

**Operation Manual
MP 100 / MP 110
Micropos
Hydraulics**



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1. Notes on this manual

1.1 How to use this manual

This manual covers technical data and properties of the digital positioning controller MP100 in the versions:

MP100.751 (Digital position acquisition)

MP100.751.SY (Digital position acquisition, synchronous run)

MP100.851 (Analogue position acquisition)

MP100.851 (Analogue position acquisition, synchronous run)



This user manual contains safety instructions which have to be observed!

In case of questions, please contact your dealer.

Inappropriate use of this product may cause damages to the valves or other pieces of equipment or products.

Make sure, the CE-Regulations are met by the complete system. Depending on the application, other national regulations, like UL or DIN, have to be met as well.

Strictly observe safety precautions VDE0100, VDE0113, VDE0160; EN50178 and the accident prevention regulations of your employer's liability insurance. Other regulations may apply.

1.2 Signs and Symbols



This sign indicates a risk of injury, if the instructions are not strictly observed.



This sign indicates a risk of damage to the product or other pieces of equipment, if the instructions are not strictly observed.



This sign indicates tips and useful information for easier handling of the product.

1.3 Changes

The information in this document are subject to changes without proclamation. The manufacturer accepts no liability in case of errors in this manual.

1.4 Copyright

© All rights reserved. No part of this manual may be reproduced or transferred, in no form or with any means, neither electronic nor on mechanical way, including photo copying, or by any information logging system, without previous written permission by the manufacturer.

1.5 Conclusion

There may be working functions in the controller which are not described in this manual. However, there are no claims to this functions for new delivered or repaired parts.

We have checked this manual with the hard- and software. Yet there might be differences. We appreciate all suggestions for improvement.

2. General

The Positioning Module is designed for:

- all closed-loop positioning applications
- tasks requiring high precision and dynamic response
- incremental and absolute feedback devices (MP100.751)
- analogue feedback devices (potentiometers) (MP100.851)
- synchronous operation applications (MP100.xxx.SY)
- use in a coupled system

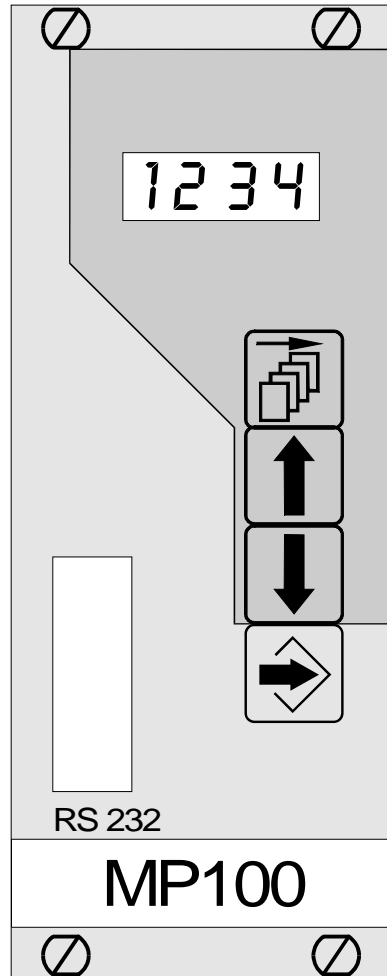
Features:

- operation and programming directly through the membrane keypad or the serial interface (RS232C)
- online interface (RS232C) for computer link
- modern SMD technology
- a 16-bit microprocessor assures high performance and dynamic response
- external outputs for selecting operating mode
- signal level for in- and outputs: 24 V DC
- supply voltage: 24 V DC
- plug-in single Euro-card



Wiring and start-up of this device may be done by trained personnel only. Read the manual carefully. Note especially the installation requirements and notes for initial start-up. Non-adherence to the instructions will result in loss of warranty and liability on the part of the manufacturer.

3. Front view (front keypad)



Menu
key

"Forward"
key

"Back"
key

Memory
key

4. Operating modes overview

Automatic:

Automatic execution of stored program data.
Positioning can be done as desired either using the programmed velocity, or a preset positioning time.

Automatic single:

Each parameter set (positioning operation) must be started individually.

Automatic profile:

In this operating mode, up to 3 parameter sets can be linked in a chain and executed after just one start.

Automatic cycle:

After one start, a complete program is executed. (program set and profiles)

Analogue setpoint:

The axle continuously follows a analogue setpoint as long as a automatic operating mode is selected. This functions is activated be parameter "APOS".

Jogging:

Travel to any desired position by pressing the keys on the front plate or with external inputs. With external inputs, movement may take place in both rapid traverse and at creep speed.

Go to home position:

Automatic search for or travel to the reference (home) point (only when a relative measurement system is used).

Program input:

Password-protected programming of the setpoint length, speed, programmable machine function output and waiting time.

Parameter assignment:

Password-protected setting of machine-specific parameters.

Tool correction:

Password-protected setting of a tool correction.

5. Selecting operating modes

The operating modes can be selected by configuring the inputs as follows:

Input 1 Automatic cycle (d 32)	Input 2 Automatic single (d 30)	Input 3 Go to home position (d 28)	Operating mode
--	--	24 V	Go to home position
0 V	24 V	0 V	Automatic single
24 V	0 V	0 V	Automatic cycle
24 V	24 V	0 V	Automatic profile
0 V	0 V	0 V	Jogging ¹⁾ Program input Parameter assignment Tool correction

1) Select using menu key. Activating the external jog inputs switches the unit over to jog mode.

6. Operating mode functions

6.1 Automatic

Automatic mode can only be selected externally (see 5. Selecting operating modes).

When a parameter set, profile or cycle has been started, the programmed parameter sets are executed in numerical order. Once the program has ended, the machine would begin with the first set, if restarted. A different start set can be enforced by means of the "Parameter set call up" inputs.

When a positioning operation has been completed, the "In position" output is switched.

When the end of a program is reached (parameter set with speed "0"), the "Program end" output is switched.

An interruption at the "Stop" input means that current positioning operations are discontinued. After the machine has been stopped, the parameter set can be continued using "Travel remaining distance", or the program can be re-started (parameter "SPAR").

As an alternative to running a program according to programmed velocities, positioning can be done using a constant positioning time. This results in an automatic velocity compensation (see 6.5.1 Parameter level 1: basic functions).

6.1.1 Automatic single set

A rising edge at the "Start" input causes a parameter set to be executed.

By means of the "Parameter set call-up" inputs, it is possible to choose which parameter set is to be executed next. Here, the machine must be started again.

6.1.2 Automatic single set profile

A rising edge at the "Start" input causes the next parameter set to be executed. A set with dwell time "0" is combined with the following set to form a profile. A maximum of 3 sets may be combined to form profiles in this manner. A profile is treated like a single positioning operation, whereby if the programmed speed of the following set is lower than the preceding one, positioning takes place without an intermediate stop.

The "Parameter set call-up" inputs are used to choose which parameter set (or profile) is to be executed next. This is done by assigning the number of the first set of the desired profile.

6.1.3 Automatic cycle

A positive pulse edge at the "Start" input means that the program is executed until the end of the program is reached. As with the automatic profile, parameter sets with dwell time "0" are combined to form profiles which are then treated as individual positioning operations.

The "Parameter set call-up" inputs are used to choose which program is to be executed next. This is done by assigning the number of the first set of the desired program. Here, each program must contain a set with speed "0" as the end of the program, before the next program is started in the memory.




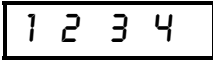
6.1.4 External parameter set call-up table

Set	Input 9 S1 (d 16)	Input 10 S2 (d 14)	Input 11 S4 (d 12)	Input 12 S8 (d 10)	Input 6 S16 (d 22)	Input 16 S32 (z10)
--	0 V	0 V	0 V	0 V	0 V	0 V
1	24 V	0 V	0 V	0 V	0 V	0 V
2	0 V	24 V	0 V	0 V	0 V	0 V
3	24 V	24 V	0 V	0 V	0 V	0 V
4	0 V	0 V	24 V	0 V	0 V	0 V
5	24 V	0 V	24 V	0 V	0 V	0 V
6	0 V	24 V	24 V	0 V	0 V	0 V
7	24 V	24 V	24 V	0 V	0 V	0 V
8	0 V	0 V	0 V	24 V	0 V	0 V
9	24 V	0 V	0 V	24 V	0 V	0 V
10	0 V	24 V	0 V	24 V	0 V	0 V
11	24 V	24 V	0 V	24 V	0 V	0 V
12	0 V	0 V	24 V	24 V	0 V	0 V
13	24 V	0 V	24 V	24 V	0 V	0 V
14	0 V	24 V	24 V	24 V	0 V	0 V
15	24 V	24 V	24 V	24 V	0 V	0 V
16	0 V	0 V	0 V	0 V	24 V	0 V
17	24 V	0 V	0 V	0 V	24 V	0 V
18	0 V	24 V	0 V	0 V	24 V	0 V
19	24 V	24 V	0 V	0 V	24 V	0 V
20	0 V	0 V	24 V	0 V	24 V	0 V
21	24 V	0 V	24 V	0 V	24 V	0 V
22	0 V	24 V	24 V	0 V	24 V	0 V
23	24 V	24 V	24 V	0 V	24 V	0 V
24	0 V	0 V	0 V	24 V	24 V	0 V
25	24 V	0 V	0 V	24 V	24 V	0 V
26	0 V	24 V	0 V	24 V	24 V	0 V
27	24 V	24 V	0 V	24 V	24 V	0 V
28	0 V	0 V	24 V	24 V	24 V	0 V
29	24 V	0 V	24 V	24 V	24 V	0 V
30	0 V	24 V	24 V	24 V	24 V	0 V
31	24 V	24 V	24 V	24 V	24 V	0 V
32	0 V	0 V	0 V	0 V	0 V	24V
...
63	24 V	24 V	24 V	24 V	24 V	24V

6.2 Jogging

The operating-mode inputs 1 (d 32), 2 (d 30) and 3 (d 28) must be switched to 0 V. Next, the jogging operating mode is selecting using the menu key on the front panel (see 5. Selecting operating modes)

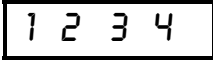
6.2.1 Jogging using the keypad

	Select operating mode
	
	Jog forward/backward at creep speed. Pressing the keys briefly means that a constant distance is travelled (parameter "STST").
	The display changes to operating status display (see 0
	Status and actual value display)

6.2.2 Jogging, external input

Here, jogging is preset via the inputs "Jog forward" and "Jog backward". As long as these inputs are actuated, the axis is travelled at creep speed.

If the "Jog fast" input is actuated at the same time, the machine proceeds in rapid traverse.

	The display changes to operating status display (see 0
	Status and actual value display)

6.3 Go to home zero position

Homing has priority over all other operating modes. When the "home position" input is actuated, the go to home position operating mode is selected and started immediately. The operating mode changes only when an axis is motionless.

Once home position is reached, the position value is set to "0" and the output "In position" is activated.

The functional sequence is determined by the setting of parameter "REFP" (see parameter lists).

6.3.1 Go to home position with absolute feedback devices

Go to home position in block (parameter "REFP": 18 - 21):

The axis searches in the specified direction at home search speed. Once the home signal is reached (e.g. pressure switch), movement is stopped.

Go to zero position (parameter "REFP": 0 - 17,22)

The system goes to the absolute zero position (feedback device null + home offset).

6.3.2 Go to home position with incremental feedback devices

Go to home position with home signal and transducer zero pulse (parameter "REFP": 0 - 7):

The axis travels to the home signal at home search speed. Upon reaching the home signal, the axis moves away from it and searches for the first incremental transducer zero point at positioning speed. Next, the axis makes a home offset run.

Go to home position with home signal only (parameter "REFP": 8 - 15):

If there is no incremental transducer zero point, the axis searches for the end of the home signal. Next, the axis makes a home offset run.

Go to home position with transducer zero pulse only (parameter "REFP": 16 or 17):

If there is no home signal, the axis searches for the incremental transducer zero point at home search speed. Next, the axis makes a home offset run.

Go to home position in block (parameter "REFP": 18 - 21):

The axis searches in the specified direction at home search speed. Once the home signal is reached (e.g. pressure switch), movement is stopped. Next, the axis makes a home offset run.

6.3.3 Reset to zero

Setting parameter "REFP": 22

A positive pulse edge at the "Reference switch" input sets the position value to "0". Resetting to zero is only possible when the machine is motionless. The programmed dimensions are based on this zero point. The "In position" output is not switched.

6.4 Status and actual value display

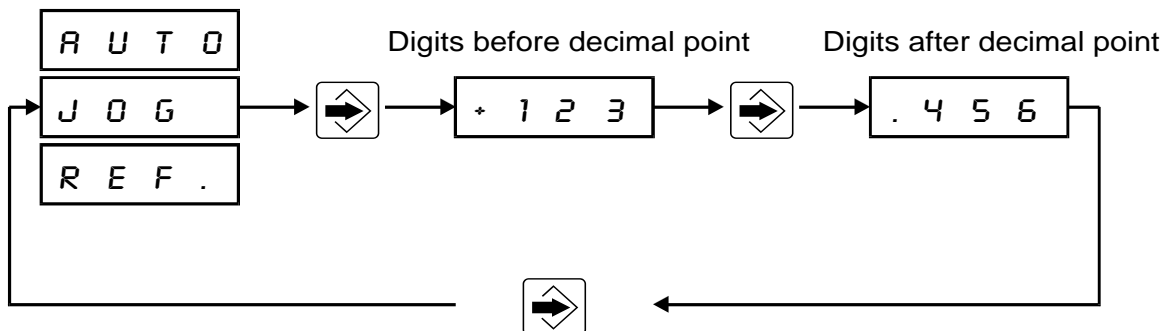
A status and actual value display may be activated in the automatic, jog and go to home position modes.

The following values may be selected for display (see parameter lists):

- Actual position
- Following error
- Current parameter set call up
- Drift offset

The required display is selected by means of parameter "INDV".








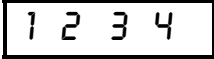



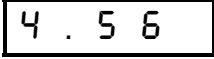





Example: Display of actual position



6.5 Parameter entry

Parameter entry is protected by a password.

Example:

		Select operating mode
		Confirm
		Confirm password prompt
		Enter password (see 15 Passwords)
		Confirm password. If the password is correct, the display switches to the first parameter.
		Abbreviated text for parameter. If this is not confirmed within 5 s, a full text scrolls down the screen.
		Confirm: The currently set value is displayed.
		Enter value
		Confirm entry
		Further entries
		or
		quit parameter assignment

Cursor keys:
Move up or down to other parameters

6.5.1 Parameter level 1: basic functions

No	Name	Description	Default	Actual
2	SSPE	Creep speed (jog) Input range: 0.01 - 320 m/min	2	
3	JACC	Jog acceleration Input range: 30 - 5000 ms	400	
4	STST	Travel when entering by keypad in jog mode Input range: 0 - 1000 increments	10	
5	SPAR	Stop parameters 0 = No error message at stop. Travel remaining distance upon new start. 1 = Stop with error message (re-start program)	0	
6	STOP	Stop in case of error 0 = Ramp stop 1 = Emergency stop	0	
7	POST	Positioning time ¹⁾²⁾ Input range: 0 - 9999 ms	0	
8	TIME	Time-out monitoring 0 = monitoring on 1 = monitoring off	0	

6.5.2 Parameter level 2: regulator parameters

No	Name	Description	Default	Actual
10	MAXS	Maximum feed-rate Input range: 0.01 - 320 m/min	10	
11	AACC	Automatic mode acceleration (ramp time) Input range: 30 - 5000 ms	300	
12	ADEC	Automatic mode acceleration ²⁾ Input range: 30 - 5000 ms	300	
13	CURV	Ramp shape 0 = Linear 1 = Sinusoidal ²	0	
14	POSW	Window for position Input range: 0.001 - 32.00 mm	0.05	
15	LGER	Window for permissible following error Input range: 0.1 - 999 mm	10.0	
16	GLA	Loop gain for position control Input range: 0.01 - 99.9 m/min/mm	1.00	
19	DPT1	Delay time of PT1 control *) input range: 0 – 100ms	0	

6.5.3 Parameter level 3: axis parameters

No	Name	Description	Default	Actual
20	INTR	Resolution of digits before decimal point Input range: 1 - 9999 incr./mm	100	
21	DECR	Resolution of digits after decimal point Input range: .000 - .999 incr./mm	0	
22	DIRC	Count direction 0 = Normal 1 = Inverted	0	
23	SDIR	Direction of system control 0 = Normal 1 = Inverted	0	
24	LIM+	Maximum travel "+" 0 = Travel range monitor switched off. Input range: ± 9999 mm If the travel range is exceeded in automatic mode, the movement will not be executed.	0	
25	LIM-	Maximum travel "-" Input range: ± 9999 mm (see parameter LIM+)	0	
26	RECO	Enabling switch 1) Input range: 0 - 2	0	
27	LENG	Dimension type 2) 0 = Absolute 1 = Relative (incremental dimension) 2 = Relative with display reset to zero at starting position	0	

6.5.4 Parameter level 4: reference parameters

No	Name	Description	Default	Actual
30	RESS	Home search speed Input range: 0.01 - 320 m/min	4	
31	REPS	Home positioning speed Input range: 0.01 - 320 m/min	2	
32	OFSI	Home offset, zero displacement digits before decimal point Input range: ± 9999 mm	0	
33	OFSD	Home offset, zero displacement digits after decimal point Input range: .000 - .999 mm	0	
34	REFP	Home parameters Input range: 0 - 22	2	
35	REFC	Auto home 0 = Monitor switched off 1 = Error message when automatic mode is selected, when machine has not yet travelled to home position	1	

6.5.5 Parameter level 5: Position acquisition parameters

No	Name	Description	Default	Actual
40	INDV	Displayed value 0 = Actual position (mm) 1 = Following error in increments 2 = Current parameter-set number 3 = Drift offset in steps of 4.88 mV	0	
41	NODP	Number of decimal places Input range: 1 - 3	3	
43	OVRTD	Output pulse duration for the outputs "In position" and "End of program" 0 = Static signal 1 - 250 = Pulse duration in ms	0	
45	IMNO	Module number (RS 232) Input range: 1 - 99	1	
46	R232	RS232 configuration Input range: 0 - 11	8	
48	D/E/F	Language 0 = German 1 = English 2 = French	0	

- 1) See 6.5.9 Explanation of coded parameters
- 2) Parameter for synchronous slave module not available
- 4) Power must be cycled to activate changes

6.5.6 Parameter level 6: Measurement system

No	Name	Description	Default	Actual
50	MESS	Feedback device 0 = Incremental measurement system 1 = Absolute SSI measurement system (Gray code) 2 = Absolute SSI measurement system (Binary) Ultrasonic (magnetostrictive) measurement systems 3 = Balluff (25 µm system resolution) 4 = Balluff (50 µm system resolution) 5 = MTS (25 µm system resolution) 6 = MTS (50 µm system resolution)	0	
51	SSI	Length of data word for SSI transducer (only when parameter "MESS" = 1 or 2) Input range: 8 – 31		

6.5.7 Parameter level 8: Synchronous run parameters

No	Name	Description	Default	Actual
70	SYLE	Synch monitor Input range: 0.000 - 32.0 mm	1.00	
71	GLS	Synch gain Input range: 0.000 - 99.9	0.5	
72	SYPI	Type of synch controller 0 = P controller 1 = I controller	0	
73	SLAV	Number of connected slave modules Input range: 0 - 3	1	
74	APOS	Analogue position default ¹⁾ 0 = Off 1 = 0 - 10 V 2 = ± 10 V The travel range is scaled by the travel range limits (see parameter "LIM+" and "LIM-").	0	
75	SDIF	Max. Deviation from master 0 = off input range: 0 – 9999mm	0	

6.5.8 Parameter level 9: Hydraulic parameters

No	Name	Description	Default	Actual
80	DRIF	Drift compensation 0 = Jog 1 = Automatic	0	
81	DOFS	Drift offset (only effective when parameter "DRIF" = 0) Input range: ± 400 Offset voltage = Input value * 4,88 mV.	0	
83	BULB	Area ratio adjustment 0 = switched off Attenuation: -0,99 ... - 0,01: Negative Valve setpoint -0,01 ... 0,99: Positive Valve setpoint	0	
84	VALV	Valve type 0 = Servo solenoid valve 1 = Proportional vale, Overlap compensation can be adjusted	0	
85	NONL	Correction of vlave flow curve 1 = Valve with dual gain 40% 2 = Valve with dual gain 60%	0	
86	COMP	Compensated range Input range: 0 – 500mV	0	
87	COMG	Compensation gain The gradient of the overlap compensation within the compensation range.	1	

- 1) See 6.5.9 Explanation of coded parameters
- 2) Parameter for synchronous slave module not available
- 3) Power must be cycled to activate changes

6.5.9 Explanation of coded parameters

6.5.9.1 Resolution of measurement systems

The resolution (in./mm) can be entered as a 7-digit number. For this purpose, parameters "INTR" and "DECR" have to be programmed.

Example: Spindle drive with incremental rotary encoder

Encoder resolution 1024 increments/resolution. Display slide position.

Display and programming in mm, leadscrew pitch 10 mm, i.e. 1024 increments (1 turn) correspond to 10 mm travel.

Resolution: $1024 * 4 \text{ increments}/10 \text{ mm} = 409.6 \text{ increments/mm}$
(factor of 4 due to internal 4x interpolation)

Parameter "INTR": 409

Parameter "DECR": .600

Example: Spindle drive with SSI rotary encoder

Encoder resolution 4096 increments/resolution. Display slide position.

Display and programming in millimetres, spindle pitch 20 mm, i.e. 4096 increments correspond to 20 mm travel.

Resolution: $4096 \text{ increments}/20 \text{ mm} = 204.8 \text{ increments/mm}$

Parameter "INTR": 204

Parameter "DECR": .800

Example: Linear drive with magnetostrictive encoder

Waveguide speed 2881 m/s (see encoder specification / nameplate)

Resolution: 120 000/waveguide speed in m/s

Parameter "INTR": 41

Parameter "DECR": .652

Example: Positioning with linear potentiometer

Resolution: 16384/Potentiometer total stroke in mm

6.5.9.2 Enable switch

The "RECO" parameter is used to set the function of the loop control and the relay output "Enable Contact". Interrupting the "Enable" input stops the axis.

- 0: The analogue output is set to 0 V and the relay output "Enable Contact" is switched off. No loop control is carried out. When switched on again, the current actual position is read.
- 1: Functions like 0 above. The relay output "Enable Contact" remains switched on.
- 2: Loop control and the relay output "Enable Contact" remain switched on.

6.5.9.3 Following (lag) error / monitoring

The following error represents the discrepancy between the actual position value and the target value. The magnitude of the following error is a function of the dynamic behaviour of the drive and of the loop gain ("GLA"). The entered value applies to monitoring while the axis is in motion.



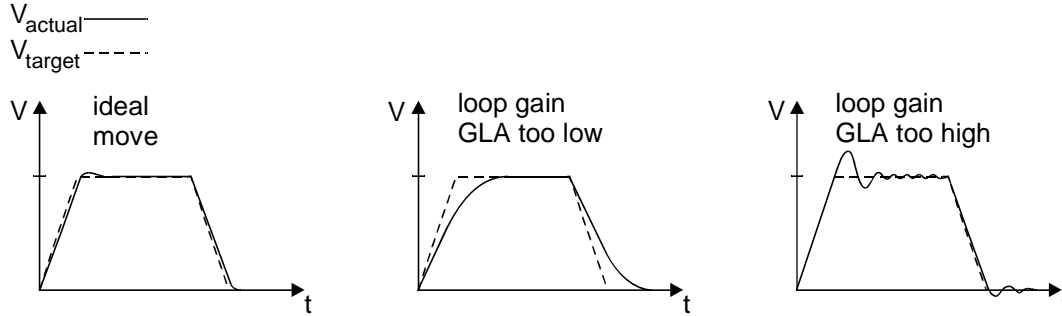
When stopped, the following error monitoring is reduced to 10% of the set value.

6.5.9.4 Loop gain for position control

The gain is defined as a ratio of the parameterised feed velocity "MAXS" to the following error.

$$GLA = \frac{MAXS}{\Delta LGER} \left[\frac{m / min}{mm} \right]$$

The loop gain determines the control performance of the closed loop. The maximum permissible "GLA" is determined by the stability and the oscillation characteristics of the entire system. The stability of the axis must be maintained through the entire velocity range from stop to maximum velocity.



V_{actual} can be measured approximately on the analogue output (target value).

6.5.9.5 Positioning Time

- 0: In automatic mode, the axis travels at the programmed speeds
- 1 - 9999ms: In automatic mode, the positioning operations are executed in the specified time (Controller calculates speed to fit)

6.5.9.6 Home parameters

Function selection table:

With home signal (switch, cam) and encoder reference pulse (measurement system) ¹⁾

Input value	Reference switch type	Search direction	Positioning direction
0	Normally open	-	-
1	Normally open	+	-
2	Normally open	-	+
3	Normally open	+	+
4	Normally closed	-	-
5	Normally closed	+	-
6	Normally closed	-	+
7	Normally closed	+	+

Function selection table: With home signal only ¹⁾

8	Normally open	-	-
9	Normally open	+	-
10	Normally open	-	+
11	Normally open	+	+
12	Normally closed	-	-
13	Normally closed	+	-
14	Normally closed	-	+
15	Normally closed	+	+

Function selection table: With encoder reference pulse only ¹⁾

16	no reference switch	-	-----
17	no reference switch	+	-----

Function selection table: Travel to "0" + offset ²⁾

0 - 17	-----	-----	-----
--------	-------	-------	-------

Function selection table: Go to home position in block

18	Normally open	-	-----
19	Normally closed	-	-----
20	Normally open	+	-----
21	Normally closed	+	-----

Function selection table: Reset to zero with input 8 ³⁾

22	Normally open	-----	-----
----	---------------	-------	-------

- 1) Not applicable to absolute measurement systems
- 2) Not applicable to incremental measurement systems
- 3) Not applicable to MP100.xxx.SY

RS232-Parameter:
















The "R232" parameter is used to set the operating mode of the RS232 interface.

Input value:	Data format:	Baud rate:
0	10 bits per character	300
1	11 bits per character	300
2	10 bits per character	1200
3	11 bits per character	1200
4	10 bits per character	2400
5	11 bits per character	2400
6	10 bits per character	4800
7	11 bits per character	4800
8	10 bits per character	9600
9	11 bits per character	9600
10	10 bits per character	19200
11	11 bits per character	19200

10 bits: 1 start bit, 8 data bits, 1 stop bit, no parity

11 bits: 1 start bit, 8 data bits, 2 stop bits, no parity

6.6 Program input

		Select operating mode
P R O G		Confirm
C O D E		Confirm password prompt
1 2 3 4		Enter password and confirm (see 1 Fehler! Kein gültiges Resultat für Tabelle.)
N R 1		Enter parameter-set number (1 - 99) and confirm
L 1		Confirm length prompt "L" (e.g. set 1)
+ 2 1 3		Enter length values (e.g. mm or degrees) and confirm (digits before decimal point)
. 1 1 1		Enter length values (e.g. mm or degrees) and confirm (digits after decimal point)
V 1		Confirm speed prompt "V" (e.g. set 1)
9 . 9 9		Enter and confirm the speed (m/min) Input range: 0.01 - MAXS (see parameter "MAXS")
M 1		Confirm prompt for programmable machine function output "M" (e.g. set 1) 0 = Output not activated 1 = Output activated
T 1		Confirm dwell time prompt "T" (e.g. set 1) Input range: 0 - 9999 ms
1 2 3 4		Confirm entry
N R 2		Set parameter-set number (1 - 99) and confirm. Program additional parameter sets or
		Quit program input

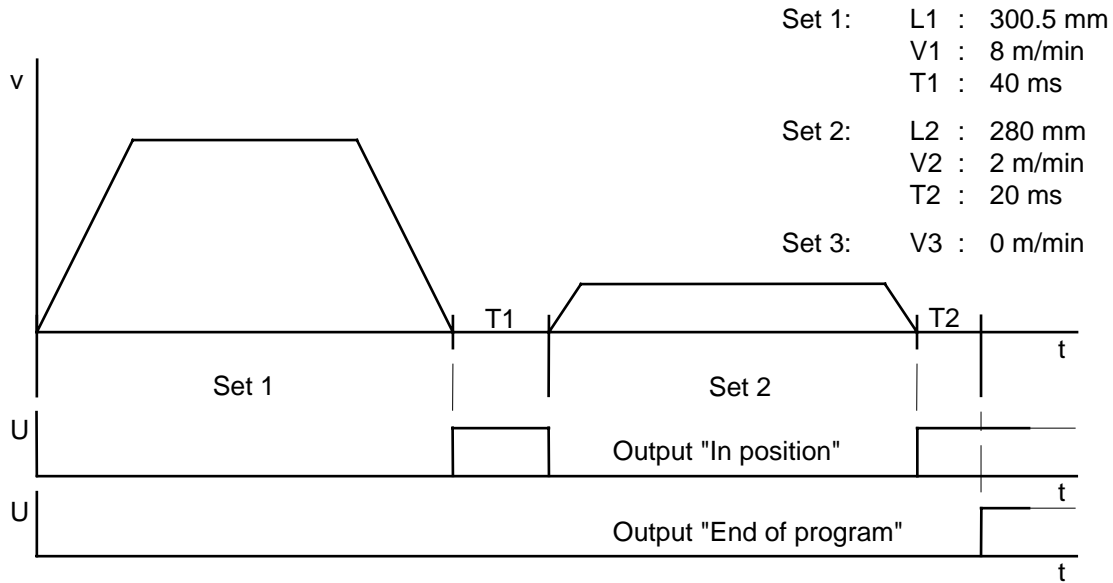
If the dwell time is programmed to "0", the next parameter set will be executed with no need for a new start (exception: automatic single set operating mode).

The end of the program is defined by a parameter set with a speed of "0".

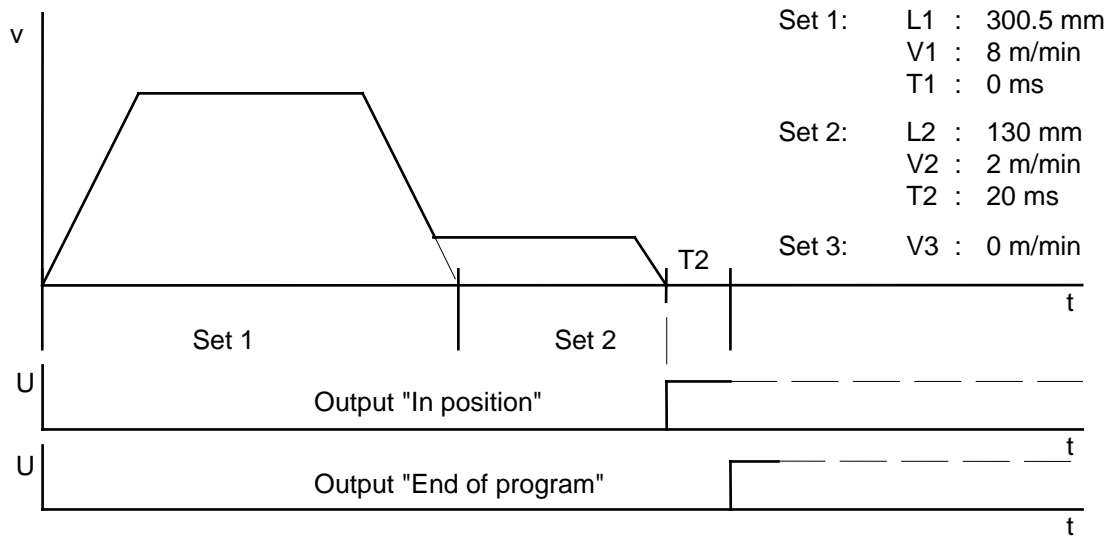
6.6.1 Programming examples

Incremental programming (parameter "LENG" = 1).

Speed change with intermediate stop.








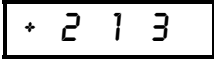

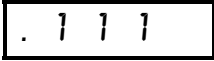



Speed change without intermediate stop (profile).



6.7 Tool correction

Tool correction only takes effect with absolute programming. The entered value is added to the target position.

		Select operating mode
		Confirm
		Confirm password prompt
		Enter password and confirm (see 1 Fehler! Kein gültiges Resultat für Tabelle.)
		Enter correction value (e.g. mm or degrees) and confirm (digits before decimal point)
		Enter correction value (e.g. mm or degrees) and confirm (digits after decimal point)

6.8 Error messages

In the event of an error, the "Ready" output is switched to 0 V. Furthermore, an error message in plain text scrolls down the display.

Each error message can be acknowledged either with the memory key or with a positive pulse edge at the "External error acknowledgement" input, once the error has been eliminated.

Error	Error message	Remedy
E1	Controller not enabled	A positioning attempt was made although the "Enabling" input is not actuated or the position control is switched off. Apply +24 V to "Enabling" input
E2	Internal error	Switch positioning module off and on again
E3	Supply voltage too high	The supply voltage must lie between +18 and +30 V DC
E4	Supply voltage too low	Check the supply voltage (ripple, in particular)
E5	Internal power-supply error	Check "Supply-voltage potentiometer" (MP100.851), "Setpoint" analogue output and "+10 V" output for overloading
E11	Parameter error	One or more parameters lie outside their limit values. Check parameters
E12	Stop	Apply +24 V to "Stop" input. Triggering of error varies depending on the setting of parameter "SPAR"
E13	Memory error	An error has occurred in the saved data (parameters, program, tool correction). Check data.
E14	Following error	The drive cannot follow the pre-defined path. Drive blocked, "Following error" parameter too low, acceleration values too high, incorrect transducer signals, incorrect direction of control, loop gain insufficient or excessive (drive is oscillating).
E15	Limit switch "-"	The limit switch was reached during travel in "-" direction. Apply 24 V to "Limit switch" input
E16	Limit switch "+"	As limit switch "-" but in the positive direction
E19	Measuring-system error	Measurement system incorrectly connected, defective, cable break. Parameter "LENG" altered or incorrectly set.
E20	First go to home	Machine has not yet gone to home position. Go to home position or set parameter "REFC" to "0"
E21	Travel range "+"	Machine has reached limit of travel range
E22	Travel range "-"	As E21
E23	Timeout	The drive did not reach the position window 5 s after the ramp was completed. Position window too small, loop-gain parameter too low, excessive drift of drive, drive blocked.
E24	Remaining-distance error ==> new start	The remaining distance can no longer be travelled. Select automatic mode again.
E25	Stop from interface	Stop command via interface. Positioning operation halted.

Error	Error message	Remedy
E26	Travel range "+" reached	The started position is outside the travel range limit.
E27	Travel range "-" reached	As E26
E28	Too many profiles	More than 3 successive parameter sets are programmed with a dwell time of 0 (profile operation). Program additional dwell time, in order to enforce an intermediate stop.
E29	Timeout RS232 / 485	The RS232/485 interface communication is interrupted.
E30	Excessive drift	Excessive drift of drive. Switch off drift compensation. Perform basic calibration of drive.
E31	Measurement system changed --> switch off controller	The setting of the measurement system will only take effect once the positioning module has been switched back on.
E32	Excessive speed time too short	The position cannot be reached in the specified time (parameter "POST"). Max. speed is exceeded (parameter "MAXS").
E40	Slave error	The error involves a slave module
E41	Synch error	The permissible synch deviation tolerance has been exceeded. Increase parameter "SYLE", "Synch monitor", or adjust gain factors
E42	Data transmission interrupted	Data transmission between master and slave modules interrupted

Displays which do not generate an error:

Error	Error message	Remedy
--	?	Actual positions greater than "9999.999" or smaller than "-9999.999" cannot be shown on the display.
--	Stop	"Stop" input switched to 0 V. The remaining distance will be executed upon the next start (only when parameter "SPAR" = 0).

7. Synchronous operation

With the MP100.xxx.SY version, up to 4 positioning modules can be synchronised. The MP100.xxx.SY module incorporates the master and slave function (see 6.5.7 Parameter level 8: Synchronous run parameters).



Important: Each module must be assigned a different module number during parameter assignment. Module 1 = Master, 2 ... 4 = Slaves

The control structure of the system is such that the position deviations of all axes are compensated. (For example: master waits for slave axes). This ensures that constant synchronous operation is achieved.

Programming and operation are effected from the master module, as with a standard positioning module. Parameter assignment and display functions are carried out at each individual module.

The modules must be connected to one another via the RS485 interface (see 13. Connection diagram - synchronous operation).

Below are extended functions and special features which the standard positioning module does not have. The basic functions are also available during synchronous operation.

7.1 Function description of synch controller

The synch controller works on the mean-value principle. Using parameter "SYPI", it is possible to choose between proportional and integral behaviour. Parameter "GLS" determines either the proportional or integral gain factor.

The synch error is monitored by the slave axes. The maximum permissible deviation is set in parameter "SYLE", "Synch monitor".

7.1.1 Electronic gearbox

In order scale one axis to the other as in a gear ratio, each axis may be programmed with a different resolution factor.

7.1.2 Switch off slave synchronisation

Each slave may be uncoupled individually (e.g. for start-up) by means of the "Enable single operation" input (slave). The slave axes can be operated in jog mode and for homing without being coupled to the master.

The master axis can move alone when all slaves are uncoupled in jog, automatic, or go to home position mode. Slave axes may also be de-coupled while in motion.

7.1.3 Oblique operation

When synchronous operation is switched off, each axis can travel to a position individually.

When synchronous operation is switched on, the movements are then performed at offset positions, when the "Enable oblique operation" input is activated.

In the following cases, oblique operation is terminated and movement is synchronised to the master position:

- Remove single-operation enable when offset operation is not enabled
- Remove oblique-operation enable when single operation is not enabled
- Acknowledge error messages when oblique operation and single operation are not enabled

Slave axes can only be synchronised when the master axis is not in motion.

The "Slave Synchronous" output is switched as soon as synchronisation is reached.

7.1.4 Analogue position setpoint

This operation mode is also for single axis applications, without slave modules.

The connected modules continually track the analogue position setpoint, provided that an automatic operating mode has been selected.

The function is activated by means of parameter "APOS"; 0 - 10 V or ± 10 V can be set as parameters for the input voltage range.

The travel range is scaled on the master module to the chosen input voltage range through the travel range limits (parameters "LIM+" and "LIM-").

The "In position" output signal is output from the master module when the actual position has reached the position window.

7.2 Automatic mode in synchronous operation

The inputs "Start", "Parameter set call up", "Stop", "Automatic single" and "Automatic cycle" are available at the master module only.

The "In position", "End of program" and "machine function" output signals are only output by the master module.

The "Enable Contact" and "Ready" signals are output both from the master module and the slave modules.

7.3 Jogging in synchronous operation

In jog mode, the slave axes travel in synchronisation with the master axis.

The slave axes may be operated individually in jogging mode once synchronous operation has been switched off.

7.4 Go to home position in synchronous operation

7.4.1 Go to home position with absolute feedback devices

Travel to zero (parameter "REFP": 0 - 17, 22)

The machine travels to the absolute zero point (measurement system zero + home offset) of the master module. The slaves also travel in synchronisation. Once the zero point is reached, the slaves are moved asynchronously to their own zero point.

Go to home position in block (parameter "REFP": 18 - 21)

The machine searches for home using the search direction preset at the master module. The slaves also travel in synchronisation. Once the home switchpoint of the master module is reached, movement is stopped.

7.4.2 Go to home position with incremental feedback devices

Go to home with home signal (parameter "REFP": 0 - 15):

Synchronous search for the home signal using the search direction and switch polarity preset at the master module. Once all home signals are switched, the master module terminates the travel to home asynchronously. At the same time, the slaves start travelling to home asynchronously.

Go to home position with transducer zero pulse only (parameter "REFP": 16 or 17):

Asynchronous search for the zero pulse using the search direction preset at the module in question. Each axis stops at the zero pulse, until all axes have reached zero pulse. Next, home offset is travelled asynchronously.

Go to home position in block (parameter "REFP": 18 - 21):

The machine searches using the search direction preset at the master module. The slaves also travel in synchronisation. Once the home switch of the master module is reached, home offset is travelled asynchronously.



For synchronous travel to home position, parameter "REFP" should have an identical setting at all modules. It is possible to have different settings for going to home position, but this does not necessarily lead to meaningful motion sequences.

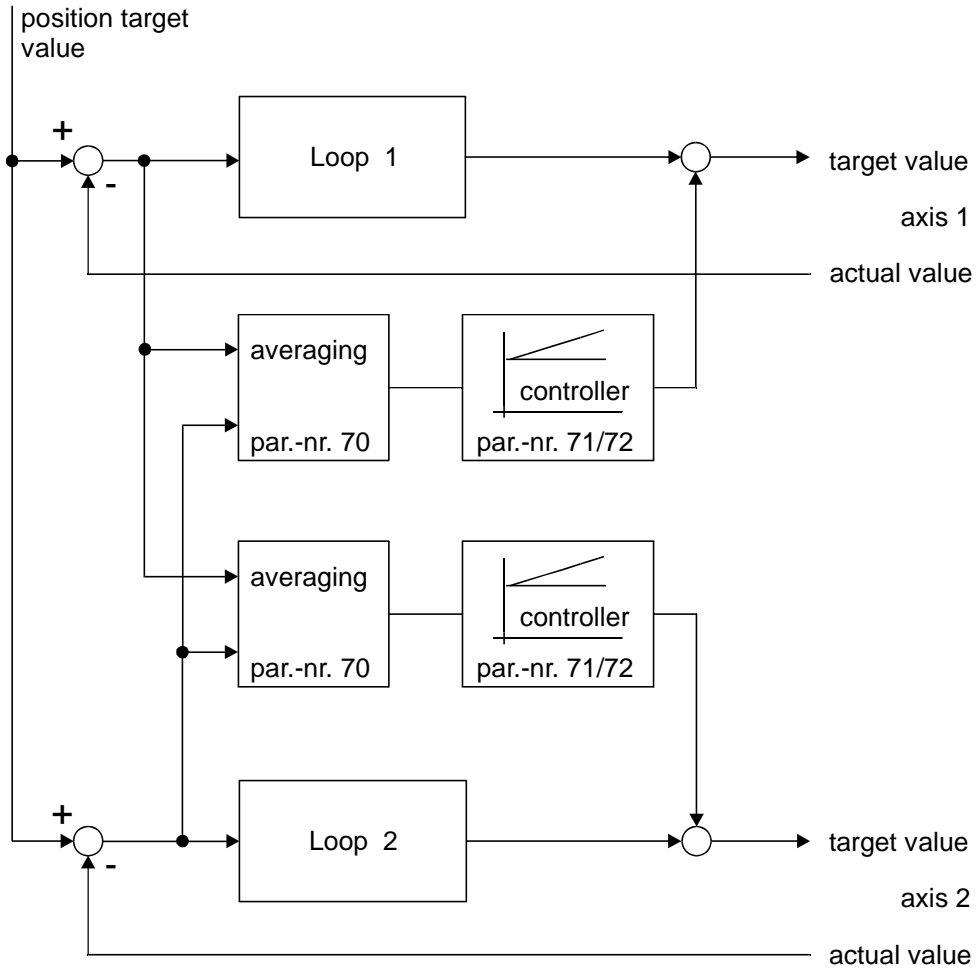
In the case of synchronous systems with different types of measurement systems (e.g. incremental and magnetostrictive), only modules with the same type of measurement system may travel to home position synchronously.

7.5 Module number synchronous run

Parameter "IMNO " determines the function of the MP100.xxx.SY modules:

- 1 = Master module
- 2 – 4 = Slave modules

7.6 Block diagram for synchronous operation



8. Function description - inputs and outputs

8.1 Digital inputs

Input	Description	Active level	Remarks
1	Automatic cycle	24 V	see 5. Selecting operating modes
2	Automatic single	24 V	
3	Go to home position	24 V	
4	Limit switch "+"	0 V	Travel range limit
5	Limit switch "-"	0 V	
6	Parameter set call up S16	24 V	see 6.1.4 External parameter set call-up table
7	Enabling	24 V	Enable controller
8	Reference switch	24 V	Home cam/reset to zero
9	Parameter set call up S1	24 V	see 6.1.4 External parameter set call-up table
10	Parameter set call up S2	24 V	
11	Parameter set call up S4	24 V	
12	Parameter set call up S8	24 V	
13	Start	24 V	Start of programmed sets in automatic mode.
14	Jog forward	24 V	see 6.2.2 Jogging, external input
15	Jog backward	24 V	
16	Parameter set call up S32	24 V	
17	External error acknowledgement	24 V	Clear error messages
18	Stop	0 V	Interrupt positioning operation

8.2 Digital inputs in synchronous operation

For MP100.xxxSY slave module only

Input	Description	Active level	Remarks
3	Go to home position ¹⁾	24 V	see 5. Selecting operating modes
4	Limit switch "+"	0 V	Travel range limit
5	Limit switch "-"	0 V	
7	Enabling	24 V	Enable controller
8	Reference switch	24 V	Home cam/reset to zero
9	Enable single operation	24 V 0 V	Synchronous operation "Off" Synchronous operation "On"
10	Enable offset operation	24 V 0 V	Offset synchronous operation possible. Automatic synchronisation when operating mode changed
14	Jog forward ¹⁾	24 V	see 6.2.2 Jogging, external input
15	Jog backward ¹⁾	24 V	
17	External error acknowledgement	24 V	Clear error messages
18	Stop ¹⁾	0 V	Interrupt positioning operation

1) For synchronous operation "Off" only

8.3 Digital outputs

Output	Description	Active level	Remarks
1	In position	24 V	Programmed position reached
2	Ready	24 V 0 V	Ready for operation Error message
3	End of program	24 V	The last parameter set of the program has been executed.
4	Programmable machine function outputs	24 V 0 V	Programmable machine function output = 1 programmed Programmable machine function output = 0 programmed

8.4 Digital outputs in synchronous operation

For MP100.xxx.SY slave module only

Output	Description	Active level	Remarks
1	In position ¹⁾	24 V	Programmed position reached
2	Ready	24 V 0 V	Ready for operation Error message
3	Slave synchronous	24 V 0 V	The slave module is in synchronisation with the master module. The slave module is in single operation or is in the process of synchronising.

1) For synchronous operation "Off" only

8.5 Relay output - enable contact

The enable for the amplifier unit.

The following errors are detected:

- Supply voltage error
- Internal voltage error
- Following error
- Time-out
- Measuring system (feedback device) error
- Excessive drift
- Error in synchronous operation
- Time-out master

8.6 Analogue position setpoint input

This input provides the analogue position setpoint for synchronous operation (MP100.xxx.SY master module only).

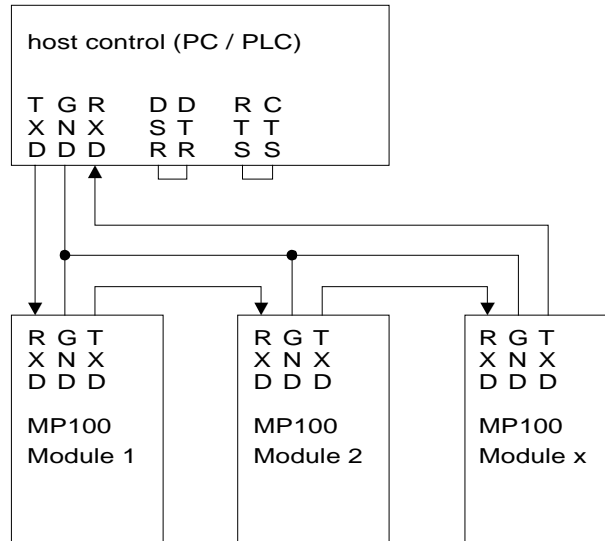
8.7 Analogue output

Variable setting for the amplifier unit.

9. Data transmission - RS232 interface

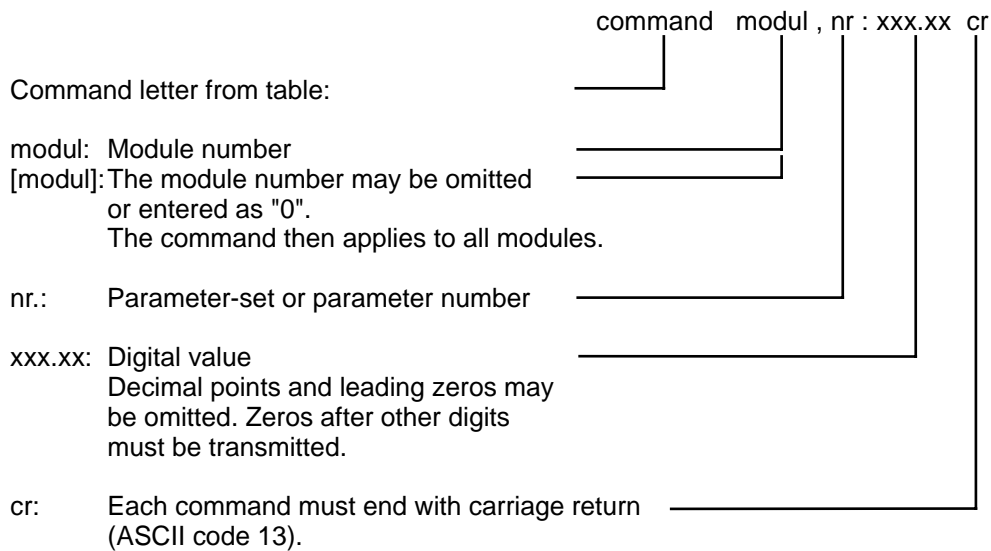
Up to 99 positioning modules may be connected to an interface of a host computer. The interface is looped through the modules. The modules pass on each character they receive. By using this "echo", the host computer is able to check the data transmission. A different module number (parameter "IMNO") must be set at each module.

Example:



Notes on data format:

The following format is used for transmission:



All characters and digits are transmitted in ASCII code.

9.1 Programming commands

D [module], no.: xxxx.xxx	Length in [mm] or [degrees] Note set position of decimal point!
V [module], no.: xxx.xx	Speed in [m/min]
M [module], no.: x	Programmable output (0 = not activated, 1 = activated)
T [module], no.: xxxx	Dwell time in [ms]
R [module]: xxxx	Acceleration time in [ms] A common value for all parameter sets.
I module, no.	Query programmed parameter-set data. If the query includes a parameter-set number, only the contents of this set will be transmitted; without a parameter-set number, the contents of all sets are output. Returned message: D module, no.: xxxxx V module, no.: xxxx M module, no.: x T module, no.: xxxx cr
L module, no.	Query programmed length. Returned message: D module, no.: xxxxx cr
S module	Save program data in EEPROM

The meaning and range of values of the individual data fields are described in the programming (see 6.6 Program input).

9.2 Parameter assignment commands

P [module], no.: xxxx.xxx	Set parameter to given value. Note set position of decimal point (see 6.5 Parameter entry)!
U module, no.	Query parameter: Returned message: :xxxxxxx cr value of parameter (without decimal point) Note position of decimal point in the parameter in question (see 6.5 Parameter entry). If the query includes a parameter number, only the value of this parameter is transmitted; without a parameter number, all parameters are listed.
Z module	Save parameter values EEPROM.
W [module]: xxxx.xxx	Set tool correction. Note position of decimal point (parameter "NODP"). The tool correction is not stored in the EEPROM

Parameter assignment is disabled in automatic and go to home position operating modes.

w module	Status query as "Q" but with monitor. When this command has been transmitted once, it must be repeated within 2 sec. Otherwise, error message E29 Timeout RS232/485 will appear Returned message: xx cr Error number xx. % cr Stop not activated. # cr Travel command is being executed. ! cr Axis ready, in position. \$ cr Axis ready, not in position.
y module	Query parameter-set number in automatic mode Returned message: :xx cr Parameter-set number

9.4 Operator commands

A [module]	Interrupt positioning operation. Generate error message.
B [module]	Interrupt positioning operation. Travel remaining distance upon next start.
C [module]	Interrupt positioning operation. Begin again upon next start.
E [module]	Acknowledge error
G [module]	Start program/positioning operation
H [module]	Go to home position
N [module]: no.	Pre-select parameter-set number in automatic mode. Function as external parameter set call up.
O [module]: x	Selection of operating mode 0 = Jogging 1 = Automatic single 2 = Automatic cycle 3 = Automatic profile
b [module]	Switch off position control and "Position control active" relay output
c [module]	Switch off position control
d [module]: xxxx	Setpoint transmitted uncontrolled (only when position control is switched off). Voltage = xxxx * 4,88 mV
e [module]	Switch on position control. "Enable Contact" relay output is switched on at the same time.
r [module]: xxxx	Jog backwards at creep speed or at speed xxxx. This command must be repeated at least every 100 ms, otherwise the machine will automatically brake.
v [module]: xxxx	Jog backwards at creep speed or at speed xxxx. This command must be repeated at least every 100 ms, otherwise the machine will automatically brake.
z [module]: xxxx.xxx ¹⁾	Reset to zero, or set to position xxxx.xxx. Note position of decimal point (parameter "NODP")!

1) Not for MP100.xxx.SY

9.5 Programming and parameter assignment examples

Command sequence Alternative Form	Explanation (using example of a system with 3 modules)
P0,26:0 cr P,26:0 cr	Language (parameter "D/E/F") set all modules to "0" (German).
Z1 cr Z3 cr	Modules 1 and 3 save parameters
D1,1:10.000 cr D1,1:10000 cr	Module 1, parameter set 1, length = 10 mm. (Parameter "NODP" set to 3 digits after decimal pt.).
V1,1:5.00 cr V1,1:500 cr	Module 1, parameter set 1, speed = 5 m/min.
V0,2:0.00 cr V,2:0 cr	All modules, parameter set 2, speed = 0 (marks end of program)



After altering parameter "NODP" (number of decimal places), all items programmed via the interface must be entered again with the correct number of digits before and after the decimal point.

10. Safety advice

10.1.1 General safety advice

Please read the manual with great care before using this product



Wiring and start-up of this device may be done by trained personnel only. Read the manual carefully. Note especially the installation requirements and notes for initial start-up. Non-adherence to the instructions will result in loss of warranty and liability on the part of the manufacturer.

This unit monitors internal operation conditions as well as on equipment side. However, malfunctions caused by defective elements cannot be prevented in any case.

Personal danger has to be avoided at system side by interrupting the operating voltage through an emergency stop chain.

We assume, as an expert, you are familiar with the relevant safety regulations, the accident prevention regulations of the employers liability insurance company and the VDE regulations and that you can use and apply them.



The controller may be used only in machines or other electrical equipment if these are in full compliance to the EU-directive 98/37EG (Machine directive) as well as 89/336EWG (EMC directive).



Depending on the application, it might be necessary to implement additional safety equipment in order to get a fail-safe system.



Make sure, all equipment is powered down, during installation.

10.1.2 Mounting instructions

- Wiring and commissioning needs to be carried out by appropriate trained personnel.
- The unit must be installed in a metal housing (machine).
- The housing must be grounded.
- Keep wire as close to housing or enclosure as possible.
- Route signal lines and power cable separately.
- Make sure cable shield makes full contact and conducts well to the housing or enclosure.
- Avoid shield contacts through pins.

10.1.3 EMC

The unit is designed for the use inside a metal housing. Use a shield lug for EMC-compatible wiring with shielded cables.



This is a class C2 product (Industrial environment). In a residential environment this product may cause high frequency interference, which may require interference suppression action.

10.2 Repairs

Repairs may be conducted only by the manufacturer or authorised personnel.



Unauthorised opening and inappropriate repairs may cause substantial risk on injury for the user or damage to equipment.

10.3 Hazard Analysis and risk assessment

According to the EU council directive 89/392/EEC the manufacturer is under an obligation to assess the hazards in order to identify all of those which apply to his machine; he must then design and construct it taking account of his assessment.

A risk assessment must show the residual risk which need to be documented. For the assessment of this risks observe the following regulations:

EN292 Safety of Machinery – Principles of Design

EN1050 Safety of Machinery – Principles for risk assessment

EN954 Safety of Machines – Safety relevant part of control systems



The listed regulations are only a selection for the most important things. Other directives or laws might apply. This list is not exhaustive.

10.4 Initial start-up synchronous run

If 2 to 4 axes are intended to run synchronous, obey these instructions:

The axes should be mechanical separated if somehow possible to allow movements of single axes without damage.

It makes sense to install a switch to input 9 (Enable single operation) on all slave modules before setting-up operation. It's permitted to connect the inputs of all slaves to one switch. If +24V is switched to those inputs, the axes may be operated separately. No synchronous regulation is executed. This allows the initial start-up of all axes according to chapter 10.5 one after the other.



There is no synchronicity monitoring active in single operation. Make sure different axle positions do not cause a damage to the machine.



Remove the switch for single operation after initial start-up.

10.5 General notes for initial start-up

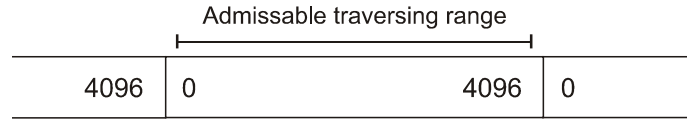
The initial start-up should be carried out by trained personnel only.
It is performed as follows:

- 1 Connect supply voltage (leave positioning module turned off).
Do not connect feedback device yet. Turn drive off.
- 2 Check all connections carefully.
Turn on power.
Set module to jog mode.
Select parameter input (see 6.5 Parameter entry)
- 3 Set feedback device type in the "MESS" parameter.
For SSI devices, also set the "SSI" parameter.
- 4 Set the desired number of decimal places in the "NODP" parameter.
- 5 Set (Interfaces) module number.
(only for MP100.xxx.SY, or when using RS232 interface).
- 6 Switch off positioning module.
- 7 Connect feedback device and turn positioning module on again.
- 8 Preset all parameters per the machine/application requirements.
- 9 Verify direction of system control and count direction (Parameters "SDIR" and "DIRC").
Caution: Drive must be switched off to change these parameters.
- 10 Set limit switch and verify.
- 11 For incremental feedback devices:
Set home point and check homing function (see 10.7 Setting the homing switch with incremental feedback devices).
- 12 Set and verify travel limits (Parameters "LIM+" and "LIM-").
- 13 Set home offset (Parameters "OFSI" and "OFSD").
- 14 Optimise loop in jog mode.
- 15 Enter programs.

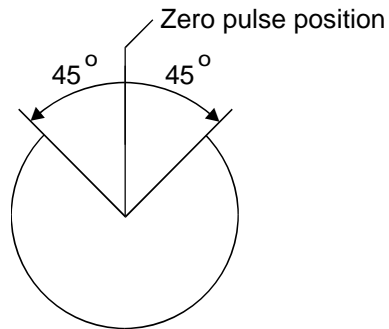
10.6 Installing SSI devices

SSI devices must be mounted in such a way that overflow digits are outside the travel range.

Example: Single-turn-transducer with 4096 increments/revolution.



10.7 Setting the homing switch with incremental feedback devices



The switching point of the home switch must not lie within the angular range of the incremental encoder shown here.

11. Technical data

11.1 General

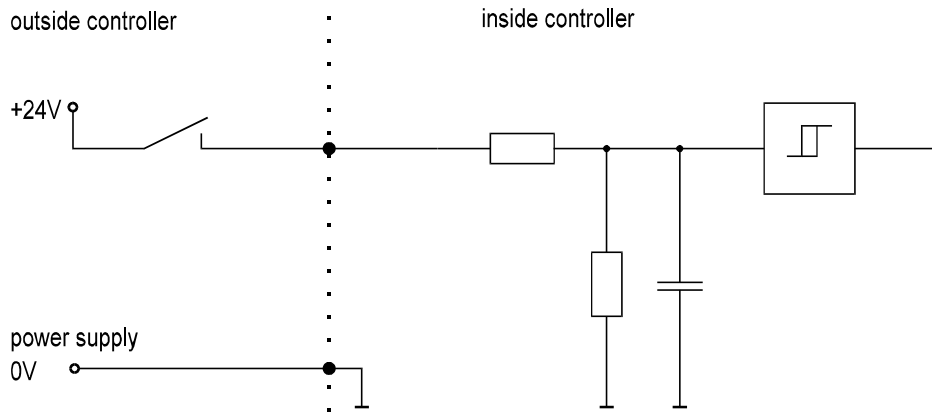
Program memory:	63 blocks (sets), service-free EEPROM
Drive correction:	7 - digit
Stop with travel remainder:	yes
Fault diagnostics:	yes, text messages
Closed loop control:	yes, cycle time 1 ms
Automatic drift compensation:	yes, on or off
Velocity range:	0.01 - 320 m/min
Acceleration and braking ramp:	30 - 5000 ms
Synchronous operation:	max. 4 axes (MP100.xxx.SY)
Ambient temperature:	0 to +50 °C
Storage temperature:	-20 to +70 °C
Humidity:	max. 90 %, non-condensing
Weight:	0.3 kg
Size:	Euro-card 100 mm x 160 mm Front panel 3 HE x 10 TE (129 mm x 50.8 mm)
Terminations:	48-pin edge connector DIN41612 (Style F)
Emission:	per EN 50081-1
Noise immunity:	per EN 50082-2
Protection class:	IP41: front side, when installed in rack with RS232 connector in place

11.2 Supply voltage

Input voltage:	
Nominal:	24 V DC
Permissible range:	18 - 30 V DC
Ripple:	≤ 5 %
Polarity reversal protection:	active
External fuse:	max. 4 A / medium time-lag
Input current:	ca. 0.3 A at 24 V DC (no load on outputs or encoder supply)

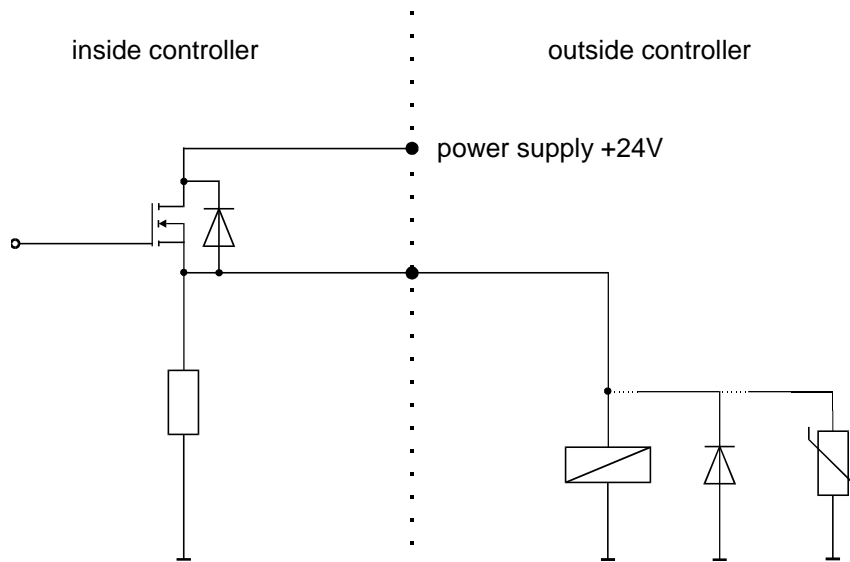
11.3 Digital inputs

Quantity of inputs:	18
Input voltage	
Nominal:	+ 24 V DC
Logic High:	+ 12 V DC
Logic Low:	+ 3 V DC
Input resistance at nominal voltage:	15 kΩ
Potential isolation:	no



11.4 Digital outputs

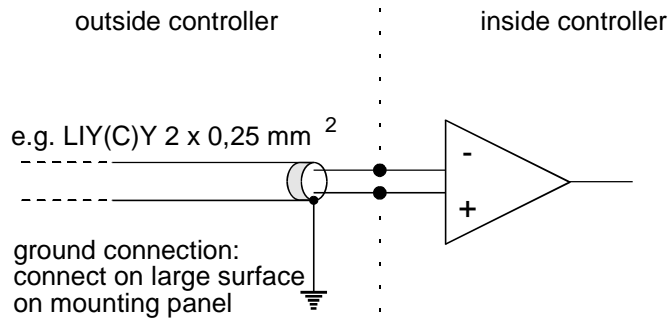
Quantity of outputs:	4
Type:	transistor outputs (MOS-FET)
Output current at high signal:	
Nominal current:	1 A
Max. total current at all outputs:	3 A
Residual current at low signal:	250 μ A
Short-circuit protection:	yes, without restart interlock
Current limited:	2 A
Short circuit release current:	1.2 A
External fuse for inductive loads:	Varistor (e.g. Murrelektronik VG-A/24) or quenching diode (e.g. Murrelektronik LG-A01)
Parallel operation of multiple units:	no
Potential isolation:	no



11.5 Analogue position setpoint input

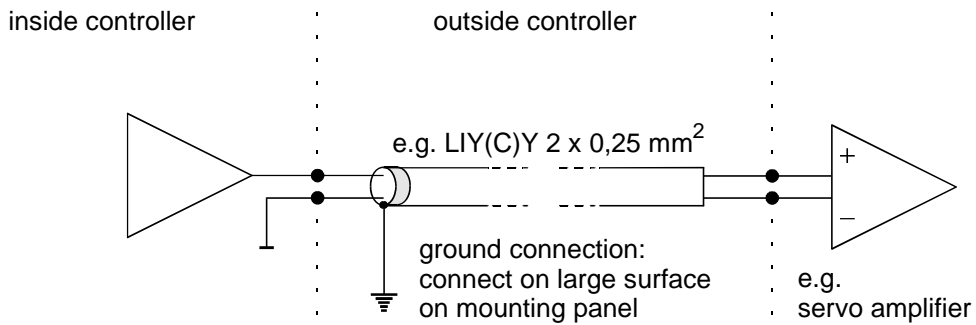
For MP100.xxx.SY only

Type:	Differential input
Resolution:	11 bits
Nominal range:	± 10 V
Max. voltage: ¹⁾	+ 30 V
Min. voltage: ¹⁾	- 12 V
1) referenced to supply voltage 0 V	
Input impedance	27 k Ω



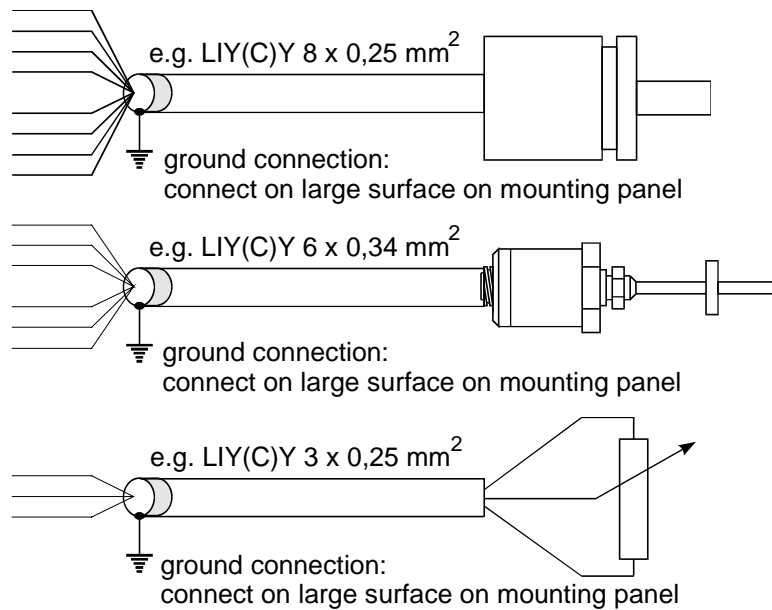
11.6 Analogue output

Output voltage:	± 10 V
Resolution:	12 bits
Output current:	max. ± 5 mA



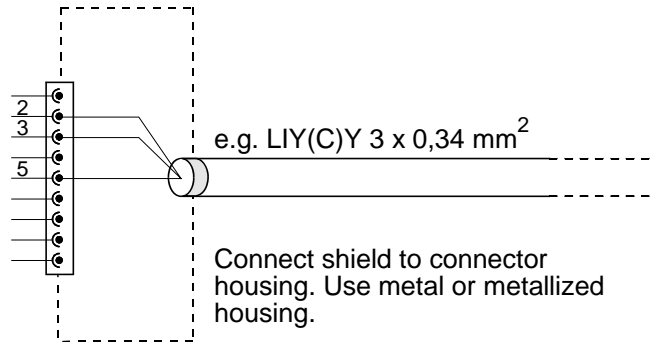
11.7 Feedback device input

Supply voltage for feedback devices	5 V DC / 300 mA
Incremental encoder: Interface:	Push-pull signals per DIN66259 part 3 EIA standards RS422
Limit frequency	250 kHz
Internal signals:	Quadrature (1 MHz)
Travel range:	Endless
SSI interface: Data format:	Adjustable from 8 - 31 bits
Code type:	Gray code or binary
Pulse frequency:	approx. 230 kHz
Magnetostrictive position transducer:	Balluff P-interface MTS start-stop interface
Potentiometers: Resolution:	14 bits
Supply voltage for potentiometers:	10 V
Permissible resistance range for potentiometers:	2 - 20 kΩ

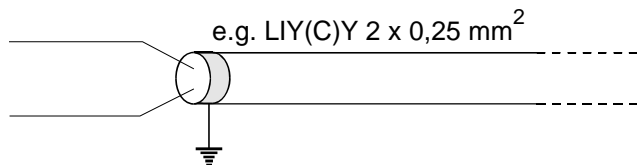


11.8 Serial interfaces

Data interface:	RS232C
Baud rate:	300 - 19200 Baud
Data format:	1 Start bit / 8 Data bits / 1 or 2 Stop bits, no parity, no handshaking
Plug connection:	9 - pin SUB-D male (Pin)



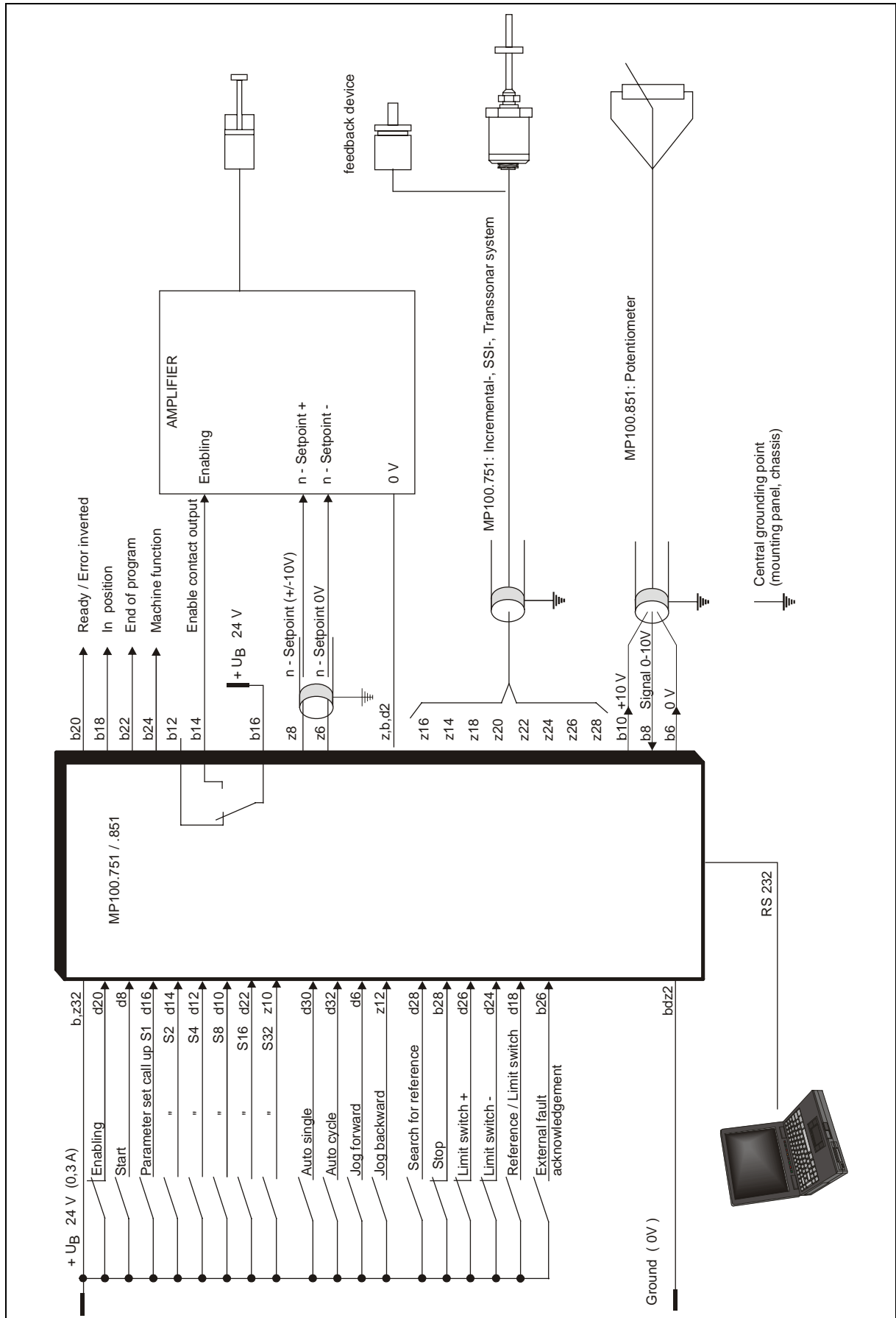
Interface for module coupling:	RS485 (only for coupling multiple positioning modules to synchronous systems).
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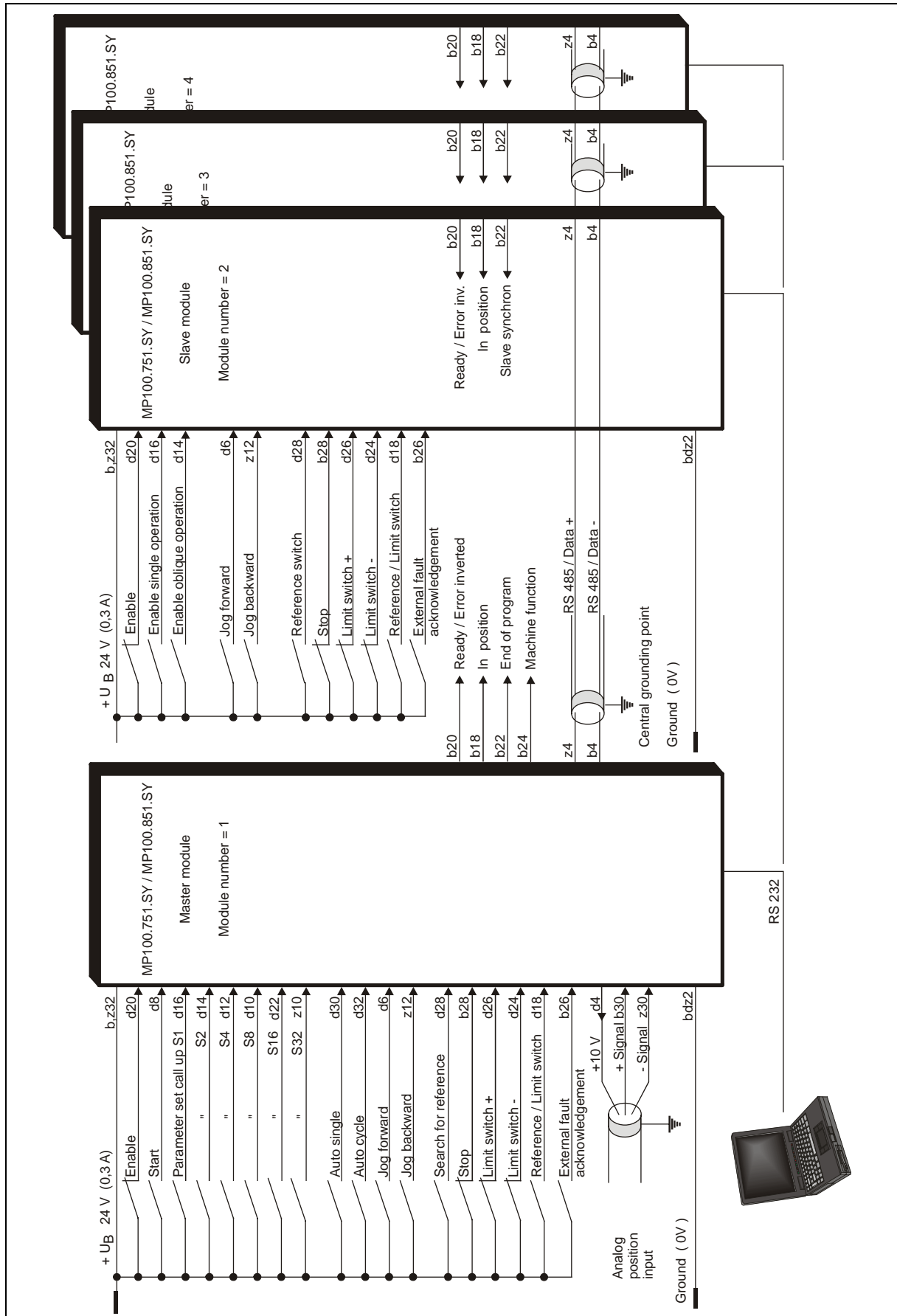
11.9 Relay output - enable contact

Relay contact:	Potential-free contact (normally open) 24 V DC / 1 A
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12. Connection diagram



13. Connection diagram - synchronous operation



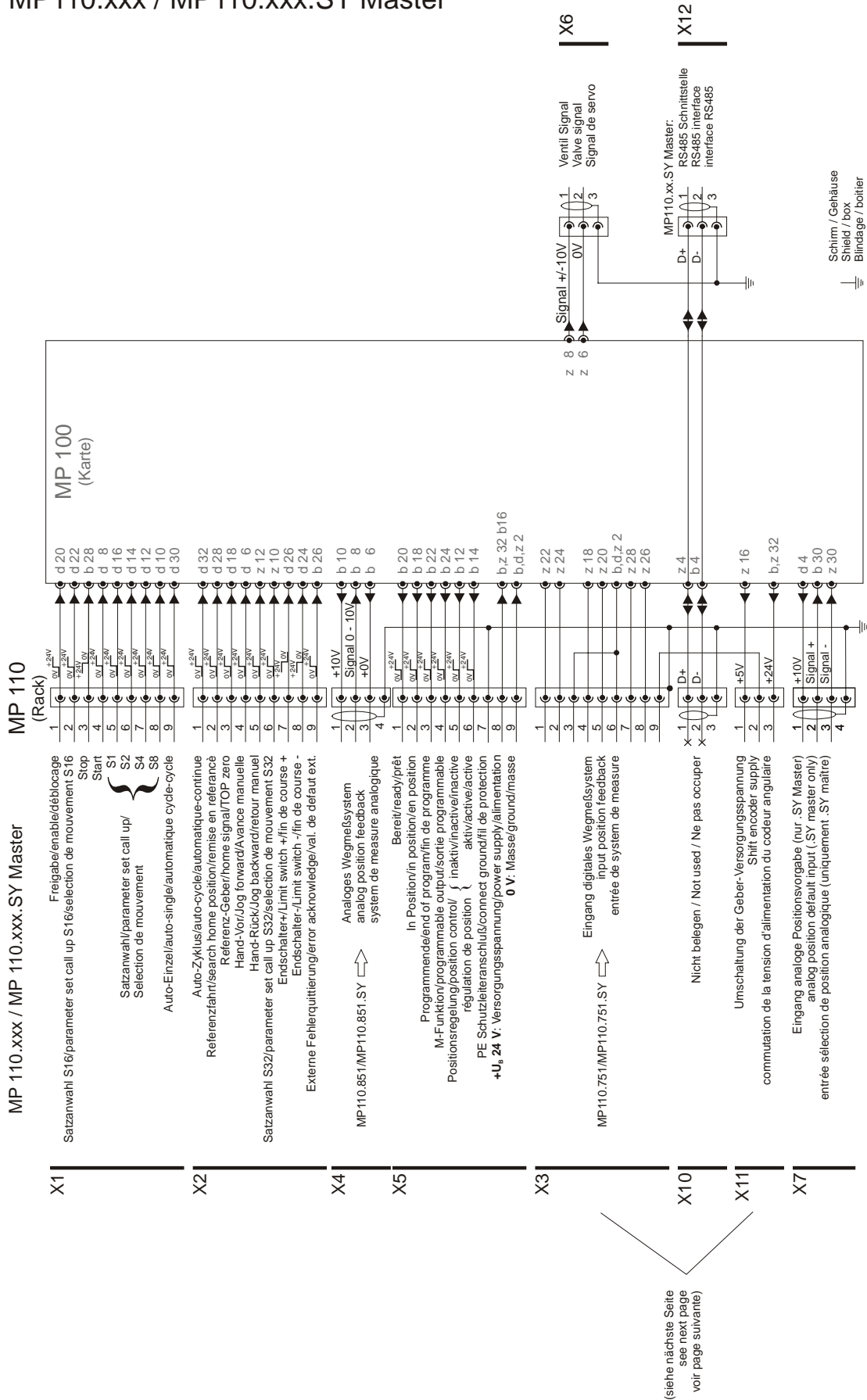
14. Pin assignments

14.1 MP100

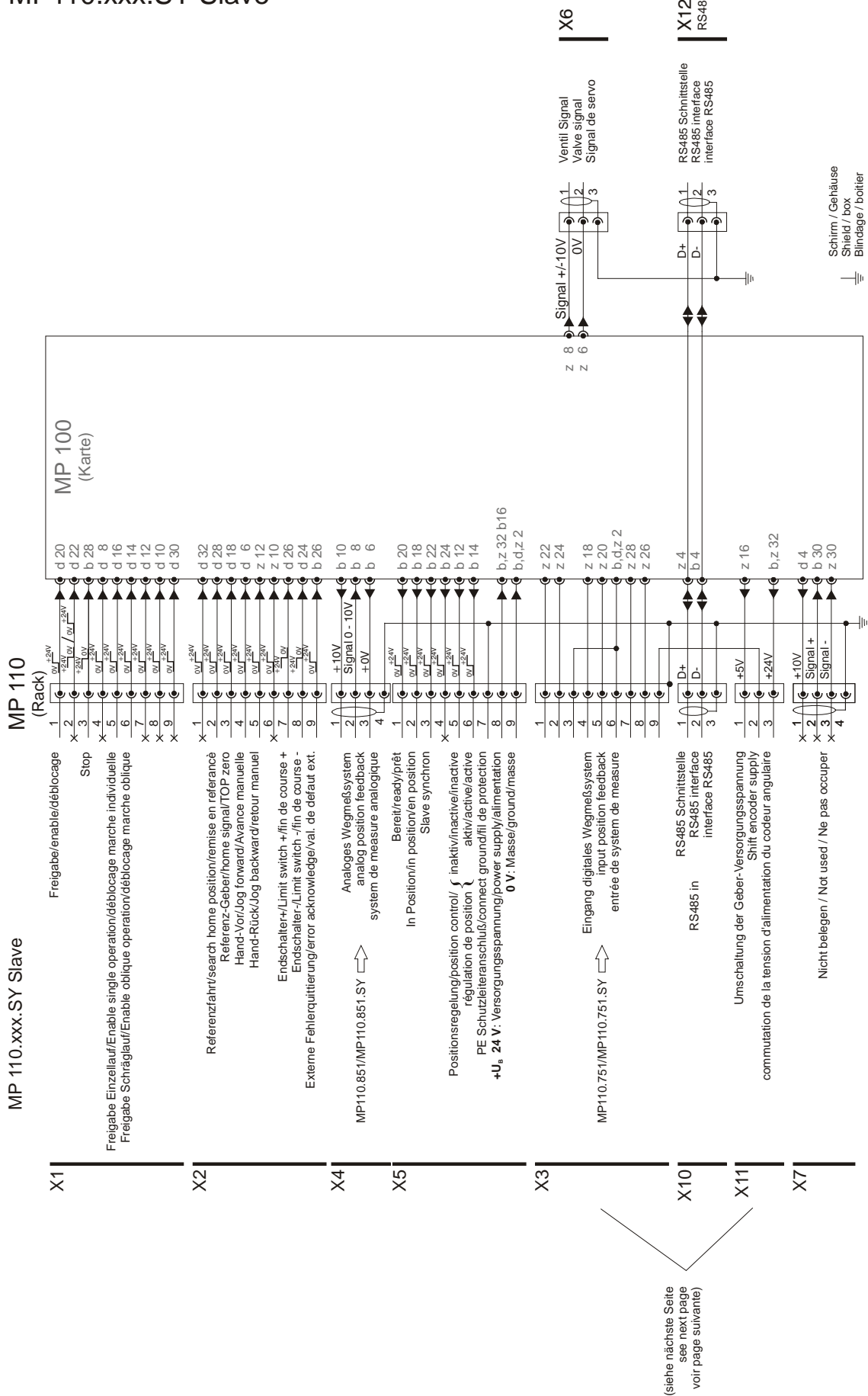
Pin number	Function	Remarks
b2	Power supply 0 V	
b4	RS485 data -	.SY only
b6	Analogue input for potentiometer (ground terminal)	MP100.851 only MP100.851.SY
b8	Analogue input for potentiometer (wiper)	
b10	Analogue input for potentiometer (supply voltage)	
b12	Relay output Enable contact normally closed	
b14	Relay output Enable contact normally open	
b16	Relay output Enable contact +24 V DC	
b18	Output 1 In position	
b20	Output 2 Ready / Error inverted	
b22	Output 3 End of program / Slave synch ¹⁾	1) .SY only
b24	Output 4 Programmable machine function output	
b26	Input 17 External error acknowledgement (positive edge)	
b28	Input 18 Stop	
b30	"+" input analogue position preset	.SY only
b32	Power supply + 24 V	
d2	Power supply 0 V	
d4	Output + 10 V	
d6	Input 14 Jog forward	
d8	Input 13 Start	not .SY
d10	Input 12 Parameter set call-up S8	not .SY
d12	Input 11 Parameter set call-up S4	not .SY
d14	Input 10 Parameter set call-up S2 / enable offset operation ¹⁾	1) .SY only
d16	Input 9 Parameter set call-up S1 / enable single operation ¹⁾	1) .SY only
d18	Input 8 Reference switch / Limit switch	
d20	Input 7 Enable	
d22	Input 6 Tool monitoring / parameter set call up S16 ¹⁾	1) not .SY
d24	Input 5 Limit switch "-"	
d26	Input 4 Limit switch "+"	
d28	Input 3 Go to home position	
d30	Input 2 Automatic single	not .SY
d32	Input 1 Automatic cycle	not .SY
48-pin VG connector Style F		DocNo: 040.197.01

14.2 MP110 Overview

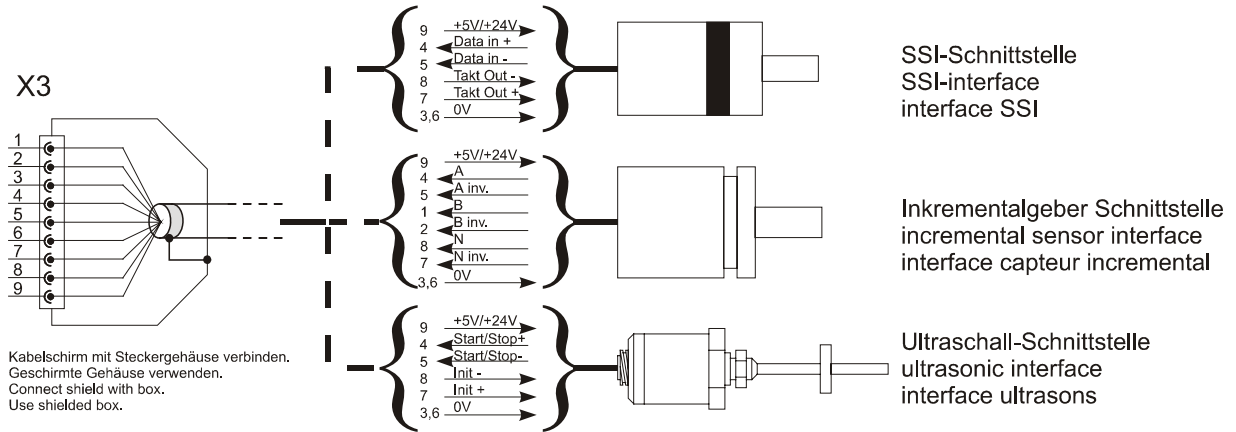
MP110.xxx / MP110.xxx.SY Master



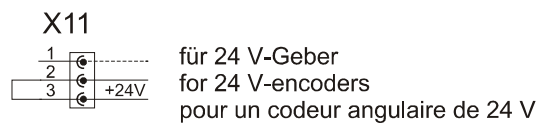
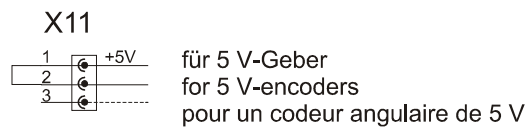
MP110.xxx.SY Slave



Eingang Wegmeßsystem
input position feedback
entrée de system de mesure



Umschaltung der Geber-Versorgungsspannung
Shift encoder supply
commutation de la tension d'alimentation du codeur angulaire

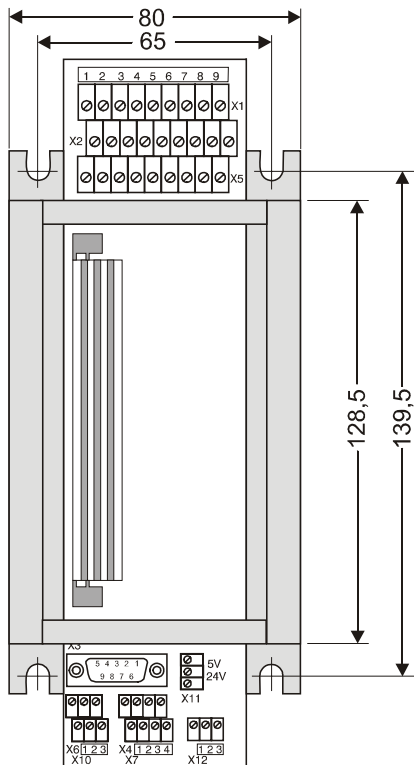
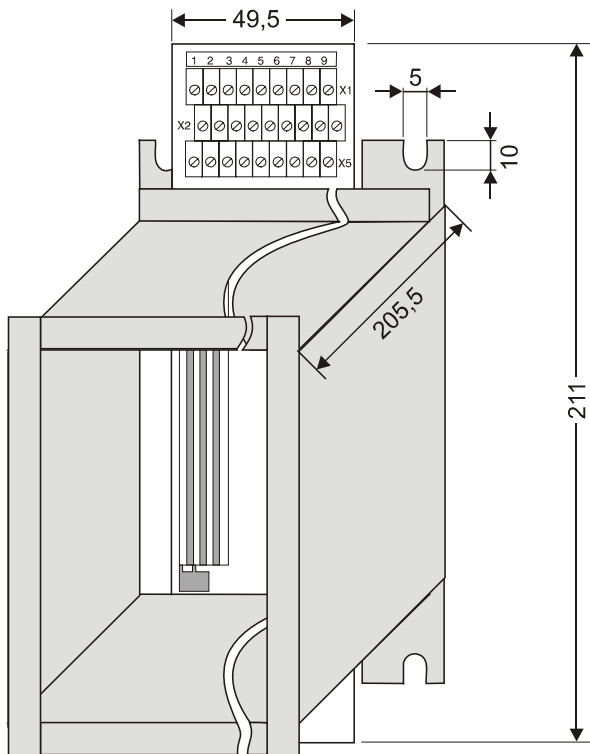


14.3 MP110 Connector assignment

Pin number	Function	Remark
X1	Inputs	
1	Input 7 Enable	
2	Input 6 Parameter set call up S16	not Slave
3	Input 18 Stop	
4	Input 13 Start	
5	Input 9 Parameter set call up S1 / Enable single operation ¹⁾	1) .SY only
6	Input 10 Parameter set call up S2 / Enable oblique operation ¹⁾	1) .SY only
7	Input 11 Parameter set call up S4	not Slave
8	Input 12 Parameter set call up S8	not Slave
9	Input 2 Auto-single	not Slave
X2	Inputs	
1	Input 1 Auto-cycle	not Slave
2	Input 3 Search home position	
3	Input 8 Home signal / Set to zero	
4	Input 14 Jog forward	
5	Input 15 Jog backward	
6	Input 16 Parameter set call up S32	not Slave
7	Input 4 Limit switch "+"	
8	Input 5 Limit switch "-"	
9	Input 17 Error acknowledge (rising edge)	
X5	Outputs and Supply	
1	Output 2 Ready	
2	Output 1 In position	
3	Output 3 end of program / Slave in sync ¹⁾	1) Slave only
4	Output 4 programmable output	
5	Output position control inactive	max. 100mA
6	Output position control active	max. 100mA
7	Connect ground (PE)	
8	Power supply + 24 V	
9	ground 0 V	
PCB clamps	DocNo: 040.196.01	

Pin number	Function			Remark
X3	Incremental-Encoder	SSI-Encoder	Transsonar-Encoder	Only: MP100.751, MP100.751.SY
1	Channel B			
2	Channel B inverted			
3	0 V Supply	0 V Supply	0 V Supply	
4	Channel A	Data In +	Start/Stop +	
5	Channel A inverted	Data In -	Start/Stop -	
6	0 V Supply	0 V Supply	0 V Supply	
7	Zero inverted	Clock Out +	Init +	
8	Zero	Clock Out -	Init -	
9	+ Supply	+ Supply	+ Supply	
X11	Encoder supply			
1	+5V Encoder supply			
2	Connection encoder supply			
3	+24V Encoder supply			
X4	Analogue Position acquisition (actual value)			only MP100.851, MP100.851.SY
1	Analogue input for potentiometer (+10V supply output)			
2	Analogue input for potentiometer (Centre tap)			
3	Analogue input for potentiometer (ground supply output)			
4	Shield			
X6	Analogue output (setpoint)			
1	Analogue output valve signal +/- 10 V			
2	Analogue output GND			
3	Shield			
X7	Analogue input target position			.SY only
1	+10V supply output			
2	"+" Input analogue position default input			
3	"-" Input analogue position default			
4	Shield			
X10	RS485-Interface			.SY only
1	RS485 Data +			
2	RS485 Data -			
3	Shield			
X12	RS485-Interface			.SY only
1	RS485 Data +			
2	RS485 Data -			
3	Shield			
PCB clamps				DocNo: 040.196.01

14.4 Dimensions



15. Passwords

Enter "PROG"

Program input		77
Clear program		1313

Enter "PAR"

Parameters 1-9	Basic function	20
Parameters 10-19	Regulator parameters	46
Parameters 20-29	Axis parameters	79
Parameters 30-39	Reference parameters	13
Parameters 40-49	Position acquisition parameters	177
Parameters 50-59	Measurement system MP100.751.xx only	61
Parameters 70-79	Synchronous run parameters MP100.xxx.SY only	92
Parameters 80-89	Hydraulic parameters	121

Enter "TOOL"

Tool correction		90
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Enter "PROG", "PAR" and "TOOL"

General password		1989
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The general password switches all password queries "OFF" (recommended for start-up). The function is reset by switching the supply voltage on and off.