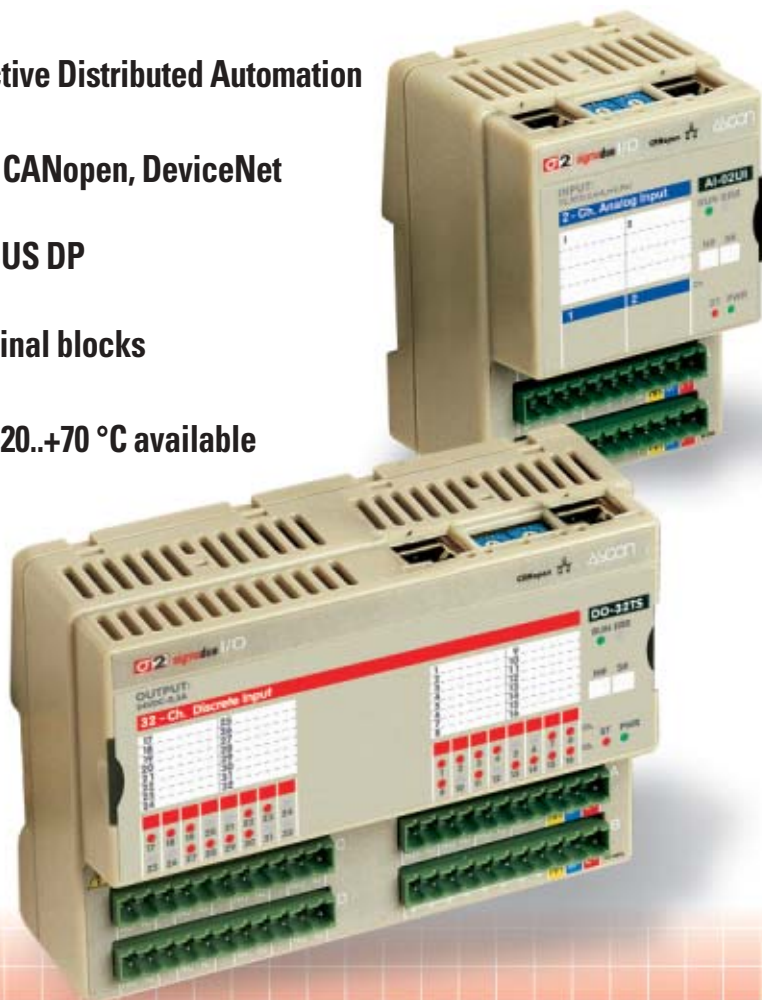


# Stand-alone remote I/O modules for fieldbus solutions sigmadue<sup>®</sup> series

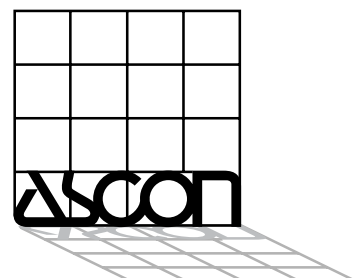
These highly modular devices uniquely combine complete programmability, high performance analogue and digital I/O, into a series of powerful, compact and autonomous modules, with direct interface to any control unit (PCs, PLCs, DCS or Operator Panels).

- Stand alone modules for effective Distributed Automation
- Fully software configurable
- Built-in Fieldbus Interface for CANopen, DeviceNet and Modbus
- Network Adapters for PROFIBUS DP and Ethernet
- Easy wiring with built-in terminal blocks
- DIN rail mounting
- Extended temperature range -20..+70 °C available



E

ISO 9001 Certified

**ASCON spa**

20021 Bollate - (Milano) Italy - Via Falzarego, 9/11 - Tel. +39 02 333 371 - Fax +39 02 350 4243  
www.ascon.it - sales@ascon.it

## Remote I/O modules for effective distributed automation

Each module has embedded fieldbus interface and power supply: therefore the modules can be distributed along the plant or on board of machines, in order to reduce engineering, mounting and wiring costs.

## Multifunction modules for high flexibility

Through software configuration, sigmadue® I/O modules can be used for different purposes. For example a module can be used at the same time for state and counter inputs, state and PWM outputs. Some sigmadue® modules boast universal analogue inputs and can be configured for different sensors. The availability of 8, 16 and 32-channel modules provides great flexibility, fitting many different applications.

## Processing capability on board

The embedded microprocessor allows local signal conditioning and data handling, such as linearisation, data scaling, engineering units conversion, alarm handling, etc... This relieves the PC or PLC CPU from a considerable load of computing power, thus improving performance and bus efficiency.

## High performances

Accuracy class: 0,1%, and 16 bit resolution for analogue I/O. Analogue sampling: from 5ms max total conversion time. Transfer of input data on fieldbus network: 5ms max for all I/O.

## Easy installation and Quick Wiring

- Bus Connection: two RJ45 connectors on each module for fast hot swap
- Removable terminal block plugs
- Screw or spring clamp type plugs
- Additional Terminal Block available to make an easier wiring of field signals just added by a "click".

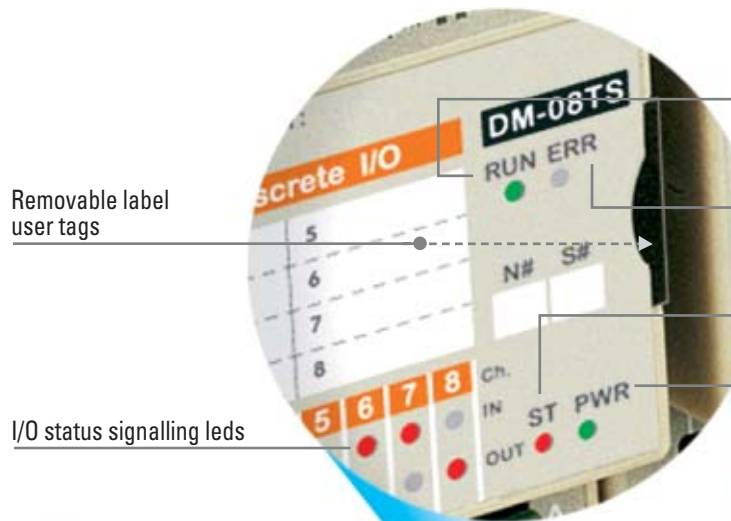
## Fieldbus technology

- Built-in fieldbus interface for CANopen, DeviceNet or RS485 Modbus
- Network Adapters for PROFIBUS DP and Ethernet.

CANopen is successfully employed in many industrial control systems: the very flexible applications layer and many optional functionalities perfectly match network designer needs.

DeviceNet is based on a object-oriented communication model and designed to connect simple devices.

Modbus is one of the best known communication protocols, implemented by hundreds of vendors, in a very large number of devices.

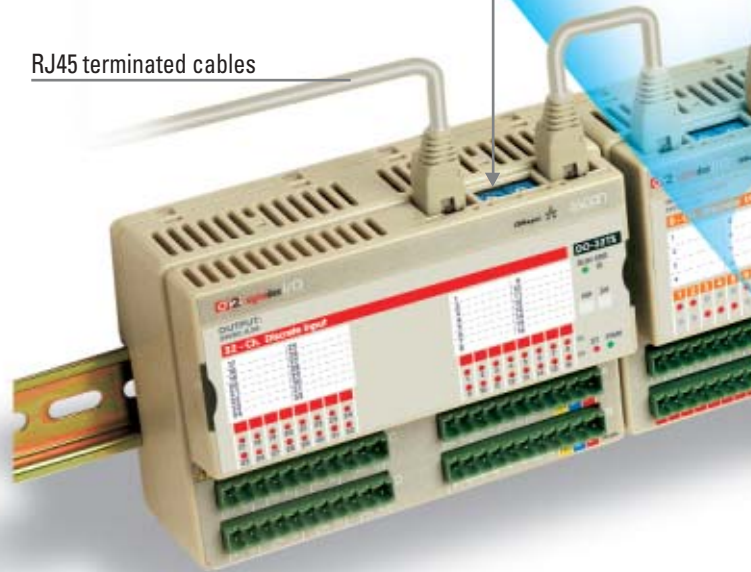


Removable label user tags

I/O status signalling leds

Rotary switch for node-ID and baud rate

RJ45 terminated cables

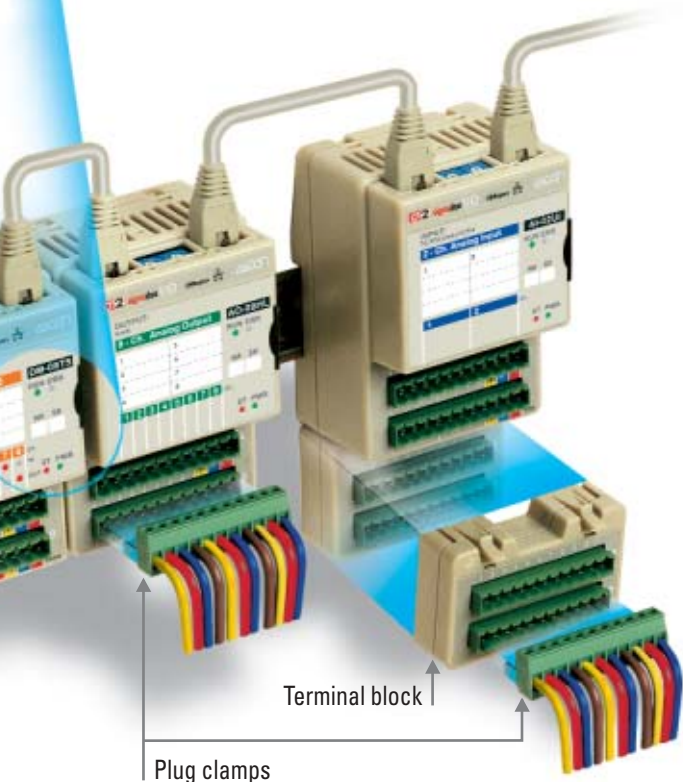


## Analogue modules

Model	Ch.s	Inputs	Outputs	Resolution class	Isolation class	Accuracy	Acq. time	Functions	Remarks
AI-02UI	2	Universal: RTD, TC, mA, mV, V, Potentiometer		16bit	2500V	0.1%	20ms	Linearisation Scaling, Engineering Units Limits Autotare Autozero	Isolation between the two inputs High accuracy High Speed
AI-08TC	8	TC, mV		16bit	800V	0.1%	60ms	Linearisation Scaling Engineering Units Limits	Differential inputs
AI-04RT	4	RTD, TC, mV		16bit	800V	0.1%	120ms	Linearisation Scaling Engineering Units Limits	
AI-08HL	8	mA, V		16bit	800V	0.1%	5ms	Limits Offset, scaling	Fast acquisition
AO-08HL	8		mA, V	16bit	800V	0.1%	20ms	Limits	High accuracy High Speed

# MODULES FOR EFFECTIVE DISTRIBUTED AUTOMATION

LED name	Status	Meaning
RUN	ON	Operational
	Blinking	Pre-operational (CANopen)
	Single flash	STOPPED
	OFF	Device in RESET state
ERR	ON	BUS OFF
	Single flash	Warning limit reached
	Double flash	Error Control Event
	Triple flash	Sync Error (CANopen)
ST	OFF	No error. Device working
	ON	DIAG Error
	Blinking	INIT and DIAG running
	Single flash	Baud rate setting
PWR	OFF	Module OK and ready
	ON	Module Power Supply ON
	OFF	Module Power Supply OFF

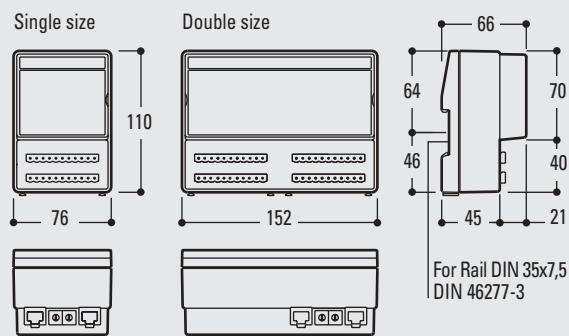


## Common Features

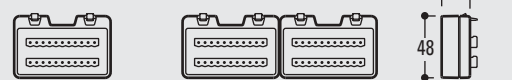
<b>Electrical</b>	
Power Supply:	24Vdc nominal (min 18V, max 30V)
Three ways isolation:	I/O to Logic - Logic to Fieldbus Power Supply to all circuits
<b>Environmental</b>	
Operating temperature:	-10..+65 °C standard -20..+70 °C extended
Storage temperature:	-40..+85 °C
Relative humidity:	5..95%, non condensing
Vibrations (3 axes):	10..57Hz, 0.0375 mm / 57..150Hz, 0.5g
Shock (3 axes):	15g, 11ms half sine
<b>General</b>	
Mounting:	on DIN rail, vertical, free air
Protection degree:	IP20
CE Marking:	EN 50081-2, EN 50082-2, EN 61010

## Dimensions

### I/O modules



### Terminal block



## Digital modules

Model	Channels		Size	Input Voltage	Output Voltage	Output Current	Isolation Class	Functions					Remarks	
	I	O						Counters	Edge detect	Latch	PWM	Pulse		
DI-16LV	16		Single	24Vdc		—	800V		✓	✓				Optoisolated Sink (PNP)
DI-32LV	32		Double	24Vdc		—	800V		✓	✓				Optoisolated Sink (PNP)
DO-16TS		16	Single		24Vdc	0.5A	800V					✓		High Side Transistor
DO-16TP		16	Single		24Vdc	2A	800V				✓	✓		High Side Transistor
DO-32TS		32	Double		24Vdc	0.5A	800V					✓		High Side Transistor
DO-04RL		4	Single		250Vac	2A (SPST) 1A (SSR)	4000V					✓		SPST Relay SSR Relay
DM-08TS	8	I/O	Single	24Vdc	24Vdc	0.5A	800V	✓	✓	✓	✓	✓		Optoisolated
DM-16TS	8	8	Single	24Vdc	24Vdc	0.5A	800V		✓	✓		✓		Sink (PNP) Input or/and
DM-32TS	16	16	Double	24Vdc	24Vdc	0.5A	800V		✓	✓		✓		High Side Trans. Output

# sigmadue® I/O line ANALOGUE I/O MODULES

## sigmadue-I/O

AI-02UI 2-channel Universal Analogue Input



**HIGH PERFORMANCES**

The sigmadue® I/O AI-02UI is a 2,5 kV isolation class, analogue input module for acquisition and signal conditioning of thermocouple, RTD, Volt, milliVolt, milliamps, and potentiometer signals.

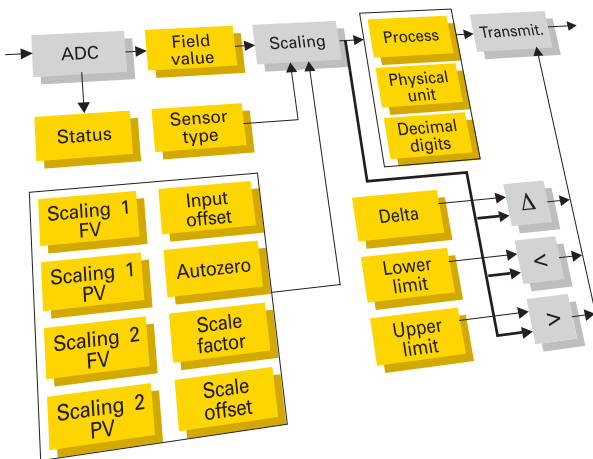
A special thermocouple input or programmable custom scale can be downloaded.

The two input channels are independent and fully configurable in a separate way.

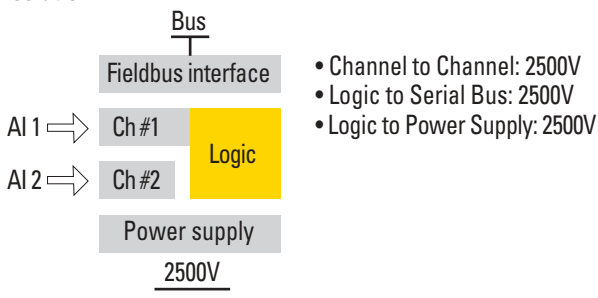
### Block diagram

The Device Profile supported is the CiA DS 404: Measuring Devices and Closed Loop Controllers, as far as the Analogue Input function block is concerned.

### Diagram for each channel:



### Isolation



### Functions

Signal conditioning, linearisation, scaling, engineering units, limits, autotare, autozero, moving average or repeating average, ...

### Technical data

#### Common features

Resolution: 16bit  
Conversion time: 20ms  
Accuracy class: 0.1%  
Overvoltage protection

#### TC input

TC J	-200..+600 °C	-328..+1112 °F
TC K	-200..+1370 °C	-328..+2498 °F
TC L	-200..+600 °C	-328..+1112 °F
TC T	-200..+400 °C	-328..+752 °F
TC N	0..+1300 °C	+32..+2372 °F
TC R	0..+1600 °C	+32..+2912 °F
TC S	0..+1760 °C	+32..+3200 °F

Others (W3, W5, B,..) downloadable.

Cold junction compensation accuracy: 1 °C/20 °C

#### RTD input

PT100	-200..+600 °C	-328..+1112 °F
-------	---------------	----------------

2, 3 or 4 wires connection

PT1000	-200..+600 °C	-328..+1112 °F
--------	---------------	----------------

2 wires connection

#### Potentiometer input

Potentiometer range: 100Ω.. 10kΩ

#### Current input

0/4.. 20mA  
Input impedance: <math>< 300\Omega</math>

#### Voltage input

0..150mV or 0..10V  
Input impedance: > 20kΩ

#### Custom input

Non-linear custom curve can be programmed on different available ranges: 20mV, ±40mV, ±80mV, 150mV, 10V, 20mA

## sigmadue-I/O

AI-08HL 8-ch configurable V, mA, Analogue Input

AI-08TC 8-ch configurable Thermocouple AI

AI-04RT 4-ch configurable RTD or TC AI



The I/O AI-08HL is a 8 channel fast analogue input module for high level signals.

The I/O AI-08TC is a 8 channel with differential analogue input module for thermocouple and low level signals.

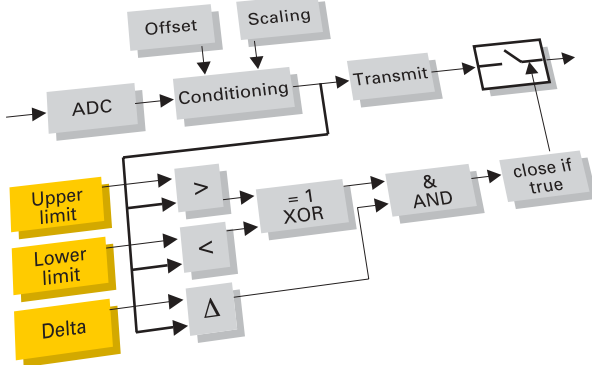
The I/O AI-04RT is a 4 channel with differential analogue input module for RTD, thermocouple and low level signals.

# sigmadue® I/O line ANALOGUE I/O MODULES

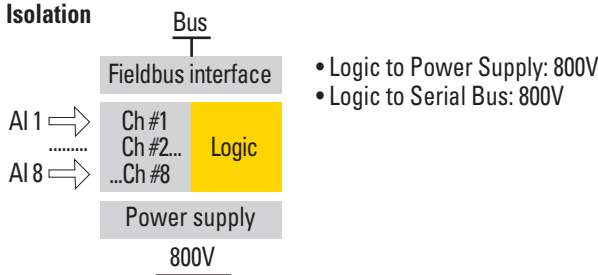
## Block diagram

The Device Profile supported is the CiA DS 401 (Generic I/O modules) for AI-08HL, and CiA DS 404 (Measuring Devices) for AI-08TC and AI-04RT.

## Diagram for each channel:



## Isolation



## Technical data

<b>Common Features</b>	
Resolution:	16bit
Accuracy class:	0.1%
Overvoltage protection	
<b>Conversion time</b>	
AI-08HL:	5ms
AI-08TC:	50ms
AI-04RT:	120ms
<b>TC input (AI-08TC and AI-04RT)</b>	
TC J	-200..+600 °C -328..+1112 °F
TC K	-200 ...+1370 °C -328..+2498 °F
TC L	-200..+600 °C -328..+1112 °F
TC T	-200..+400 °C -328..+752 °F
TC N	0..+1300 °C +32..+2372 °F
TC R	0..+1600 °C +32..+2912 °F
TC S	0..+1760 °C +32..+3200 °F
Cold junction compensation accuracy:	1°C/20°C
<b>RTD input (AI-04RT)</b>	
PT100 2 or 3 wires connection	-200..+600°C -328..+1112 °F
PT1000 2 wires connection	-200..+600°C -328..+1112 °F
<b>Current input (AI-08HL)</b>	
0 (4)..20mA	
Input impedance:	< 300Ω
<b>Voltage input</b>	
-50 .. +50mV	(AI-08TC and AI-04RT)
-300 ..+300mV	(AI-08TC and AI-04RT)
-1 ..+1V	(AI-04TC and AI-04RT)
0 ..+10V	(AI-08HL)
Input impedance:	> 100kΩ

## Functions

Signal conditioning, linearisation, scaling, engineering units, limits.

## sigmadue-I/O

AO-08HL

8-channel analogue output



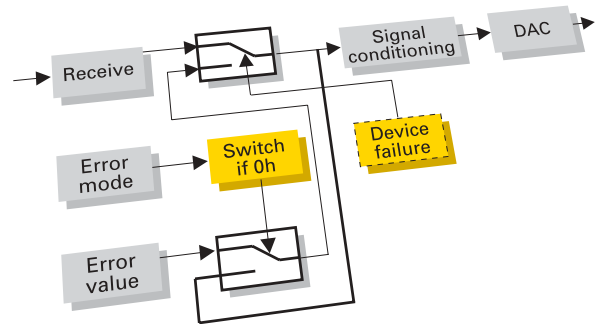
HIGH PERFORMANCES

The I/O AO-08HL is a 8 channel analogue output module for high level signals. Every channel can be selected as voltage or current output. Voltage output range is 0..10V. Current output range is 0/4..20mA.

## Block diagram

The Device Profile supported is the CiA DS 401 (Generic I/O modules).

## Diagram for each channel:



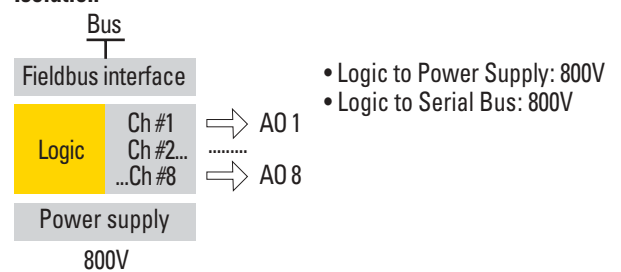
## Technical data

<b>Common features</b>	
Resolution:	16bit
Accuracy:	0.1%
Conversion time:	20ms
Output impedance:	
- V output	min 600Ω
- mA output	max 600Ω
<b>Protection</b>	
Overvoltage - Overload	
<b>Isolation</b>	
Logic to Power Supply:	800V
Logic to Serial Bus:	800V

## Functions

Ramp, triangle or saw-tooth output wave, 16 points output linearisation.

## Isolation



# sigmadue® I/O line DIGITAL I/O MODULES

## sigmadue-I/O

DI-16LV	16-channel Digital Input
DO-16TS	16-channel Digital Output
DO-16TP	16-channel 2A Digital Output
DM-08TS	8-channel Digital Input or Output
DM-16TS	16-channel 8 Digital Input + 8 Digital Output
DO-04RL	4-channel Relay Digital Output
DO-04RS	4-channel SSR Relay Digital Output



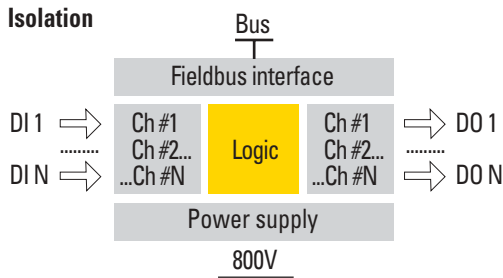
## sigmadue-I/O

DI-32LV	32-channel Digital Input
DO-32TS	32-channel Digital Output
DM-32TS	32-channel 16 Digital Input + 16 Digital Output



The broad line of sigmadue I/O Digital modules from 4 to 32 channels per module, mixed Input and Output and advanced functions can fit any application in an effective way for space, cost and communication efficiency.

### Isolation

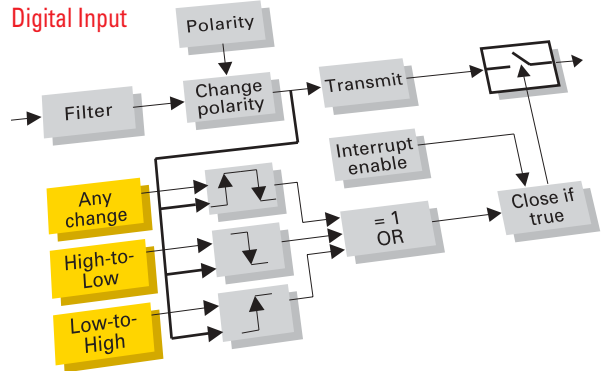


### Block diagram

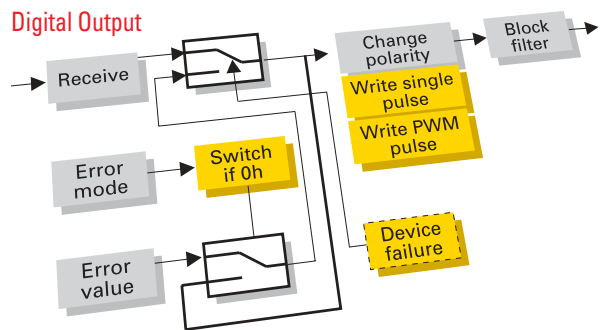
All modules support Device Profile CiA DS 401 (Generic I/O modules).

### Diagram for each channel:

#### Digital Input



#### Digital Output



### Technical data

#### Digital Input

Input type:	24V nominal (EN61131-2, type 2)
Signal voltage (0):	-3..+5V
Signal voltage (1):	11..+30V
Input impedance:	5kΩ

#### Digital Output

Rated voltage:	24V (10..30Vdc)
Rated current/channel:	0,5 A (DO-XX-TS, DM-XX-TS) 2A (DO-XX-TP)

#### Relay Output

Relay:	SPST, 2A/250Vac
SSR:	1A/250Vac

### Functions

Input	DM-08TS	DI-16LV	DI-32LV DM-16TS DM-32TS
	Read Input	✓	✓
Read Pulse Frequency <sup>1)</sup>	✓		
Read Pulse width	✓		
Pulse counting	✓		
Edge detect	✓	✓	✓
Latch input	✓	✓	✓
Read Input monostable	✓	✓	
Reset latch	✓	✓	✓
Output	DM-08TS	DO-16TS DO-04RL DO-04RS	DM-16TP DM-32TS DO-32TS
	Force Output	✓	✓
PWM Pulse generation <sup>2)</sup>	✓		
Single Pulse generation <sup>3)</sup>	✓	✓	

1) Frequency: 0..20kHz - 2) PWM: max period 65s, max frequency 4kHz - 3) Pulse: min 5ms, max 65s

# FIELDBUS INTERFACES AND ACCESSORIES

## Fieldbus Technology

The sigmadue I/O series can be integrated in the most common fieldbus networks:

### Native interfaces

**CAN-bus** Every module can be provided with built-in CAN-bus interface, with **CANopen** protocol according to CiA DS401 or DS404 profiles, and operating as a network slave node.

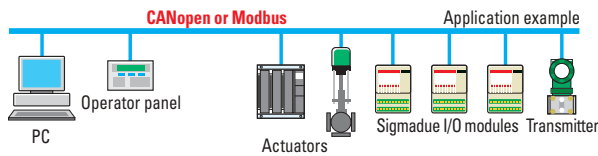
- CAN 2.0b controller with physical connection according to ISO 11898
- Galvanic isolation via high-speed opto-coupler
- Transmission data rate up to 1Mb/s

**DeviceNet** protocol has to come.

### RS485

Every module can be provided with built-in serial RS-485 interface with Modbus protocol, operating as a network slave node.

- Two wire RS485 serial
- Galvanic isolation
- Transmission data rate up to 9,6 kb/s.



## sigmadue-I/O Network adapter

NA-00PB	PROFIBUS DP slave
NA-00ET	Ethernet



### Profibus DP

Direct integration on PROFIBUS DP fieldbus networks is made via Network Adapter sigmadue I/O NA-00PB.

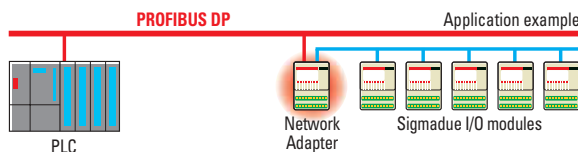
The NA operates as slave node on PROFIBUS DP side, extending data exchange to the sigmadue I/O modules.

- PROFIBUS DP slave SPC3 controller according to EN 50170
- Galvanic isolation via high-speed opto-coupler.
- Transmission data rate up to 12Mb/s with automatic baud rate detection.

### Ethernet

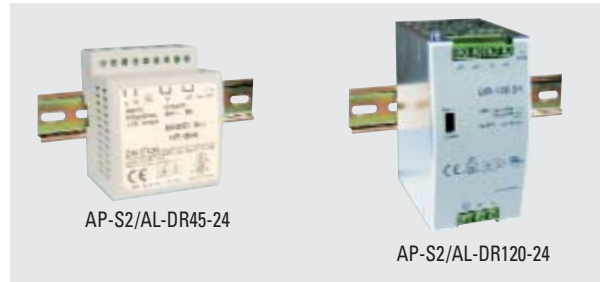
Sigmadue I/O NA-00ET provides Ethernet connection to the sigmadue I/O modules for accessing field I/O data via internet/intranet technology.

IEEE 802.3 10baseT.



## Accessories

### Power Supply Unit

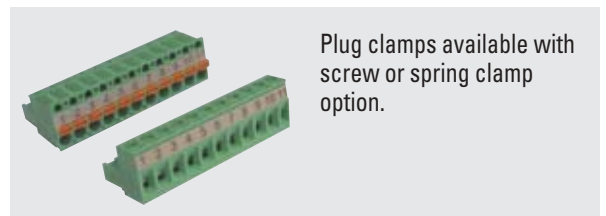


Input Voltage:	88..264 Vac
Output Voltage:	24V, ±1%
Output rated current:	2A (DR-45-24), 5A (DR-120-24)
Protection:	Over voltage, Overload, auto recovery
Temperature:	-10..+50 °C
Mounting:	DIN Rail
Dimensions:	97x78x67 mm (DR-45-24), 65x125x103 mm (DR-120-24)

### Cables and connectors



Additional Terminal Block  
2x11 poles.



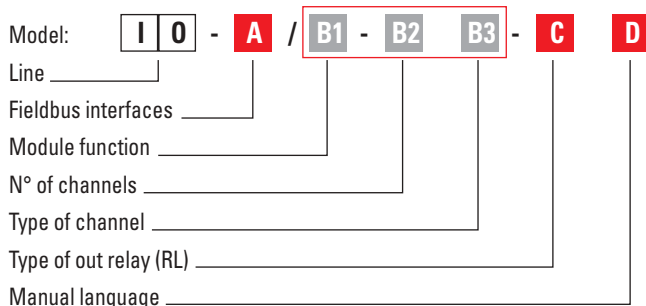
Plug clamps available with  
screw or spring clamp  
option.



RJ45 terminated cables  
are available with 14 cm  
or 22 cm standard lengths for  
easy daisy-chain connection  
of the I/O modules.

## Ordering codes

### I/O modules



Fieldbus interfaces	A	Type of channels	B3
CANopen	C B	High level V, mA	H L
Modbus	M B	RTD (Pt100)	R T
DeviceNet protocol has to come	D N	Analogue I/O	
		Thermocouple	T C
		Universal	U I
		Digital I/O	
		Low voltage 24V	L V
		Relay or SSR	R L
		Transistors 24Vdc, -0,5A	T S
		Transistors 24Vdc, -2A	T P

Module function	B1
Analogue input	A I
Analogue output	A O
Digital input	D I
Digital output	D O
Mix In/Out	D M

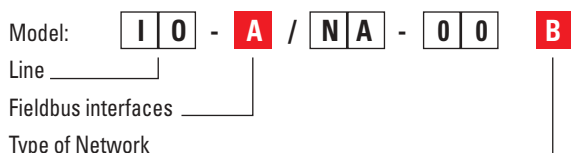
N° channels	B2	Type of output RL (only for relay modules)	C
2 channels	02	Modules other than RL	0
4 channels	04	SPST Relay 250V-2A	1
8 channels	08	SSR Relay 250V-1A	2
16 channels	16		
32 channels	32		

User manual	D
Italian/English (standard)	0
French/English	1
German/English	2
Spanish/English	3

Ordering example: mod. **IO - CB/AI - 02UI - 00**  
2-channel configurable CANopen Universal Analog Input

### Network adapter modules



Fieldbus interfaces	A	Type of Network	B
CANopen	C B	PROFIBUS DP	P B
Modbus	M B	Ethernet	E T
DeviceNet protocol has to come	D N		

Ordering example: mod. **IO - CB/NA - 00PB**  
PROFIBUS DP Network Adapter Module

B1 - B2 - B3  
available combinations

B1	B2	B3
AI	02	UI
AI	08	HL
AI	08	TC
AI	04	RD
AO	08	HL
DI	16	LV
DI	32	LV
DO	16	TS
DO	32	TS
DO	16	TP
DO	04	RL
DM	08	TS
DM	32	TS
DM	16	TP

### Accessories

#### Power supply

- 45W - 24 Vdc/2A power supply  
mod.: [AP-S2 / AL-DR45-24](#)

- 120W - 24 Vdc/5A power supply  
mod.: [AP-S2 / AL-DR120-24](#)

#### Cables and connectors

- Additional terminal block  
mod.: [AP-S2 / TB-211-1](#)

- Screw clamp plug 11 poles  
mod.: [AP-S2 / SPINA-V11](#)

- Spring clamp plug 11 poles  
mod.: [AP-S2 / SPINA-M11](#)

- Screw clamp plug 5 poles  
mod.: [AP-S2 / SPINA-V5](#)

- Spring clamp plug 5 poles  
mod.: [AP-S2 / SPINA-M5](#)

- RJ45 terminated 14 cm segment cable  
mod.: [AP-S2 / LOCAL-BUS76](#)

- RJ45 terminated 22 cm segment cable  
mod.: [AP-S2 / LOCAL-BUS152](#)

- Bus termination adapter  
mod.: [AP-S2 / TERM-CAN](#)