

9.5 AT300

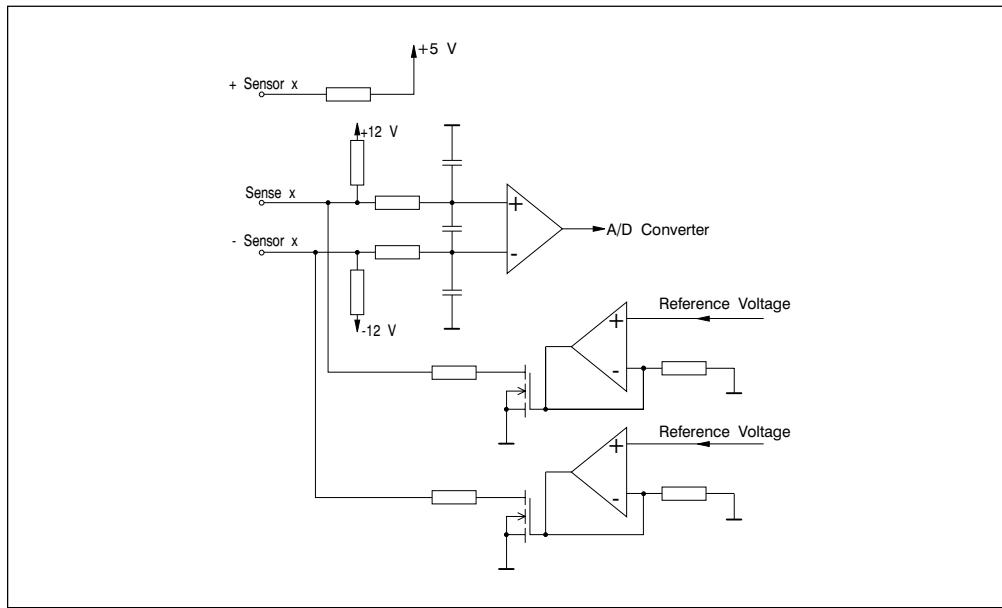
9.5.1 Technical Data



Module ID	AT300
Model Number	2AT300.6
Description	2010 Analog Input Module, 8 inputs, PT100 (3-wire connection), -50 to +450 degrees C, Order terminal blocks separately!
C-UL-US Listed	Yes
B&R ID Code	\$0A
Base Plate Module	BP200, BP201, BP210
Number of Inputs Total in 2 Groups of	8 inputs for resistance measurement 4
Electrical Isolation Input - PCC Group - Group Input - Input	Yes Yes No
Sensor Type Connection Standard	PT100 3-wire connection IEC/EN 60751
Measurement Range	-50 to +450 °C
Resolution	Internal 20000 steps
Measurement Procedure	Integrated converter
Measurement Time per Channel	33 msec
Conversion Time for all Channels	160 msec

Module ID	AT300
Input Filter	Bessel low pass 2nd order / cutoff frequency: 8 Hz
Precision Basic Precision at 25 °C Precision (0 to 60 °C)	±0.1 % ±0.2 %
Linearization	Automatic in the module
Measurement Current	2 mA (±0.2 %)
Power Consumption	Max. 9 W
Dimensions (H, W, D) [mm]	285, 40, 185

9.5.2 Input Circuit



9.5.3 Status LEDs

- C— Indicates the status of the terminal block, i.e. if this LED is lit there is either no terminal block connected or the terminal block is improperly connected .
- RUN** Indicates that the analog / digital converter is running and the module is accessed through the I/O bus.

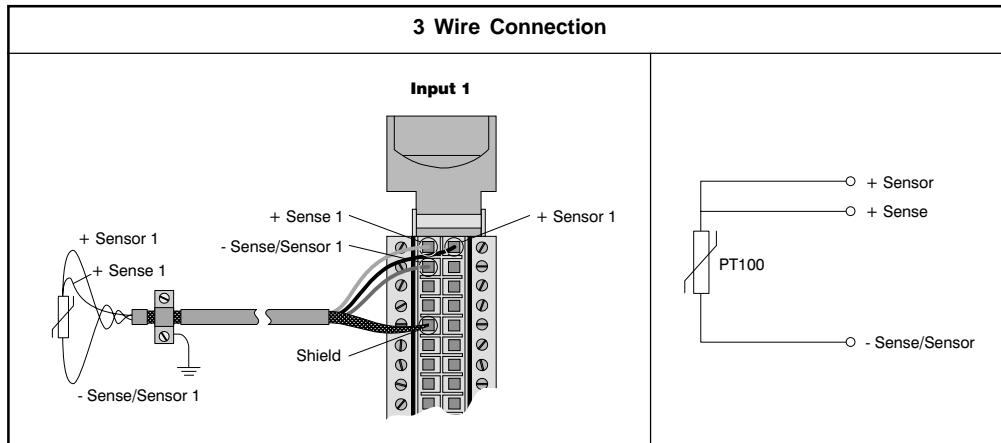


9.5.4 Terminal Assignments

	Terminal	Description		Terminal	Description	
1	1	+ Sense 1	Group 1	21	+ Sensor 1	Group 1
2	2	- Sense/Sensor 1		22	----	
3	3	+ Sense 2		23	+ Sensor 2	
4	4	- Sense/Sensor 2		24	----	
5	5	Shield		25	Shield	
6	6	+ Sense 3		26	+ Sensor 3	
7	7	- Sense/Sensor 3		27	----	
8	8	+ Sense 4		28	+ Sensor 4	
9	9	- Sense/Sensor 4		29	----	
10	10	Shield		30	Shield	
11	11	+ Sense 5	Group 2	31	+ Sensor 5	Group 2
12	12	- Sense/Sensor 5		32	----	
13	13	+ Sense 6		33	+ Sensor 6	
14	14	- Sense/Sensor 6		34	----	
15	15	Shield		35	Shield	
16	16	+ Sense 7		36	+ Sensor 7	
17	17	- Sense/Sensor 7		37	----	
18	18	+ Sense 8		38	+ Sensor 8	
19	19	- Sense/Sensor 8		39	----	
20	20	Shield		40	Shield	

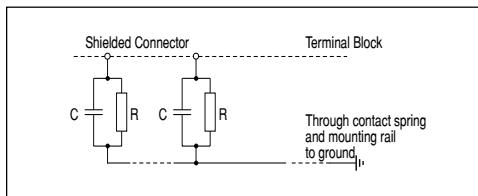
Connecting the Signal Cable

All wiring for the temperature sensor must be carried out with shielded cable. The shielding is wired to shield connectors on the terminal block.



All shield connections are of equal value and are connected to ground ($\frac{1}{2}$, i.e.: contact spring and mounting rail) over an RC circuit.

R: 22 kΩ
C: 10 nF / 60 V



For a three line connection, only sensors for which the connection lines are of equal value are to be used, i.e. same length, same cross section, same material and therefore the same resistance.

The maximum total resistance between the + and - sensor connections may not exceed 600 Ω , otherwise the overload on the internal current source will lead to measurement errors.

Sensors or sense lines must not be grounded or connected with other connection lines for other sensors.

9.5.5 Variable Declaration

Function	Variable Declaration				
	Scope	Data Type	Length	Module Type	Channel
Single Analog Input in 0.1 °C data format (channel x)	tc_global	INT16	1	AnalogIn	1 ... 8
Single Analog Input in 0.01°C data format (channel x)	tc_global	INT16	1	AnalogIn	17 ... 24
Read Status Register	tc_global	BYTE	1	StatusIn	0
Read Over Range of Measurement Register	tc_global	BYTE	1	StatusIn	2
Read Under Range of Measurement Register	tc_global	BYTE	1	StatusIn	4
Read Broken Contact Register	tc_global	BYTE	1	StatusIn	21



Several registers which are reserved for service purposes can be found in the status area of the AT300 modules. It is recommended, in the interest of the user, that only those registers described are used in the application program !

Status Register

REGISTER	READ	Bit	Description	
			Value	Description
		7	DV1	- Measurement value validity
		6	DV2	
		5	OVR	- Measurement over-range
		4	UNR	- Measurement under-range
		3	MOD_1	- Module identification
		2	MOD_2	
		1		
		0	FKL	- Terminal block status

Bit mask diagram:

DVx Measurement value validity:

DV1	DV2	Note
0	0	Internal error. Contact your technical advisor at B&R.
0	1	Internal error. Contact your technical advisor at B&R.
1	0	Internal error. Contact your technical advisor at B&R.
1	1	All temperature values are valid.

UNR 0 No Measurement Under-Range. The temperature values of all inputs are over the allowable lower limit (-50 °C).

1 Measurement Under-Range. The temperature value of at least one input is under (-50 °C).

MOD_x Module identification:

MOD_1	MOD_2	Note
0	0	Internal error. Contact your technical advisor at B&R.
0	1	Module: AT300 (RTD sensor, 3 line)
1	0	Module: AT400 (RTD sensor, 4 line)
1	1	Internal error. Contact your technical advisor at B&R.

OVR 0 No Measurement Over-Range. The temperature values of all inputs are under the allowable upper limit (+450°C).

1 Measurement Over-Range. The temperature value of at least one input has exceeded (+450 °C).

FKL 0 Terminal block is connected properly.
 1 No terminal block connected.

Measurement Over-Range-Register (Measurement Over-Range: Temperature value > +450 °C)

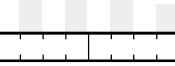
REGISTER	READ	Bit	Description	0	1
		7	Input 8: Measurement Over-Range	NO	YES ¹⁾
		6	Input 7: Measurement Over-Range	NO	YES ¹⁾
		5	Input 6: Measurement Over-Range	NO	YES ¹⁾
		4	Input 5: Measurement Over-Range	NO	YES ¹⁾
		3	Input 4: Measurement Over-Range	NO	YES ¹⁾
		2	Input 3: Measurement Over-Range	NO	YES ¹⁾
		1	Input 2: Measurement Over-Range	NO	YES ¹⁾
		0	Input 1: Measurement Over-Range	NO	YES ¹⁾



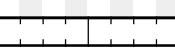
¹⁾ If the respective input is open, the bit is also set to log. 1.

Measurement Under-Range-Register (Measurement Under-Range: Temperature value < -50 °C)

REGISTER	READ	Bit	Description	0	1
		7	Input 8: Measurement Under-Range	NO	YES
		6	Input 7: Measurement Under-Range	NO	YES
		5	Input 6: Measurement Under-Range	NO	YES
		4	Input 5: Measurement Under-Range	NO	YES
		3	Input 4: Measurement Under-Range	NO	YES
		2	Input 3: Measurement Under-Range	NO	YES
		1	Input 2: Measurement Under-Range	NO	YES
		0	Input 1: Measurement Under-Range	NO	YES


Broken Contact-Register

REGISTER	READ	Bit	Description	0	1
		7	Input 8: Broken Contact or Open Input	NO	YES
		6	Input 7: Broken Contact or Open Input	NO	YES
		5	Input 6: Broken Contact or Open Input	NO	YES
		4	Input 5: Broken Contact or Open Input	NO	YES
		3	Input 4: Broken Contact or Open Input	NO	YES
		2	Input 3: Broken Contact or Open Input	NO	YES
		1	Input 2: Broken Contact or Open Input	NO	YES
		0	Input 1: Broken Contact or Open Input	NO	YES



9.5.6 Relationship between Temperature and Converter Value

Data Format 0.1 °C

Temperature	Converter Value	
	Hexadecimal	Decimal
< -50.0 °C	FE0C	-500
-50.0 °C	FE0C	-500
:	:	:
-0.1 °C	FFFF	-1
0.0 °C	0000	0
0.1 °C	0001	1
:	:	:
450.0 °C	1194	4500
> 450.0 °C	1194	4500



Value in the range between (-50 to 450 °C) correspond with the precision, which is indicated in the technical data!



Values outside of the range between (-50 to 450 °C) give a value of (-50 °C) for under ranged measurements and (450 °C) for over ranged measurements.

Data Format 0.01 °C

Temperature	Converter value	
	Hexadecimal	Decimal
< -50.00 °C	EC79	-4999
-50.00 °C	EC79	-4999
-49.99 °C	EC79	-4999
-49.98 °C	EC7A	-4998
:	:	:
-0.10 °C	FFFF	-1
0.00 °C	0000	0
0.10 °C	0001	1
:	:	:
327.67 °C	7FFF	32767
> 327.67 °C	7FFF	32767

With this data format, the measurement range remains (-50 °C to 450 °C). Because of the data format however, the output range is limited and values between 327.67 to +450 °C are no longer displayed. These are seen as value 32767 (7FFF).

For temperatures (\leq -50 °C) the module internal calculation outputs a value of -4999 (EC79).



Values within the range from (-50 to 327.67 °C) correspond with the precision, which is indicated in the technical data!



Values outside of the range from (-50 to 327.67 °C) are output as (-49.99 °C) for under-range and as (327.67 °C) for over-range.