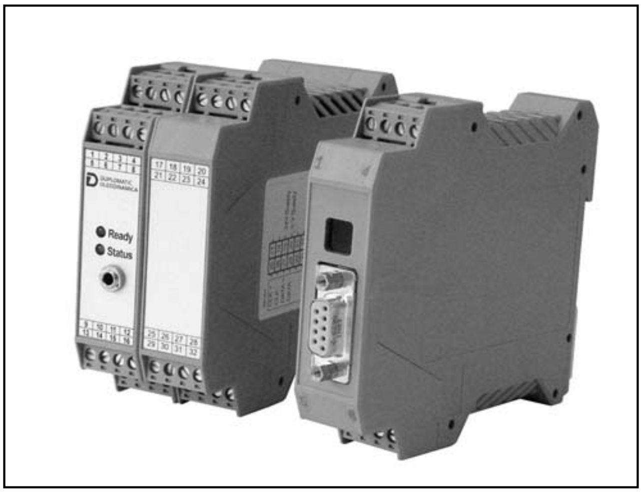
EWM-SS-DAD

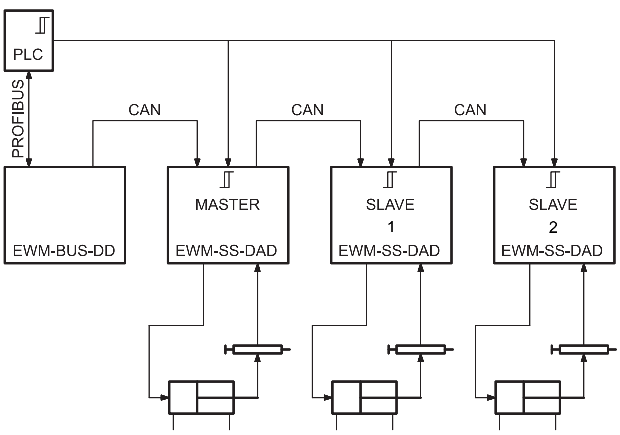
CARD FOR AXIS SYNCHRONIZATION CONTROL FOR SYSTEMS FROM 2 TO 24 AXES WITH PROFIBUS/CAN COMMUNICATION INTERFACE

SERIES 10



RAIL MOUNTING TYPE: DIN EN 50022

OPERATING PRINCIPLE



— This card has been developed as axes controller and it is connected to the other cards via Canbus. This bus line has to be coupled with a PLC interface Profibus DP, the EWM-BUS-DD/10 (to be ordered separately).

— The EWM-SS-DAD synchronizes the axes with a high accuracy. The position accuracy is reached using a digital sensor with SSI interface to measure the position. The card can drive only an hydraulic axis per card, so a EWM-SS-DAD per axis is needed.

— The synchronization controller correct the speed of the slave axis. Positioning failures during the movement will increase or reduce the slave axis velocity, so the synchronization failure will be compensated.

— The card use the RS232C interface, and is easily settable via notebook, using the software kit (EWMPC).

TECHNICAL CHARACTERISTICS

Power supply	V DC	12 ÷ 30 ripple included - external fuse 1,0 A
Current consumption	mA	< 200 + sensor power consumption
Command value		via Profibus DP - ID number 1810h
Speed input value		via Profibus DP - ID number 1810h
Feedback value	V mA SSI	0 ÷ 10 (R_I = 33 kΩ) 4 ÷ 20 (R_I = 250 Ω) digital sensor with any SSI interface
Output value: - E0 version - E1 version	V mA	±10 (max load 5 mA) 4 ÷ 20 (max load 390 Ω)
Position accuracy		± 2 bits of digital sensor resolution
Interface		RS 232 C
Electromagnetic compatibility (EMC): according to 2004/108/CE standards		Emissions EN 61000-6-3 Immunity EN 61000-6-2
Housing material		thermoplastic polyamide PA6.6 combustibility class V0 (UL94)
Housing dimensions - EWM-SS-DAD - EWM-BUS-DD	mm	120 x 99(h) x 46(w) 120 x 99(h) x 23(w)
Connector		4x4 poles screw terminals - PE direct via DIN rail
Operating temperature range	°C	-20 / +60
Protection degree		IP 20

1 - IDENTIFICATION CODES

1.1 - Profibus / CAN coupler code

E	W	M	-	BUS	-	DD	/	10

Digital card for closed loop systems
DIN EN 50022 rail mounting

Profibus / CAN coupler

Digital command and output value

Series No. (from 10 to 19 sizes and mounting dimensions remain unchanged)

NOTE: Just one coupler per system is needed.

1.2 - Code of the axis drive card

E	W	M	-	SS	-	D	AD	/	10	

Digital card for closed loop systems
DIN EN 50022 rail mounting

Synchro Stroke control

Digital command value

Analog and digital feedback values

Output value:
E0 = voltage ±10V (**standard**)
E1 = current 4 ÷ 20 mA

Series No. (from 10 to 19 sizes and mounting dimensions remain unchanged)

NOTE: One card per axis is needed.

This electronic module is developed for controlling of hydraulic drives in synchronization. The communication with the PLC is solved by a standard Profibus DP interface.

A typical repeatable positioning accuracy of up to 0,01% with analogue sensors or up to 0,001 mm with digital SSI sensors can be achieved. Proportional valves with integrated electronics (typically with control valves) can be driven by the analogue differential output.

Internal profile generation (acceleration time, max. velocity and stroke depended deceleration) provides fast and excellent positioning. The drive works in open loop mode and is switched over in closed loop during deceleration. This is a time-optimal positioning structure with very high stability. An extra Numeric Control mode can be used for a speed controlled profile generation (VMODE = ON).

The synchronization control works as a second overriding velocity/position controller. Failure between the axes will be compensated by adjusting the speed of the slave axis.

The card sample time is 2 ms, up to 5 ms with 24 axes to drive.

2 - EWM-SS-DAD FUNCTIONAL SPECIFICATIONS

2.1 - Power supply

This card is designed for 12 to 30 VDC (typical 24 V) of a power supply. This power supply must correspond to the actual EMC standards.

All inductivity at the same power supply (relays, valves) must be provided with an over voltage protection (varistors, free-wheel diodes).

It is recommended to use a regulated power supply (linear or switching mode) for the card supply and for the sensors.

2.2 - Electrical protections

All inputs and outputs are protected with suppressor diodes and RC-filters against transient overshoots.

2.3 - Digital Input (ENABLE)

The digital input must have a voltage from 12 to 24 V; Low level: <4V, high level >12V with current <0,1A. See the block diagram at paragraph 8 for the electric connections. Apply to PIN 8 the 24V to enable hardware.

2.4 - Reference signal

The reference signal is run through the card-bus and addressed to the individual modules via Profibus, ID number 1810h (see par. 10).

2.5 - Input feedback values

The card works both with digital (SSI) or analog sensors.

SSI: parameters are settable via software (see SSI parameters in the table on next page).

ANA: The analogue signal must be voltage 0 ÷ 10V with RI = 33 kΩ or current 4 ÷ 20 mA (250Ω), with RI = 250 kΩ
The analogue resolution is of 0,01% of the sensor stroke.

⚠ Using analog sensors, the SSI parameters in the software assume default preset values that the user must not change.

2.6 - Output values

E0 version: output voltage 0 ±10 V (standard).
E1 version: output current 4 ÷ 20 mA. (max load 390 Ω)

2.7 - Digital Output

Two digital output are available, INPOS and READY, that are displayed via LEDs on the front panel. .

Low level <4V; High level >10V (I_{max} 50 mA with load of 200Ω)

3 - LED FUNCTIONS

There are two leds on the EWM-SS-DAD card:

GREEN: Shows if the card is ready.

ON - The card is supplied and ENABLE hardware e software ON
OFF - No power supply or the ENABLE HW/SW is inactive
FLASHING - Failure detected (internal or 4 ÷ 20 mA).
Only if the parameter SENS is ON

YELLOW: Is the signal of the control error monitoring.

ON - No control error, system in closed loop control.
OFF - Error detected or START signal not active.

4 - ADJUSTMENTS

On the EWM cards the adjustment setting is possible only via software. Connecting the card to the PC, the software automatically recognises the card model and shows a table with all the available commands, with their parameters, the default setting, the measuring unit and an explanation of the commands and its uses.

The parameters changes depending on the card model.

PARAMETERS TABLE

Commands	Parameter	Defaults	Units	Description
inpx	X= SSI|ANA	SSI	-	Selection of the sensor input channel. The standard is a digital sensor with SSI specification at the corresponding connections (clamps 25 to 28 and 31, 32). Alternatively an analogue input which is indicated in the command as parameters “ANA” can be used. The command AIN is used for input scaling of the analogue input.
ain:i a b c x	i= XL a= -10000… 10000 b= -10000… 10000 c= -10000… 10000 x= V|C	 : 1000 : 1000 : 0 : V	 - - 0,01% -	Analogue input scaling (only). **XL** for the input signal. **V** = voltage input and **C** = current input. With the parameters **a**, **b** and **c** the inputs can be scaled (output = a / b * (input - c)). Because of the programming of the **x**-value (x = **C**) the corresponding input will be switched over to current automatically. (see **NOTE**)
num	X= 0… 24	2	-	Number of modules used in synchronization system.
stroke x	X= 2… 5000	500	mm	Length of the sensor. The length of the stroke sensor is needed for the scaling of the analogue input and for the calculation of the braking stroke.
ssioffset x	X= -30000… 30000	0	0,01 mm	Zero point adjustment of the sensor.
ssires x	X= 10… 1000	1000	0,001 mm	Resolution of the sensor. The highest resolution (1000) corresponds to 1 μm. This sensor resolution is always used for the input data via Profibus and is needed for the internal calculations. (see **NOTE**)
ssibits x	X= 8… 32	24	-	Data protocol length in bits
ssicode x	X= GRAY|BIN	GRAY	-	Transmitting code of the sensor.
ssipol x	X= +|-	+	-	Sensor polarity. In order to reverse the working direction of the sensor, the polarity can be changed via this command. In any case also the SSIOFFSET has to be adjusted. Ex: Sensor length = 200 mm opposite working direction. SSIPOL is set on “-“ and SSIOFFSET on 20000.
a:i x	i= A|B x= 1… 2000	:A 100 :B 100	ms ms	Acceleration time depending on direction. The ramp time is separately set for driving out (**A**) and for driving in (**B**). Normally **A** = flow P-A, B-T and **B** = flow P-B, A-T.
d:i x	i= A|B|S X= 50… 10000	:A 2500 :B 2500 :S 1000	0,01% 0,01% 0,01%	Deceleration stroke depending on direction. This parameter is set in 0,01% units of the maximum length of the sensor. The braking distance is set dependent from the direction. The controller gain will be calculated by means of the braking distance. The shorter the braking distance the higher the gain (see command CTRL). In case of instabilities a longer braking distance should be set. The parameter **D** indicates the ratio between the maximum sensor length and and a indicated stopping point;will become active after the removal of the ‘START’ signal only .
ctrl x	x= lin|sqrt1 |sqrt2	sqrt1	-	Selection of the control function: (see **NOTE**) **lin** = standard linear P-control, **sqrt1** = progressive time optimized deceleration curve **sqrt2** = sqrt1 with a higher gain in position
syncmode x	X= MS|AV	MS		Synchronization mode. **MS** - Master/Slave:all axes are following the master axis (axis number 1) **AV** - Averages calculation: the command position will be calculated by the averages of all axes.
glp x **t1 x**	X= -10000… 10000 X= 0… 100	500 10	0,01 ms	Parameter of the synchronisation control function. (see **NOTE**) The SYNC-controller works as a PT1 compensator for optimized controlling of hydraulic drives. Critical drives can be stabilized with the T1 factor.
vramp x	x= 1… 2000	200	ms	Ramp time for the external velocity. Operating shocks can be reduced when changing the external velocity.

vmode x	x= on|off	off	-	Activation of the NC-generator. In OFF state the stroke depended deceleration is active; the velocity preset limits the output signal. In ON state a profile generator generates the positioning demand value and the axis drives to the target position with the defined velocity. The stroke time is defined by the parameter VEL.
vel x	X= 1… 20000	50	mm/s	Internal maximum velocity preset. This parameter is only active in case of VMODE = ON.
min:i x	i= A|B x= 0… 5000	:A 0 :B 0	0,01% 0,01%	Deadband compensation of positive overlapped proportional valves. Good adjustment will increase positioning accuracy
max:i x	i= A|B X= 5000… 10000	:A 10000 :B 10000	0,01% 0,01%	Maximum output signal. Adapt the control range to maximum flow range.
trigger x	X= 0… 2000	200	0,01%	Point to activate the deadband compensation (**min**). (see **NOTE**) Also useful for reduced sensitivity in position with control valves.
inpos x **glerror x**	X= 0… 5000 x= 0… 5000	200 200	0,01mm 0,01mm	Synchronization error. This parameter is entered in 0,01 mm units. The INPOS command defines the window when the INPOS message is indicated. The positioning process is not influenced by this message. The controller remains active. In NC-mode (VMODE = ON) this message has to be interpreted as following error control. With the GLERROR value the synchronization error window is defined.
offset x	x= -2000… 2000	0	0,01%	Zero point adjustment. The corresponding OFFSET will be added to the control error (demand value - actual value + offset). With this parameter the zero point failure can be compensated.
pol x	x= +|-	+	-	Output polarity. All **A** and **B** adjustments depend on the output polarity. The right polarity should be defined first.
sens x	x= on|off	on	-	The sensor monitoring can be activated (with 4… 20 mA sensors).
save	-	-	-	Storing the programmed parameter in E²PROM.
loadback	-	-	-	Reloading the parameter from E²PROM in working RAM
help	-	-	-	Listing of all available commands.
para	-	-	-	Actual parameter list with all programmed values.
copy	-	-	-	Transfer of the parameters into all other modules at the node CAN. The parameters are stored in the EEPROM. **Caution**: All up to now adjusted values are overwritten in all modules. This command is carried out usually during the first basic installation.
st	-	-	-	Internal status. Monitoring of the control and status word (see par. 10). Command available via software only.
wl **xl** **xw** **kx** **kxw** **v** **u** **x:i**	Demand value Actual value Control deviation Sync position Sync error Velocity Actuator signal Indexed axes process	-	0,01 mm	The process data can be read out via software. They show the actual and command values
default	-	-	-	Preset values will be set.

NOTE about the AIN command: This command is for analogue sensor only.

With this command each input can be scaled individually. For the scaling function the following linear equation is taken: output signal = *a / b * (input signal - c)*.

At first the offset (c) will be subtracted (in 0,01% units) from the input signal, then the signal will be multiplied with factor **a** / **b**. **a** and **b** should always be positive. With these both factors every floating-point value can be simulated (for example: 1.345 = 1345 / 1000).

With the x parameter value the internal measuring resistance for the current measuring (4… 20 mA) will be activated (V for voltages input and C for current input). ATTENTION: This resistor is never activated at the k input.

	AIN:X	a	b	c	x
i with voltage:	AIN:i	1000	1000	0	V
i with current:	AIN:i	1250	1000	2000	C

NOTE about the SSIRES command: the standard of measurement is defined as increment/mm (inkr/mm). The maximum available resolution is equal to 1 µm that corresponds to a value 1000.

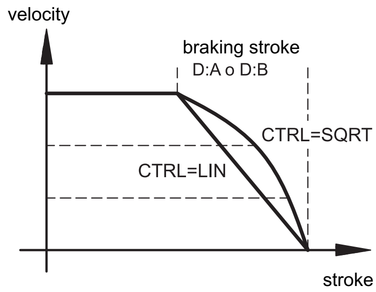
Example: A sensor with resolution 5µm has a resolution (0.005 mm) 5 times lower than the maximum set.
The SSIRES value is calculated as follows: *1000* (full scale ink) */ n* (sensor resolution in µm) = *1000 / 5 = 200*

NOTE about the CTRL command: This command controls the braking characteristic of the hydraulic axis. With positive overlapped proportional valves one of both SQRT braking characteristics should be used because of the linearization of the non-linear flow curve typical of these valves If zero overlapped proportional valves (control valves) are used, you can choose between LIN and SQRT1 according to the application. The progressive gain characteristic of SQRT1 has the better positioning accuracy.

According to the application there is maybe a longer braking distance, so that the total stroke time will be longer.

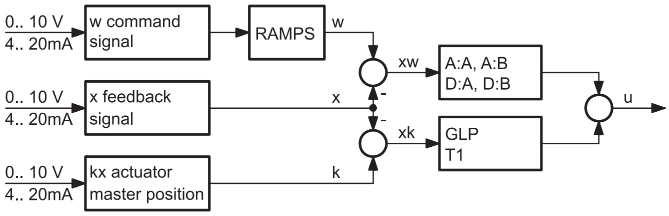
LIN: Linear braking characteristics (control gain corresponds to: 10000 / d:i).

SQRT*: Root function for the calculation for the braking curve.
SQRT1: with small control error. control gain corresponds to 30000 / d:i ;
SQRT2: control gain corresponds to 50000 / d:i



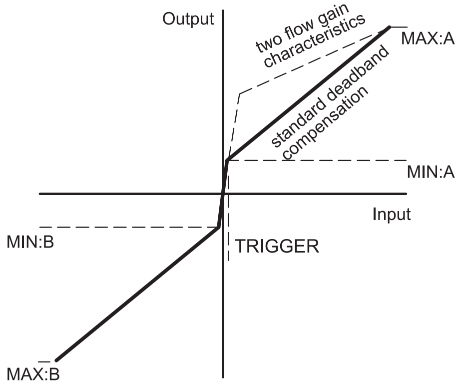
NOTE about the GLP and T1 command: Both controllers (sync and positioning) are working parallel. The higher the sync-gain the lower must be the gain of the positioning controller. A time constant value (T1) can be used to damp the sync-controller for better stability.

Simplified control structure:



NOTE about the TRIGGER command: With this command, the output signal is adjusted to the valve characteristics. The positioning controllers have a double-gain characteristic curve instead of a typical overlapped jump. The advantage is a better and more stabile positioning behaviour. With this compensation, non-linear volume flow characteristic curves can be adjusted too.

If there exist also possibilities for adjustments at the valve or at the valve electronics, it has to be guaranteed, that the adjustment has to be carried out at the power amplifier or at the positioning module. If the MIN value is set too high, it influences the minimal velocity, which cannot be adjusted any longer. In extreme case this causes to an oscillating around the closed loop controlled position.



5 - INSTALLATION

The card is designed for rail mounting type DIN EN 50022.

The wiring connections are on the terminal strip located on the bottom of the electronic control unit. It is recommended to use cable sections of 0.75 mm^2, up to 20 m length and of 1.00 mm^2 up to 40m length, for power supply and solenoid connections. For other connections it is recommended to use cables with a screened sheath connected to earth only on the card side.

NOTE: To observe EMC requirements it is important that the control unit electrical connection is in strict compliance with the wiring diagram. As a general rule, the valve and the electronic unit connection wires must be kept as far as possible from interference sources (e.g. power wires, electric motors, inverters and electrical switches).

In environments that are critical from the electromagnetic interference point of view, a complete protection of the connection wires can be requested.

A typical screened Profibus plug (D-Sub 9pol with switchable termination) is mandatory. Also the Profibus cable must be screened.

Every Profibus segment must be provided with an active bus termination at the beginning and at the end. The termination is already integrated in all common Profibus plugs and can be activated by DIL switches.

For the installation of the EWM-BUS-DD only a few steps are necessary (CAN-side).

Electric connection: the CAN Bus of the modules is wired with the CAN Bus of the coupler.

EWM-SS-DAD: PIN 23 at PIN EWM-BUS-DD 1
EWM-SS-DAD: PIN 22 at PIN EWM-BUS-DD 4
EWM-SS-DAD: PIN 21 at PIN EWM-BUS-DD 3

Power supply: PIN 5 and PIN 6 = 24 V
PIN 7 and PIN 8 = 0 V

5.1 - CAN interface

The CAN interface is wired on all modules in parallel. The terminating resistors have to be activated in the EWM-SS-DAD at the first and last module.

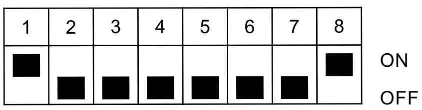
The addressing of the EWM-SS-DAD about the DIL switches must begin with one. The first module has a master functionality and takes over the communication with the interface converter EWM-BUS-DD. The DIL-switch is inside the unit on the interface board opposite of the main board. Position and switch position are marked.

DIL switches (the DIL switch is on the interface board):

1 to 5: Binary coding of the postal address of the node. At the most 24 addresses are managed.

8: Terminal resistance: only at the first and last module the terminal resistance is activate.

Example: EWM-SS-DAD configuration node address 1.



For all the cards the default adress is type “Master”; so it is necessary for each card to select the correct adress in according to the number of axis (see example paragraph 8.1).

ADRESSES TABLE FOR EWM-SS-DAD NODE

DIL ->	1	2	3	4	5
NODE					
1	ON	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF
4	OFF	OFF	ON	OFF	OFF
5	ON	OFF	ON	OFF	OFF
6	OFF	ON	ON	OFF	OFF
7	ON	ON	ON	OFF	OFF
8	OFF	OFF	OFF	ON	OFF
9	ON	OFF	OFF	ON	OFF
10	OFF	ON	OFF	ON	OFF
11	ON	ON	OFF	ON	OFF
12	OFF	OFF	ON	ON	OFF
13	ON	OFF	ON	ON	OFF
14	OFF	ON	ON	ON	OFF
15	ON	ON	ON	ON	OFF
16	OFF	OFF	OFF	OFF	ON
17	ON	OFF	OFF	OFF	ON
18	OFF	ON	OFF	OFF	ON
19	ON	ON	OFF	OFF	ON
20	OFF	OFF	ON	OFF	ON
21	ON	OFF	ON	OFF	ON
22	OFF	ON	ON	OFF	ON
23	ON	ON	ON	OFF	ON
24	OFF	OFF	OFF	ON	ON

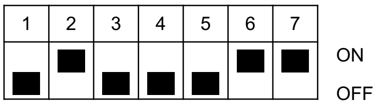
6 - PROFIBUS/CANbus card EWM-BUS-DD

The module supports all baud rates from 9,6 kbit/s up to 12000 kbit/s with auto detection of the baud rate. The functionality is defined in IEC 61158. The Profibus address can be programmed by a terminal program, EWMPC/10 or online via the Profibus.

The reference values are preset over the digital Profibus / CAN-Bus that worked with full internal resolution. The position resolution corresponds to the sensor resolution.

TIn the EWM-BUS-DD the presetting is to be maintained for the CAN-Bus (address 2 and 1 MBd).

DIL Switches configuration for module EWM-BUS-DD:



DIL Switches is inside the module and it gives the possibility to set address and data transmission speed.

tables below show the meaning of DIL Switches:

DIP-SWITCH						
1	2	3	4	5	6	7
CANBUS ADDRESS NODE					TRANSMISSION SPEED	

TRANSMISSION SPEED	DIP-SWITCH	
	6	7
125 Kbaud	OFF	OFF
250 Kbaud	ON	OFF
500 Kbaud	OFF	ON
1 Mbaud	ON	ON

6.1 - Display

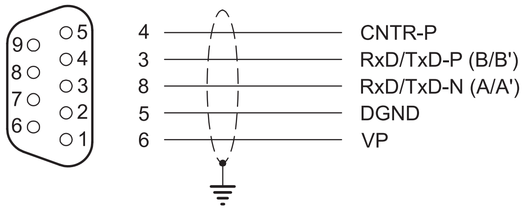
The EWM-BUS-DD has a display that shows the module status:

- \- everything OK, Profibus and CAN Bus in data exchange
- 1 Error, CAN Bus no data exchange
- 2 Error, Profibus no communication
- 3 Error, Profibus no communication, CAN Bus no data exchange
- 4 Error, Profibus OK, not connected CAN Bus
- 5 Error, Profibus no communication, not connected CAN Bus
- 6 Error, hardware fault

6.2 - ProfiBUS port

A shielded typical Profibus connector (9-polig), possibly with internal terminal resistors, must be used .The pre addressing of the module can be changed only by Profibus (DEFAULT is 3). The cable is not included.

PROFIBUS PORT WIRING AND LINKING CONFIGURATION



pin	Signal name	Function
1-2-7-9	not used	-
3	RxD/TxD-P (B-Line)	Receive/Send P data
4	CNTR-P/RTS	Request to Send
5	DGND	Data ground
6	VP	+5 V DC for external bus termination
8	RxD/TxD-N (A-Line)	Receive/Send N data

7 - SOFTWARE KIT EWMPC/10 (code 3898401001)

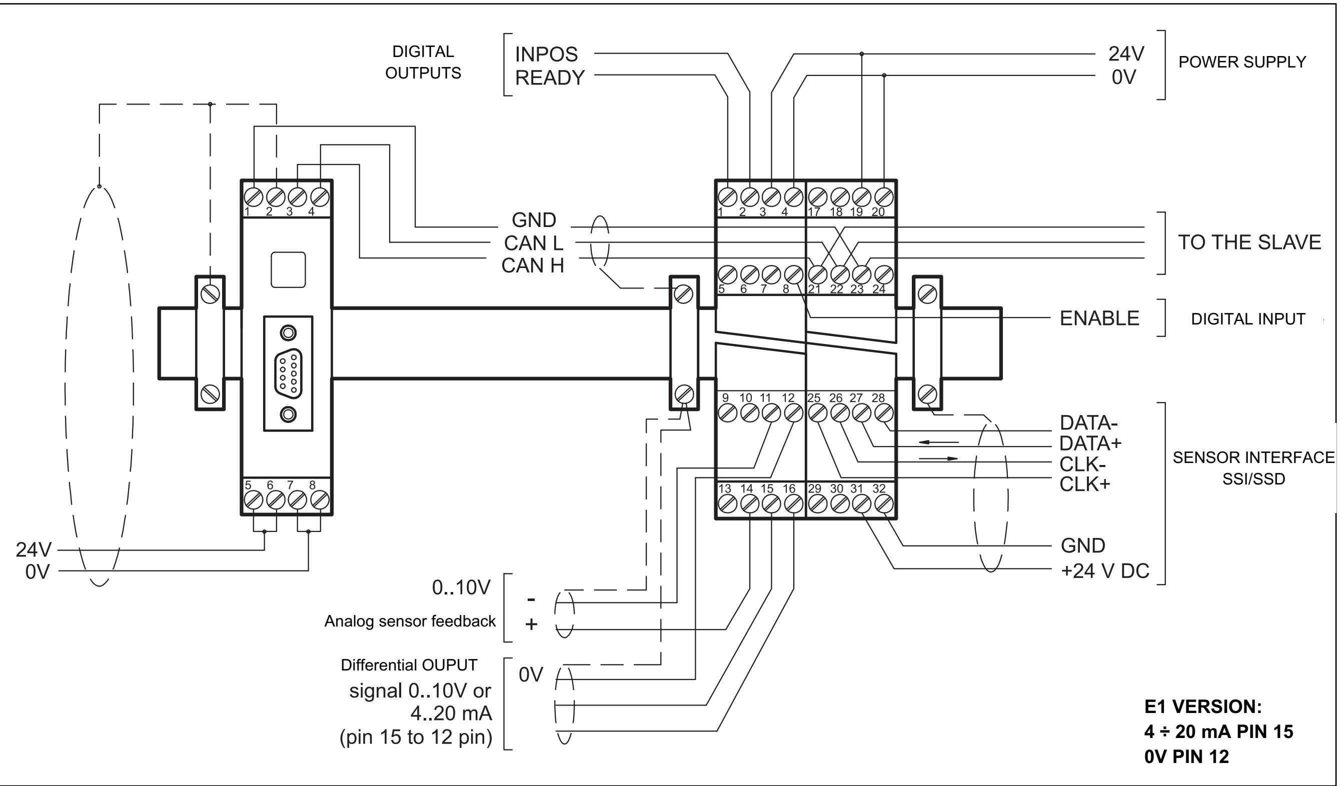
The software kit comprising a USB cable (2 mt length) to connect the card to a PC or notebook and the software.

During the identification all information are read out of the module and the table input will be automatically generated.

Some functions like baud rate setting, remote control mode, saving of process data for later evaluation are used to speed up the installation procedure.

The software is compliant with Microsoft XP® operating systems.

8 - WIRING DIAGRAMS FOR EWM-SS-DAD*E0 AND EWM-BUS-DD



DIGITAL INPUT AND OUTPUT

PIN 1 — READY output:
General operationally, ENABLE is active and there is no sensor error (by use of 4 ÷ 20 mA sensors). This output corresponds with the green LED.

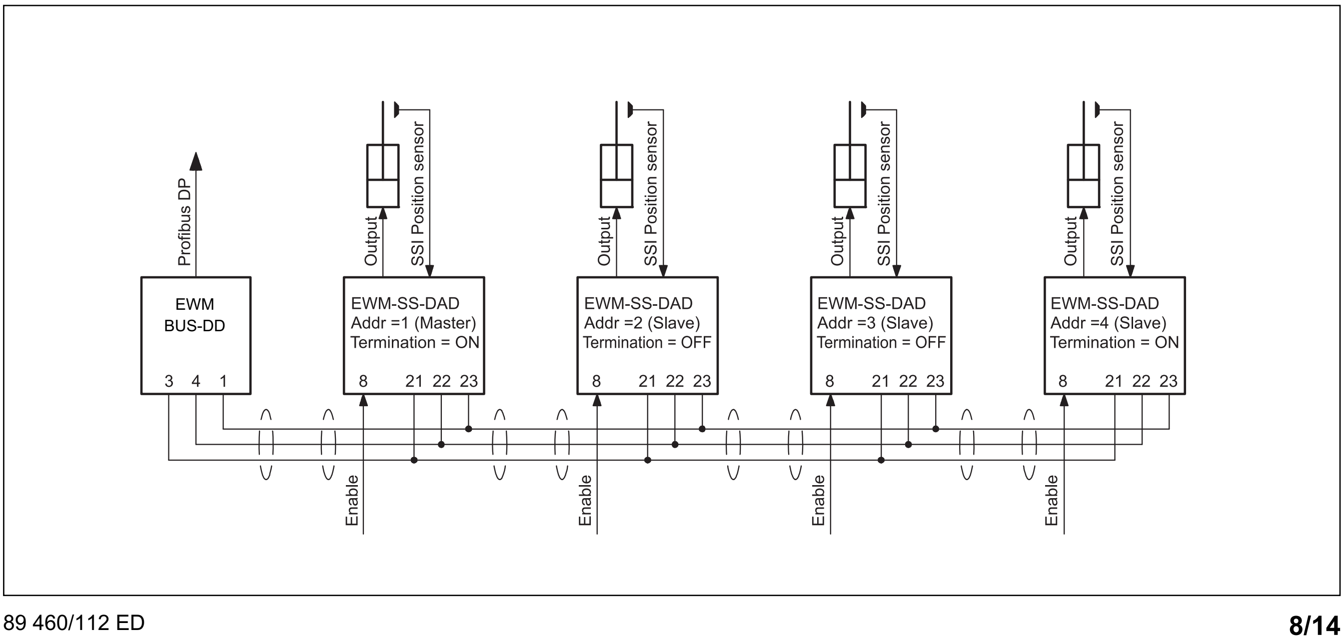
PIN 8 — ENABLE input:
This digital input signal initializes the application.
The analogue output is active and the READY signal indicates that all components are working correctly.
Target position is set to actual position and the drive is closed loop controlled.

ANALOGUE INPUT AND OUTPUT

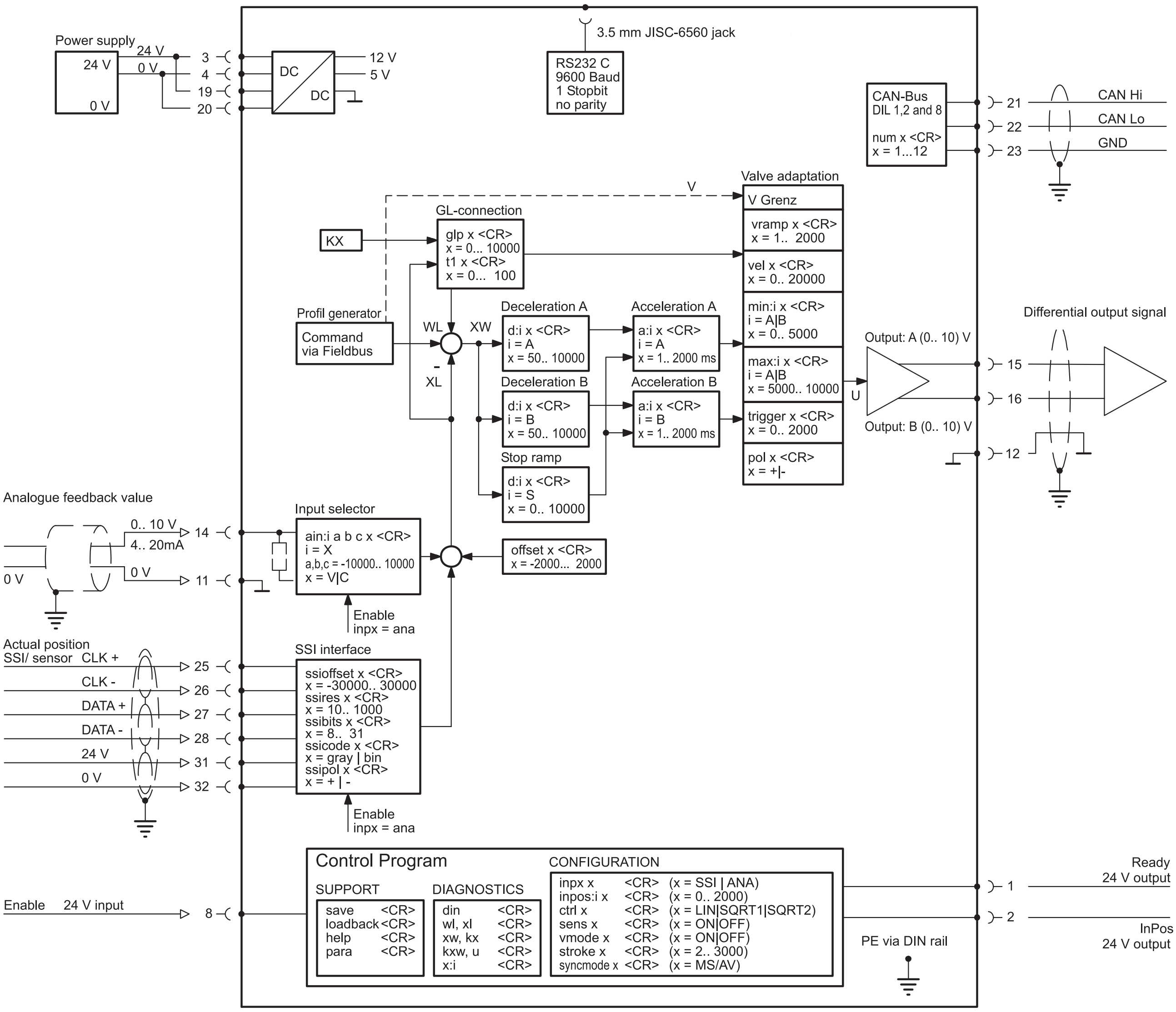
PIN 14 — Analogue feedback value (X),
range 0 ÷ 100% corresponds to 0 ÷ 10V or 4 ÷ 20 mA

PIN 15/16 — Differential output (U)
±100% corresponds to ± 10V differential voltage, optionally (E1 version) current output ±100% corresponds to 4 ÷ 20 mA (PIN 15 to PIN 12)

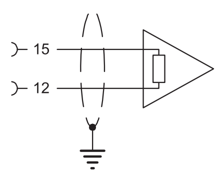
8.1 - Wiring for 4-axes synchronization



9 - EWM-DD-DAD CARD BLOCK DIAGRAM



OUTPUT SIGNAL - E1 VERSION



10 - PROFIBUS COMMUNICATION

The Profibus board controls the modules by sending 8 bytes of data, which contain information on two control words, the command position (position setpoint) and speed control (speed setpoint). The EWM-SS-DAD cards send back to the bus-card two status words, the nominal current position and current actual position, for a total of 24 bytes of data.

Using ST command in EWMPC, those data can be read out. and they appearing in this way:

(high byte / low byte)
control word : 1110 1000 / 0000 0000
control word 2 : 0010 0000 / 0010 0000
status word : 1101 0000 / 1101 0000
status word 2 : 0010 0000 / 0010 0000

position setpoint: 22400 (command position in HEX via Profibus)
speed setpoint: Iffff (command speed in HEX via Profibus)

Enable: enabled (module = enabled (Profibus & Hardware-enable))

10.1 - Data sent to the axes

The EWM-BUS-DD card is set as follows:
(Hi = High byte; Lo = low byte)

Byte	Function	Comment
0	control word Hi	unsigned int
1	control word Lo	
2	command position Hi	unsigned long
3	command position..	
4	command position ..	
5	command position Lo	
6	velocity Hi	unsigned int
7	velocity Lo	
8	control word 2 Hi	unsigned int
9	control word 2 Lo	
10 - 23	reserved	no function

10.1.1 - Axes control

Only the first four axes may be activated individually, the other axes must be enabled for groups of four axes at a time, with the indicator x SEL, according to the following:

Address	Controlled axes					
SEL	**1 to 4**	**5 to 8**	**9 to 12**	**13 to 16**	**17 to 20**	**21 to 24**
2	0	0	0	0	1	1
1	0	0	1	1	0	0
0	0	1	0	1	0	1

10.1.2 - Control words

The control words contain the following informations:

ENABLE: Must be activated in addition to the hardware signal.
START: In case of increasing edge the current command position is taken over, in case of deactivated START the system about a brake ramp is stopped.
GL-ACTIVE: Over this bit the overlapped synchronism controller is activated.
SEL x: Groups of each four modules with the information about status and positions can be read - by the control of the three select-bits -back.

Byte 0 - control word Hi		
bit	**Function**	
0	Axis START 4	start 1 = active
1	Axis START 3	start 1 = active
2	Axis START 2	start 1 = active
3	Axis START 1	start 1 = active
4	SEL 2	selection 1 = active
5	SEL 1	selection 1 = active
6	SEL 0	selection 1 = active
7	Enable (with which enable hardware links)	operation 1 = active

Byte 1 - control word Lo		
bit	**Function**	
0	GL- Active ext 2 (axis 9 to 12)	1 = GL active (group 2)
1	GL- Active ext 1 (axis 5 to 8)	1 = GL active (group 1)
2	START ext 2 (axis 9 to 12)	1 = start (group 2)
3	START ext 1 (axis 5 to 8)	1 = start (group 1)
4	GL- Active axis 4	synch 1 = active
5	GL- Active axis 3	synch 1 = active
6	GL- Active axis 2	synch 1 = active
7	GL- Active axis 1	synch 1 = active

Byte 8 - control word 2 Hi		
bit	**Function**	
0	Reserved	
1	Reserved	
2	Reserved	
3	START ext 5 (start of axis 13 to 16)	1 = start (group 5)
4	START ext 4 (start of axis 17 to 20)	1 = start (group 4)
5	START ext 3 (start of axis 13 to 16)	1 = start (group 3)
6	Reserved	
7	Reserved	

Byte 9 - control word 2 Lo		
bit	**Function**	
0	Reserved	
1	Reserved	
2	Reserved	
3	GL- Active ext 5 (axis 21 to 24)	1 = GL active (group 5)
4	GL- Active ext 4 (axis 17 to 20)	1 = GL active (group 4)
5	GL- Active ext 3 (axis 13 to 16)	1 = GL active (group 3)
6	Reserved	
7	Reserved	

10.1.3 - Position setpoint description

Command position: according to the sensor resolution.

Byte 2 to 5 - command position		
bit	**Function** defined by the sensor resolution	
from 0 to 7	Command position Lo byte	Byte 5
from 8 to 15	Command position	Byte 4
from 16 to 23	Command position	Byte 3
from 24 to 31	Command position Hi byte	Byte 2

Example of calculation of position control for SSI sensor resolution = 5 µm and 100% stroke = 300 mm.

Position setpoint = 150 mm (= 50% stroke)

STROKE • SSIRES = 100% stroke (dec)

300 • 200 = 60.000 (dec) → EA60 (hex)
50% di 60.000 = 30.000 (dec) → 7530 (hex)

Example of calculation of position control for ANA sensor with 100% stroke = 300 mm. With analog sensors SSIRES value is preset and unchangeable.

Position setpoint = 150 mm (= 50% stroke)

STROKE • SSIRES = 100% stroke (dec)

300 • 1000 = 300.000 (dec) → 493E0 (hex)
50% di 300.000 = 150.000 (dec) → 249F0 (hex)

Position setpoint to be sent
with decimal value 150,000 :

hex **00 02 49 F0**

Byte 2, Byte 3, Byte 4, Byte 5

10.1.4 - Speed setpoint description

Command velocity: 0x3fff corresponds to 100 %.

Byte 6 and 7 - command velocity		
bit	**Function** max value 0x3FFF	
from 0 to 7	velocity Lo byte	Byte 7
from 8 to 15	velocity Hi byte	Byte 6

10.2 - Updating data

The EWM-SS-DAD cards send back to the bus-card two status words, the received setpoint command and the current actual position, totally of 24 bytes of data.

Byte	Function		Comment
0	status word	Hi	unsigned int
1	status word	Lo	
2	control position*	Hi	unsigned long
3	control position*		
4	control position*		
5	control position*	Lo	
6	status word 2	Hi	unsigned int
7	status word 2	Lo	
8	actual pos. axes 1,5,9,13,17,21	Hi	unsigned long
9	actual pos. axes 1,5,9,13,17,21		
10	actual pos. axes 1,5,9,13,17,21		
11	actual pos. axes 1,5,9,13,17,21	Lo	
12	actual pos. axes 2,6,10,14,18,22	Hi	unsigned long
13	actual pos. axes 2,6,10,14,18,22		
14	actual pos. axes 2,6,10,14,18,22		
15	actual pos. axes 2,6,10,14,18,22	Lo	
16	actual pos. axes 3,7,11,15,19,23	Hi	unsigned long
17	actual pos. axes 3,7,11,15,19,23		
18	actual pos. axes 3,7,11,15,19,23		
19	actual pos. axes 3,7,11,15,19,23	Lo	
20	actual pos. axes 4,8,12,16,20,24	Hi	unsigned long
21	actual pos. axes 4,8,12,16,20,24		
22	actual pos. axes 4,8,12,16,20,24		
23	actual pos. axes 4,8,12,16,20,24	Lo	

(*) If the average-value control is active (SYNCMODE = AV) the acknowledged value is the calculated position; If the MASTER / SLAVE (SYNCMODE = MS) is active the acknowledged value will be the command position.

Current command position: is interpreted according to mode differently.

Standard mode : target command position
NC-mode : (VMODE = ON) calculated command position of the generator.

Actual position: according to the sensor resolution.

Example: reading the value of stroke 299251:

hex **00 04 90 F3**

Byte 9, Byte 10, Byte 11, Byte 12

10.2.1 - Status word descriptions

READY: System is ready.

INPOS: Depending on the mode set, can transmit a position or, in NC mode, the following error control information.

GL-ERROR: The synchronism error is indicated over this bit by the parameter GLERROR dependently.

SENSOR ERROR: When the sensor monitoring is activated, the READY signal is deactivated with a sensor error.

COMERROR: Communication error on the CAN Bus. This message will be sent only from the module No. 1. if general communication problems are found or if a module is faulty

Always the hardware enable signal has to be deactivated at a sensor error (READY Signal) or when a COM error appear.

Byte 0 - status word Hi		
bit	**Function**	
0	INPOS axis 4	1= in position
1	INPOS axis 3	1= in position
2	INPOS axis 2	1= in position
3	INPOS axis 1	1= in position
4	READY axis 4	1= ready
5	READY axis 3	1= ready
6	READY axis 2	1= ready
7	READY axis 1	1= ready

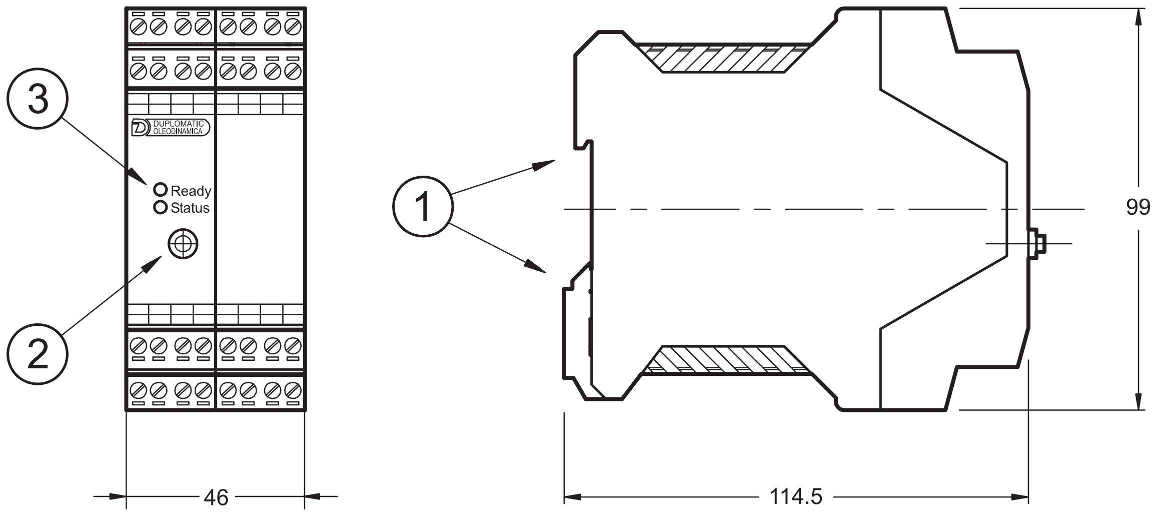
Byte 1 - status word Lo		
bit	**Function**	
0	COMerror	1 = no error
1	reserved	
2	reserved	
3	reserved	
4	axis GL-Error 4	1 = no error
5	axis GL-Error 3	1 = no error
6	axis GL-Error 2	1 = no error
7	axis GL-Error 1	1 = no error

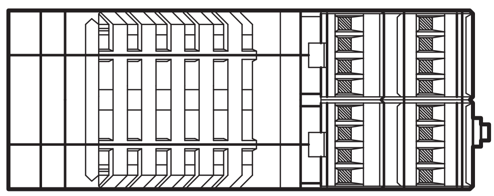
Byte 6 - status word 2 Hi		
bit	**Function**	
0	INPOS axis 4, 8, 12, 16, 20, 24	1= no error Corresponding signal indicator through selection bits Sel_0 to Sel_2 in the control word Hi
1	INPOS axis 3, 7, 11, 15, 19, 23	
2	INPOS axis 2, 6, 10, 14, 18, 22	
3	INPOS axis 1, 5, 9, 13, 17, 21	
4	READY axis 4, 8, 12, 16, 20, 24	1= Ready Corresponding signal indicator through selection bits Sel_0 to Sel_2 in the control word Hi
5	READY axis 3, 7, 11, 15, 19, 23	
6	READY axis 2, 6, 10, 14, 18, 22	
7	READY axis 1, 5, 9, 13, 17, 21	

Byte 7 - status word 2 Lo		
bit	**Function**	
0	reserved	
1	reserved	
2	reserved	
3	reserved	
4	GL-Error axis 4, 8, 12, 16, 20, 24	1= no error Corresponding signal indicator through selection bits Sel_0 to Sel_2 in the control word Hi
5	GL-Error axis 3, 7, 11, 15, 19, 23	
6	GL-Error axis 2, 6, 10, 14, 18, 22	
7	GL-Error axis 1, 5, 9, 13, 17, 21	

The status word 2 concerns the messages in the EXTENDED mode.

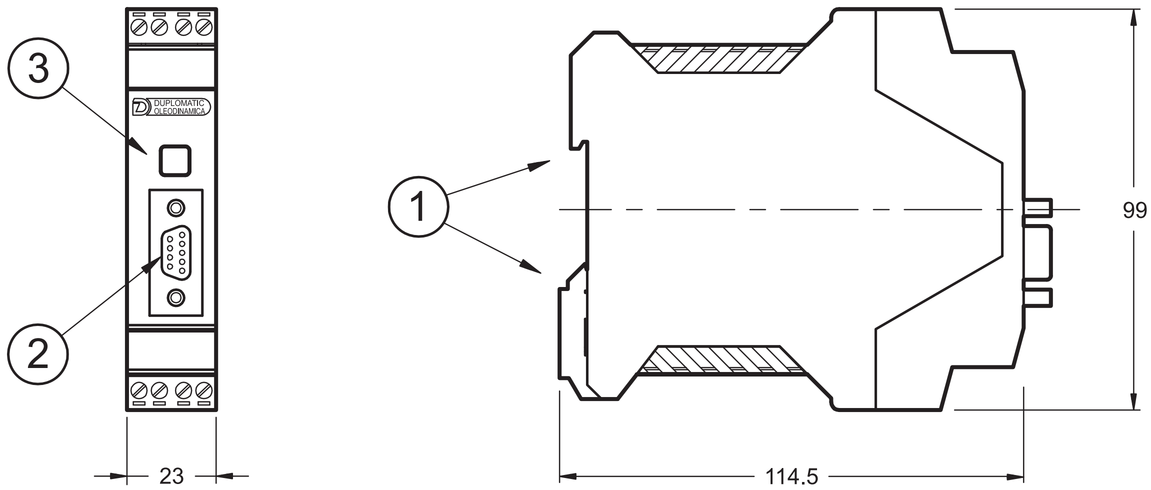
11 - OVERALL AND MOUNTING DIMENSIONS OF EWM-SS-DAD





1	DIN EN 50022 rail type fastening
2	Plug for PC cable connection
3	LED for output signals

12 - OVERALL AND MOUNTING DIMENSIONS OF EWM-BUS-DD



1	DIN EN 50022 rail type fastening
2	Profibus interface port
3	Display

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