12.4 AT324

12.4.1 General Information

The screw-in module AT324 is equipped with four input channels. It is used to evaluate measured values for PT100, PT1000, KTY10-6 and KTY84-130 temperature sensors.
The module is installed on the adapter module or on the CP interface.

12.4.2 Technical Data

Module ID	AT324
General Information	
Model Number	7AT324.70
Short Description	2003 Analog Input Module, 4 temperature inputs (2-line connection), KTY10 -50 to +150 degrees C, KTY84 -40 to +300 degrees C, PT100 -200 to +850 degrees C, PT1000 -200 to +850 degrees C, screw-in module, Order terminal block TB712 separately!
C-UL-US Listed	in preparation
B&R ID Code	$3E
Slot	AF101 adapter module, CP interface
Static Characteristics	
Module Type	B&R 2003 screw-in module
Input Type	Resistance measurement using 2-line procedure with constant current feed
Number of Inputs	4
Sensor KTY10-6 KTY84-130 PT100 PT1000	 -50 °C to +150 °C -40 °C to +300 °C -200 °C to +850 °C -200 °C to +850 °C
Wiring	2-line
Conversion Method	Sigma Delta
Digital Converter Resolution	16 Bit

Module ID	AT324
Input Amplification G = 1 G = 2	Can be set for each channel using software KTY10-6, KTY84-130, PT1000 PT100
Reference	5 kΩ ±0.1 %
Measurement Current	200 µA ±5.22 %
Resistance Measurement Range at G = 1 at G = 2	 1 to 4995 Ω 1 to 2497.5 Ω
Conversion Time per Channel Input Amplification Uniform Different	 60 ms 190 ms
Resolution in °C KTY10-6 KTY84-130 PT100 PT1000	 1 LSB = 0.01 °C 1 LSB = 0.03 °C 1 LSB = 0.15 °C 1 LSB = 0.03 °C
Resolution in Ω at G = 1 at G = 2	 1 LSB = 76.29395 mΩ ±0.1 % 1 LSB = 38.14697 mΩ ±0.1 %
Data Format	INT16
Standardization KTY10-6 KTY84-130 PT100 PT1000	Can be set per channel -50.00 °C to +150.00 °C -40.00 °C to +300.00 °C -200.0 °C to +850.0 °C -200.0 °C to +850.0 °C
Value range for resistance measurement at G = 1 at G = 2	Can be set per channel 0.1 Ω to 5000.0 Ω 0.05 Ω to 5000.0 Ω
Measurement Range Monitoring Open Inputs Broken Line Range Exceeded (neg.) [1] Range Exceeded (pos.) General Error	 $7FFF $7FFF $8001 $7FFF $8000
Maximum Error at 25 °C	±0.1 % [2]
Offset Drift	±2.5 mΩ / °C [2]
Gain Drift	±30 ppm / °C [3]
Maximum Error over Entire Temperature Range	±0.2 % [2]
Repeat Precision	±0.01 % [2]
Common Mode Rejection DC 50 Hz	 >90 dB >150 dB
Cross-talk between Channels	Typ. 100 dB
Power Consumption	Max. 0.1 W
Dynamic Characteristics	
Input Filter Type Cut-off Frequency	 Lowpass 1st Order 150 Hz

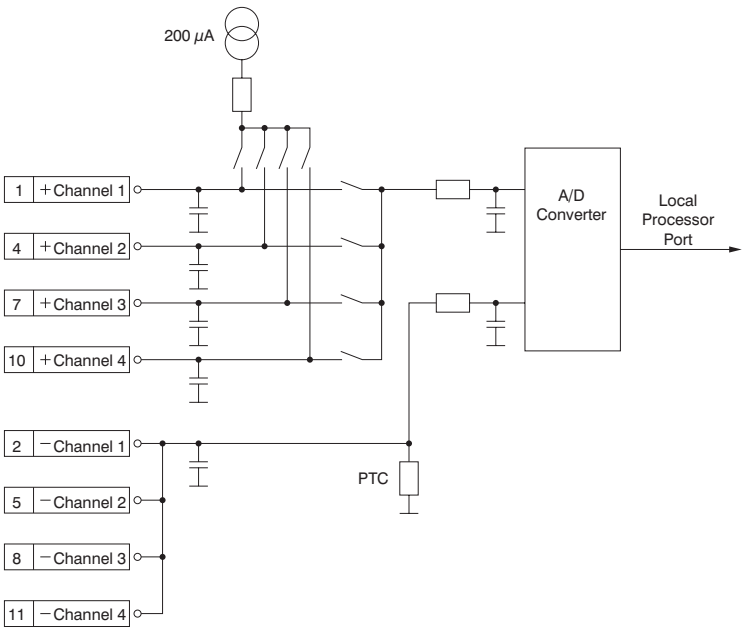
Module ID	AT324
Operating Characteristics	
Electrical Isolation Input - PCC Input - Input	 No No
Mechanical Characteristics	
Dimensions	B&R 2003 screw-in module

[1] Only when measuring with a temperature sensor.

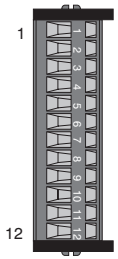
[2] Referring the measurement range.

[3] Referring the current measurement value.

12.4.3 Input Circuit Diagram



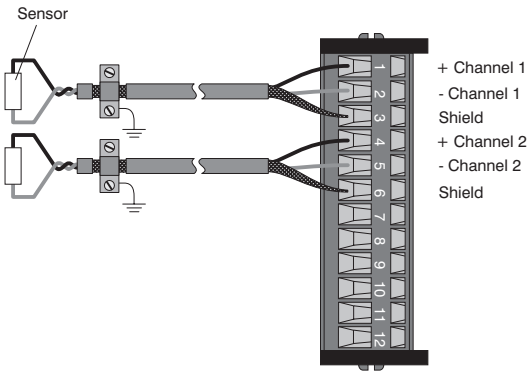
12.4.4 Connections



TB712

Assignment	
1	+ channel 1
2	- channel 1
3	Shield
4	+ channel 2
5	- channel 2
6	Shield
7	+ channel 3
8	- channel 3
9	Shield
10	+ channel 4
11	- channel 4
12	Shield

12.4.5 Connection Example



12.4.6 Variable Declaration

The variable declaration is valid for the following controllers:

- 2003 PCC CPU
- Remote I/O Bus Controller
- CAN Bus Controller

The variable declaration is made in PG2000. The variable declaration is described in Chapter 4, "Module Addressing".

Automation Studio™ Support: See Automation Studio™ Help starting with V 1.40

Accessing screw-in modules is also explained in the sections "AF101" and "CPU".

Data access takes place using data and configuration words. The following table provides an overview of which data and configuration words are used for this module.

Data Access	VD Data Type	VD Module Type	VD Chan.	R	W	Description
Data word 0	INT16	Analog In	1	●		Analog input value channel 1
Data word 1	INT16	Analog In	2	●		Analog input value channel 2
Data word 2	INT16	Analog In	3	●		Analog input value channel 3
Data word 3	INT16	Analog In	4	●		Analog input value channel 4
Configuration word 12	WORD	Transp. In	24	●		Module status
Configuration word 14	WORD	Transp. In	28	●		Module type
	WORD	Transp. Out	28		●	Module configuration

12.4.7 Access using CAN Identifiers

Access via CAN Identifiers is used if the slave is being controlled by a device from another manufacturer. Access via CAN Identifiers is described in an example in Chapter 4, "Module Addressing".
The transfer modes are explained in Chapter 5, "CAN Bus Controller Functions".

Data cannot be packed on the AT324. Therefore one CAN object is transferred per screw-in module. If an adapter module AF101 is equipped with a four AT324 modules, the CAN object has the following structure:

Slot	CAN ID [1]	Word 1		Word 2		Word 3		Word 4	
1	542	Chan. 1L	Chan. 1H	Chan. 2L	Chan. 2H	Chan. 3L	Chan. 3H	Chan. 4L	Chan. 4H
2	543	Chan. 1L	Chan. 1H	Chan. 2L	Chan. 2H	Chan. 3L	Chan. 3H	Chan. 4L	Chan. 4H
3	544	Chan. 1L	Chan. 1H	Chan. 2L	Chan. 2H	Chan. 3L	Chan. 3H	Chan. 4L	Chan. 4H
4	545	Chan. 1L	Chan. 1H	Chan. 2L	Chan. 2H	Chan. 3L	Chan. 3H	Chan. 4L	Chan. 4H

[1] CAN ID = 542 + (nd - 1) x 16 + (ma - 1) x 4 + (sl - 1)

nd ..... Node number of the CAN slave = 1

ma .... Module address of the AF101 = 1

sl ..... Slot number of the screw-in module on the AF101 (1 - 4)

B&R 2000 users have to exchange the data so that the high data is first (Motorola format)!

For more information on ID allocation, see Chapter 5, "CAN Bus Controller Functions".

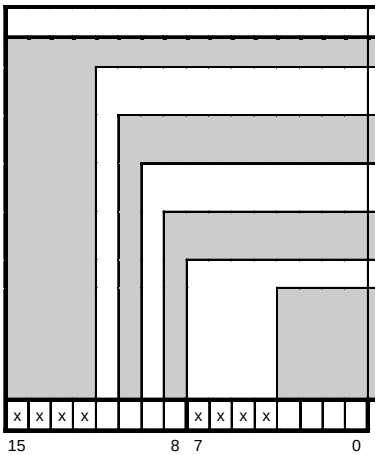
12.4.8 Description of Data and Configuration Words

Data word 0, 1, 2, 3 (read)

16 bit standardized values for temperature or resistance.

Configuration word 12 (read)

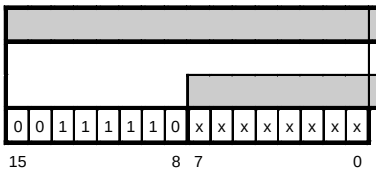
Configuration word 12 contains the module status.



Bit	Description
12 - 15	x .... Not defined, masked out
11	0 .... Converter value 1 ready 1 .... Converter value 1 not yet ready
10	0 .... Converter value 2 ready 1 .... Converter value 2 not yet ready
9	0 .... Converter value 3 ready 1 .... Converter value 3 not yet ready
8	0 .... Converter value 4 ready 1 .... Converter value 4 not yet ready
4 - 7	x .... Not defined, masked out
0 - 3	Channel currently being converted 1 .... Channel 1 2 .... Channel 2 3 .... Channel 3 4 .... Channel 4

Configuration word 14 (read)

The High Byte of configuration word 14 defines the module code.



Bit	Description
8 - 15	Module code = $3E
0 - 7	x .... Not defined, masked out

Configuration Word 14 (write)

The module is configured using configuration word 14.

Bit	Description
14 - 15	0
12 - 13	Select the hardware filter time 0 .... 50 Hz (default) 1 .... 60 Hz
9 - 11	Definition of the input signal for channel 4 0 .... KTY10-6 1 .... KTY84-130 2 .... PT100 3 .... PT1000 4 .... Reserved (value = $8000) 5 .... Resistance measurement 1 to 4995 Ω 6 .... Resistance measurement 1 to 2497.5 Ω 7 .... Input switched off – setting for channels not being used (value = $8000)
6 - 8	Definition of the input signal for channel 3 0 .... KTY10-6 1 .... KTY84-130 2 .... PT100 3 .... PT1000 4 .... Reserved (value = $8000) 5 .... Resistance measurement 1 to 4995 Ω 6 .... Resistance measurement 1 to 2497.5 Ω 7 .... Input switched off – setting for channels not being used (value = $8000)
3 - 5	Definition of the input signal for channel 2 0 .... KTY10-6 1 .... KTY84-130 2 .... PT100 3 .... PT1000 4 .... Reserved (value = $8000) 5 .... Resistance measurement 1 to 4995 Ω 6 .... Resistance measurement 1 to 2497.5 Ω 7 .... Input switched off – setting for channels not being used (value = $8000)
0 - 2	Definition of the input signal for channel 1 0 .... KTY10-6 1 .... KTY84-130 2 .... PT100 3 .... PT1000 4 .... Reserved (value = $8000) 5 .... Resistance measurement 1 to 4995 Ω 6 .... Resistance measurement 1 to 2497.5 Ω 7 .... Input switched off – setting for channels not being used (value = $8000)