GEMÜ®

Diaphragm Valve, Metal / Plastic

Construction

The GEMÜ 648 motorized 2/2-way valve has a compact electric linear actuator with a motor designed for DC and AC operating voltages. The integrated gear translates the rotary motor movement into a linear movement.
The actuator is available as an Open/Close version or with an integrated positioner and additional process controller.
The membrane keypad and the backlit display are at the front of the unit and easily accessible.
The integrated electronic system enables easy setting of actuating speed, control parameters and other functions.

Features

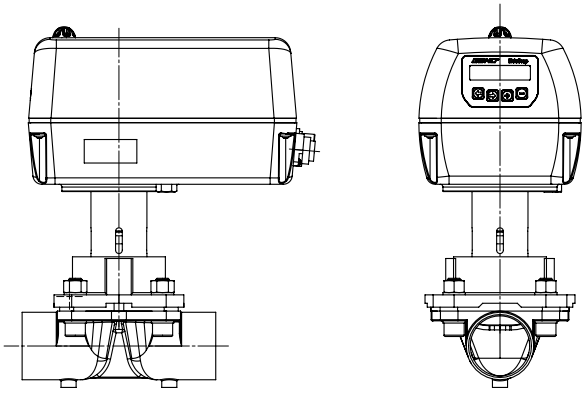
- Suitable for inert and corrosive* liquid and gaseous media
- OPEN/CLOSE function or CONTROL version
- Actuating speed and control parameters easily adjustable
- Optimized initialisation and valve control
- Parameterisation during operation
- Torque limitation
- Electronic limitation of opening and closing stroke
- Positioner and process controller are synchronized with each other
- Optional integrated emergency power supply module with selectable safety position
- Setting of functions via display

Advantages

- Can be combined with virtually all GEMÜ diaphragm valve bodies
- 2-colour LEDs with good visibility for indication of end position and t ravel direction
- Extensive integrated diagnostic functions
- Simple commissioning and versatile operating facilities
  - Fascia keys
  - PC connection with Internet browser MS® Internet Explorer
  - Field bus interfaces, e.g. Profibus DP
  - **e.sy**-com interface for connecting a Bluetooth module or industrial modem to enable access via PDA or PC

*see information on working medium on page 2

GEMÜ 648



For installation dimensions see page 6.

GEMÜ® 648

Technical data

Working medium

Corrosive, inert, gaseous and liquid media which have no negative impact on the physical and chemical properties of the body and diaphragm material.

Max. perm. pressure of working medium see table on page 4

Max. perm. temp. of working medium 150° C (standard)

Operating conditions

Storage temperature	-10 to +60°C
Ambient temperature	see Derating curve on page 4

General information

Protection class to EN 60529	IP 65
Weight	See table
Dimensions L x W x H	See dimensional drawing
Mounting position	Optiona
Particulars:	
Safety function during electrical powersupply failure (by optional emergency power supply module)	
Position indication	
LED	2-colour, good visibility
Directives	
EC low voltage directive	73/23/EEC
EMC directive	89/336/EEC
Interference emission	EN 61000-6-4
Interference resistance	EN 61000-6-2
Rating	40%

Actuator materials

Housing cover	PSU
Housing base	PPS 40 glass reinforced
Distance piece	1.4301

Electrical data (all versions)

Power supply	
Power supply	U_V = 24V DC ± 10% max. residual ripple ± 10% U_V = 120V 50/60 Hz ± 10% U_V = 230V 50/60 Hz ± 10%
Power consumption	DC approx. 96 W AC approx. 120 VA
Operating elements	
Keys	4 fascia membrane protected keys

Electrical data (Economy version)

Electrical connection	
Power supply	1 x Binder series 693
Input signals	1 x M12 plug A-coded
Input signals	
Control inputs	2 x 24 V DC
Voltage	U_{rated} = 24V DC
Level „Logical 1“	14 V DC ≤ U_H ≤ 28V DC
Level „Logical 0“	0 V DC ≤ U_L ≤ 8V DC
Input current	I_{typ} = 2.5 mA (@ 24V DC)

Electrical data (optional integrated emergency power supply module)

Charging time	max. 3 min (for complete charging)
Additional current consumption during charging process	max. 3 A
Number of guaranteed switching cycles at full load	1 switching cycle

Electrical data (Industrial version)

Electrical connection	
Power supply	1 x Binder series 693
Input/output signals	
OPEN/CLOSE control, process controller and positioner	
	1 x M12 plug A-coded 1 x M12 socket A-coded* 1 x M12 plug B-coded * only for Digital inputs option
Profibus DP	1 x M12 socket B-coded 1 x M12 plug B-coded
Input signals[1]	
Control inputs	2 x 24V DC
Digital inputs (optional)[1]	2 x
Function	selectable (ON, OFF, safety position, loading of parameter set)
Voltage	U_{rated} = 24 V DC
Level „Logical 1“	14 V DC ≤ U_H ≤ 28 V DC
Level „Logical 0“	0 V DC ≤ U_L ≤ 8 V DC
Input current	I_{typ} = 2.5 mA (@ 24 V DC)
Output signals[1]	
Digital outputs	
Number	2 relay outputs (potential-free)
Switching voltage	= U_V
Switching current	≤ 0,5 A
Function	selectable (position, warnings, errors)
Display elements	
Text display	2-line display with 16 digits each, with background light
LED	Profibus status (only with Profibus DP version)
Interfaces	
PC interface[1]	RS 232 with PPP protocol for Internet browser
Field bus (optional)	Profibus DP V1 interface certified

Electrical data (Industrial version with integrated control module)

Analogue inputs [1,2]	
Set value external	0/4 - 20 mA (selectable) (for version with positioner)
Actual value external	0/4 - 20 mA (selectable) (for version with process controller)
Input resistance	120 Ω
Analogue output [1]	
Actual value position feedback	4 - 20 mA
Digital inputs	
Number of integrated inputs	2 inputs (use of the analogue inputs)
Voltage	U_{rated} = 24V DC
Level ”Logical 1”	14V DC ≤ U_H ≤ 28V DC
Level ”Logical 0”	0V DC ≤ U_L ≤ 8V DC
Input current	I_{typ} = 18 mA (@ 24V DC)
Positioner	
Deviation	≥ 0.1 % (adjustable)
P D parameters	adjustable
Initialisation	automatic or manual
Process controller (for version with process controller)	
Type of controller	continuous controller
PID parameters	adjustable

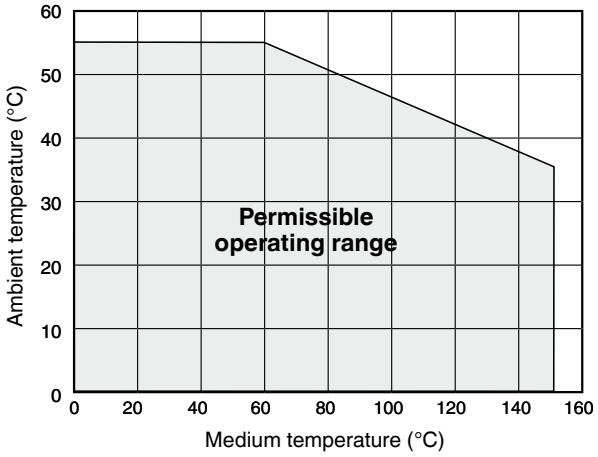
[1] Unavailable for Profibus DP (option code 2). All signals via Profibus communication.
[2] Analogue inputs can be used as digital inputs by special wiring according to the operating instructions.

Technical data

Mechanical actuator data

Actuator version 2D	
Stroke	28.8 mm
Actuating speed	max. 3.3 mm/sec.
Axial force	4500 N
Actuator size	2
Actuator version 3F	
Stroke	46.0 mm
Actuating speed	max. 1.85 mm/sec.
Axial force	7800 N
Actuator size	3
Actuator version 3G	
Stroke	37.4 mm
Actuating speed	max. 1.04 mm/sec.
Axial force	14000 N
Actuator size	3

Derating curve



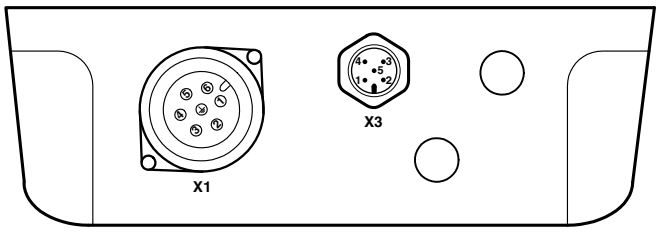
		Max. operating pressure [bar]						Kv value
MG	DN	Actuator version 2D		Actuator version 3F		Actuator version 3G		[m³/h]
		Diaphragm material		Diaphragm material		Diaphragm material		
		EPDM	PTFE	EPDM	PTFE	EPDM	PTFE	
25	15 20 25	10	6	-	-	-	-	see data sheet 620, 687, 690
40	32 40	10	6	-	-	-	-	
50	50	10	6	-	-	-	-	
80	65 80	-	-	5	5	10	6	
100	100	-	-	-	-	10	6	

Features of the different actuator versions

Features	*SideStep® Economy* OPEN / CLOSE control	*SideStep® Industrial* OPEN / CLOSE control	*SideStep® Industrial* control system
	Code A*	Code C, D	Code S, T, P, R
2-line display	-	X	X
Automatic initialisation	X	X	X
4 fascia keys	X	X	X
Position indication by LED	X	X	X
Operating indication by LED	X	-	-
e.sy-com interface	-	X	X
Axial force (adjustable)	-	X	X
Actuating speed (adjustable)	-	X	X
Option Profibus	-	X	X
Positioner	-	-	X
Option process controller	-	-	X
Option digital inputs	-	X	X
Extended diagnostic facilities	-	X	X
Alarm outputs (adjustable)	-	X	X
Analogue output	-	-	X
Min / Max position (adjustable)	-	-	X

* not available for actuator version 3

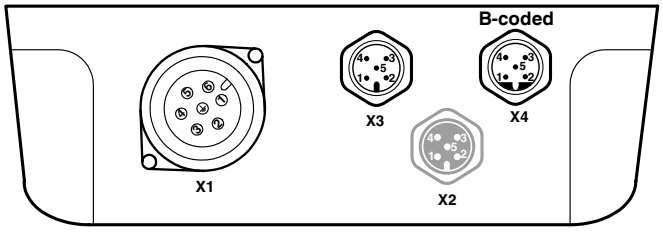
Electrical connection - OPEN/CLOSE Economy



Connection	Pin	Signal name
X 1 Connector Binder series 693	1	U_V, L1 / L+ supply voltage
	2	U_V, N / L- supply voltage
	3	n.c.
	4	n.c.
	5	n.c.
	6	n.c.
	PE	Protective earth conductor

Connection	Pin	Signal name
X 3 M12 plug A-coded	1	U_V, signal supply, 24V DC
	2	L+, direction of travel OPEN
	3	GND,direction of travel OPEN/CLOSED
	4	L+, direction of travel CLOSED
	5	Input, keypad lock, 24V DC

Electrical connection - OPEN/CLOSE Industrial



Connection	Pin	Signal name
X 1 Connector Binder series 693	1	U_V, L1 / L+ supply voltage
	2	U_V, N / L- supply voltage
	3	Common, relay output K1
	4	Make-contact, relay output K1
	5	Common, relay output K2
	6	Make-contact, relay output K2
	PE	Protective earth conductor

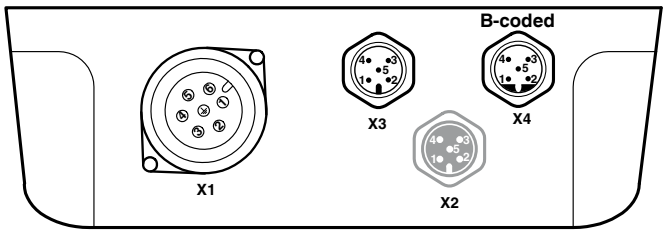
Connection	Pin	Signal name
X 2 * M12 socket A-coded	1	U_V, signal supply, 24V DC
	2	Digital input 1
	3	GND, signal supply
	4	Digital input 2
	5	n.c.

Connection	Pin	Signal name
X 3 M12 plug A-coded	1	L+, direction of travel OPEN
	2	GND, direction of travel OPEN
	3	L+, direction of travel CLOSED
	4	GND, direction of travel CLOSED
	5	n.c.

Connection	Pin	Signal name
X 4 M12 plug B-coded	1	n.c.
	2	n.c.
	3	RxD, Receive Data, RS 232
	4	TxD, Transmit Data, RS 232
	5	GND, RS 232

* Connection X 2 only available as Option Digital inputs Code 1

Electrical connection - Positioner/ process controller



Connection	Pin	Signal name
X 1 Connector Binder series 693	1	U_V, L1 / L+ supply voltage
	2	U_V, N / L- supply voltage
	3	Common, relay output K1
	4	Make-contact, relay output K1
	5	Common, relay output K2
	6	Make-contact, relay output K2
	PE	Protective earth conductor

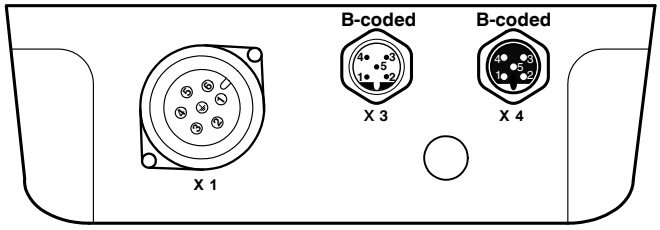
Connection	Pin	Signal name
X 2 * M12 socket A-coded	1	U_V, signal supply, 24V DC
	2	Digital input 1
	3	GND, signal supply
	4	Digital input 2
	5	n.c.

Connection	Pin	Signal name
X 3 M12 plug A-coded	1	I+, set value input 0/4 - 20 mA
	2	I-, set value input 0/4 - 20 mA
	3	I+, actual value output 4 - 20 mA
	4	I-, actual value output 4 - 20 mA
	5	n.c.

Connection	Pin	Signal name
X 4 M12 plug B-coded	1	I+, actual value input 0/4 - 20 mA
	2	I-, actual value input 0/4 - 20 mA
	3	RxD, Receive Data, RS 232
	4	TxD, Transmit Data, RS 232
	5	GND, RS 232

* Connection X 2 only available as Option Digital inputs Code 1

Electrical connection - Profibus DP



Connection	Pin	Signal name
X 3 M12 plug B-coded	1	n.c.
	2	RxD / TxD-N
	3	n.c.
	4	RxD / TxD-P
	5	Shield

Connection	Pin	Signal name
X 1 Connector Binder series 693	1	U_V, L1 / L+ supply voltage
	2	U_V, N / L- supply voltage
	3	n. c.
	4	n. c.
	5	n. c.
	6	n. c.
	PE	Protective earth conductor

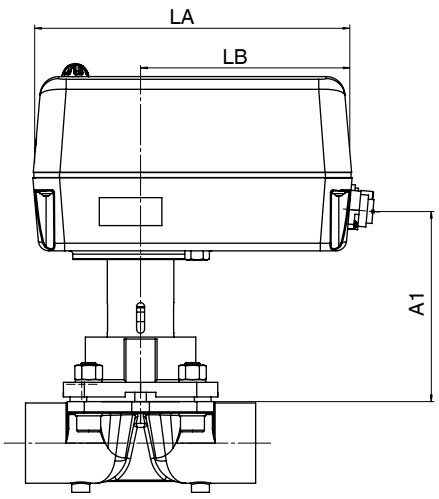
Connection	Pin	Signal name
X 4 M12 socket B-coded	1	BUS-VDC, +5 V DC
	2	RxD / TxD-N
	3	GND
	4	RxD / TxD-P
	5	Shield

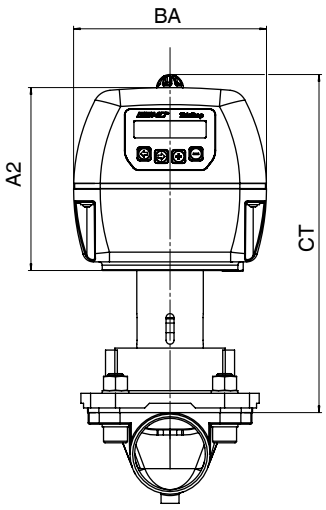
Dimensions [mm]

Installation dimensions

		Actuator version 2D							Actuator version 3F, 3G						
MG	**DN**	**CT**	**A1**	**A2**	**LA**	**LB**	**BA**	**Weight [kg] actuator**	**CT**	**A1**	**A2**	**LA**	**LB**	**BA**	**Weight [kg] actuator**
25	15 20 25	237	126	137.5	239	159	145	6.2	-	-	-	-	-	-	-
40	32 40	254	143	137.5	239	159	145	6.7	-	-	-	-	-	-	-
50	50	254	143	137.5	239	159	145	7.1	-	-	-	-	-	-	-
80	65 80	-	-	-	-	-	-	-	356	220	197	281	188	170	10.2
100	100	-	-	-	-	-	-	-	377	238	197	281	188	170	10.7

MG = diaphragm size





Use the order codes for the diaphragm, body and surface finish stated in these data sheets in the order example below.

Supply voltage/mains frequency	Code
24V DC	C1
120V 50/60 Hz	G4
230V 50/60 Hz	L4

Option	Code
Without option	0
Digital inputs	1
Profibus DP	2

Main function	Code
OPEN/CLOSE control (Economy) * (not available for actuator version 3)	A
OPEN/CLOSE control (Industrial)	C
OPEN/CLOSE control (Industrial) + emergency power supply module (not available for actuator version 3)	D
Positioner	S
Positioner + emergency power supply module (not available for actuator version 3)	T
Process controller and positioner	P
Process controller and positioner + emergency power supply module (not available for actuator version 3)	R

* With version “Main function A (Economy)“ no options are possible.

Actuator version	Code
Actuator size 2, actuating force 4500 N	2D
Actuator size 3, actuating force 5500 N	3E
Actuator size 3, actuating force 7800 N	3F
Actuator size 3, actuating force 14000 N	3G

Order example	648	50	D	0	34	14	C1	A	0	2D	1500
Type	648										
Nominal size		50			see data sheet 620, 687, 690						
Body configuration (code)			D								
Connection (code)				0							
Valve body material (code)					34					see data sheet 687	
Diaphragm material (code)						14					
Supply voltage/mains frequency (code)							C1				
Main function (code)								A			
Option (code)									0		
Actuator version (code)										2D	
Surface finish (code) (only for GEMÜ 687 stainless steel bodies)											1500