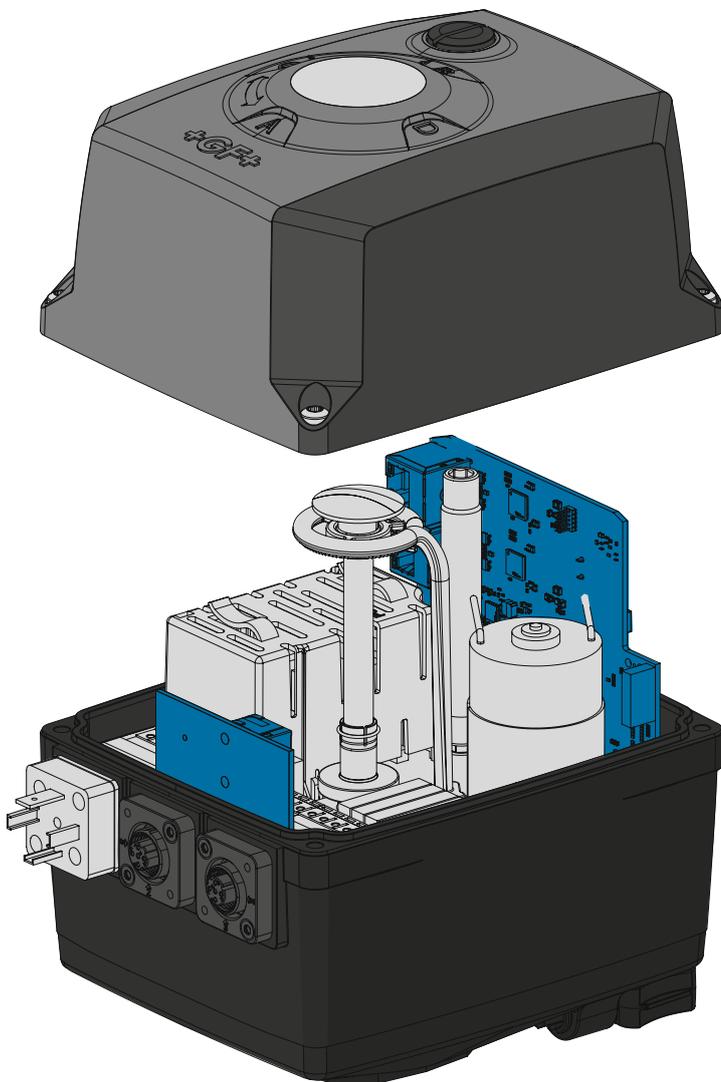


PROFINET Interface Card for Electric Actuators Type EA25 - EA250

Interface Description



2033233 EA25-250 PROFINET

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Original operating manual

Disclaimer

The technical data are not binding. They neither constitutes expressly warranted characteristics nor guaranteed properties nor a guaranteed durability. They are subject to modification. Our General Terms of Sale apply.

Observe instruction manual

The instruction manual is part of the product and an important element within the safety concept.

- ▶ Read and observe instruction manual.
- ▶ Always have instruction manual available by the product.
- ▶ Give instruction manual to all subsequent users of the product.

1 About this document

This document contains all the necessary information to operate the product.

1.1 Other applicable documents

Code	Document name
700671687	Planning Fundamentals GF Piping Systems Industry
2008328	Operating Instructions for Electric Actuators EA25-250
700278223	Instruction Manual EA25-250 Ethernet Interface Card

These document can be obtained through the GF Piping Systems representative or at www.gfps.com.

2 Intended use

Supplementing documentation to EA manual for:

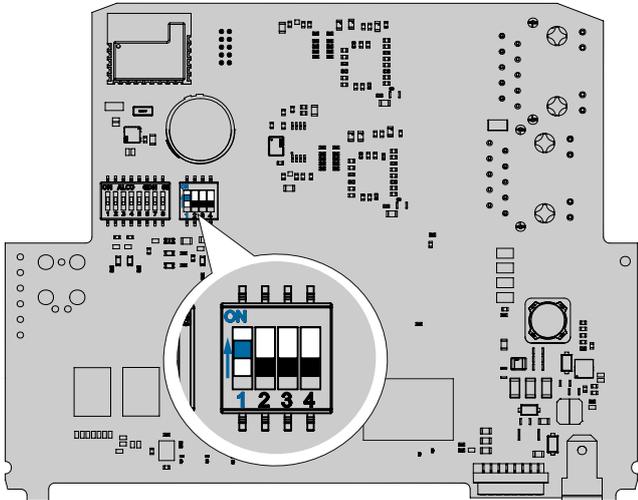
- PROFINET integration into control systems, e.g. Siemens
- Access to embedded web server

3 IT Security

3.1 Hardening Guidelines

Deactivate web server after commissioning.

There are two options for doing this:

Option 1	Option 2
<p>Turning the DIP switch 1 to "ON": On = Webserver OFF Off = Webserver ON</p> 	<p>Writing the Parameter of Submodule ID 8-1 (Name: WebserverEnabled) to 0 (false).</p>

Note:

The DIP switch is dominant. If DIP is set to ON (Webserver off) the value WebserverEnabled is read-only..

3.2 Secure operation Guidelines

- It is not allowed to connect the actuator directly to the Internet (see Planning Fundamentals Industry, chapter Defense in depth strategy).
- The actuator must not be used to bridge two different network zones.

3.3 Secure disposal guidelines

To ensure that all customer-related data on the device is deleted, it is recommended to carry out a „reset to factory settings“ before disposing of the device.

To reset the actuator to factory:

4. Open housing.
5. Connect the actuator to the power supply.
6. Press the two outer buttons on the EA socket board for at least 3 seconds (see Electric Actuator EA15-250 operating instructions).
7. The actuator acknowledges the factory reset with a „P“ on the 7-segment display.
8. Switch the actuator off.

For a secure destruction of the electronics, it can be sent back to GF Piping Systems. Contact your local GF Piping Systems partner.

3.9 Secure operation guidelines

For secure operation it is recommended to:

- Turn the Webserver off, see chapter „Hardening Guidelines“.
- Regular installation of security updates (see <https://www.gfps.com/cyber-security> for updates). See chapter „Security Update via TFTP“ for further details.

Please indicate any deviations or suspicious behavior at: <https://www.gfps.com/cyber-security>

3.10 Secure Account management

This is not applicable for this product, as only one group account is available.

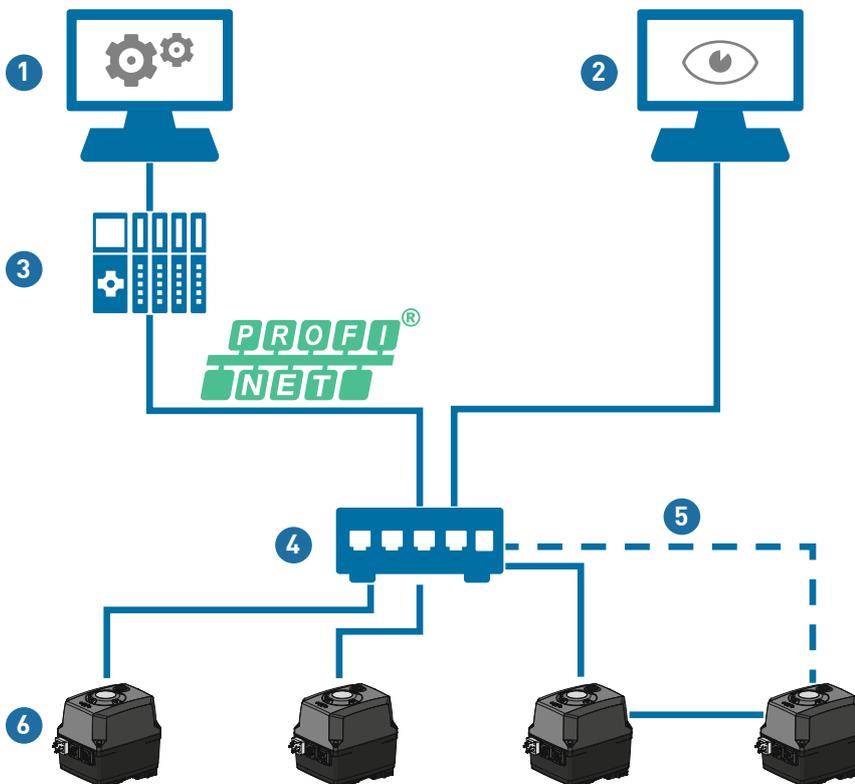
Details on the group accounts can be found in chapter „Technical data“.

4 Prerequisites / Hardware

4.1 Network topology

In general, an PROFINET network topology consists of the following components:

- Controller – programmable logic controller (PLC) including its engineering software
- The PLC is connected to the field level via a switched network using Industrial Ethernet switches, preferable managed switches.
- IO Device – the PROFINET field devices such as the Electric Actuator EA25-250 are connected in
 - A star (point-to-point connection to the switch) or
 - In a line (using the second Ethernet port of the device)
- It is possible to set-up a redundancy system using the Media Redundancy Protocol (MRP) which supports continuous communication if a device in the line fails or a cable break in the line occurs.
- The embedded web server of the GF Ethernet-enabled devices is accessible via the Ethernet network with a web client and the IP address of the Ethernet device. Alternatively the web server is also accessible via one of the two Ethernet ports directly at the device. For more details see chapter «Embedded Web Server».



Nr.	Description
1	Engineering
2	Web client
3	PLC
4	Managed Ethernet Switch
5	MRP ring
6	PROFINET device

4.2 Cables and connectors

The cable for PROFINET communication is defined in IEC 612156-6 where CAT 5e is recommended as minimum cable category. The industrial Ethernet cable contains two shielded twisted pairs with optional MRP redundancy:

- 1 pair for data transmission (TX+ and TX-)
- 1 pair for data reception (RX+ and RX-)

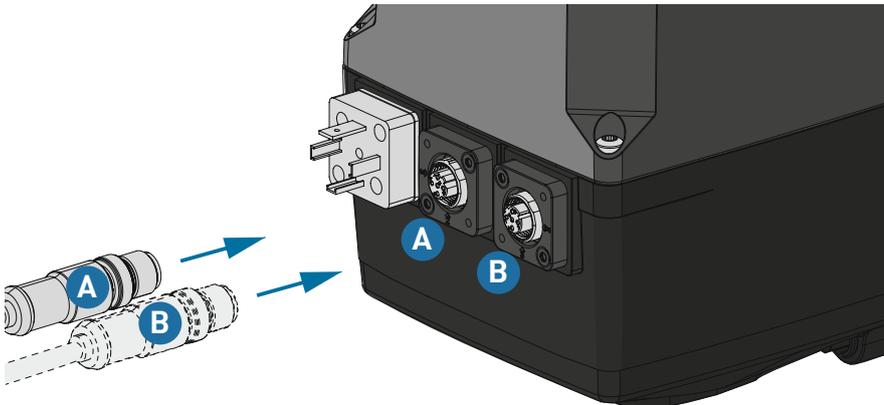
Pair Assignment	Signal Name	2 Pair
Pair 1	TX+	White-orange
	TX-	Orange
Pair 2	RX+	White-green
	RX-	Green

The connection to the Electric Actuator EA25-250 can be realized via:

- Cable glands with internal wiring to the Ethernet accessory board using RJ45 connectors
- M12 D-coded connectors with the optional M12 accessory board

Pin	Assignment	Plug image
1	Transmit +	
2	Receive +	
3	Transmit -	
4	Receive -	

The Electric Actuator EA25-250 provides two Ethernet ports. Port A is the connection to the control unit. The optional Port B can be used as connection to further actuators (line topology with optional DLR redundancy) or as local access to the embedded web server.



5 PROFINET device integration to PLC via device driver GSD

The integration of a PROFINET device to a PLC works via the dedicated device driver „General Station Description“ (GSD). The GSD is in XML format and consists of a device description defining supported input data, output data, and configuration data.

The GSD file can be accessed via:

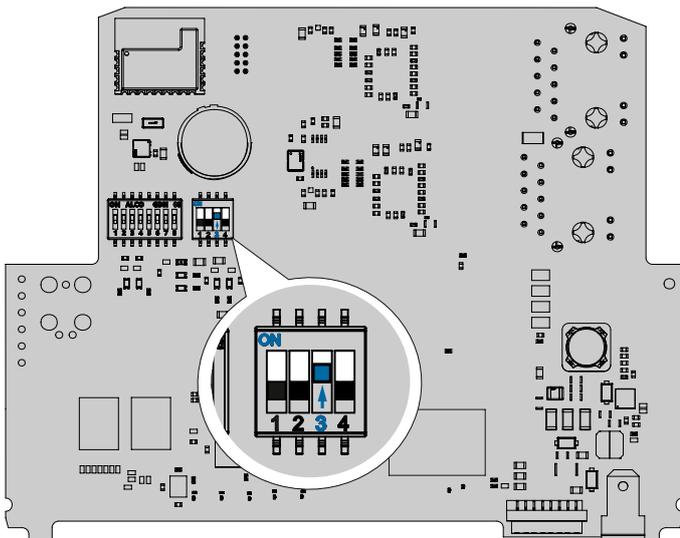
- The embedded device web server (Menu “Download” > “GSD File)
- Official PI product page: <https://www.profibus.com/ea25-45-120-250-profinet>
- <https://www.gfps.com/is-software>

6 IP address assignment

Each PROFINET device in the network needs an unique IP address. The default IP address is: 0.0.0.0 (PROFINET standard).

The IP address is assigned and changed via the Dynamic Configuration Protocol (DCP), e.g. with a tool like PRONETA or directly from the PLC engineering system.

For maintenance or service purposes, it is possible to activate the DIP switch 3 on the Ethernet accessory board to assign the GF default IP address (192.168.1.111) temporarily. In this case, the device is not able to operate.



7 Commissioning and Operation

The PROFINET communication between the controller (PLC) and the I/O device is differ-entiated in:

- Cyclic data: time critical I/O data which is transmitted in a defined cycle time
- Acyclic data: not time critical read/write parameter access (e.g. configuration)

7.1 PROFINET Modules

This chapter describes all modules in detail. Refer also to GSDML file for further information.

7.1.1 Process Values

Attribute	Description	Type	Min	Max	Default	Unit	List value
ActualPosition	The actual position shows the valve position as a percentage value.	Unsigned8	0	100	0	%	-
ControlByte	Control of the Electric Actuator	Unsigned8	0	4	0	-	0: Stop 1: Close 2: Open 4: Middle 16: Positioner Mode
PositionSetpoint	The PositionSetpoint is active, if positioner mode is enabled, see ControlByte.	Unsigned8	0	100	-	%	0: closed 100: open
NamurStatus	The NAMUR NE107 status displays the device status	Unsigned8	0	5	1	-	0: Diagnostic Passive 1: Diagnostic Active 2: Maintenance Required 3: Out of Specification 4: Function Check 5: Failure
AckReset	Possibility acknowledge error and reset cycle counter	Unsigned8	0	2	0	-	0: No Acknowledge 1: Error Acknowledge 2: Reset Cycle Counter

7.1.2 Monitoring Values

Attribute	Description	Type	Min	Max	Default	Unit	List value
Cycles	The cycles show the absolute cycles of the EA.	Unsigned32	0	2147483646	0	-	-
LimitSwitchState	Information about actuators final positions. Indicates weather an endpoint is reached (+/- 2%).	Unsigned8	0	2	-	-	0: Close 1: Open 2: Middle
ActuatorMoving	Indicates actuator movement.	Boolean	-	-	False	-	False: Actuator is not moving True: Actuator is moving
TeachinActiv	Indicates teaching state. Note: During teaching the actuator is not ready to operate	Boolean	-	-	False	-	False: Teaching is not active True: Teaching is active
ReadyToOperateState	Indicates actuator is ready for operation	Boolean	-	-	False	-	False: Actuator not ready to operate True: Actuator is ready to operate
Current	The current shows the absolute value of motor current in milliamps.	Unsigned16	0	32767	0	mA	-
TemperatureCelsius	Temperature in ° Celsius measured on EA-Baseboard..	Integer16	-100	100	-	°C	-
Temperature-Fahrenheit	Temperature in ° Fahrenheit measured on EA-Baseboard.	Integer16	-148	212	-	°F	-

7.1.3 Diagnostic Data

Data Type: Unsigned32

Errorflags

0 means no error/warning asserted.

Else:

Bit	Name	Seven segment display	Description
0	undervoltage	U	Undervoltage condition
1	over_temp_case	□	Over temperature inside EA
2	max_positioning_time	5	Time monitoring
3	heating	H	Heating defect
4	position_detection_failed	E	Position learn required e
5	position_out_of_range	P	Position out of range: The actual measured actuator position is outside position out of range
6	manual_actuation	E	Manual actuation via handle detected
7	accessory_no_reply	3	Accessory option board no answer / communication timed out
8	powerfail_action		Powerfail board is in active state
9	powerfail_accu_lvl_warn	L	Power fail intern accu level warning
10	powerfail_accu_defect	A	Power fail intern accu defect error
11	watchdog_recovery		Restart of EA through watchdog timer warning.
12	Motor current overflow	I	max motor current monitoring tripped (max_current_supervisor)
13	mot_driver_overload	8	error mot driver
14 - 31	reserved		

7.1.4 Security Settings

Attribute	Description	Type	Min	Max	Default	Unit	List value
WebserverEnabled	Read whether the Webserver is enabled, same functionality as Hardware DIP switch number 1.	Boolean	-	-	True	-	False: Disabled True: Enabled
Commissioning-ModeActive	Read whether the Commissioning Mode is enabled, same functionality as Hardware DIP switch number 2.	Boolean	-	-	False	-	False: Inactive True: Active
TftpSwUpdateEnabled	"Read whether the TFTP server is enabled, same functionality as Hardware DIP switch number 3. See chapter x.y Security Update via TFTP for further details"	Boolean	-	-	False	-	False: Disabled True: Enabled

7.2 PROFINET Start-Up Parameter

7.2.1 Cycle Time Extension

Description: The cycle time extension extends the cycle time of the electric actuator. To do this, the actuator is moved continuously into the end positions (OPEN or CLOSE). For the corresponding value please refer to the table below. These values are valid for 90° actuation. The cycle time is given in seconds.

Type: Parameter

Min: 0

Max: 9

Default: 0

Note: This setting is dependent on EA-type - same as setting on monitoring board.

All values in [seconds]

Value	EA25	EA45	EA120	EA250
0	7	7	25	27
1	10	10	28	35
2	13	13	32	40
3	15	15	38	45
4	18	18	42	50
5	20	20	48	55
6	23	23	52	60
7	25	25	58	65
8	28	28	62	70
9	30	30	67	75

7.2.2 Cycle Time Monitoring

Description: The cycle time monitoring monitors the duration of a preset cycle time of the electric actuator. As soon as the cycle exceeds the preset time, an error is reported. For the corresponding value please refer to the table below. These values are valid for 90° ac-tuation. The cycle time is given in seconds.

Type: Parameter

Min: 0

Max: 9

Default: 0

Note: This setting is dependent on EA-type - same as setting on monitoring board.

All values in [seconds]

Value	EA25	EA45	EA120	EA250
0	8	7	20	30
1	11	10	30	40
2	14	13	35	40
3	17	16	40	45
4	20	19	50	55
5	23	22	50	55
6	26	25	55	60
7	29	28	60	65
8	32	31	65	70
9	36	34	75	75

7.2.3 Current Monitoring

Description: The current monitoring function monitors the motor current. If the motor current is higher than the pre-set value, an error is reported and the actuator will remain in place.

Type: Parameter

Min: 0

Max: 9

Default: 9

Note: This setting is dependent on EA-type - same as setting on monitoring board.

Current Monitoring all values in [mA]

Value	EA25	EA45	EA120	EA250
0	25	25	50	50
1	100	300	300	400
2	150	350	400	500
3	200	400	500	600
4	250	450	600	700
5	300	500	700	800
6	400	600	800	1000
7	500	700	900	1200
8	600	900	1000	1500
9	700	1100	1200	1800

7.2.4 Webserver Off

Description: This value disables the webserver - via software. Attention, as hardware has higher priority: If DIP switch no. 1 is active, this value has no effect.

Type: Parameter

Min: 0

Max: 1

Default: 0

Note: This setting is dependent on EA-type - same as setting on monitoring board.

Current Monitoring all values in [mA]

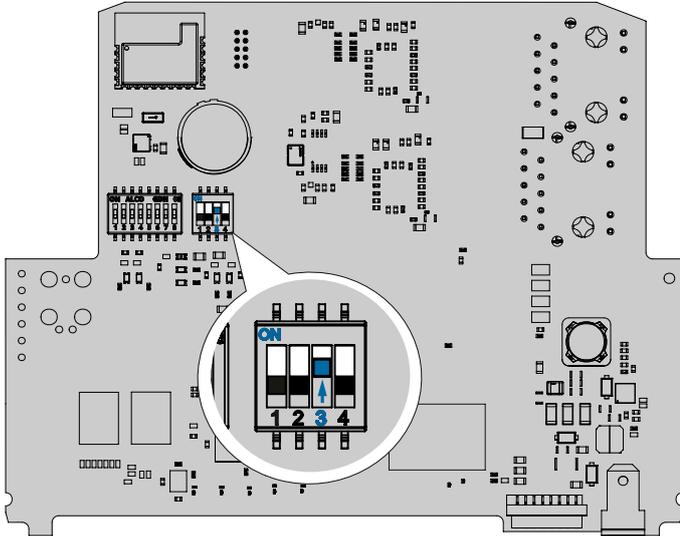
Value	EA25	EA45	EA120	EA250
0	25	25	50	50
1	100	300	300	400
2	150	350	400	500
3	200	400	500	600
4	250	450	600	700
5	300	500	700	800
6	400	600	800	1000
7	500	700	900	1200
8	600	900	1000	1500
9	700	1100	1200	1800

8 Embedded Web Server

8.1 Pre-requisites

To connect to the embedded web server, make sure that the following pre-requisites are fulfilled:

1. DIP switch 1 on Ethernet board is inactive (DIP Switch down)

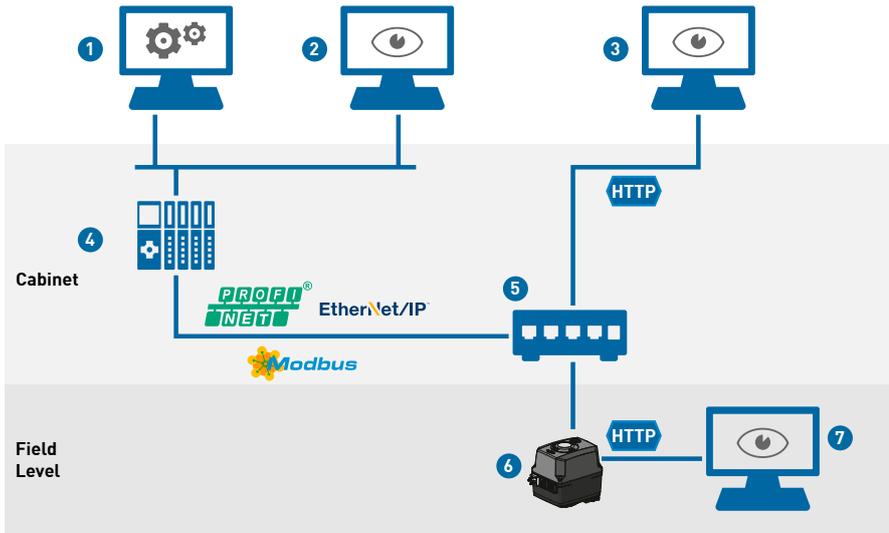


2. Web server is not deactivated via software (see chapter «Webserver Off»)
3. Network settings
The network settings of the device (IP address, subnet mask) need to be known in order to establish a connection to the embedded web server.

Default network settings

- IP address: 0.0.0.0
- Subnet mask: 0.0.0.0
- Note: With the default settings, no connection to the embedded web server is possible. Assign a valid IP address first (e.g. via DCP with a tool like PRONETA)

4. Connection to the device



Nr.	Description
1	Engineering System (PLC software)
2	Operator/Maintenance systems (SCADA, HMI, etc.)
3	Web Server (locally connected to switch)
4	PLC
5	Managed Ethernet Switch
6	EtherNet/IP device
7	Web Server (connected to 2nd port of device)

1. Locally

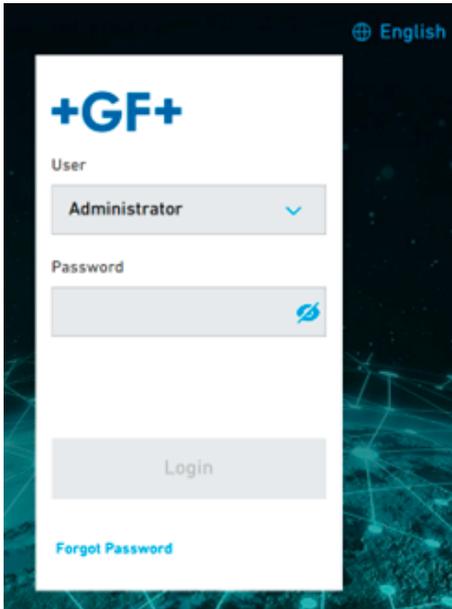
- ▶ Only possible if one of the two Ethernet ports of the Electric Actuator is free
- ▶ Connect the operating tool (e.g. laptop) to one of the free ports of the device using an Industrial Ethernet cable
- ▶ Ensure that the network settings of the operating tool match to the network settings of the device (same IP address range and matching subnet mask)
- ▶ Open a web browser and enter the IP address of the device
- ▶ Continue with the operation of the web server as described in chapter "Web Server User Interface"

2. Via network

- ▶ Ensure that the network settings of the operating tool match to the network settings of the device (same IP address range and matching subnet mask)
- ▶ Open a web browser and enter the IP address of the device
- ▶ Continue with the operation of the web server as described in chapter "Web Server User Interface"

8.5 Web Server User Interface

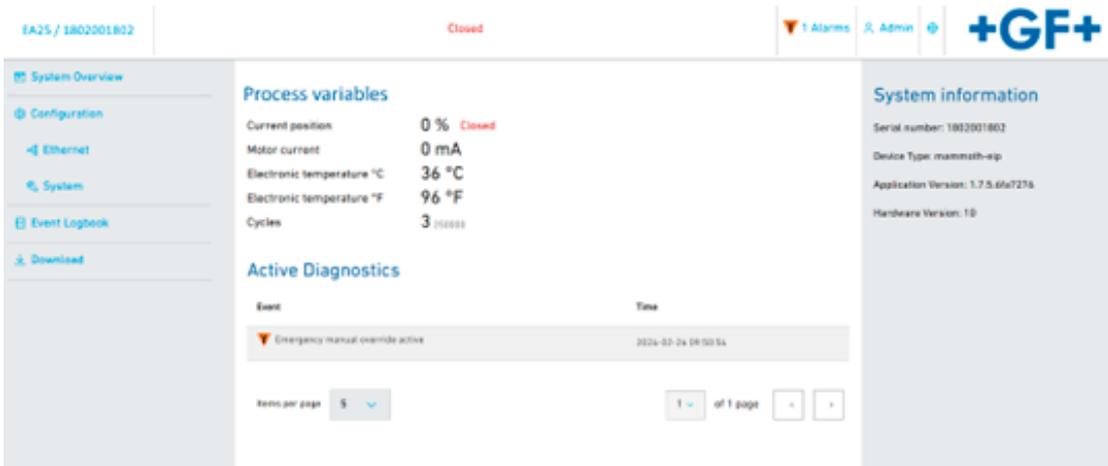
8.5.1 Login



- The default password for the first login is the same as the name of the selected user role:
 “Operator” for role “Operator”
 “Administrator” for role “Administrator”
- The system enforces the change of the default password after the first login.
- In case of forgotten passwords, a factory reset is required

8.5.2 General structure of UI

The user interface is divided into the following areas



1. Header

Consists of most important device information: Device name, current valve position, global device status (NE107), Logout, Language selection

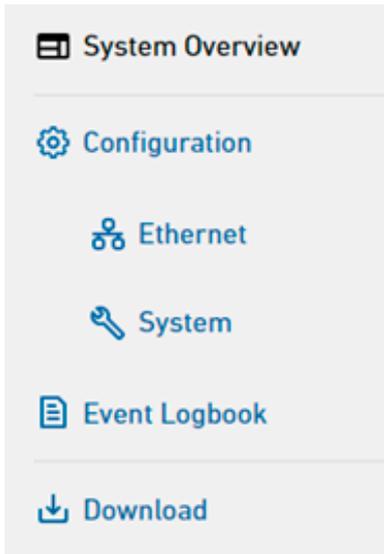
2. Menu navigation

Provides the possibility to browse through the menu to get access to parameters and functionalities

3. Content area

Shows the content of the selected menu, see details in chapter “Menus and Functionalities”

8.5.3 Menus and Functionalities



System overview

This menu provides a general overview of most important information:

- Process variables (e.g. valve position, motor current)
- Identification information about the device (e.g. serial number)
- Current diagnostics (all currently active diagnostic events)

Configuration

These menus provide the configuration of the device:

- General device settings, e.g. Action on signal loss, motor current monitoring
- Ethernet settings, e.g. IP address
- System settings, e.g. session timeout, reset, software update

Event logbook

This menu provides an historical overview of events (general system events, diagnostic events, parameter changes). Maximum 5000 events are stored within the logbook. After-wards, the oldest entries are deleted.

Note: In the menu „Download“, it is possible to download the current state of the event log-book to a PDF file.

Download

This menu provides the possibility to download the following files from the device:

- Device Report: generates a PDF report with all device information
- Event logbook: generates a PDF report with the latest 5000 historical events
- GSD: provides the device driver for PLC integration
- User manual: provides the user manual of the Electric Actuator

9 Security Update via TFTP

To update the device, use the files located in the GF download center:

- <https://www.gfps.com/is-software>

Precondition for the PC to execute the update:

- TFTP must be activated/available on the PC
- The PowerShell Execution Policy should be set to: "RemoteSigned"

Steps to perform the software update

1. Disconnect the device from power
2. Activate the TFTP Enable Dip Switch No. 4
3. Power the device, the actuator will blink and signal ||| in the seven segment display
4. Open a Powershell Console and navigate to the Electrical Actuator Update Package
5. If the device is configured with the GF standard IP address (192.168.1.111) you can start the update script directly without further parameters
 - a. To configure the device temporarily with the standard IP, Dip switch 3 can be activated. A reboot of the device is required for the configuration to become effective.
 - b. It is possible to set an IP address, in case the device is configured to different IP address, therefore provide the parameter "-Ip XXX.XXX.XXX.XXX" to the script
6. The script will provide feedback similar to this output:

```
PS C:\Users\GeorgIloTLab\Downloads\TFTP_Update_Package_1.7.6.2bcbd4d> .\ElectricalActuatorStartUpdate.ps1
Transcript started, output file is .\log\update.log
Connecting to Device on IP: 192.168.1.111
Detected Variant is XXX
Starting Update
Update Finished successfully
Transcript stopped, output file is C:\Users\GeorgIloTLab\Downloads\TFTP_Update_Package_1.7.6.2bcbd4d\log\update.log
```

7. If the output of the script is "Update Finished successfully" all steps succeeded.
 - a. In case of any errors please check the files in the log folder for questions to the support
8. Disable Dip Switch 3 and 4 and reboot the device.

10 Troubleshooting

Green LED (Activity)	Red LED (Failure)	Blue LED (Signaling)	Description
Blinking	-	-	Normal operation
-	-	Blinking	DCP Signaling
-	Steady on	Blinking	Contact service

11 Technical data

Link to PI Certificate:

- <https://www.gfps.com/is-software>

Security

- Security level: SL1
- <https://www.gfps.com/is-software>

Protocol data

- Conformance class: CC-B PA
- PROFINET version: 2.43
- Netload class: I
- Minimum device interval: 8 ms
- MRP support: yes

12 Further references

PROFINET Installation Guidelines for Design, Assembling and Commissioning:

- <https://www.profibus.com/download/profinet-installation-guidelines>

Local support around the world

Visit our webpage to get in touch with your local specialist:
www.gfps.com/our-locations



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