1 Accessory Modules

The CNC 61.00 provides several sockets to expand the functions. The sockets are marked with the letters A to E and G and can be equipped with an accessory module of the respective code.

Code	Accessory Module	Order Number	Socket
A1	INTERBUS interface	026.44.0056	A
A2	Second serial interface	026.44.0073	
A3	Transducer interface	026.44.0053A	
A4	Analog input module	026.44.0053B	
A5	Transducer and second serial interface	026.44.0067A	AB[1]
A6	Analog input module and second serial interface	026.44.0067B	
AA	Transducer and two serial interfaces	061.01.009	A
AB	Profibus-DP interface	061.01.0012	
AE	Transducer and Profibus-DP interface	061.01.0033	
AF	Active transducer and Profibus-DP interface	061.01.0033A	
AG	Passive twin transducer, 2 serial interfaces, Profibus interface and angle pulse input 5 V	061.01.0043/.0049	AB[1]
AH	Active twin transducer, 2 serial interfaces, Profibus interface and angle pulse input 5 V	061.01.0043/.0044	
B1	Interface for incremental encoder 5 V	061.01.0020B1	B
B2	Interface for incremental encoder 24 V	061.01.0020B2	
B3	Angle pulse output module 5 V	061.01.0020B3	
B4	Angle pulse output and input 5 V	061.01.0020B4	
B5	Angle pulse input module, 2-fold, with 5 V level	061.01.0020B5	
B7	Counter input and angle pulse output 5 V	061.01.0020B7	
B8	Counter input and angle pulse output 5 V	061.01.0020B8	
B9	Angle pulse input module, 2-fold, with 5 V/24 V levels	061.01.0020B9	
BA	Angle pulse input 24 V/angle pulse output 5 V	061.01.0020BA	
C1	I/O expansion interface	026.44.0054	C
C2	SSI interface, comprising the I/O expansion interface, an input for an incremental encoder with 5 V level and an input for an absolute value encoder	026.44.0079A	BC[2]
C3	SSI interface, comprising the I/O expansion interface, an input for an incremental encoder with 24 V level and an input for an absolute value encoder	026.44.0079B	
C4	SSI interface, I/O expansion and angle pulse output 5 V	061.01.0035	

Code	Accessory Module	Order Number	Socket
D1	CAN Bus interface	026.44.0055	D
E1	battery-buffered RAM and real time clock	026.44.0065	E
F1	MODLINK interface		F[3]
G1	ETHERNET interface	061.01.0042	G[3]

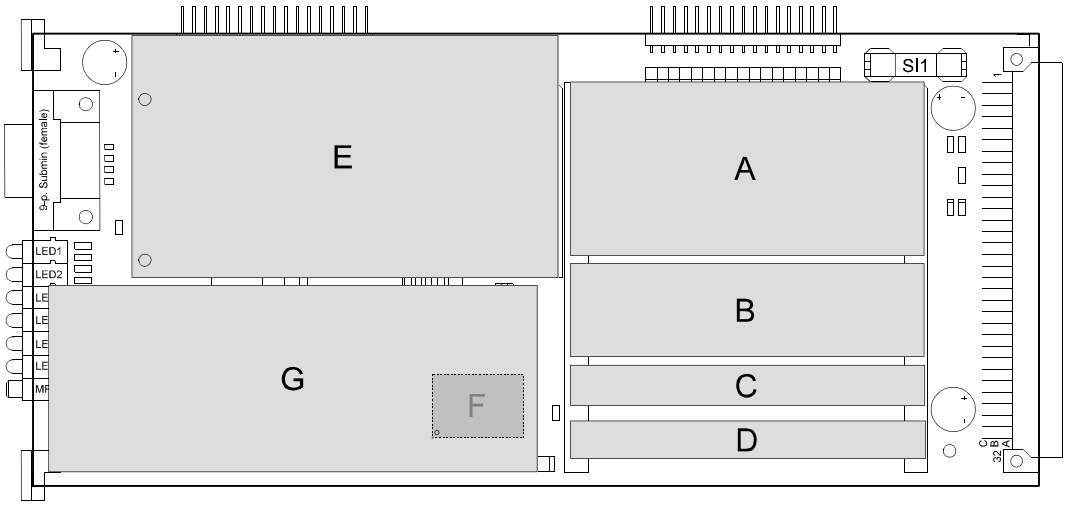
[1] The accessory modules occupy the sockets A and B and therefore cannot be combined with modules of code B.

[2] The accessory modules occupy the sockets B and C and therefore cannot be combined with modules of code B.

[3] The accessory modules F1 and G1 cannot be used simultaneously.

1.1 Mounting of the Accessory Modules

The mother board 026.44.0041 of the CNC 61.00 provides two 64-pole female connectors for expansions. The position of the modules can be found from the labeled letters. All accessory modules are mounted with the yellow marked side to the front panel (exception: accessory module F1).

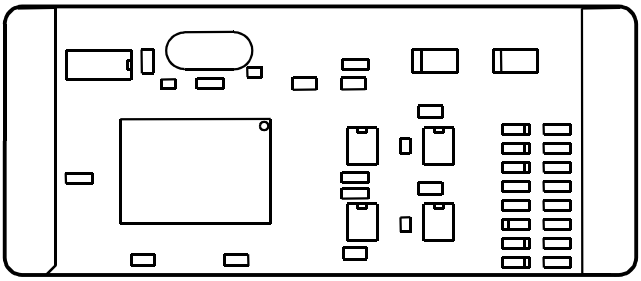


Mother Board 026.44.0041 with Sockets for the Accessory Modules A to G (Accessory Module F is located below accessory module G)

1.2 A1 - INTERBUS Interface

The interface expands the CNC 61.00 as remote bus participant in the INTERBUS. The interface occupies 4 words (64 bit) in the address range and is set to ID=3 (identification). The status of the bus is displayed with three LEDs at the front panel and at the rear side of the module.

LED			Designation	Meaning
ResReg	green	●	remote bus check	monitoring of the input remote bus cable
BA	green	●	active bus	bus connection is completed
RBDA	red/orange	●	error	error of module / no active master



INTERBUS Interface 026.44.0056

Socket: A

Connection

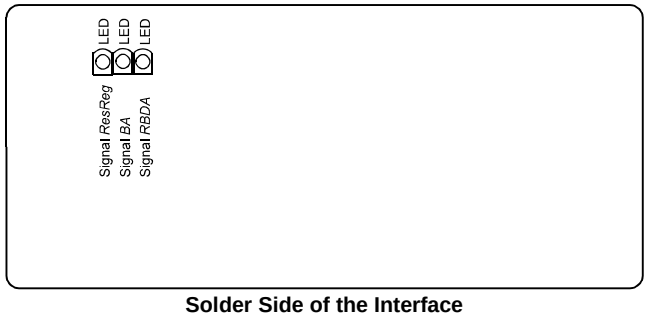
The INTERBUS interface is connected to the periphery via two Submin D connectors (X5 and X6 of the back planes). Pin assignment of the connectors:

- Back planes for the multi-axis system
  - 61.01.0004, X5, page 62 and X6, page 63
  - 61.01.0038, X5, page 85 and X6, page 86
  - 61.01.0060, X5, page 109 and X6, page 110
- Back planes for the compact system
  - 61.01.0019, X5, page 119 and X6, page 119
  - 61.01.0028, X5, page 127 and X6, page 128

Via the female connector X5 and the male connector X6 the Interbus (remote bus) is connected. If the module CNC61 is the last module within the Interbus, X6 is not connected. Furthermore the following applies:

- Pin 5 only serves for the supply of Pin 9 of X5; identification, whether further modules are connected. Further modules will be identified, if Pin 5 provides 5 V.
- Pin 5 and Pin 9 are not connected = no further modules
  Pin 5 and Pin 9 are connected = further modules

The connection between the separate INTERBUS modules can be made with the cable of order number K61.08.*xxx* (xxx = length in decimeter).



Solder Side of the Interface

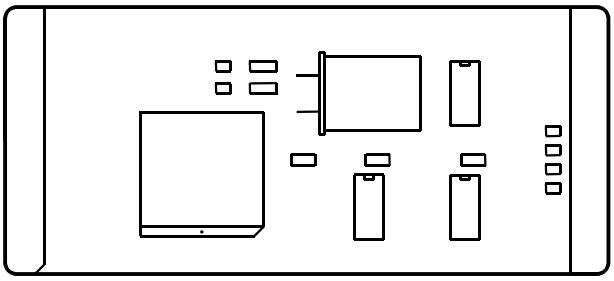
The ID code 3 (digital input/output module) is set as a standard for the interface.

Software (Example)
The 4 words of the INTERBUS (64 bit) are inserted like an I/O expansion into the input/output range. They assign the inputs or outputs 168 to 231.

```
SET  1, 0168; set the first bit in the Interbus
```

1.3 A2 - Second Serial Interface

The module provides an additional serial interface with a level corresponding to RS232. The interface may, for example, be used for connecting a serial printer.



Second Serial Interface 026.44.0073

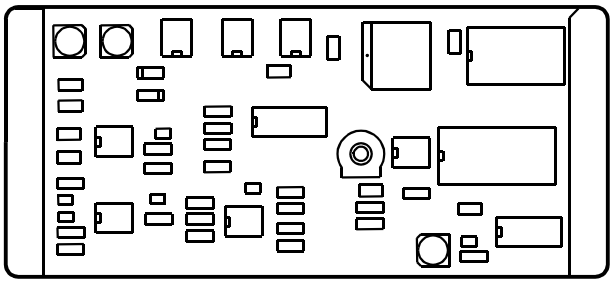
Socket: A

Connection
Connection of the module with the periphery via the 9-pole female Submin D connector X21

- of the back plane 61.01.0028, page 129
- of the back plane 61.01.0037, page 80
- of the back plane 61.01.0051, page 137
- of the back plane 61.01.0058, page 103

1.4 A3 - Transducer Interface

A transducer serves for measuring torques (e. g. for nut running applications) by means of resistance bridges. The impressing of a voltage at the transducer permits to convert a torque into an equivalent voltage. The voltage is amplified and smoothed in the module and converted with an analog/digital converter.



Transducer Interface 026.44.0053A

Socket: A
The four soldering jumpers at the rear side of the modules (when mounted the visible

side) serve for the adaptation of the used transducers.

J2	closed soldering jumper	≙ 1 mV/V ≙ gain	1,000
J2 and J3	closed soldering jumpers	≙ 2 mV/V ≙ gain	500
J2 to J4	closed soldering jumpers	≙ 3 mV/V ≙ gain	250
J2 to J5	closed soldering jumpers	≙ 4 mV/V ≙ gain	125

The jumpers are usually set by SIEB & MEYER according to the user's requirement, so that later modifications are not necessary.

Connection

Connection with the periphery:

- Back planes of the multi-axis system
  - via the female Submin D connector X14 of back plane 61.01.0004, page 64
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0018, page 73
  - via the female Submin D connector X14 of back plane 61.01.0037, page 79
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0038, page 87
  - via the female Submin D connector X14 of back plane 61.01.0060, page 111
- Back planes of the compact system
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0019, page 122
  - via the female Submin D connector X8 of back plane 61.01.0028, page 128
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0057, page 148

Software (Example)
The module can be addressed by the software with three system variables.

`T_ACT [-2048..2047]`
The actual converter value of the torque transducer is provided.

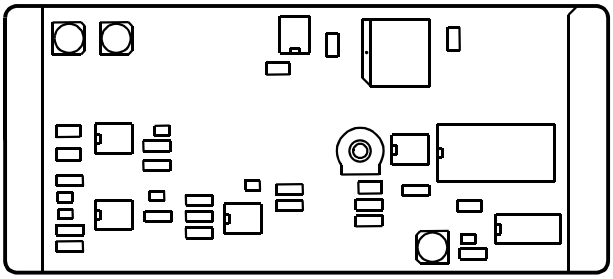
`T_Offset [-2048..2047]`
This parameter defines the offset for the torque transducer. A deviation to the zero point of the transducer can be compensated by entering the actual converter value (unloaded bridge) into this parameter.

`T_ADJ [0..15]`
To switch different calibrating resistances on the measuring bridge (detuning), values between 0 and 15 may be entered with this parameter.

1	lowest load of the bridge
15	highest load of the bridge
0	no detuning

1.5 A4 - Analog Input Module

The module provides an analog input with a resolution of 12 bits to the CNC 61.00. The input voltage is between –10 V and +10 V.



Analog Input Module 026.44.0053B

Socket: A
At the rear side of the modules (when mounted the visible side) many “soldering jumpers” can be seen. The jumpers control internal functions of the module and must only be modified after consulting SIEB & MEYER.

Connection
Connection with the periphery:

- Back planes of the multi-axis system
  - via the female Submin D connector X14 of back plane 61.01.0004, page 64
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0018, page 73
  - via the female Submin D connector X14 of back plane 61.01.0037, page 79
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0038, page 148
  - via the female Submin D connector X14 of back plane 61.01.0060, page 111
- Back planes of the compact system
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0019, page 122
  - via the female Submin D connector X8 of back plane 61.01.0028, page 128
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0057, page 148

Input resistance: $R_{In} \approx 22\ k\Omega$

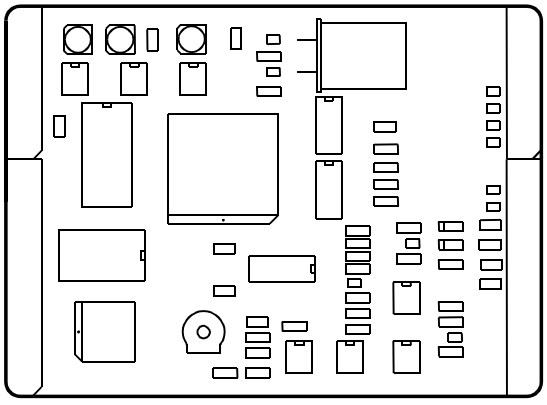
Software (Example)
The system variable T_ACT provides the actual converter value:

Input voltage	-10 V	= converter value	-2048
Input voltage	0 V	= converter value	0
Input voltage	10 V	= converter value	2047

The values are achieved, when the negative analog input is connected to ground and the voltage to be measured is connected between the positive analog input and the ground.

1.6 A5 - Transducer Interface and Second Serial Interface

This module combines the Transducer Interface (A3) and the module of the Second Serial Interface (A2).



Transducer and Second Serial Interface 026.44.0067A

Socket: AB
The four soldering jumpers at the rear side of the modules (when mounted the visible side) serve for the adaptation of the used transducers.

J2	closed soldering jumper	≙ 1 mV/V ≙ gain	1,000
J2 and J3	closed soldering jumpers	≙ 2 mV/V ≙ gain	500
J2 to J4	closed soldering jumpers	≙ 3 mV/V ≙ gain	250
J2 to J5	closed soldering jumpers	≙ 4 mV/V ≙ gain	125

The jumpers are usually set by SIEB & MEYER according to the user's requirement, so that later modifications are not necessary.

Connections
The **second serial interface** is connected to the periphery via the 9-pole female Submin D connector

- Back planes for the multi-axis system
  - X4 of back plane 61.01.0004, page 64
  - X4 of back plane 61.01.0018, page 70
  - X4 of back plane 61.01.0037, page 79
  - X4 of back plane 61.01.0038, page 85
  - X4 of back plane 61.01.0060, page 111
- Back planes for the compact system
  - X4 of back plane 61.01.0019, page 118
  - X4 of back plane 61.01.0028, page 128
  - X4 of back plane 61.01.0057, page 148

The **transducer interface** is connected to the periphery:

- Back planes of the multi-axis system
  - via the female Submin D connector X14 of back plane 61.01.0004, page 64

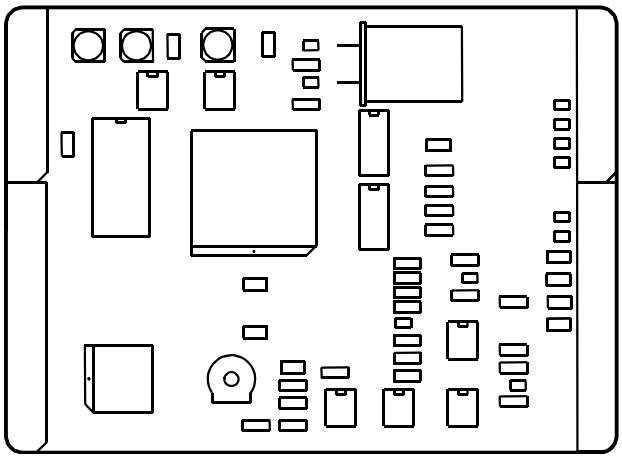
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0018, page 73
  - via the female Submin D connector X14 of back plane 61.01.0037, page 79
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0038, page 88
  - via the female Submin D connector X14 of back plane 61.01.0060, page 111
- Back planes of the compact system
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0019, page 122
  - via the female Submin D connector X8 of back plane 61.01.0028, page 128
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0057, page 148

Software (Example)

See under “A3 - Transducer Interface”, page 168.

1.7 A6 - Analog Input Module and Second Serial Interface

This module combines the Analog Input Module (A4) and the module of the Second Serial Interface (A2).



Analog Input Module and Second Serial Interface 026.44.0067B

Socket: AB
At the rear side of the modules (when mounted the visible side) many “soldering jumpers” can be seen. The jumpers control internal functions of the module and must only be modified after consulting SIEB & MEYER.

Connection
The **second serial interface** is connected to the periphery via the 9-pole female Submin D connector

- Back planes for the multi-axis system
  - X4 of back plane 61.01.0004, page 64
  - X4 of back plane 61.01.0018, page 70
  - X4 of back plane 61.01.0037, page 78
  - X4 of back plane 61.01.0038, page 85
  - X4 of back plane 61.01.0060, page 109
- Back planes for the compact system
  - X4 of back plane 61.01.0019, page 118
  - X4 of back plane 61.01.0028, page 127
  - X4 of back plane 61.01.0057, page 145

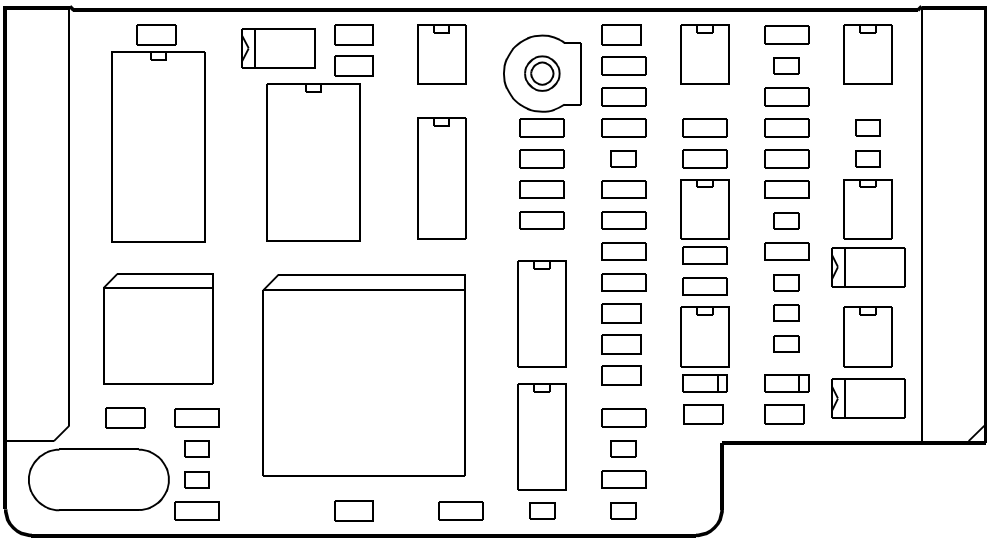
The **analog input module** is connected to the periphery:

- Back planes of the multi-axis system
  - via the female Submin D connector X14 of back plane 61.01.0004, page 64
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0018, page 73
  - via the female Submin D connector X14 of back plane 61.01.0037, page 79
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0038, page 88
  - via the female Submin D connector X14 of back plane 61.01.0060, page 111
- Back planes of the compact system
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0019, page 122
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0057, page 148

Software (Example)
See under “A4 - Analog Input Module”, page 170.

1.8 AA - Transducer and Two Serial Interfaces

The interface is an upgrading of the accessory module A5 (transducer and second serial interface). It has an additional serial interface.



Transducer and Two Serial Interfaces 061.01.0009

Socket: A
The four soldering jumpers at the rear side of the module (when mounted the visible side) serve for the adaptation of the used transducers.

J2	closed soldering jumper	≙ 1 mV/V ≙ gain	1,000
J2 and J3	closed soldering jumpers	≙ 2 mV/V ≙ gain	500
J2 to J4	closed soldering jumpers	≙ 3 mV/V ≙ gain	250
J2 to J5	closed soldering jumpers	≙ 4 mV/V ≙ gain	125

The jumpers are usually set by SIEB & MEYER according to the user's requirement, so that later modifications are not necessary.

Connection
The **serial interfaces** are connected to the periphery via the 9-pole female Submin D connector X21

- of back plane 61.01.0028 for compact systems, page 129
- of back plane 61.01.0037 for multi-axis systems, page 80

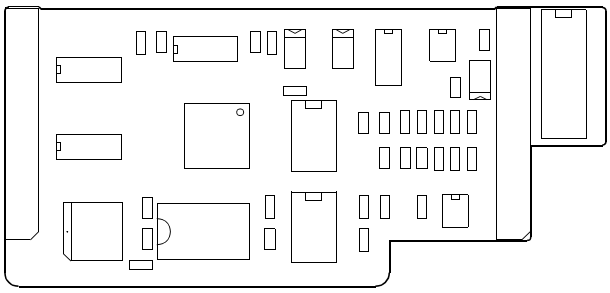
The **transducer interface** is connected to the periphery:

- via the Submin D connector X8 of back plane 61.01.0028 for compact systems, page 128
- via the Submin D connector X14 of back plane 61.01.0037 for multi-axis systems, page 111

Software (Example)
See under "A3 - Transducer-Interface", page 168.

1.9 AB - Profibus Interface

The accessory module enables the connection of the Profibus. The module is galvanically separated from the bus and can be operated with max. 12 MBaud. The firmware operates the software connection. The functions can be used independently of the used bus system in application programs. Detailed information can be found in chapter “Firmware Functions” and in the description “Communication Protocol DNC 61.00”.



Profibus Interface 061.01.0012

Socket: A

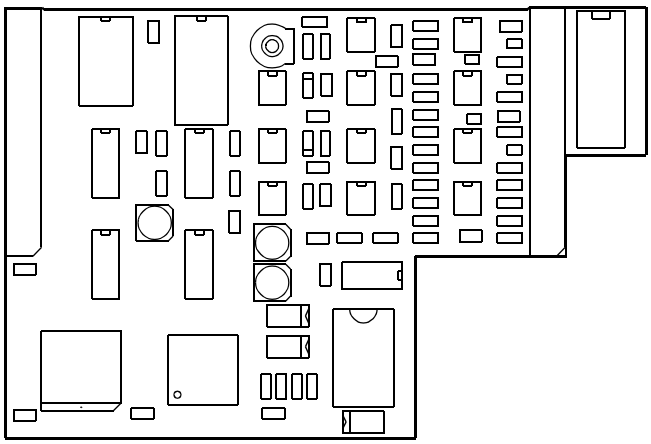
Connection

The Profibus interface is connected to the periphery via the connectors

- multi-axis system
  - X5 and X6 of back plane 61.01.0018, pages 93 and 94
  - X19 of back plane 61.01.0037, page 79
  - X5 and X6 of back plane 61.01.0053, pages 93 and 94
  - X19 of back plane 61.01.0058, page 102, 137
- compact system
  - X8 of back plane 61.01.0019, page 128
  - X19 of back plane 61.01.0028, page 129
  - X19 of back plane 61.01.0051, page 137

1.10 AE - Transducer and Profibus Interface

The interface combines the transducer interface (A3) and the Profibus interface (AB).

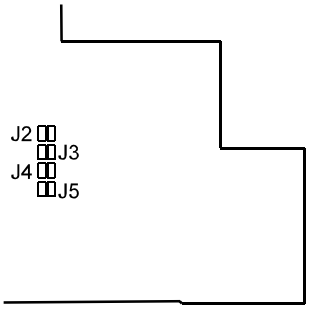


Transducer and Profibus Interface 061.01.0033

Socket: A

The four soldering jumpers at the rear side serve for the adaptation of the used transducers.

J2	closed soldering jumper	≙ 1 mV/V ≙ gain	1,000
J2 and J3	closed soldering jumpers	≙ 2 mV/V ≙ gain	500
J2 to J4	closed soldering jumpers	≙ 3 mV/V ≙ gain	250
J2 to J5	closed soldering jumpers	≙ 4 mV/V ≙ gain	125



The jumpers are usually set by SIEB & MEYER according to the user's requirement, so that later modifications are not necessary.

Connection

The **transducer interface** is connected to the periphery:

- back planes of the multi-axis system
  - via the terminals 21 to 24 "Transducer/Analog Input" of back plane 61.01.0018, page 73
  - via the female Submin D connector X14 of back plane 61.01.0037, page 64
- back planes of the compact system
  - via the terminals 21 to 24 "Transducer/Analog input" of back plane 61.01.0019, page 122
  - via the female Submin D connector X8 of back plane 61.01.0028, page 128

The **Profibus interface** is connected to the periphery via the connectors

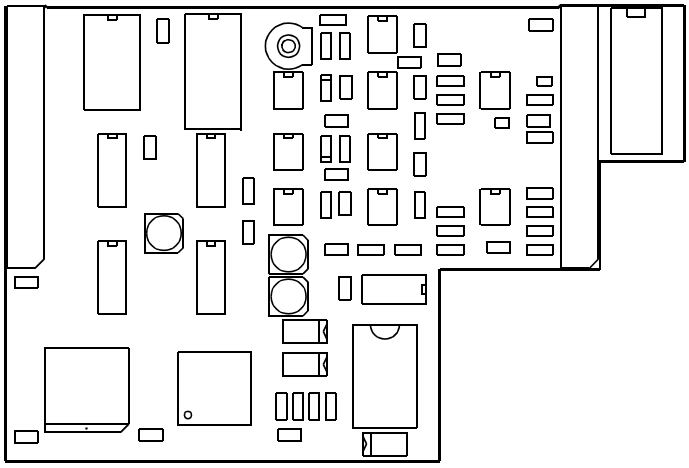
- of the multi-axis system
  - X5 and X6 of back plane 61.01.0018, pages 93 and 94
  - X19 of back plane 61.01.0037, page 79
- of the compact system
  - X8 of back plane 61.01.0019, page 120
  - X19 of back plane 61.01.0028, page 129

Software (Example)

See under "A3 - Transducer Interface", page 168. Detailed information can be found in chapter "Firmware Functions" and in the description "Communication Protocol DNC 61.00".

1.11 AF - Active Transducer and Profibus Interface

The interface is a combination of the Profibus interface (AB) and an active transducer.



Active Transducer and Profibus Interface 061.01.0033A

Socket: A

Connection

The **Profibus interface** is connected to the periphery via the connectors

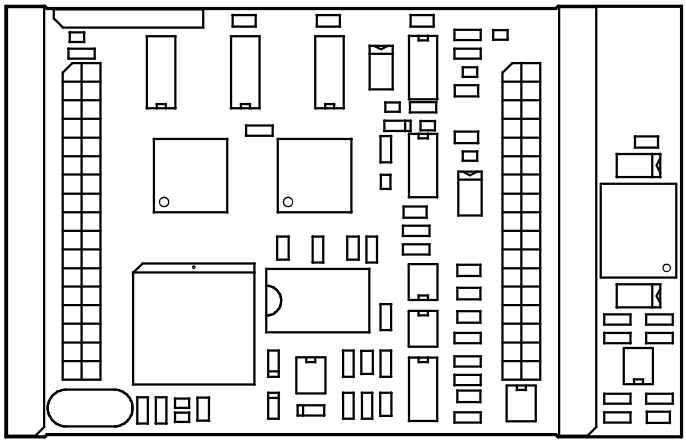
- of the multi-axis system
  - X5 and X6 of back plane 61.01.0018, pages 93 and 94
  - X19 of back plane 61.01.0037, page 79
  - X5 and X6 of back plane 61.01.0053, pages 93 and 94
  - X19 of back plane 61.01.0058, page 102
- of the compact system
  - X8 of back plane 61.01.0019, page 120
  - X19 of back plane 61.01.0028, page 129
  - X19 of back plane 61.01.0051, page 137

The **active transducer** is connected to the periphery:

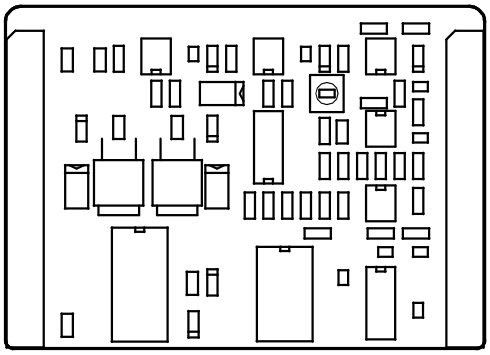
- back planes of the multi-axis system
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0018, page 73
  - via the female Submin D connector X14 of back plane 61.01.0037, page 64
  - via the female Submin D connector X15 of back plane 61.01.0053, page 95
  - via the female Submin D connector X15 of back plane 61.01.0058, page 102
- back planes of the compact system
  - via the terminals 21 to 24 “Transducer/Analog Input” of back plane 61.01.0019, page 122
  - via the female Submin D connector X8 of back plane 61.01.0028, page 128
  - via the female Submin D connector X15 of back plane 61.01.0051, page 137

1.12 AG – Passive Twin Transducer, 2 Serial Interfaces, Profibus Interface and Angle Pulse Input 5 V

The accessory module AG consists of two cards:
- 61.01.0043 base card with the functions Profibus and two serial interfaces
- 61.01.0049 plug-in module with passive twin transducer and angle pulse input

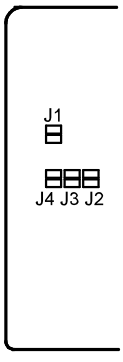


Profibus and 2 serial interfaces 061.01.0043



Twin transducer and angle pulse input 061.01.0049

The functions in detail:
- **Profibus**
  Physical interface to the Profibus. The bus is galvanically separated from the CNC 61.00 and can be operated up to 12 MBaud. The link to the software is made in the firmware and is provided for the user in the application program, independently of the used bus system. Detailed information can be found in the manual “Firmware Functions“ and in the manual “Communication Protocol DNC 61.00“.
- **Serial Interfaces**
  Two additional serial interfaces as RS232 are provided for the connection of, for example, printers, bar code scanners, etc., addressable by the application program.
- **Twin Transducers**
  Two independent passive transducer inputs (measuring bridges for accepting torques/forces). The module provides the supply voltage for the measuring bridge (±5 V, max. 400 mA for both transducers) and comprises a measuring amplifier, adjustable via soldering jumpers for the arriving analog signals and a 12 bit AD converter for the data transmission.
- **Angle Pulse Input**
  The input enables the connection of an additional rotary encoder on the basis of 5 V, permitting, for example, the synchronization with another drive.



Socket: AB

The four soldering jumpers on the rear side of module 61.01.0049 serve for the adaptation of the used transducer.

J1	closed soldering jumper	≙ 1 mV/V ≙ gain	1,000
J1 and J2	closed soldering jumpers	≙ 2 mV/V ≙ gain	500
J1 to J3	closed soldering jumpers	≙ 3 mV/V ≙ gain	250
J1 to J4	closed soldering jumpers	≙ 4 mV/V ≙ gain	125

Usually, the jumpers are preset by SIEB & MEYER according to the user’s requirements, so that later modifications can be omitted.

Connections

Connection of the **twin transducer**

- back planes of the multi-axis system
  - via the female Submin D connector X15 of back plane 61.01.0053, page 95
  - via the female Submin D connector X15 of back plane 61.01.0058, page 102
- back planes of the compact system
  - via the female Submin D connector X15 of back plane 61.01.0051, page 102, 146

Connection of the **Profibus interface**

- back planes of the multi-axis system
  - via the female Submin D connector X5 and the male Submin D connector X6 of back plane 61.01.0053, pages 93 and 94
  - via the female Submin D connector X19 of back plane 61.01.0058, page 102
- back planes of the compact system
  - via the female Submin D connector X19 of back plane 61.01.0051, page 137

Connection of the **two serial interfaces**

- back planes of the multi-axis system
  - via the female Submin D connector X21 of back plane 61.01.0058, page 103
- back planes of the compact system
  - via the female Submin D connector X21 of back plane 61.01.0051, page 103, 137

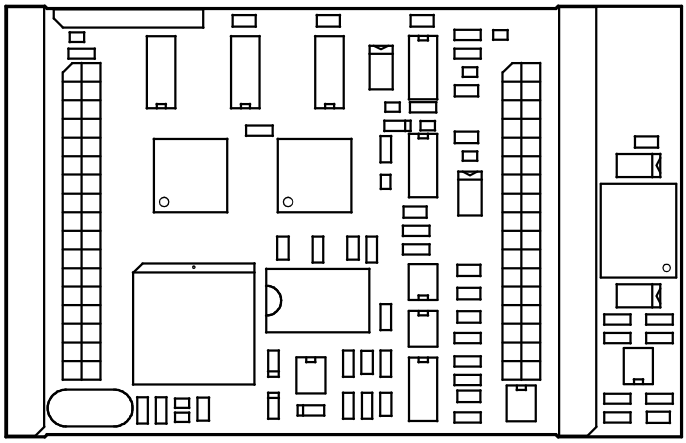
Connection of the **angle pulse input**

- back planes of the multi-axis system
  - via the female Submin D connector X4 of back plane 61.01.0053, page 93
  - via the female Submin D connector X4 of back plane 61.01.0058, page 101
- back planes of the compact system
  - via the female Submin D connector X4 of back plane 61.01.0051, page 136

The two serial interfaces are not provided when using the back plane 61.01.0053.
If only one transducer input is required, also other back planes can be used. See accessory modules AE and AF, pages 175 and 177

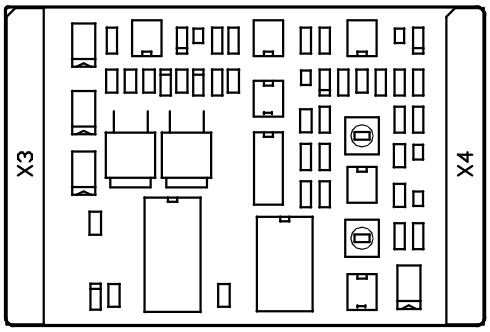
1.13 AH - Active Twin Transducer, 2 Serial Interfaces, Profibus Interface and Angle Pulse Input 5 V

The accessory module AH consists of two cards:
- 61.01.0043 base card with the functions Profibus and two serial interfaces
- 61.01.0044 plug-in module with active twin transducer and angle pulse input



Profibus and 2 serial interfaces 061.01.0043

The functions in detail:



Twin transducer and angle pulse input 061.01.0044

- **Profibus**
  Physical interface to the Profibus. The bus is galvanically separated from the CNC 61.00 and can be operated up to 12 MBaud. The link to the software is made in the firmware and is provided for the user in the application program, independently of the used bus system. Detailed information can be found in the manual “Firmware Functions“ and in the manual “Communication Protocol DNC 61.00“.
- **Serial Interfaces**
  Two additional serial interfaces as RS232 are provided for the connection of, for example, printers, bar code scanners, etc., addressable by the application program.
- **Twin Transducers**
  Two independent active transducer inputs (measuring bridges for accepting torques/forces). The module provides the supply voltage for the measuring bridge (±12 V, max. 200 mA for both transducers) and converts the arriving analog signals (±5 V) with a 12 bit AD converter.
- **Angle Pulse Input**
  The input enables the connection of an additional rotary encoder on the basis of 5 V, permitting, for example, the synchronization with another drive.

Socket: AB
The soldering jumper on the rear side of the module 61.01.0044 has no relevant function for the user and must not be altered.

Connections
Connection of the **twin transducer**
- back planes of the multi-axis system
  - via the female Submin D connector X15 of back plane 61.01.0053, page 95
  - via the female Submin D connector X15 of back plane 61.01.0058, page 102
- back planes of the compact system
  - via the female Submin D connector X15 of back plane 61.01.0051, page 102, 146

Connection of the **Profibus interface**
- back planes of the multi-axis system
  - via the female Submin D connector X5 and the male Submin D connector X6 of back plane 61.01.0053, pages 93 and 94
  - via the female Submin D connector X19 of back plane 61.01.0058, page 102, 137
- back planes of the compact system
  - via the female Submin D connector X19 of back plane 61.01.0051, page 102, 137

Connection of the **two serial interfaces**
- back planes of the multi-axis system
  - via the female Submin D connector X21 of back plane 61.01.0058, page 103
- back planes of the compact system
  - via the female Submin D connector X21 of back plane 61.01.0051, page 103, 137

Connection of the **angle pulse input**
- back planes of the multi-axis system
  - via the female Submin D connector X4 of back plane 61.01.0053, page 93
  - via the female Submin D connector X4 of back plane 61.01.0058, page 101
- back planes of the compact system
  - via the female Submin D connector X4 of back plane 61.01.0051, page 136

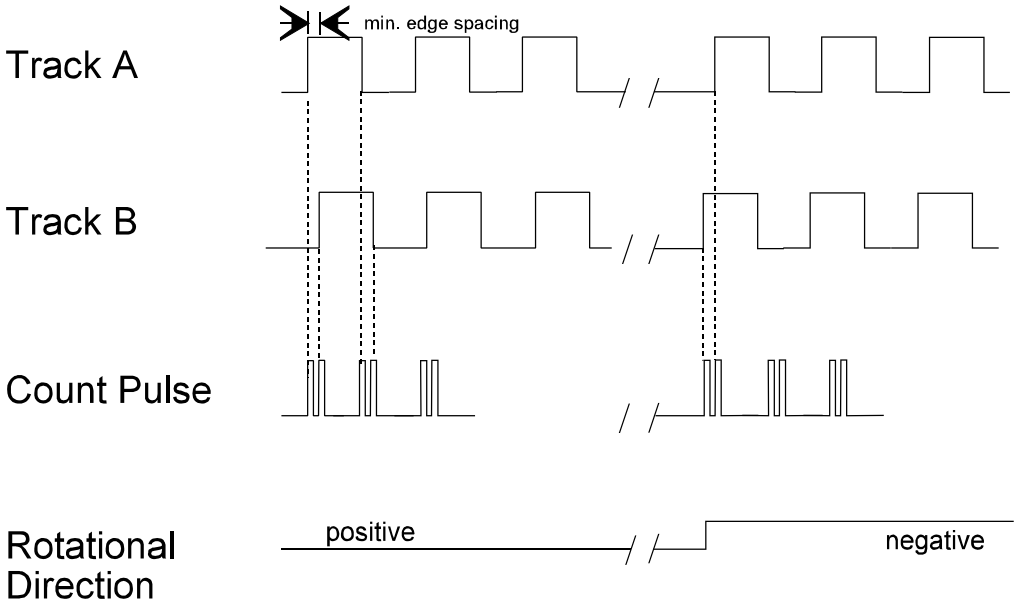
The two serial interfaces are not provided when using the back plane 61.01.0053.
If only one transduce input is required, also other back planes can be used. See accessory modules AE and AF, pages 175 and 177

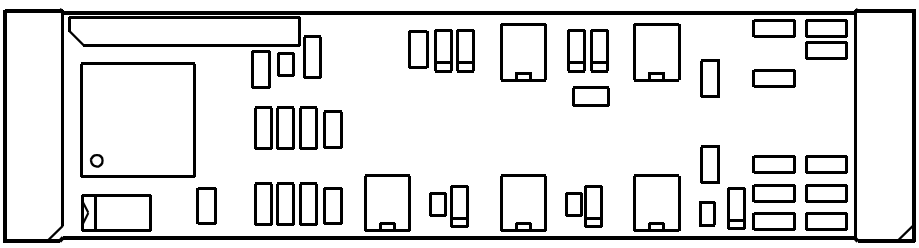
1.14 B - Universal Angle Pulse Module

This module is an upgrading of all previously available accessory modules of the code B and replaces them. In addition, it can process measuring systems with doubled input frequency (previously 150 kHz, now 300 kHz).

All accessory modules providing one or two angle pulses show the following basic behavior:

- Two square-wave signals dephased to each other (track A and track B) are evaluated to detect the rotational direction of the encoder.
- The input signals of both tracks are galvanically isolated from the evaluation system via optocouplers. They have to be wired as differential voltage input.
- With each edge change (see figure below) the evaluation electronics generates a count pulse towards the micro controller (CNC61 controller).
- The maximum count frequency (f_{max}) of the micro controller is 1 MHz. This means that the minimum spacing between two edges of track A and B is $1/f_{max}$ = 1 µs (if this value falls below 1 µs, pulse losses will occur!)
- This maximum frequency applies for all modules of the series *61.01.0020xx*. For all other module series (e. g. *26.44.0059* etc.) the maximum frequency is 500 kHz, and thus the minimum edge spacing is 2 µs.
- For the evaluation of a zero pulse an additional differential voltage input can be used.
- When wiring the angle pulse encoder it is recommended to use a twisted-pair cable (1. pair: track A, 2. pair: track B and 3. pair: zero pulse).





Universal Angle Pulse Module 061.01.0020

The universal module in detail:

Variant	Function	Replaced Card	New Card	Page
BA	angle pulse input (24 V) and angle pulse output (5 V)	026.44.0074C	061.01.0020BA	187
B1	angle pulse input 5 V	026.44.0059A	061.01.0020B1	184
B2	angle pulse input (24 V)	026.44.0059B	061.01.0020B2	184
B3	angle pulse output (5 V)	026.44.0060	061.01.0020B3	185
B4	angle pulse input (5 V) and angle pulse output (5 V)	026.44.0074	061.01.0020B4	185
B5	angle pulse input (5V) and angle pulse input (5V)	026.44.0080	061.01.0020B5	185
B7	counter input (5 V) and angle pulse output (5 V)	026.44.0074A	061.01.0020B7	186
B8	counter input (24 V) and angle pulse output (5 V)	026.44.0074B	061.01.0020B8	186
B9	angle pulse input (24 V) and angle pulse input (5 V)	026.44.0080A	061.01.0020B9	187

Socket: B

Connection
The connection facilities of the universal angle pulse module can be found in the descriptions of the separate accessory modules of the codes B.

Software (Example)
Examples can be found in the descriptions of the separate accessory modules of the code B.

1.15 B1/B2 - Incremental Encoder Interface

The module permits to connect an incremental encoder (second measuring system) to the CNC 61.00. Incremental encoders with 5 V/24 V output level can be used. An external encoder can be supplied via the 9-pole Submin D female connector X4 of the back planes, but only 24 V incremental encoders.

Socket: B

Difference Between the Modules
The “soldering jumpers” at the rear side of the module (visible when mounted) serve for the distinction of the incremental encoder used.

All soldering jumpers closed (soldering point): 5 V incremental encoder module (code B1)
All soldering jumpers open: 24 V incremental encoder module (code B2)

Connection
The module is connected to the periphery via the 9-pole Submin D connector X4 of all back planes (example of pin assignment, see page 70).
The max. count frequency is 150 kHz at the input.

Software (Example)
The system variables S_ACT_2, V_ACT_2 and S_LATCH_2 permit to access to the data of the second measuring system.

S_ACT_2
Definition of the position of the measuring system in increments. The variable may be read and set.

V_ACT_2
Actual speed of the measuring system. This value can only be read. Unit: $\frac{\text{Increments}}{\text{Sample}}$

S_LATCH_2
Contains the position of the measuring systems along with the condition of input i4 (internal input of the CNC 61.00; Pin 18)

```
SET  0, S_ACT_2 ; set sec. measuring system to Zero
FCT  1, F22     ; edge change at input i4 writes to S_Latch_2
                ; further modes, see function calls
GET  S_LATCH_2  ; read the saved value
```

1.16 B3 - Angle Pulse Output Module 5 V Level

The module externally provides the angle pulses of the first measuring system. It is useful, if, for example, two axes shall be synchronized (electronic gear). Axis 1 as master then is equipped with the Angle Pulse Output Module, the axis 2 as slave is equipped with the Incremental Encoder Interface of code B1.

Socket: B

Connection
The module is connected to the periphery via the 9-pole female Submin D connector X4 of all back planes (Example of the pin assignment, see page 70).

Driver capacity max. 3 × incremental encoder interface B1/B2 (page 184).

1.17 B4 - Angle Pulse Input and Output Module

The module combines the module B1/B2 (Incremental Encoder Interface) with module B3 (Angle Pulse Output Module), permitting the operator to use the second measuring system (rotary encoder/CNC 61.00) along with the output of the angle pulses of the first measuring system of the respective axis simultaneously.

Socket: B

Connection
The module is connected to the periphery via the 9-pole female Submin D connectors X4 and X7 of all back planes, except for the back plane 61.01.0028. Example for the pin assignment, see pages 62 and 63.

Count frequency at the input: max. 150 kHz

Software (Example)
See under “B1/B2 - Incremental Encoder Interface”, page 184.

1.18 B5 - Angle Pulse Input Module, 2-Fold, 5 V Level

The module enables the connection of two incremental encoders (second and third measuring system) to the CNC 61.00. Encoders with 5 V output level can be connected.

Socket: B

Connections
The module is connected to the periphery via the 9-pole female Submin D connectors X4 and X7 of all back planes, except for the back plane 61.01.0028. Example for the pin assignment, see pages 62 and 63

Software
See under “B1/B2 - Incremental Encoder Interface”, page 184.

1.19 B7/B8 - Counter Input and Angle Pulse Output

The module provides a fast counter input and an angle pulse output. The counter input permits to measure pulses up to 300 kHz. The count direction can be controlled via the external output UB0+ of the 9-pole female Submin D connector X4 of the back planes.

Socket: B
The “soldering jumpers” at the rear side of the module (visible when mounted) serve for the setting of the counter input:

- All soldering jumpers closed (soldering point): 5 V input (variant B7)
- All soldering jumpers opened: 24 V input (variant B8)

Connections
The module is connected to the periphery via the 9-pole female Submin D connectors X4 and X7 of all back planes, except for the back plane 61.01.0028. Example for the pin assignment, see pages 62 and 63.

Software (Example)
See under “B1/B2 - Incremental Encoder Interface”, page 184.

1.20 B9 - Angle Pulse Input Module, 2-Fold, 5 V/24 V Levels

The module enables the connection of two incremental encoders (second and third measuring system) to the CNC 61.00. An encoder with an output level of 5 V and an encoder with an output level of 24 V can be connected.

Socket: B

Connections
The module is connected to the periphery via the 9-pole female Submin D connectors X4 and X7 of all back planes, except for the back plane 61.01.0028. Example for the pin assignment, see pages 62 and 63.

Software
See under “B1/B2 - Incremental Encoder Interface”, page 184.

1.21 BA - Angle Pulse Input 24 V / Angle Pulse Output 5 V

The module combines the accessory modules B2 (angle pulse input with 24 V level) and B3 (angle pulse output with 5 V level).

Socket: B

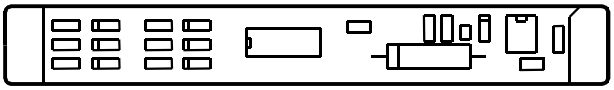
Connection
The module is connected to the periphery via the 9-pole female Submin D connectors X4 and X7 of all back planes, except for the back plane 61.01.0028. Example for the pin assignment, see pages 62 and 63.

Counter frequency at the input: max. 150 kHz

Software (Example)
See under “B1/B2 - Incremental Encoder Interface”, page 184.

1.22 C1 - I/O Expansion Interface

The module expands the I/O range by farther 128 inputs and outputs. However, the I/O Expansion Interface only connects the CNC to the following Basic Module 44.20.012 (page 197) or to the I/O system 50.06, to which input modules 44.20.014 and output modules 44.20.013 can be connected in any order. The latter modules each provide 16 inputs or outputs.



I/O Expansion Interface 026.44.0054

Socket: C

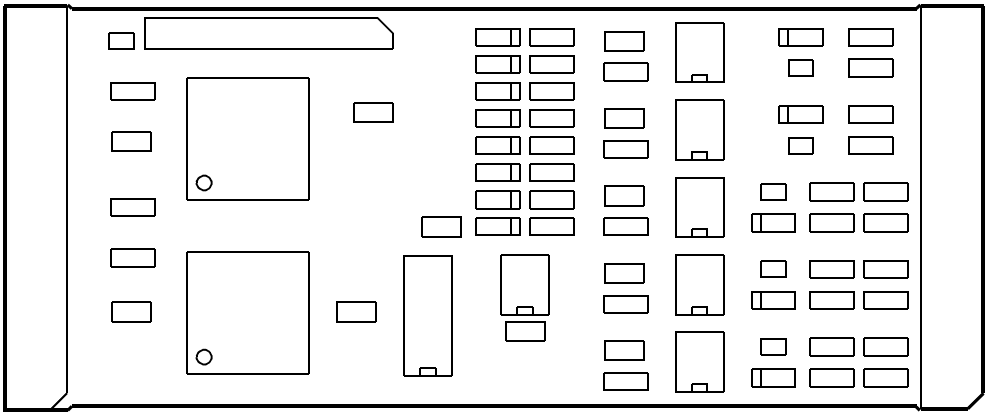
Connection
The module is connected to the periphery via the 9-pole female Submin D connector X3 of all back planes. Example for the pin assignment, page 61.

Software (Example)

```
SET  1, O8 ; set output 8 to 1 (set; 24 V at the output)
           ; 8 is the first output in the external IO area,
           ; since the outputs 0 to 7 are already provided by
           ; the CNC 61.00
```

1.23 C2/C3 - SSI Interface, Angle Pulse Input and IO Expansion

This module combines the modules B1/B2 (incremental encoder) and C1 (IO expansion) with an interface for an absolute value encoder (SSI). SSI encoder systems are used for applications, during which the positions must be recorded. The interface processes all systems, running with max. 25 bits resolution.



SSI Interface, Angle Pulse Input and IO Expansion 026.44.0079A/B

Socket: BC

Difference Between the Modules
The “soldering jumpers” at the rear side of the module (visible when mounted) serve for changing over the input voltage for the angle pulse input.

All soldering jumpers closed (soldering point):	5 V input (code C2)
All soldering jumpers open:	24 V input (code C3)

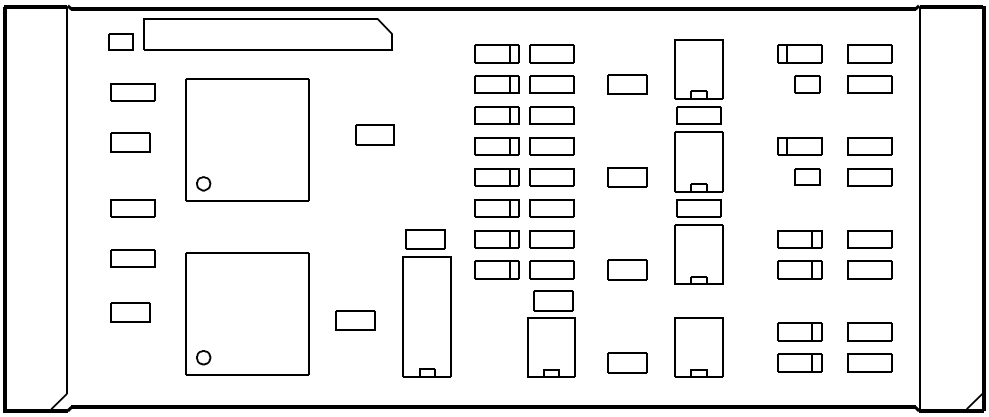
Connection
The module is connected to the periphery via the three 9-pole female Submin D connectors X3, X4 and X7 of all back planes, except for the back plane 61.01.0028. Examples for the pin assignment, pages 61, 62 and 63.

Software (Example)
The subfunction 38 of function 10 permits to read the connected absolute value encoder (SSI encoder). After calling the function the actual encoder value is provided in the numerical accumulator. The value is in the range of -8388608 to 8388607, corresponding to a resolution of max. 2^{24} bits.

```
GET  38
FCT  F10
SET  NA, N_Position_SSI
```

1.24 C4 - SSI Interface, I/O Expansion and Angle Pulse Output 5 V

The module is a variant of the accessory module C2, but with the distinction that an angle pulse output with 5 V level is provided instead of the angle pulse input.



SSI Interface, I/O Expansion and Angle Pulse Output 5 V, 061.01.0035

Socket: BC

Connection
The module is connected to the periphery via the three 9-pole female Submin D connectors X3, X4 and X7 of all back planes, except for the back plane 61.01.0028. Examples for the pin assignment, pages 61, 62 and 63.

Software (Example)
See under “C2/C3 - SSI Interface, Angle Pulse Input and IO Expansion”, page 189.

1.25 D1 - CAN Bus Interface

The CAN Bus Interface cannot be retrofit. That means: It must be ordered along with the CNC 61.00.

The module provides the physical connection to the CAN Bus.

CAN Bus Interface 026.44.0055

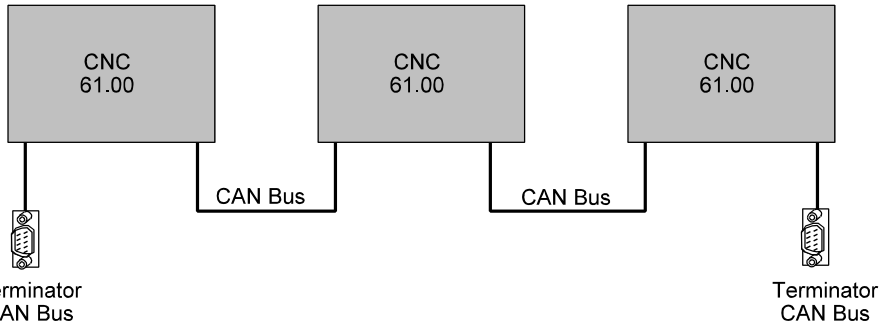
Socket: D
At the rear side of the module (when mounted the visible side) two “soldering jumpers” can be seen. The jumpers whether the module is supplied from the CAN Bus (external supply) or from the CNC 61.00 (internal supply).

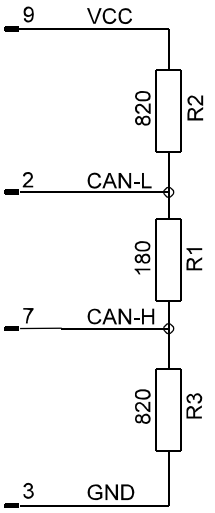
Internal supply: Both soldering jumpers are closed. The CNC 61.00 supplies the CAN Bus module. No connection to the external CAN Bus supply.
External supply: Both soldering jumpers are open. The voltage supply for the CAN Bus module must be made externally.

Connection

Connection of the CAN bus interface to the periphery:

- Multi-axis system
  - via the 9-pole female Submin D connector X11 of the back plane 61.01.0004, page 64, the back plane 61.01.0037, page 79, the back plane 61.01.0053, page 94, the back plane 61.01.0058, page 102 and the back plane 61.01.0060, page 111
  - via the 9-pole Submin D connectors X5 and X6 of the back plane 61.01.0038, pages 85
- Compact system
  - via the 9-pole female Submin D connector X31 of the back plane 61.01.0028, page 129 and the back plane 61.01.0051, page 138
  - via the 9-pole Submin D connectors X5 and X6 of the back plane 61.01.0019, pages 119





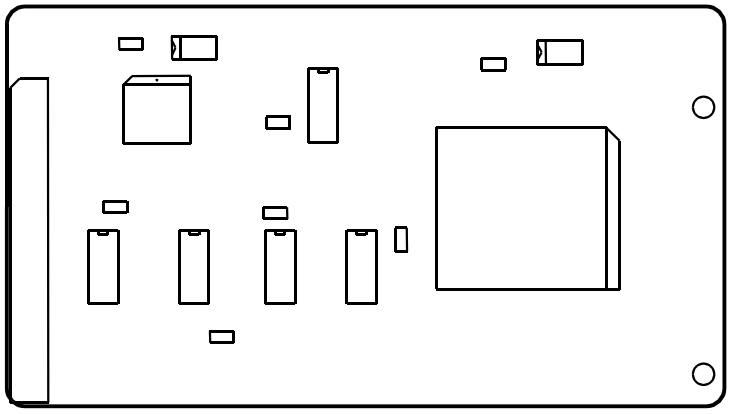
9-pole female/male Submin D connection

The CAN Bus must be closed electrically at both ends. Therefore, a terminator must be put on the connector X5 or X6. The terminator has the design, shown at the left side:

The connection between the separate CAN Bus modules can be made with the cable of order number K51.10.xxx (xxx = length in decimeter).

1.26 E1 - Battery-Buffered RAM and Real Time Clock

The module provides the user with a RAM of 128 kbyte that may be used for the user-specific management. This area is battery-buffered, which means that data are not lost after turning off the supply voltage. Additionally, a real time clock is included that of course also runs after turning off the supply voltage.



Battery-Buffered RAM and Real Time Clock 026.44.0065

Socket: E

Software (Example)

- Access to time/date:
  The two system variables TIME/DATE are provided for the user, permitting to read the actual time or date.

  ```
  SET  TIME, NA    ;transmits the actual time into the accumulator
  ```
  Format: (hour × 65536) + (minute × 256) + seconds = numerical accumulator

  ```
  SET  DATE, NA    ;transmit the actual date into the accumulator
  ```
  Format: (year × 65536) + (month × 256) + day = numerical accumulator

- Access to the battery-buffered RAM:
  TBL4: access byte by byte (8 bits)
  TBL5: access word by word (16 bits)
  TBL6: access to long word (32 bits)
  TBL7: access to true value (64 bits)

```
SET  NA, TBL5[0] ;write the contents of the numerical accu-
                 ;mulator into the field with index 0 of the
                 ;word-oriented table 5(16 bits)
```

1.27 F1 - MODLINK Interface

The CAN Bus Interface cannot be retrofit. That means: It must be ordered along with the CNC 61.00.

This interface is no pluggable card. Alterations are carried out on the mother board 26.44.0041.

The MODLINK bus system serves to build up a network with the CNC 61.00 modules. The structure of the bus is a master/slave system, which means that up to 16 slaves (CNC 61.00) may be connected to the master (e. g. PC). Physically, the MODLINK is a fast serial bus (4 MBits/s) permitting to provide data of the master at all axes synchronously.

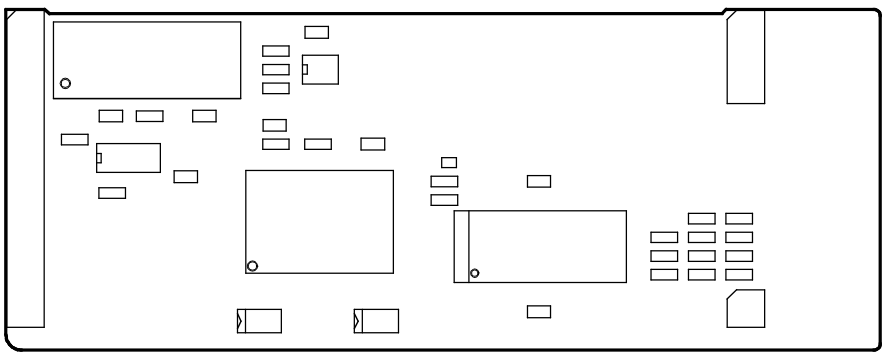
Connections
Connection of the MODLINK interface to the periphery:

- Multi-axis system
  - via the 9-pole Submin D connectors X9 and X10 of the back plane 61.01.0004, pages 63 and 64
  - via the 9-pole Submin D connectors X9 and X10 of the back plane 61.01.0060, pages 110 and 111
  - via the 9-pole Submin D connectors X5 and X6 of the back plane 61.01.0038, pages 85 and 86
- Compact system
  - via the 9-pole Submin D connectors X9 and X10 of the back plane 61.01.0028, pages 128 and 129
  - via the 9-pole Submin D connectors X5 and X6 of the back plane 61.01.0019, pages 119

1.28 G1 - Ethernet Interface

The Ethernet interface cannot be used along with the MODLINK interface (F1), since both modules assign identical hardware resources.

The accessory module G1 provides the Ethernet functions (10BaseT) for the CNC 61.00. The real coupling to the Ethernet then is made with an 8-pole “Western” connector on a prepared back plane.



Ethernet interface 61.01.0042

Socket: G

The soldering jumpers on the module are for test purposes and must not be modified!

Connections
Connection of the Ethernet interface with the periphery:
- Multi-axis system
  - via the 8-pole female Western connector X33 of the back plane 61.01.0053, page 95, the back plane 61.01.0058, page 103 and the back plane 61.01.0060, page 112
- Compact system
  - via the 8-pole female Western connector X33 of the back plane 61.01.0051, page 138 and the back plane 61.01.0057, page 146

Software
The firmware of the CNC 61.00 provides the TCP/IP protocol, see the manual “Software Option Ethernet”.