

10.6 AI351

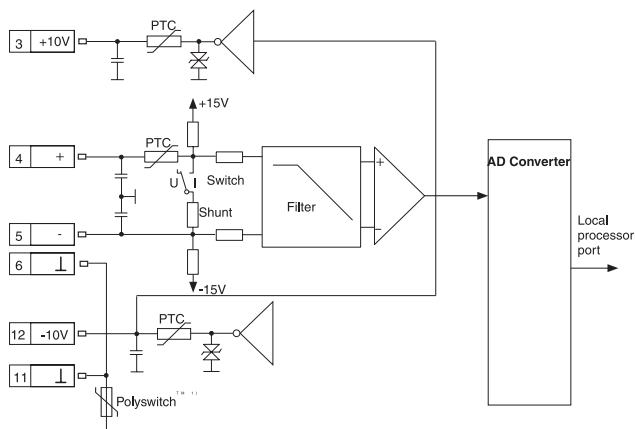
10.6.1 Technical Data



Module ID	AI351		
General Information			
Model Number	7AI351.70		
Short Description	2003 Analog Input Module, 1 input, +/- 10 V or 0 to 20 mA, 12 Bit + sign, screw-in module, Order TB712 terminal block separately!		
C-UL-US Listed	Yes		
B&R ID Code			
Voltage	\$02		
Potentiometer Operation	\$02		
Current	\$03		
Slot	AF101 adapter module, CP interface		
Static Characteristics			
Module Type	B&R 2003 screw-in module		
Number of Inputs	1 differential input		
Input Signal	Set using switch		
Current	0 - 20 mA (also ±20 mA)		
Voltage	±10 V		
Potentiometer Voltage	±9.94 V at max. 10 mA		
Digital Converter Resolution	12 Bit + sign		
Differential Input Resistance			
Voltage	20 MΩ		
Current (load)	130-200Ω		
Measurement Precision at 25 °C			
Offset	Voltage	Current	
Gain	Max. ±2.5 mV	Max. ±5 μA	
Linearity Error	Max. 0.1 % of final value		
Potentiometer Feed	Max. 0.05 % of final value		
	±9.94 V + 2.3 % / -1.7 % max.		
Temperature Drift			
±10 V Input	±0.014 %/°C ±125 μV/°C		
0 - 20 mA Input	±0.012 %/°C ±0.4 μA/°C		
Potentiometer Feed	±0.01 %/°C		

Module ID	AI351
Power Consumption Current/Voltage Measurement Potentiometer Operation	Max. 0.3 W Max. 0.7 W
Dynamic Characteristics	
Input Filter Cut-off Frequency Attenuation	1 kHz 60 dB
Operating Characteristics	
Electrical Isolation Input - PCC	No
Mechanical Characteristics	
Dimensions	B&R 2003 screw-in module

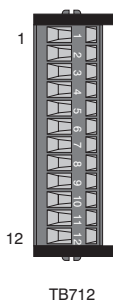
10.6.2 Input Circuit Diagram



¹⁾ Polyswitch™ is a registered trademark of RAYCHEM.

This is a polymer PTC protective element that functions as overload and short circuit protection. If an overload or short circuit occurs, the protective element becomes highly resistive and breaks the flow of current. In order to activate the input again, the external supply must be turned off and the error (overload or short circuit) must be removed. After a reset time > 10 seconds, the protective element returns to the conductive state.

10.6.3 Connections



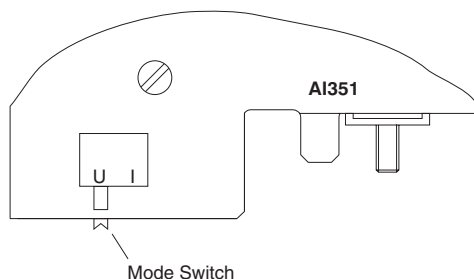
Pin	Assignment
1	+10 V potentiometer supply
2	+ differential input
3	- differential input
4	GND
5	GND
6	-10 V potentiometer supply
7	Shield
8	n. c.
9	n. c.
10	n. c.
11	n. c.
12	n. c.

10.6.4 Connection Examples

The analog input module AI351 can be used for voltage and current measurement and also for potentiometer operation. The following connection diagram shows how the module is to be wired.

Voltage and Current Measurement

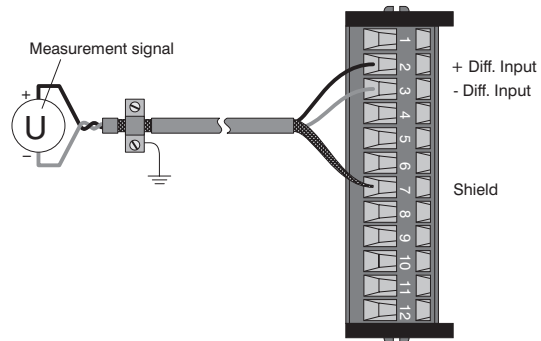
Mode Switch



The module can be used for voltage or current measurement. The selection is made with the mode switch on the back of the module. Place the switch in the respective position for the desired measurement:

- U Voltage measurement
- I Current measurement

Module Wiring



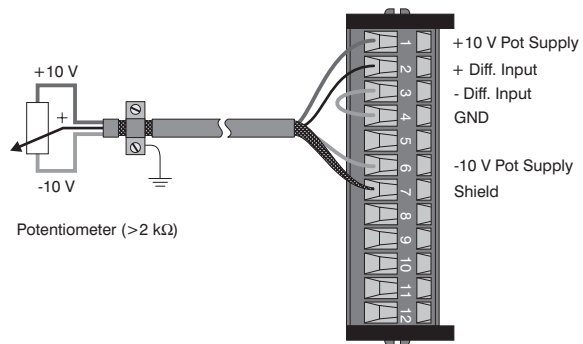
Potentiometer Operation

Mode Switch



For potentiometer operation: Set the switch in the U position!

Module Wiring



10.6.5 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
Configuration word 8	INT16	Transp. Out	16		●	Switching level for threshold value switch
Configuration word 12	WORD	Transp. In	24	●		Module status
Configuration word 14	WORD	Transp. In	28	●		Module type
	WORD	Transp. Out	28		●	Module configuration

10.6.6 Access Using CAN IDs

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".

The AI351 can transfer data in packed or unpacked format. The CAN objects look like this:

CAN ID Packed

Only one CAN object is returned.

CAN ID ¹⁾	Slot 1		Slot 2		Slot 3		Slot 4	
542	ScrM 1L	ScrM 1H	ScrM 2L	ScrM 2H	ScrM 3L	ScrM 3H	ScrM 4L	ScrM 4H
543	free							
544	free							
545	free							

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

nd Node number of the CAN slave = 1

ma Module address of the AF101 = 1

CAN ID Unpacked

Four CAN objects are returned.

Slot	CAN ID ¹⁾	Word 1		Word 2	Word 3	Word 4
1	542	ScrM 1L	ScrM 1H	Not used (2 byte objects)		
2	543	ScrM 2L	ScrM 2H	Not used (2 byte objects)		
3	544	ScrM 3L	ScrM 3H	Not used (2 byte objects)		
4	545	ScrM 4L	ScrM 4H	Not used (2 byte objects)		

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".

10.6.7 Description of Data and Configuration Words

Data Word 0 (read)

16 bit standardized value representing either voltage or current. The selection is made using a switch on the screw-in module.

When used as a potentiometer, the voltage value is read according to the potentiometer position.

Configuration Word 8 (write)

Value of the switching level for the threshold value switch (16 bit, signed).

Configuration Word 12 (read)

Configuration word 12 contains the module status.

	Bit	Description
	12 - 15	x.... Not defined, masked out
	11	0.... Converter value ready 1.... Wandlerwert noch nicht bereit
	8 - 10	x.... Not defined, masked out
	7	Comparator status 0.... if the value < threshold value 1.... if the value ≥ threshold value
	2 - 6	x.... Not defined, masked out
	1	0.... Input signal for current 1.... Input signal for voltage
	0	0.... Voltage/current measurement 1.... Potentiometer operation

Configuration Word 14 (read)

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

	Bit	Description
	8 - 15	Module code = \$02..... Voltage measurement or potentiometer operation Module code = \$03..... Current measurement
	0 - 7	x....Not defined, masked out

The module is configured using configuration word 14.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1