

Multi-Axis Controller

V85 / VV85



The V85/VV85 is a robust joystick commonly used in electro-hydraulic applications. Long life and high reliability is ensured by the latest contactless hall-technology. With many outputs and grip options the V85/VV85 series is flexible and customisable.

Technical data

Mechanical life V85	10 million operating cycles
Mechanical life VV85	20 million operating cycles
Supply voltage	See interface
Operation temperature	-40°C to +85°C
Degree of protection	up to IP67
Functional safety	PLd compatible (EN ISO 13849, complies SIL2 to DIN EN IEC 61508)



		VV85	S8	P	T	-Z80	+R11	-B	-E...	-S...	-X
Basic unit											
V85.1	1-axis										
V85	2-axis										
Reinforced version											
VV85.1	1-axis										
VV85	2-axis										
Control-handle extended											
	Standard 160 mm*										
S5	-20 mm										
S8	+20 mm										
*Only available in combination with a handle!											
Gate											
P	Cross gate										
PX	Special gate										
Grip / Palm Grip											
	Knob (included in basic unit!)										
M	Knob with mechanical zero interlock										
T	Dead man										
H	Signal button										
D	Push button										
B...	Palm Grip B... (see page Palm Grip 154)										

Technical details may vary based on configuration or application! Technical data subject to change without notice!

VV85 S8 P T -Z80 +R11 -B -E... -S... -X

Axis 1 / Axis 2 (not applied for V/VV85.1)

Z	Spring return
R	Friction brake*
	Latching:*
11	1-0-1
22	2-0-2
33	3-0-3
44	4-0-4
55	5-0-5
08	end-position latching SR2 or SR4
19	1-0-1 + end-position latching SR2 or SR4
80	end-position latching SR1 or SR3
91	1-0-1 + end-position latching SR1 or SR3
88	end-position latching SR1 + SR2 or SR3 + SR4
99	1-0-1 + end-position latching SR1 + SR2 or SR3 + SR4

*Maximum deflection angle +/- 25°!

Degree of protection

B	Cover housing (included in basic unit!)
B10	Joystick-main board sealed (IP67)
B11	Joystick-main board sealed (IP67) and grip function sealed, grip with drain hole

For a schematic description of the protection class, see page 121

Interface (description see on the following pages)

E0xx	Switching output
E1xx	Voltage output
E2xx	Current output
E3xx	CAN-interface
E4xx	CANopen Safety interface
E5xx	Profibus DP-interface
E6xx	Profinet
E7xx	PROFIsafe
E8xx	PWM - Output
E9xx	Other outputs

Plug connectors

S...	Standard plug connectors (see page 120)
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Special model

X	Special / customer specified
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Combination possibilities with our grips



Digital output	
Supply voltage	9-32 V DC
Current carrying capacity	Direction signal 150 mA Zero position signal 500 mA
Mounting depth A	72 mm (reduced mounting depth on request!)
Wiring	1. cable 14 x 0,25 mm ² 500 mm long without plug connector 2. cable 14 x 0,25 mm ² (optional for grip function) 500 mm long without plug connector Optional with plug connector (<i>standard plug connectors see page 120</i>)
S	
2 Direction signals + 1 zero position signal (galvanically isolated) per axis	
	1 axis
	2 axis
	E001 1
	2

Voltage output (not stabilized)	
Supply voltage	4,75-5,25 V DC
Current carrying capacity	Direction signal 8 mA
Mounting depth A	72 mm (reduced mounting depth on request!)
Wiring	1. cable 14 x 0,25 mm ² 500 mm long without plug connector 2. cable 14 x 0,25 mm ² (optional for grip function) 500 mm long without plug connector Optional with plug connector (<i>standard plug connectors see page 120</i>)
S	
0,5...2,5...4,5 V redundant + 2 direction signals per axis	
	1 axis
	2 axis
	E104 1
	2
Output options	
Characteristic:	
Inverse dual	1
Dual	2
Inverse dual with dead zone +/- 3° (standard)	3
Dual with dead zone +/- 3°	4

Voltage output	
Supply voltage	9-32 V DC (*11,5-32)
Current carrying capacity	Direction signal 150 mA
	Zero position signal 500 mA
Mounting depth A	72 mm (reduced mounting depth on request!)
Option	Input for capacitive sensor
Wiring	1. cable 14 x 0,25 mm ² 500 mm long without plug connector
	2. cable 14 x 0,25 mm ² (optional for grip function) 500 mm long without plug connector
	Optional with plug connector (<i>standard plug connectors see page 120</i>)
0,5...2,5...4,5 V redundant + 2 direction signals + 1 zero position signal (galvanically isolated) per axis	
	1 axis E112 1
	2 axis 2
	3 axis* 3
	4 axis* 4
0...5...10 V redundant + 2 direction signals + 1 zero position signal (galvanically isolated) per axis, supply voltage 11,5 - 32 V DC	
	1 axis E132 1
	2 axis 2
	3 axis* 3
	4 axis* 4
10...0...10 V + 2 direction signals + 1 zero position signal (galvanically isolated) per axis, supply voltage 11,5 - 32 V DC, sensor redundant with error monitoring and error signal	
	1 axis E136 1
	2 axis 2
	3 axis* 3
	4 axis* 4
+10...0...-10 V + 2 direction signals + 1 zero position signal (galvanically isolated) per axis, supply voltage 11,5 - 32 V DC, redundant sensor with error monitoring	
	1 axis E138 1
	2 axis 2
	3 axis* 3
	4 axis* 4
Output options	
Characteristic:	
Inverse dual *1	1
Dual *1	2
Inverse dual with dead zone +/- 3° *1 (standard)	3
Dual with dead zone +/- 3° *1	4
*1 not combinable with output E136X + E138X	
Single *2	5
Single with dead zone *2 (standard)	6
*2 not combinable with output E112X and E132X	
Digital output signals:	
Output signals standard:	
Direction signals and zero position signals 1,5A 24V DC	1

*Axis for grip functions, interface can vary depending upon actuation element!

Voltage output with other value on request!

Current output													
Supply voltage	9-32 V DC												
Current carrying capacity	Direction signal 150 mA												
	Zero position signal 500 mA												
Mounting depth A	72 mm (reduced mounting depth on request!)												
Option	Input for capacitive sensor												
Wiring	1. cable 14 x 0,25 mm ² 500 mm long without plug connector												
	2. cable 14 x 0,25 mm ² (optional for grip function) 500 mm long without plug connector												
	Optional with plug connector (<i>standard plug connectors see page 120</i>)												
0...10...20 mA + 2 direction signals + 1 zero position signal (galvanically isolated) per axis, sensor redundant with error monitoring and error signal													
	<table border="1"> <tr><td>1 axis</td><td>E206</td><td>1</td></tr> <tr><td>2 axis</td><td></td><td>2</td></tr> <tr><td>3 axis*</td><td></td><td>3</td></tr> <tr><td>4 axis*</td><td></td><td>4</td></tr> </table>	1 axis	E206	1	2 axis		2	3 axis*		3	4 axis*		4
1 axis	E206	1											
2 axis		2											
3 axis*		3											
4 axis*		4											
20...0...20 mA + 2 direction signals + 1 zero position signal (galvanically isolated) per axis, sensor redundant with error monitoring and error signal													
	<table border="1"> <tr><td>1 axis</td><td>E208</td><td>1</td></tr> <tr><td>2 axis</td><td></td><td>2</td></tr> <tr><td>3 axis*</td><td></td><td>3</td></tr> <tr><td>4 axis*</td><td></td><td>4</td></tr> </table>	1 axis	E208	1	2 axis		2	3 axis*		3	4 axis*		4
1 axis	E208	1											
2 axis		2											
3 axis*		3											
4 axis*		4											
4...12...20 mA + 2 direction signals + 1 zero position signal (galvanically isolated) per axis, sensor redundant with error monitoring and error signal													
	<table border="1"> <tr><td>1 axis</td><td>E214</td><td>1</td></tr> <tr><td>2 axis</td><td></td><td>2</td></tr> <tr><td>3 axis*</td><td></td><td>3</td></tr> <tr><td>4 axis*</td><td></td><td>4</td></tr> </table>	1 axis	E214	1	2 axis		2	3 axis*		3	4 axis*		4
1 axis	E214	1											
2 axis		2											
3 axis*		3											
4 axis*		4											
20...4...20 mA + 2 direction signals + 1 zero position signal (galvanically isolated) per axis, sensor redundant with error monitoring and error signal													
	<table border="1"> <tr><td>1 axis</td><td>E216</td><td>1</td></tr> <tr><td>2 axis</td><td></td><td>2</td></tr> <tr><td>3 axis*</td><td></td><td>3</td></tr> <tr><td>4 axis*</td><td></td><td>4</td></tr> </table>	1 axis	E216	1	2 axis		2	3 axis*		3	4 axis*		4
1 axis	E216	1											
2 axis		2											
3 axis*		3											
4 axis*		4											
+20...0...-20 mA + 2 direction signals + 1 zero position signal (galvanically isolated) per axis, sensor redundant with error monitoring													
	<table border="1"> <tr><td>1 axis</td><td>E226</td><td>1</td></tr> <tr><td>2 axis</td><td></td><td>2</td></tr> <tr><td>3 axis*</td><td></td><td>3</td></tr> <tr><td>4 axis*</td><td></td><td>4</td></tr> </table>	1 axis	E226	1	2 axis		2	3 axis*		3	4 axis*		4
1 axis	E226	1											
2 axis		2											
3 axis*		3											
4 axis*		4											
	Output options <table border="1"> <tr><td>Single</td><td>5</td></tr> <tr><td>Single with dead zone +/- 3° (standard)</td><td>6</td></tr> <tr><td>Digital output signals:</td><td></td></tr> <tr><td>Output signals standard:</td><td></td></tr> <tr><td>Direction signals and zero position signals 1,5A 24 V DC</td><td>1</td></tr> </table>	Single	5	Single with dead zone +/- 3° (standard)	6	Digital output signals:		Output signals standard:		Direction signals and zero position signals 1,5A 24 V DC	1		
Single	5												
Single with dead zone +/- 3° (standard)	6												
Digital output signals:													
Output signals standard:													
Direction signals and zero position signals 1,5A 24 V DC	1												
*Axis for grip functions, interface can vary depending upon actuation element!													
Current output with other value on request!													

CAN		
Supply voltage	9-32 V DC	
Idle current consumption	120 mA (24 V DC)	
Current carrying capacity	Direction signal 100 mA	
	Zero position signal 100 mA (potential-free)	
	External digital output for LEDs 5 mA - 30 mA (dependent on the number of LEDs)	
	Digital switching output (potential-free) 100 mA	
Mounting depth A	E3091: 72 mm	
	E3091X: 85 mm	
	E3101X - E3103X: 85 mm	
	E3104X - E3105X: 105 mm	
	(reduced mounting depth on request!)	
Protocol	CANopen CiA DS 301 or SAE J1939 (based on)	
Baud rate	20 kBit/s to 1 Mbit/s (standard 250 kBit/s)	
Wiring	CAN (IN) cable 300 mm with plug connector M12 (male)	
	CAN (OUT) cable 300 mm with plug connector M12 (female)	
	External in-/outputs cable 300 mm long without plug connector	
	External in-/outputs cable 300 mm long without plug connector (additionally from 32 in-/outputs)	
	Optional with plug connector (<i>standard plug connectors see page 120</i>)	S
CAN expansion stage 1		E309 1
- 7 analog joystick axis		
- 16 digital joystick functions		
- Input for capacitive sensor		
With additional external in-/outputs		
- 8 external LED-outputs (dimmable optional), 1 switching output (potential-free, 100 mA), 8 external digital inputs		2
- 16 external LED-outputs (dimmable optional), 1 switching output (potential-free, 100 mA), 16* external digital inputs		3
*External LED-outputs can be used for LEDs in the grip		
*With the use of capacitive sensor, the external digital inputs are reduced by one input!		
CAN expansion stage 2		E310 1
- 10 analog joystick axis		
- 16 digital joystick functions		
- 2 inputs for capacitive sensors		
With additional external in-/outputs		
- 8 external LED-outputs (dimmable optional), 1 switching output (potential-free, 100 mA), 8 external digital inputs		2
- 16 external LED-outputs (dimmable optional), 1 switching output (potential-free, 100 mA), 16 external digital inputs		3
- 24 external LED-outputs (dimmable optional), 1 switching output (potential-free, 100 mA), 24 external digital inputs		4
- 32 external LED-outputs (dimmable optional), 1 switching output (potential-free, 100 mA), 32* external digital inputs		5
*External LED-outputs can be used for LEDs in the grip		
*With the use of two capacitive sensors, the external digital inputs are reduced by one input!		
Main-axis with additional digital-/analog outputs separately wired (not via CAN)		
- 2 direction signals + 1 zero position signal (potential-free) per main-axis		3
<i>Additional analog outputs on request!</i>		

CANopen Safety		
Supply voltage	9-32 V DC	
Idle current consumption	120 mA (24 V DC)	
Current carrying capacity	Direction signal 100 mA	
	Zero position signal 100 mA (potential-free)	
	External digital output for LEDs 5 mA - 30 mA (dependent on the number of LEDs)	
	Digital switching output (potential-free) 100 mA	
Mounting depth A	E4091: 72 mm	
	E4091X: 85 mm	
	E4101X - E4103X: 85 mm	
	E4104X - E4105X: 105 mm	
	(reduced mounting depth on request!)	
Protocol	CANopen Safety EN50325-5	
Baud rate	20 kBit/s to 1 MBit/s (standard 250 kBit/s)	
Wiring	CAN (IN) cable 300 mm with plug connector M12 (male)	
	CAN (OUT) cable 300 mm with plug connector M12 (female)	
	External in-/outputs cable 300 mm long without plug connector	
	External in-/outputs cable 300 mm long without plug connector (additionally from 32 in-/outputs)	
	Optional with plug connector (<i>standard plug connectors see page 120</i>)	S
CANopen Safety expansion stage 1		E409 1
- 7 analog joystick axis		
- 16 digital joystick functions		
- Input for capacitive sensor		
With additional external in-/outputs		
- 8 external LED-outputs (dimnable optional), 1 switching output (potential-free, 100 mA), 8 external digital inputs		2
- 16 external LED-outputs (dimnable optional), 1 switching output (potential-free, 100 mA), 16* external digital inputs		3
*External LED-outputs can be used for LEDs in the grip		
*With the use of capacitive sensor, the external digital inputs are reduced by one input!		
CANopen Safety expansion stage 2		E410 1
- 10 analog joystick axis		
- 16 digital joystick functions		
- 2 inputs for capacitive sensors		
With additional external in-/outputs		
- 8 external LED-outputs (dimnable optional), 1 switching output (potential-free, 100 mA), 8 external digital inputs		2
- 16 external LED-outputs (dimnable optional), 1 switching output (potential-free, 100 mA), 16 external digital inputs		3
- 24 external LED-outputs (dimnable optional), 1 switching output (potential-free, 100 mA), 24 external digital inputs		4
- 32 external LED-outputs (dimnable optional), 1 switching output (potential-free, 100 mA), 32* external digital inputs		5
*External LED-outputs can be used for LEDs in the grip		
*With the use of two capacitive sensors, the external digital inputs are reduced by one input!		
Main-axis with additional digital outputs separately wired (not via CAN)		
- 2 direction signals + 1 zero position signal (potential-free) per main-axis		3
Additional analog outputs on request!		

Profibus DP	
Supply voltage	18-30 V DC
Baud rate	to 12 MBit/s
Output value	0...128...255
Mounting depth A	105 mm (reduced mounting depth on request!)
Wiring	Profibus, cable 100 mm with plug connector D-Sub 9
	Supply voltage (if applicable contact wiring) cable 12 x 0,25 mm ² 300 mm long without plug connector
	External in-/outputs, cable 300 mm long without plug connector
	Optional with plug connector (<i>standard plug connectors see page 120</i>)
	S
Profibus DP	E501 1
- 4 analog joystick axis	
- 16 digital joystick functions	
- Input for capacitive sensor	
With additional external in-/outputs	
- 8 external LED-outputs, 8 external digital inputs	2
- 16 external LED-outputs, 16 external digital inputs	3
*External LED-outputs can be used for LEDs in the grip	
Main-axis with additional contact equipment separately wired (not via profibus)	
- 2 direction contacts + 1 zero position contact (not potential-free) per main-axis	1
- 1 zero position contact (potential-free) per main-axis	2

Profinet	
Supply voltage	18-30 V DC
Baud rate	to 100 MBit/s
Output value	0...512...1023
Mounting depth A	85 mm (reduced mounting depth on request!)
Wiring	Profinet (1), cable 300 mm with M12 plug connector (female)
	Profinet (2), cable 300 mm with M12 plug connector (female)
	Supply voltage (if applicable contact wiring) cable 12 x 0,25 mm ² 300 mm long without plug connector
	External in-/outputs, cable 300 mm long without plug connector
	Optional with plug connector (<i>standard plug connectors see page 120</i>)
	S
Profinet	E601 1
- 4 analog joystick axis	
- 16 digital joystick functions	
- Input for capacitive sensor	
With with additional external in-/outputs	
- 8 external LED-outputs, 8 external digital inputs	2
- 16 external LED-outputs, 16 external digital inputs	3
*External LED-outputs can be used for LEDs in the grip	
Main-axis with additional signals separately wired (not via profinet)	
- 2 direction signals + zero position signal (potential-free) per main-axis	3

PROFIsafe	
Supply voltage	18-30 V DC
Baud rate	to 100 MBit/s
Output value	0...512...1023
Mounting depth A	85 mm (reduced mounting depth on request!)
Wiring	Profinet (IN), cable 300 mm with M12 plug connector (female) Profinet (OUT), cable 300 mm with M12 plug connector (female) Supply voltage (if applicable contact wiring) cable 12 x 0,25 mm ² 300 mm long without plug connector External in-/outputs, cable 300 mm long without plug connector
	Optional with plug connector (<i>standard plug connectors see page 120</i>)
- 4 analog joystick axis	E701 1
- 16 digital joystick functions	
- Input for capacitive sensor	
With additional external in-/outputs	
- 8 external LED-outputs, 8 external digital inputs	2
- 16 external LED-outputs, 16 external digital inputs	3
*External LED-outputs can be used for LEDs in the grip	
Main-axis with additional signals separately wired (not via profinet safe)	
- 2 direction signals + zero position signal (potential-free) per main-axis	3

PWM Outputs	
Supply Voltage	9-32V DC
Valve control current	max. 3 A
PWM-frequency	1225 Hz
Dither frequency	1...250 Hz adjustable
Mounting depth A	85 mm (reduced mounting depth on request!)
Other features	Creep speed per axis 5 configurable switching outputs 2A LED outputs for status indication Input for redundant deadman
Wiring:	Built-in socket Phoenix 2-pole (power supply) Cable 1 (PWM) 12 x 1mm ² 300 mm long without plug Cable 2 (switching output) 12 x 1mm ² 300 mm long without plug Cable 3 (creep speed / dead man) 14x0,25mm ² 300mm long without plug
	Optional with plug connector (<i>standard plug connectors see page 120</i>)
PWM Output 0-3 A for 2 proportional valve magnets per axis	1 axis E801 1 2 axis 2 3 axis 3 4 axis 4

Other outputs

Voltage output for PVG32 0,25...0,5...0,75Us, power supply 9-32 V DC

Mounting depth A 72 mm (reduced mounting depth on request!)

Option Input for capacitive sensor

Wiring
 1. cable 14 x 0,25 mm² 300 mm long without plug connector
 2. cable 14 x 0,25 mm² 300 mm long without plug connector (optional for grip function)

Optional with plug connector (*standard plug connectors see page 120*)

S

1 axis	E907 1
2 axis	2
3 axis	3
4 axis	4
5 axis	5
6 axis	6

Main-axis with additional direction signals and zero direction signals (potential-free) per main-axis

3

8 Bit Gray-Code with direction signals per main-axis, supply voltage 9-36 V DC

Wiring:
 1. cable 37 x 0,14 mm² 300 mm long without plug connector (axis 1+2)
 2. cable 37 x 0,14 mm² 300 mm long without plug connector (optional for axis 3+4)

Optional with plug connector (*standard plug connectors see page 120*)

S

1 axis	E903 1
2 axis	2
3 axis	3
4 axis	4

8 Bit binary-Code with direction signals per main-axis, supply voltage 9-36 V DC

Wiring:
 1. cable 37 x 0,14 mm² 300 mm long without plug connector (axis 1+2)
 2. cable 37 x 0,14 mm² 300 mm long without plug connector (optional for axis 3+4)

Optional with plug connector (*standard plug connectors see page 120*)

S

1 axis	E904 1
2 axis	2
3 axis	3
4 axis	4

Attachments

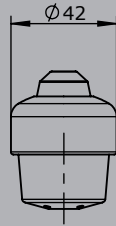
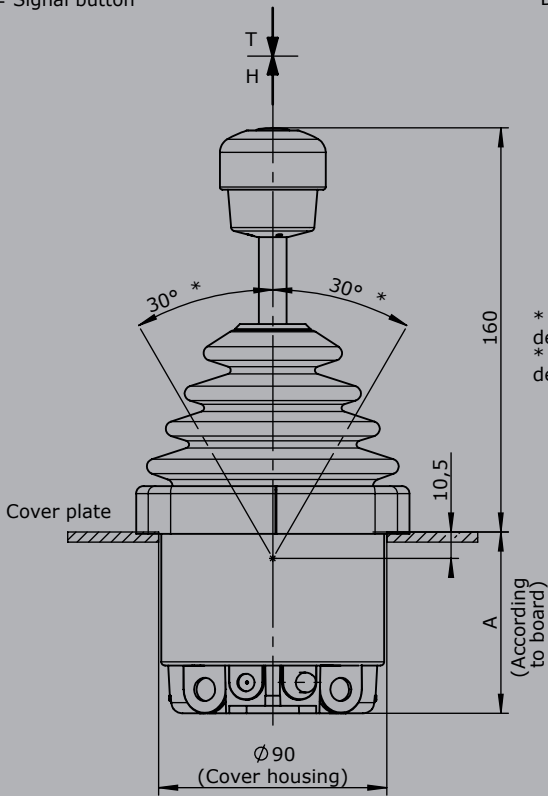
Z01	Mating connector (CAN) M12 (male insert) with 2 m cable	20201140
Z02	Mating connector (CAN) M12 (female contact) with 2 m cable	20202298
Z03	Mating connector (Profibus) straight	22201440
Z04	Mating connector (Profibus) 90° angled	22201741
Z05	Mating connector (Profinet) M12 (male insert) with 2 m cable	5300000222

T = Dead man's button
H = Signal button

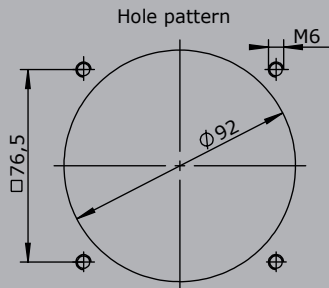
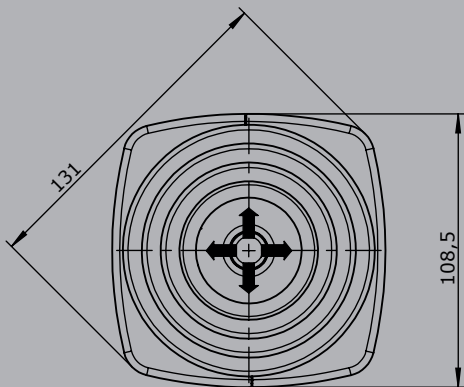
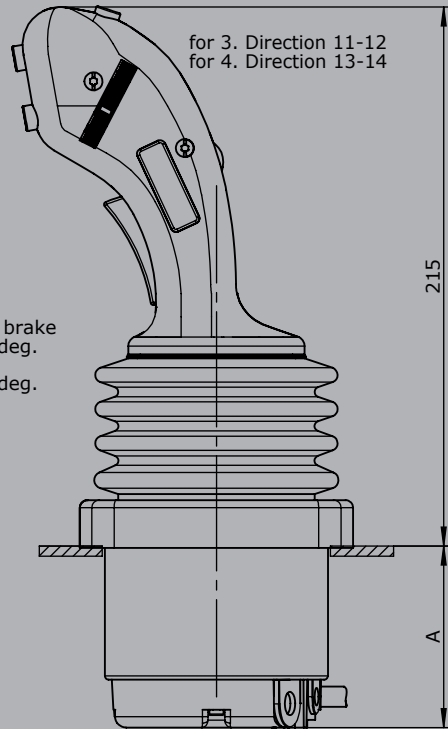
Knob solid
D= Push button

Palm grip B3

for 3. Direction 11-12
for 4. Direction 13-14



* Type with friction brake
deflection max. 25 deg.
* Type with detent
deflection max. 25 deg.



Palm grip B25

