Item	Item-No.
M-SCOPE3-Pro RT	00024212-63
M-SCOPE3-Pro-USB	00026255-00

Scope 3 – Overview in real-time

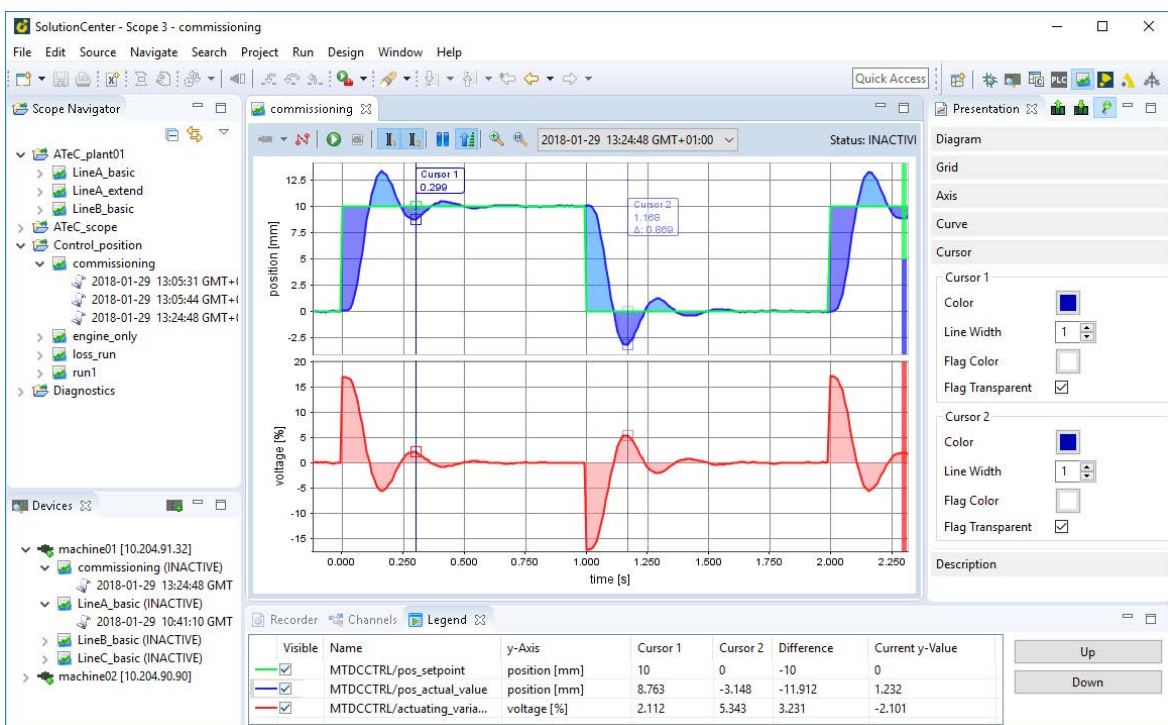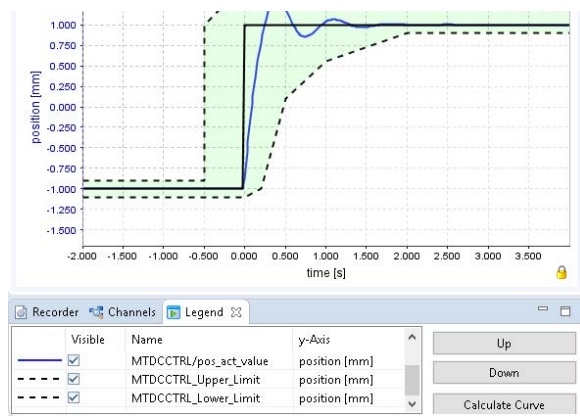Signal analytics and diagnostics directly with the controller

In the initial project design and also for commissioning or troubleshooting, transparent information concerning states and sequences of an automatic system is essential for success. For many dynamic processes seeing a physical variable as only a numeric value is insufficient. The software oscilloscope »Scope 3« makes the temporal progression of processes visible and places this progression in relation to other process variables. »Scope 3« is an indispensable tool for optimization of a controller setting, for troubleshooting in a sequential program, or for ongoing verification of the manufacturing process on the machine. It permits specific and stand-alone data recording, archiving of the relevant sequences in a database and subsequent measurement or evaluation of a great number of values in parallel. Different trigger conditions as well as pre-trigger and post-trigger functionalities enable acquisition of all relevant data, such as in the case of sporadically occurring errors.
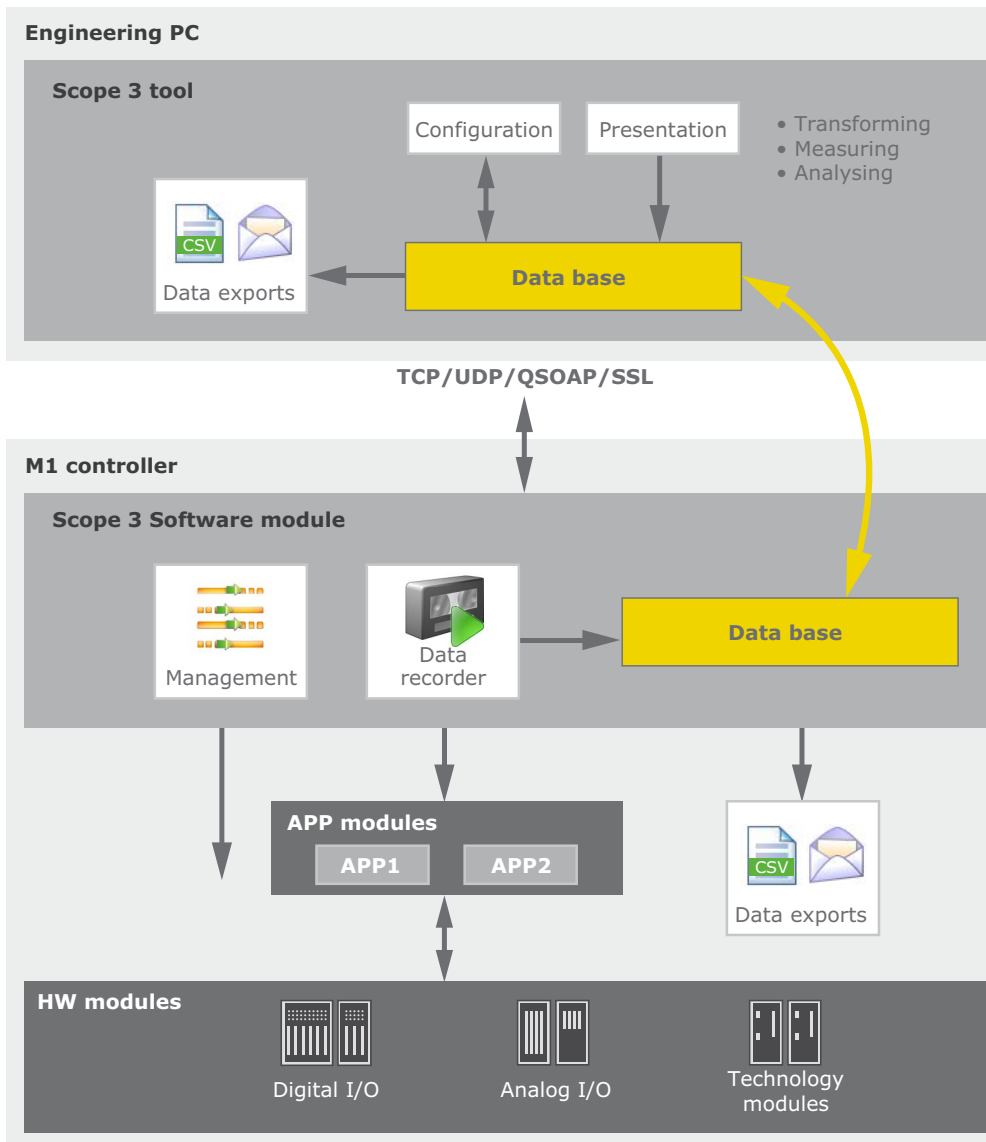
Curves that can be calculated directly from recorded values facilitate retrospective data analysis in addition. A special exchange format enables saving and sending of the recording configuration and entered values in one and the same file. Thus, for example, Scope recordings can be forwarded by email and further processed by the recipient to their full extent (zoom, measurement with cursors, calculated curves, etc.).

»Scope 3« is also the right tool for the long-term archiving of measured values directly on the controller. The maximum storage space available is configured and the recording started by means of archiving limits.

Thus, millions of data points can also be archived directly on the controller. Backup and export functions then allow further processing of the collected data.

• Recording of analog and digital values
• Real-time acquisition directly on the controller
• Long-term recordings per database
• Large number of signals (multiple acquisition tasks possible)
• High resolution / variable sampling priority
• Versatile trigger possibilities / pre-triggers and post-triggers
• Graphic evaluation / curve display on the PC
• Measurement of curves
• Scaling / shifting of curves and calculated curves
• Overlay of reference curves
• Archiving / export on the PC

Engineering PC

Scope 3 tool

Configuration

Presentation

- Transforming
- Measuring
- Analysing

CSV

Data exports

Data base

TCP/UDP/QSOAP/SSL

M1 controller

Scope 3 Software module

Management

Data recorder

Data base

APP modules

APP1

APP2

CSV

Data exports

HW modules

Digital I/O

Analog I/O

Technology modules

The central aspect of Scope 3 is the portable database on the Engineering PC and M1 controller. This enables very simple data exchange and collaboration – also using copies of a single file, if necessary.

Scope 3

General	
Recording module	Stand-alone real-time recorder on the controller
Configuration	Graphic configuration interface in the SolutionCenter
Presentation interface	Diagram display with dynamic legend in the SolutionCenter
Delivery	Scope 3 is delivered as part of M-Base

Recording module	
Recordable data sources	Channel values direct (MIO), SVI variables
Data Types	All analog and digital formats up to 64-bit
Recordable tasks	SVI variables of any number of software modules simultaneously
Sampling modes	• Continuous • Triggered once • Triggered cyclically
Sampling rate	• Cyclical, min. 100 microseconds, max. 60 minutes • Coupled with hardware interrupts
Time base	• System-tick • Hardware-sync-signal • Auxiliary clock • Real-time clock
Trigger	• Any combination of start- and stop-triggers • Recording conditions as additional limitation of the recorded data • Edge, level and distance triggering • Pre-trigger and post-trigger of any length (max. length of recording)
Data quantities	No technical limitation, dependent on the free resources on the M1 controller
Interface	C-library for using the data recorder in an application: • Executing commands (Start, Stop, etc.) • Changing the recording configuration
Scaling	Several recordings executable in parallel with different sampling rates and different priorities
Auto-run	Yes, automatic start after reboot possible
Write protection	Yes, definable warning text on changes
Data buffer	Configurable ring buffer for loss-free transfer of data from the controller to the PC

Data archiving on controller[1]	
System	Embedded database, optionally activatable, database file can be copied freely to different controllers or PCs and used
Archiving interval	Freely configurable in seconds, fast recorded data is buffered and stored in the database in the archiving interval
Configurable limits	• Length in seconds • Number of recorded points • Number of recordings
Caching of the data-base	Cache size in the working memory freely configurable
Interface	C-library for using the database in an application: • Addition of reference channels or entire recordings • Export of data or hot backup

1) Functions are only available in the Professional Version

Scope 3

Management / Configuration

Project Management	Configurations can be created flexibly in workspace and managed there in projects
Management of recordings	Recordings installed on the M1 can be managed directly via their own view
Configuration of recordings	All configuration methods can be selected via masks. Entries are validated immediately and configuration errors are displayed.
Delivery of configuration	A recording configuration can be delivered to a controller via a single action.
Backup of data	Data on an M1 can be saved on the PC by drag and drop.

Presentation/analysis system

Presentation forms	Value-over-time [x(t)], value-over-value [x(y)]
Time formats	Milliseconds [ms] or date/time formats (freely configurable)
Number of value axes	User-defined
Number of curves	User-defined, selective showing/hiding for maintaining clarity
Axis reference	Each curve can be allocated to any axis
Auto-scaling	Yes, linear or logarithmic scaling possible
Fixed scaling	Yes, adjustable
Scale arrangement	Yes, adjustable
Measurement cursors	2 (can be offset separately and together)
Measurement cursor functions	Value display in legend, time display, differential display
Stacked Plot	Yes, a separate diagram per signal, a separate diagram per axis, selective full-screen mode per curve
Array of curves	Up to 10 older recordings in addition can be displayed faded in the background to the comparison.
Grid	Yes, configurable
Presentation options	Curve, axis, grid colors, all line thicknesses, orientation, axis label, axis arrangement (left/right), flooded curves on reference value or other curves
Raw value transformation	Factor and offset per signal
Reference curves	Yes, can be imported from CSV or integrated via application
Highlighting ranges	Curves can be flooded against a configurable reference value or against another curve, configurable via color and transparency value
Curve calculation	• Measured curve values or calculated curve values are the basis • The calculation methods are addition, subtraction, multiplication, division, integration, differentiation, Fast Fourier Transformation (FFT) • Users can add their own calculation methods
Possibilities for making comparisons	Yes, comparison of recordings from different time ranges as well as different recordings
Interfaces	Extendible with regard to specific calculation operations for curves and export functions for individual formats

Scope 3	
Data retention	
Recording configuration	Can be exported/imported as a file
Value storage	On the controller or PC
Exchange formats	A database for configuration and data can be exported/imported
Excel interface	CSV export
System requirements	
PC software (minimum)	Processor 2 GHz, working memory 1024 MB RAM, hard disk drive with 250 MB of free storage space, screen resolution 1024x768 pixels, Microsoft Windows 7 (64 Bit) or higher
M1 software module	M1 controller system (except for ME2xx) with M-Base 3.75 or higher, portable license on USB storage device with M-Base 3.95 or higher

Order codes		
Item	**Item no.**	**Description**
M-SCOPE3-Pro RT	00024212-63	Software package for recording and diagnosis of dynamically changing waveforms (IO – and process variables) on M1 controller systems. Stand-alone task for recording and archiving of records on the controller, trigger and pretrigger, multiple recordings. Comprehensive graphical representation (chart) and evaluation functions, data export on the PC, SolutionCenter integration. License bound to target device.
M-SCOPE3-Pro-USB	00026255-00	Software package for recording and diagnosis of dynamically changing waveforms (IO – and process variables) on M1 controller systems. Stand-alone task for recording and archiving of records on the controller, trigger and pretrigger, multiple recordings. Comprehensive graphical representation (chart) and evaluation functions, data export on the PC, SolutionCenter integration. Portable license on USB storage device (delivery includes a USB-stick).