

## Integrated module with analog- and galvanically separated digital input and CAN bus interface for control applications

### Features

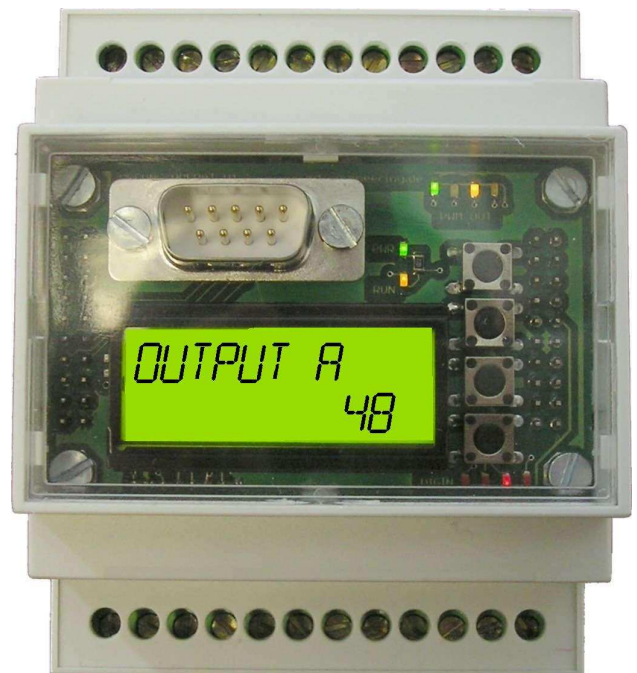
- power supply 10-30 V
- 8 galvanically separated digital inputs 10-30 V
  - 2 frequency / duty cycle inputs
- 7 analog inputs 0-10 V
  - 4 voltage/current/resistor (multiplexed)
  - 3 voltage (0-10V) or 3 current (0-25mA)
- 8 V supply output for analog inputs
- CAN bus interface
  - secure MDCAN realtime protocol
  - MDFUNC series compatible
  - MDCAN series compatible
  - NAVIO series compatible
- configurable on-chip software
  - MDFUNC<sub>Out</sub> input vs. output matrix
    - select an input out of more than 30 sources for each output channel or link function
    - several automatic control functions (P/PID/RPM)
    - latch function
    - triple station control
    - logic functions
    - transfer function (input vs. output)
    - RS232 interface or USB interface
  - configuration and monitoring with LC display
  - comfort configuration and monitoring with free PC-Tool
    - MDFUNC-I/O Tool
    - easy to use
    - more possibilities, more functions
  - firmware upgrades
- status indication by LEDs
- safety feature for AIN/CANbus cable break
- mountable on 35 mm DIN-rail
- max. cable diameter for connectors: 1.5mm<sup>2</sup> with ferrule

### Applications

Galvanically separated input module for mobile and marine applications, valve controls, engine controls, control systems, input/output CAN bus node

- speed request for marine or industrial engines
  - suitable for Steyr/Deutz/Caterpillar etc.
- together with MDFUNC-PWM3 modules suitable for propulsion systems
  - hydraulic propulsion systems
    - RPM control
  - mechanical clutches with soft shifting
  - mechanical clutches with trolling function
    - RPM control
  - emergency controls
- voltage measurement
- current measurement
- resistor measurement (passive sensor)
  - pressure measurement
  - temperature measurement

MD engineering GmbH can help to choose the right components and implement your application.



**Description**

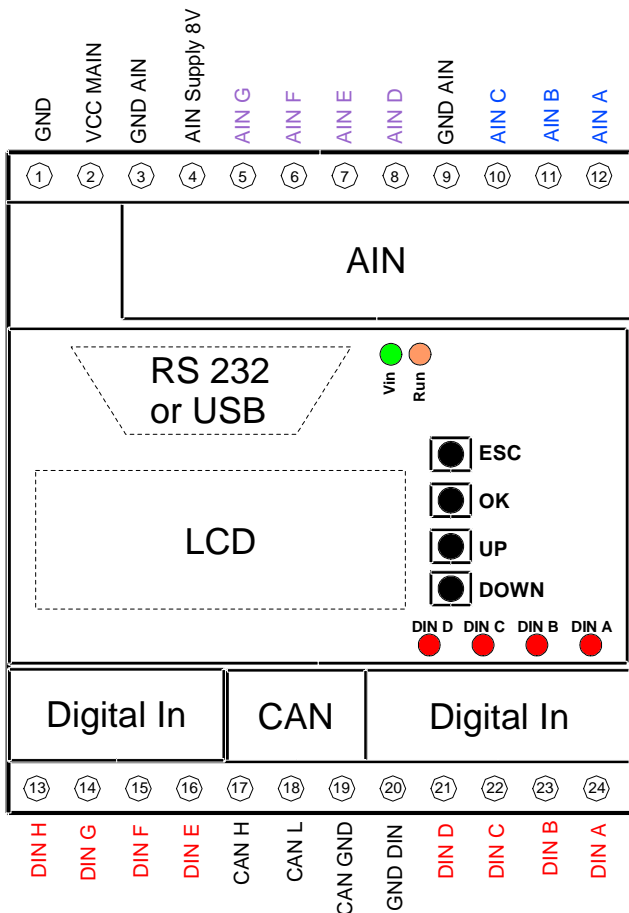
The MDFUNC-ADIN unit is a pre-programmed and easy to use input module for voltage, current or resistor measurement.

Seven analog, eight digital inputs and a CAN-interface are available. Two of the digital inputs can also be used for frequency measurement (i.e. read engine revolutions) or to measure the duty cycle.

The ADIN uses the new *MDFUNCout*-engine, which offers more powerful possibilities for creating your control application. Functions like multiple station control, network control or positioning control are pre-programmed and easily accessible.

The onboard LC-display has multiple language support (English, German, Dutch - others are possible), offers monitoring functions and the possibility to change module parameters. For configuring the module more comfortable, the new PC-Tool *MDFunc-I/O* is available at the support site. A PC can be connected via RS232 serial port or via USB (hardware option).

**Connection diagram**



**Connector description**

**supply**

1	GND	main system ground
2	V <sub>CC</sub> MAIN	main system supply

**inputs**

digital inputs		
13,14,15,16	DIN E/F/G/H	digital inputs
24,23,22,21	DIN A/B/C/D	digital inputs
20	GND DIN	digital ground, reference potential
analog inputs		
12,11,10	AIN A/B/C	analog inputs (voltage)
8,7,6,5	AIN D/E/F/G	analog inputs (voltage/current/resistor)
CAN-Bus		
17,18	CANH/CANL	CAN bus connectors
19	CAN GND	CAN bus ground

**outputs**

4	AIN Supply 8V	supply for passive analog devices: e.g. joysticks, potentiometers etc.
3,9	GND AIN	analog ground

**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

**Software assignments**

- Output A      free, calculation channel
- Output B      free, calculation channel
- Output C      free, calculation channel
- Output D      free, calculation channel
- Output E      free, calculation channel

## Electrical Characteristics

( $T_{env} = 25^{\circ}\text{C}$ )

### Power supply

Symbol	Parameter	min	typ.	max.	abs max.	Unit
$V_{in}$	system power supply voltage DC	10	12/24	30	32	V
$I_{in} @ 12\text{ V}$	system current (with LCD)		180			mA
$I_{in} @ 24\text{ V}$	system current (with LCD)		90			mA
$T_{env}$	environment temperature	-10	25	50	60	$^{\circ}\text{C}$

### Digital Inputs A/B/C/D/E/F/G/H

- inputs galvanically separated
- frequency measurement on DIN A/B
- duty cycle measurement on DIN A/B

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
$I_{DIN} @ 24\text{ V}$	current per channel	1.0 <sup>1</sup>	11.0 <sup>2</sup>	12	-	mA

<sup>1</sup> @  $V_{DIN} = 3.5\text{ V}$

<sup>2</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

### Analog Inputs D/E/F/G (multiplexed)

#### Voltage measurement

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	-	100	-	-	Hz

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

**Current measurement**

Symbol	Parameter	min	typ.	max.	abs max.	Unit
$V_{AIN}$	analog input voltage	0	-	10	11	V
$A_{AIN}$		0	-	25	30	mA
$R_{AIN}$	input impedance	50 <sup>4</sup>	94	110	-	k $\Omega$
$f_{Sample}$	internal register update frequency	-	100	-	-	Hz

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

**Resistor measurement**

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	-	100	-	-	Hz

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

**CAN bus interface**

- galvanically separated
- connectors with CANH, CANL and CANGnd
- max. bus length: 40 m..1000 m
- selectable CAN bus speed: 50, 125, 250, 500, 1000 kBit/s
- blinking RUN-LED and blinking antenna symbol on LCD, when bus OK
- 3 free 16 bit inputs (MDCAN protocol)
- 3 free 8 bit inputs (MDCAN protocol)
- MDCAN protocol output (10 Hz):
  - analog inputs A/B/C/D/E/F/G
  - digital inputs (A/B/C/D/E/F/G/H)
  - frequency input (DINA/DINB)
  - latch status results (A/B/C/D/E)
  - output channels (A/B/C/D/E)

**AIN supply output**

- $V_{sup,AIN} = 8\text{ V}$
- $I_{sup,AIN,max} = 90\text{ mA}$
- 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 the ADIN and your PC. Best use a laptop powered by battery.
- SUB-D 9 pin male connector on board
- connect common zero modem cable to port (also possible with "USB/RS232" adapter)
- data connection: 57600,8,N,1

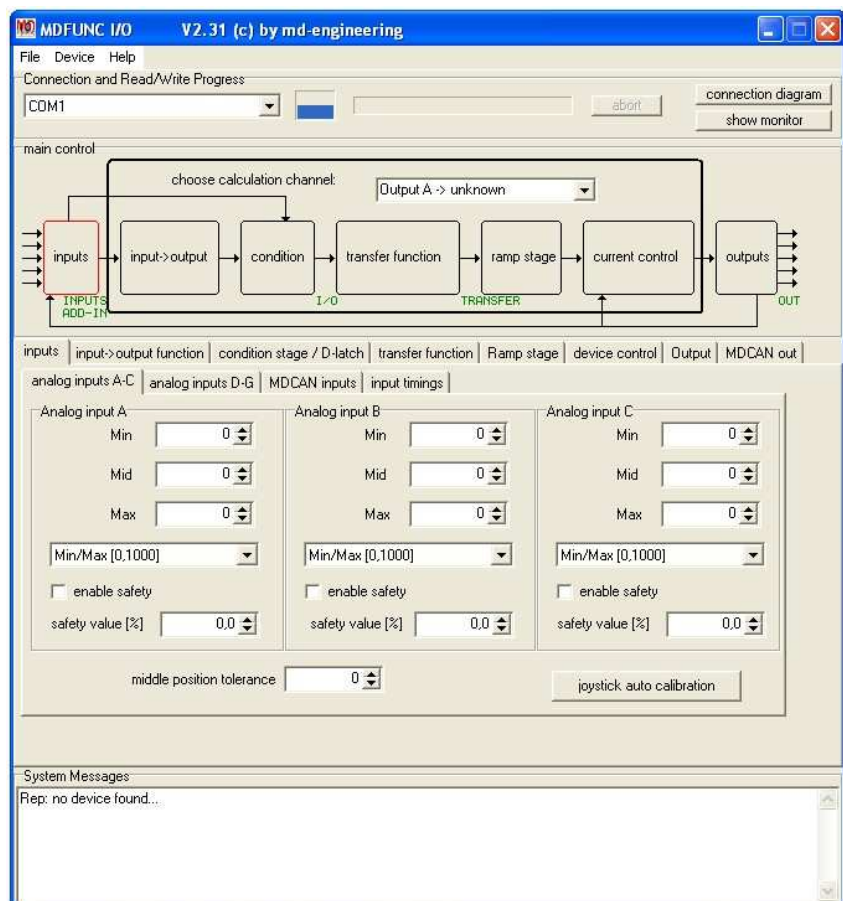
**USB connection**

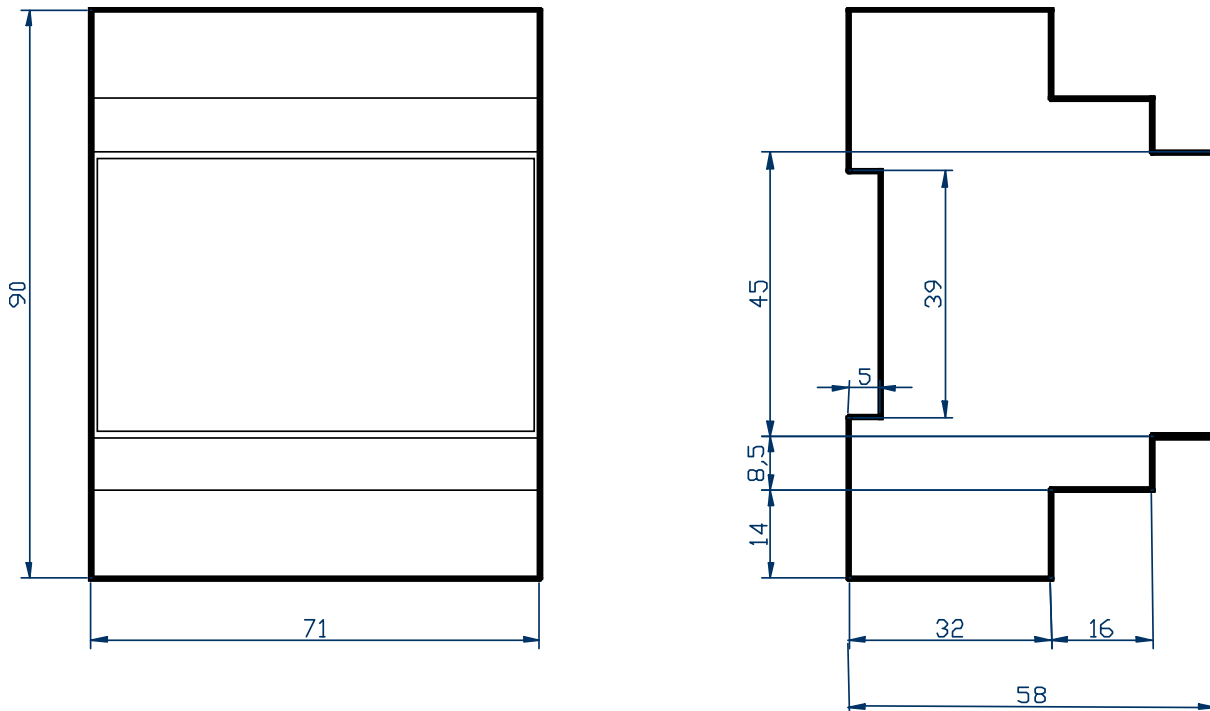
- not galvanically separated  
**ATTENTION** when using PC with grounded outlet power supply  $GND_{PC}$  must have the same potential as  $GND_{PWM3}$ . If the difference is more than 100 mV you can damage the ADIN and your PC. Best use a laptop powered by battery.
- Mini-USB connector 5 pin on board
- USB 1.1 standard
- connect ADIN with common Mini-USB cable to your PC

- on board USB/RS232 adapter, device will appear as COM-port on your PC
- RS232 data connection: 57600,8,N,1
- driver for free download

### Setup Program: MDFUNC-I/O Tool Version 2.3

- more possibilities, better overview
- easy user interface
- free input-output combinations
- inputs from local analog inputs, digital inputs, can inputs or system outputs for feedback
- boolean operations, latch function
- CAN bus inputs/outputs
- output transfer function
- monitor functions
- load/save settings from/to file
- special functions: automatic control, multiple station control
- Requirements:
  - Win2000/XP
  - CPU with 600 MHz or higher
  - COM port or USB port



**Package dimensions (in mm)****Order codes**

**ADIN with 3 current inputs and RS232 connector**  
MDFUNC-ADINc-RS232-LCD

**ADIN with 3 voltage inputs and RS232 connector**  
MDFUNC-ADINu-RS232-LCD

**ADIN with USB-connector**  
MDFUNC-ADINc-USB-LCD

**ADIN with USB-connector**  
MDFUNC-ADINu-USB-LCD

**RS232-PC connection cable**  
MDCABLE-RS232-ZERO

**USB-PC connection cable**  
MDCABLE-MiniUSB

Please ask for our "low cost solutions" (e.g. not galvanically separated or no LCD), or special device programming.

**Support**

Get datasheets, drivers, firmware, software and examples from:

<http://www.md-engineering.de/produkte/mdfunc/main.html>