Twido programmable controller
Analogue I/O modules

Presentation

Twido analogue I/O expansion modules enable the acquisition of various analogue values encountered in industrial applications.

Analogue output modules are used to control the preactuators in devices such as variable speed drives, valves and applications that require process control. The output current or voltage is proportional to the numerical value defined by the user program. When the Twido controller stops, the outputs can be configured with fallback (reset to the lowest scale value or hold the last value received). This function, when set to 'hold', is useful when debugging the application or when a fault occurs, in order not to disturb the process being controlled.

The 8 following analogue I/O modules are available:

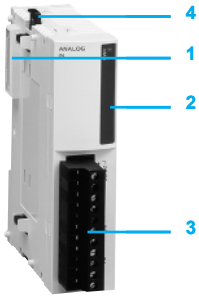
- One module with 2 inputs: 0…10 V, 4…20 mA.
- One module with 4 inputs: 0…10 V, 0…20 mA, Pt 100/1000, Ni100/1000 range 50...150 °C.
- One module with 8 inputs: 0…10 V, 0…20 mA.
- One module with 8 inputs: PTC/NTC.
- One module with 1 output: 0…10 V, 4…20 mA.
- One module with 2 outputs: ± 10 V.
- One mixed module with 2 inputs: 0…10 V, 4…20mA and 1 output: 0…10 V, 4…20mA.
- One mixed module with 2 thermocouple or temperature probe inputs and one 0…10 V, 4…20 mA output.

Twido analogue extension modules offer a resolution of 10 bits, 11 bits + sign and 12 bits, with connection by removable screw terminal block. An external ⎓ 24 V power supply is required for each analogue module.

Like discrete I/O modules, analogue I/O modules are connected to the base controller by stacking them on a ⎍ rail, starting from the right-hand side panel of the base controller, according to the following rules:
- For 24 I/O compact base controllers TWD LC●A 24DRF: 4 modules max. (see characteristics page 41001/4).
- For 40 I/O compact base controllers TWD LCA● 40DRF: 7 modules max. (see characteristics page 41001/4).
- For 20 I/O modular base controllers TWD LMDA 20D●K: 4 modules max. (see characteristics page 41002/5).
- For 40 I/O modular base controllers TWD LMDA 20DRT/40D●K: 7 modules max. (see characteristics page 41002/5).
- For interface modules Advantys OTB 1● DM9LP: 7 modules max. or 24 input channels and 24 output channels max.

All analogue I/O modules are electrically isolated with the use of a photocoupler between the internal electronic circuit and the input/output channels.

Description



Twido analogue I/O modules comprise:

1 An extension connector for electrical connection to the previous module *(1)*.
2 A block for displaying the channel and module diagnostics.
3 A removable screw terminal block for connection of the ⎓ 24 V external power supply, the sensors and the preactuators.
4 A latching mechanism for attachment to the previous module.

These modules are mounted on a symmetrical ⎍ rail. Fixing kit TWD XMT 5 (supplied in lots of 5) allows plate or panel mounting.

(1) A connector on the right-hand side panel ensures continuity of the electrical link with the next I/O module.

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General characteristics

Temperature		**°C**	Operation: 0…+ 55. Storage: - 25…+ 70.
Relative humidity			30 to 95 %, without condensation
Degree of protection			IP 20
Altitude		**m**	Operation: 0…2000. Storage: 0…3000.
Vibration resistance	Rail mounted	**Hz**	10…57, amplitude 0.075 mm, acceleration 57…150 Hz
		m/s²	9.8 (1 gn)
	Plate or panel mounted (using fixing kit TWD XMT 5)	**Hz**	2…25, amplitude 1.6 mm, acceleration 25…100 Hz
		m/s²	39.2 (4 gn)
Shock resistance		**m/s²**	147 (15 gn) for 11 ms

Analogue input characteristics

Module type			**TWD AMI 2HT/AMM 3HT**		**TWD ALM 3LT**	
Number of channels			2 high-level inputs		2 low-level inputs	
Range			Voltage 0…10 V	Current 4…20 mA	Thermocouple Type K (0…1300° C) Type J (0…1200° C) Type T (0…400° C) No isolation between the input channels	Temperature probe Pt probe, 3-wire type (- 100…500° C) No isolation between the input channels
Type			Non differential	Differential		
Resolution			12 bits or 11 bits + sign (4096 points)			
LSB value			2.5 mV	4 µA	0.325° C (type K) 0.3° C (type J) 0.1° C (type T)	0.15° C
Connection			Removable screw terminal block			
Permissible continuous overload			⎓ 13 V	40 mA	–	
External supply		**V**	Rated voltage: ⎓ 24. Voltage range: ⎓ 20.4…28.8			
Input impedance			1 MΩ min	10 Ω	250 Ω max	5 Ω max
Maximum sampling duration		**ms**	16		50	
Sampling repetition time		**ms**	16		50	
Acquisition period		**ms**	32 + 1 controller cycle time		100 + 1 controller cycle time	
Measuring precision	Maximum error at 25° C	**% PE**	± 0.2		0.2 + precision of cold junction compensation (± 4° C max)	± 0.2
	Temperature coefficient	**% PE/°C**	± 0.006			
	Repeat accuracy after stabilisation time	**% PE**	± 0.5			
	Non linearity	**% PE**	± 0.2			
	Total error	**% PE**	± 1			
Common mode rejection			- 50 dB			
Cross talk			2 low significance bits max.			
Cabling			Twisted shielded pair recommended		–	
Dielectric strength		**V rms**	∿ 500 between the input and the supply circuit			
Type of protection			Photocoupler between the input and the internal circuit			
Consumption	Internal supply ⎓ 5 V	**mA**	50			
	External supply ⎓ 24 V	**mA**	60			

Analogue input characteristics (continued)

Module type			TWD AMI 4LT			TWD ARI 8HT	TWD AMI 8HT	
Number of channels			4 inputs			8 inputs	8 inputs	
Range			Temperature	Current	Voltage	Temperature	Current	Voltage
			PT100, PT1000, Ni100, Ni1000	0…20 mA	0…10 V	NTC, PTC, 100 Ω<R<10 kΩ	0…20 mA	0…10 V
Type			Differential	Non differential		Differential	Non differential	
Resolution			12 bits			10 bits		
LSB value			–	9 mV	20 µA	–	2,5 mA	4 µA
Connection			Removable screw terminal block					
Permissible continuous overload			–	13 V	40 mA	–	40 mA	13 V
External supply		**V**	Rated voltage: ⎓ 24. Voltage range: ⎓ 20.4…28.8					
Input impedance			>1 MΩ	470 Ω	1 MΩ	>1 MΩ	470 Ω	1 MΩ
Maximum sampling duration		**ms**	160					
Sampling repetition time		**ms**	4			8		
Acquisition period		**ms**	640 + 1 controller cycle time			1280 + 1 controller cycle time		
Measuring precision	Maximum error at 25° C	**% PE**	0.5			1		
Consumption	Internal supply ⎓ 5 V	**mA**	50			50		
	External supply ⎓ 24 V	**mA**	60			50		
Applicable load			–					
Dielectric strength			2500 V between the inputs and the internal circuit					

Analogue output characteristics

Module type			TWD AMO 1HT	AMM 3HT/ALM 3LT	TWD AVO 2HT
Number of channels			1 output		2 outputs
Range			Voltage	Current	Voltage
			0…10 V	4…20 mA	±10 V
Resolution			12 bits (4096 points)	12 bits or 11 bits + sign (4096 points)	11 bits + sign (2048 points)
LSB value			2.5 mV	4 µA	± 4.8 mV
Load impedance		Ω	2000 min	300 max	3000 min
Applicable load			Resistive		
Stabilisation time		**ms**	20		0.3
Total output system transfer time		**ms**	20 + 1 controller cycle time		0.3 + 1 controller cycle time
External supply		**V**	Rated voltage: ⎓ 24. Voltage range: ⎓ 20.4…28.8		
Measuring precision	Maximum error at 25° C	**% PE**	± 0.2		
	Temperature coefficient	**% PE/°C**	± 0.015		
	Repeat accuracy after stabilisation time	**% PE**	± 0.5		
	Output error	**% PE**	± 1		
	Non linearity	**% PE**	± 0.2		
	Output ripple		1 low significance bit max.		
	Total error	**% PE**	± 1		
Cabling			Twisted shielded pair recommended		
Dielectric strength		**V rms**	∿ 500 between the input and the supply circuit		
Consumption (for **TWD AMO 1HT**)	Internal supply ⎓ 5 V	**mA**	50		50
	External supply ⎓ 24 V	**mA**	40		60
Applicable load			–		Resistive
Dielectric strength			–		2500 V between the outputs and the internal circuit

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References

TWD AMI 2HT

TWD ALM 3LT

These analogue I/O expansion modules are mounted on symmetrical ⎓ rails to the right of the Twido base controller. The sensors/preactuators are connected to a removable screw terminal block (supplied with each module). The maximum number of I/O and/or analogue modules which may be mounted depends on the type of base controller:

Type of TWD controller	LC●A 10DRF	LC●A 16DRF	LC●A 24DRF	LCA● 40DRF	LMDA 20D●K	LMDA 20DRT	LMDA 40D●K
Number of modules	0	0	4	7	4	7	7

Analogue input modules

Channel type	Input range	Output range	Resolution	Reference	Weight kg
2 inputs	0…10 V 4…20 mA	–	12 bits or 11 bits + sign	**TWD AMI 2HT**	0.085
4 inputs	0…10 V 0…20 mA Temperature	–	12 bits	**TWD AMI 4LT**	0.085
8 inputs	0…10 V 0…20 mA	–	10 bits	**TWD AMI 8HT**	0.085
8 inputs	PTC/NTC	–	10 bits	**TWD ARI 8HT**	0.085

Analogue output modules

1 output	–	0…10 V 4…20 mA	12 bits	**TWD AMO 1HT**	0.085
2 outputs	–	± 10 V	11 bits + sign	**TWD AVO 2HT**	0.085

Analogue I/O modules

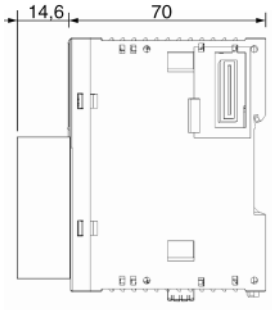
2 inputs and 1 output	0…10 V 4…20 mA	0…10 V 4…20 mA	12 bits or 11 bits + sign	**TWD AMM 3HT**	0.085
	Thermocouple K, J, T Temperature probe 3-wire Pt 100 No isolation between the input channels	0…10 V 4…20 mA	12 bits or 11 bits+ sign	**TWD ALM 3LT**	0.085

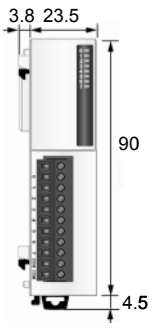
Separate components

Application	Description	Reference	Weight kg
Fixing kit	For plate or panel mounting of the analogue modules. Sold in lots of 5	**TWD XMT 5**	–
Telefast pre-wired system for Twido	Connection sub-bases I/O connection sub-bases Pre-wired solutions Cables and accessories	See page 14073/3	–

Dimensions

Analogue I/O modules





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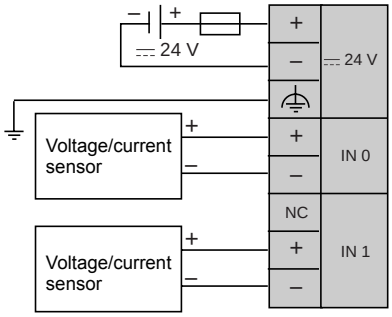
Analogue input modules

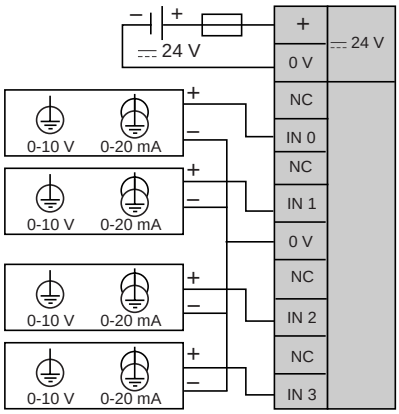
TWD AMI 2HT



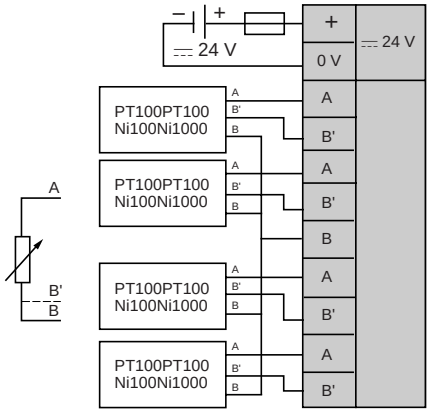
- Fit a fuse of appropriate size for the sensor type.
- Do not connect any wires to the unused channel.

TWD AMI 4LT

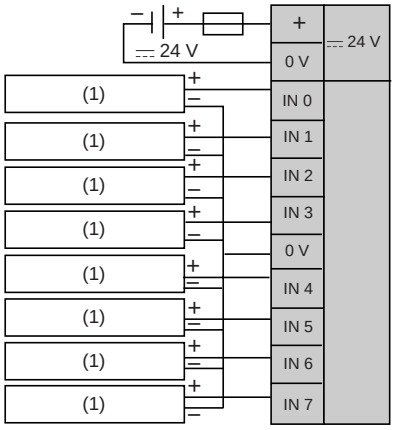
Voltage/Current configuration



PT100/PT1000 temperature probe, Ni100/Ni1000 configuration



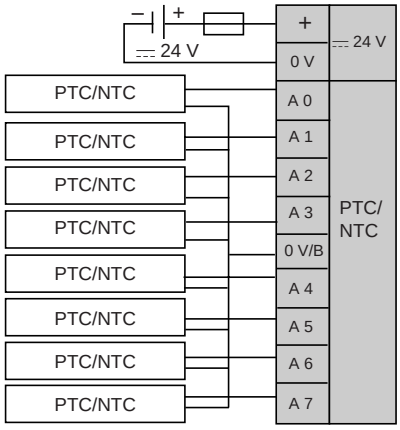
TWD AMI 8HT



(1) Analogue current/voltage output peripheral.

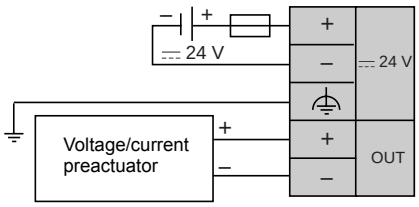
- Fit a fuse of appropriate size for the sensor type.
- Do not connect any wires to the unused channel.

TWD ARI 8HT

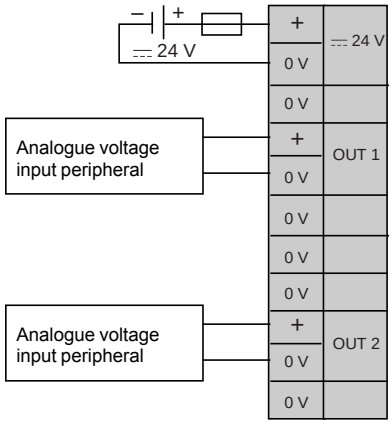


Analogue output modules

TWD AMO 1HT



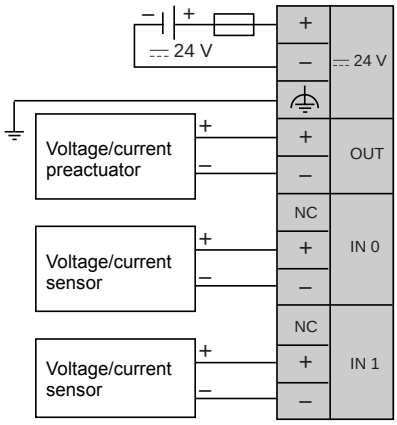
TWD AVO 2HT



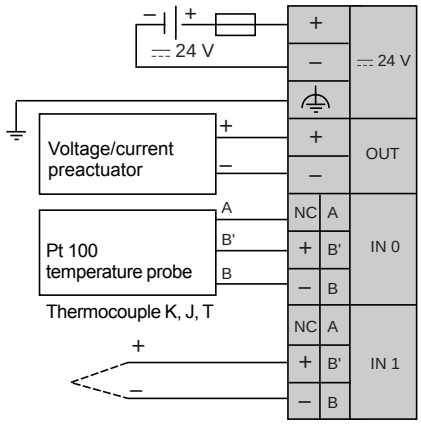
- Fit a fuse of appropriate size for the sensor type.
- Do not connect any wires to the unused channel.

Mixed input/output module

TWD AMM 3HT



TWD ALM 3LT



- Fit a fuse of appropriate size for the sensor and preactuator types.
- For a Pt 100 3-wire temperature probe (RTD), connect the three wires to terminals A, B' and B (channels IN0 and IN1).
- For a Pt 100 2-wire temperature probe (RTD), connect the two wires to terminals A and B' and make a bridge between B' and B (channels IN0 and IN1).
- For a thermocouple, connect the two wires to the + and - terminals (channels IN0 and/or IN1).
- Do not connect any wires to unused channels.