Twincat Library: Diagnostics

Application Note

Version	Date	Editor	Comment
002	2012-1127	mvx	Copied from AN150 and converted to new document style
003	2014-04-02	mvx	New Diagnostic feature of lib 3.0.3 for debugging streamed positions
004	2023-03-28	mvx	Continuous Motion state is 25, not 24.

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Table of Contents

1 Target and Purpose

This application note describes diagnostic functions available in the Triamec PLC library for TwinCat. A Diagnostic file may be generated and analyzed using the TAM System Explorer. This application note describes the content of this file and is valid for Log-Version 0.1 with PLC library 3.0.3.

2 Concept of the Diagnostic Feature

2.1 Enabling and Folder management

The feature is enabled by specifying a root folder Trialink::Config.RootFolder. The folder must end with a '\'.

During Trialink boot, a sub folder 'triamecLog' is generated at this path.

If the number of files is larger than Trialink::Config.DiagnosticNumberOfFiles the oldest files are deleted. The default is currently 20.

2.2 Triggering file save

A diagnostic file is generated at any adapter or axis error. It may manually be generated by setting Trialink::Diagnostics.stop TRUE. This is set FALSE after successful generation of the file. Please make sure, the stop input is not continuously set, because this causes continuous file generation.

Data generation is always running in the background and fills a circular buffer. Data generation is stopped shortly after the stop trigger, as soon as the next MAIN_SLOW call is received. File generation then runs in the MAIN_SLOW task and may take several 10 seconds depending on the MAIN_SLOW rate.

A typical file name is ***triamec-2014-04-02-093547.csv***, which contains the date and time strings.

2.3 Analyzing

A log file may be directly imported into the TAM System Explorer and even overlay-ed with Observer data taken with the Explorer. Explorer version must be 4.5 or newer.

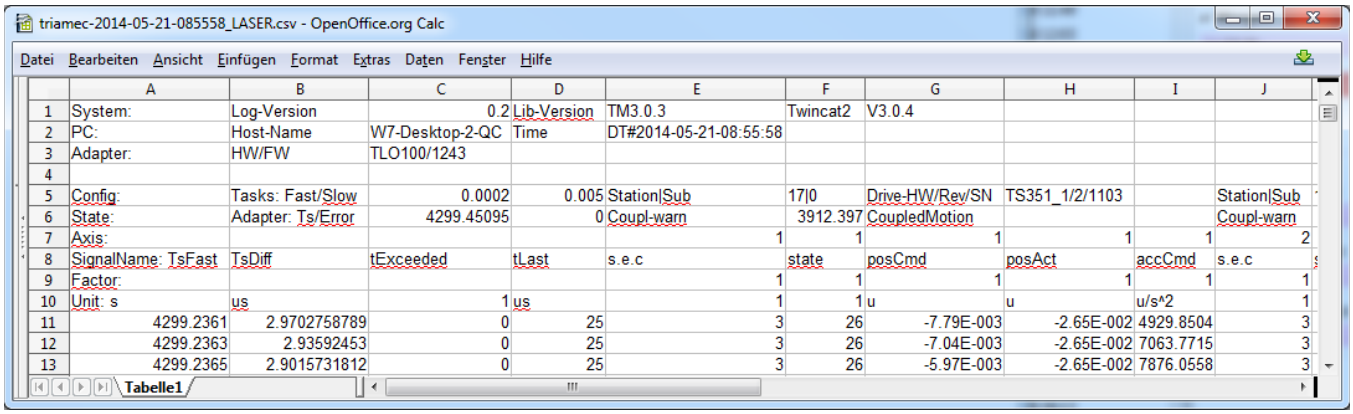
The file is written in the comma separated format. If importing into OpenOffice mark “comma” and “Extended number recognition” and do not mark spaces as separators. Importing data into Microsoft Excel isn't straightforward in German speaking countries. This article ([1]) provides information for different versions of Microsoft Excel.

The content of the file is described in the next chapter.

1 “Excel: CSV-Datei importieren”, PCtipp, 2012
http://www.pctipp.ch/tipps-tricks/kummerkasten/office/artikel/excel-csv-datei-importieren-27911/

3 Description of the CSV file

The content of the CSV file below is described in the following.


triamec-2014-05-21-085558_LASER.csv - OpenOffice.org Calc

Datei Bearbeiten Ansicht Einfügen Format Extras Daten Fenster Hilfe

	A	B	C	D	E	F	G	H	I	J
1	System:	Log-Version	0.2	Lib-Version	TM3.0.3	Twincat2	V3.0.4			
2	PC:	Host-Name	W7-Desktop-2-QC	Time	DT#2014-05-21-08:55:58					
3	Adapter:	HW/FW	TLO100/1243							
4										
5	Config:	Tasks: Fast/Slow	0.0002	0.005	Station|Sub	17|0	Drive-HW/Rev/SN	TS351_1/2/1103		Station|Sub
6	State:	Adapter: Ts/Error	4299.45095	0	Coupl-warn	3912.397	CoupledMotion			Coupl-warn
7	Axis:				1	1	1	1	1	2
8	SignalName: TsFast	TsDiff	tExceeded	tLast	s.e.c	state	posCmd	posAct	accCmd	s.e.c
9	Factor:				1	1	1	1	1	1
10	Unit: s	us	1	us	1	1	u	u	u/s^2	1
11	4299.2361	2.9702758789	0	25	3	26	-7.79E-003	-2.65E-002	4929.8504	3
12	4299.2363	2.93592453	0	25	3	26	-7.04E-003	-2.65E-002	7063.7715	3
13	4299.2365	2.9015731812	0	25	3	26	-5.97E-003	-2.65E-002	7876.0558	3

Tabelle1

3.1 System header

Rows 1 to 4 describe general system parameters. Important parameters are

- cell C1 and E1, the log version and the PLC library version of triamec
- cells F1 and G1, the Twincat version (2 or 3) and the Twincat version identifier of Beckhoff
- cells C2 and E2, the PC name and time
- cell C3, the adapter version and firmware, separated by a "/" character.

3.2 Log data header

Rows 5 to 10 are the header rows for the log data starting at row 11. Columns A to D contain Trialink adapter data and the remaining columns contain axis data.

- Row 5 configuration parameters
  for adapter (C5 and D5 are task times of MAIN_FAST/MAIN_SLOW)
  and axes (F5 is the station/SubAxis and H5 is the drive HW, revision, and serial number)
- Row 6 state information
  for adapter (C6 is the PLL time and D6 is the adapter error/warning output)
  and axes (F6 is the time of the first couple warning since coupling and G6 is the axis state)
- Row 7 the logical axis number (empty for adapter data in columns B to D)
- Row 8 The signal name
- Row 9 The scale factor between drive positions and PLC positions (TL_AxisSlow::Config.GearFactor)

3.3 Log data Adapter

Column

- A The Trialink timestamp in seconds, read at the Trialink.CallFast() call.
- B The difference timestamp-PLL in µs. A positive number means, the CallFast call was delayed.
- C A number 1 means, the last call of MAIN_FAST exceeded an acceptable duration
- D The duration of the last execution of MAIN_FAST in µs.

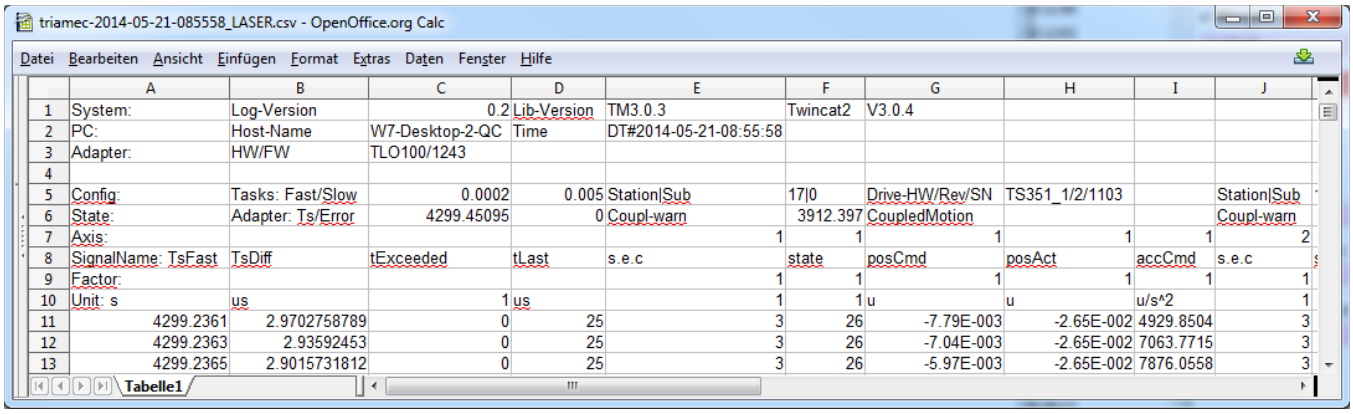
3.4 Log data Axis

Columns E to I contain data of the first axis, described below. The subsequent axes start at column J.

Column E is the axis control input of TL_AxisSlow calculated as 4*stopping+2*enable+1*couple.

Column F is the extended state output ([2]) of the drive, see table below: Values above 264 are errors and warnings described in Application note AN103, only the most important ones are shown here:

0	NotReadyToSwitchOn	26	DirectCoupledMotion	269	ErrBridgeOverCurrentOrMidVoltage
1	ReadyToSwitchOn	27	TamaCoupledMotion	270	ErrTemperatureLimit
21	Disabled	28	Stopping		
22	Enabling	29	ErrorStopping	280	PosErrLim
23	Standstill	266	ErrI2tLimit	282	IqErrLim
24	DiscreteMotion	267	ErrCurrentLimit	285	AnalogEncoderAmplitudeTooLow
25	ContinuousMotion	261 268	Bridge voltage out of range warning/error	262 293	SafeTorqueOff warning/error



	A	B	C	D	E	F	G	H	I	J
1	System:	Log-Version	0.2	Lib-Version	TM3.0.3	Twincat2	V3.0.4			
2	PC:	Host-Name	W7-Desktop-2-QC	Time	DT#2014-05-21-08:55:58					
3	Adapter:	HW/FW	TLO100/1243							
4										
5	Config:	Tasks: Fast/Slow	0.0002	0.005	Station|Sub	17|0	Drive-HW/Rev/SN	TS351_1/2/1103		Station|Sub
6	State:	Adapter: Ts/Error	4299.45095	0	Coupl-warn	3912.397	CoupledMotion			Coupl-warn
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8	SignalName: TsFast	TsDiff	tExceeded	tLast	s.e.c	state	posCmd	posAct	accCmd	s.e.c
9	Factor:				1	1	1	1	1	1
10	Unit: s	us	1	us	1	1	u	u	u/s^2	1
11	4299.2361	2.9702758789	0	25	3	26	-7.79E-003	-2.65E-002	4929.8504	3
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13	4299.2365	2.9015731812	0	25	3	26	-5.97E-003	-2.65E-002	7876.0558	3

Column G are commanded positions at the input TL_AxisFast::PosIn in PLC units. Please note the factor 1000 in cell G9, which is TL_AxisSlow::Config.GearFactor. This means PLC positions are divided by 1000 before being sent to the axis.

Column H are actual positions in PLC units received by the state abo, which are updated in the MAIN_SLOW task rate.

Column I are commanded accelerations as calculated after interpolation and filtering. Units are PLC units per second square.

2 TL_MC_AXIS_REF::stateId