CPU Module Registers

General Register Survey (all modules)

<table>
<thead>
<tr>
<th>Register Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 .. 20479</td>
<td>24 bit user register</td>
</tr>
<tr>
<td>21000 .. 24999</td>
<td>Slave registers slot 2</td>
</tr>
<tr>
<td>31000 .. 34999</td>
<td>Slave registers slot 3</td>
</tr>
<tr>
<td>41000 .. 44999</td>
<td>Slave registers slot 4</td>
</tr>
<tr>
<td>50200 .. 59999</td>
<td>Network registers</td>
</tr>
<tr>
<td>61440 .. 64999</td>
<td>System / special registers</td>
</tr>
</tbody>
</table>

Operating System (Error) Messages

<table>
<thead>
<tr>
<th>Register Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>61477</td>
<td>Operating system errors (special flags 2136 .. 2143)</td>
</tr>
<tr>
<td></td>
<td>If 61477 ≠ 0 ERR-LED (red) lights</td>
</tr>
<tr>
<td></td>
<td>bit1 = 1 illegal branch destination for GOTO or CALL. Task was broken</td>
</tr>
<tr>
<td></td>
<td>bit2 = 1 actual instruction would cause stack overflow. Task was broken</td>
</tr>
<tr>
<td></td>
<td>bit3 = 1 actual instruction would cause stack underflow. Task was broken</td>
</tr>
<tr>
<td></td>
<td>bit4 = 1 no user program or CRC error</td>
</tr>
<tr>
<td></td>
<td>bit5 = 1 OPC error</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Register Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>61478</td>
<td>Operating system errors, messages</td>
</tr>
<tr>
<td></td>
<td>bit1 = 1 digital output error</td>
</tr>
<tr>
<td></td>
<td>bit2 = 1 RTC identified</td>
</tr>
<tr>
<td></td>
<td>bit3 = 1 RTC battery Ok</td>
</tr>
<tr>
<td></td>
<td>bit4 = 1 battery for register RAM soon exhausted</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Register Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>61530</td>
<td>Task number of OPC error</td>
</tr>
<tr>
<td>61952</td>
<td>Run time user program in s</td>
</tr>
<tr>
<td>61953</td>
<td>Controller run time since reset in s</td>
</tr>
<tr>
<td>61954</td>
<td>Controller run time in user time base units</td>
</tr>
<tr>
<td>61955</td>
<td>Controller run time since reset in ms</td>
</tr>
<tr>
<td>62977</td>
<td>Operating system version * 100</td>
</tr>
</tbody>
</table>

Task Control

<table>
<thead>
<tr>
<th>Register Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>61449</td>
<td>Priority task</td>
</tr>
<tr>
<td>61467</td>
<td>Task switch conditions (special flags 2056 .. 2063)</td>
</tr>
<tr>
<td></td>
<td>Task switch always if</td>
</tr>
<tr>
<td></td>
<td>o DELAY</td>
</tr>
<tr>
<td></td>
<td>o USERINPUT</td>
</tr>
<tr>
<td></td>
<td>o WHEN (not fulfilled)</td>
</tr>
<tr>
<td></td>
<td>and also if</td>
</tr>
<tr>
<td></td>
<td>o flag 2056 AND task switch time out (61804)</td>
</tr>
<tr>
<td></td>
<td>o flag 2057 AND GOTO</td>
</tr>
<tr>
<td></td>
<td>o flag 2058 AND IF (not fulfilled)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Register Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>61474</td>
<td>Multitasking Control (special flags 2112 .. 2119)</td>
</tr>
<tr>
<td></td>
<td>bit0 = 0 SYMPAS, LCD operation before TASK0</td>
</tr>
<tr>
<td></td>
<td>bit0 = 1 SYMPAS, LCD before each task</td>
</tr>
<tr>
<td></td>
<td>bit5 = 0 N-SEND-REGISTER, N-GET-REGISTER are interrupted</td>
</tr>
<tr>
<td></td>
<td>bit5 = 1 N-SEND-REGISTER, N-GET-REGISTER are not interrupted</td>
</tr>
</tbody>
</table>

User Interface Control (LCD Displays)

<table>
<thead>
<tr>
<th>Register Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>61448</td>
<td>Display language, 0 = german, 1 = english</td>
</tr>
<tr>
<td>61451</td>
<td>Field width for floating point register display</td>
</tr>
<tr>
<td>61452</td>
<td>Number of places behind point</td>
</tr>
<tr>
<td>61453</td>
<td>Field width for integer register display</td>
</tr>
<tr>
<td>61454</td>
<td>Flush left number display</td>
</tr>
<tr>
<td>61455</td>
<td>Field width USERINPUT</td>
</tr>
<tr>
<td>61461</td>
<td>Delimiter to end of line character</td>
</tr>
<tr>
<td>61462</td>
<td>Clear display character</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Register Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>61472</td>
<td>Monitor function restriction, 0=disable, 1=enable</td>
</tr>
<tr>
<td></td>
<td>bit0 = 0 R, I/O key without monitor function (but sets flag)</td>
</tr>
<tr>
<td></td>
<td>bit1 = 1 R key with monitor function</td>
</tr>
<tr>
<td></td>
<td>bit2 = 0 R key without monitor function</td>
</tr>
<tr>
<td></td>
<td>bit2 = 1 R key with flag input function</td>
</tr>
<tr>
<td></td>
<td>bit3 = 0 R, I/O key without output number input</td>
</tr>
<tr>
<td></td>
<td>bit3 = 1 R, I/O key with output number input</td>
</tr>
<tr>
<td></td>
<td>bit4 = 0 key can not change register content</td>
</tr>
<tr>
<td></td>
<td>bit4 = 1 key changes register content</td>
</tr>
<tr>
<td></td>
<td>bit5 = 0 key can not change flags</td>
</tr>
<tr>
<td></td>
<td>bit5 = 1 key changes flags</td>
</tr>
<tr>
<td></td>
<td>bit6 = 0 key can not change outputs</td>
</tr>
<tr>
<td></td>
<td>bit6 = 1 key changes outputs</td>
</tr>
<tr>
<td></td>
<td>bit7 = 0 key has no access to inputs</td>
</tr>
<tr>
<td></td>
<td>bit7 = 1 key display input state</td>
</tr>
</tbody>
</table>
User interface keys (special flags 2160 .. 2223)
User interface LED (special flags 2224 .. 2239)
Absolute cursor position cp=0 for DISPLAY_TEXT and DISPLAY_REG
Absolute cursor position cp=0 for USER_INPUT
Display time of monitor functions
Text selection for DISPLAY_TEXT_2
0 = text 1, 1 = text 2
First by LCD changeable register - range 1
Last by LCD changeable register - range 1
First by LCD changeable register - range 2
Last by LCD changeable register - range 2
First by LCD changeable register - range 3
Last by LCD changeable register - range 3
First by LCD changeable flag
Last by LCD changeable flag
max time for user input, default=0 (disabled)
Number of characters per line
Number of lines
Number of characters (61488 * 61489)

Programming (PC) Interface Control
Programming interface baud rate (0 .. 15)
Initialized by 63238 at power-up
Baud rate pointer programming interface (EEPROM, see 62990).

User Program Status
bit0 = 0 user program stopped
bit0 = 1 user program runs
Flip switch position at power-up:
Stop = 0, Run = 2, Load = 1
Current flip switch position:
Stop = 0, Run = 2, Load = 1

Network Control
Network number
Time until response (ms)
Network instruction time
Timeout time network access
Indirect network number
50000er offset for inputs
50000er offset for outputs
50000er offset for flags
50000er offset for registers
Number checksum errors network receiving
Network 1 number
Baud rate network 1
Network 1 number at power-up (EEPROM)
Baud rate index network 1 (EEPROM, see 62990)

Network Interface 2 / PRIM Interface Control
Receiving buffer level
Transmission buffer level
Interface status
bit0 = 1 lost one or more characters during receiving
bit1 = 1 stop bit error
bit2 = 1 parity error
bit3 = 1 bit 0 to 2 is or was not 0
bit4 = 1 receiving buffer overflow
bit5 = 1 transmission buffer overflow
Master timeout
Configuration
bit0 = 0=PRIM, 1=net 2
bit1 reserved
bit2 = 0=1, 1=2 stop bit
bit3 = 0=7, 1=8 bit per character
bit5,4 = 00 = no parity
01 = prohibited
10 = odd parity
11 = even parity
bit7,6 = 0 = RS232
01 = RS485 (4 wire)
10 = RS422
11 = RS485 (2 wire)
Default: PRIM, RS232, 8N1, 9600 baud
Baudrate

Controller Board Access (SV, SM, PID)
Flag 2105 = 1 indicates an error
Save process access error: slot number –1
Save process access error: axis number –1
Save process access error: register number

Timer Registers
Number of timer registers
Task timer registers
User time base in ms
Time base for START-TIMER, TIMER-END?

Real Time Clock Control
RTC buffer, no access to RTC
RTC direct, transfer of all registers
Seconds
Minutes
Hours
24 hour format 0, 12 hour format:
RTC configuration (EEPROM)

\[ \text{bit0} = 1 \ \text{summer/winter time enabled} \]
\[ \text{bit1} = 0 \ \text{am/pm format} \]
\[ 1 \ \text{24 hour format} \]

Floating Point Registers

Floating Point Registers

General registers

Bitcode of slots and plugged-in boards

Single channel counter (digital input IN2)

Combined Inputs

8 Combined Inputs

24 Combined Inputs
Combined Outputs

8 Combined Outputs

62720 Outputs 101..108
62721 Outputs 109..116
62722 Outputs 117..124
62723 Outputs 125..132
62724 Outputs 133..140
62725 Outputs 141..148
62726 Outputs 149..156
62727 Outputs 157..164
62728 Outputs 201..208
62729 Outputs 209..216
62730 Outputs 217..224
62731 Outputs 225..232
62732 Outputs 233..240
62733 Outputs 241..248
62734 Outputs 249..256
62735 Outputs 257..264
62736 Outputs 301..308
62737 Outputs 309..316
62738 Outputs 317..324
62739 Outputs 325..332
62740 Outputs 333..340
62741 Outputs 341..348
62742 Outputs 349..356
62743 Outputs 357..364
62744 Outputs 401..408
62745 Outputs 409..416
62746 Outputs 417..424
62747 Outputs 425..432
62748 Outputs 433..440
62749 Outputs 441..448
62750 Outputs 449..456
62751 Outputs 457..464

16 Combined Outputs

62784 Outputs 101..116
62785 Outputs 109..124
62786 Outputs 117..132
62787 Outputs 125..140
62788 Outputs 133..148
62789 Outputs 141..156
62790 Outputs 149..164
62791 Outputs 157..164
62792 Outputs 201..216
62793 Outputs 209..224
62794 Outputs 217..232
62795 Outputs 225..240
62796 Outputs 233..248
62797 Outputs 241..256
62798 Outputs 249..264
62799 Outputs 257..264
62800 Outputs 301..316
62801 Outputs 309..324
62802 Outputs 317..332
62803 Outputs 325..340
62804 Outputs 333..348
62805 Outputs 341..356
62806 Outputs 349..364
62807 Outputs 357..364
62808 Outputs 401..416
62809 Outputs 409..424
62810 Outputs 417..432
62811 Outputs 425..440
62812 Outputs 433..488
62813 Outputs 441..456
62814 Outputs 449..464
62815 Outputs 457..464

24 Combined Outputs

62848 Outputs 101..124
62849 Outputs 109..132
62850 Outputs 117..140
62851 Outputs 125..148
62852 Outputs 133..156
62853 Outputs 141..164
62854 Outputs 149..164
62855 Outputs 157..164
62856 Outputs 201..224
62857 Outputs 209..232
62858 Outputs 217..240
62859 Outputs 225..248
62860 Outputs 233..256
62861 Outputs 241..264
62862 Outputs 249..264
62863 Outputs 257..264
62864 Outputs 301..324
62865 Outputs 309..332
62866 Outputs 317..340
62867 Outputs 325..348
62868 Outputs 333..356
62869 Outputs 341..364
62870 Outputs 349..364
62871 Outputs 357..364
62872 Outputs 401..424
62873 Outputs 409..432
62874 Outputs 417..440
62875 Outputs 425..448
62876 Outputs 433..456
62877 Outputs 441..464
62878 Outputs 449..464
62879 Outputs 457..464

Overlay Flag-Registers

0 256..279
1 280..303
... 2032..2047
Servo / DIMA Module Registers

Register Number Pattern

\[
\begin{align*}
\text{xyz} & \quad x \text{ is slot number 2, 3, 4} \\
y & \quad y \text{ is axis number 1, 2, 3, 4, (42)} \\
z & \quad z \text{ is register number 0 .. 999}
\end{align*}
\]

Axis Number Pattern

\[
\begin{align*}
\text{xy} & \quad x \text{ is slot number 2, 3, 4} \\
y & \quad y \text{ is axis number 1 axis 1} \\
1 & \quad 1 \\
2 & \quad 2 \\
3 & \quad 3 \\
4 & \quad 4 \\
(42)axs & \quad (42)
\end{align*}
\]

xy000 Status register

- bit0: referenced
- bit1: AXARR position was reached
- bit2: actual position in destination window
- bit3: tracking error recognized
- bit4: negative limit switch active
- bit5: positive limit switch active
- bit6: reference switch active
- bit7: software limit switch was active
- bit8: limit switch was active
- bit9: position controller active
- bit10: 'control after AXARR active
- bit11: motion controller active
- bit12: reference run error
- bit13: BUSY (only for commands 9 to 12, 42)
- bit14: software limit switch active
- (write access activates the function)
- bit15: reserved
- bit16: axis within stop ramp
- bit17: do not deactivate on tracking error
- (write access activates the function)
- bit18: found no print mark
- bit19: only DIMA: amplifier error
- bit20: only DIMA: resolver error
- bit21: only DIMA: overheat motor
- bit22, 23: reserved
- bit24: Command register
- 0: AXARR with stop ramp
- 1: Activate and release all controllers
- 2: cancel controller release
- 3: set reference
- 4: clear reference
- 5: AXARR with position control
- 6: AXARR without position control
- 7: activate position control after AXARR
- 8: deactivate position control after AXARR
- 9: automatic reference run, -> +, rec. ref
- 10: automatic reference run, -> -, rec. ref
- 11: automatic reference run, -> +, ign. ref
- 12: automatic reference run, -> -, ign. ref
- 13: output 10V (for test purposes)
- 14: deactivate command 13
- 15: global axis activation
- 16: global axis deactivation
- 17: relative positioning
- 18: absolute positioning
- 19: continuebreaked relative positioning
- 20: activate positioning with start input
- 21: deactivate positioning with start input
- 22: activate halt at reference point
- 23: deactivate halt at reference point
- 24: annex next interpolation
- 25: combine circle and linear interpolation
- 26: activate print mark recognition
- 27: deactivate print mark recognition
- 28 .. 31: reserved
- 32: 33: axis is slave
- 34: axis 4 is slave, only both axes of the module are slaves
- 35: axis 4 is slave, both axes of the module are slaves and there are external slaves
- 36: axis 4 is master, only axis 3 of the master module and external axis are slaves
- 37: axis 4 is master, only axis 1 of the master module and external axis are slaves
- 38: activate follower
- 39: deactivate follower
- 40: activate follower by table
- 41: activate follower by factor/divisor
- 48: right rotation direction
- 49: left rotation direction
- 50: optimize distance
- 51: deactivate commands 48 to 50
- 52: endless positioning in positive direction
- 53: endless positioning in negative direction
- 54: analog speed acquisition
- 55: analog speed acquisition
- 56: Nominal position
- 57: Nominal speed
- 58: Input polarities
- 59: Start ramp
- 60: Stop ramp
- 61: Destination window
- 62: Digital offset
- 63: Actual position
- 64: P gain of position controller
- 65: Nominal speed of the position controller
- 66: Actual speed
- 67: Positive software limit switch
- 68: Negative software limit switch
- 69: Digital analog offset
- 70: Number of encoder lines
- 71: Maximum speed of servo/motor combination
- 72: Tracking error
- 73: Tracking error threshold
- 74: Reference value for register xy003
- 75: Relation user/encoder resolution
- 76: SAV: Selection of LED meaning
- 77: DIMA: Number of pole pairs
- 78: P gain of digital speed loop
- 79: Nominal current
- 80: I coefficient speed loop
- 81: Current limitation of speed loop
- 82: Current I coefficient of speed loop
- 83: I coefficient limitation of speed loop
- 84: Nominal position axis 1 of master module
- 85: Nominal position axis 2 of master module
- 86: Nominal position external slave
- 87: Nominal position external slave
- 88: Actual position of the external axis for calculation of the diagonal
- 89: Actual position of the external axis for calculation of the diagonal
- 90: Length of software axis
- 91: Center axis 1
xy042  Center axis 2
xy045  Nominal angle of circle interpolation
xy046  Calculated radius of circle interpolation
xy047  Calculated start angle
xy048  Calculated arc length
xy1049  Calculated destination position axis 1
xy3050  Calculated destination position axis 2
xy051  Adaptation of maximum speed to data axis
xy052  Adaptation of different encoder resolutions
xy053  Pointer to table element
xy054  Value of table element
xy055  Number of table elements
xy056  Factor master to slave
xy057  Divisor master to slave
xy058  Positive maximum position of master
xy059  Negative maximum position of master
xy060  Increase limitation of follower
xy061  Print mark position
xy062  Print mark tolerance
xy063  Maximum print mark correction
xy064  Encoder word width
xy065  Offset for reference position
xy066  Bit mask word width
xy067  Relative position for positioning with start input
xy068  Last nominal position of relative mode
xy1082  Counter - path parts
xy1083  Level register memory
xy085  Absolute maximum position
x1098  Mode selection
  bit0 = 0  analog speed loop
  bit0 = 1  digital speed loop (DIMA always 1)
  bit1 = 0  S/V3 mode
  bit1 = 1  SV4 mode
  bit2 = 0  cam function OFF (special function)
  bit2 = 1  cam function ON (special function)
x1099  Version number
PID Controller Module Registers

**Register Number Pattern**

`xyzz`  
- `x` is slot number 2,3,4  
- `y` is axis number 1,2,3,4,(42)  
- `z` is register number 0 .. 999  

`xy000`  
- **Status register**  
  - bit0: controller1 0=off 1=on  
  - bit1: controller2 0=off 1=on  
  - bit2: controller3 0=off 1=on  
  - bit3: controller4 0=off 1=on  
  - bit4: out1,2: 0=ana 1=PWM  
  - bit5: out3,4: 0=ana 1=PWM  
  - bit6: alarm PWM out 0=off 1=on  
  - bit7: cont1: current <2mA on 4-20mA inp  
  - bit8: cont2: current <2mA on 4-20mA inp  
  - bit9: cont3: current <2mA on 4-20mA inp  
  - bit10: cont4: current <2mA on 4-20mA inp  
  - bit11..23 reserved  

`xy001`  
- **Command register**  
  - 1: activate controller  
  - 2: deactivate controller  
  - 3: clear I coefficient  
  - 4: activate PWM+  
  - 5: deactivate PWM+  
  - 6: activate PWM-  
  - 7: deactivate PWM-  
  - 8: auto calibration  
  - 12: deactivate controller, controlled variable remains  
  - 13: set I coefficient to `xy017`  

`xy002`  
- Nominal value  

`xy003`  
- P gain  

`xy004`  
- Adjustment time `T_i` (I coefficient)  

`xy005`  
- Rate time `T_d` (D coefficient)  

`xy006`  
- Sample time T  

`xy007`  
- I limitation  

`xy008`  
- Increase limitation  

`xy010`  
- PWM period time  

`xy011`  
- Assignment input - controller  

`xy012`  
- Assignment output - controller  

`xy017`  
- Output value, direct  

`xy018`  
- I coefficient  

`xy019`  
- Output value (normalized, scaled)  

`xy020`  
- Threshold - controller activation  

`x1023`  
- Number of activable controller (global)  

`x1030`  
- Software version  

`x1041`  
- Status register  

`x1048`  
- Actual value (normalized, scaled)  

`x1051`  
- Number of activable controller (global)  

`x1058`  
- Actual value, direct  

`x1061`  
- Input configuration  

`x1068`  
- Output configuration  

**DA-Module Registers**

Plug DA-Module into submodule slot Modul 3  

`x3011` (Output 1) .. `x3058` (Output 8)  
- x is slot number (2 .. 8)  
- Value range: ±32767

**AD-Module Registers**

Plug AD-Module into submodule slot Modul 3  

`x1061` ..  
- input configuration  
- Single ended `-20 .. +20mA`  
- `xy017` (Output 1) .. `xy018` (Output 8)  
- x is slot number (2 .. 8)  
- Value range: ±32767

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PID Coef.</td>
<td>-10 .. +10V</td>
</tr>
<tr>
<td>PWM+ Coef.</td>
<td>-20 .. +20mA</td>
</tr>
<tr>
<td>PWM- Coef.</td>
<td>4 .. 20mA</td>
</tr>
<tr>
<td>Threshold</td>
<td>10 .. +10V</td>
</tr>
</tbody>
</table>

7
Programming Language

Instructions

ACTUAL_POS AP
AXARR AX
BIT_CLEAR BC
BIT_SET BS
CALL CA
CLEAR_FLAGS CF
COPY CO
DELAY DE
DISPLAY_REG DR
DISPLAY_TEXT DT
ELSE E
FLAG F
GOTO G
IF IF
IN IN
LABEL LA
LIMITS LI
NET_GET_REGISTER_NG
NETSEND_REGISTER_NS
NOT NO
NOP NP
OR OR
OUT OU
POS PO
REG RE
REG_CLEAR RC
REG_DEC RD
REG_INC RI
REGISTER_LOAD RL
REGISTER_ZERO_RZ
RETURN RT
START_TIMER S
TASKBREAK TB
TASKCONTINUE TC
TIMER_END? TE
TASKRESTART TR
THEN TH
USER_INPUT UI
WAND WA
WHEN WH
WHEN_MAX WM
WOR WD
WXOR WX

Numbers:

- Binary number NB
- Decimal number ND
- Hexadecimal number NH

Terminal Description

1. CPU Module Terminals

1.1 Power Supply

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>TxD</td>
<td>RS232</td>
</tr>
<tr>
<td>3</td>
<td>RxD</td>
<td>RS232</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td></td>
</tr>
</tbody>
</table>

1.2 Connection to PC, VIADUKT

PC (9 pin Sub-D female)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>TxD</td>
<td>RS232</td>
</tr>
<tr>
<td>3</td>
<td>RxD</td>
<td>RS232</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td></td>
</tr>
</tbody>
</table>

1.3 Connection to the LCD

LCD - RS232 (15 pin Sub-D female)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>TxD</td>
<td>RS232</td>
</tr>
<tr>
<td>3</td>
<td>RxD</td>
<td>RS232</td>
</tr>
<tr>
<td>4</td>
<td>+24V</td>
<td>Power supply</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td></td>
</tr>
</tbody>
</table>

LCD - Open Collector (15 pin Sub-D female)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>TxD</td>
<td>Open collector</td>
</tr>
<tr>
<td>12</td>
<td>RxD</td>
<td>Open collector</td>
</tr>
<tr>
<td>4</td>
<td>+24V</td>
<td>Power supply</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td></td>
</tr>
</tbody>
</table>

Input Terminal Block

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0V</td>
<td>Gnd</td>
<td>Logic</td>
</tr>
<tr>
<td>24V</td>
<td>24VDC</td>
<td>Logic</td>
</tr>
</tbody>
</table>

Output Terminal Block

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0V</td>
<td>Gnd</td>
<td>Supply of outputs</td>
</tr>
<tr>
<td>24V</td>
<td>24VDC</td>
<td>Supply of outputs</td>
</tr>
</tbody>
</table>
### 1.4 Network Connection

#### Net 1 - RS485 (9 pin Sub-D female)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>D+</td>
<td>RS485</td>
</tr>
<tr>
<td>9</td>
<td>D-</td>
<td>RS485</td>
</tr>
<tr>
<td>5</td>
<td>RTS+</td>
<td>RS485</td>
</tr>
<tr>
<td>6</td>
<td>RTS-</td>
<td>RS485</td>
</tr>
<tr>
<td>1</td>
<td>+5V</td>
<td>Power supply</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td></td>
</tr>
</tbody>
</table>

#### Net 2 - RS485 (9 pin Sub-D female)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>D+</td>
<td>RS485</td>
</tr>
<tr>
<td>9</td>
<td>D-</td>
<td>RS485</td>
</tr>
<tr>
<td>5</td>
<td>RTS+</td>
<td>RS485</td>
</tr>
<tr>
<td>6</td>
<td>RTS-</td>
<td>RS485</td>
</tr>
<tr>
<td>1</td>
<td>+5V</td>
<td>Power supply</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td></td>
</tr>
</tbody>
</table>

**ATTENTION**

All mass connections (Gnd) are attached to the controller internal mass connections, the controller housing and the housings of the Sub-D connectors.

#### Net 2 - RS422 and RS485 4 wire (9 pin Sub-D female)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>SDA</td>
<td>RS422, RS485</td>
</tr>
<tr>
<td>8</td>
<td>SDB</td>
<td>RS422, RS485</td>
</tr>
<tr>
<td>6</td>
<td>RDA</td>
<td>RS422, RS485</td>
</tr>
<tr>
<td>5</td>
<td>RDB</td>
<td>RS422, RS485</td>
</tr>
<tr>
<td>1</td>
<td>+5V</td>
<td>Power supply</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td></td>
</tr>
</tbody>
</table>

#### Net 2 - RS232 (9 pin Sub-D female)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>TxD</td>
<td>RS232</td>
</tr>
<tr>
<td>3</td>
<td>RxD</td>
<td>RS232</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td></td>
</tr>
</tbody>
</table>

**ATTENTION**

All mass connections (Gnd) are attached to the controller internal mass connections, the controller housing and the housings of the Sub-D connectors.

#### 1.5 Digital Inputs and Outputs

On the left side are the digital inputs, on the right side are the digital outputs. Both, inputs and outputs are numbered from 1 to 16.

#### 1.6 LED Description

IN1 .. 16 digital inputs
OUT1 .. 16 digital outputs
RUN lights: operating system runs, user program runs
blinking: operating system runs, user program was stopped
10

ERR1 operating system error; The error state is in register 61477. The user program can access to this error state.

PC CARD reserved

ERR2 digital output driver: overload, overtemperature, cable break one or more outputs.

24V external supply of the 24V digital outputs.

1.7 Switch Description

RUN Position
The user program is executed. The switch position is only evaluated at power-on not during operation.

STOP Position
The user program is not executed after power-on. The switch position is only evaluated at power-on not during operation.

LOAD Position
This switch position is used for operating system download. The operating system can be read via PC interface or from a PC Card.

2. Servo Module Terminals

2.1 Power Supply

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0V</td>
<td>Gnd</td>
<td>Logic</td>
</tr>
<tr>
<td>24V</td>
<td>24VDC</td>
<td>Logic</td>
</tr>
</tbody>
</table>

Input Terminal Block

Output Terminal Block

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0V</td>
<td>Gnd</td>
<td>Supply of outputs</td>
</tr>
<tr>
<td>24V</td>
<td>24VDC</td>
<td>Supply of outputs</td>
</tr>
</tbody>
</table>

2.2 Servo Amplifier Connection

9 pin Sub-D female

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Speed nominal value</td>
<td>-10V..+10V</td>
</tr>
<tr>
<td>8</td>
<td>Gnd for 9</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Gnd for encoder</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Release (relay)</td>
<td>Contact1</td>
</tr>
<tr>
<td>4</td>
<td>Release (relay)</td>
<td>Contact2</td>
</tr>
</tbody>
</table>

2.3 Connection to incremental or absolute encoder

15 pin Sub-D female

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd for encoder</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>KD+</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>KD-</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>K1+, D+(SSI)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>K1-, D-(SSI)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>K2+</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>K2-</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>SSI clock -</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>SSI clock +</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>5 VDC</td>
<td>Power supply</td>
</tr>
</tbody>
</table>

2.4 Digital Inputs and Outputs

On the left side are the digital inputs, on the right side are the digital outputs. Both, inputs and outputs are numbered from 1 to 16.
2.5 Limit and Reference Switches

The limit respectively the reference switches are connected to the digital inputs.

### Digital Inputs

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input 1</td>
<td>Limit + axis 1</td>
<td>Limit switch</td>
</tr>
<tr>
<td>Input 2</td>
<td>Limit - axis 1</td>
<td>Limit switch</td>
</tr>
<tr>
<td>Input 3</td>
<td>Reference axis 1</td>
<td>Reference switch</td>
</tr>
<tr>
<td>Input 4</td>
<td>Limit + axis 2</td>
<td>Limit switch</td>
</tr>
<tr>
<td>Input 5</td>
<td>Limit - axis 2</td>
<td>Limit switch</td>
</tr>
<tr>
<td>Input 6</td>
<td>Reference axis 2</td>
<td>Reference switch</td>
</tr>
</tbody>
</table>

2.6 LED Description

Following states are indicated if register x1023 = 0:
- S1: Positive limit switch axis 1 is or was active
- S2: Axis 1 reached position (LED lights when axis 1 reaches the destination window and extinguishes when a new position is started)
- S3: Negative limit switch axis 1 is or was active
- S4: Positive limit switch axis 3 is or was active
- S5: Axis 3 reached position (LED lights when axis 3 reaches the destination window and extinguishes when a new position is started)
- S6: Negative limit switch axis 3 is or was active
- S7: Reserved
- S8: Reserved

The limit switch LED have different indication modes:
- Continuous light: Axis stands at the limit switch, the limit switch is active
- Equal blinking: The limit switch was active, is not active and no new positioning was started
- Unequal blinking: The software limit switch was triggered

Following states are indicated if register x1023 = 1:
- S1: Voltage at the K0 input of axis 1 (positive means LED on)
- S2: Voltage at the K1 input of axis 1
- S3: Voltage at the K2 input of axis 1
- S4: Voltage at the K0 input of axis 3
- S5: Voltage at the K1 input of axis 3
- S6: Voltage at the K2 input of axis 3
- S7, S8: Reserved

IN1 .. 16: Digital inputs
OUT1 .. 16: Digital outputs
ERR2: Digital output driver: overload, overtemperature, cable break one or more outputs
3. DIMA Module Terminals

2.1 Power Supply

- **Input Terminal Block**
  - Terminal: 0V, 24V
  - Signal: Gnd, 24VDC
  - Meaning: Logic, Logic

- **Output Terminal Block**
  - Terminal: 0V, 24V
  - Signal: Gnd, 24VDC
  - Meaning: Supply of outputs, Supply of outputs

2.2 Resolver Connection

9 pin Sub-D female

2.3 Connection to the amplifier

26 pin Sub-D female

Pin 1 to pin 18 of the two cable connectors correspond directly to its counterparts of the other connector.

2.4 Digital Inputs and Outputs

On the left side are the digital inputs, on the right side are the digital outputs. Both, inputs and outputs are numbered from 1 to 16.

2.5 Limit and Reference Switches

The limit respectively the reference switches are connected to the digital inputs.

2.6 LED Description

Following states are indicated if register x1023 = 0

- **Limit Switches**
  - S1: positive limit switch axis 1
  - S2: axis 1 reached position
  - S3: negative limit switch axis 1
  - S4: positive limit switch axis 3
  - S5: axis 3 reached position

- **Digital Outputs**
  - OUT1 .. 16: digital outputs
  - ERR2: digital output driver: overload, overtemperature, cable break one or more outputs
  - 24V: external supply of the 24V digital outputs

**IN1 .. 16**: digital inputs

24V external supply of the 24V digital outputs

S1 positive limit switch axis 1 is or was active
S2 axis 1 reached position (LED lights when axis 1 reaches the destination window and extinguishes when a new position is started)
S3 negative limit switch axis 1 is or was active
S4 positive limit switch axis 3 is or was active
S5 axis 3 reached position (LED lights when axis 3 reaches the destination window and extinguishes when a new position is started)
The limit switch LED have different indication modes:
- **Continuous light:** the axis stands at the limit switch, the limit switch is active.
- **Equal blinking:** the limit switch was active, is not active and no new positioning was started.
- **Unequal blinking:** the software limit switch was triggered.

Following states are indicated if register x1023 = 1:
- **S1 reserved**
- **S2 voltage at the K0 input of axis 1** (positive means LED on)
- **S3 voltage at the K1 input of axis 1**
- **S4 voltage at the K2 input of axis 1**
- **S5 voltage at the K0 input of axis 3**
- **S6 voltage at the K1 input of axis 3**
- **S7 voltage at the K2 input of axis 3**
- **S8 reserved**
## 4. AD-Submodule

### 4.1 Analogue Inputs

**Voltage Inputs Differential - 15 pin Sub-D female**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>2</td>
<td>IN1</td>
<td>Single Ended 1</td>
</tr>
<tr>
<td>3</td>
<td>IN2</td>
<td>Single Ended 2</td>
</tr>
<tr>
<td>4</td>
<td>IN3</td>
<td>Single Ended 3</td>
</tr>
<tr>
<td>5</td>
<td>IN4</td>
<td>Single Ended 4</td>
</tr>
<tr>
<td>6</td>
<td>IN5</td>
<td>Single Ended 5</td>
</tr>
<tr>
<td>7</td>
<td>IN6</td>
<td>Single Ended 6</td>
</tr>
<tr>
<td>8</td>
<td>IN7</td>
<td>Single Ended 7</td>
</tr>
<tr>
<td>9</td>
<td>IN8</td>
<td>Single Ended 8</td>
</tr>
<tr>
<td>10</td>
<td>nc</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>+15V</td>
<td>Power supply 5mA</td>
</tr>
<tr>
<td>12</td>
<td>-15V</td>
<td>Power supply 5mA</td>
</tr>
<tr>
<td>13</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>14</td>
<td>nc</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>nc</td>
<td></td>
</tr>
</tbody>
</table>

**Voltage Inputs Single Ended - 15 pin Sub-D female**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>2</td>
<td>IN1</td>
<td>Single Ended 1</td>
</tr>
<tr>
<td>3</td>
<td>IN2</td>
<td>Single Ended 2</td>
</tr>
<tr>
<td>4</td>
<td>IN3</td>
<td>Single Ended 3</td>
</tr>
<tr>
<td>5</td>
<td>IN4</td>
<td>Single Ended 4</td>
</tr>
<tr>
<td>6</td>
<td>IN5</td>
<td>Single Ended 5</td>
</tr>
<tr>
<td>7</td>
<td>IN6</td>
<td>Single Ended 6</td>
</tr>
<tr>
<td>8</td>
<td>IN7</td>
<td>Single Ended 7</td>
</tr>
<tr>
<td>9</td>
<td>IN8</td>
<td>Single Ended 8</td>
</tr>
<tr>
<td>10</td>
<td>nc</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>+15V</td>
<td>Power supply 5mA</td>
</tr>
<tr>
<td>12</td>
<td>-15V</td>
<td>Power supply 5mA</td>
</tr>
<tr>
<td>13</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>14</td>
<td>nc</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>nc</td>
<td></td>
</tr>
</tbody>
</table>

**Current Inputs Differential - 9 pin Sub-D female**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>2</td>
<td>IN1</td>
<td>Differential input 1/1</td>
</tr>
<tr>
<td>3</td>
<td>IN2</td>
<td>Differential input 2/1</td>
</tr>
<tr>
<td>4</td>
<td>IN3</td>
<td>Differential input 3/1</td>
</tr>
<tr>
<td>5</td>
<td>IN4</td>
<td>Differential input 4/1</td>
</tr>
<tr>
<td>6</td>
<td>IN5</td>
<td>Differential input 1/2</td>
</tr>
<tr>
<td>7</td>
<td>IN6</td>
<td>Differential input 2/2</td>
</tr>
<tr>
<td>8</td>
<td>IN7</td>
<td>Differential input 3/2</td>
</tr>
<tr>
<td>9</td>
<td>IN8</td>
<td>Differential input 4/2</td>
</tr>
<tr>
<td>10</td>
<td>nc</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>+15V</td>
<td>Power supply 5mA</td>
</tr>
<tr>
<td>12</td>
<td>-15V</td>
<td>Power supply 5mA</td>
</tr>
<tr>
<td>13</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>14</td>
<td>nc</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>nc</td>
<td></td>
</tr>
</tbody>
</table>

**Current Inputs Single Ended - 9 pin Sub-D female**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>2</td>
<td>IN1</td>
<td>Input 1, pin 5 to Gnd</td>
</tr>
<tr>
<td>3</td>
<td>IN2</td>
<td>Input 2, pin 4 to Gnd</td>
</tr>
<tr>
<td>4</td>
<td>IN3</td>
<td>Input 3, pin 3 to Gnd</td>
</tr>
<tr>
<td>5</td>
<td>IN4</td>
<td>Input 4, pin 2 to Gnd</td>
</tr>
</tbody>
</table>

**Current Inputs Single Ended - 9 pin Sub-D female**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>2</td>
<td>nc</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>4</td>
<td>IN1</td>
<td>Input 1, pin 5 to Gnd</td>
</tr>
<tr>
<td>5</td>
<td>IN2</td>
<td>Input 2, pin 4 to Gnd</td>
</tr>
<tr>
<td>6</td>
<td>IN3</td>
<td>Input 3, pin 3 to Gnd</td>
</tr>
<tr>
<td>7</td>
<td>IN4</td>
<td>Input 4, pin 2 to Gnd</td>
</tr>
</tbody>
</table>

**Analogue Outputs - 15 pin Sub-D female**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>2</td>
<td>nc</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>IOUT1</td>
<td>Current output 4</td>
</tr>
<tr>
<td>4</td>
<td>IOUT2</td>
<td>Current output 3</td>
</tr>
<tr>
<td>5</td>
<td>IOUT3</td>
<td>Current output 2</td>
</tr>
<tr>
<td>6</td>
<td>IOUT4</td>
<td>Current output 1</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>9</td>
<td>Gnd</td>
<td>Power supply ground</td>
</tr>
<tr>
<td>10</td>
<td>nc</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>VOUT1</td>
<td>Voltage output 4</td>
</tr>
<tr>
<td>12</td>
<td>VOUT2</td>
<td>Voltage output 3</td>
</tr>
<tr>
<td>13</td>
<td>VOUT3</td>
<td>Voltage output 2</td>
</tr>
<tr>
<td>14</td>
<td>VOUT4</td>
<td>Voltage output 1</td>
</tr>
<tr>
<td>15</td>
<td>nc</td>
<td></td>
</tr>
</tbody>
</table>

Description to input numbering $x/y$

$x/   => channel number
$y/   => Differential input line 1 or 2

## 5. DA-Submodule