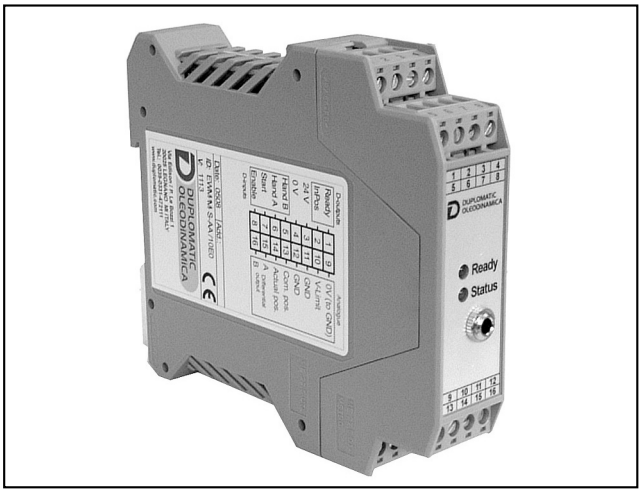


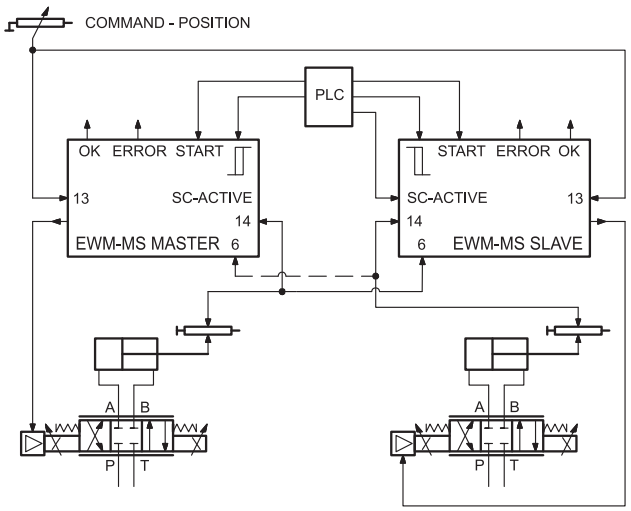
EWM-MS-AA

CARD WITH ANALOGUE SIGNALS FOR SYNCHRONIZATION CONTROL

SERIES 10

RAIL MOUNTING TYPE: DIN EN 50022

OPERATING PRINCIPLE



— This card has been developed for an easy synchronization of two actuators with an overriding synchronization controller.

— The card can drive only an axis; to get the complete master and slave synchronization two cards are necessary.

— Proportional valves with integrated electronics can be driven by the differential output. As option, an integrated amplifier is available.

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

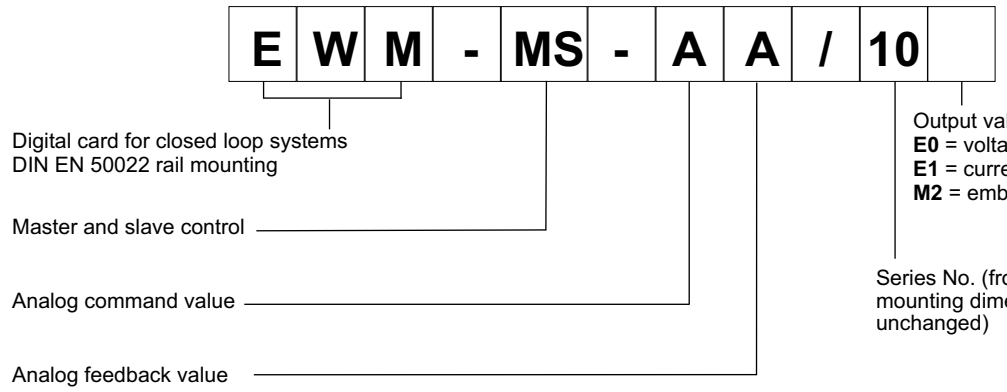
— The axes speed can be limited by an external analogue speed input.

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

TECHNICAL CHARACTERISTICS

Power supply	V DC	12 ÷ 30 ripple included external fuse 1,0 A (5 A for M2 version)
Current consumption: - E0 and E1 version - M2 version	mA A	100 + sensor power consumption depending from solenoid current
Command value	V mA	0 ÷ 10 (R_I = 33 kΩ) 4 ÷ 20 (R_I = 250 Ω)
Command value resolution	%	0,01 (internally 0,0031)
Speed input value	V	0 ÷ 10 (R = 90 kΩ)
Speed input value resolution	%	0,024
Feedback value	V mA	0 ÷ 10 (R_I = 33 kΩ) 4 ÷ 20 (R_I = 250 Ω)
Output value: - E0 version - E1 version - M2 version	V mA A	±10 (max load 5 mA) 4 ÷ 20 (max load 390 Ω) 1,0 ÷ 2,6
Interface		RS 232 C
Electromagnetic compatibility (EMC):		Emissions EN 61000-6-2:8/2002 Immunity EN 61000-6-3:8/2005
Housing material		thermoplastic polyammide PA6.6 - combustibility class V0 (UL94)
Housing dimensions	mm	120(d) x 99(h) x 23(w) (M2 version: w = 46)
Connector		4x4 poles screw terminals - PE direct via DIN rail
Operating temperature range	°C	-20 / +60
Protection degree		IP 20

1 - IDENTIFICATION CODE



NOTE: one card per axis is needed. To synchronize 2 axes, 2 cards are needed.

The structure of the synchronisation controller was deduced from our positioning modules. The positioning function is controlled by the input PIN 13 (target position of the axis) and PIN 14 (actual position of the axis).

With input PIN 6 (normally the sensor of the master axis) the actual position of the other axes is given to the module.

SC MODE: With the SC active, the synchronisation controller is overriding the position control process. When the actual position of the master axis is given to the slave axis (sc = active), all slave axes will follow the master axis.

In case of two axes, the position information can be linked crosswise from PIN 14 to PIN 6. The modes are master/master (both SC inputs are active), master/slave with selectable master function by deactivating of the SC input or independent positioning by deactivation of both SC inputs and separate command positions at PIN 13. The function of the STATUS output is - depending on SC input - in position signal (failure between PIN 13 and 14) or synchronisation error signal (failure between PIN 6 and PIN 14).

For a reliable function of the synchronisation control the speed should be limited to app. 70/80% of maximum speed. The slave axis must be able to increase the speed against the master axis to compensate position failures.

NOTE: By using positioning sensors with current input (4…20 mA) PIN 6 of the slave and with PIN 14 of the master are connected parallel. DIL switches are removed; the right current input is set automatically.

2 - 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 inductivities 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 the sensors.
NOTE: in the type M2 the value of the power supply voltage on the card must not be lower than the rated working voltage of the solenoid to be controlled.

2.2 - Electrical protections

All inputs and outputs are protected against overvoltage and have filters.

2.3 - Command value

The card accepts analogue input. The command value must be 0 ÷ 10 V (R_I = 33 kΩ) or 4 ÷ 20 mA. (R_I = 250Ω)

2.4 - Input feedback values

The card accepts analogue feedback input. The feedback value can be 0 ÷ 10 V (R_I = 33 kΩ) or 4 ÷ 20 mA (R_I = 250Ω). The sensor parameters are settable via software (see parameters table).

2.5 - Command speed input

The card accepts the command speed input with value 0 ÷ 10 V (R = 90 kΩ)

2.6 - Output values

The card is designed for two type of output values, voltage ±10V (E0 version) or current 4 ÷ 20 mA (E1 version); standard output value is E0 type. The embedded power stage is available on version M2 and it is adjustable via software, from 1 to 2,6 A.

2.7 - Digital Output

Two digital output are available, INPOS and READY, and their signals are displayed from the LEDS. As common potential 0V used (PIN 4) Low level <4 High Level >10.

3 - LED FUNCTIONS

There are two LED on the card: GREEN and YELLOW.

GREEN: Shows if the card is ready.

ON - The card is supplied
OFF - No power supply or the ENABLE parameter 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
OFF - Error detected, depending of a parameter error.

4 - ADJUSTMENTS

On the EWM card family, 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 (see example below in the page) with all the available parameters, with their commands, the default setting, the measuring unit and an explanation of the command and its uses.

The parameters changes depending on the card model, and they are fully described in the *Overhaul manual*.

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 mm², up to 20 m length and of 1.00 mm² up to 40m length, for power supply and, for M2 version, for solenoid connections. For other connections it is recommended to use cables with a screened sheath connected to earth only on the card side.

NOTE 1

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.

EXAMPLE OF PARAMETERS TABLE

Commands	Parameter	Defaults	Units	Description
ain:i a b c x	i= W|X|K a= -10000… 10000 b= -10000… 10000 c= -10000… 10000 x= V|C	 : 10000 : 10000 : 0 : V	- - 0,01% -	Analogue output selection. **W,X** and **K** for the inputs and **V** = voltage, **C** = current. 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.
a:i x	i= A|B x= 1… 2000	:A 100 :B 100	ms ms	Acceleration time depending on direction. **A** indicates analogue output 15 and **B** indicates analogue output 16. Normally **A** = flow P-A, B-T and **B** = flow P-B, A-T.
d:i x	i= A|B x= 10… 10000	:A 2500 :B 2500	0,01% 0,01%	Deceleration stroke depending on direction. The loop gain is calculated by the deceleration stroke. The shorter the higher. In case of instabilities longer deceleration stroke will be sufficient.
ctrl x	x= lin|sqrt1|sqrt2	sqrt1	-	Selection of the control function: **lin** = standard linear P-control, **sqrt1** = progressive time optimized deceleration curve **sqrt2** = sqrt1 with a higher gain in position
glp x **t1 x**	X= 0… 10000 X= 0… 100	500 10	0,01 ms	Parameter of the synchronisation control function. GLP is used for the proportional control gain and T1 time constant for damping of the control function. Critical drives can be stabilized with the T1 factor.
velo x	x= 1000… 10000	10000	0,01%	Internal limitation of the velocity. This limitation is active when command vs = off.
vs x	x= ext|int	int	-	Activates the external velocity limitation with the parameter EXT.
vramp x	x= 1… 2000	50	ms	Ramp time for velocity input.
vmode x	x= on|off	off	-	Activation of the NC-generator. The command position is generated by a velocity profile (internal or external preset of v). The axis drives more or less speed controlled.
th x	x= 100… 60000	5000	ms	Stroke time for 100% velocity and 100% nominal sensor stroke.
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 range for adapting control range to maximum flow range.
trigger x	x= 0… 2000	200	0,01%	Point to activate the deadband compensation (**min**). Also useful for reduced sensitivity in position with control valves.
inpos x	x= 2… 2000	200	0,01%	Range for the InPos signal (status output).
offset x	x= -2000… 2000	0	0,01%	The offset will be added to the command value.
pol x	x= +|-	+	-	For changing the 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	-	Activation of the sensor and internal failure monitoring.
save	-	-	-	Storing the programmed parameter in E²PROM.
loadback	-	-	-	Reloading the parameter from E²PROM in working RAM
din	-	-	-	Status of the digital inputs.
w, x, k, xw, xk, u ,v	-	-	-	Actual signals: command value, actual value, process data, control divergence and reference value.
default	-	-	-	Preset values will be set.

6 - SOFTWARE KIT EWMPC/10 (code 3898401001)

The software kit comprising a USB cable (2.70 mt length) to connect the card to a PC or notebook and the software.

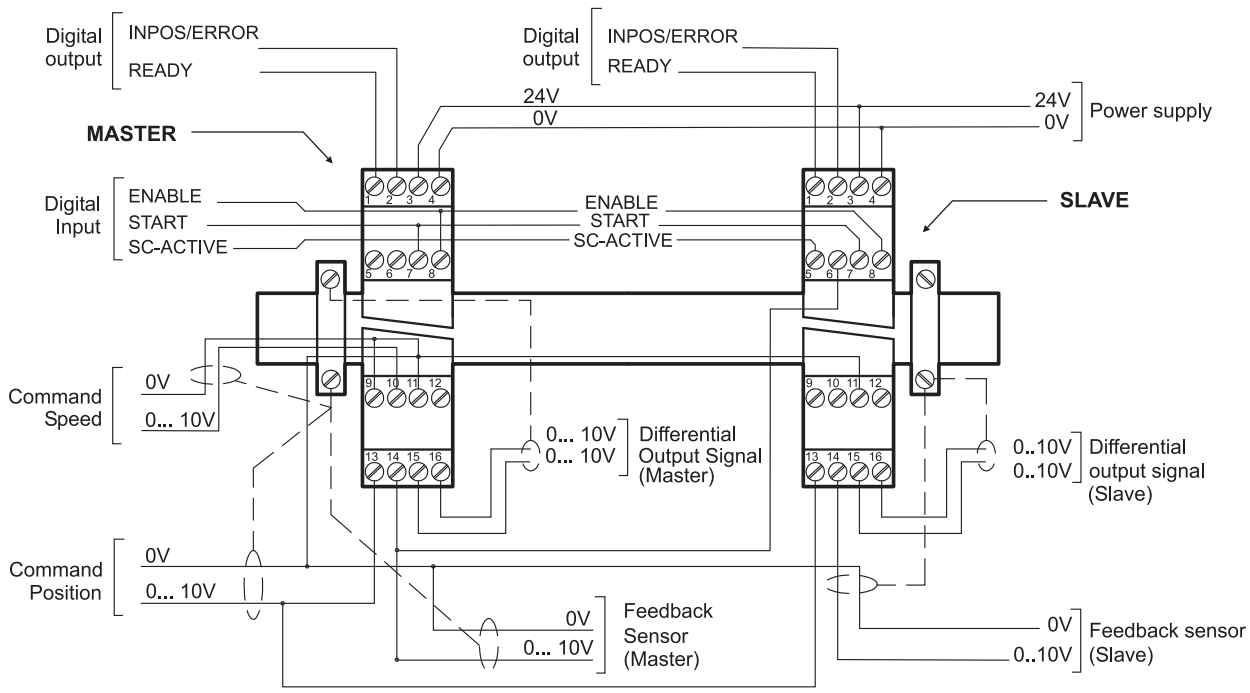
During the identification all information are read out of the module and the table input will be automatically generated.

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.

7 - WIRING DIAGRAM

MASTER-SLAVE WIRING WITH VOLTAGE (0..10V) SENSORS OUTPUT SIGNAL



DIGITAL INPUT AND OUTPUT

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

PIN 2 — STATUS output.
Monitoring of the control error (INPOS). Depending on the INPOS command, the status output will be deactivated, if the position difference is greater then the adjusted window. If SC-ACTIVE (pin 5) is on, this output is used to monitor the synchronization error.
The output is only active if START = ON.

PIN 5 — SC-ACTIVE:
The synchronisation controller is activated. If this input is not activated, the system works as a normal positioning controller.

PIN 7 — START input:
The positioning controller is active; the external analogue command position is taken over as command value.
If the input is switched off during movement, the command position is set to the actual position plus a defined emergency deceleration stroke

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

PIN 6 — Actual (feedback) value (K) of the master axis
range 0÷100% corresponds to 0 ÷ 10V or 4 ÷20 mA

PIN 9/10 — External command speed (V),
range 0 ÷ 100 % corresponds to 0 ÷ 10 V

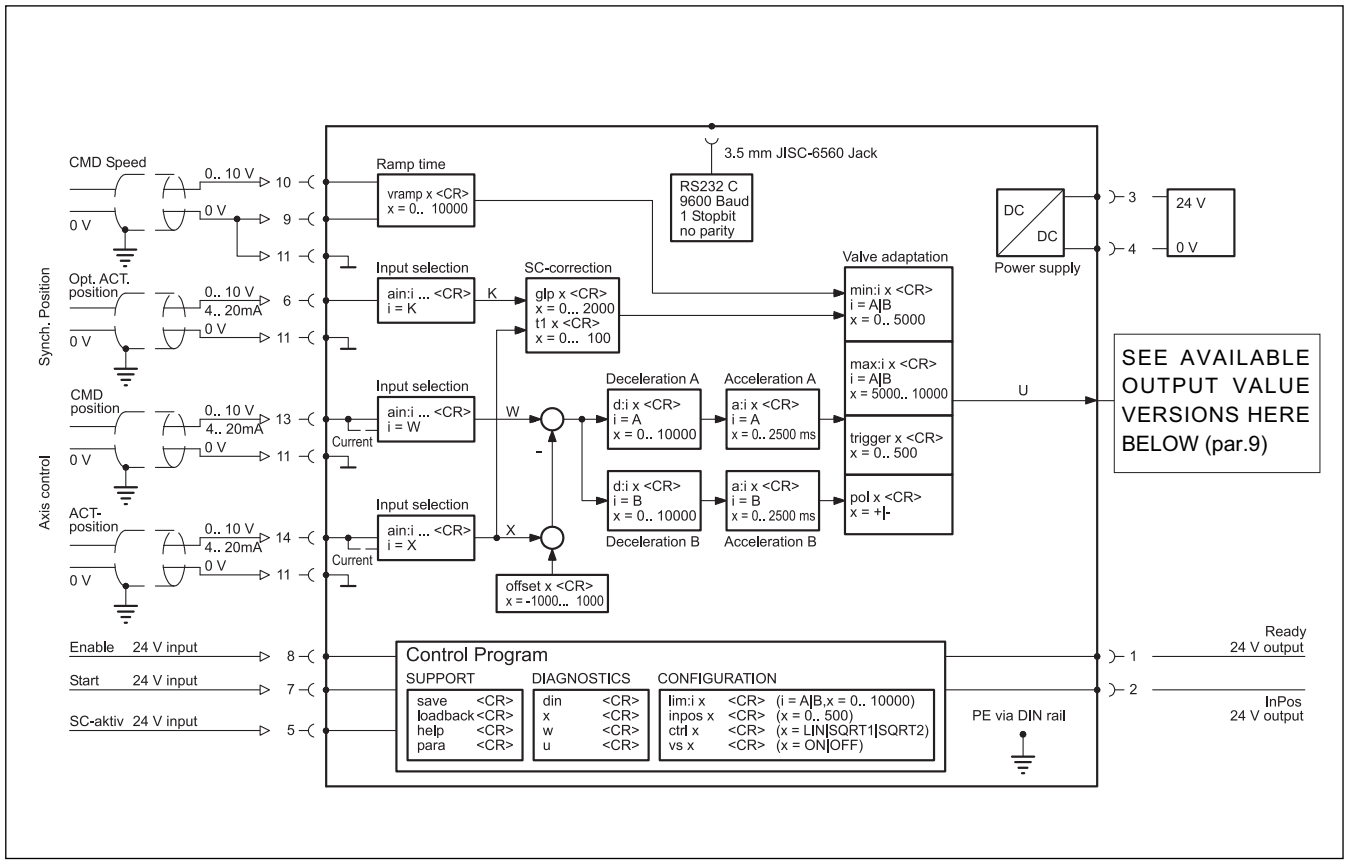
PIN 13 — Command position (W),
range 0 ÷ 100% corresponds to 0 ÷ 10V or 4 ÷ 20 mA

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

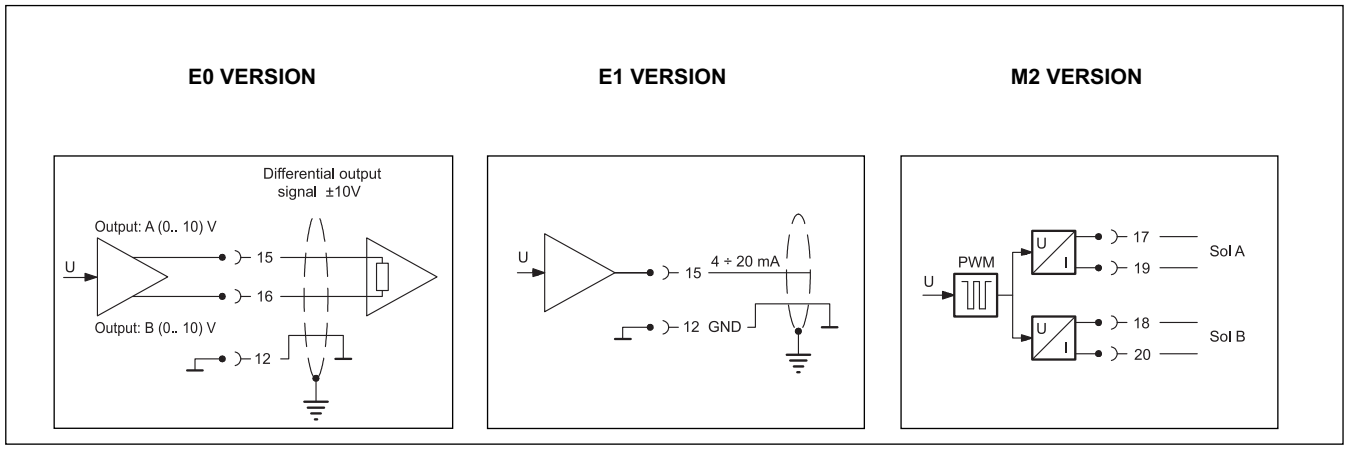
ANALOGUE OUTPUT

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)

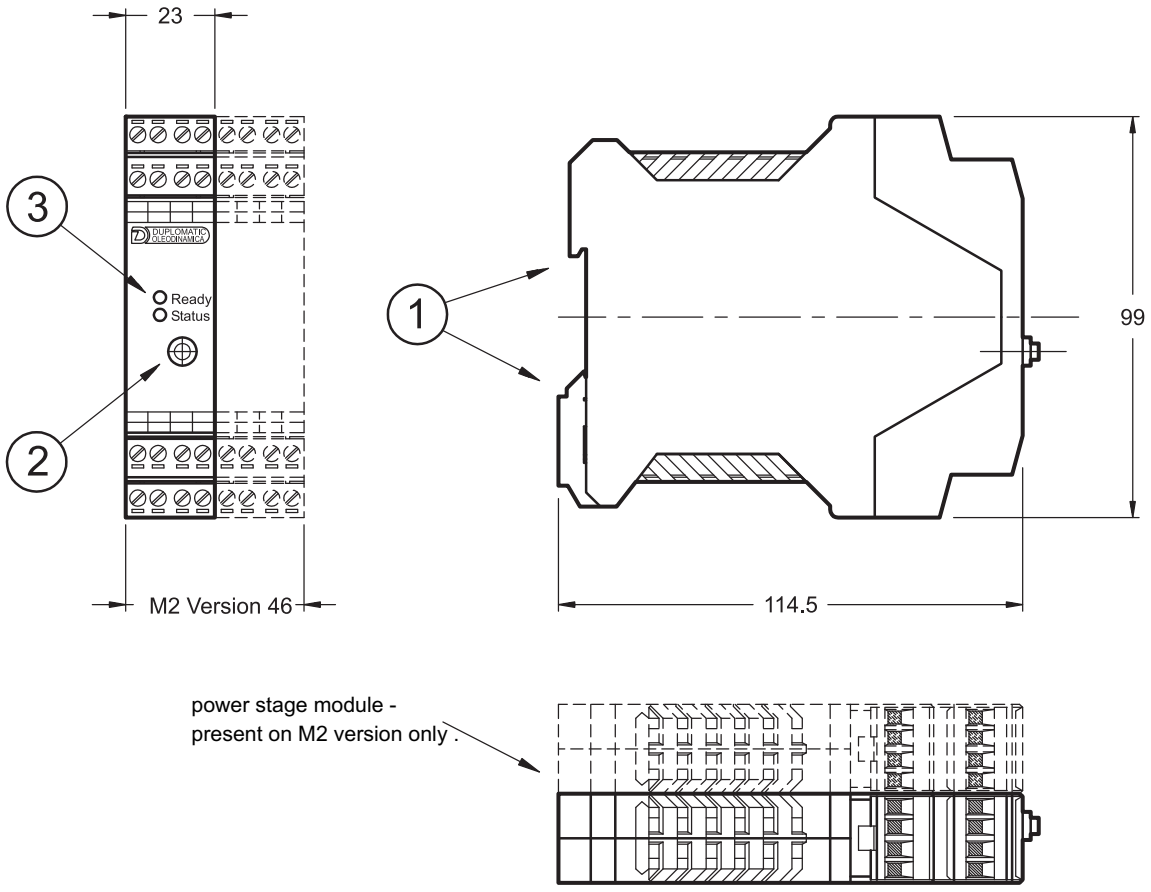
8 - CARD BLOCK DIAGRAM



9 - AVAILABLE OUTPUT VALUE VERSIONS



10 - OVERALL AND MOUNTING DIMENSIONS



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

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