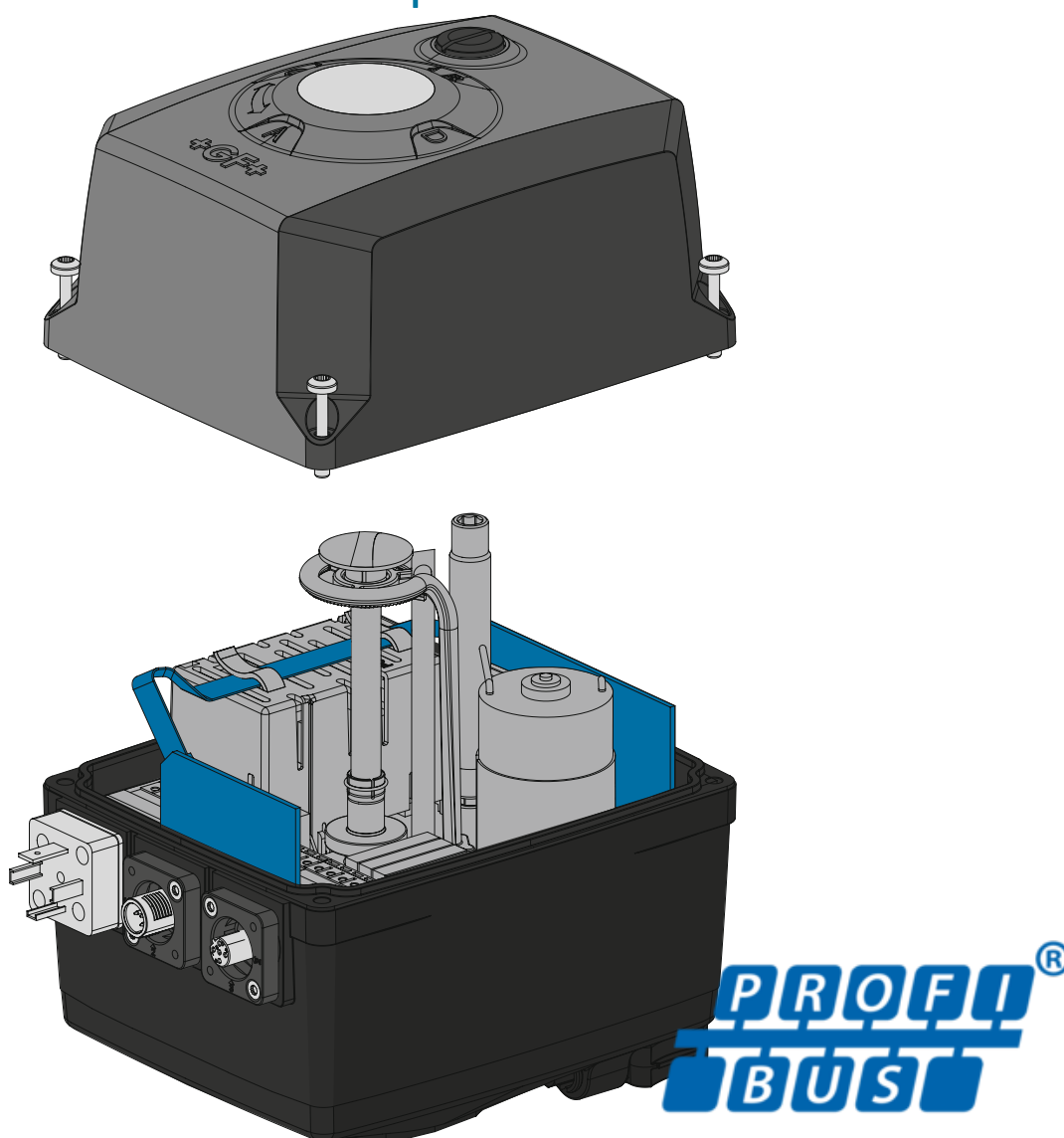


# Profibus DP-V0 Electric Actuators Type EA25 - EA250

## Interface Description



2038589 EA25-250 Profibus DP-V0

MA\_00150 / EN / 01 (06.2023)

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**Contents**

<b>1</b>	<b>Intended use</b>	<b>4</b>
<b>2</b>	<b>About this document</b>	<b>4</b>
2.1	Warnings	4
2.2	Further symbols and labels	4
2.3	Other applicable documents	4
2.4	Abbreviations	4
<b>3</b>	<b>Safety information</b>	<b>5</b>
3.1	Intended use	5
3.2	Users and training	5
3.3	Precautions	5
3.4	Transport and Storage	5
3.5	Disposal	5
<b>4</b>	<b>Slave Address</b>	<b>6</b>
<b>5</b>	<b>Cyclic data exchange</b>	<b>6</b>
5.1	Configurations of cyclic data	6
5.2	Output Data (MASTER – SLAVE)	10
5.3	Input Data (SLAVE – MASTER)	11
<b>6</b>	<b>Data Exchanged During Parametrization</b>	<b>14</b>
6.1	BCDSET0	14
6.2	BCDSET1	14
6.3	NSIGACT	15
<b>7</b>	<b>Diagnosis</b>	<b>15</b>
7.1	PROFIBUS diagnosis	15
7.2	LED	15

## 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 Intended use

Profibus is a standard for fieldbus communication in automation technology. DP-V0 indicates the cyclic exchange of data and diagnostics.

The Profibus DP-V0 is used to upgrade Electric GF Actuators Type EA25, EA45, EA120 and EA250 with the Profibus interface. The board has to be installed into the designated slot of the actuator. This board can be used for 24 VAC/DC as well as for 100-230 VAC actuator versions. The connection with the customer provided PLC will be realized via two M12 plugs.

## 2 About this document

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

### 2.1 Warnings

In this instruction manual, warnings are used, which shall warn you of death, injuries or material damage. Always read and observe these warnings!

#### CAUTION!

##### **Dangerous situation!**

Non-observance may result in minor injuries.

- Measures to avoid the danger.

### 2.2 Further symbols and labels

Symbol	Meaning
1.	Call for action in a certain order: Here, you have to do something.
►	Call for action: Here, you have to do something.

### 2.3 Other applicable documents

Symbol	Meaning
700671687	Planning Fundamentals GF Piping Systems Industry
2008328	Operating Instructions for Electric Actuators EA25-250

These document can be obtained through the GF Piping Systems representative or at [www.gfps.com](http://www.gfps.com).

### 2.4 Abbreviations

Abbreviation	Meaning
RTU	Remote Terminal Unit
PLC	Programmable Logic Controller

## 3 Safety information

### 3.1 Indended use

- Only use the product for the intended purpose, see chapter Intended use.

### 3.2 Users and training

- Product and accessories only to be operated by persons, who have the necessary training, knowledge or experience.
- Regularly instruct personnel on all questions regarding the local regulations applying to occupational safety and environmental protection, especially for pressurized pipelines.
- Make sure that personnel know, understand and follow the instruction manual and the instructions contained therein.

The following target groups are addressed in this instruction manual:

- **Operators:** Operators are instructed in the operation of the actuator and observe the safety guidelines.
- **Service staff:** The service staff have been professionally trained and carry out maintenance work.
- **Electrically qualified person:** Persons who work on the electrical equipment must be technically trained and qualified.

### 3.3 Precautions

- Observe the related instruction manuals. They are an integral component of this manual.
- Take precautions against electrostatic hazards.
- Do not use the product if it is damaged or faulty. Sort out the product immediately or obtain service if damaged.
- Location: Only install this products out of reach for unqualified persons. Also ensure it cannot be hit by any moving objects.

### 3.4 Transport and Storage

The product must be handled, transported and stored with care. Please note the following points:

- Protect the product against external forces during transport (impacts, knocks, vibrations, etc.).
- Transport and/or store the product in its unopened original packaging.
- Protect the product from heat (humidity), dust, dirt, moisture as well as heat and ultraviolet radiation.
- Ensure that the product is not damaged either by mechanical or thermal influences.
- Prior to installation, the product should be inspected for transport damages. Damaged products must not be installed.

### 3.5 Disposal

#### ⚠ NOTICE!

##### Properly disposal!

Before disposal, separate the individual materials into recyclable materials, normal waste and hazardous waste.

- Observe local regulations, standards and guidelines.
- Products with electrical components must be disposed of separately.
- Consult safety data sheet.
- A product marked with this symbol must be taken to separate collection of electrical and electronic equipment.
- For questions concerning the disposal of the product, please contact your national representative of GF Piping Systems.



## 4 Slave Address

The slave address is changeable via PROFIBUS-DP in the Range 1...125.

Slave address 126 is the reserved default address after factory reset.

Slave address setting 0 is not allowed.

Use SetSlaveAddress message via PROFIBUS-DP for setting the slave address.

If slave address setting is locked via PROFIBUS-DP it can be reset to the default address by triggering a factory reset on the Electric Actuator base-board (see user manual of the Electric Actuator).

Alternatively, a temporary setting of the PROFIBUS-DP address is possible via the service interface.

## 5 Cyclic data exchange

### 5.1 Configurations of cyclic data

Firmware: V1.00

Only the data exchange telegram 1 is supported.

From firmware V1.01 and hardware version Revision C on: User can select one of 8 possible data exchange telegrams via the modules.

		Telegram 1	Telegram 2	Telegram 3	Telegram 4	Telegram 5	Telegram 6	Telegram 7	Telegram 8
Bytes Output		3	2	3	3	3	3	3	3
Bytes Input		14	1	2	3	5	7	9	10
Output	EACON	x	x	x	x	x	x	x	x
	ACKRST	x	x	x	x	x	x	x	x
	POSSET	x		x	x	x	x	x	x
Inout	TYPVLT	x							x
	STATE	x	x	x	x	x	x	x	x
	POSACT	x		x	x	x	x	x	x
	CURRENT_H	x				x		x	x
	CURRENT_L	x				x		x	x
	TEMP	x			x	x	x	x	x
	CYCLES_3	x					x	x	x
	CYCLES_3	x					x	x	x
	CYCLES_3	x					x	x	x
	CYCLES_3	x					x	x	x
	ERRFLAGS_3	x							
	ERRFLAGS_3	x							
	ERRFLAGS_3	x							
	ERRFLAGS_3	x							

The following chapters describe the predefined data exchange telegrams in more detail (byte order).

### 5.1.1 Data exchange telegram 1 (maximal, compatibility)

3 Byte Output, 14 Byte Input.

Data Exchange Telegram 1 - Output Data		
Byte 0	Byte 1	Byte 2
EACON	ACKRST	POSSET

Data Exchange Telegram 1 - Input Data		
Byte 0	Byte 1	Byte 2
TYPVLT	STATE	POSACT

Data Exchange Telegram 1 - Input Data		
Byte 3	Byte 4	Byte 5
CURRENT_H	CURRENT_L	TEMP

Data Exchange Telegram 1 - Input Data			
Byte 6	Byte 7	Byte 8	Byte 9
CYCLES_3	CYCLES_2	CYCLES_1	CYCLES_0

Data Exchange Telegram 1 - Input Data			
Byte 10	Byte 11	Byte 12	Byte 13
ERRFLAGS_3	ERRFLAGS_2	ERRFLAGS_1	ERRFLAGS_0

### 5.1.2 Data exchange telegram 2 (minimal)

2 Byte Output, 1 Byte Input.

Data Exchange Telegram 2 - Output Data	
Byte 0	Byte 1
EACON	ACKRST

Data Exchange Telegram 2 - Input Data	
Byte 0	
STATE	

### 5.1.3 Data exchange telegram 3

3 Byte Output, 2 Byte Input.

Data Exchange Telegram 3 - Output Data		
Byte 0	Byte 1	Byte 2
EACON	ACKRST	POSSET

Data Exchange Telegram 3 - Input Data	
Byte 0	Byte 1
STATE	POSACT

5.1.4 Data exchange telegram 4

3 Byte Output, 3 Byte Input.

Data Exchange Telegram 4 - Output Data		
Byte 0	Byte 1	Byte 2
EACON	ACKRST	POSSET

Data Exchange Telegram 4 - Input Data		
Byte 0	Byte 1	Byte 2
STATE	POSACT	TEMP

5.1.5 Data exchange telegram 5

3 Byte Output, 5 Byte Input.

Data Exchange Telegram 5 - Output Data		
Byte 0	Byte 1	Byte 2
EACON	ACKRST	POSSET

Data Exchange Telegram 5 - Input Data		
Byte 0	Byte 1	Byte 2
STATE	POSACT	TEMP

Data Exchange Telegram 5 - Input Data		
Byte 3	Byte 4	
CURRENT H	CURRENT L	

5.1.6 Data exchange telegram 6

3 Byte Output, 7 Byte Input.

Data Exchange Telegram 6 - Output Data		
Byte 0	Byte 1	Byte 2
EACON	ACKRST	POSSET

Data Exchange Telegram 6 - Input Data		
Byte 0	Byte 1	Byte 2
STATE	POSACT	TEMP

Data Exchange Telegram 6 - Input Data			
Byte 3	Byte 4	Byte 5	Byte 6
CYCLES_3	CYCLES_2	CYCLES_1	CYCLES_0



5.1.7 Data exchange telegram 7

3 Byte Output, 9 Byte Input.

Data Exchange Telegram 7 - Output Data		
Byte 0	Byte 1	Byte 2
EACON	ACKRST	POSSET

Data Exchange Telegram 7 - Input Data		
Byte 0	Byte 1	Byte 2
STATE	POSACT	TEMP

Data Exchange Telegram 7 - Input Data			
Byte 3	Byte 4	Byte 5	Byte 6
CYCLES_3	CYCLES_2	CYCLES_1	CYCLES_0

Data Exchange Telegram 7 - Input Data		
Byte 7	Byte 8	
CURRENT_H	CURRENT_L	

5.1.8 Data exchange telegram 8

3 Byte Output, 10 Byte Input.

Data Exchange Telegram 8 - Output Data		
Byte 0	Byte 1	Byte 2
EACON	ACKRST	POSSET

Data Exchange Telegram 8 - Input Data		
Byte 0	Byte 1	Byte 2
STATE	POSACT	TEMP

Data Exchange Telegram 8 - Input Data			
Byte 3	Byte 4	Byte 5	Byte 6
CYCLES_3	CYCLES_2	CYCLES_1	CYCLES_0

Data Exchange Telegram 8 - Input Data		
Byte 7	Byte 8	Byte 9
CURRENT_H	CURRENT_L	TYPVLT

## 5.2 Output Data (MASTER – SLAVE)

### User data received by Slave in the Data Exchange Telegram 0

Byte 0 (First received)	Byte 1	Byte 3 (Last received)
EACON	ACKRST	POSSET

### 5.2.1 EACON

Electric Actuator Control Byte

Byte-Name: EACON								
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Action
reserved	reserved	reserved	positioner enable	stop	middle	open	close	
X	X	X	0	X	0	0	0	STOP
X	X	X	0	X	X	X	1	CLOSE
X	X	X	0	X	X	1	0	OPEN
X	X	X	0	X	1	0	0	MIDDLE
X	X	X	1	X	X	X	X	POSITIONER_MODE

Close Dominant as in wired Version.

### 5.2.2 ACKRST

ByteName: ACKRST								
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Action
reserved	reserved	reserved	reserved	reserved	reserved	cycle_cntr_reset	error_ack	
X	X	X	X	X	X	1	X	reset_cycle_counter
X	X	X	X	X	X	X	1	error_ack

### 5.2.3 POSSET

ByteName: POSSET								
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	comment
position_setpoint in percent 0...100%								0...100 = setpoint range
active if positioner is enabled								0 = closed position
								100 = open position
								101...255 = invalid alue
								(no action)

### 5.3 Input Data (SLAVE – MASTER)

User data sent by Slave in the Data Exchange Telegram 0		
Byte 0 (First sent)	Byte 1	Byte 2
TYPVLT	STATE	POSACT

User data sent by Slave in the Data Exchange Telegram 1		
Byte 3	Byte 4	Byte 5
CURRENT_H	CURRENT_L	TEMP

User data sent by Slave in the Data Exchange Telegram 2			
Byte 6	Byte 7	Byte 8	Byte 9
CYCLES_3	CYCLES_2	CYCLES_1	CYCLES_0

User data sent by Slave in the Data Exchange Telegram 3			
Byte 10	Byte 11	Byte 12	Byte 13 (Last sent)
ERRFLAGS_3	ERRFLAGS_2	ERRFLAGS_1	ERRFLAGS_0

#### 5.3.1 TYPVLT

TYPVLT byte contains information about electric actuator type and voltage version. It does not change during normal operation.

Byte-Name: TYPVLT							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<ea_voltage>				<ea_type>			

**<ea\_type>**

- 0 = EA25
- 1 = EA45
- 2 = EA120
- 3 = EA250

**<ea\_voltage>**

- 0 = 24VDC / 24VAC
- 1 = 230VAC

5.3.2 STATE

Byte-Name: STATE							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
reserved	reserved	ready_relay	teachin_active	actuator_moving	limit_switch_middle	limit_switch_open	limit_switch_closed

5.3.3 POSACT

POSACT is the actual measured relative position between closed and open positions in percent.

Byte-Name: POSACT							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<position_actual_value>							

<position\_actual\_value>

range = 0...100%

0 = position\_closed

100 = position\_open

255= position invalid

5.3.4 CURRENT

The CURRENT word holds the absolute value of motor current in milliamps

Word-Name: CURRENT															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<motor_current>															

<motor\_current> = Absolute value of motor current in milliamps.

5.3.5 TEMP

Temperature measured on EA-Baseboard.

Byte-Name: TEMP							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<temperature_base>							

<temperature\_base> = Temperature in DEG-Celsius (-20...100°C).

5.3.6 CYCLES

Double-Word = 32Bit-Value.

<cycle\_counter> = Number of movement cycles since last "cycle\_counter\_reset".

### 5.3.7 ERRFLAGS

Error and warning flags of EA.

Also transmitted via user diagnostics. <error\_flags> = 0 means no error/warning asserted.

<error\_flags> = Double-Word = 32Bit-Value.

Bit	Name	Description		
0	undervoltage	Undervoltage condition / seven segment 'U'		
1	over_temp_case	Over temperature inside EA / seven segment 'O'		
2	max_positioning_time	Time monitoring / seven segment 'S'		
3	heating	Heating defect / seven segment 'H'		
4	position_detection_failed	Position learn required / seven segment 'e'		
5	position_out_of_range	Position out of range: The actual measured actuator position is outside position out of range / seven segment 'P'		
6	manual_actuation	manual actuation via handle detected / seven segment 'E'		
7	accessory_no_reply	accessory option card no answer / communication timed out / seven segment '9'		
8	powerfail_action	Powerfail card is in active state		
9	powerfail_accu_lvl_warn	power fail intern accu level warning / seven segment 'L'		
10	powerfail_accu_defect	power fail intern accu defect error / seven segment 'A'		
11	watchdog_recovery	Restart of EA through watchdog timer warning.		
12	Motor current overflow	max motor current monitoring tripped / seven segment 'I' (max_current_supervisor)		
13	mot_driver_overload	error mot driver / seven segment 'b'		
14	reserved			
15	reserved			
16	reserved			
17	reserved			
18	reserved			
19	reserved			
20	reserved			
21	reserved			
22	reserved			
23	reserved			
24	reserved			
25	reserved			
26	reserved			
27	reserved			
28	reserved			
29	reserved			
30	reserved			
31	reserved			

## 6 Data Exchanged During Parametrization

First seven Bytes are standard in DPV0. Byte 7 to 9 are reserved for DPV1.

User data sent from master to module in parametrization telegram		
Byte 10	Byte 11	Byte 12 (Last received)
BCDSET0	BCDSET1	NSIGACT

### 6.1 BCDSET0

Byte-Name: BCDSET0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<cyc_time_mon_bcd>				<cyc_time_ext_bcd>			

#### <cyc\_time\_ext\_bcd>

Min: 0

Max: 9

Default: 0

Description:

Extends the time for a movement of typical 90°.

Positioning speed can be reduced with this setting.

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

#### <cyc\_time\_mon\_bcd>

Min: 0

Max: 9

Default: 4

Description:

Set threshold time for maximum accepted positioning time until target position is reached.

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

### 6.2 BCDSET1

Byte-Name: BCDSET1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
reserved				<current_mon_bcd>			

#### <current\_mon\_bcd>

Min: 0

Max: 9

Default: 9

Description:

Set threshold current for the current monitoring feature.

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

## 6.3 NSIGACT

Action on loss of signal

Byte-Name: NSIGACT							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
reserved	reserved	reserved	reserved	reserved	reserved	< signal_loss_action >	error_ack

### <signal\_loss\_action>

<signal_loss_action>	
Value	Action / Description
0	STOP / EA stops.
1	CLOSE / EA moves to CLOSE-Position.
2	OPEN / EA moves to OPEN-Position.
3	reserved

If the PROFIBUS signal is lost e.g. master is offline or master state changes to clear (fail-safe) mode the EA performs the selected "signal\_loss\_action".

## 7 Diagnosis

### 7.1 PROFIBUS diagnosis

If a fault has occurred the diag-bit is set by the slave -> master requests diagnostic information.

Diagnosis data see: ERRFLAGS and GSD-File.

### 7.2 LED

Indication LED on PROFIBUS-DP-MODULE (red, green)	
LED-state	Description
Off	No Power
Red blinking	Fatal Error
Red	No communication on Bus / Communication timeout
Green blinking	Master is in "Clear-Mode" (fail safe)
Green	OK normal Dataexchange

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