

## Integrated PWM module with CAN bus interface for control applications

### Features

- 3 PWM outputs 10-30 V, 3 A (high side switch)
- 3 analog inputs 0-10 V
- 4 digital inputs 10-30 V
- power supply 10-30 V
- galvanically separated inputs and outputs (except analog inputs)
- CAN bus interface
  - secure MDCAN realtime protocol
  - MDFUNC series compatible
  - MDCAN series compatible
  - NAVIO series compatible
  - CANopen version available
- 8 V supply output for analog inputs
- configurable on-chip software
  - selectable inputs for each output
  - automatic control function
  - triple station control
  - transfer function (input vs. output)
  - logic functions
  - comfort configuration with PC-Tool
    - RS232 interface
    - USB interface
  - configuration and monitoring with optional LC display
- status indication by LEDs
- safety feature for cable break
- mountable on 35 mm DIN-rail
- max. cable diameter for connectors: 1.5mm<sup>2</sup> with ferrule

### Applications

mobile and marine applications, hydraulic valve controls, motor controls, home control systems, dimmer controls, input/output CAN bus node

- control of hydraulic proportional valves
  - bow/stern thruster
  - cylinders
  - winches
  - clutches
  - drives etc.
- position control of hydraulic cylinders
  - steering gears
  - compactors
- pressure control
- central switching
- control of DC-motors

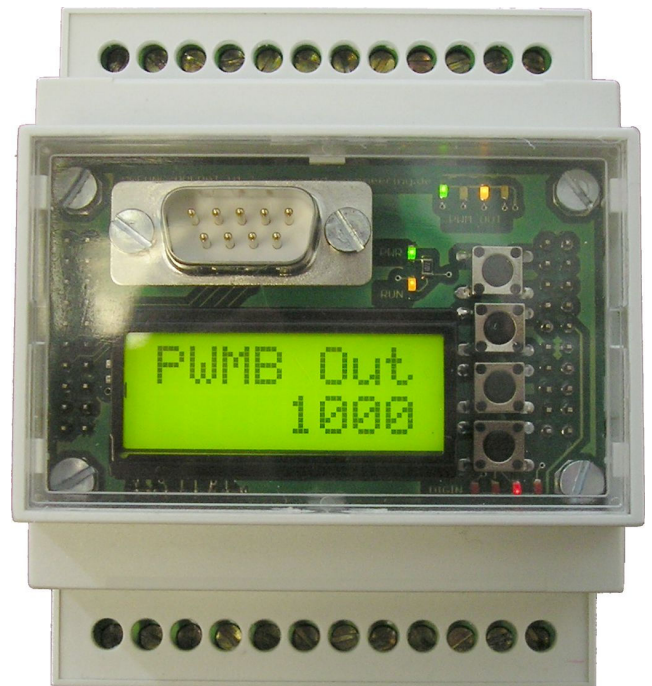
### Description

The MDFUNC-PWM3 unit is a pre-programmed and easy to use I/O module to control proportional functions with PWM outputs. Up to 3 inductive (e.g. coils) or non inductive loads can be controlled proportionally.

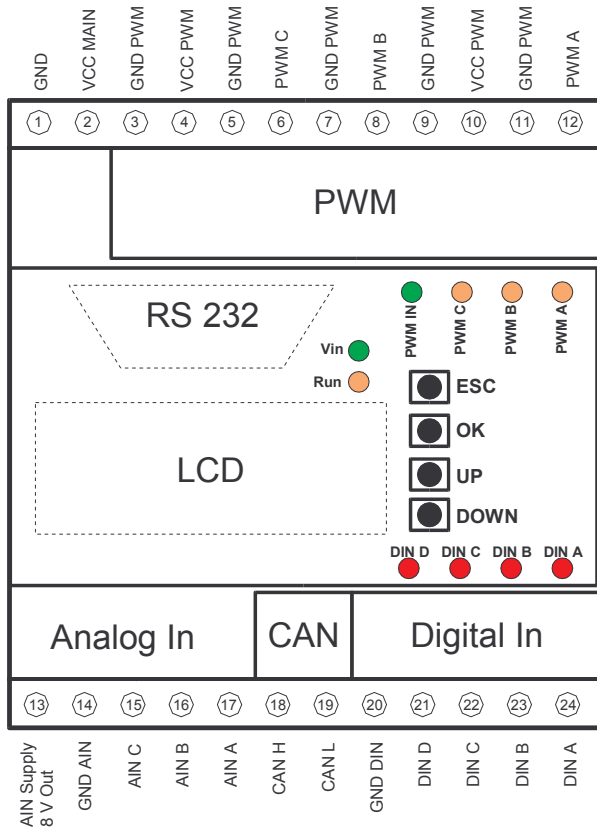
Three analog, four digital inputs and a CAN-interface are available. These inputs can be linked to the outputs by the use of a **setup-program** via PC or an onboard LC-display easily and versatile. Functions like multiple station control, network control or positioning control are pre-programmed and easily accessible.

Furthermore all internal data can be displayed on the CAN-bus and multiple units can be linked to a network.

Every output features open-load detection\* as well as thermal and short-circuit protection.



**Connection diagram**



**Connector description**

V<sub>CC MAIN</sub> main system supply  
 GND main system ground  
 V<sub>CC PWM</sub> supply for PWM-circuit  
 GND<sub>PWM</sub> ground for PWM-circuit  
 PWM A/B/C + PWM-Outputs (positive)  
 DIN A/B/C/D digital inputs (positive)  
 GND<sub>DIN</sub> ground for digital inputs  
 AIN A/B/C analog inputs (positive)  
 AIN Supply 8V supply for passive analog devices:  
 e.g. joysticks, potentiometers etc.  
 GND<sub>AIN</sub> Ground for analog inputs  
 CANL/CANH CAN bus connectors

**Button description**

UP/DOWN switch through current menu /  
 in/decrease a value  
 OK jump in submenu / select value for  
 edit / accept edited value  
 ESC jump out of submenu / cancel value edit

**Electrical Characteristics**

(T<sub>env</sub> = 25° C)

**Power supply**

Symbol	Parameter	min	typ.	max.	abs max.	Unit
V <sub>In</sub>	system power supply voltage DC	10	12/24	30	40	V
I <sub>In @ 12 V</sub>	system current (with LCD)		300			mA
I <sub>In @ 24 V</sub>	system current (with LCD)		150			mA
T <sub>env</sub>	environment temperature	-10	25	50	60	°C

**PWM A/B/C**

- high side switches
- outputs galvanically separated

Symbol	Parameter	min	typ.	max.	abs max.	Unit
V <sub>cc,PWM</sub>	PWM-stage supply voltage DC	10	12/24	30	40	V
I <sub>CC,PWM</sub> (both inputs connected)	PWM-stage supply current	-	-	9	13	A
I <sub>PWM A/B/C</sub>	current per channel	20	-	3000	5000	mA
t <sub>on</sub>	turn on- switching time <sup>3</sup>	-	140	-	-	µs
t <sub>off</sub>	turn off- switching time <sup>3</sup>	-	70	-	-	µs
R <sub>on</sub>	impedance during "on state"	-	30	50	-	mΩ
f <sub>PWM,A/B</sub> <sup>1</sup>	frequency range channel A and B	1	-	2000	-	Hz
f <sub>PWM,C</sub> <sup>2</sup>	frequency range channel C	15	-	1950	-	Hz

<sup>1</sup> resolution: 1 Hz

<sup>2</sup> six frequencies available: 15 Hz, 66 Hz, 122 Hz, 244 Hz, 488 Hz, 1950 Hz

<sup>3</sup> 10 % V<sub>CC,PWM</sub> to 90 % V<sub>CC,PWM</sub> (@V<sub>CC,PWM</sub> = 13 V)

### Digital Inputs A/B/C/D

- inputs galvanically separated

Symbol	Parameter	min	typ.	max.	abs max.	Unit
$V_{DIN,H}$	voltage for high level	3.5	12/24	28	32	V
$V_{DIN,L}$	voltage for low level	-0.5	0	2.5	-	V
$t_{S,DIN}$	turn on/off time (sample time)	-	1	3	-	ms
$I_{DIN @ 24 V}$	current per channel	1.0 <sup>4</sup>	11.0 <sup>5</sup>	12	-	mA

<sup>4</sup> @ $V_{DIN} = 3.5 V$

<sup>5</sup> optocoupler: 5.5 mA, LED: 5.5 mA

### Analog Inputs A/B/C

- averaged values
- overvoltage protected input

Symbol	Parameter	min	typ.	max.	abs max.	Unit
$V_{AIN}$	analog input voltage	0	-	10	11	V
$R_{AIN}$	input impedance	50 <sup>4</sup>	94	110	-	k $\Omega$
$f_{Sample}$	internal register update frequency	-	400	-	-	Hz

<sup>4</sup> input impedance decreases, when  $V_{AIN}$  is higher than 11.2 V

### CAN bus interface

- galvanically separated
- connectors with CANH and CANL
- max. bus length: 40 m..1000 m
- selectable CAN bus speed: 50, 125, 250, 500, 1000 kBit/s
- blinking RUN-LED when bus OK

### AIN supply output

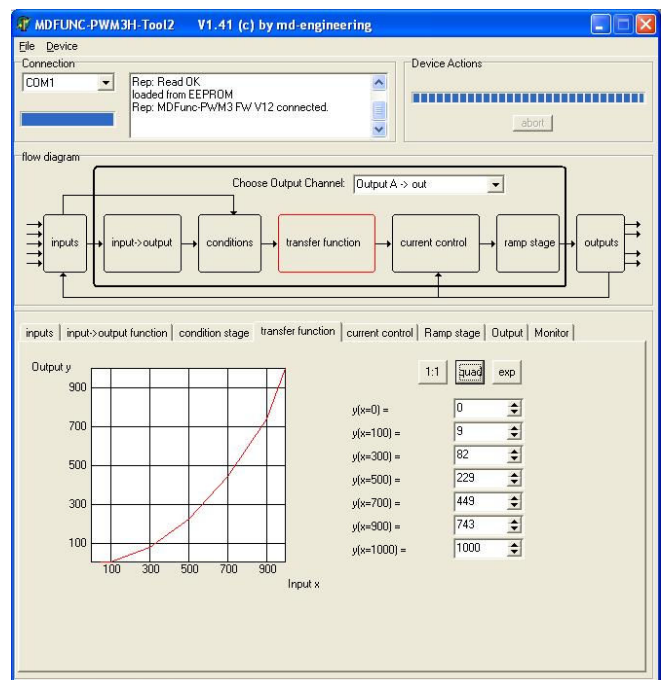
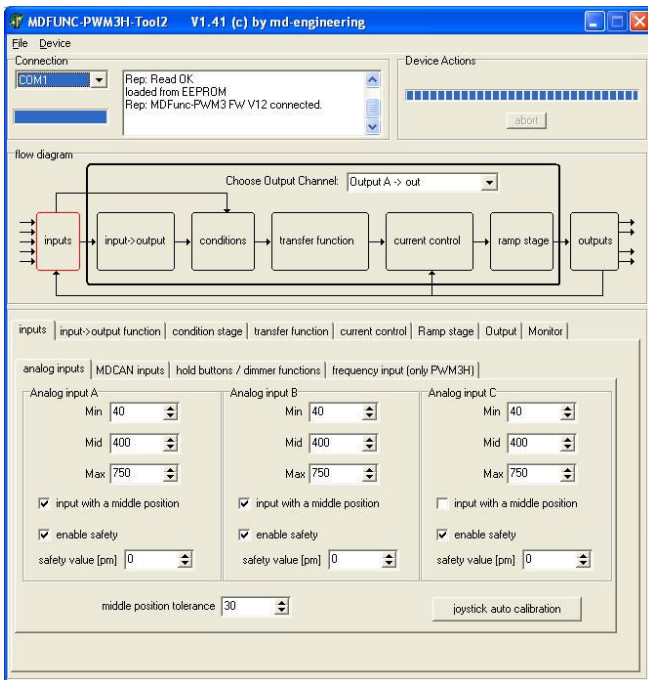
- $V_{sup,AIN} = 8 V$
- $I_{sup,AIN,max} = 90 mA$
- output not galvanically separated

### RS232 connection

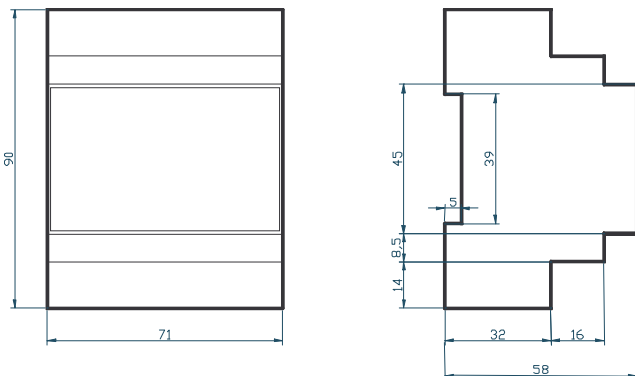
- not galvanically separated
- ATTENTION** when using PC with grounded outlet power supply  $GND_{PC}$  must have the same potential as  $GND_{PWM3}$ . If the difference is more than 100 mV you can damage your PWM3 and your PC. Best use a laptop powered by battery.
- SUB-D 9 pin male connector on board
- connect normal zero modem cable to port (also possible with "USB/RS232" adapter)
- data connection: 57600,8,N,1

### Setup Program

- easy user interface
- free input-output combinations
- inputs from local analog or digital inputs
- boolean operations
- CAN bus inputs/outputs
- output transfer function
- monitor functions
- load/save settings from/to file
- special functions: automatic control, multiple station control, dimmer function



**Package dimensions (in mm)**



**Order codes**

MDFUNC-PWM3H-GS-LCD	Power version with galvanically separated IOs and CAN-interface and with LC-display RS232 interface
MDFUNC-PWM3H-GS-ND	Power version with galvanically separated IOs and CAN-interface without LC-display
MDFUNC-PWM3H-GU-LCD (available from July 2006)	Power version with galvanically separated IOs and CAN-interface and with LC-display mini-USB interface
MDFUNC-PWM3H-NS-ND	Power version with non separated IOs and CAN-interface without LC-display
MDFUNC-PWM3H-GFXX-LCD (available only on request)	Fast switching version with galvanically separated IOs and CAN-interface and with LC-display XX= 04 (4.5 V), 07 (7.5 V), 11 (11.5 V)

- Please ask for "low cost solutions" user hardware For PWM-ask also for fast switching versions