

I/O Configurations

Digital Inputs All the inputs can be read by the overriding controller. See signals **DI6-1 STATUS (1.15)** and **DI STATUS WORD (8.05)**. Input functions are programmable and defined in parameter group 10.

Hardware Source Selection for Digital Inputs The basic I/O board NIOC-01, NIOB-01 or NBIO-21 can be selected by parameter **98.07 BASIC I/O BOARD**.

The hardware source is selected by Parameters 98.03...98.05 and 98.07. There are five selections available:

1. NIOC-01 basic I/O board.
2. NBIO-21 I/O Unit as the basic I/O board.
3. NIOB-01 I/O Unit as the basic I/O board.
4. NDIO I/O Extension modules replace basic I/O board inputs.
5. NDIO I/O Extension modules extend the I/O.
The maximum number of digital inputs is 12.

Software	NIOC-01 I/O Board						NDIO I/O						Parameter Selection
I/O Name	DI1	DI2	DI3	DI4	DI5	DI6	Ext1 DI1	Ext1 DI2	Ext2 DI1	Ext2 DI2	Ext3 DI1	Ext3 DI2	
DI1	1						2						1 = Par. 98.03 = NO
DI2		1						2					1 = Par. 98.04 = NO
DI3			1						3				1 = Par. 98.05 = NO
DI4 *)				1						3			2 = Par. 98.03 = REPLACE
DI5 *)					1						4		3 = Par. 98.04 = REPLACE
DI6 *)						1						4	4 = Par. 98.05 = REPLACE
EXT1_DI1							5						5 = Par. 98.03 = EXTEND
EXT1_DI2								5					6 = Par. 98.04 = EXTEND
EXT2_DI1									6				7 = Par. 98.05 = EXTEND
EXT2_DI2										6			
EXT3_DI1											7		
EXT3_DI2												7	

*) Not available with NBIO-21 and NIOB-01 I/O Unit

Digital Outputs The following digital outputs are available in the AMC program. The outputs are programmable (see Parameter Group 14) and can also be controlled from the overriding system.

The use of DO2 and DO3 control upon a communication break can be defined by Parameter **21.07 COM LOSS RO**.

Digital outputs can also be controlled from the overriding system by means of Auxiliary Control Words 7.01 and 7.02.

- Hardware Source Selection for Digital Outputs**
- The hardware source is selected by Parameters 98.03...98.05 and 98.07. There are five selections available:
1. NIOC-01 basic I/O board.
 2. NBIO-21 I/O Unit as the basic I/O board.
 3. NIOB-01 I/O Unit as the basic I/O board.
 4. NDIO I/O Extension modules replace basic I/O board digital outputs and add EXT2_DO2, EXT3_DO1 and EXT3_DO2.
 5. NDIO I/O Extension modules extend the I/O. The maximum numbers of digital inputs and outputs are 12 and 9 respectively. EXT2 DO1 and EXT2 DO2 can also be programmed from the group 14.

Software	NIOC-01 I/O Board			NDIO I/O						Parameter Selection
I/O Name	DO1	DO2	DO3	Ext1 DO1	Ext1 DO2	Ext2 DO1	Ext2 DO2	Ext3 DO1	Ext3 DO2	
DO1 DO2 DO3 *)	1	1	1	2	2	3				1 = Par. 98.03...05=NO 2 = Par. 98.03=REPLACE 3 = Par. 98.04=REPLACE 4 = Par. 98.05=REPLACE
EXT1_DO1 EXT1_DO2 EXT2_DO1 EXT2_DO2 EXT3_DO1 EXT3_DO2				5	5	6	3,6	4,7	4,7	5 = Par. 98.03=EXTEND 6 = Par. 98.04=EXTEND 7 = par. 98.05=EXTEND

*) Not available with NBIO-21 and NIOB-01 I/O Unit

Analogue Inputs Analogue inputs can be used for motor temperature measurement, I/O speed / torque references and signals can be read by the overriding system.

I/O Speed Reference If a bipolar type of analogue input is needed, the scaling to the speed units (integer value –20000...0...20000) is defined by Parameters **AIx HIGH VALUE** and **AIx LOW VALUE**. The digital input function **DIRECTION** is valid only with unipolar signals. See parameter **MINIMUM AI1** in Group 13.

Example:

Bipolar type of speed reference signal is needed. Range is –10V..0...+10V. Set **13.01 AI1 HIGH VALUE** to 20000 and **13.02 AI1 LOW VALUE** to –20000. Select –10V with **13.12 MINIMUM AI1**. 20000 units equals the speed in Parameter **50.01 SPEED SCALING**.

NIOC-01 Basic I/O Board Three differential non-galvanically isolated analogue inputs (10 bits, accuracy +/- 0.5 %) are available on the basic (NIOC-01) I/O board. The updating interval is 10 ms for the speed reference chain. The overriding system can read the inputs if the motor temperature measurement is not selected.

NIOC-01	Input Type	Signal	Description
BASIC I/O board AI 1	0 ... 10V DC, $R_i = 200 \text{ k}\Omega$	MOTOR 1 _TEMP or SPEED REFERENCE	Motor temperature measurement by means of 1...3 PTC thermistor or 1...3 PT100 sensors. Speed reference if I/O control or HAND/AUTO selected If both functions have been incorrectly selected to the AI1, MOTOR1 TEMP is valid, speed reference is switched to zero and an alarm "I/O SP REF" is indicated.
BASIC I/O board AI 2	0(4) ... 20 mA $R_i = 100 \Omega$	SPEED REFERENCE or not used	Alternative for speed reference (mA) if I/O control control or HAND/AUTO is selected.
BASIC I/O board AI 3	0(4) ... 20 mA $R_i = 100 \Omega$	TORQUE REFERENCE or not used	Torque reference, if I/O control control or HAND/AUTO is selected

NBIO-21/NIOB-01 Analogue Inputs Two bipolar 12 bit + sign analogue inputs are available on the NBIO-21 and NIOB-01 I/O Unit. The hardware range (-2V...0...+2V or -10V...0...+10V) is selected by parameters **13.13 NBIO/NIOB AI1 GAIN** and **13.14 NBIO/NIOB AI2 GAIN**. Voltage / current type input is selected separately for both channels with switch S2. The node address is A and selected with switch S1.

NBIO-21/NIOB-01	Input Type	Signal	Description
BIPOLAR MODE AI1	-20 ..0.. +20 mA 0(4) ... 20 mA $R_i = 100 \Omega$ -2 ..0.. +2 V DC -10 ..0.. +10 V DC $R_i = 200 \text{ k}\Omega$	MOTOR 1 TEMP or SPEED REFERENCE	Motor 1 temperature measurement by means of 1...3 PTC thermistors or PT100 sensors or Speed reference of the drive in the I/O-control mode
BIPOLAR MODE AI2	-20 ..0.. +20 mA 0(4) ... 20 mA $R_i = 100 \Omega$ -2 ..0.. +2 V DC -10..0..+10 V DC $R_i = 200 \text{ k}\Omega$	MOTOR 2 TEMP or TORQUE REFERENCE B	Motor 2 temperature measurement by means of 1...3 PTC thermistors or PT100 sensors. Bipolar torque reference in the I/O control mode.

NAIO-03
Analogue
I/O
Extension
Module

It is possible to use an NAIO-03 Analogue I/O Extension Module to replace inputs AI1, AI2 and outputs AO1 and AO2 on the NIOC-01 Basic I/O board. The resolution of the NAIO-03 is 12 bits. The input range is selectable by DIP switches and the maximum voltage or milliampere value corresponds an integer value in the software, defined by parameter **AIx HIGH VALUE** in the group 13. The module selection is done by Parameter 98.06.

NAIO-03	Input Type	Signal	Description
UNIPOLAR MODE (NAIO-01 mode) AI/O Extension module 1 AI1	0(4) ... 20 mA $R_i = 100 \Omega$ 0 ... 2 V DC 0 ... 10V DC, $R_i = 200 \text{ k}\Omega$	MOTOR 1 TEMP or SPEED REFERENCE	Motor 1 temperature measurement by means of 1...3 PTC thermistors or PT100 sensors or Speed reference of the drive in the I/O-control mode
BIPOLAR MODE (NAIO-02 mode) AI/O Extension module 1 AI1	-20 ... 0... +20 mA 0(4) ... 20 mA $R_i = 100 \Omega$ -2 ... 0... +2 V DC -10 ... 0... 10 V DC $R_i = 200 \text{ k}\Omega$	MOTOR 1 TEMP or SPEED REFERENCE	Motor 1 temperature measurement by means of 1...3 PTC thermistors or PT100 sensors or Speed reference of the drive in the I/O-control mode
UNIPOLAR MODE (NAIO-01 mode) AI/O Extension module 1 AI2	0(4) ... 20 mA $R_i = 100 \Omega$ 0 ... 2 V DC 0 ... 10V DC $R_i = 200 \text{ k}\Omega$	MOTOR 2 TEMP or TORQUE REFERENCE B	Motor 2 temperature measurement by means of 1...3 PTC thermistors or PT100 sensors. Torque reference in the I/O control mode.
BIPOLAR MODE (NAIO-02 mode) AI/O Extension module 1 AI2	-20 ... 0... +20 mA 0(4) ... 20 mA $R_i = 100 \Omega$ -2 ... 0... +2 V DC -10 ... 0... +10 VDC $R_i = 200 \text{ k}\Omega$	MOTOR 2 TEMP or TORQUE REFERENCE B	Motor 2 temperature measurement by means of 1...3 PTC thermistors or PT100 sensors. Torque reference in the I/O control mode.

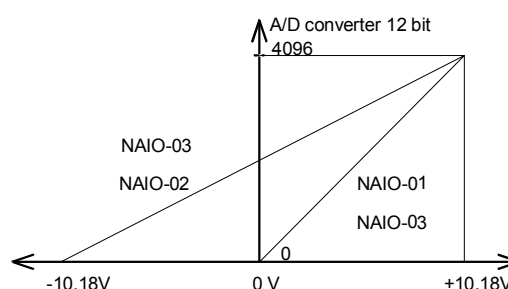


Figure 3 - 11 Resolution of the A/D Converter as a Function of the Input Voltage

Analogue Outputs Two non-galvanically isolated analogue outputs (10 bits, accuracy +/- 1%) are available on the basic I/O board (NIOC-01). The output updating time is 10 ms.

NIOC-01	Output Type	Signal	Description
BASIC I/O Board AO 1	0(4) ...20 mA $R_i = 700 \Omega$	AO1_OUT	A programmable analogue output from the program. The output can be used also as a constant current source to supply the temperature measurement sensor PT100 or PTC. The current is set automatically according to the type of the sensor.
BASIC I/O Board AO 2	0(4) ...20 mA $R_i = 700 \Omega$	AO2_OUT	(The overriding system application can control the output)

If an extension module is used, the resolution is 12 bits.
Programmable analogue outputs can be extended using this module.
See the different configurations at Parameter 98.06.

NAIO-03	I/O Type	Command	Description
AI/O Extension Module 1 AO3	0(4) ...20 mA $R_i = 700 \Omega$ Isolated from power supply	AO3_OUT	See Parameter 98.06 and Group 15
AI/O Extension Module 1 AO4	0(4) ...20 mA $R_i = 700 \Omega$ Isolated from power supply	AO4_OUT	See Parameter 98.06 and Group 15

The NBIO-21 or NIOB-01 I/O Unit can be configured for unipolar 0...20 mA mode with a resolution of 12 bits, or bipolar -10V...0...+10 V mode with a resolution of 11 bits + sign.

NBIO-21/ NIOB-01	I/O Type	Command	Description
AO1	Voltage output – 10V...0...+10V 1 k Ω min or Current Output 0...20 mA Max load = 800 Ω . Isolated from power supply	AO1_OUT	See Parameter 98.07 and Group 15
AO2	Voltage output – 10V...0...+10V 1 k Ω min or Current Output 0...20 mA Max load = 800 Ω . Isolated from power supply	AO2_OUT	See Parameter 98.07 and Group 15