

Connecting and operating instructions

MSI diagnostics software Safety interface function blocks

(of series MSI -s / -sx , -i / -ix , -mi / -mix and -m(E) / -mx(E))



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1 General information

The Msidiag allows you to diagnose the safety modules during commissioning or at any later time.

An MSI selection provides you with a quick overview of the available clamp connections.

The status window contains further information regarding the connected MSI, such as sensor type and operating mode (once data transmission has begun).

In the time diagram, any number of self-definable terminals are displayed along a time axis, along with their input and output potentials. This function greatly simplifies both commissioning and troubleshooting.

A data recorder function with selectable trigger condition makes it possible to trace even the most difficult long-term errors.

Errors caused by improper connections, internal MSI hardware defects, or exceeded time limits are indicated in a separate window in plain text.

2 Quick start

2.1 Displaying information in the status window

- ↵ Establish the connection from PC to MSI (via PC diagnostics cable).
- ↵ Start the MSI diagnosis.
- ↵ Select the menu item "Data transmission" --> "Start" (the COM connection in the lower left corner of the diagnosis window is highlighted in green).
- ↵ Select "View" --> "Status window"

In the status window (located to the right of the MSI top view) you should now be able to see the current MSI settings (such as program version, types of sensors connected, and the selected operating modes). In the terminal view (at the bottom of the status window) you can get an initial overview of the terminal assignments for the MSI being diagnosed.

2.2 Displaying information in the time diagram

- ↵ Now change to "View" --> "Time diagram" in order to show individual terminals in their time sequence.
- ↵ To select terminals, click with the mouse on the right side of the terminal window (small arrow pointing down next to the terminal number) and set the desired terminal number. A total of 9 terminals can be displayed at the same time.
- ↵ To start the display, click on "Display start" and to stop, on "Display Stop".

2.3 Recording data with the recorder

- ↵ Click on "Recorder start".
The window for file selection is opened.
- ↵ In this window, click on "OK" to open the pre-selected file 'default.log' for the recording.
- ↵ Confirm the query for overwriting the file with "yes".
The recorder is now running.
The recorder records every signal change at >all< terminals.
(You can now change any of the inputs on the MSI, e.g. interrupting sensors...)
- ↵ To stop the recorder, click on "Recorder stop".
The recording is now complete and the data are saved in the file 'default.log'.

2.4 Recalling data with the recorder

- ↵ Click on "Playback start"
The window for file selection is opened.
- ↵ In this window, click on "OK" to open the pre-selected file 'default.log' for the playback.
At the bottom edge of the time diagram, you can see a scroll bar used for controlling the red cursor in the time diagram (also possible by using cursor keys, page up/down, Pos 1, End or clicking with the mouse directly into the time diagram).
At the left side of the time diagram you can see the start and stop time of the recording.
Under Current you can see the current date / time of the cursor position (red line) in the time diagram.
- ↵ The terminals to be diagnosed can be changed later at any time, since records are always made for all terminals during recording.

3 The individual menus

3.1 Menu "File"

- Start and stop data recorder
Record the data received by the MSI.
- Start and stop playback
Playback recorded data.
- Print
Prints the current window.
- End
Ends Msidiag.

3.2 Menu "Data transmission"

- Start and stop
Switches the online visualization off and on.

3.3 Menu "Extras"

- Languages
Select German or English as the operating language.
- COM connection
Select the serial connection to be used COM1...COM4.

3.4 Menu "View"

- Status window
Overview of the connected MSI, such as
version number, safety inputs, muting inputs and safety door contacts
- Selected operating mode, such as restart interlock, feedback circuit
Additional information regarding relay prefailure warning and current relay cycles
Start test emulation, time monitoring (during cyclical)
Muting sensor test, time monitoring (during muting)
Muting operating mode (simple or double)
- Time diagram
Operate and visualize the data records
Setting of the terminals to be visualized
Set a trigger
Start / stop the playback
Start / stop the recorder
Start / stop the display
- MSI selection
By clicking on the MSI type designation, you can receive an overview
of the terminal assignments and top view of the corresponding MSI.
Menu "?"
- Help
This help text
- About
Information about the program Msidiag

4 Tips for initial commissioning (checklist)

Problems during commissioning are often due to simple causes. The following checklist is intended to help you check that the switch settings and terminals wiring are correct.

4.1 Basic procedure

Check the points in the order given.

The questions () must be answered with Yes.

- () Has the connection been made between the PC and MSI?
- () Is the power supply to the MSI intact (terminal 4 = +24 V, terminal 9 = 0 V)?
- () Choose the operating mode "With" or "Without" restart interlock:
If "With", does terminal 13 go to +24 V via NO contact and terminal 14 to 0 V?
If "Without", does terminal 13 go to 0 V and terminal 14 to +24 V?
- () Change to "View" -> "Status window"
- () "Data transmission" -> "Start"
- () Are terminals 15 and 24 flashing (indicates that data connection is OK)?
- () Are all of the inputs S1..S4, ME1..ME4 and SS1a..SS2b WITHOUT a red background?
If not, then continue to monitor these specific inputs!
N.c. means that the connected sensor type was not recognized, which can be due to the following reasons:
S1..S4: (safety inputs) terminals 22, 23, 16, 17
No sensor connected (or no wire bridge to the corresp. test output)
Sensor incorrectly connected
Sensor interrupted (or no power supply)

RULE

- Connect sensor type 4, semiconductor output (e.g. COMPACT) >without< test directly to e.g. S1 and S2
- For sensor type 4, relay output (e.g. ROBUST type 4), connect test outputs T1 and T2 via relay outputs to e.g. S1(S3) and S2(S4) (uncrossed), i.e. connect T1 via relay contact to S1 and T2 via relay contact to S2.
- For sensor type 2, semiconductor output (e.g. ECO, ROBUST type 2) connect test output to transmitter test input, receiver output to safety input (S1..S4), crossed connection, i.e. if T1 to test input, then receiver output to S2 (S4) or if T2 to test input, then receiver output to S1 (S3).
- Unused inputs must be connected from T1 to S1(S3) or T2 to S2(S4) by means of wire bridges.

M1..M4: (muting sensor inputs) terminals 20, 21, 31, 32 -->
only relevant for muting components

- If >non-testable sensors< are used, then move the DIP switch (MU3) on the I/O card (right card in the MSI) to the up position

Wire muting sensor for dark switching

Corresp. muting sensor input M1..M4 turns green if dampened

- If >testable sensors< are used, then move the DIP switch (MU3) on the I/O card (right card in the MSI) to the down position

Wire test as for type 2 semiconductor output (->S1..S4) (crossed)

Wire muting sensor for dark switching

Corresp. muting sensor input M1..M4 turns green if dampened

- Unused inputs do not need to be connected.
- Depending on the type of sensor connected to S1 and S3, it may be necessary to set the two DIP switches on the I/O card:
 - Type 2 - sensor (e.g. ECO or ROBUST type 2) to S1
-> MU4 up in position "S1 only"
 - Type 4 - sensor (e.g. COMPACT or ROBUST type 4) to S1, S2
-> MU4 down in position S1 and S2
 - Type 2 - sensor to S3
-> MU5 up in position "S3 only"
 - Type 4 - sensor to S3, S4
-> MU5 down in position S3 and S4

If the setting is incorrect, the MSI reports this error as soon as the connected sensor is recognized at the corresponding input (S1..S4).

SS1.1..SS2.2: (safety doors) terminals 25, 26, 34, 35

- The safety door inputs act like type 4 relay sensors (or like wire bridges) i.e. connect test outputs T1 and T2 via safety door contacts to e.g. SS1.1 and SS1.2 (uncrossed, i.e. connect T1 via 1st door contact to SS1.1 and T2 via 2nd door contact to SS1.2), SS2 analog to this
- Unused inputs must be connected from T1 to SS1.1(SS2.1) or T2 to SS1.2(SS2.2) by means of wire bridges.

() Reset input, terminal 13

Without restart interlock = 0 V (terminal 13 red)

With restart interlock = high-impedance (terminal 13 yellow)

Or when reset button is pressed (terminal 13 green)

() EDM input, terminal 14 (EDM = External Device Monitoring -> contactor monitoring)

Without restart interlock = +24 V (terminal 14 green)

With restart interlock depending on the type of contactor monitoring

- **Dynamic contactor monitoring**

DIP switch DS2 down - on the CPU card (card with diagnostic socket)

MSI output "off" then 0 V (feedback circuit is closed) (terminal 14 red)

MSI output "on" then high-impedance (feedback circuit has opened) (terminal 14 yellow)

- **Static or without contactor monitoring**

DIP switch DS2 up - on the CPU card (card with diagnostic socket)

MSI output "off" then 0 V (feedback circuit is closed) (terminal 14 red)

MSI output "on" then high-impedance or 0 V (terminal 14 yellow or red)

-> is not tested

() All of the basic functions of the MSI are now available.

5 Overview of all available DIP switches

Factory setting: all DIP switches down

Relay card (left card in the MSI) only in X versions of the MSI

Warning relay switching cycles	1,000,000	RX2 down	RX1 down
Warning relay switching cycles	500,000	RX2 up	RX1 down
Warning relay switching cycle	200,000	RX2 down	RX1 up
Warning relay switching cycles	100,000	RX2 up	RX1 up

CPU card (card with diagnostic connector)

DS4 always down -- no function

DS3 down "Without start interlock" only available in the operating mode "Without start/restart interlock"
(terminal 13 = 0 V, terminal 14 = 24 V)
Meaning: No test procedure necessary for the sensor connected to S1

"Start/restart interlock" for all other operating modes

The "start/restart interlock" operating mode is selected with terminal 13 "Reset" via a start button at 24 V DC and terminal 14 "EDM" (via feedback contacts) at 0 V.

DS3 up "Start interlock only" only available in the operating mode "With start interlock/without restart interlock"
(terminal 13 = 0 V, terminal 14 = 24 V)
Meaning: A test procedure is necessary for the sensor connected to S1 (startup test). For MSI -i / -ix / -mi / -mix, remote-controlled operation via Clear/Test terminal 20 is also possible (e.g. startup test via PLC).

D2 down Dynamic contactor monitoring (contactors are monitored in the ON and OFF state) only in the operating mode "With start/restart interlock" -> terminal 13, 14

DS2 up Static contactor monitoring (contactors are monitored only in the OFF state) or without contactor monitoring (terminal 14 to 0 V / 24 V DC, depending on the operating mode)

MSI -m(E) / -mx(E) only

DS3 down Muting restart possible
i.e. at least one muting sensor dampened and sensor to be muted dampened, then a muting restart is possible via RESET button (press 2 times).

DS3 up No muting restart possible

MSI -i / -ix / -mi / -mix only

DS1 down Cycle time limit = 30 sec.

DS1 up Cycle time limit = 30 min.

IOX card (right card in the MSI), MSI -mx(E) / -mix only

MU5 down For double muting type 4 sensor to S3 & S4 (area 2)

MU5 up For double muting type 2 sensor to S3 (area 2)

MU4 down For single/double muting type 4 sensor to S1 & S2 (area 1)

MU4 up For single/double muting type 2 sensor to S1 (area 1)

MU3 down Testable muting sensors

MU3 up	Non-testable muting sensors
MU2 down	Muting time limit = 10 min.
MU2 up	No muting time limit
MU1 down	Single muting (serial M1..M4 and parallel M2, M3)
MU1 up	Double muting (par. area 1 M2, M3; par. area 2 M1, M4)

IO card (right card), MSI -m(E) / -mi only

MU4 down	Type 4 sensor to S1 & S2
MU4 up	Type 2 sensor to S1
MU3 down	Testable muting sensors
MU3 up	Non-testable muting sensors
MU2 down	Muting time limit = 10 min.
MU2 up	No muting time limit
MU1 down	Single muting (serial M1..M4 and parallel M2, M3)
MU1 up	Without muting