GEMÜ®

Combi switchbox with integrated 3/2 way pilot valve

Construction

The GEMÜ 4222 combi switchbox with integrated 3/2 way pilot valve for pneumatically operated linear actuators has a microprocessor controlled intelligent position sensor as well as an analogue integrated travel sensor system. The optical position feedback is via LEDs.
Electrical activation and position feedback is provided via 24 V DC signals or via field bus (AS-Interface, DeviceNet).
The GEMÜ 4222 combi switchbox has a solid transparent plastic housing cover and a metal base.

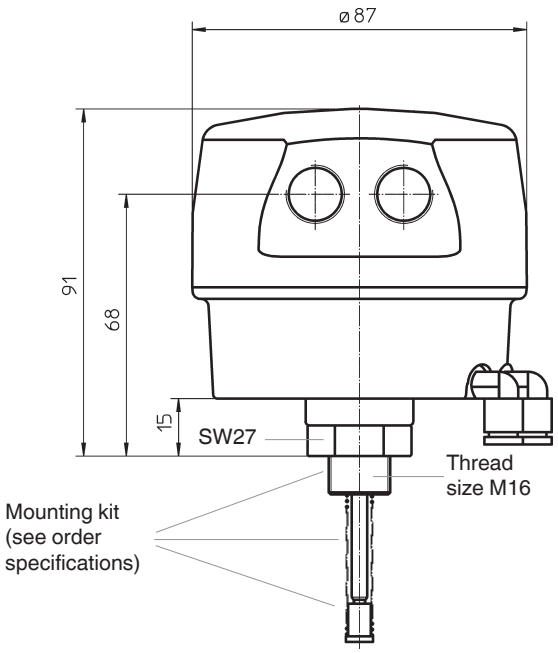
Features

- Integrated end position control
- Integrated pilot valve for single or double acting actuators
- Integrated travel and system control

Advantages

- Design:
  - 24 V version
  but also direct field bus connection to
  - AS-Interface
  - DeviceNet
- Easy setting of valve end positions by automatic or manual programming mode
- Reduced cabling time
- Reduced planning time

Dimensions - GEMÜ 4222 [mm]



GEMÜ® 4222

General technical data

Contents

Operating conditions

Medium	Quality classes to DIN ISO 8573-1
Dust content	Class 3 (max. particle size 5 µm) (max. particle density 5 mg/m^3)
Pressure dew point	Class 4 (max. pressure dew point 3°C)
Oil concentration	Class 5 (max. oil concentration 25 mg/m^3)
Operating pressure	1.5 - 7 bar
Flow rate (at 6 bar)	100 l/min
Ambient temperature	0°C to +50°C

Attention: Note max. control pressure of valve actuator!

General information

Protection class	IP 65
Electrical protection class	III
Weight	380 g
Mounting position	optional
Mounting	M16 x 1 thread
Approvals	
AS-Interface certificate	46901 (AS-Interface A2 version) 47001 (AS-Interface A3 version)
DeviceNet certificate	Composite Test Revision 18 ODVA File Number 10168
Directives	
EC EMC directive	89/336/EEC
Emission of interference	EN 61000-6-3 (24 V/DeviceNet version) AS-Interface Spec. 2.11 (AS-Interface version)
Immunity to interference	EN 61000-6-2 (24 V/DeviceNet version) AS-Interface Spec. 2.11 (AS-Interface version)
EC low voltage directive	73/23/EEC

Electrical data

Power supply		
Power supply U_V	24 V version AS-Interface version DeviceNet version	24 V DC (16 - 32 V DC) 26.5 ... 31.6 V DC acc. to AS-Interface specification 11 - 25 V DC
Current consumption	24 V version AS-Interface version DeviceNet version	typ. 100 mA typ. 100 mA 400 mA @ 11 V DC
Rating	continuously rated	
Signal processing		
Switching frequency	max. 10 Hz	
Hysteresis	0.2 / 0.4 / 0.6 mm	(30/50/75 mm travel length)
Electrical connection		
Electrical connection	24 V version AS-Interface version DeviceNet version	2 x 5 pin M12 plug (A-coded) 1 x 5 pin M12 plug (A-coded) 1 x 5 pin M12 plug (A-coded)
Measuring range		
Minimum stroke	3 / 6 / 9 mm	(30/50/75 mm travel length)
Maximum stroke	26/50/75 mm	(30/50/75 mm travel length)

24 V version

Technical data 24 version

Switch points

Switch point group (Internal switch S2)	Input E2	Input E1	Switch point open [%]	Switch point closed [%]
0	0	0	25	6
0	0	1	12	6
0	1	0	6	6
0	1	1	25	12
1	0	0	12	12
1	0	1	6	12
1	1	0	25	25
1	1	1	12	25

Switch points: The data in percent refer to the programmed stroke, before each end position

End position output signals

Valve position	ORed output (plug 1; pin 5)	Output CLOSED (plug 2; pin 1)	Output OPEN (plug 2; pin 2)
OPEN	1	0	1
Intermediate pos.	0	0	0
CLOSED	1	1	0

DIP / DIL switch

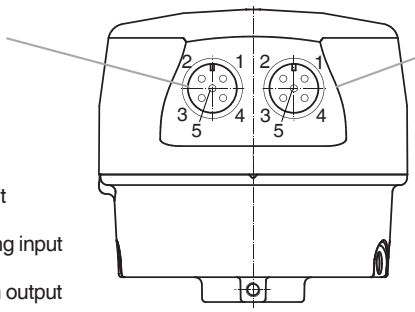
Switch	Function
S1	0 = Automatic programming mode 1 = Manual programming mode
S2	Switch group change-over (see Switch point table)
S3	0 = Normal operation 1 = Quick programming on site

Electrical connections - 24 V

Standard
M12 plug

Plug 1

Pin	Signal
1	+ 24 V DC
2	Control input
3	GND
4	Programming input
5	ORed end position output

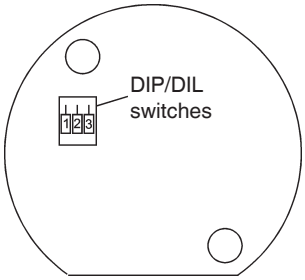


Standard
M12 plug

Plug 2

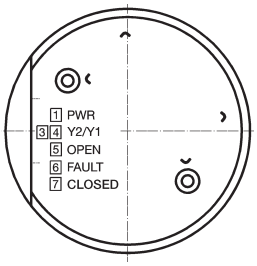
Pin	Signal
1	End position CLOSED output
2	End position OPEN output
3	Error output
4	Switch point 1 input
5	Switch point 2 input

Operating elements - 24 V



S1 Programming mode Auto/Manual
S2 Change-over of switch point groups
S3 Quick programming on site
(see table DIP/DIL switches)

Optical indication - 24 V



LED	Colour	Function
1	green	Power
3	yellow	Pilot valve Y2 activated
4	yellow	Pilot valve Y1 activated
5	yellow	Process valve in Open position
6	red	Fault
7	orange	Process valve in Closed position

AS-Interface Version

Technical data - AS-Interface version

Electrical data

Power supply	
Reverse battery protection	yes
AS-Interface profile	
AS-Interface specification	2.11; max. 31 slaves (A2 version) 2.11; max. 62 slaves (A3 version)
AS-Interface profile	S 7.F.E (A2 version) S 7.A.E (A3 version)
I/O configuration	7
ID code	F (A2 version) A (A3 version)
ID2 code	E

Inputs/Outputs - A2 version

Inputs AS-Interface (as seen from the AS-Interface master)

Bit	Function	Logic
DI0	Indication of Open position	0 = process valve not in Open position 1 = process valve in Open position
DI1	Indication of Closed position	0 = process valve not in Closed position 1 = process valve in Closed position
DI2	Indication of operating mode	0 = normal operation 1 = programming mode
DI3	Error 2	see table: Error analysis
FID	Error 1	see table: Error analysis

Outputs AS-Interface (as seen from the AS-Interface master)

Bit	Function	Logic
DO0	Activation of pneum. outlet 2 (c.f. 1, 2 and 3) (activation of pilot valve Y1)	0 = pneum. outlet 2 vented 1 = pneum. outlet 2 pressurized
DO1	Activation of pneum. outlet 4 (c.f. 3) (activation of pilot valve Y2)	0 = pneum. outlet 4 vented 1 = pneum. outlet 4 pressurized
DO2	Setting slave in programming mode	0 = normal operation 1 = programming mode
DO3	Selection of programming mode	0 = manual programming 1 = automatic programming

Parameter outputs

Bit	Function	Logic
P0	Setting of switch points	see table: Switch points
P1	Setting of switch points	see table: Switch points
P2	Setting of switch points	see table: Switch points
P3	Setting of switch points	see table: Switch points

Switch points - A2 version					
P3	**P2**	**P1**	**P0**	**Switch point OPEN [%]**	**Switch point CLOSED [%]**
0	0	0	0	3	25
0	0	0	1	3	12
0	0	1	0	3	6
0	0	1	1	6	3
0	1	0	0	12	3
0	1	0	1	25	3
0	1	1	0	3	3
0	1	1	1	6	25
1	0	0	0	12	25
1	0	0	1	25	25
1	0	1	0	6	12
1	0	1	1	12	12
1	1	0	0	25	12
1	1	0	1	6	6
1	1	1	0	12	6
1	1	1	1	25	6
Switch points: The data in percent refer to the programmed stroke, before each end position					

Inputs / Outputs - A3 version		
Inputs AS-Interface (as seen from the AS-Interface master)		
Bit	**Function**	**Logic**
DI0	Indication of Open position	0 = process valve not in Open position 1 = process valve in Open position
DI1	Indication of Closed position	0 = process valve not in Closed position 1 = process valve in Closed position
DI2	Indication of operating mode	0 = normal operation 1 = programming mode
DI3	Error 2	see table: Error analysis
FID	Error 1	see table: Error analysis
Outputs AS-Interface (as seen from the AS-Interface master)		
Bit	**Function**	**Logic**
DO0	Activation of pneum. outlet 2/4 (c.f. 1, 2 + 3) (activation of pilot valve Y1/Y2)	0 = pneum. outlet 2 vented/outlet 4 pressurized 1 = pneum. outlet 2 pressurized/ outlet 4 vented
DO1	Programming mode	0 = manual programming 1 = automatic programming
DO2	Setting slave in programming mode	0 = normal operation 1 = programming mode
DO3	not available	
Parameter outputs		
Bit	**Function**	**Logic**
P0	Setting of switch points	see table: Switch points
P1	Setting of switch points	see table: Switch points
P2	Setting of switch points	see table: Switch points

Switch points - A3 version

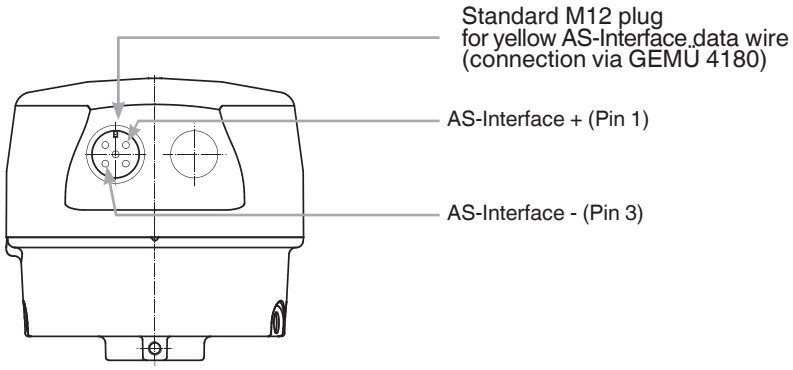
P2	P1	P0	Switch point OPEN [%]	Switch point CLOSED [%]
0	0	0	12	25
0	0	1	25	25
0	1	0	6	12
0	1	1	12	12
1	0	0	25	12
1	0	1	6	6
1	1	0	12	6
1	1	1	25	6

Switch points: The data in percent refer to the programmed stroke, before each end position

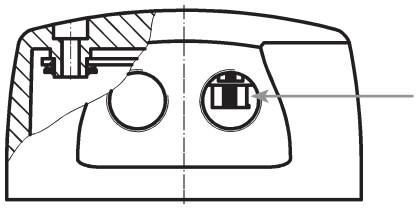
Error analysis

Error 1	Error 2	Error function
1	0	Internal error
0	1	Programming error
1	1	Sensor error

Electrical connections - AS-Interface



Operating elements - AS-Interface

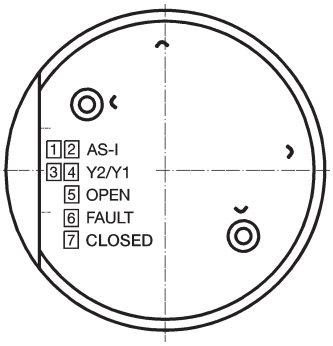


Slide switch for valve function **(manual operation)**

Switch position	Left	Middle	Right
Valve:	Manual on	Manual off	Autom. via bus

3 switch positions

Optical indication - AS-Interface



LED	Colour	Function
1	green	AS-Interface
2	red	AS-Interface error
3	yellow	Pilot valve Y2 activated
4	yellow	Pilot valve Y1 activated
5	yellow	Process valve in Open position
6	red	Fault
7	orange	Process valve in Closed position

DeviceNet Version

Technical data - DeviceNet Version

I/O data

Outputs (as seen from the DeviceNet master)

Bit	Value/Default	Designation	Function	Logic
0	0	Activate valve 1	Activation of pneum. outlet 2 (activation of pilot valve Y1)	1 = pneum. outlet 2 pressurized 0 = pneum. outlet 2 vented
1	0	Activate valve 2	Activation of pneum. outlet 4 (activation of pilot valve Y2)	1 = pneum. outlet 4 pressurized 0 = pneum. outlet 4 vented
2	not used			
3	not used			
4	not used			
5	not used			
6	not used			
7	0	Reset traveltime error	Reset of travel time error	1 = reset 0 = no reset

Inputs (as seen from the DeviceNet master)

Bit	Value/Default	Designation	Function	Logic
0	0	State Valve 1	Status query pneum. outlet 2 (activation of pilot valve Y1)	1 = pneum. outlet 2 pressurized 0 = pneum. outlet 2 vented
1	0	State Valve 2	Status query pneum. outlet 4 (activation of pilot valve Y2)	1 = pneum. outlet 4 pressurized 0 = pneum. outlet 4 vented
2	X	Operating mode	Indication of operating mode	1 = normal operation 0 = programming mode
3	X	Position Closed	Indication of Closed position	1 = process valve in Closed position 0 = process valve not in Closed position
4	X	Position Open	Indication of Open position	1 = process valve in Open position 0 = process valve not in Open position
5	0	Sensor Error	Sensor error	1 = sensor error 0 = normal operation
6	0	Programming Error	Programming error	1 = programming error 0 = normal operation
7	0	Traveltime Error	Travel time error	1 = travel time error 0 = normal operation

Communication types I/O - data

Function	Description	Value
Polling	Poll Size	1 Byte In 1 Byte Out
COS	Change of State	yes
Cycle	Cyclic I/O	yes
Bit Strobe		yes

Note: Download EDS file from www.gemue.de

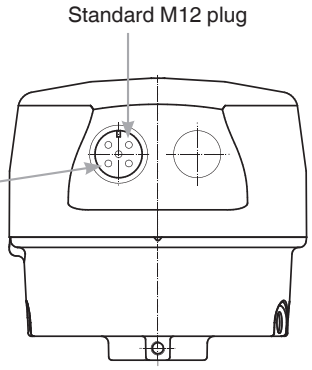
Parameter - Object

Class	Inst.	Attr.	Service	Bit	Value/ Default	Value range	Unit	Parameter
Fh	1h	1h	Get		X	0-100	1%	Valve position
Fh	2h	1h	Get		X	0-1023		AD Value real
Fh	3h	1h	Get		X	0-65535	h	Operating Time
Fh	4h	1h	Get/Set		3	3-97	%	Threshold Close
Fh	5h	1h	Get/Set		3	3-97	%	Threshold Open
Fh	6h	1h	Get/Set		1	1-5		Hysteresis Close
Fh	7h	1h	Get/Set		1	1-5		Hysteresis Open
Fh	8h	1h	Get		0	0-6000	0.1s	Close Time
Fh	9h	1h	Get		0	0-6000	0.1s	Open Time
Fh	Ah	1h	Get/Set		200	0-6000	0.1s	Set Close Time
Fh	Bh	1h	Get/Set		200	0-6000	0.1s	Set Open Time
Fh	Ch	1h	Get		0	0-4294967295		Valve Cycles
Fh	Dh	1h	Get/Set	0 1	0 0	1 = automatic programming 0 = normal operation 1 = manual programming 0 = normal operation		Programming Command
Fh	Eh	1h	Get		0	0-65535		Programming counter
Fh	Fh	1h	Get			0-65535		Powerfail counter
Fh	10h	1h	Get/Set	0 1	0 0	1 = pneumatic outlet 2 pressurized 0 = pneumatic outlet 2 vented 1 = pneumatic outlet 4 pressurized 0 = pneumatic outlet 4 vented		Bus off state
Fh	11h	1h	Get		X	0-1000	0.1 mm	Stroke
Fh	12h	1h	Get		X	0-1000	0.1 mm	Min. Stroke

Identity - Object

Class	Inst.	Attr.	Function	Value
1h	1h	1h	Vendor ID	869
		2h	Product Type	0
		3h	Product Code	4220
		4h	Rev.	1.1
		5h	Status	0
		6h	Series No.	Continuous serial number
		7h	Name	4221/4222 DN combi switchbox

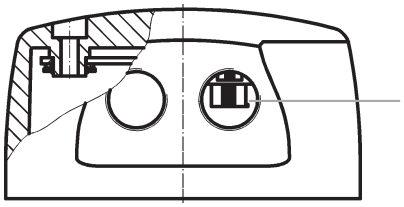
Electrical connections - DeviceNet



Plug 1

Pin	Signal	
1	Shield	bare
2	V+	red
3	V-	black
4	CAN_H	white
5	CAN_L	blue

Operating elements - DeviceNet

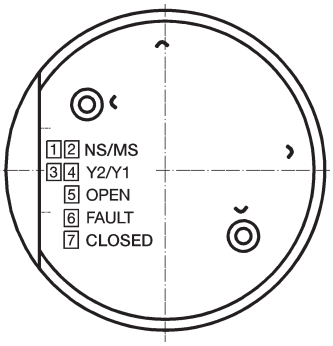


Slide switch for valve function **(manual operation)**

Switch position	Left	Middle	Right
Valve:	Manual	Manual	Autom.
	on	off	via bus

3 switch positions

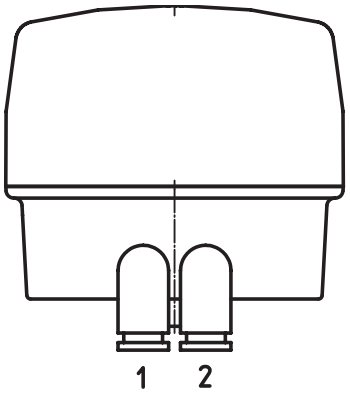
Optical indication - DeviceNet



LED	Colour	Function
1	green/red	Network Status
2	green/red	Module Status
3	yellow	Pilote valve Y2 activated
4	yellow	Pilot valve Y1 activated
5	yellow	Process valve in Open position
6	red	Fault
7	orange	Process valve in Closed position

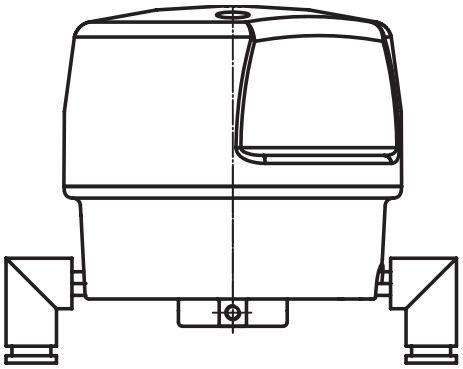
Pneumatic connections

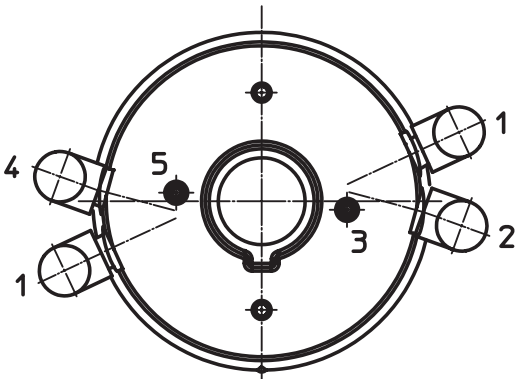
Single acting



Key:
1 (P) = air supply
2 = outlet

Double acting





Key:
1 = air supply
2 = outlet c.f. 1, 2 and 3
3 = outgoing air c.f. 1, 2 and 3
4 = outlet c.f. 3
5 = outgoing air c.f. 3

Air supply: 1.5 - 7 bar **Attention:** Note maximum control pressure of pneumatic valve actuator!

Order data

Field bus	Code
Without (24 V DC version)	000
AS-Interface; 31 Slaves, Spec. 2.11	A2
AS-Interface; 62 Slaves, Spec. 2.11	A3
DeviceNet; 63 Slaves, Spec. Release 2.0 Errata 5	DN
LON	L

Housing material		Code
Base: **Cover:** **Seal:**	Aluminium, black powder coated Polysulfone, transparent FPM	02
Base: **Cover:** **Seal:**	Aluminium, black powder coated PMMA, transparent FPM	04
Base: **Cover:** **Seal:**	Stainless steel 1.4301 Polysulfone, transparent FPM	05
Base: **Cover:** **Seal:**	Stainless steel 1.4301 PMMA, transparent FPM	06

Functional profile	Code
1 Pilot valve, position feedback OPEN/CLOSED	S2
2 Pilot valves, position feedback OPEN/CLOSED	D2

Electrical connection	Code
M12 plug **AS-Interface and DeviceNet version**	01
M12 plug + M12 socket **LON version**	02
2 x M12 plug **24 V DC version**	03

Transmission	Code
Standard isolation cable **24 V DC version**	00
2-wire AS-Interface **AS-Interface version**	01
DeviceNet Group 2 only **DeviceNet version**	03
Transceiver FFT 10A **LON version / 24 V DC**	20
Transceiver LPT 10 **LON version / Link Power**	21

Voltage	Code
Link Power via bus wire **AS-Interface and LON version**	00
Field bus specific **DeviceNet version**	01
24 V DC **24 V DC und LON version**	C1

Travel length	Code
Potentiometer, 30 mm travel length	030
Potentiometer, 50 mm travel length	050
Potentiometer, 75 mm travel length	075

Pneumatic connection	Code
Air supply 6 mm angled connection Outlet 6 mm angled connection	31
Air supply 6 mm T-connection Outlet 6 mm angled connection	41
Air supply and outlet 6 mm straight, st.st. Swagelok	50
Air supply 1/4" straight, st.st., Swagelok Outlet 6 mm straight, st.st. Swagelok	51

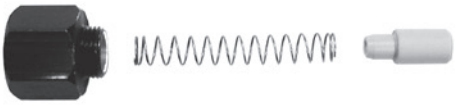
Note: Mounting kit 4222S01Z... dependent on valve type. Please order separately specifying valve type, DN, control function and actuator size. Photo see page 12 (last page).
Observe travel length of mounting kit (see price list).

Order data	4222	000	Z	02	S2	03	00	C1	030	31
Type	4222									
Field bus system (Code)		000								
			Z							
Housing material (Code)				02						
Functional profile (Code)					S2					
Electrical connection (Code)						03				
Transmission (Code)							00			
Voltage (Code)								C1		
Travel length (Code)									030	
Pneumatic connection (Code)										31

Accessories

Connector plug GEMÜ 4180
for A2 / A3 version

Connector plug GEMÜ 1219



Mounting kit GEMÜ 4222S01Z...
(Spindle + mounting parts)
(Threaded adapter only included if necessary)

GEMÜ 4112
AS-Interface Controller;
ControlNet / AS-Interface Gateway;
Profibus-DP / AS-Interface Gateway

DeviceNet®
CONFORMANCE TESTED

AS-INTERFACE

For further products please see our Product Range catalogue and Price List.
Contact GEMÜ.

TÜV CERT
DIN EN ISO 9001
Zertifikat: 09 100 4136

GEMÜ® VALVES, MEASUREMENT AND CONTROL SYSTEMS

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