

# 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	Example						
					T	-Z80	+R11	-B	-E...	-S...	-X
<b>Basic unit</b>											
V85.1	1-axis										
V85	2-axis										
Reinforced version											
VV85.1	1-axis										
VV85	2-axis										
<b>Control-handle extended</b>											
	Standard 160 mm*										
S5	-20 mm										
S8	+20 mm										
*Only available in combination with a handle!											
<b>Gate</b>											
P	Cross gate										
P X	Special gate										
<b>Grip / Palm Grip</b>											
	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
<b>Axis 1 / Axis 2</b> (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°!											
<b>Degree of protection</b>											
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											
<b>Interface</b> (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										
<b>Plug connectors</b>											
S...	Standard plug connectors (see page 120)										
<b>Special model</b>											
X	Special / customer specified										

Combination possibilities with our grips

 p. 199	 p. 197	 p. 194	 p. 192	 p. 188	 p. 188	 p. 186	 p. 184	 p. 182
 p. 180	 p. 178	 p. 176	 p. 174	 p. 172	 p. 170	 p. 168	 p. 166	 p. 164
 p. 162	 p. 160	 p. 158	 p. 156	 p. 154				

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 <sup>2</sup> 500 mm long without plug connector		
	2. cable 14 x 0,25 mm <sup>2</sup> (optional for grip function) 500 mm long without plug connector		
	Optional with plug connector (standard plug connectors see page 120)		
2 Direction signals + 1 zero position signal (galvanically isolated) per axis			
	1 axis	E001 1	
	2 axis	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 mm² 500 mm long without plug connector		
	2. cable 14 x 0,25 mm² (optional for grip function) 500 mm long without plug connector		
	Optional with plug connector (standard plug connectors see page 120)		
0,5...2,5...4,5 V redundant + 2 direction signals per axis			
	1 axis	E104 1	S
	2 axis	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 <sup>2</sup> 500 mm long without plug connector		
	2. cable 14 x 0,25 mm <sup>2</sup> (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 + 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	
<b>Output options</b>			
Characteristic:			
	Inverse dual * <sup>1</sup>	1	
	Dual * <sup>1</sup>	2	
	Inverse dual with dead zone +/- 3° * <sup>1</sup> (standard)	3	
	Dual with dead zone +/- 3° * <sup>1</sup>	4	
* <sup>1</sup> not combinable with output E136X + E138X			
	Single * <sup>2</sup>	5	
	Single with dead zone * <sup>2</sup> (standard)	6	
* <sup>2</sup> 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 <sup>2</sup> 500 mm long without plug connector		
	2. cable 14 x 0,25 mm <sup>2</sup> (optional for grip function) 500 mm long without plug connector		
	Optional with plug connector ( <i>standard plug connectors see page 120</i> )		S
0...10...20 mA + 2 direction signals + 1 zero position signal (galvanically isolated) per axis, sensor redundant with error monitoring and error signal			
	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			
	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			
	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			
	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			
	1 axis	E226	1
	2 axis		2
	3 axis*		3
	4 axis*		4
Output options			
	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 (standard plug connectors see page 120)		S
<b>CAN expansion stage 1</b>		E309 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!			
<b>CAN expansion stage 2</b>		E310 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-/analog outputs separately wired (not via CAN)			
- 2 direction signals + 1 zero position signal (potential-free) per main-axis			3
Additional analog outputs on request!			

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 (standard plug connectors see page 120)		S
<b>CANopen Safety expansion stage 1</b>		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!			
<b>CANopen Safety expansion stage 2</b>		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 <sup>2</sup> 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> )

## Profibus DP

- 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
- 16 external LED-outputs, 16 external digital inputs

*\*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 zero position contact (potential-free) per main-axis

E501 1

2

3

1

2

S

## 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 <sup>2</sup> 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> )

## Profinet

- 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
- 16 external LED-outputs, 16 external digital inputs

*\*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

E601 1

2

3

3

S



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 <sup>2</sup> 300 mm long without plug connector		
	External in-/outputs, cable 300 mm long without plug connector		
Optional with plug connector (standard plug connectors see page 120)			S
- 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 <sup>2</sup> 300 mm long without plug		
	Cable 2 (switching output) 12 x 1mm <sup>2</sup> 300 mm long without plug		
	Cable 3 (creep speed / dead man) 14x0,25mm <sup>2</sup> 300mm long without plug		
Optional with plug connector (standard plug connectors see page 120)			S
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 mm<sup>2</sup> 300 mm long without plug connector  
2. cable 14 x 0,25 mm<sup>2</sup> 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 mm<sup>2</sup> 300 mm long without plug connector (axis 1+2)  
2. cable 37 x 0,14 mm<sup>2</sup> 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 mm<sup>2</sup> 300 mm long without plug connector (axis 1+2)  
2. cable 37 x 0,14 mm<sup>2</sup> 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

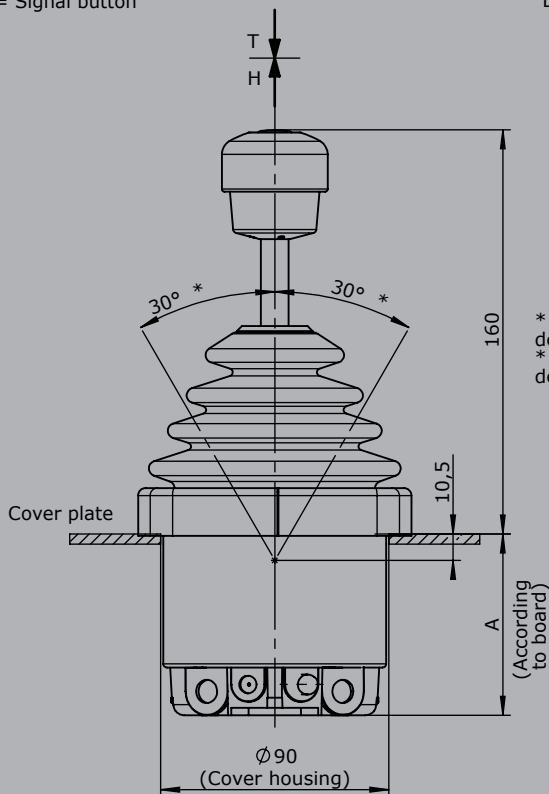
Z01	Mating connector (CAN) M12 (male insert) with 2 m cable	20201140
Z02	Mating connector (CAN) M12 (female contact) with 2 m cable	20202298
Z03	Mating connector (Profibus) straight	22201440
Z04	Mating connector (Profibus) 90° angled	22201741
Z05	Mating connector (Profinet) M12 (male insert) with 2 m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

T = Dead man's button  
H = Signal button

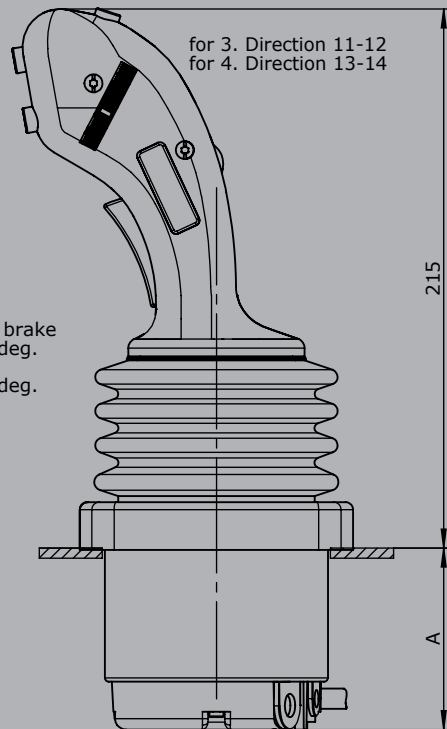
Knob solid  
D= Push button

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

