



PS340 / PS641

Autonomous low-cost single axis position controller for various machine applications

Product Features:

- Easy parameter setting and immediately ready to work with minimum commissioning time
- High accuracy due to high feedback frequency range (300 kHz with TTL encoders and 200 kHz with HTL encoders)
- Extremely smooth motion by optimized S-shape profiles
- High dynamic response by means of short cycle time
- Various modes of operation for absolute and relative positions (incremental length), loop operation and positioning on index signals or print marks
- Most compact unit including operator panel for direct access and RS232 interface for remote access
- PROFIBUS DP interface available (option)
- 24 VAC / 17 ... 40 VDC power supply

Availables Devices:

- **PS340:** for more details please refer to chapter [2](#)
- **PS641:** for more details please refer to chapter [2](#)

Die deutsche Beschreibung ist verfügbar unter:

https://www.motrona.com/fileadmin/files/bedienungsanleitungen/Ps340_d.pdf



The English description is available at:

https://www.motrona.com/fileadmin/files/bedienungsanleitungen/Ps340_e.pdf



The English description is available at:

<https://www.motrona.com/en/support/software.html>



Version:	Description:
PS34001a/June 14/TJ/NW	First edition
Ps34001b_oi/May 15/TJ/AG	1. Analog output -20 ...+20 mA (instead of 0 ... 20 mA). 2. Different spelling corrections. 3. Design, "Safety Instructions" and "Technical Specifications" updated. 4. "Legal notices" supplemented.
Ps340_01c_oi/Aug 21/TJ	PC-Software OS 6 replaced by OS10
Ps340_02a_oi/Aug. 23/TJ	<ul style="list-style-type: none">- Chapter 7.2.2 und 10.2: Preset of absolute position by thumbwheel switchset- Kap. 8.3: Display No. 6 Actual position in length units added.

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1. Safety Instructions and Responsibility

1.1. General Safety Instructions

This operation manual is a significant component of the unit and includes important rules and hints about the installation, function and usage. Non-observance can result in damage and/or impairment of the functions to the unit or the machine or even in injury to persons using the equipment!

Please read the following instructions carefully before operating the device and observe all safety and warning instructions! Keep the manual for later use.

A pertinent qualification of the respective staff is a fundamental requirement in order to use these manual. The unit must be installed, connected and put into operation by a qualified electrician.

Liability exclusion: The manufacturer is not liable for personal injury and/or damage to property and for consequential damage, due to incorrect handling, installation and operation. Further claims, due to errors in the operation manual as well as misinterpretations are excluded from liability.

In addition the manufacturer reserve the right to modify the hardware, software or operation manual at any time and without prior notice. Therefore, there might be minor differences between the unit and the descriptions in operation manual.

The raiser respectively positioner is exclusively responsible for the safety of the system and equipment where the unit will be integrated.

During installation or maintenance all general and also all country- and application-specific safety rules and standards must be observed.

If the device is used in processes, where a failure or faulty operation could damage the system or injure persons, appropriate precautions to avoid such consequences must be taken.

1.2. Use according to the intended purpose

The unit is intended exclusively for use in industrial machines, constructions and systems. Non-conforming usage does not correspond to the provisions and lies within the sole responsibility of the user. The manufacturer is not liable for damages which has arisen through unsuitable and improper use.

Please note that device may only be installed in proper form and used in a technically perfect condition (in accordance to the "Technical Specifications", see chapter [11](#)). The device is not suitable for operation in explosion-proof areas or areas which are excluded by the EN 61010-1 standard.

1.3. Installation

The device is only allowed to be installed and operated within the permissible temperature range. Please ensure an adequate ventilation and avoid all direct contact between the device and hot or aggressive gases and liquids.

Before installation or maintenance, the unit must be disconnected from all voltage-sources. Further it must be ensured that no danger can arise by touching the disconnected voltage-sources.

Devices which are supplied by AC-voltages, must be connected exclusively by switches, respectively circuit-breakers with the low voltage network. The switch or circuit-breaker must be placed as near as possible to the device and further indicated as separator.

Incoming as well as outgoing wires and wires for extra low voltages (ELV) must be separated from dangerous electrical cables (SELV circuits) by using a double resp. increased isolation.

All selected wires and isolations must be conformed to the provided voltage- and temperature-ranges. Further all country- and application-specific standards, which are relevant for structure, form and quality of the wires, must be ensured. Indications about the permissible wire cross-sections for wiring are described in the "Technical Specifications" (see chapter [11](#)).

Before first start-up it must be ensured that all connections and wires are firmly seated and secured in the screw terminals. All (inclusively unused) terminals must be fastened by turning the relevant screws clockwise up to the stop.

Overvoltages at the connections must be limited to values in accordance to the overvoltage category II.

1.4. EMC Guidelines

All motrona devices are designed to provide high protection against electromagnetic interference. Nevertheless you must minimize the influence of electromagnetic noise to the device and all connected cables.

Therefore the following measures are mandatory for a successful installation and operation:

- **Use shielded cables for all signal and control input and output lines.**
- **Cables for digital controls (digital I/O, relay outputs) must not exceed a length of 30 m and are allowed for in building operation only**
- Use shield connection clamps to connect the cable shields properly to earth
- The wiring of the common ground lines must be star-shaped and common ground must be connected to earth at only one single point
- The device should be mounted in a metal enclosure with sufficient distance to sources of electromagnetic noise.
- Run signal and control cables apart from power lines and other cables emitting electromagnetic noise.

Please also refer to motrona manual "General Rules for Cabling, Grounding, Cabinet Assembly". You can download that manual by the link

<https://www.motrona.com/en/support/general-certificates.html>



1.5. Cleaning, Maintenance and Service Notes

To clean the front of the unit please use only a slightly damp (not wet!), soft cloth. For the rear no cleaning is necessary. For an unscheduled, individual cleaning of the rear the maintenance staff or assembler is self-responsible.

During normal operation no maintenance is necessary. In case of unexpected problems, failures or malfunctions the device must be shipped for back to the manufacturer for checking, adjustment and reparation (if necessary). Unauthorized opening and repairing can have negative effects or failures to the protection-measures of the unit.

2. Available Models

The two models as shown below are available. Both models are fully similar in terms of function and performance; however, there is some difference with the size, the alert outputs and the length setting.

 The PS340 device features a red LED display showing the number '123456'. Below the display is a keypad with four buttons: a 'P' button, a right arrow, a left arrow, and a return key. A vertical status indicator with five LEDs is on the right side.	<p>PS340:</p> <ul style="list-style-type: none">▪ Front size 96 x 48 mm (3.780'' x 1.890'')▪ Position setting by keypad▪ Analog output 14 bits▪ 4 power transistor outputs (alert)
 The PS641 device features a red LED display showing the number '123456'. Below the display is a keypad with four buttons: a 'P' button, a right arrow, a left arrow, and a return key. Below these buttons is a row of six thumbwheel switches. A vertical status indicator with five LEDs is on the right side.	<p>PS641:</p> <ul style="list-style-type: none">▪ Front size 96 x 96 mm (3.780'' x 3.780'')▪ Position setting by keypad or by front thumbwheel switches▪ Analog output 14 bits▪ 4 power transistor alert outputs▪ 4 additional relay alert outputs

Both models are suitable for front panel or operator desk mounting, by means of the included mounting clamps.

Where you desire to mount the units on DIN rails inside a cabinet, please refer to the mounting brackets type SM 300 and SM 600 available as accessories.

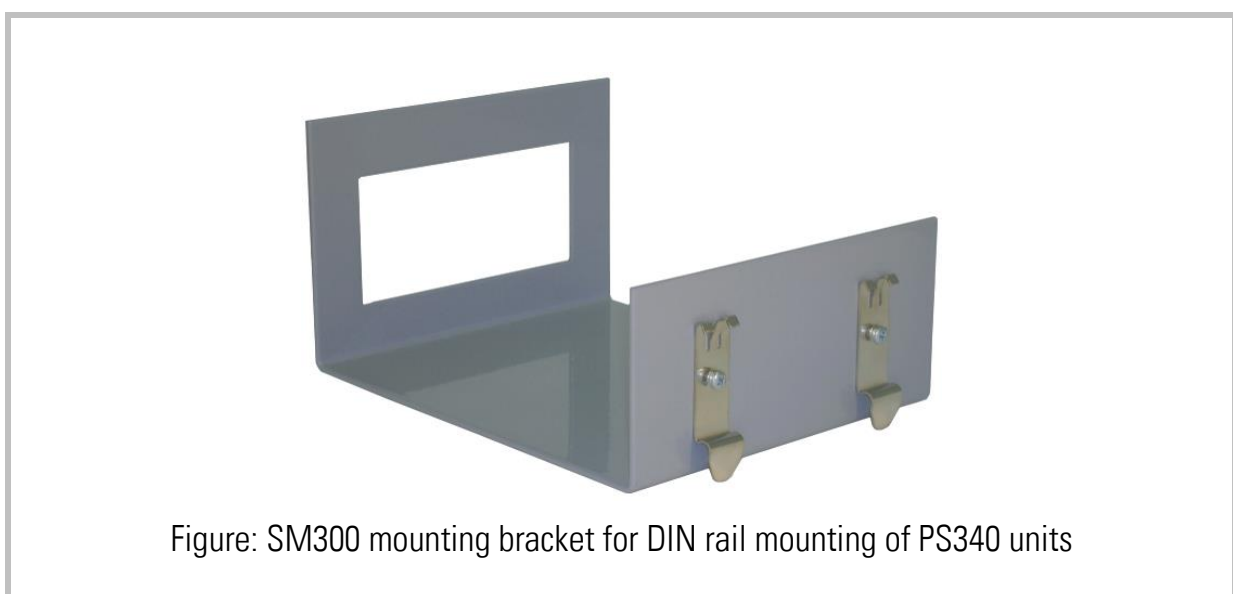


Figure: SM300 mounting bracket for DIN rail mounting of PS340 units

3. Introduction

The PS340/PS641 units have been designed for the special requirements of single-axis positioning systems, under consideration of maximum performance and accuracy, with minimum stress for all mechanical parts. Very short control cycles together with intelligent motion profiles provide excellent performance under all operating conditions.

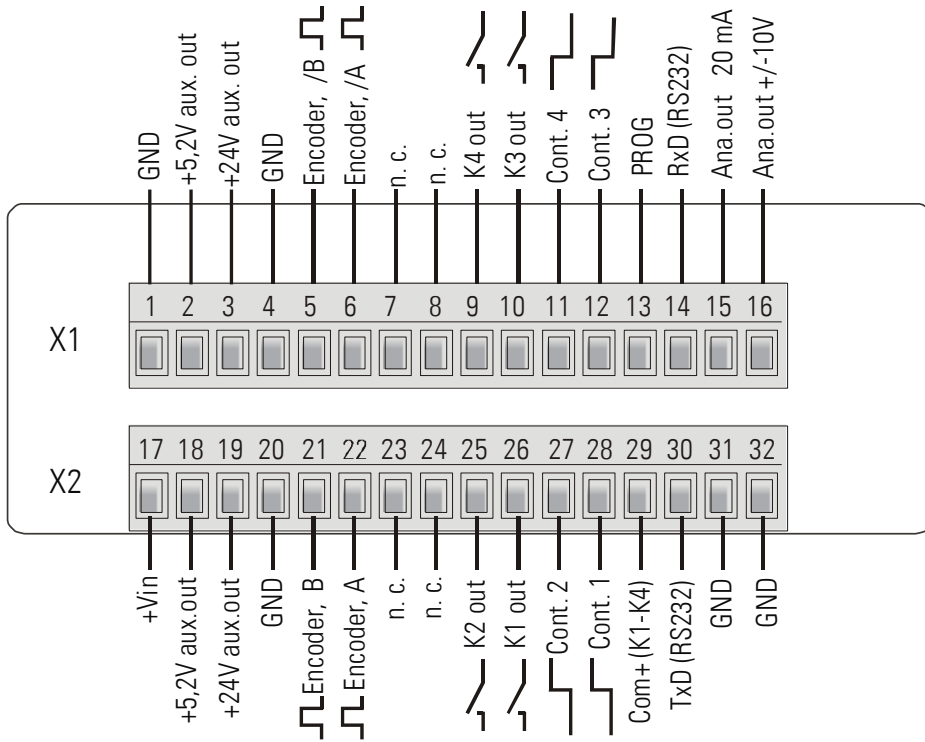
This unit is very easy to set up. All settings can be made either by keypad and display at the unit or by PC, with use of the motrona operator software OS10.

All relevant operational parameters and variables are accessible by RS232/RS485 interface. For PROFIBUS applications, our PB251 gateway is available. Therefore, the user has multiple possibilities for remote control of all parameters via operator terminals, PC or PLC systems

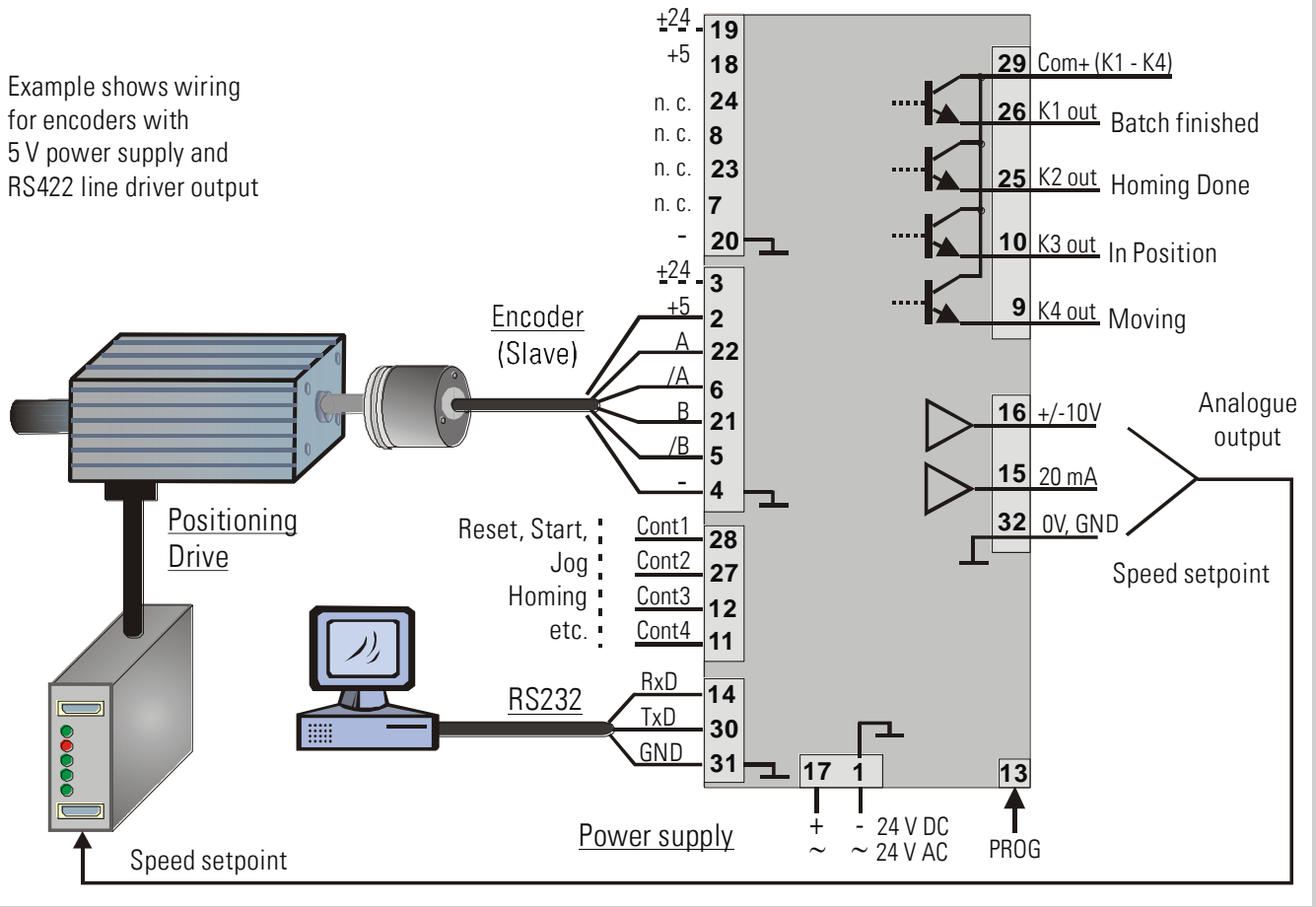


- This manual first provides all basic instructions for operation of model PS340
- For operation of relays and thumbwheels with model PS641 see appendix
- For PC setup our "OS 10" software is available on the USB stick included to delivery, or on our homepage www.motrona.com
- For communication by PLC or IPC or by a remote operator terminal, please observe the serial protocol details described in our separate manual "Serpro".
- PROFIBUS communication is possible with use of our gateway PB251.

4. Electrical Connections



Example shows wiring for encoders with 5 V power supply and RS422 line driver output



Terminal	Name	Function
01	GND	Common Ground Potential (0V)
02	+5.2 V out	Aux. output 5.2 V/150 mA for encoder supply *)
03	+24 V out	Aux. output 24 V/120 mA for encoder supply *)
04	GND	Common Ground Potential (0V)
05	Encoder, /B	Encoder of the positioning drive, channel /B (B inverted)
06	Encoder, /A	Encoder of the positioning drive, channel /A (A inverted)
07	n. c.	n. c.
08	n. c.	n. c.
09	K4 out	Digital output K4, transistor PNP 30 V, 350 mA
10	K3 out	Digital output K3, transistor PNP 30 V, 350 mA
11	Cont. 4	Programmable control input
12	Cont. 3	Programmable control input
13	(PROG)	(for download of new firmware only, not for general use)
14	RxD	Serial RS232 interface, input (Receive Data)
15	Ana. out 20 mA	Analog output -20 mA ... +20 mA (Slave speed reference) **)
16	Ana. out +/-10V	Analog output -10 V ... +10 V (Slave speed reference) **)
17	+Vin	Power supply input, +17 ... 40 VDC or 24 VAC
18	+5.2 V out	Aux. output 5.2 V/150 mA for encoder supply
19	+24 V out	Aux. output 24 V/120 mA for encoder supply
20	GND	Common Ground Potential (0 V)
21	Encoder, B	Encoder of the positioning drive, channel B (non-inverted)
22	Encoder, A	Encoder of the positioning drive, channel A (non-inverted)
23	n. c.	n. c.
24	n. c.	n. c.
25	K2 out	Digital output K2, transistor PNP 30 V, 350 mA
26	K1 out	Digital output K1, transistor PNP 30 V, 350 mA
27	Cont. 2	Programmable control input
28	Cont. 1	Programmable control input
29	Com+ (K1 to K4)	Common positive input for transistor outputs K1 to K4
30	TxD	Serial RS232 interface, output (Transmit Data)
31	GND	Common Ground Potential (0 V)
32	GND	Common Ground Potential (0 V) for DC or AC power supply

*) 120 mA and 150 mA are per output, i.e. total maximum currents are 240 mA and 300 mA

**) In general, the voltage output terminal 16 should be used for the slave speed signal

4.1. Power Supply

The PS340 controller accepts both, a 17 to 40 VDC power or a 24 VAC power for supply via terminals 17 and 1. The current consumption depends on the level of the input voltage and some internal conditions; therefore, it can vary in a range from 100 to 200 mA (auxiliary currents taken from the unit for encoder supply not included).

4.2. Auxiliary Outputs for Encoder Supply

Terminals 2 and 18 provide an auxiliary output with approx. +5.2 VDC (300 mA totally).
Terminals 3 and 19 provide an auxiliary output with approx. +24 VDC (240 mA totally)

4.3. Pulse Input for Incremental Encoders

All input characteristics of the pulse input can be set by the parameter menu. The unit works with quadrature information (A/B, 90°) only. In theory, any of the following encoder characteristics would be applicable:

- Symmetric differential signals according to RS422 standard, however 1V min. as differential voltage.
- TTL input at a level of 3.0 to 5 V (differential, with inverted signal)
- TTL input at a level of 3.0 to 5 V (single-ended) *)
- HTL signals at a 10 ... 30 V level
(alternatively differential A, /A, B, /B, or single-ended A, B only)
- Impulses from photocells or proximity switches etc. providing a HTL level (10 ... 30 V)
- Proximity switches according to NAMUR (2-wire) standard
(may need additional remote resistor)

*) requires special settings of the threshold parameters, see "Special parameters F08"



- For trouble-free operation it is mandatory to use a quadrature encoder with channels A and B or with channels A, /A, and B, /B (90° phase displacement).
- Where the pulse level is HTL (10 to 30 V) you can use either single-ended signals (A and B only) or differential signals (A, /A, B, /B)
- Where the pulse level is TTL or RS422, it is strictly recommended to use symmetric differential signals (with inverted channels /A and /B). Under industrial environment conditions, single-ended TTL signals may cause serious problems due to insufficient EMC immunity of the signal lines
- All encoder input lines are internally terminated by pull-down resistors (8.5 kOhm). Where encoders with pure NPN outputs are used, corresponding pull-up resistors must be available inside the encoder or externally to ensure proper function (1 kOhm to 3.3 kOhm).

4.4. Control Inputs Cont.1 – Cont.4

These inputs can be configured for remote functions like Reset, Start, Jog, Homing etc. All control inputs require HTL level. They can be individually set to either NPN (switch to -) or PNP (switch to +) characteristics. For applications where edge-triggered action is needed, the menu allows to set the active edge (rising or falling). The Control inputs will also accept signals with Namur (2-wire) standard.



For reliable operation of the Control Inputs a minimum pulse duration of 50 μ s must be ensured. Especially when using the Z marker pulse of a HTL encoder for index tracking, please verify that this minimum duration can be kept even with maximum speed of the machine

4.5. Switching Outputs K1 – K4

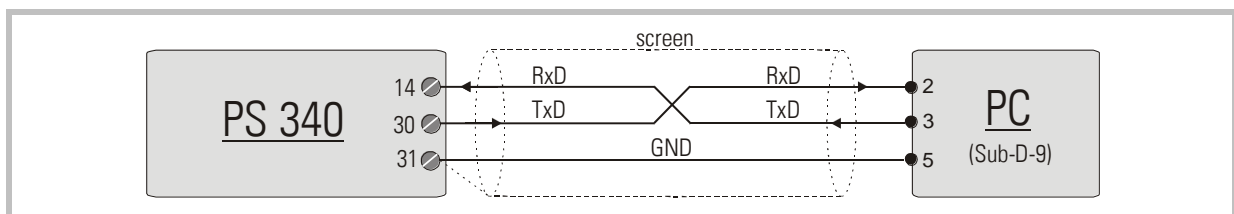
PS340 provides four digital outputs to signal control states like Moving, In Position, Homing Done or Batch Finished. K1 to K4 are fast-switching and short-circuit-proof transistor outputs with a switching capability of 5 to 30 V/350 mA each. The switching voltage of the outputs must be applied remotely to the Com+ input (terminal 29)

4.6. Serial Interface

The serial RS232 interface can be used for the following purposes:

- Set-up of the unit by PC with use of the OS10 PC software
- Remote change of parameters during operation
- Remote readout of actual values by PLC or PC

The figure below explains the connection between the PS340 unit and a PC using the standard Sub-D-9 serial connector



For details of the serial communication protocol, please refer to the special "Serpro" manual.

4.7. Analog Outputs

The unit provides a voltage output of ± 10 V (load = 3 mA), and a current output of ± 20 mA (load = 0 to 270 Ohms), both at a resolution of 14 bits (13 bits + sign).

With most standard applications the voltage output is used as speed set-point signal, connected to the speed input of the positioning drive.



Important note: "Voltage out" and "Current out" cannot be used together. Please do never connect mA and V simultaneously!

5. Functional Description

5.1. Principle of Operation

The drive can move to any relative or absolute position depending on the operating mode (see chapter [7.2.2](#) / parameter F02.002 "Operation Mode") and therefore cover a great variety of positioning applications:

- Incremental Length:** Moving of a certain length from the actual position.
This mode can be used for discontinuous cutting of material in start-stop mode, i.e. move the material for a certain length and cut during standstill.
- Relative Positioning:** Moving of a certain length related to the last target position.
- Absolute Positioning:** Moving to a preset absolute position.
After switch-on of the machine the drive can move to a defined starting position with a homing cycle and thereby set a defined reference point for the absolute positions.
- Loop Operation:** Moving consecutively to several absolute positions in endless loop operation
- Incremental Operation with print mark control:** Relative positioning to a position specified by an index mark.
This mode can be used for discontinuous cutting of pre-printed material in start-stop mode, i.e. move the material for a certain length and cut during the standstill on a position determined by a print mark.

5.2. System Configuration

The encoder resolution should be at least 5 times higher than the maximum acceptable position error.

At maximum positioning speed the input frequency must not exceed the maximum level of 300 kHz (RS422 and TTL differential encoder) or 200 KHz (HTL and TTL single-ended encoders).

It is necessary to adjust the positioning drive to its maximum dynamic response (no internal ramps, no integral control loop, high proportional gain), because the PS340 and PS641 will generate the ramps which the drive has to follow with no additional delay







For safety reasons it is mandatory to limit the traveling range of the positioning drive by independent limit switches at both ends, in order to avoid damage by overshoot upon failure of the electronic control system!

6. Keypad Operation

An overview of all parameters and explanations can be found under chapter [7](#).

The menu of the unit uses four keys, hereinafter named as follows:

			
PROG	UP	DOWN	ENTER


Key functions depend on the actual operating state of the unit. Essentially, we have to describe three basic states:

- Normal operation
- General setup procedure
- Direct fast access to scaling factors

6.1. Normal Operation

In this mode the unit operates to the settings defined upon setup. All front keys may have customer-defined functions according to the specifications met in the keypad definition menu F06 (e.g. Display scroll, Jog, Homing or else)

6.2. General Setup Procedure

The unit changes over from normal operation to setup level when keeping the  key down for at least 2 seconds. Thereafter you can select one of the parameter groups F01 to F09.












**Setup operation is disabled while the drive is within a positioning cycle.
I. e. the setup procedure cannot be started before the actual positioning cycle has been finished and the drive has reached the target position.**

Inside the group you can now select the desired parameter and set the value according to need. After this you can either set more parameters or return to the normal operation.

The adjoining sequence of key operations explains how to change

Parameter number 052 of group F06 from the original value of 0 to a new value of 8.

Step	State	Key action		Display	Comment
00	Normal operation			Actual Error	
01			> 2 sec.	F01	Display of the Parameter group
02	Level: Parameter group		5 x	F02 ... F06	Select group # F06
03				F06.050	Confirmation of F06. The first parameter of this group is F06.050
04	Level: Parameter numbers		2 x	F06.051... F06.052	Select parameter 052
05				0	Parameter 052 appears in display, actual setting is 0
06	Level: Parameter values		8 x	1 8	Setting has been modified from 0 to 8
07				F06.052	Save the new setting (8)
08	Level: Parameter numbers			F06	Return to level parameter groups
09	Level: Parameter groups			Actual Error	Return to normal operation
10	Normal operation				



During the general setup procedure all control activities remain disabled. New parameter settings become active after return to normal operation only.

6.3. Direct Fast Access to Incremental Length Setting

To get to the fast access routine, please press both



and



at the same time

This will access the parameter group F01 right away. To change the settings follow the same procedure as already described above.





Besides the advantage of direct access, the fundamental difference to general setup is the following:



- Direct fast access is enabled when the drive is within a positioning cycle.
- During the fast access procedure all control functions remain fully active.
- Access is limited to incremental length and position number setting; no other parameters can be changed.

6.4. Change of Parameter Values on the Numeric Level











The numeric range of the parameters is up to 6 digits. Some of the parameters may also include a sign. For fast and easy setting of these values the menu uses an algorithm as shown subsequently. During this operation the front keys have the following functions:

			
PROG	UP	DOWN	ENTER
Saves the actual value shown in the display and returns to the parameter selection level	Increments the highlighted (blinking) digit	Decrements the highlighted (blinking) digit	Shifts the cursor (blinking digit) one position to the left, or from utmost left to right

With signed parameters the left digit scrolls from **0 to 9** and then shows “-”, (negative) and “-1” (minus one). The example below shows how to change a parameter from the actual setting of 1024 to the new setting of 250 000.

This example assumes that you have already selected the parameter group and the parameter number, and that you actually read the parameter value in the display.

Highlighted digits appear on colored background.

Step	Display	Key action	Comment
00	001024		Display of actual parameter setting, last digit is highlighted
01		 4 x	Scroll last digit down to 0
02	001020		Shift cursor to left
03	001020	 2 x	Scroll highlighted digit down to 0
04	001000	 2 x	Shift cursor 2 positions left
05	001000		Scroll highlighted digit down to 0
06	000000		Shift cursor left
07	000000	 5 x	Scroll highlighted digit up to 5
08	050000		Shift cursor left
09	050000	 2 x	Scroll highlighted digit up to 2
10	250000		Save new setting and return to the parameter number level

6.5. Code Protection against Unauthorized Keypad Access

Parameter group F09 allows to define an own locking code for each of the parameter menus. This permits to limit access to certain parameter groups to specific persons only.

When accessing a protected parameter group, the display will first show "CODE" and wait for your entry. To continue keypad operations, you must now enter the code which you have stored before, otherwise the unit will return to normal operation again.

After entering your code, press the ENTER key and keep it down until the unit responds. When your code was correct, the response will be "YES" and the menu will work normally. With incorrect code the response will be "NO" and the menu remains locked.

6.6. Return from the Programming Levels and Time-Out Function



At any time, the PROG key sets the menu one level up and finally returns to normal operation. The same step occurs automatically via the time-out function, when during a period of 10 seconds no key has been touched.


Termination of the menu by automatic time-out will not store new settings, unless they have already been stored by the PROG key after editing.

6.7. Reset all Parameters to Factory Default Values

Upon special need it may be desirable to set all parameters back to their original factory settings (e.g. because you have forgotten your access code, or by too many changes of settings you have achieved a complex parameter state). Default values are indicated in the parameter tables shown later.

To reset the unit to default, please take the following steps:

- Switch power off
- Press  and  simultaneously
- Switch power on while you keep pressing both keys

 Where you decide to take this action, please note that all parameters and settings will be lost, and that you will need to run a new setup procedure again.

7. Menu Structure and Description of Parameters

All parameters are arranged in a reasonable order of functional groups (F01 to F09)
 You must only set those parameters which are really relevant for your specific application.
 Unused parameters can remain as they actually are.

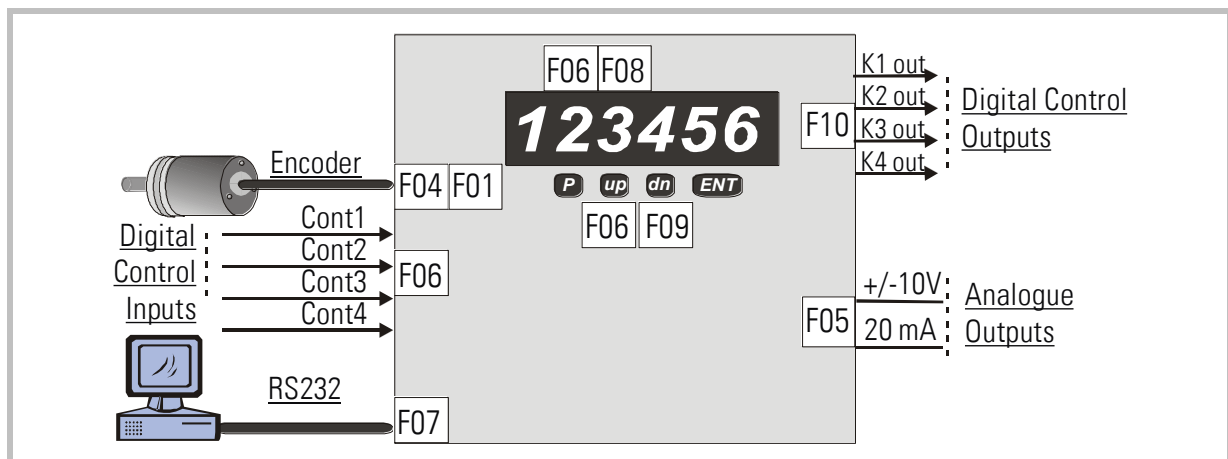
7.1. Summary of the Menu

This section shows a summary of the parameter groups, with an assignment to the functional parts of the unit.

Group	Function	Group	Function
F01	Position Setting	F03	Definitions for the Master Encoder
000	Incremental Length	026	Not applicable
001	Position Number	027	Not applicable
F02	Operational Setting	028	Not applicable
002	Operation Mode	029	Reserved
003	Acceleration Ramp	030	Reserved
004	Deceleration Ramp	031	Reserved
005	Emergency Stop Ramp	F04	Definitions for the Slave Encoder
006	Pulses per 1000 LU	032	Encoder Properties
007	Position Window	033	Edge Counting
008	Frequency Max. Speed	034	Counting Direction
009	Positioning Speed %	035	Reserved
010	Home Position/Photo Offset	036	Reserved
011	Homing/Jog Speed	037	Reserved
012	Homing/Jog Ramp	F05	Analog Output Settings
013	Homing Mode	038	Analog Format
014	Ramp Form	039	Offset Correction
015	Pos. 0	040	Gain Correction
016	Pos. 1	041	Max. Correction
017	Pos. 2	042	Offset Total
018	Pos. 3	043	Gain Total
019	Pos. 4	044	Reserved
020	Pos. 5	045	Reserved
021	Pos. 6		
022	Pos. 7		
023	Pos. 8		
024	Pos. 9		
025	Batch Quantity		

F06	Command Assignment	F09	Keypad protection codes
046	Key Up Function	072	Protect Group F01
047	Key Down Function	073	Protect Group F02
048	Key Enter Function	074	Protect Group F03
049	Input 1 Configuration	075	Protect Group F04
050	Input 1 Function	076	Protect Group F05
051	Input 2 Configuration	077	Protect Group F06
052	Input 2 Function	078	Protect Group F07
053	Input 3 Configuration	079	Protect Group F08
054	Input 3 Function	080	Protect Group F09
055	Input 4 Configuration	081	Reserved
056	Input 4 Function	082	Reserved
057	Reserved	083	Reserved
F07	Serial communication	084	Reserved
058	Unit Number	085	Reserved
059	Serial Baud Rate	086	Reserved
060	Serial Format	087	Reserved
061	Reserved		
062	Reserved		
063	Reserved		
F08	Special functions		
064	Input Filter		
065	Trigger Threshold 1		
066	Trigger Threshold 2		
067	Brightness		
068	Frequency Control		
069	Length Store Configuration		
070	Display Time		
071	Default Display		

The following schematics shows how in principle the parameter blocks are assigned to the various elements and functions of the controller.



7.2. Description of the Parameters

Prior to register setting you must decide which dimensions or length units (LU) you like to use for preset of the incremental length or absolute positions. This could be 0.1mm or 1mm or 0.001 inch or any other resolution you desire. All further settings refer to the Length Units you decided to use. E.g. when you chose to set the length with a 0.1 mm resolution, 1000 LUs will represent a length of 100.0 millimeters with all further entries.

7.2.1. Position Setting

F01		Range	Default
F01.000	<p>Incremental Length: Moving length setting for incremental length operation and relative positioning. In mode 0, 1 or 4 (see parameter F02.002) the position advances always the same distance upon each start. With a PS641 variant, the value can be set by the thumbwheel switch on the front (see chapter 10.2)</p>	1 to 999999	10000
F01.001	<p>Position Number: This is a pointer to an absolute position value stored in parameter F02.015 "Position 0" to F02.024 "Position 9". In mode 2 and 3 the position number determines the new absolute target position. <u>Attention:</u> In mode 3 (loop operation), this register is automatically incremented with each start and follows the branch instructions within a program loop. After an interruption of a loop cycle, be aware where the pointer is or set it to start position again.</p>	0 to 9	0

7.2.2. Operational Settings

F02		Range	Default
F02.002	<p>Operation Mode: This setting selects one of the five general modes of operation. See table on the next page for details.</p>	0 to 4	0
F02.003	<p>Acceleration Ramp: Determines the ramp time in s for acceleration from standstill to full speed.</p>	0.001 to 10.000	1.000
F02.004	<p>Deceleration Ramp: Determines the ramp time in s for deceleration from full speed to standstill.</p>	0.001 to 10.000	1.000
F02.005	<p>Emergency Stop Ramp: Deceleration ramp time in s from full of speed to standstill at emergency stop. A setting of 0 will result in a jump to zero.</p>	0 to 10.000	0.100



- The controller generates ramps of a constant gradient. Therefore, the actual ramp times depend on the ramp time settings and the positioning speed.
- You must only use acceleration and deceleration settings that the drive is really able to follow. Settings outside of the physical capability of the drive will result in malfunction or even failure of the whole system.
- Please note: When you use S-ramps (see parameter F02.014 Ramp Form), the maximum acceleration / deceleration at the steepest position of the S-profile will be 1.25 times higher than with linear ramps

Description of the diverse operation modes:

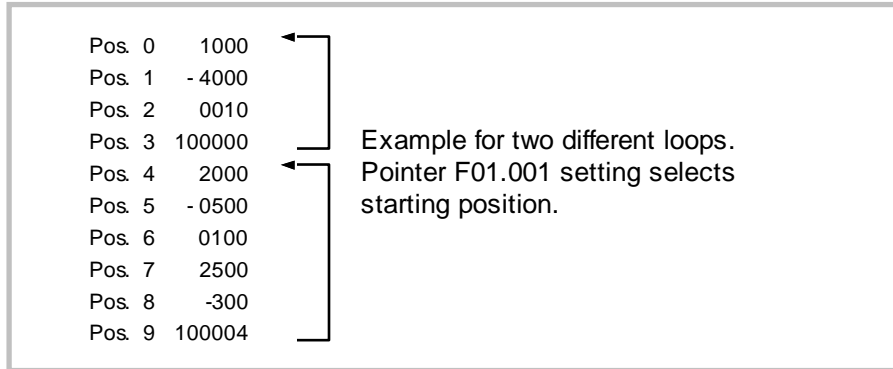
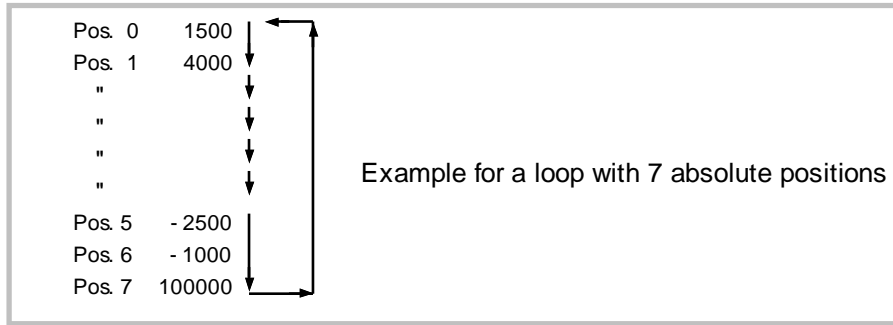
Mode F02.002	Function	Description
0	Incremental Length	F01.000 (Incremental Length) defines the next position. Target position = actual position + F01.000 Positioning direction is always forward. Residual position error at last target position remain unconsidered
1	Relative Positioning	F01.000 (Incremental Length) defines the next position with consideration of the actual position error. Target position = Last target position + F01.000 Position direction is always forward. Actual position error is considered in the next cycle.
2	Absolute Positioning	Absolute target position is selected by pointer F01.001 (Position Number) from the corresponding position value 0 to 9 (F02.015 to F02.024). A new target position can be entered either by changing the value of F01.001 (pointer selects another position value) or by entering a new position value in the position register F01.001 is actually pointing to.
3	Loop Operation	F01.001 (Position Number) will define the start position stored in F02.015 to F02.024 for a numerical sequence with consideration of branch instructions. F01.001 will be incremented or set to a branch value with every start command.
4	Incremental Length with print mark control	F01.000 (Incremental Length) defines the next position. When a signal is detected at input "Reference Position" the position cycle which is actually in progress will not be affected, but the subsequent target position will be overwritten by the print mark position, with respect of the offset set by register F02.010 "Photo Offset".

F02		Range	Default
F02.006	<p>Pulses per 1000 LU: This is a scaling factor permitting to set the positions in any kind of length units, independent of the feedback resolution. Set the number of encoder pulses generated by the encoder for a distance of 1000 length units here. <u>Example:</u> You desire to have a position preset with a 0.1 mm resolution. Consequently, your length units are 0.1 mm and 1000 length units will be 100 mm. If, i.e., the encoder would generate 1380 impulses to go 100 mm forward, set the register to "1380". Scaling of the carriage encoder. Find out how many pulses you receive when the carriage moves 1000 length units (LU) forward and set the proper number of pulses here.</p>	1 to 999 999	10 000
F02.007	<p>Position Window: This is a tolerance window around the target position for the output K3 "In Position". Setting in length units.</p>	1 to 999	25
F02.008	<p>Frequency Max. Speed: Encoder feedback frequency at maximum speed of the positioning drive.</p>	1 to 300 000	100 000
F02.009	<p>Positioning Speed %: This register is used to set the desired positioning speed from 0 to 100% of the maximum speed.</p>	0.1 to 100.0	100.0
F02.010	<p>Home Position/Photo Offset: When during the homing sequence the drive reaches its reference position (defined by proximity switch or index pulse), the position counter will be set to this value. In mode 4, this register sets an offset to the position of the print mark (= distance between photocell and desired stop position)</p>	-99 999 to 999 999	0
F02.011	<p>Homing/Jog Speed: Speed set-point in Volt for jog operations and homing sequence.</p>	0.01 to 10.00	1.00
F02.012	<p>Homing/Jog Ramp: Ramp time in seconds for jog operations and homing sequence with respect to speed changes between standstill and maximum speed (set-point 10 V)</p>	0.025 to 10.000	1.000
F02.013	<p>Homing Mode: There are 4 modes selectable, permitting the user to choose the appropriate homing sequence. See table on next page for details.</p>	0 to 3	0

Homing Mode	Homing forward	Homing reverse		
0 Static homing input (Homing while input homing forw. or homing rev. is set)				
1 Reference position defined by proximity switch, Homing sequence without change of moving direction				
2 Reference position defined by proximity switch, Approach to reference position in forward direction				
3 Reference position defined by proximity switch, Approach to reference position in reverse direction				
	↑ Start homing sequence in forward direction	↑ Set position counter to reference position value	↑ Set position counter to reference position value	↑ Start homing sequence in rev. direction

F02		Range	Default
F02.014	Ramp Form: Selects the shape of the ramps of the positioning speed profile: 0: Parabolic s-ramps (generally recommended with standard servo drives) 1: Linear ramps (recommended with less dynamic systems, e.g. DC drives) 2: sin ² shaped ramps (recommended with extremely dynamic servo systems)	0 to 2	0

F02		Range	Default
F02.015	<p>Pos. 0: Registers to preset up to 10 fixed positions and to set branch (jump) functions for the next target position. The next target position can be determined by the following methods:</p> <ul style="list-style-type: none"> • Change pointer F01.001 "Position Number" selecting one of the position registers "Pos. 0" to "Pos. 9" • With fixed pointer change the value of the selected position register. With a PS641 variant, the value can be set by the thumbwheel switch on the front (see chapter 10.2) • Step through a logical sequence of positions <p>When used as a position register, the setting range is -99 999 to +99 999.</p> <p>Values from 100 000 to 100 009 serve as branch address for the position targets Pos. 0 to Pos. 9.</p> <p>When, in the logical sequence of positions, the unit finds a branch instruction, the next position to go will be the one defined by the position number. The starting position is defined by the setting pointer F01.001. See examples on next page.</p>	-99 999 to 100 009	0
F02.016	<p>Pos. 1: See Parameter F02.015</p>	-99 999 to 100 009	10 000
F02.016	<p>Pos. 2: See Parameter F02.015</p>	-99 999 to 100 009	20 000
F02.017	<p>Pos. 3: See Parameter F02.015</p>	-99 999 to 100 009	30 000
F02.019	<p>Pos. 4: See Parameter F02.015</p>	-99 999 to 100 009	40 000
F02.020	<p>Pos. 5: See Parameter F02.015</p>	-99 999 to 100 009	50 000
F02.021:	<p>Pos. 6 See Parameter F02.015:</p>	-99 999 to 100 009	60 000
F02.022	<p>Pos. 7: See Parameter F02.015</p>	-99 999 to 100 009	70 000
F02.023	<p>Pos. 8: See Parameter F02.015</p>	-99 999 to 100 009	80 000
F02.024	<p>Pos. 9: See Parameter F02.015</p>	-99 999 to 100 009	90 000
F02.025	<p>Batch Quantity: If the batch counter reaches the value specified here the output "Batch finished" is set.</p>	0 to 99 999	0



7.2.3. Definitions for the Master Encoder

F03		Range	Default
F03.026	n. a.= not applicable (not used with PS units)		
F03.027			
F03.028			
F03.029			

7.2.4. Definitions for the Slave Encoder

F04		Range	Default
F04.032	Encoder properties	0 to 1	1
	0= Impulses A, /A, B, /B (2 x 90°) incl. inv.		
	1= Impulses A, B (2 x 90°) without inv.		
F04.033	Edge counting	0 to 2	0
	0= Single (x1)		
	1= Double (x2)		
	2= Full quadrature (x4)		
F04.034	Counting direction	0 to 1	0
	0= Up when A leads B		
	1= Down when A leads B		
F04.035	n. a..		

n. a. = not applicable

7.2.5. Analogue output definitions

F05		Range	Default	
F05.038	Control characteristics and Analog format		0 to 3	0
	0=	Output scaled for a -10 V to +10 V signal		
	1=	Output scaled for a -10V to +10 V signal		
	2=	Output scaled for a -20 mA to +20 mA signal		
	3=	Output scaled for a -20 mA to +20 mA signal		
F05.039	Offset Correction: Digital setting of Analog offset on correction signal.	-10.000 to +10.000 (V)	0.000	
F05.040	Gain Correction: Digital setting of the proportional gain of the control loop. Setting to 2.048 results in a response of 1 mV per error bit. Recommended setting: 0.500 to 5.000 (Gain Correction / 2048 = x.xxx V per error bit).	0 to 51.200	2.000	
F05.041	Max. Correction: Limitation of the output voltage of the correction signal (correction will not exceed this setting)	0 to 10.000 (V)	2.000	
F05.042	Offset Total: Digital setting of analog offset of the overall analog output signal.	-10.000 to +10.000 (V)	0.000	
F05.043	Gain Total: Sets the full-scale output voltage at maximum speed, i.e. 9,000 means 9 V at max. speed	0 to 11.000 (V)	10.000	


n. a. = not applicable

7.2.6. Key command assignments

F06		Range	Default
F06.046	Function assignment to key „UP“	0 to 16	0
	0= No function		
	1= Reset		
	2= Start		
	3= Homing forward		
	4= Homing reverse		
	5= n. a.		
	6= Emergency Stop		
	7= Store to EEPROM		
	8= Scroll Display		
	9= n.a.		
	10= Jog forward		
	11= Jog reverse		
	12= n. a.		
	13= n. a.		
	14= Read front thumbwheels (model PS641 only)		
15= Clear Batch Counter			
16= n. a.			
		For more details about these functions see chapter 8.1	
F06.047	Function assignment to key „DOWN“	0 to 16	0
	See key „UP“		
F06.048	Function assignment to key „ENTER“	0 to 16	0
	See key „UP“		

n. a. = not applicable

7.2.7. Characteristics and functions of Control Inputs

F06		Range	Default	
F06.049	Switching characteristics of input „Cont.1“		0 ... 7	0
	0=	NPN (switch to -), function active LOW		
	1=	NPN (switch to -), function active HIGH		
	2=	NPN (switch to -), rising edge		
	3=	NPN (switch to -), falling edge		
	4=	PNP (switch to +), function active LOW		
	5=	PNP (switch to +), function active HIGH		
	7=	PNP (switch to +), falling edge		
F06.050	Function assignment to input „Cont.1“		0 ... 16	6
	0=	No function		
	1=	Reset		
	2=	Start		
	3=	Homing forward		
	4=	Homing reverse		
	5=	n.a.		
	6=	Emergency Stop		
	7=	Store to EEPROM		
	8=	Scroll Display		
	9=	Parameter Input Disable		
	10=	Jog forward		
	11=	Jog reverse		
	12=	Reference Position (only "Cont. 1" to "Cont. 3")		
	13=	n.a.		
	14=	Read front thumbwheels (model PS641 only)		
15=	Clear Batch Counter			
16=	n.a.			
		For more details about these functions see chapter 8.1		
F06.051	Switching characteristics of input „Cont.2“		See „Cont.1“ (F06.049)	
F06.052	Function assignment to input „Cont.2“		See „Cont.1“ (F06.050)	
F06.053	Switching characteristics of input „Cont.3“		See „Cont.1“ (F06.049)	
F06.054	Function assignment to input „Cont.3“		See „Cont.1“ (F06.050)	
F06.055	Switching characteristics of input „Cont.4“		0 – 3	 <p>no edge-triggered functions are possible with Cont.4</p>
	0=	NPN (switch to -) function active LOW		
	1=	NPN (switch to -) function active HIGH		
	2=	PNP (switch to +), function active LOW		
	3=	PNP (switch to +), function active HIGH		
F06.056	Function assignment to input „Cont.4“		See „Cont.1“ (F06.050)	

n. a. = not applicable



- Unconnected NPN inputs are always HIGH (internal pull-up resistor)
- Unconnected PNP inputs are always LOW (internal pull-down resistor)
- The function "Reference Position" can be assigned to inputs "Cont. 1" to "Cont.3". If this function is used for the homing sequence the corresponding input must operate statically, i. e. the corresponding parameter F06.049, F06.051 or F06.053 must be set to 0, 1, 4 or 5!

7.2.8. Serial communication parameters

F07		Range	Default
F07.058	Serial device address (unit number)	11 ... 99	11
F07.059	Serial baud rate	0 ... 6	0
	0= 9600 Baud		
	1= 4800 Baud		
	2= 2400 Baud		
	3= 1200 Baud		
	4= 600 Baud		
	5= 19200 Baud		
6= 38400 Baud			
F07.060	Serial data format	0 ... 9	0
	0= 7 Data, Parity even, 1 Stop		
	1= 7 Data, Parity even, 2 Stop		
	2= 7 Data, Parity odd, 1 Stop		
	3= 7 Data, Parity odd, 2 Stop		
	4= 7 Data, no Parity, 1 Stop		
	5= 7 Data, no Parity, 2 Stop		
	6= 8 Data, Parity even, 1 Stop		
	7= 8 Data, Parity odd, 1 Stop		
	8= 8 Data, no Parity, 1 Stop		
9= 8 Data, no Parity, 2 Stop			

7.2.9. Special functions

F08		Range	Default
F08.064	Digital input filter: <u>must be set to "0"</u> .	0 ... 3	0
F08.065	Trigger threshold for encoder1 inputs *)	30 ... 250	166
F08.066	Trigger threshold for encoder2 inputs *)	30 ... 250	166
F08.067	Brightness of the 7-segment LED display	0 ... 4	0
	0= 100% of maximum brightness		
	1= 80% of maximum brightness		
	2= 60% of maximum brightness		
	3= 40% of maximum brightness		
4= 20% of maximum brightness			
F08.068	Frequency Control: <u>must be set to "0"</u>	0 ... 1	0
F08.069	Length Storage	0 ... 1	0
	0= Incremental length set by the "Direct Fast Access" menu (see chapter 6.3) is only temporary active until next power-down.		
	1= Incremental length set by the "Direct Fast Access" menu (see chapter 6.3) is stored to EEPROM for enduring use.		
F08.070	Display Time: Update time (sec.) for display only	0.005 ... 9.999	0.050
F08.071	Default Display: Number of actual value displayed by the unit after power up (see table in chapter 8.1 at description of Scroll Display command)	0 ... 8	0

*) Must be set to the default value (166) for any kind of input signals, except for single-ended TTL signals which require a setting of 35.

7.2.10. Keypad protection codes

F09		Range	Default
F09.071	Protected group F01	0 = no protection 1 – 999 999 = Protection code for the actual parameter group	0
F09.072	Protected group F02		
F09.073	Protected group F03		
F09.074	Protected group F04		
F09.075	Protected group F05		
F09.076	Protected group F06		
F09.077	Protected group F07		
F09.078	Protected group F08		
F09.079	Protected group F09		

8. Description of Commands and Outputs

8.1. Commands

No.	Command	Description	Assignment to	
			Keypad	Input
1	Reset	Sets the internal differential counter and the analog correction signal to zero, i. e. the position control runs in open loop operation. Furthermore this command resets error conditions and clears the corresponding error messages (see also chapter 8.4 / Error Messages).	yes	yes
2	Start	Start next positioning cycle.	yes	yes
3	Homing forward	Start homing in forward direction.	yes	yes
4	Homing Reverse	Start homing in backward direction.	yes	yes
5	n. a.		no	no
6	Emergency Stop	Any positioning in progress will be aborted and the drive will go to standstill using the Emergency Stop Ramp setting.	yes	yes
7	Store EEPROM	Stores actual operational settings to the EEPROM, so they remain available also after power down.	yes	yes
8	Scroll Display	Selects the source of the digital display. See chapter 8.3 Display for details.	yes	yes
9	Keyboard Disable	Lock the keyboard against the access on parameters, but keyboard commands are executed.	no	yes
10	Jog Forward	Moves the drive in one or the other direction (Jog speed register settable). After termination of a Jog command, the drive will be held again in its new position under closed-loop control. From this new position the drive will also start to execute the next positioning cycle.	yes	yes
11	Jog Reverse	The Jog inputs are only active when the drive has finished a positioning cycle and is stopped.	yes	yes

No.	Command	Description	Assignment to	
			Keypad	Input
12	Reference Position	In modes 0 – 3, this input receives a signal from a limit switch or a proximity to define the reference position. Depending on the selected home mode, the drive will stop here, the output “Homing Done” will switch on and the position counter will be set to the value of register F02.010 “Home Position” In mode 4, this input receives a signal from a photocell or print mark sensor, and the rising edge will correct the next target position in order to match the print mark position.	yes	yes
13	n. a.	n. a.		
14	Read Thumbwheels	Reads and activates the incremental length setting from the front thumbwheel switches (model PS641 only)	yes	yes
15	Clear Batch Counter	Resets the internal batch counter to zero.	yes	yes
16	n. a.	n. a.	no	no

n. a. = not applicable

8.2. Outputs

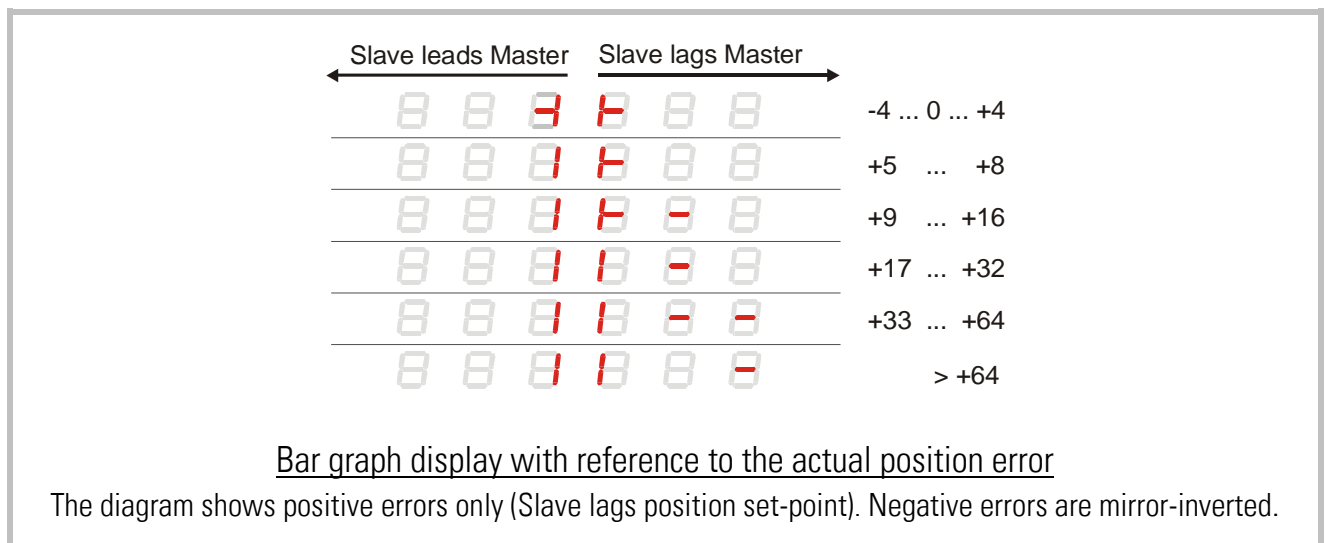
No.	Output	Terminal
K1	Batch Finished: The batch counter has reached the value set by parameter F02.025 (Batch Quantity).	X2 / 26
K2	Homing done: Upon power up, this output remains low until a homing cycle has been executed and the system has been calibrated by moving to its reference position. The output stays high all the time, unless a new homing cycle is started.	X2 / 25
K3	In Position: This output continuously compares the actual position to the actually required target position +/- a programmable position window. It goes high upon coincidence. It goes low again on next start command.	X1 / 10
K4	Moving: This output is high whenever the drive is moving during a positioning cycle	X1 / 9
-	Unit Ready: This announces that the unit is ready to run. On power up, this output is "Low" for about three seconds to allow the power supply to settle, and then switches to "High".	*
-	Max. Correction: Indicates that the limitation of the correction voltage has been activated to keep the correction inside "Max. Correction".	*
-	Emergency Stop: The emergency stop function has been activated. The drive will ramp down to standstill using the Emergency Ramp setting.	*
-	Error: If there is a fault during the operation this output is set. (See chapter 8.4 "Error Messages")	*

*) These outputs can only be read via serial interface

8.3. Display of Actual Values

During normal operation it is possible to display an actual value. Two LEDs at the front panel indicate the actual value displayed. You can scroll the actual value on the display by Scroll Display command, which can be assigned either to a key or to an input. Parameter F08.071 "Default Display" selects the actual value to be displayed after power up of the unit.

Nr.	Display	L1 (red)	L2 (yellow)
0	Display OFF (only two decimal points are lit to indicate operation state)	Off	Off
1	Position error (differential counter)	Off	Off
2	Position error (bar graph display, see diagram below)	Off	Off
3	Actual frequency (Hz)	On	Off
4	Actual position in encoder increments	Off	On
5	Batch Counter (Incremented by each positioning operation; can be reset to zero by the command "Clear Batch Counter")	On	On
6	Actual position in length units	Flashing	Off



8.4. Error Messages

Upon detection of an error, the drive remains in a closed-loop standstill at the actual position. Output "Error" switches to high and the unit displays a flashing error message "Error..." indicating the error number.

To clear an error state either set "Reset" command or cycle the power supply of the unit. Please note that the unit will immediately return to the error state if the cause for the error has not been eliminated.

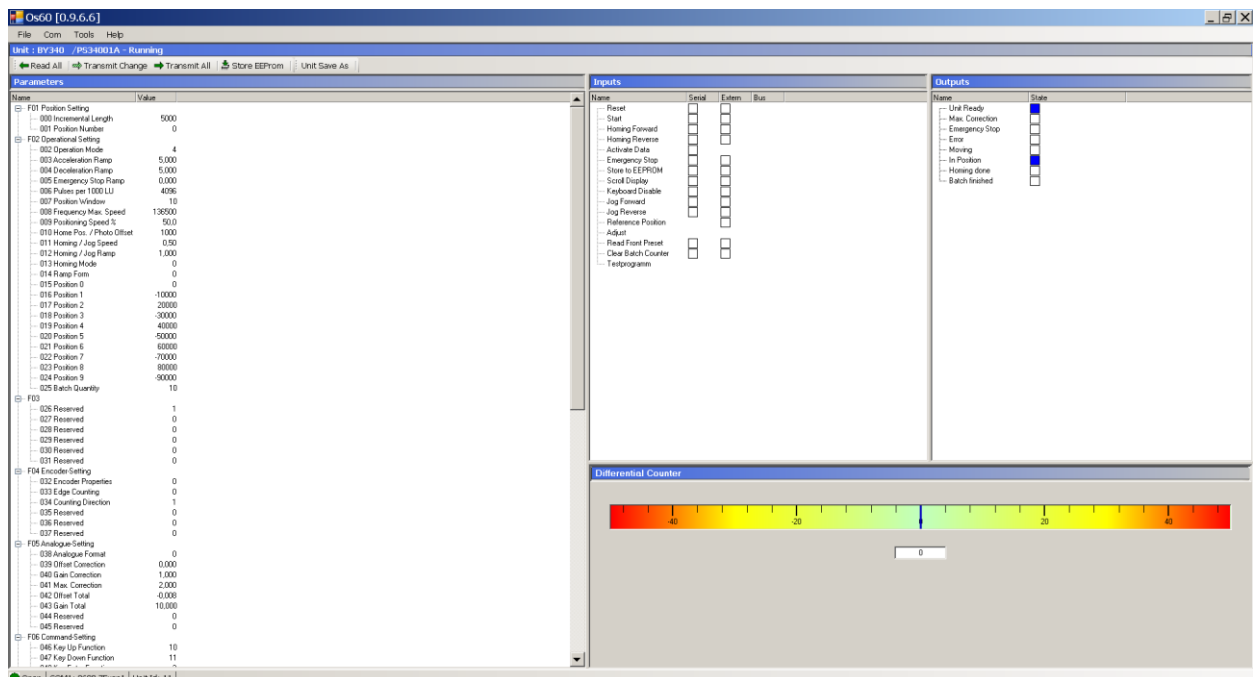
Error No.	Error Description
Error 0	The reason for the error has been rectified (e. g. power supply voltage recovered above minimum level) but the error has not yet been cleared by input "Reset".
Error 1	Power Low: The power supply voltage is too low. This error is reset automatically when the power supply voltage recovers and exceeds the minimum power supply voltage level.
Error 2	Val. Range exceed: An internal parameter value is out of range
Error 3	Invalid Position Setting: At loop operation (mode 3) the branch address does not refer to a new position but again to a branch address.

9. Steps for Commissioning

For easy and uncomplicated commissioning of the PS340 / 641 controllers you need a PC with the actual operator software OS10. You can download this software and full instructions, free of charge, from our homepage <https://www.motrona.com/en/support/software.html>, see also QR code on page 2.

In exceptional cases where no PC or laptop is available for commissioning you can set all parameter values also by keypad as shown in chapter 6. In this case please define the encoder counting direction as described in chapter 9.4.

Connect your PC to the controller as shown in chapter 4.6 and start the OS10 software. The following screen will appear:



When you find the mask blank with the indication „Unit: Searching Unit...“ at the top instead of the device version, please click to the „Com“ menu and check the serial settings of your PC.

A user manual of the OS 10 you can find in menu “Help” at “Show Help”.

Set all parameters in the edit field according to your needs, following the hints given in this manual. The following parameters should initially be set to the values as shown:

Number	Register	Initial Setting
F02.009	Positioning Speed	20.0*
F05.040	Correction Gain	1.000

*) Determines the speed of the positioning drive in the following adjust menu (can be set higher or lower than 20.0% according to your needs)

After entry of all parameters click to "Transmit Change" or "Transmit All" followed by "Store EEPROM" to store all parameters to the PS340 or PS641 controller.

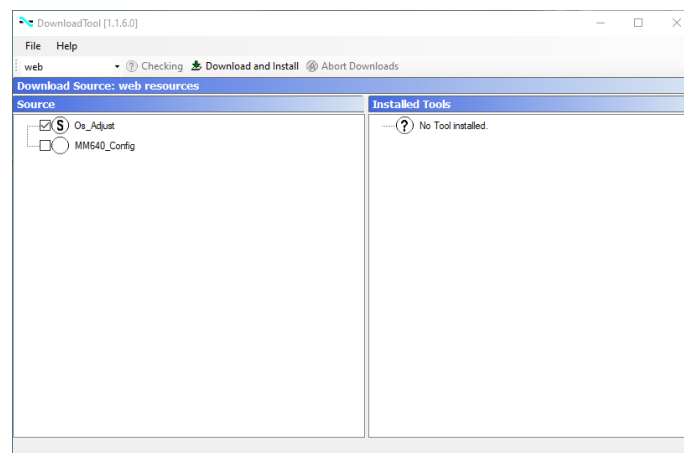


- At this time, the positioning drive must be adjusted to proper and stable operation over the full speed range. The drive controller must provide a maximum of dynamics and response (set ramps to zero, switch off any integral or differential component of the internal speed control loop, i.e. operate the drive with proportional speed control only, with the proportional Gain set as high as possible).
- For the set-up procedure it is recommended to mechanically disconnect the motor shaft from the machine, so you can run the motor continuously and need not to observe the mechanical limitations of the machine

9.1. Download of the Adjust program

The Adjust program is an external tool of the OS 10. Before you can use it for the first time you must download and install the tool.

Please go to menu "Tools" and check if the entry "Os10 Adjust Tool" already exists. If it does not, please start "Os Download Tool" in the same menu. When the Download Tool window opens, please click to "Checking". Then go to the column "Source" and activate the checkbox at "Os_Adjust":

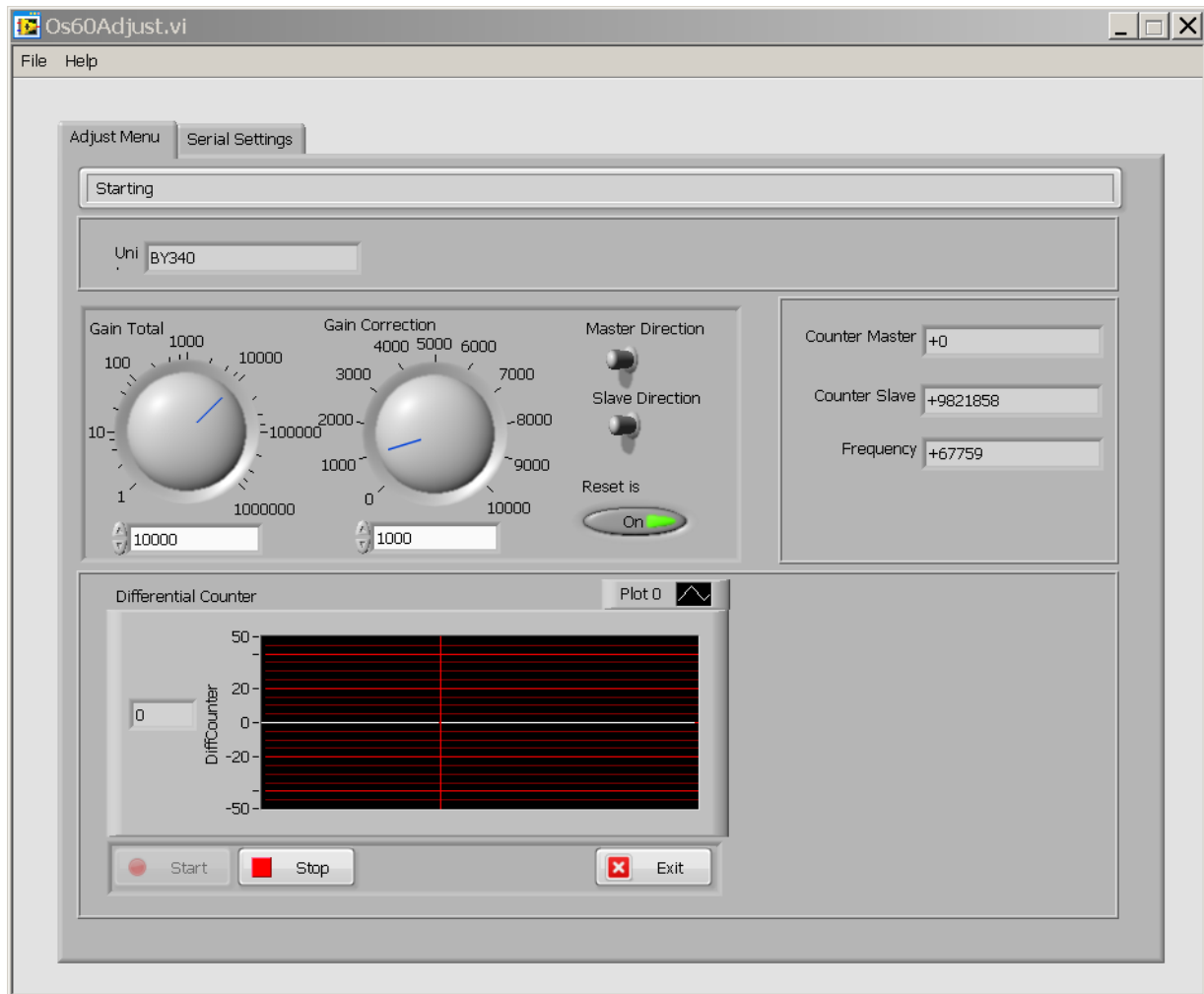


Now click to "Download and install" and follow the instructions. When the installation of the tool has been finished please restart the OS10 software.

9.2. Use of the Adjust program

The settings of the direction of rotation and the controller gain is carried out by means of the adjust program which can be opened in the menu "Tools" with "OS10 Adjust Tools" and started with the button "Start".

For reasons of safety the positioning drive should be disabled at that time.



9.3. Set Directions of Rotation

The direction of rotation must be defined now. Move the positioning drive into the **forward** direction (this is the direction to which the drive moves with a **positive** set-point) either

- manually or
- with an external positive set-point or
- by enabling the positioning drive. In this case the drive gets a speed set-point from PS340/PS641 corresponding to the value of parameter F02.009 "Positioning Speed".

Observe in the small monitor window right on the screen behind "Counter Slave" the displayed count. This counter must **count upwards** (increase) and the displayed encoder frequency must be positive.

If the counter counts downward and the frequency is negative, please click on the switch "Slave Direction" to reverse the counting direction. The "Master Direction" item has no function in the adjust menu of PS340/PS641 units. Moreover, if you are using the speed set-point by PS340/PS641 you can use the displayed frequency value to check the settings of the parameter F02.008 "Frequency Max. Speed": The displayed encoder frequency must correspond to the speed set by parameter F02.009 "Positioning Speed".

9.4. Set Directions of Rotation without PC

If there is no PC or Laptop available the direction of rotation of the encoder of the positioning drive can be adjusted alternatively:

First of all, the position error (differential counter) must be shown on the display of the device (see chapter [8.3](#)); with factory settings the default display value is the differential counter. Then you must move the positioning drive to **forward direction** (this is the direction to which the drive moves with a **positive speed set-point**). The differential counter thereby must **count downwards**, i. e. the position error must decrement to negative values. If the differential counter counts upwards, please reverse the counting direction by parameter F04.034 "Counting Direction".

9.5. Setting of the Proportional Gain

The register F05.040 "Gain Correction" determines how strong the controller responds to position and speed errors of the drive. In principle, this setting therefore should be as high as possible. However, depending on dynamics and inertia of the whole system, too high gain values will produce stability problems.

Please try to increase the setting of Correction Gain from 1.000 to 1.500, 2.000, 2.500, 3.000 etc. However, as soon as you find unsteady operation, noise or oscillation, you must reduce the setting again accordingly.

At this point all important settings are done. Please stop the adjust program by button "Stop" and leave it by button "Exit". The system is ready for operation now and you can carry out the first positioning.

9.6. Optimization of the controller

It is recommended to carry out several positioning cycles with practical speed settings to check the dynamic stability of the system with the actual parameter settings.

In doing so, please observe the positioning error (differential counter) on the PC operating software or on the display of the device:

- If during forward acceleration the position error reaches high positive values and the bar graph moves to the extreme right position, this indicates that the drive cannot follow the acceleration ramp and you should increase the parameter F02.003 "Acceleration Ramp".
- If during forward deceleration the position error reaches high negative values and the bar graph moves to the extreme left position, this indicates that the drive cannot follow the deceleration ramp and you should increase the parameter F02.004 "Deceleration Ramp".

Where you find your position error remains small enough all the time, you are free to decrease the acceleration and deceleration ramp time settings. This will cause steeper ramps and therefore decrease the total positioning cycle time.

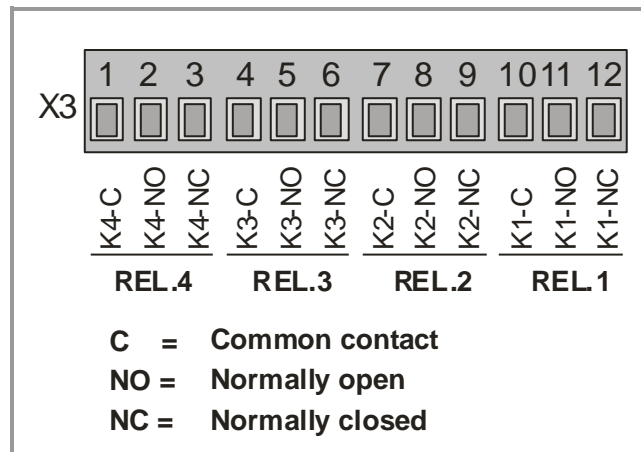
This concludes the procedure of commissioning of your positioning system. We recommend to save all parameter settings in a file and to add it to the machine documentation. In case of repeat applications (machine with similar specifications) or after exchange of the controller, you just need to download the settings to be immediately ready to go.

10. Appendix for model PS641

10.1. Relay Outputs

While model PS340 provides high-speed transistor outputs only, model PS641 provides four additional relay outputs, operating in parallel to the high-speed transistor outputs K1 to K4.

All electrical connections of PS641 are fully similar to PS340, except that with PS641 models the back plane is equipped with an additional terminal strip X3 providing the relay connector:



10.2. Front Thumbwheel Switches

Moreover, the PS641 models provide thumbwheel switches on the front panel, for simple and easy setting of the incremental length F01.001 (in operation mode 0, 1 or 4) or the position setpoint F02.015 etc. (in operation mode 2 or 3).

This is how the front switches work:

In operation mode 0 (Incremental Length), 1 (Relative Positioning) or 4 (Incremental Length with print mark control):

- Upon power-up the unit will read the thumbwheel settings and overwrite the incremental length setting of F01.000 correspondingly, i.e. the system moves the length set by the front thumbwheels.
- When during operation you change the thumbwheel setting, this will not affect the incremental length until you apply a "Read Thumbwheel" command to the unit. You can assign this command to either one of the front keys or to one of the Control Inputs, as shown under chapter [7.2.6](#), [7.2.7](#) and [8.1](#). By this command the thumbwheel setting will be read and transferred to parameter F01.000 "Incremental Length".
- When the front thumbwheels are all set to zero, the controller will automatically use the incremental length set at parameter F01.000 by keypad or PC operator software.

In operation mode 2 (Absolute Positioning) or 3 (Loop operation):

- Upon power-up the unit will read the thumbwheel settings and overwrite the position setting of the position register F02.015 "Pos. 0" ... F02.024 "Pos. 9" which is selected by pointer F01.001 "Position Number".
With F01.001 = 0, for example, the thumbwheel switch value will be transferred to position register F02.015 "Pos. 0".
- When during operation you change the thumbwheel setting, this will not affect the position setting until you apply a "Read Thumbwheel" command to the unit. You can assign this command to either one of the front keys or to one of the Control Inputs, as shown under chapter [7.2.6](#), [7.2.7](#) and [8.1](#). By this command the thumbwheel setting will be read and transferred to the position register F02.015 "Pos. 0" ... F02.024 "Pos. 9" which is selected by pointer F01.001 "Position Number".

11. Technical Specifications

Technical Specifications		
Power supply:	Input voltage (AC): Input voltage (DC): Protection circuit: Consumption: Connections:	24 VAC +/- 10 % 17 ... 40 VDC reverse polarity protection 100 mA at 24 VDC (unloaded encoder supply) screw terminal, 1.5 mm ² / AWG 16
Encoder supply:	Number of aux. voltages: Output voltage 1: Output current 1: Output voltage 2: Output current 2: Connections:	2 (each double-performed) 24 VDC max. 120 mA each 5.2 VDC max. 150 mA each screw terminal, 1.5 mm ² / AWG 16
Incremental input:	Signal levels: Channels: Frequency: Internal resistance: Connections:	HTL: LOW 0 ... 2 V, HIGH 10 ... 30 V TTL: LOW 0 ... 0.8 V, HIGH 3 ... 5 V RS422: Differential voltage > 1 V symmetrical: A, /A, B, /B or asymmetrical: A, B RS422 / TTL symmetrical: 300 kHz HTL or TTL asymmetrical: 200 kHz Ri ≈ 8.5 kOhm screw terminal, 1.5 mm ² / AWG 16
Control inputs:	Number of inputs: Signal levels: Characteristic: Internal resistance: Min. pulse time: Connections:	4 (configurable) HTL: LOW 0 ... 2.5 V, HIGH 10 ... 30 V NPN / PNP / Namur Ri ≈ 3.3 kOhm 50 μs screw terminal, 1.5 mm ² / AWG 16
Control outputs:	Number of outputs: Protection circuit: Characteristic: Output current: Reaction time: Connections:	4 fast transistor outputs **) short circuit proof PNP, 5 ... 30 V 350 mA each < 1 ms *) screw terminal, 1.5 mm ² / AWG 16
Relay outputs: (only with version PS641)	Number of outputs: Switching capacity: Reaction time: Connections:	4 potential-free changeovers **) 250 VAC / 1 A / 250 VA or 100 VDC / 1 A / 100 W ca. 10 ms screw terminal, 1.5 mm ² / AWG 16
Analog outputs:	Voltage output: Current output: Resolution: Accuracy: Reaction time: Connections:	+/- 10 V (load max. 2 mA) +/- 20 mA (burden max. 270 Ohm) 14 Bit (13 Bit + sign) 0.1 % < 1 ms *) screw terminal, 1.5 mm ² / AWG 16
Serial interface:	Format: Baud rate (selectable): Connections:	RS232 600, 1200, 2400, 4800, 9600, 19200, 38400 Baud screw terminal, 1.5 mm ² / AWG 16

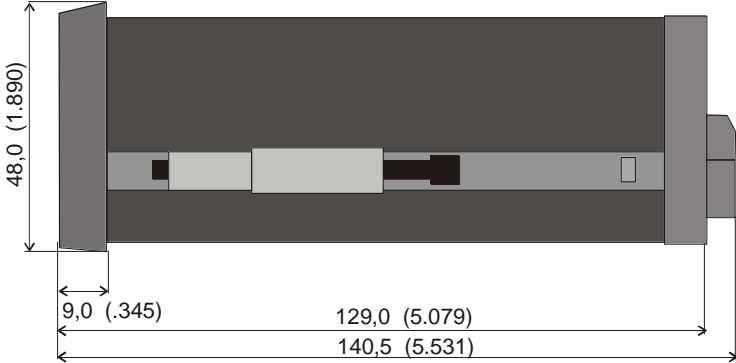
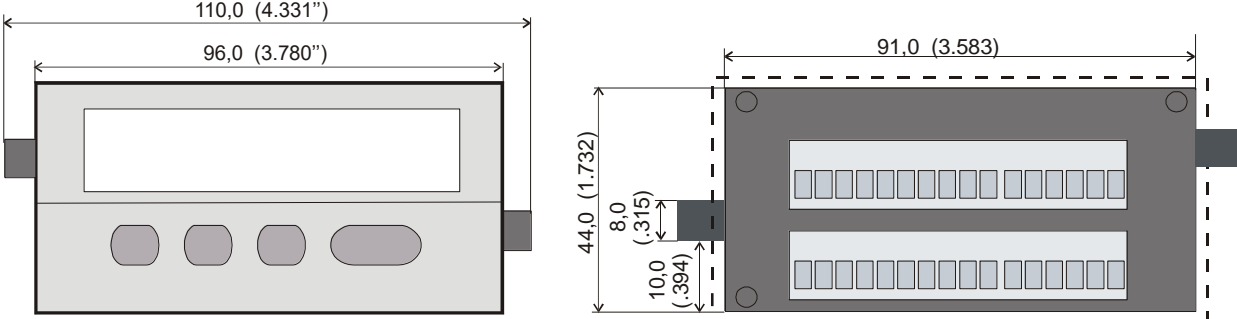
Technical Specifications		
Housing:	Type / Material: Mounting: Dimensions PS340: Dimensions PS641: Protection class PS340: Protection class PS641: Accessories: Weight:	Norly UL94-V-0 / plastic panel Cut out (w x h): 91 x 44 mm / 3.59 x 1.73 inch Outer dimensions (w x h x d): 110 x 48 x 141 mm resp. 4.33 x 1.89 x 5.55 inch Cut out (w x h): 89 x 91 mm / 3.50 x 3.59 inch Outer dimensions (w x h x d): 110 x 96 x 141 mm resp. 4.33 x 3.78 x 5.55 inch front: IP 65 / rear: IP20 front: IP 20 (***) / rear: IP20 (***) with optional plexiglass cover part # 64026 also IP65 achievable SM300: optional mounting bracket for top hat rail mounting of PS340 units PS340: approx. 250 g / PS641: approx. 370 g
Ambient temperature:	Operation: Storage:	0 °C ... +45 °C / +32 ... +113 °F (not condensing) -25 °C ... +70 °C / -13 ... +158 °F (not condensing)
Conformity and standards:	EMC 2014/30/EU: LV 2014/35/EU: RoHS (II) 2011/65/EU RoHS (III) 2015/863:	EN 61326-1: 2013 for industrial location EN 55011: 2016 + A1: 2017 + A11: 2020 Class A EN 61010-1: 2010 + A1: 2019 + AC: 2019-04 EN IEC 61010-2-201: 2018 EN IEC 63000: 2018

*) Continuous serial communication may temporary increase response times

**) Diode or RC filtering is mandatory when switching inductive loads

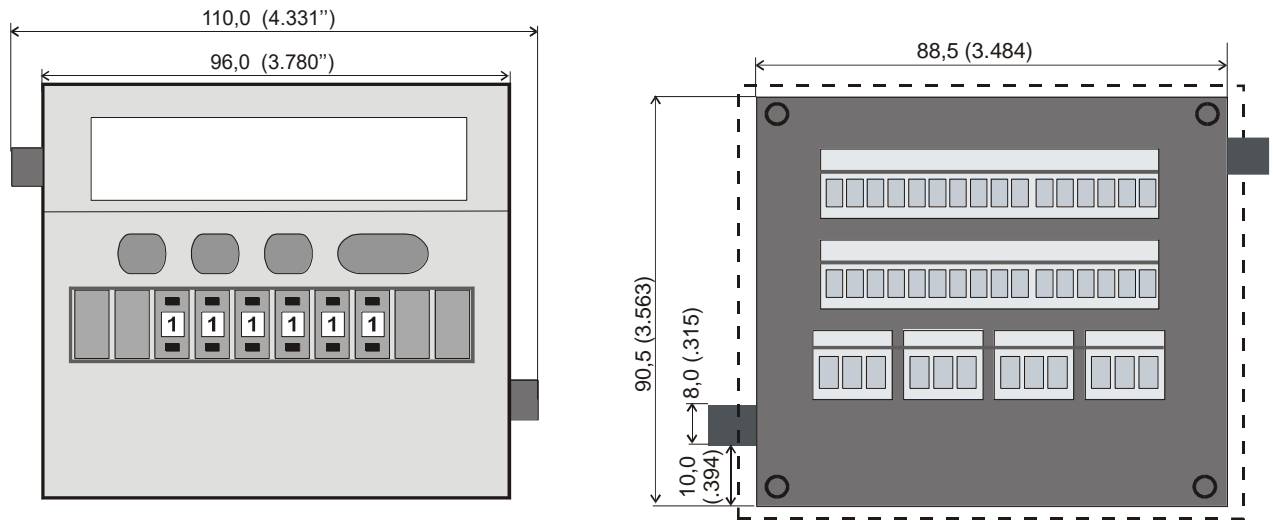
12. Dimensions

12.1. Model PS340:

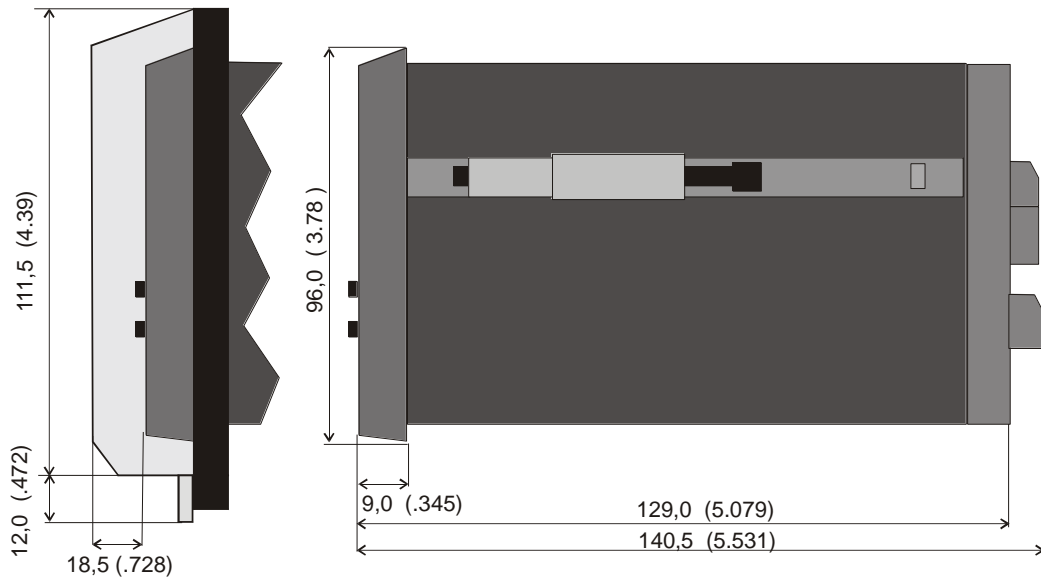


Panel cut out: 91 x 44 mm (3.583 x 1.732")

12.2. Model PS641:



**With optional plexi glass cover
for protection class IP65
(motrona part # 64026)**



Panel cut out (b x h): 89 x 91 mm (3.504" wide x 3.583" high)