WOODWARD

HighPROTEC

HighPROTEC Troubleshooting Guide

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Contents

Self-supervision Messages

The protection device supervises its normal operation by executing various self-supervision checks during runtime of the device.

When detecting any serious faults, the system LED will start flashing alternating red and green. The issue will be recorded in an internal memory.

Please check the self-supervision messages under <Operation/ Self Supervision/ Messages>.

Self-supervision Message [1]	*Message Description*	*Corrective Action*
S 1	The device suffered an unscheduled restart.	Get in contact with our service-team. You will be supplied with a tool for error analysis.
S 2..4	Critical level of internal resources.	Get in contact with our service-team. You will be supplied with a tool for error analysis.
S 5..10	– reserved for future use –	
S 11	Hardware: FRAM defect. The device will be set out-of-service on next reboot.	Send the device for repair.
S 12	The battery for buffering the real time clock is low.	The battery can be exchanged by the manufacturer. There's no impact on the functionality of the device if the battery breaks down, except for the buffering of the clock while the unit is in de-energized condition.
S 13	– reserved for future use –	
S 14	Your device suffered a short-term sag or outage of the supply voltage.	Please check your power supply. You can quit the System LED by selecting <Operation/ Acknowledge/ SSV.Ack System LED>.

1 You can find the messages under <Operation/ Self Supervision/ Messages>

Self-supervision Message	*Message Description*	*Corrective Action*
S 15	Critical level of internal resources.	Get in contact with our service-team. You will be supplied with a tool for error analysis.
S 16..29	– reserved for future use –	
S 30	Problems with the 24 km Line Differential module.	Get in contact with our service-team. You will be supplied with a tool for error analysis.
S 31	– reserved for future use –	
S 32	Problems with the 24 km Line Differential module.	Get in contact with our service-team.
S 33	Problems with the Line Differential protection communication.	Get in contact with our service-team.

Troubleshooting by means of the System-OK-LED status

System LED	*Device Status*	*Potential Error Cause*	*Corrective Action*
off (not illuminated)	Other LEDs are also off.	Either no supply voltage or the power supply is faulty.	Please check the supply voltage. If it is OK, send the device to be repaired.
undefined, not flashing	Other LEDs are showing a random pattern.	The CPU board is faulty.	Send the device to be repaired.
flashing red	The HMI shows an error number.	Fatal system error	Get in contact with the manufacturer.
constant red	The HMI shows an error number.	Fatal system error	Get in contact with the manufacturer.
	You have started the device while pressing the <CTRL> key for performing a bootloader or firmware update.	No device error.	Please follow the instructions in the installer`s manual.
flashing green, switch to constant green within 30 seconds		No error. The device is in its start-up phase. When the System LED switches to constant green, the protection functions are active.	No action necessary.
flashing red/ green	The device is up and running. The protection functions are working.	The internal self-supervision module has detected a serious problem in the system. The issue will be recorded within an integrated fault memory.	Please refer to chapter “Self-supervision Messages”.

System LED	*Device Status*	*Potential Error Cause*	*Corrective Action*
constant green	The device´s HMI is not operable. There are no Softkeys shown on the panel. Instead the panel shows „Startup“ or just the device type (e.g. MCA4) without any Softkeys.	The device is starting up. The protection functions are already working, but the HMI is still starting up. If this is not finished after 5 minutes, the device is probably busy with handling Ethernet packets (Connector X100).	Check if the following action makes the device´s HMI operable: Plug off the Ethernet (Connector X100). Is the HMI now operable, there is an error on your Ethernet network (e.g. an Ethernet storm). Please check your network traffic.
	The HMI is not operable. A normal page of the HMI is visible: Either there are Softkeys visible or the LED status page is being displayed.	The device is busy with handling Ethernet packets (Connector X100). The protection functions are working.	Plug off the Ethernet (Connector X100). Is the HMI now operable, there is an error on your Ethernet network (e.g. an Ethernet storm). Please check your network traffic. Should this action not change the device´s behavior, please read the next entry of this table.
	The HMI is not operable. A normal page of the HMI is visible: Either there are Softkeys visible or the LED status page is being displayed. There is no Ethernet connector (Connector X100).	Some of the device´s system parts are not working. The protection functions are working.	Leave the device connected to the supply voltage. Get in contact with our service-team. You will be supplied with a tool for error analysis.

System LED	*Device Status*	*Potential Error Cause*	*Corrective Action*
	The HMI is operable.	The device is ready for operation and protects your electrical equipment. If you have the impression that the relay is not working correctly or you have any problems with setting its parameters, please look-up the next tables.	Look-up the next tables.

Troubleshooting – Hardware

Problem or maloperation in…	*Problem Description*	*Corrective Action*
Failure of the display	After selecting any key, the whole display remains dark or the display is defective.	Check the following issues: • Is the supply voltage connected? This is the case when the System-LED is illuminated • Is the environmental temperature within the allowed range? • Try to adjust the contrast of the display by using Smart view (increase/ decrease). If these checks do not show any results, send the relay back to the manufacturer.
Failure of a binary output (Also refer to: ”Binary outputs do not react“)	The physical status does not match the reported state. Check the reported state of the binary output with the HMI or Smart view.	Check the following issues: • Is the binary output in the latched state? Acknowledge the state if necessary. • Is <Inverting> parameter of the binary output set? • Check the wiring. • Plug off the wiring from the binary output and measure its output. Set the state of the binary output by using the test functions Force/Disarm. If these checks do not show any results, send the relay back to the manufacturer.
Failure of a digital input	The physical status of a digital input does not match its reported state. Check the reported	Check the following issues: • Is the configured voltage level set correctly?

Problem or maloperation in…	*Problem Description*	*Corrective Action*
	state of the digital input with the HMI or Smart view.	• Is the voltage level of the digital input (signal level) correct? • Is the parameter <Inverting> set? • Check the wiring. If these checks do not show any results, send the relay back to the manufacturer.
Wrong setting of the device´s clock after a shortage of the supply voltage	The internal battery for powering the clock is empty or defect.	The relay is also working properly with an empty clock battery. The device´s time can be synchronized. Please contact the service team.
Failure of a key		Send the relay back to the manufacturer.
Line Differential: Failure of the Fiber optic port	You want to verify the correct functionality of the relay's fiber optic module.	Do a Loopback Test: • During this test the device receives and interprets its own data as data coming from the remote device. Therefore the differential protection modules, the Transfer Trip module or the Signal Transfer module might trip during the Loopback test. Therefore we recommend that you block these modules (or their trip commands) during the test. • Build a short direct connection between the RX and TX port of the device. The device's fiber optic module is functional, if: • the device displays <Loopback> under

Problem or maloperation in…	*Problem Description*	*Corrective Action*
		<Operation/ Status Display/ Prot-Transfer/ ProtCom/ Advanced States/ Operating Mode> • <Operation/ Status Display/ Prot-Transfer/ ProtCom/ State/ 24h Err Cr> shows a stable value

Troubleshooting – Operation of the Device

Problem or maloperation in…	*Problem Description*	*Corrective Action*
Binary outputs or LEDs are in unexpected state.	A binary output or an LED has been reconfigured from latched to unlatched. Now you need to acknowledge the status once, if it was already pending before the reconfiguration.	Acknowledge the LEDs and binary outputs.
Missing description of the LEDs on the front panel of the device.		On the supplied product CD there is a template „HighPROTEC_label_Arial.pdf“. This can be adapted and printed out on adhesive labels.
The relay is set to English language.	The HighPROTEC relay was shipped with English language. You want to select a different language.	Connect the relay to the supply voltage. When the relay is completely booted, select <Menu/ Device Para/ HMI/ Menu language> on the HMI and select a different language.
Smart view is set to English language.	You have installed Smart view with English language. Now you want to switch to a different language.	Select <Settings/ Language> within Smart view and select your desired language. A window will pop up. This informs you that the language will get activated after a restart of Smart view. Accept this information, close and restart Smart view.
A trip shall be acknowledged without a password.		Set the password for <Password Level 0> to „empty input“. Now you do not have to enter any password for changes and acknowledges on security level 0.

Problem or maloperation in…	*Problem Description*	*Corrective Action*
What is the default password?		The factory-provided default password for all security levels is „1234“.
How do I reset the password?		Refer to the security chapter of the user manual.

Troubleshooting – Parameter Settings

Problem or maloperation in…	*Problem Description*	*Corrective Action*
Transfer of device parameters from one protection device to another of the same type (e.g. MCA4).	You have configured the parameters of a HighPROTEC device. Now you want to transfer these parameters to another relay. This is possible, if both relays are of the same type, e.g. MCA4.	Read out the device parameters with Smart view from the first relay. Save them into a file. Now reopen this file with Smart view. Adapt the settings to the order code of the second device <Edit/ Modify Device Configuration (Typecode)...>. Select <Apply>. By this the existing parameter file is being converted to the format of the second device. Now there may be implausible parameters. They are marked with a question mark. These are not valid for this device type. Please adapt the values of these implausible parameters. Afterward you can transfer the parameter settings to the second device.

Troubleshooting – Protection and Control

Problem or maloperation in…	*Problem Description*	*Corrective Action*
After first start-up of the protective device there is a pending trip.	Two red LEDs are illuminated at the front of the HMI. They indicate a trip and an alarm.	With the factory default settings the protection relay is configured with an undervoltage protection. Adapt the settings of the undervoltage protection or remove this module from the device project settings (if you do not need it). If you have any problems with acknowledging the pending alarm, please refer to „Failure of a binary output“.
The switchgears can not be operated by SCADA communication.		Set the switching authority of the device to „remote“.
Current and Voltage measurement	The measured values of current and voltage have a big fluctuation.	Adjust the field parameters´ general settings to the connected grid frequency (50Hz or 60Hz).
Binary outputs do not react.	The contacts of the binary outputs do not open or close. This can be checked by simulating a fault and checking the binary output contacts with measurement equipment.	Check the following issues: • Acknowledge the binary outputs, if applicable. • Is the status of the binary output forced to a dedicated value? (The binary output can be overwritten for commissioning purpose, refer to <Service/ Test>.) • Is the correct parameter set active (1..4)? • Is the required protection function active? • Is overall protection active? • Are the field parameters set correctly (CT ratio etc.)?

Problem or maloperation in…	*Problem Description*	*Corrective Action*
		• Are the protection parameters set correctly (trip value, trip time)? • Is the assigned protection function blocked? • Is the protection function´s trip signal routed to the Trip-Manager of the correct switchgear? • Is the trip signal of the switchgear routed to the correct binary output? • Is the wiring correct?
Failure of control from local or remote	You can not switch locally or remotely.	Check the following issues: • Is the switch command blocked? • Is the wiring correct? • Do you have switching authority? Check the value of switching authority („local“ or „remote“). • Is switching blocked by the synchro-check?

Troubleshooting – Communication

Problem or maloperation in…	*Problem Description*	*Corrective Action*
Failure of time synchronization.		Check the following issues: • Is the correct protocol for time synchronization selected (<Device Para/ Time / TimeSync>)? • Is the timezone set correctly? • Open the status page of the used protocol. Check, if the module works correctly. • IRIGB: Is the correct type (IRIGB-00x) selected? • SNTP: Is the IP address of a valid NTP Server configured?
Failure of the TCP/IP connection.		Check the following issues with your local IT: • Does the device answer a “ping“ request? • If the device and the PC are part of different subnets, the gateway and subnet mask have to be set correctly within the device (<Device Para/ TCP/IP/ TCP/IP Config>). • Is network communication blocked by a firewall?
USB COM port is not visible on the PC.	It is not possible to connect Smart view, Field Device Installer or some other application to the relay via USB. The corresponding USB port (e.g. COM 5) is not visible in the application.	Check the following issues: • Smart view: Have you installed release 4.40 or higher? • Plug off the USB cable from the protective device and plug it in again. After 10 seconds try again to

Problem or maloperation in…	*Problem Description*	*Corrective Action*
		connect Smart view (or Field Device Installer) to the relay. • Restart your PC.
USB COM port visible, but no connection possible.	It is not possible to communicate with Smart view to the relay via USB. The corresponding USB port (e.g. COM 5) is available and was selected correctly.	Check the following issues: • Is Smart view access via USB enabled on the device? Check the <Device Para/ Security/ Communication> settings. • Is the USB port of the PC still occupied by another application (or program)? Close those applications. • Is the protective device started up completely?
Older protective devices with RS232: Smart view does not connect via RS232.	It is not possible to establish a connection with Smart view from a PC to the device via RS232.	Use a Smart view version release 4.40 or higher. If your PC does not have a serial port, you need a USB-to-serial-adapter that has been approved by *Woodward Kempen GmbH.* This has to be installed correctly. Verify that your cable is a zero-modem cable (please refer to the corresponding chapter). A simple serial cable does not have any flow control lines. A connection is only possible with a zero-modem cable.
Smart view cannot connect to the device. This has been possible before by using the same PC.	A connection between Smart view and device has been possible before using the same PC.	Check the following issues: • Are the connection settings of Smart view correct

Problem or maloperation in…	*Problem Description*	*Corrective Action*
	Now it is not possible to connect to the device.	(refer to <Settings/ Device Connection...>)? In case of Ethernet (TCP) connection: Is the correct IP address selected? • Is Smart view access enabled on the device? Check the <Device Para/ Security/ Communication> settings. • Check the wiring between PC and device. • In case of Ethernet (TCP) connections: Is the TCP/IP connection working? Refer to „Failure of the TCP/IP connection“. • Wait for 15 minutes and then try again to connect to the device. • Restart your PC and then try again to connect to the device.
No communication (data transfer) with Smart view possible, even though a connection has been established.	Port 52152 is being blocked by a firewall.	Check the settings of your firewall. You may require to unblock port 52152.
Line Differential: Smart view remote connection not possible.	Port 52160 is being blocked by a firewall, or the remote connection is disabled by the device settings.	Check the following issues: • Check the settings of your firewall. You may require to unblock port 52160. • Check the settings of your local device: <Protection Para/ Global Prot Para/ Prot-Transfer/ ProtCom/ Use remote access> has to be <active>. • Check the settings of your remote device:

Problem or maloperation in…	*Problem Description*	*Corrective Action*
		Is Smart view access via ProtCom enabled on the device? Check the <Device Para/ Security/ Communication> settings.

Line Differential: Protection Communication not working.	Protection Communication not working.
	State <Operation/ Status Display/ Prot-Transfer/ ProtCom/ State/ Comm. Ok> is 0.
		Check <Operation/ Status Display/ Prot-Transfer/ ProtCom/ State/ Communication>:
		• Err (no RX) or Err (no TX)
		  • check wiring
		  • verify that fiber optic line is connected to the correct fiber optic port
		• Err (corrupt data)
		device is connected to a non-HighPROTEC device
		• Err (incomp. IDs)
		  • connected to wrong partner device
		  • or adjust <Protection Para/ Global Prot Para/ Prot-Transfer/ ProtCom/ Pair ID>
		• Err (incomp. frequ)
		devices are configured to different nominal frequencies
		• Err (incomp version)
		devices contain different firmware version, please update the firmware
		• Err (incomp. Sync 1) or Err (incomp. Sync 2)
		check fiber optic:
		  • Fiber optic not plugged in correctly

Problem or maloperation in…	*Problem Description*	*Corrective Action*
		• Fiber optic lines are too long • Fiber optic lines are damaged • Fiber optic connectors are damaged • You can do a test of the fiber optic port (see under “Troubleshooting – Hardware”, Loopback Test) • OK (some errors) Some errors occurred during normal protection communication, see <Operation/ Status Display/ Prot-Transfer/ ProtCom/ State/ 24h Err Cr>. Errors may occur when plugging in/ out the connection line. The counter can be reset via <Operation/ Reset/ ProtCom.Res all Cr/Err>. You can adjust the warning level under <Protection Para/ Global Prot Para/ Prot-Transfer/ ProtCom/ 24h Err WarnLev>. • Eth.Switch det. Devices are connected via a switch. Proper operation can only be guaranteed for direct device connection. Please adjust. • OK (stable) Protection communication is running stable.
Line Differential: Protection Communication not working as expected.	Protection Communication is working, but not correctly.	If <Operation/ Status Display/ Prot-Transfer/ ProtCom/ Advanced States/ Operating Mode> shows <Loopback>,

Problem or maloperation in…	*Problem Description*	*Corrective Action*
	State <Operation/ Status Display/ Prot-Transfer/ ProtCom/ State/ Comm. Ok> is 1.	you have a loopback connection between RX and TX of your device. Please adjust the wiring.

Troubleshooting – Recorder

Problem or maloperation in…	*Problem Description*	*Corrective Action*
The Event Recorder is permanently logging new events.	The Event Recorder does permanently show new events (<Operation/ Recorders / Event rec>). To observe this phenomenon in Smart view, please execute a „refresh“ (F5 or Ctrl+F5).	Proceed as follows: 1. Look inside the Event Recorder which protection function is creating the events. 2. Check the settings of this protection function. Adapt them, if necessary. Example: Protection function df/dt (ROCOF) is configured too sensitive and is creating alarms with high frequency. Change the settings of this function.
The Disturbance Recorder is permanently creating new records.	The Disturbance Recorder shows a high number of created disturbance records. This number is growing steadily over time (<Operation/ Recorders / Disturb rec>). To observe this phenomenon in Smart view, please execute a „refresh“ (F5 or Ctrl+F5).	Check the following issues: 1. Check which events are configured to trigger the Disturbance Recorder (<Device Para/ Recorders / Disturb rec>), e.g. Protection Alarm. 2. Check within the Event Recorder, which protection function creates the trigger (<Operation/ Recorders / Event rec>). 3. Check the settings of this protection function. Adapt them, if necessary. Example: Protection function df/dt (ROCOF) is configured too sensitive and is creating alarms with high frequency. Change the settings of this function. Alternatively you can also change the trigger source of the Disturbance Recorder. But this is less advisable.