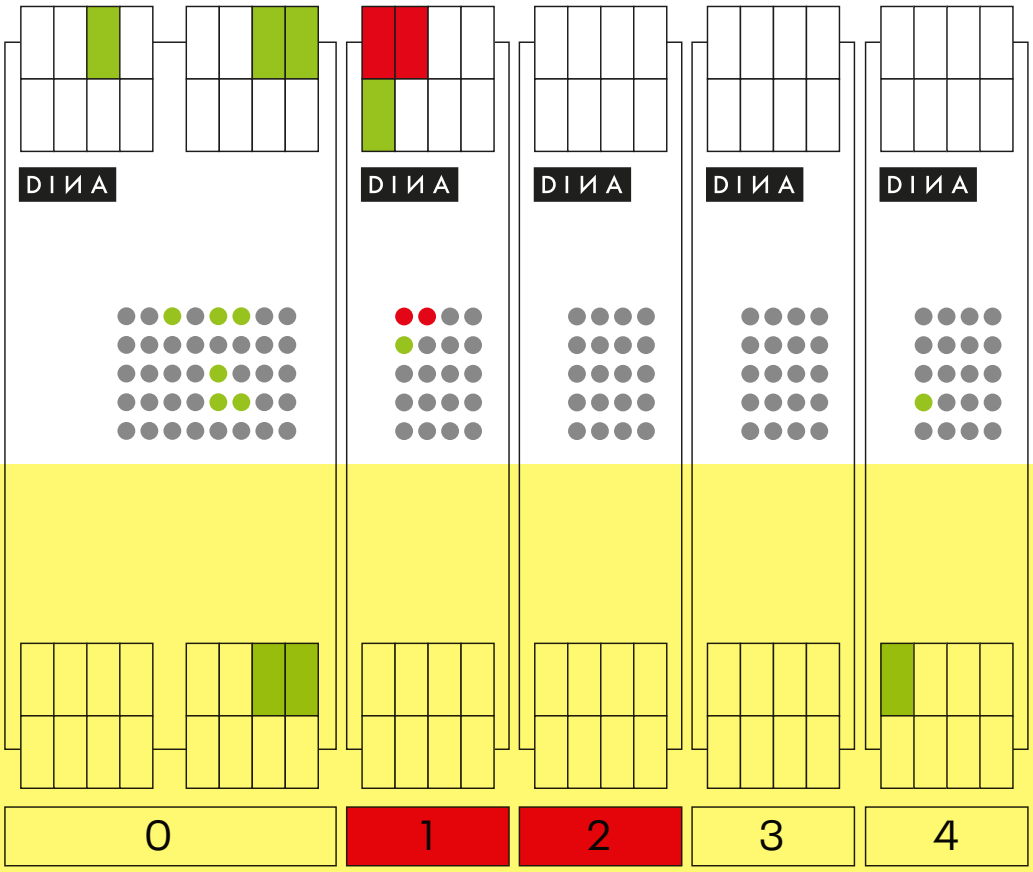
DINA

SAFELINE VARIO Diagnosis

Instruction Manual



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The information contained in this documentation corresponds to the technical state of the product at the time these operating instructions were published.

Legal information

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Table of contents

SL VARIO Diagnostics

Fast detecting of error and operating states

Product description

The graphical programming software SL VARIO Designer allows extensive diagnostics options. Status information as well as set points and actual values of the SL VARIO-modules are captured and displayed by the software.

The use of graphic elements makes it very easy to detect errors and to identify the operational states of the SL VARIO-modules and errors can be quickly and effectively eliminated.

For the diagnosis the central module ZMK respectively ZMVK needs to be connected to the PC via the USB port.There are two diagnostic options available:

In the online diagnostic conditions can be detected with an open application.

The rack diagnostics, the states can be read out to the connected modules without opening an application.

1 Online-Diagnostics

In the online diagnosis the logic states of the application can be observed. The system status as well as the requirements for a fault free operation can be retraced.

1.1 Starting the Online Diagnostics

▶ Open designer and link SL VARIO to the computer with the USB interface.

▶ Open application, if necessary enter password for authorization to use the application. (Fig. 1-1)

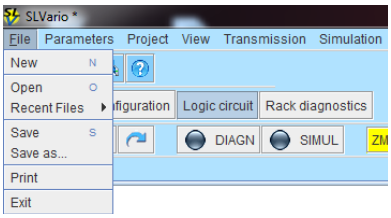


Fig. 1-1

▶ Adjust interface in the menu "transmission-interface" (Fig. 1-2), see designer manual.

Fig. 1-2

▶ Select „DIAGN" in the menu "logic". (Fig. 1-3)

Fig. 1-3

The diagnostics is started and the actual states of the modules are displayed. A color change of the button indicates the active diagnostics. (Fig. 1-4)

Fig. 1-4

During the diagnosis not all functions of the Designer are available. Blocked functions are displyed in grey. (Fig. 1-5)

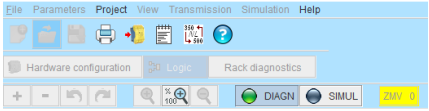


Fig. 1-5

1.2. Display of the symbols in the online diagnostics

The states are displayed differently according to the configured symbol. (Fig. 1-6)

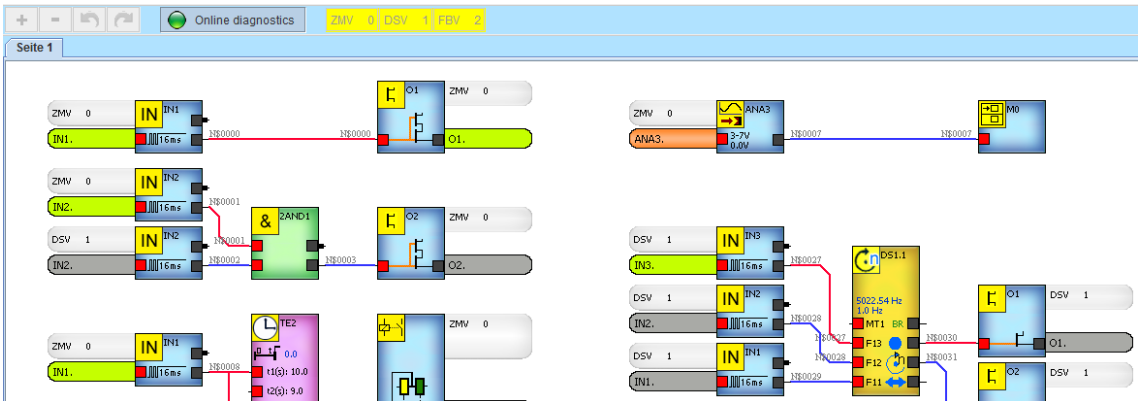


Fig. 1-6

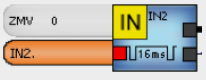
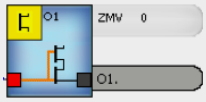
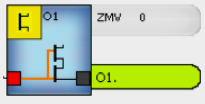
This way at the speed monitoring both the parameterized target and the actual values are displayed. The current value is always displayed at the time and counters. Setpoints and actual values are also visible on all analog elements in the symbol.

The terminals on the inputs and outputs or safety circuits change color depending on whether the terminal is connected or not connected or if an error is detected in this terminal.

In case an entire symbol turns orange, a fault is indicated, but does not necessarily lead to SLOK OFF.

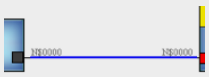
Errors can be dedected more specific by applying the rack diagnostics.

The color of the connecting lines indicates the high / low state of this connection.

Symbol	Display	Description
Input (also for safety-related functions)		**Terminal grey** = Input off
		**Terminal green** = Input on
		**Terminal orange** = error at the input, e.g. clocked input is activated static
Output		**Terminal grey** = output off
		**Terminal green** = output on

Connection

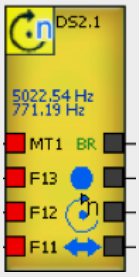
The color of the connections between the elements can be set via the project options-view options menu.



Connection not shifted

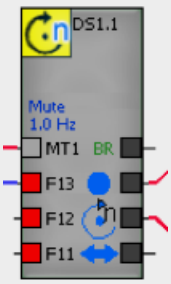
Connection shifted

speed monitoring



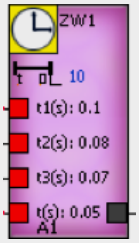
Upper value = setpoint
Lower value = actual value

Bei zweikanaliger Überwachung durch Initiatoren werden jeweils die Werte beider Kanäle angezeigt.



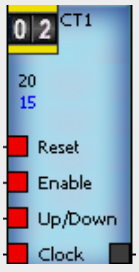
Operating mode MUTE and the function "Muting without sensor monitoring" is active.

Timer



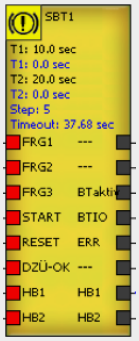
Current value (blue)
is indicated

Counter

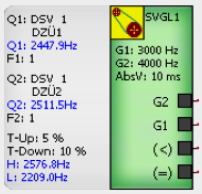
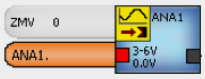
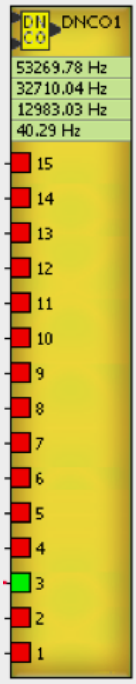


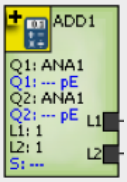
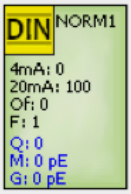
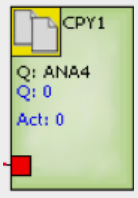
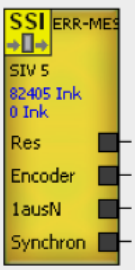
Upper value (black):
parameterized count value
Lower value (blue):
Current count value

Safe brake test



Black: set parameter
Blue: current values
T1: Stabilization time
T2: Testing time
Step: Test step Timeout

Comparator Synchronous comparator		**Black:** set parameter **Blue:** current or calculated frequencies **H:** max. tolerance **L:** min. tolerance
Safety mat		Current voltage value is displayed. **Terminal green:** safety mat shifts **Terminal red:** short circuit or wire break
Analog input		**Upper values:** parameterized limits **Upper value:** current analog value
		**Terminal gray:** analog value is outside the configured limits.
		**Terminal green:** analog value within the configured limits.
		**Terminal red:** short circuit or wire break or voltage/current more than 13.5V / 25mA
Multiplexer		**Setpoint for Fx3** **Setpoint for Fx2** **Setpoint for Fx1** **Setpoint for Standstill** according to DNCO table and selected terminal **Green:** Selected terminal

Adder		**Black:** set parameter **Blue:** current analog values
Subtractor		**Black:** set parameter **Blue:** current analog values
Normalizer		**Black:** set parameter **Blue:** current analog values
Analog Input Comparator		**Black:** set parameter **Blue:** current analog values
Analog Output		**Black:** set parameter **Blue:** current analog values ANA terminal changes from gray to green when voltage is in the configured range
Copier		**Q:** analog value at the given source **Act:** Copied value
Cam		**Blue:** current values
ERR-MESS		**Blue:** current values of encoder 1 and 2

2 Rack-Diagnostics

Besides the online diagnostics the Rack diagnostics is also available for the SL VARIO. A hardware image of the application which is located on the central module will be reproduced. The operating conditions of the respective modules and their details such as axis states, operating modes, safety circuits, etc. can be detected.

2.1. Starting the Rack Diagnostics

▶ Open designer and link SL VARIO to the computer with the USB interface.

▶ Start a new application. „File New“ (Fig. 2-1)

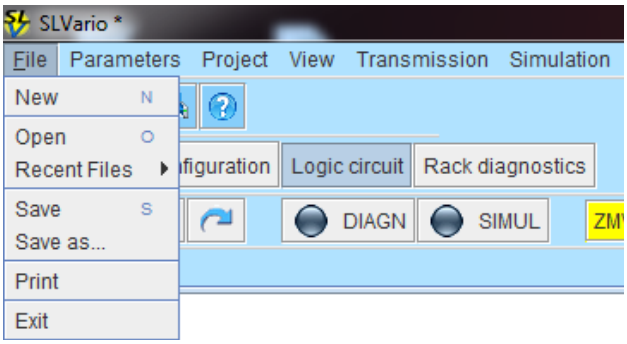


Fig. 2-1

▶ Adjust interface in the menu “transmission-interface” (Fig. 2-2), see designer manual.

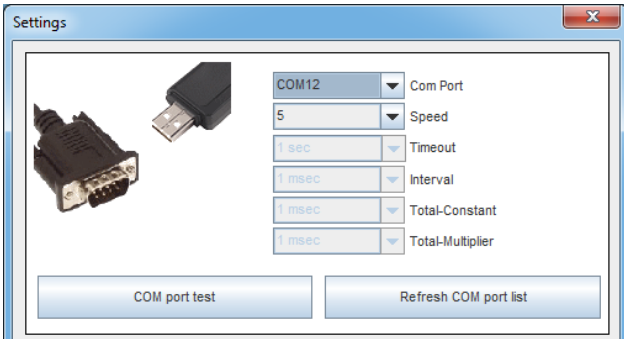


Fig. 2-2

▶ Select „Rack diagnostics“ in the menu “logic”. (Fig. 2-3)

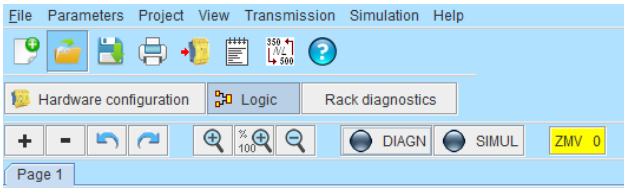


Fig. 2-3

The application is read out of the central module. (Fig. 2-4)

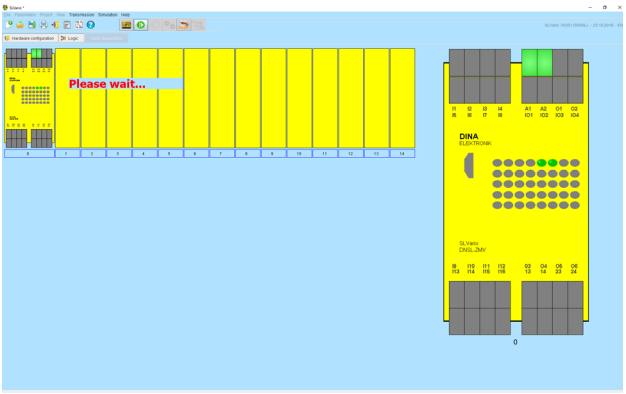


Fig. 2-4

The status of the hardware specified in the application is displayed. . (Fig. 2-5)

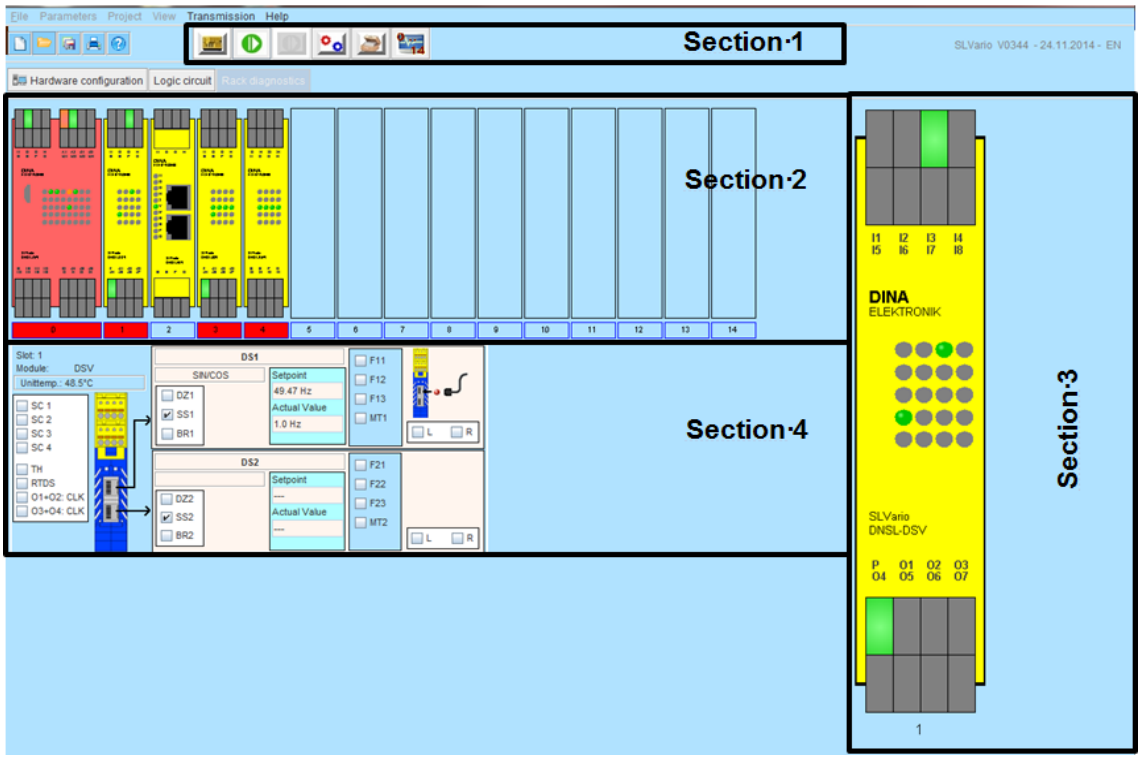


Fig. 2-5

The main menu is divided into 4 areas:

In **Section 1** the diagnostic buttons are located. These open different diagnostic functions or start or close a diagnostic. The functionality of the menu items is described more detailed in the chapter "Diagnostics buttons".

In **Section 2** the real rack is simulated. Not used slots are displayed empty. More information to this section in chapter "Read out Rack information".

In **Section 3** is located in the right corner of the window. The modules selected by the operater from area 2 are shown here enlarged. For more information see chapter „Modul Diagnostics".

In **Section 4** status information selected modules related to area 3 are displayed. More information in chapter "Status information".

2.2. Diagnostics Buttons

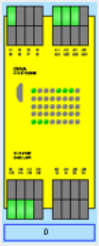
The diagnosis buttons are selected or deselected using the left mouse button.
Only one function can be activated.

	**RACK READING** The first time you start the diagnostics specific data of the present application is read once from SL VARIO. If the user changes the saved SL VARIO application data or a new rack is connected to the diagnosis, a new diagnostics has to be started by pressing this button so the diagnosis information can be activated.
	**STANDARD - DIAGNOSIS** The standard diagnosis of SL VARIO is activated with this button and disabled. Diagnostics and status information are read out.
	**TRIGGER DIAGNOSIS** This function is currently not yet implemented.
	**ERROR DIAGNOSIS** Clicking on this button takes the user to the error diagnostics window. In this window all errors are listed in detail. This window is described in the chapter "Error Diagnostics".
	**HISTORY** After each SL VARIO programming, information as the programming time, checksums, author, machine description on SL VARIO are permanently stored on SL VARIO as history points. A maximum of 16 history points can be stored on SL VARIO. By clicking the History button, this data is read and displayed. For more information, see Chapter "History".
	**DIAGNOSTICS SELECTION FOR NO MODULE / ALL MODULES** By clicking this button, all modules located in the rack can be selected or deselected for the diagnosis. Individual modules can be also selected or deselected for diagnosis by right clicking on the module image in the section 2. Thus, the update time can be increased for the diagnostics data of selected modules.

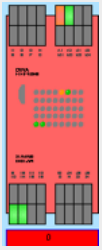
2.3. Read out Rack information

Section 2 shows the entire rack, the states at the inputs and outputs of the SL VARIO modules and fault states.

2.3.1. Overview of possible representation types of modules

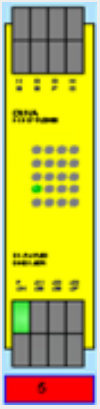


No error
Module ok



A red highlighted central module signals a SLOK-OFF State, i.e. a faulty operating state. In this connection, the slot number under the module is red highlighted and the A1 terminal is shown in orange.

⚠ **SLOK-OFF always requires a restart of the central module.**



If only the slot number is red highlighted and the corresponding module yellow, it indi-cates a plausibility error, however, does not necessarily lead to a SLOK-OFF state. Error information of the modules can be accessed by clicking on the red slot number. These errors are then displayed with an error number and a brief description.

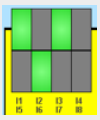
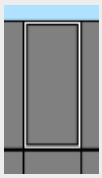
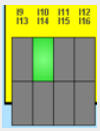
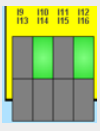
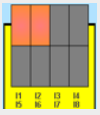
The module number is highlighted with a blue outline of the selected diagnostic modules. In case a module number is not outlined means this module is not selected for the diagnostics. For these modules, the associated diagnostic information is not updated.

Modules that are configured in the application, but not present in the rack as hardware (muting), are shown in gray.

2.4. Module Diagnostics

By left clicking on one of the modules in the rack (section 2), this specific module will appear in section 3. The terminals and the LEDs of this module are shown here enlarged. The states are constantly updated.

2.4.1. Overview of possible module terminals representation

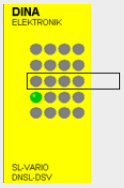
 A1 24V/DC	Only at ZMV and ZMVK **A1 Terminal orange:** SLOK OFF **A1 Terminal green:** SLOK
 Digital inputs	Green complies with H-level Grey complies with L-level
 Reset input	A framed terminal symbolizes a digital input that has been parameterized as a reset input.
 Analog inputs	If the inputs of ZMV are used as analog inputs, the following applies: • Green: if voltage / current within the configured range • Grey: if voltage / current is outside the configured range • Blinking: reading is 0V, wire breakage
 Frequency inputs	If the inputs of the ZMV are used as analog inputs, terminals flash with the applied frequency.
 Digital inputs	Orange terminals indicate a functional error, e.g. Error on the safety circuit sein. In order to clear this error message the application must be provided by the element RTSK.
 Outputs	Green signal level corresponds to H-level Gray corresponds to signal L-level Flashing output terminal: Short circuit on output Clocked output pairs are flashing.

2.4.2. Overview of LED display possibilities

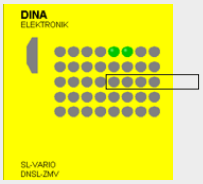
- Green signal level corresponds to H-level
- Gray signal level corresponds to L-level
- Orange LEDs indicate a functional error, e.g. Error on the safety circuit.
- Blinking of an input LED: Frequency input
- Blinking (with 2Hz) at LED output: transistor error

2.4.3. Overview of LED display possibilities to speed monitoring

At the SL VARIO modules that enable speed monitoring shows the mean row LED the status standstill, speed ok or over speed. These states are also shown in the rack diagnostics.



DSV/DRV/SIV



ZMV/ZMVK

Speed monitoring with sin/cos, TTL/HTL or resolver measuring systems

1 2 3 4

1 if f<= parameterized standstill frequency at first monitoring

1 if f> parameterized standstill frequency at first monitoring

2 if f<= parameterized standstill frequency at second monitoring

2 if f> parameterized standstill frequency at second monitoring

3 if f<= parameterized speed frequency at first monitoring

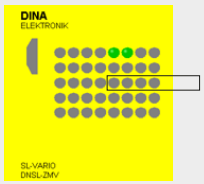
3 if f> parameterized speed frequency at first monitoring

4 if f<= parameterized speed frequency at second monitoring

4 if f> parameterized speed frequency at second monitoring

After shutdown

- LED for standstill switches on again if the actual frequency < the parameterized frequency (at ZMV/ZMVK <4Hz).
- LED for over speed switches on if the actual frequency < the parameterized frequency (at ZMV/ZMVK <4Hz) and the acknowledgement has happened with RTDS.



ZMV/ZMVK

One-channel sensor monitoring at ZMV/ZMVK

1 2 3 4

1 if f<= parameterized speed frequency at I9

1 if f> parameterized speed frequency at I9

2 if f<= parameterized speed frequency at I10

2 if f> parameterized speed frequency at I10

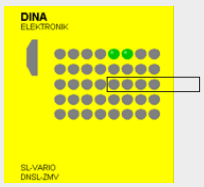
3 if f<= parameterized speed frequency at I11

3 if f> parameterized speed frequency at I11

4 if f<= parameterized speed frequency at I12

4 if f> parameterized speed frequency at I12

- After shutdown the LEDs switches on again, if the actual frequency <4Hz and the acknowledgement has happened with RTDS.



ZMV/ZMVK

Two-channel sensor monitoring at ZMV/ZMVK

1 2 3 4

1 if f<= parameterized standstill frequency at I9/I10

1 if f> parameterized standstill frequency at I9/I10

2 if f<= parameterized standstill frequency at I11/I12

2 if f> parameterized standstill frequency at I11/I12

3 if f<= parameterized speed frequency at I9/I10

3 if f> parameterized speed frequency at I9/I10

4 if f<= parameterized speed frequency at I11/I12

4 if f> parameterized speed frequency at I11/I12

After shutdown

- the LED for standstill switches on again if the actual frequency <4Hz)
- the LED for over speed switches on if the actual frequency <4Hz) and the acknowledgement has happened with RTDS.

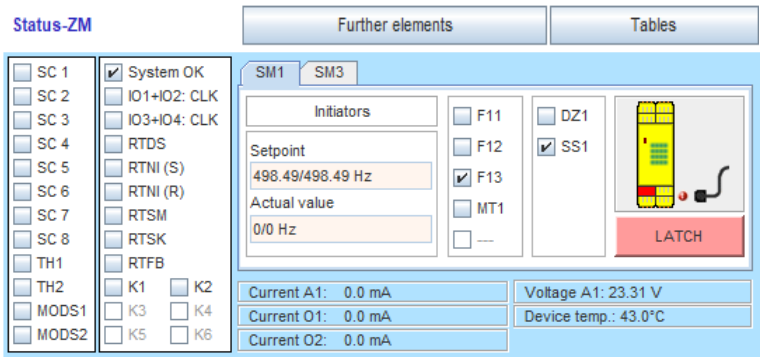
Mixed one-channel and two-channel sensor monitoring at ZMV/ZMVK

The LEDs for the two-channel monitoring switch as described above. The LED for the both one-channel monitoring switches, if the conditions for both single-channel monitoring are met.

2.5. Status information

In section 4 the status information of a selected module in area 2 is displayed.
The image of the status information is module-dependent.

2.5.1. Status information central module ZMV



Status information ZMV

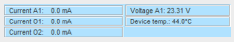
In the left panel, the following states are represented.
The boxes are checked, if the conditions are met.

SK1 - SK8	Conditions for safety circuit 1…. Safety circuit 8 is met.
ZH1 - ZH2	Conditions for two-hand control 1/2 are met.
MODS1 - MODS2	an output on the Operating mode selector (MODE SLCT) is set.
System OK	SL VARIO is working properly.
IO1+IO2:CLK	IO1 IO2 and are configured as clocked outputs.
IO3+IO4:CLK	IO3 and IO4 are configured as clocked outputs.
RTDS	Acknowledging of triggered Speed monitoring is due.
RTNI (S)	Release for network input information is set.
RTNI (R)	Release of network input information is reset.
RTSM	Acknowledgment of the reclosing lockout at safety mats is due.
RTSK	Acknowledgment of the safety circuit error message and the latch error message is due.
RTFB	Fieldbus outputs are activated.

The upper area contains buttons. Left-click leads to further status information window.

Further elements	Status information about timer, counters, safety mats, copiers, cams, analog terminals, analog-input-comparator, safe braking test see chapter “Information to...”
Tables	DNCO-Tables See chapter „Tables“

The lower level contains information windows to hardware

	Current and voltage at the terminals A1, O1 and O2 device temperature

The following additional area appears if the application contains the function speed monitoring. (Fig. 2-6)

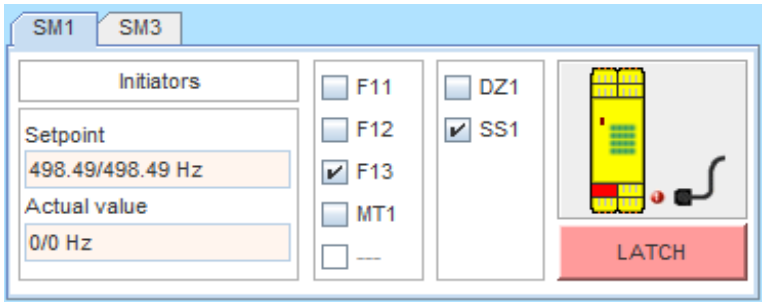


Fig. 2-6

SMx Configured speed monitoring. Selection with a left click. The corresponding field is blue.

Initiators encoder type

Setpoint Programmed setpoint value of he selected mode

Actual value current actual value

If the operating mode MT is selected, the observed target value for each speed module is defined as infinite. In the display field for the corresponding setpoint the text appears „**NO LIMIT**“.

If "position monitoring" is activated, instead of the desired and actual frequencies, the incremental values are displayed. In this case the term "ink" is displayed behind the numbers.

Following windows display the status of the speed monitoring SMx.

It applies for: ☑ recognized and acknowledged ☐ triggered off/ not recognized

Fxx, MTx	operating mode
DZx	Speed monitoring
SSx	Standstill monitoring
BR	Brake monitoring
L/R	Left / right run
	no encoder signals available

LATCH To access the trigger conditions press this button with the left mouse button.

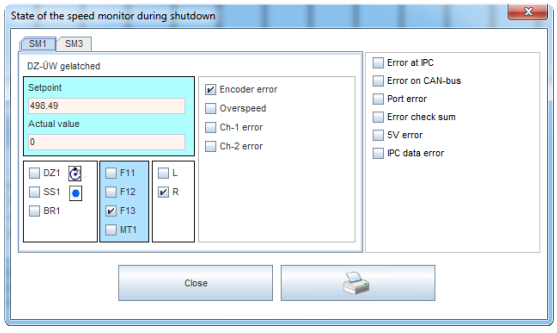
For more information see “Latch for speed monitoring at ZMV/ZMVK“.

2.5.2. Latch for speed monitoring at ZMV

Shutdowns of speed monitoring can have various causes. The so-called latch function of the speed monitoring in conjunction with the designer provides good diagnostic capabilities to determine the causes of shutdowns. In case of a shutdown the state of the speed monitoring is latched or buffered and can be displayed in the designer, as long as the power is not turned off and the latch function is not acknowledged.

Press the button LATCH , following menu is displayed, "state of the speed control during shutdown“(Fig. 2-7).

Monitoring via initiators



Monitoring via TTL / HTL encoder

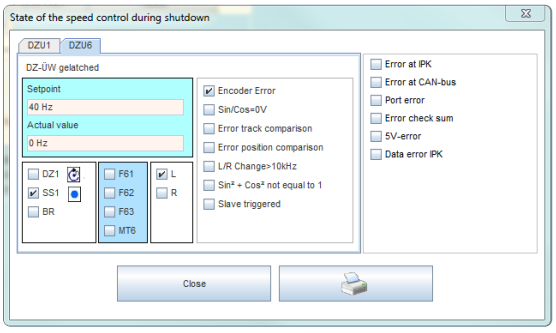


Fig. 2-7

setpoint	Programmed setpoint value
actual value	actual value at shut down
DZ1; SS1; BR	Restores the state of the outputs at shut down.
F11-F13;MT1	Restores the state of the inputs at shut down.
L / R	Describes the direction at shut down mode.
	A PDF file will be created out of this data release

Possible causes of shut downs:

Exceeding the parameterized speed:
The shutdown frequency is displayed in the Latch window.

Exceeding the parameterized positions:
The position and increments are displayed in the Latch window.

Encoder error:
Caused by broken wire at one or more signals.

Sin/Cos = 0V:
Caused while sine and cosine differential voltages of <60mV.
This can for example arise by erected reading head of linear encoders.

Track comparison error:

The tracks Sin / Cos or A / B are monitored through 2 channels in the speed monitoring.

Two reasons, besides from internal hardware failure, can cause this error:

- At very different frequencies (> 20%) over a period of> 2.5 seconds.
- If a track stands still and the other track gives frequencies> 5x standstill frequency about a time of > 2.5 seconds.

Both can be provoked by strong control behavior of the drive at a standstill.

Rectification: implement Standstill monitoring by position monitoring.

The standstill frequency has to be parameterized as high as possible corresponding to about 1/6 of the reduced speed.

Error position comparison:
The increments of the tracks Sin / Cos or A / B are monitored through 2 channels at the position monitoring. If the position deviates strongly from each other, it comes to a position comparison error.

Cause, besides from internal hardware failure:
The control inputs F11, F12, F13, MT, etc. can be switched between frequency measurement and position monitoring by increments if the position control is selected in the designer. If the control inputs are all turned off, the position control is shifted.

In the event shifting to position monitoring happens when the drive is still running, an error on this position comparison can occur, since the changeover will not be in perfect synchronized. The application should ensure that the drive is at standstill, when switching to position control.

L/R-change >10kHz:
Only for position control possible. When direction changes faster than 10 kHz accordingly, the error occurs. Have only been observed so far as internal hardware errors of the speed monitoring.

Sin^2+Cos^2 unequal 1:
Only possible in SL VARIO DSV modules. If the option is selected in the designer and the Sin / Cos signal is not equivalent to $Sin^2 + cos^2 = 1$, this error occurs, for example, on EMC problems.

In the latch window of the designer there are more possibilities for error listed. They refer mainly to internal hardware error that leads to the shutdown of the operation system:

IPK error

IPK data error

CAN error

Port error

5V error

Checksum error

⚠ **To delete / acknowledge these error messages the icon RTSK has to be wired.**

2.5.3. Status information about timers

Timers with 4 inputs
(Fig. 2-8)

- [x]: the respective timer is configured and is in use...
- [ ]: Timer in the application is not in use.
- actual value in s.
- State of inputs T...T3
- State of outputs

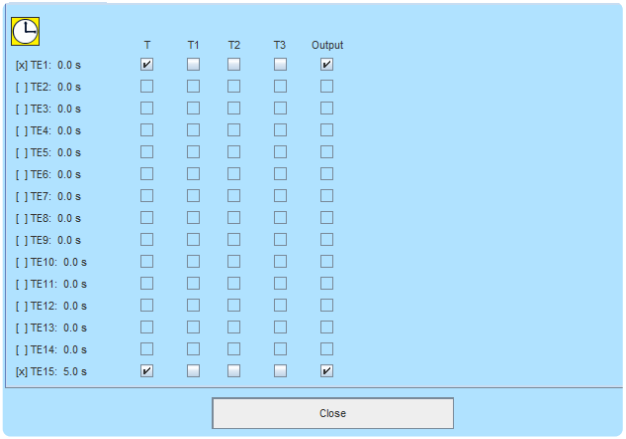


Fig. 2-8

Timer-S with 1 input
(Fig. 2-9)

- [x]: the respective timer is configured and is in use.
- [ ]: ZTimer in the application is not in use.
- actual value in s..
- State of input T
- State of output

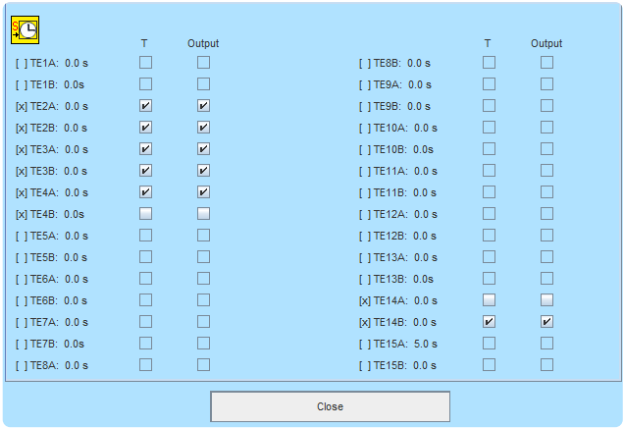


Fig. 2-9

2.5.4. Status information about counters

Fig. 2-10

- Actual/set value
- State of inputs and outputs

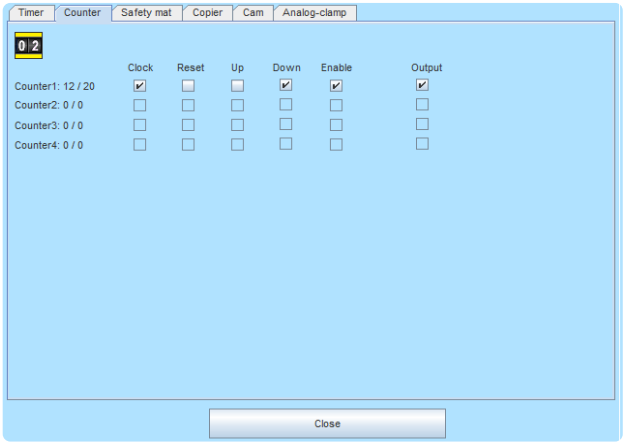


Fig. 2-10

2.5.5. Status information about safety mats

Fig. 2-11

- State of output
- Actual value at input terminal
- Fixed values, where the safety mats switch
- Latched values

In case of a shutdown the state of the analog input is latched and buffered and can be displayed in this mask, as long as the power is not turned off and the latch function is not acknowledged.

To delete/acknowledge these latched values, the icon RTSK  has to be wired in the application.

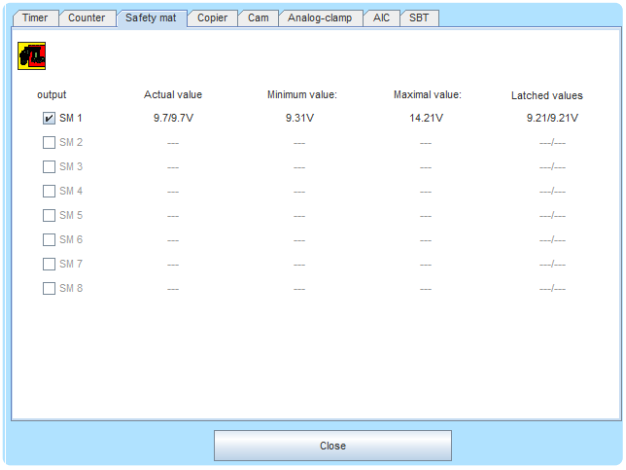


Fig. 2-11

2.5.6. Status information about copier

Fig. 2-12

- State of input
- copied value of the specified source

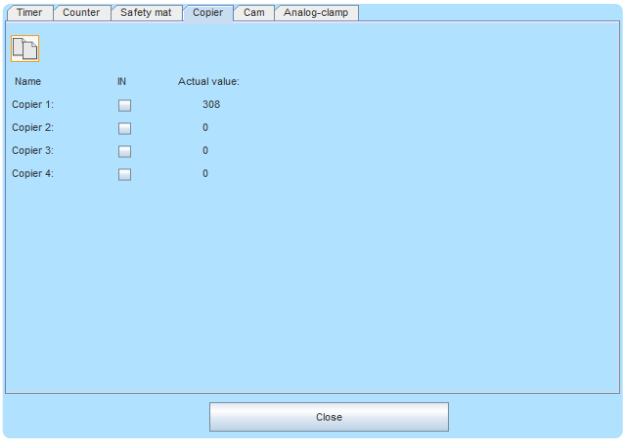


Fig. 2-12

2.5.7. Status information about cams

Fig. 2-13
Only the cams used in the application are visible .

- State of output „Range“
- upper and lower limit
- Slot of SIV module
- Actual value on encoder input (Encoder No. : increments/ frequency)

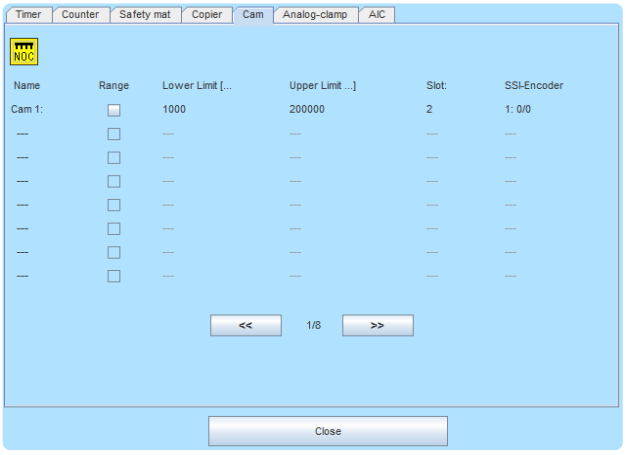


Fig. 2-13

2.5.8. Status information about synchronicity comparator

Fig. 2-14
Nur die in der Applikation verwendeten Nocken sind sichtbar.

- (=) Drives run synchronously
- (>) Drive 1 is faster than drive 2
- G1 Drive 1 is within the limit
- G2 Drive 2 is within the limit
- Latch Synchronous operation was / is not guaranteed
- Actual values
- Latch values

Latch-Werte
In case of a shutdown on the (=) output, the actual state is latched and buffered and can be displayed in this mask, as long as the power is not turned off and the latch function is not acknowledged.

To delete/acknowledge these latched values, the icon RTSK  has to be wired in the application.

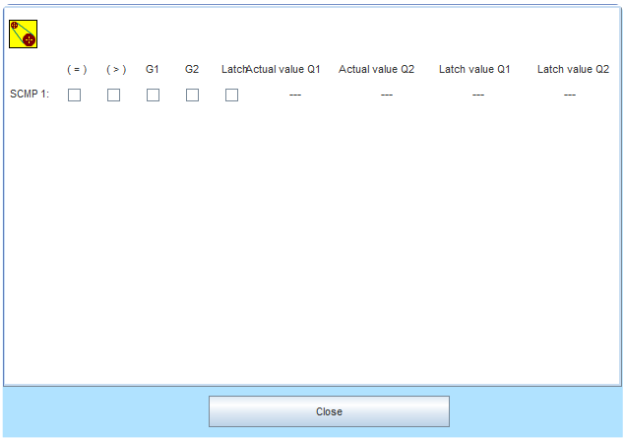


Fig. 2-14

2.5.9. Status information about analog-terminals

Fig. 2-15

- State of output
- 0-10V Power supply evaluation
- 4-20mA Current evaluation
- Minimum value / Maximal value
- Actual value at the analog terminal
- Latch values

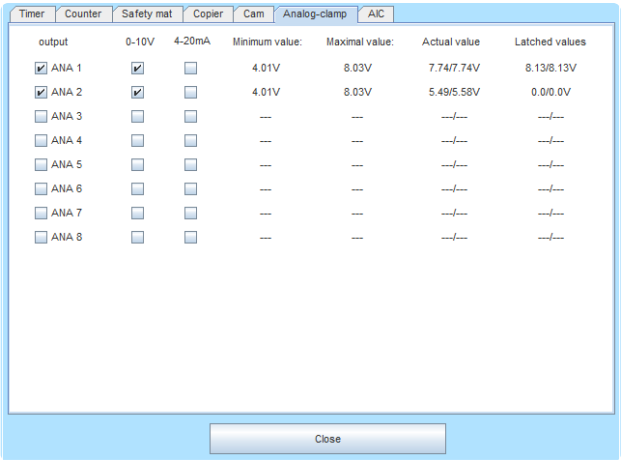


Fig. 2-15

Latch-Werte
In case of a shutdown the state of the analog input is latched and buffered and can be displayed in this mask, as long as the power is not turned off and the latch function is not acknowledged.

To delete/acknowledge these latched values, the icon RTSK has to be wired in the application.

2.5.10. Status Information about Analog-Input Comparator

Fig. 2-16

- State of output
- **Q1/Q2** Analog Inputs which will be compared.
- **Deviant** Parameterized deviation (tolerance)
- **Q1/Q2** Actual value Q1/ Q2
- **Difference**
  Difference of Q1 ad Q2
- Latch values

Latched values (blue)
In case of a shutdown the state of the analog input is latched and buffered and can be displayed in this mask, as long as the power is not turned off and the latch function is not acknowledged.

To delete/acknowledge these latched values, the icon RTSK has to be wired in the application.

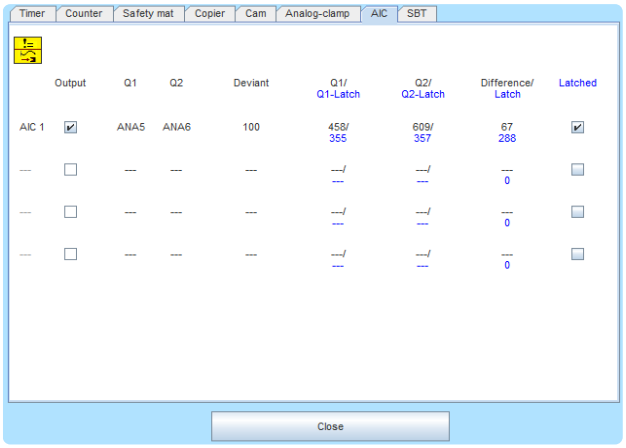


Fig. 2-16

2.5.11. Status Information about Safe brake test

Fig. 2-17

- State of inputs
- State of outputs
- Display of actual / setpoint
  - Stabilization time
  - Testing time
  - Timeout
- **Step** Actual Test Step

An explanation of the test step, see Designer manual.

Diagnostic box:
These indicate the status of the brake test.

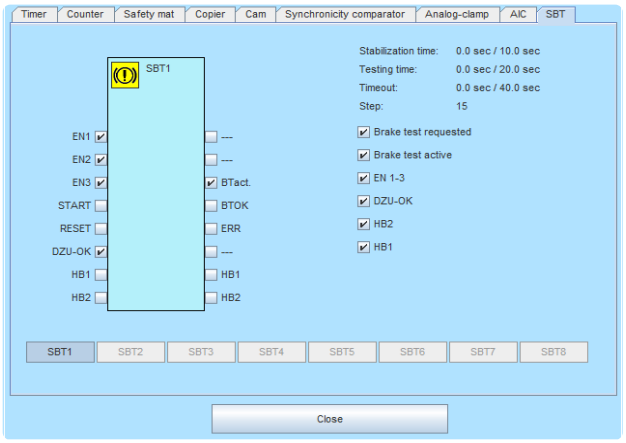


Fig. 2-17

2.5.12. Tables

The button "Tables" reads the values from the DNCO1 and DNCO2 frequency tables. (Fig. 2-18)

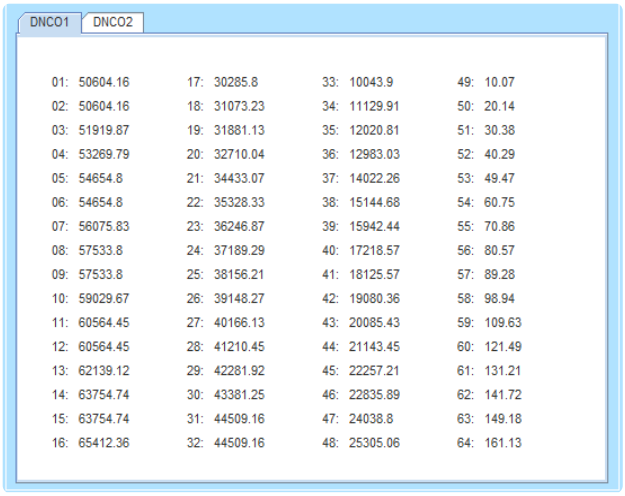
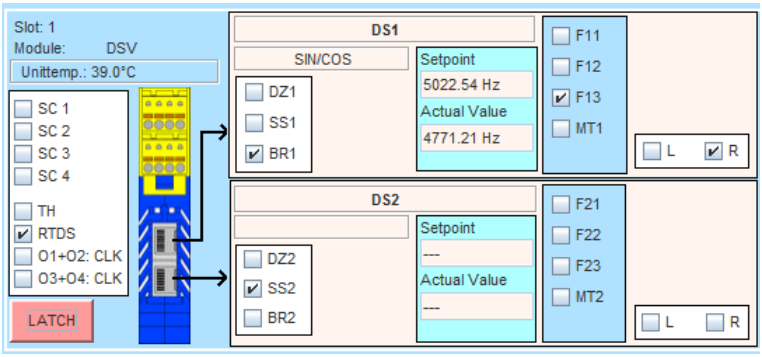


Fig. 2-18

2.6. Status information for the speed monitoring modules



Status information DSV

Slot Slot number

In the left pane, the following states are represented. The boxes are checked, if the conditions are met.

SK1 - SK4 Conditions for safety circuit 1 ... safety circuit 4 are met.

ZH Conditions for two-hand control are met.

RTDS Acknowledging of triggered Speed monitoring is due.

O1+O2:CLK O1 and O2 are configured as clock outputs.

O3+O4:CLK O3 and O4 are configured as clock outputs.

The following windows show the status of the speed monitoring DSx

This applies: ☑ recognized and acknowledged ☐ triggered / not recognized

DZx	speed monitoring
SSx	Standstill monitoring
BRx	break monitoring (only at DSV)
Fxx, MTx	operating mode
L/R	left/right
Sollwert	programmed setpoint value in the selected operating mode
Istwert	current actual value
SIN/COS	encoder type

If the operating mode MT is selected, the observed target value for each speed module is defined as infinite. In the display field for the corresponding setpoint the text appears „**NO LIMIT**". If "position monitoring" is activated, instead of the desired and actual frequencies, the incremental values are displayed. In this case the term "ink" is displayed behind the numbers.

No encoder signals available

To access the trigger conditions press this button with the left mouse button. For more informationen see chapter "Latch function".

2.6.1. Latch function

Shutdowns of speed monitoring can have various causes. The so-called latch function of the speed monitoring in conjunction with the designer provides good diagnostic capabilities to determine the causes of shutdowns. In case of a shutdown the state of the speed monitoring is latched or buffered and can be displayed in the designer, as long as the power is not turned off and the latch function is not acknowledged.

Press the button LATCH, following menu is displayed, "state of the speed control during shutdown": (Fig. 2-19).

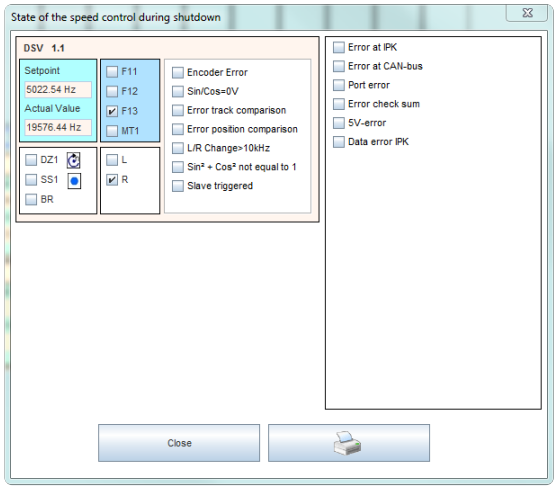


Fig. 2-19

setpoint	Programmed setpoint value
actual value	actual value at shut down
DZ1; SS1; BR	Restores the state of the outputs at shut down.
F11-F13;MT1	Restores the state of the inputs at shut down.
L / R	Describes the direction at shut down mode .
	A PDF file will be created out of this data release

Possible causes of shut downs:

Exceeding the parameterized speed:
The shutdown frequency is displayed in the Latch window.

Exceeding the parameterized positions:
The position and increments are displayed in the Latch window.

Encoder error:
Caused by broken wire at one or more signals.

Sin/Cos = 0V:
Caused while sine and cosine differential voltages of <60mV.
This can for example arise by erected reading head of linear encoders.

Track comparison error:

The tracks Sin / Cos or A / B are monitored through 2 channels in the speed monitoring.

Two reasons, besides from internal hardware failure, can cause this error:

- At very different frequencies (> 20%) over a period of> 2.5 seconds.
- If a track stands still and the other track gives frequencies> 5x standstill frequency about a timeof > 2.5 seconds.

Both can be provoked by strong control behavior of the drive at a standstill.

Rectification: implement Standstill monitoring by position monitoring.

The standstill frequency has to be parameterized as high as possible corresponding to about 1/6 of the reduced speed.

Error position comparison:
The increments of the tracks Sin / Cos or A / B are monitored through 2 channels at the position monitoring. If the position deviates strongly from each other, it comes to a position comparison error.

Cause, besides from internal hardware failure:
The control inputs F11, F12, F13, MT, etc. can be switched between frequency measurement and position monitoring by increments if the position control is selected in the designer. If the control inputs are all turned off, the position control is shifted.

In the event shifting to position monitoring happens when the drive is still running, an error on this position comparison can occur, since the changeover will not be in perfect syncronized. The application should ensure that the drive is at standstill, when switching to position control.

L/R-change >10kHz:
Only for position control possible. When direction changes faster than 10 kHz accordingly, the error occurs. Has only been observed so far as internal hardware errors of the speed monitoring.

Sin^2+Cos^2 unequal 1:
Only in SL VARIO DSV modules possible. If the option is selected in the designer and the Sin / Cos signal is not equivalent to $Sin^2 + cos^2 = 1$, this error occurs, for example, on EMC problems. .

In the latch window of the designer there are more possibilities for error listed. They refer mainly to internal hardware error, that lead to the shutdown of the operation system:

IPK error

IPK data error

CAN error

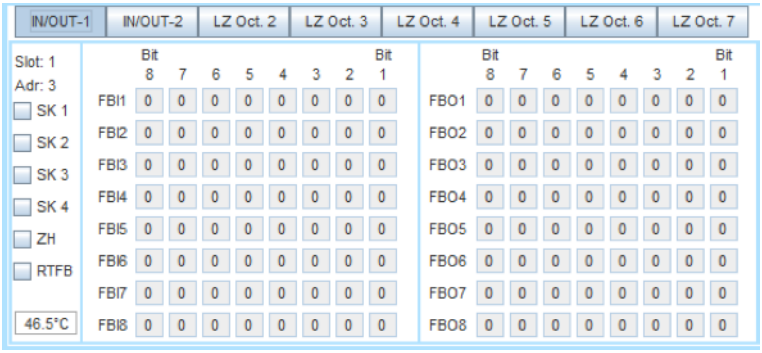
Port error

5V error

Checksum error

⚠ To delete / acknowledge these error messages the icon RTSK has to be wired.

2.7. Status information about Fieldbus Module FBV



Status information FBV

With the buttons IN / OUT- 1 and IN / OUT- 2 the section of fieldbus inputs and outputs FBI / O1-8 or FBI / O9-16 are selected.

- The bits of FBIx correspond to the FB inputs FBIx.1-FBIx.8 in the logic diagram.
- The bits of FBOX meet the FB outputs FBOx.1-FBOx.8 in the logic diagram.

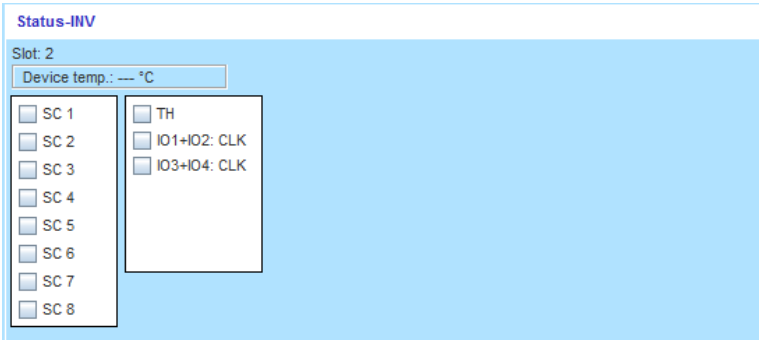
With the buttons LZ Oct x, you see the content of the bytes from the FB-RT-Diag (see Designer manual).

Slot	slot number
Adr	station address

In the left pane, the following states are displayed.
The boxes are checked, if the conditions are met.

SK1 - SK4	Conditions for safety circuit 1 ... safety circuit 4 are met.
ZH	Conditions for two-hand control are met.
RTFB	Fieldbus outputs are activated.

2.8. Status information about Input Module INV



Statusinformationen INV

Slot Slot number

The box will be checked if the following conditions are met.

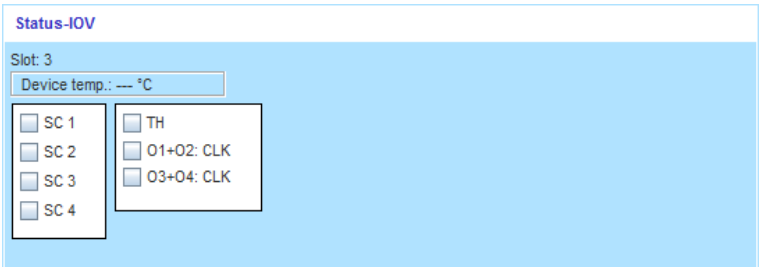
SK1 - SK8 Conditions for safety circuit 1 ... safety circuit 8 are met.

ZH Conditions for two-hand control are met.

IO1+IO2:CLK IO1 and IO2 are configured as clock outputs.

IO3+IO4:CLK IO3 and IO4 are configured as clock outputs.

2.9. Status information about In/Output Module IOV



Status information IOV

Slot Slot number

The box will be checked if the following conditions are met.

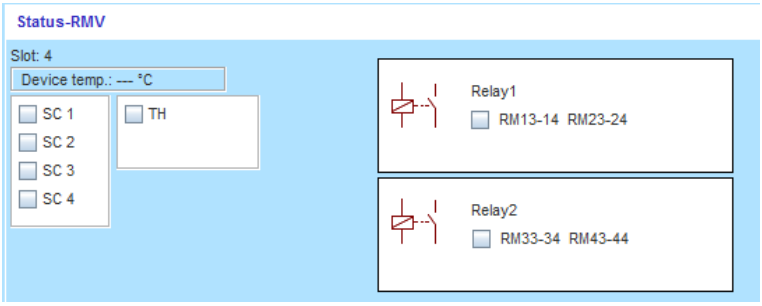
SK1 - SK4 Conditions for safety circuit 1 ... safety circuit 4 are met.

ZH Conditions for two-hand control are met.

O1+O2:CLK O1 and O2 are configured as clock outputs..

O3+O4:CLK O3 and O4 are configured as clock outputs.

2.10. Status information about module RMV



Status information RMV

Slot Slot number

The box will be checked if the following conditions are met.

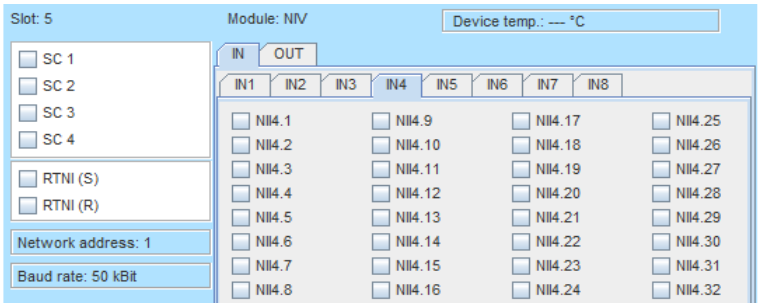
SK1 - SK4 Conditions for safety circuit 1 ... safety circuit 4 are met.

ZH Conditions for two-hand control are met.

Relais 1 Relay 1 has attracted

Relais 2 Relay 2 has attracted

2.11. Status information about network module NIV



Status information NIV

Slot Slot number
Network address Specifies the address of the NIV module, whose data are presented here.

The box will be checked if the following conditions are met.

SK1 - SK4 Conditions for safety circuit 1 ... safety circuit 4 are met.

RTNI Specifies whether the signal RTNI was set.

IN1...IN8 shows the state of the inputs of this NIV module. The first digit indicates the network address from where the signals were sent.

OUT1...OUT8 shows the state of the outputs of this NIV module. The first digit indicates the network address to which the signals were sent.

3 Error Diagnostics

Regarding errors on SL VARIO it is distinguished between two different kinds of errors. On one hand they are SLOK-off errors that can cause a SLOK-OFF (Faulty operation state of SL VARIO). On the other hand they are plausible errors that indicate an incorrect, but not leading to SLOK-OFF state of SL VARIO.

⚠ **SLOK-OFF always requires a restart of the central module.**

Any detected errors will cause the slot number field of the affected module in the rack illustration to light up red. (Fig. 3-1)

Fig. 3-1

After selecting this red highlighted slot number field the present errors on the respective module are displayed. (Fig. 3-2)

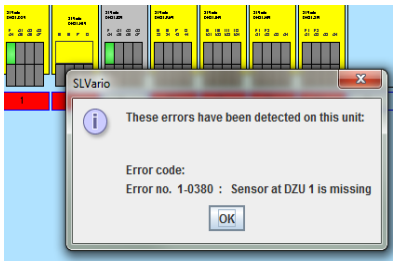


Fig. 3-1

3.1 Show detailed information

Detailed information about error conditions can be accessed via the error-diagnostic button. (Fig. 3-3)

Fig. 3-3

After clicking on this button, the error diagnostics panel appears. (Fig. 3-4)
This is divided into 3 sections.

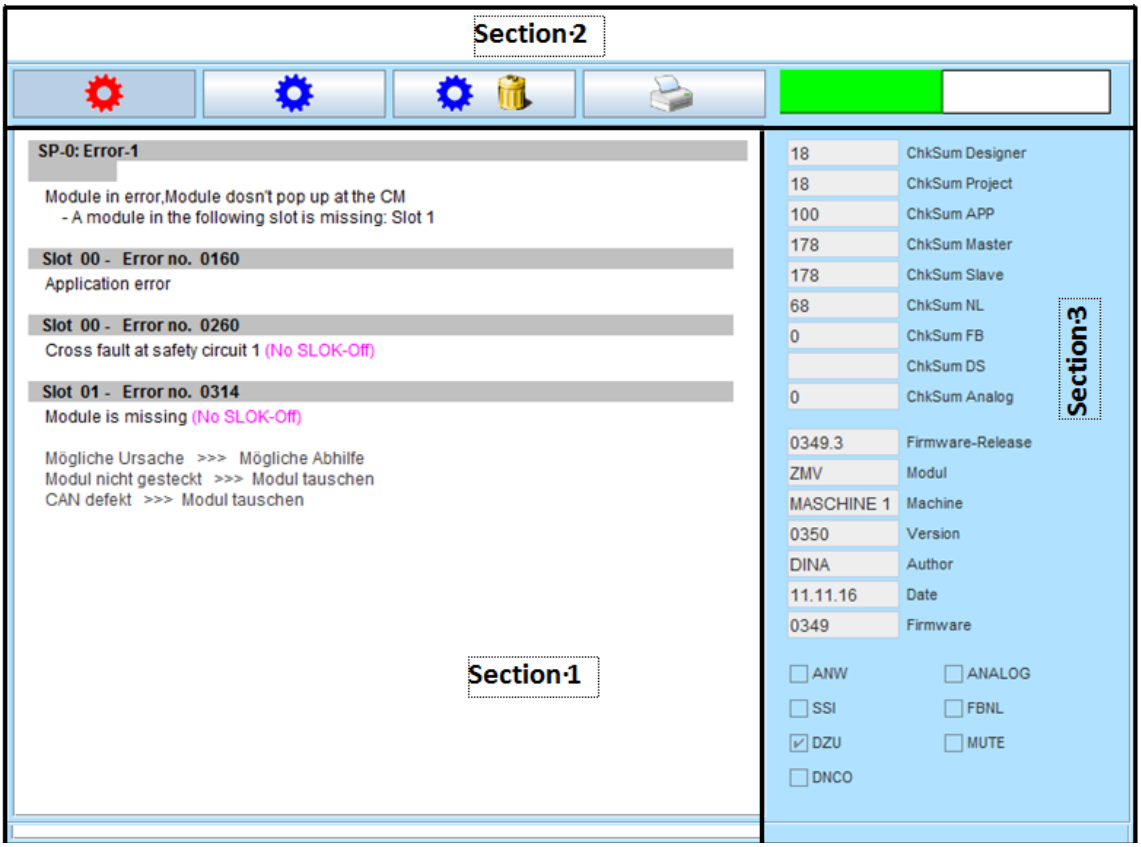


Fig. 3-4

In **section 1** a list of all errors that occurred appears. All error messages are indicated by an error number and the slot on which the error occurred. Errors which do not lead to a SLOK OFF are marked accordingly.

In **section 2** the following buttons can be selected with a left click:

Display current errors
If this button is activated, the latest error information on SL VARIO are being constantly read and displayed.

Display saved errors
If this button is activated, the latest by SL VARIO detected errors that are stored in an EEPROM will be displayed. This can be even seen after a power failure.

Delete saved errors
The errors stored in SL VARIO can be deleted with this button. If SL VARIO was provided with a password, the password is required here.

Print
By pressing this button a PDF document is created, which contains the information on this page.

- runs when current diagnostic is activ.

- Stands, if canceled or stored errors are read.

In **section 3** following information is available on

- Checksums
- Firmware version of the connected device
- Application-specific data, such as machine name, author, date
- Spezielle Funktionen, die die Applikation beinhalten, wie z.B. Analogklemmen oder DNCO which can be used for more precise error analysis.

4 History

After each programming of SL VARIO, the following information is stored

- **programming time**
- **author,**
- **designer version**
- **checksum size**
- **machine name**

Maximum 16 history indices can be stored on SL VARIO. The data are arranged according to the time of programming. In the index-1 are the last transmitted data.

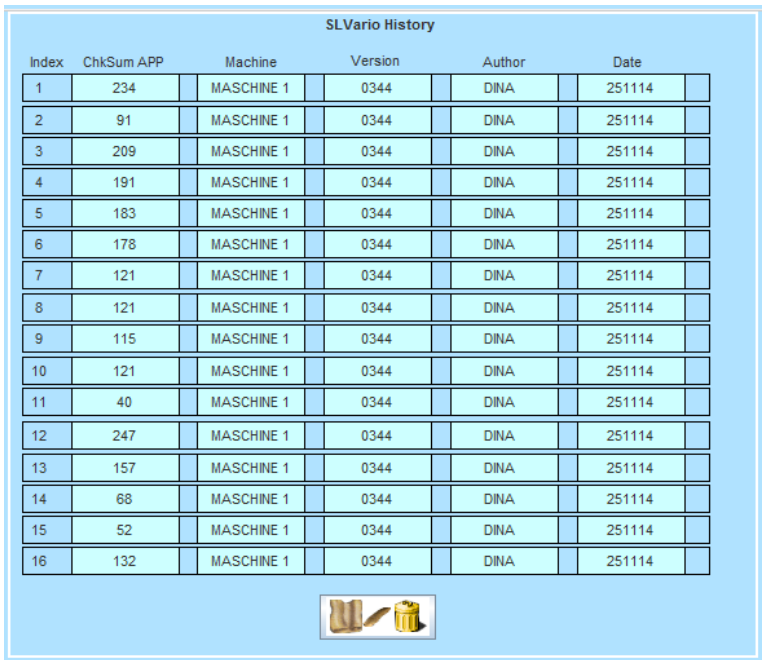
4.1. Read out History

Dieser Button öffnet einen Notizblock, in dem Sie Projektnotizen nach Datum und Uhrzeit sortiert eintragen und ausdrucken können. Diese sind nicht in der Projektdokumentation sichtbar.

► Press the button "History" (Fig. 4-1)

Fig. 4-1

The stored history data is read out and displayed. (Fig. 4-2). If SL VARIO was provided with a password, a password will be asked at first.



SLVario History

Index	ChkSum APP	Machine	Version	Author	Date
1	234	MASCHINE 1	0344	DINA	251114
2	91	MASCHINE 1	0344	DINA	251114
3	209	MASCHINE 1	0344	DINA	251114
4	191	MASCHINE 1	0344	DINA	251114
5	183	MASCHINE 1	0344	DINA	251114
6	178	MASCHINE 1	0344	DINA	251114
7	121	MASCHINE 1	0344	DINA	251114
8	121	MASCHINE 1	0344	DINA	251114
9	115	MASCHINE 1	0344	DINA	251114
10	121	MASCHINE 1	0344	DINA	251114
11	40	MASCHINE 1	0344	DINA	251114
12	247	MASCHINE 1	0344	DINA	251114
13	157	MASCHINE 1	0344	DINA	251114
14	68	MASCHINE 1	0344	DINA	251114
15	52	MASCHINE 1	0344	DINA	251114
16	132	MASCHINE 1	0344	DINA	251114

4.2. Delete History

► To delete the history press the button "Delete History". (Fig. 4-3).

If SL VARIO was provided with a password a password will be asked.

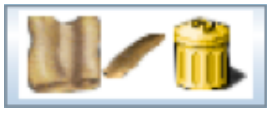


Fig. 4-3