

ELECTRONIC CONTROL UNITS



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REFERENCE TABLE

Setting by Trimmers				☺																	
Setting by PC																					
Setting by Switches				☺																	
Connection for Display																					
CANbus Interface																					
RS485																					
RS232 (interface needed)																					
Total Number of Outputs				1	3	5	8	8-12													
PWM Outputs				1	2 (NOT simultaneous)	4 (max 2 simultaneous)	8 (max 4 simultaneous)	8 (max 4 simultaneous)													
Analog Outputs																					
High Side Power Outputs					1 (max 3.5 A)	1 (max 5 A)		4 (optional, max 5 A)													
Low Side Power Outputs																					
Signal Digital Outputs																					
Total Number of Inputs				1	1	8	8	8-10													
Analog Inputs				1	1	8	6	8													
Optoisolated Digital Inputs																					
Digital Inputs							2	2													
Power Supply Range				8.5-30 V	8-32 V	9-30 V	9-30 V	9-30 V													
Tecnord P/N				EC-PWM-A1-MPC1*-	EC-PWM-A2-MPC1*-	EC-PWM-P4-MPC2-H	EC-PWM-08-MPC4-H	EC-PWM-P8-MPC4-H													
Description				PWM card 1 coil, 1 channel	PWM card 2 coils, 1 channel	PWM card 4 coils, 2 channels	PWM card 8 coils, 4 channels (factory preset)	PWM card 8 coils, 4 channels (programmable)													
PWM DRIVERS																					
MMS 10 inputs, 12 outputs	EC-MMS-1012-H	9-30 V	2	8	10																
MMS 7 inputs, 13 outputs	EC-MMS-0713-H	8.5-32 V	6 (5 if 1 dig. output is not used)	1	6-7																
MMS 22 inputs, 18 outputs	EC-MMS-2218-H	8.5-32 V	14	8	22																
MMS 48 inputs, 20 outputs (coding card)	EC-MMS-4820-H	8.5-40 V	32	16	48																
MMS 62 inputs, 52 outputs (main unit)	EC-MMS-6252-H	8.5-40 V	40	16 (0-5 V) 6 (0-20 mA)	62																
MMS 15 inputs, 21 outputs (main unit)	EC-MMS-1521-H	8-32 V	4 (8 if 4 pow. outs not used)	11	15-19																
MACHINE MANAGEMENT SYSTEMS																					

WARNING: the specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

ELECTRONIC CONTROL UNITS

PWM Driver

	Description	Page
EC-PWM-A1-MPC1-P	1 PWM output for single solenoid valve wire connection	4
EC-PWM-A1-MPC1-D	1 PWM output for single solenoid valve din plug for coil mounting	6
EC-PWM-A1-MPC1-E	1 PWM output for 1 single solenoid valve male DIN plug connection	8
EC-PWM-A2-MPC1-*	1 PWM output for 1 dual solenoid valve wire connection	10
EC-PWM-P4-MPC2-H	2 PWM outputs for 2 dual solenoid valves programmable	12
EC-PWM-08-MPC4-H	4 PWM outputs for 4 dual solenoid valves fixed settings	14
EC-PWM-P8-MPC4-H	4 PWM outputs for 4 dual solenoid valves programmable	16

EC-PWM-A1-MPC1-P PWM Driver

DESCRIPTION

Microprocessor-based PWM electronic driver for remote control of a single proportional solenoid valve.

OPERATION

The EC-PWM-A1-MPC1-P proportional valve driver receives a command signal from a potentiometer, PLC or other control systems, and supplies a solenoid with a PWM (*Pulse Width Modulated*) current proportional to the input signal. An auxiliary power supply (+5 V) is provided as a reference for the command signal.

Adjustments of "Imin/Imax", "Ramp time" and "Dither" can be carried out directly from a key-pad integrated on the front panel.

Mounting option: panel-mounting style with INPUT/OUTPUT multi-core sheathed cable.

FEATURES

- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Power supply line is protected against reversed polarity and load dump.
- Input is protected against short circuits to GND and power supply.
- Output is protected against short circuits, over-current and over-temperature.
- The EC-PWM-A1-MPC1 is completely potted.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).



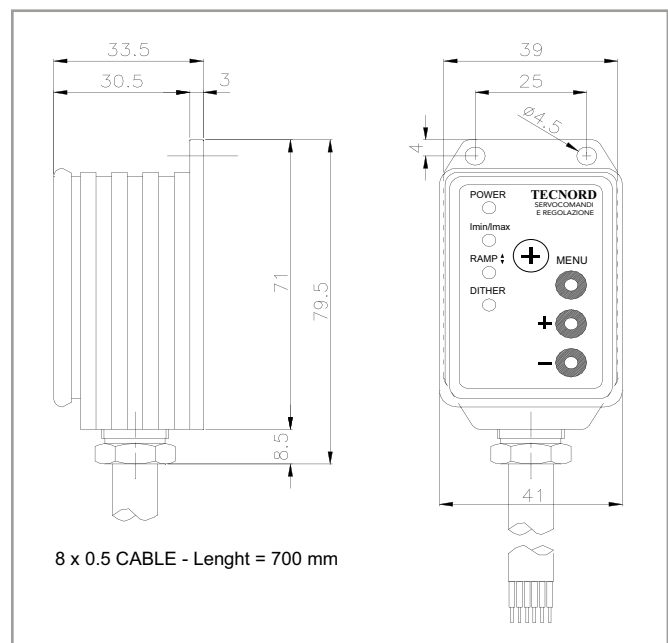
SPECIFICATIONS

• Operating voltage:	8.5 ÷ 30 VDC
• Max current consumption:	100 mA (no load applied)
• Operating temperature:	-25°C / +85°C
• Input resistance 0 ÷ 5V voltage input:	560 KOhms
0 ÷ 10V voltage input:	1 MOhm
0 ÷ 20mA current input:	250 Ohms
• Degree of protection:	IP 67
• Analog input signals available:	0 ÷ 5 V
	0 ÷ 10 V
	0 ÷ 20 mA
• Typical ctrl pot resistance:	2 ÷ 47 kΩ
• Current output range (PWM):	100 ÷ 3000 mA
• PWM dither frequency:	55 ÷ 200 Hz (adjustable)
• Ramp time:	0.05 ÷ 5 s (adjustable)
• Max. current from auxiliary +5 V:	15 mA

APPLICATIONS

- Primary applications are the control of proportional pressure reducing valves and proportional flow regulators to attain smooth acceleration/deceleration and fine-metering control of electro-hydraulic functions.

DIMENSIONS



ELECTRONIC CONTROL UNITS

EC-PWM-A1-MPC1-P PWM Driver

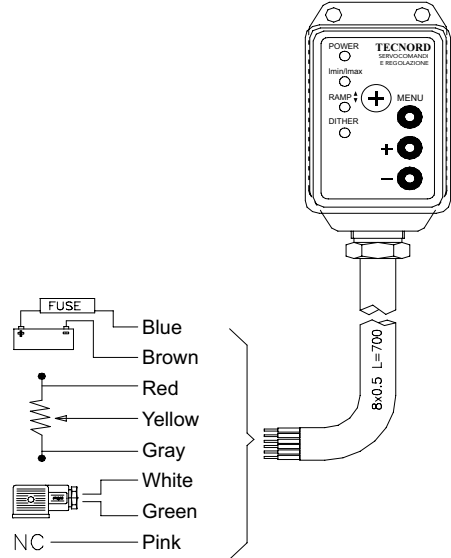
CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Wiring Colours

Blue	+Battery
Brown	-Battery (GND)
Red	Command signal supply (+5 V)
Yellow	Command signal in
Gray	Command signal GND
White	Proportional coil output
Green	Proportional coil current feedback line
Pink	Spare / Not used

Note

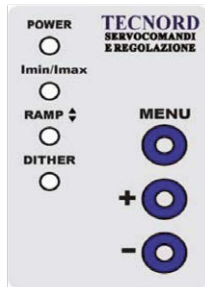
A 5A fuse must be inserted on the BLUE wire connecting the PWM driver to the power source.



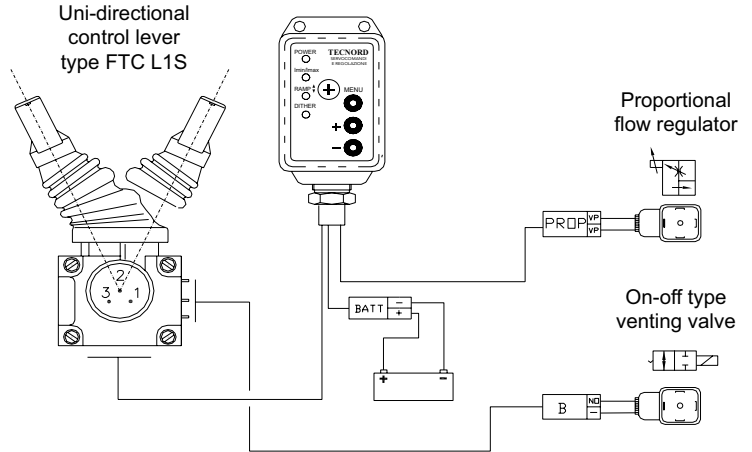
ADJUSTMENTS

The following adjustments can be made directly from the front key-pad by selecting the 3-pushpins in various combinations:

- I_{min} (minimum output current)
- I_{max} (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency



APPLICATION EXAMPLE



Remote operation of a proportional flow control valve from single axis/unidirectional control lever incorporating a rotary potentiometer and a center/power-off switch for the energization of an auxiliary solenoid-operated dump valve.

ORDERING INFORMATION

EC-PWM-A1-MPC1-P

A = Adjustable

P = Panel mounting

Part numbers	Version
23.0409.045	0-5 V
23.0409.087	0-10 V
23.0409.136	0-20 mA

EC-PWM-A1-MPC1-D PWM Driver

DESCRIPTION

Microprocessor-based PWM electronic driver for remote control of a single proportional solenoid valve.

OPERATION

The EC-PWM-A1-MPC1-D proportional valve driver receives a command signal from a potentiometer, PLC or other control systems, and supplies a solenoid with a PWM (*Pulse Width Modulated*) current proportional to the input signal.

An auxiliary power supply (+5 V) is provided as a reference for the command signal. Adjustments of "Imin/Imax", "Ramp time" and "Dither" can be carried out directly from a key-pad integrated on the front panel.

Mounting option: female DIN 43650 socket on valve's side and sheathed exit cable to connect to power source and remote control devices.

FEATURES

- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Power supply line is protected against reversed polarity and load dump.
- Input is protected against short circuits to GND and power supply.
- Output is protected against short circuits, over-current and over-temperature.
- The EC-PWM-A1-MPC1 is completely potted.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).



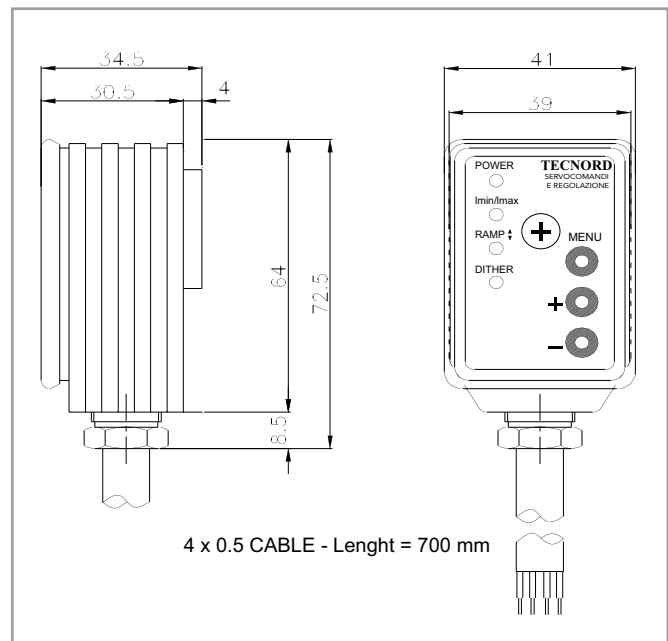
SPECIFICATIONS

• Operating voltage:	8.5 ÷ 30 VDC
• Max current consumption:	100 mA (no load applied)
• Operating temperature:	-25°C / +85°C
• Input resistance 0 ÷ 5V voltage input:	560 KOhms
0 ÷ 10V voltage input:	1 MOhm
0 ÷ 20mA current input:	250 Ohms
• Degree of protection:	IP 67
• Analog input signals available:	0 ÷ 5 V 0 ÷ 10 V 0 ÷ 20 mA
• Typical ctrl pot resistance:	2 ÷ 47 kΩ
• Current output range (PWM):	100 ÷ 3000 mA
• PWM dither frequency:	55 ÷ 200 Hz (adjustable)
• Ramp time:	0.05 ÷ 5 s (adjustable)
• Max. current from auxiliary +5 V:	15 mA

APPLICATIONS

- Primary applications are the control of proportional pressure reducing valves and proportional flow regulators to attain smooth acceleration/deceleration and fine-metering control of electro-hydraulic functions.

DIMENSIONS



ELECTRONIC CONTROL UNITS

EC-PWM-A1-MPC1-D PWM Driver

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Power supply wiring colours

- Blue** (+) Positive from power source
Yellow/Green (-) Negative from (GND)

Remote potentiometer wiring colours

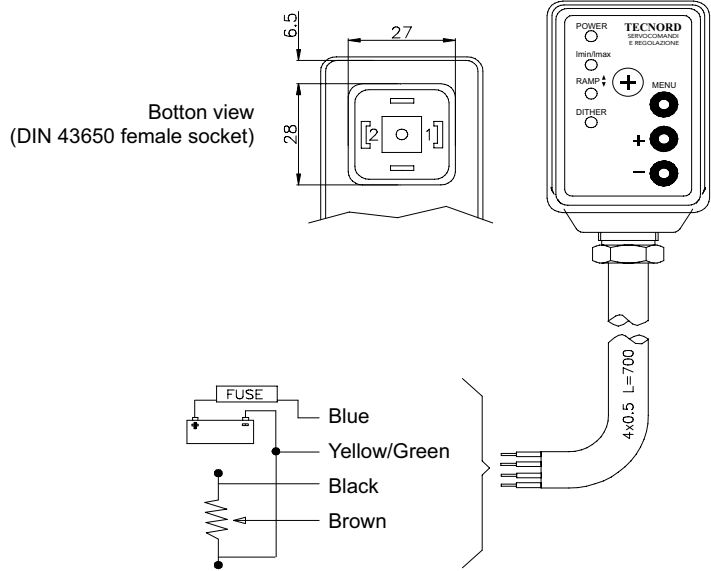
- Black** Command signal supply (+5 V)
Brown Command signal in

Proportional valve connector pins

- 1** Proportional coil output
2 Proportional coil current feedback line

Note

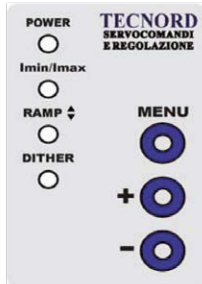
A 5A fuse must be inserted on the BLUE wire connecting the PWM driver to the power source.



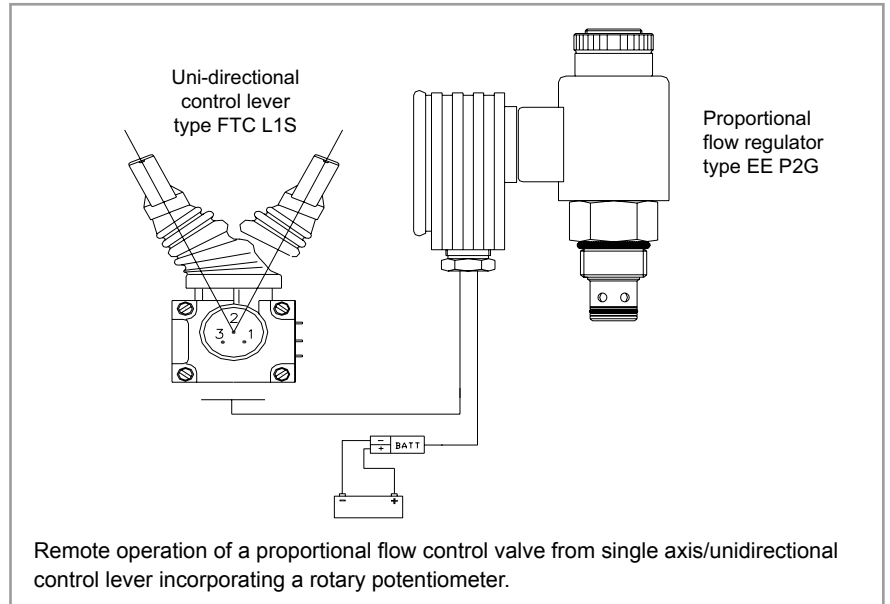
ADJUSTMENTS

The following adjustments can be made directly from the front key-pad by selecting the 3-pushpins in various combinations:

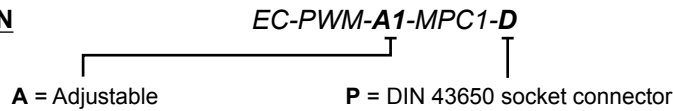
- **Imin (minimum output current)**
- **Imax (maximum output current)**
- **Ramp-up time**
- **Ramp-down time**
- **Dither frequency**



APPLICATION EXAMPLE



ORDERING INFORMATION



Part numbers	Version
23.0409.046	0-5 V
23.0409.065	0-10 V
23.0409.077	0-20 mA

EC-PWM-A1-MPC1-E PWM Driver

DESCRIPTION

Microprocessor-based PWM electronic driver for remote control of a single proportional solenoid valve.

OPERATION

The EC-PWM-A1-MPC1-E proportional valve driver receives a command signal from a potentiometer, PLC or other control systems, and supplies a solenoid with a PWM (*Pulse Width Modulated*) current proportional to the input signal.

An auxiliary power supply (+5 V) is provided as a reference for the command signal. Adjustments of “Imin/Imax”, “Ramp time” and “Dither” can be carried out directly from a key-pad integrated on the front panel.

Mounting option: female DIN 43650 socket on valve's side and male DIN 43650 plug to connect to power source and remote control devices.



FEATURES

- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Power supply line is protected against reversed polarity and load dump.
- Input is protected against short circuits to GND and power supply.
- Output is protected against short circuits, over-current and over-temperature.
- The EC-PWM-A1-MPC1 is completely potted.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

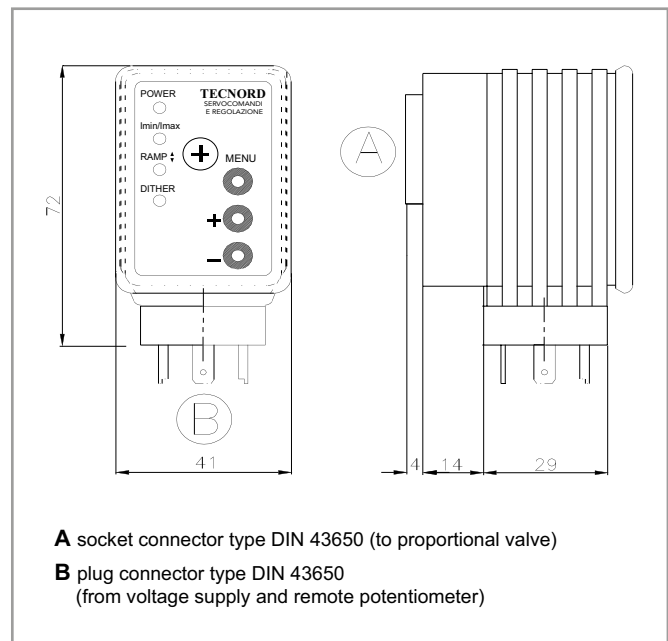
SPECIFICATIONS

• Operating voltage:	8.5 ÷ 30 VDC
• Max current consumption:	100 mA (no load applied)
• Operating temperature:	-25°C / +85°C
• Input resistance 0 ÷ 5V voltage input:	560 KOhms
0 ÷ 10V voltage input:	1 MOhm
0 ÷ 20mA current input:	250 Ohms
• Degree of protection:	IP 67
• Analog input signals available:	0 ÷ 5 V 0 ÷ 10 V 0 ÷ 20 mA
• Typical ctrl pot resistance:	2 ÷ 47 kΩ
• Current output range (PWM):	100 ÷ 3000 mA
• PWM dither frequency:	55 ÷ 200 Hz (adjustable)
• Ramp time:	0.05 ÷ 5 s (adjustable)
• Max. current from auxiliary +5 V:	15 mA

APPLICATIONS

- Primary applications are the control of proportional pressure reducing valves and proportional flow regulators to attain smooth acceleration/deceleration and fine-metering control of electro-hydraulic functions.

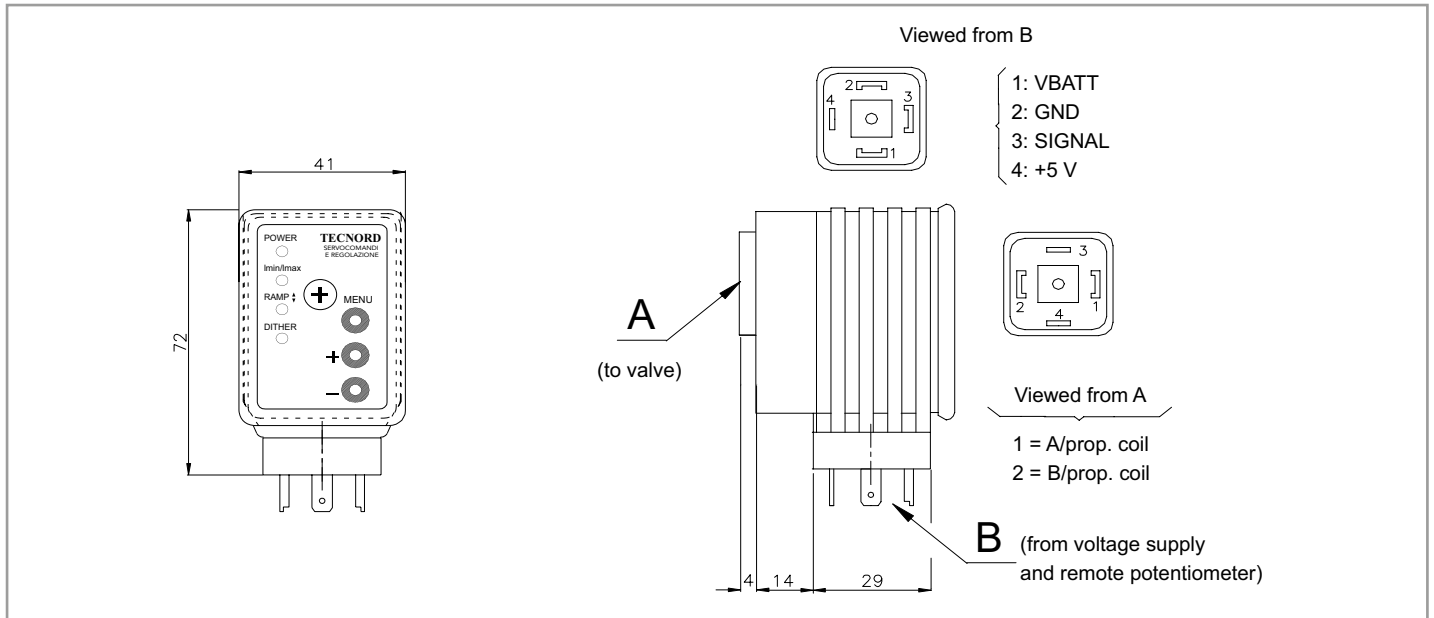
DIMENSIONS



ELECTRONIC CONTROL UNITS

EC-PWM-A1-MPC1-E PWM Driver

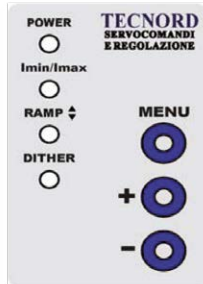
CIRCUIT BOARD PINOUT - WIRING DIAGRAM



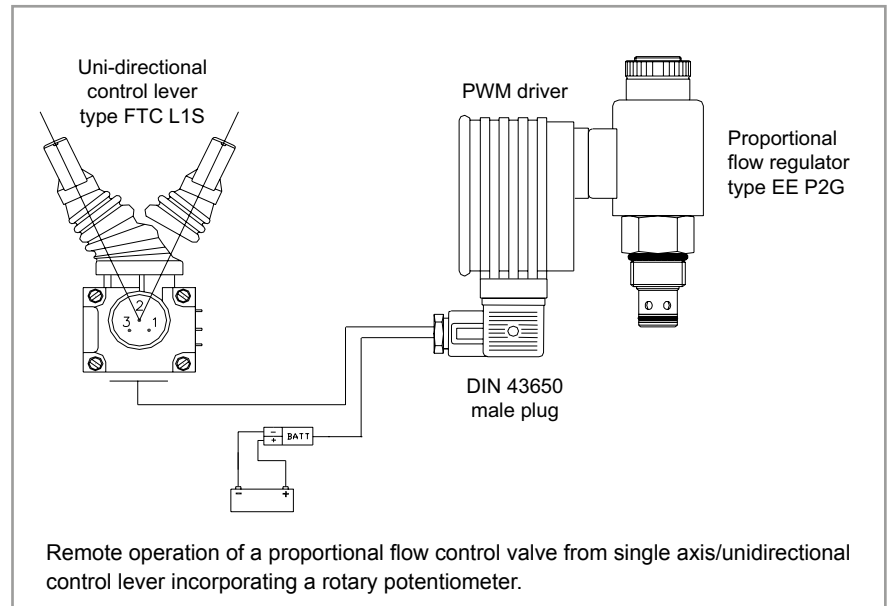
ADJUSTMENTS

The following adjustments can be made directly from the front key-pad by selecting the 3-pushpins in various combinations:

- Imin (minimum output current)
- Imax (maximum output current)
- Ramp-up time
- Ramp-down time
- Dither frequency



APPLICATION EXAMPLE



ORDERING INFORMATION

EC-PWM-A1-MPC1-E

A = Adjustable

E = DIN 43650 plug connector

Part numbers	Version
23.0409.089	0-5 V
23.0409.047	0-10 V
23.0409.137	0-20 mA

EC-PWM-A2-MPC1-* PWM Driver

DESCRIPTION

Microprocessor-based PWM electronic driver for remote control of a dual-coil proportional solenoid valve.

OPERATION

The EC-PWM-A2-MPC1 proportional valve driver supplies a double solenoid with a PWM (*Pulse Width Modulated*) current proportional to the input signal from a potentiometer, PLC or other control systems.

Proportional valve A is controlled with an input command signal varying from 2.5 to 4.5 Volt.

Proportional valve B is controlled with an input command signal varying from 2.5 to 0.5 Volt. An auxiliary on-off type solenoid can be energised anytime the input signal goes out of the 2.25-2.75 V range.

FEATURES

- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Supply line is protected against reversed polarity.
- Input is protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- The EC-PWM-A2 circuit is potted inside a plastic enclosure suitable for panel mounting by means of 2 set screws.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

SPECIFICATIONS

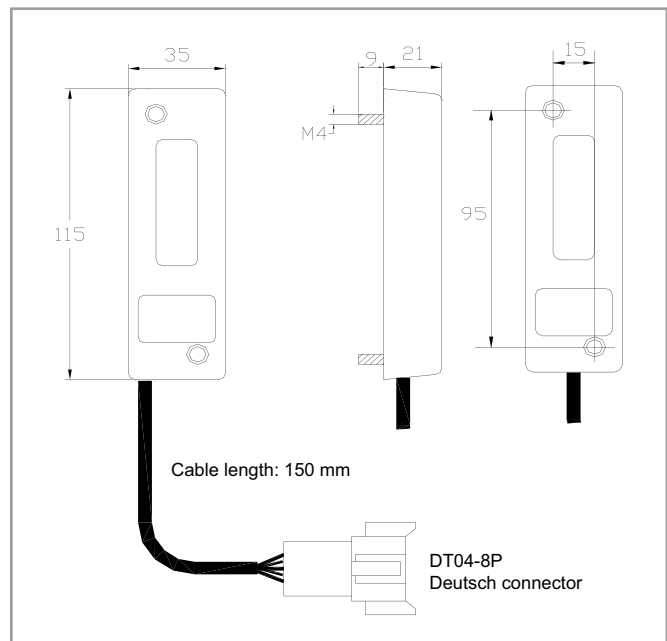
• Operating voltage:	8 ÷ 32 VDC
• Max current consumption:	100 mA (no load applied)
• Operating temperature:	-25°C / +85°C
• Degree of protection:	IP 68
• Input impedance:	40 kΩ
• Analog input signals:	0.5 - 2.5 - 4.5 VDC
• Typical ctrl pot resistance:	2 ÷ 10 kΩ
• Current output range (PWM):	100 ÷ 1500 mA
• Current on-off output:	max 1800 mA
• PWM dither frequency:	100 Hz
• Resolution:	10 bits
• DT04-8P Deutsch connector (male contacts)	

APPLICATIONS

- 12 VDC and 24 VDC systems.
- Remote control of proportional valves.
- Field-adjustable applications.
- Control of a proportional bi-directional valve with a venting valve.



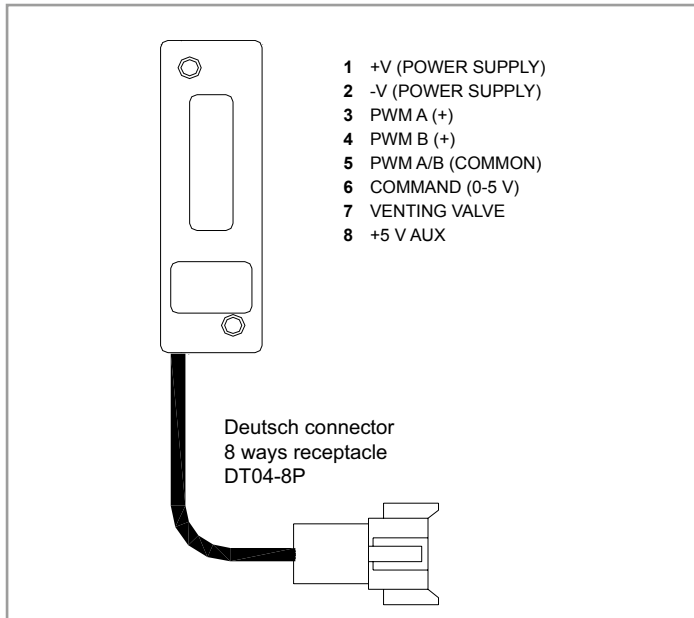
DIMENSIONS



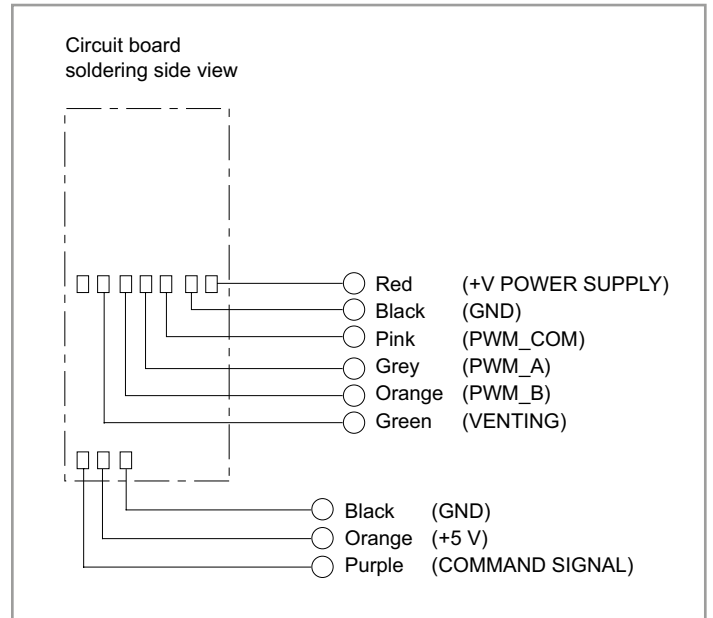
ELECTRONIC CONTROL UNITS

EC-PWM-A2-MPC1-* PWM Driver

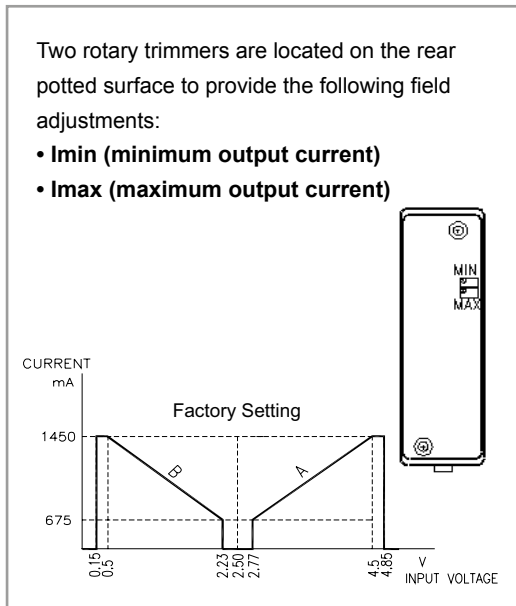
H VERSION - PINOUT



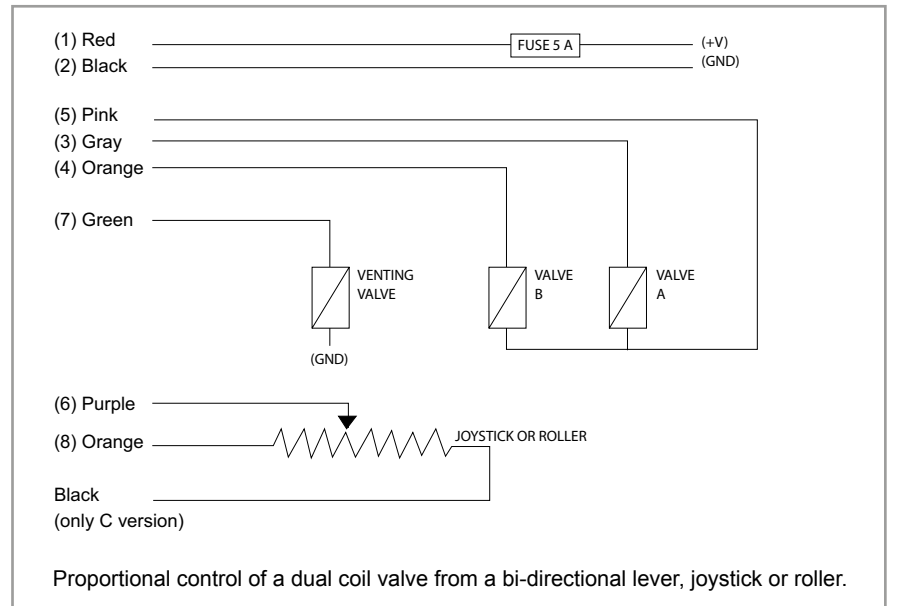
C VERSION - WIRING DIAGRAM



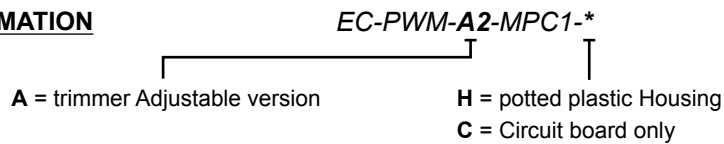
ADJUSTMENTS



APPLICATION EXAMPLE



ORDERING INFORMATION



Part numbers	Version
23.0409.138	H
23.0409.109	C

EC-PWM-P4-MPC2-H PWM Driver

DESCRIPTION

Microprocessor-based PWM driver for remote control of 2 dual-coil proportional solenoid valves.

OPERATION

The EC-PWM-P4-MPC2-H proportional valve driver supplies up to two dual-coil proportional valves with PWM (*Pulse Width Modulated*) current proportional to input signals coming from potentiometers, PLC or other control systems. The control characteristics (I_{min}/I_{max} , ramps, dither) are configurable via PC connected with a RS232 serial line to a configuration kit and PC interface of Tecnord supply.

FEATURES

- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Supply line is protected against reversed polarity and load dump.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- The EC-PWM-P4-MPC2-H is completely potted.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).



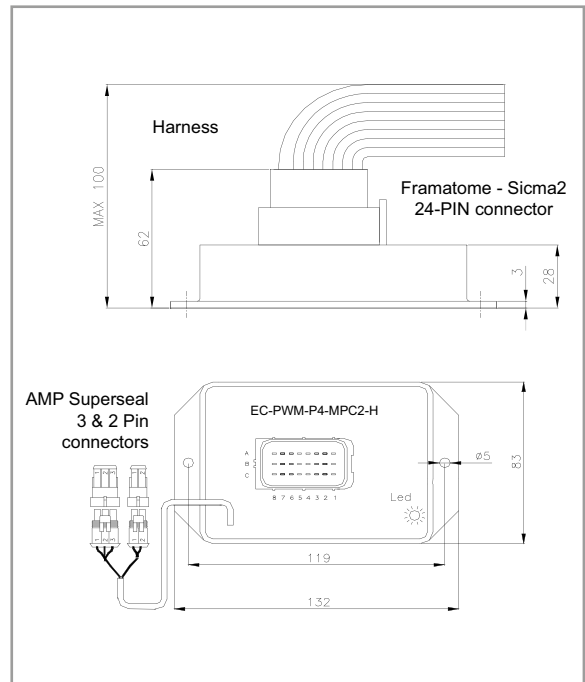
SPECIFICATIONS

• Operating voltage:	9 ÷ 30 VDC
• Max current consumption:	100 mA (no load applied)
• Operating temperature:	-25°C / +85°C
• Degree of protection:	IP 67
• Input impedance:	100 kΩ
• Analog inputs:	4 x 0-5 V
• Typical ctrl pot resistance:	1 ÷ 10 kΩ
• Digital inputs:	analog inputs can be used as digital
• Resolution:	10 bit
• PWM outputs channels:	2 x dual-coil proportional valves
• Current output range (PWM):	100 ÷ 1500 mA (3 A version available)
• PWM dither frequency:	75 ÷ 250 Hz (adjustable)
• On-off digital output:	1 (1500 mA)

APPLICATIONS

- Specifically designed for applications requiring accurate adjustments and calibrations.
- 12 VDC and 24 VDC systems.
- Remote control of non-feedback proportional valves.
- Control of a proportional bi-directional valve with a venting valve.

DIMENSIONS

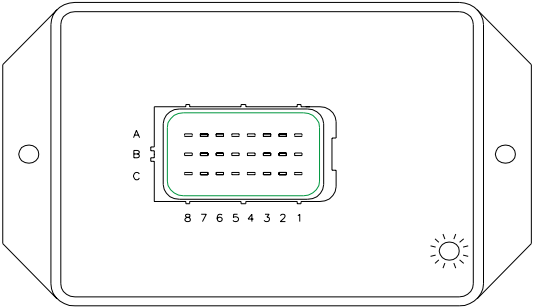


ELECTRONIC CONTROL UNITS

EC-PWM-P4-MPC2-H PWM Driver

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: framatome SICMA2



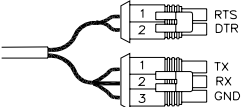
A

- 1 ON-OFF OUTPUT
- 2 NOT CONNECTED
- 3 NOT CONNECTED
- 4 NOT CONNECTED
- 5 NOT CONNECTED
- 6 NOT CONNECTED
- 7 ANALOG INPUT FOR FUNCTION 1 (TO DRIVE EV1A/B)
- 8 FEEDBACK FOR EV1A/B

B

- 1 +V (POWER SUPPLY)
- 2 NOT CONNECTED
- 3 NOT CONNECTED
- 4 ANALOG INPUT FOR FUNCTION 2 (TO DRIVE EV2A/B)
- 5 NOT CONNECTED
- 6 FEEDBACK FOR EV2A/B
- 7 NOT CONNECTED
- 8 NOT CONNECTED

Connector type: AMP-Seal



For software download

- 1 RTS
- 2 DTR

For calibration and adjustments

- 1 TX
- 2 RX
- 3 GND

C

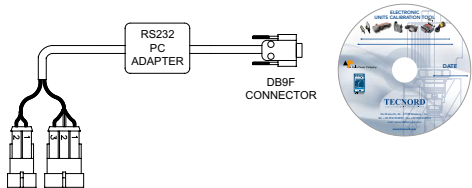
- 1 -V (POWER SUPPLY - GND)
- 2 +5 VDC EXTERNAL SUPPLY VOLTAGE
- 3 ANALOG INPUT - SPARE
- 4 ANALOG INPUT - SPARE
- 5 EV1A PROP. COIL OUTPUT (+)
- 6 EV1B PROP. COIL OUTPUT (+)
- 7 EV2A PROP. COIL OUTPUT (+)
- 8 EV2B PROP. COIL OUTPUT (+)

ADJUSTMENTS

Adjustments can be effected via RS232 serial line to modify the following work parameters:

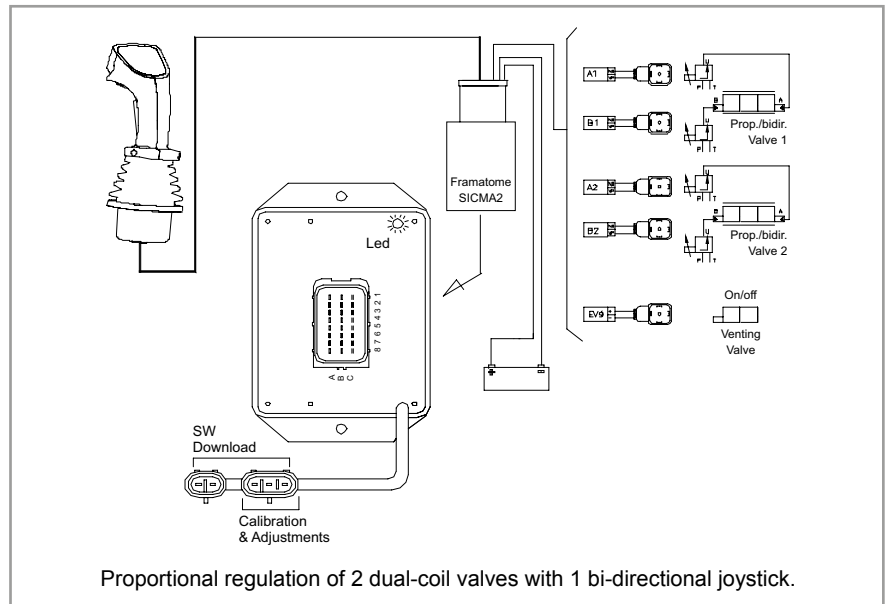
- **I_{min}** (minimum output current)
- **I_{max}** (maximum output current)
- **Ramp-up time**
- **Ramp-down time**
- **Dither frequency**

Ordering code for the calibration tool:
20.1001.026/A RS232 cable adapter for PC connection including calibration software on CD (see page 44-45).

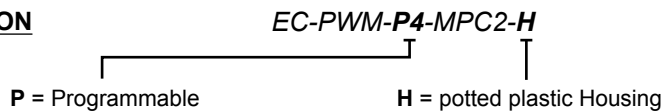


Note: USB/RS232 interface available on request.

APPLICATION EXAMPLE



ORDERING INFORMATION



Part numbers	Version
23.0409.237	1.5 A
23.0409.238	3 A

EC-PWM-08-MPC4-H PWM Driver

DESCRIPTION

Microprocessor-based PWM driver for remote control of 4 dual-coil proportional solenoid valves.

OPERATION

The EC-PWM-08-MPC4 proportional valve driver supplies up to four dual-coil proportional solenoid valves with PWM (*Pulse Width Modulated*) current proportional to the input signals coming from potentiometers, PLC or other control systems.

PWM currents are factory pre-set and cannot be adjusted.

FEATURES

- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Supply line is protected against reversed polarity and load dump.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- The EC-PWM-08-MPC4-H is completely potted.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).



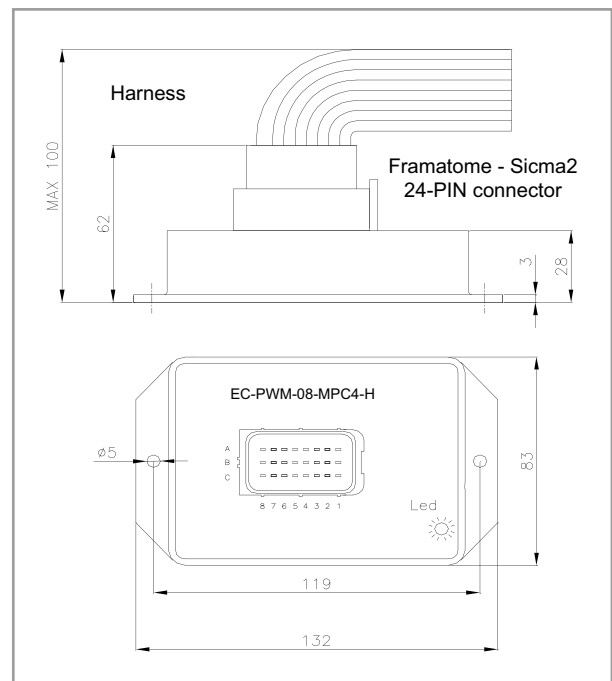
SPECIFICATIONS

• Operating voltage:	9 ÷ 30 VDC
• Max current consumption:	100 mA (no load applied)
• Operating temperature:	-40°C / +100°C
• Degree of protection:	IP 67
• Input impedance:	100 kΩ
• Analog inputs:	6 x 0-5 V
• Typical ctrl pot resistance:	1 ÷ 10 kΩ
• Digital inputs:	2 x PNP (Active High)
• Resolution:	10 bit
• PWM outputs channels:	4 x dual-coil proportional valves
• Current output range (PWM):	100 ÷ 1500 mA
• PWM dither frequency:	75 ÷ 250 Hz (factory pre-set, standard 100 Hz)

APPLICATIONS

- Specifically designed for applications with factory-set working parameters and requiring no field-adjustments.
- 12 VDC and 24 VDC systems.
- Remote control of proportional valves.
- Control of a 4 functions proportional bi-directional system.

DIMENSIONS

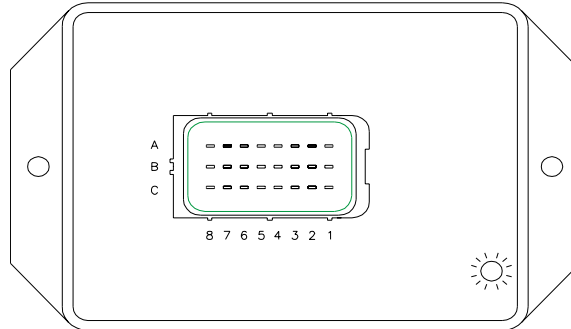


ELECTRONIC CONTROL UNITS

EC-PWM-08-MPC4-H PWM Driver

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: framatome SICMA2



A

- 1 EV4A PROP. COIL OUTPUT FEEDBACK (-)
- 2 EV4B PROP. COIL OUTPUT FEEDBACK (-)
- 3 EV3A PROP. COIL OUTPUT FEEDBACK (-)
- 4 EV3B PROP. COIL OUTPUT FEEDBACK (-)
- 5 ANALOG INPUT FOR FUNCTION 4 (TO DRIVE EV4A/B)
- 6 ANALOG INPUT FOR FUNCTION 3 (TO DRIVE EV3A/B)
- 7 ANALOG INPUT FOR FUNCTION 1 (TO DRIVE EV1A/B)
- 8 COMMON COMMAND FOR EV1A/B (+)

B

- 1 +V (POWER SUPPLY)
- 2 ANALOG INPUT - SPARE
- 3 ANALOG INPUT - SPARE
- 4 ANALOG INPUT FOR FUNCTION 2 (TO DRIVE EV2A/B)
- 5 ANALOG INPUT - SPARE
- 6 COMMON COMMAND FOR EV2A/B (+)
- 7 COMMON COMMAND FOR EV4A/B (+)
- 8 COMMON COMMAND FOR EV3A/B (+)

C

- 1 -V (POWER SUPPLY - GND)
- 2 +5 VDC EXTERNAL SUPPLY VOLTAGE
- 3 DIGITAL INPUT - SPARE
- 4 DIGITAL INPUT - SPARE
- 5 EV1A PROP. COIL OUTPUT FEEDBACK (-)
- 6 EV1B PROP. COIL OUTPUT FEEDBACK (-)
- 7 EV2A PROP. COIL OUTPUT FEEDBACK (-)
- 8 EV2B PROP. COIL OUTPUT FEEDBACK (-)

ADJUSTMENTS

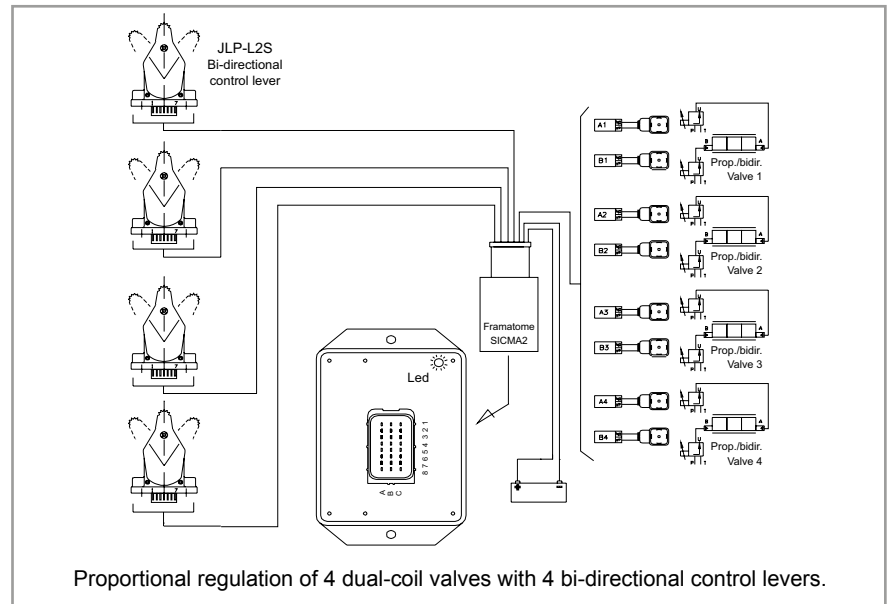
Factory pre-set for:

- **I_{min}** (minimum output current)
- **I_{max}** (maximum output current)
- **Ramp-up time**
- **Ramp-down time**
- **Dither frequency**

Factory pre-set values for the standard version p/n 23.0409.170:

- **I_{min} = 100 mA**
- **I_{max} = 1500 mA**
- **Ramp-up/-down time = 0 sec**
- **Dither frequency = 100 Hz**

APPLICATION EXAMPLE



ORDERING INFORMATION

EC-PWM-08-MPC4-H

0 = factory pre-set

H = potted plastic Housing

Part numbers	Version
23.0409.170	1.5 A

EC-PWM-P8-MPC4-H PWM Driver

DESCRIPTION

Microprocessor-based PWM driver for remote control of 4 dual-coil proportional solenoid valves.

OPERATION

The EC-PWM-P8-MPC4 proportional valve driver supplies up to four dual-coil proportional solenoid valves with PWM (*Pulse Width Modulated*) current proportional to the input signals coming from potentiometers, PLC or other control systems. The control characteristics (Imin/Imax, ramps, dither) are configurable via PC connected with a RS232 serial line to a configuration kit and PC interface of Tecnord supply.

FEATURES

- The current in the solenoid is independent from any change in the coil resistance or in the supply voltage.
- The inherent superimposed dither frequency helps to overcome friction and stiction effects in the controlled device.
- Supply line is protected against reversed polarity and load dump.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- The EC-PWM-P8-MPC4-H is completely potted.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).



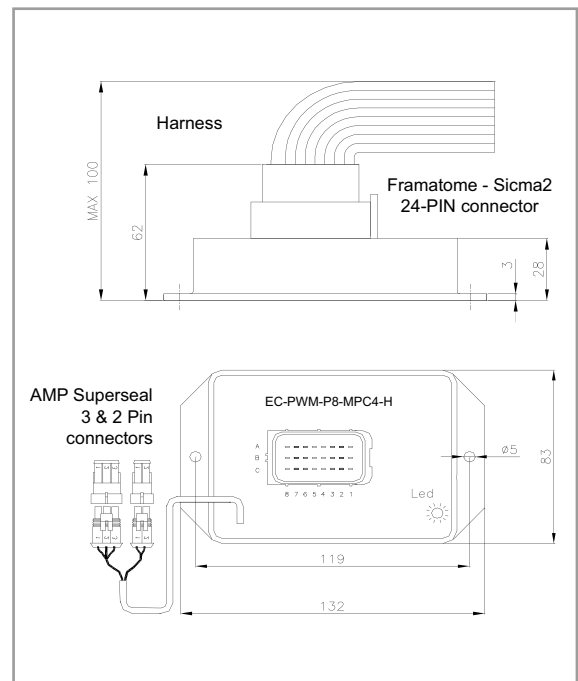
SPECIFICATIONS

• Operating voltage:	9 ÷ 30 VDC
• Max current consumption:	100 mA (no load applied)
• Operating temperature:	-25°C / +85°C
• Degree of protection:	IP 67
• Input impedance:	100 kΩ
• Analog inputs:	8 x 0-5 V
• Typical ctrl pot resistance:	1 ÷ 10 kΩ
• Digital inputs:	analog inputs can be used as digital
• Resolution:	10 bit
• PWM outputs channels:	4 x dual-coil proportional valves
• Current output range (PWM):	100 ÷ 1500 mA (3 A version available)
• PWM dither frequency:	75 ÷ 250 Hz (adjustable)

APPLICATIONS

- Specifically designed for applications requiring accurate adjustments and calibrations.
- 12 VDC and 24 VDC systems.
- Remote control of non-feedback proportional valves.
- Control of up to 4 proportional bi-directional valves.

DIMENSIONS

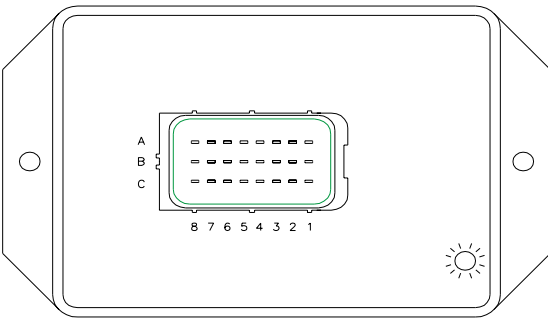


ELECTRONIC CONTROL UNITS

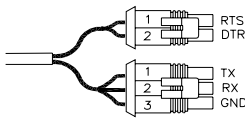
EC-PWM-P8-MPC4-H PWM Driver

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: framatome SICMA2



Connector type: AMP-Seal



For software download
1 RTS
2 DTR

For calibration and adjustments
1 TX
2 RX
3 GND

A

- 1 EV4A PROP. COIL OUTPUT (+)
- 2 EV4B PROP. COIL OUTPUT (+)
- 3 EV3A PROP. COIL OUTPUT (+)
- 4 EV3B PROP. COIL OUTPUT (+)
- 5 ANALOG INPUT FOR FUNCTION 4 (TO DRIVE EV4A/B)
- 6 ANALOG INPUT FOR FUNCTION 3 (TO DRIVE EV3A/B)
- 7 ANALOG INPUT FOR FUNCTION 1 (TO DRIVE EV1A/B)
- 8 FEEDBACK FOR EV1A/B

B

- 1 +V (POWER SUPPLY)
- 2 NOT CONNECTED
- 3 ANALOG INPUT - SPARE
- 4 ANALOG INPUT FOR FUNCTION 2 (TO DRIVE EV2A/B)
- 5 ANALOG INPUT - SPARE
- 6 FEEDBACK FOR EV2A/B
- 7 FEEDBACK FOR EV4A/B
- 8 FEEDBACK FOR EV3A/B

C

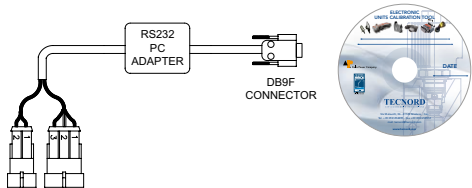
- 1 -V (POWER SUPPLY - GND)
- 2 +5 VDC EXTERNAL SUPPLY VOLTAGE
- 3 ANALOG INPUT - SPARE
- 4 ANALOG INPUT - SPARE
- 5 EV1A PROP. COIL OUTPUT (+)
- 6 EV1B PROP. COIL OUTPUT (+)
- 7 EV2A PROP. COIL OUTPUT (+)
- 8 EV2B PROP. COIL OUTPUT (+)

ADJUSTMENTS

Adjustments can be effected via RS232 serial line to modify the following work parameters:

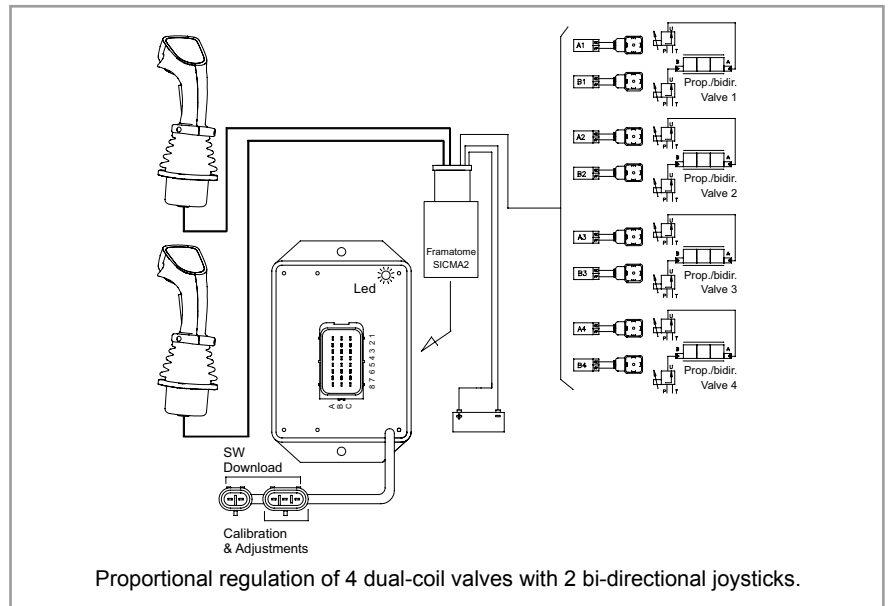
- **I_{min}** (minimum output current)
- **I_{max}** (maximum output current)
- **Ramp-up time**
- **Ramp-down time**
- **Dither frequency**

Ordering code for the calibration tool:
20.1001.026/A RS232 cable adapter for PC connection including calibration software on CD (see page 44-45).

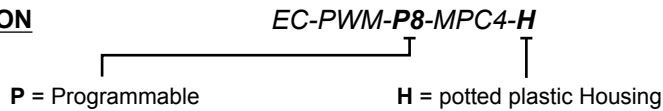


Note: USB/RS232 interface available on request.

APPLICATION EXAMPLE



ORDERING INFORMATION



Part numbers	Version
23.0409.081	1.5 A
23.0409.071	3 A

ELECTRONIC CONTROL UNITS

Machine Management Systems

	Description	Page
EC-MMS-1012-H	10 inputs, 12 outputs meter-in systems controller	20
EC-MMS-2218-H	22 inputs, 18 outputs RS232 / RS 485 interface	22
EC-MMS-1521-H	15 inputs, 21 outputs CANbus interface	24
EC-MMS-4820-H	48 inputs, 20 outputs RS 485 / CANbus interface	26
EC-MMS-0713-H	5 inputs, 16 outputs Deutsch connection / RS 485 interface	28
EC-MMS-6252-H	62 inputs, 52 output RS485 / CANbus interface	30

EC-MMS-1012-H Machine Management System

DESCRIPTION

Digital MMS (*Machine Management System*) with built-in advanced safety and fault detection features for integrated control of mobile equipment functions.

OPERATION

10 inputs and 12 outputs are managed by this small-size unit. PWM current outputs are field-adjustable and their setting is stored in a EEPROM memory. Parameters can be loaded via software from a standard PC connected with a RS232 serial line.

It can be used as a stand-alone controller for both meter-in systems (up to 5 functions) and bi-directional proportional systems (up to 4 functions). Additional output for a safety venting valve is available.

FEATURES

- Supply line is protected against reversed polarity and overvoltage.
- Inputs are protected against short circuits to GND and power supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- 3-wires RS232 serial interface.
- Auxiliary +5 V supply for control devices (e.g. potentiometers).
- Performance level c capability according to ISO 13849, due to high reliability of components and embedded diagnostics.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).



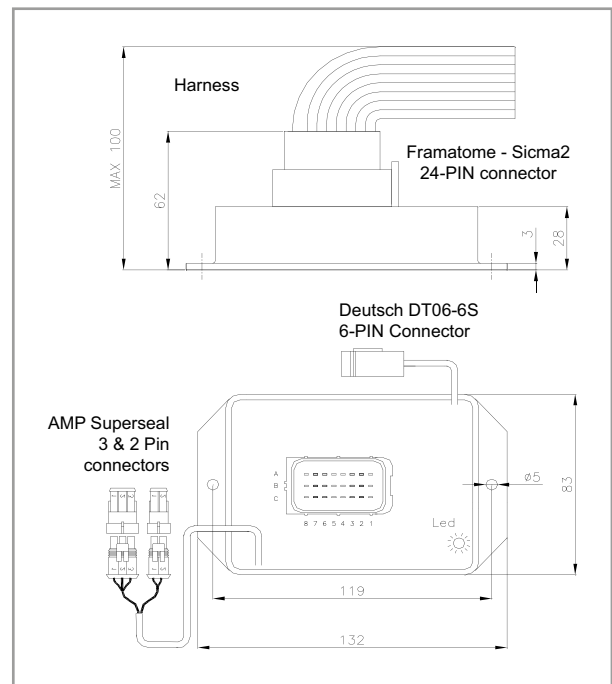
SPECIFICATIONS

• Operating voltage:	9 ÷ 30 VDC
• Max current consumption:	100 mA (no load applied)
• Operating temperature:	-25°C / +85°C
• Degree of protection:	IP 67
• Input impedance:	100 kΩ
• Analog inputs (10 bits):	8 (0-5 V)
• Typical ctrl pot resistance:	1 ÷ 10 kΩ
• Digital inputs:	2
• High side power outputs:	12 (3.5 A max)
• Inputs for current feedback:	4
• Current output range (PWM):	100 ÷ 1500 mA
• PWM dither frequency:	60 ÷ 200 Hz

APPLICATIONS

- 12 VDC and 24 VDC systems.
- Remote control of non-feedback proportional and on-off valves.
- Specifically designed for applications requiring accurate adjustments and calibrations.
- Control of up to 4 proportional bi-directional valves plus a venting valve and additional 3 auxiliary outputs.
- Control of up to 5 functions in meter-in configuration (10 on-off valves plus 1 proportional valve and 1 venting valve).

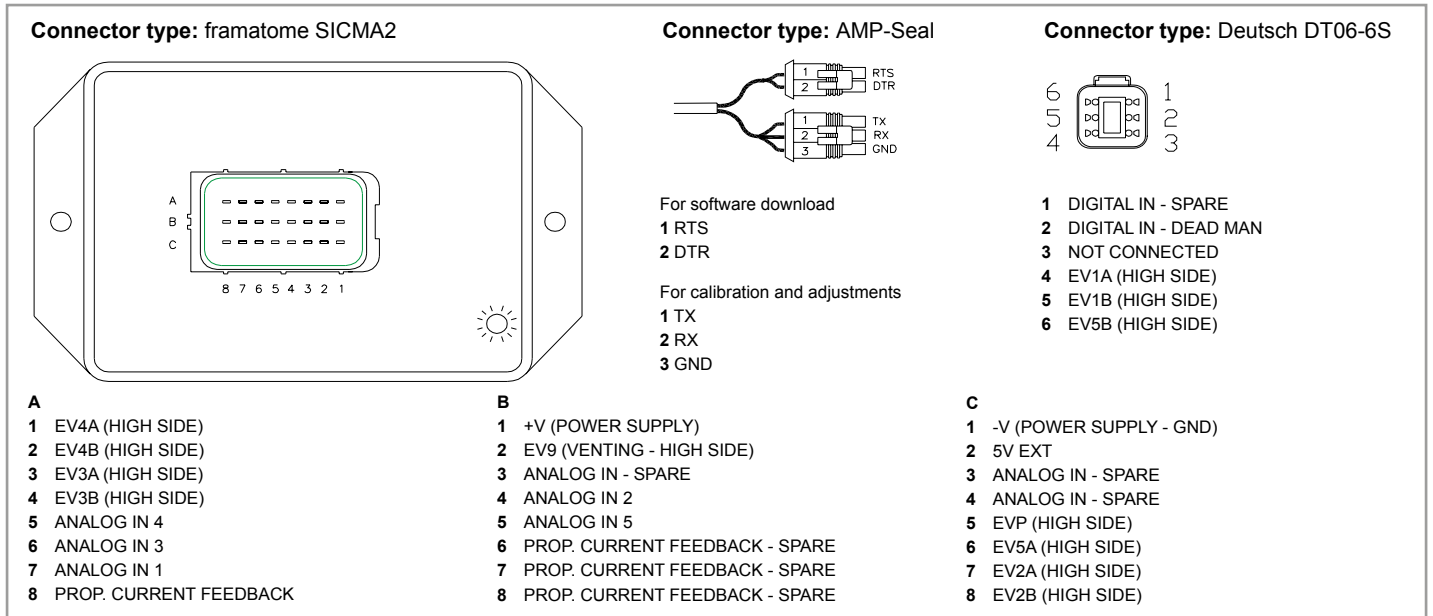
DIMENSIONS



ELECTRONIC CONTROL UNITS

EC-MMS-1012-H Machine Management System

CIRCUIT BOARD PINOUT - WIRING DIAGRAM (reference: meter-in layout)

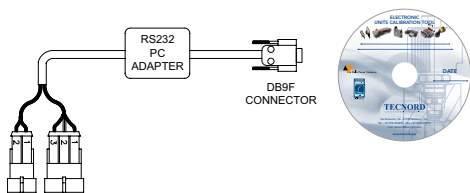


ADJUSTMENTS

Adjustments can be effected via RS232 serial line to modify the following work parameters:

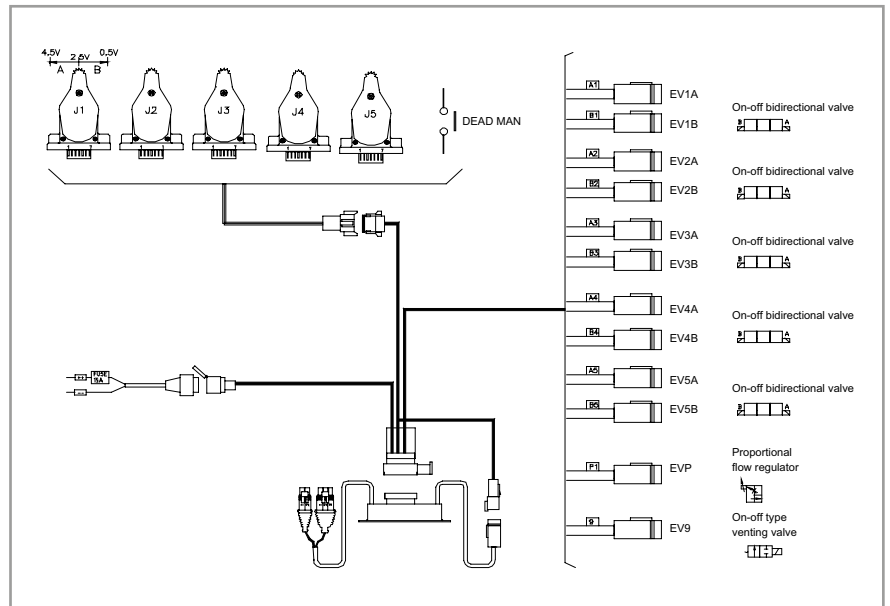
- **I_{min}** (minimum output current)
- **I_{max}** (maximum output current)
- **Ramp-up time**
- **Ramp-down time**
- **Dither frequency**

Ordering code for the calibration tool:
20.1001.026/A RS232 cable adapter for PC connection including calibration software on CD (see page 44-45).



Note: USB/RS232 interface available on request.

APPLICATION EXAMPLE



ORDERING INFORMATION



Part number (Std Version)
23.0409.177

EC-MMS-2218-H Machine Management System

DESCRIPTION

Digital MMS (*Machine Management System*) with built-in advanced safety and fault detection features for integrated control of Mobile Equipment functions. CANbus capability make it suitable for high-end network systems.

OPERATION

22 inputs and 18 outputs are managed by this small-size unit. Analog outputs are field-adjustable and their setting is stored in an EEPROM memory and can be loaded via software from vehicle's controller through CANbus or from a standard PC connected through an RS232 serial line.

It can be used as a stand-alone controller or in conjunction with other MMS electronic units like Tecnord's Mod. MMS-4820.

FEATURES

- Power Supply line is protected against reversed polarity and overvoltage.
- Inputs are protected against short circuits to GND and supply.
- High resolution, 16-bits, analog inputs.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- CANbus serial interface.
- RS232 serial interface.
- Especially designed to drive up to 6 electro-hydraulic proportional actuators Tecnord type MLT-FD4/5.
- Auxiliary +5V supply for control devices (e.g. potentiometers).
- Performance Level c capability according to ISO 13849, due to high reliability of components and embedded diagnostics.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).

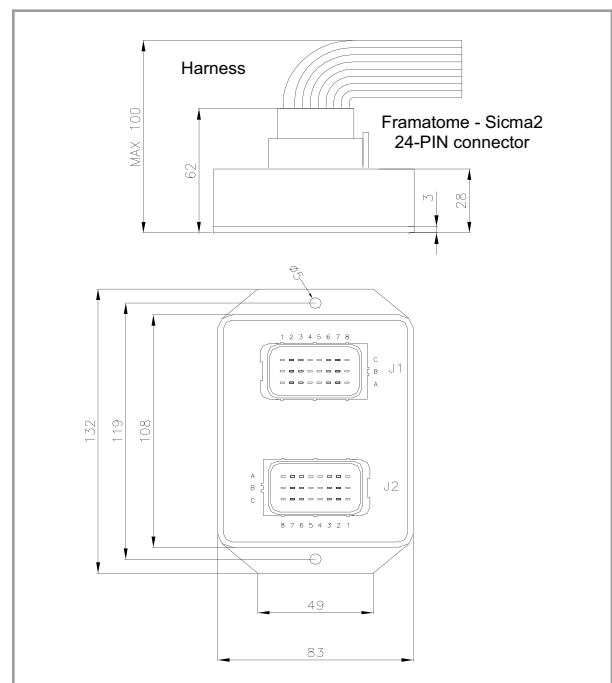
DIMENSIONS

SPECIFICATIONS

• Operating voltage:	8 ÷ 32 VDC
• Max current consumption:	0.5 A (no load applied)
• Operating temperature:	-25 ÷ +85°C
• Degree of protection:	IP 67
• Analog inputs (10 bits):	8 (0-5 V)
• Input impedance:	100 kΩ
• Typical ctrl pot resistance:	1 ÷ 10 kΩ
• Digital inputs:	14
• High side power outputs:	12 (3.5 A max)
• PWM current feedback:	1
• Max current load on all outputs:	10 A
• Analog outputs:	6 (0-5 V)

APPLICATIONS

- 12 VDC and 24 VDC systems.
- Closed loop systems with electro-hydraulic prop. actuators.
- General purpose applications requiring field-adjustments.
- MMS-2218 can be connected to a CANBus network (J1939 or CANOpen).

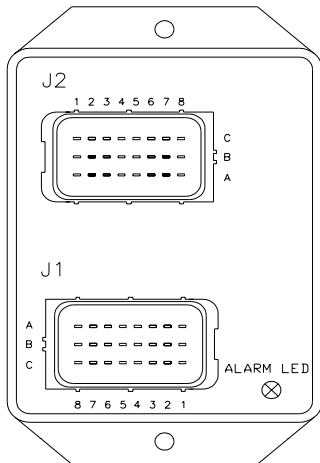


ELECTRONIC CONTROL UNITS

EC-MMS-2218-H Machine Management System

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: framatome SICMA2



J1

A

- 1 ANALOG IN 2
- 2 ANALOG IN 5
- 3 DIGITAL IN 0
- 4 DIGITAL IN 2
- 5 DIGITAL IN 4
- 6 DIGITAL IN 7
- 7 DIGITAL IN 9
- 8 RS232 TX

B

- 1 ANALOG IN 1
- 2 ANALOG IN 4
- 3 ANALOG IN 7
- 4 DIGITAL IN 1
- 5 DIGITAL IN 3
- 6 DIGITAL IN 6
- 7 DIGITAL IN 8
- 8 RS232 RX

C

- 1 ANALOG IN 0
- 2 ANALOG IN 3
- 3 ANALOG IN 6
- 4 5V EXT
- 5 RS232 GND
- 6 DIGITAL IN 5
- 7 DIGITAL IN 10
- 8 DIGITAL IN 11

J2

A

- 1 OUT 0 (WITH FEEDBACK)
- 2 OUT 1
- 3 OUT 2
- 4 OUT 3
- 5 OUT 4
- 6 OUT 5
- 7 ANALOG OUT 4
- 8 -V (POWER SUPPLY - GND)

B

- 1 OUT 7
- 2 CAN L
- 3 ANALOG OUT 0
- 4 CAN H
- 5 ANALOG OUT 2
- 6 ANALOG OUT 1
- 7 ANALOG OUT 5
- 8 +V (POWER SUPPLY)

C

- 1 OUT 6
- 2 OUT 9
- 3 OUT 8
- 4 OUT 11
- 5 OUT 10
- 6 DIGITAL IN 12
- 7 DIGITAL IN 13
- 8 ANALOG OUT 3

ADJUSTMENTS

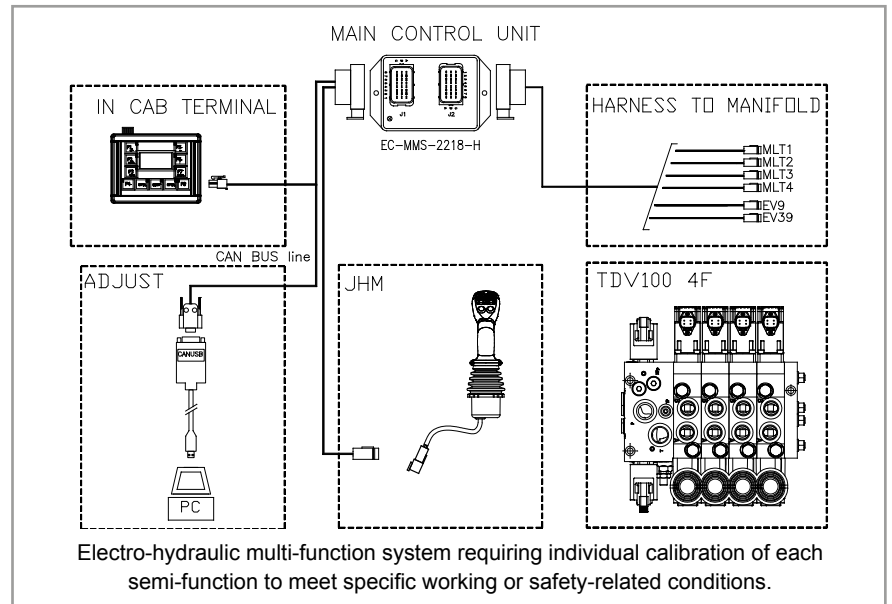
Adjustments can be effected via RS232 serial line to modify the following work parameters:

- **Vmin (minimum output voltage)**
- **Vmax (maximum output voltage)**
- **Ramp-up time**
- **Ramp-down time**



Ask for: PC configuration electronic units calibration tool (see page 44).

APPLICATION EXAMPLE



ORDERING INFORMATION

EC-MMS-2218-H

2218 = 22 inputs - 18 outputs

H = potted plastic Housing for panel mounting

EC-MMS-1521-H Machine Management System Controller

DESCRIPTION

MMS (*Machine Management System*) controller in rugged aluminum enclosure dual microprocessor, CANbus, built-in safety and fault-detection features for integrated control of complex functions in mobile equipment applications.

OPERATION

It is normally used as the main control unit in a complete management system. Two microprocessors and advanced diagnostics for safety applications. The EC-MMS-1521 comes with an aluminium casing, a silicon rubber gasket and connectors, designed to ensure power dissipation, robustness and tightness required in severe environment conditions. Software download available.



FEATURES

- Robust aluminum enclosure.
- Power supply is protected against reversed polarity (external fuse required) and overvoltage.
- Inputs are protected against short circuits to GND and power supply.
- Outputs protected against short circuits, over-current and over-temperature.
- 2 CANbus connections.
- PWM drivers with current feedback.
- +5 V auxiliary power supply for external control devices.
- Performance level d capability according to ISO 13849, thanks to redundant microcontroller and embedded diagnostics.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).
- Reserved power supply pins for safety power outputs.
- Optional add-on inclinometer.
- Optional real time clock for data logging.

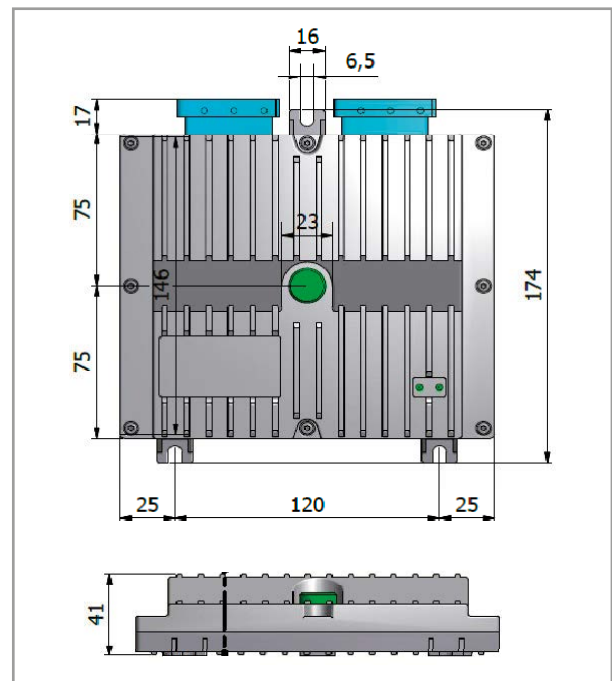
SPECIFICATIONS

• Operating voltage:	8 ÷ 32 VDC
• Max. current consumption:	< 400 mA (no load applied)
• Operating temperature:	-40°C / +105°C
• Degree of protection:	IP 69
• Analog inputs (16 bits):	3 (0-5 V)
• Analog inputs (10 bits):	8 (0-5 V)
• Digital (frequency) inputs:	4
• High side power outputs:	18 (6 if PWM outputs are used)
• Low side power outputs (LS):	2
• PWM outputs with current feedback (3A):	12
• Analog voltage outputs (0-5 V):	1
• Pins selectable as power OUT or digital IN:	6
• Inputs with SW selectable pull-up:	4
• CANbus lines:	2 (ISO 11898, CAN 2.0A/B)
• Available bus speed:	up to 1 Mbit/s

APPLICATIONS

- Main ECU for aerial platforms, cranes, telehandlers, agriculture vehicles.
- 12 VDC and 24 VDC systems.
- Two or more MMS boards can be interconnected through the CANbus line.

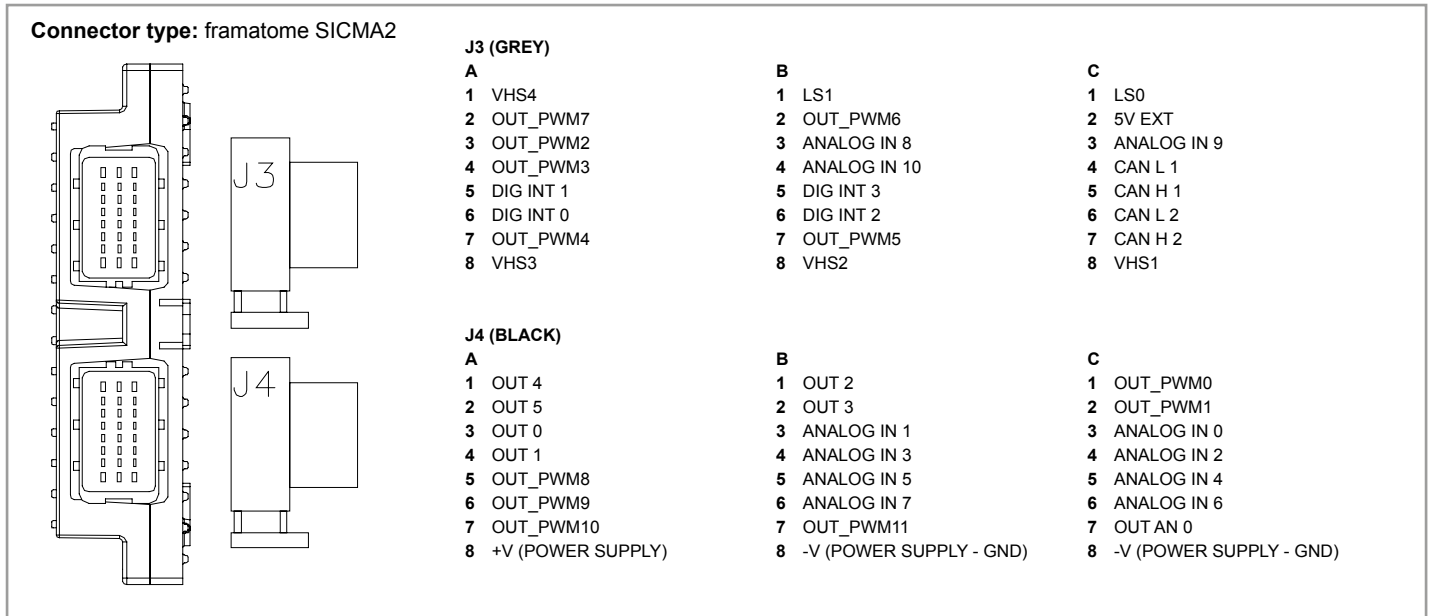
DIMENSIONS



ELECTRONIC CONTROL UNITS

EC-MMS-1521-H Machine Management System Controller

CIRCUIT BOARD PINOUT - WIRING DIAGRAM



ADJUSTMENTS

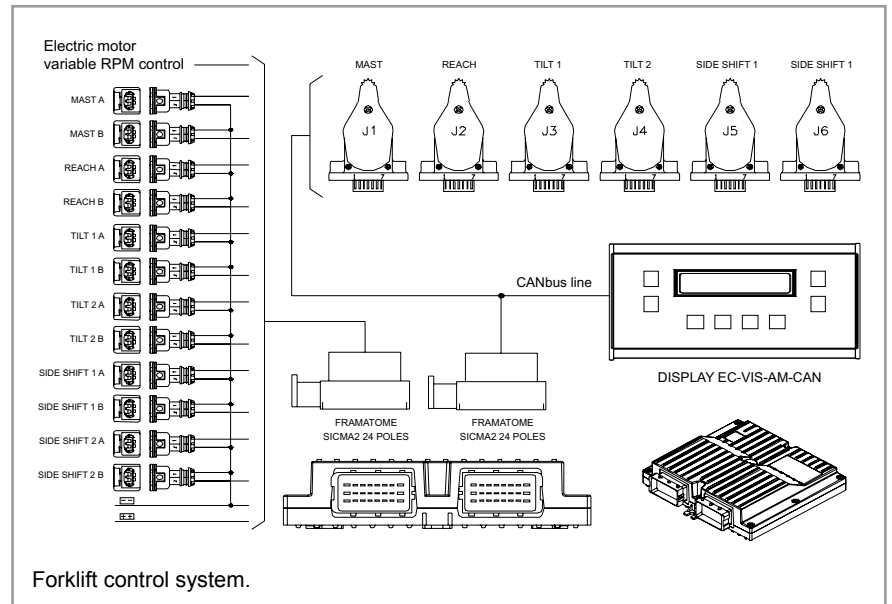
Adjustments can be effected via CANbus interface to modify the following work parameters:

- **I_{min}** (minimum output current)
- **I_{max}** (maximum output current)
- **Ramp-up time**
- **Ramp-down time**



Ask for: PC configuration electronic units calibration tool (see page 44).

APPLICATION EXAMPLE



ORDERING INFORMATION

EC-MMS-1521-H

1521 = 15 inputs - 21 outputs

H = aluminium Housing

EC-MMS-4820-H Machine Management System

DESCRIPTION

MMS (*Machine Management System*) coding card with CANbus and RS485 interface and built-in advanced safety and fault-detection features for integrated control of mobile equipment functions.

OPERATION

The MMS-4820 can be lodged inside any remote control box or panel to make command signals compatible with CANbus networks or RS485 serial lines.

It can be used as a stand-alone controller for Tecnord's Multidrom MLT/FD5 CANbus-configured electro-hydraulic proportional actuators.

It can be used as a remote coding card for RS485 serial line connection to other MMS electronic units like Tecnord's Mod. MMS-2218.



FEATURES

- Power supply line is protected against reversed polarity and overvoltage.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- 2-wires CANbus or RS485 serial interface.
- Performance level d capability according to ISO 13849, thanks to microprocessor redundancy.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).
- Auxiliary +5 V supply for control devices (e.g. potentiometers).

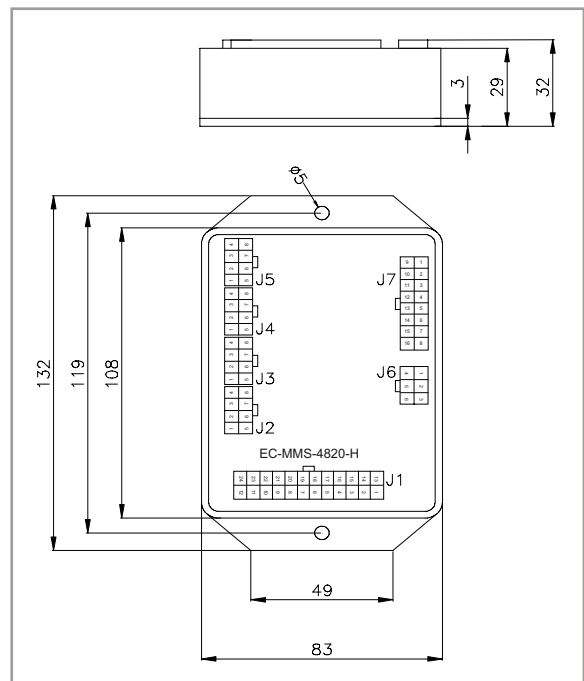
SPECIFICATIONS

• Operating voltage:	8.5 ÷ 40 VDC
• Max current consumption:	0.5 A (no load applied)
• Operating temperature:	-25°C / +85°C
• Degree of protection:	IP 54
• Input impedance:	100 kΩ
• Analog inputs (10 bits):	16 (0-5 V)
• Typical ctrl pot resistance:	1 ÷ 10 kΩ
• Digital inputs:	32
• High side power outputs:	4 (3.5 A max)
• Max current load on all outputs:	5 A
• High side signal outputs:	16 (0.7 A max)
• Inputs for current feedback:	1
• Current output range (PWM):	100 ÷ 1500 mA
• PWM dither frequency:	60 ÷ 200 Hz (adjustable)

APPLICATIONS

- 12 VDC and 24 VDC systems.
- Control panel management.
- Field-adjustable applications.
- Closed loop systems with electro-hydraulic digital actuators.
- Two or more MMS boards can be interconnected by means of 2-wires RS485 serial lines or CANbus where rotating joints or cable reels are installed.

DIMENSIONS

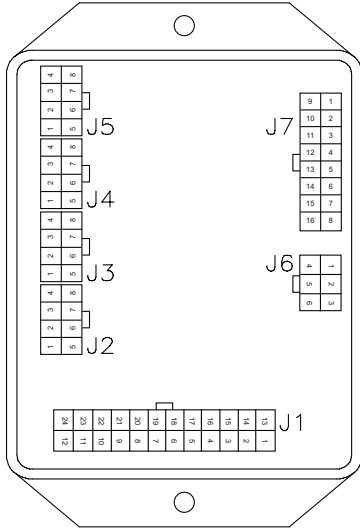


ELECTRONIC CONTROL UNITS

EC-MMS-4820-H Machine Management System

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: Molex MINIfit



J1	1 +V (POWER SUPPLY)	J6	1 POWER OUT 1
2 5V EXT	3 CANH / RS485+	2 GND	3 PWM CURRENT FEEDBACK
4 CANL / RS485-	5+12 ANALOG IN [1+8]	4 POWER OUT 2	5 POWER OUT 3
13 -V (POWER SUPPLY - GND)	14 PROG1 (#1 MICROCONTROLLER)	6 POWER OUT 4	
15 PROG2 (#2 MICROCONTROLLER)	16 RESET		
17÷24 ANALOG IN [9+16]			
J2 ÷ J5	1÷8 DIGITAL IN [1+32]	J7	1÷16 SIGNAL OUT [1+16]

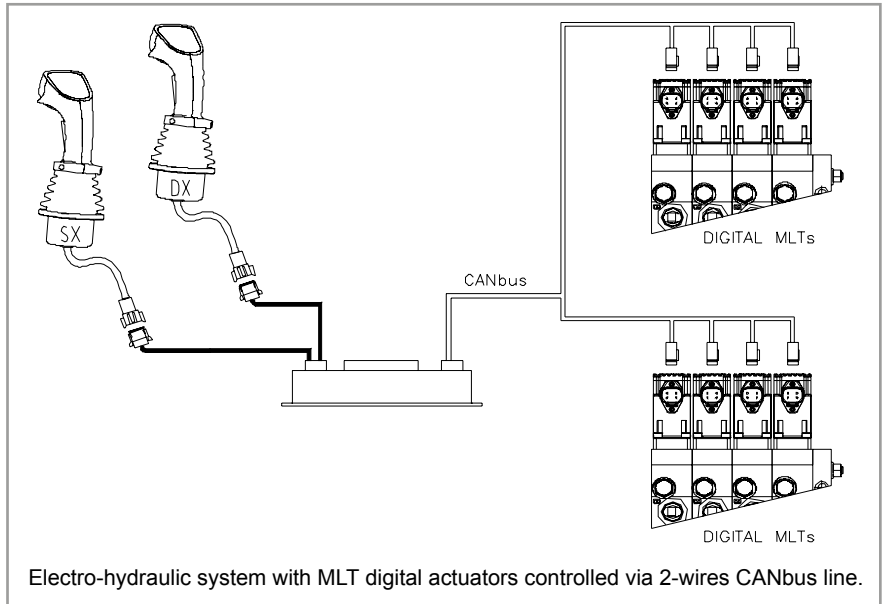
ADJUSTMENTS

Adjustments through RS485 serial line and CANbus interface.

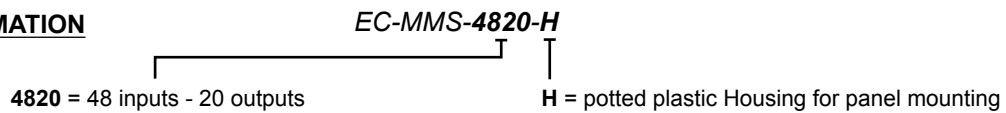


Ask for: PC configuration electronic units calibration tool (see page 44).

APPLICATION EXAMPLE



ORDERING INFORMATION



EC-MMS-0713-H Machine Management System

DESCRIPTION

MMS (*Machine management System*) controller with built-in advanced driving and fault-detection features to be used as a stand-alone unit or in connection with other CANbus units (e.g. joysticks, MLTs, radio, other MMS).

OPERATION

EC-MMS-0713 can be used as a stand-alone controller for applications with a single PWM or dual proportional manifolds where the functions are operated in meter-in configuration.

Its CANbus interface allows it to be used as a part of complex CAN networks e.g. equipped with radio systems. EC-MMS-0713 is provided with display and push-buttons to configure the control characteristics (Imin/Imax, ramps, deadbands, dither) of its PWM output channels.

FEATURES

- Power supply line is protected against reversed polarity and overvoltage.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, over-current and over-temperature.
- CANbus (CAN 2.0B) interface
- Internal measurement of battery voltage.
- The current in the proportional solenoids is independent of change in the coil resistance and supply voltage variations.
- Especially designed for applications with manifolds in meter-in configuration (single or dual proportional).



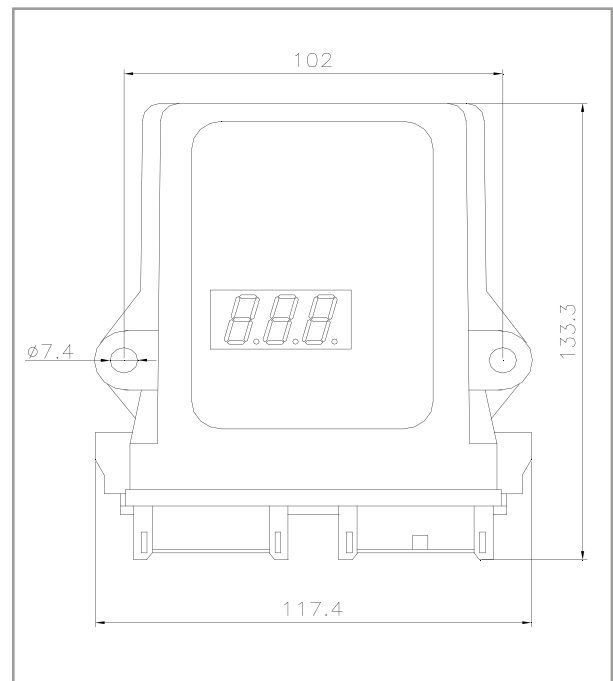
SPECIFICATIONS

• Operating voltage:	8.5 ÷ 32 VDC
• Max current consumption:	0.25 A (no load applied)
• Operating temperature:	-25°C / +85°C
• Degree of protection:	IP 65 (with housing)
• Analogue inputs:	1, 10-bits resolution
• Analogue input type:	0 ÷ 20 mA or 0 ÷ 5 V selectable by sw (HW option 0 ÷ 10V)
• Digital inputs:	6
• Input impedance:	100kΩ (internal pull-down)
• Max current load on all outputs:	10 A
• High Side power outputs:	13 (3.5A max each) (HW option: 14-one digital input not available)
• Current output range (PWM):	3 A
• Available current feedbacks:	2 (on the high side) (HW option: 4)

APPLICATIONS

- 12 VDC and 24 VDC systems
- For hand held terminal cable/radio applications
- Field - adjustable applications
- Machine management systems based on CANbus.

DIMENSIONS

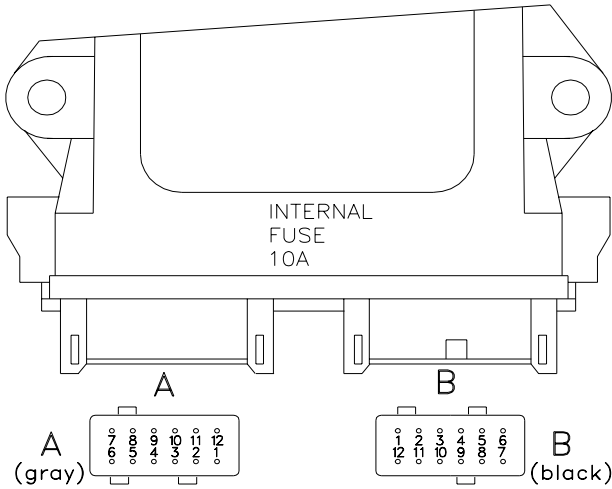


ELECTRONIC CONTROL UNITS

EC-MMS-0713-H Machine Management System

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: Deutsch - DTM12



A (GREY)

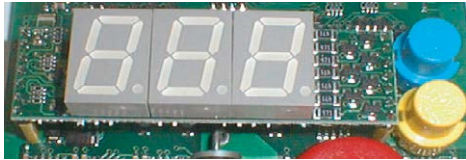
- 1 DI1 (DIGITAL INPUT)
- 2 EVP1 (HS OUTPUT WITH CURRENT FEEDBACK)
- 3 -V (POWER SUPPLY - GND)
- 4 EVP2 (HS OUTPUT WITH CURRENT FEEDBACK)
- 5 HS11 (HIGH SIDE OUTPUT)
- 6 +V (POWER SUPPLY - POSITIVE)
- 7 HS1 (HIGH SIDE OUTPUT)
- 8 HS2 (HIGH SIDE OUTPUT)
- 9 HS3 (HIGH SIDE OUTPUT)
- 10 HS4 (HIGH SIDE OUTPUT)
- 11 HS5 (HIGH SIDE OUTPUT)
- 12- HS6 (HIGH SIDE OUTPUT)

B (BLACK)

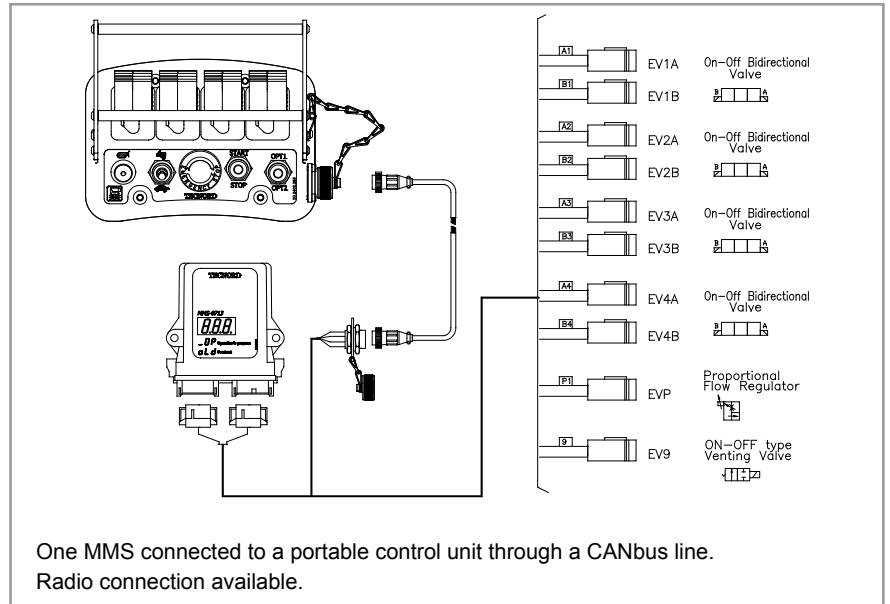
- 1 HS7 (HIGH SIDE OUTPUT)
- 2 HS8 (HIGH SIDE OUTPUT)
- 3 DI2 (DIGITAL INPUT)
- 4 DI3 (DIGITAL INPUT)
- 5 HS9 (HIGH SIDE OUTPUT)
- 6 HS10 (HIGH SIDE OUTPUT)
- 7 CAN HIGH
- 8 CAN LOW
- 9 AIN (ANALOGUE INPUT)
- 10 DI4 (DIGITAL INPUT)
- 11 DI5 (DIGITAL INPUT)
- 12 DI6 (DIGITAL INPUT)

ADJUSTMENTS

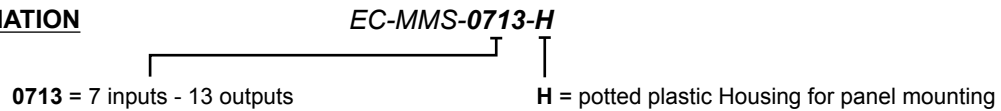
Adjustments through integrated display and pushbuttons



APPLICATION EXAMPLE



ORDERING INFORMATION



ELECTRONIC CONTROL UNITS

EC-MMS-6252-H Machine Management System Controller

DESCRIPTION

MMS (*Machine Management System*) controller with built-in advanced safety and fault-detection features for integrated control of a high number of functions in mobile equipment applications.

OPERATION

It is normally used as the main control unit in a complete machine management system. Two microprocessors and advanced diagnostics for safety applications. CANbus communication. Serial connection for software download.

FEATURES

- Robust metal enclosure and complete potting.
- Power supply line is protected against reversed polarity and overvoltage.
- Inputs are protected against short circuits to GND and supply.
- Outputs are protected against short circuits, reversed polarity, over-current and over-temperature.
- Dual microprocessor for advanced diagnostics capability.
- Serial communication ports: CANbus, RS485, RS232.
- Optional add-on inclinometer.
- +5 V auxiliary power supply for external control devices.
- Performance level d capability according to ISO 13849, thanks to redundant microcontroller and embedded diagnostics.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity), EN 61000-6-3 (Emissions).



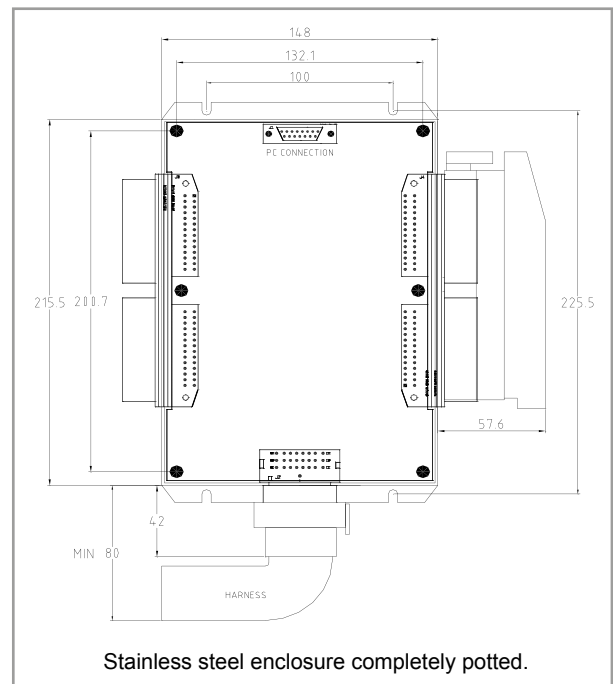
SPECIFICATIONS

• Operating voltage:	8.5 ÷ 32 VDC
• Max current consumption:	400 mA (no load applied)
• Operating temperature:	-25°C / +85°C
• Degree of protection:	IP 67
• Input impedance:	100 kΩ
• Analog inputs (10 bits):	16 (0-5 V) 6 (0-20 mA)
• Typical ctrl pot resistance:	1 ÷ 10 kΩ
• High side power outputs:	8 (5 A max) 28 (3.5 A max)
• High side signal outputs:	10 (0.7 A max)
• Digital inputs:	40
• Max current load on all outputs:	16 A
• Inputs for current feedback:	4
• Current output range (PWM):	100 ÷ 1600 mA
• Analog voltage outputs:	6 (0-5 V)

APPLICATIONS

- 12 VDC and 24 VDC systems.
- Main ECU for aerial platforms, cranes, telehandlers, agric. machines.
- Field-adjustable applications.
- Two or more MMS boards can be interconnected by means of 2-wires RS485 serial lines or CANbus.

DIMENSIONS



Stainless steel enclosure completely potted.

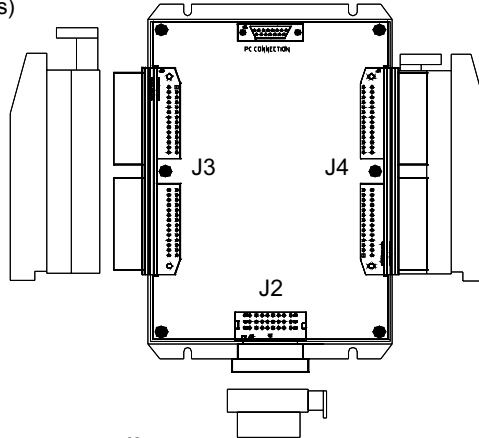
ELECTRONIC CONTROL UNITS

EC-MMS-6252-H Machine Management System Controller

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Main Connectors type: SICMA2/DCS1 (56 poles)
Auxiliary connector type: SICMA2 (24 poles)
PC connector type: DB15 female

- J3**
- 1 CAN BUS
 - 4 ANALOG INPUTS (0+20 MA)
 - 8 ANALOG INPUTS (0+5 V)
 - 24 ANALOG INPUTS
 - 10 DIGITAL OUTPUTS (0.7 A)
 - 1 RS485
 - 2 +5 V AUX
 - 2 +VBATT
 - 2 GND



- J4**
- 2 CAN BUS
 - 2 ANALOG INPUTS (0+20 MA)
 - 2 ANALOG INPUTS (0+5 V)
 - 16 DIGITAL INPUTS
 - 18 DIGITAL OUTPUTS (3.5 A)
 - 8 DIGITAL OUTPUTS (5 A)
 - 4 CURRENT FEEDBACKS
 - 2 GND

- J2**
- 6 ANALOG INPUTS (0+5 V)
 - 10 DIGITAL OUTPUTS (3.5 A)
 - 6 ANALOG OUTPUTS (0+5 V)
 - 2 GND

For wiring schematics consult factory.

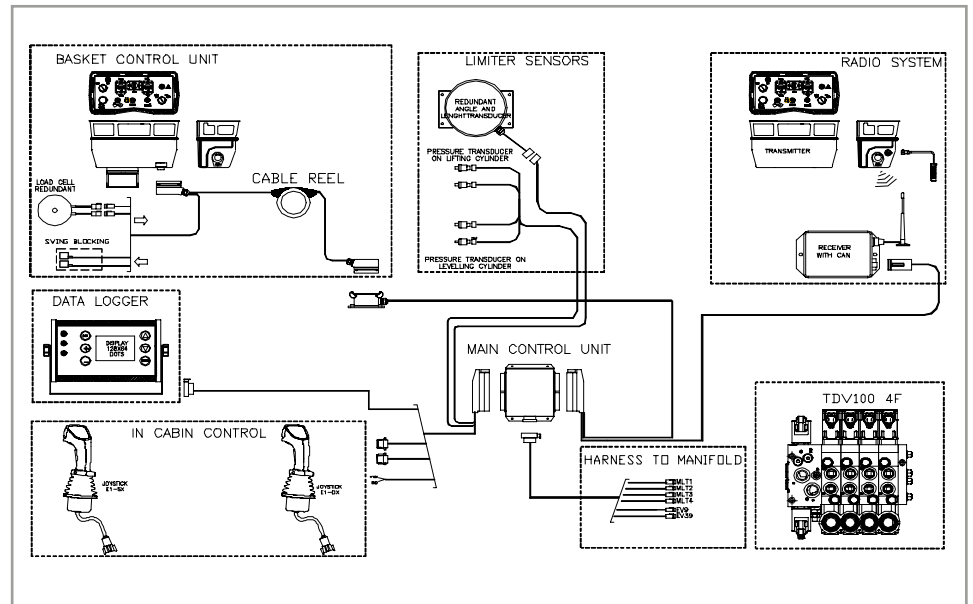
ADJUSTMENTS

Adjustment of working parameters can be effected: via RS232 serial line or via CAN bus interface.

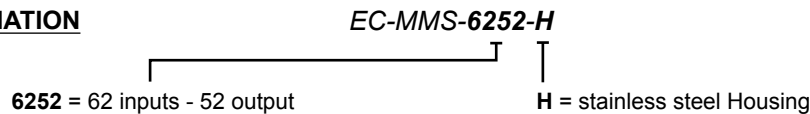


Ask for: PC configuration electronic units calibration tool (see page 44).

APPLICATION EXAMPLE



ORDERING INFORMATION



Two configuration available:
Standard (2 main connectors)
Full (all connectors)

ELECTRONIC CONTROL UNITS

Graphic Display Units

	Description	Page
EC-VIS-G-D128X64-P	Graphic color display 128x64	36
EC-VIS-G-D128x64-M-C	Graphic display 128x64 dots (192 kB eeprom)	38
EC-VIS-GC-P480x272-S	Graphic color display 480x272 pixels (64 kB eeprom)	39

EC-VIS-G-D128X64-P Graphic Display Unit



DESCRIPTION

Graphic Display Unit to be used as operator's interface in complex Machine Management Systems.

FEATURES

- Compact control unit to be fixed inside a cabin.
- Robust suction cup on the rear.
- CANbus connection.
- Graphic display 128 x 64 dots backlit.

MECHANICAL / ENVIRONMENTAL SPECIFICATIONS

• Dimensions:	131 x 100.5 x 20.8 mm
• Housing:	Plastic body Membrane keypad
• Operating temperature:	-25 / 85°C
• Degree of protection:	IP 67
• Connector:	Molex Minifit 20 poles

ELECTRICAL SPECIFICATIONS

Display

• Type and size:	graphic
• Resolution:	128 x 64 dot-matrix
• Viewing area:	50 x 25 mm
• Backlight:	Led
• Backlight color:	white
• Viewing angle range:	40°

ELECTRONIC CONTROL UNIT

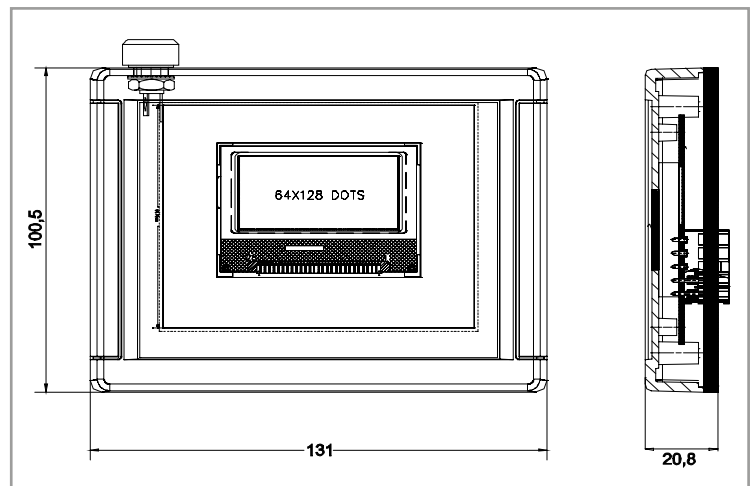
• Operating voltage:	8.5 ÷ 30 VDC
• Communication interfaces:	CANbus SAE J1939
• Analog inputs (10 bits):	4 (0-5 V)
• Digital inputs:	5
• High side power outputs:	4 (3.5 A max each)
• Internal inputs for current feedback:	4
• PWM output current range:	100 - 1500 mA
• Membrane keypad with:	
• Pushbuttons:	9
• SMD leds:	9
• Control potentiometer on the top:	1

APPLICATIONS

- 12 VDC and 24 VDC systems.
- Service/Maintenance Tool.
- Diagnostic/Configuration unit for Hedgecutters.
- In-cab terminal.



DIMENSIONS



DISPLAY UNITS

EC-VIS-G-D128X64-P Graphic Display Unit



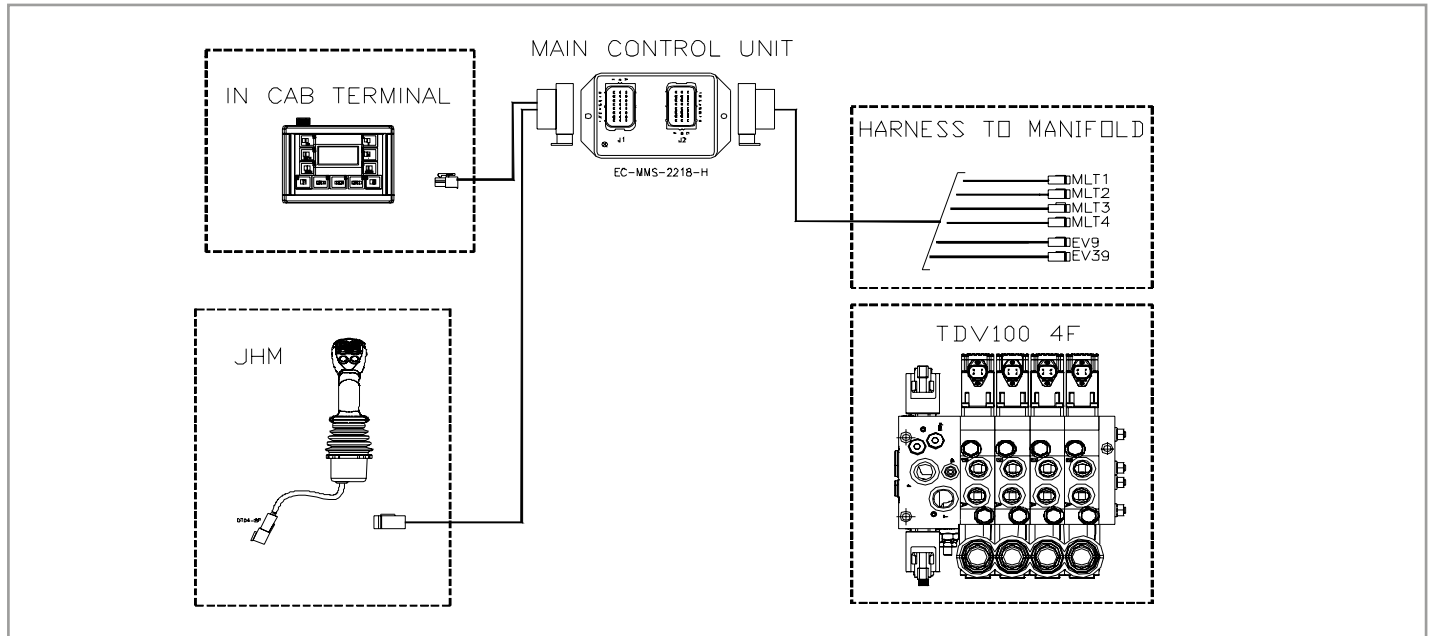
CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: Molex Minifit

- | | |
|--------------------|-----------------|
| 1 -V (POWER - GND) | 11 +V (POWER) |
| 2 CAN H | 12 CAN L |
| 3 ANALOG IN 2 | 13 ANALOG IN 3 |
| 4 ANALOG IN 0 | 14 ANALOG IN 1 |
| 5 DIGITAL IN 2 | 15 DIGITAL IN 3 |
| 6 DIGITAL IN 0 | 16 DIGITAL IN 1 |
| 7 DIGITAL IN 4 | 17 OUT P0 |
| 8 OUT P1 | 18 OUT P2 |
| 9 N.C. | 19 OUT P3 |
| 10 N.C. | 20 +5 V EXT |

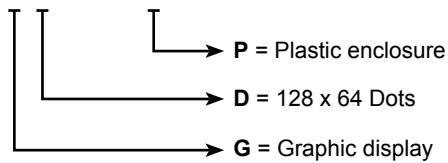


APPLICATION EXAMPLE



ORDERING INFORMATION

EC-VIS-G-D128x64-P



EC-VIS-G-D128x64-M-C Graphic Display Unit

DESCRIPTION

Graphic display unit to be used as operator's interface in complex Machine Management Systems.

FEATURES

- RS-232 serial interface.
- 1 CANbus connection.
- Graphic display 128 x 64 dots backlit.
- Real time clock with calendar.
- Wide data storage memory.

MECHANICAL / ENVIRONMENTAL SPECIFICATIONS

• Dimensions:	174 x 108 x 31 mm
• Housing:	Metal body Polycarbonate cover
• Operating temperature:	-25°C / 85°C
• Degree of protection:	IP 67
• Connector:	SICMA2, 24 pin



ELECTRICAL SPECIFICATIONS

Display

• Type and size:	graphic
• Resolution:	128 x 64 dot-matrix
• Viewing area:	62 x 44 mm
• Brightness:	8 cd/m ²
• Contrast:	8:1
• Viewing angle range:	40°

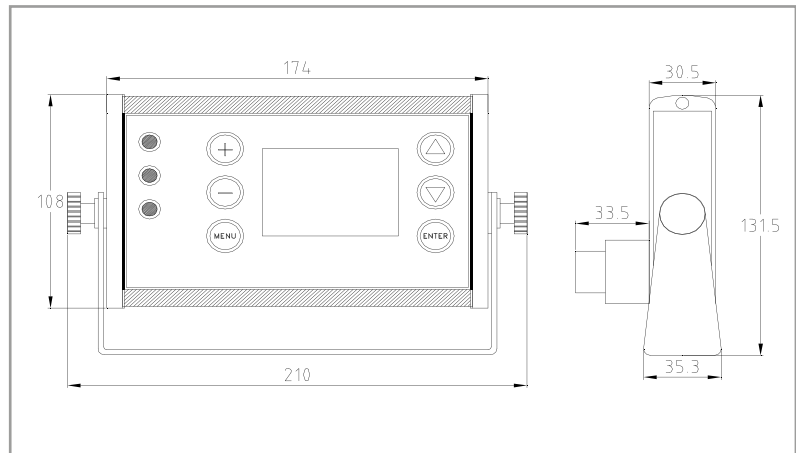
ELECTRONIC CONTROL UNIT

• Operating voltage:	8.5 ÷ 30 VDC
• Communication interfaces:	CANbus ISO11898 RS 232
• Analog inputs (10 bits):	8 (0-5 V)
• Digital inputs:	1
• High side power outputs:	4 (3.5 A max each)
• Inputs for current feedback:	2
• PWM output current range:	100-1500 mA
• Non volatile memory:	192 kB
• Backlight pushbuttons:	standard 6 (max 9)
• High efficiency leds:	standard 3 (max 4)

APPLICATIONS

- 12 VDC and 24 VDC systems.
- Load limiter and/or area control systems.
- In-cab terminal.
- Data logger.

DIMENSIONS



ELECTRONIC CONTROL UNITS

C-VIS-G-D128x64-M-C Graphic Display Unit

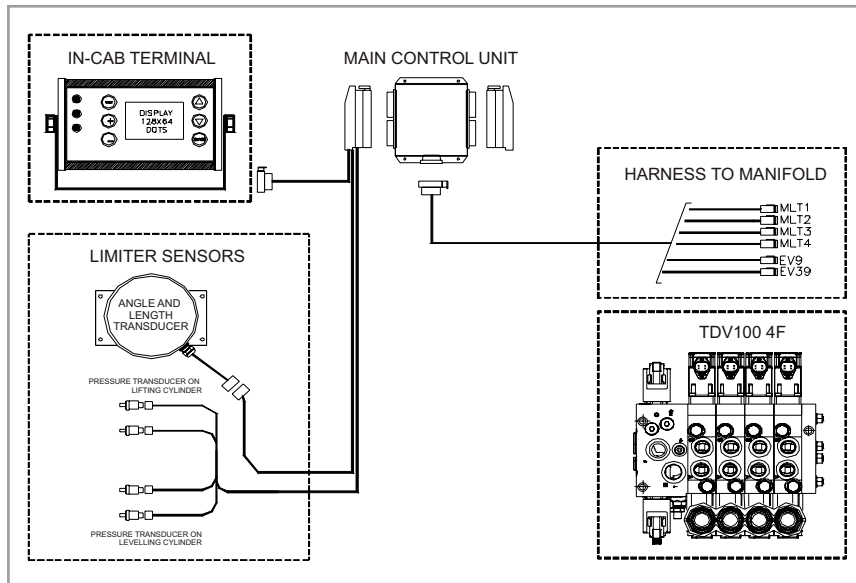
CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: SICMA2 (24 poles)



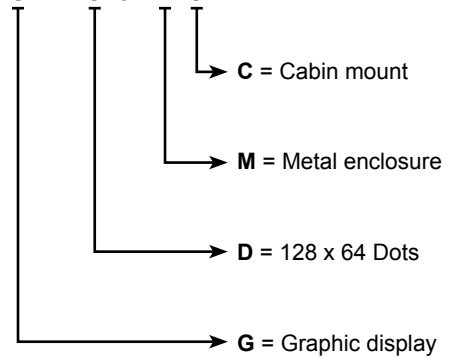
A	B	C
1 -V (POWER - GND)	1 +5V EXT	1 +V (POWER)
2 ANALOG IN 1	2 ANALOG IN 0	2 CAN-L
3 ANALOG IN 2	3 ANALOG IN 3	3 CAN-H
4 DIGITAL IN	4 HEATER IN	4 CURRENT FEEDBACK 1
5 ANALOG IN 5	5 ANALOG IN 4	5 CURRENT FEEDBACK 2
6 ANALOG IN 6	6 ANALOG IN 7	6 RS232 TX
7 OUT 1	7 -V (POWER - GND)	7 RS232 RX
8 OUT 0	8 OUT 3	8 OUT 2

ADJUSTMENTS



ORDERING INFORMATION

EC-VIS-G-D128x64-M-C



EC-VIS-GC-P480x272-S Graphic Display Unit

DESCRIPTION

Color graphic display unit.

FEATURES

- Dual-molding plastic-silicon enclosure.
- 4.3" TFT backlighted color display.
- Standalone or dashboard mount.
- 6 pushbuttons (backlighted), 6 LEDs.
- CANbus interface.
- Electro Magnetic Compatibility (EMC): EN 61000-6-2 (Immunity)
EN 61000-6-3 (Emissions)
- Auxiliary +5 V supply for external devices (e.g. sensors)

MECHANICAL / ENVIRONMENTAL SPECIFICATIONS

- Dimensions: 182 x 117 x 49 mm
- Housing: polycarbonate body
soft silicon rubber cover
- Operating temperature: -25°C / 85°C
- Degree of protection: IP 65
- Connector: AMP superseal, 26 pin

ELECTRICAL SPECIFICATIONS

Display

- Type and size: TFT, 4.3", 16:9
- Resolution: 480 x 272 pixels
- Viewing area: 95.04 x 53.856 mm
- Brightness: 280 cd/m²
- Contrast: 450:1
- Viewing angle range: ± 70° H, +70/-50° V

ELECTRONIC CONTROL UNIT

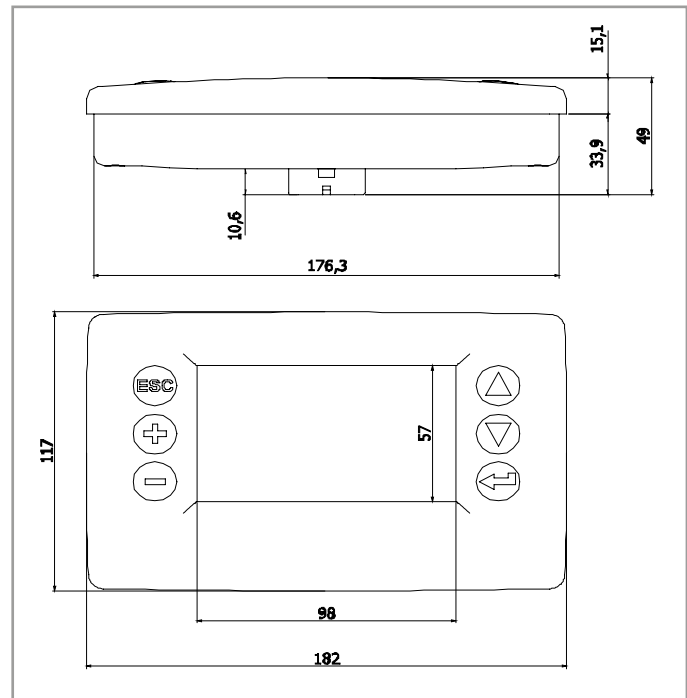
- Operating voltage: 8 ÷ 32 VDC
- Communication interfaces: CANbus ISO11898
RS 232
USB
- Analog inputs (10 bits): 8 (0-5 V)
- Additional features: real time clock
4 analog inputs
- Input impedance: 100 kΩ
- Max. current from +5 V auxiliary out: 25 mA

APPLICATIONS

- System diagnostic for heavy duty vehicles.
- Diagnostic/configuration unit for telehandlers.
- Service/maintenance tool.
- Data logger.



DIMENSIONS

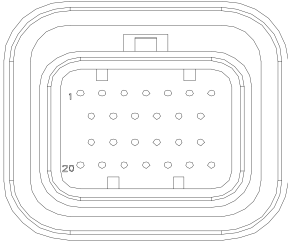


ELECTRONIC CONTROL UNITS

EC-VIS-GC-P480x272-S Graphic Display Unit

CIRCUIT BOARD PINOUT - WIRING DIAGRAM

Connector type: AMP Superseal 1.00 mm, 26 pin



- | | | |
|---------------|---------------------|---------------------|
| 1 ANALOG IN 0 | 10 ANALOG IN 5 | 19 +5 V EXT |
| 2 ANALOG IN 1 | 11 NOT USED | 20 CAN H |
| 3 ANALOG IN 2 | 12 -V (POWER - GND) | 21 CAN L |
| 4 NOT USED | 13 -V (POWER - GND) | 22 -V (POWER - GND) |
| 5 +5 V EXT | 14 RX232 | 23 NOT USED |
| 6 +V (POWER) | 15 TX232 | 24 USB ID |
| 7 +V (POWER) | 16 NOT USED | 25 USB D+ |
| 8 ANALOG IN 3 | 17 NOT USED | 26 USB D- |
| 9 ANALOG IN 4 | 18 NOT USED | |

MOUNTING OPTIONS

Dashboard Mount



Panel cutout of 177 x 112 mm

Cabin Mount



N. 4 Fixing holes for M4 screws at 75 x 50 mm

ORDERING INFORMATION

EC-VIS-GC-P480x272-S-*

- D = Dashboard mount
- C = Cabin mount
- S = polycarbonate with Silicon cover
- P = 480 x 272 Pixels
- GC = Graphic Color display

ELECTRONIC CONTROL UNITS

Accessories

	Description	Page
Control unit connection	Connector kits	42
Control unit calibration tool	Software calibration too linking cables	43

6 POLES DEUTSCH DT04-6P

Kit includes: female connector, male contacts, secondary lock and fillers
Available for electronic control unit: EC-MMS-1012-H

ORDERING CODE: 13.0310.386



8 POLES DEUTSCH DT06-8S

Kit includes: male connector, female contacts, secondary lock and fillers
Available for electronic control unit: EC-PWM-A2-MPC1-H

ORDERING CODE: 13.0310.432



12 POLES "DEUTSCH DTM06-12SA & DTM06-12SB"

Kit includes: male connector, female contacts, secondary lock and fillers
Available for electronic control unit: EC-MMS-0713-H

ORDERING CODE: 13.0310.253



26 POLES AMP SUPERSEAL

Kit includes: 2 male connectors, female contacts
Available for electronic control unit: EC-VIS-GC-P480x272-S

ORDERING CODE: 13.0310.635



ELECTRONIC CONTROL UNITS

Electronic Control Unit - Connection

Accessories

24 POLES SICMA BLACK COLOR

Kit includes: male connector, female contacts, locking cum, fillers

Available for electronic control unit: EC-PWM-P4-MPC2-H; EC-PWM-P8-MPC4-H;
EC-PWM-08-MPC4-H; EC-MMS-1012-H; EC-MMS-2218-H; EC-MMS-1521-H

ORDERING CODE: 13.0310.150



24 POLES SICMA GREY COLOR

Kit includes: male connector, female contacts, locking cum, fillers

Available for electronic control unit: EC-MMS-1521-H

ORDERING CODE: 13.0310.634



24 POLES SICMA BLACK COLOR WITH WIRES 0.8 M LENGTH

Kit includes: male connector, female contacts, locking cum and wires 0,8 m length

Available for electronic control unit: EC-PWM-P4-MPC2-H; EC-PWM-P8-MPC4-H;
EC-PWM-08-MPC4-H; EC-MMS-1012-H; EC-MMS-2218-H; EC-MMS-1521-H

ORDERING CODE: 13.0310.236



56 POLES SICMA

Kit includes: male connector, female contacts, locking cum, cover and fillers

Available for electronic control unit: EC-MMS-6252-H

ORDERING CODE: 13.0310.324



56 POLES SICMA WITH WIRES 0.8 M LENGTH

Kit includes: male connector, female contacts, locking cum, cover and fillers

Available for electronic control unit: EC-MMS-6252-H

ORDERING CODE: 13.0310.324



TECNORD SOFTWARE ELECTRONIC UNITS CALIBRATION TOOL

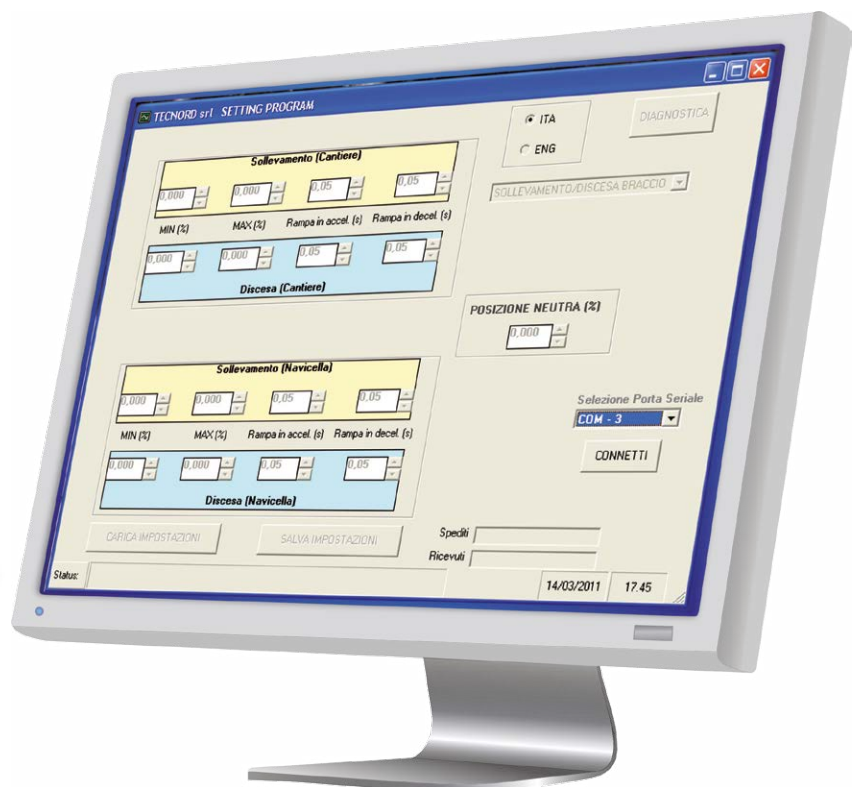
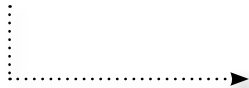
Tecnord electronic control units are supplied with operation parameters standard programming, which satisfies most applications.

For special application SCT calibration software allows some of the parameters for proportional solenoid valve control to be modified via computer; for example the minimum and maximum current or ramp up and ramp down parameters may be defined.

The linking cable shown in the following page (optional, to be ordered separately) is necessary for the computer connection.



SOFTWARE
INSTALLATION

**MINIMUM SYSTEM REQUIREMENTS**

- Windows XP® operating system or higher.
- Intel® Pentium processor.
- 32 Mb RAM.
- CD player unit.
- Connecting through a standard RS232 serial port, DB9 connection; alternatively, a USB-RS232 converter can be used.

PROGRAM INSTALLATION

To install the SCT software onto a personal computer, simply execute the file *setup.exe*.

ELECTRONIC CONTROL UNITS

Electronic Control Unit - Linking Cables

Accessories

AMPSEAL-DB9 CABLE ADAPTER (with software calibration tool)

Available for electronic control unit: EC-PWM-P4; EC-PWM-P8; EC-MMS-1012-H

ORDERING CODE: 20.1001.026/A



DEUTSCH-DB9 LINKING CABLE (with software calibration tool)

Available for electronic control unit: EC-MMS-2218-H

ORDERING CODE: 21.0801.031



DB15-DB9 LINKING CABLE (with software calibration tool)

Available for electronic control unit: EC-MMS-6252-H

ORDERING CODE: 21.0801.053



RS232 - USB CONVERTER

It allows Tecnord electronic control units to personal computer connection when the latter is unprovided of serial port; for installation follow the instruction enclosed with the converter

ORDERING CODE: 50.2205.227



CAN - USB CONVERTER

It allows Tecnord CAN joysticks to Personal Computer connection with a USB port; for installation follow the instruction enclosed with the interface device

ORDERING CODE: 50.2205.229

