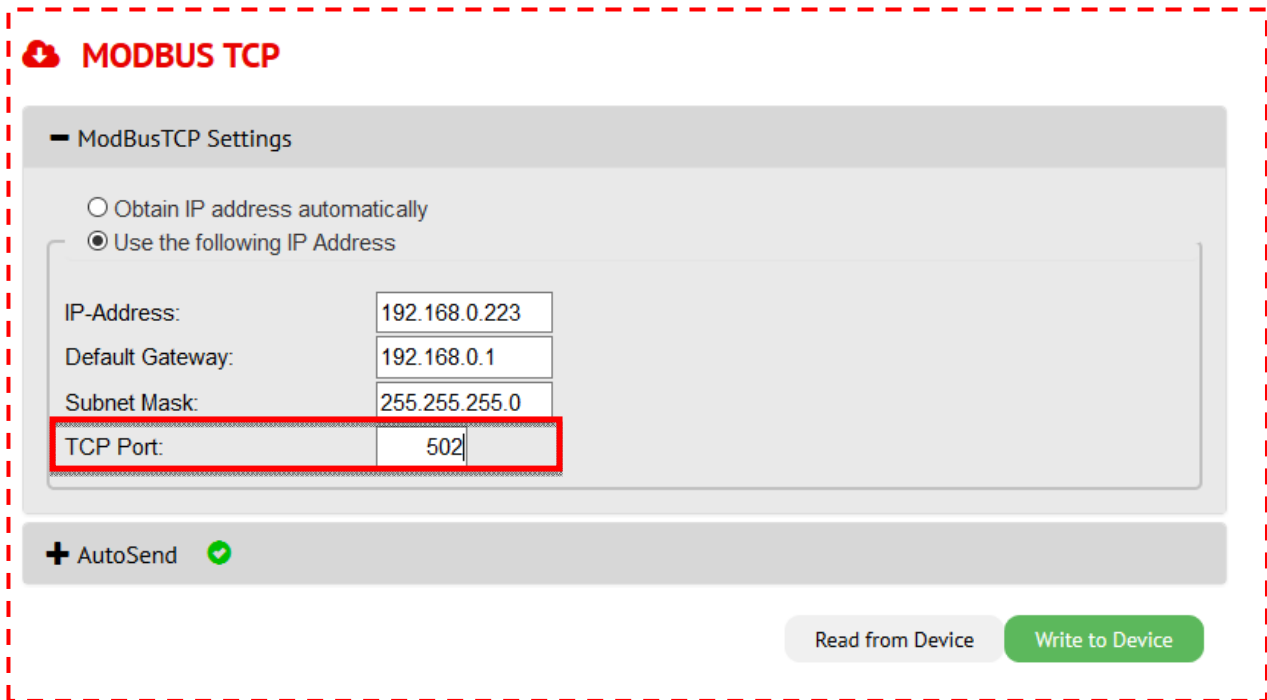


Fig.: 6.2

The input register table gives read-only access to device information, system status and measurement data (process data). The encoder has the starting address: **0x0B0F** (see table below).

For transferring the setup to the RapidoScan please press the **Write to Device** button and afterwards do not forget to make the setup persistent by pressing the **SAVE** button on the upper left corner.

**Consistent pre calculated data:**

Starting Address	Mask	Description
0x0B02 – 0x0B03	-	Counter for number of measuring cycles incremented on every cycle
0x0B04	-	First Interrupted Beam
0x0B05	-	First NOT Interrupted Beam
0x0B06	-	Last Interrupted Beam
0x0B07	-	Last NOT Interrupted Beam
0x0B08	-	Total number of Interrupted Beams
0x0B09	-	Total number of NOT Interrupted Beams
0x0B0A	-	First Interrupted Beam of Major Data Block
0x0B0B	-	Total number of Interrupted Beams of Major Data Block
0x0B0F	-	Rotary Encoder Value

For more details on the register mapping please refer to the application note “RapidoScan, Modbus TCP and Ethernet, EN.pdf”! Details about Modbus can be found at [http://www.modbus.org/docs/Modbus\\_Application\\_Protocol\\_V1\\_1b.pdf](http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b.pdf).

**6.2 Using the AutoSend Channel**

Furthermore the **“AutoSend”** functionality can be activated and configured.  
At first open the **AutoSend** folder (Fig.: 6.3).



Fig.: 6.3

Now enable **AutoSend** and choose the **Client/Server & Network Protocol** adjustment for your application (Fig.: 6.4).



Fig.: 6.4

### 6.2.1 UDP | Client setup

In case you are using the UDP protocol the RapidoScan typically acts as a Client seen from the connection buildup. So the RapidoScan must be setup to what address it has to buildup connection and what port they are using.

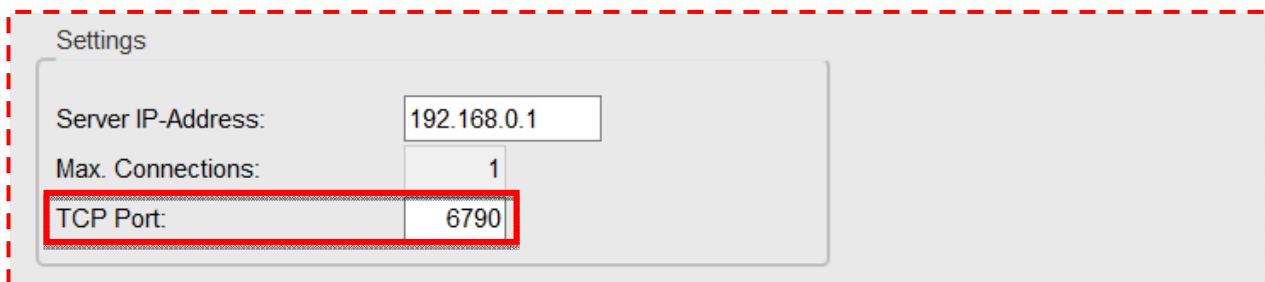


Fig.: 6.5

### 6.2.2 TCP | Server setup

In case you are using the TCP protocol the RapidoScan typically acts as a Server seen from the connection buildup. Here the RapidoScan awaits the connection buildup through a client. The number of parallel allowed connections is actually limited to 1.

### 6.2.3 Encoder Data setup

To add the encoder value to the AutoSend data you have to add that object to the mapping list. Therefore move the ENCODER object form the left sided selection list box to the right sided mapping list box:

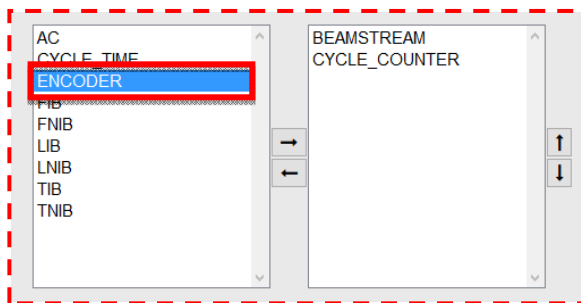


Fig.: 6.6

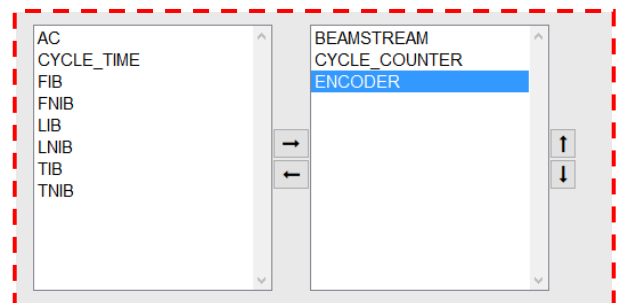


Fig.: 6.7

With the **Up** and **Down** buttons (Fig.: 6.8) the order of the different objects can be rearranged.

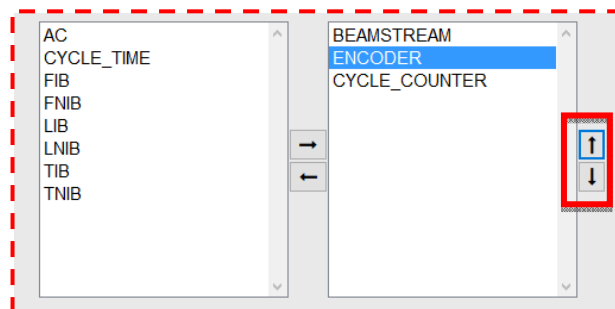


Fig.: 6.8

Again do not forget to press the **Write to Device** button for transferring the configuration to the scanner. For permanent storing/making persistent the setup press the **SAVE** button at the upper left corner (Fig.: 5.5).

### 6.3 EtherCAT

The encoder is also available for **EtherCAT**. Therefore navigate to the **EtherCAT** page (Fig.: 6.9) and download the EtherCAT Device Description by using the link at this page (Fig.: 6.10).

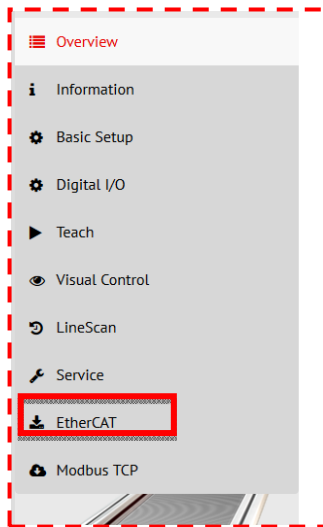


Fig.: 6.9



Fig.: 6.10