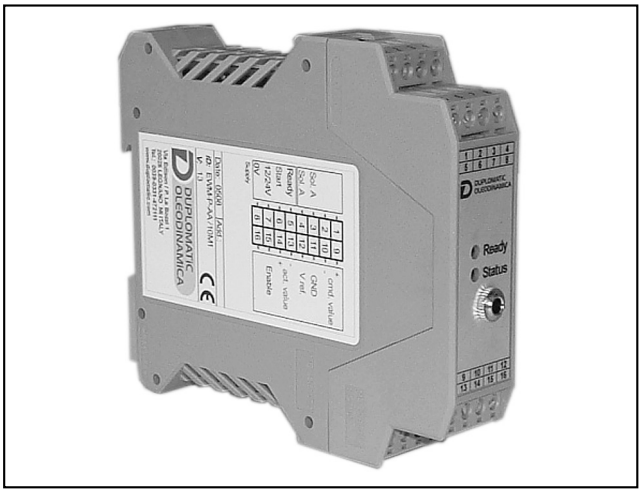


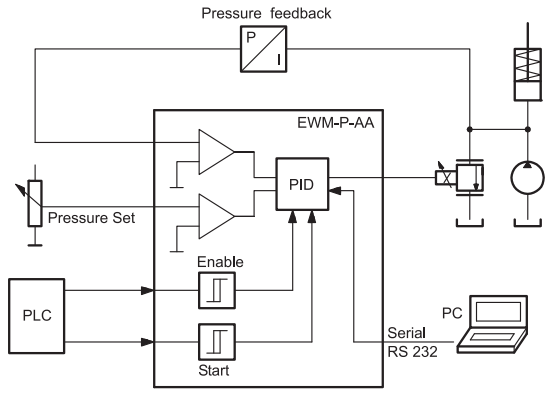
EWM-P-AA

DIGITAL CARD FOR PRESSURE AND FORCE CONTROL IN CLOSED LOOP SYSTEMS

SERIES 10

RAIL MOUNTING TYPE: DIN EN 50022

OPERATING PRINCIPLE



— The EWM-P-AA has been developed for pressure closed loop control of pressure reducing and pressure relief valves, with an embedded power amplifier for proportional valves.

— This card works as a bypass control module. The command value is directly transferred to the control output (pressure valve) and the closed loop compensates only the linearity failures. In most of cases the optimization is possible without any measuring instruments (only one manometer is necessary).

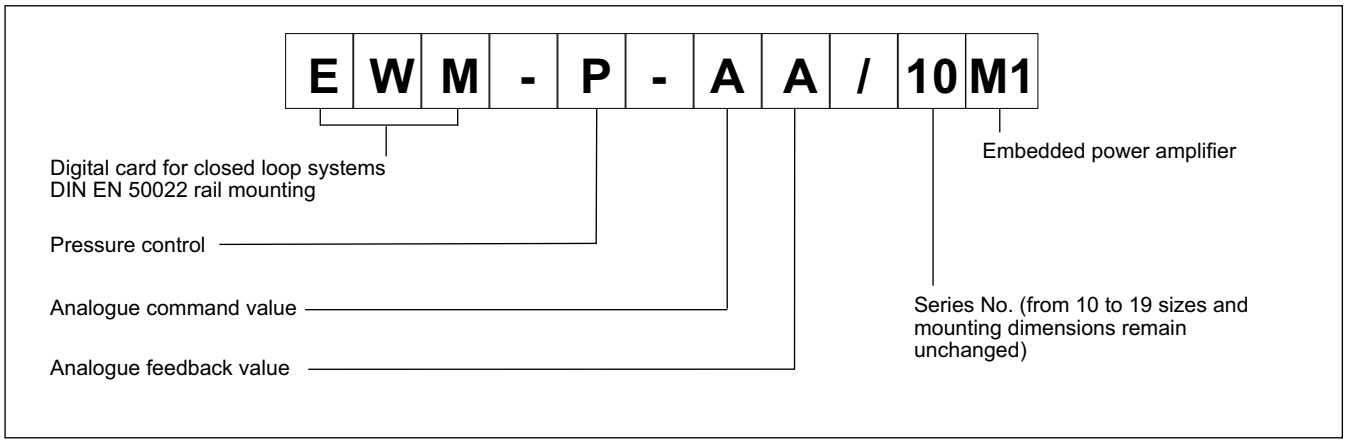
— The card allows to set the following parameters: ramp up, ramp down, PID parameters, dither, frequency and amplitude, PWM, maximum and minimum pressure.

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

TECHNICAL CHARACTERISTICS

Power supply	V DC	12 ÷ 30 ripple included external fuse 3,0 A
Current consumption	A	1,0 ÷ 2,6 depending from solenoid current
Command value	V mA	0 ÷ 10 (R_I = 100 kΩ) 4 ÷ 20 (R_I = 390 Ω)
Feedback value	V mA	0 ÷ 10 (R_I = 100 kΩ) 4 ÷ 20 (R_I = 390 Ω)
Output current	A	1,0 -1,6 - 2,6
Pressure accuracy	%	0,1
Interface		RS 232 C
Electromagnetic compatibility (EMC): according to 89/336 CEE standards		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)
Connector		4x4 poles screw terminals - PE direct via DIN rail
Operating temperature range	°C	-20 / +60
Protection degree		IP 20

1 - IDENTIFICATION CODE



This module is useful for pressure control in very different applications. The output signal can control various kind of pressure valves, but the controller structure is optimized for pressure closed loop control system with typical pressure valves. An integrated power stage and high dynamic control loops (1 msec for pressure control and 0,167 msec for the current loop control) offers a simple solution.

This module is recommended where open loop applications are not sufficient concerning the accuracy.

Pressure controls with constant pumps or remote controllable servo pumps and for force and torque controls with cylinders and motor drives are typical applications.

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 for the sensors.

NOTE: 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 - Digital Input
The card accepts digital input. The digital input must have a voltage from 12 to 24 V with current <0,1A. See the block diagram at paragraph 8 for the electric connections. As common: potential 0V (PIN 4) is used. Low level <4; High level >10V

2.4 - Command Input
The card accepts analogue command input, with voltage 0÷10V (R_I= 100Ω) and current 4÷20 mA (R_I= 390Ω)

2.5 - Input feedback values
The card accepts analogue feedback input. The feedback value must be 0 ÷ 10V (R_I= 100Ω) or 4 ÷ 20 mA (R_I= 390Ω).

2.6 - Output values
The output current value for this card is settable via software, The available values are 1,0 - 1,6 and 2,6 A.

2.7 - Digital Output
A digital output is available (READY) and its signal is displayed from the green led.

3 - LED SIGNALS

There are two leds on the card, but only the GREEN one works.

GREEN: Shows if the card is ready.

ON - The card is supplied and the system is ready
OFF - No power supply or ENABLE non activated
FLASHING - Failure detected (solenoid or 4÷20 mA) only if the parameter SENS is ON.

YELLOW: No function.

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 on next 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*.

EXAMPLE OF PARAMETERS TABLE

Commands	Parameter	Defaults	Units	Description
ainw x **ainx x**	x = V|C	V	-	Simple input selection: V is used for voltages input (+/- 10 V) and C is used for current input (4… 20 mA). AINW = command value and AINX = feedback value.
aa:i x	i= UP|DOWN x= 0..60000	 100	 ms	Ramp times for pressure UP and DOWN.
gainx x	x= 200… 5000	1000	-	Sensor gain to adapt the sensor to the required working range (1000 = gain of 1).
lim:i x	i= I|S :I 0… 10000 :S 0… 10000	 2500 2500	 0,01% 0,01%	Integrator limitation / activation LIM:I, general limitation (2500 = ±25%) LIM:S, Integrator activation depending on the command value. LIM:S 2500 (25%) = the integrator is active if the actual pressure is higher than 25% of the command pressure.
c:i x	i= P|I|D|T1|IC :P x= 0… 10000 :I x= 2… 2050 :D x= 0… 120 :T1 x= 0… 100 :SC x= 0… 10000	 :P 50 :I 400 :D 0 :T1 1 :SC 10000	 0,01 ms ms ms 0,01%	PID-compensator for pressure limitation: **P**-gain, 50 corresponded with a nominal gain of 0,5. **I**-gain, integrator time in ms, >2010 for deactivation. **D**-gain, **T1**-time for damping of the D part. **SC** command signal scaling (direct control of the output).
min:i x	i= A x= 0… 5000	 :A 0	0,01%	Deadband compensation of positive overlapped proportional valves. Good adjustment will increase positioning accuracy.
max:i x	i= A x= 5000… 10000	 :A 10000	 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.
current:i x	i= A x= 0… 2	 0	 -	Selection of the output current range: 0 = 1,0 A range, 1 = 1,6 A range and 2 = 2,6 A range.
dampl:i x	i= A x= 0..2000	 0	0,01%	Dither frequency
dfreq:i x	i= A x= 60… 400	 125	Hz	Dither amplitude. Typical values between 500 and 1200 (good experience were made with 700).
pwm:i x	i= A x= 100..3900	 1900		PWM Frequency. PWM Frequencies of ≥2000 Hz improve the current loop dynamics. PWM Frequencies in the range of 100 ÷500 Hz will be used for low dynamic valves with high hysteresis. In this case, DAMPL must be zero.
ppwm:i x **ipwm:i x**	x= 1… 20 x= 5… 100	3 40	- -	PI-compensator for the current controller. Changes should be only done with good experience in optimizing of current loops. In some cases a PWM Frequency of >2500 Hz; PPWM can be increased to 7...15. ATTENTION: The dither amplitude must be optimized after that.
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, xd, u	-	-	-	Actual signals: command value, actual value, process data, control divergence and reference value.
default	-	-	-	Preset values will be set.

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 solenoid connections on version M2. 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.

6 - SOFTWARE KIT EWMPC/10 (code 3898401001)

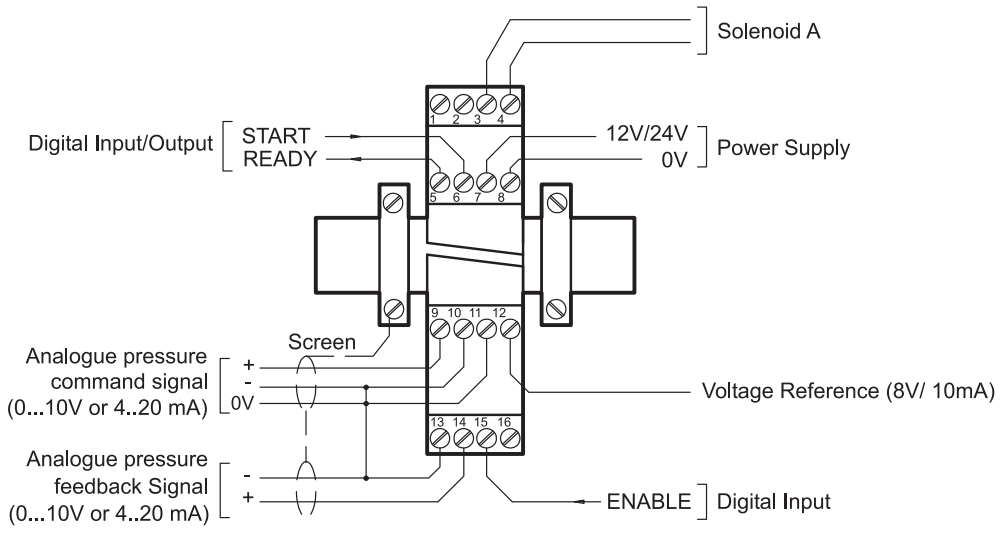
The software kit includes a USB cable (2.70 mt lenght) to connect the card to a PC or notebook and the software.

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



DIGITAL INPUT AND OUTPUT

PIN 5 — 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 6 — START Input:
The controller is active; the external analogue command value is taken over.

PIN 15 — 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. The system works in open loop (like a simple power amplifier).

ANALOGUE INPUT

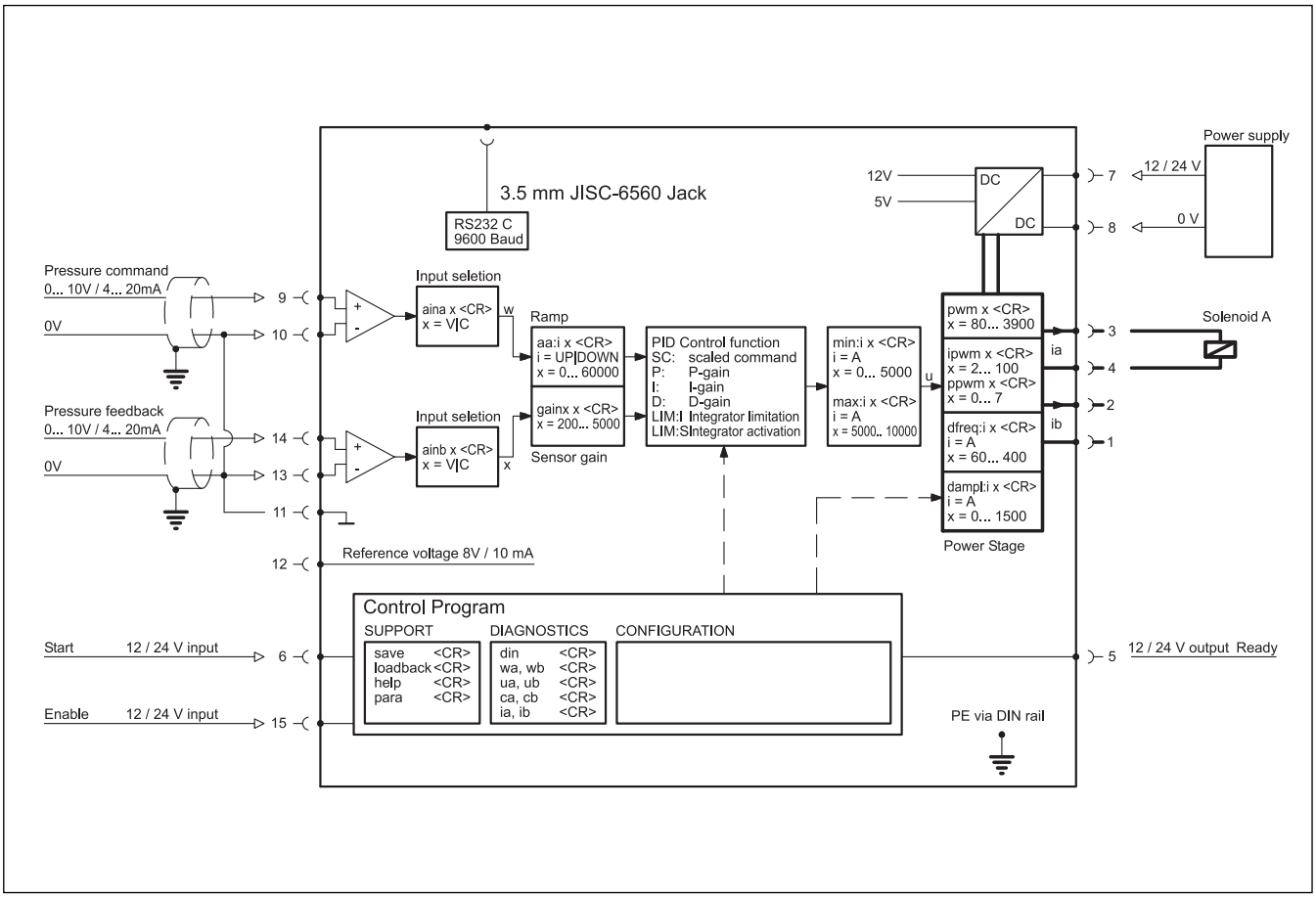
PIN 9/10 — P-command (W)
range 0 ÷ 100% corresponds to 0 ÷ 10V or 4 ÷20 mA

PIN 13/14 — P-feedback (X),
range 0 ÷ 100% corresponds to 0 ÷ 10V or 4 ÷20 mA

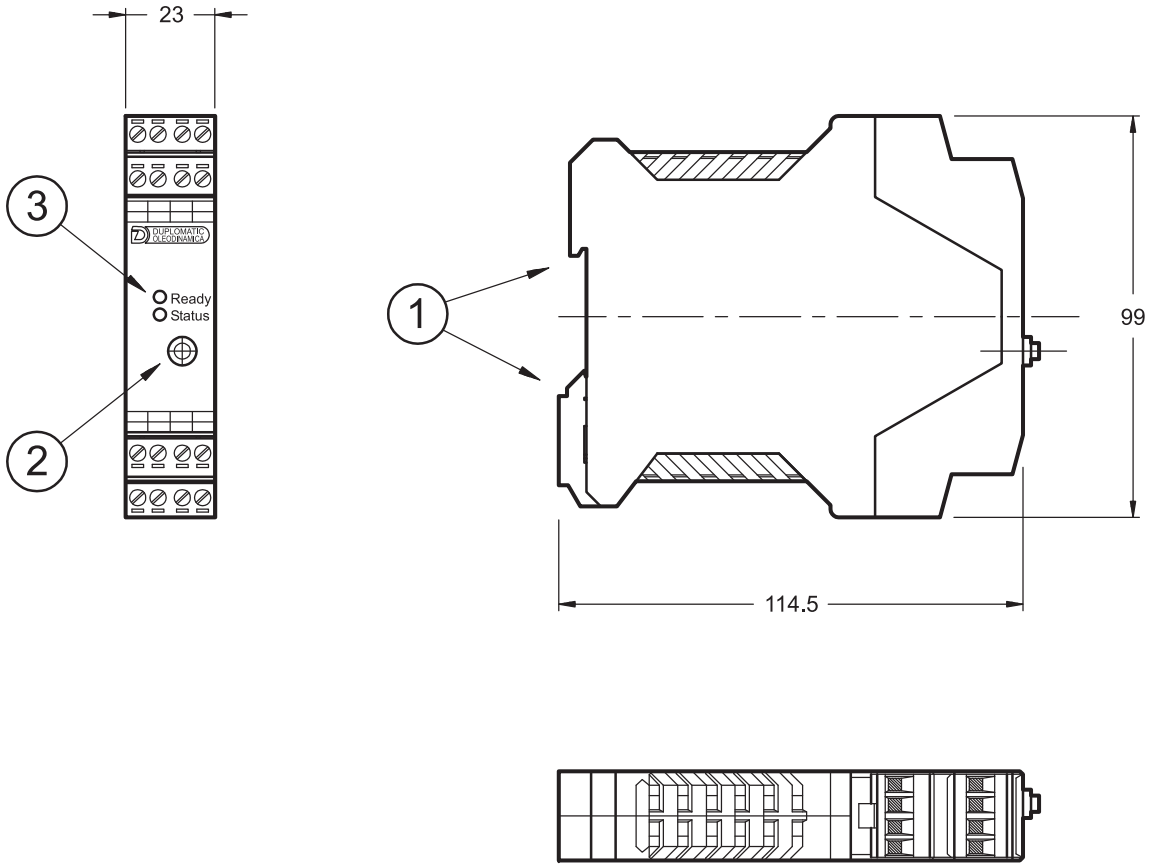
ANALOGUE OUTPUT

PIN 3/4 — PWM output for controlling of the valve.

8 - CARD BLOCK DIAGRAM



9 - OVERALL AND MOUNTING DIMENSIONS



1	DIN EN 50022 rail type fastening
2	Plug for connection PC cable
3	LED for OUTPUT signal

DUPLOMATIC OLEODINAMICA S.p.A.
20025 LEGNANO (MI) • P.le Bozzi, 1
Tel. +39 0331.472.111
Fax +39 0331.548.328
www.duplomatic.com