

IndraMotion MLC 14VRS

RegisterControl

Application Description
R911341507

Edition 05



PY-MSS01.1-T1
PY-MSS01.1-O1
PY-MSS01.2-O1/000,0
PY-MSS01.3-O1

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Table of Contents

	Page
1 About this documentation.....	5
1.1 Validity of the documentation.....	5
1.2 Documentation structure.....	6
1.3 Required and supplementing documentation XLC/MLC.....	6
1.4 Terms and abbreviations.....	12
1.5 Customer feedback.....	13
2 Intended use.....	15
2.1 General information.....	15
2.2 Explosion Protection.....	16
2.2.1 General information.....	16
2.2.2 Safety instructions/special conditions.....	16
3 Using safety instructions.....	19
3.1 Structure of the safety instructions.....	19
3.2 Explaining signal words and safety alert symbol.....	19
3.3 Symbols used.....	20
3.4 Explaining the signal alert symbol on the device.....	20
4 Introduction.....	21
4.1 General information.....	21
4.2 Licensing and available variants.....	21
4.3 Brief description.....	23
4.4 System overview.....	23
5 Drive parameterization.....	25
5.1 Parameterization of the incremental encoder emulation.....	25
5.2 Checking the correct incremental encoder parameterization.....	25
6 Technical information on the mark stream sensor PY-MSS01.1-T1.....	27
6.1 General information.....	27
6.2 Product identification and scope of delivery.....	27
6.2.1 Product identification.....	27
6.2.2 Scope of delivery.....	27
6.3 Spare parts and accessories.....	27
6.3.1 Spare parts.....	27
6.3.2 Accessories.....	28
6.4 Ambient conditions.....	29
6.5 Technical data.....	29
6.5.1 General data.....	29
6.5.2 Voltage supply.....	30
6.5.3 Degree of protection and weight.....	30

Table of Contents

	Page
6.6 Standards.....	31
6.6.1 Standards used.....	31
6.6.2 Declaration of conformity.....	32
6.7 Interfaces.....	34
6.7.1 Connector panel.....	34
6.7.2 24 V DC power supply X1S power.....	35
6.7.3 Ethernet interface X7E ETH.....	36
6.7.4 Incremental encoder interface X8T TTL.....	37
6.7.5 Optical fiber interfaces X801 TX and X802 RX.....	38
6.8 Mounting, demounting and electric installation.....	39
6.8.1 Housing dimensions.....	39
6.8.2 Mounting the evaluation electronic of mark stream sensor.....	39
6.8.3 Mounting the sensor optics of mark stream sensor.....	41
6.8.4 Demounting.....	51
6.8.5 Electric installation.....	52
6.9 Commissioning.....	54
6.10 Device description.....	54
6.10.1 General information.....	54
6.10.2 Operating and display components.....	55
6.11 Troubleshooting and debugging.....	57
6.12 Maintenance and repair.....	57
7 Firmware update.....	59
7.1 General information.....	59
7.2 Firmware update tool description.....	59
7.3 Updating the firmware.....	59
7.4 Configuring the IP address.....	62
7.5 Sensor reset.....	64
8 Commissioning the HMI interface.....	67
8.1 General information.....	67
8.2 WinStudio licensing.....	68
8.2.1 Introduction.....	68
8.2.2 Overview on WinStudio licenses.....	68
8.2.3 Activating a WinStudio license.....	68
8.2.4 Consequences of a missing or a lower-class license.....	69
8.3 Preconditions to use the central visualization for the register control.....	69
8.4 IndraControl VPP, IndraControl VPB/IndraControl VDP.....	70
8.4.1 WinStudio settings to be selected.....	70
8.4.2 Installing additional files.....	71
8.4.3 Registering ActiveX controls.....	71
8.4.4 Starting runtime.....	72
8.5 IndraControl VEP with Windows Embedded Standard 7 operating system.....	72
8.5.1 WinStudio settings to be selected.....	72
8.5.2 Installing additional files.....	73

Table of Contents

	Page
8.5.3	Registering ActiveX controls..... 74
8.5.4	Transmitting the application..... 74
8.5.5	Starting the remote agent..... 75
9	HMI application scenarios..... 77
9.1	General information..... 77
9.2	Overview of all HMI processes..... 77
9.3	Service..... 78
9.4	Production..... 79
9.5	Job configuration..... 80
9.6	Diagnostics..... 81
10	HMI dialog and element description..... 83
10.1	General information..... 83
10.2	Navigation structure..... 83
10.3	Dialog structure..... 84
10.3.1	Header..... 84
10.3.2	Navigation area..... 85
10.3.3	Arrow wizard and switching panel of the printing unit..... 86
10.3.4	Sidebar..... 87
10.3.5	Content area..... 87
10.4	Machine configuration for narrow web applications..... 88
10.4.1	Brief description..... 88
10.4.2	Machine configuration dialog..... 89
10.4.3	Machine configuration dialog (communication settings of the sensors)..... 95
10.5	Machine configuration for applications with terminals (e.g. gravure printing) 98
10.5.1	Brief description..... 98
10.5.2	Machine configuration dialog..... 98
10.5.3	Machine configuration dialog (communication settings of the sensors)..... 104
10.6	Job configuration for narrow web applications..... 107
10.6.1	Brief description..... 107
10.6.2	Job management..... 107
10.6.3	Preset settings - Length..... 125
10.6.4	Preset side..... 127
10.7	Job configuration for applications with terminals (e.g. gravure printing)..... 128
10.7.1	Brief description..... 128
10.7.2	Job management..... 128
10.7.3	Preset settings - Length..... 156
10.7.4	Preset side..... 158
10.7.5	Preset format..... 159
10.7.6	Optional functions..... 161
10.8	Production..... 161
10.8.1	Brief description..... 161
10.8.2	Register Overview..... 161
10.8.3	Trend overview..... 168

Table of Contents

	Page
10.8.4 Register Single View.....	170
10.8.5 Histogram.....	176
10.9 Diagnostics.....	177
10.9.1 Brief description.....	177
10.9.2 Diagnostics overview.....	177
10.9.3 Oscilloscope.....	180
10.9.4 Logbook.....	183
10.10 Service.....	184
10.10.1 Machine configuration.....	184
10.10.2 Advanced settings.....	184
10.10.3 Language.....	186
10.10.4 User management.....	187
10.11 Auxiliary functions.....	188
10.11.1 Auxiliary function "2 sensors behind a printing unit".....	188
10.11.2 Auxiliary function "turning bar".....	190
10.11.3 Additional function "Acceleration compensation".....	194
10.11.4 Additionally "Automatic pre-registration" (APR).....	198
10.11.5 Additional function "Freely selectable reference unit".....	204
11 Decentral HMI dialog of the decentral register control.....	211
11.1 General information.....	211
11.2 Importing the dialog of the decentral register control.....	211
11.3 Operating the dialog of the decentral register control.....	215
12 Troubleshooting.....	219
12.1 General information.....	219
12.2 Approach in case of error.....	219
12.3 Error numbers and troubleshooting.....	221
12.4 Problems with the 360° display.....	231
12.5 Backing up data for the remote diagnostics.....	232
12.5.1 General information.....	232
12.5.2 Backing up the oscilloscope data.....	232
12.5.3 Backing up the current job.....	233
13 Service and support.....	235
Index.....	237

1 About this documentation

Editions of this documentation

Edition	Release Date	Note
01	2015-01	First edition for 14VRS
02	2016-10	New: Additional function "Freely selectable reference unit"
03	2017-05	Porting the central register controller HMI to 1366x768 pixels (VEP15.6/R0015/DR0018/VR3115)
04	2018-01	Porting the central register controller HMI to 1920x1080 pixels (DR0021 / VRxx21)
05	2019-01	- Technical data of the mark stream sensor PY-MSS01.1-T1 changed and supplemented - Chapter "Describing the HMI dialogs and HMI elements"

Tab. 1-1: Change Record

1.1 Validity of the documentation

Overview on target groups and product phases

In the following illustration, the framed activities, product phases and target groups refer to the present documentation.

Example: In the product phase "Mounting (assembly/installation)", the "mechanic/electrician" can execute the activity "unpack, mount and install" using this documentation.

This documentation is intended for users wanting to use the integrated register control.

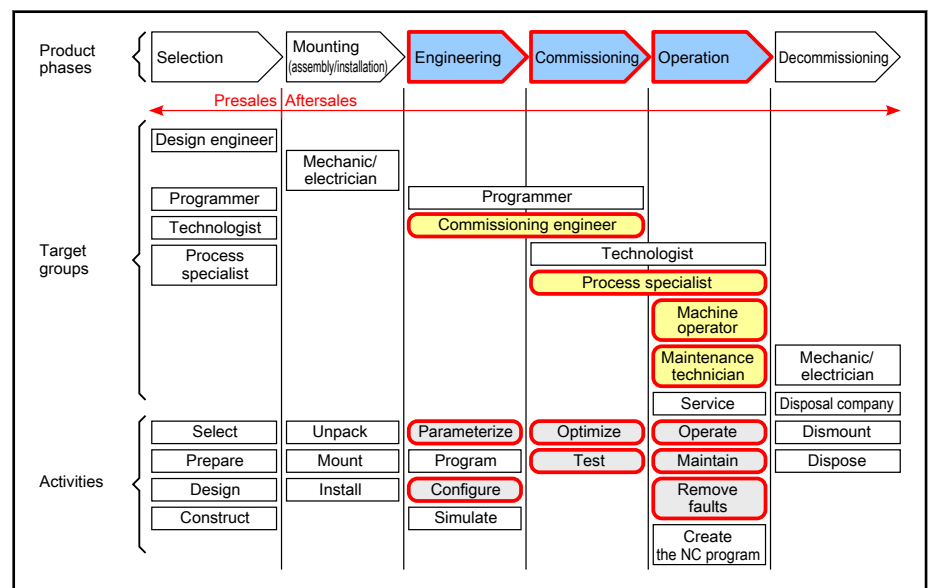


Fig. 1-1: Assigning the present documentation to the target groups, product phases and activities of the target group

Purpose

This documentation describes the application of the integrated register control for a rotogravure printing machine. The components of the mark stream sensor, the HMI application and the error recovery options are described. This application manual provides information on how to operate the register control, react to errors and query diagnostics.

About this documentation

1.2 Documentation structure

The first part of the document contains important instructions for use for the safety instructions used in the document ([chapter 2 "Intended use" on page 15](#) and [chapter 3 "Using safety instructions" on page 19](#)).

The [chapter 4 "Introduction" on page 21](#) contains an introduction to the PY-MSS01.1-T1 mark stream sensor.

The [chapter 5 "Drive parameterization" on page 25](#) describes the drive parameterization.

The [chapter 6 "Technical information on the mark stream sensor PY-MSS01.1-T1" on page 27](#) describes the mark stream sensor system commissioning.

The [chapter 7 "Firmware update" on page 59](#) describes the firmware update procedure.

The [chapter 8 "Commissioning the HMI interface" on page 67](#) contains information about HMI interface commissioning.

The [chapter 9 "HMI application scenarios" on page 77](#) describes the HMI use cases.

The elements and functionalities of the current HMI dialogs are explained in [chapter 10 "HMI dialog and element description" on page 83](#).

The [chapter 11 "Decentral HMI dialog of the decentral register control" on page 211](#) describes dialogs for remote register control.

The [chapter 12 "Troubleshooting" on page 219](#) contains information about how to handle errors.

For information on the customer service helpdesk, refer to [chapter 13 "Service and support" on page 235](#).

1.3 Required and supplementing documentation XLC/MLC

Documentation titles with type codes and part numbers

System overview
IndraLogic XLC IndraMotion MLC 14VRS System Overview
DOK-XLCMLC-SYSTEM**V14-PRRS-EN-P, R911341504
This documentation provides an overview on the possible hardware/software components of the automation systems IndraLogic XLC and IndraMotion MLC of the mentioned version. The documentation facilitates assembling a system.

Tab. 1-2: XCL/MLC documentation overview - System overview

First steps
IndraMotion MLC 14VRS First Steps DOK-MLC***-F*STEP**V14-CORS-EN-P, R911341517 This documentation describes the first steps of the IndraMotion MLC and the RobotControl. It includes the hardware and software prerequisites as well as the creation of a project.
IndraLogic XLC 14VRS First Steps DOK-XLC***-F*STEP**V14-CORS-EN-P, R911341489 This documentation describes the first steps of the IndraLogic XLC. It includes the hardware and software prerequisites as well as the creation of a project.
Rexroth IndraLogic XLC IndraMotion MLC 14VRS Project Conversion DOK-XLCMLC-PROCONV*V14-APRS-EN-P, R911341494 This documentation describes the project conversion of the IndraMotion MLC.

Tab. 1-3: XCL/MLC documentation overview - First steps

Engineering
IndraWorks 14VRS Software Installation DOK-IWORKS-SOFTINS*V14-CORS-EN-P, R911344286 This documentation describes the IndraWorks installation.
IndraWorks 14VRS Engineering DOK-IWORKS-ENGINEE*V14-APRS-EN-P, R911343566 This documentation describes the application of IndraWorks in which the Rexroth Engineering tools are integrated. It includes instructions on how to work with IndraWorks and how to operate the oscilloscope function.
IndraLogic XLC IndraMotion MLC 14VRS Function Description DOK-XLCMLC-FUNC****V14-APRS-EN-P, R911341700 This documentation describes wizards, context menus, dialogs, control commissioning, device configuration and functionalities of the IndraMotion MLC.

Tab. 1-4: XCL/MLC documentation overview - Engineering

Diagnostics and service
IndraLogic XLC IndraMotion MLC 14VRS Diagnostics DOK-XLCMLC-DIAG****V14-RERS-EN-P, R911341481 This documentation includes all control diagnostics implemented in the control systems IndraLogic XLC and IndraMotion MLC.
IndraLogic XLC IndraMotion MLC 14VRS Parameters DOK-XLCMLC-PARAM***V14-RERS-EN-P, R911341479 This documentation describes the parameters of the XLC/MLC systems as well as the interaction between parameterization and programming. It includes the axis parameters, control parameters, kinematic parameters, touch probe parameters and programmable limit switch parameters.
IndraLogic XLC IndraMotion MLC 14VRS Commissioning DOK-XLCMLC-STARTUP*V14-CORS-EN-P, R911341502 This documentation describes the steps to commission and service the IndraMotion MLC and IndraLogic XLC systems. It includes checklists for frequent tasks and a detailed description of the steps.

About this documentation

Diagnostics and service
WebAssistant DOK-GENERL-WEB*ASSIST*-APRS-EN-P, R911381469 This documentation describes the WebAssistant. The WebAssistant is a webbased diagnostic tool used to access a control system via an Ethernet highspeed connection. The WebAssistant allows OEMs, end users and service engineers to access and to remotely diagnose a system. A PC with Internet Explorer version 11 or higher, Firefox version 45 or above or Google Chrome version 54 or above is required. The following control variants are supported: • IndraMotion MLC L45/L65/L75/XM21/XM22/XM42/VPx • IndraLogic XLC L45/L65/L75/VEP
IndraWorks IndraMotion Service Tool DOK-IWORKS-IMST*****-APRS-EN-P, R911341383 This documentation describes the IndraMotion Service Tool (IMST). IMST is a web-based diagnostic tool used to access a control system via an Ethernet high-speed connection. The IMST allows OEMs, end users and service engineers to access and remotely diagnose a system. The PC has to use at least Internet Explorer 8, Firefox 3.5 or a higher version. The following control variants are supported: • IndraMotion MLC L45/L65/L75/XM21/XM22/XM42/VPx • IndraLogic XLC L45/L65/L75

Tab. 1-5: XLC/MLC documentation overview - Diagnostics and service

Firmware
Rexroth IndraDrive MPx-20, Functions ¹⁾ DOK-INDRV*-MP*-20VRS**-AP01-EN-P, R911345608 This documentation describes all functional properties of the IndraDrive firmware in the variants MPB-20, MPM-20, MPC-20 and MPE-20.
Rexroth IndraDrive MPx-16 to MPx-20 und PSB, Parameters DOK-INDRV*-GEN1-PARA**-RERS-EN-P, R911328651 This documentation contains the descriptions of all parameters implemented in the firmware for drive controllers of the IndraDrive range. It supports the drive controller parameterization.
Rexroth IndraDrive MPx-16 to MPx-20 and PSB, Diagnostic Messages DOK-INDRV*-GEN1-DIAG**-RERS-EN-P, R911326738 This documentation contains the descriptions of all diagnostic messages implemented in the following firmware products: • Drive controller firmware variants MPx-16 to MPx-20 • PSB firmware variants for "HMU05" and "KMV03" type supply units • Firmware variants for "HMV01" type supply units It assists machine operators and installation programmers with troubleshooting.
Hardware
Rexroth IndraDrive Control Sections CSB02, CSE02, CSH02, CDB02 DOK-INDRV*-Cxx02*****-PRRS-EN-P, R911338962
Rexroth IndraDrive Cs Drive Systems with HCS01 DOK-INDRV*-HCS01*****-PRRS-EN-P, R911322210

About this documentation

Rexroth IndraDrive Mi Drive Systems with KCU02, KSM02, KMS02/03, KMV03 DOK-INDRV*-KCU02+KSM02-PRxx-EN-P, R911335703
Rexroth IndraDrive ML Drive Systems with HMU05 DOK-INDRV*-Hxx05*****-PRxx-EN-P, R911344279

1) In preparation
Tab. 1-6: Overview of documentations for drive controllers

PLC
IndraWorks 14VRS PLC Programming System IndraLogic 2G DOK-IWORKS-IL2GPRO*V14-APRS-EN-P, R911343571 This documentation describes the PLC programming tool IndraLogic 2G and its usage. It includes the basic use, first steps, visualization, menu items and editors.
IndraWorks 14VRS Basic Libraries IndraLogic 2G DOK-IL*2G*-BASLIB**V14-LIRS-EN-P, R911343920 This documentation describes the system-comprehensive PLC libraries.
IndraLogic XLC IndraMotion MLC 14VRS PLCopen Libraries DOK-XLCMLC-FUNLIB**V14-LIRS-EN-P, R911341491 This documentation describes the function blocks, functions and data types of the RIL_CommonTypes, ML_Base and ML_PLCOpen libraries for the IndraLogic XLC/IndraMotion MLC. It also includes the error reactions of function blocks.

Tab. 1-7: XCL/MLC documentation overview - PLC

Field buses
IndraWorks 14VRS Field Buses DOK-IWORKS-FB*****V14-APRS-EN-P, R911341485 This documentation describes the field bus and local periphery connections supported by the IndraLogic XLC, IndraMotion MLC and IndraMotion MTX systems. The focus of this documentation is on the configuration, parameterization, commissioning and the diagnostics of the different periphery connections. This documentation is the basis for the online help.
IndraWorks 14VRS Field Buses Libraries DOK-IWORKS-FB*LIB**V14-LIRS-EN-P, R911343575 This documentation describes the field bus libraries: RIL_ProfibusDP_02, RIL_ProfibusDP Slave, RIL_ProfinetIO, RIL_ProfinetIODevice, RIL_EtherNetIPAdapter, RIL_MappingList, RIL_SERCOSIII, RIL_Inline including their diagnostics and error reactions of the function blocks.
Rexroth IndraWorks 12VRS FDT Container DOK-IWORKS-FDT*CON*V12-APRS-EN-P, R911334398 This documentation describes the IndraWorks FDT Container functionality. It includes the activation of the functionality in the project and working with DTMs.
Sercos System Manual for I/O Devices DOK-CONTRL-ILS3*****-APxx-EN-P, R911333512 This documentation describes the configuration, parameterization, commissioning and diagnostics of I/O devices with a Sercos interface.

xx Corresponding edition
Tab. 1-8: XCL/MLC documentation overview - Field buses

About this documentation

HMI
IndraWorks 14VRS HMI DOK-IWORKS-HMI*****V14-APRS-EN-P, R911343569 This documentation describes the functions, configuration and operation of the user interfaces IndraWorks HMI Engineering and IndraWorks HMI Operation.
IndraWorks 14VRS WinStudio 7.4 DOK-IWORKS-WINSTUD*V14-APRS-EN-P, R911341585 This "User Manual and Technical Reference Book" facilitates working with the "Rexroth WinStudio" software for optimal results. This document provides technical information and step-by-step instructions to create web-enabled HMI/SCADA programs.
Rexroth IndraLogic XLC IndraMotion MLC 14VRS HMI Connection DOK-XLCMLC-HMI*****V14-APRS-EN-P, R911341497 This documentation describes the visualization systems supported by the IndraLogic XLC and IndraMotion MLC and their connection.

Tab. 1-9: XCL/MLC documentation overview - HMI

Technology
IndraLogic XLC IndraMotion MLC 14VRS Generic Application Template DOK-XLCMLC-TF*GAT**V14-APRS-EN-P, R911341487 This documentation provides a structured template to the IndraLogic PLC programmer. This template can be used to add and edit the PLC programming code. It includes the template, the template wizard and example applications.
IndraMotion MLC 14VRS Technology Libraries DOK-MLC***-TF*LIB**V14-LIRS-EN-P, R911341511 This documentation describes the function blocks, functions and data types of the "ML_TechInterface.library", "ML_TechMotion.library", "RMB_TechCam.library" and "ML_TechBase.library". It also includes libraries for the winder functionality, register controller functionality and CrossCutter functionality.
IndraWorks 14VRS Energy Efficiency Management DOK-IWORKS-4EE*****V14-APRS-EN-P, R911339229 This documentation describes the HMI connection of the energy management system and the function blocks, functions and data types of the "RIL_4EE " library. The documentation also includes the error reactions of the function blocks.
Rexroth IndraMotion MLC 14VRS RegisterControl (Library) DOK-MLC***-REGI*CO*V14-LIRS-EN-P, R911341509 This documentation describes the inputs and outputs of the individual function blocks and provides notes on their use.
IndraMotion MLC 14VRS RegisterControl (Application Description) DOK-MLC***-REGI*CO*V14-APRS-EN-P, R911341507 This documentation describes the application of the integrated register control for a rotogravure printing machine. The components of the mark stream sensor, the HMI application and the error recovery options are described. This instruction provides information on how to operate the register control, react to errors and query diagnostics. This documentation is written for machine setters and machine operators.
Rexroth IndraMotion MLC 14VRS Winder Function Application DOK-MLC***-TF*WIND*V14-APRS-EN-P, R911341513 This application-related system documentation describes the application of the winder technology functions.

Technology
Rexroth IndraWorks CamBuilder 13VRS DOK-IWORKS-CAMBUIL*V13-APRS-EN-P, R911336291 This documentation describes the basic principles and operation of the CamBuilder, the cam editing tool.
IndraMotion MLC 14VRS Robot Control V2 DOK-MLC***-ROCO****V14-RERS-EN-P, R911341588 This documentation provides information about the Robot Control V2. The focus is on PLCopen programming. The program structure, variables, functions, motion statements and the required system parameters are described. This documentation also includes the description of the "ML_Robot" library. Robot Control V2 is supported by a kinematic interface. The components of this interface are described in the "ML_KinTech" library.

Tab. 1-10: XCL/MLC documentation overview - Technology

Open Core Engineering - OCE
IndraLogic XLC IndraMotion MLC 14VRS First Steps MLPI (online help) DOK-XLCMLC-MLPI****V14-CORS-EN-E, R911341033 This document describes the installation and the commissioning of the MLPI interface.
IndraLogic XLC IndraMotion MLC 14VRS Automation Interface (online help) DOK-XLCMLC-AUT*INT*V14-APRS-EN-E, R911341499 This documentation describes the script-based access to IndraWorks project data via the interface of the Automation Interface.

Tab. 1-11: XCL/MLC documentation overview - Open Core Engineering - OCE

SafeLogic
IndraWorks SafeLogic 14VRS First Steps DOK-IWORKS-SL*STEP*V14-CORS-EN-P, R911341520 This documentation describes the initial commissioning of the Safety function module and its external Safety periphery. Taking the example of a project, all required steps to commission a simple Safety application are executed.
IndraLogic XLC IndraMotion MLC 14VRS SafeLogic System Overview DOK-XLCMLC-SL**SYS*V14-PRRS-EN-P, R911341696 This documentation describes the project planning, configuration, creation and commissioning of safety-related devices.
IndraWorks 14VRS SafeLogic - Project Configuration, Version 1.2.0.0. DOK-IWORKS-SL**PRJ*V14-APRS-EN-P, R911341694 This documentation describes the configuration of Safety applications.
IndraControl CFL01.1-F1 Safety Function Module DOK-CONTRL-SL**FM*****-ITRS-EN-P, R911336576 This documentation is provided with the hardware and describes the commissioning, the installation, the decommissioning and disposal of the hardware.

Tab. 1-12: XCL/MLC documentation overview - SafeLogic

Hardware
Rexroth IndraControl L45/L65/L85 Control DOK-CONTRL-ICL45L65L85-PRxx-EN-P, R911332116 This documentation describes the IndraControl L45/L65/L85 controls.
Rexroth IndraControl Lxx 14VRS Function Modules DOK-CONTRL-FM*LXX**V14-APRS-EN-P, R911341583 This documentation describes all function modules of the Lxx controls including engineering and diagnostics.

About this documentation

Hardware
IndraControl XM21, XM22 Controls DOK-CTRL-IC*XM2****-ITRS-EN-P, R911340667 This documentation describes the IndraControl XM21/XM22 controls.
IndraControl XM42 Controls DOK-CTRL-XM4X*CTRL**-ITRS-EN-P, R911345566 This documentation describes the IndraControl XM42 controls.
IndraControl XFE 01.1 Extension Modules Profibus, RT-Ethernet, Sercos, CAN DOK-CTRL-XFE**EXTMOD-ITRS-EN-P, R911345570 This documentation describes all extension modules of the XM controls.

xx Corresponding edition
Tab. 1-13: XCL/MLC documentation overview - Hardware

Hydraulics
Rexroth IndraMotion MLC 14VRS Hydraulic Functions DOK-MLC***-TF*HMOT*V14-LIRS-EN-P, R911341907 This documentation describes the function blocks, functions and data types of the MH_TechHydrBase and MH_TechHydrMotion libraries. The documentation also includes the error reactions of the function blocks.
Rexroth IndraLogic XLC IndraMotion MLC 14VRS Sequential Programming DOK-XLCMLC-SEQPROG*V14-LIRS-EN-P, R911341909 This documentation describes the sequential programming options, also when using GAT, and the MH_HydrControlProg library.

Tab. 1-14: XCL/MLC documentation overview - Hydraulics

1.4 Terms and abbreviations

Term	Explanation
Barcode	Sequence of at least 3 blocks that can be found automatically by the sensor
Ethernet	Communication interface
OWG	Optical waveguide
Mark stream sensor	Evaluation unit, sampling a mark stream and measuring the mark positions
Measurement	Mark positions of the defined marks are determined and send to the control
OEM	Original Equipment Manufacturer
Runtime license	A check for the license is carried out at runtime. For each control, on which the function blocks are used, one license is required (runtime license)
S-curve	Jerk-limited acceleration phase
Sercos	Field bus

About this documentation

Term	Explanation
Teach-In	Process during which the mark stream sensor measures the threshold values for the mark measurement
CSV	The CSV file format stands for "Comma-separated values" and describes the text file structure to save or exchange simple, structured data

Tab. 1-15: Terms and abbreviations

1.5 Customer feedback

Customer requests, comments or suggestions for improvement are of great importance to us. Please email your feedback on the documentations to Feedback.Documentation@boschrexroth.de. Directly insert comments in the electronic PDF document and send the PDF file to Bosch Rexroth.

2 Intended use

2.1 General information

The PY-MSS01.1-T1 mark stream sensor is intended for use together with a drive system and the corresponding software of the Bosch Rexroth company. The PY-MSS01.1-T1 mark stream sensor was checked by an external technical inspection authority (German TÜV SÜD Product Service GmbH). The conformity of the PY-MSS01.1-T1 mark stream sensor was confirmed with a test report and an official test number.



Only commission the product after you have thoroughly read, understood and complied with the documents and safety instructions provided with the product.

If no documents are available in your national language, please contact your Bosch Rexroth distribution partner.

The PY-MSS01.1-T1 mark stream sensor can only be commissioned in explosive environment if

- all following information about the commissioning and the application notes of the application description have been understood and have been implemented
- the entire system consisting of mark stream sensor, optic sensor, cable and accessories was checked, approved and documented according to the relevant standard requirements



- Comply with the specific standards and directives of your country when mounting, installing and using the PY-MSS01.1-T1 mark stream sensor
- The following national/international statutory provisions apply to installation and use as well as commissioning and periodic technical inspections of the PY-MSS01.1-T1 mark stream sensor:
 - Low Voltage Directive 2014/35/EC
 - Machinery Directive 2006/42/EC
 - EMC Directive 2014/30/EU
 - Work Equipment Directive 2009/104/EC
 - Accident prevention regulations/safety rules

Only skilled personnel can execute the tests.

This application description does not contain a guide for operating the machine, the PY-MSS01.1-T1 is or will be integrated in. The operating instructions of the machine contains detailed information.

NOTICE

Only use the PY-MSS01.1-T1 mark stream sensor in an industrial environment!

The PY-MSS01.1-T1 mark stream sensor meets the conditions of class A (industrial applications) according to the "emission" standard. Thus, the PY-MSS01.1-T1 mark stream sensor is only intended for use in an industrial environment.

Intended use

2.2 Explosion Protection

2.2.1 General information

DANGER

Danger to life, danger of explosion or considerable material damage!

All components and accessories used have to comply with the requirements for explosion protection according to the directive 94/9EC.

The application conditions mentioned in this documentation always have to be complied with during project planning, configuration and operation.

The evaluation electronic PY-MSS01.1-T1 contains a power-limited white light source of type PR0138.

Explosion protection ID:

- Evaluation electronic PY-MSS01.1-T1:  II (2)G [Ex op is Gb] IIB X
- Sensor optics PY-MSS01.1-O1:  II 2G Ex op is IIB T4 Gb X
- Sensor optics PY-MSS01.2-O1/000,0:  II 2G Ex op is IIB T4 Gb X
- Sensor optics PY-MSS01.3-O1:  II 2G Ex op is IIB T4 Gb X

2.2.2 Safety instructions/special conditions

Information on the test number

The EC type examination certificate number for the mark stream sensor system specified in the declaration of conformity and the type plate is labeled with an "X" at the end. This ID refers to the special conditions that have to be complied with in connection with the underlying standards of the specified safety and health requirements. The following special conditions have to be complied with for a safe operation of the mark stream sensors in the system.

White light source of type PR0138:  II (2)G [Ex op is Gb] IIB X

WARNING

The white light source/evaluation circuit must not be installed in an explosive environment.

The explosion protection can only be ensured in a combination of white light source PR0138 or evaluation circuit PY-MSS01.1-T1 and the optics PY-MSS01.1-O1, PY-MSS01.2-O1/000,0 or PY-MSS01.3-O1.



Only optical fibers provided by Bosch Rexroth upon delivery are to be used.

WARNING

The explosion protection can be compromised by interchanging the two optical fibers.

The two optical fibers must not be interchanged when connecting the optical fibers to the evaluation electronic. Thus, note the colored labeling (red, blue).

Exception: When using the sensor options PY-MSS01.3-O1, the two connections at the divided end of the optical fiber can be connected to the sensor electronics.

Intended use

NOTICE

Do not open the housing.

The white light source PR0138/evaluation circuit PY-MSS01.1-T1 as well as the sensor optics PY-MSS01.1-O1, PY-MSS01.2-O1/000,0 and PY-MSS01.2-O1 must only be opened by the manufacturer.

⚠ WARNING

Create potential equalization.

When using the sensor optics PY-MSS01.2-O1/000,0 or PY-MSS01.3-O1, a potential equalization has to be achieved between the evaluation circuit housing and the installation area of the sensor optics (e.g. by grounding). The metallic shrink sleeve of the optical fiber must not be used for potential equalization.



The evaluation circuit may only be operated in areas with at least a degree of contamination 2 and on networks of a least overvoltage category II.

Comply with the technical connections loads (see [chapter 6.5 "Technical data" on page 29](#)) and the ambient conditions (see [chapter 6.4 "Ambient conditions" on page 29](#)).

Sensor optics PY-MSS01.1-O1:  II 2G Ex op is IIB T4 Gb X

Sensor optics PY-MSS01.2-O1/000,0:  II 2G Ex op is IIB T4 Gb X

Sensor optics PY-MSS01.3-O1:  II 2G Ex op is IIB T4 Gb X



The sensor optics may only be operated with the evaluation electronic PY-MSS01.1-T1 or with the power-limited white light source PR0138.

Potential equalization

⚠ WARNING

Create potential equalization.

The system/sensors has/have to be integrated into the local potential equalization. All conductive parts have to be grounded or connected to conductive parts. The bleeder resistor has to be smaller than 10^6 ohm.



Appropriate measures regarding the explosion protection (e.g. intrinsically safe electric circuits) have to be complied with for monitoring systems.

3 Using safety instructions

3.1 Structure of the safety instructions

The safety instructions are structured as follows:

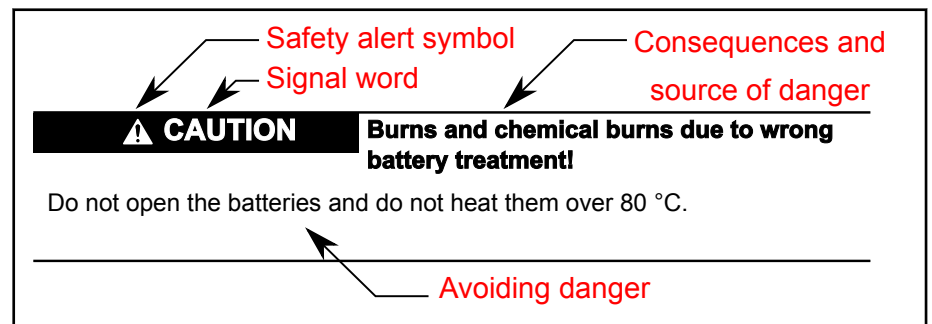


Fig. 3-1: Structure of the safety instructions

3.2 Explaining signal words and safety alert symbol

The safety instructions in this documentation contain specific signal words (danger, warning, caution, notice) and, if necessary, a safety alert symbol (according to ANSI Z535.6-2006).

The signal word draws attention to the safety instruction and indicates the risk potential.

The safety alert symbol (triangular safety reflector with exclamation marks), preceding the signal words Danger, Warning, Caution indicates hazards for persons.

⚠ DANGER

In case of non-compliance with this safety instruction, death or serious injury **will** occur.

⚠ WARNING

In case of non-compliance with this safety instruction, death or serious injury **can** occur.

⚠ CAUTION

In case of non-compliance with this safety instruction, minor or moderate injury can occur.

NOTICE

In case of non-compliance with this safety instruction, material damage can occur.

Using safety instructions

3.3 Symbols used

Pointers are displayed as follows:



This is a note.

Tips are displayed as follows:



This is a tip.

3.4 Explaining the signal alert symbol on the device



If this symbol is on your device, you have to observe the documentation on the device. The respective documentation informs on the type of hazard as well as the steps required to avoid this hazard.

4 Introduction

4.1 General information

The mark stream sensor is intended for use together with a drive system and the corresponding software of Bosch Rexroth.

The description in [chapter 6 "Technical information on the mark stream sensor PY-MSS01.1-T1" on page 27](#) is limited to the connection and the commissioning of the mark stream sensor.

The mark stream sensor system consists of the PY-MSS01.1-T1 evaluation circuit and optionally of the PY-MSS01.1-O1, PY-MSS01.2-O1/000,0 or PY-MSS01.3-O1/000,0.

Electrical as well as optical connecting leads are available as accessories. The corresponding types are listed in [chapter 6.3.2 "Accessories" on page 28](#).



This documentation does not explain the integration of the PLC program of the RegisterControl into the machine program.

4.2 Licensing and available variants



The use of the register controller function is subject to license. Depending on the application, one of the following 3 licenses used on the register control has to be acquired per control:

- FWS-IM*MLC-TEC-NNVRS-NN-REGI*EXT
- FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV1
- FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV2

For each control on which the function blocks are used, one license is required each (runtime license).

Einzellizenz Technologiebibliothek
Berechtigt zur Verwendung mit einer einzigen Steuerungsfirmware.

Single licence for technology library
Authorize the use with exactly one controller firmware.

TechLib RegisterControl Extended		
TechLib RegisterControl Extended		
Licence key (MNR): R911xxxxxx	Serial number: 1234567	Type code: FWS-IM*MLC-TEC-NNVRS-NN-REGI*EXT
Registration key WAHOF2-FBJYZF-8CSB0F-9DQO0D-9E8ZER		

Fig. 4-1: FWS-IM*MLC-TEC-NNVRS-NN-REGI*EXT license key

Introduction

Einzellizenz Technologiebibliothek
Berechtigt zur Verwendung mit einer einzigen Steuerungsfirmware.

Single licence for technology library
Authorize the use with exactly one controller firmware.

TechLib RegisterControl Advanced 1 TechLib RegisterControl Advanced 1		
Licence key (MNR): R911xxxxxx	Serial number: 1234567	Type code: FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV1
		
Registration key WAHOF2-FBJYZF-8CSB0F-9DQO0D-9E8ZER		

Fig. 4-2: FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV1 license key

Einzellizenz Technologiebibliothek
Berechtigt zur Verwendung mit einer einzigen Steuerungsfirmware.

Single licence for technology library
Authorize the use with exactly one controller firmware.

TechLib RegisterControl Advanced 2 TechLib RegisterControl Advanced 2		
Licence key (MNR): R911xxxxxx	Serial number: 1234567	Type code: FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV2
		
Registration key WAHOF2-FBJYZF-8CSB0F-9DQO0D-9E8ZER		

Fig. 4-3: FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV2 license key

The figures show the corresponding license keys. One license certificate has to be acquired per control to use the register control on this control system.

The content, the functional scope and the application area and the respective licenses are listed in the following:

FWS-IM*MLC-TEC-NNVRS-NN-REGI*EXT

- HMI for narrow web applications (up to twelve printing units, no decoupling and acceleration compensation)
- Firmware update tool
- Documentations: Application Manual and Library Description
- Libraries: RMB_TechRegiExtended and RMB_TechRegiAdvanced

FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV1

- HMI for applications with clamping units (such as gravure printing) (up to twelve printing units, with decoupling and acceleration compensation)
- Firmware update tool
- Documentations: Application Manual and Library Description
- Libraries: RMB_TechRegiExtended and RMB_TechRegiAdvanced

*FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV2*

- HMI for applications with clamping units (such as gravure printing) (up to 24 printing units, with decoupling and acceleration compensation)
- Firmware update tool
- Documentations: Application Manual and Library Description
- Libraries: RMB_TechRegiExtended and RMB_TechRegiAdvanced

Scalable solutions are available for simple narrow web applications with up to 12 printing units, for more complex applications with clamping units with up to 12 printing units and for applications with 24 printing units. In this documentation, writing is executed identically for all variants during the HMI operation and differences between the variants are listed separately.

4.3 Brief description

Controlling the printing machine, especially the rotogravure printing machine, is very challenging due to its long web distances, the dryer behind each printing unit, the following cooling roll with high inertia and the clamping units at each printing unit. Therefore, an intelligent and complex register control was designed. It can be operated via a visualization.

This document describes the commissioning of the sensors as well as of the side register controllers and length register controllers by configuring the machine and the current print job. By means of the HMI application, the machine can be configured. This means, the relevant sensors and their network settings can be assigned to the printing units. The machine configuration is generally executed only once. Furthermore, the individual print jobs are defined. Up to 300 print jobs can be created. In each print job, the active printing units are selected, the settings for the length registers and side registers are made, the control strategy and the reference color are selected and the material to be printed on is defined.

The current status is monitored via the visualization during the print job. It is possible to display trends and statistics and jog command values. The current diagnostic data can also be queried. The complete printing process can be monitored and parameterized via the HMI.

4.4 System overview

The following figure shows a 4-color rotogravure printing machine with its system components.

Introduction

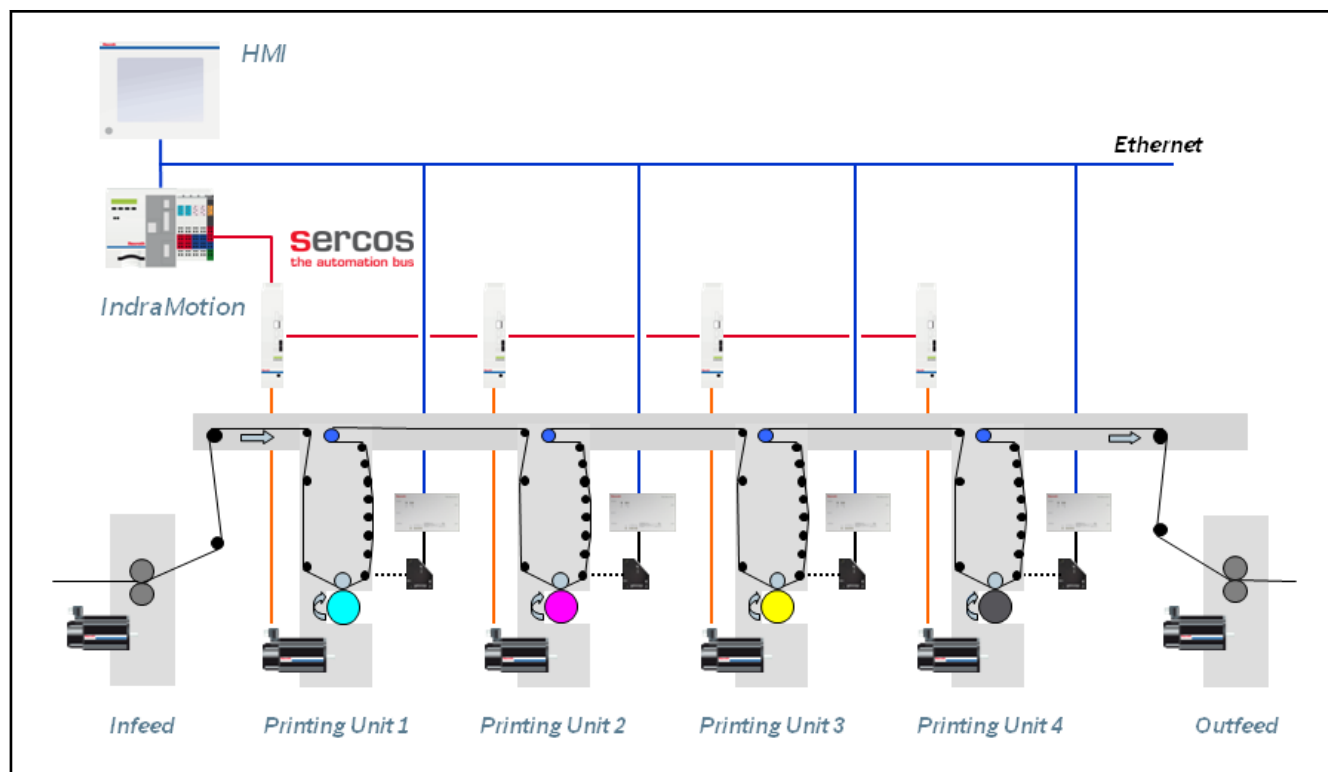


Fig. 4-4: System overview of the integrated register control

The rotogravure printing machine consists of an unwinder and an infeed, generally equipped with a tension controller or a dancer to control the web tension in the machine. At each printing unit, one color is printed on the material web, subsequently dried in the dryer and cooled via the cooling roll before the next color is printed.

Each printing unit prints a register mark on the border of the material web. This mark is measured by the mark stream sensor. For this purpose, a sensor system is located behind each printing unit. The sensor system measures the distance between the register marks. The measured values are sent to the control (IndraMotion MLC) via Ethernet. The register control is implemented on the control, calculating the respective control variables from the measured values and transferring these control variables to the respective drive system. The register control ensures that the printed image is printed.

To parameterize the register control and to monitor the actual state, a visualization (HMI) is provided. The visualization has to be a PC-based system (e.g. IndraControl VPx,...). The central visualization has to run on a visualization device with a screen resolution of at least 1280 x 1024 DPI in order to fully use the graphic representation.

5 Drive parameterization

5.1 Parameterization of the incremental encoder emulation

The mark stream sensor requires information on velocity and position of the drive system to determine the measurement results and to detect the mark stream. Therefore, the drive has to be parameterized via IndraWorks and the corresponding Control section "encoder emulation output card" of the drive system has to be available. The drive has to be selected in IndraWorks; via the axis names, the "encoder emulation" can be parameterized.

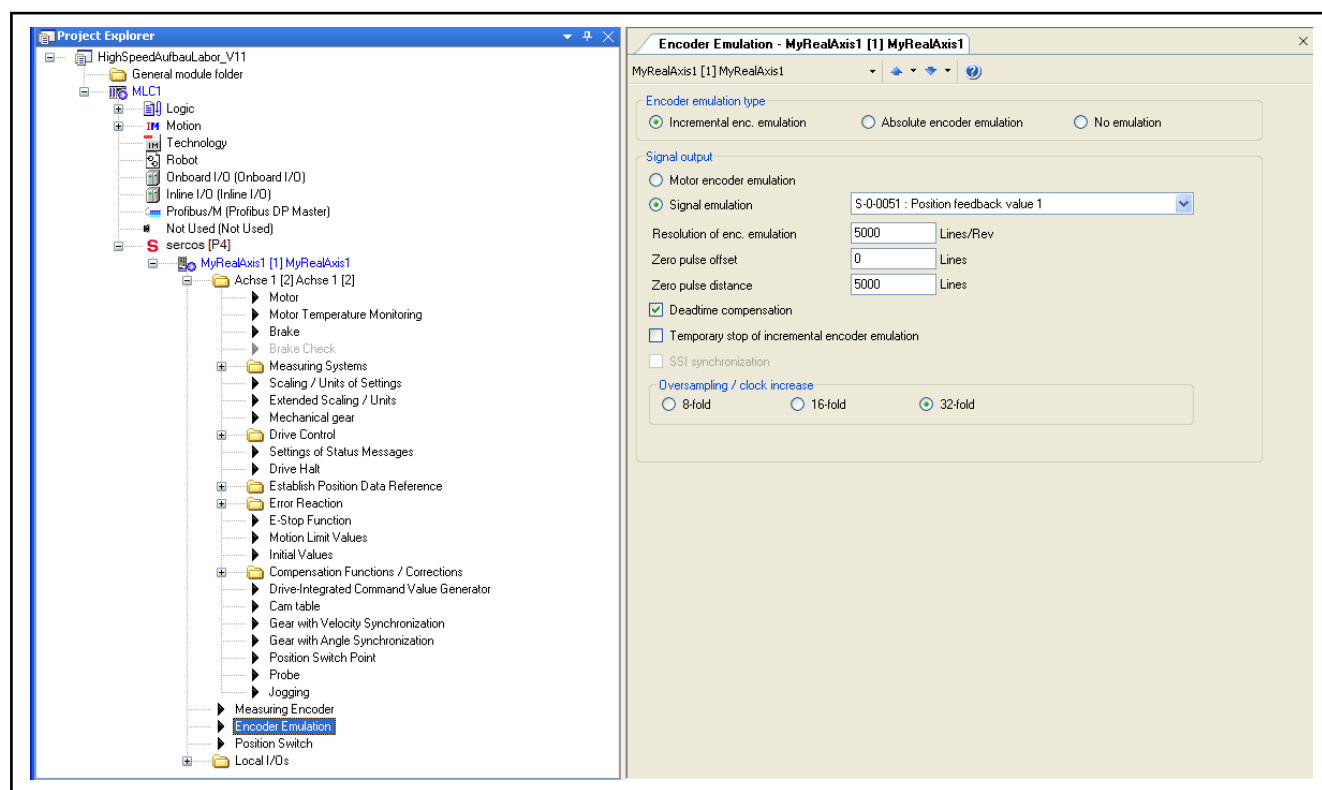


Fig. 5-1: Parameterization of the incremental encoder emulation

For the encoder emulation type, the "incremental encoder emulation" and the emulation type "Signal emulation" has to be selected. Parameter S-0-0051 of the axis to be controlled should be used as signal selection. For a high accuracy, a resolution of the encoder emulation of 5000 lines/revolution is provided. The zero pulse distance has to correspond to the number of lines set. The dead time compensation and an oversampling rate of 32 has to be set. Due to these settings, a value of 5000 increments has to be transferred in the parameterization of the mark stream sensor. The mark stream sensor expects a 4-time internal evaluation of the increments.



Check the parameterization of the drive system since incorrect parameterizations can cause invalid measured values.

5.2 Checking the correct incremental encoder parameterization

The correct parameterization can be checked via the "Diag 1" LED of the mark stream sensor. For that purpose, the axis to be controlled has to rotate. A velocity of 60 rpm is recommended. The "Diag 1" LED flashes for 20ms each time there is a zero pulse of the incremental encoder emulation. That

Drive parameterization

means that the LED flashes each second if the velocity is 60 rpm. Any other velocity can also be used. It has to be calculated for the respective interval.

If the "Diag 1" LED does not flash in the desired interval, the parameterization has to be checked. If the "Diag 1" LED does not flash, the correct cabling of the mark stream sensor with the drive system as well as the power supply has to be checked.



If the Diag1 LED does not flash, the direction of rotation of the emulated axis has to be checked as well.



The correct parameterization of the increments can be checked via the displayed velocity in the visualization and via the actual value of the parameter A-0-0102 in IndraWorks. If the velocities deviate from each other, it has to be checked whether the values for the "printing cylinder format" and "the number of increments" transferred to the mark stream sensor are correct.

6 Technical information on the mark stream sensor PY-MSS01.1-T1

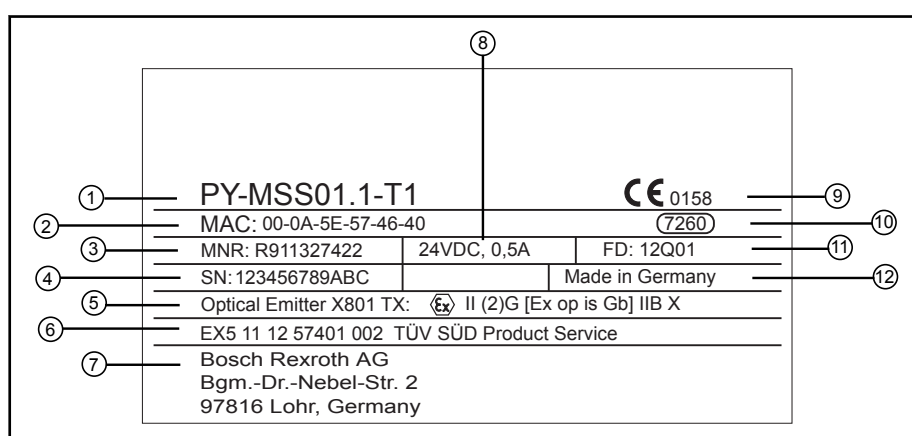
6.1 General information

This chapter describes the technical data and the handling of the mark stream sensor. Refer to this chapter for the mark stream sensor assembly and comply with the specified ambient conditions.

6.2 Product identification and scope of delivery

6.2.1 Product identification

The type plate is located on the front side of the mark stream sensor PY-MSS01.1-T1.



- | | |
|----|----------------------------------|
| 1 | Type code |
| 2 | MAC address |
| 3 | Part number |
| 4 | Serial number |
| 5 | Explosion protection test number |
| 6 | Explosion protection ID |
| 7 | Company address |
| 8 | Rated voltage/current |
| 9 | CE conformity mark |
| 10 | Sector/plant number |
| 11 | Production date |
| 12 | Name of origin |

Fig. 6-1: Type plate of the mark stream sensor PY-MSS01.1-T1

6.2.2 Scope of delivery

- Mark stream sensor PY-MSS01.1-T1

6.3 Spare parts and accessories

6.3.1 Spare parts

There are no spare parts for the PY-MSS01.1-T1 mark stream sensor.
 The PY-MSS01.1-T1 mark stream sensor is not subject to wear.

Technical information on the mark stream sensor PY-MSS01.1-T1

6.3.2 Accessories

To connect to the PY-MSS01.1-T1 mark stream sensor, the following sensor optics and cables are available:

Ordering code	Part number	Description
PY-MSS01.1-O1	R911327423	Sensor optics "Standard" (without pre-assembled optical fiber cables)
PY-KOE001/000,0	R911328936	Optical fiber cable (1 mm), sender (sensor optics to sensor electronics), variable length (max. 6 m)
PY-KOE001/000,0	R911328937	Optical fiber cable (2 mm), receiver (sensor optics for sensor electronics), variable length (max. 6 m)
Ordering code	Part number	Description
PY-MSS01.2-O1/000,0	R911334134	Sensor optics "Robust". Optic sensor with pre-assembled optical fiber cables of variable length (2 m - 6 m in steps of 0.5 m)
PY-MSS01.3-O1/000,0	R911342153	Sensor optics "Robust 2" (without pre-assembled optical fiber cables)
PY-KOER001/000,0	R911342154	Coaxial optical fiber cables to the sensor optics PY-MSS01.3-O1/000,0 with variable length (2 m - 6 m in steps of 0.5)
PY-KG0001/000,0	R911328938	Encoder cable (sensor electronics for IndraDrive/MEM card), variable length (max. 50 m)
PY-KP0001/000,0	R911328939	Voltage supply cable (24 V sensor electronic box), variable length (max. 25 m)
PY-KE0001/000,0	R911328940	Ethernet cable (sensor electronics for hub/switch/MotionControl), variable length (max. 100 m)

6.4 Ambient conditions

	In operation	Storage and transport
Ambient temperature of evaluation electronic PY-MSS01.1-T1 and sensor optics PY-MSS01.1-O1 and PY-MSS01.2-O1/000,0	+5 °C to +55 °C	-25 °C to +70 °C Optical fiber, max. +60 °C
Ambient temperature of sensor optics PY-MSS01.3-O1/000,0	+5 °C to +130 °C	-25 °C to +130 °C
Relative humidity	RH-2; 5% up to 95% acc. to DIN EN 61131-2, condensation not permitted	RH-2; 5% up to 95% acc. to DIN EN 61131-2, condensation not permitted
Operating height	Up to 2,000 m above sea level acc. to EN 61131-2	Up to 3,000 m above sea level acc. to EN 61131-2
Mechanical strength	Maximum vibration: Frequency range: 10 Hz to 150 Hz Excursion: 0.75 mm At 10 Hz up to 57 Hz Acceleration: 1 g At 57 Hz up to 150 Hz Acc. to EN 60068-2-6	Max. shock: 15 g acc. to EN 60068-2-27, no malfunction
Contamination level	2	2
Overvoltage category	2	–

Tab. 6-1: Ambient conditions



This is a product that corresponds to the limit values of the emitted interference of class A (industrial environments), but not of class B (residential area and small enterprises).

When using the product in residential areas or small enterprises, the operator has to take actions to prevent radio interferences (also refer to DIN EN 55022).

6.5 Technical data

6.5.1 General data

Sampling frequency	250 kHz
Resolution	16 bits per channel
Sensitivity	8 amplifying stages in the ratio 2:1
Light source	Power-limited white light source PR0138; current-controlled operation

Technical information on the mark stream sensor PY-MSS01.1-T1

Interfaces	Incremental encoder connection, M12 8-pin, circular socket Ethernet interface, M12 4-pin, circular socket Power supply, M12 8-pin, circular connector Connecting the sensor optics via two optical fibers with SMA port
Digital interface	1 differential input for a signal level of 24 V 2 differential outputs for high speed signals with levels of 24 V. Current limitation of 30 mA, suitable for connection lengths for up to 5 m and an edge steepness of $< 2 \mu\text{s}$
Date of manufacturing	The manufacturing date is specified on the type plate behind the "FD:" label as quarter FD following DIN ISO 8601. Structure of the 5-digit alphanumerical quarter FD: Year (2 digits), quarter (1 digit) and quarter of the current year (2 digits) = YYQqq Example: 11Q04 = 4th quarter 2011
Maximum path velocity	1200 m/min (= 20m/s)
Setup velocity	At least 1 m/min (0.017 m/s)
Format length	0.3 m - 2.5 m
Printing materials	Cardboard (folding carton), plastic foil (BOPP, PET, LDPE,...) and aluminum foil, laminate and paper
Number of colors	Up to 12 registration marks at a same time
Colors	Solvent colors, watercolors, UV colors, varnishes (ethyl acetate and ethanol)
Length of mark pattern	Results from the number of colors and mark distances The maximum length of the mark window depends on the setup velocity: • Ca. 0.6 m at 10 m/min • Ca. 0.3 m at 5 m/min • Ca. 0.06 m at 1 m/min
Other printing	Printing before and after the mark pattern is possible, but not during the mark pattern

6.5.2 Voltage supply

The voltage for the PY-MSS01.1-T1 mark stream sensor is supplied via "X1S Power".

Supply voltage	24 V DC (19 V...30 V DC)
Nominal current	Typ. 240 mA (at a nominal current of 24 V)
Power consumption	Max. 5.8 W

6.5.3 Degree of protection and weight

Degree of protection	IP 54
Weight (without packaging)	Ca. 300 g

6.6 Standards

6.6.1 Standards used

The PY-MSS01.1-T1 mark stream sensor complies with the DIN EN standards listed in the following:

Standard	
EN 61326-1 (directive 2014/30/EU)	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements Edition 2013
DIN EN 60079-0 (directive 2014/34/EU)	Explosive atmospheres - Part 0 Equipment – General requirements
DIN EN 60079-28 (directive 2014/34/EU)	Explosive atmospheres - Part 28 Protection of equipment and transmission systems using optical radiation

Tab. 6-2: Safety standards

Technical information on the mark stream sensor PY-MSS01.1-T1

6.6.2 Declaration of conformity



rexroth
A Bosch Company

EU-Konformitätserklärung - Original EC declaration of conformity

Dok.-Nr. / Doc. No.: DCTC-30505-002

Datum / Date: 19.06.2018

- ☐ nach Maschinenrichtlinie 2006/42/EG / in accordance with Machinery Directive 2006/42/EC
- ☐ nach Niederspannungsrichtlinie 2014/35/EU / in accordance with Low Voltage Directive 2014/35/EU
- ☒ nach EMV-Richtlinie 2014/30/EU / in accordance with EMC Directive 2014/30/EU
- ☐ nach Druckgeräte-Richtlinie 2014/68/EU / in accordance with Pressure Equipment Directive 2014/68/EU
- ☒ nach ATEX-Richtlinie 2014/34/EU / in accordance with ATEX Directive 2014/34/EU
- ☒ nach RoHS-Richtlinie 2011/65/EU / in accordance with RoHS Directive 2011/65/EU

Hiermit erklärt der Hersteller, / The manufacturer

Bosch Rexroth AG, Bürgermeister-Dr.-Nebel-Straße 2, 97816 Lohr a. Main / Germany

dass das nachstehende Produkt / hereby declares that the product below

Bezeichnung / Name: Markenstromsensordsystem „Rexroth Mark Stream Sensor“
Typ / Type:

Handelsbezeichnung / Trade name	Materialnummer
PY-MSS01.1-T1	R911327422
PY-MSS01.1-O1	R911327423
PY-MSS01.2-O1/000,0	R911334134
PY-MSS01.3-O1	R911342153

Handelsbezeichnung / Trade name: Rexroth
Baujahr / Year of construction: ab Herstellungsdatum 18Q01

in Übereinstimmung mit oben genannte(n) Richtlinie(n) entwickelt, konstruiert und gefertigt wurde. / was developed, designed and manufactured in compliance with the above-mentioned directive(s).

Die alleinige Verantwortung für die Ausstellung dieser EU-Konformitätserklärung trägt der Hersteller. / This EC declaration of conformity is issued under the sole responsibility of the manufacturer.

Angewandte harmonisierte Normen / Harmonized Standards applied:

Norm / Standard	Titel / Name	Ausgabe / Issue
EN 61326-1 (IEC 61326-1)	Elektrische Mess-, Steuer-, Regel- und Laborgeräte — EMV-Anforderungen — Teil 1: Allgemeine Anforderungen	2013 (2012)
EN 60079-0 (IEC 60079-0)	Explosionsfähige Atmosphäre – Teil 0: Geräte – Allgemeine Anforderungen	2012 + A11:2013 (2011, modifiziert + Cor.:2012 + Cor.: 2013)
EN 60079-28 (IEC 60079-28)	Explosionsfähige Atmosphäre Teil 28 Schutz von Einrichtungen und Übertragungssystemen, die mit optischer Strahlung arbeiten	2015 (2015)

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DCTC 00001-001_KOE_M_XX_2018-06-08.docx

Seite Page 1 / 2

Fig. 6-2: Declaration of conformity of the mark stream sensor system, page 1

Technical information on the mark stream sensor PY-MSS01.1-T1

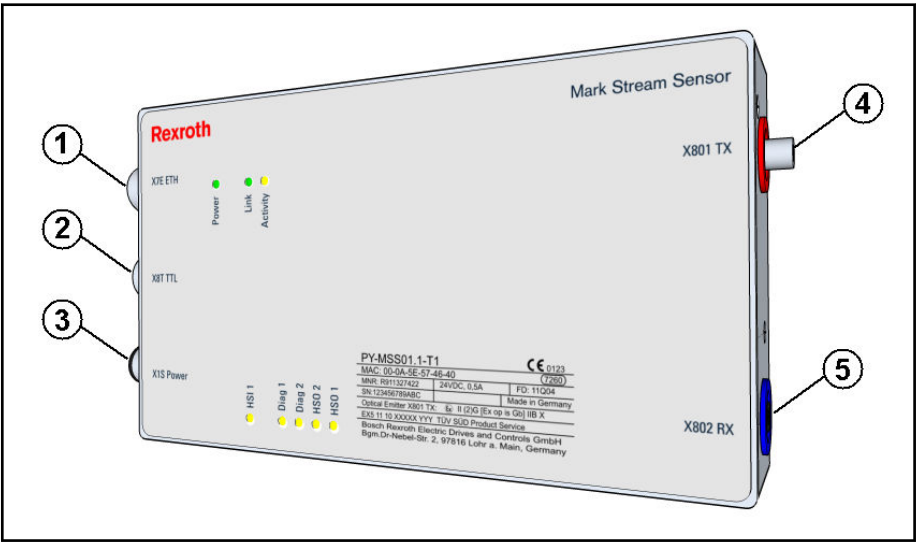
EU-Konformitätserklärung - Original EC declaration of conformity		Seite Page 2 / 2 DCTC 00001-001 : 2018-06-08	
Kennzeichnung zum Explosionsschutz:			
Bezeichnung	ATEX-Kennzeichnung		
Sensoroptik PY-MSS01.1-O1	II 2G Ex op is IIB T4 Gb X		
Sensoroptik PY-MSS01.2-O1/000,0	II 2G Ex op is IIB T4 Gb X		
Sensoroptik PY-MSS01.3-O1	II 2G Ex op is IIB T4 Gb X		
Weißlichtquelle PR0138 eingebaut in Auswertelektronik PY-MSS01.1-T1	II (2)G [Ex op is Gb] IIB X		
Benannte Stelle, die das EU-Baumusterprüfverfahren nach oben genannter ATEX-Richtlinie durchgeführt hat: / <i>Notified body that has conducted the EC type-examination procedure in accordance with the above-mentioned ATEX directive:</i> Name / Name: TÜV Süd Product Service GmbH Anschrift / Address: Gottlieb-Daimler-Str., 70794 Filderstadt / Germany Kennnummer / Identification number: 0123 EU-Baumusterprüfbescheinigungs-Nr / No. of EC type-examination certificate: EX5 11 12 57401 002			
Benannte Stelle, die das umfassende Qualitätssicherungssystem nach oben genannter ATEX-Richtlinie genehmigt hat: / <i>Notified body that has approved the full quality assurance system in accordance with the above-mentioned ATEX directive:</i> Name / Name: DEKRA EXAM GmbH Anschrift / Address: Dinnendahlstr. 9, 44809 Bochum Kennnummer / Identification number: 0158			
Nachfolgende Person ist bevollmächtigt, die relevanten technischen Unterlagen zusammenstellen: / <i>The individual below is authorized to compile the relevant technical files:</i> Name / Name: Christian Russo, Abt. DC-AE/EPI2 Anschrift / Address: Bürgermeister-Dr.-Nebel-Str. 2, 97816 Lohr a. Main			
Weitere Erläuterungen / <i>Further explanations:</i> Die Montage- und Installationshinweise gemäß Produktdokumentation sind zu beachten. / <i>The assembling and installation instructions according to the manual have to be followed.</i>			
Lohr a. Main Ort / Place	19.06.2018 Datum / Date	i.V.  Leiter / Head Service Automation & Electrification Solutions Dan DeTroy (DC-AE/SMP2)	i.A.  Leiter / Head Development Motion Solution Integration Dr. Christian Fahrbach (DC-AE/EAS)
Änderungen im Inhalt der EU-Konformitätserklärung sind vorbehalten. Derzeit gültige Ausgabe auf Anfrage. <i>We reserve the right to make changes to the content of the EC Declaration of Conformity. Current issue on request.</i>			

Fig. 6-3: Declaration of conformity of the mark stream sensor system, page 2

Technical information on the mark stream sensor PY-MSS01.1-T1

6.7 Interfaces

6.7.1 Connector panel



- ① Ethernet connection, X7E ETH
- ② Incremental encoder connection, X8T TTL
- ③ Power supply connection, X1S Power
- ④ Optical fiber connection, X801 TX
- ⑤ Optical fiber connection X802 RX

Fig. 6-4: Connector panel of the PY-MSS01.1-T1 mark stream sensor

Name at housing	Connection type	Connector type (installed)	Mating connector or connection (external)
X7E ETH	Network connection: Ethernet 10Base T or 100Base TX	4-pin circular socket, M12	4-pin circular connector M12 x 1, straight
X8T TTL	Incremental encoder connection	8-pin circular socket, M12	8-pin circular connector M12 x 1, straight
X1S Power	Power supply 24 V DC	8-pin circular connector, M12	8-pin circular socket, M12 x 1, straight
X801 TX	Optical fiber output of evaluation electronic	SMA socket for optical fibers	SMA connector for optical fibers
X802 RX	Optical fiber input of evaluation electronic	SMA socket for optical fibers	SMA connector for optical fibers

Tab. 6-3: Interfaces

NOTICE

Plugging or removing connections under voltage can damage the mark stream sensor!

Switch off the supply voltage before attaching or detaching any connections!



Only the cables provided by Bosch Rexroth as accessories may be used to connect the PY-MSS01.1-T1 mark stream sensor.

6.7.2 24 V DC power supply X1S power

All internally required voltages are generated with electrical isolation via a DC/DC converter. The connection is an 8-pin M12 circular connector.

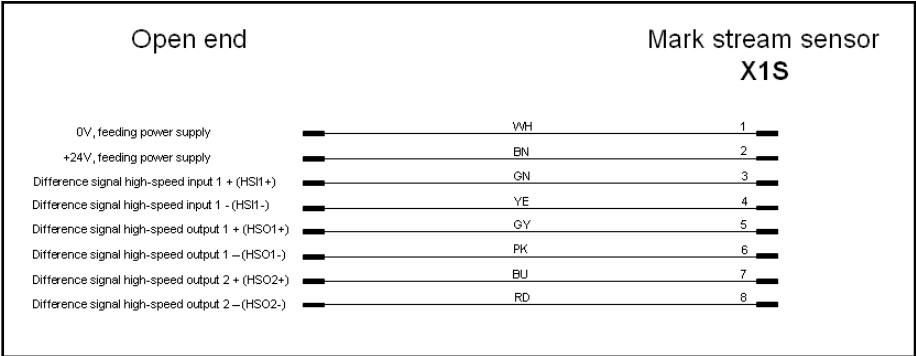


Fig. 6-5: Connection lead at X1S Power

Pin	Color	Function
1	White	0 V, feeding power supply
2	Brown	+24 V, feeding power supply
3	Green	Differential signal of high-speed input 1 + (HSI1+)
4	Yellow	Differential signal of high-speed input 1 - (HSI1-)
5	Grey	Differential signal of high-speed output 1 + (HSO1+)
6	Pink	Differential signal of high-speed output 1 - (HSO1-)
7	Blue	Differential signal of high-speed output 2 + (HSO2+)
8	Red	Differential signal of high-speed output 2 - (HSO2-)

Tab. 6-4: Pin assignment of X1S power

 The PY-MSS01.1-T1 mark stream sensor is reverse polarity-protected. A reverse polarity of the 24 V power supply to X1S Power does not damage the device.

NOTICE Damaging the PY-MSS01.1-T1 mark stream sensor by excessive input voltages

Overvoltages higher than 35 V for more than 500 ms damage components in the power supply area of the device.

EMC noise immunity To increase noise immunity against high-frequency radiation (EMC), it is recommended to attach a braid-breaker (split ferrite) at the voltage supply cable.

Technical information on the mark stream sensor PY-MSS01.1-T1

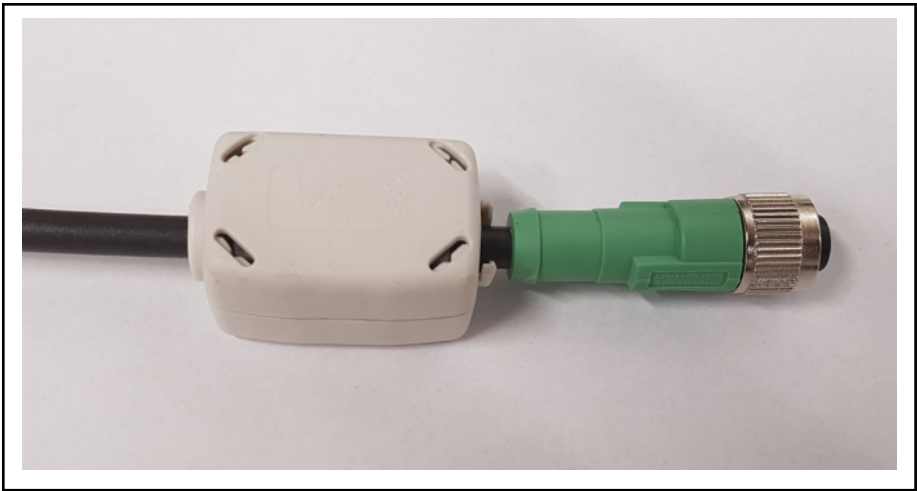


Fig. 6-6: Connection lead at X1S Power - Braid-breaker

If there is a very extensive cable routing of the 24V connection lead, it is recommended to additionally stabilize the supply voltage in the control cabinet of the sensor using pulse capacitors (Y-capacitors). For example by using pulse capacitors MKP10-1000 100N (100 nF, 1000 V).

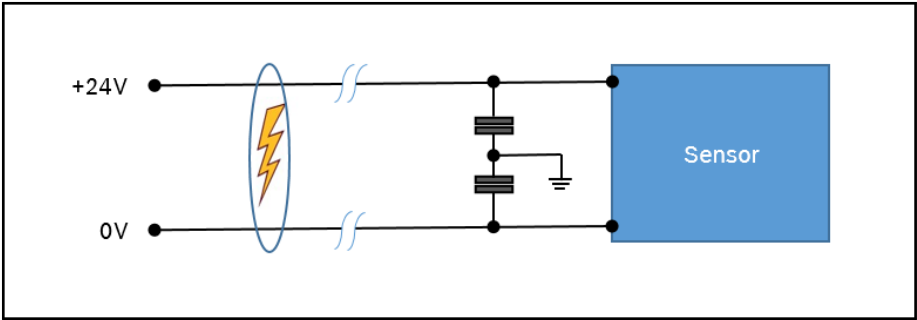


Fig. 6-7: Connection lead at X1S Power - Pulse capacitor

6.7.3 Ethernet interface X7E ETH

The Rexroth mark stream sensor can be connected to an Ethernet network via the Ethernet interface. The interface is a 4-pin M12 circular socket.

M12 circular socket, 4-pin	
Type	Ethernet 10Base T/100Base TX
Cable length	100 m max.
Cable type	Shielded, twisted pair, Cat 5
Transmission rate	10 or 100 MBit/s

Tab. 6-5: Technical data of the Ethernet interface

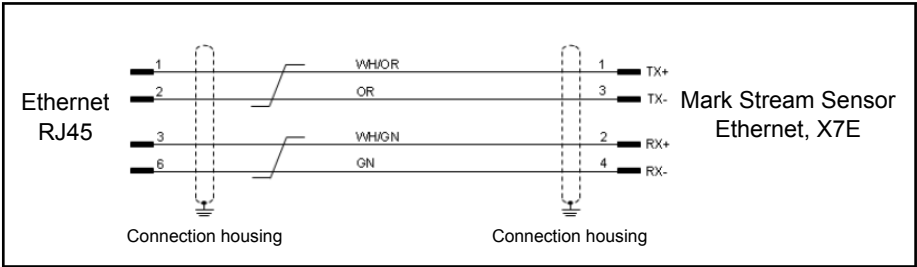


Fig. 6-8: Connecting lead at X7E ETH

Technical information on the mark stream sensor PY-MSS01.1-T1

Pin	Function
1	TX+
2	RX+
3	TX-
4	RX-

Tab. 6-6: X7E ETH pin assignment

NOTICE

The PY-MSS01.1-T1 mark stream sensor is not intended for connection to telecommunications networks!

Do not connect the device to a telecommunications network.

6.7.4 Incremental encoder interface X8T TTL

Via the incremental interface, the mark stream sensor PY-MSS01.1-T1 can be connected to a Bosch Rexroth drive via the control unit option "Encoder emulation output card" to transmit the velocity information to the mark stream sensor PY-MSS01.1-T1.

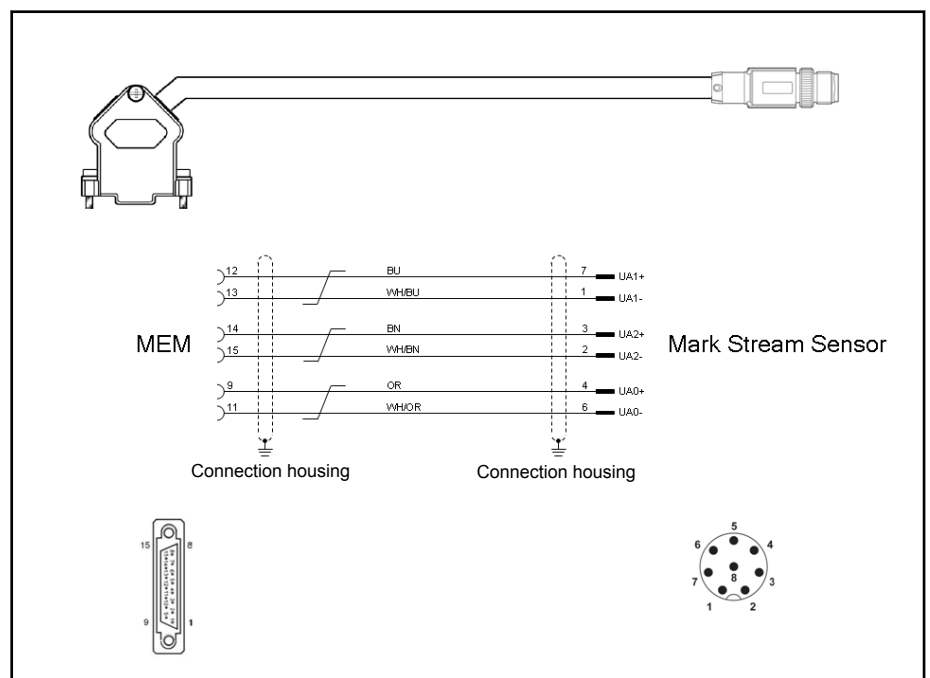


Fig. 6-9: Connection lead to X8T TTL

PIN	Color	Function
1	White/blue	Incremental encoder, track A (A-)
2	White/brown	Incremental encoder, track B (B-)
3	Brown	Incremental encoder, track B (B+)
4	Orange	Incremental encoder, reference track C (C+)
5	White/green	Not connected

Technical information on the mark stream sensor PY-MSS01.1-T1

PIN	Color	Function
6	White/ orange	Incremental encoder, reference track C (C-)
7	Blue	Incremental encoder, track A (A+)
8	Green	Not connected

Tab. 6-7: X8T TTL pin assignment



Only connect the incremental encoder interface to the control unit option "Encoder emulation output card" of the drive system provided by Bosch Rexroth.

6.7.5 Optical fiber interfaces X801 TX and X802 RX

The optical fibers are connected with an SMA plug. A transmission link starts at the sender output and ends at the recipient input. The transmission path consists of optical fibers. The optical fibers of the optics PY-MSS01.1-O1 and PY-MSS01.2-O1/000,0 are plastic optical fibers. The coaxial optical fibers of the optics PY-MSS01.3-O1/000,0 is a glass optical fiber. The cable lengths are available in steps of 0.5 and can be freely configured. The minimum cable length is 2 m and the maximum cable length is 6 m.

The different connection types of the 3 optics are described in the following:

PY-MSS01.1-O1

The optical fiber output of the evaluation electronic X801 TX is connected to the optical fiber input of the X803 sensor optics using an OWG cable (in red). The optical fiber input of the evaluation electronic X802 RX is connected to the optical fiber output of the X804 sensor optics using an OWG cable (in blue).

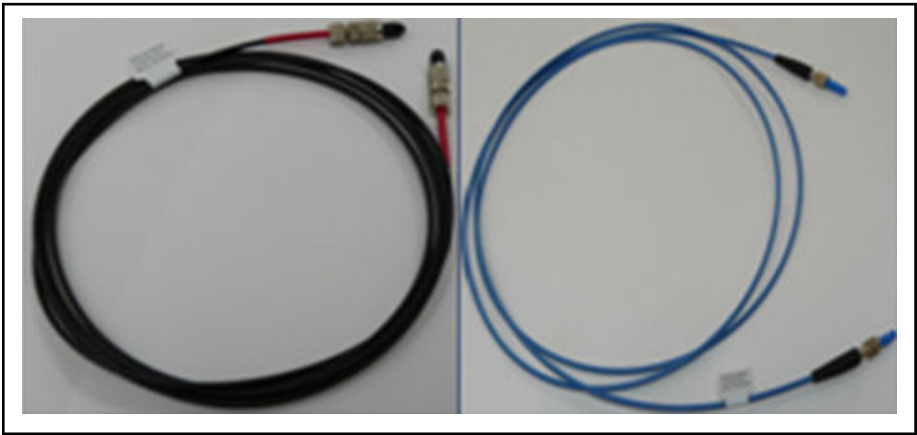


Fig. 6-10: Optical fiber for use with PY-MSS01.1-O1

PY-MSS01.2-O1/000,0

When using the PY-MSS01.2-O1/000,0 sensor optics, both optical fibers are attached to the optics and protected by a shrink sleeve. The length of the optical fibers is selected when ordering the sensor optics. Blue and red labeling at the optical fibers and the sensor electronics is used for assignment at the sensor electronics.

PY-MSS01.3-O1/000,0

When using the optics PY-MSS01.3-O1/000,0, a 2 to 1 optical fiber with a flexible tube is used. The single end is connected to the X805 input of the optics. The two other ends are connected to the X801 TX and X802 RX connections of the evaluation electronic. There is no difference between sending and receiving optical fiber in case of the PY-MSS01.3-O1/000,0 optics with the optical fiber PY-KOER001/000,0.

Technical information on the mark stream sensor PY-MSS01.1-T1

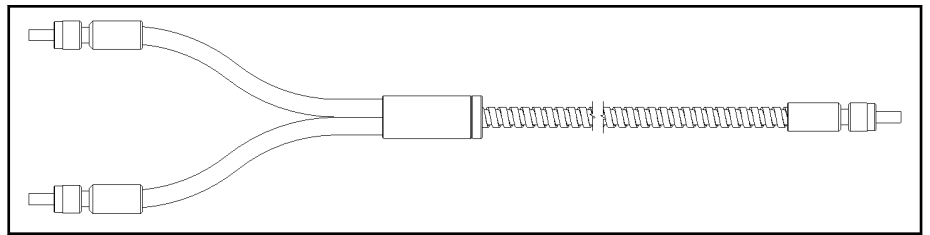


Fig. 6-11: Optical fiber for use with PY-MSS01.3-O1/000,0



Only cables provided by Bosch Rexroth can be used to connect the mark stream sensor.

⚠ WARNING

Light with high energy. Danger of blindness and eye injuries

Do not look into the light ray (sender output or end of OWG).

NOTICE

Error when handling and mounting. The optical fiber components can be mechanically destroyed

- Comply with valid mechanic limit values
- Do not tighten the optical fiber connector too tight

6.8 Mounting, demounting and electric installation

6.8.1 Housing dimensions

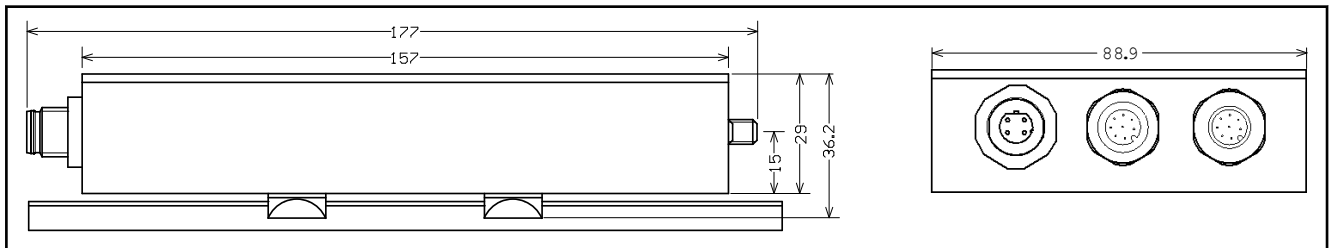
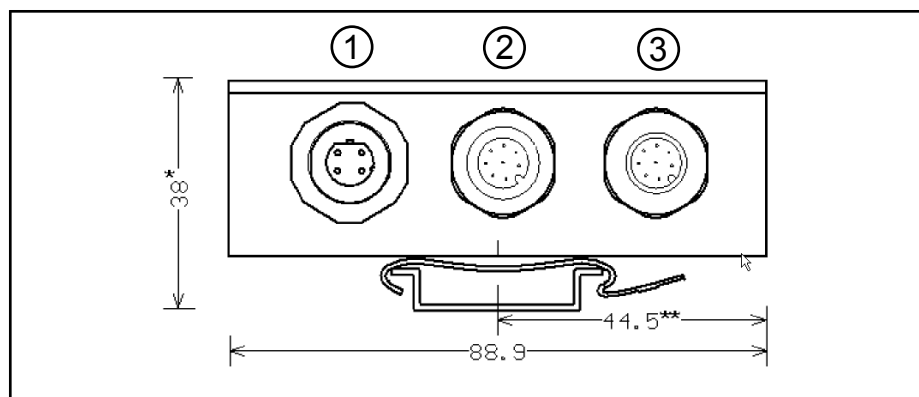


Fig. 6-12: Dimensions of the evaluation electronic

6.8.2 Mounting the evaluation electronic of mark stream sensor

The evaluation electronic is to be mounted on a mounting rail (standard C-rail 30 mm x 3.5 mm) with the clamp as shown in the following figure.

Technical information on the mark stream sensor PY-MSS01.1-T1



① Ethernet

② Encoder

③ Supply and I/O

* Approximate measurement, irrespective of the mounting rail

** Approximate measurement

Fig. 6-13: Evaluation circuit with mounting rail

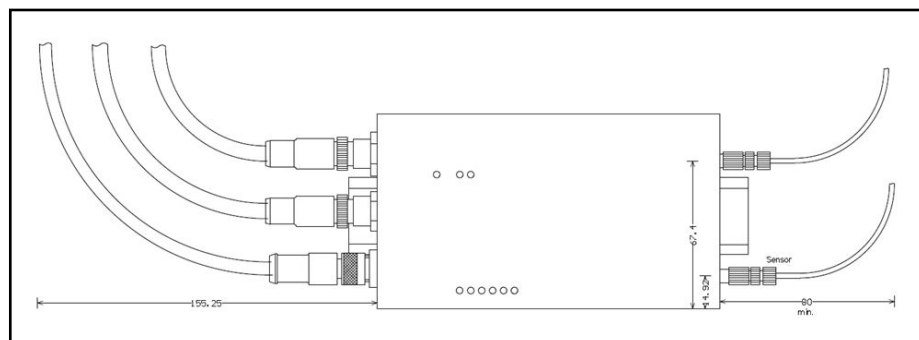


Fig. 6-14: Lateral free space for the connecting cables to the evaluation electronic



The evaluation electronic has to be outside the area exposed to explosion hazards. The mounting rail has to be grounded.

NOTICE

Electrostatic discharge-sensitive devices!

Do observe all required precautionary measures when handling electrostatic discharge-sensitive devices! (EN 61340-5-1, EN 61340-5-2)!

CAUTION

Glare by strong light source!

Only trained and qualified staff may install or replace the module! The internal white light source is very powerful. Do not look directly into the light source or into the connected optical fibers!

6.8.3 Mounting the sensor optics of mark stream sensor



Two sensor optic types are available. The two optic types differ in their mechanic measurements and mounting of optical fibers:

- **PY-MSS01.1-O1**

The optical fibers are not firmly attached to the sensor optics. The optical fibers are screwed at the sensor optics via a thread

- **PY-MSS01.2-O1/000,0**

The optical fibers for this sensor optics are firmly attached to the sensor optics. The length is variable (2 m - 6 m in steps of 0.5 m). The optical fibers are protected by a metallic sleeve

- **PY-MSS01.3-O1/000,0**

The optical fibers are not firmly attached to the sensor optics. The optical fibers are screwed at the sensor optics via a thread. The length is variable (2 m - 6 m in steps of 0.5 m). The optical fibers are protected by a metallic tube and it is a 2 to 1 optical fiber with 3 connections



If it is not differentiated between the sensor optics, the description is valid for all optic types.

Sensor optics PY-MSS01.1-O1

The sensor optics of the mark stream sensor has to be mounted to a cross beam with mounting holes.

The sensor optics is connected to the sensor electronics using the optical fiber PY-KOE001 (transmission direction) or PY-KOR001 (receiving direction). The optical fibers are available in different lengths.

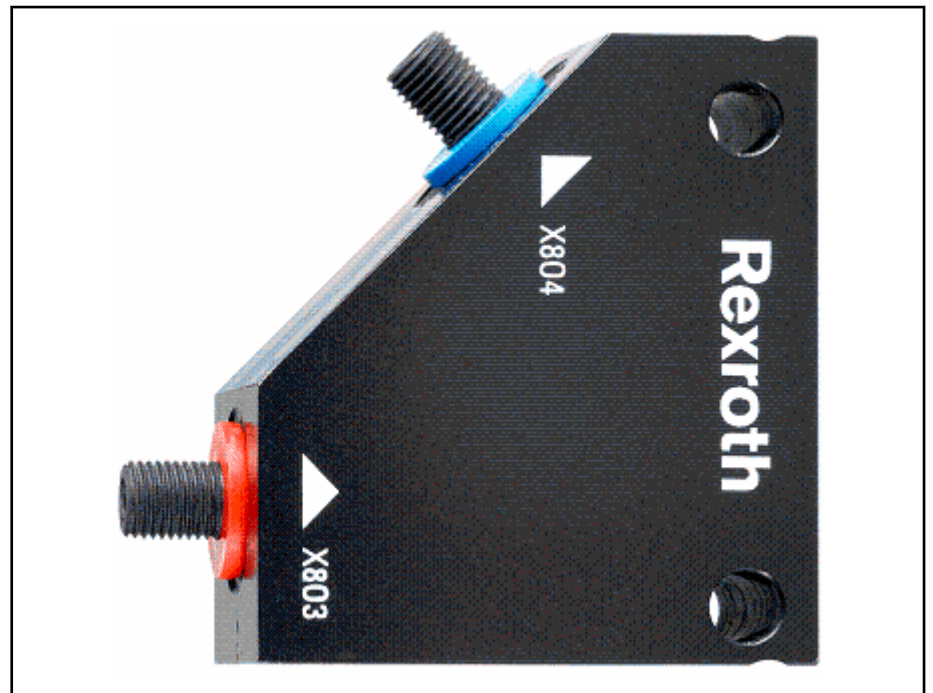


Fig. 6-15: Sensor optics PY-MSS01.1-O1

Technical information on the mark stream sensor PY-MSS01.1-T1

NOTICE**Do not fall below the minimum bending radius!**

For optical fibers, it may never be fallen below the valid bending radius of 50 mm.

The fixture used should be adjustable in lateral direction as well as in its distance using several adjusting screws. Furthermore, mount the sensor optics at a low vibration position to ensure a higher accuracy.

The sensor optics PY-MSS01.1-O1 has the following dimensions:

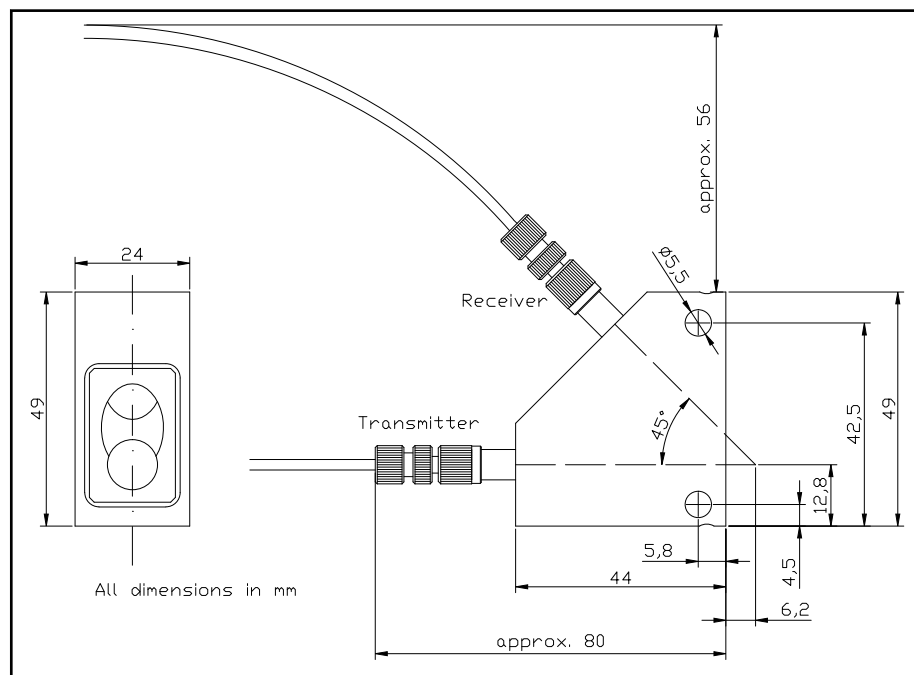


Fig. 6-16: Sensor optic dimensions PY-MSS01.1-O1



Mount the sensor optics to an area that is electrically conducting and connected to a grounding conductor!



The background the light spot focuses on has to be monochromatic and may not reflect. A matt background is recommended. To optimize the background, a background with color information is recommended.

The material web with the marks to be detected has to have a defined distance to the sensor optics. This distance has to correspond exactly to the distance of the protective cap. The sensor optics has to be installed in parallel to the material web. The sensor optics with the protective cap has to be positioned at a right angle to the material web.

Technical information on the mark stream sensor PY-MSS01.1-T1

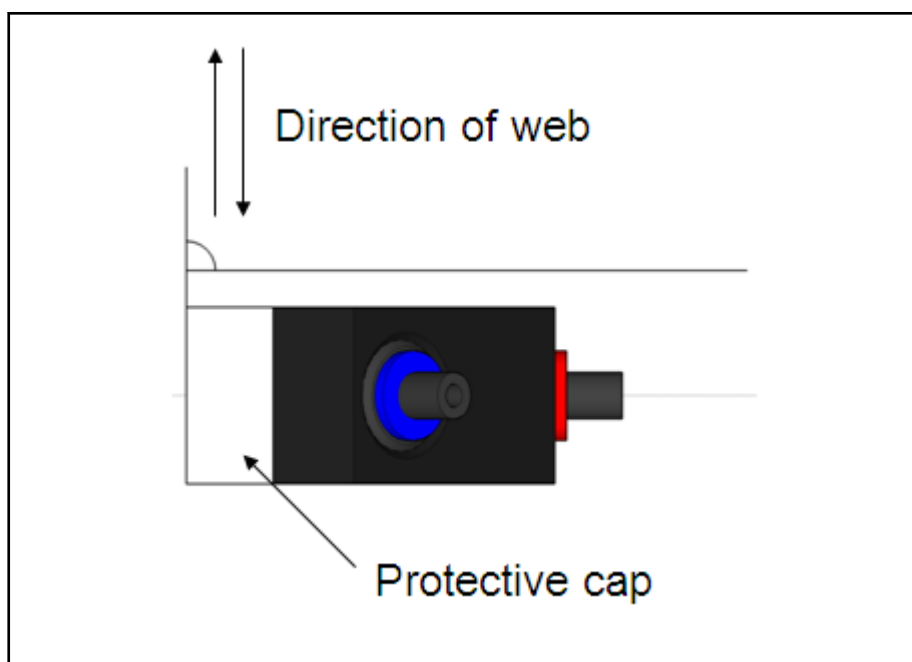


Fig. 6-17: Parallel mounting of the sensor optics

The distance between optics and material path can also be adjusted using the protective cap, by a minimal contact of the protective cap with the web. The following figure shows the mounting of the sensor optics using the protective cap.

Technical information on the mark stream sensor PY-MSS01.1-T1

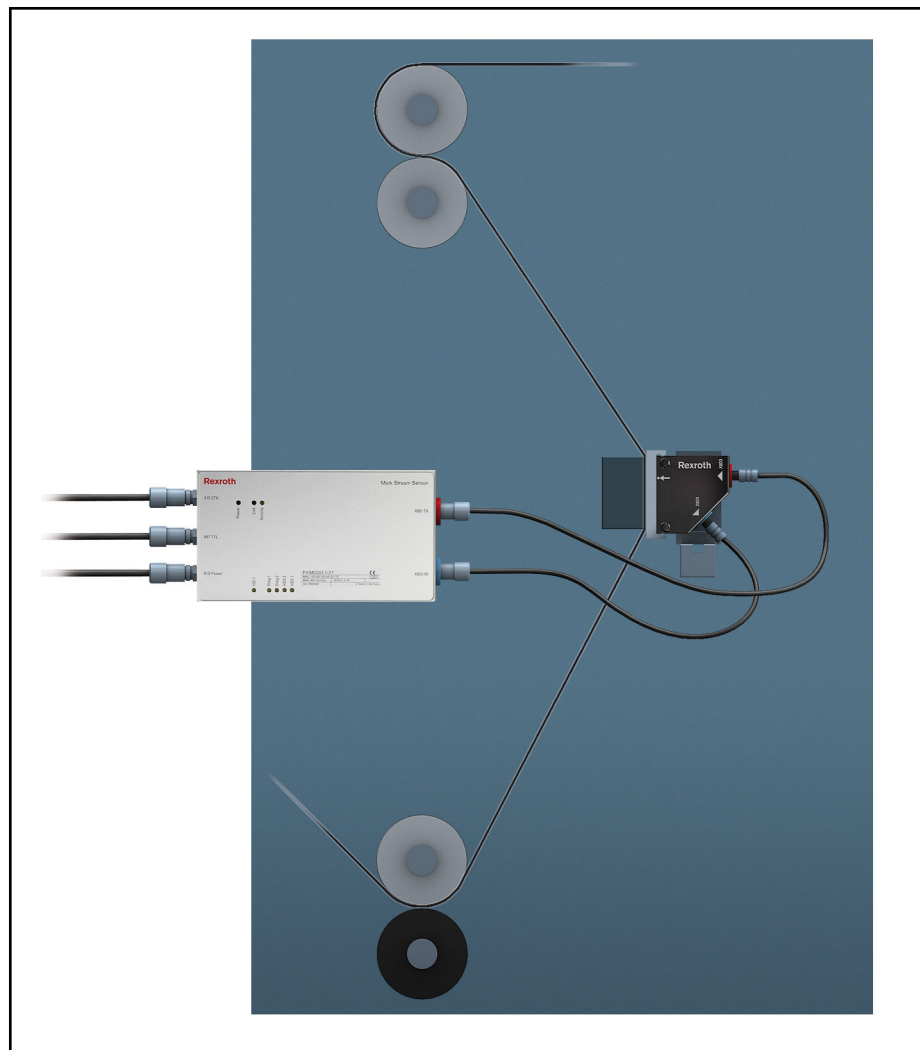


Fig. 6-18: Mounting the sensor optics at the material web with protective cap



Mount the sensor optics horizontally to the traverse.

After the correct sensor optic alignment, the protective cap can be removed carefully.



Please ensure that the sensor optics is not displaced when removing the protective cap, as a change in distance might result in incorrect measuring signals.

After removing the protective cap, the sensor has a correct distance to the material web and a highly-precise measurement can be guaranteed:

Technical information on the mark stream sensor PY-MSS01.1-T1

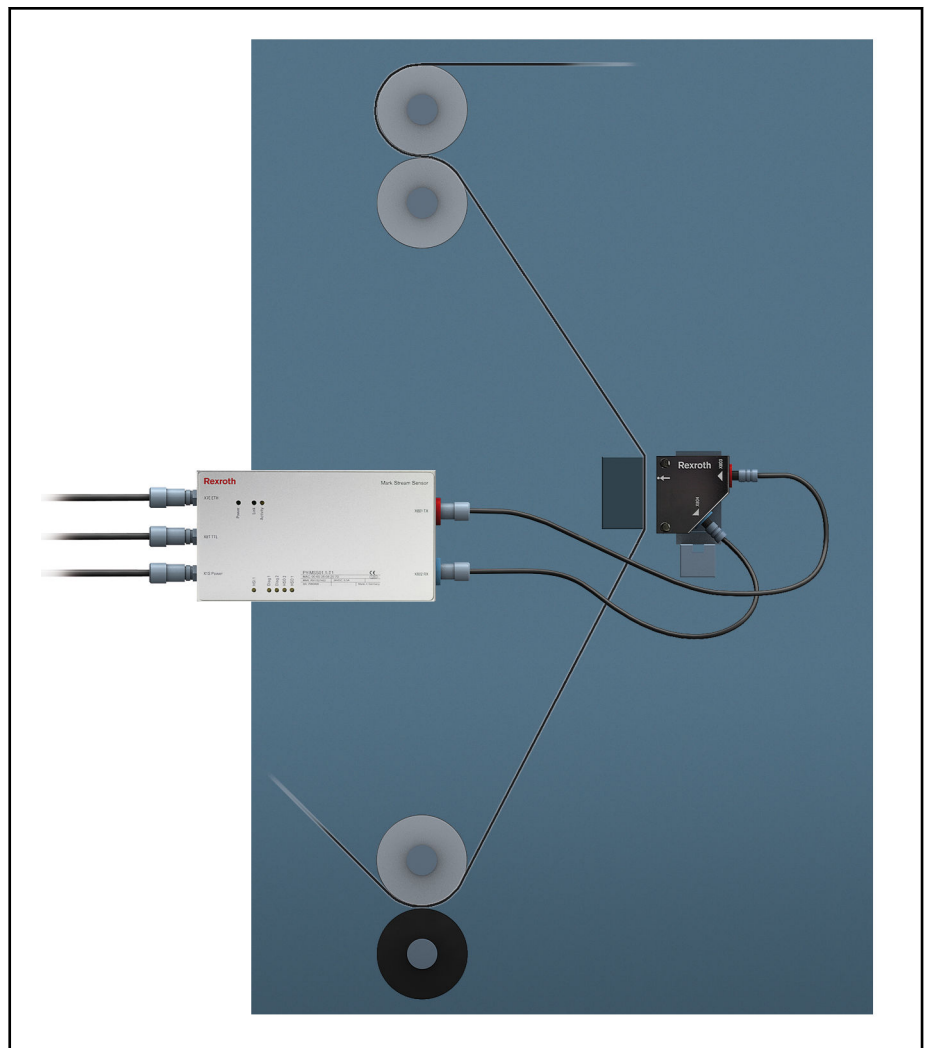


Fig. 6-19: Mounting the sensor optics after removing the protective cap



If the position of the sensor optics is displaced for a new production, it is strongly recommended to place the protective cap again and to use it for the optimum alignment of the sensor optics.



The protective cap should also be placed again if the sensor optics is not used (e.g. when cleaning the machine) to protect the sensor optics from pollution.

**Sensor optics PY-MSS01.2-
 O1/000,0**

The sensor optics of the mark stream sensor has to be mounted to a cross beam with mounting holes.

The sensor optics is firmly attached to the optical fiber and it is connected to the sensor electronics. The optical fibers are available in different lengths.

Technical information on the mark stream sensor PY-MSS01.1-T1

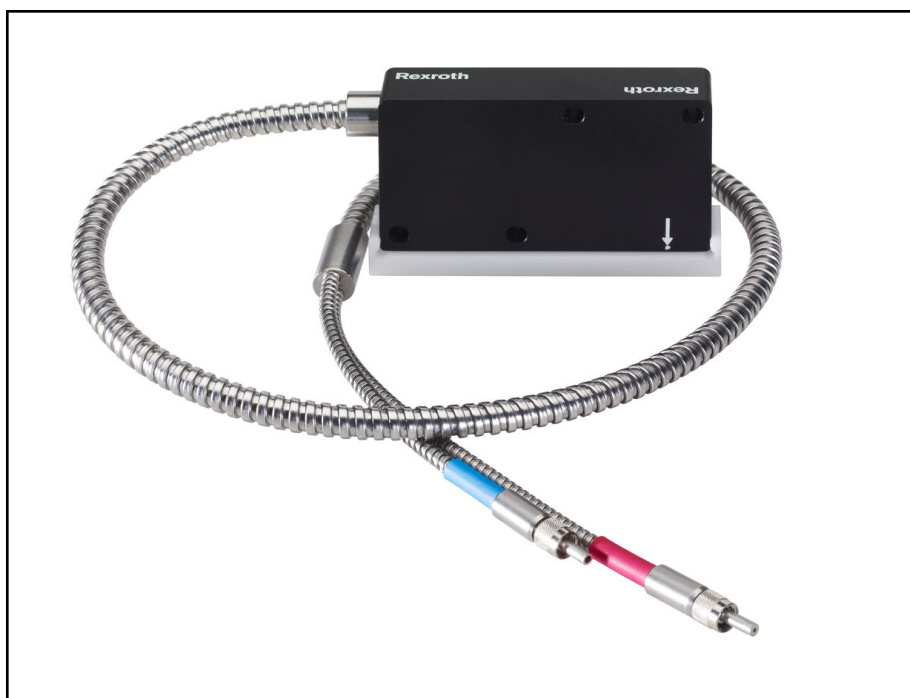


Fig. 6-20: Sensor optics PY-MSS01.2-O1/000,0

NOTICE

Do not fall below the minimum bending radius!

For optical fibers, it may never be fallen below the valid bending radius of 50 mm.

The fixture used should be adjustable in lateral direction as well as in its distance using several adjusting screws. Furthermore, mount the sensor optics at a low vibration position to ensure a higher accuracy. The optical fibers are firmly attached to the sensor optics and protected by a shrink sleeve. For the sensor optics PY-MSS01.2-O1/000,0, the optical fibers only have to be connected to the evaluation box.

The sensor optics PY-MSS01.2-O1/000,0 has the following dimensions:

Technical information on the mark stream sensor PY-MSS01.1-T1

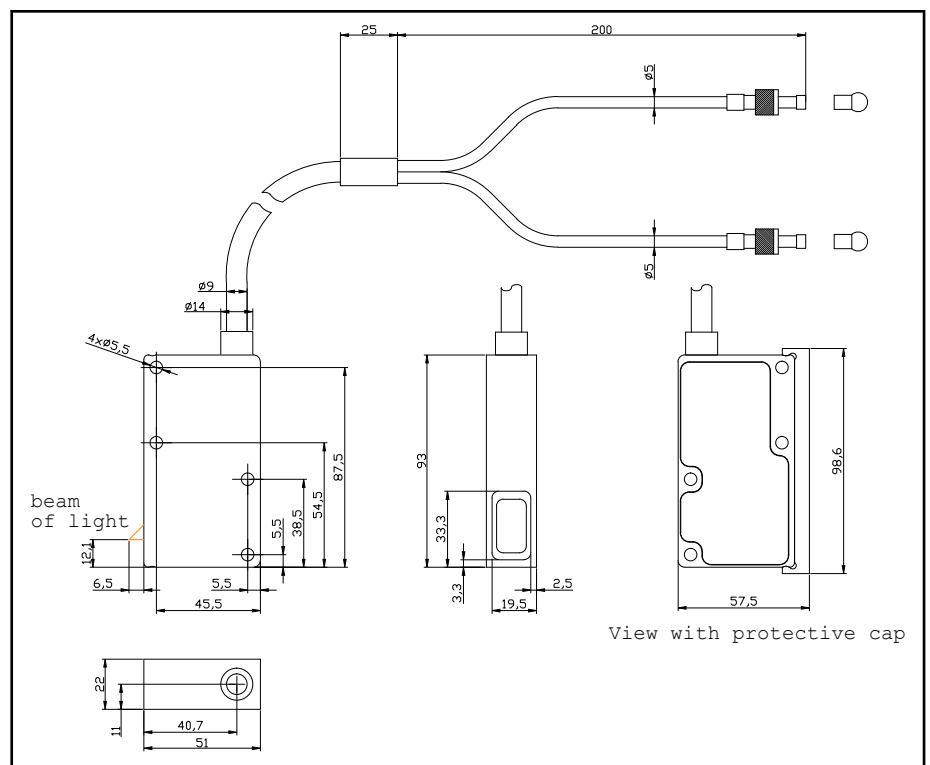


Fig. 6-21: Sensor optic dimensions PY-MSS01.2-O1/000,0



Mount the sensor optics to an area that is electrically conducting and connected to a grounding conductor!



The background the light spot focuses on, has to be monochromatic and may not reflect

A matt background is recommended. To optimize the background, a background with color information is recommended.

The OWG spiraled hose is available with lengths from 2 m to 6 m, in steps of 0.5. The spiraled hose cannot be separated from the sensor optics.

The material web with the marks to be detected has to have with a fixedly defined distance to the sensor optics that corresponds exactly to the distance of the protective cap. The distance between optics and material path can thus also be adjusted using the protective cap, by a minimal contact of the protective cap with the web (see [fig. 6-18 "Mounting the sensor optics at the material web with protective cap"](#) on page 44). The sensor optics has to be mounted parallel to the material web.

After the correct sensor optic alignment, the protective cap can be removed carefully.



Please ensure that the sensor optics is not displaced when removing the protective cap, as a change in distance might result in incorrect measuring signals.

After removing the protective cap, the sensor is positioned in a correct distance to the material web and a high-precision measurement can be guaranteed (see [fig. 6-19 "Mounting the sensor optics after removing the protective cap"](#) on page 45).

Technical information on the mark stream sensor PY-MSS01.1-T1



If the position of the sensor optics is displaced for a new production, it is strongly recommended to place the protective cap again and to use it for the optimum alignment of the sensor optics.



The protective cap should also be placed again if the sensor optics is not used (e.g. when cleaning the machine) to protect the sensor optics from pollution.

Sensor optics PY-MSS01.3-O1/000,0

The sensor optics of the mark stream sensor has to be mounted to a cross beam with mounting holes.

The sensor optics is connected to the sensor electronics using the optical fiber PY-KOER001/000,0 (transmission and receiving direction). The optical fibers are available in different lengths.

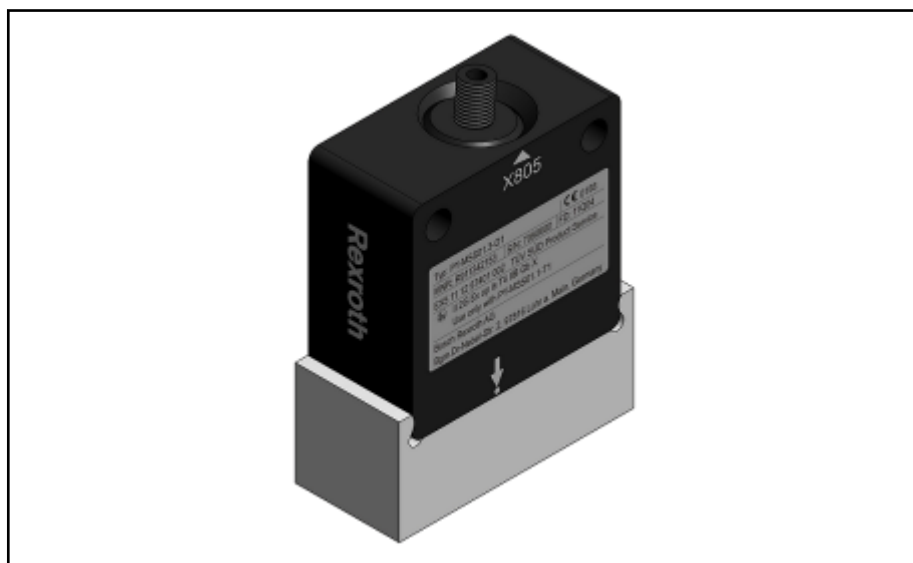


Fig. 6-22: Sensor optics PY-MSS01.3-O1/000,0

NOTICE

Do not fall below the minimum bending radius!

For optical fibers, it may never be fallen below the valid bending radius of 50 mm.

The fixture used should be adjustable in lateral direction as well as in its distance using several adjusting screws. Furthermore, mount the sensor optics at a low vibration position to ensure a higher accuracy. The optical fiber is protected by a shrink sleeve. The single end of an optical fiber has to be connected to the optics. For the sensor optics PY-MSS01.3-O1/000,0, the two other ends of the optical fibers have to be connected to the evaluation box.

Technical information on the mark stream sensor PY-MSS01.1-T1

The sensor optics PY-MSS01.3-O1/000,0 has the following dimensions:

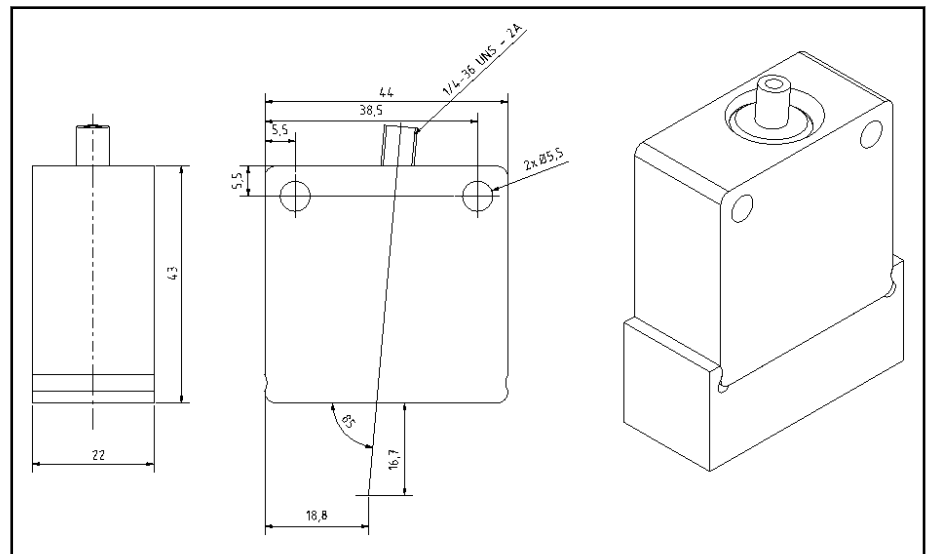


Fig. 6-23: Sensor optic dimensions PY-MSS01.3-O1/000,0



Mount the sensor optics to an area that is electrically conducting and connected to a grounding conductor!



The metallic shrink sleeve of the OWG has to be grounded as well.



The background the spot is focusing on, has to be monochrome.

The OWG spiraled hose is available with lengths from 2 m to 6 m, in steps of 0.5.

The material web with the marks to be detected has to have with a fixedly defined distance to the sensor optics that corresponds exactly to the distance of the protective cap. The distance is 16.7 mm. The sensor optics has to be mounted parallel to the material web.

The following figure shows the correct alignment of the optics to the web. Please comply with these assembly instructions.

Technical information on the mark stream sensor PY-MSS01.1-T1

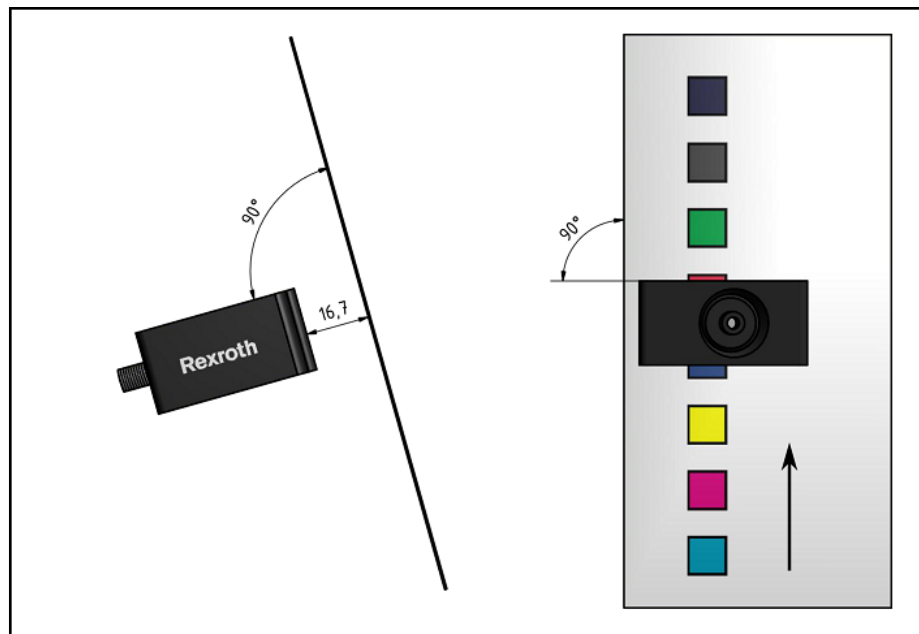


Fig. 6-24: Sensor optic alignment PY-MSS01.3-O1/000,0

The distance between optics and material path can also be adjusted using the protective cap, by minimal contact of the protective cap with the web (see [fig. 6-18 "Mounting the sensor optics at the material web with protective cap"](#) on page 44).

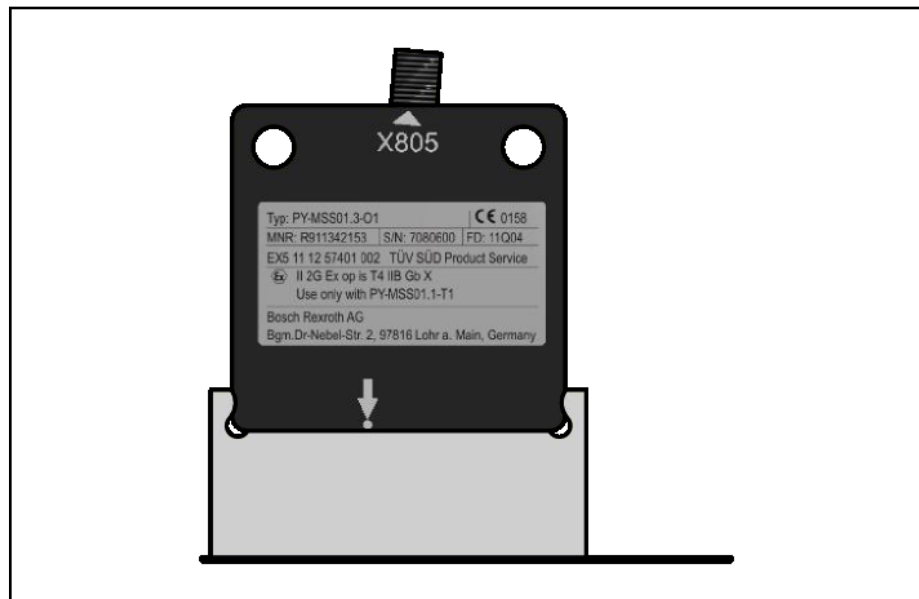


Fig. 6-25: Protective cap as assembly aid

After the correct sensor optic alignment, the protective cap can be removed carefully.



Please ensure that the sensor optics is not displaced when removing the protective cap, as a change in distance might result in incorrect measuring signals.

After removing the protective cap, the sensor has a correct distance to the material web and a highly-precise measurement can be guaranteed (see [fig.](#)

Technical information on the mark stream sensor PY-MSS01.1-T1

[6-19 "Mounting the sensor optics after removing the protective cap" on page 45\).](#)



If the position of the sensor optics is displaced for a new production, it is strongly recommended to place the protective cap again and to use it for the optimum alignment of the sensor optics.



The protective cap should also be placed again if the sensor optics is not used (e.g. when cleaning the machine) to protect the sensor optics from pollution.

Additional mounting instructions

- Mount the PY-MSS01.1-T1 mark stream sensor to ensure an ergonomic operation. Additionally, ensure that all moving machine components are visible for the operator at any time
- Avoid mounting locations that are exposed to direct sunlight, as this can result in additional warming
- Mount the optics to allow displacement and alignment at a right angle to the material web
- Keep the maximum distance possible from interference sources
- Lay all connecting cables in loops and use strain reliefs for all cables
- Provide sufficient space for mounting, demounting, plugs and the cable length

6.8.4 Demounting

WARNING

Personal injuries and material damages during installation works!

- Do not work at running or unsecured machines
- Prior to start working at the machines, secure the machines against unpredictable motions and operation by unauthorized personnel
- Secure the mark stream sensor, the sensor optics and the supply lines from falling before releasing mechanical connections

To demount the mark stream sensor or the sensor optics, proceed as follows:

1. Set the machine to standstill.
2. Disconnect the voltage of the mark stream sensor.
3. Switch off the main switch of the machine.
4. Secure the machine against unpredicted motions and operation by unauthorized personnel.
5. Wait for the discharging time of the electric systems.
6. Disconnect all electric connections.
7. Prior to the disassembly, secure the mark stream sensor, the sensor optics and the supply lines from falling or moving before releasing mechanical connections.
8. Remove the mark stream sensor and/or the sensor optics from the machine.
9. Enter all executed measures into a maintenance protocol.

Technical information on the mark stream sensor PY-MSS01.1-T1

6.8.5 Electric installation

NOTICE

Malfunctions due to insufficient shielding!

Use only shielded cables and metallic, conductive connector housings or coupling housings with large-area shield support.

First, connect the sensor optics and the PY-MSS01.1-T1 evaluation electronic using cables.

PY-MSS01.1-O1

Connect the blue optical fibers to the blue labeling of the sensor optics and the evaluation electronic. The optical fibers have to be firmly and completely mounted to ensure the transmitting power. The optical fiber with the red labeling has to be mounted on the red-labeled ports of the evaluation electronic and the sensor optics.

⚠ WARNING

The explosion protection can be compromised by interchanging the two optical fibers

Ensure a correct optical fiber connection.

PY-MSS01.2-O1/000,0

The optical fibers only have to be connected to the evaluation electronic in the PY-MSS01.2-O1/000,0 sensor optics, as it is firmly attached to the sensor optics and protected by a shrink sleeve. The optical fibers have to be firmly and completely mounted to ensure the transmitting power.

⚠ WARNING

The explosion protection can be compromised by interchanging the two optical fibers

Ensure a correct optical fiber connection.

PY-MSS01.3-O1/000,0

The individual optical fiber connection has to be connected to the sensor optics in case of the sensor optics PY-MSS01.3-O1/000,0. The two other optical fiber connections can be arbitrarily connected to the evaluation electronic. The optical fibers have to be firmly and completely mounted to ensure the transmitting power.

NOTICE

Do not fall below the minimum bending radius!

For optical fibers, it may never be fallen below the valid bending radius of 50 mm.

The correct distance between the sensor optics has to be checked and only then the protective cap can be removed from the sensor optics. Finally, connect the evaluation electronic to the control and the drive system using cables (see the following figures).

To connect the mark stream sensor system to the control and to the drive system, proceed as follows:

1. Connect the incremental encoder connection of the mark stream sensor to the control section "Encoder emulation card" of the corresponding drive.

It has to be the drive that is to be controlled with the measured values of the mark stream sensor.

Technical information on the mark stream sensor PY-MSS01.1-T1

2. Connect the Ethernet connection of the mark stream sensor to the control.

This is generally performed via an industrial Ethernet switch.

3. Connect the 24 V power supply to the mark stream sensor.

Thus, the green "Power" LED and the "Link" LED flash if there is an Ethernet connection.

All mark stream sensor systems have to be cabled again and checked subsequently.

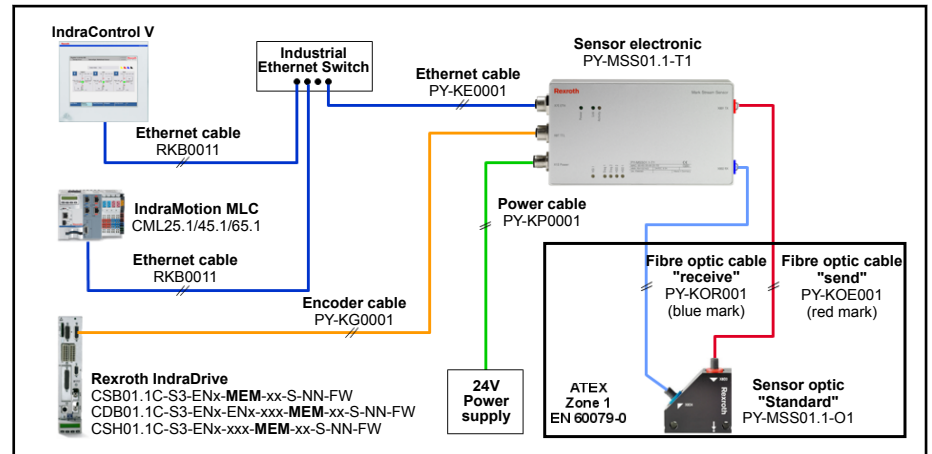


Fig. 6-26: Cabling the mark stream sensor system with the sensor optics PY-MSS01.1-O1

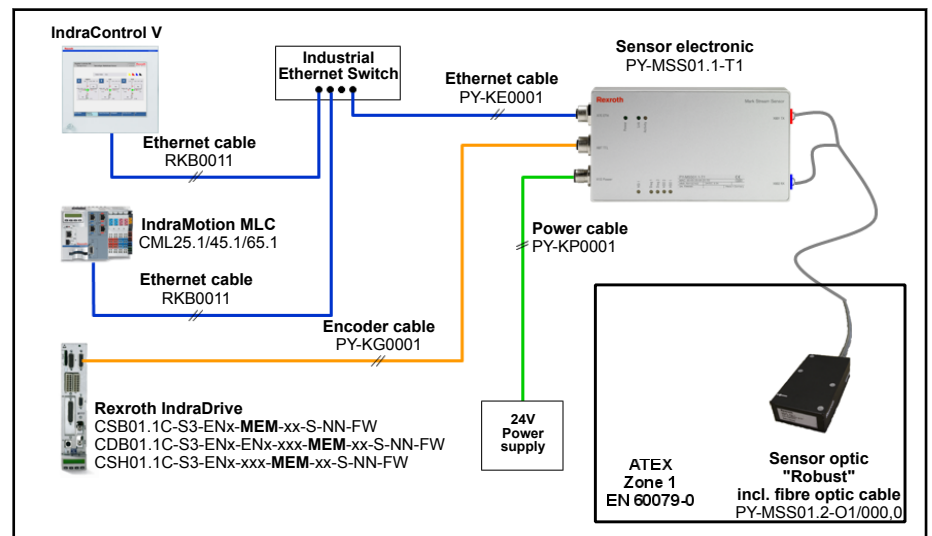


Fig. 6-27: Cabling the mark stream sensor system with the sensor optics PY-MSS01.2-O1/000,0

Technical information on the mark stream sensor PY-MSS01.1-T1

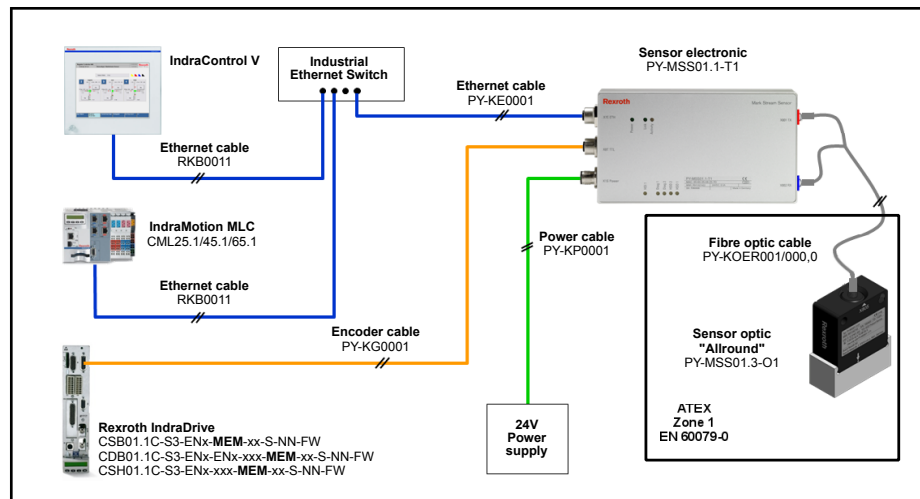


Fig. 6-28: Cabling the mark stream sensor system with the sensor optics PY-MSS01.3-O1/000,0

6.9 Commissioning

The product is operational upon delivery.

However, function blocks from the "RMB_TechRegiExtended" library are required for the communication with the mark stream sensor. The use of these function blocks is described in the library description "Rexroth IndraControl MLC 14VRS RegisterControl", part number R911341509 (see [chapter 1.3 "Required and supplementing documentation XLC/MLC" on page 6](#)).

6.10 Device description

6.10.1 General information

The PY-MSS01.1-T1 mark stream sensor is intended for use together with a drive system and the corresponding software of the Bosch Rexroth company.

The mark stream sensor consists of the following components:

- Evaluation electronic PY-MSS01.1-T1
- Sensor optics PY-MSS01.1-O1
- or
- Sensor optics PY-MSS01.2-O1/000,0
- or
- Sensor optics PY-MSS01.3-O1/000,0

Electrical as well as optical connecting leads are available as accessories. The corresponding types are listed in [chapter 6.3 "Spare parts and accessories" on page 27](#).

Technical information on the mark stream sensor PY-MSS01.1-T1

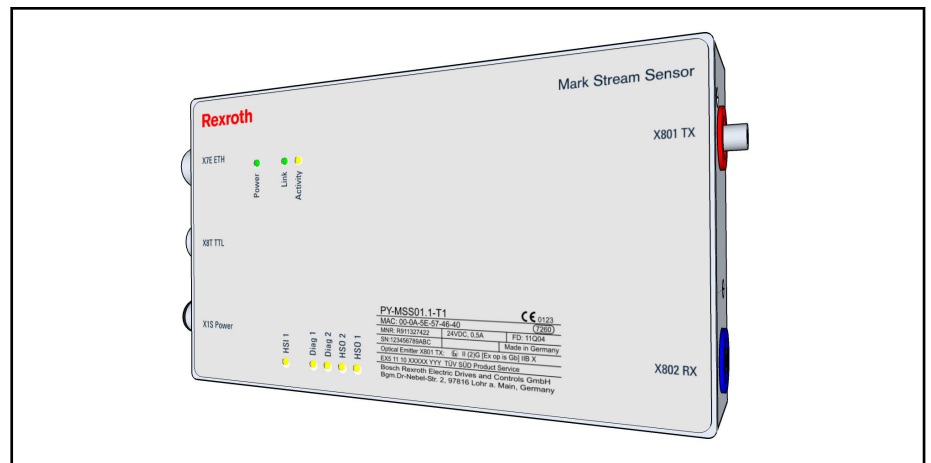


Fig. 6-29: Mark stream sensor PY-MSS01.1-T1

6.10.2 Operating and display components

General information

Several LEDs can be used to display and diagnose the current status of the PY-MSS01.1 mark stream sensor on top of the evaluation electronic. The LEDs can still be used to diagnose errors (see [tab. 6-8 "LEDs for operation and error display on the evaluation electronic" on page 56](#)).

Operating and error displays

Two LED rows to display the device status and errors are located on the evaluation electronic.

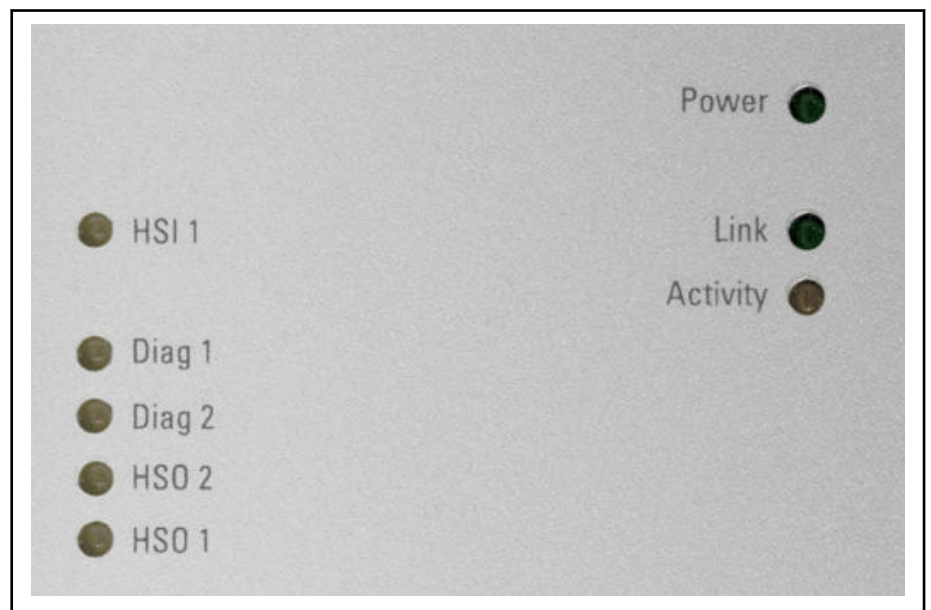


Fig. 6-30: LEDs of the evaluation electronic

The description of the display elements as well as the measures taken in case of errors are listed in the following table:

Technical information on the mark stream sensor PY-MSS01.1-T1

Symbol or LED	Display	Meaning	Action
Power	LED green on	Normal operation	–
	LED green off	No supply voltage 24 V DC	Check the supply voltage at the power supply unit!
Link	LED green on	Ethernet connection established	–
	LED green off	No Ethernet connection	Check the Ethernet connection!
Activity	LED flashing yellow	Ethernet data traffic available	–
	LED yellow off	No Ethernet data traffic	–
HSI 1	Reserved	Reserved	–
Diag 1	LED flashing yellow	LED flashes for 20 ms if the sensor receives a zero pulse from the incremental encoder emulation	–
	LED yellow off	No zero pulse from the incremental encoder simulation	Check whether the axis is rotating! Check the incremental encoder connection! Check parameterization of incremental encoder emulation
Diag 2	LED yellow ON	The sensor sends a measuring package with at least one valid measuring result	–
	LED yellow off	The sensor does not send any measuring results or no valid measured data is available.	Check whether the measurement was started. Check the correct configuration
HSO 1	LED yellow ON	LED flashes if the sensor generates a 24 V signal	–
	LED yellow off	Sensor does not generate a 24 V signal	Check whether 24 V is activated at the sensor
HSO 2	Reserved	Reserved	–

Tab. 6-8: LEDs for operation and error display on the evaluation electronic

The "HSO 1" LED is only required if the path/cylinder measuring method at the sensor was parameterized with 24 V. Otherwise, this LED can be ignored. "Diag 1" has to flash if the referenced axis is rotating and a correct configuration was transmitted to the sensor. After the measurement start, "Diag 2" indicates that valid measuring packages are sent.

Electronic type plate

The device is provided with an electronic type plate. In this type plate, the device data is retentively stored. The electronic type plate contains the following device data:

1. Operating hours counter
2. Serial number

Technical information on the mark stream sensor PY-MSS01.1-T1

3. Index
4. Part number
5. Type code

This data is entered into the electronic type plate during the production. The content of the electronic type plate can be read via the "MB_RegiSensor01ReadDiagType01" function block of the "RMB_TechRegiExtended" library.

6.11 Troubleshooting and debugging

LEDs indicate the operating states of the mark stream sensor PY-MSS01.1-T1.

For the description of the LED displays, refer to [chapter "Operating and error displays" on page 55](#).

NOTICE

Do not open the housing!

Do not open the housing of the mark stream sensor PY-MSS01.1-T1!



Repairs at the device by the customer are not permitted. Exceptions are maintenance works listed in the chapter "Maintenance".

For further information in the event of repair, please contact the Bosch Rexroth Service.

6.12 Maintenance and repair

The service life is increased by regular, preventive maintenance. Comply with the specifications of the machine manufacturer in the machine maintenance schedule as well as with the following specifications regarding maintenance measures and intervals at the PY-MSS01.1-T1 mark stream sensor.

⚠ WARNING

Personal injuries and damage to property in case of maintenance or repair work!

- Do not work at running or unsecured machines
- Prior to start working at the machines, secure the machines against unpredictable motions and operation by unauthorized personnel
- Secure the mark stream sensor, the sensor optics and the supply lines from falling before releasing mechanical connections

In case of malfunctions or maintenance and or repair work of the PY-MSS01.1-T1 mark stream sensor, proceed as follows:

1. Set the machine to standstill.
2. Disconnect the voltage of the mark stream sensor.
3. Switch off the main switch of the machine.
4. Secure the machine against unpredicted motions and operation by unauthorized personnel.
5. Wait for the discharging time of the electric systems.
6. Disconnect all electric connections.

Technical information on the mark stream sensor PY-MSS01.1-T1

7. Prior to the disassembly, secure the mark stream sensor, the sensor optics and the supply lines from falling or moving before releasing mechanical connections.
8. Remove the mark stream sensor and/or the sensor optics from the machine.
9. Log all measures into the machine maintenance report.

Maintenance measures

Action	Interval
Check mechanic and electric connections	According to machine maintenance schedule, check at least every 1000 operating hours
Remove dust, chips and other dirt from the mark stream sensor, the sensor optics and the connections	According to the contamination level, remove them at least after one year of operation

*Tab. 6-9: Maintenance measures***Repairs**

The PY-MSS01.1-T1 mark stream sensor may only be repaired in the plant of the manufacturer or in a shop authorized by Bosch Rexroth. The following repairs can be executed in authorized shops:

- Exchanging mark stream sensor
- Exchanging sensor optics
- ...

7 Firmware update

7.1 General information

In some cases it is required to update the firmware of the mark stream sensor. For these use cases, a tool available on the CD can be used to update the firmware.



The firmware only has to be updated in some cases. The update should only be executed after checking with your contact person at Bosch Rexroth.



The tool is only available in English.

7.2 Firmware update tool description

A link to the tool for updating the firmware is contained on the register control CD under "Tools". The file is available as ".zip". Save this file and unpack the file on your PC. Open the folder. A dll, the tool (BRMSSFWUpdateTool.exe) as well as another folder for the firmware is contained in the folder. The folder is empty. If a firmware update is required, your contact person at Bosch Rexroth will provide you with the firmware file. This file has the extension ".fuf". Copy the file content to the "firmware" folder.



The file for the firmware update is exclusively provided by your contact person at Bosch Rexroth. Thus, the respective firmware folder is empty.

The firmware update tool provides the following functions:

- [chapter 7.3 "Updating the firmware" on page 59](#)
- [chapter 7.4 "Configuring the IP address" on page 62](#)
- [chapter 7.5 "Sensor reset" on page 64](#)

7.3 Updating the firmware

Execute the following steps to update the firmware:



The 24V power supply voltage cannot be switched off during the firmware update.



A sensor firmware update from version 12.29 to version 12.34 is described in the following working procedure.

1. Copy the "FWUpdateTool_BRMSS" folder to your Engineering computer.
2. Contact your Bosch Rexroth contact person. He will provide the new firmware file. Copy this file to the "firmware" folder.
3. Open the firmware update tool "BRMSSFWUpdateTool.exe".

Firmware update

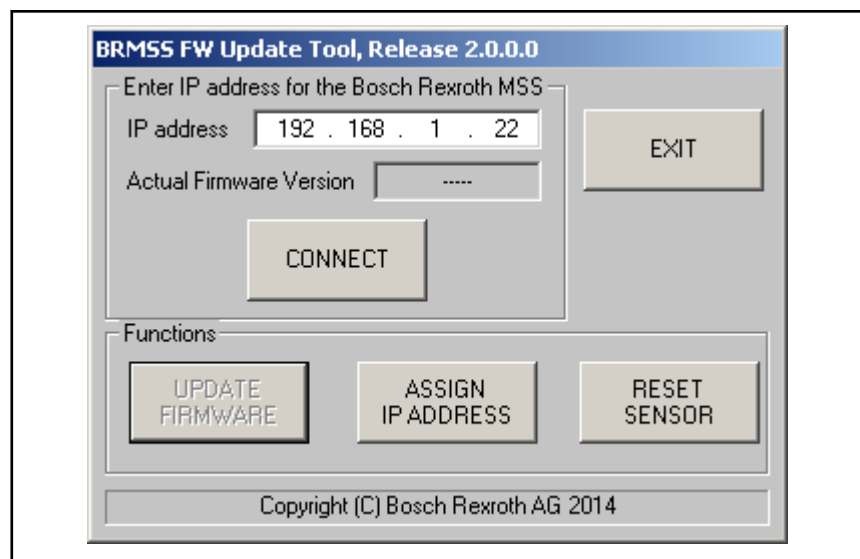


Fig. 7-1: Start screen of firmware update tool

4. Enter the IP address of the sensor used to execute the firmware update on and click on **Connect**. A connection is established to the sensor and the current firmware (in this example: firmware version 12.29) is displayed.

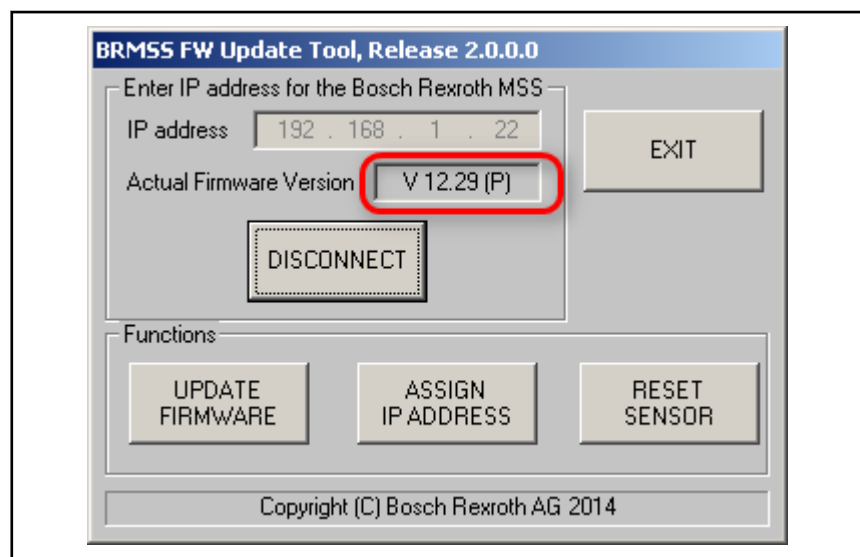


Fig. 7-2: Display of the current firmware after the connection has been established

5. Press **Update Firmware**. All valid firmware files contained in the "firmware" folder are displayed.

Firmware update

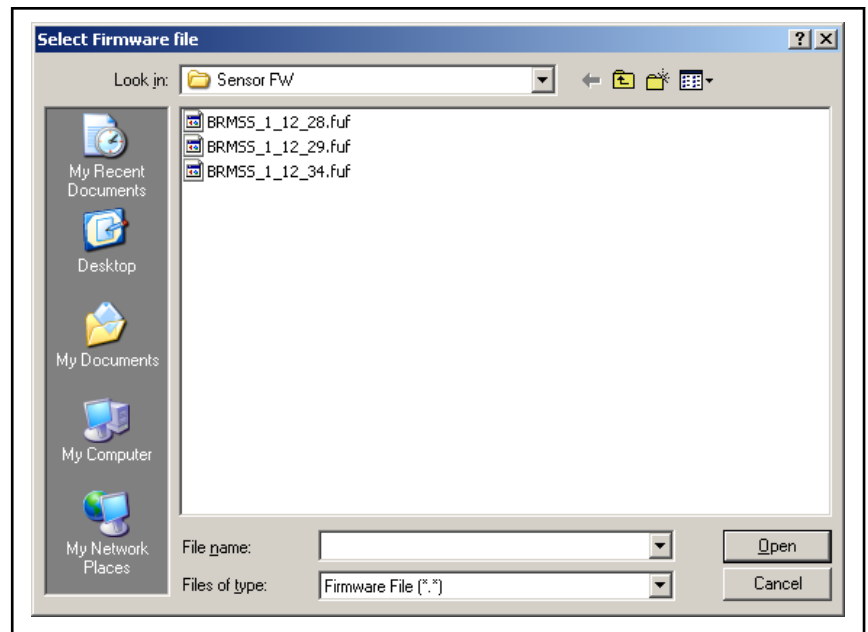


Fig. 7-3: Selecting the firmware

In this example, the sensor firmware versions 12.28, 12.29 and 12.34 are located in the folder.

6. Select the corresponding firmware and start the firmware update.



The 24V power supply voltage cannot be switched off during the firmware update.

7. After the firmware update, restart the sensor to activate the new firmware. Click on **Yes** to send a "Reset" command to the sensor. Alternatively, restart the sensor by shortly interrupting the voltage supply of the mark stream sensor.

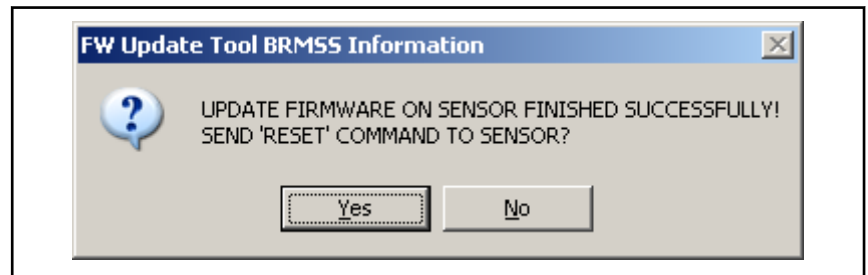


Fig. 7-4: Restarting the sensor after the firmware has been updated successfully

8. The firmware has been updated successfully. To check whether the new firmware is on the sensor, connect again to the sensor after the sensor restart using the firmware update tool.



The sensor restart can take up to 30 s.

Firmware update

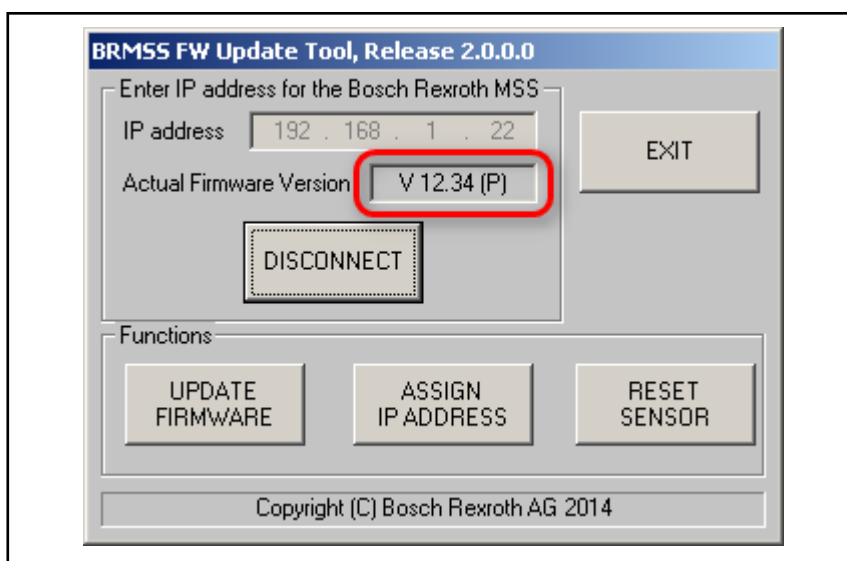


Fig. 7-5: Reconnecting to the sensor

The figure shows that the sensor is updated to firmware version 12.34.

9. Please start with step 3 for all other sensors on which you want to update the firmware.

After the firmware has been updated successfully, a valid configuration can be transferred to the sensor to execute the required measurements.

7.4 Configuring the IP address

Execute the following steps to configure the IP address:

1. Open the firmware update tool "BRMSSFWUpdateTool.exe".

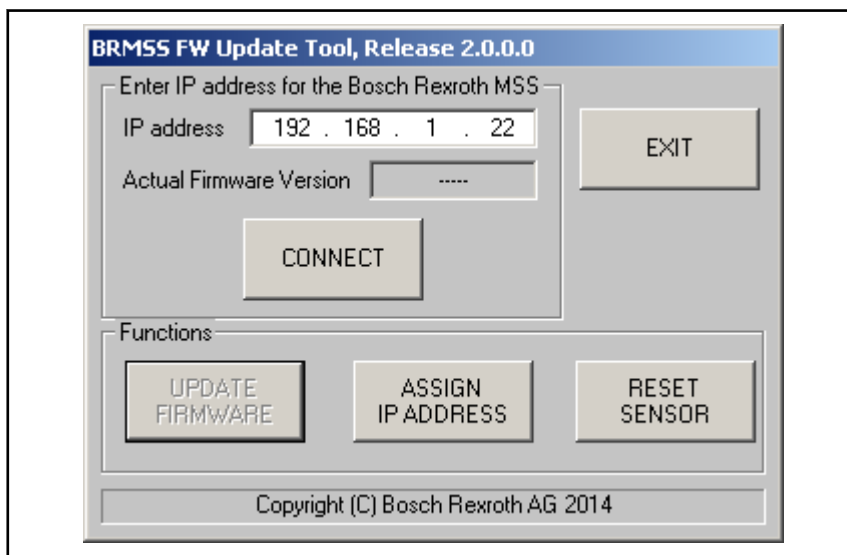


Fig. 7-6: Start screen of firmware update tool

2. Enter the IP address of the sensor and click on **Connect**. A connection is established to the sensor and the current firmware is displayed.



If the IP address is unknown, skip this step and continue with step 3.

Enter the MAC address of the sensor manually in the next step.

Firmware update

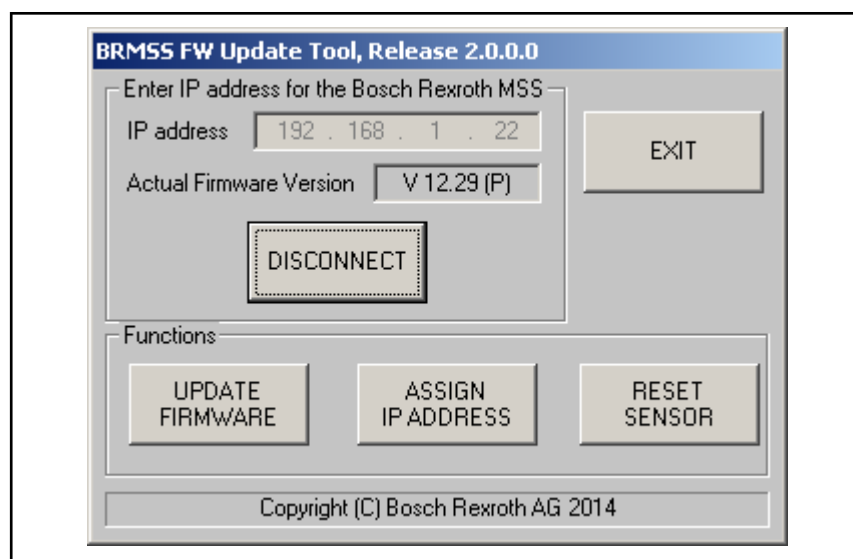


Fig. 7-7: Firmware update tool - Connection active

- Click on **Assign IP address** to open the configuration dialog and enter the MAC address of the sensor.



If there is a connection to the sensor, The MAC address of the sensor is already set.

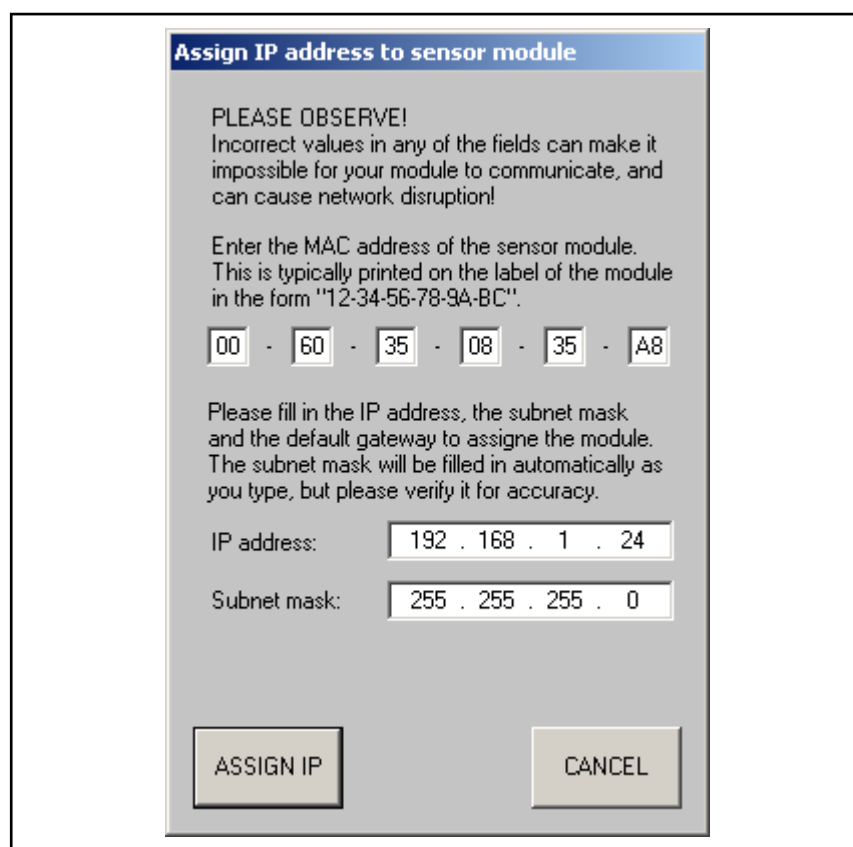


Fig. 7-8: Firmware update tool - Assigning IP address

- Enter the new IP address. The subnet mask is entered automatically using the specified IP address.

Click on **Assign IP** to apply the new IP configuration to the sensor.

Firmware update



The sensor is automatically restarted after applying the IP configuration.

After approximately 30 s, the sensor can be reached using the new IP address.

7.5 Sensor reset

Execute the following steps to restart the sensor:

1. Open the firmware update tool "BRMSSFirmwareUpdateTool.exe".

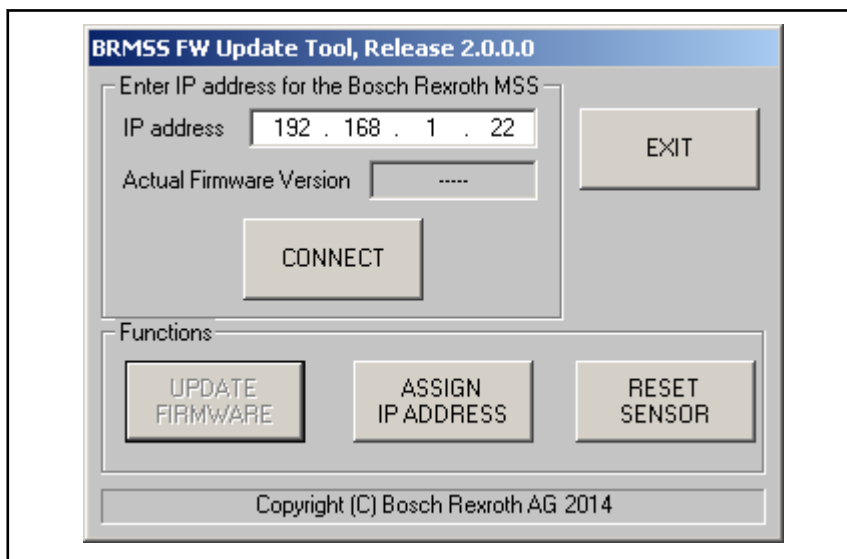


Fig. 7-9: Start screen of firmware update tool

2. Enter the IP address of the sensor and click on **Connect**. A connection is established to the sensor and the current firmware is displayed.



If the IP address is unknown, skip this step and continue with step 3.

Enter the MAC address of the sensor manually in the next step.

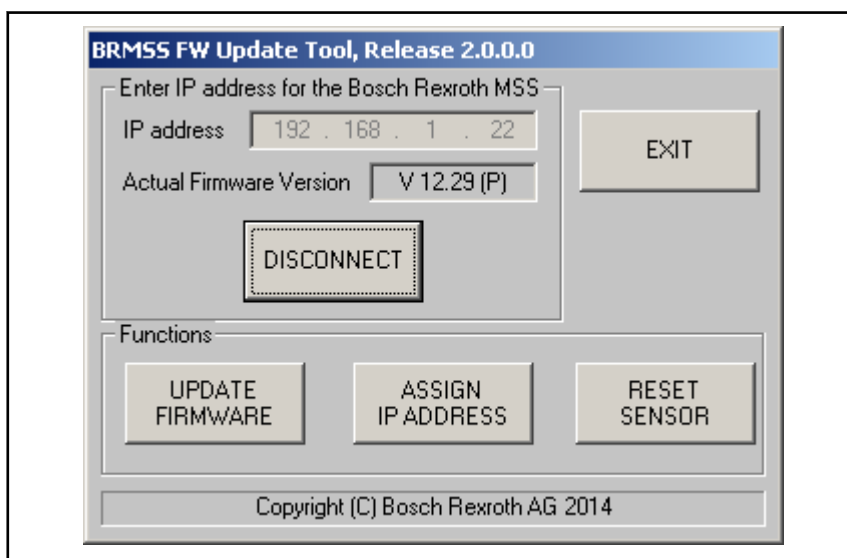


Fig. 7-10: Firmware update tool - Connection active

Firmware update

- Click on **Reset sensor** to open the "Reset" dialog and enter the MAC address of the sensor.



If there is a connection to the sensor, The MAC address of the sensor is already set.

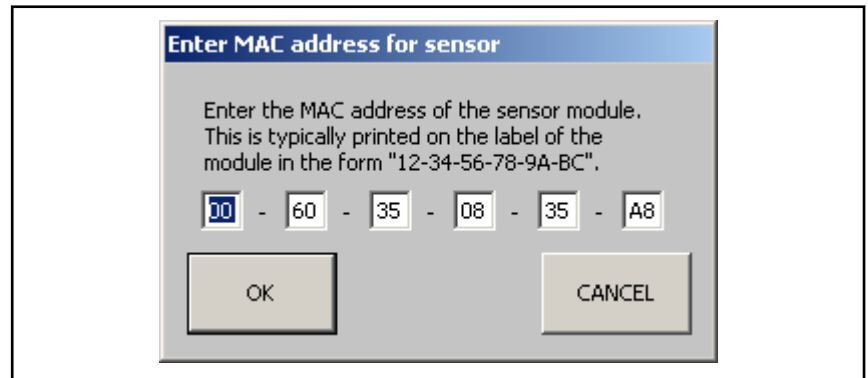


Fig. 7-11: Firmware update tool - Reset sensor

- Click on **OK** to apply the "Reset" command to the sensor.
After a successful sensor restart, it can be connected again to the sensor using the firmware update tool.



The sensor restart can take up to 30 s.

8 Commissioning the HMI interface

8.1 General information

When commissioning the HMI interface, it has to be differentiated between the central visualization of the configuration and the operation of the machine and the decentral visualization for the operation of an individual printing unit. General instructions on licensing are given to show the differences between the commissioning of an HMI application of WinStudio in case of a PC-based visualization device with Windows Embedded Standard 7 or Windows 10 and a decentralized visualization device with Windows Embedded Standard 7 in the following sections.

Three variants of the central HMI are available. They run exclusively on a PC-based visualization device.

1. **4:3 format** with a screen resolution of **1280 x 1024** pixels

The following devices are available in connection with this resolution as central HMI:

- Panel PC 19" Touch (IndraControl VPP 60.3)
- Display 19" Touch (IndraControl VDP 60.3) and industrial PC (IndraControl VPB 40.3/VPB 40.4)

2. **16:9 format** with a screen resolution of **1366 x 768** pixels

The following devices are available in connection with this resolution as central HMI:

- Panel PC 15.6" Touch (IndraControl VPP 15.3)
- Embedded panel-PC 15.6" Touch (IndraControl VEP 15.6)
- Display 15.6" Touch (IndraControl VDP 15) and industrial PC (IndraControl VPB 40.3/VPB 40.4)
- Panel PC 15.6" Touch (IndraControl VRxx15)
- Display 15.6" Touch (IndraControl DR0015) and industrial PC (IndraControl VRxx00)
- Display 18.5" Touch (IndraControl DR0018) and industrial PC (IndraControl VRxx00)

3. **16:9 format** with a screen resolution of **1920 x 1080** pixels

The following devices are available in connection with this resolution as central HMI:

- Display 21.5" Touch (IndraControl VDP 21) and industrial PC (IndraControl VPB 40.3/VPB 40.4)
- Panel PC 21.5" Touch (IndraControl VRxx21)
- Display 21.5" Touch (IndraControl DR0021) and industrial PC (IndraControl VRxx00)

The printing unit dialog is available for decentral visualization. The dialog can be integrated into the decentralized machine operation on an Embedded Terminal IndraControl VEP 40.4. Windows Embedded Standard 7 is provided as operating system for this device.



The decentral printing unit dialog can only be used with the central visualization as the printing unit dialog requires the configuration data of the central visualization.

Commissioning the HMI interface

8.2 WinStudio licensing

8.2.1 Introduction

The graded license model permits an optimized adjustment to the required number of variables and the required functional scope. The larger license package covers the functional scope of the smaller package. An upgrade to the next higher license class is possible.

The WinStudio licensing procedure changed with the introduction of WinStudio 7.x (from IndraWorks 09VRS). In the following, please find a description of the new license management.

8.2.2 Overview on WinStudio licenses

The following licenses are available:

- **WinStudio Lite**

This license is part of the IndraWorks installation. The user can create and execute WinStudio projects with a maximum of 500 variables (tags). Moreover, all CE devices are equipped with a Lite license to execute Lite runtime projects. With this license, alarms, recipes, reports, trends as well as TCP/IP and DDE driver sheets are not executed and cannot be created or edited

- **WinStudio Runtime 1K5 / 4K / 16K / 64K / 512K (RUN licenses)**

For WinStudio runtime projects, licenses with up to 1,500, 4,000, 16,000, 64,000 and 512,000 WinStudio variables (tags) are available

- **WinStudio Engineering and Runtime 1K5 / 4K / 16K / 64K / 512K (RUD licenses)**

With this license, WinStudio projects with up to 1,500, 4,000, 16,000, 64,000 or 512,000 WinStudio variables (tags) can be created and executed

- **WinStudio demo license**

With this license, the WinStudio functional scope can be tested within 30 days. After the test period, the last valid license (e.g. Lite license) is active

The demo license can only be activated once.



Only 1K5 and 4K runtime licenses are available for the activation on an IndraControl VEx device.

8.2.3 Activating a WinStudio license

The individual "WinStudio Runtime" and "WinStudio Engineering and Runtime" licenses are subject to additional costs and have to be activated by entering a license key. The license sheet contains your personal license key.

To activate the license, open the licensing dialog via **Tools ► Options ► General ► Software Licenses** and select "WinStudio". Open the activation dialog via **Licensing...** and enter the activation key.

After license activation, WinStudio Engineering or IndraWorks Operation might have to be restarted.

Saving license on dongle

The activation key is only valid for one PC. To use a license on several PCs, save it on a dongle. The license is valid as long as the dongle is plugged into a USB interface of the computer. Windows CE licenses (VEx) cannot be transferred to a dongle.

License activation on VEx devices

Commissioning the HMI interface

To enable a WinStudio license on a VEx device with a Windows CE operating system, open the licensing dialog on the VEx device in the Windows start menu via **Programs ► Rexroth ► WinStudio ► License management** and enter the activation key. The licensing software is already installed on new VEx devices. If you have a VEx device without pre-installed licensing software, install the IndraWorks visualization software on the VEx device and enable the WinStudio license.

To save the license setting, start IndraWorks Operation on a VEx device and subsequently back up the Windows registry.



The license activation via the WinStudio remote agent is not possible anymore with the new licensing procedure. Use the IndraWorks licensing dialog to activate the license (as described above).



The license key cannot be transmitted anymore via the integrated WinStudio function due to the new licensing procedure. The license key has to be directly entered at the VEx device.



The IndraWorks license component for Windows CE is already installed on new devices. To update an already existing VEx device with the new software, install the runtime components on the VEx device via the context menu of the VEx device in IndraWorks Engineering using the function **Install software**. The link might not be given. In this case, start the licensing dialog via `\StorageCard\Rexroth\WinStudio\bin\IndraWorks.LicenseImport.CE.exe`. The licensing component requires .Net CompactFramework 2.0 so that only the firmware has to be updated.

8.2.4 Consequences of a missing or a lower-class license

When opening a project with the WinStudio that was editor created on another computer with a higher class WinStudio license, the elements subject to license in WinStudio Engineering are not activated. Thus, these elements can neither be created nor edited.

When starting IndraWorks Operation, a message displays that the available WinStudio license is insufficient for the current project. No WinStudio screens are displayed in case of an insufficient or missing license.



If you still want to use the current project, activate the demo license. Use the IndraWorks licensing dialog to activate the license (as described above).

8.3 Preconditions to use the central visualization for the register control

The centralized visualization was designed for a PC-based 19" visualization device in 4:3 format as well as for different PC-based visualization devices (15", 18", 21") in 16:9 format.

Thus, the central HMI can be executed on the following devices:

1. **4:3 format** with a screen resolution of **1280 x 1024** pixels
 - Panel PC 19" Touch (IndraControl VPP 60.3)

Commissioning the HMI interface

- Display 19" Touch (IndraControl VDP 60.3) and industrial PC (IndraControl VPB 40.3/VPB 40.4)
2. **16:9 format** with a screen resolution of **1366 x 768** pixels
 - Panel PC 15.6" Touch (IndraControl VPP 15.3)
 - Embedded panel-PC 15.6" Touch (IndraControl VEP 15.6)
 - Display 15.6" Touch (IndraControl VDP 15) and industrial PC (IndraControl VPB 40.3/VPB 40.4)
 - Panel PC 15.6" Touch (IndraControl VRxx15)
 - Display 15.6" Touch (IndraControl DR0015) and industrial PC (IndraControl VRxx00)
 - Display 18.5" Touch (IndraControl DR0018) and industrial PC (IndraControl VRxx00)
 3. **16:9 format** with a screen resolution of **1920 x 1080** pixels
 - Display 21.5" Touch (IndraControl VDP 21) and industrial PC (IndraControl VPB 40.3/VPB 40.4)
 - Panel PC 21.5" Touch (IndraControl VRxx21)
 - Display 21.5" Touch (IndraControl DR0021) and industrial PC (IndraControl VRxx00)

A 16k WinStudio runtime license is required to use the central HMI register controller.



Only chapter [chapter 8.4 "IndraControl VPP, IndraControl VPB/IndraControl VDP"](#) on page 70 is relevant to integrate the central HMI register controller.

[chapter 8.5 "IndraControl VEP with Windows Embedded Standard 7 operating system"](#) on page 72 is relevant for decentral visualizations on the visualization devices IndraControl VEP 40.4 with Windows Embedded Standard 7.

8.4 IndraControl VPP, IndraControl VPB/IndraControl VDP

8.4.1 WinStudio settings to be selected

The target system has to be set to "WinStudio 16k" under **Project ► Settings...** in WinStudio.

Commissioning the HMI interface

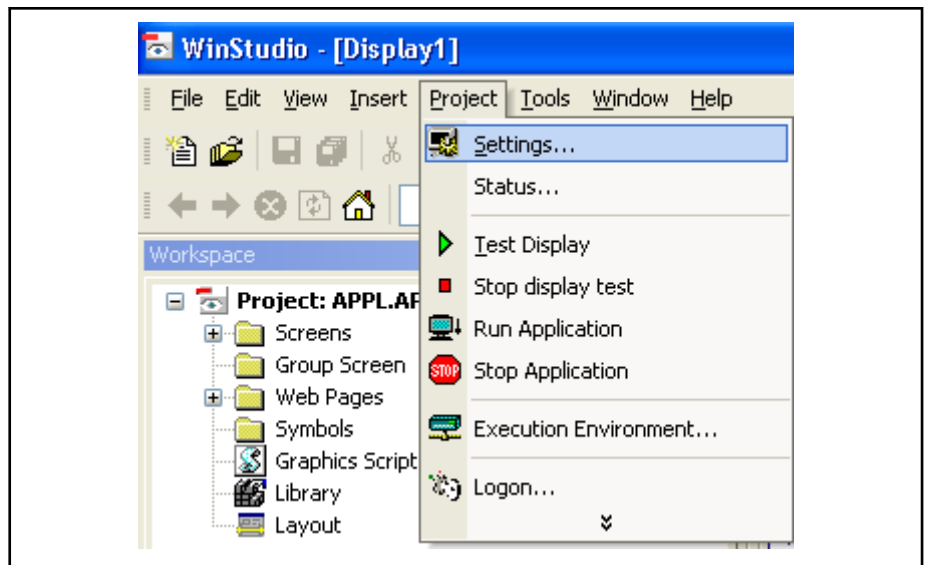


Fig. 8-1: WinStudio settings

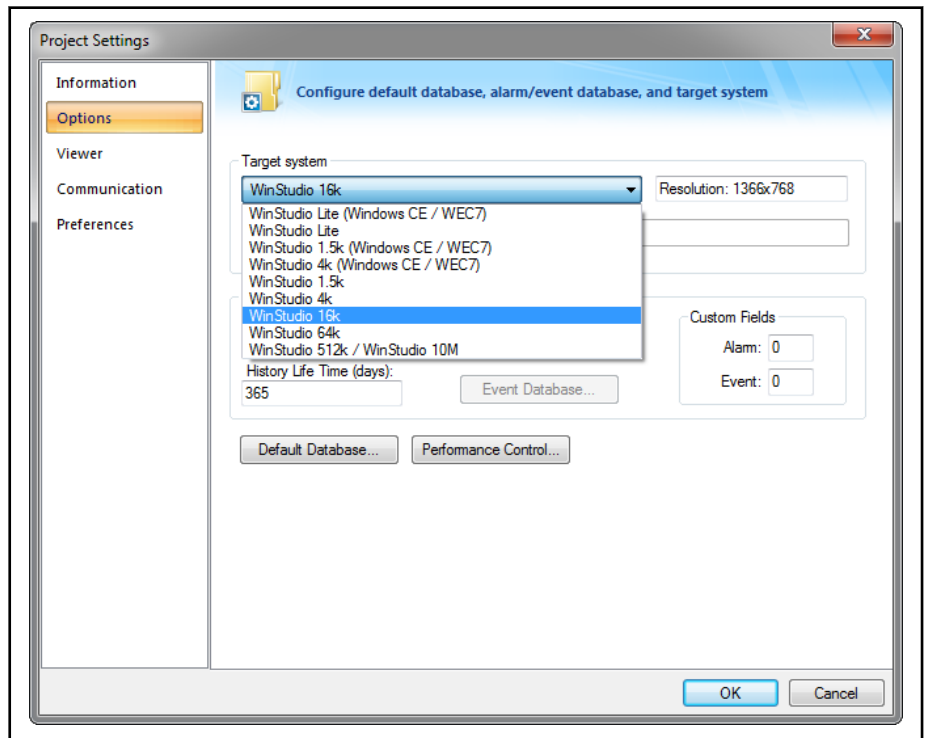


Fig. 8-2: IndraControl VPx – Project settings

8.4.2 Installing additional files

To successfully register the ActiveX-Control of the oscilloscope, the files "VCRedist_2008" and "VCRedist_SP1" have to be installed first. These files are contained on the installation CD of the HMI application in the "UpdateIW_HMI_ActiveX" folder.

8.4.3 Registering ActiveX controls

Copy the folder containing the ActiveX control to the device and execute the "WIN32_UnRegister_OCX.bat" file first and then the "WIN32_Register_OCX.bat" file. A popup window is displayed for each file which confirms the successful execution.

Commissioning the HMI interface



Admin rights are required in Windows 7 and Windows 10 to successfully register the ActiveX control.

8.4.4 Starting runtime

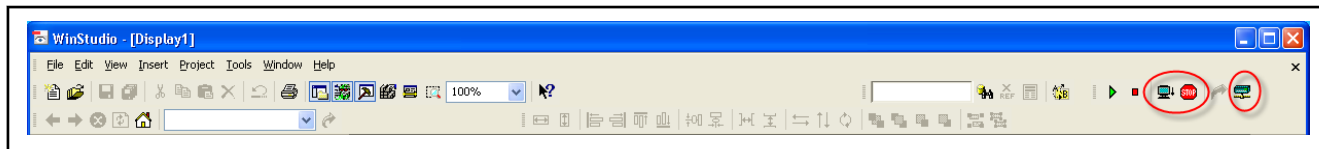


Fig. 8-3: Starting runtime

Before runtime is started, ensure that the execution platform is set to "Local".

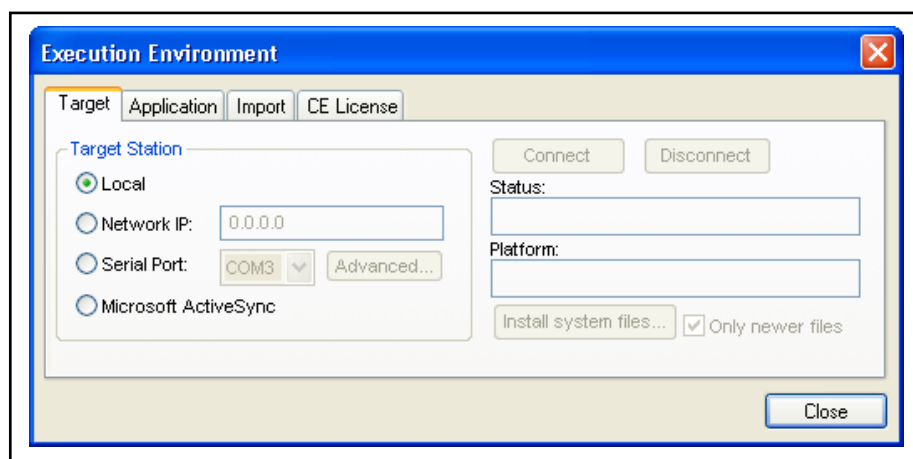


Fig. 8-4: IndraControl VPP – Settings of the development environment



This symbol starts the application in a separate window.

8.5 IndraControl VEP with Windows Embedded Standard 7 operating system

8.5.1 WinStudio settings to be selected

The target system has to be set to "WinStudio 4k" under **Project ► Settings...** in WinStudio.

Commissioning the HMI interface

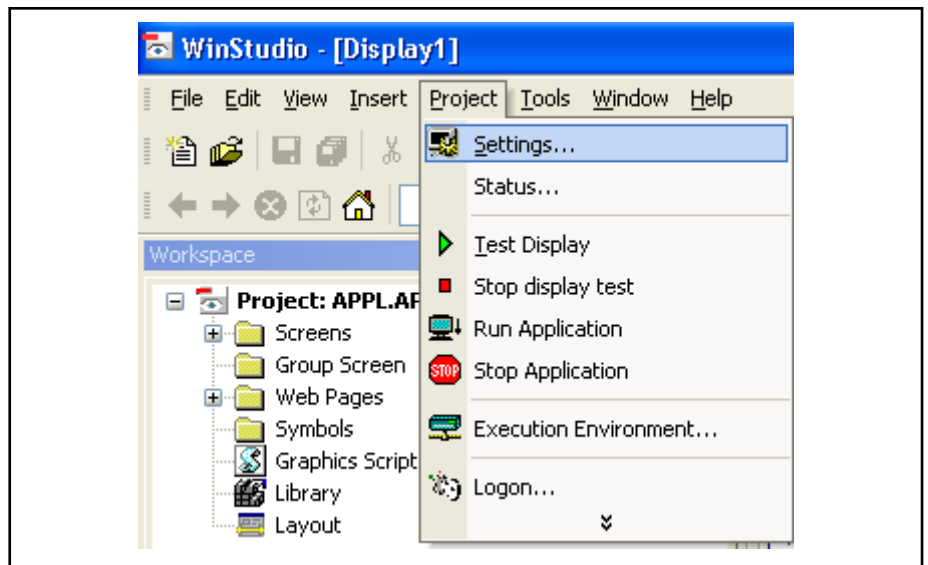


Fig. 8-5: WinStudio settings

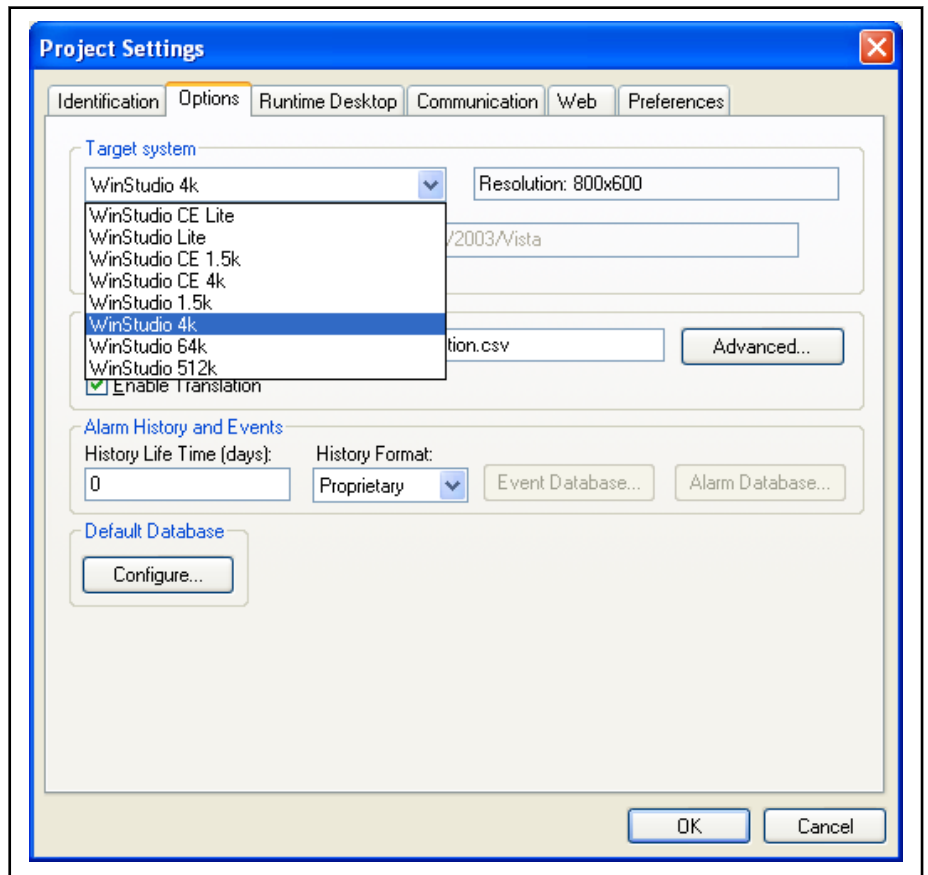


Fig. 8-6: IndraControl VEP - Project settings

8.5.2 Installing additional files

To successfully register the ActiveX-Control of the oscilloscope, the files "VCRedist_2008" and "VCRedist_SP1" have to be installed first. These files are contained on the installation CD of the HMI application in the "UpdateIW_HMI_ActiveX" folder.

Commissioning the HMI interface

8.5.3 Registering ActiveX controls

Copy the folder containing the ActiveX control to the device and execute the "WIN32_UnRegister_OCX.bat" file first and then the "WIN32_Register_OCX.bat" file. A popup window is displayed for each file which confirms the successful execution.



Admin rights are required in Windows 7 and Windows 10 to successfully register the ActiveX control.

8.5.4 Transmitting the application

To transfer an application from a PC to an IndraControl VEP via network, it has to be loaded in WinStudio.

Select "Network IP" in the execution platform and enter the IP address of the IndraControl VEP. A connection to the IndraControl VEP can now be established using the **Connect** button.



Note: To establish a connection, the "Remote Agent" has to run on IndraControl VEP.

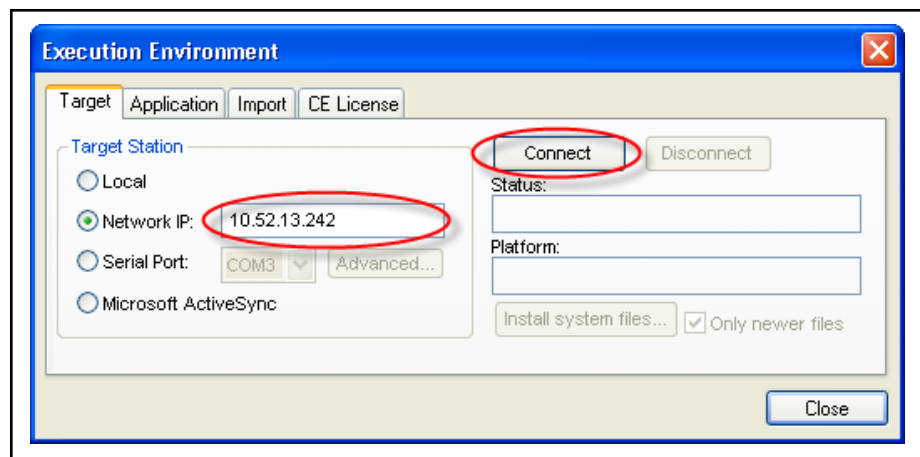


Fig. 8-7: IndraControl VEP – Setting the development environment

Under "Application", the application can be transferred to the IndraControl VEP with the **Send to target** button.

Commissioning the HMI interface

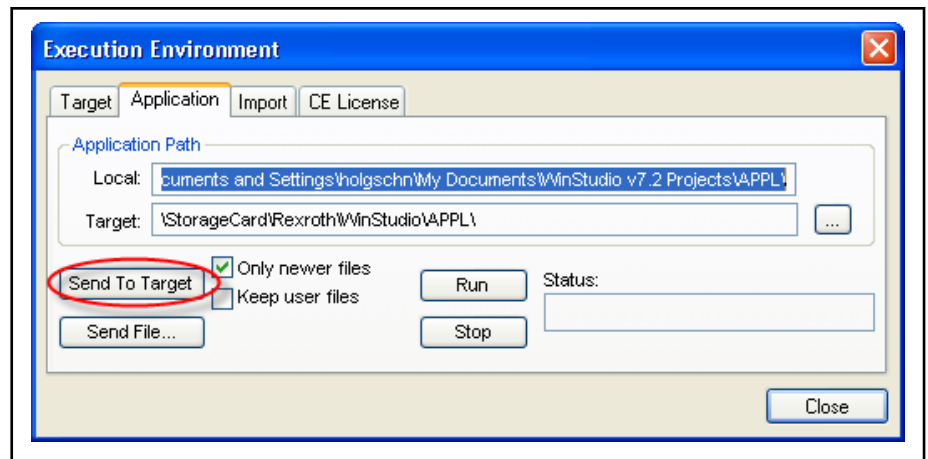


Fig. 8-8: IndraControl VEP - Loading an application

8.5.5 Starting the remote agent

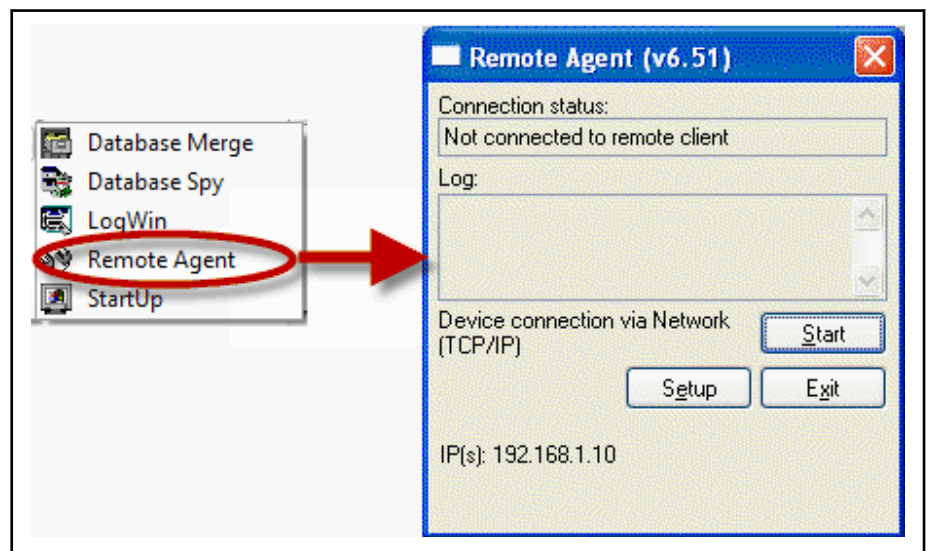


Fig. 8-9: Starting the "remote agent"

To start the application, open the "remote agent" and click on **Start** in the Windows start menu under **Programs ► Rexroth ► WinStudio**.

9 HMI application scenarios

9.1 General information

This chapter describes the different HMI use cases. It is distinguished between the configuration dialogs and the running operation. This chapter provides an overview on the interrelation of the individual dialogs.

The machine has to be configured first. The machine is usually configured once upon the initial commissioning of the machine. The individual jobs can subsequently be configured. One job usually corresponds to one production. During the production, the running process is monitored via the HMI and the diagnostics are queried.

9.2 Overview of all HMI processes

The flow diagram in [chapter 9.2 "Overview of all HMI processes" on page 77](#) shows the main areas of application of the user dialogs for the RegisterControl. All dialogs can be roughly divided into two areas:

1. The configuration dialogs are used to
 - adjust the HMI dialogs to the existing hardware configuration
 - configure the sensors and controllers via the PLC structure for the print job
2. The dialogs for the running operation are used to
 - monitor and visualize the running controller functions and measurement results
 - to adjust controller settings at runtime
 - to graphically represent data, to evaluate quality and to visualize measurement results over a specified period of time

Additionally, there are dialogs to map concurrent processes that are active during the configuration and while the system is running. Topics:

1. User management: to restrict the authorizations on user group level
2. Diagnostics: to analyze error states and the error history
3. Logbook: to record user activities and process activities

HMI application scenarios

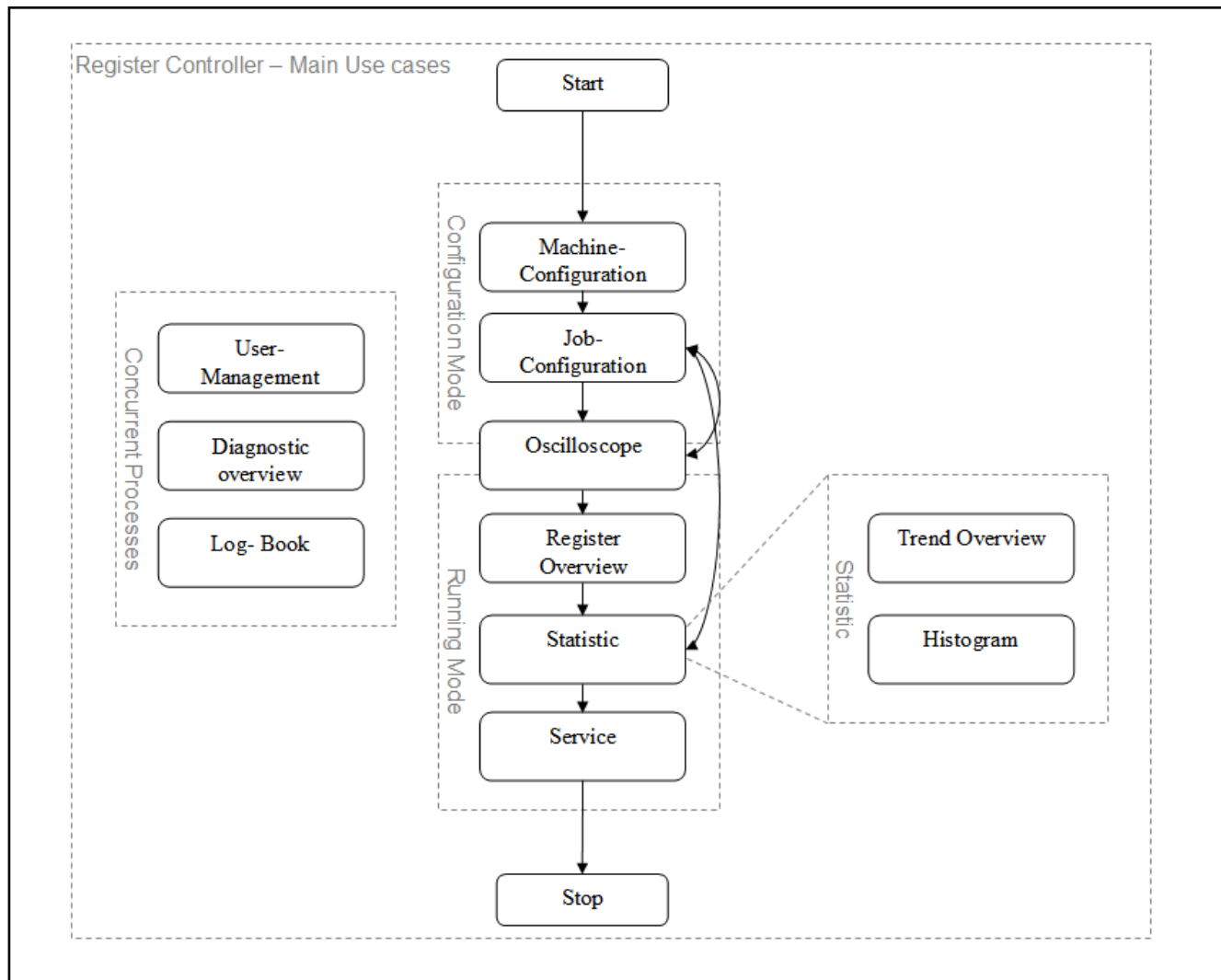


Fig. 9-1: General structure

9.3 Service

The service contains the machine configuration with advanced settings, the language selection and the user management.

The machine configuration forms the basis for the following configuration steps and has to be processed first in an SFC during a commissioning. Generally, the machine has to be configured only once. In the machine configuration dialogs, all specific features of the printing presses are mapped in the software modules.

The basic information is the number of configurable printing units and the respective sensors.

For each machine unit, the respective register settings (length register and side register available) can be selected during the machine configuration depending on the control request.

Another focus is on the communication settings of the control and the sensors in the machine configuration. In the communication settings, the IP addresses, the port numbers to transfer the configuration data and the measured values are to be defined.

HMI application scenarios

In the "Advanced settings", the switch on and switch off thresholds that switch the velocity of the machine on/off, can be changed. The decoupling can also be enabled under "Advanced settings".

The desired language can be selected using the language selection.

All users of the HMI application are divided into special groups. Authorizations for different areas and functions can be given to and revoked from the groups depending on their tasks. The authorizations are managed at runtime via special dialogs.

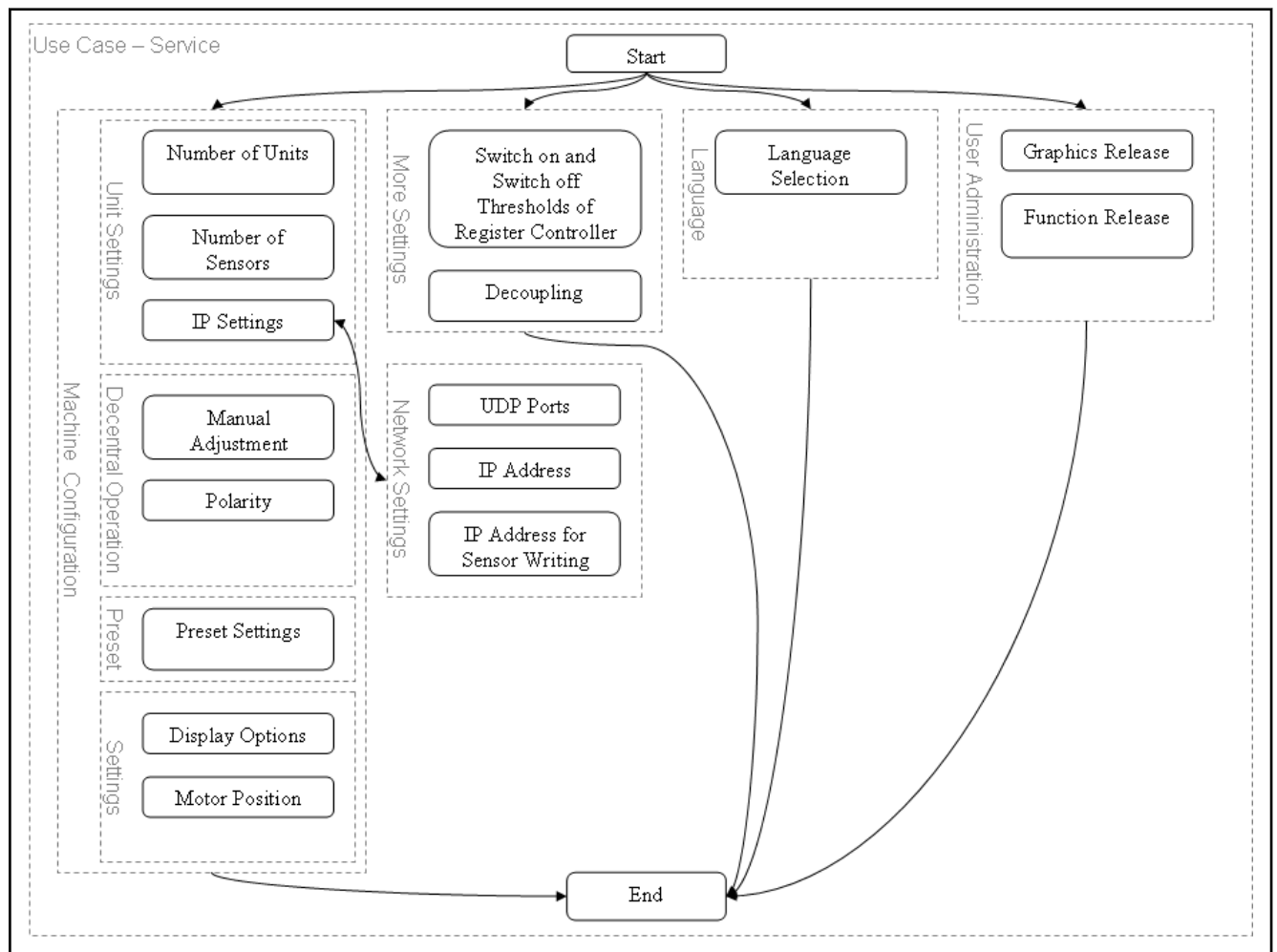


Fig. 9-2: Service

9.4 Production

The dialogs for the production are used to visualize the process variables of the register errors for the user. These process variables are provided for each printing unit or other processing units with register controller. The length register error as well as the side register error are displayed. Printed paper waste can be displayed by a color change via a defined alarm area.

Apart from the visualization of the current register deviation, dialogs are provided in the running operation which allow statistic analyses of the process variables over a certain period of time. Dialogs:

- Trend overview: Displays register errors over a defined period of time.
- Histogram: Categorizes measurands (deviations) and can thus be used for the quality assurance.

HMI application scenarios

The display of the mark status and the sensor status as well as the functionality to switch on / off the register controller are also part of the running operation.

Furthermore, the individual overview of a control station can be accessed from the register overview as well as from the trend overview. In the register overview, a continuous oscilloscope display is shown in which an expectation window can be set.

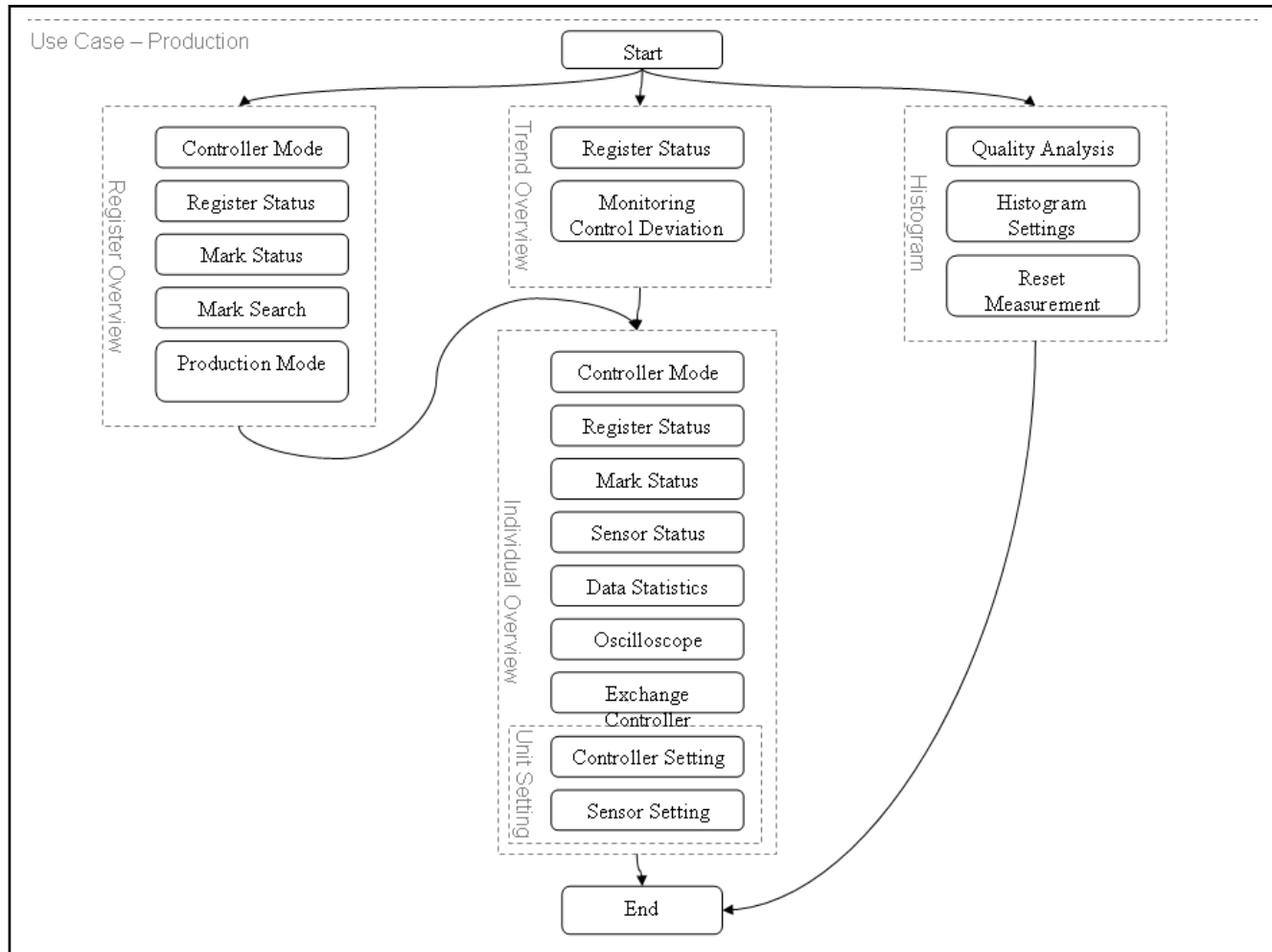


Fig. 9-3: Production

9.5 Job configuration

The job configuration covers an extensive framework consisting of job management and material management as well as dialogs to configure the machine units and their control structures. They are performed using a Wizard by the configuration dialogs of a print job.

The job management allows loading, editing and deleting the existing job or to create a new one. Up to 300 print jobs can be created. A job configuration contains the following data:

- The format and the web width are entered globally for all sensors.
- In the "print configuration", the individual mark and the reference mark are assigned depending on the machine design and the measuring principle (reference color, previous color). In case of deviations from the command value, the controlling element behavior is specified in the

HMI application scenarios

controller parameters for length register and side register that are also part of the print configuration

- In the "mark stream configuration", the mark geometry and the mark alignment can be defined. These settings apply globally for all sensors of the printing press. Furthermore, a barcode can be defined.
- The "material data" of the printing web is used to calculate the acceleration compensation (elasticity, grammage) and as input parameter for the mark stream sensor (color scaling, intensity scaling). A maximum of the 16 material data records can be preconfigured and saved.

The settings for fine adjustment for the automatic format correction are contained on the left side of the preset. The drive position of the length register is contained on the right side.

The dialog for the side register preset contains the data of the drive position for the adjusting unit of the side register.

The methods for precontrol during the acceleration phase can be configured in the acceleration dialog.

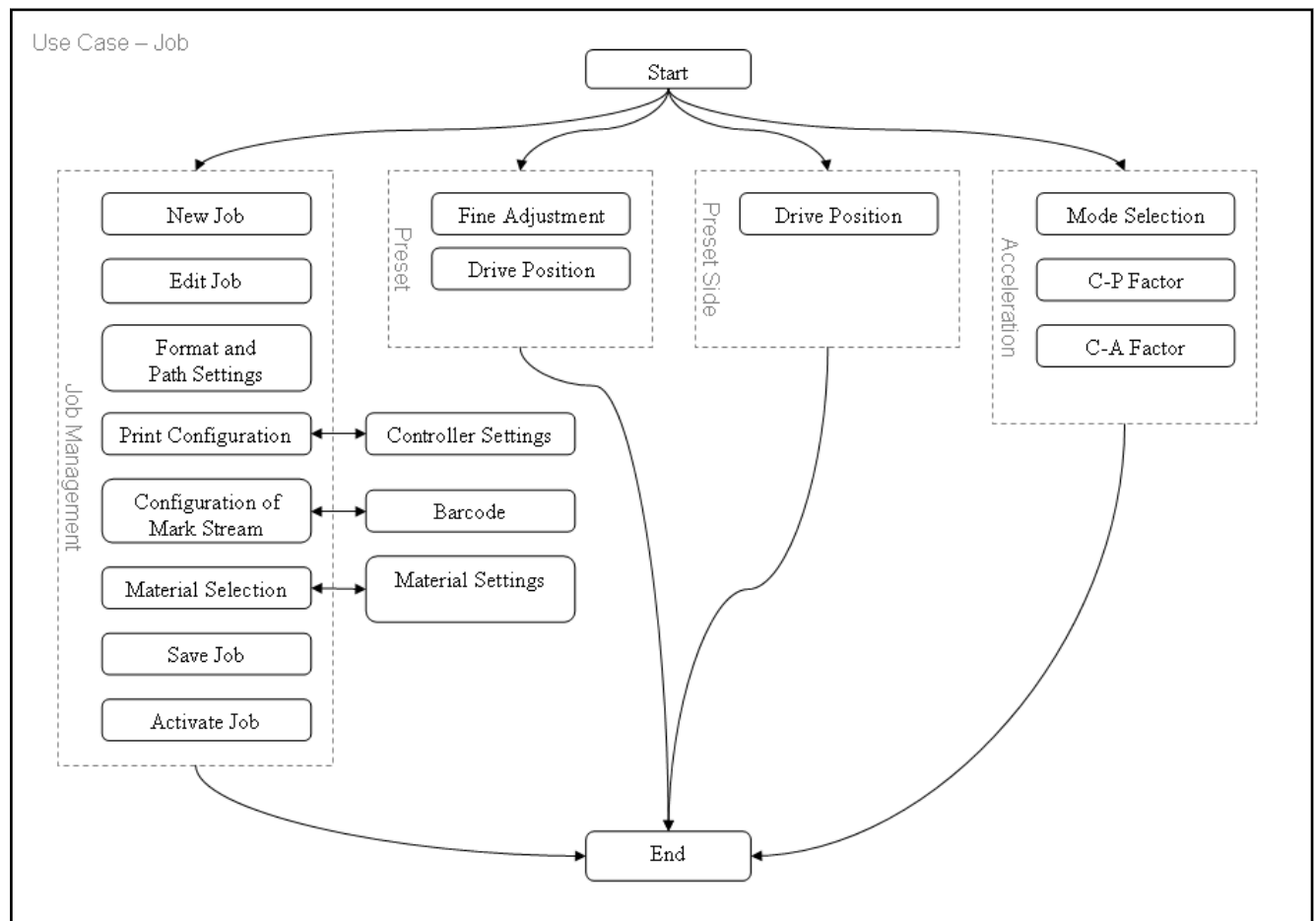


Fig. 9-4: Job

9.6 Diagnostics

The diagnostic overview ensures the analysis of error states during the runtime of the application. It is distinguished between diagnostic data of the HMI (e.g. driver status) and data of the PLC function block outputs. Only the

HMI application scenarios

current error states are listed as default setting. Additionally, the analysis of historical data is possible.

An expectation window can be set in the oscilloscope function of a continuous display to analyze the marks of the individual controllers.

The logbook functionality provides the option to record user actions as well as system warnings, to use the data for a later analysis.

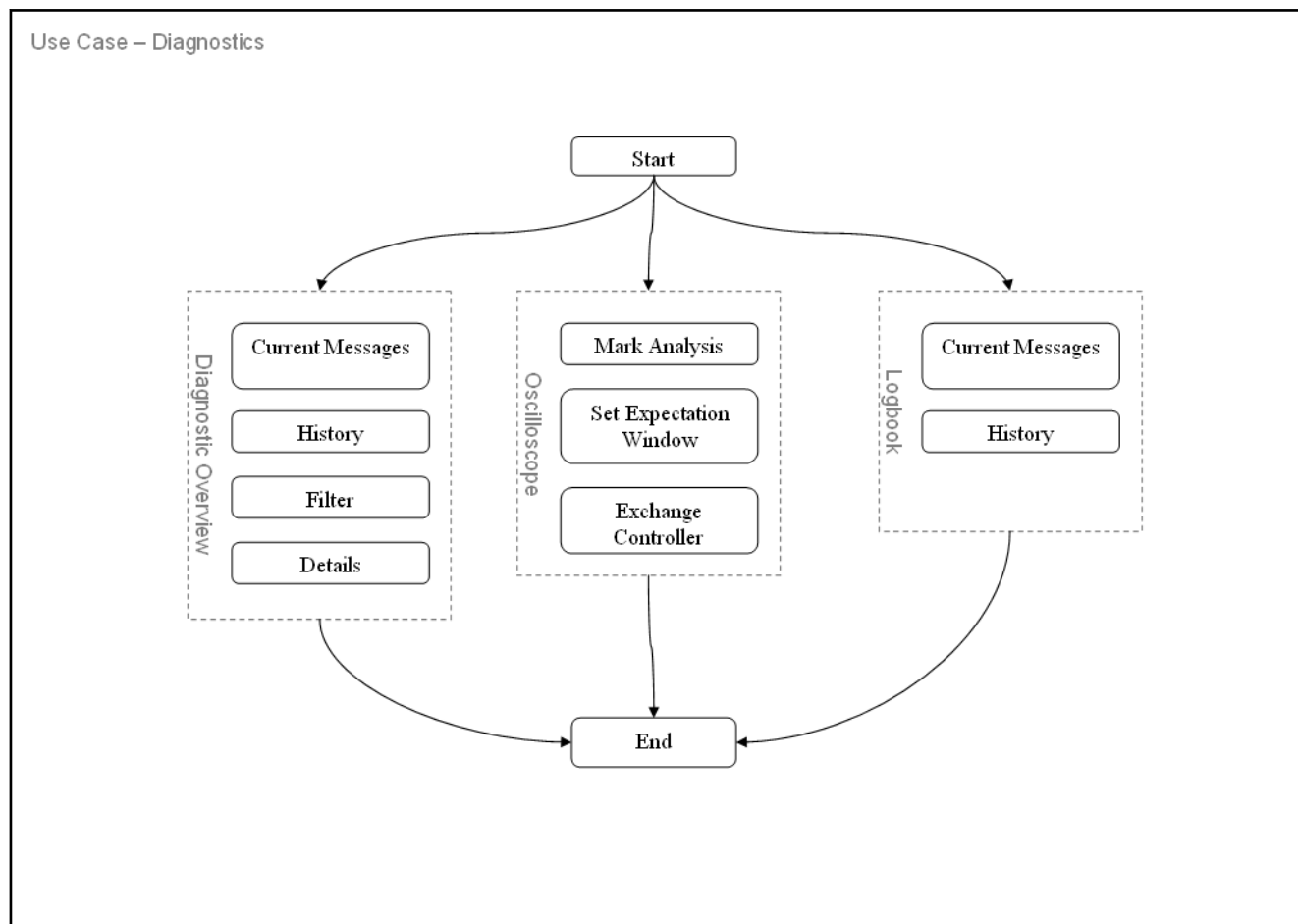


Fig. 9-5: Diagnostics

10 HMI dialog and element description

10.1 General information

This chapter describes the current HMI dialogs, their elements and functionalities.

The general dialog structure consisting of the following components is described:

- Header
- Navigation line
- Arrow wizard or the shift bar of the printing unit
- Right sidebar
- Content area

Subsequently, the individual dialogs of the machine configuration and the job configuration are described.



As the dialogs of the machine configuration for narrow web applications (license variant FWS-IM*MLC-TEC-NNVRS-NN-REGI*EXT) differ from dialogs of the machine configuration for applications with terminals (license variants FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV1 and FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADW2), these dialogs are described separately in the following chapters.

10.2 Navigation structure

The navigation is divided into 2 levels. Other menu items can exist in a dialog that are not shown in the navigation frame. The "main navigation bar" is the main feature of the navigation structure. It contains individual main topics of the user guidance. Main topics:

- Production
- Job
- Quality
- Diagnostics
- Service

Each main topic has its own "subnavigation" in which all topic-related subitems are contained.

HMI dialog and element description

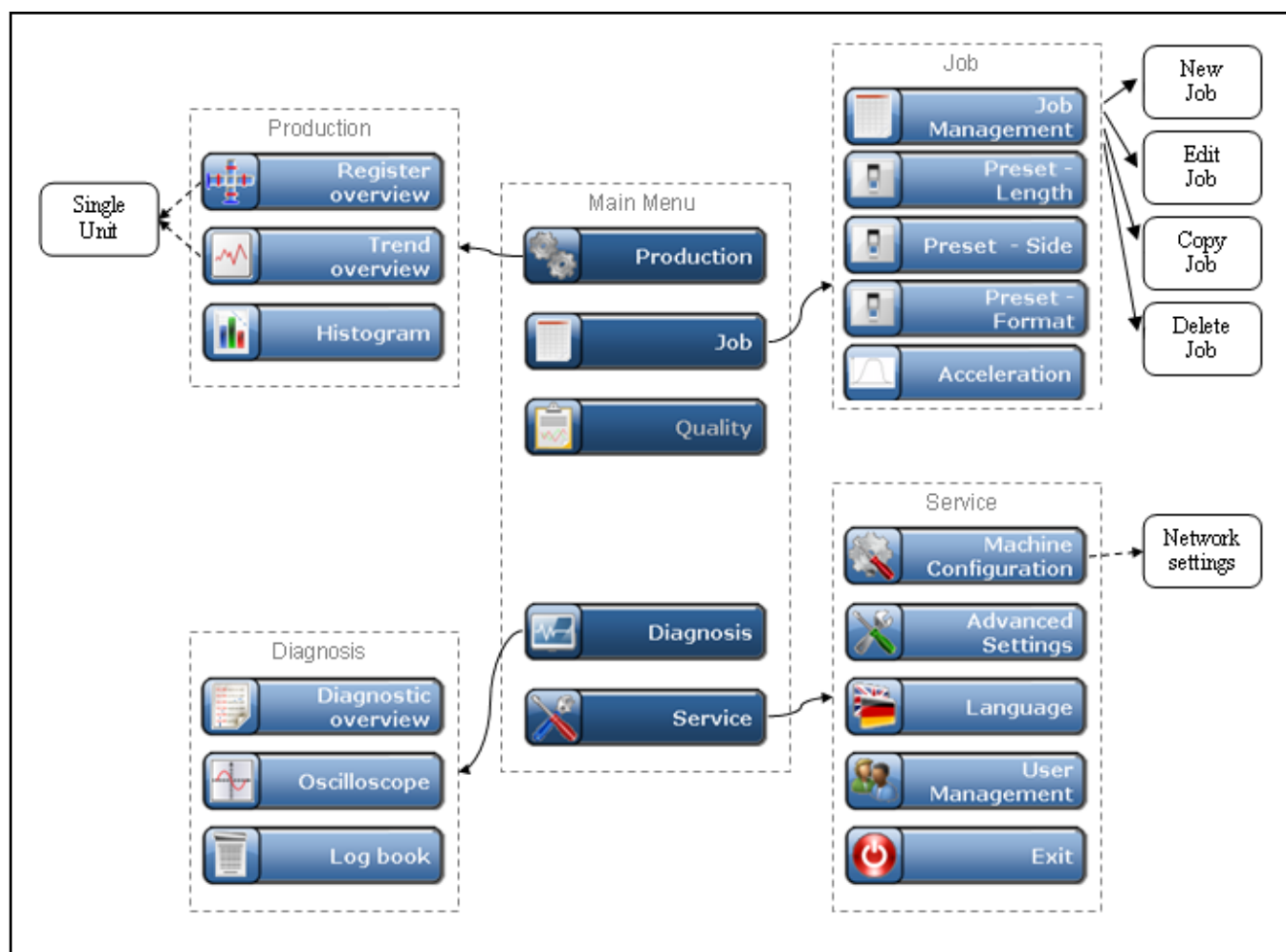


Fig. 10-1: Navigation structure

10.3 Dialog structure

10.3.1 Header

The header shows important information during runtime and is available on each page.

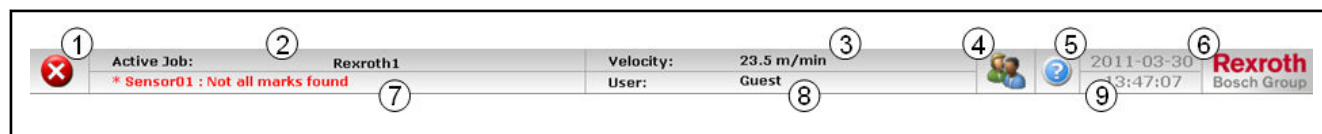


Fig. 10-2: Header

1. Error signal.

The Error button is enabled as long as a global error state is TRUE or at least one unacknowledged error is reported. Clicking on the Error button acknowledges all existing errors.

2. Indicates the name of the currently active print job.

3. Velocity.

The velocity indicates the current production velocity (web velocity) in m/min.

4. It opens the Login/Logout dialog to change the user.

HMI dialog and element description

5. Opens a dialog with information about the PC and the WinStudio application.
6. Current system date.
7. Error status.

The Error Status line shows the latest error in the list. By selecting the status line, it can be changed to the Diagnostic overview.

8. Indicates the name of the currently logged-in user.
9. Current system time.

10.3.2 Navigation area

The double-spaced navigation area is used to switch the screens of the configured HMI dialogs. The main navigation can be found in the lower bar. Switching between the individual subnavigation bars is possible. An individual subnavigation with topic-specific menu items is displayed for each main topic.



Fig. 10-3: Double-spaced navigation bar



The interfaces **Tab 13-24 overview**, **Trend 13-24 overview** and **Bar chart 13-24** are only available for license FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV2, if more than 12 printing units have been defined.

Representation variants of the navigation buttons

It is differentiated between three different representation variants of the navigation buttons:

Deactivated dialog

	Color: Dark blue Font color: White
Description: The dialog is available, but currently not selected/activated	

Activated dialog

	Color: Light blue Font color: black
Description: The dialog is opened/activated	

Locked dialog

	Color: Dark blue Font color: Grey
Description: The dialog is only locked for the currently logged in user. Screen switching is not executed while clicking	

Exit application

Exit application function

HMI dialog and element description



Fig. 10-4: Exit

The subnavigation item "Exit" can be found at the right in the main menu under **Service**. This function is used to exit the HMI application. A dialog opens and the user has to confirm to exit the application.

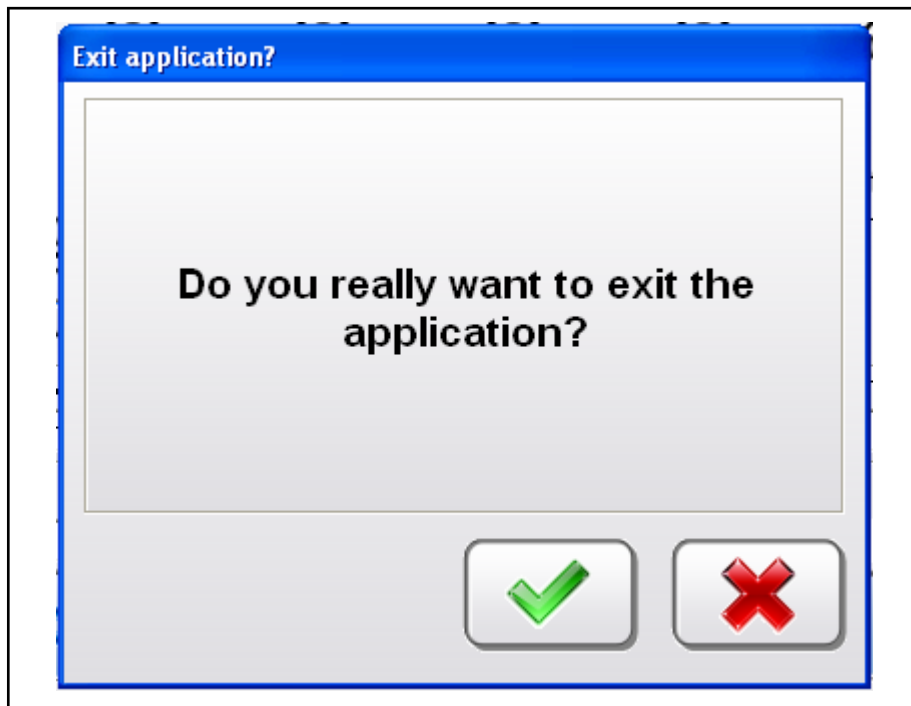


Fig. 10-5: "Exit" dialog

10.3.3 Arrow wizard and switching panel of the printing unit

The arrow wizard and the switching panel of the printing unit are located above the navigation area.

The arrow wizard is used to run the machine and job wizard. The wizard can be canceled by clicking on **Exit**. The changes can be saved before exiting the wizard.



Fig. 10-6: Arrow wizard

The switching panel of the printing unit is displayed for dialogs requiring a switching of the printing units. The printing units that are defined are displayed in their respective color.

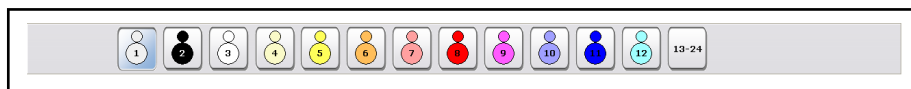


Fig. 10-7: Shift bar for printing units



The **13-24** interface is only available for license FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV2, if more than 12 printing units have been defined. Thus, toggling between the printing units 1-12 and 13-24 is possible using the interfaces.

10.3.4 Sidebar

The right sidebar is used for "Editing". All important dialog functions can be found in the sidebar. The functions can be executed by clicking on the respective button.

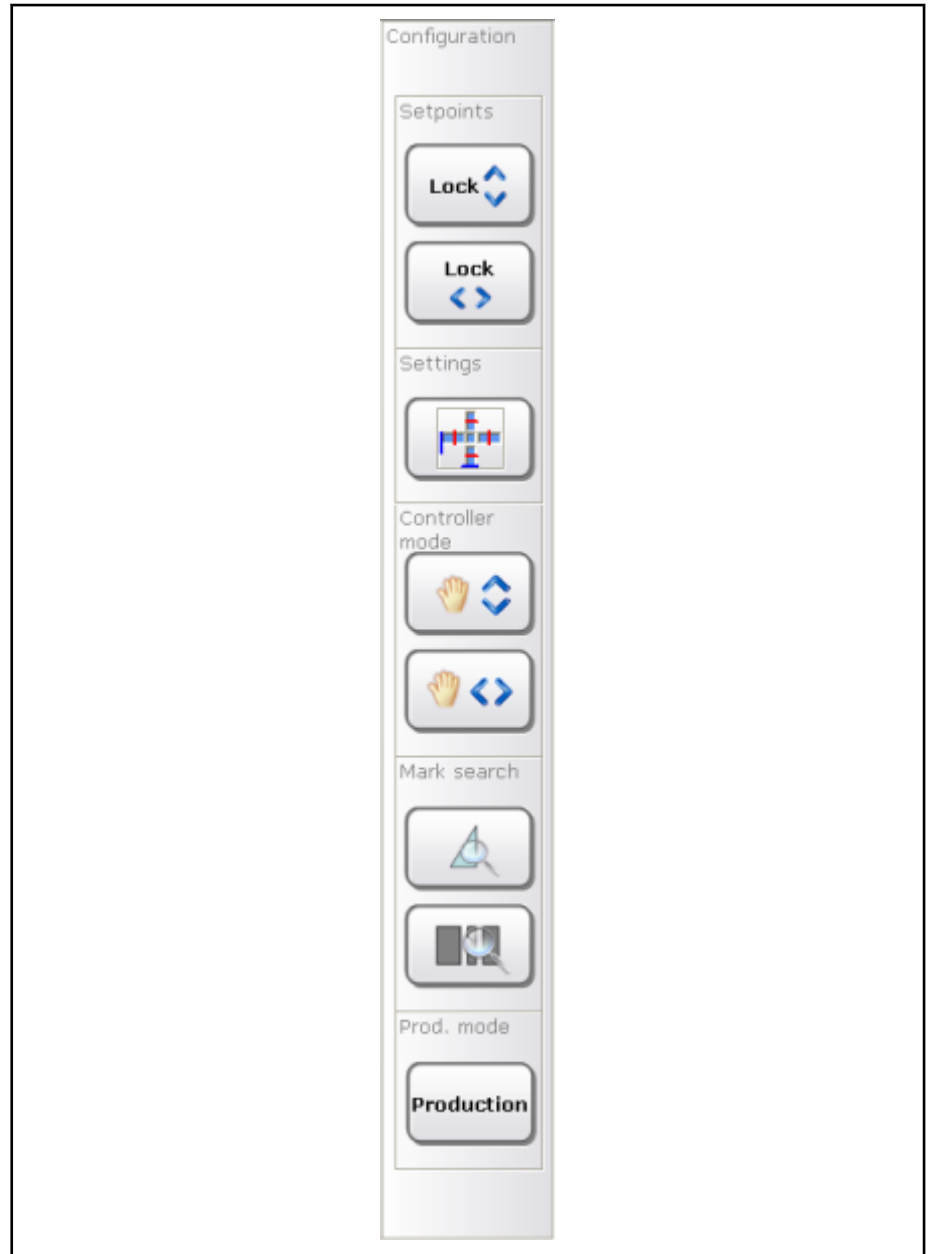


Fig. 10-8: Sidebar

10.3.5 Content area

The content area is the largest part of the dialog and displays the screen contents via navigation. The content area is located between header and arrow wizard, i.e. switching panel of the printing unit. Additional elements to switch screens can also be contained in the content area. These elements are used to divide a dialog into subareas.

HMI dialog and element description

Active Job: 24 Velocity: 27.0 m/min User: Guest 2012-08-09 10:28:46 Rexroth Bosch Group

Printing configuration

1	2	3	4	5	6	7	8	9	10	11	12
Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length
4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]
Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active
Mark 1	Mark 2	Mark 3	Mark 4	Mark 5	Mark 6	Mark 7	Mark 8	Mark 9	Mark 10	Mark 11	Mark 12
Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1
Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1

Length Side

Job Management Preset Length Preset Side Preset Format Acceleration Diagnosis Service

Fig. 10-9: Content area

10.4 Machine configuration for narrow web applications

10.4.1 Brief description

In the machine configuration dialogs (main menu: "Service"), the hardware-dependent machine features are specified while setting up. The dialogs can be divided into the configuration of the processing units (printing units) and the sensors.



The machine is usually configured once when commissioning the machine. When subsequently changing the machine configuration, already defined jobs can sporadically not be used anymore.

The machine is configured via a wizard consisting of four dialogs.

As the dialogs of the machine configuration for narrow web applications (license variant FWS-IM*MLC-TEC-NNVRS-NN-REGI*EXT) differ from dialogs of the machine configuration for applications with terminals (license variants FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV1 and FWS-IM*MLC-

TEC-NNVRS-NN-REGI*ADW2), these dialogs are described separately in the following chapters.

10.4.2 Machine configuration dialog

The following can be entered in the **Service ► Machine configuration** dialog:

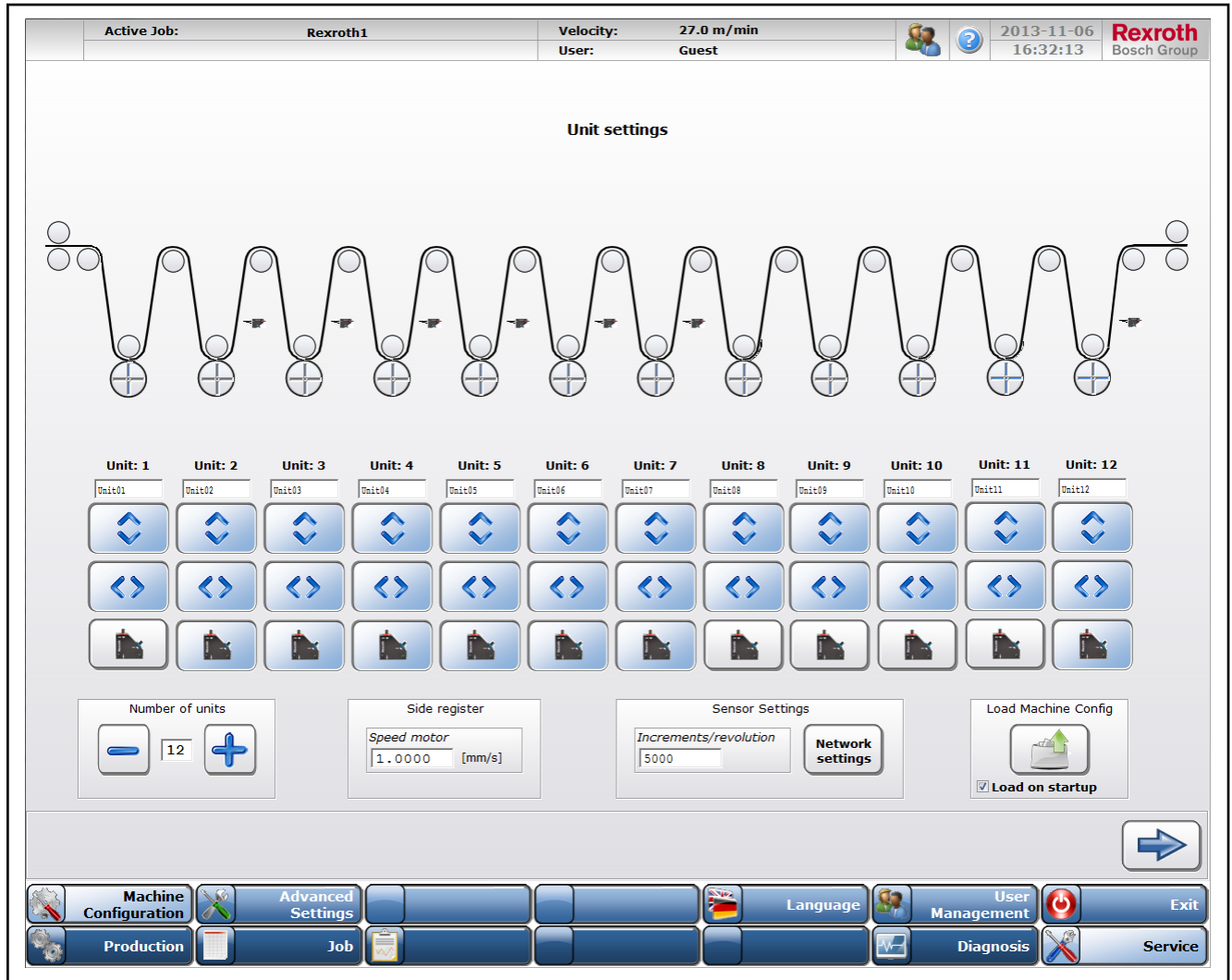
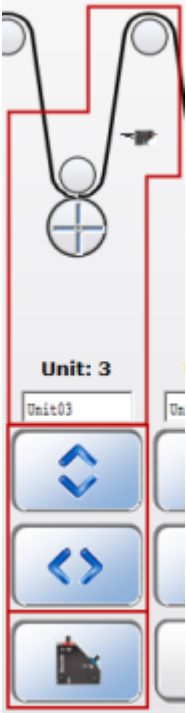


Fig. 10-10: Unit settings

HMI dialog and element description

	The length register and the side register can be enabled using the cursor keys. By means of the sensor interface it can be defined if a sensor is located behind the respective printing unit
Unit name	Specifies a unit name (default: unit x)
Number of units	Number of available machine units (in case of the FWS-IM*MLC-TEC-NNVRS-NN-REGI*EXT, a maximum of 12 machine units can be defined)
Speed motor 1.0000 [mm/s]	Regulating velocity of the side register regulating unit in [mm/s]
Increments/revolution 5000	Increments per cylinder revolution (cf. chapter 5.1 "Parameterization of the incremental encoder emulation" on page 25)
Network settings	Opens another dialog to set the communication parameters for each sensor (cf. chapter 10.4.3 "Machine configuration dialog (communication settings of the sensors)" on page 95)
	Opens a file browser dialog to load a complete machine configuration from a receipt file (xxx_machine.DAT)

The second dialog of the machine configuration wizard allows configuring decentralized control elements. In this dialog, it can be selected whether decentrally executed adjustments via joystick or a decentralized HMI have an effect on the command value or the motor position and their respective polarity.

HMI dialog and element description

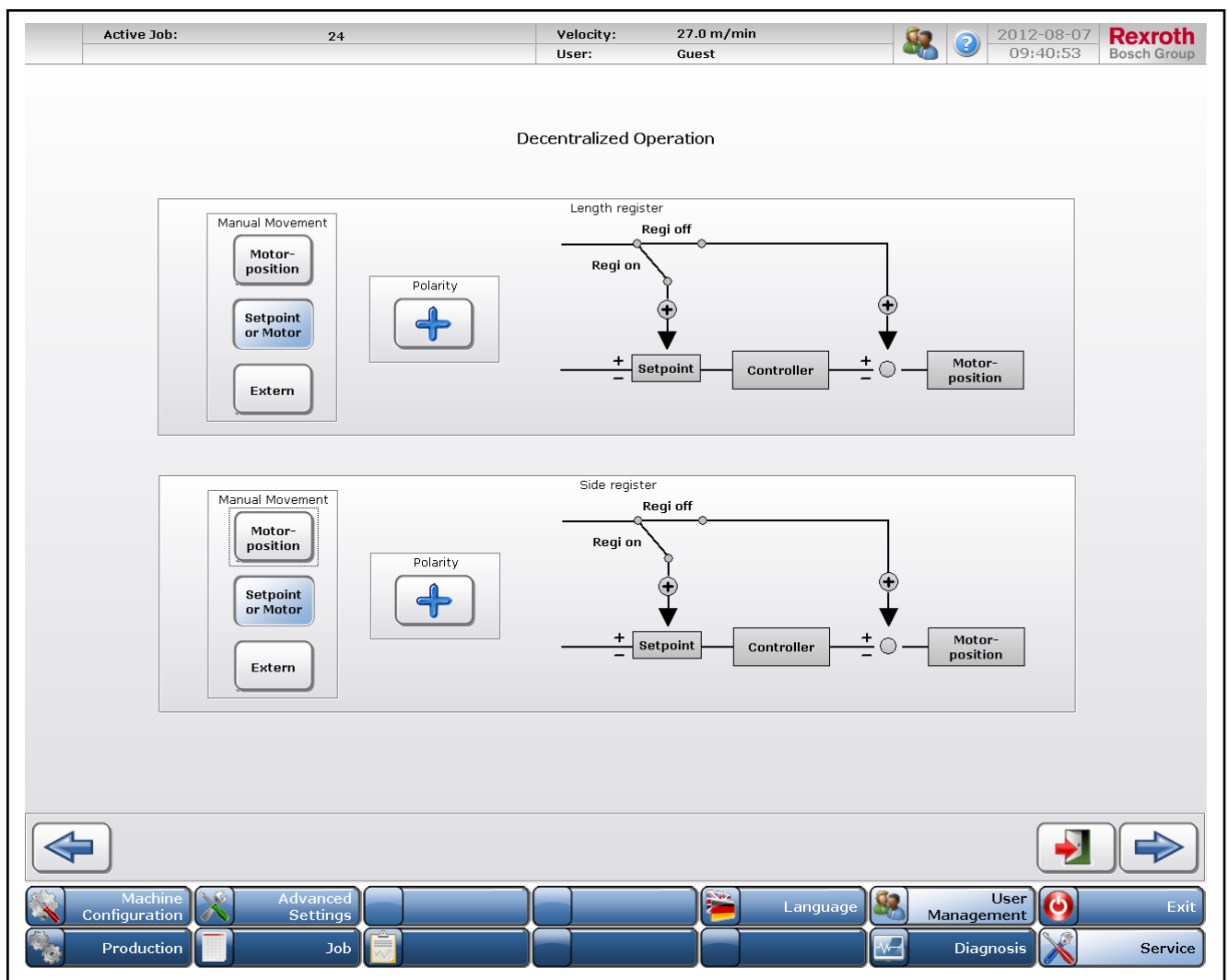


Fig. 10-11: Decentral operation

	Changes joystick polarity or adjustment of decentralized HMI
	The motor position is always jogged during the production process using the arrow keys, irrespective of whether the control is enabled or disabled

HMI dialog and element description

	The motor position is jogged with the arrow keys if the register controller is disabled. The command value is jogged with the arrow keys if the register controller is enabled
	Via the machine interface it can be selected whether the command value or the motor position is to be jogged

In the third wizard dialog, the user can select if he wants to preset the drive position and the side register via the register control or if this is to be done externally, e.g. via the machine program.

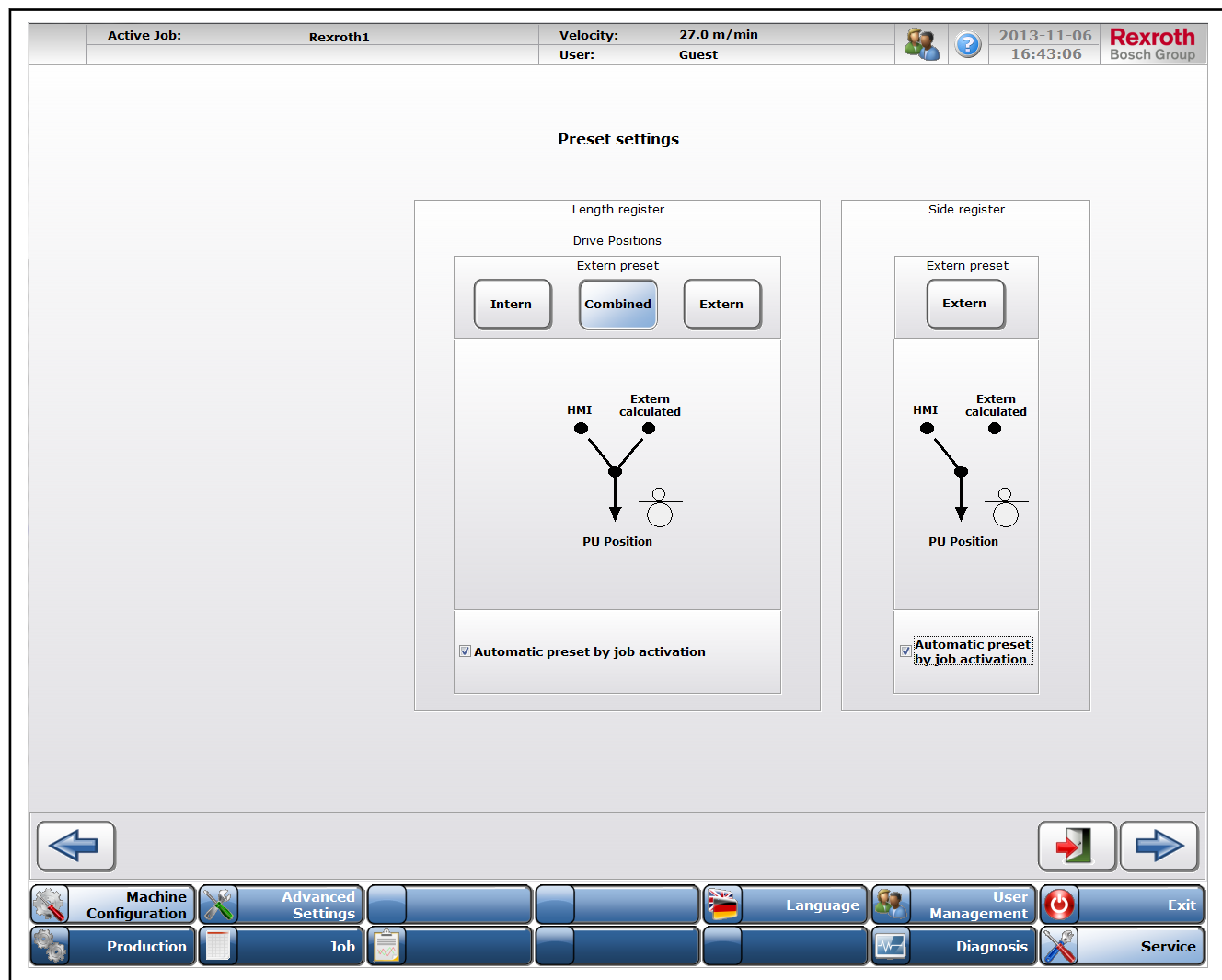
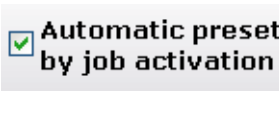


Fig. 10-12: Unit settings

HMI dialog and element description

	If the button is activated, the Preset is executed externally via the machine interface. Individual settings can be selected for the drive position (length register) and the side register
	If this interface is enabled, the preset can be executed via the internal Preset dialog as well as via the machine interface
	If this interface is enabled, the preset can only be executed via the internal Preset dialog
	If the checkbox is enabled, an automatic preset is executed when activating the job. An automatic preset is only possible if the preset handling was not done externally

The fourth dialog of the machine configuration allows configuring the display direction of the deviations, the control direction of the controller and the definition of the machine position.

HMI dialog and element description

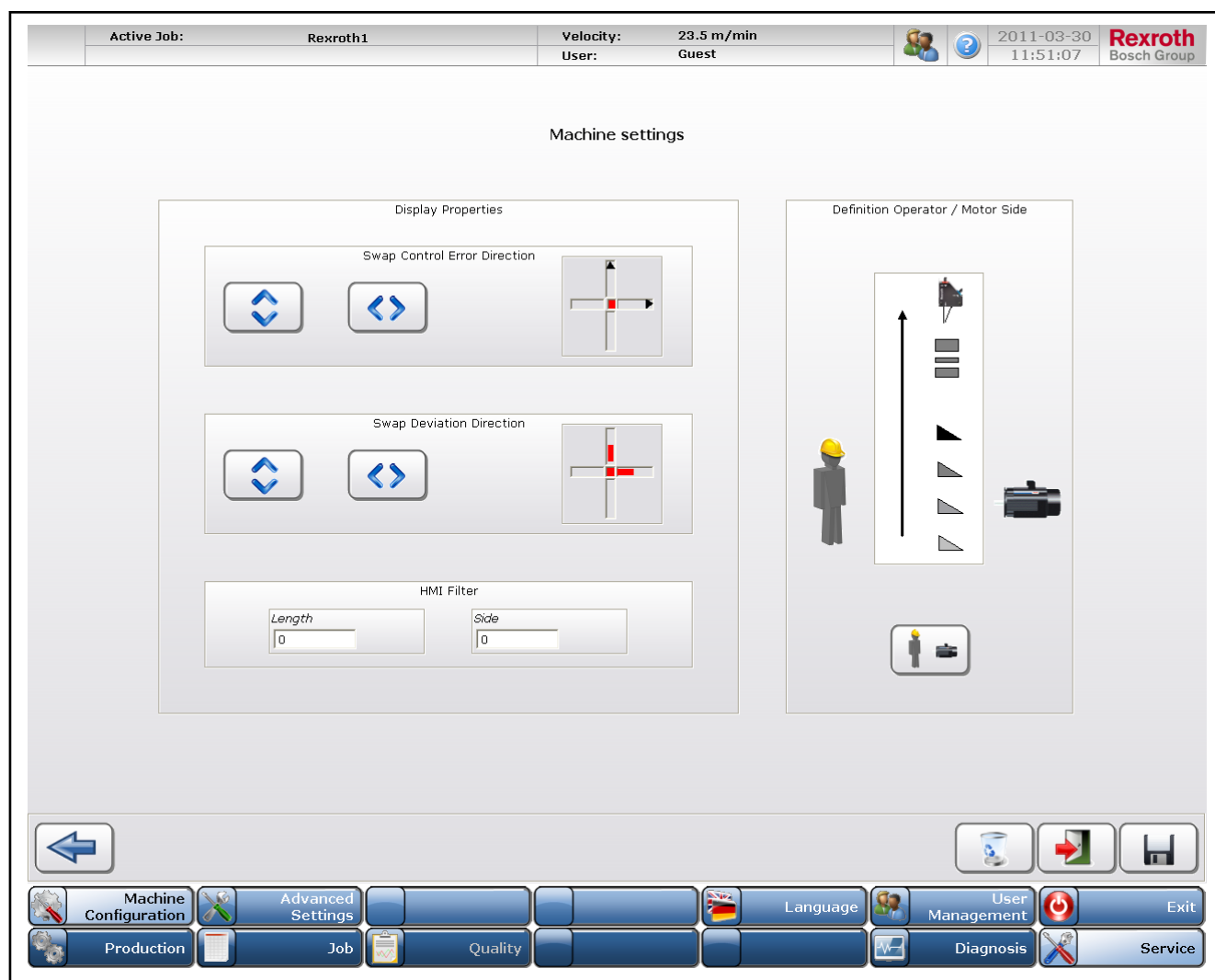


Fig. 10-13: Machine settings

	Opens a dialog to save a complete machine configuration into a recipe file. A new receipt file is created or an existing file is overwritten with 
	A recipe file can now be deleted
	Exiting the machine configuration without saving the modified data
Loading upon start	The checkbox allows the automatic loading of the currently selected recipe file when starting the HMI application. The checkbox can be ticked when saving the recipe

HMI dialog and element description

Change direction of deviation	Changes the polarity of the displayed register deviation
Invert display	Changes the polarity of the arrows for the control direction
	Changes the position of the machine operator with regard to the machine. It is required to correctly define the mark stream in the job configuration

10.4.3 Machine configuration dialog (communication settings of the sensors)

The configuration settings of the sensors are selected in this dialog. Each sensor requires an IP address and 2 ports for the measured data and the configuration. The settings can be opened in the first dialog of the machine configuration via "IP settings".



Each port and each IP address can only be assigned once.
 Multiple assigned IP addresses and ports are highlighted in red and have to be changed.
 The specified ports are ports on the control and not on the sensor.



The UDP ports have to be selected in the range of 6001-6098.
 Port 6040 and port 6042 are used for internal purposes and cannot be entered.
 If one of the ports is entered a dialog is displayed and the input is discarded.

HMI dialog and element description

Active Job: Labor Velocity: 12.8 m/min User: Guest 2014-11-26 14:09:17 **Rexroth**
Bosch Group

Machine configuration - network settings

IP-address Control
192.168.1.10

Unit	Sensor name	IP-address	UDP-Port		Sensor FW	Communication settings	Ping	FW Update
			Measuring	Configuration				
3	Sensor_01	192.168.1.22	6002	6052	12.33	Setup	Ping	FW Upd.
6	Sensor_02	192.168.1.23	6003	6053	12.33	Setup	Ping	FW Upd.

Machine Configuration Advanced Settings Network settings Language User Management Exit
Production Job Diagnosis Service

Fig. 10-14: Overview on the sensor communication settings

The table lists all configured sensors and their communication parameters as well as the firmware version. The parameters of the sensor are edited via

Setup

in the respective line of the sensor to be configured. If the current IP address of the sensor and the IP address of the control are in the same subnet, the IP address of the sensor can also be set in this dialog.

Ping

Press to check the network connection to the sensor.

FW Upd.

By clicking on , the firmware update tool with the configured IP address of the respective sensor is opened. For details about the operation of the firmware update tool, refer to [chapter 7.3 "Updating the firmware" on page 59](#).

This function can be enabled and disabled in the user management.

HMI dialog and element description



If more than 12 sensors are defined in the FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV2 license, another button **13-24** is displayed above confirmation button to toggle to the sensors 13-24.

Active Job: Rexroth1 Velocity: 23.5 m/min User: Guest 2011-03-30 11:52:39 Rexroth Bosch Group

Machine configuration - network settings

Sensor: 2 Sensor name: Sensor02

UDP-Port setup
Measuring port: 6002 Configuration port: 6022

Sensor IP setup
Sensor MAC-address (e.g.: 2A-08-48-01-00-FF): Sensor IP-address: 192.168.1.22 Write IP to sensor

Machine Configuration Advanced Settings Language User Management Exit
Production Job Quality Diagnosis Service

Fig. 10-15: Sensor – Network settings

The following table lists the settings that can be selected for each sensor:



The MAC address name is case sensitive. Setting the IP address is only possible when complying with the case sensitivity.

Sensor	Displays the number of the currently selected sensor
Sensor name	Input field for the sensor name
Measuring port	UDP port to transfer measurement results from the sensor to the control
Settings port	UDP port to transfer the configuration data from the control to the sensor (measuring port and settings port have to be unique)

HMI dialog and element description

Sensor MAC address	MAC address to transfer a new IP address to the sensor (format: XX-XX-XX-XX-XX-XX)
IP address of the sensor	IP address of the sensor (format: XXX.XXX.XXX.XXX)
	Writes the IP address to the sensor specified via the MAC address



If the IP address of the sensor is not in the same subnet as the IP address of the control, The firmware update tool has to be used to set the IP address (refer to [chapter 7.4 "Configuring the IP address" on page 62](#))

If the IP address is changed, ensure that the correct MAC address of the respective sensor was entered. The sensor has to be reset after setting the IP address. To do so, interrupt the voltage supply of the sensor. Alternatively, restart via the firmware update tool (see [chapter 7.5 "Sensor reset" on page 64](#))



The UDP ports have to be selected in the range of 6001-6098.

Port 6040 and port 6042 are used for internal purposes and cannot be entered.

If one of the ports is entered a dialog is displayed and the input is discarded.

10.5 Machine configuration for applications with terminals (e.g. gravure printing)

10.5.1 Brief description

In the machine configuration dialogs (main menu: "Service"), the hardware-dependent machine features are specified while setting up. The dialogs can be divided into the configuration of the processing units (printing units) and the sensors.



The machine is usually configured once when commissioning the machine. When subsequently changing the machine configuration, already defined jobs can sporadically not be used anymore.

The machine is configured via a wizard consisting of four dialogs.

As the dialogs of the machine configuration for narrow web applications (license variant FWS-IM*MLC-TEC-NNVRS-NN-REGI*EXT) differ from dialogs of the machine configuration for applications with terminals (license variants FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV1 and FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADW2), these dialogs are described separately in the chapter.

10.5.2 Machine configuration dialog

The following can be entered in the **Service ► Machine configuration** dialog:

HMI dialog and element description

Active Job: 24				Velocity: 27.0 m/min				2012-08-07 08:44:01 Rexroth Bosch Group	
				User: Guest					

Unit settings

Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length
2000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]

Distance
4800 [mm]

Unit: 1	Unit: 2	Unit: 3	Unit: 4	Unit: 5	Unit: 6	Unit: 7	Unit: 8	Unit: 9	Unit: 10	Unit: 11	Unit: 12
Unit01	Unit02	Unit03	Unit04	Unit05	Unit06	Unit07	Unit08	Unit09	Unit10	Unit11	Unit12

Number of units

-

24

+

Side register

Speed motor
 1.0000 [mm/s]

Sensor Settings

Increments/revolution
 5000

Network settings

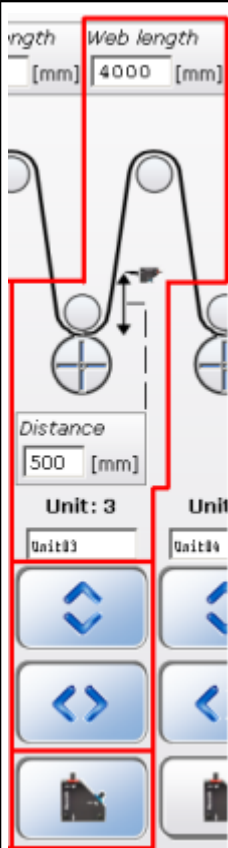
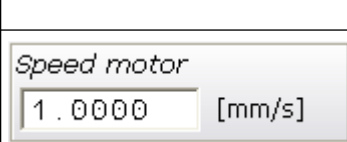
Load Machine Config

☒ Load on startup

Machine Configuration	Advanced Settings			Language	User Management	Exit
Production	Job				Diagnosis	Service

Fig. 10-16: Unit settings

HMI dialog and element description

	The length register and the side register can be enabled using the cursor keys. By means of the sensor interface it can be defined if a sensor is located behind the respective printing unit
Web length [mm]	Web length to the printing unit located in front
Distance to the sensor [mm]	Distance of the sensor optics to the assigned printing unit in [mm]
Unit name	Specifies a unit name (default: unit x)
Number of units	Number of available machine units (depending on the license, a maximum of 12 or 24 machine units can be defined)
	Regulating velocity of the side register regulating unit in [mm/s]
	Increments per cylinder revolution (cf. chapter 5.1 "Parameterization of the incremental encoder emulation" on page 25)
	Opens another dialog to set the communication parameters for each sensor (cf. chapter 10.5.3 "Machine configuration dialog (communication settings of the sensors)" on page 104)
	Opens a file browser dialog to load a complete machine configuration from a receipt file (xxx_machine.DAT)



If more than 12 printing units are defined for license FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV2, a dialog with the machine units 13-24 is subsequently opened in the wizard.

HMI dialog and element description

The second dialog of the machine configuration wizard allows configuring decentralized control elements. In this dialog, it can be selected whether decentrally executed adjustments via joystick or a decentralized HMI have an effect on the command value or the motor position and their respective polarity.

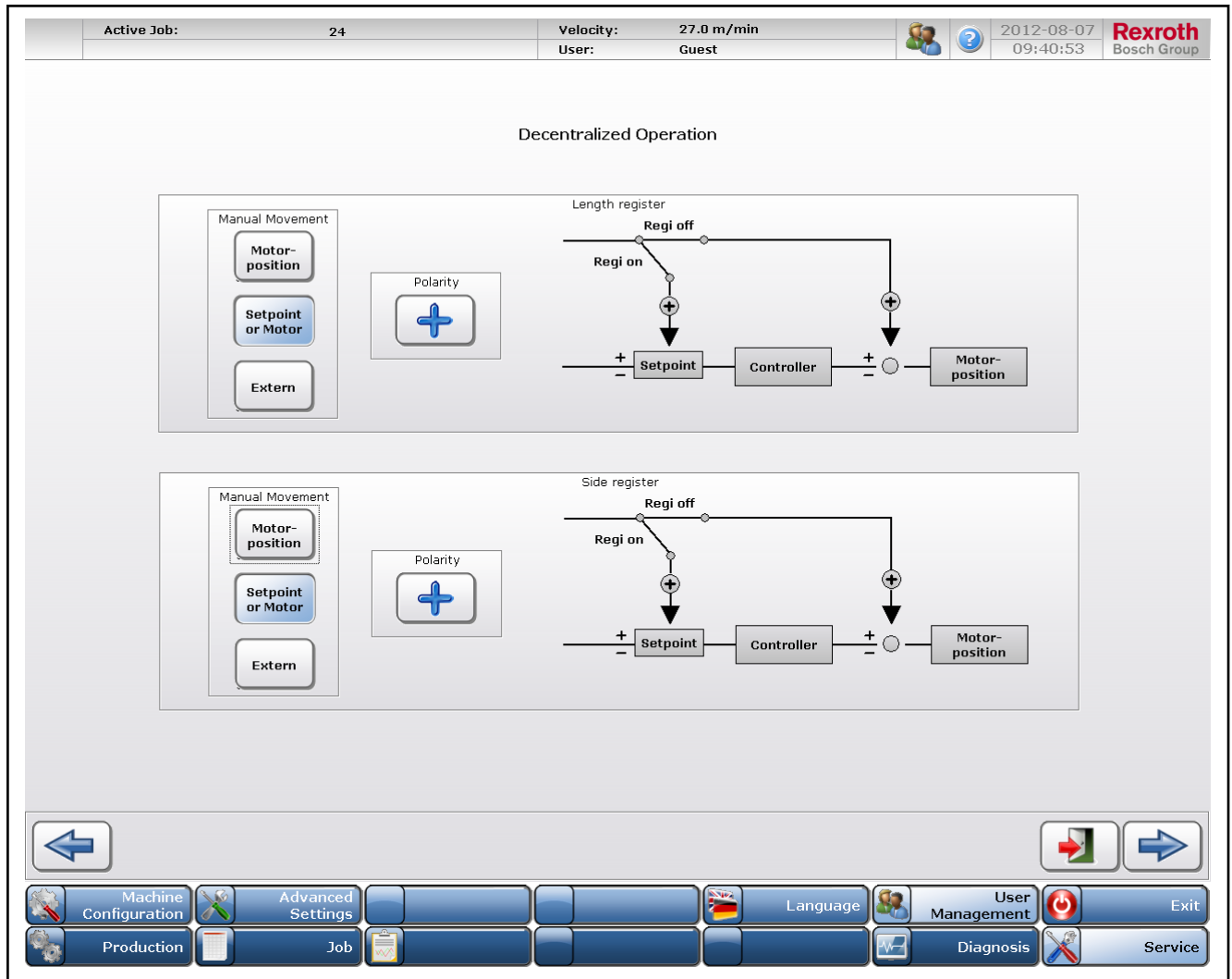


Fig. 10-17: Decentral operation

	Changes joystick polarity or adjustment of decentralized HMI
	The motor position is always jogged during the production process using the arrow keys, irrespective of whether the control is enabled or disabled

HMI dialog and element description

	The motor position is jogged with the arrow keys if the register controller is disabled. The command value is jogged with the arrow keys if the register controller is enabled
	Via the machine interface it can be selected whether the command value or the motor position is to be jogged

In the third wizard dialog, the user can select if he wants to preset the fine adjustment, the drive position and the side register via the register control or if this is to be done externally, e.g. via the machine program.

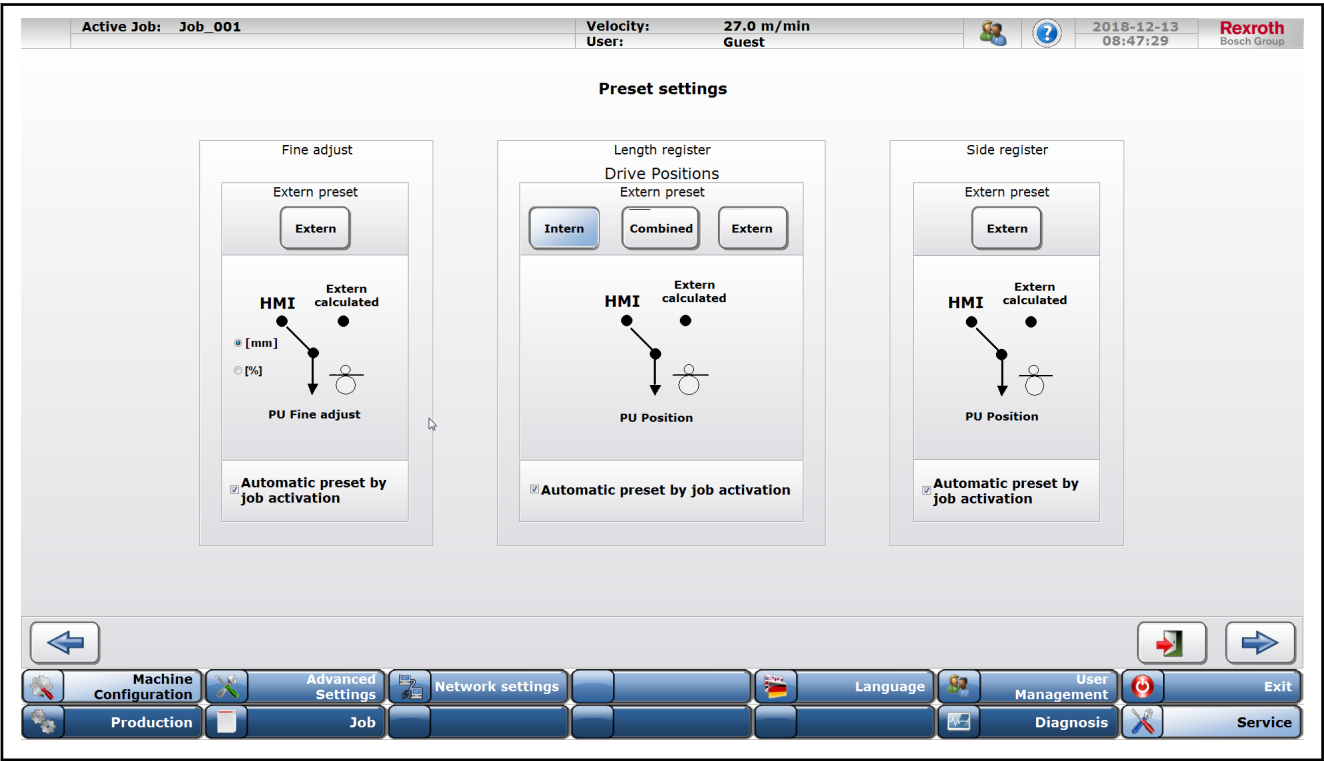


Fig. 10-18: Unit settings

	If the button is activated, the Preset is executed externally via the machine interface. Individual settings can be selected for fine adjustment, drive position (length register) and the side register
	If this interface is enabled, the preset can be executed via the internal Preset dialog as well as via the machine interface
	If this interface is enabled, the preset can only be executed via the internal Preset dialog

HMI dialog and element description

☒ Automatic preset by job activation	If the checkbox is enabled, an automatic preset is executed when activating the job. An automatic preset is only possible if the preset handling was not done externally
☒ [mm] ☐ [%]	This selection box is only available for an internal preset of the fine adjustment by the HMI. It allows to change the unit for the "Preset" value of the fine adjustment from [%] to [mm]

The fourth dialog of the machine configuration allows configuring the display direction of the deviations, the control direction of the controller and the definition of the machine position.

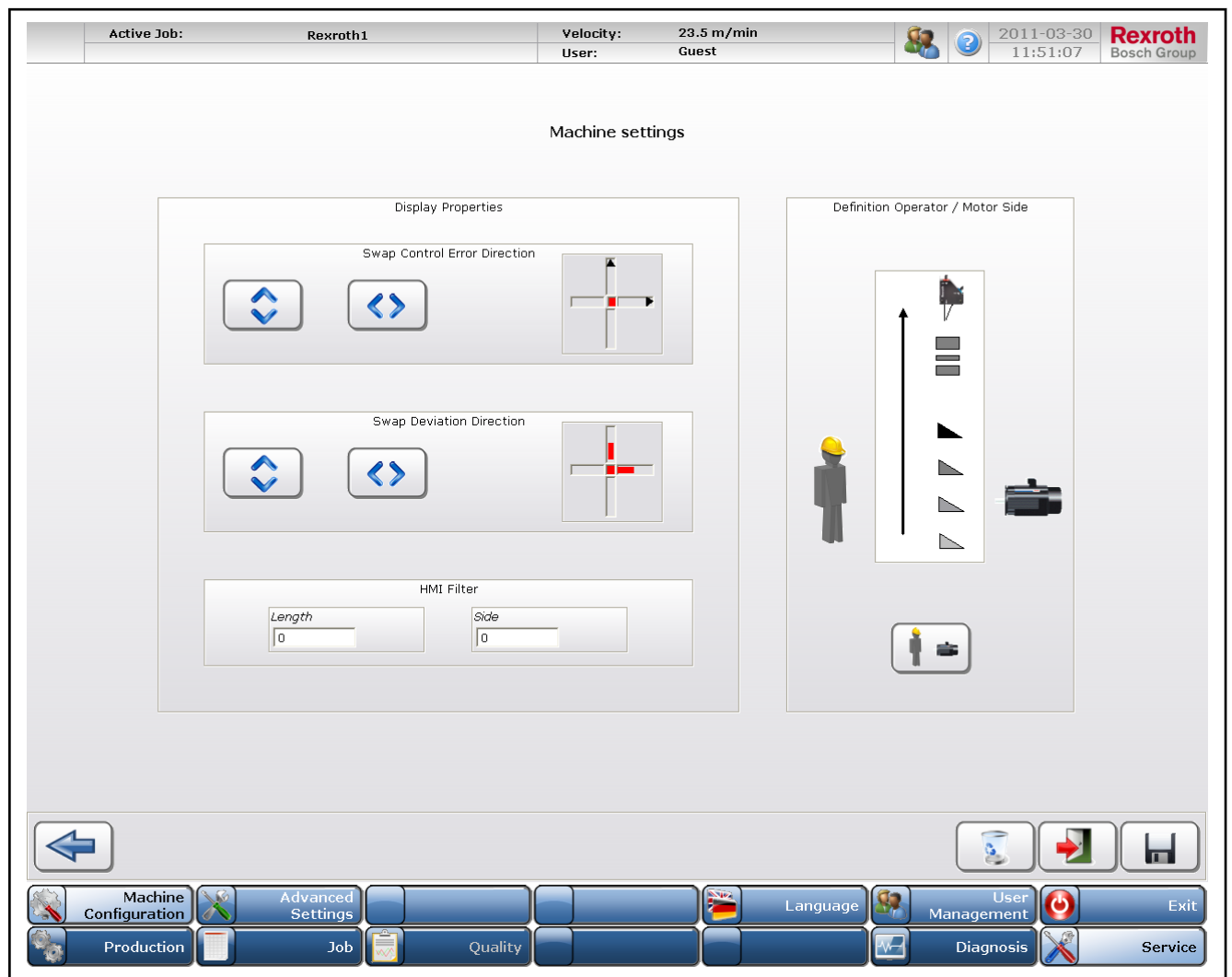


Fig. 10-19: Machine settings

HMI dialog and element description

	Opens a dialog to save a complete machine configuration into a recipe file. A new receipt file is created or an existing file is overwritten with 
	A recipe file can now be deleted
	Exiting the machine configuration without saving the modified data
Loading upon start	The checkbox allows the automatic loading of the currently selected recipe file when starting the HMI application. The checkbox can be ticked when saving the recipe
Change direction of deviation	Changes the polarity of the displayed register deviation
Invert display	Changes the polarity of the arrows for the control direction
	Changes the position of the machine operator with regard to the machine. It is required to correctly define the mark stream in the job configuration

10.5.3 Machine configuration dialog (communication settings of the sensors)

The configuration settings of the sensors are selected in this dialog. Each sensor requires an IP address and 2 ports for the measured data and the configuration. The settings can be opened in the first dialog of the machine configuration via "IP settings".



Each port and each IP address can only be assigned once.

Multiple assigned IP addresses and ports are highlighted in red and have to be changed.

The specified ports are ports on the control and not on the sensor.



The UDP ports have to be selected in the range of 6001-6098.

Port 6040 and port 6042 are used for internal purposes and cannot be entered.

If one of the ports is entered a dialog is displayed and the input is discarded.

HMI dialog and element description

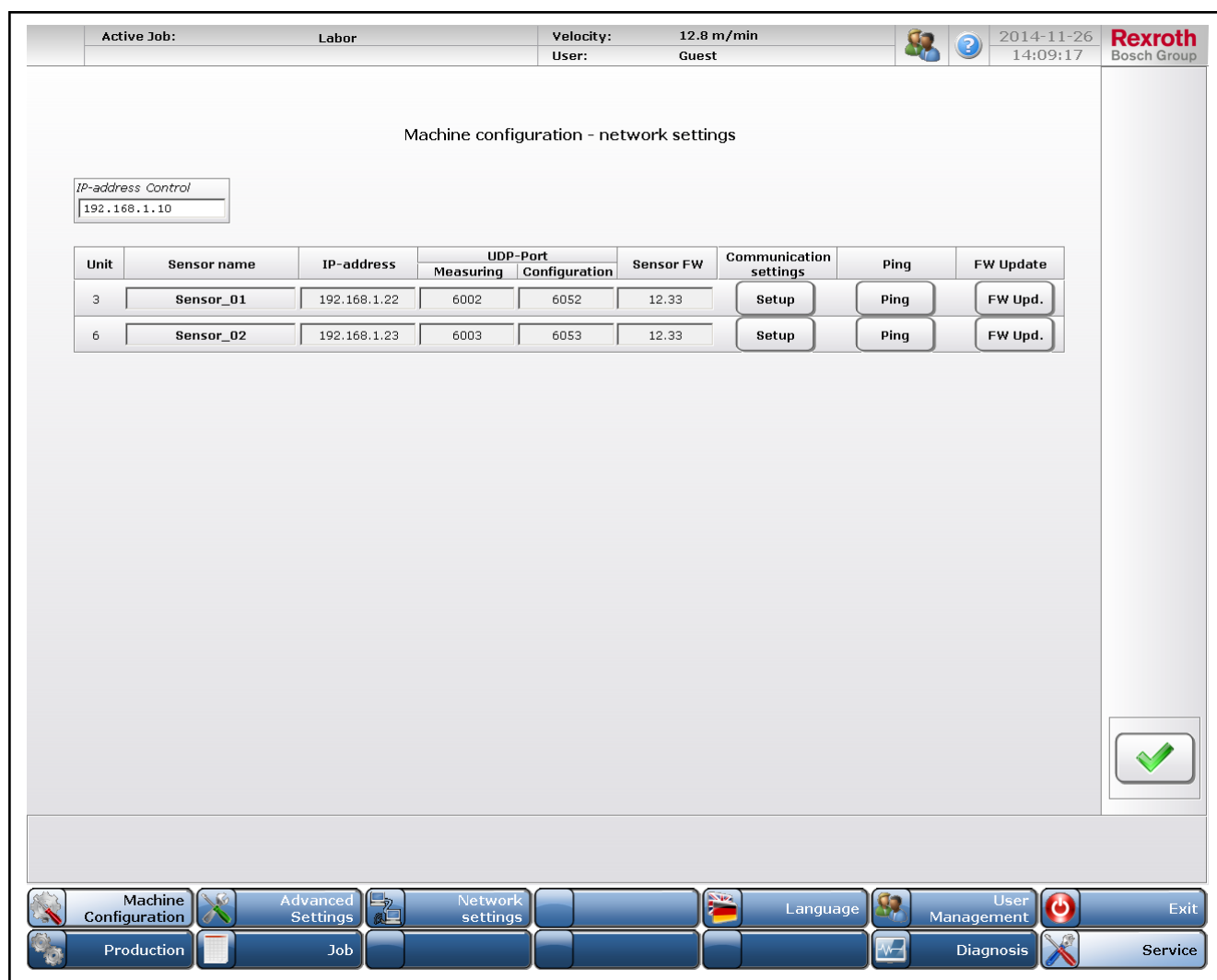


Fig. 10-20: Overview on the sensor communication settings

The table lists all configured sensors and their communication parameters as well as the firmware version. The parameters of the sensor are edited via

Setup in the respective line of the sensor to be configured. The IP address for the sensor can also be selected in this dialog. Press **Ping**, to check the network connection to the sensor.

By clicking on **FW Upd.**, the firmware update tool with the configured IP address of the respective sensor is opened. For details about the operation of the firmware update tool, refer to [chapter 7.3 "Updating the firmware" on page 59](#).

This function can be enabled and disabled in the user management.



If more than 12 sensors are defined in the FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV2 license, another button **13-24** is displayed above confirmation button to toggle to the sensors 13-24.

HMI dialog and element description

Active Job:Rexroth1

Velocity:23.5 m/min

User:Guest



2011-03-30
11:52:39



Machine configuration - network settings

Sensor

2

Sensor name

Sensor02

UDP-Port setup

Measuring port

6002

Configuration port

6022

Sensor IP setup

Sensor MAC-address (e.g.: 2A-08-48-01-00-FF)

-

-

-

-

-

Sensor IP-address

192.168.1.22

Write IP to sensor



Machine Configuration

Advanced Settings

Production

Job

Quality

Language

User Management

Diagnosis

Exit

Service

Fig. 10-21: Sensor – Network settings

The following table lists the settings that can be selected for each sensor:

 The MAC address name is case sensitive. Setting the IP address is only possible when complying with the case sensitivity.

Sensor	Displays the number of the currently selected sensor
Sensor name	Input field for the sensor name
Measuring port	UDP port to transfer measurement results from the sensor to the control
Settings port	UDP port to transfer the configuration data from the control to the sensor (measuring port and settings port have to be unique)
Sensor MAC address	MAC address to transfer a new IP address to the sensor (format: XX-XX-XX-XX-XX-XX)

HMI dialog and element description

IP address of the sensor	IP address of the sensor (format: XXX.XXX.XXX.XXX)
	Writes the IP address to the sensor specified via the MAC address



If the IP address is changed, it has to be ensured that the correct MAC address of the respective sensor was entered. The sensor has to be reset after setting the IP address. That means that the power supply of the sensor has to be interrupted.



The UDP ports have to be selected in the range of 6001-6098. Port 6040 and port 6042 are used for internal purposes and cannot be entered.

If one of the ports is entered a dialog is displayed and the input is discarded.

10.6 Job configuration for narrow web applications

10.6.1 Brief description

All product-specific parameters containing different features according to their type of print job are specified in the job configuration. Product-specific data:

- Print format – Setting the printing cylinder format and the material web width
- Mark properties – Setting the mark geometry and the mark alignment
- Barcode - Activating and defining the barcode
- Control method – Presenting the individual mark and the reference mark
- Register controller data – Setting the reaction of the register controller in case of a register deviation
- Material data – Setting the specific properties of the material to be printed

The different job features are in the "Job management" dialog.

As the dialogs of the job configuration for narrow web applications (license variant FWS-IM*MLC-TEC-NNVRS-NN-REGI*EXT) differ from dialogs of other license variants, these dialogs are described separately in the following.

10.6.2 Job management

General information

The "Job Management" dialog is used to manage existing job recipes or to create new ones. A wizards guides through all print job settings that have to be selected. In the overview dialog, it can be selected whether a new job should be created or an existing job should be copied, edited or deleted. Furthermore, the selected job can be enabled.

In older HMI versions, it was possible to create up to 300 jobs in the job list.

In the HMI version 5.5.8.4 and above, it is not limited anymore. The number of jobs is thus only limited due to the available memory of the Windows file system.

HMI dialog and element description

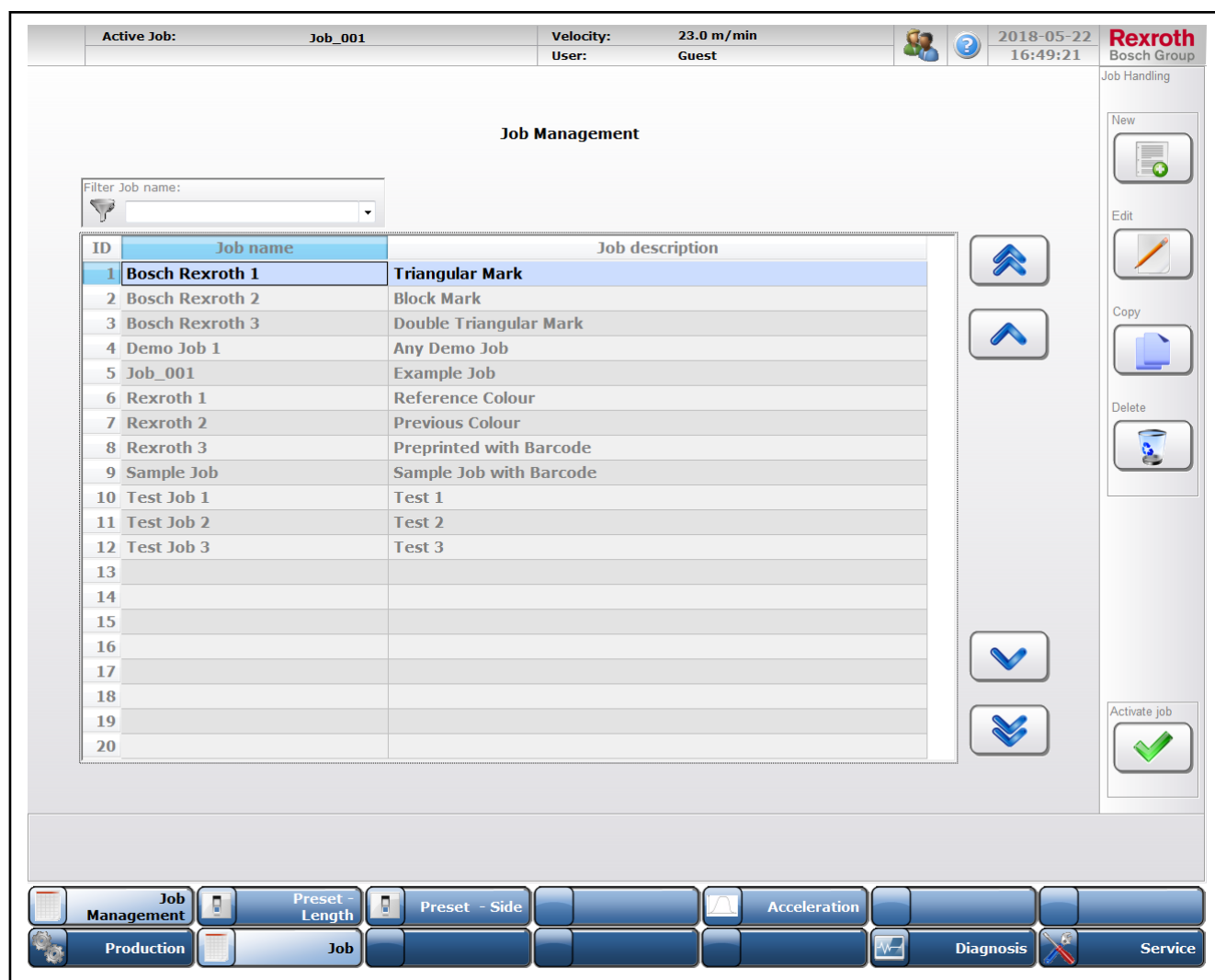


Fig. 10-22: Job management

Job filter To better overview a high number of jobs, filter the job list content. Only jobs with job names specified in the given filter text are displayed.

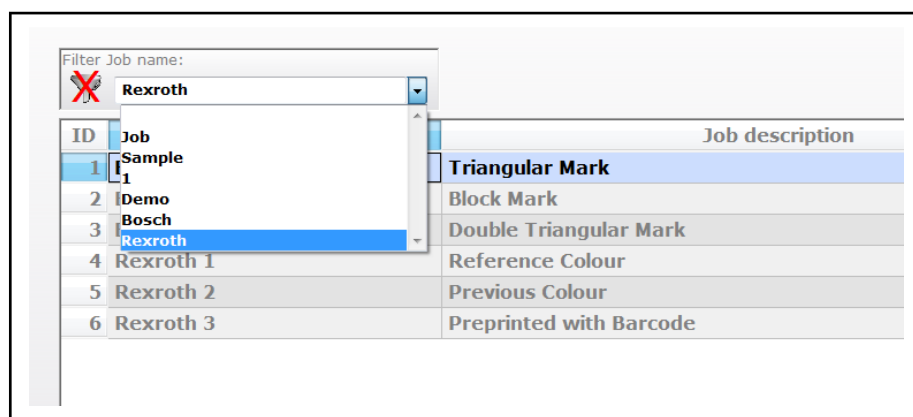


Fig. 10-23: Job management - Filter

The six filters entered last are saved and can be selected using the drop-down list.

HMI dialog and element description

When entering another filter text, the oldest entry saved is replaced by the new filter text.

To show all entries in the job list again, reset an active filter. Selecting an

empty line in the drop-down menu or pressing  resets the active filter.

The following entries can be made in the "Job management" dialog:

	Enabling the job - Transmitting the selected job to the PLC and the sensors
	A new job is created
	The selected job is edited
	The selected job is copied. When copying, a default job can additionally be copied. This means, an existing job is saved as default job. This default job is always loaded when creating a new job. To load the default job, the respective user rights have to be specified
	The selected job is deleted

If a new job is selected or edited, the job is run through the respective dialogs for the job configuration.

Format and web settings

The printing cylinder format and the material web width have to be specified globally for all printing units. It also has to be specified if the material is preprinted and thus a register mark has already been set.

HMI dialog and element description

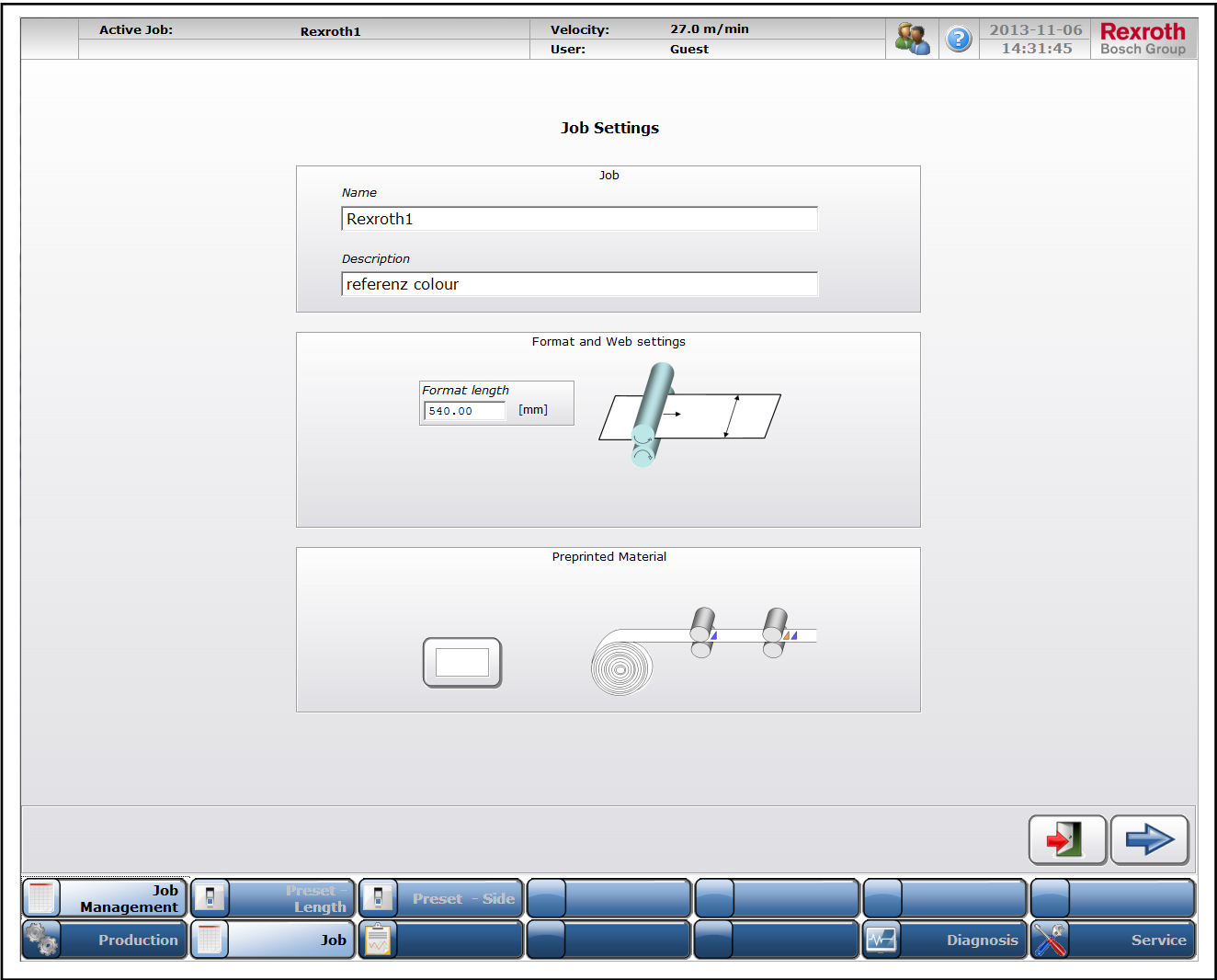
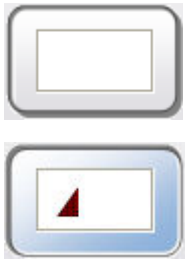


Fig. 10-24: *Format and web settings*

Name	Displays the current job name
Description	Description specification of the current job
Format length [mm]	Specifying the format, i.e. the printing cylinder circumference
	Selection if material is preprinted

Subsequently, the dialog to define the printing unit properties opens.

Print configuration

The printing units participating in the production are defined in the Unit configuration. Furthermore, the printed color can be defined, the control strategies for the length register and the side register can be selected and their settings can be selected.

HMI dialog and element description



One mark stream sensor can only measure 12 marks simultaneously. This has to be taken into consideration when defining the mark stream. To avoid that more than 12 marks are measured by a sensor, print or measure the multiple reference mark or set the relevant settings via the advanced settings.

1	2	3	4	5	6	7	8	9	10	11	12
Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active
Mark 1	Mark 2	Mark 3	Mark 4	Mark 5	Mark 6	Mark 8		Mark 9	Mark 10	Mark 11	Mark 12
Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 7	Length 7	Length 7	Length 7	Length 7	Length 7
Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 7		Side 7	Side 7	Side 7	Side 7

Length

Side

Multiple Ref. Mark

Measuring Method Length

Ref Unit 1

Reference Colour

Previous Colour

Measuring Method Side

Ref Unit 1

Reference Colour

Previous Colour

Job Management

Preset Length

Preset - Side

Production

Job

Diagnosis

Service

Fig. 10-25: Print configuration

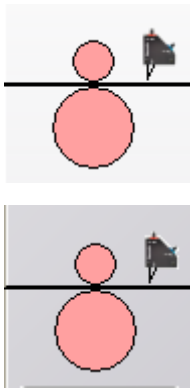
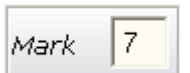
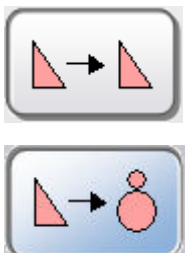


It is recommended to calculate the basic settings via the **reference** and **previous color** interfaces before selecting the print configuration settings. The basic settings are sufficient for all basic printing applications. The mark sequence in the mark stream is calculated sequentially. The reference mark is defined with "Ref Unit" for the **reference color**. The mark of the active printing unit is specified in the **previous color**.

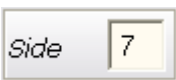
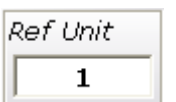


The calculation should only take place after the printing units processing the job have been enabled and disabled.

HMI dialog and element description

	The selected printing unit is highlighted in gray
	Activating the individual printing unit: Setting and displaying the color by enabling the lower loop of the printing unit If the sensor is enabled, the dialog for advanced sensor settings is opened (see "Advanced sensor settings dialog" on page 114)
	Select, if the printing unit prints a register mark: Top: Printing unit does not print any visible mark Down: Printing unit prints a visible mark
	Specifies the position of the printed mark in the mark stream
	Selecting between web/web and web/cylinder control: Top: Web/web control. This means, a register mark to be controlled is compared to another register mark. Down: Web/cylinder control. This means, the printed register mark is compared to a cylinder position

HMI dialog and element description

	Reference mark for length register control
	Reference mark for side register control. This reference mark is only available in case of a web/web control
	Opens the dialog to define reference marks that have been printed multiple times
	Entering a reference color (the entered number is only effective for a reference color. The entry is ignored for the previous color since the reference color results from the active printing unit at the front). The entered number is automatically corrected if the selected printing unit does not print any mark
	Selecting the reference color as measurement procedure
	Selecting the previous color as measurement procedure

By selecting the buttons for the length register or the side register, the dialog to configure the register controller for the activated printing unit is opened.

Multiple reference marks dialog



This feature is only available if no preprinted material is printed and the multiple reference mark is the first mark that has been printed. This function has to be enabled by Bosch Rexroth.

In this dialog it can be selected if several reference marks are printed and how many marks are located in between. If the button is enabled, multiple reference colors are printed. The number of the marks located in between specifies after how many register marks the reference mark is printed again.

HMI dialog and element description

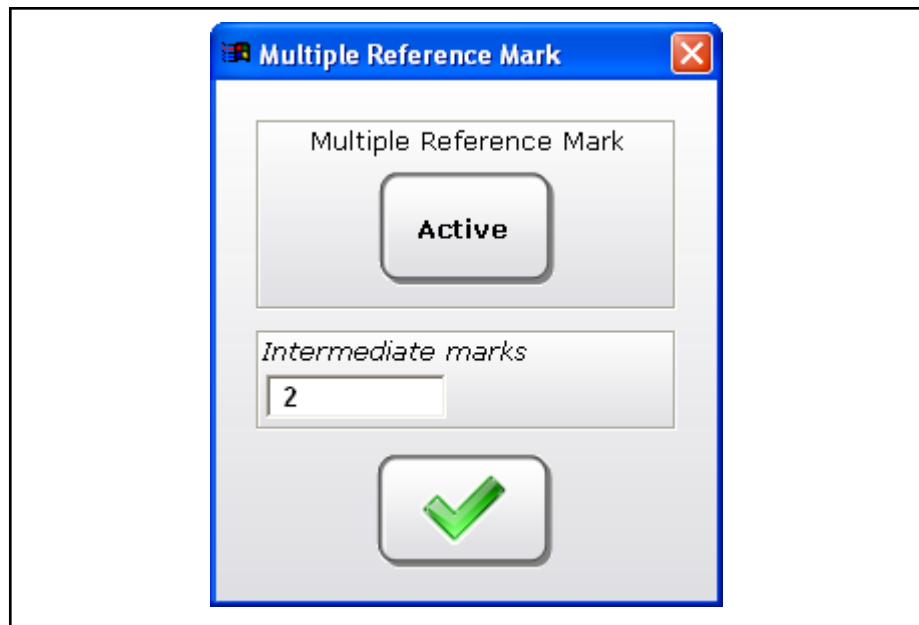


Fig. 10-26: "Multiple reference marks" dialog

Subsequently, the resulting mark stream is displayed. The first mark (1) is the reference mark. Subsequently, 4 marks of printing units follow until subsequently, the reference mark (6) is printed.

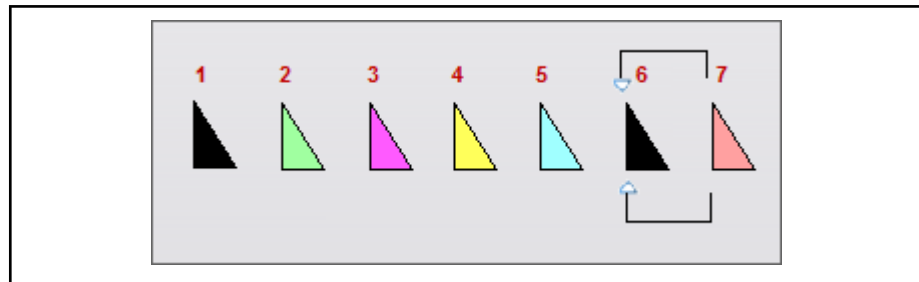
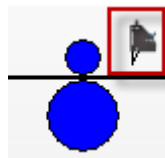


Fig. 10-27: Sample mark stream for multiple reference marks

The sensor behind the printing unit printing the turquoise mark (5), detects 5 marks in this case. The sensor behind the printing unit printing the mark (7) to the far right detects 2 marks in this case, as the multiple reference mark defines a new section. For example, if 24 printing units are available in which each printing unit prints a mark, a multiple reference mark has to follow after 11 marks. Thus, it can be ensured that each sensor smaller or equal to 12 register marks is measuring at the same time.

"Advanced sensor settings" dialog

The "Sensor" dialog is displayed when selecting the small sensor image to the right of the printing unit symbol.



Depending on the function that can be enabled separately, this dialog contains different options for parameterization.

By default, the following configuration options are available in the dialog.

HMI dialog and element description

Advanced Sensor configuration

Unit: 3 (Unit 3)
Sensor: 1 (Sensor_01)

Advanced Sensor
 configuration
 Sensor: 1

Color weighting
 0.5000

Barcode Search Prob.
 50.0000

Min. Marklevel
 500

Gain
 2

Copy to all
 units

Fig. 10-28: Dialog "Advanced sensor configuration" (default)

Color scaling	Color scaling of the sensor measurement (value range: 0 - 0.99) • A color scaling of 0.99 means that the sensor is exclusively operated as color sensor • A color scaling of 0 means that the sensor is exclusively operated as contrast sensor
Barcode search prob.	Barcode search probability (value range: 0 - 100 %) Minimum degree of conformity of the configured barcode pattern in which the determined pattern is accepted as barcode
Min. mark level	Minimum mark level Minimum analog value of the measured register mark detected as mark during TeachIn

HMI dialog and element description

Gain	Gain (value range 0-7) Gain factor of the sensor. Automatically determined during TeachIn. Should only be influenced in exceptional cases (e.g., if the expectation window cannot detect all marks within the 360° display in case of manual configuration even though the sensor is positioned correctly)
Copy to all units	Applies the configured values of the selected sensor to all other sensors

Configuring the length register

The length register controller for the selected printing unit can be configured in this dialog. During the parameterization, it is differentiated between a length register controller in web/web or in web/cylinder.

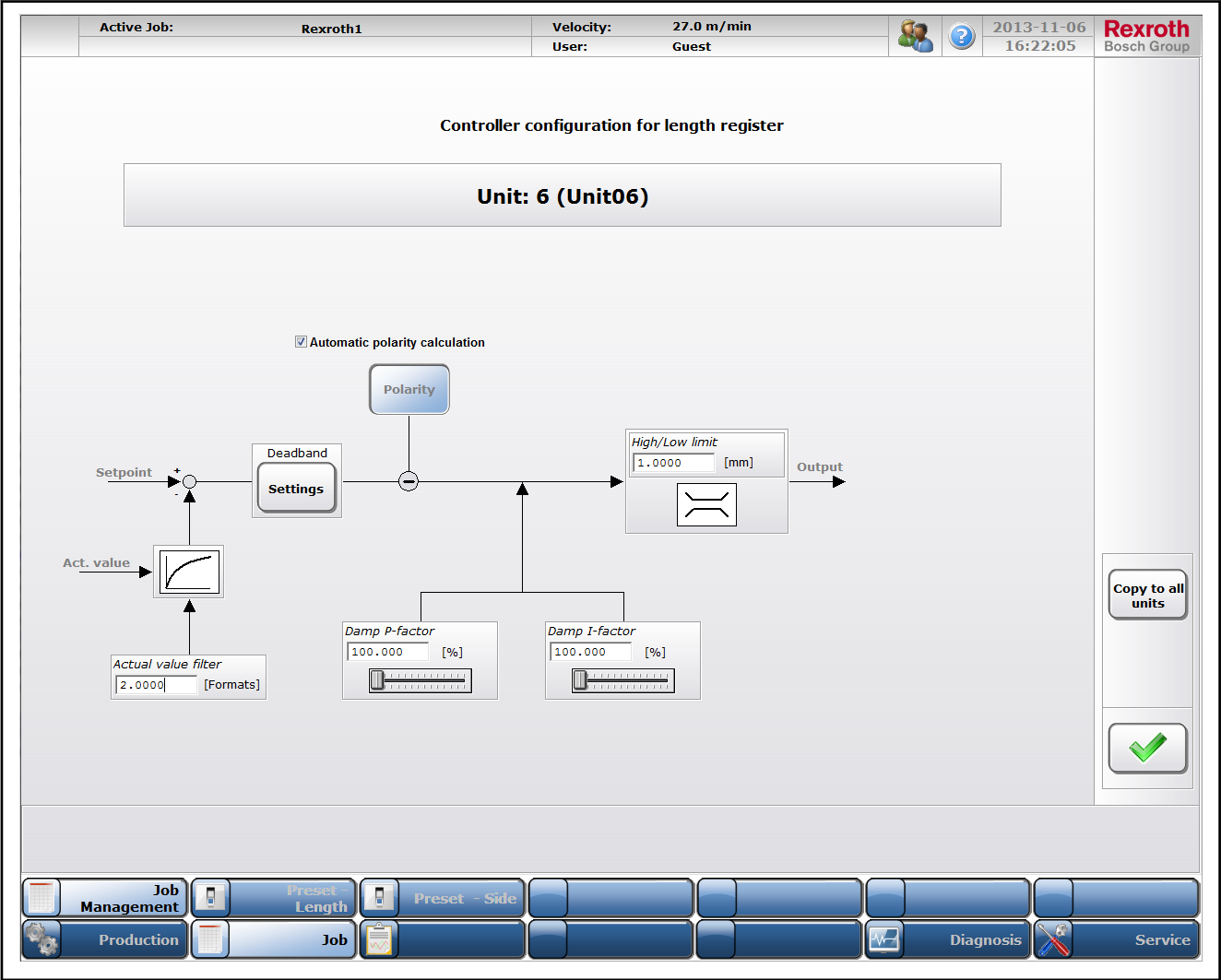
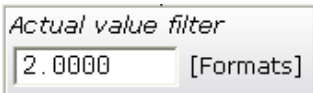
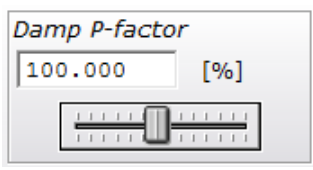
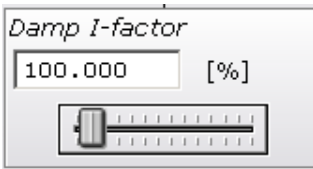
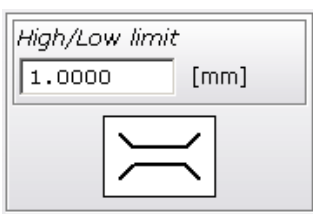


Fig. 10-29: Controller configuration "length register"

HMI dialog and element description

 Actual value filter 2.0000 [Formats]	Filter constant for the measurands
	Parameterizing the dead zone or resetting to default values
 ☒ Automatic polarity calculation	Setting the polarity If the automatic polarity calculation is active, the polarity is automatically calculated depending on the defined mark stream. Otherwise, the polarity can be set manually
 Damp P-factor 100.000 [%] [Slider control]	Indicates how the optimally calculated controller parameters should be scaled. The input size can vary from 0 to 200%. The slide control effects the P-factor of the calculated controller parameter. 100 % signifies that the exact and precisely calculated P-factor is used. 50 % signifies that half the P-factor is used
 Damp I-factor 100.000 [%] [Slider control]	Indicates how the optimally calculated controller parameters should be scaled. The input size can vary between 0 and 1000 %. The slide control effects the I-factor of the calculated controller parameter. 100 % means that the exact calculated I-factor is used. 50 % means that half the I-factor is used. The control loop dynamics is thus increased
 High/Low limit 1.0000 [mm] [Limit symbol]	Box to enter the maximum length register adjustment within a printing cylinder revolution
	Copies the data of the currently selected printing unit to all other printing units. By copying, the data of a web/web register controller are only copied to control stations with web/web register controllers. If the path/cylinder controller is not defined as processing unit, the data is only copied to the path/cylinder controllers that are no processing units. If the path/cylinder controller is defined as processing unit, the data is only copied to the path/cylinder controllers that are processing units



The automatic polarity calculation can be enabled and disabled per printing unit.

Side register configuration

The side register controller of the selected printing unit can be configured in this dialog.

HMI dialog and element description

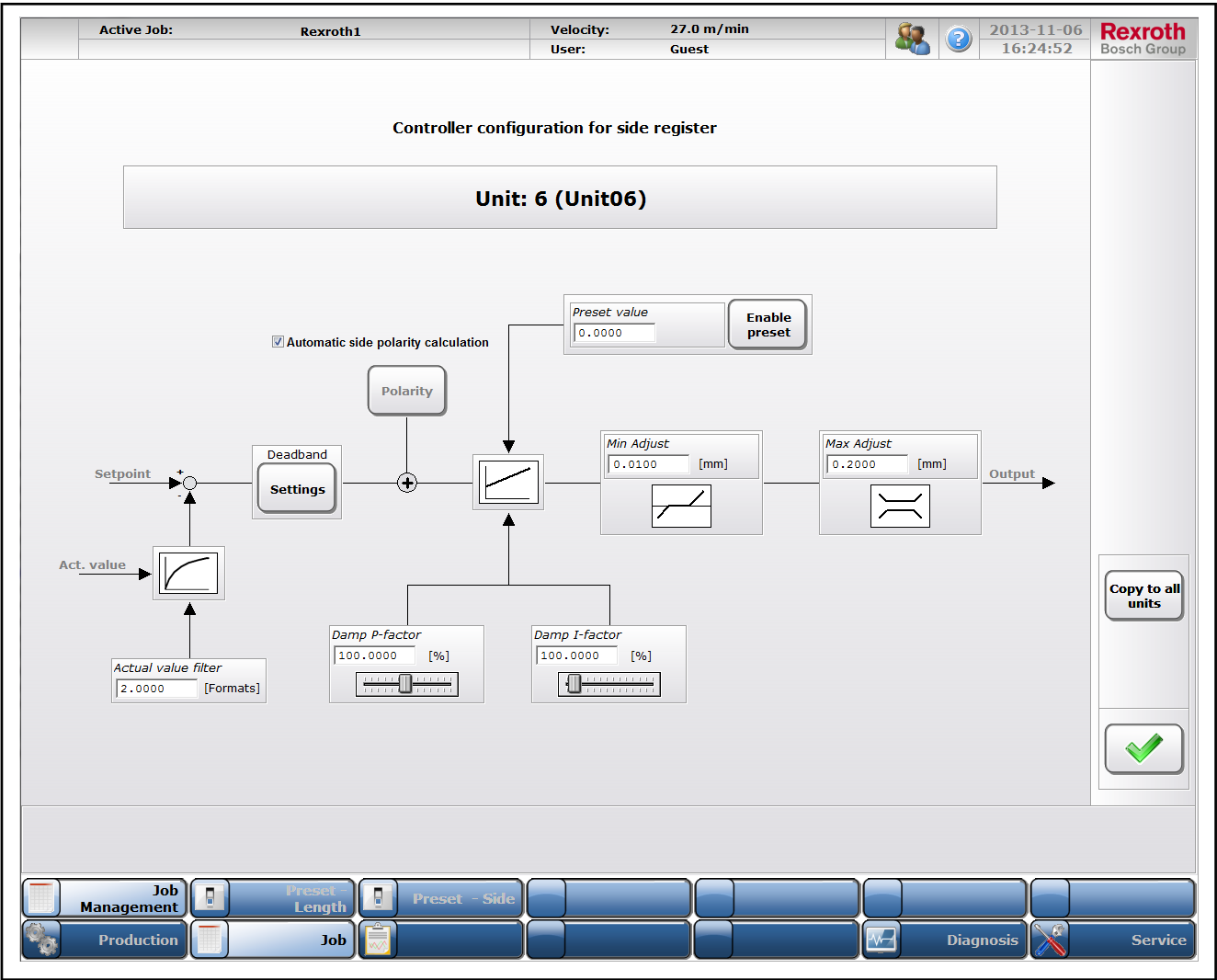


Fig. 10-30: Controller configuration of "side register"

Actual value filter 2.0000 [Formats]	Filter constant for the measurands
Setup	Parameterizing the dead zone or resetting to default values
Polarity ☒ Automatic polarity calculation	Setting the polarity If the automatic polarity calculation is active, the polarity is automatically calculated depending on the defined mark stream. Otherwise, the polarity can be set manually

HMI dialog and element description

	Indicates how the optimally calculated controller parameters should be scaled. The input size can vary from 0 to 200%. The slide control effects the P-factor of the calculated controller parameter. 100 % signifies that the exact and precisely calculated P-factor is used. 50 % signifies that half the P-factor is used
	Indicates how the optimally calculated controller parameters should be scaled. The input size can vary between 0 and 1000 %. The slide control effects the I-factor of the calculated controller parameter. 100 % means that the exact calculated I-factor is used. 50 % means that half the I-factor is used. The control loop dynamics is thus increased
	Preset of the controlled variable of the controller
	Input for the minimum adjustment of the side register (the value should correspond to at least the minimum adjustment of the side register adjustment device)
	Box to enter the maximum side register adjustment in one printing cylinder revolution
	Copies the side register controller data of the currently selected printing unit to all other printing units



The automatic polarity calculation can be enabled and disabled per printing unit.

After the parameterization of all register controllers has been completed, you can go to the next dialog for the configuration of the mark stream using the "arrow" keys.

Mark stream

To define the mark stream, the mark geometry and the mark stream features have to be specified. Furthermore, it has to be specified whether a barcode is active.



The barcode is printed in front of the mark stream by the first printing unit. The sensor can detect the barcode and use this information to calculate the expectation window. The barcode has to be printed in front of the mark stream and has to be correctly defined.

HMI dialog and element description

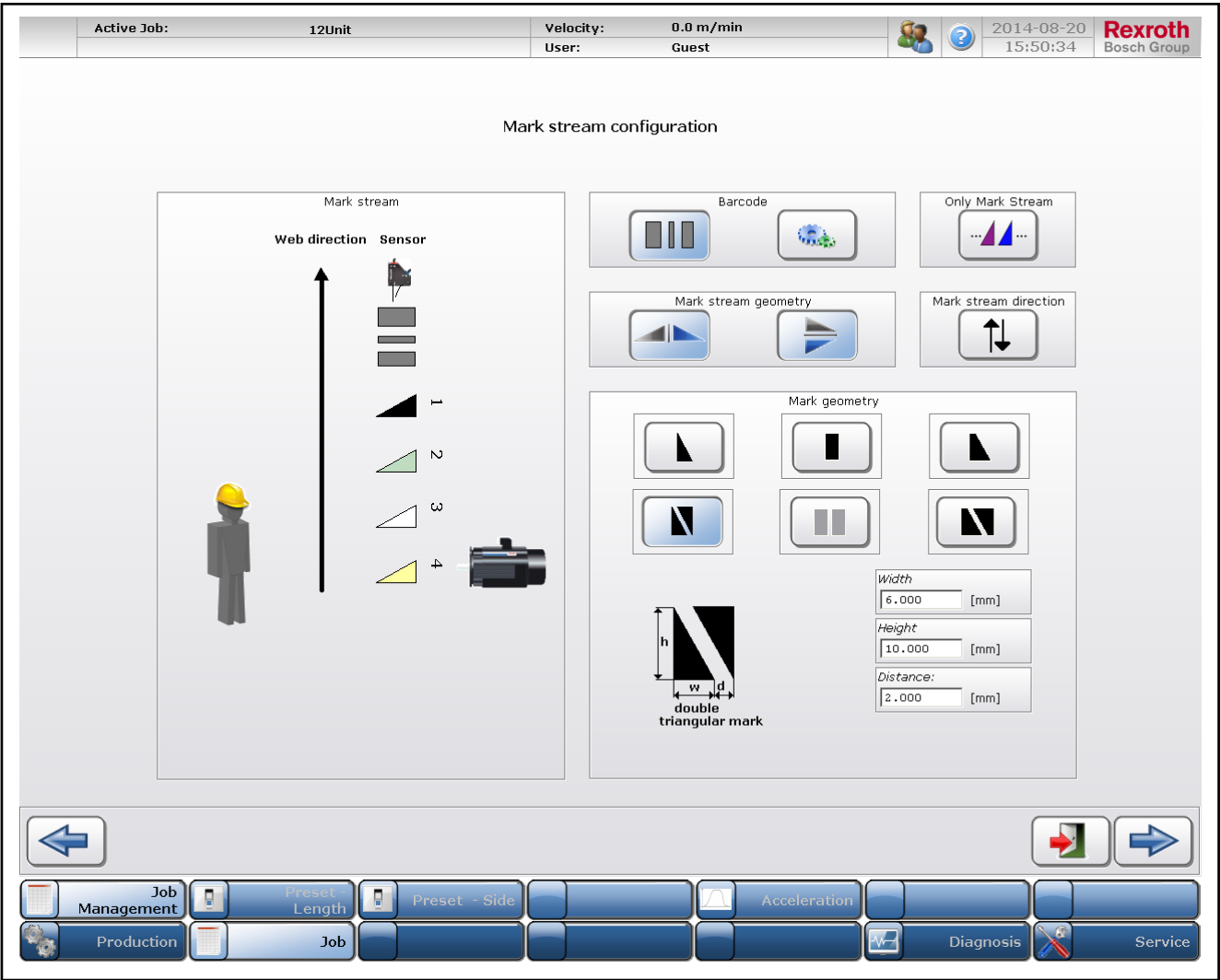


Fig. 10-31: Mark stream configuration

	Indicates that a barcode is available
	Opens the configuration dialog of the barcode. This button is only visible if a barcode is available
	Specifies that only register marks are contained in a 360° cylinder revolution. The remaining area does not contain any register crosses, arrows, etc. The sensor can then find the mark stream (without barcode) and start the measurement as soon as the mark stream search is started

HMI dialog and element description

	Selecting the geometry of the printed marks
Width [mm]	Width of the selected mark
Height [mm]	Height of the selected mark
Distance [mm]	Distance between the double marks
	Selecting the mark orientation
	Selecting the mark sequence. It is specified, whether the registration mark printed by the first printing unit should be on the first or on the last position of the mark stream
	Selects which mark edge is the first to be detected by the sensor
	Canceling the job configuration (changes are discarded)
	Saving the job configuration

HMI dialog and element description

The mark stream can be completely defined using the 3 buttons. The mark stream has to be exactly graphically displayed in the characteristics the mark stream is printed on the material web and measured by the sensor.



The mark stream has to be correctly defined for the sensor optics to detect it. If the mark stream is not correctly defined, a correct length register control and side register control cannot be guaranteed.

Barcode definition



This dialog can only be opened if a barcode is printed and activated.

The technical requirements for the barcode are as follows:

- The barcode has to be **unambiguous** within one revolution
- The barcode has to be printed in front of or behind the mark stream
- Optionally, a second barcode can also be printed indicating the end of the mark stream. This barcode may not be identical to the first barcode. A mirror-inverted barcode is recommended
- The barcode can consist of 3 - 10 blocks
- A printing-free area of 20 mm has to be in front of the barcode
- A printing-free area of 20 mm has to be behind the mark stream
- The size of the barcode blocks has to be 2 - 10 mm
- The distance between the barcode blocks has to be 2 - 10 mm each



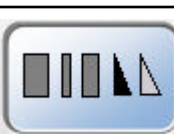
A barcode search can only be started if the barcode can be measured under the corresponding sensor. If a barcode search is started without a barcode being printed, an incorrect barcode position can sporadically be returned.



The barcode detection can only be ensured if it is complied with the listed specifications.

The barcode dialog is structured as follows:

Individual elements description:

	Defining the barcode position. It can be defined whether the barcode is in front of or behind the mark stream
Free area in front of the first block [mm]	It indicates the printing-free area in front of the barcode
Mark distance [mm]	Specifies the mark distance of the register marks
Size of the expectation window [mm]	Indicates the size of the expectation window behind the barcode. The size is defined directly after the barcode, if the barcode is in front of the mark stream. Marks can only be found if the mark stream is located behind the barcode in the area defined by this value. If the barcode is behind the mark stream, the size of the expectation window has to be defined from the start of the mark stream plus half a print-free area up to the start of the barcode (see figure above)
Number of barcode blocks	Indicates the number of barcode blocks. The number can vary from 3 to 10

HMI dialog and element description

Width [mm]	Indicates the width of the respective barcode block
Distance [mm]	Indicates the distance between the respective barcode blocks. The last value to be entered is the distance between the barcode and the first mark



If the barcode search with a subsequent measurement was not successful, the cause might be an incorrectly defined barcode or an incorrect size of the expectation window. In this case, open the oscilloscope of the respective sensor and get the current data displayed. Using the oscilloscope, it can be detected whether the expectation window was selected too small (marks are missing) or too large (the expectation window is larger than the printing-free area). In this case, correct your input.

Sample mark stream

This section describes the sample structure of a recommended mark stream.

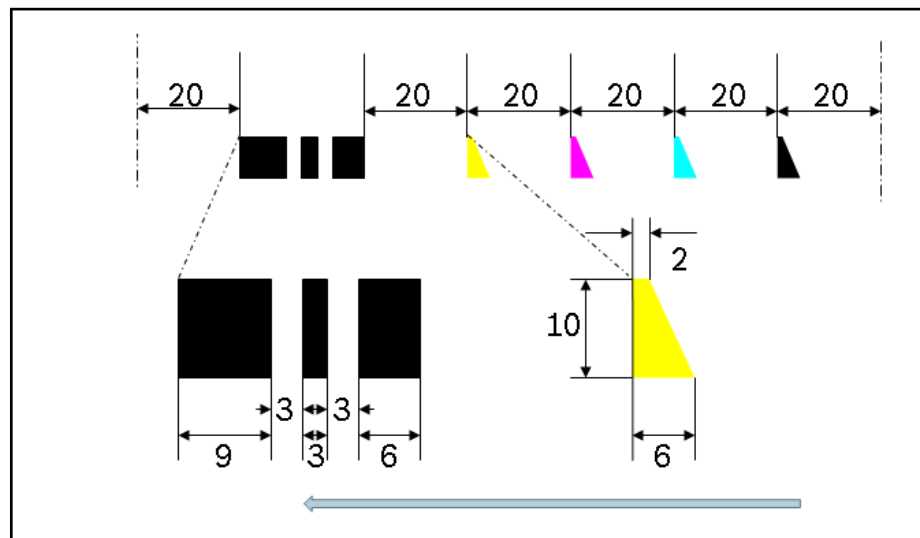


Fig. 10-33: Recommended sample mark stream

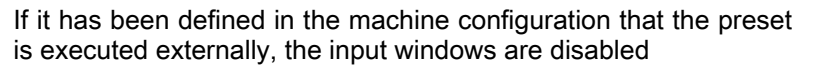
The blue arrow points into the direction of the path, i.e. the barcode is displayed as first entry below the sensor optics.

The following general requirements for a mark stream with trapezoidal marks have to be complied with:

- The recommended printed mark distance is 20 mm. The minimum distance between the marks should not be less than 15 mm as the area to be controlled by the marks is considerably limited
- The trapezoidal marks top width should not be less than 2 mm
- The height depends on the required control area of the side register. 10 mm is recommended
- The order of the vertical and the inclined mark edge to the printing direction is user-defined, however, the direction has to be used in the entire mark stream

The barcode requirements are described in the previous section (cf. [chapter 10.7.2 "Job management" on page 128](#)).

After the mark stream has been configured, the changed job has to be saved. If this job should now be directly used, the job can be additionally activated in the job overview. Due to the activation, the job is transferred from the HMI to the control and to the sensors. The job configuration is now completed.



Active Job: Job_001

Velocity: 27.0 m/min

User: Guest

2018-12-11 16:13:32

Rexroth Bosch Group

Preset settings - Length

1

Job

0.00 [mm]

Drive

0.00 [mm]

2

Job

0.00 [mm]

Drive

0.00 [mm]

3

Job

0.00 [mm]

Drive

0.00 [mm]

4

Job

0.00 [mm]

Drive

0.00 [mm]

5

Job

0.00 [mm]

Drive

0.00 [mm]

6

Job

0.00 [mm]

Drive

0.00 [mm]

7

Job

0.00 [mm]

Drive

0.00 [mm]

8

Job

0.00 [mm]

Drive

0.00 [mm]

9

Job

0.00 [mm]

Drive

0.00 [mm]

10

Job

0.00 [mm]

Drive

0.00 [mm]

11

Job

0.00 [mm]

Drive

0.00 [mm]

12

Job

0.00 [mm]

Drive

0.00 [mm]

HMI

Extern calculated

PU Position

Ramp setup

Drive Positions

Save to current job

Job Management

Production

Preset - Length

Job

Preset - Side

Preset - Format

Acceleration

Pre Registration

Diagnosis

Service

Job [mm]	Specifies preset values for the drive position
 	Top: Apply drive position as “Preset” value Down: Write “Preset” value to drive and traverse offset
	Saves the data in the current job configuration

HMI dialog and element description

Drive [mm]	Shows the position offset currently applied to the drive While traversing the position offset, the background color of this display field changes to green to signal an active adjustment motion
	Opens the dialog to configure the ramp settings

Preset of length ramp settings

The dialog "Length register - Position preset - Settings" is used to configure the parameters to ramp the "Preset" values for the length register.

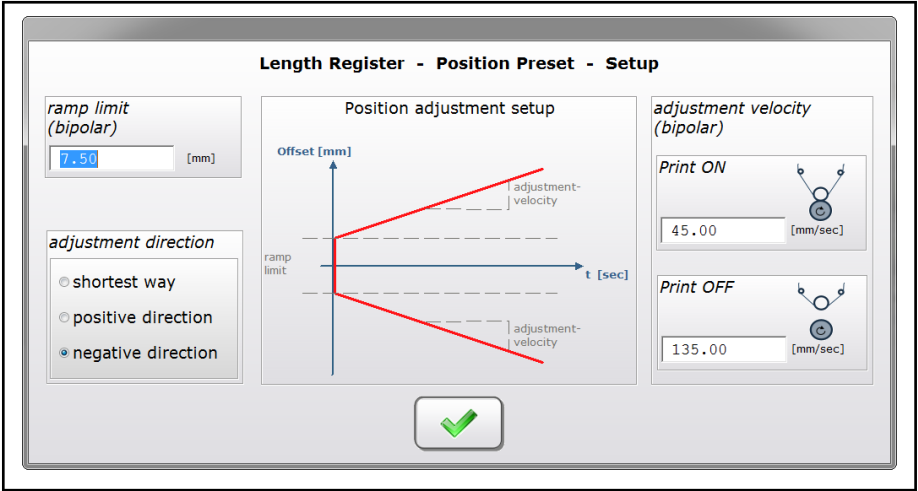


Fig. 10-35: Length register - Position preset - Settings

Ramp limit (bipolar) [mm]	A "Preset" value causing a position change greater than the ramp limit is ramped with the adjustment velocity set
Adjustment velocity (bipolar) [mm/s]	Print ON: Velocity used to ramp the position offset at a closed printing unit Print OFF: Velocity used to ramp the position offset at an open printing unit
Adjustment direction	• Shortest way: The position offset is traversed on the shortest distance possible (positive or negative direction) • Positive direction: The position offset is always traversed in positive direction, even if the distance is shorter in negative direction • Negative direction: The position offset is always traversed in negative direction, even if the distance is shorter in positive direction



If preset values have been found, it is recommended to download the values from the control and save them in the job. These values can be written directly upon a new job activation if the preset is activated in the machine configuration upon the job activation.

10.6.4 Preset side



If it has been defined in the machine configuration that the preset is executed externally, the dialog is disabled.

The "Preset side" dialog is used to preregister the page register. The dialog structure is adjusted to the length register preset (preset dialog: right side).

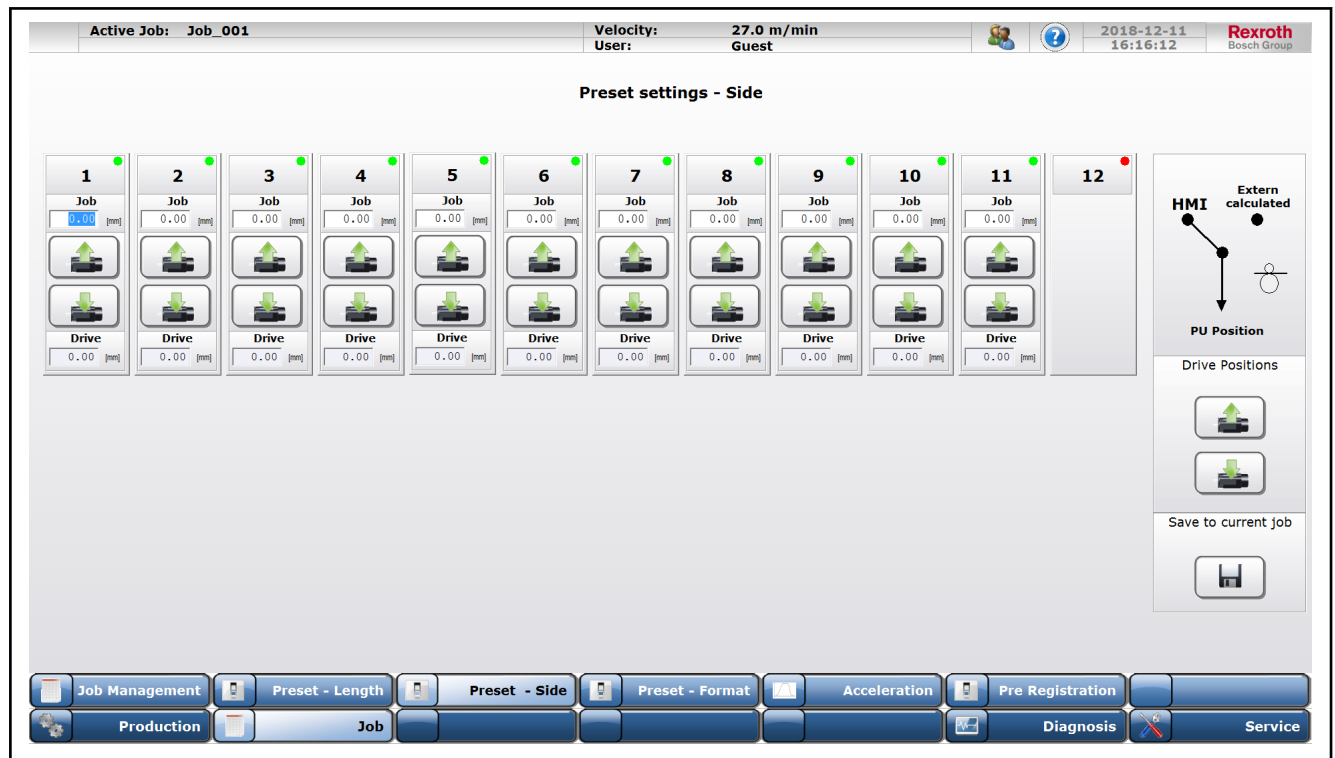


Fig. 10-36: Preset settings "Side register"

Job [mm]	Specifies "Preset" values for the side register
 	Top: Applying side register position as "Preset" value Down: Write "Preset" value to drive and traverse offset
	Saves the data in the current job configuration
Drive [mm]	Shows the position offset currently applied to the drive A yellow background of this display box signals that the motor setting the side register is at its traversing limit

HMI dialog and element description



If preset values have been found, it is recommended to download the values from the control and save them in the job. These values can be written directly upon a new job activation if the preset is activated in the machine configuration upon the job activation.

10.7 Job configuration for applications with terminals (e.g. gravure printing)

10.7.1 Brief description

All product-specific parameters containing different features according to their type of print job are specified in the job configuration. Product-specific data:

- Print format – Setting the printing cylinder format and the material web width
- Mark properties – Setting the mark geometry and the mark alignment
- Barcode - Activating and defining the barcode
- Control method – Presenting the individual mark and the reference mark
- Register controller data – Setting the reaction of the register controller in case of a register deviation
- Material data – Setting the specific properties of the material to be printed

The different job features are contained in the "Job Management" dialog

10.7.2 Job management

General information

The "Job management" dialog is used to manage existing job recipes or to create new ones. A wizard guides through all print job settings that have to be selected. In the overview dialog, it can be selected whether a new job should be created or an existing job should be copied, edited or deleted. Furthermore, the selected job can be enabled.

In older HMI versions, it was possible to create up to 300 jobs in the job list.

In the HMI version 5.5.8.4 and above, it is not limited anymore. The number of jobs is thus only limited due to the available memory of the Windows file system.

HMI dialog and element description

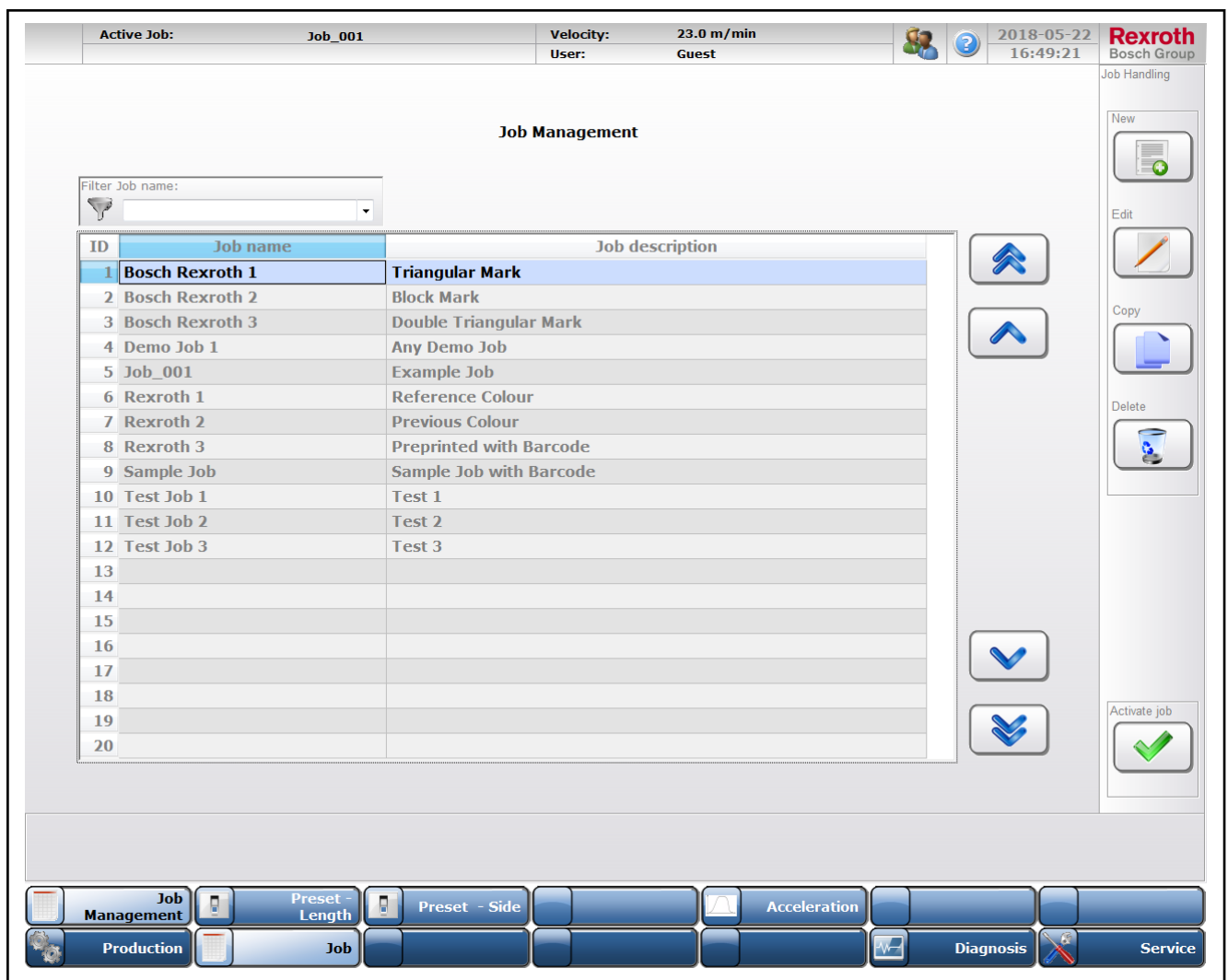


Fig. 10-37: Job management

Job filter To better overview a high number of jobs, filter the job list content. Only jobs with job names specified in the given filter text are displayed.

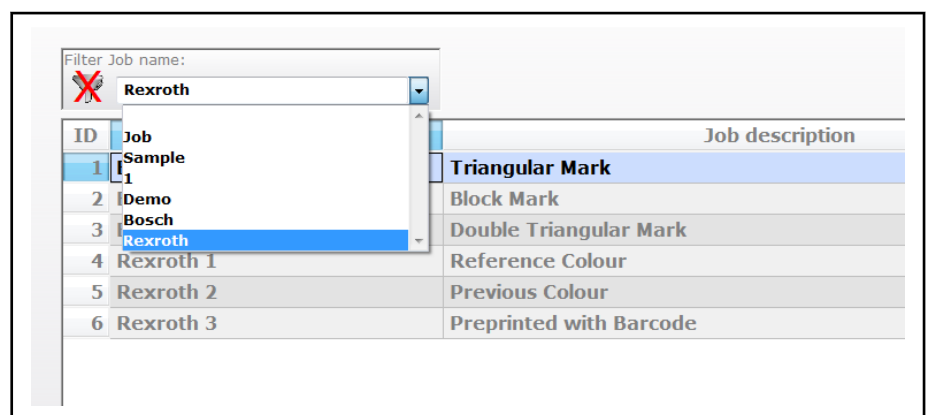


Fig. 10-38: Job management - Filter

The six filters entered last are saved and can be selected using the drop-down list.

HMI dialog and element description

When entering another filter text, the oldest entry saved is replaced by the new filter text.

To show all entries in the job list again, reset an active filter. Selecting an

empty line in the drop-down menu or pressing  resets the active filter.

The following entries can be made in the "Job management" dialog:

	Enabling the job - Transmitting the selected job to the PLC and the sensors
	A new job is created
	The selected job is edited
	The selected job is copied. When copying, a default job can additionally be copied. This means, an existing job is saved as default job. This default job is always loaded when creating a new job. To load the default job, the respective user rights have to be specified
	The selected job is deleted

If a new job is selected or edited, the job is run through the respective dialogs for the job configuration.

Format and web width

The printing cylinder format and the material web width have to be specified globally for all printing units. It also has to be specified if the material is preprinted and thus a register mark has already been set.

HMI dialog and element description

Fig. 10-39: Format and web width

Name	Displays the current job name
Description	Description specification of the current job
Format length [mm]	Specifying the format, i.e. the printing cylinder circumference
Web width [mm]	Specifying the web width
	Selection if material is preprinted

Subsequently, the dialog to define the printing unit properties opens.

Print configuration

The printing units participating in the production are defined in the Unit configuration. Furthermore, the printed color can be defined, the control

HMI dialog and element description

strategies for the length register and the side register can be selected and their settings can be selected.



If more than 12 printing units are defined for the "FWS-IM*MLC-TEC-NNVRS-NN-REGI*ADV2" license, the "Print configuration overview" dialog for printing units 13-24 is subsequently opened in the wizard.



One mark stream sensor can only measure 12 marks simultaneously. This has to be taken into consideration when defining the mark stream. To avoid that more than 12 marks are measured by a sensor, print or measure the multiple reference mark or set the relevant settings via the advanced settings.

Active Job: 24

Velocity: 27.0 m/min

User: Guest

2012-08-09 10:28:46

Rexroth
Bosch Group

Printing configuration

1	2	3	4	5	6	7	8	9	10	11	12
Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length
4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]
Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active
Mark 1	Mark 2	Mark 3	Mark 4	Mark 5	Mark 6	Mark 7	Mark 8	Mark 9	Mark 10	Mark 11	Mark 12
Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1
Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1

Length

Side

Measuring Method Length

Ref Unit 1

Reference Colour

Previous Colour

Measuring Method Side

Ref Unit 1

Reference Colour

Previous Colour

Job Management

Production

Preset Length

Job

Preset - Side

Preset Format

Acceleration

Diagnosis

Service

Fig. 10-40: Print configuration

HMI dialog and element description



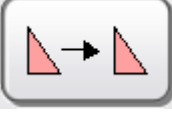
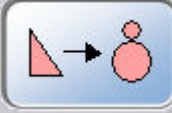
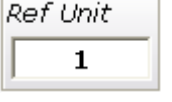
It is recommended to calculate the basic settings via the **reference** and **previous color** interfaces before selecting the print configuration settings. The basic settings are sufficient for all basic printing applications. The mark sequence in the mark stream is calculated sequentially. The reference mark is defined with "Ref Unit" for the **reference color**. The mark of the active printing unit is specified in the **previous color**.



The calculation should only take place after the printing units processing the job have been enabled and disabled.

	The selected printing unit is highlighted in gray
Web length 7200 [mm]	The material web length to the active printing unit in the front in [mm]
	Activating the individual printing unit: Setting and displaying the color by enabling the lower loop of the printing unit If the sensor is enabled, the dialog for advanced sensor settings is opened (see "Advanced sensor settings dialog" on page 114)

HMI dialog and element description

 	Select, if the printing unit prints a register mark: Top: Printing unit does not print any visible mark Down: Printing unit prints a visible mark
	Specifies the position of the printed mark in the mark stream
 	Selecting between web/web and web/cylinder control: Top: Web/web control. This means, a register mark to be controlled is compared to another register mark. Down: Web/cylinder control. This means, the printed register mark is compared to a cylinder position
	Reference mark for length register control
	Reference mark for side register control. This reference mark is only available in case of a web/web control
 	Enable/disable the automatic format correction. Enables a controller (also called inset controller) that controls the fine adjustment
	Opens the dialog to define reference marks that have been printed multiple times
	Entering a reference color (the entered number is only effective for a reference color. The entry is ignored for the previous color since the reference color results from the active printing unit at the front). The entered number is automatically corrected if the selected printing unit does not print any mark

HMI dialog and element description

	Selecting the reference color as measurement procedure
	Selecting the previous color as measurement procedure

By selecting the buttons for the length register or the side register, the dialog to configure the register controller for the activated printing unit is opened.

Multiple reference marks dialog



This feature is only available if no preprinted material is printed and the multiple reference mark is the first mark that has been printed. This function has to be enabled by Bosch Rexroth.

In this dialog it can be selected if several reference marks are printed and how many marks are located in between. If the button is enabled, multiple reference colors are printed. The number of the marks located in between specifies after how many register marks the reference mark is printed again.

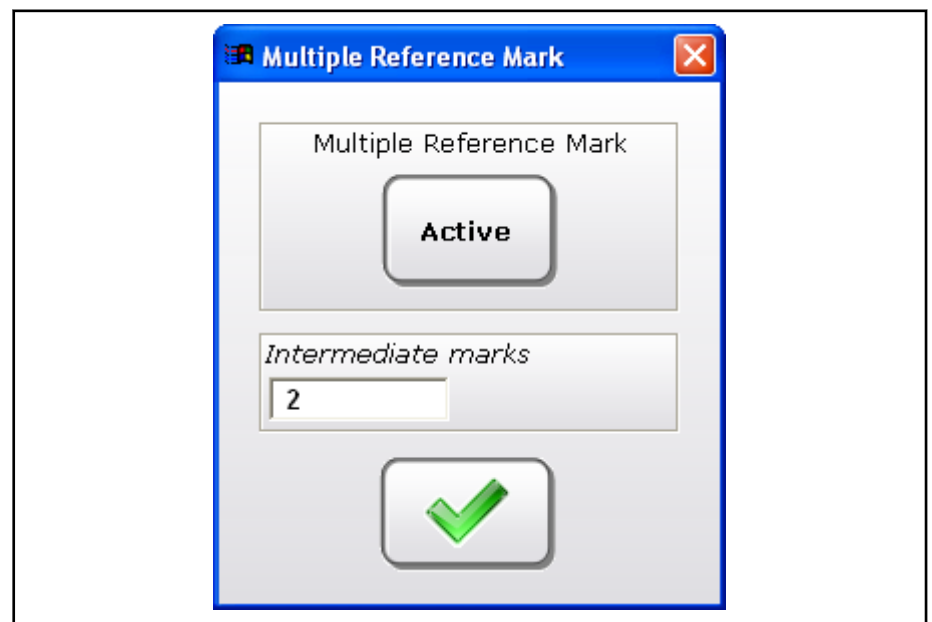


Fig. 10-41: "Multiple reference marks" dialog

Subsequently, the resulting mark stream is displayed. The first mark (1) is the reference mark. Subsequently, 4 marks of printing units follow until subsequently, the reference mark (6) is printed.

HMI dialog and element description

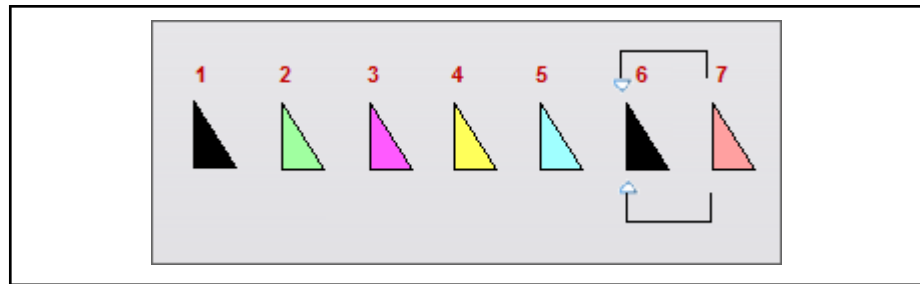
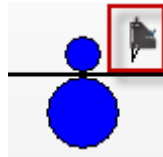


Fig. 10-42: Sample mark stream for multiple reference marks

The sensor behind the printing unit printing the turquoise mark (5), detects 5 marks in this case. The sensor behind the printing unit printing the mark (7) to the far right detects 2 marks in this case, as the multiple reference mark defines a new section. For example, if 24 printing units are available in which each printing unit prints a mark, a multiple reference mark has to follow after 11 marks. Thus, it can be ensured that each sensor smaller or equal to 12 register marks is measuring at the same time.

"Advanced sensor settings" dialog

The "Sensor" dialog is displayed when selecting the small sensor image to the right of the printing unit symbol.



Depending on the function that can be enabled separately, this dialog contains different options for parameterization.

By default, the following configuration options are available in the dialog.

HMI dialog and element description

Advanced Sensor configuration

Unit: 3 (Unit 3)
Sensor: 1 (Sensor_01)

Advanced Sensor
 configuration
 Sensor: 1

Color weighting

Barcode Search Prob.

Min. Marklevel

Gain

**Copy to all
 units**

Fig. 10-43: Dialog "Advanced sensor configuration" (default)

Color scaling	Color scaling of the sensor measurement (value range: 0 - 0.99) • A color scaling of 0.99 means that the sensor is exclusively operated as color sensor • A color scaling of 0 means that the sensor is exclusively operated as contrast sensor
Barcode search prob.	Barcode search probability (value range: 0 - 100 %) Minimum degree of conformity of the configured barcode pattern in which the determined pattern is accepted as barcode
Min. mark level	Minimum mark level Minimum analog value of the measured register mark detected as mark during TeachIn

HMI dialog and element description

Gain	Gain (value range 0-7) Gain factor of the sensor. Automatically determined during TeachIn. Should only be influenced in exceptional cases (e.g., if the expectation window cannot detect all marks within the 360° display in case of manual configuration even though the sensor is positioned correctly)
Copy to all units	Applies the configured values of the selected sensor to all other sensors

If the additional settings are enabled, the dialog provides more setting options, described below.

Advanced Sensor configuration

Unit: 3 (Unit 3)

Sensor: 1 (Sensor_01)

Number of visible marks

3

Own Mark

3

Reference mark length

1

Reference mark side

1

Dist. Barcode Exp. Win.

0

[mm]

Exp. Win. Size

240

[mm]

Advanced Sensor configuration

Sensor: 1

Color weighting

0.5000

Barcode Search Prob.

50.0000

Min. Marklevel

500

Gain

2

Copy to all units

Not Fixed

Mark stream configuration

Fig. 10-44: Dialog "Advanced sensor configuration"


 The advanced settings should only be selected in special cases, if the automatic calculation of the mark stream is not sufficient. This function has to be enabled by Bosch Rexroth.

HMI dialog and element description

The automatic calculation can be disabled in this dialog. If "fixed" is enabled, no automatic calculation takes place. The entered values are transmitted without conversion to the sensor or the control.

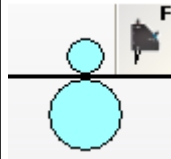
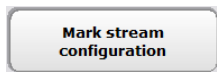


The button in the next dialog used to define the direction of the mark stream does not change the entered mark positions.

Furthermore, it has to be entered how many marks the sensor can identify.



By entering the visible marks, it is selected via how many marks the expectation window is set. If this setting is selected, the automatic barcode search can sporadically not be used anymore. The expectation window has to be set manually.

Visible marks	Specify the number of marks to be displayed to and to be measured by the sensor
Own mark	Specifies the position of the own mark within the visible marks
Reference mark length	Specifies the position of the own mark for the length register within the visible marks
Reference mark side	Specifies the position of the individual mark for the side register within the visible marks
Distance of barcode to EWF	This input field is only active if a barcode is printed. Specifies in which distance the expectation window containing the visible register marks starts from the end of the barcode
EWF size	This input field is only active if a barcode is printed. Specifies the expectation window size containing the visible register marks
	If "fixed" is selected, no automatic calculations are executed for this printing unit. The data entered in this dialog is transmitted to the sensor If the button is pressed continuously (fixed), an "F" is displayed in the print configuration overview 
	This button is only active if the sensor is marked as fixed. The button opens the dialog for separate configuration of the mark stream and the barcode for a "fixed" sensor. The separate mark stream or barcode are configured analog to the configure the global mark stream or the barcode (see chapter "Mark stream" on page 148 and chapter "Barcode definition" on page 151)

HMI dialog and element description



If the sensor is marked as "fixed", a subsequent change to the global mark stream configuration or the global barcode configuration for this sensor is not applied.

Mark stream as well as barcode have to be configured separately for a "fixed" sensor.

Sample mark stream:

A printing machine with processing unit is described as use case. The printing units print a barcode and six register marks. Additionally, an individual register mark is printed for the processing unit. As the processing unit does not print an own mark, the processing unit has to be path-/cylinder-controlled. Therefore, not all register marks have to be measured but only a reference mark placed at another position. The sample mark stream displays the barcode, six register marks and finally the reference mark to which the processing unit is to be controlled to.

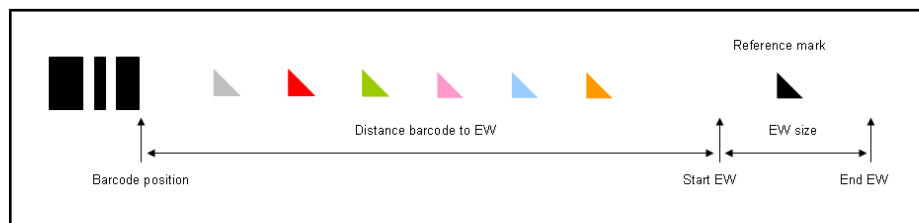


Fig. 10-45: Definition of only one mark to be measured, including the advanced settings

This mark stream can be defined as follows via the advanced processing unit settings:

The HMI dialog is titled "Advanced Sensor configuration". It is for "Unit: 3 (Unit 3)" and "Sensor: 2 (Sensor_02)".

On the left side, there are four input fields:

- Number of visible marks:** 1
- Own Mark:** 0
- Reference mark length:** 1
- Dist. Barcode Exp. Win.:** 150 [mm]
- Exp. Win. Size:** 30 [mm]

On the right side, there are four input fields and a button:

- Advanced Sensor configuration Sensor: 2**
- Color weighting:** 0.5000
- Barcode Search Prob.:** 30.0000
- Min. Marklevel:** 500
- Gain:** 2
- Copy to all units** (button)

At the bottom, there are three buttons: "Fixed" (highlighted in blue), "Mark stream configuration", and a green checkmark button.

Fig. 10-46: Definition of the sample mark stream

A visible mark is defined for the processing unit. Consequently, a path/cylinder control is executed, as a register mark to be measured has to be the reference mark. As no individual register mark is printed, a "0" is entered. A printed mark has been selected as reference mark for the length register.

No side register control is available for path/cylinder control. Therefore, this input field is hidden. The reference mark is only printed after the mark stream. The distance of this reference mark to the end position of the barcode is 150 mm.

As only one register mark has to be measured, the expectation window is defined with 30 mm. The reference mark has to be in this range. To prevent overwriting of these entries by the automatic calculation, the settings can be **fixed**.

After the job has been enabled, a barcode search can now also be executed for this processing unit, after which the mark measurement of the reference mark is started automatically. The expectation window can also be set manually via the reference mark.

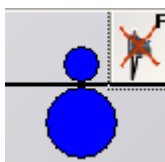
HMI dialog and element description



If the barcode search fails, the configuration has to be checked or the expectation window has to be manually set via the number of visible register marks.



If a sensor is available for several printing units, the printing unit without sensor also features an icon showing a crossed out sensor if the advanced sensor settings are enabled for the subsequent sensor.



The visible marks are highlighted in gray in the dialog. The value corresponds to the visible marks of the sensor. Furthermore, the position of the individual mark, visible to the sensor, as well as the reference mark for the length and side register has to be specified for this control station.

Configuring the length register

The length register controller for the selected printing unit can be configured in this dialog. During the parameterization, it is differentiated between a length register controller in web/web or in web/cylinder.

HMI dialog and element description

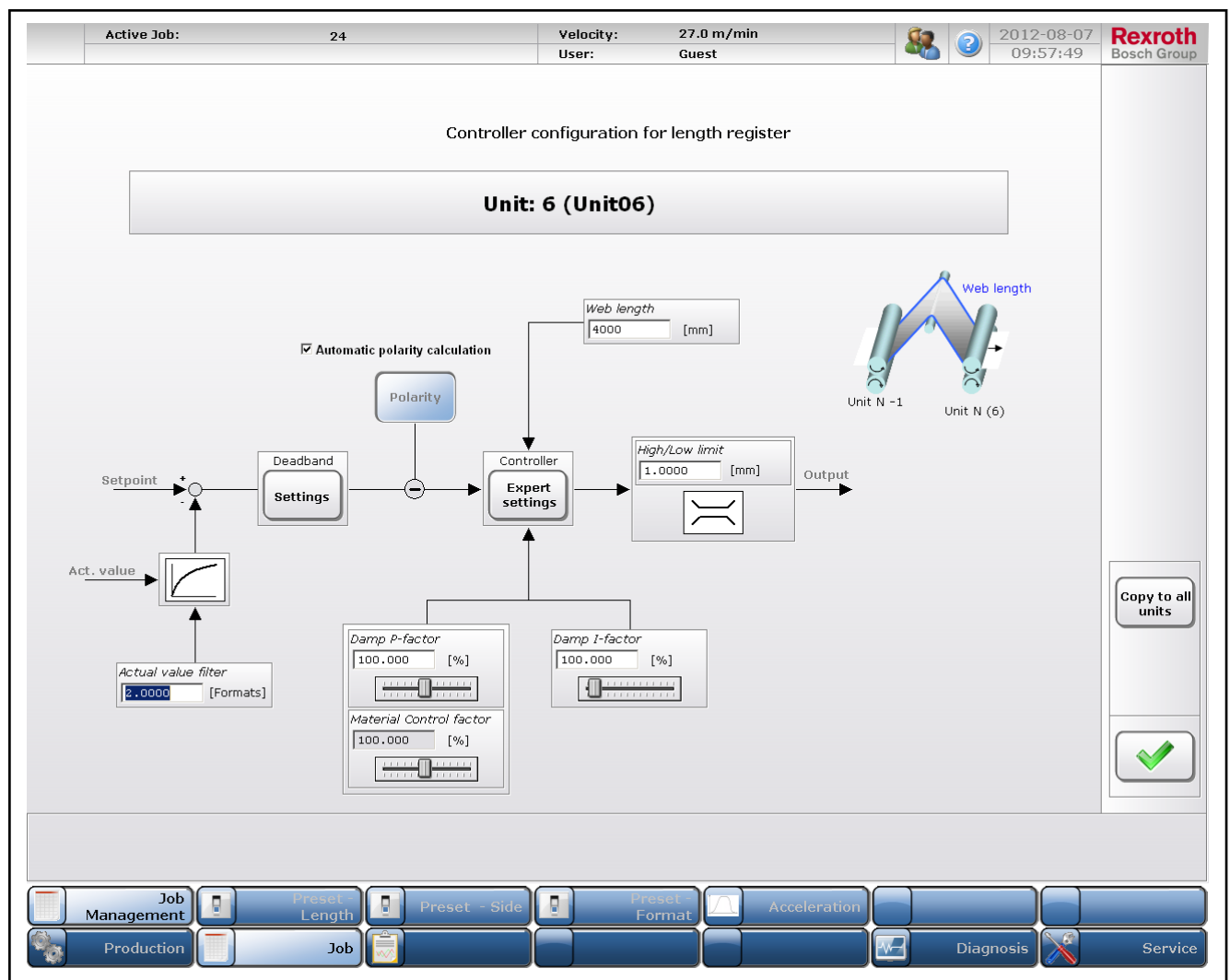


Fig. 10-47: Controller configuration "length register"



Please check that it is set in the expert setup, whether it is a printing process with or without clamping unit. The dynamics of the calculated controller parameter depends on this fact.

Actual value filter 2.0000 [Formats]	Filter constant for the measurands
Setup	Parameterizing the dead zone or resetting to default values
Polarity ☒ Automatic polarity calculation	Setting the polarity If the automatic polarity calculation is active, the polarity is automatically calculated depending on the defined mark stream. Otherwise, the polarity can be set manually

HMI dialog and element description

	Indicates how the optimally calculated controller parameters should be scaled. The input size can vary from 0 to 200%. The slide control effects the P-factor of the calculated controller parameter. 100 % signifies that the exact and precisely calculated P-factor is used. 50 % means that half the P-factor is used. The control factor "Material" is entered in the material settings and can be calculated with the P-factor. The P-factor cannot be changed in this dialog
	Indicates how the optimally calculated controller parameters should be scaled. The input size can vary between 0 and 1000 %. The slide control effects the I-factor of the calculated controller parameter. 100 % means that the exact calculated I-factor is used. 50 % means that half the I-factor is used. The control loop dynamics is thus increased
	Opens another dialog where the controller mode can be selected. In this setting, it has to be specified if it is a control station with clamping unit (e.g. gravure printing) or without clamping unit (e.g. screen printing)
	Length of the material web to the previously active printing unit
	Box to enter the maximum length register adjustment within a printing cylinder revolution
	Copies the data of the currently selected printing unit to all other printing units. By copying, the data of a web/web register controller are only copied to control stations with web/web register controllers. If the path/cylinder controller is not defined as processing unit, the data is only copied to the path/cylinder controllers that are no processing units. If the path/cylinder controller is defined as processing unit, the data is only copied to the path/cylinder controllers that are processing units



If the web/cylinder control mode is selected, the material factor and the expert setup is not needed with the setting with or without clamping unit.



The automatic polarity calculation can be enabled and disabled per printing unit.

Side register configuration

The side register controller of the selected printing unit can be configured in this dialog.

HMI dialog and element description

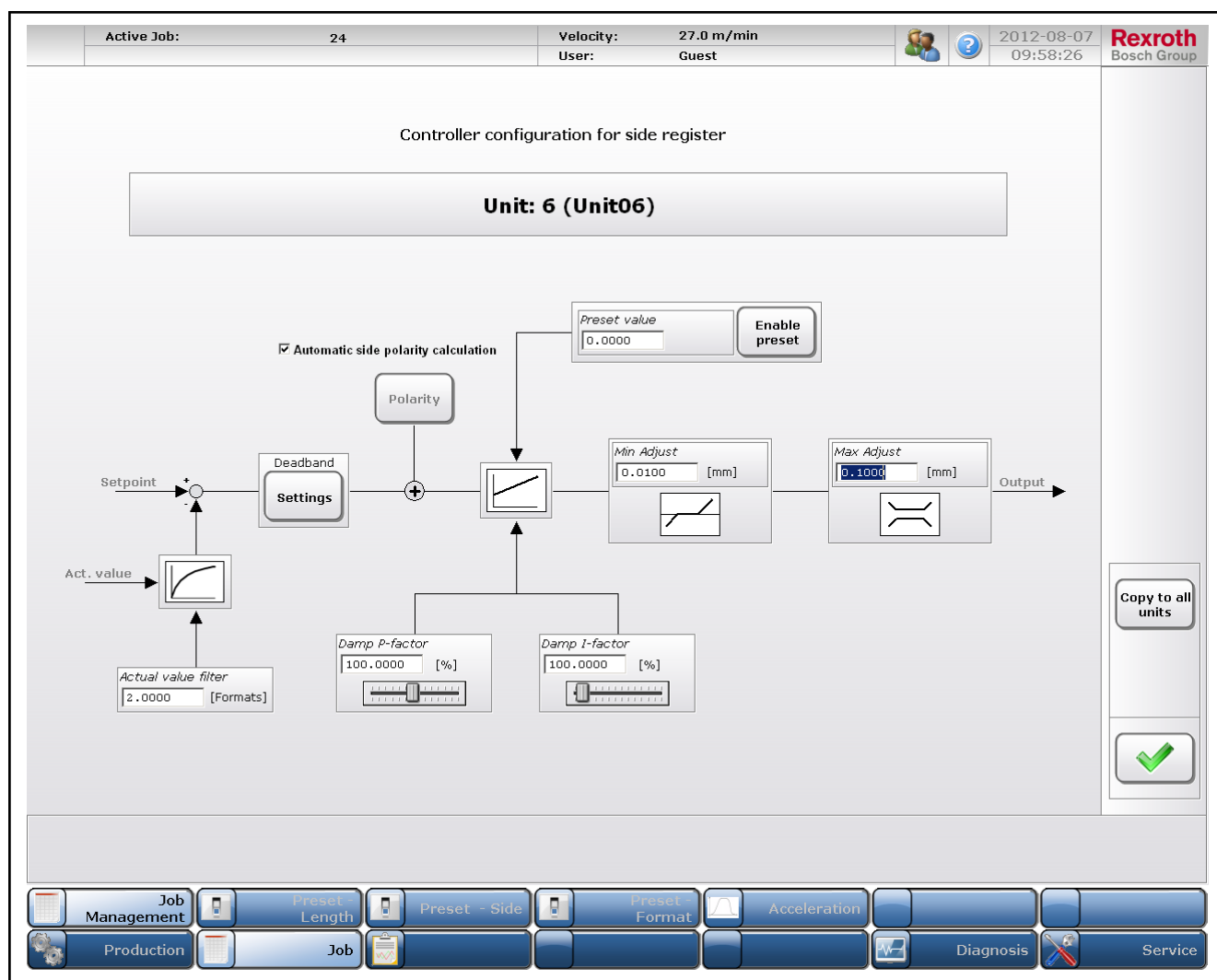


Fig. 10-48: Controller configuration of "side register"

Actual value filter 2.0000 [Formats]	Filter constant for the measurands
Setup	Parameterizing the dead zone or resetting to default values
Polarity ☒ Automatic polarity calculation	Setting the polarity If the automatic polarity calculation is active, the polarity is automatically calculated depending on the defined mark stream. Otherwise, the polarity can be set manually
Damp P-factor 100.000 [%]	Indicates how the optimally calculated controller parameters should be scaled. The input size can vary from 0 to 200%. The slide control effects the P-factor of the calculated controller parameter. 100 % signifies that the exact and precisely calculated P-factor is used. 50 % signifies that half the P-factor is used

HMI dialog and element description

Damp I-factor 100.000 [%]	Indicates how the optimally calculated controller parameters should be scaled. The input size can vary between 0 and 1000 %. The slide control effects the I-factor of the calculated controller parameter. 100 % means that the exact calculated I-factor is used. 50 % means that half the I-factor is used. The control loop dynamics is thus increased
Preset value 0.0000 Enable preset	Preset of the controlled variable of the controller
Min Adjust 0.0010 [mm]	Input for the minimum adjustment of the side register (the value should correspond to at least the minimum adjustment of the side register adjustment device)
Max Adjust 0.2000 [mm]	Box to enter the maximum side register adjustment in one printing cylinder revolution
Copy to all units	Copies the side register controller data of the currently selected printing unit to all other printing units



The automatic polarity calculation can be enabled and disabled per printing unit.

Automatic format correction

In this dialog, the automatic format correction (insetter) can be configured for the selected printing unit.

HMI dialog and element description

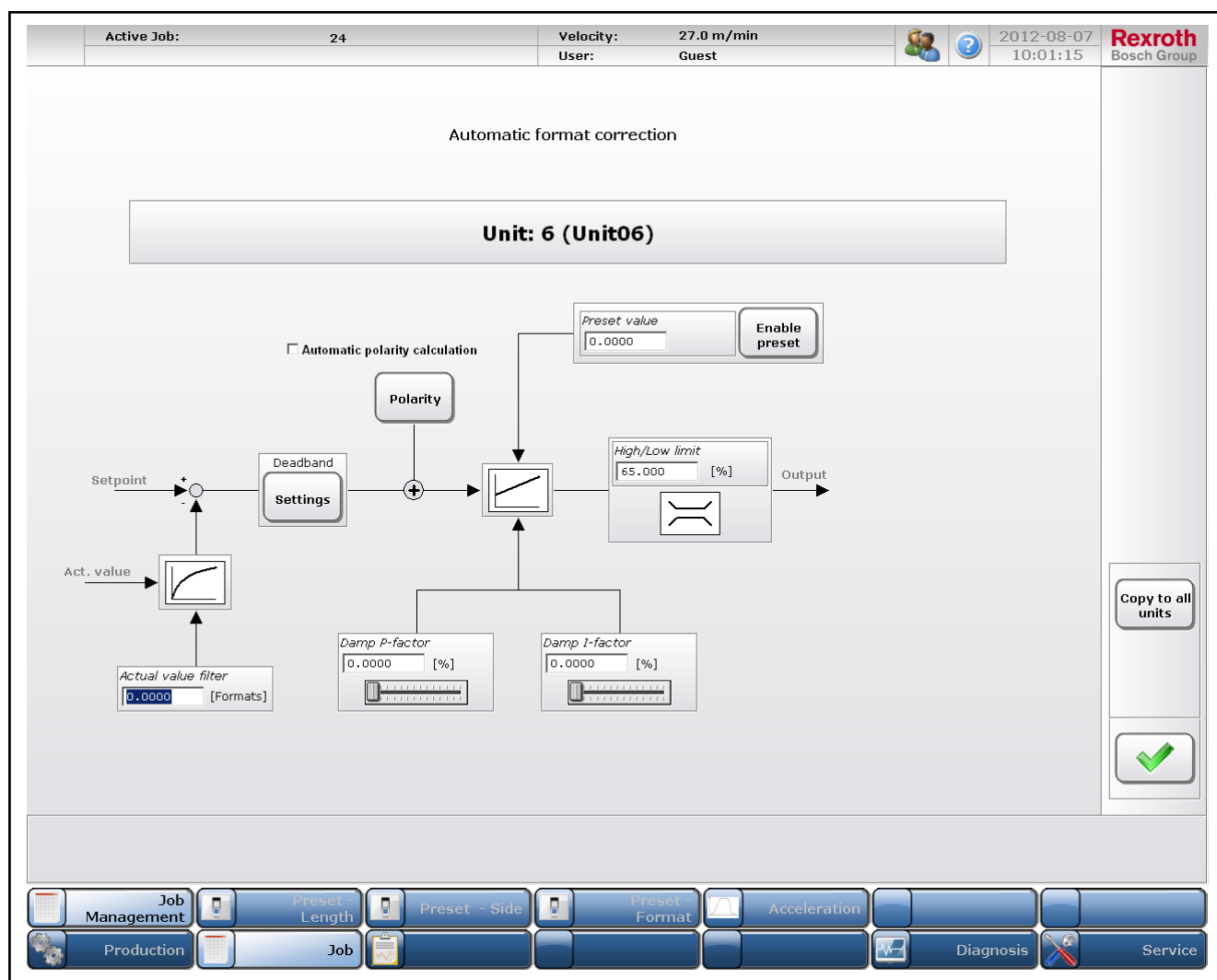
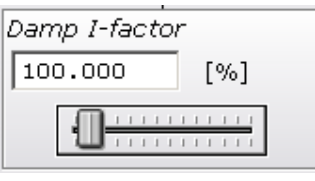
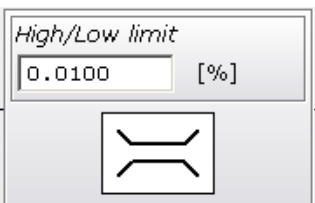


Fig. 10-49: Automatic format correction

Actual value filter 2.0000 [Formats]	Filter constant for the measurands
Setup	Parameterizing the dead zone or resetting to default values
Polarity ☒ Automatic polarity calculation	Setting the polarity If the automatic polarity calculation is active, the polarity is automatically calculated depending on the defined mark stream. Otherwise, the polarity can be set manually
Damp P-factor 100.000 [%]	Indicates how the optimally calculated controller parameters should be scaled. The input size can vary from 0 to 200%. The slide control effects the P-factor of the calculated controller parameter. 100 % signifies that the exact and precisely calculated P-factor is used. 50 % signifies that half the P-factor is used

HMI dialog and element description

	Indicates how the optimally calculated controller parameters should be scaled. The input size can vary between 0 and 1000 %. The slide control effects the I-factor of the calculated controller parameter. 100 % means that the exact calculated I-factor is used. 50 % means that half the I-factor is used. The control loop dynamics is thus increased
	Preset of the controlled variable of the controller
	Limit for the maximum permissible fine adjustment in [%]
	Copies the data of the automatic format correction of the currently selected printing unit to all other printing units with active controller for the automatic format correction. If the automatic format correction is not defined as processing unit, the data is only copied to controllers of the automatic format correction that are no processing units. If the automatic format correction is defined as processing unit, the data is only copied to controllers of the automatic format correction that are processing units

After the parameterization of all register controllers has been completed, you can go to the next dialog for the configuration of the mark stream using the "arrow" keys.

 The automatic polarity calculation can be enabled and disabled per printing unit.

Mark stream

To define the mark stream, the mark geometry and the mark stream features have to be specified. Furthermore, it has to be specified whether a barcode is active.

 The barcode is printed in front of the mark stream by the first printing unit. The sensor can detect the barcode and use this information to calculate the expectation window. The barcode has to be printed in front of the mark stream and has to be correctly defined.

HMI dialog and element description

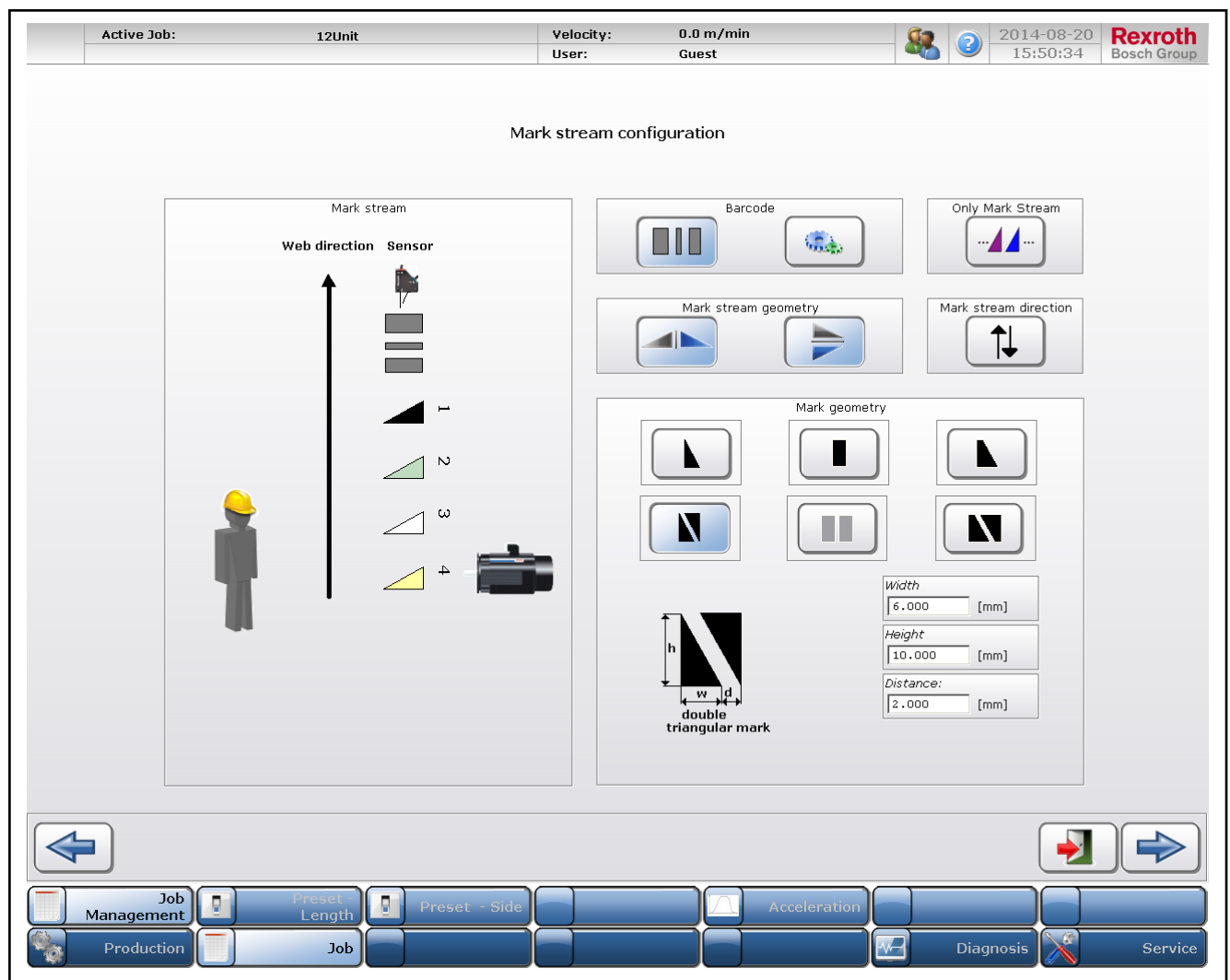
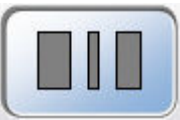


Fig. 10-50: Mark stream configuration

	Indicates that a barcode is available
	Opens the configuration dialog of the barcode. This button is only visible if a barcode is available
	Specifies that only register marks are contained in a 360° cylinder revolution. The remaining area does not contain any register crosses, arrows, etc. The sensor can then find the mark stream (without barcode) and start the measurement as soon as the mark stream search is started

HMI dialog and element description

     	Selecting the geometry of the printed marks
Width [mm]	Width of the selected mark
Height [mm]	Height of the selected mark
Distance [mm]	Distance between the double marks
	Selects the mark orientation
	Selects the mark sequence. It is specified, whether the registration mark printed by the first printing unit should be on the first or on the last position of the mark stream
	Selects which mark edge is the first to be detected by the sensor
	Cancels the job configuration (changes are discarded)
	Saves the job configuration

HMI dialog and element description

The mark stream can be completely defined using the 3 buttons. The mark stream has to be exactly graphically displayed in the characteristics the mark stream is printed on the material web and measured by the sensor.

The dialog to define the material properties is opened after the mark stream has been defined.



The mark stream has to be correctly defined for the sensor optics to detect it. If the mark stream is not correctly defined, a correct length register control and side register control cannot be guaranteed.



The configured mark stream applies to all sensors that are not fixed. For fixed sensors, the mark stream configuration has to be selected in the advanced sensor settings of the respective sensor. Refer to [fig. 10-44 "Dialog Advanced sensor configuration" on page 138](#).

Barcode definition



This dialog can only be opened if a barcode is printed and activated.

The technical requirements for the barcode are as follows:

- The barcode has to be **unambiguous** within one revolution
- The barcode has to be printed in front of or behind the mark stream
- Optionally, a second barcode can also be printed indicating the end of the mark stream. This barcode may not be identical to the first barcode. A mirror-inverted barcode is recommended
- The barcode can consist of 3 - 10 blocks
- A printing-free area of 20 mm has to be in front of the barcode
- A printing-free area of 20 mm has to be behind the mark stream
- The size of the barcode blocks has to be 2 - 10 mm
- The distance between the barcode blocks has to be 2 - 10 mm each



A barcode search can only be started if the barcode can be measured under the corresponding sensor. If a barcode search is started without a bar code being printed, an incorrect bar code position can sporadically be returned.



The barcode detection can only be ensured if it is complied with the listed specifications.

The barcode dialog is structured as follows:

HMI dialog and element description

Active Job:	Rexroth1	Velocity:	23.5 m/min		2011-03-30 11:57:55	Rexroth Bosch Group
		User:	Guest			

Barcode configuration

Barcode location

Free space in front of markstream

20 [mm]

Mark distance

20 [mm]

Size of Expectation Window

80 [mm]

Number of barcode blocks

3

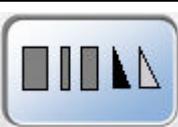
Barcode parameter

	Block 1	Block 2	Block 3	
Width	9.0	6.0	3.0	[mm]
min.: 2mm				
max.: 12mm				
	W1	W2	W3	
Distance	3.0	3.0	20.0	[mm]
min.: 2mm				
	D1	D2	D3	

Job Management	Preset	Preset - Side	Acceleration	Preset	Preset	Preset
Production	Job	Quality	Preset	Preset	Preset	Diagnosis
					Service	

Fig. 10-51: Barcode configuration

Individual elements description:

	Defining the barcode position. It can be defined whether the barcode is in front of or behind the mark stream
Free area in front of the first block [mm]	It indicates the printing-free area in front of the barcode
Mark distance [mm]	Specifies the mark distance of the register marks
Size of the expectation window [mm]	Indicates the size of the expectation window behind the barcode. The size is defined directly after the barcode, if the barcode is in front of the mark stream. Marks can only be found if the mark stream is located behind the barcode in the area defined by this value. If the barcode is behind the mark stream, the size of the expectation window has to be defined from the start of the mark stream plus half a print-free area up to the start of the barcode (see figure above)
Number of barcode blocks	Indicates the number of barcode blocks. The number can vary from 3 to 10

HMI dialog and element description

Width [mm]	Indicates the width of the respective barcode block
Distance [mm]	Indicates the distance between the respective barcode blocks. The last value to be entered is the distance between the barcode and the first mark



If the barcode search with a subsequent measurement was not successful, the cause might be an incorrectly defined barcode or an incorrect size of the expectation window. In this case, open the oscilloscope of the respective sensor and get the current data displayed. Using the oscilloscope, it can be detected whether the expectation window was selected too small (marks are missing) or too large (the expectation window is larger than the printing-free area). Correct your entry if required.



The configured barcode applies to all sensors that are not fixed. For fixed sensors, the barcode configuration has to be selected in the advanced sensor settings of the respective sensor. Refer to [fig. 10-44 "Dialog Advanced sensor configuration" on page 138](#).

Sample mark stream

This section describes the sample structure of a recommended mark stream.

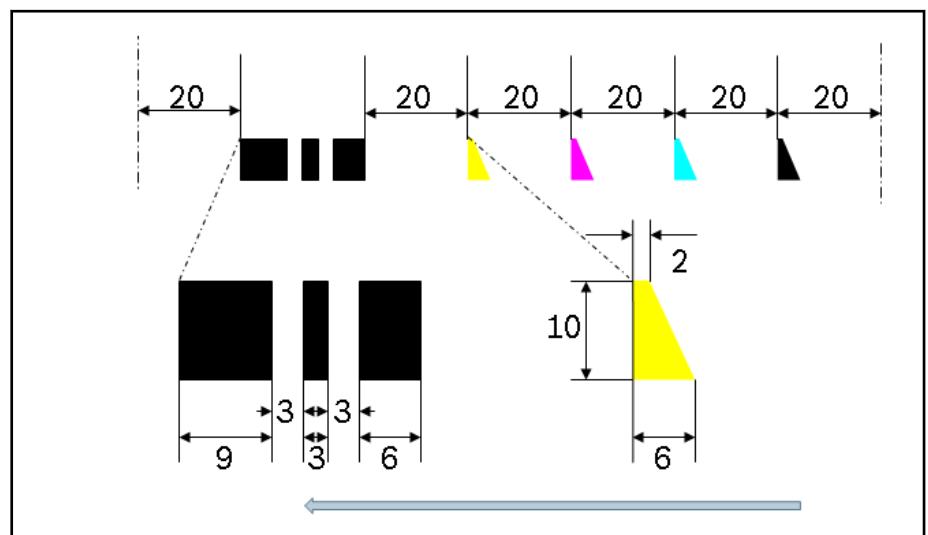


Fig. 10-52: Recommended sample mark stream

The blue arrow points into the direction of the path, i.e. the bar code is displayed as first entry below the sensor optics.

The following general requirements for a mark stream with trapezoidal marks have to be complied with:

- The recommended printed mark distance is 20 mm. The minimum distance between the marks should not be less than 15 mm as the area to be controlled by the marks is considerably limited
- The trapezoidal marks top width should not be less than 2 mm
- The height depends on the required control area of the side register. 10 mm is recommended
- The order of the vertical and the inclined mark edge to the printing direction is user-defined, however, the direction has to be used in the entire mark stream

HMI dialog and element description

The barcode requirements are described in the previous section (cf. [chapter 10.7.2 "Job management" on page 128](#)).

Material selection

General information

In the "Material selection" dialog, up to 16 material data blocks can be created/edited and selected, if required.

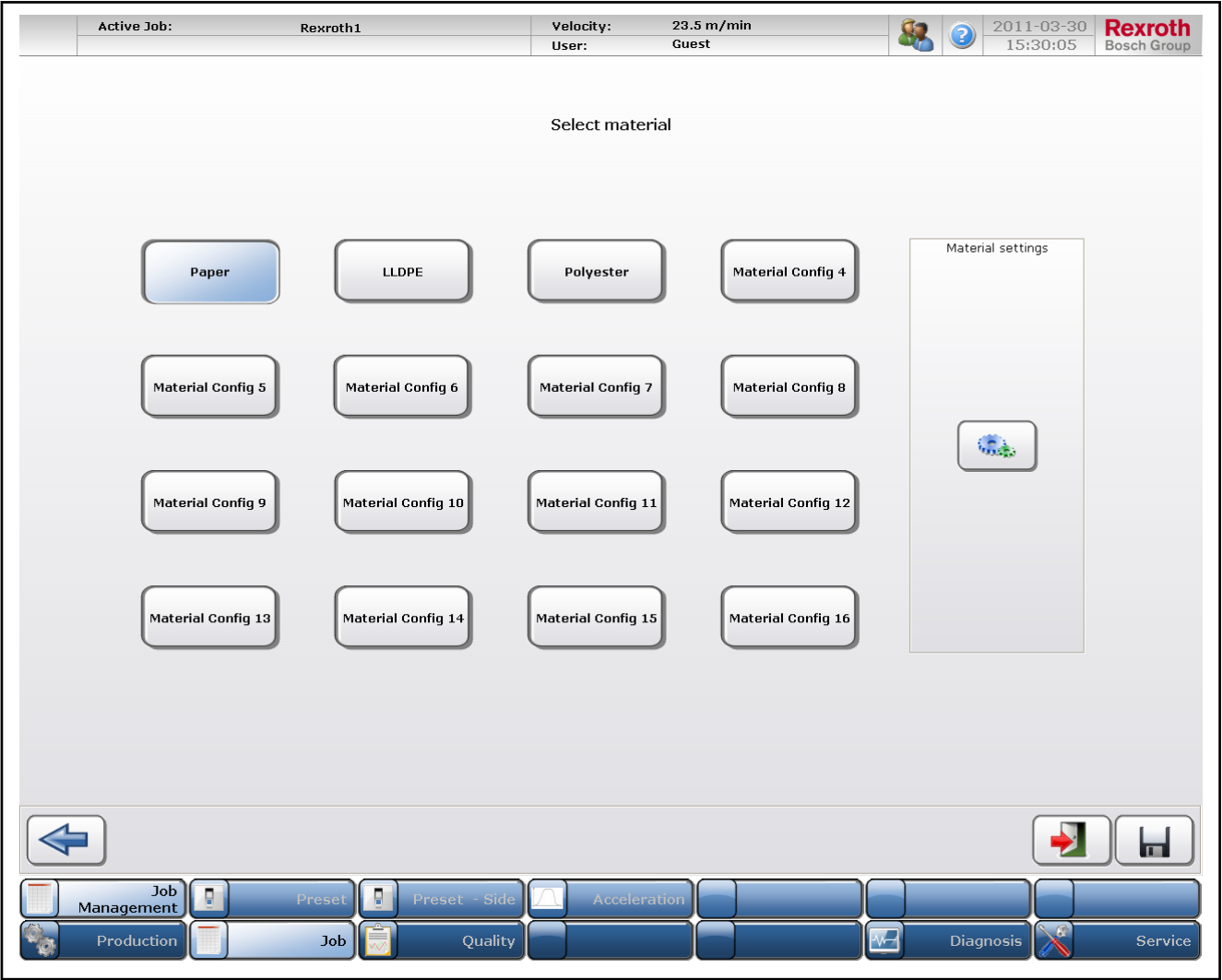


Fig. 10-53: Material selection

Material	Selecting the material data block
	Linking to the configuration dialog to enter the material-specific constants

Material settings

The material-specific properties can be entered in this subdialog.

HMI dialog and element description

Active Job: Labor **Velocity:** 28.5 m/min **User:** Guest **2014-11-28 15:13:01** **Rexroth Bosch Group**

Material settings

Name: BOFF Description:

Material constants for acceleration compensation

Elasticity: 7000.000 [N/mm²]

Web thickness: 70 [µm]

Grammage: 2.0000 [g/m²]

Control Settings

Material Control factor: 100.000 [%]

Navigation Bar: Job Management, Production, Preset Length, Job, Preset Side, Preset Format, Acceleration, Diagnosis, Service

Fig. 10-54: Material settings

Material name	Material name specification. The name describes the material data block in the "Material selection" dialog
Material description	Material data record description
Elasticity [N/mm²]	Modulus of elasticity of the material
Web thickness [µm]	Material thickness
Grammage [g/mm²]	Grammage of the material (paper)
Control factor Material	Factor that influences the P-factor of the length register independent of the material. 100 % signifies that the exact calculated P-factor is used

HMI dialog and element description

	Cancels the material configuration (changes are discarded)
	Saves the material configuration

After the material has been configured, the changed job has to be saved. If this job should now be directly used, the job can be additionally activated in the job overview. Due to the activation, the job is transferred from the HMI to the control and to the sensors. The job configuration is now completed.

10.7.3 Preset settings - Length

 If it has been defined in the machine configuration that the preset is executed externally, the input windows are disabled.

The "Preset settings - Length" preregisters the length register.

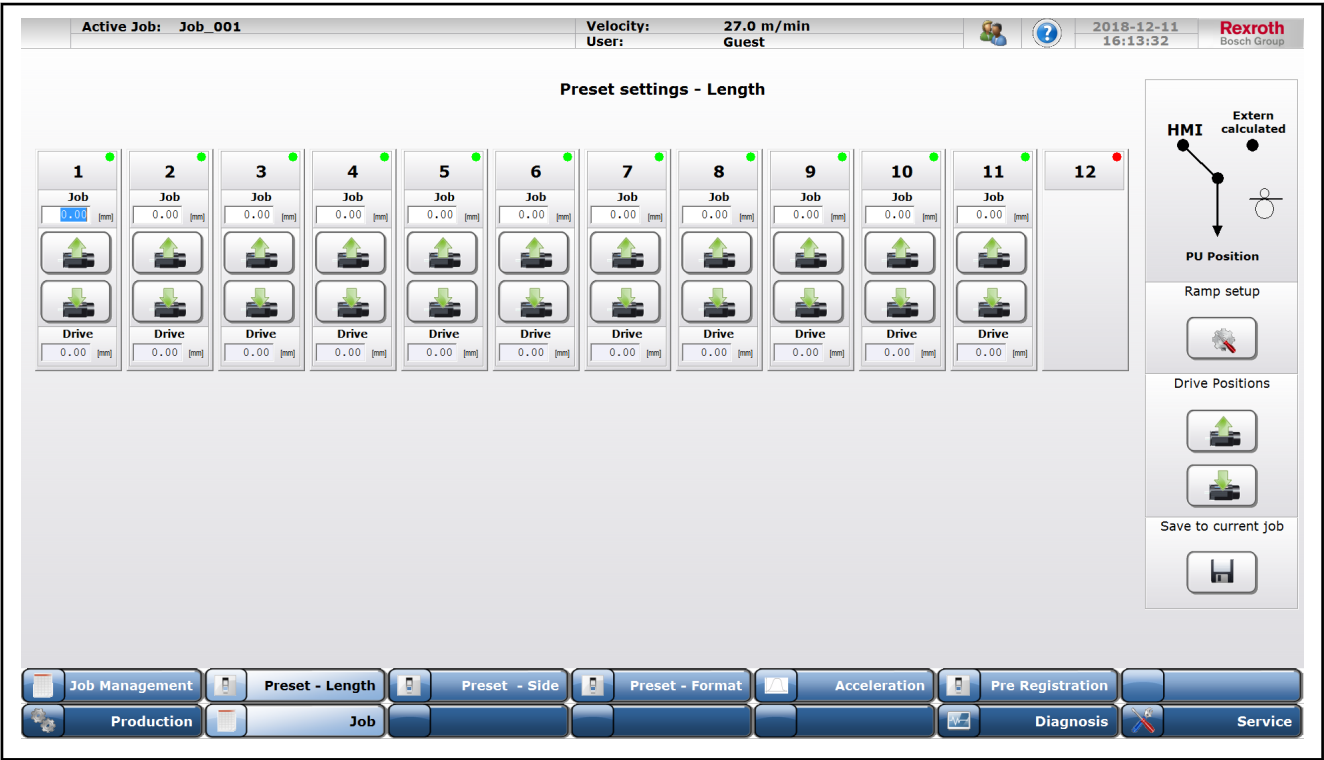


Fig. 10-55: Preset settings "length register"

HMI dialog and element description

Job [mm]	Specifies preset values for the drive position
 	Top: Apply drive position as "Preset" value Down: Write "Preset" value to drive and traverse offset
	Saves the data in the current job configuration
Drive [mm]	Shows the position offset currently applied to the drive While traversing the position offset, the background color of this display field changes to green to signal an active adjustment motion.
	Opens the dialog to configure the ramp settings

Preset longitudinal - Ramp settings

The dialog "Length register - Position preset - Settings" is used to configure the parameters to ramp the "Preset" values for the length register.

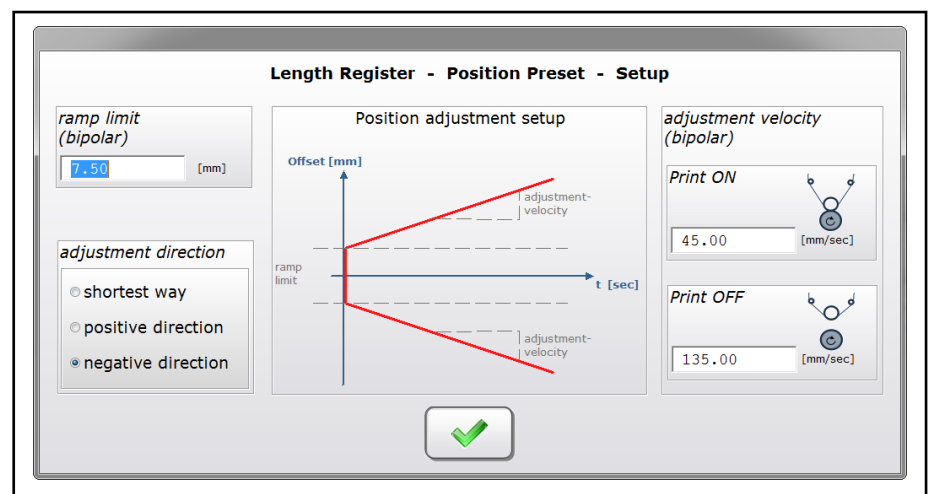


Fig. 10-56: Length register - Position preset - Settings

HMI dialog and element description

Ramp limit (bipolar) [mm]	A "Preset" value causing a position change greater than the ramp limit is ramped with the adjustment velocity set.
Adjustment velocity (bipolar) [mm/s]	Print ON: Velocity used to ramp the position offset at a closed printing unit Print OFF: Velocity used to ramp the position offset at an open printing unit
Adjustment direction	• Shortest way: The position offset is traversed on the shortest distance possible (positive or negative direction) • Positive direction: The position offset is always traversed in positive direction, even if the distance is shorter in negative direction • Negative direction: The position offset is always traversed in negative direction, even if the distance is shorter in positive direction



If preset values have been found, it is recommended to download the values from the control and save them in the job. These values can be written directly upon a new job activation if the preset is activated in the machine configuration upon the job activation.

10.7.4 Preset side



If it has been defined in the machine configuration that the preset is executed externally, the dialog is disabled.

The "Preset side" dialog is used to preregister the page register. The dialog structure is adjusted to the length register preset (preset dialog: right side).

HMI dialog and element description

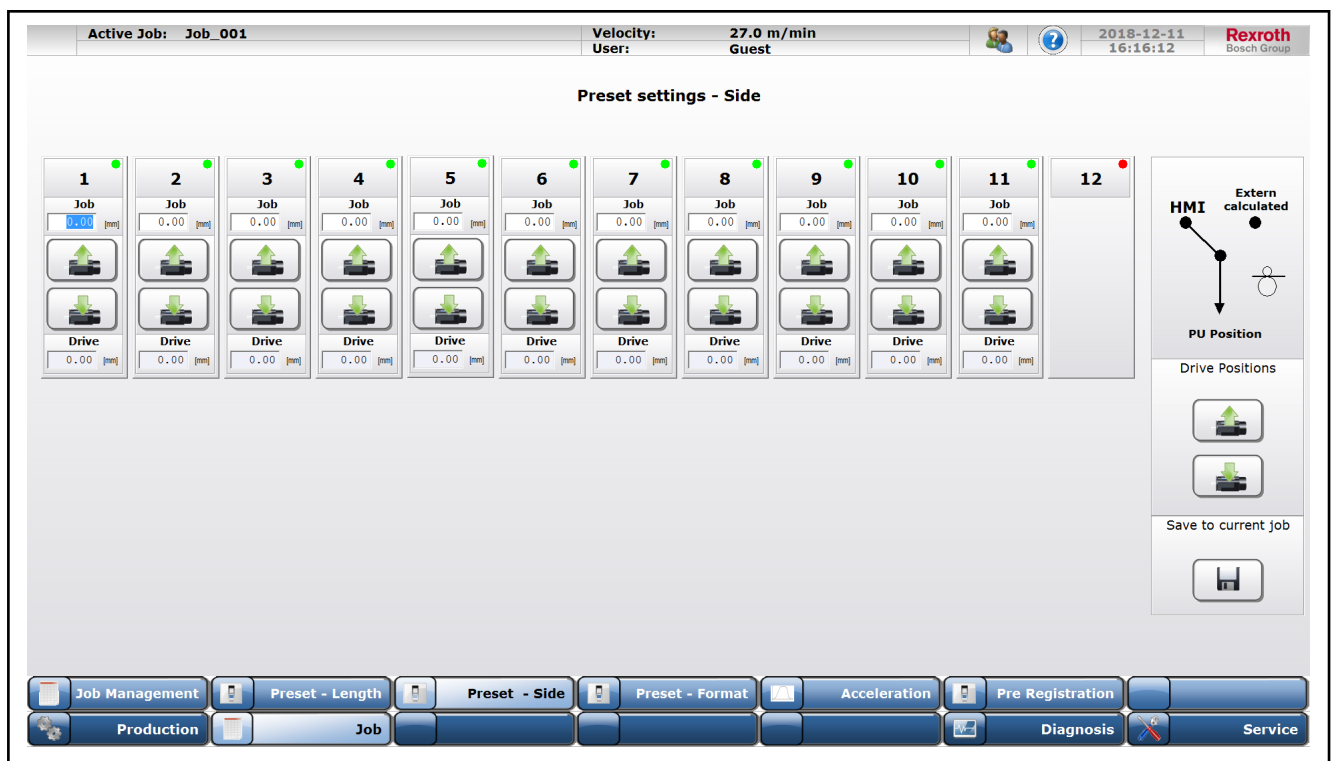


Fig. 10-57: Preset settings "Side register"

Job [mm]	Specifies "Preset" values for the side register
 	Top: Applying side register position as "Preset" value Down: Write "Preset" value to drive and traverse offset
	Saves the data in the current job configuration
Drive [mm]	Shows the position offset currently applied to the drive A yellow background of this display box signals that the motor setting the side register is at its traversing limit



If preset values have been found, it is recommended to download the values from the control and save them in the job. These values can be written directly upon a new job activation if the preset is activated in the machine configuration upon the job activation.

10.7.5 Preset format



If it has been defined in the machine configuration that the preset is executed externally, the input windows are disabled.

HMI dialog and element description

For the format length correction, enter the “Preset” values for the fine adjustment into the "Preset" dialog.

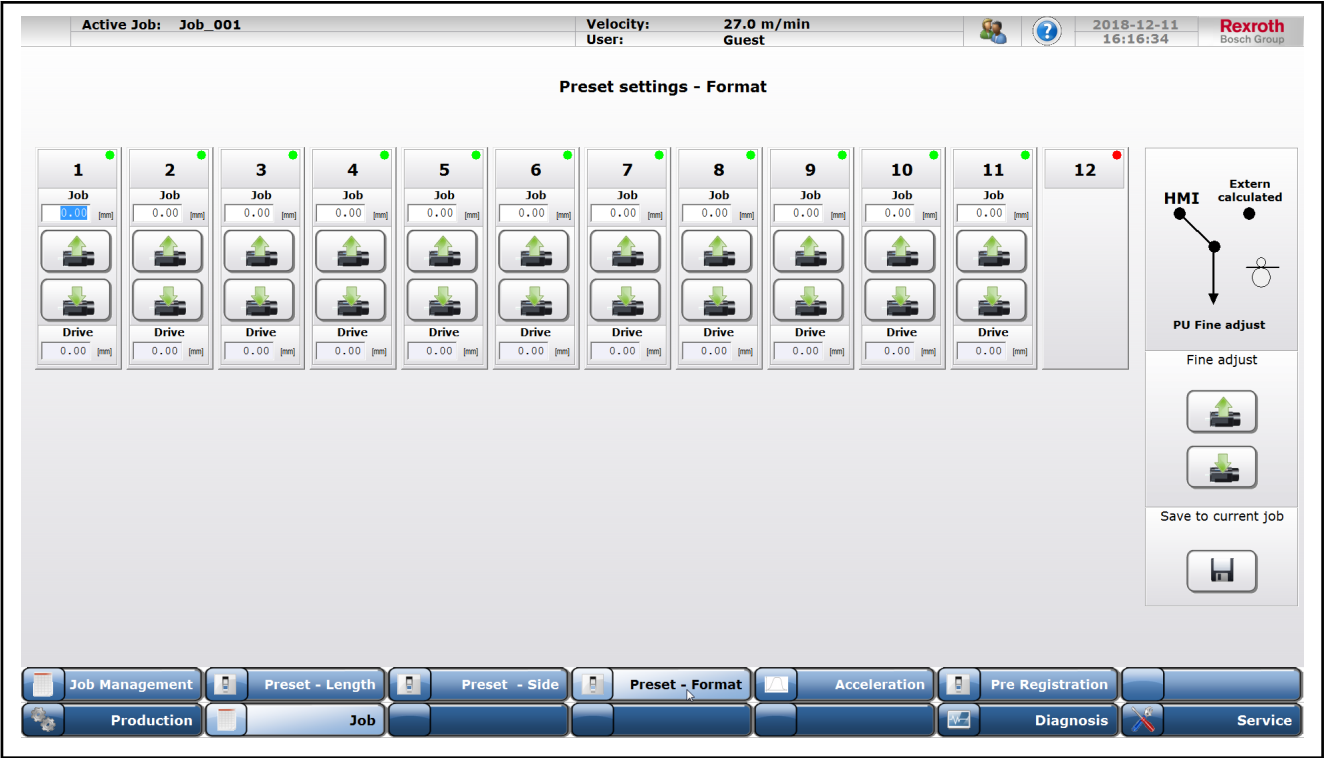


Fig. 10-58: Preset settings for fine adjustment

Job [mm] or [%]	Specifies preset values for the fine adjustment Select the unit of the “Preset” values for the fine adjustment in the machine configuration. [mm] or [%] can be selected. Refer to fig. 10-18 "Unit settings" on page 102
 	Top: Apply fine adjustment from the drive as “Preset” value Down: Apply “Preset” value to the drive
	Saves the data in the current job configuration
Drive [mm] or [%]	Shows the fine adjustment value currently applied to the drive A yellow background of this display field signals that a “Preset” value with a limit value higher or smaller than the limit value was transferred



If preset values have been found, it is recommended to download the values from the control and save them in the job. These values can be written directly upon a new job activation if the preset is activated in the machine configuration upon the job activation.

10.7.6 Optional functions

Acceleration compensation



The function "Acceleration compensation" is only intended for special hardware-specific characteristics. This function has to be enabled by Bosch Rexroth.

There are two different procedures for the acceleration compensation.

- **Standard acceleration compensation** - Based on a velocity-dependent adaptation of the control variable during the acceleration
- **Advanced acceleration compensation** - Based on velocity- and acceleration-dependent compensation factors that can compensate errors occurring due to friction and inertia during the acceleration phase

For a detailed description, refer to [chapter 10.11.3 "Additional function Acceleration compensation" on page 194](#).

Automatic pre-registration



The function "Automatic pre-registration" is only intended for special hardware-specific characteristics. This function has to be enabled by Bosch Rexroth.

The function "Automatic pre-registration" can be used to calculate the web length changed between the printing unit and the sensor resulting while engaging the impression roller based on the barcode position and to compensate it during the engagement. Thus, the printing units can already print in the correct color register right from the beginning.

For a detailed description, refer to [chapter 10.11.4 "Additionally Automatic pre-registration \(APR\)" on page 198](#).

10.8 Production

10.8.1 Brief description

The dialogs for the production are used to visualize register errors and to monitor the status of the configured sensors and printing units.

10.8.2 Register Overview

In the Register overview, the register deviations of all printing units are clearly represented. In this dialog, the sensors and controllers can be controlled after the job has been configured. For example, a global barcode search can be started, the command values are applied and the controllers can be switched on or off.

HMI dialog and element description

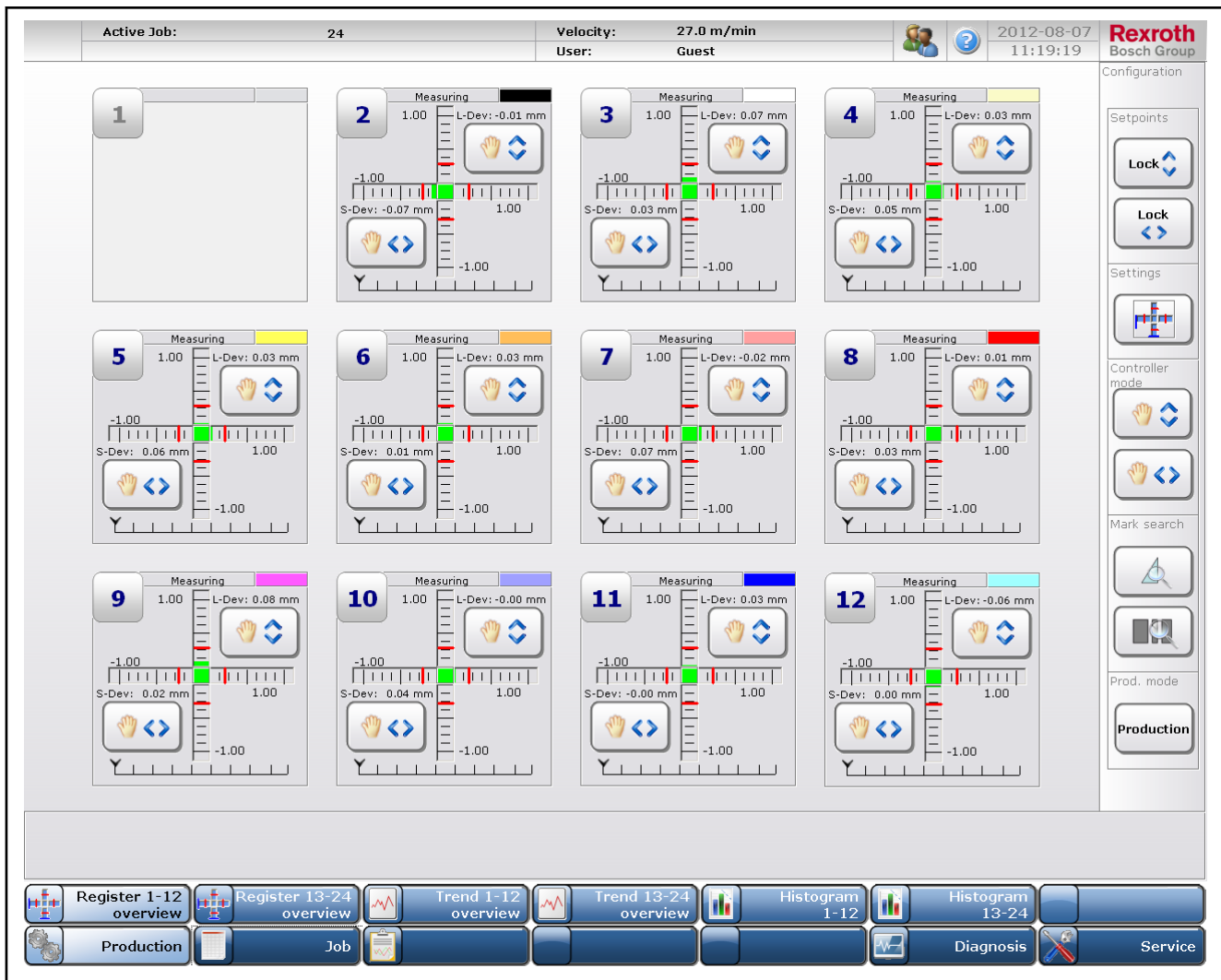


Fig. 10-59: Register overview

The register error is represented as bar charts whose size and color correspond to the respective deviation. The bar charts are aligned as cross hair (register cross) which visualizes the deviation in the positive as well as in the negative direction for the length register and the side register.

HMI dialog and element description

Register cross

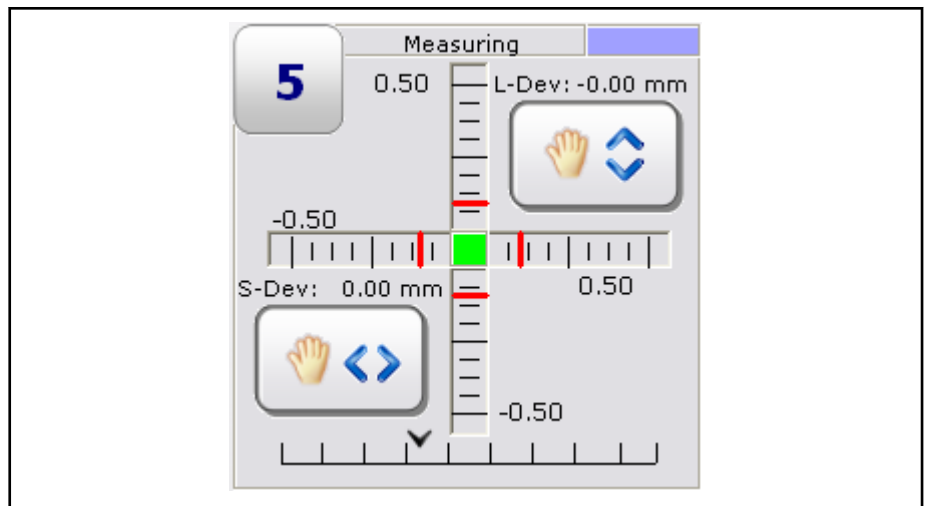
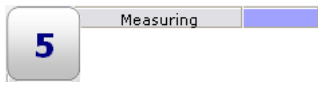


Fig. 10-60: Register cross

- Functions of the register cross element

 	Logic number of the printing unit with linking to single view (register single view). A red color change is executed (flashing) if the marks assigned to the printing unit are not detected by the sensor
	Toolbar with: - Display of the current sensor status - Field with selected printing unit color
	The numeric value (MaxScale) of the scaling for the maximum visualization of the register error in [mm]. If the complete chart is displayed, there is a register $\geq$ MaxScale. The MaxScale value is valid for the side register as well as for the length register (positive and negative). MaxScale is specified in the HMI settings and can be set individually for each printing unit
	Bar chart to visualize the register deviation. The height of the bar corresponds to the percentage value of the register deviation with regard to MaxScale
	The alarm limit can be defined in [mm] via the "HMI Settings" dialog. The alarm limit is specified as absolute value and can be individually set for the side register and for the length register. If a register error is reported for the side register or for the length register within the alarm limits, the register error is visualized with a green bar. If the register error is above the alarm limit, a color change results and the register deviation is visualized with a red bar
L dev: xx.xx mm S dev.: xx.xx mm	Display of the register deviation as numeric value of length register and side register

HMI dialog and element description

	Display/selection whether the register controller works for the side or length register in Automatic mode (display: Circle with arrows), i.e. that the register controller works, or in Manual (display: hand) mode (for manual jogging of the control variable)
	
	Actual value of the mark width in relation to the defined total width of the mark. This display can be used to orient the sensor. Without control, the arrow should be in the middle of the display, as the scan spot of the sensor samples the mark exactly in its middle

Toolbar • Toolbar

Configuration

Setpoints

Lock 

Lock 

Settings



Controller mode





Mark search

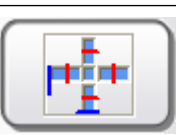




Prod. mode

Production

HMI dialog and element description

	Adding the current deviation of the length register to the command value of the length register. This function can be used when manually setting the machine and if the register controller is not enabled yet
	Adding the current deviation of the side register to the command value of the side register
	Opening the "HMI Settings" dialog
	Function to activate/deactivate all register controllers for the length register
	Function to activate/deactivate all register controllers for the side register
	Starting the automatic TeachIn for all printing units with the expectation window saved last. This action can only be executed for printing units for which a valid expectation window is already available (e.g. from the bar code search or the manual setting of the expectation window)
	Barcode search if configured
 	At runtime, the Production button can be used to simultaneously set the operating modes of all register controllers: Production = Enabled ► Production Mode Production = Disabled ► Setup Mode Switching the production mode should be executed if: - the register controller of all printing units are activated - the printing image has the desired quality (after manual adjustment of the command value if required) or - the acceleration phase is to be started Note: If the button is activated, the controller parameters are designed for higher control loop dynamics. Thus, switching after the setup phase has to occur in any case to minimize the paper waste during the acceleration phase and the production phase

HMI settings • Dialog "HMI settings"

HMI dialog and element description

HMI Settings

Unit: 5

Alarmlimits and scale

Length: 0.200 [mm]

Side: 0.500 [mm]

Scale: 2.000 [mm]

Copy to all units

Set tip width

Length register: 0.100 [mm] (Polarity: -)

Side register: 0.020 [mm] (Polarity: +)

Buttons: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Fig. 10-61: HMI settings

Unit: 5

- Printing unit name display
- Length and side register status +
- Printing unit status ● ●
- Selection of printing ink from color palette

Buttons: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Switching bar for the printing unit to be edited

Length: 0.200 [mm]

Side: 0.500 [mm]

Scale: 2.000 [mm]

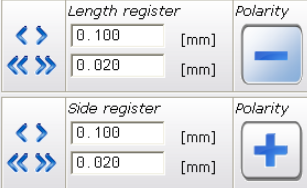
Copy to all units

Specification of:

- Alarm limits for length registers and side registers
- Value range for bar charts (amount)

Button function to copy the current HMI settings to all available printing units (except function/color and color selection)

HMI dialog and element description

 Length register 0.100 [mm] 0.020 [mm] Side register 0.100 [mm] 0.020 [mm] Polarity - +	Setting the jog parameters for manual command value correction • Specification of the jog width for the manual jogging of the command value [mm] • The settings are globally valid for all configurable printing units
	Saves the settings for the currently selected print job
	Closes the dialog

Register settings

- "Settings" dialog

This dialog is opened by activating the button on the lower right next to the register error cross of the printing unit to be modified.

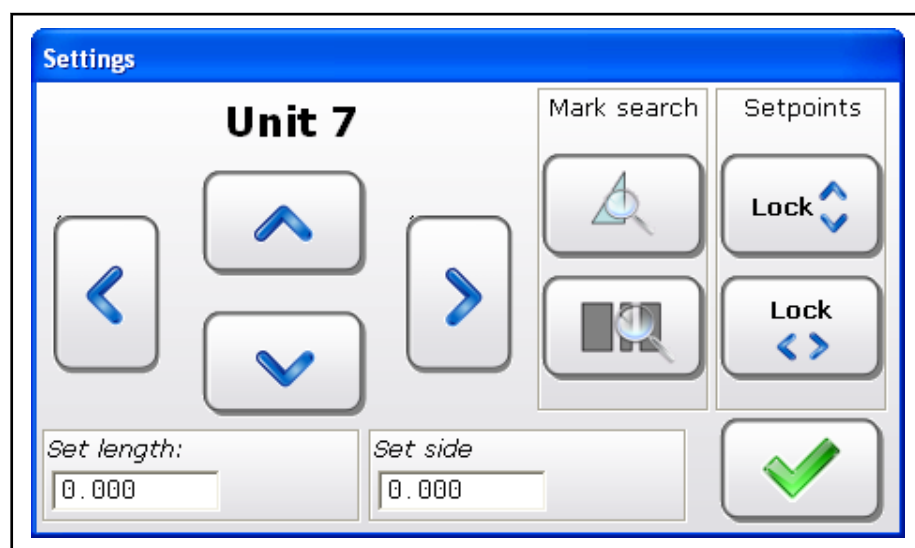


Fig. 10-62: Register settings

Unit 7	Displays the currently selected printing unit
	Jog buttons for command value change in case of enabled activated controller and the motor position in case of deactivated controller
Set length: 0.000 Set side 0.000	Display and input option for the command value of the length register and side register for the selected printing unit
	Adds the current deviation of the length register to the command value of the length register of the selected printing unit

HMI dialog and element description

	Adds the current deviation of the side register to the command value of the side register of the selected printing unit
	Starts the automatic TeachIn for the selected printing unit with the last valid expectation window. This option is only enabled if there is a valid expectation window for this print job
	Barcode search if configured
	Closes the dialog

10.8.3 Trend overview

The objects in the trend overview are used to visualize statistic measurands of register deviations of different printing units in operation. The deviation of the length and the side register are graphically displayed in a time slot of two minutes. The representation allows to analyze the register deviation of different printing units during that time and to understand control processes.

HMI dialog and element description

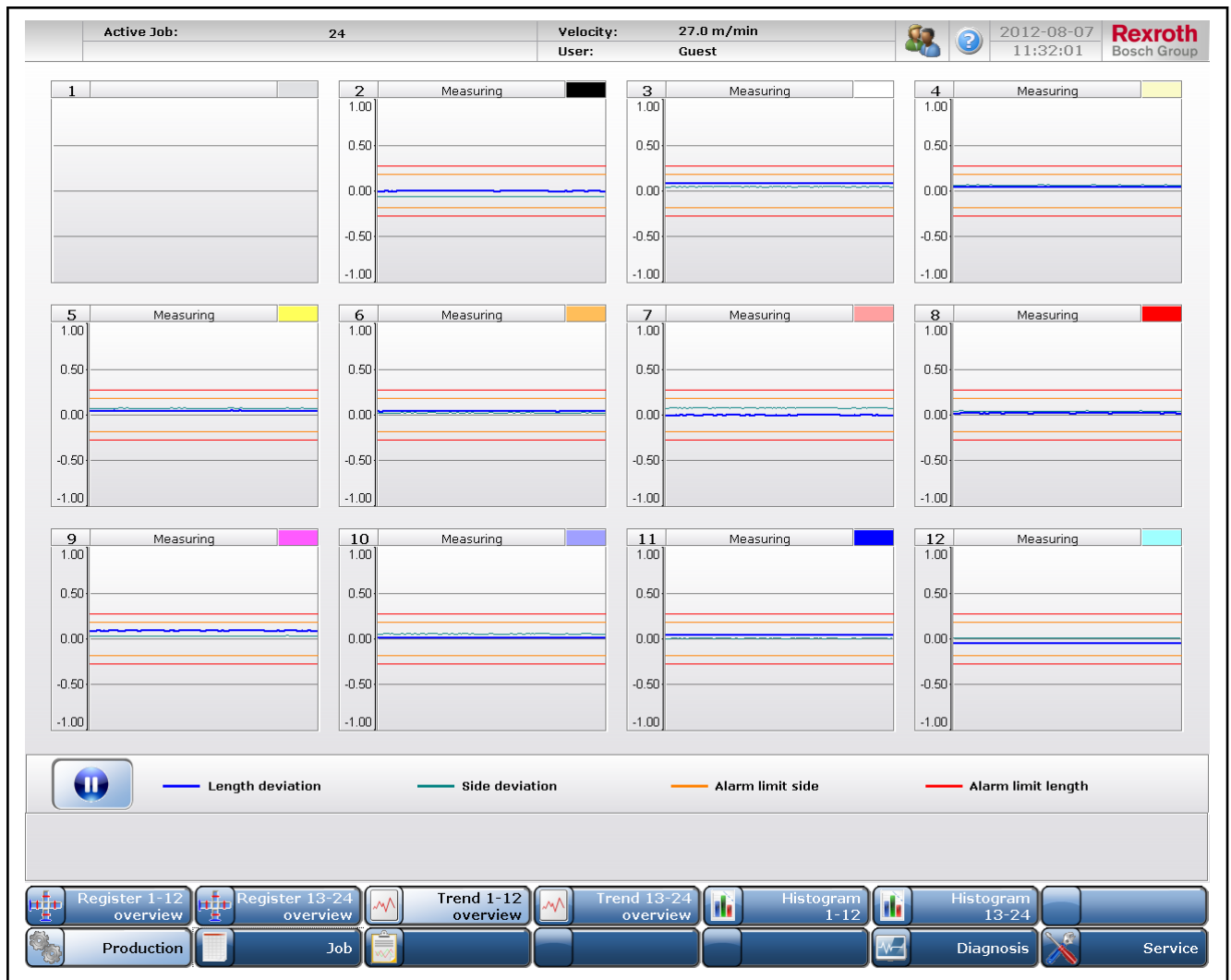


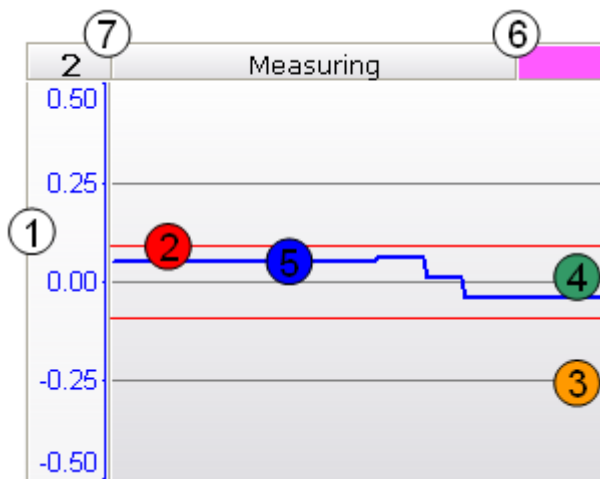
Fig. 10-63: Trend overview

The register error is recorded in a line chart. The side register errors or the length register errors are continuously read with a sample rate of 1 second and shown in lines of different colors.



Click on the "Trend" object in the overview representation to toggle to the register single view.

HMI dialog and element description



- ① - Scaling the y-axis
- ② - Alarm limit for the length register
- ③ - Alarm limit for the side register
- ④ - Side register error
- ⑤ - Length register error
- ⑥ - Current sensor status
- Field with selected printing unit color
- ⑦ - Printing unit number

2 2

Color change of the printing unit number in case of mark loss

Start/stop recording



The buttons "Start" and "Stop" can be used to start and stop the recording of trend data (deviations)



If the recording has been started once, it continues to run in the background. Switching to the trend overview is possible. The register error history can be found in the trend overview.

10.8.4 Register Single View

By selecting a printing unit number in the "register overview" dialog or by clicking on an object in the "trend overview", it can be switched to the single view of the selected printing unit.



The oscilloscope display is started upon opening the dialog. If the sensor is currently measured, the content of the expectation window is displayed. Otherwise, the analog data of the 360° recording is displayed. The expectation window can be set and the transition to the measurement can be started.



To the left above the oscilloscope it is displayed how many register marks the sensor expects and over how many register marks the expectation window has to be set to start a valid measurement.

HMI dialog and element description

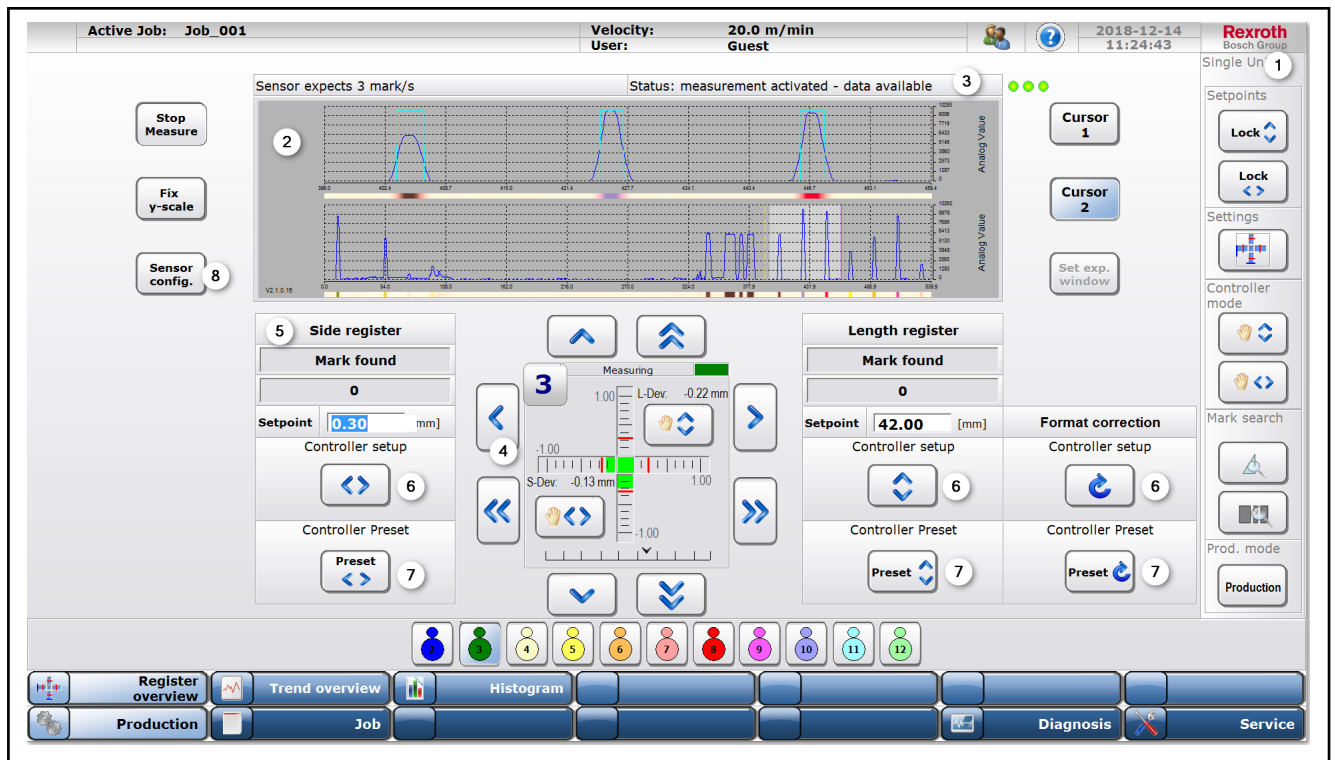


Fig. 10-64: Register overview

1. Symbol bar with corresponding HMI setting dialog is applied from the register overview.
2. Oscilloscope display with 360° measurement (below) and detailed display of the expectation window (above).
 - **Stop measurement**
The function stops the measurement
 - **Cursor 1 / Cursor 2**
The cursors are used to set the expectation window within the 360 ° display (below). An area in which the mark stream is searched for is defined via the starting point (Cursor 1) and the end point (Cursor 2)
 - **Set expectation window**
The function transfers the beginning and the size of the expectation window to the PLC and subsequently starts the teaching and the measurement.
The expectation window can only be set if no measurement is active
 - **Fix y-scale**
Fixes the y-axis scaling
3. Sensor diagnostics and status display of the sensor communication with the following states:
 - Connection to sensor established (LED to the left)
 - Measurement enabled - waiting for measured data (LED in the middle)
 - Measurement enabled - Measured data available (LED to the right)

HMI dialog and element description

- Error messages of the sensor are also displayed in this array and superimpose the clear text display of the communication status
- 4. Jog buttons for the manual command value correction of side register and length register.
The command value is jogged in case of an enabled register controller. In case of a disabled register controller, the motor position is jogged.
 - Two freely-configurable jog modes are provided for length register and side register
- 5. Status display of the sensor assigned to the printing unit.
 - Current sensor status display
 - Current mark status display:
 - "Mark found" if the marks have been found
 - "Mark lost" if the marks have been lost
 - Number of lost marks display
 - Display and manual input of the command value in [mm] for side register and length register
- 6. Link to parameterize the automatic format correction and the length and side register controllers. The following controller settings become active immediately:
 - Damp P-factor
 - Damp I-factor
 - Dead zone
 - Actual value filter
 - Polarity
 - Upper/lower limit
 - Min. displacement
 - Max. displacement



It is strongly recommended to save the selected settings in the corresponding dialog. If the controller parameters are not saved, the job management is opened and the settings are overwritten with the saved settings in the job.

- 7. Linking to "Preset" dialogs for the respective controller of the currently selected printing unit.

HMI dialog and element description

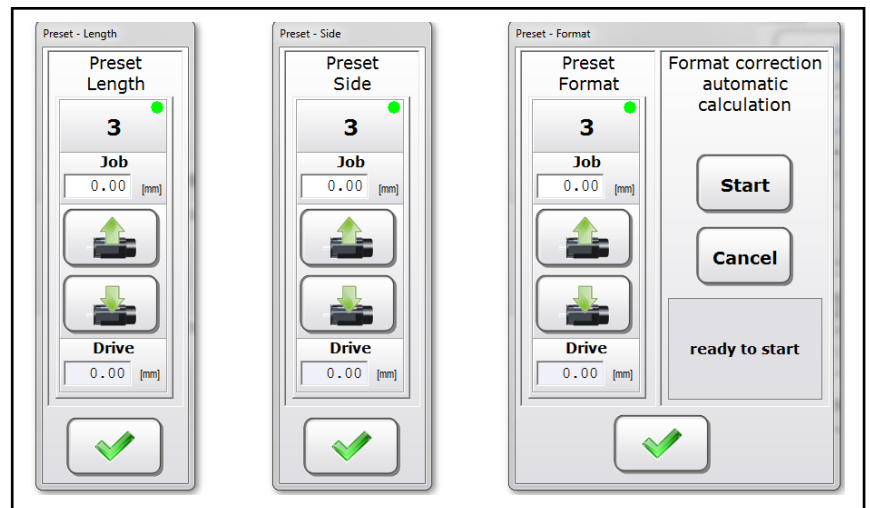


Fig. 10-65: Unit settings

The “Preset” dialogs include the following information on the currently selected printing unit:

- **Job:** Display and input of the “Preset” value from the active job
- **Drive:** Display of the currently applied offset value
- Button to transfer the “Preset” value to the drive
- Button to apply the currently applied offset value from the drive to the job

The dialog to preset the format correction additionally includes the option to automatically determine the “Preset” value for the format correction.

The position of a mark is compared in two subsequent measurements. A value for the fine adjustment is then computed from the position difference and commanded to the format controller.

To start the automatic determination, press <Start>. The measurement has to be active.

To cancel the automatic determination, press <Cancel>.

The current automatic determination status is displayed in the status display.

8. Linking to the advanced sensor configuration.

HMI dialog and element description

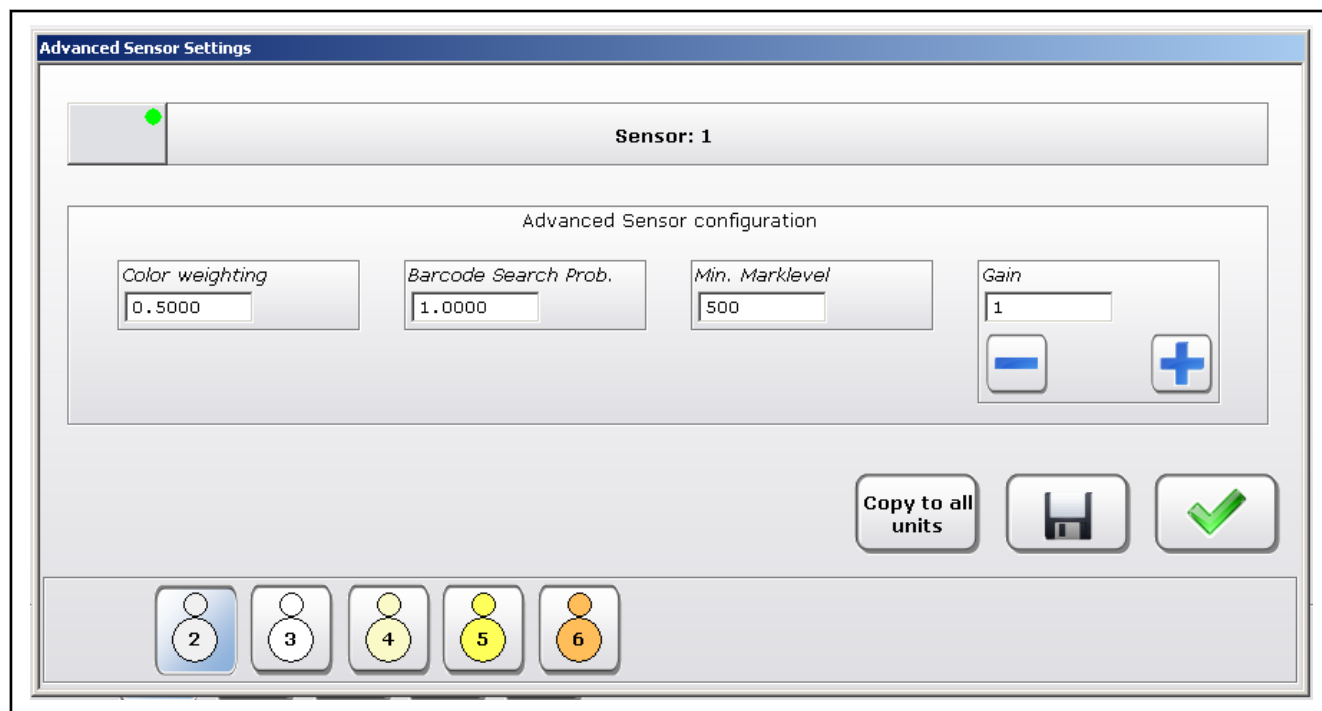


Fig. 10-66: Dialog "Advanced sensor configuration"

In this menu, the following sensor settings can be adjusted. The changes become effective immediately.

Color scaling	Color scaling of the sensor measurement (value range: 0 - 0.99) • A color scaling of 0.99 means that the sensor is exclusively operated as color sensor • A color scaling of 0 means that the sensor is exclusively operated as contrast sensor
Barcode search prob.	Barcode search probability (value range: 0 - 100 %) Minimum degree of conformity of the configured barcode pattern in which the determined pattern is accepted as barcode
Min. mark level	Minimum mark level Minimum analog value of the measured register mark detected as mark during TeachIn
Gain	Gain (value range 0-7) Gain factor of the sensor. Automatically determined during TeachIn. Should only be influenced in exceptional cases (e.g., if the expectation window cannot detect all marks within the 360° display in case of manual configuration even though the sensor is positioned correctly)

HMI dialog and element description

	Applies the configured values of the selected sensor to all other sensors
	Saves the configured values in the active job

Colorimetry A bar with a colorimetry can be displayed in the register single view of the oscilloscope data.



Fig. 10-67: Color-bar in the single dialog

The color-bar is located below the oscilloscope display in the ActiveX control. The background and the printed objects are displayed in color in the 360° recording (e.g. marks of the mark stream or bar code blocks).

The register marks to be measured as well as the background are displayed in the color-bar during the measurement.

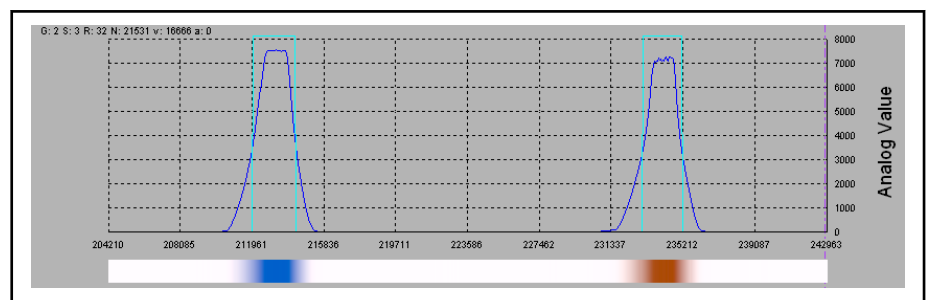


Fig. 10-68: Color-bar during measurement

In this example, a blue and a red mark are measured on white paper.

10.8.5 Histogram

The histogram is used to statistically evaluate and represent the measured register errors of the side register and length register per printing unit in three categories. The categories correspond to value ranges that can be defined via the "limit" at runtime.

Calculation formula:

	Category 1: $0 \leq X \leq \lfloor \text{limit}/5 \rfloor$
	Category 2: $\lfloor \text{limit}/5 \rfloor < X \leq \lfloor 3 * (\text{limit}/5) \rfloor$
	Category 3: $\lfloor 3 * (\text{limit}/5) \rfloor < X \leq \lfloor \text{limit} \rfloor$

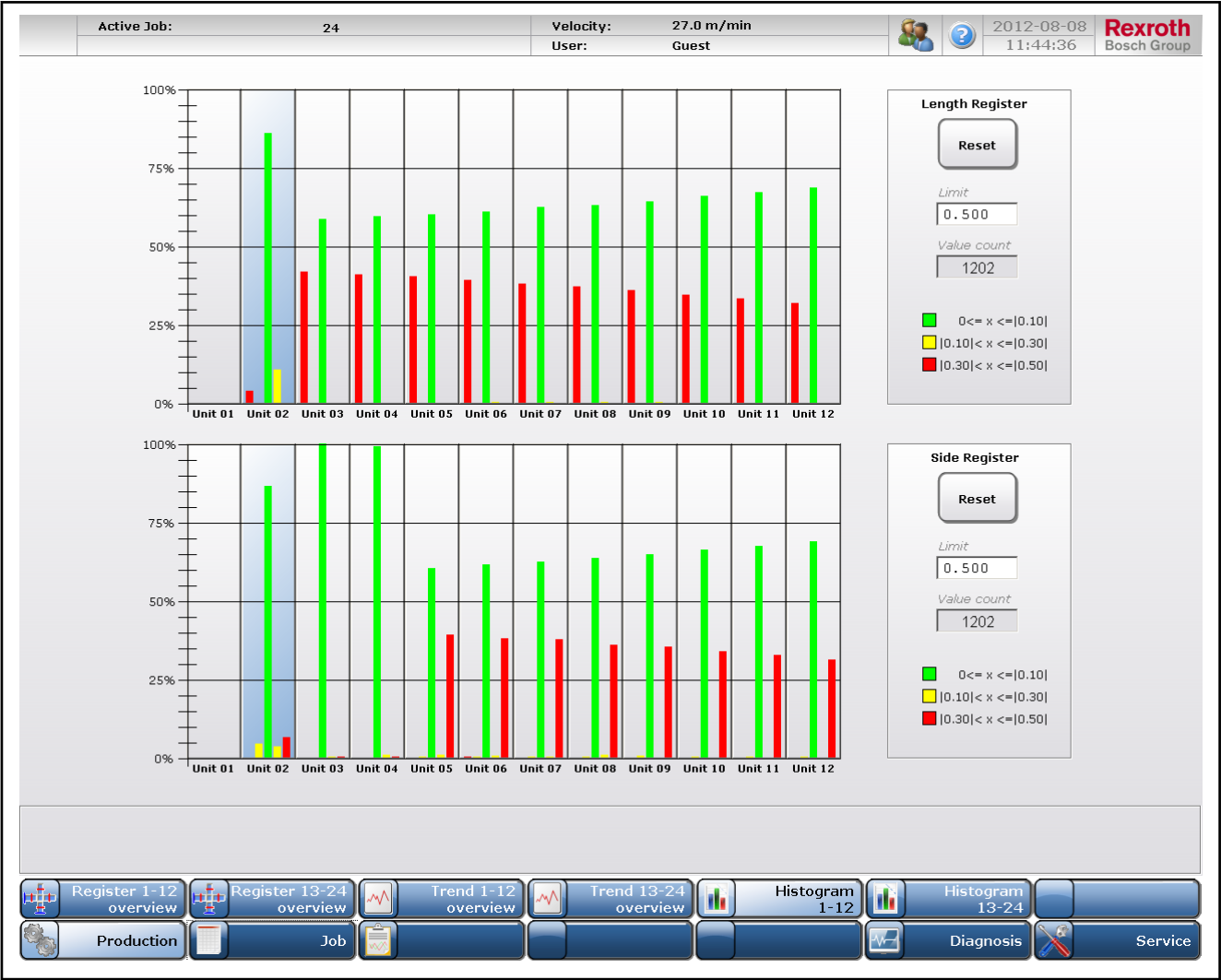
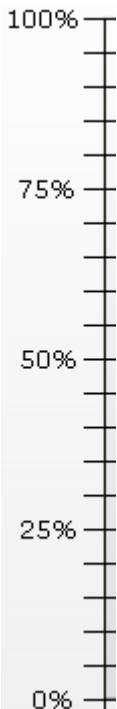
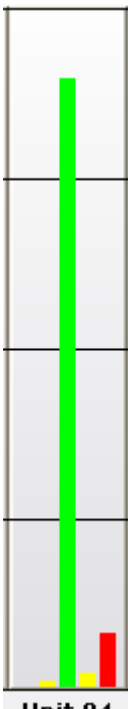


Fig. 10-69: Histogram
The individual elements have the following meaning:

HMI dialog and element description

Scaling the Y-axis	Active unit	Selected unit	Deactivated unit
	 Unit 04 - Displays the category values	 Unit 05 - Displays the category values - Displays the "counter"	 Unit 06 - Unit number displayed in gray - No displaying of values

	Resets the previously displayed measured values in the histogram bar (category values and counters)
Limit	The limits for the five categories are calculated from the limit value
Counter	The "counter" variable indicates the total number of sorted values for a selected unit (highlighted in blue)
 $0 \leq x \leq 0.10 $  $ 0.10 < x \leq 0.30 $  $ 0.30 < x \leq 0.50 $	Displays the value ranges of the three categories depending on the set limit value

10.9 Diagnostics

10.9.1 Brief description

The dialogs for error handling are used to analyze and trace errors during the configuration and during the running operation.

10.9.2 Diagnostics overview

The dialog "Diagnostic overview" facilitates the analysis and the acknowledgement of error messages at runtime of the HMI application. The

HMI dialog and element description

active error messages are chronologically ordered. The latest error always ranks first. Each diagnostic list is automatically written to a file. These files (history) can be evaluated at a later point in time.

Active Job: Rexroth1 **Velocity:** 23.5 m/min **User:** Guest **30.03.2011 13:48:56** **Rexroth** Bosch Group

*** Sensor01 : Not all marks found**

Diagnostic Overview

Control state

Diagnostic number: 0 Diagnostic text:

Diagnostic log

	Time stamp	Tag name	Value	Message
⚠	30.03.2011 13:43:26	rch_SensorDiagnostic...	1	Sensor01 : Not all marks found
✓	30.03.2011 13:41:22	rch_ControllerDiagno...	7441	Configuration Error Length Controller 6
✓	30.03.2011 13:41:22	rch_ControllerDiagno...	7441	Configuration Error Length Controller 7
✓	30.03.2011 13:41:22	rch_ControllerDiagno...	7441	Configuration Error Length Controller 5
✓	30.03.2011 13:41:22	rch_ControllerDiagno...	7441	Configuration Error Length Controller 4

History

Current messages History

Filter

All messages Sensor Controller Communication Details

Acknowledge error(s) ✓

Diagnostic overview **Oscilloscope** **Log book** **Production** **Job** **Quality** **Diagnosis** **Service**

Fig. 10-70: Diagnostic overview

1. Status message/StatusID of the control.
2. Error table.

The error table lists all current errors. There are three different representation variants:

Active unconfirmed errors:

- Errors whose error status has not changed since their detection. The font color is red and there is a yellow exclamation mark in the left column

⚠	2011-03-25 10:45:55	rch_BRWS_Write_Diag[9]	1005	BRWS-Error - Write Job Length Controller Configuration
---	---------------------	------------------------	------	--

Fig. 10-71: Active unconfirmed errors

Active confirmed errors:

- Errors acknowledged by the user (acknowledge errors). The font color is red and there is a green checkmark in the left column

HMI dialog and element description

✓	2011-03-25 10:45:55	rch_BRWS_Write_Diag[10]	1005	BRWS-Error - Write Job Side Controller Configuration
---	---------------------	-------------------------	------	--

Fig. 10-72: Active confirmed errors

Inactive errors:

- Errors whose error status has changed since their detection or which are not active anymore. The font color is blue and there is a yellow exclamation mark in the left column

⚠	21.07.2010 13:47:09	rch_SensorDiagnostic...	0	Configuration Error SensorUnit05
---	---------------------	-------------------------	---	----------------------------------

Fig. 10-73: Inactive errors

3. Sidebar.

Current messages History	Switching between the "Current messages" and the "History"
 	The history function loads the entries of all history files into the error list. Two more interfaces are displayed: - Filter historical error list The filter function displays the historical error data limited to a certain period in time - Delete all historical entries
All messages Sensor Controller Communication	- The filter function can be used to select a certain error type that should be displayed in the error table - It is distinguished between three different types of errors: - Sensor error: Displays error messages read by the sensor configuration function block (PLC) - Controller error: Displays error messages read by the register controller function block (PLC) - Connection error: The driver status is read during each writing and reading process between the HMI and the PLC. If errors occur, they are listed under "Communication"

HMI dialog and element description

	Opens the dialog with extended error list for sensor and register controller errors
	Acknowledges all error messages

In the "Details" dialog, the specific error numbers are displayed that correspond to the direct output from the function blocks. For the error number description, please refer to [chapter 12.3 "Error numbers and troubleshooting"](#) on page 221.

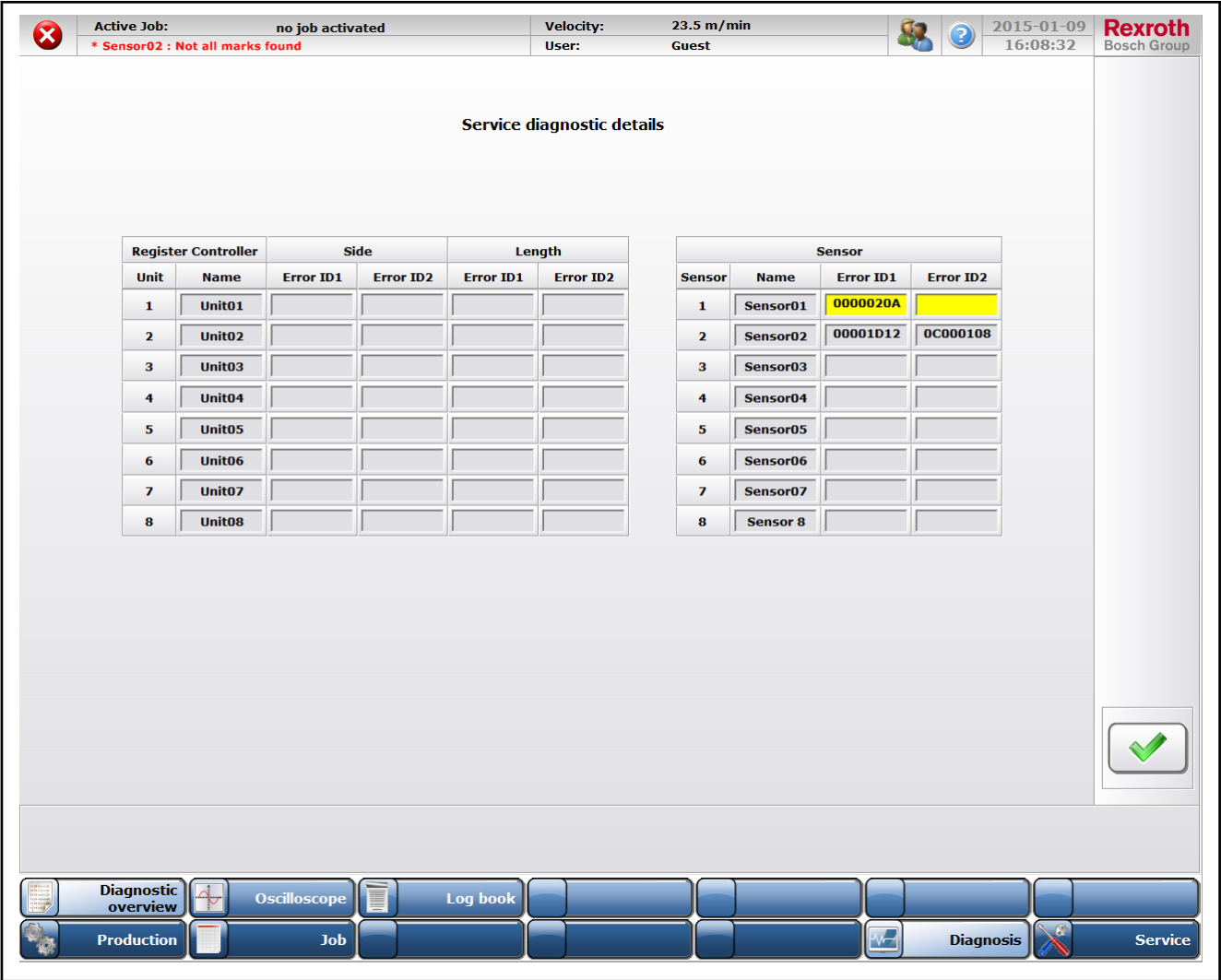


Fig. 10-74: Diagnostic details

In this figure, a warning is displayed for Sensor 1 and an error is reported at Sensor 2.

10.9.3 Oscilloscope

The dialog is used to diagnose possible error causes. An incorrect orientation of the sensor can be detected. The expectation window can still be set.

HMI dialog and element description

However, the expectation window should be set in the single view register. The expectation window is set via the "Oscilloscope" dialog.

Procedure:

Select sensor ► Establish connection ► Read 360° ► Set start and end cursor ► Set expectation window

After a correct configuration, first teaching and then the measurement is started after setting the expectation window.

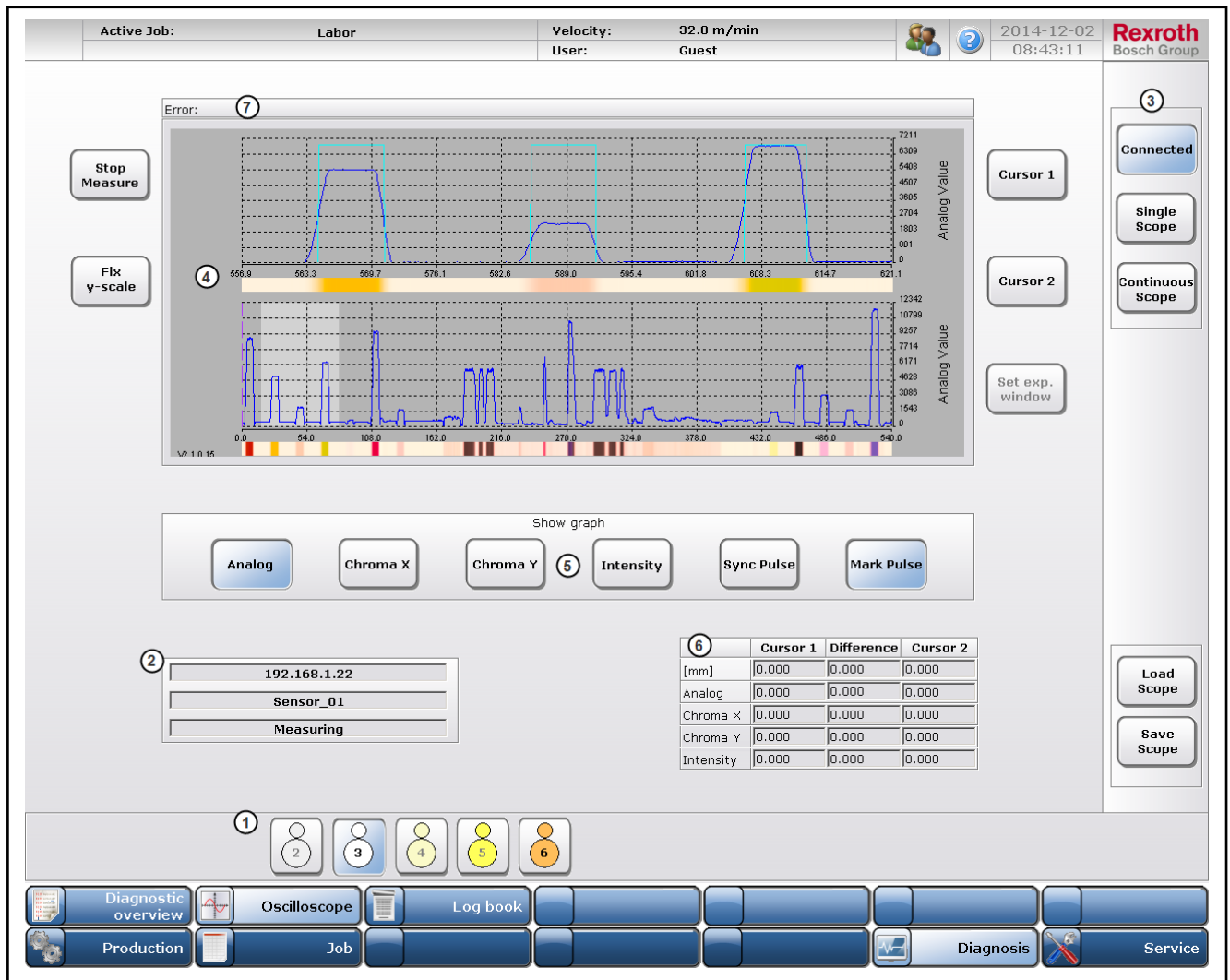


Fig. 10-75: Oscilloscope

- Switching bar for the printing unit to be edited.
- Sensor status information.
 - IP address
 - Sensor name (see Machine Configuration)
 - Sensor status
 - Zoom status
- Sidebar.
 - Connect**

A connection to the sensor can be established via the **Connect** button. Except when loading oscilloscope data from a file, a

HMI dialog and element description

connection has to be established to the sensor to use the oscilloscope

- **Individual scope**

Function to start a single measurement

- **Cont. scope**

Function to start a single measurement.

Starts the cyclic display of the analog values of the currently selected sensor during the measurement

- **Monitoring**

Monitoring is an operating state guaranteeing a simple error analysis. If this state is activated, the sensor checks whether all marks are correctly detected in the expectation window. If this is not the case, the graphs of the incorrect message are transferred and graphically represented for analysis

- **Continuous**

- **Load screen**

Allows loading of the oscilloscope data

- **Save screen**

Allows saving the currently indicated oscilloscope data

4. Oscilloscope display with 360° measurement (below) and detailed display of the expectation window (above).

The oscilloscope display is operated via the following interfaces:

- **Stop measurement**

Stops an active measurement

- **Fix y-scale**

Fixes the y-axis scaling

- **Cursor 1 / Cursor 2**

The cursors are used to set the expectation window within the 360 ° measurement (below). An area in which the mark stream is searched for is defined via the starting point (Cursor 1) and the end point (Cursor 2)

- **Set expectation window**

The function transfers the beginning and the size of the expectation window to the PLC and subsequently starts the teaching and the measurement.

The expectation window can only be set if no measurement is active.

5. List of the available oscilloscope graphs.

- Analog: Analog sensor signal
- Chroma X: Color signal 1 of the sensor
- Chroma Y: Color signal 2 of the sensor
- Intensity: Intensity signal of the sensor
- Sync pulse: Zero pulse
- Mark pulse: Recorded mark, is only displayed during the measurement

6. Tabular representation of the cursor values of the activated graphs (8).

HMI dialog and element description

The line [mm] indicates the distance of the cursors measured to the zero pulse as well as the distances of the cursors to each other.

7. Diagnostic messages of the oscilloscope element.

The possible error numbers are represented in [chapter 12.3 "Error numbers and troubleshooting" on page 221](#).

10.9.4 Logbook

The logbook is used to log and request the events and to list the events chronologically. The following events are logged:

- Logging users on and off
- Loading saved jobs
- Saving jobs
- Activating a job

The screenshot displays the Logbook interface within the HMI. At the top, a status bar shows 'Active Job: no job activated', 'Velocity: 23.5 m/min', and 'User: Guest'. The main area is titled 'Event configuration' and contains an 'Event log' table with two columns: 'Time stamp' and 'Message'. The table lists various events such as 'Error by activating Sensor FB - (Sensor01)', 'Job Activation is running', and 'Job: [Rexroth1] wurde erfolgreich geladen'. On the right side, there is a 'History' panel with buttons for 'Current messages' and 'History'. At the bottom, a navigation bar includes buttons for 'Diagnostic overview', 'Oscilloscope', 'Log book', 'Production', 'Job', 'Quality', 'Diagnosis', and 'Service'.

Time stamp	Message
2011-03-30 12:05:40	Error by activating Sensor FB - (Sensor01)
2011-03-30 12:05:32	Job Activation is running
2011-03-30 12:05:14	Error by activating Sensor FB - (Sensor01)
2011-03-30 12:05:04	Job Activation is running
2011-03-30 11:53:55	Job: 'Rexroth1' was loaded in edit mode
2011-03-30 11:16:22	Set expectation window for sensor 2 failed - acknowledge timeout!
2011-03-30 11:15:09	Set expectation window for sensor 2 failed - acknowledge timeout!
2011-03-30 11:13:27	Job: [Rexroth1] wurde erfolgreich geladen
2011-03-30 11:13:21	Job Activation is running
2011-03-30 11:13:16	Job: 'Rexroth1' was saved
2011-03-30 11:09:40	Job: 'Rexroth1' was loaded in edit mode
2011-03-30 11:09:12	Set expectation window for sensor 1 failed - acknowledge timeout!
2011-03-30 11:08:05	Job: [Rexroth1] wurde erfolgreich geladen
2011-03-30 11:07:57	Job Activation is running
2011-03-30 11:07:55	Job: 'Rexroth1' was saved
2011-03-30 11:07:38	Job: 'Rexroth1' was loaded in edit mode
2011-03-30 11:06:40	Job: [Rexroth1] wurde erfolgreich geladen
2011-03-30 11:06:33	Job Activation is running
2011-03-30 11:06:17	Job: 'Rexroth1' was saved
2011-03-30 11:05:52	Job: 'Rexroth1' was loaded in edit mode
2011-03-30 11:04:16	Job: [Rexroth1] wurde erfolgreich geladen
2011-03-30 11:04:08	Job Activation is running
2011-03-30 11:04:05	Job: 'Rexroth1' was saved
2011-03-30 11:03:55	Job: 'Rexroth1' was loaded in edit mode
2011-03-30 11:00:26	Job: [Rexroth1] wurde erfolgreich geladen
2011-03-30 11:00:18	Job Activation is running
2011-03-30 10:58:43	Job: 'Rexroth1' was loaded in edit mode
2011-03-30 10:56:28	Job: 'Rexroth1' was loaded in edit mode
2011-03-30 10:53:35	Job: 'Rexroth1' was loaded in edit mode

Fig. 10-76: Logbook

HMI dialog and element description

 	Switching between the Current Messages and the History
 	The history function loads the entries of all history files into the logbook. Two more interfaces are displayed: • Filter historical error list • Delete all historical entries

10.10 Service

10.10.1 Machine configuration

The machine configuration has already been described in an individual chapter (see [chapter 10.4 "Machine configuration for narrow web applications" on page 88](#)).

10.10.2 Advanced settings

In the "Advanced settings" dialog, velocities can be specified and the respective controllers can be automatically added and removed. Furthermore, the decoupling can be deactivated and data can be saved in a file.

HMI dialog and element description

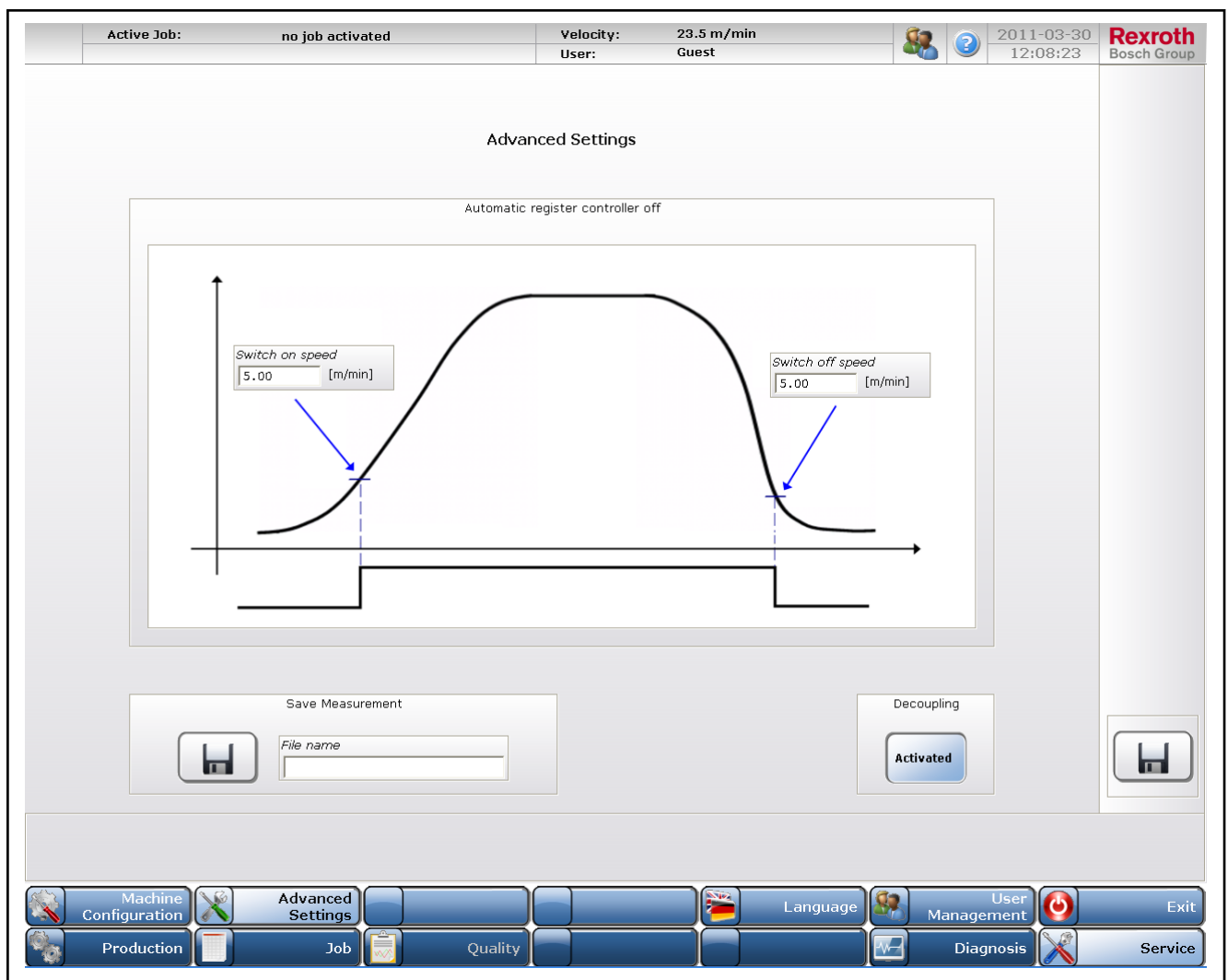


Fig. 10-77: "Advanced settings" dialog

Switch-on velocity	Minimum velocity, control starts automatically (0 disables an automatic start)
Switch-off velocity	If the velocity falls below, the control is automatically disabled (0 disables automatic switch-off)
	Disables the decoupling
Save measurements	The current measured values are saved in a one second cycle in the HMI folder under "file name".csv, if the button Saving is pressed
	Saves the data in the current machine configuration

HMI dialog and element description

10.10.3 Language

Under "Language", the required language can be selected and saved by



clicking on .



Fig. 10-78: Language selection



Only German and English are provided by Bosch Rexroth.

More languages can be added by the user by extending the "Translation.csv" file. The file is stored in the main directory of the WinStudio visualization.

By way of example, the following languages provided by the customer have been integrated:

- Russian
- Chinese
- Dutch

Bosch Rexroth assumes no guarantee or liability for the substantive accuracy or completeness of the Russian, Chinese or Dutch texts.

10.10.4 User management

Via "User Management", the authorizations of individual user groups at runtime can be changed. Two authorization categories are distinguished:

- Screen switching
- Executing functions

Each category contains individual authorizations that can be determined for four user groups. The fifth group, the administrators, are not restricted in their authorizations.



The user can register via the little men symbol in the header. By default, the user is registered as guest.

HMI dialog and element description

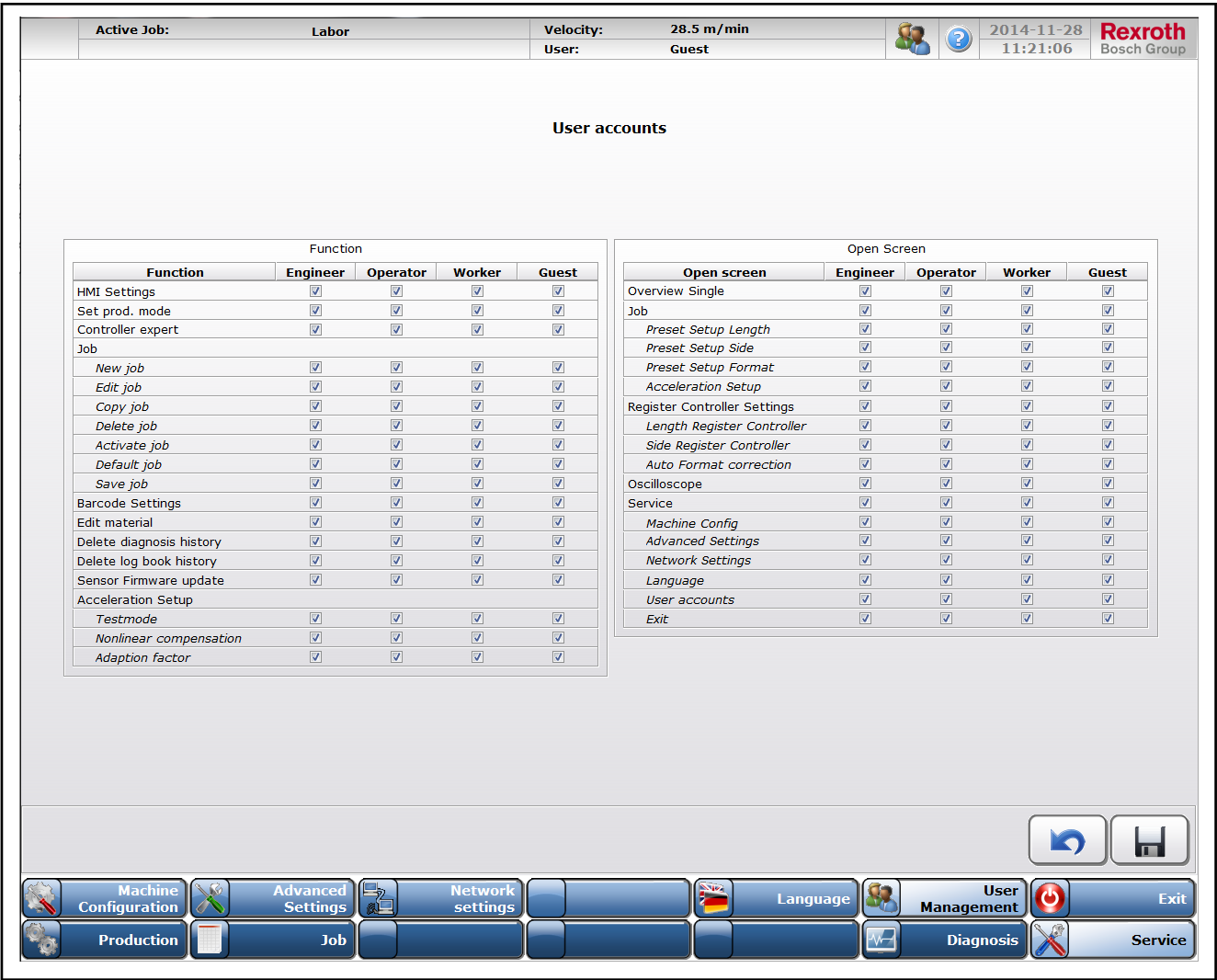


Fig. 10-79: Dialog "User Management"

	Discards all changes made in the User Management
	Saves the current "User management" settings

10.11 Auxiliary functions

10.11.1 Auxiliary function "2 sensors behind a printing unit"



The function "2 sensors behind a printing unit" is only intended for special hardware-specific characteristics. This function has to be enabled by Bosch Rexroth.

This function has exclusively been developed in case it is not possible to position a sensor behind each printing unit due to structural reasons. This

HMI dialog and element description

can be the case if two printing units are positioned very closely together and if the sensors for printing unit 1 and printing unit 2 are positioned behind the second printing unit.



The function has been exclusively implemented for this constellation and cannot be used for other characteristics.

If the function is enabled, 2 sensors can be defined graphically in the machine configuration.

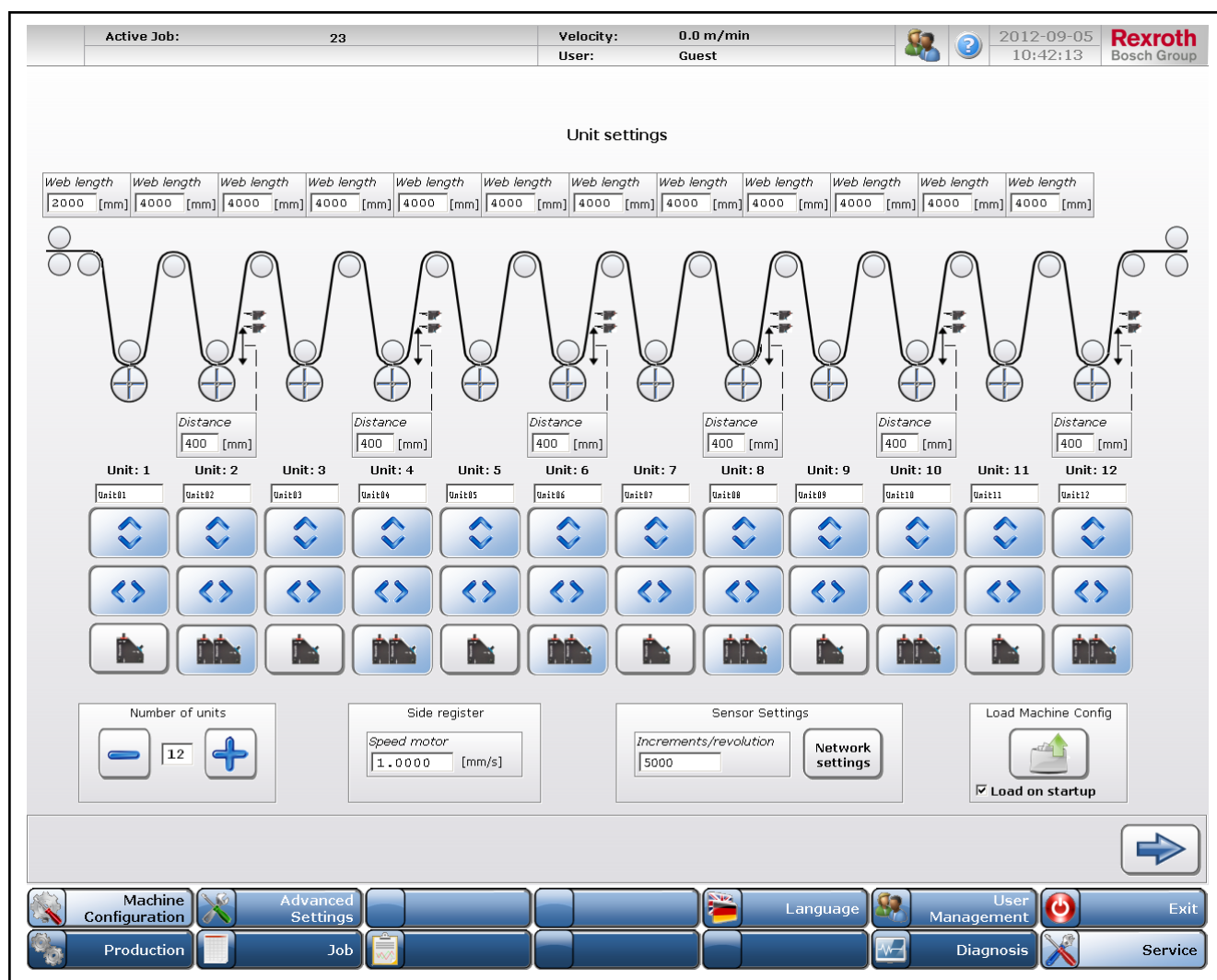


Fig. 10-80: Defining 2 sensors behind a printing unit in the machine configuration

chapter 10.11.1 "Auxiliary function 2 sensors behind a printing unit" on page 188 shows that two sensors can be defined behind a printing unit. The largest distance from sensor to printing unit has to be specified as sensor distance. Generally, it is the distance of the first printing unit to the relevant sensor. To be able to define two sensors behind a printing unit, no sensor can be defined for the printing unit located at the front. If a sensor is defined at the printing unit located at the front, only one sensor can be defined at the next printing unit.

The entry is required to be able to correctly calculate the number of visible marks for a sensor. In case one mark is printed by each printing unit:

HMI dialog and element description

If the sensor is located behind printing unit 3, the printing unit would detect three marks. If the sensor of printing unit 3 is located behind printing unit 4, it would detect four marks. The correct configuration of two sensors behind a printing unit is automatically taken into consideration.

The defined machine configuration is mapped as follows in the job configuration.

Active Job: 23 Velocity: 0.0 m/min User: Guest 2012-09-05 10:42:55 Rexroth Bosch Group

Printing configurations

1	2	3	4	5	6	7	8	9	10	11	12
Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length
4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]
Mark	Mark	Mark	Mark	Mark	Mark	Mark	Mark	Mark	Mark	Mark	Mark
1	2	3	4	5	6	7	8	9	10	11	12
Length	Length	Length	Length	Length	Length	Length	Length	Length	Length	Length	Length
1	1	1	1	1	1	1	1	1	1	1	1
Side	Side	Side	Side	Side	Side	Side	Side	Side	Side	Side	Side
1	1	1	1	1	1	1	1	1	1	1	1

Length Side

Job Management Production Preset Length Job Preset Side Preset Format Acceleration Diagnosis Service

Fig. 10-81: Two sensors behind a printing unit in the job configuration

An arrow indicates that the sensor of this printing unit is located behind the next printing unit. Thus, the sensor also detects the register marks - if printed - of the subsequent printing unit.

10.11.2 Auxiliary function "turning bar"



The function "turning bar" is only intended for special hardware-specific characteristics. This function has to be enabled by Bosch Rexroth.

The following basic conditions have to be complied with in order to be able to use the turning bar function:

- Function Multiple Reference Mark is not permitted
- Auxiliary function 2 Sensors behind a printing unit is not permitted

HMI dialog and element description

- Maximum number of printing units: 12
- To be able to use the barcode search function, the barcode on the front and back has to be identical. The size of the expectation window containing the register marks after the barcode has to be identical

Preprinted material is supported in the turning bar function.

If the function turning bar is enabled, turning bars can be enabled in the machine configuration. Enabling means that it is physically possible at the machine that there is a turning bar at this position. Actual enabling of the turning bar takes place in the job configuration.



Several positions can be enabled in the machine configuration in which there might be a turning bar at a later point. Only 1 turning bar can be active in a job.

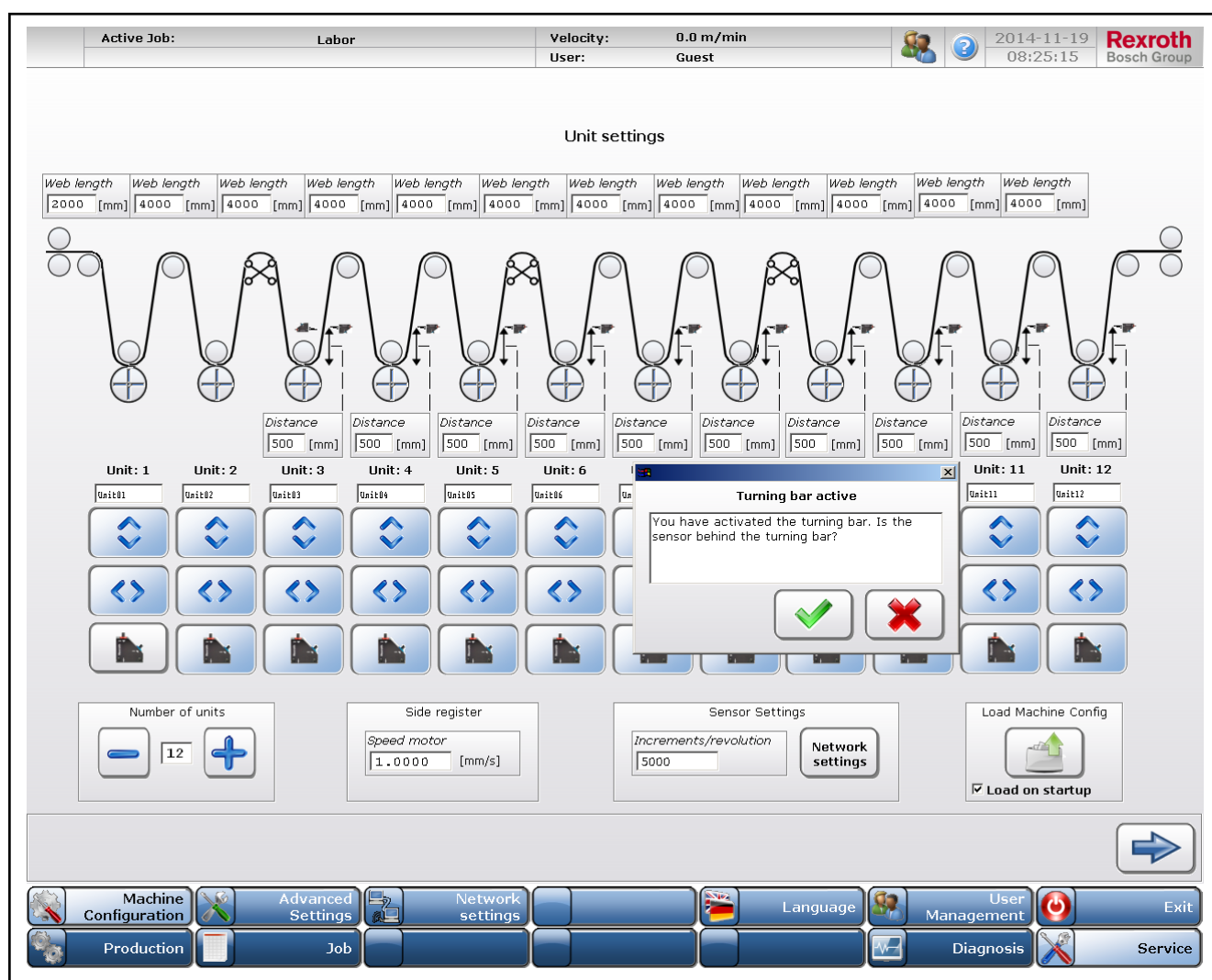


Fig. 10-82: Turning bar in the machine configuration

The turning bar is designated by the following icons: . By clicking on a position between 2 units, physically possible reversing units can be defined. In this example, a turning bar is defined between Unit 2 and Unit 3, between Unit 5 and Unit 6 and between Unit 8 and Unit 9.

HMI dialog and element description

After a turning bar has been defined, a query (if a sensor has been defined behind the unit) is triggered, verifying whether the sensor has been installed at its original position or whether the sensor is positioned on the rear side of the web. Depending on the selection, the sensor is displayed at the corresponding position. For example, the sensor of Unit 2 measures two register marks at the rear side of the web after the turning bar. At Unit 5, the sensor is mounted behind the printing unit.



The sensor position influences the number of visible marks in the job configuration. If a sensor points to the rear side of the web and if no upstream turning bar is active in the job, this sensor cannot measure any register marks.

After the machine configuration has been completed, define in the job whether or not and which turning bar is active.

1	2	3	4	5	6	7	8	9	10	11	12
Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length	Web length
200 [mm]	200 [mm]	1330 [mm]	1330 [mm]	1330 [mm]	1330 [mm]	1330 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]	4000 [mm]
Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active
Mark 1	Mark 2	Mark 1	Mark 2	Mark 3	Mark 4	Mark 5	Mark 6	Mark 7	Mark 8	Mark 9	Mark 10
Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1	Length 1
Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1	Side 1

Length

Side

Job Management

Production

Job

Preset Length

Preset Side

Preset Format

Acceleration

Diagnosis

Service

Fig. 10-83: Turning bar in the job configuration

The physically possible reversing units defined in the machine configuration are contained in the job configuration. It can be defined in the job whether or not and which turning bar is active. A maximum of one turning bar can be active in the job. In the graphics, the turning bar between Unit 2 and Unit 3 is active. As the turning bar is active before Unit 3, the reference mark for length and side register control refers to the register marks on the front

HMI dialog and element description

printed first. In the mark stream in the lower dialog area, the mark of Unit 3 is controlled to the first mark of the front. The marks of the front and back side are staggered in the representation of the mark stream in order to be able to see which marks are on the front or back side.

If a turning bar has been enabled in the job, at the end of the job configuration, another dialog is displayed for the turning bar. In this dialog, the user has to enter specifications about the polarity of the side register and about the control strategy.

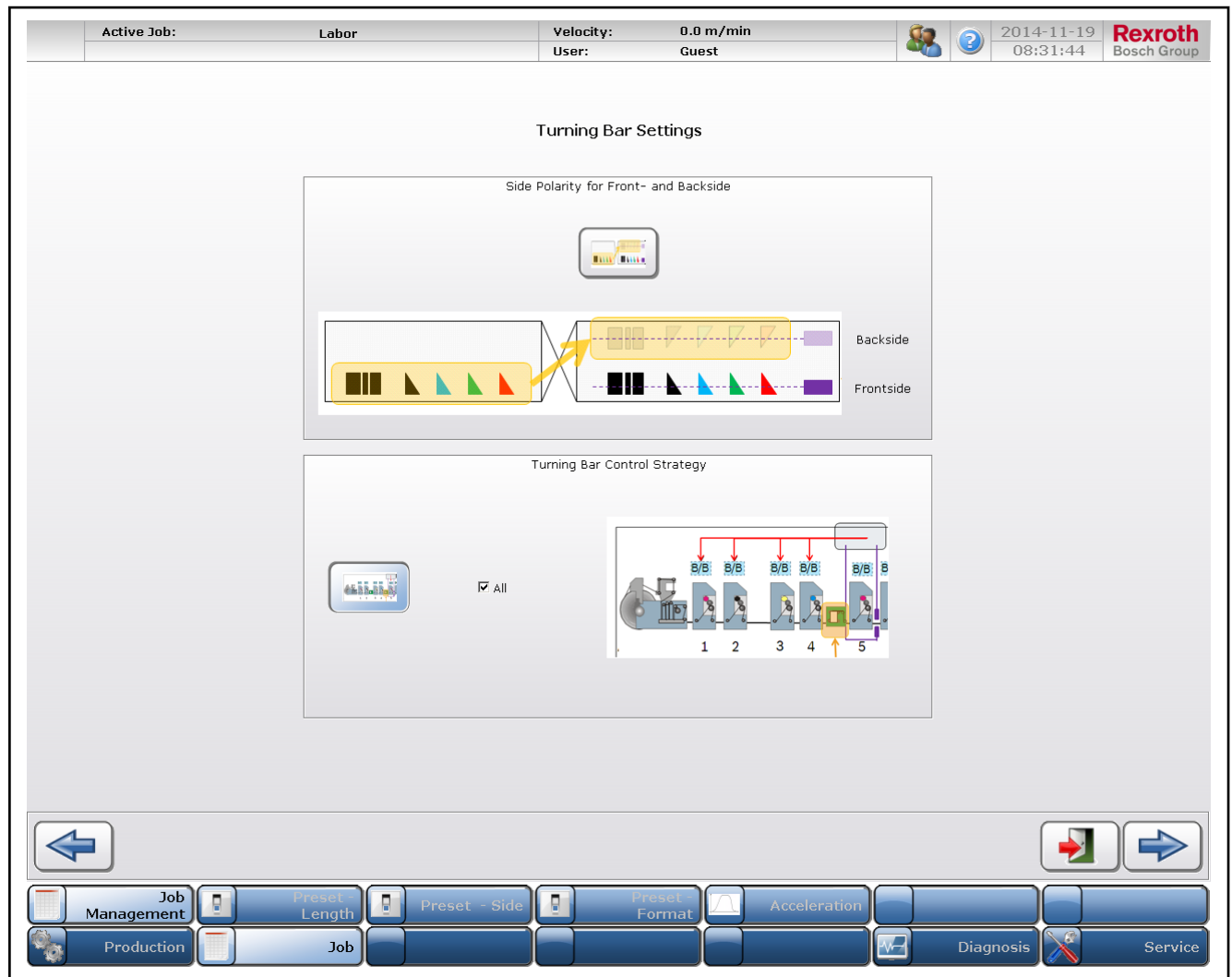


Fig. 10-84: Polarity and control strategy for the turning bar

In the upper dialog area, the mark stream characteristics can be defined via a button. This directly influences the polarity of the side register control for the front and back side control. The polarity can be determined automatically when correctly configuring the mark stream characteristics from front to back side.

The bottom dialog facilitates the selection of the control strategy for the front to back side control. If the button is not active, the front to back side control is executed by the printing unit control directly after the turning bar. If the button is active and the checkbox "All" is not active, the control is executed by displacing the printing unit 1 on the front. If additionally the checkbox is active, a control variable is not only applied to printing unit 1 of the front, but to all control stations on the front.

HMI dialog and element description

10.11.3 Additional function "Acceleration compensation"

General information



The function "Acceleration compensation" is only intended for special hardware-specific characteristics. This function has to be enabled by Bosch Rexroth.

There are two different procedures for the acceleration compensation:

- Standard acceleration compensation - Based on a velocity-dependent adaptation of the control variable during the acceleration
- Advanced acceleration compensation - Based on velocity- and acceleration-dependent compensation factors that can compensate errors occurring due to friction and inertia during the acceleration phase

Standard acceleration compensation

To calculate the acceleration compensation, the required characteristic values can be entered and saved in the "Acceleration dialog". The compensation is based on a velocity-dependent adaptation of the control variable during the acceleration.

Active Job:		Labor		Velocity:	27.0 m/min		2015-10-08 16:44:47	 Bosch Group
				User:	Guest			

Acceleration compensation

Offset Values					Copy to all units	
Unit	Kp - Start factor [%]	Kp - End factor [%]	Start velocity [m/min]	End velocity [m/min]		
+ 1	100.0	100.0	0.000	0.000		
+ 2	100.0	100.0	0.000	0.000		
+ 3	100.0	100.0	0.000	0.000		
+ 4	100.0	100.0	0.000	0.000		
+ 5	100.0	100.0	0.000	0.000		
+ 6	100.0	100.0	0.000	0.000		
+ 7	100.0	100.0	0.000	0.000		
+ 8	100.0	100.0	0.000	0.000		
+ 9	100.0	100.0	0.000	0.000		
+ 10	100.0	100.0	0.000	0.000		
+ 11	100.0	100.0	0.000	0.000		
+ 12	100.0	100.0	0.000	0.000		

Default values

Reset Values

Data to / from control

Save to current job

Job Management	Preset - Length	Preset - Side	Preset - Format	Acceleration	Pre Registration	
Production	Job				Diagnosis	Service

Fig. 10-85: Standard acceleration compensation

HMI dialog and element description

Kp - Start factor [%]	Factor used to start the linear adaptation of the control variable during the acceleration from the starting velocity. Default value: 100.0% $\Rightarrow$ no control value change
Kp - End factor [%]	Factor used to end the linear adaptation of the control variable during the acceleration when reaching the end velocity. Default value: 100.0% $\Rightarrow$ no control value change
Starting velocity [m/min]	Velocity at which the acceleration starts. From this velocity, the linear adaptation of the control variable starts with the "Kp - Start factor" Default value: 0.000 m/min
End velocity [m/min]	Velocity at which the acceleration ends. From this velocity, the linear adaptation of the control variable ends with the "Kp - End factor" Default value: 0.000 m/min
	Copies the values of the currently selected printing unit to all other printing units
	Sets the following parameters to their standard value: • Kp - Start factor • Kp - End factor • Start velocity • End velocity
	Top: Retrieves the parameter values from the control Down: Applies the parameter values to the control
	Saves the data in the current job configuration

Advanced acceleration compensation

To calculate the acceleration compensation, the required constants can be entered and saved in the "Acceleration dialog". The compensation is divided into velocity and acceleration-dependent values that can compensate errors occurring due to friction and inertia during the acceleration phase.

HMI dialog and element description

Active Job:

Labor

Velocity:

27.0 m/min

User:

Guest

2014-12-05 16:05:37

Rexroth

Bosch Group

Acceleration compensation

Fixed

Adaptive

Start velocity

0.000 [m/min]

copy actual

Target velocity

100.000 [m/min]

Maximum velocity

200.000 [m/min]

Acceleration duration

120.000 [sec.]

Adaption factor

60 [%]

Unit	Static deviation [mm]	Dynamic deviation [mm]	Compensation delay [%]
1	0.000 C-P: 0.000000	0.000 C-A: 0.000000	0.000
2	0.000 C-P: 0.000000	0.000 C-A: 0.000000	0.000
3	0.000 C-P: 0.000000	0.000 C-A: 0.000000	0.000
4	0.000 C-P: 0.000000	0.000 C-A: 0.000000	0.000
5	0.000 C-P: 0.000000	0.000 C-A: 0.000000	0.000
6	0.000 C-P: 0.000000	0.000 C-A: 0.000000	0.000
7	0.000 C-P: 0.000000	0.000 C-A: 0.000000	0.000
8	0.000 C-P: 0.000000	0.000 C-A: 0.000000	0.000
9	0.000 C-P: 0.000000	0.000 C-A: 0.000000	0.000
10	0.000 C-P: 0.000000	0.000 C-A: 0.001000	0.000
11	0.000 C-P: 0.000000	0.000 C-A: 0.001000	0.000
12	0.000 C-P: 0.000000	0.000 C-A: 0.001000	0.000

Enable Testmode

Prod. mode

Production

Reset Values

Data to / from control

Job Management

Production

Preset - Length

Job

Preset - Side

Preset - Format

Acceleration

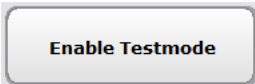
Diagnosis

Service

Fig. 10-86: Advanced acceleration compensation

Static deviation in [mm] or C-P-factor	Calculation value of static velocity compensation in [mm]. To calculate the variables in [mm] the inputs "start velocity", "target velocity", "maximum velocity" and "acceleration duration" are used. This means, the inputs have to be entered correctly. The corresponding CP value does not depend on these values
Dynamic deviation in [mm] or C-A-factor	Calculation value of dynamic acceleration compensation in [mm]. To calculate the variables in [mm] the inputs "start velocity", "target velocity", "maximum velocity" and "acceleration duration" are used. This means, the inputs have to be entered correctly. The corresponding CA value does not depend on these values
Feed forward delay [%]	The values to be fed resulting from static and dynamic deviation can be delayed by this percentage depending on the web length and the material web velocity. The default value "0" is recommended

HMI dialog and element description

	Disabling the static or dynamic feed forward. The button refers to the respective column underneath. For example, if "Disabled" is selected via the dynamic deviation, no dynamic compensation takes place
	The calculation values "static deviation in [mm]" or "C-P factor" or "dynamic deviation in [mm]" or "C-A factor" are not refreshed. The specified values are applied
	The calculation values "static deviation in [mm]" or "C-P factor" or "dynamic deviation in [mm]" or "C-A factor" are recalculated after the subsequent acceleration phase has been completed. Subsequently, the button is automatically set to "Fixed". If the data is to be saved, the data has to be read in and saved in the job
Starting velocity [m/min]	Start velocity in [m/min], the acceleration phase with compensation is started with after the setup mode
Target velocity [m/min]	Target velocity in [m/min] of the acceleration phase during which the compensation takes place
Maximum velocity [m/min]	Maximum velocity in [m/min] of the machine
Acceleration duration [s]	Acceleration duration of 0 [m/min] until maximum velocity at the machine in [s]
Adaption factor [%]	If the adaptive learning is triggered again, the percentage of how the determined values are integrated in the new compensation value can be specified via this percentage. This function can be enabled and disabled in the user management
	If the test mode is active, the acceleration compensation also operates without the register controller. That means, the actual influence of the acceleration compensation on the machine can be verified. This function can be enabled and disabled in the user management.
 	Production enables the acceleration compensation. If the button is not active, no compensation takes place during the acceleration phase, irrespective of all other settings. Thus, the acceleration compensation can be enabled via the button Production in the register overview dialog during runtime
	Reset the values for "static deviation in [mm] or C-P factor" or "dynamic deviation in [mm] or C-A factor" to "0"

HMI dialog and element description

 	Top: Reading of C-P/C-A data from the control and conversion to static and dynamic deviation in [mm] Down: Write C-P / C-A data to the control
	Saves the data in the current job configuration



If "Adaptive" is selected, learning of the acceleration compensation value for the next acceleration phase is enabled. After the acceleration phase is completed, "Adaptive" is automatically set to "Fixed". New learning has to be triggered explicitly.



To continuously apply the new values calculated during learning to the static and dynamic deviation, load the new values and save them explicitly in the job first. Otherwise, old values are loaded if the job configuration has been opened in the meantime.

10.11.4 Additionally "Automatic pre-registration" (APR)



The function "Automatic pre-registration" is only intended for special hardware-specific characteristics. This function has to be enabled by Bosch Rexroth.

The function "Automatic pre-registration" can be used to calculate the web length changed between the printing unit and the sensor resulting while engaging the impression roller based on the barcode position and to compensate it during the engagement. Thus, the printing units can already print in the correct color register right from the beginning.



The function "Automatic pre-registration" requires a barcode and that the sensor detects the barcode. This barcode has to be either printed by the first printing unit or it has to be on the pre-printed material.

The following dialogs are available if the "Automatic pre-registration" function is enabled.

Machine configuration

Another dialog to configure the mechanical dimensions of the individual printing units is displayed in the machine configuration wizard.

HMI dialog and element description

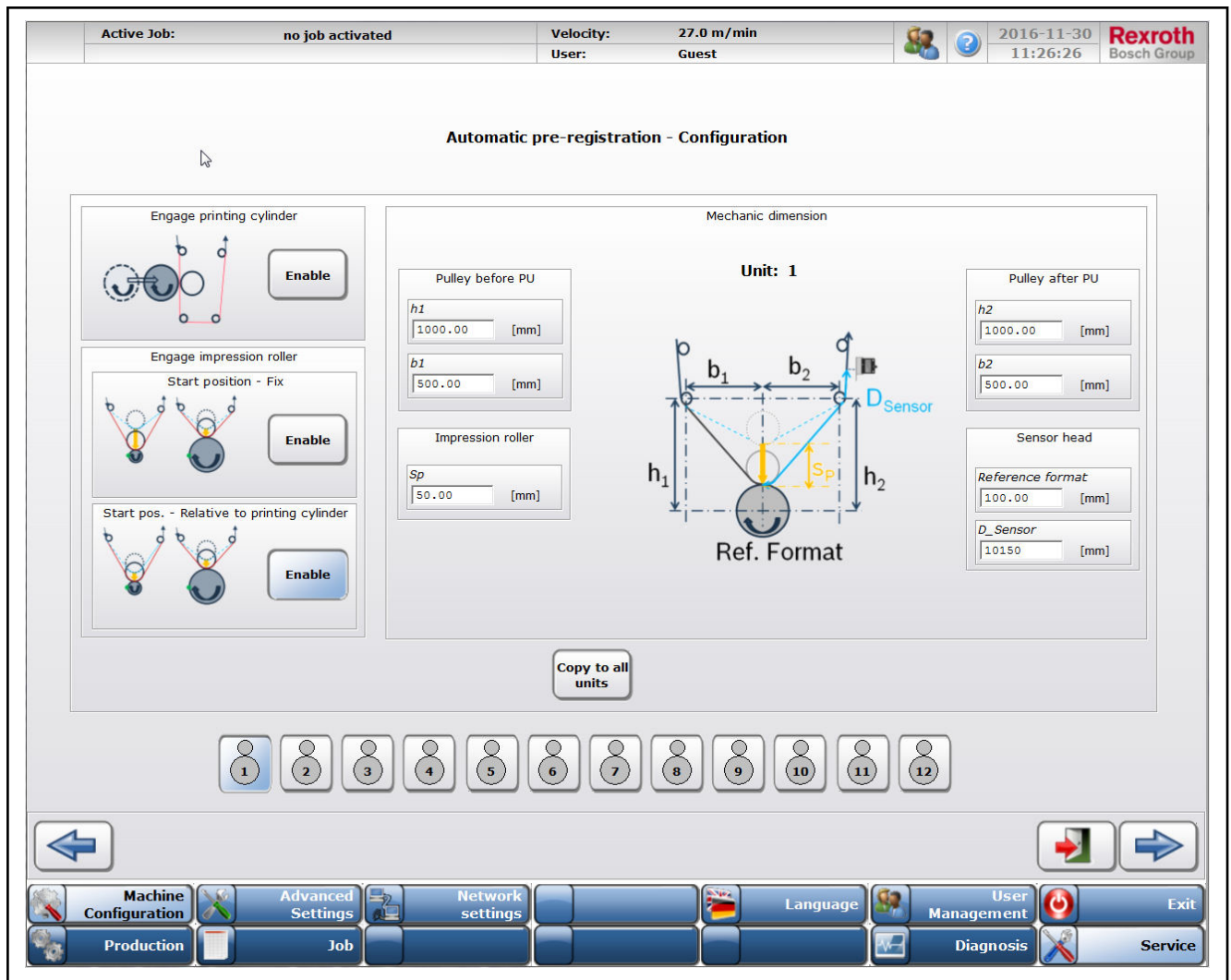
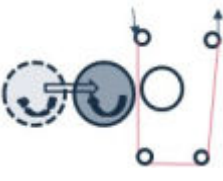
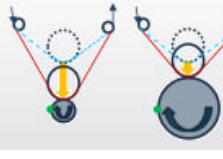
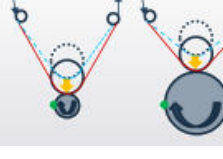


Fig. 10-87: Automatic pre-registration - Configuring the mechanical dimensions
 These mechanical dimensions are used to calculate the web length change. They have to be entered for all printing units.
 The settings are saved as part of the machine configuration data.



When configuring "Engage print cylinder", the web length is not changed while engaging. I.e. except for the distance between the sensor and the print point, no further dimensions are required for the calculation. Thus, entering them is not possible (disabled).

HMI dialog and element description

Engage print cylinder 	Specifies that the print cylinder is engaged. The web length is not changed. I.e. except for the distance between the sensor and the print point, no further dimensions are required for the calculation. Thus, entering them is not possible (disabled) Only the job-specific offset of the respective printing unit is effective
Engage impression roller Start position - Fix 	Specifies that the impression roller is engaged from a fix start position. I.e. In case of different printing formats, there is another distance between the printing cylinder and the impression roller (S_P). ⇒ The distance (S_P) has to be specified with regard to the reference format. The web length is changed between the printing unit and the sensor while engaging. I.e. all following mechanical dimensions are used to calculate the web length change
Engage impression roller Start position - Relative to print cylinder 	Specifies that the impression roller is engaged from the starting position relatively to the printing cylinder. I.e. The distance between the printing cylinder and the impression roller (S_P) is also always the same in case of different printing formats. The web length is changed between the printing unit and the sensor while engaging. I.e. all following mechanical dimensions are used to calculate the web length change
Impression roller	S_P: Distance between the printing cylinder and the impression roller if the printing unit is open [mm] (distance covered by the impression roller while engaging). If the impression roller is engaged from a fixed start position, specify the distance in relation to the reference format
Pulley before PU	h_1: Vertical distance of the pulley to the center of the printing cylinder [mm] b_1: Horizontal distance of the pulley to the center of the printing cylinder [mm]
Pulley behind PU	h_2: Vertical distance of the pulley to the center of the printing cylinder [mm] b_2: Horizontal distance of the pulley to the center of the printing cylinder [mm]
Sensor head	Reference format: Reference printing format in [mm], the distance to the sensor refers to. D_{Sensor}: Distance between the sensor and the print point on the impression roller for the specified reference format (if the "reference format = 0 mm", the distance from the sensor to the center of the printing cylinder has to be specified)

HMI dialog and element description

	Reference unit selection to toggle between the individual printing units (only printing units with length register control are available for selection)
	Applies the configured values of the selected printing unit to all other printing units

Job configuration – Pre-registration

The "Job" menu provides another dialog to enter a job-specific offset for each printing unit to fine tune the calculated web length change.



The function "Automatic pre-registration" requires a barcode and that the sensor detects the barcode.

If no barcode is configured in the current job, the dialog to configure the job-specific offsets is locked.

Active Job:

Labor

Velocity:

0.0 m/min

User:

Guest




2015-10-02

13:50:14

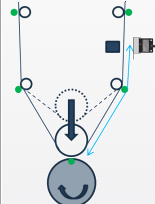
Rexroth

Bosch Group

Automatic Pre Registration

Offset Values

Unit	Offset Values [mm]
+ 1	1.000
+ 2	2.000
+ 3	0.000
+ 4	0.000
+ 5	0.000
+ 6	0.000
+ 7	0.000
+ 8	0.000
+ 9	0.000
+ 10	0.000
+ 11	0.000
+ 12	0.000



Offset Values



Save to current job



Job Management

Production

Preset - Length

Job

Preset - Side

Preset - Format

Acceleration

Pre Registration

Diagnosis

Service

Fig. 10-88: Job menu – Automatic pre-registration – Offset

HMI dialog and element description

The offset values entered are job-specific and they are saved as part of the job data.

	Writes the offset values to the control
	Saves the offset values to the current job

Production – Register controller settings

Go to the menu "Production – Register overview" and select the respective reference unit to open the "Register controller settings dialog". Can start or cancel the automatic pre-registration of the respective printing unit in this dialog. The pre-registration status is displayed additionally.



The function "Automatic pre-registration" requires a barcode and that the sensor detects the barcode.

If no barcode is configured in the current job, the operating and display elements of the automatic pre-registration are hidden.

HMI dialog and element description

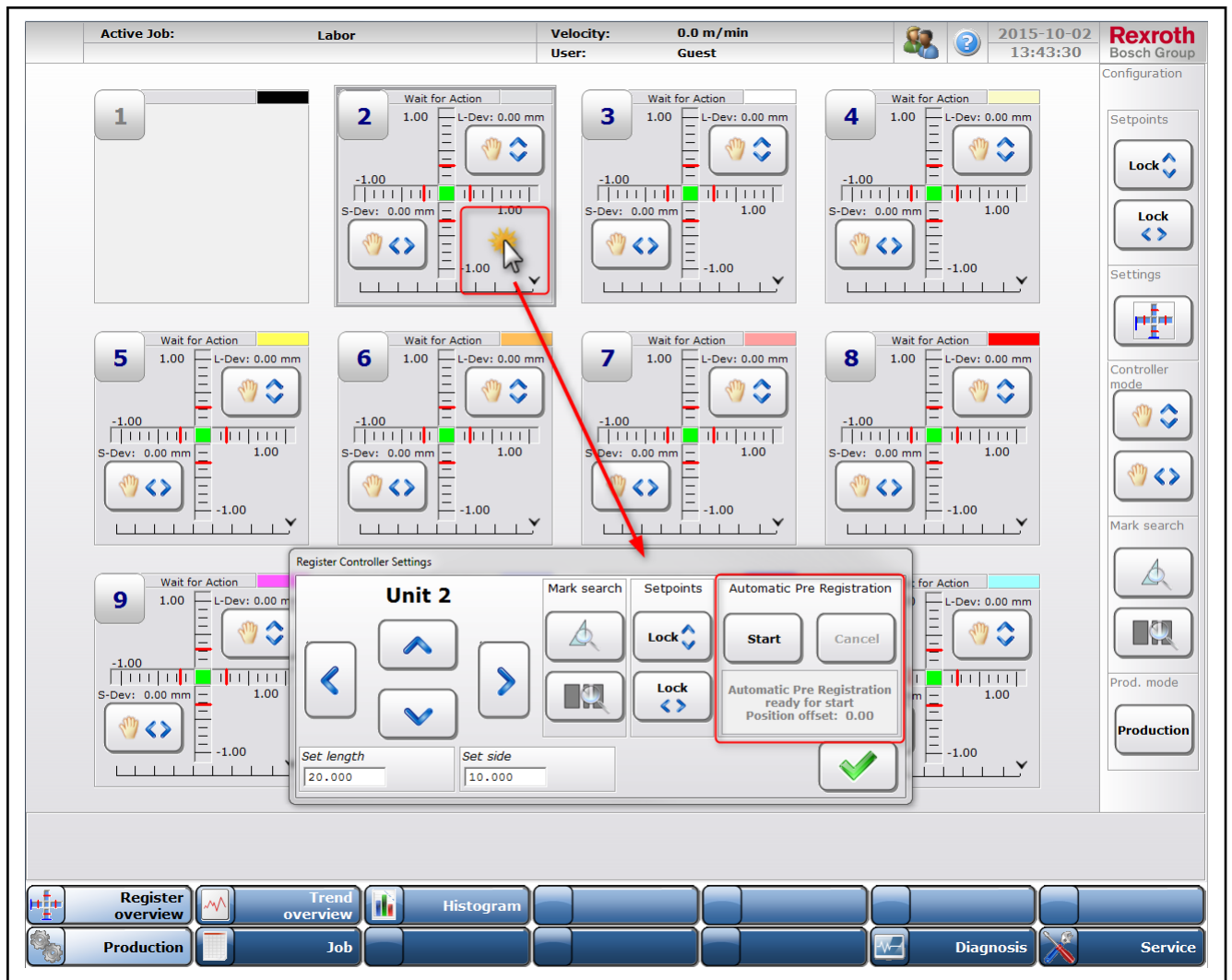


Fig. 10-89: Production – Register controller settings – Automatic pre-registration

HMI dialog and element description

Start	Starts the automatic pre-registration of the respective printing unit
Cancel	Aborts the already started pre-registration of the respective printing unit
Status display:	Current pre-registration status of the respective printing unit as plain text message including the resulting offset. Possible states: • Automatic pre-registration ready - Position offset: x.yy • Barcode search is running • Compute position offset • Command position offset: x.yy • Synchronization motion running - Position offset: x.yy • Pre-registration completed successfully - Position offset: x.yy • Abort • Function abort - Wait for end of barcode search • Error: Barcode not found • Error: Impression roller closed - No commanding of the position offset: x.yy • Error: Timeout during synchronization motion - Position offset: x.yy

10.11.5 Additional function "Freely selectable reference unit"



The function "Freely selectable reference unit" is only intended for special hardware-specific characteristics. This function has to be enabled by Bosch Rexroth.

The following basic conditions have to be complied with to use the "Freely selectable reference unit" function:

- Function Multiple Reference Mark is not permitted
- Auxiliary function 2 Sensors behind a printing unit is not permitted
- Maximum number of printing units: 12

The function "Freely selectable reference unit" allows to select a printing unit different from the first active printing unit as reference to control the remaining printing units.

The mark of the reference unit is entered as reference mark for length registers as well as for side registers of the other printing units.

HMI dialog and element description

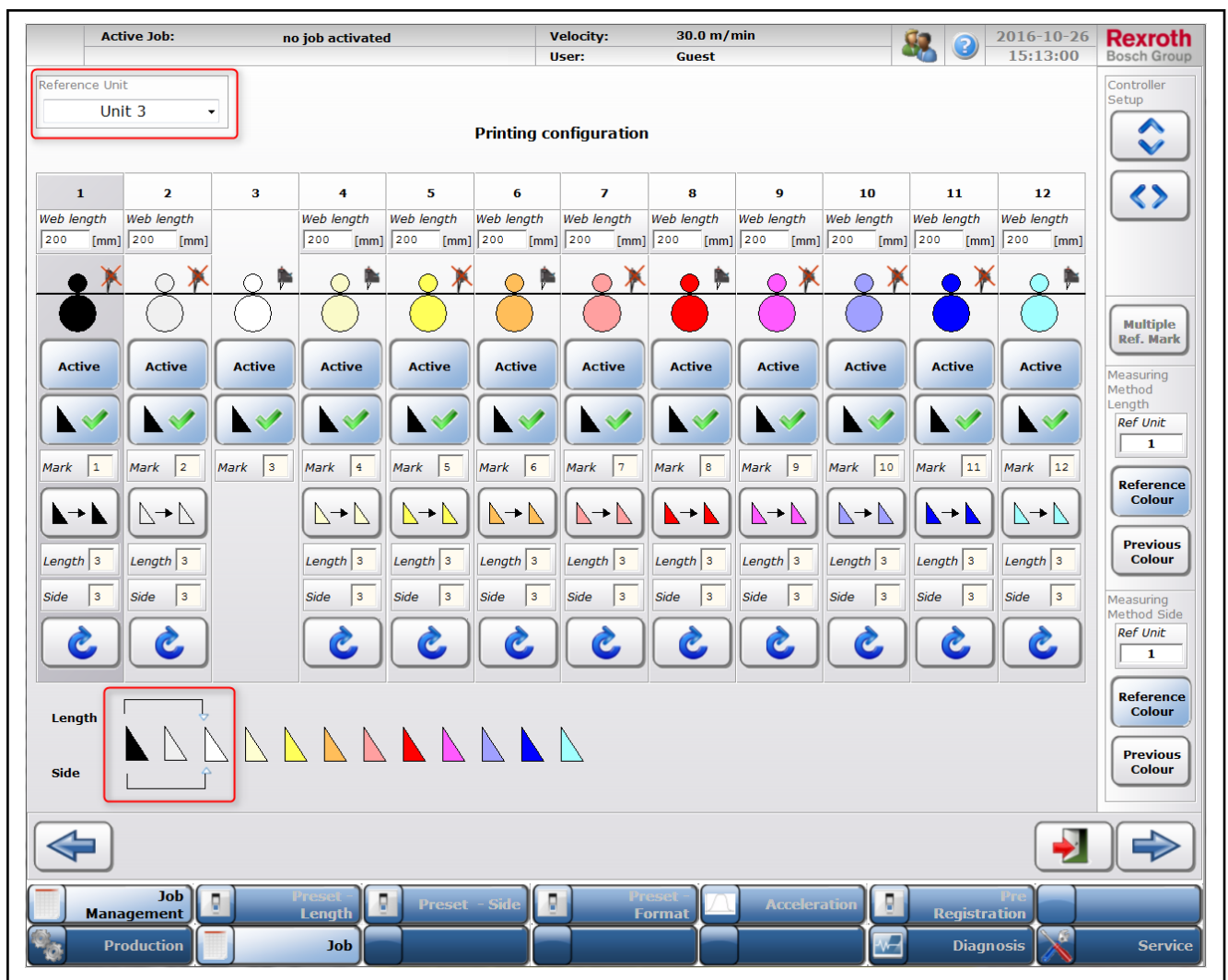


Fig. 10-90: Freely selectable reference unit - Configuration

All active printing units printing a mark can be configured.

When selecting a printing unit not printing any mark, an error message is issued and the first active printing unit is set as reference unit.

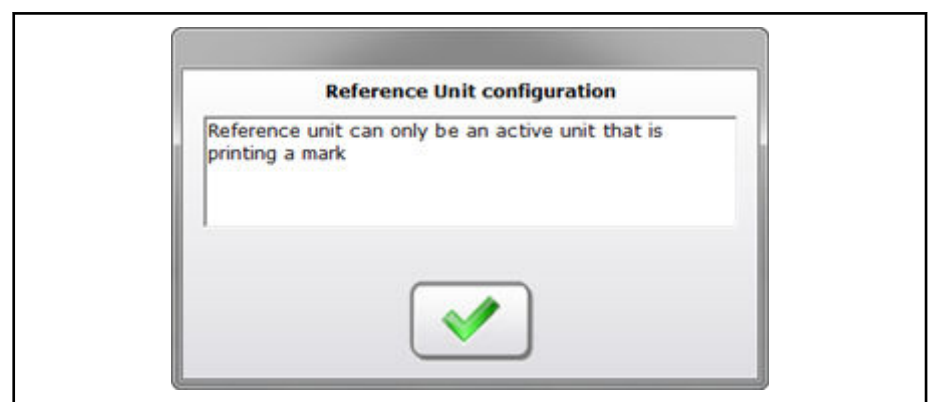


Fig. 10-91: Configuration error: Inactive reference unit

Freely selectable reference unit - Pre-printed material

When used together with pre-printed material, the reference mark has to be the first pre-printed mark.

HMI dialog and element description

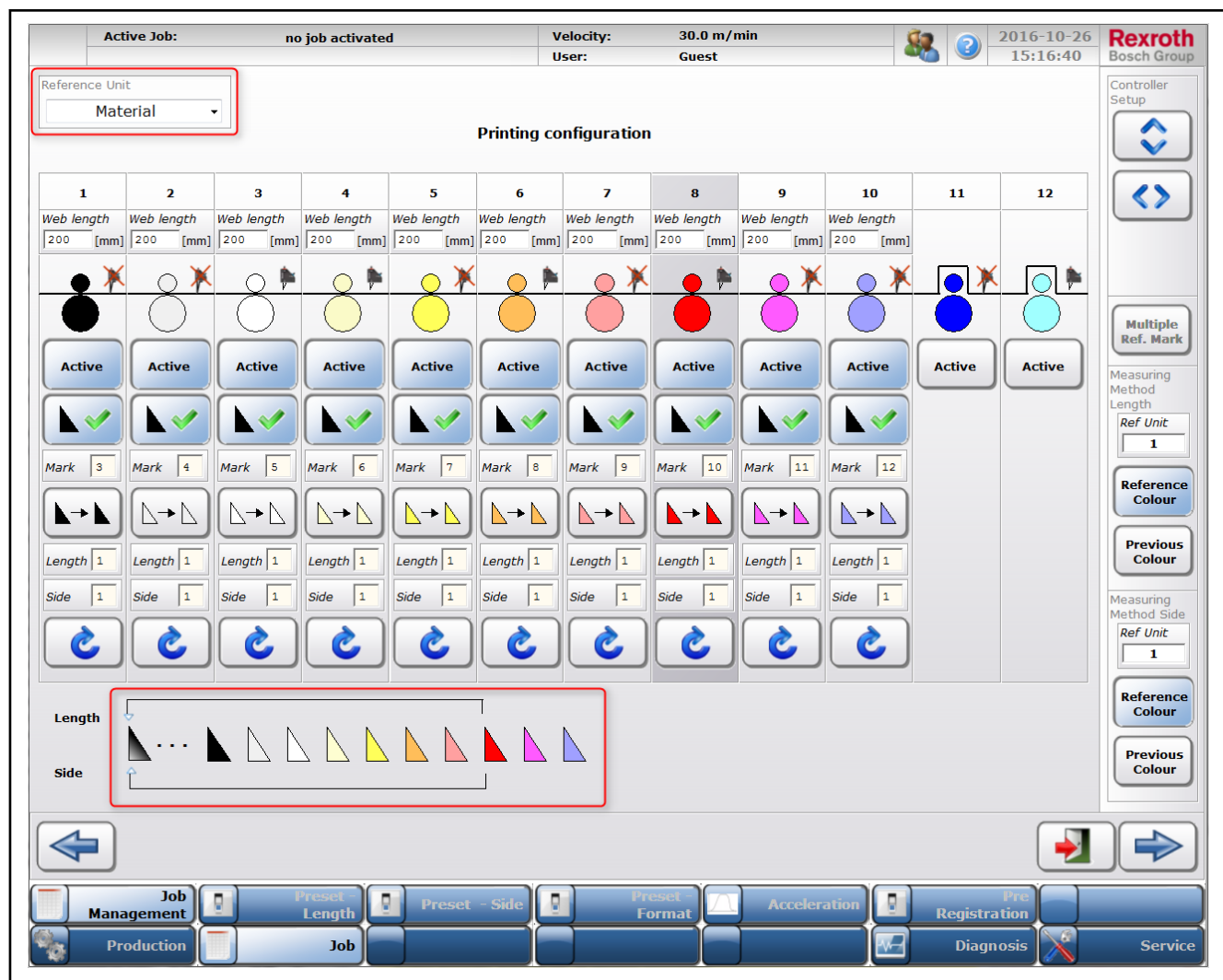


Fig. 10-92: Freely selectable reference unit - Configuration of pre-printed material

To select something different than "Material" for the pre-printed material, an error message is issued and "Material" is set as reference unit.

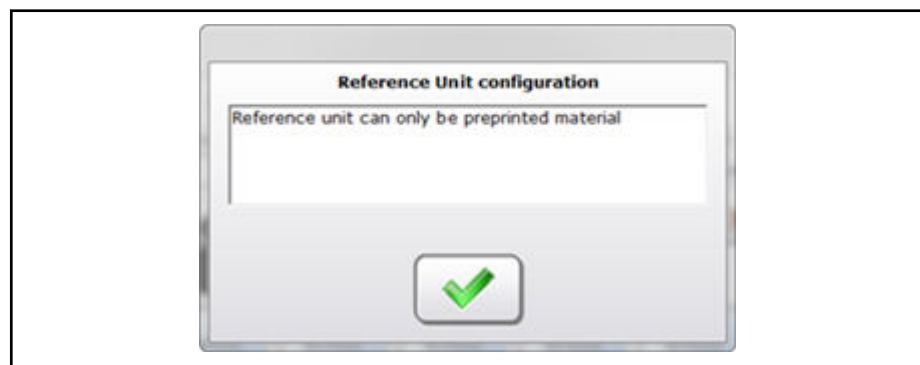


Fig. 10-93: Configuration error: Preprinted material

Freely selectable reference unit - Turning bar

When used together with an active turning bar, an own reference unit can be configured for each side of the web.

HMI dialog and element description

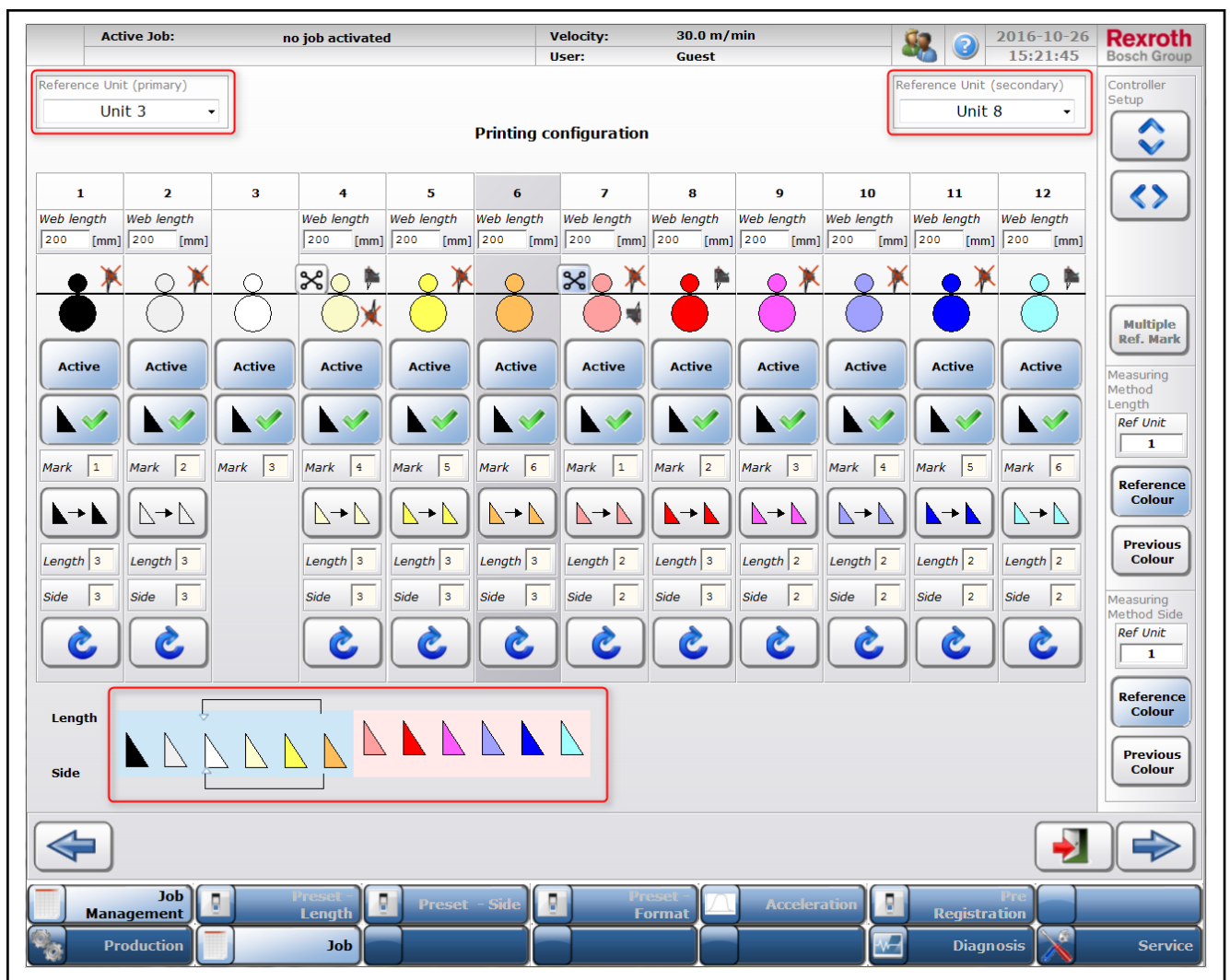


Fig. 10-94: Freely selectable reference unit - Turning bar configuration

The following applies:

- Reference unit (primary):
 - Has to be in front of the turning bar
 - It is the reference for the printing units of the front side
 - It is the reference for the reference unit of the rear side (secondary)
- Reference unit (secondary):
 - It has to be behind the turning bar
 - It is the reference for the printing units of the rear side
 - It is primarily controlled to the reference unit of the front side (primary)

When selecting a printing unit as reference unit (primary) located behind an active turning bar, an error message is issued and the first active printing unit is set as reference unit (primary).

HMI dialog and element description

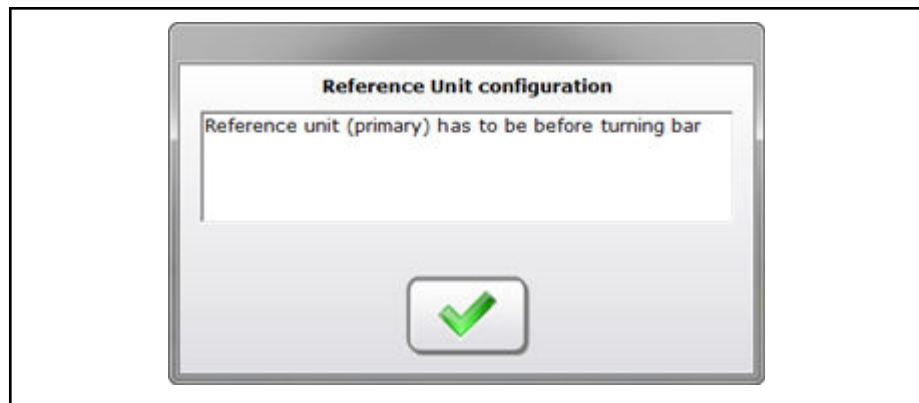


Fig. 10-95: Configuration error: Reference unit (primary)

When selecting a printing unit as reference unit (secondary) located in front of an active turning bar, an error message is issued and the first active printing unit after the turning bar is set as reference unit (secondary).

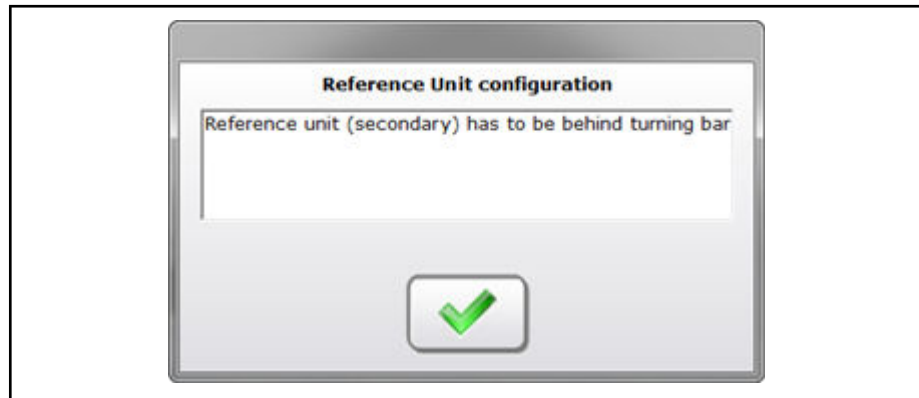


Fig. 10-96: Configuration error: Reference unit (secondary)

**Freely selectable reference unit -
Turning bar and pre-printed material**

Pre-printed material is also supported together with an active turning bar. Select "Material" as reference unit (primary).

HMI dialog and element description

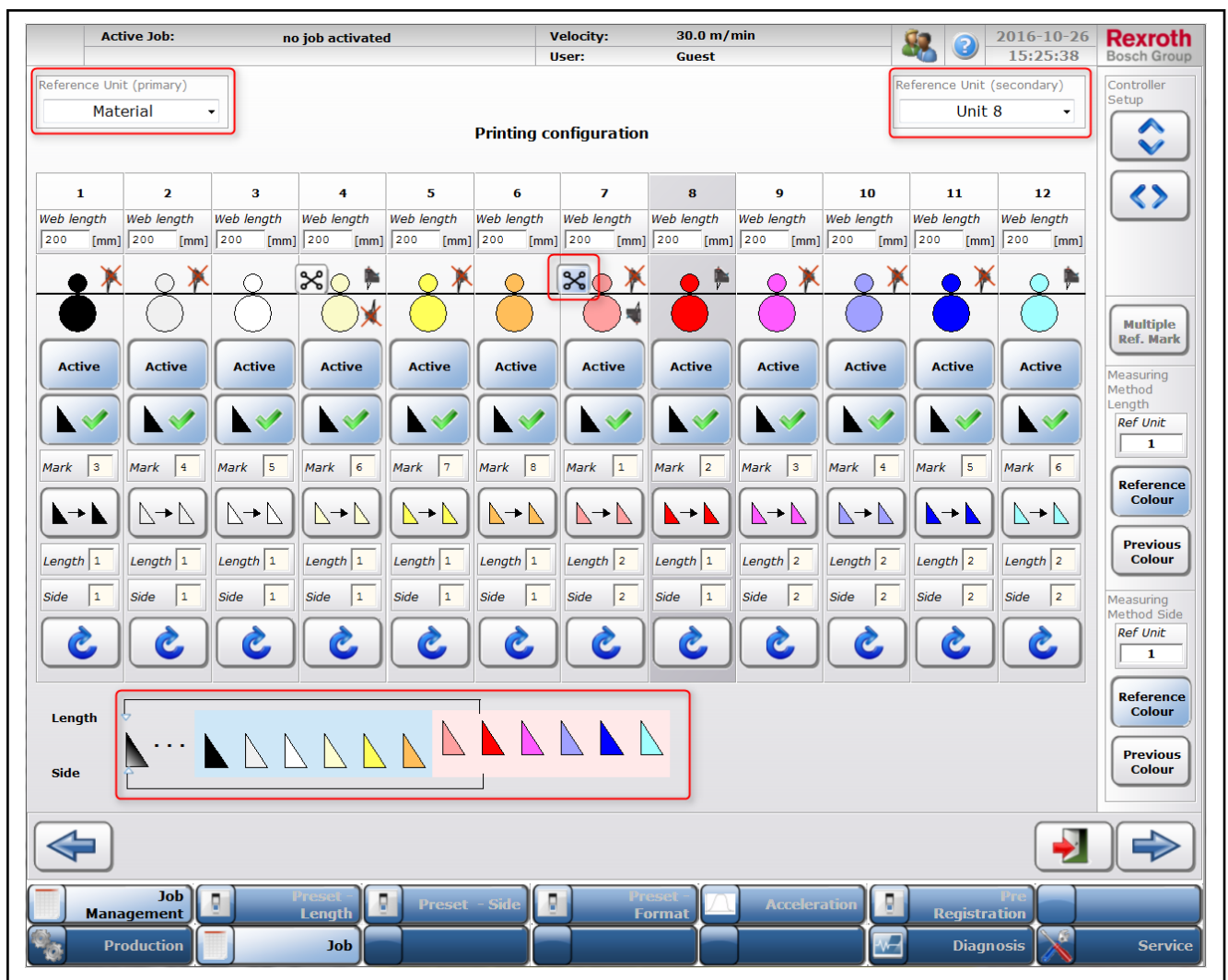


Fig. 10-97: Freely selectable reference unit - Configuration of turning bar and pre-printed material

To select something different than "Material" for the pre-printed material for the reference unit (primary), an error message is issued and "Material" is set as reference unit (primary).

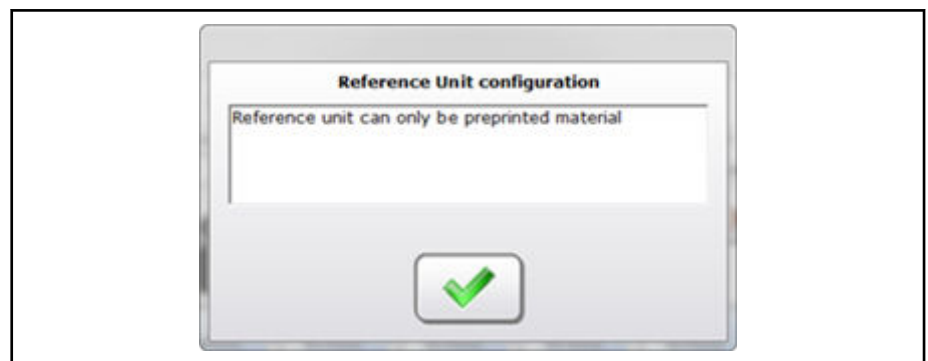


Fig. 10-98: Configuration error: Preprinted material

11 Decentral HMI dialog of the decentral register control

11.1 General information

Decentral visualizations are used for decentral operation at a printing machine. A decentral overview dialog is available for the register control. Using this dialog, all important register controller operations of the printing unit can be executed decentrally. The decentral HMI dialog can be integrated in the decentral machine operation. The following conditions apply for using the decentral HMI:

- Embedded Terminal IndraControl VEP 40.4
- Operating system Windows Embedded Standard 7
- WinStudio license ≥ 1.5 k
- Per sensor, only one dialog of the decentral register control can be used

The decentral register controller dialog uses 420 variables. This has to be taken into consideration when calculating the WinStudio license size when the dialog is integrated in the decentral machine visualization. If a 1.5 license is used, $1500 - 420 = 1080$ variables are available for the machine visualization.

The dialog has a size of 800x500 pixel. Consequently, 800x50 pixel is available for header and footer.



The dialog has been scaled for a 12.1" device. The user can scale this dialog to a different display size. No commands can be changed in the background script as well as in dialog elements in the scaling.

11.2 Importing the dialog of the decentral register control

The decentral dialog is saved on the CD under "VEP_SingleScreen" as .zip file. Save this file on your local commissioning PC and unzip this file.

A sample framework containing header, footer and main screen has been added to the dialog. The framework can be extended or applied.

Up to two register controller dialogs can be integrated on a decentral HMI in a project.

The import wizard is used to import the decentral dialog. It is recommended to manually check the imported elements.



It is recommended to create a backup of the application in which the decentral dialog is to be imported to.



Please ensure that the decentral visualization device has been licensed (cf. [chapter 8 "Commissioning the HMI interface" on page 67](#)).

1. Call the import wizard in WinStudio in the decentral machine operation project via **File ► Import Wizard**.
2. Select **WinStudio Database** and click on **Next**.
3. Select **Import the whole application** and optionally **Do not import duplicate tags and files**. Subsequently, select the "VEP_SingleScreen_x_x_x_x.app" file at the local storage location of the decentral HMI.

Decentral HMI dialog of the decentral register control

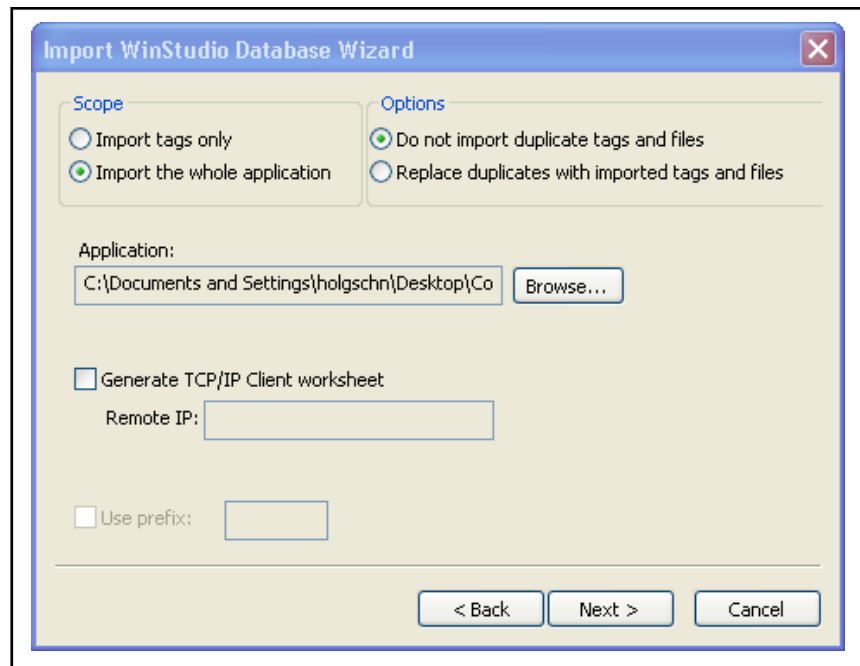


Fig. 11-1: Import wizard

4. The variables to be imported are displayed in the following dialog. All variables and classes have to be highlighted in blue.

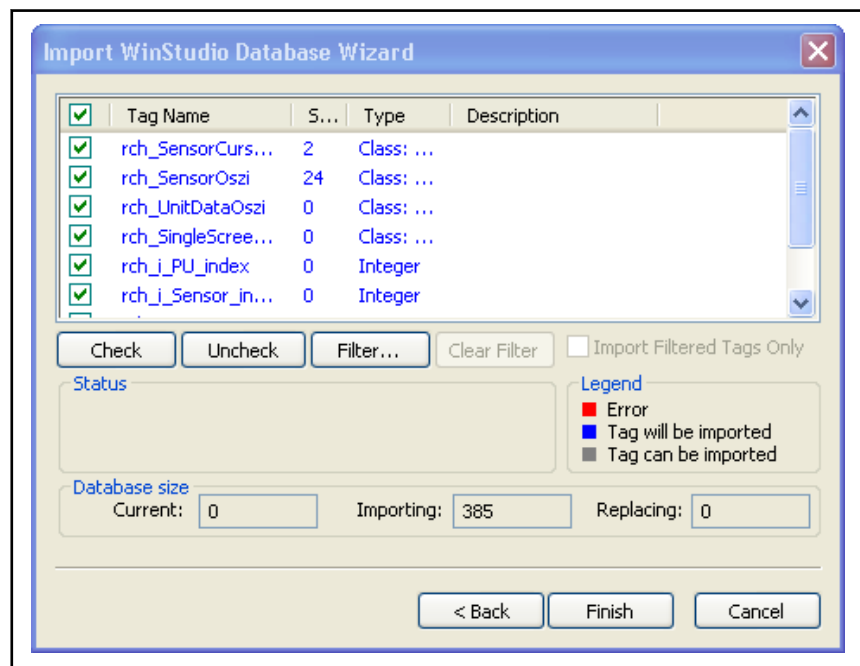


Fig. 11-2: Import variables

If a variable or class is highlighted in red, the variable name already exists in your project. Rename the variable highlighted in red and check this variable again. Subsequently, close the dialog.

The automatic import of the decentral dialog has been completed successfully. The imported elements have to be checked and manual operations have to be executed.

5. Copy the ".sym" elements to the "Symbol" folder of your application from the "VEP_SingleScreen/Symbol" folder.

Decentral HMI dialog of the decentral register control

6. Open the startup script under **Tasks ▶ Scripts ▶ Startup Script** in WinStudio. If a startup script is used in the application, no data has been imported. Insert the following lines in your startup script:

```
$rch_str_IP_Main_HMI = {"xxx.xxx.xxx.xxx" }
```

Replace the IP address "xxx.xxx.xxx.xxx" with a variable or IP address of the central HMI.

If only one register controller dialogs is used, enter the printing unit for this register controller:

```
$rch_i_PU_index_dialog1 = {x}
```

Replace printing unit x with a variable or the printing unit number for whose printing unit the decentral HMI is used.

This entry is part of the register controller dialog "rch_RegisterController.scr".

To integrate a second register controller dialog into the decentral register controller visualization, specify the printing unit number:

```
$rch_i_PU_index_dialog1 = {x}
```

Replace printing unit x with a variable or the printing unit number for whose printing unit the decentral HMI is used.

This entry is part of the register controller dialog "rch_RegisterController_Dialog2.scr".

The subsequent assignment has to be available irrespective of the number of used register controller dialogs in the startup script:

```
$rch_i_PU_index = $rch_i_PU_index_dalog1
```



More than two register controller dialogs cannot be imported in a decentral visualization.

If no startup script has been defined in your application, the following startup scrip has been imported:

```
'Variables available for all Script groups from the Script task can be declared and initialized here.

'Procedures available for all Script groups from the Script task can be implemented here.

//Insert the IP of the main HMI
$rch_str_IP_Main_HMI = "192.168.1.235"

//Insert the number for the printing unit
$rch_i_PU_index_dialog1 = 2
$rch_i_PU_index_dialog2 = 19

$rch_i_PU_index = $rch_i_PU_index_dialog1

//Insert the language name of the translation file
//$SetTranslationFile(($GetAppPath()& "Config\Translation.csv"), "Deutsch")
//$SetDateFormat( ".", "DMY" )

//$SetTranslationFile(($GetAppPath()& "Config\Translation.csv"), "Original")
//$SetDateFormat( "-", "YMD" )
```

Fig. 11-3: Startup script

Change the IP address of the decentral HMI as well as the printing unit number. Ideally, variables are assigned in this script that have been defined and saved in the machine configuration.

7. Register the ActiveX control as described in [chapter 8.4 "IndraControl VPP, IndraControl VPB/IndraControl VDP"](#) on page 70.

Decentral HMI dialog of the decentral register control

8. The source language of the decentral register controller dialog is English. The German translation is provided in an Excel sheet. If language switching is available in the decentral machine project, the English and German columns can be copied from the Excel sheet to your Excel file. Thus, language switching of the decentral dialog is possible. More languages can be inserted in the Excel sheet. Copy the German and English terms from the "VEP_SingleScreen/Config/TRANSLATION.CSV" file to your translation file.
9. Verify under **Tasks ▶ Scheduler** that the scheduler "OszilloscopeHandling" has been created.
If this is not the case, copy the scheduler from "VEP_SingleScreen/Config/SCHED001.SCH" to the "Config" folder.
10. Verify under **Comm ▶ TCP/IP** that the driver sheets have been created.
11. Verify under **Graphics ▶ Images** that the corresponding dialogs are available. The images "rch_Footframe_Example.scr", "rch_Header_Example.scr" and "rch_MainScreen_Example.scr" are a sample framework that can be edited by the user. If the sample framework is not used, the three images can be deleted after the "rch_RegisterController.scr" dialog has been integrated.
Integrate the "rch_RegisterController.scr" dialog in your machine framework via "Open". When exiting this dialog, the dialog has to be closed first. The "rch_MsgBox_Decision.scr" dialog does not have to be called explicitly. The dialog is automatically opened during the query if the ActiveX control is to be closed on the decentral HMI.



The "rch_RegisterController.scr" dialog always has to be closed when exiting the dialog. The dialog cannot be open in the background as the ActiveX control cannot be lock so that the central HMI cannot access it anymore.

If two register controller dialogs are used at a decentral visualization, additionally use the "rch_RegisterController_Dialog2.scr" dialog.



If only one register controller dialog is used, the "rch_RegisterController.scr" dialog has to be used. The "rch_RegisterController_Dialog2.scr" dialog may only be used as second register controller position at a decentral HMI.



Please note that the correct assignment for the register controller dialog has been selected in the startup script.

Decentral HMI dialog of the decentral register control



If two register controller dialogs are used at a decentral HMI, the dialog of the first register controller position has to be closed before the dialog of the second register controller can be opened. Otherwise, problems with the different ActiveX controls can occur. For example, it can be checked if another dialog is opened with an ActiveX control before opening the register controller dialog:

```
If (#CloseActiveXScreen: <>
"", Close (#CloseActiveXScreen:)) ).
```

The other register controller dialog is entered in "#CloseActiveXScreen:". Only after the first register controller dialog is entered, the second register controller dialog can be opened:

```
Open (#strScreenName:).
```

Subsequently, the register controller dialog can be opened on the decentral visualization device.



If there are connection errors in this dialog, check the connection to the central HMI. The application has to be started for verification and the IP address of the central HMI has to be entered in the startup script.

11.3 Operating the dialog of the decentral register control

The dialog of the decentral register control is based on the register single view structure. Therefore, it is recommended to refer to the relevant section ([chapter 10.8.4 "Register Single View" on page 170](#)).

In contrast to previous versions, the current versions of the Active X control and the sensor firmware, up to 3 ActiveX controls can be connected to a sensor simultaneously. That is why the central HMI and the decentral HMI interlock does not apply in this case.

The dialog functionality of the decentral register control is described in the following.

Decentral HMI dialog of the decentral register control

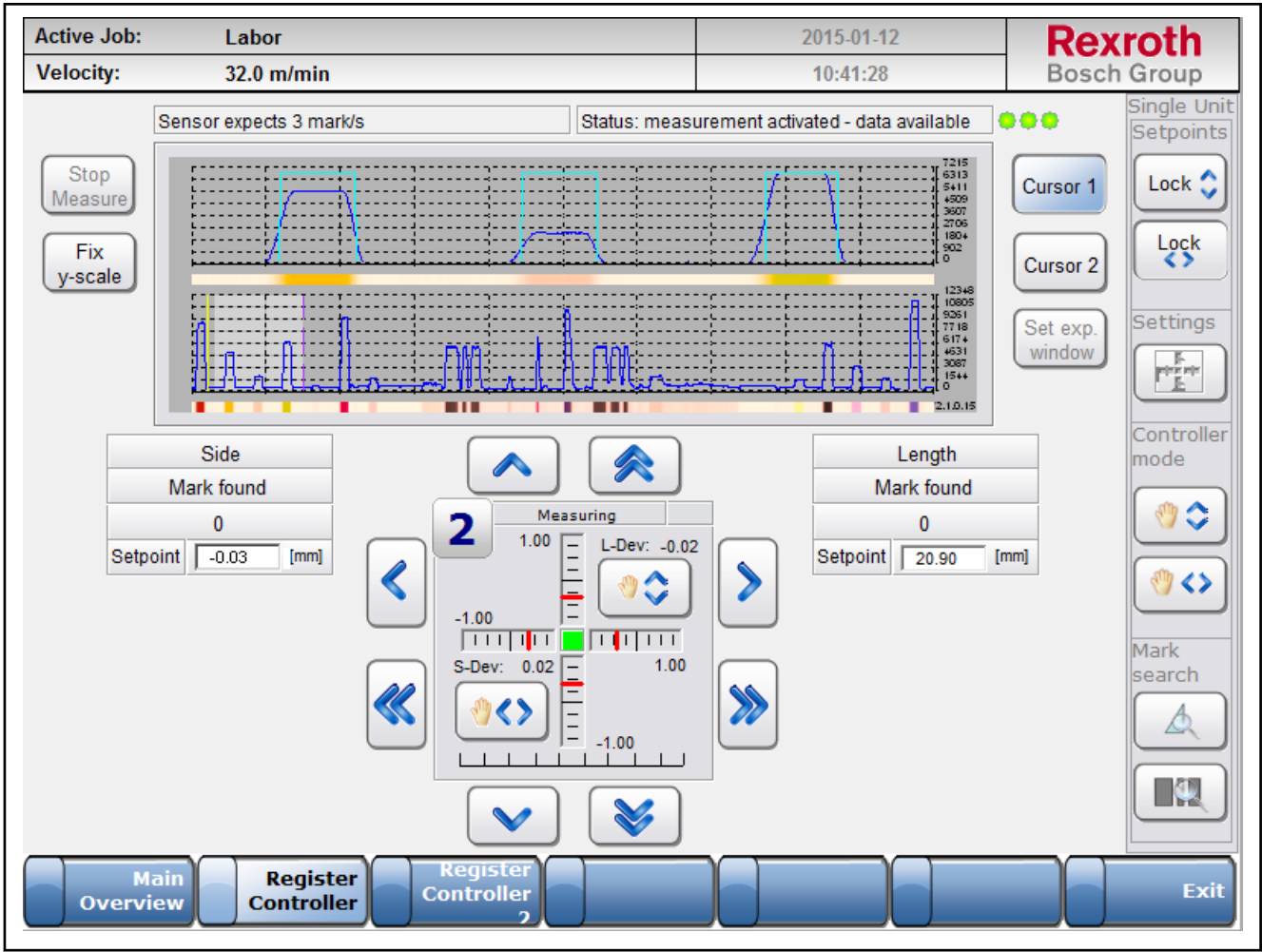
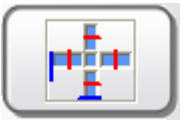


Fig. 11-4: Decentral HMI

 To the left above the oscilloscope it is displayed how many register marks the sensor expects and over how many register marks the expectation window has to be set to start a valid measurement.

The symbol bar on the right side has following functionality for the defined printing unit:

	Adding the current deviation of the length register to the command value of the length register. This function can be used when manually setting the machine and if the register controller is not enabled yet
	Adding the current deviation of the side register to the command value of the side register
	Always inhibited as the HMI settings can only be selected via the central HMI

Decentral HMI dialog of the decentral register control

	Function to activate/deactivate all register controllers for the length register of the printing unit
	Function to activate/deactivate all register controllers for the side register of the printing unit
	Starts the automatic teach-in for the selected printing unit with the last saved expectation window. This action is only executed if an expectation window has determined once before for the defined printing unit
	Barcode search if configured

Other elements are described in the following:

1. Oscilloscope display.

- **Stop measurement**
The function stops the active measurement
- **Cursor 1 / Cursor 2**
The cursors are used to set the expectation window within the 360 ° display (below). An area in which the mark stream is searched for is defined via the starting point (Cursor 1) and the end point (Cursor 2)
- **Set expectation window**
The function transfers the beginning and the size of the expectation window to the PLC and subsequently starts the teaching and the measurement.
The expectation window can only be set if no measurement is active
- **Fix y-scale**
Fixes the y-axis scaling

2. Jog buttons for the manual command value correction of side register and length register.

The command value is jogged in case of an enabled register controller. In case of a disabled register controller, the motor position is jogged.

3. Status display of the sensor assigned to the printing unit.

- Current sensor status display
- Current mark status display:
 - "Mark found" if the marks have been found
 - "Mark lost" if the marks have been lost
- Number of lost marks display
- Display and manual input of the command value in [mm] for side register and length register

12 Troubleshooting

12.1 General information

Errors can occur during the application. This chapter describes how to proceed in case of error using an example. Subsequently, the error numbers are specified and possible solutions are suggested.

12.2 Approach in case of error

An error at the expectation window is simulated in this example. Three marks are defined for the mark stream sensor "Sensor01" at "Unit 3". The expectation window is set above two marks. That means that the mark stream sensor does not detect three marks and sends an error message as shown below:



Fig. 12-1: Error during teach-in

An error message at "Sensor_01" is displayed in the header. Furthermore, the left side indicates a "teach-in error". To get a more detailed error diagnostics, the "Service" area has to be opened. Optionally, click on the error in the header. The "Diagnostic overview" opens:

Troubleshooting

[illegible]

Fig. 12-2: Diagnostic overview

This "Diagnostics" dialog indicates the time stamp and an error "message". To get a detailed diagnostics, click on **Details**. The following detailed diagnostics is displayed:

The screenshot displays the 'Service diagnostic details' window. At the top, a status bar shows 'Active Job: Rexroth1', 'Velocity: 20.0 m/min', and 'User: Guest'. A red error message states '* Sensor02 : Not all marks found'. The main area contains two tables: 'Register Controller' and 'Sensor'. The 'Register Controller' table lists units 1 through 6, each with a name and two error ID columns. The 'Sensor' table lists Sensor01 and Sensor02, with Sensor02 showing error IDs '00001D12' and '0C000108'. A green checkmark icon is visible in the bottom right corner of the main area. The bottom of the window features a navigation bar with buttons for 'Diagnostic overview', 'Oscilloscope', 'Log book', 'Production', 'Job', 'Quality', 'Diagnosis', and 'Service'.

Register Controller		Side		Length	
Unit	Name	Error ID1	Error ID2	Error ID1	Error ID2
1	Unit01				
2	Unit02				
3	Unit03				
4	Unit04				
5	Unit05				
6	Unit06				

Sensor			
Sensor	Name	Error ID1	Error ID2
1	Sensor01		
2	Sensor02	00001D12	0C000108

Fig. 12-3: Display of the detailed diagnostics

The detailed diagnostics indicates an error at "Sensor02". Furthermore, a 4-byte error number is displayed. These error numbers are listed in the following tables. In this case, not all marks are detected by the sensor. A possible option is to check whether the expectation window was set correctly. The user has to set the expectation window again. The expectation window is set above six marks. Since the mark stream sensor can now find six marks, the teaching is successfully completed and the measurement can be started.

12.3 Error numbers and troubleshooting

The error numbers are listed. These numbers have either been directly generated by the mark stream sensor or by the communication function blocks with the mark stream sensor. Subsequently, the error numbers created by the control components on the printing units are specified and implemented by the S curve function block integrated into the machine program. For all errors, notes on problem solving are given.

The following table contains the error numbers and communication function blocks with the mark stream sensor (error table F_RELATED_TABLE):

Troubleshooting

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00000006	16#00000000	Internal error	Internal error
16#00001D10	16#00000000	Timeout when receiving data	• Check whether the Ethernet cables are connected correctly • Check whether the power supply is applied to the sensor • Check whether the network settings of the sensor are correct • Try to execute a new ping on the sensor
16#00001D10	16#00000001	Timeout while teaching	• Check the entered configuration • Check whether the expectation window was set correctly • Check whether the zero pulse display flashes at the sensor
16#00001D10	16#00000002	Timeout during barcode search	Check the barcode configuration
16#00001D10	16#00000003	Timeout while establishing a connection	• Check whether the Ethernet cables are connected correctly • Check whether the power supply is applied to the sensor • Check whether the network settings of the sensor are correct • Try to contact the sensor using a ping
16#00001D10	16#00000004	Timeout while sending	• Sending the package failed • Check the connection to the sensor • Check whether the power supply is applied to the sensor • Try to contact the sensor using a ping
16#00001D10	16#00000005	Timeout while receiving	• Receiving the package failed • Check the connection to the sensor • Check whether the power supply is applied to the sensor • Try to contact the sensor using a ping
16#00001D10	16#00000006	Timeout while receiving data	• Receiving the package failed • Check the connection to the sensor • Check whether the power supply is applied to the sensor • Try to contact the sensor using a ping
16#00001D11	16#00000000	Invalid printing cylinder format	Check the entered printing cylinder format
16#00001D11	16#00000001	Invalid mark type	Check the entered mark type
16#00001D11	16#00000002	Invalid mark geometry	Check the entered mark geometry in the job configuration
16#00001D11	16#00000003	Invalid number of barcode blocks	Enter a valid number of barcode blocks
16#00001D11	16#00000004	Invalid number of marks	Check the number of printed marks

Troubleshooting

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00001D11	16#00000005	Invalid mark distances	Check the entered mark distances
16#00001D11	16#00000006	Invalid length register mode	Internal error
16#00001D11	16#00000007	Invalid properties for the length register control	Internal error
16#00001D11	16#00000008	Invalid side register mode	Internal error
16#00001D11	16#00000009	Invalid sensor IP address	Check the IP address of the sensor in the machine configuration
16#00001D11	16#0000000A	Invalid IP address of the PLC	Check the IP address of the PLC in the machine configuration
16#00001D11	16#0000000B	Invalid port for the measurement	Check the "Measuring Port" in the machine configuration
16#00001D11	16#0000000C	Invalid port for the configuration	Check the "Configuration Port" in the machine configuration
16#00001D11	16#0000000D	Invalid number of increments	Check the entered number of increments per revolution in the machine configuration
16#00001D11	16#0000000E	Invalid measurement tolerances	Internal error
16#00001D11	16#0000000F	Invalid teach tolerances	Internal error
16#00001D11	16#00000010	Invalid tolerance to the zero pulse	Internal error
16#00001D11	16#00000011	Invalid beginning of expectation window	Internal error
16#00001D11	16#00000012	Invalid size of the expectation window	Internal error
16#00001D11	16#00000013	Invalid tolerance for mark width	Internal error
16#00001D11	16#00000014	Invalid tolerance for mark height	Internal error
16#00001D11	16#00000015	Invalid position tolerance	Internal error
16#00001D11	16#00000016	Internal error	Internal error
16#00001D11	16#00000017	Invalid color weighting	Check the entered color scaling in the material settings
16#00001D11	16#00000018	Invalid intensity weighting	Check the entered intensity scaling in the material settings
16#00001D11	16#00000019	Invalid measurement mode	Check the entered "MeasureMode"
16#00001D11	16#0000001A	Invalid gain	Check the entered gain
16#00001D11	16#0000001B	Invalid port for the measurement data	Check the "Measuring Port" in the machine configuration
16#00001D11	16#0000001C	Invalid sensor IP address	Check the IP address of the sensor in the machine configuration
16#00001D11	16#0000001D	Invalid reference color	Check the entered mark geometry in the job configuration
16#00001D11	16#0000001E	Invalid individual mark	Check the entered individual mark in the job configuration

Troubleshooting

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00001D11	16#0000001F	Reference color is equal to the individual mark	Change the individual mark or the reference mark
16#00001D11	16#00000020	No valid configuration found	Internal error
16#00001D11	16#00000021	The specified mark does not correspond to the maximum number of marks seen at the printing unit	Change the individual mark or the reference mark since the reference mark is not within the interval
16#00001D11	16#00000022	Invalid time interval	Internal error
16#00001D11	16#00000023	Invalid cycle time	Internal error
16#00001D11	16#00000026	Invalid PLC port	Invalid PLC port when setting the IP address
16#00001D11	16#00000027	Invalid MAC address	Check the format of the entered MAC address
16#00001D11	16#00000028	Invalid pointer	Apply a valid pointer
16#00001D11	16#00000029	Invalid mode	Select the reading mode or the writing mode
16#00001D11	16#0000003B	Invalid free space in front of the barcode	Check the barcode configuration
16#00001D13	16#00000001	Mark stream search failed	Check the configuration Check that nothing except for the mark stream is visible to the sensor on the 360° rotation
16#00001D13	16#00000002	Measurement has already been started	Stop the measurement
16#00001D13	16#00000003	Measurement has already been stopped	Start the measurement
16#00001D13	16#00000004	"Send velocity information" has already been started	Stop sending
16#00001D13	16#00000005	"Send velocity information" has already been stopped	Start sending

Error numbers of the mark stream sensor are always labeled with the error table NO_TABLE_USED and **Additional 1 16#00001D12**:

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00001D12	0x0C000001	No new configuration opened	Internal error
16#00001D12	0x0C000002	Configuration was not closed	Internal error
16#00001D12	0x0C000003	Configuration data missing	Enter a new configuration for the sensor
16#00001D12	0x0C000004	Configuration was opened with different numbers	Internal error
16#00001D12	0x0C000005	Time was not initialized	Internal error
16#00001D12	0x0C000006	Invalid parameters	Check the configured parameters
16#00001D12	0x0C000007	Invalid command	Check the configured parameters

Troubleshooting

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00001D12	0x0C000008	Teach mode has already been started	Wait till teaching is completed
16#00001D12	0x0C000009	Measurement has already been started	Stop the measurement
16#00001D12	0x0C00000A	Measurement has not yet been started	Start the measurement
16#00001D12	0x0C00000B	Initialization of the mark stream sensor has not yet been completed	Wait for longer. In case of error, upload the configuration again
16#00001D12	0x0C00000C	Teach mode has not been started	First, start the teaching
16#00001D12	0x0C00000D	Measurement start and stop was not executed	Start or stop the measurement again
16#00001D12	0x0C00000E	Tolerances were not transferred	• Internal error • Check the connection to the PLC program
16#00001D12	0x0C000100	Teach error: Not all marks have been found	• Set the expectation window again • Check whether the number of the defined marks corresponds to the marks in the expectation window • Check whether you are at the correct mark stream sensor
16#00001D12	0x0C000101	Teaching has not yet been completed	Wait before starting the next action
16#00001D12	0x0C000102	Unknown teach error occurred	• Repeat teaching • Check the sensor settings and the selection of the expectation window
16#00001D12	0x0C000103	Teach error: Too many marks defined	• Too many marks defined for the printing unit/sensor • Define the correct number of marks
16#00001D12	0x0C000104	Teach error: No marks defined	• No marks defined for the printing unit/sensor • Define the correct number of marks
16#00001D12	0x0C000105	Teach error: Mark type is not supported	Select a different mark type
16#00001D12	0x0C000106	No teach data available	• Repeat teaching • Check the sensor settings and the selection of the expectation window
16#00001D12	0x0C000107	Teach data invalid	• Repeat teaching • Check the sensor settings and the selection of the expectation window

Troubleshooting

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00001D12	0x0C000108	Teach error: Not all marks could be found	- Set the expectation window again - Check whether the number of the defined marks corresponds to the marks in the expectation window - Check whether you are at the correct mark stream sensor
16#00001D12	0x0C000109	Teach error: No analog data available	- Repeat teaching - Check the sensor settings and the selection of the expectation window
16#00001D12	0x0C00010A	Teach error: Amplification has to be reduced	- Amplification too high - Check the mounting of the optics
16#00001D12	0x0C00010B	Teach error: No valid teach data	No valid teach data. Check the optics and the existence of the zero pulse
16#00001D12	0x0C00010C	Teach error: Too many marks defined	- Too many marks defined for the printing unit/sensor - Define the correct number of marks
16#00001D12	0x0C00010D	Teach error: No marks defined	- No marks defined for the printing unit/sensor - Define the correct number of marks
16#00001D12	0x0C00010E	Teach error: Mark type is not supported	Select a different mark type
16#00001D12	0x0C00010F	Teach error: Error for some marks	- Set the expectation window again - Check whether the number of the defined marks corresponds to the marks in the expectation window - Check whether you are at the correct mark stream sensor
16#00001D12	0x0C000110	Teach error: The background cannot be determined	- No uniform background available - Minimize the expectation window so that only the expected reference marks are located within this window
16#00001D12	0x0C000111	Teach error: The barcode search is not yet completed	Complete the barcode search before the next action is triggered
16#00001D12	0x0C000112	Teach error: No barcode active	- Check the barcode configuration - A correct barcode has to be defined for the barcode search
16#00001D12	0x0C000113	Teach error: No barcode defined	- Check the barcode configuration - A correct barcode has to be defined for the barcode search

Troubleshooting

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00001D12	0x0C000114	Teach error: Too many barcode blocks defined	• Check the barcode configuration • A correct barcode has to be defined for the barcode search
16#00001D12	0x0C000115	Teach error: Barcode configuration invalid	• Check the barcode configuration • A correct barcode has to be defined for the barcode search
16#00001D12	0x0C000116	Teach error: Analog value of the background is greater than the minimum permissible analog value	Check if the mark stream is already being printed
16#00001D12	0x0C000117	Teach error: The maximum determined analog value is too low	Check if the mark stream is already being printed
16#00001D12	0x0C000118	Teach error: Distance between the marks is too small. All marks have been found but the distance between two marks is smaller than the measuring tolerance	• Check the mark distance • Check the measuring tolerance • Check the preregistration
16#00001D12	0x0C000120	Barcode error: The probability of the found barcode is too small	• Check if a barcode has been printed – Check the barcode configuration
16#00001D12	0x0C000121	Barcode error: The found barcode does not correspond to the actually configured barcode in the minimum value of the analog signal	• Check if a barcode has been printed • Check the barcode configuration
16#00001D12	0x0C000122	Barcode error: The velocity of the machine is too slow for a barcode measurement	• Check if the machine is running • Increase the velocity of the machine before the next barcode search
16#00001D12	0x0C000200	No analog data available for display	• Check the sensor configuration • Check the sensor optics • Check the existence of the zero pulse
16#00001D12	0x0C000201	Analog data has not yet been prepared	• Check the sensor configuration • Check the sensor optics • Check the existence of the zero pulse
16#00001D12	0x0C000202	No analog data available for the 360° recording	• Check the sensor configuration • Check the sensor optics • Check the existence of the zero pulse

Troubleshooting

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00001D12	0x0C000203	Analog data for the 360° recording has not yet been prepared	• Check the sensor configuration • Check the sensor optics • Check the existence of the zero pulse
16#00001D12	0x0C000204	No analog data could be recorded for 360°	• Check the sensor configuration • Check the sensor optics • Check the existence of the zero pulse
16#00001D12	0x0C000210	Too many devices registered for the oscilloscope data at the sensor	• Reduce the devices registered at the sensor and displaying the oscilloscope data
16#00001D12	0x0C000300	No measured data available	• Check the sensor configuration • Check the current sensor status

Error numbers of the control (error table F_RELATED_TABLE):

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00000006	16#00000000	Internal error	Internal error
16#0000000D	16#00000000	The created axis is not within the limits allowed	Check the axis created
16#00001D11	16#00000000	Invalid printing cylinder format	Check the entered printing cylinder format
16#00001D11	16#0000002A	Invalid damping factor	Check the slider at the respective controller. The slider has to be between 1 and 200
16#00001D11	16#0000002B	Invalid web length	Check the entered length of the material web
16#00001D11	16#0000002C	Invalid control mode	Check the mode entered into the control
16#00001D11	16#0000002D	Invalid material web velocity	Check the current material web velocity
16#00001D11	16#0000002E	Invalid "Response Mode"	Internal error
16#00001D11	16#0000002F	Invalid sensor distance to the printing unit	Check the entered sensor distance to the printing in the machine configuration
16#00001D11	16#00000030	Invalid delay time	Check the entered delay time in the machine configuration
16#00001D11	16#00000031	Invalid web length	Check the entered length of the material web
16#00001D11	16#00000032	Invalid radius of the cooling roll	Check the entered radius of the cooling roll
16#00001D11	16#00000033	Invalid inertia of the cooling roll	Check the entered inertia of the cooling roll
16#00001D11	16#00000034	Invalid modulus of elasticity	Check the entered modulus of elasticity of the material web
16#00001D11	16#00000035	Invalid cross section of the material web	Check the entered cross section of the material web
16#00001D11	16#00000036	Invalid cycle time	Internal error
16#00001D11	16#00000037	Invalid compensation mode	Check the selected compensation mode in the "Acceleration, Preset" dialog

Troubleshooting

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00001D11	16#00000038	Invalid "normal speed"	Check the entered "normal speed"
16#00001D11	16#00000039	Invalid "reduced speed"	Check the entered "reduced speed"
16#00001D11	16#0000003A	Invalid decoupling mode	Internal error
16#00001D11	16#00000045	Invalid integral damping factor	Check the entered integral damping factor
16#00001D11	16#00000046	Invalid measured value filter	Check the entered measured value filter

Error numbers of the S-curve function blocks (error table F_RELATED_TABLE):

Error number Additional 1	Error number Additional 2	Errors	Problem recovery
16#00001D11	16#00000000	Invalid printing cylinder format	Check the entered printing cylinder format
16#00001D11	16#00000024	Invalid acceleration period	Check the entered acceleration period
16#00001D11	16#00000025	Invalid jerk limitation value	Check the entered value for the jerk limitation
16#0000000D	16#00000000	Invalid axis reference	Check the axis created
16#00000006	16#00000000	Internal error	Internal error

Error numbers of the oscilloscope/ActiveX control:

Error code	Error description
0x0C001000	IP address is invalid
0x0C001001	Connection cannot be established
0x0C001002	Connection to the internal sensor port cannot be established
0x0C001003	Network connection to the sensor not established
0x0C001004	No socket connection to the sensor
0x0C001005	Maximum buffer size is not set
0x0C001006	Maximum buffer size is set
0x0C001007	Setting the timeout for the network port failed
0x0C001008	Setting the timeout for the internal network port failed
0x0C001009	Reading out of sensor information failed
0x0C00100A	Query of current sensor data failed
0x0C00100B	Reading of gain information failed
0x0C00100C	Reading of color information failed
0x0C00100D	Reading of normalization failed
0x0C00100E	Reading of color information failed
0x0C00100F	Reading of sensor information failed
0x0C001010	Reading of sensor information failed
0x0C001011	Reading of sensor information failed

Troubleshooting

Error code	Error description
0x0C001012	Writing of gain failed
0x0C001013	Query for current configuration failed
0x0C001014	Cylinder circumsphere not configured
0x0C001015	Setting of expectation window failed
0x0C001016	Reading of expectation window failed
0x0C001017	Reading the MAC address failed
0x0C001018	Registration for continuous oscilloscope data failed
0x0C001101	Requesting new oscilloscope data from sensor failed
0x0C001102	Requesting status oscilloscope data from sensor failed
0x0C001103	Requesting status oscilloscope data from sensor caused timeout
0x0C001104	Requesting analog values from sensor failed
0x0C001105	Requesting analog values from sensor failed; no oscilloscope data available
0x0C001106	Requesting the mark margins of sensor failed
0x0C001107	Reading further oscilloscope data (1) of sensor failed
0x0C001108	Reading further oscilloscope data (2) of sensor failed
0x0C001109	Reading further oscilloscope data (3) of sensor failed
0x0C00110A	Reading further oscilloscope data (4) of sensor failed
0x0C00110B	Reading further oscilloscope data (5) of sensor failed
0x0C001200	Oscilloscope data not prepared on the sensor
0x0C001201	No oscilloscope data with full resolution available
0x0C001202	Error when reading full resolution
0x0C001203	Reading oscilloscope data by the sensor in case full resolution not completed
0x0C001300	Parameter for "RGBColor" is not available
0x0C001301	Parameter for "GraphID" is not within the limit values
0x0C001302	Parameter for "ValueID" is not within the limit values
0x0C001303	Parameter for "CursorID" is not within the limit values
0x0C001304	No cursor active
0x0C001305	Parameter for "ValueID" is not available
0x0C001306	Value for Cursor 1 is not available
0x0C001307	Value for Cursor 2 is not available
0x0C001308	New cursor position is smaller than the minimum coordinate
0x0C001309	New cursor position is larger than the maximum coordinate
0x0C00130A	Parameter "BackgroundID" is outside the valid range
0x0C00130B	Parameter "LabelID" is outside the valid range
0x0C001400	Zoom window is not available

Troubleshooting

Error code	Error description
0x0C001401	Zoom coordinates "X1" are smaller than the minimum coordinate
0x0C001402	Zoom coordinates "X2" are larger than the maximum coordinate
0x0C001403	Zoom window error in diagram data
0x0C001500	Error since continuous oscilloscope display is started
0x0C001501	Error since monitoring is started
0x0C001502	Error when starting/stopping the continuous oscilloscope display
0x0C001503	Error when starting/stopping the monitoring
0x0C001504	Error when reading the oscilloscope data from a file
0x0C001600	Error when opening the oscilloscope file for reading
0x0C001601	Error when opening the oscilloscope file for writing
0x0C001602	Error when opening the oscilloscope debug data for writing
0x0C001603	Error when reading the oscilloscope data from the file
0x0C001604	Error when writing the oscilloscope data into the file
0x0C001605	Error when writing the oscilloscope debug data into a file
0x0C001606	No valid oscilloscope data available
0x0C001607	File does not contain any valid oscilloscope data
0x0C001608	No dynamic asynchronous oscilloscope data available
0x0C001609	Adding the asynchronous oscilloscope data failed
0x0C00160A	Display of the asynchronous oscilloscope data failed
0x0C00160B	Timeout: Query of asynchronous oscilloscope data
0x0C001700	Scope of asynchronous oscilloscope data already started
0x0C001701	Start/stop of asynchronous oscilloscope data failed
0x0C001702	Start of network socket of asynchronous oscilloscope data failed
0x0C001703	Stop of network socket of asynchronous oscilloscope data failed
0x0C001704	Scope of asynchronous data is not active
0x0C001705	Continuous scope of asynchronous data is active
0x0C001F00	Internal error: Init handling failed
0x0C001F01	Internal error: Init failed
0x0C001F02	Internal error: Init of asynchronous data failed

12.4 Problems with the 360° display

A common error source is the error parameterization of the drive or the sensor using the data of the incremental encoder emulation. This section describes possible diagnostic options such as how to find error parameterizations. Corresponding approaches are given. In the "Oscilloscope" dialog, the scaling of the plate cylinder is specified in μm at the bottom right (cp. chapter [chapter 12.5.2 "Backing up the oscilloscope data" on page 232](#)) after a 360° revolution. This value must approximately correspond to the defined printing cylinder format. If this is not the case, a

Troubleshooting

wrong number of increments was configured in the drive or sensor. If the 360° revolution displays the mark stream sensor more than once, it can be assumed that the zero pulse is not displayed correctly. In this case, parameterize the incremental emulation according to [chapter 5 "Drive parameterization"](#) on page 25.

12.5 Backing up data for the remote diagnostics

12.5.1 General information

Problems at the machine can occur that have to be checked via a remote diagnostics. Only use a remote diagnostics after consulting your contact person at Bosch Rexroth. Two different data records are required for the remote diagnostics. On the one hand the oscilloscope data that can be used to diagnose problems when teaching and measuring and on the other hand the currently parameterized job configuration and machine configuration.

12.5.2 Backing up the oscilloscope data

The oscilloscope data can be saved as follows. Open the "Oscilloscope" dialog. Connect to the printing unit or to the respective sensor with which problems occurred (cf. figure below).



Fig. 12-4: Saving an oscilloscope recording

Start a single-shot measurement using **Individual Scope** and wait until the oscilloscope data is displayed. Subsequently, wait until "Save Scope" is enabled. By pressing this button, select a path and enter a file name. Two files (.bin, .txt) with these file names are saved under the specified path. Using these two files, generate a .zip file using the password "ARC". Subsequently, rename the ".zip" to ".zap" and send this file to your contact person at Bosch Rexroth.

12.5.3 Backing up the current job

Back up the current job. Go to the project directory of the HMI application. In the project directory, there is the folder "Web". Generate a .zip file of this folder with the password "ARC". Rename the ".zip" file into a ".zap" file. Send this file together with the oscilloscope data and by specifying the last job used to your contact person at Bosch Rexroth.

13 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

Service Germany Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

Phone: **+49 9352 40 5060**
Fax: **+49 9352 18 4941**
E-mail: service.svc@boschrexroth.de
Internet: <http://www.boschrexroth.com>

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

Service worldwide Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

Preparing information To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

Index

0 ... 9

24 V DC power supply X1S Power..... 35

A

Abbreviations..... 12
About this documentation..... 5
Accessories..... 27
ActiveX control..... 71, 74
Additional functions
 Acceleration compensation..... 194
Ambient conditions..... 29
ANSI Z535.6-2006..... 19

B

Backing up data for the remote diagnostics
 Backing up the current job..... 233
 Backing up the oscilloscope data..... 232
 General information..... 232
Barcode..... 122, 151

C

Commissioning..... 54
Commissioning the HMI interface..... 67
 General information..... 67
 IndraControl VEP..... 72
 IndraControl VPP, IndraControl VPB/
 IndraControl VDP..... 70
 Preconditions to use the central visuali-
 zation for the register control..... 69
Commissioning the mark stream sensor
 General information..... 27
Complaints..... 13
Configure IP address..... 62
Connections..... 34
Connector panel..... 34
Content area..... 87
Control section encoder emulation output
card..... 25
Criticism..... 13
Customer Feedback..... 13

D

Decentral HMI..... 211
 General information..... 211
 Import dialog..... 211
 Operation..... 215
Declaration of conformity..... 32
Degree of protection..... 30
Demounting..... 51
Describing HMI dialogs and HMI elements
 Navigation structure..... 83
Describing the HMI dialogs and HMI elements
 Diagnostics..... 177
 Job configuration for applications with
 terminals (e.g. gravure printing)..... 128

Production..... 161
Service..... 184
Describing the HMI Dialogs and HMI Elements
 Job configuration for narrow web applica-
 tions..... 107
 Machine configuration for applications
 with terminals..... 98
 Machine configuration for narrow web ap-
 plications..... 88
Description of HMI dialogs and elements
 Dialog structure..... 84
Device description..... 54
Diagnostics
 Brief description..... 177
 Diagnostics overview..... 177
 Logbook..... 183
 Oscilloscope..... 180
Dialog structure
 Arrow wizard and switching panel of the
 printing unit..... 86
 Content area..... 87
 Header..... 84
 Navigation area..... 85
 Sidebar..... 87
Dimension drawing..... 39
Dimensions..... 39
Documentation
 Change record..... 5
Documentation structure..... 6
Drive parameterization..... 25
 Checking the correct incremental encod-
 er parameterization..... 25
 Parameterization of the incremental en-
 coder emulation..... 25

E

Electric installation..... 52
Electronic type plate..... 56
Emitted interference..... 29
Error causes..... 57
Error numbers..... 221
Ethernet interface X7E ETH..... 36
Explosion protection..... 16

F

Feedback..... 13
Firmware update..... 59
Format..... 109, 130

G

General data..... 29

H

Hazard warnings..... 19
Header..... 84

Standards.....	31
Suggestions.....	13
Support.....	235
Symbols.....	20

T

Technical data.....	29
Technical information on the mark stream sensor PY-MSS01.1-T1.....	27
Terms and abbreviations.....	12
Trend.....	168
Troubleshooting.....	57, 219
Approach in case of error.....	219
Backing up data for the remote diagnos- tics.....	232
Error numbers and troubleshooting.....	221
General information.....	219
Problems with the 360° display.....	231
Type plate.....	27

U

Unit configuration	110, 131
Use, intended.....	15
User Management.....	187

V

Validity of the documentation.....	5
Voltage supply.....	30
VPP, VPB/VDP Registering ActiveX controls.....	71

W

Warnings.....	19
Web width.....	130
Weight.....	30
WinStudio licensing.....	68

Notes

Notes

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