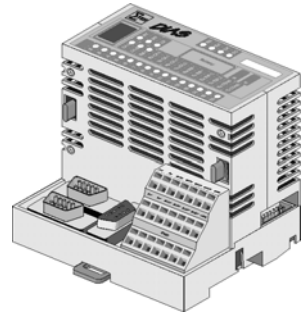


Processor module

DCP 161

The DCP 161 processor module executes the control program and constitutes a major part of the automation system. Since it has no internal power supply, the processor module has to be supplied from a DPS module.



Technical data

Performance data

Processor	INTEL386EX	
Addressable I/O/ P modules	16	
Internal I/O	no	
Instruction execution time	typically 0.3 μ s	minimum 0.094 μ s
Internal program storage (Flash-PROM)	40 kByte	
Internal program storage (SRAM)	112 kByte	
Internal data storage (SRAM)	124 kByte	
Interfaces	1 x CAN 1 x RS 232 1 x RS 232 or RS 422 or RS 485	
Data preservation	Lithium battery	
Status display	yes	
Status LED's	yes	
Real time clock	yes	

Electrical requirements

Supply voltage	+ 5 V DC
Supply voltage current consumption	typically 600 mA
Supply to DIAS bus	via a power supply module DPS001 (Article number: 05-002-001) – no fibre optic cable exit DPS211 (Article number: 05-002-211) – 1 fibre optic cable exit DPS221 (Article number: 05-002-221) – 2 fibre optic cable exits
Current drawn at the DIAS bus (Supply of the I/O/ P modules)	see power supply module

Connection requirements

Required terminal module	DKL 002 (Article number: 05-024-002)															
Mechanical coding	<table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr></table>								1	2	3	4	5	6	7	8
1	2	3	4	5	6	7	8									
Connection technique	21 pole spring terminal strip 3 row D-Sub plug															

Miscellaneous

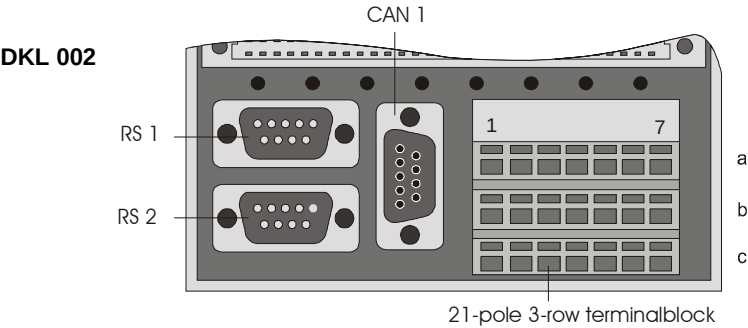
Article number	05-004-161
Module identification at the DIAS Bus	no
Hardware version	1.x
Standardization	UL (E247993)

Environmental conditions

Storage temperature	-20 – +85 °C	
Operating temperature	0 – +60 °C	
Humidity	0 – 95 %, without condensation	
EMV stability	in accordance with EN 50082 part 2 (industrial)	
Resistance to shocks	EN 60068-2-27	150 m/s²
Protective system	EN 60529	IP 20

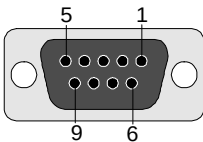
Interfaces

CAN Bus and RS232



Pin assignment for the CAN bus interface

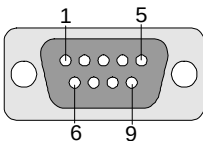
9-pole D-SUB socket



Pin	Function
1	CAN A
2	not assigned
3	not assigned
4	not assigned
5	GND
6	CAN B
7	not assigned
8	not assigned
9	+ 5 V

Pin assignment for the RS232 interface RS1

9-pole D-SUB plug



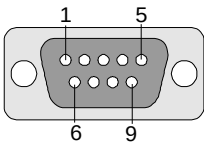
Pin	Function
1	DCD
2	Rx
3	Tx
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

The RS232 interface must be installed with the system call SYS 130, Function 1. The system call SYS 130 also operates the routines for the sending and receiving of data.

Macros are obtainable for the operation of the RS 232 interface!

Pin assignment for the RS232 interface RS2

9-pole D-SUB plug



Pin	Function
1	not assigned
2	Rx
3	Tx
4	not assigned
5	GND
6	not assigned
7	DTR
8	RI
9	not assigned

The RS 232 interface must be installed with the system call SYS 130, Function 20. The system call SYS 130 also operates the routines for the sending and receiving of data.

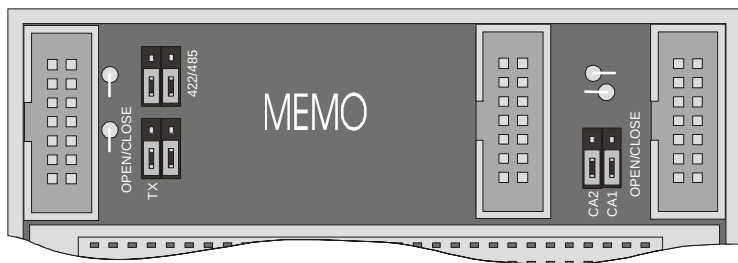
Macros are obtainable for the operation of the RS 232 interface!

Terminal assignment for the 21-pole 3-row spring terminal strip

Terminal	Row a	Row b	Row c
1	not assigned	not assigned	GND
2	not assigned	not assigned	GND
3	CAN A	CAN B	GND
4	CAN A	CAN B	GND
5	not assigned	not assigned	GND
6	not assigned	not assigned	GND
7	+ 24 V/ 1	+ 24 V/ 2	GND

Supply + 24 V/ 1: reserved
Supply + 24 V/ 2: reserved

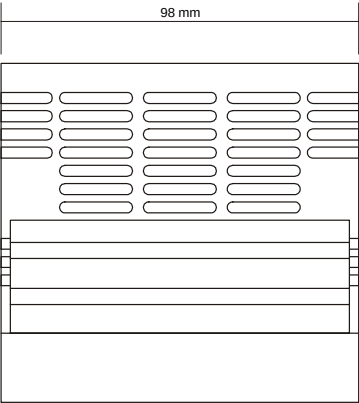
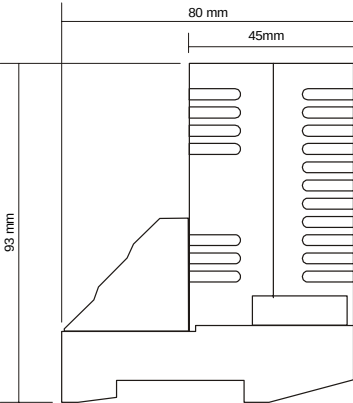
Jumper



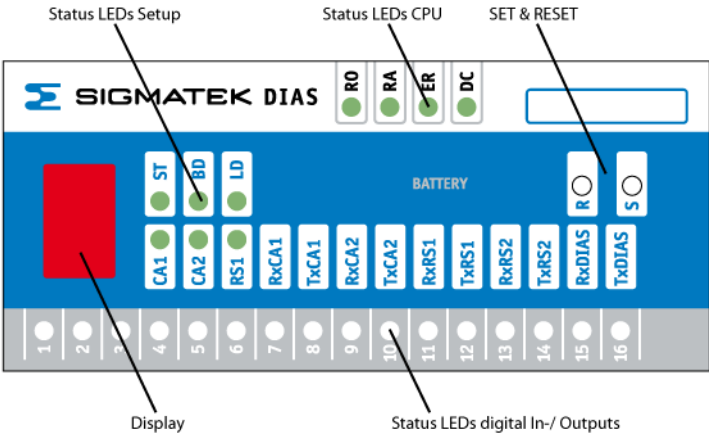
DKL 002

Since the RS2 interface of the dcp 161 is not able to handle RS422/485, the jumpers on the DKL 002 are not assigned.

Mechanical dimensions



Status displays



Status LEDs for the CPU

The status LEDs for the CPU signal the operating status of the processor module.

RO	yellow	Run ROM	Illuminates when the program from the external memory module is executing. Flashes when the program from the internal memory module (Flash-PROM) is executing.
RA	yellow	Run RAM	Illuminates when the program from the internal applications program storage (SRAM) is executing.
ER	red	Error	Flashes when an error has occurred. The error code is displayed in the status line of the PG-Software.
DC	green	DC OK	Illuminates when the supply voltage to the CPU is connected correctly.

Status LEDs for the interfaces

The status LEDs indicate the signal statuses of the interfaces.

LED 7	green	Rx CAN	Illuminates, when data from the CAN bus are being received.
LED 8	yellow	Tx CAN	Illuminates, when data from the CAN bus are being sent.
LED 11	green	Rx RS232 – RS1	Illuminates when data from the RS1 serial interface are being received
LED 12	yellow	Tx RS232 – RS1	Illuminates when data from the RS1 serial interface are being sent
LED 13	green	Rx RS232 – RS2	Illuminates when data from the RS2 serial interface are being received
LED 14	yellow	Tx RS232 – RS2	Illuminates when data from the RS2 serial interface are being sent
LED 15	green	Rx DIAS Bus	Illuminates, when data to the DIAS bus are being received.
LED 16	yellow	Tx DIAS Bus	Illuminates, when data to the DIAS bus are being sent.

The status LEDs setup

Together with the display, the status LEDs show the configuration of the process module.

CA1	red	CAN 1 configuration	Illuminates when the parameters for the CAN 1 are being shown on the display.
CA2	red	CAN 2 configuration	Illuminates when the parameters for the CAN 2 are being shown on the display.
RS1	red	not used	
ST	red	station number	Illuminates when the station number is being shown on the display.
BD	red	baud rate	Illuminates when the baud rate is being shown on the display.
LD	red	not used	

SET and RESET buttons

The push-button R (Reset) is used to trigger a reset at the processor module. The processor module will then display the error „Er 08“. „[08 Reset]“ will be displayed in the PG status line.

The push-button S is used to change the configuration of the processor module. This procedure is described in the CAN bus set-up.

Display

The DCP 161 processor module possesses a 2-digit, decimal display (7 segment display) for the following functions:

- During the configuration of the processor module, the parameters are shown on the display.
- If an error occurs during the execution of the program or if no valid applications program is found, the display will give an error message. In this case „Er“ (= error) and the error code will be repeated alternately. The same error code will also be displayed in the PG status line.
- During execution of the program, the display can be used for displaying digits. For this purpose the data storage D 0001 (system variable **Display**) is used. Valid values are 0 to 255, values over 99 are, however, not displayed and the display remains dark.

CAN BUS setup

In this section it is explained how the CAN bus is correctly configured. For this purpose the following parameters must be set: station number and transmission rate.

CAN Bus station number

Each CAN bus station has its own station number. Under this station number the other bus elements can fetch data from the station and send data to it. It is possible to install up to 31 elements on one CAN bus system. Please note that each station number in the CAN bus system may be allocated only once!

CAN Bus transmission rate

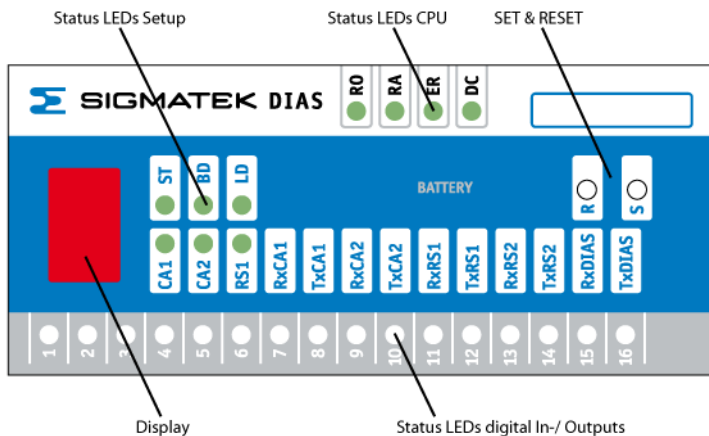
It is possible to set different transmission rates (baud rates) on the CAN bus. The greater the length of the bus line, the smaller the transmission rate must be.

Value	Baud rate	Maximum length
0	615 kBit / s	60 m
1	500 kBit / s	90 m
2	250 kBit / s	200 m
3	125 kBit / s	450 m
4	100 kBit / s	600 m
5	50 kBit / s	1000 m
6	20 kBit / s	1000 m
7	1 Mbit / s	5 m

These values apply to the following cable: 120 Ω , Twisted Pair.

Note: For the CAN bus protocol: 1 kBit/s = 1 kBaud.

Configuration of the processor module



1. Press push-button R (Reset). The currently set parameters will be displayed one after another on the status display on the processor module in the following order:

Station number CAN 1	0 - 30	
Baud rate CAN 1	0 - 6	
Station number CAN 2 *	0 - 30	
Baud rate CAN 2 *	0 - 6	* only with DCP 640, DCP 642, DIP 011

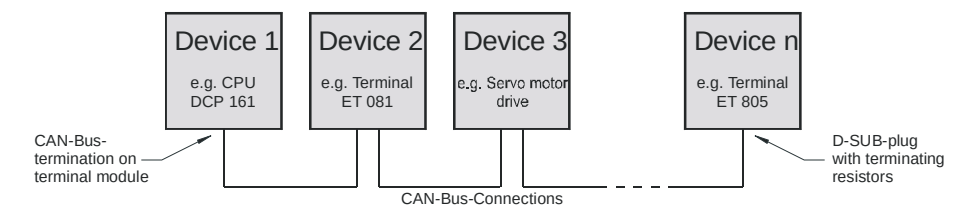
Each of the illuminated status LEDs gives information about the parameter currently shown on the display.

Parameter (e.g.: LEDs CA1 + BD illuminated $\Rightarrow$ the value of the baud rate of the CAN1 bus is being shown on the display).

2. If during this the push-button S (Set) is pressed, the set-up is called. The status LEDs indicate the first parameter to be changed.
3. By brief presses on the push-button S (Set) the value can now be changed. If in the process the highest possible value is reached, the display begins again from the start.
4. To reach the next parameter the push-button S (Set) must be pressed for about 2 seconds. The status LED's indicate the next parameter to be changed.
5. The set-up is terminated by pressing the push-button R (Reset) again. The values will be saved and the processor module will return to normal operation.

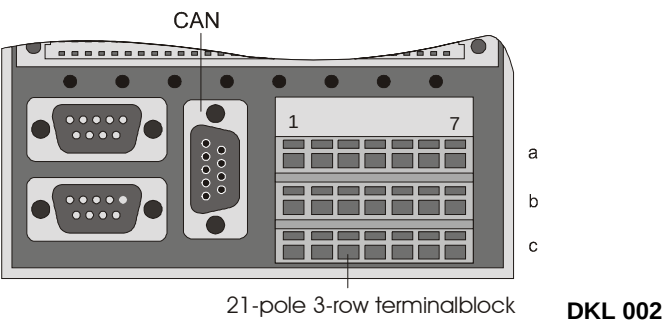
CAN bus termination

On both terminal devices in a CAN bus system the line must be terminated. This is necessary for preventing transmission errors occurring through reflections in the circuit.



If the DCP 161 processor module is one of these terminal devices, the termination can be done by setting a jumper on the terminal module.

On the DKL 002 a jumper is available for each of the CAN1 and the CAN2. The jumper for CAN2 is in this case of no relevance for this processor module.



Buffer battery

The buffer battery takes care of preserving programs and data in the applications program storage (RAM) when the supply voltage is switched off. The lithium battery is fitted in the factory.

The capacity of this battery is sufficient for securing data for a period of 3 years while the supply voltage is turned off.

However, for your own security we recommend exchanging the battery **yearly**.

Order number for the battery: 01-690-027

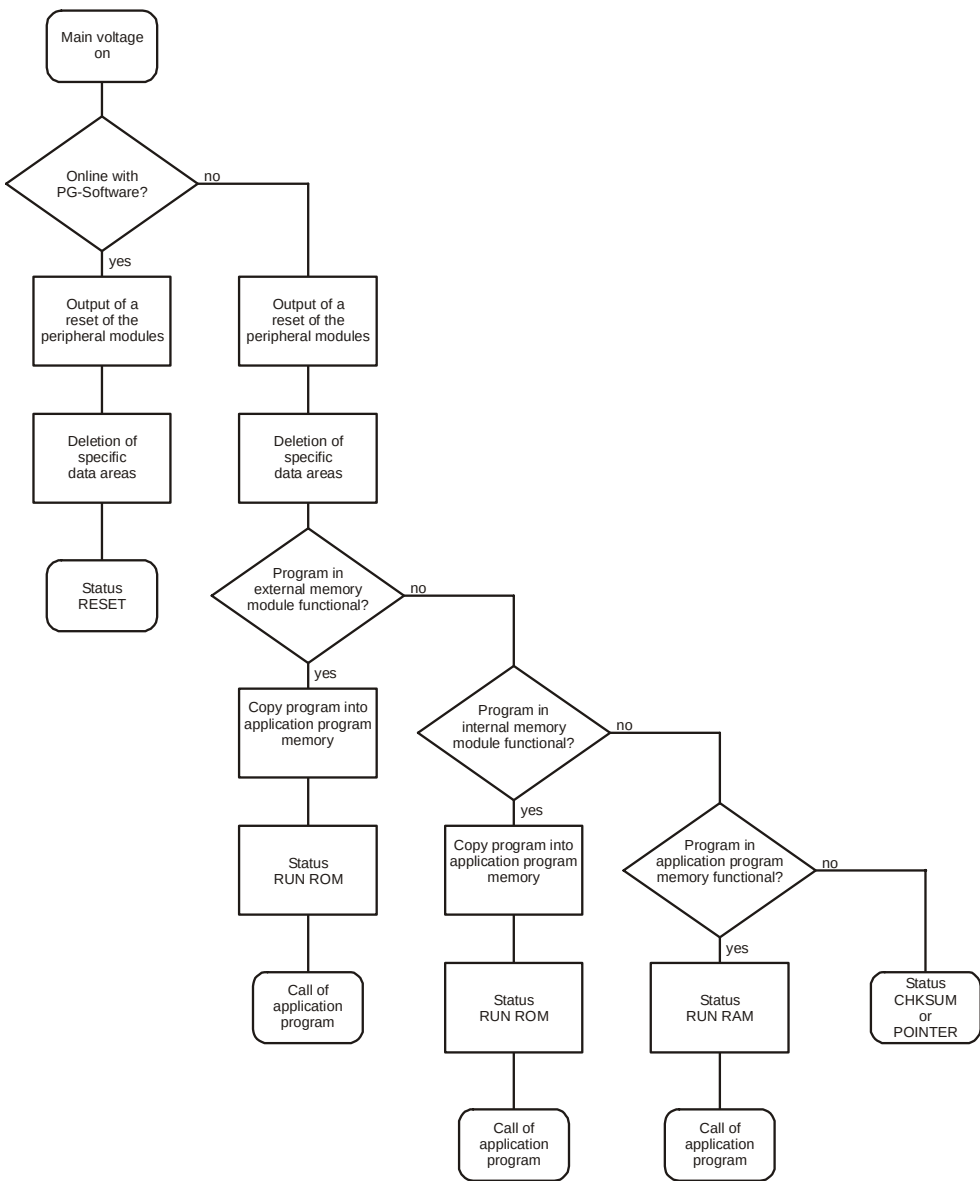
	FIRMA	DATA
Lithium battery	RENATA	3,0 V / 500 mAh

Replace Battery with RENATA, Part No. CR2450N only! Use of another battery may present a risk of fire or explosion!

Caution:

A change of battery may only take place, of course, when the control terminal is **switched on** – otherwise a loss of data occurs!

Switching-on procedure



Status and Error Messages PG50

Number	Message	Meaning	Cause/Solution
00	RUN RAM	The application program is running. The display is not influenced.	
01	RUN ROM	The application program, which is in the application memory modules being run. The display is not influenced.	
02	RUNTIME	The application program was interrupted by an cycle time of an incorrect length (> 100 msec).	Possible Causes: - Too many program loops - Endless loop - Time intensive subroutine Solution: - Correct program error
03	POINTER	Before the application program was run, erroneous program pointers were found.	Possible Causes: - Program memory module missing, is not programmed or is defect - Program in application program memory (RAM) will not run - No longer battery buffered - Software error - application program partially overwritten Solution: - Reprogram program memory module. If error occurs again, replace - Replace battery - Correct program error
04	CHKSUM	Before running the application program, an incorrect checksum was found.	Cause/Solution: see POINTER
05	WATCHDOG	The program was interrupted by the watchdog.	Possible Causes: - Interrupts blocked by application program (Forgotten STI instruction) - Erroneous hardware interrupt programmed. - INB, OUTB, INW or OUTW instruction used incorrectly - Defect processor Solution: - Correct program error - Exchange CPU

06	ERROR		
07	PROM DEFECT	Error occurred programming program memory module.	Causes: - Defect program memory module - Application program too long - Missing program memory module Solution: - Replace program memory module
08	RESET	The CPU has been RESET and is waiting for further instructions. The application program is not processed.	
09	WD DEFECT	The hardware watchdog is defect. The CPU checks the watchdog functions after booting. If an error occurs during this test, the CPU intentionally goes into an endless loop and no longer accepts any instructions.	Solution: - Replace CPU
10	STOP		
11	BUSY PROG	The CPU is currently programming a program memory module with the operating system and application program.	
12	PGM TOO LONG	The program is too long for the type of memory being used.	Solution: - Use a larger program memory module.
13	PROG END	Programming the program memory module has been ended successfully.	
14	PROG EEPROM	The CPU is programming the program memory module now.	
15	STOP BRKPT	The CPU has been stopped by a breakpoint.	
16	CPU HALT	The CPU has been stopped by the PG software (F6 HALT in debugger).	
17	INT ERROR	The CPU has incorrectly generated an interrupt and the application program ended.	Causes: - A non-existent operating system instruction has been used - Stack error (unequal amount of PUSH and POP instructions) - The application program was stopped by a software error Solution: - Correct program error
18	SINGLE STEP	The CPU is in single step mode.	

19	READY	A module or project has been sent to the CPU and it is now ready to be run.	
20	LOAD	Program processing has stopped and the CPU is receiving a module or project.	
21	BAD MODULE	The CPU has received a module that doesn't belong to the project.	
22	MEMORY FULL	During the transfer of a module or project to the CPU, not enough program memory was found.	
23	NOT LINKED	During the CPU start, a module was found to be missing in the program or a module does not belong to the project.	
24	DIV. ERROR	An error has occurred during a division.	Possible Causes: - Division by 0 - Result of a division doesn't fit in the result register Solution: - Correct program error
25	DIAS ERROR	An error has occurred while accessing a DIAS module	Possible Causes: - Module doesn't exist - DIAS Bus error Solution: - Check DIAS Bus - Check termination resistor
26	WAIT	CPU is busy	
27	OP PROG	Reprogramming operating system	
28	OP INSTALLED	Reinstalling operating system	
29	OP TO LONG	Operating system is too long	
30	NO OP -SYSTEM	No operating system	Possible Causes: - The CPU cannot find a valid operating system in memory - The checksum of the operating system has been destroyed Solution: - Reload the operating system with the PG Software
31	SEARCH OP SYS	The Base operating system is looking for a valid operating system	

32	NO MEMORY	External program memory module doesn't exist.	Possible Causes: - An attempt is being made to program an external program memory module although none is installed in the CPU
33	UNUSED CODE	The CPU has received an invalid instruction from the programming software.	
34	MEM ERROR	The operating system does not correspond with the hardware configuration.	
35	MAX. IO's	The maximum number of addressable DIAS modules has been exceeded.	