11 MALFUNCTIONS

11.1 Safety instructions for disconnecting connections and replacing modules

11.1.1 Fitting terminations and connection cables

Warning	**ENDANGERING OF EXPLOSION PROTECTION!** Explosion protection can be endangered when working on the BusRail or terminations or when disconnecting the connection cables. ➢ Never work on the terminations, power supply or connection cables when under voltage.

11.1.2 Disconnecting the connections

Warning	**ENDANGERING OF EXPLOSION PROTECTION!** Explosion protection is endangered when disconnecting the power supply connections. ➢ In Zone 1, only disconnect the power supply without voltage applied. ➢ In Zone 2, only disconnect the power supply when there is no danger of explosion.

	The I.S. 1 system is set up for intrinsic safety. Disconnecting field device connections to the I/O modules during operation is expressly permitted.

11.1.3 Replacing modules

In Zone 1 the CPU & Power Module can be replaced without danger.
In Zone 2 the CPU & Power Module can be replaced without danger after the power supply is disconnected (see above).
I/O modules can be replaced without danger.

11.1.4 Zone-specific measures

<table>
<tr><th>Zone 1</th><th>Zone 2</th><th>Safe area</th></tr>
<tr><td colspan="3">The following measures are permitted:
• Remove / insert I/O module terminal block with field cable
• Replace I/O modules (see safety instructions 11.1.2)</td></tr>
<tr><td>The following measures are permitted for the Zone 1 CPU & Power Modules:
• Remove / insert fieldbus connections (the fieldbus is intrinsically safe)
• Replace CPU & Power Modules suitable for Zone 1 (locking with two-stage separation)</td><td colspan="2">The following measures are permitted for the CPU & Power Modules if there is no danger of explosion:
• Remove / insert X5 power supply
• Remove / insert fieldbus connections
• Replace the CPU & Power Module</td></tr>
<tr><td>• Do not disconnect the power supply of the base EEx e terminals of the CPU & Power Module when under voltage</td><td colspan="2"></td></tr>
<tr><td colspan="3">• Do not disconnect the BusRail, terminations or connection cables when under voltage</td></tr>
</table>

Tab. 11-1 Zone-specific measures when disconnecting connections and/or module replacement

11.2 Possible errors and malfunctions

Error detection

There are three error detection options for the I.S. 1 system:

- Error detection using the CPU & Power Module display or the green and red LEDs of the module
- Error detection using a laptop or PC via the ServiceBus and the "I.S. Wizard" software supplied on demand. For further information, see the "I.S. Wizard" operating instructions
- Error detection by evaluating the diagnostic information provided by the automation equipment

Possible errors

The following errors can occur in the system:

- Open circuit in a field circuit
- Short circuit in a field circuit
- Loose field cable in the I/O module terminals
- Loose I/O module terminal
- I/O module not firmly attached to the BusRail or not engaged in the rail
- Loose fieldbus cable
- Defective I/O module
- Defective CPU & Power Module

11.3 Error detection with the CPU & Power Module

If an error occurs in the fieldbus or in a connected module, the error is displayed on the LCD display. In addition, the LEDs indicate an error.

Layout of LCD display

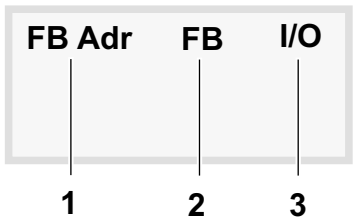


Fig. 11-1 Significance of the CPU & Power Module LCD display

1 Indicates the field station address at the fieldbus as a numerical value.

2 Indicates the status of the fieldbus. Possible values are "OK", "off" and "baud"".

3 Indicates the status of the I/O modules and the I/O signals. Possible values are "OK" and "err".

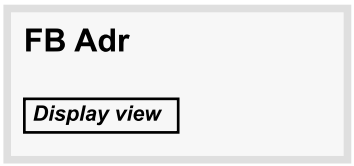
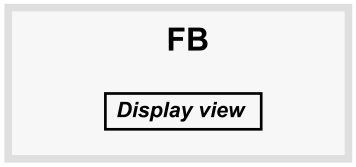
11.3.1 LED and LCD displays of the CPU & Power Module (CPM)

A summary of all errors that can be displayed by the CPU & Power Module, together with the data regarding error/malfunction sources and troubleshooting advice, can be found in *Tab. 11-2* and *Tab. 11-3*.

Green diode	Red diode	LCD display	CPM status	Error source	Possible solution
On	Off	FB: OK I/O: OK	All modules OK All signals OK	None	--
		FB: OK I/O: err	CPM: OK	Group I/O signal alarm	See LED displays of the I/O modules
On	Flashes	FB: OK I/O: err	CPM: OK I/O: Module group alarm	• Module damaged • Module not present • Incorrect module inserted	• Replace module • Insert module • Insert correct module
Flashes	Off	FB: off / baud I/O: --	Ready (after switch-on, before data exchange with master)	None	Initiate cyclical data exchange with the master. Check master and bus connection to CPM
Flashes	Flashes	FB: off / baud I/O: OK / err	Leave data exchange (outputs in safety position)	Cyclical data exchange with master is interrupted	Initiate cyclical data exchange with the master. Check master, bus connection and CPM
Flashes	On	FB: off / baud I/O: --	Configuration fault	Configuration incorrect	Change configuration in master
Off	On or flashes	FB: off / baud I/O: --	CPM hardware error	• Hardware check error • EPROM error • EEPROM error	Replace CPM
Off	Off	No display	Off	No supply voltage to CPM or defective CPM	• Check CPM power supply • Check CPM • Replace CPM

Tab. 11-2 Significance of the CPU & Power Module diode displays

11.3.2 Error messages on the CPU & Power Module display

Module	Display views	Designation / cause	Solution
	0 .. 127	CPM address	--
	--	No address defined	Enter address again
	OK	Fieldbus OK (cyclical data exchange)	--
	off	No data exchange at the fieldbus	--
	baud	CPM baud rate detected The field station is not addressed by the master	Configure field station in the master
	OK	All I/O modules and signals are OK	--
	err	Group alarm I/O: One or more I/O modules or signals are defective	Check I/O modules and I/O signals
	--	CPM access to the I/O modules is not possible	--

Tab. 11-3 Group information on the CPU & Power Module display

11.4 Error detection by I/O modules

	Before replacing a module, check all cables and connections for tightness and secure contact. Check the tight fit of the CPU & Power Module and I/O modules on the BusRail.

The I.S. 1 system offers the option of direct error detection at the CPU & Power Module and I/O modules. Errors can also be detected by using the R. STAHL software "I.S. Wizard", which can be supplied on demand.

11.4.1 Overview of measures for error determination

Implement the following steps for error determination:

- Check the LED displays of the I/O modules.
- Use *Tab. 11-4* to look for the error indicated by the LED display.
- Read the display on the CPU & Power Module for further errors.

11.4.2 LED displays on the I/O module and error rectification

Green diode	Red diode	I/O module status	Error source	Possible solution
On	Off	All signals OK	None	--
On	Flashes	Signal diagnosis	Signal(s) inoperative	• Rectify source of signal diagnosis (short circuit, line break, etc.)
Flashes	Off	Ready (after switch-on, before data exchange with master)	• Module is in order but not ready for cyclical data exchange (a parameter set is not yet present) • Outputs are in a powerless condition (however, the HART Analog Output Module Type 9466 outputs 4 mA)	• Initiate cyclical data exchange with the master • Check master, bus connection and CPM
Flashes	Flashes	Leave data exchange (outputs in safety position)	Cyclical data exchange with master is interrupted	• Initiate cyclical data exchange with the master • Check master, bus connection and CPM
Flashes	On	Configuration fault	Configuration incorrect or incorrect module inserted	• Change master configuration or insert correct module
Off	On or flashes	I/O module hardware error	• Hardware check error • EPROM error • EEPROM error	• Replace I/O module
Off	Off	Off	No voltage supply to I/O module or defective I/O module	• Check CPM power supply • Check CPM • Check BusRail • Engage I/O module correctly on the rail • Replace I/O module

Tab. 11-4 LED displays on the I/O module and error rectification

11.5 Replacing modules during operation

	If one or more I/O modules are not replaced at the same time as the CPU & Power Module, the fieldbus addresses do not need to be reset. The CPU & Power Module takes over the fieldbus addresses from the I/O modules present.

CPU & Power Module on the Profibus

A new CPU & Power Module is automatically detected as a slave and loaded with the configuration and parameters by the Profibus master. Cyclical data exchange then commences independently.

CPU & Power Module on the Modbus

The "I.S. Wizard" software is used to load the configuration and parameters of the field station into the CPU & Power Module via the ServiceBus.

11.5.1 CPU & Power Module in Zone 1, Type 9440/12

	The CPU & Power Module for Zone 1 can be replaced during operation and in a hazardous area.

Removing the CPU & Power Module for Zone 1

Warning	**HEAVY COMPONENT!** The CPU & Power Module, Type 9440/12, weights approx. 2.5 kg. ➢ Hold the CPU & Power Module firmly while removing it.

- ➢ Push both red latches in the direction of the arrow up to the stop (*Position II*).
- ➢ Pull the CPU & Power Module vertically out of the base until the stop is reached.

The module engages in the intermediate level.

- ➢ Push the two latches back in the direction of the arrow up to the stop in the exit position (*Position I*).
- ➢ Remove the CPU & Power Module vertically.

If the module cannot be removed, e.g. if it has become tilted:

- ➢ Let the module engage back into the base (as when fitting it).
- ➢ Repeat removal procedure.

Fitting the CPU & Power Module for Zone 1

Before the CPU & Power Module is fitted, check that both red latches are in *Position I*. If necessary, bring the latches into *Position I*.

- ➢ Insert and engage the CPU & Power Module in the plug connection of the base.
- ➢ Check the tight fit of the CPU & Power Module.

The green diode will light up on the newly inserted module.

ⓘ	If the green diode on the newly inserted CPM is not lit or flashing, or the red diode is lit, see *Tab. 11-2* for error determination.

11.5.2 CPU & Power Module in Zone 2, Type 9440/15

If there is no danger of explosion, the CPU & Power Module can be replaced during operation.

Proceed as follows to replace the module:

- Open enclosure.
- Identify module to be replaced.
- Remove all plugs from module.
- Lift up red handle on module.

This releases the catch.

- With the red handle raised, remove the module by lightly waggling it and then pulling.
- Insert a new module of the same type on the BusRail and engage on the rail.
- Reattach all plugs.

The green diode will light up on the newly inserted and connected module.

If the green diode on the newly inserted CPM is not lit or flashing, or the red diode is lit, see *Tab. 11-2* for error determination.

11.5.3 I/O module

	The I/O module can be replaced in all application cases during operation.

Proceed as follows to replace individual I/O modules:

- Identify I/O module to be replaced.
- Remove plug-in terminals from the module.
- Lift up the red handle on the I/O module.

This releases the catch.

- With the red handle raised, remove the I/O module by lightly waggling it and then pulling.
- Insert a new I/O module of the same type on the BusRail and engage on the rail.
- Reattach plug-in terminals.

The new module is automatically recognized by the CPU & Power Module. The green diode will light up on the newly inserted I/O module.

	If the green diode on the newly inserted I/O module is not lit or flashing, or the red diode is lit, see *Tab. 11-4* for error determination.

11.6 Hotline and service

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- Internet:http://www.stahl.de
  http://www.is1easy.com