
Instruction Manual

PSx3xxDP



halstrup-walcher GmbH

Stegener Straße 10
D-79199 Kirchzarten, Germany

Phone: +49 (0) 76 61/39 63-0
Fax: +49 (0) 76 61/39 63-99

E-Mail: info@halstrup-walcher.com
Internet: www.halstrup-walcher.com

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1 Purpose of instruction manual

This instruction manual describes the features of the PSx 3xxDP positioning systems and provides guidelines for their use.

Improper use of these instruments or failure to follow these instructions may cause injury or equipment damage. All individuals responsible for operating these instruments must therefore be properly trained and aware of the hazards, and must carefully follow these operating instructions and the safety precautions detailed within. **Contact the manufacturer if you do not understand any part of this instruction manual.**

Handle this manual with care:

- It must be readily available throughout the lifecycle of the instruments.
- It must be provided to any individuals who assume responsibility for operating the instrument at a later date.
- It must include any supplementary materials provided by the manufacturer.

The manufacturer reserves the right to continue developing this instrument model without documenting such development in each individual case. The manufacturer will be happy to determine whether this manual is up-to-date.

2 Conformity

This instrument corresponds to the state of the art and meets all legal requirements set forth in EC directives as evidenced by the CE label.



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The manufacturer owns the copyright to this instruction manual. This manual contains data, instructions and drawings pertaining to the features and usage of these instruments; copying this manual in part or in full or distributing it to third parties is prohibited.

3 Safety precautions

3.1 Appropriate use

Positioning systems are especially suitable for automatically setting tools, stops or spindles for wood-processing equipment, packing lines, printing equipment, filling units and other types of special machines.

PSx3xxDP positioning systems are not stand-alone instruments and may only be used if coupled to another machine.

Always observe the operating requirements – particularly the permissible supply voltage – indicated on the rating plate and in the “Technical data” section of this manual.

The instrument may only be handled as indicated in this manual. Modifications to the instrument are prohibited. The manufacturer is not liable for damages caused by improper use or failure to follow these instructions. Violations of this type render all warranty claims null and void.

3.2 Shipping, assembly, electrical connections and start-up

Only technical personnel who are appropriately trained and authorized by the operator of the facility may assemble the instrument and set up its electrical connections.

The instrument may only be operated by appropriately trained individuals who have been authorized by the operator of the facility.

Specific safety precautions are given in individual sections of this manual.

3.3 Troubleshooting, maintenance, repairs, disposal

The individual responsible for the electrical connections must be notified immediately if the instrument is damaged or if errors occur.

This individual must take the instrument out of service until the error has been corrected and ensure that it cannot be used unintentionally.

This instrument requires no maintenance.

Only the manufacturer may perform repairs that require the housing to be opened.

The electronic components of the instrument contain environmentally hazardous materials and materials that can be reused. For this reason the instrument must be recycled in accordance with the environmental guidelines of the jurisdiction in question once it has been taken permanently out of service.

3.4 Symbols

The symbols given below are used throughout this manual to indicate instances when improper operation could result in the following hazards:



WARNING! This warns you of a potential hazard that could lead to bodily injury up to and including death if the corresponding instructions are not followed.



CAUTION: This warns you of a potential hazard that could lead to significant property damage if corresponding instructions are not followed.



INFORMATION: This indicates that the corresponding information is important for operating the instrument properly.

4 Instrument description

4.1 Functions

The PSx3xxDP positioning system, an intelligent, compact, complete solution for positioning auxiliary and positioning axes, consists of an EC motor, gear power amplifier, control electronics, absolute measuring system and Profibus DP interface. The integrated absolute measuring system eliminates the need for a time-consuming reference run. Connecting to a bus system simplifies the wiring. A hollow shaft with adjustable collar makes assembly quite simple. The positioning system is especially suitable for automatically setting tools, stops or spindles for wood-processing equipment, packing lines, printing equipment, filling units and other types of special machines.

PSx3xxDP positioning systems convert a digital positioning signal into an angle of rotation.

4.2 Assembly

Hollow shaft:

The PSx3xxDP is mounted onto the machine by sliding the hollow shaft of the positioning gear onto the axis to be driven and then securing it with an adjustable collar (recommended diameter of the axis is either 8h9 or 14h9; wrench torque for screw: 1.5Nm). The adjustable collar should be tightened only just to the point where it can no longer rotate freely.

Securing the pin under the hollow shaft into an appropriate bore will prevent further rotation.

Solid shaft:

The PSx3xxDP is mounted on the machine by fixing the solid shaft with coupling and intermediate flange to the axis of the machine.



Never apply force to the housing cover, e.g., for supporting weight.



Driving the PSx3xxDP rearward is prohibited (e.g. it's not allowed to turn the output shaft by an external force)

4.3 Pin assignment

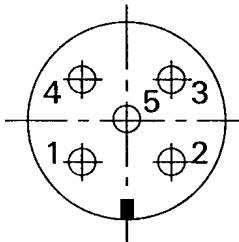
For the supply voltage either a Binder series 713/763 (A-coded) round, 5-pin plug for PSE and PSS devices or a 5-pin Harting plug with protective sleeve (HAN4A) for the PSE34xx devices is located in the housing cover of the PSx3xxDP.

A series 715 (B-coded) 5-pin round socket and 5-pin plug are provided for connecting the bus

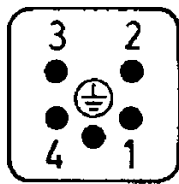
A Binder series 718 4-pin plug is used to connect the jog keys (optional).

Supply voltage connector:
(external top view)

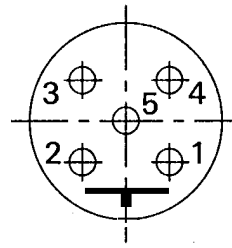
Binder 713/763



Harting(PSE34xxDP)



Profibus DP connector (B encoded)
(external top view)



- 1 +24VDC (final stage)
- 2 ground (final stage)
- 3 +24VDC (control unit)
- 4 ground (control unit)
- 5 housing/pressure balance

- 1 VP +5V
- 2 RxD/TxD-N / A cable
- 3 DGND (reference potential to VP)
- 4 RxD/TxD-P / B line
- 5 shield



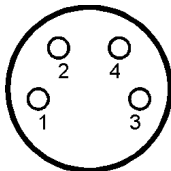
To prevent the ingress of fluids into the PSW-housing during cooldown, use a special cable with an airtube for pressure balancing of your PSW.

Optional connectors

Connector for external keyboard)

4-pin Binder 718 connector

(External top view)



- 1 bn +24V(from control unit)
- 2 ws forward key
- 3 bl reverse key
- 4 sw GND(from control unit)

Electrical grounding

Next to the connecting plugs there is a M4 stud bolt. It is recommended to connect the positioning system with a cable as short as possible to the machine base. The minimum wire cross section therefor is 1.5mm².

4.4 Setting the device address and terminating resistors

Removing the protective cap provides access to two rotary switches for setting the device address and a DIP switch to set the terminating resistors.

The rotary switches indicate the tens and ones places of the address selected. A setting of 01 is the delivery state; the PSx3xxDP identifies itself using address 1 at the bus.

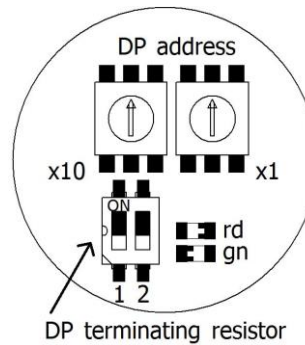
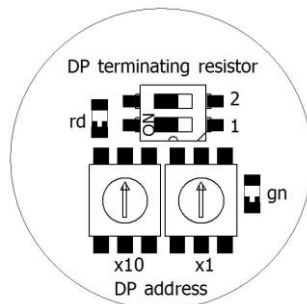
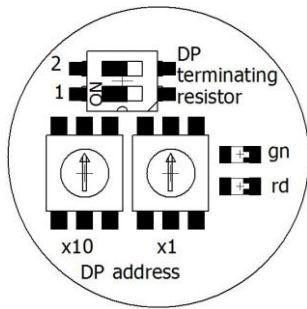
To activate the terminating resistors both switches must be in position ON (If active, remove the connection to a following device).

Switch configurations:

PSx30xDP,
PSx31xDP-8,
Psx32xDP,
PSx31xxDP

PSx31xDP-14,
PSx33xDP-14

PSx34xxDP



Important: Always replace the protective cap after setting the address. This will prevent dust and contaminants from entering the housing.

4.5 LED status

The red LED indicates the operating status of the Profibus DP.

| LED status | Meaning |
|-----------------|--|
| LED remains lit | The Profibus DP is not connected or is inactive |
| LED flashes | The instrument has detected data transfer activity on the bus and identified the transfer rate. |
| LED is not lit | Provided the power supply is switched on, an unlit LED indicates that the instrument is involved in bus communication. |

The green LED indicates the status of the power supply.

| LED status | Meaning |
|-----------------|--|
| LED remains lit | Power supply of control unit and motor is activ |
| LED flashes | Power supply of the motor is inactive. |
| LED is not lit | Power supply of the control unit is inactive. The status of the motor supply could not be detected in this case. |

4.6 Using the bus to set the address

The Profibus DP can also be used to set the device address, provided the address switch is set to 00. In the delivery state, the instrument will identify itself using address 100. Various devices (such as the BW1311 Profibus Master Simulator, see link below) can be used to change this address. The address is then saved and can be used to communicate with the instrument the next time it is switched on. The address set at the address switches always takes precedence, i.e., if an address other than 00 has been set at the address switch, this address is always used for communication with the instrument.

Link to Profibus Master Simulator BW1311:

<http://www.bihl-wiedemann.de/en/products/bus-couplersmaster-simulators/product-overview-bus-couplersmaster-simulators/l/bw1131.html>



Using the address switch instead of the bus to set the Profibus address offers numerous advantages and more safety. As such, the bus should only be used for settings when absolutely necessary.

4.7 Using the parameter module to set the address (firmware version 8)

The parameter module can also be used for setting the device address via the bus if no bus assistant is available for setting the address.

The instrument is projected using the 100 address. Only the 'parameter' module and the status byte are required. The following settings are set to the device once bus communication has been initiated.

| | |
|--------------------|--|
| Parameter index | = 126(0x7E) |
| Parameter data out | = 170(0xAA) → The 'hardware error' bit is activated in the status byte |

| | | |
|--------------------|------------------|-----------------------|
| Parameter index | = 52(0x34) | index → DP address |
| Parameter data in | = 0000 | set by the instrument |
| Parameter data out | = new DP address | |

| | | |
|--------------------|------------------|--------------------------|
| Parameter index | = 180(0xB4) | index → write DP address |
| Parameter data in | = 0000 | set by the instrument |
| Parameter data out | = new DP address | |

The instrument saves the address and resets, after which communication with the instrument can only occur via the new DP address.

The device address for all halstrup-walcher Instruments is 100 by default. If you wish to incorporate an address change into an SPS project and do not want to use 100, the address can be changed for a projected address. In this event, all instruments to be incorporated into the project must be preset to this address (ex.: 50). The bus then accepts the device with this address (ex.: 50) for data transfer, introduces the transfer driver and resets to the new address. The transfer driver and the driver with the address change function can then be reinstalled.

5 Jog key operation

5.1 Connecting the keyboard

The jog keys attach to the instrument via the 4-pin connector. The switching contacts must be connected between +24V and the jog key inputs. Both GND cables must be connected if using an external power supply, making certain that the GND cable for the jog keys is linked to the control unit GND cable.

5.2 Using the control unit to activate the jog keys

The jog keys are inactive by default. The jog key status is copied into the status byte, giving the user the ability to activate jog key functions from the control unit. This only works, however, if the release has been set in the command byte and the 'accept and proceed to position' bit has not been set. Jog key bits can now be copied from the status byte to the command byte, and the drive may begin a positioning sequence. This also allows operators to use the control unit as a means of executing a positioning sequence at one drive using the jog keys of another drive.

5.3 Direct positioning using the jog keys

Direct jog key positioning requires that the jog key function be released, either when setting parameters or by means of the 'manual run release' bit in the command byte. The 'release' bit must be set and the 'accept and proceed to position' bit must not be activated. Any jog key input will now be executed directly by the drive.

5.4 Incremental manual operation

When a jog key is depressed, the drive will move by the distance specified in the 'jog key increment size' parameter. The instrument will then wait for the amount of time specified by the 'jog key pause' parameter. If the key remains depressed, the drive will resume operation at manual speed and will continue until either the key is released or a second key is depressed. This pause was introduced so that users would have sufficient time to release the key in order to position the drive in individual increments.

5.5 Incremental operation

Setting the 'jog key pause' parameter to zero will suppress manual operation, making it possible to operate the drive solely in increments.

6 Start-up

6.1 Setting the reference position

Once it has been installed, the PSx3xxDP must be moved to the reference position, either via the jog keys or with a positioning command. The 'set reference position' command (see section entitled 'Command byte configuration') is used to set the internal position of the PSx3xxDP to zero. This position is saved by the instrument and used as a reference for all positioning data and ranges.

Position 0000 was assigned to the reference point for firmware version 6 and lower. Beginning with firmware version 7, however, the reference position is assigned the value of the module target position. The reference position and assigned position are both permanently stored in the instrument.

6.2 Positioning sequence

The PSx3xxDP distinguishes between the following steps of a positioning sequence (It is assumed that all target positions are approached via forward motion.)

1. New position value is larger than the current value: position approached directly.
2. New position value is smaller than the current value: the instrument reverses by the length of the reference loop and approaches the exact position after resuming forward motion.
3. New position value after reverse run (no reference loop): the instrument always approaches the position by moving forward the length of the reference loop; if necessary, it will first reverse by one rotation.

Once the target position has been reached, the instrument compares it to the internal absolute encoder status. If a discrepancy is detected, the instrument then sets the "positioning error" status bit.

The length of the reference loop and the direction can be configured when setting parameters or by using the parameter module.

6.3 Positioning sequence (without reference loop)

The "positioning without a reference loop" mode is used primarily for moving the small distances involved in fine adjustments. In this case, each position is approached directly. This does NOT eliminate any play present in the spindle in question. The PSx3xxDP internal gear backlash does not play a role in this case, as position data are acquired directly at the output shaft.



Underwater usage of the PSW is not allowed.

7 Interface

| Modules | Format | Meaning |
|-----------------|--|---|
| status byte | 16 bit | flags for instrument status |
| actual position | signed long 32 bit | current actual position in target-value increments |
| command byte | 16 bit | flags for controlling the instrument |
| target position | signed long 32 bit | next position to be achieved in target value increments |
| parameters | 8 bit index signed int 16 bit data in signed int 16 bit data out | set and/or read out parameters, indexed |
| actual index | 8 bit | index of the parameter that has been read out |

The status byte provides the user with information on the current status of the PSx3xxDP. The actual position indicates the current position at which the positioning unit is located. The command byte is used to transmit commands to the positioning unit. The target position is used for transmitting the next position to be reached. During operation, the parameter module allows users to adjust instrument settings directly (via the control unit) that could otherwise only be modified when setting parameters.

7.1 Status byte configuration

| Bit | Hexadec. | Meaning |
|---------|----------|--------------------------------------|
| 15(MSB) | 0x8000 | target position reached |
| 14 | 0x4000 | drive running |
| 13 | 0x2000 | motor supply voltage OK |
| 12 | 0x1000 | ready |
| 11 | 0x0800 | hardware error |
| 10 | 0x0400 | positioning run aborted |
| 9 | 0x0200 | jog key, down |
| 8 | 0x0100 | jog key, up |
| 7 | 0x0080 | temperature too high |
| 6 | 0x0040 | drag error |
| 5 | 0x0020 | invalid target / parameter value |
| 4 | 0x0010 | positioning error |
| 3 | 0x0008 | manual rotation |
| 2 | 0x0004 | no supply voltage available to motor |
| 1 | 0x0002 | positive range limit |
| 0(LSB) | 0x0001 | negative range limit |

7.1.1 Target position reached

The drive is at the target position \pm the permissible deviation defined by the positioning window.

7.1.2 Drive running

The drive is performing a positioning run.

7.1.3 Motor supply voltage OK

The power supply to the motor is higher than the value indicated in the 'min. supply voltage' parameter. This bit must be set prior to performing a run. The level of the supply voltage has a significant effect on the torque and/or motor speed.

7.1.4 Ready

Supply voltages, temperature and target position are all in the permissible range and the drive can begin operation. An exception here is when the display indicates a hardware error, which the operator must acknowledge (thereby deleting the error message) before performing the run.

7.1.5 Hardware error

This bit is set if an error is detected during an internal process and causes the drive to stop. The 'error status' parameter can be used to determine the source of the error. This bit can be deleted by temporarily deactivating the release bit in the command byte, an action that causes the error to be recorded in an internal error memory. The 'save' command can be used to save this error memory in the instrument's non-volatile EEPROM.

7.1.6 Positioning run aborted

The positioning run has been aborted, either because the release bit was reset or because of an error.

7.1.7 Jog key, down

This bit indicates that the 'down' jog key has been depressed. A manual run can be performed directly either if the 'manual run release' bit in the command byte has been activated or if the manual run was released when setting parameters and the positioning bit has not been set.

7.1.8 Jog key, up

This bit indicates that the 'up jog key' input has been activated (connected to +24V). A manual run can be performed directly either if the 'manual run release' bit in the command byte has been activated or if the manual run was released when setting parameters and the positioning bit has not been set.

7.1.9 Temperature too high

The PSx3xxDP positioning unit is equipped with a simple temperature monitoring device intended to avoid a thermal overload. This bit is set if the temperature inside the instrument exceeds the temperature limit set in the parameters; new positioning runs can only be performed once the instrument has cooled down (the 'temperature too high' bit is reset). The 'temperature too high' bit must be reset with the confirmation bit.

7.1.10 Drag error

If the load moment prevents the drive from achieving the target rpm, the current position will not agree with that for the target rpm, a situation that can cause problems when multiple drives are running in parallel. The 'drag error' parameter allows the user to establish the maximum discrepancy. This bit is activated if the difference exceeds that of the set value; the run is not interrupted. The action required to eliminate this problem must be monitored by the external control unit.

7.1.11 Invalid target/parameter value

The operator has attempted to enter a target value or a parameter that lies outside of the valid range.

7.1.12 Positioning error

After the positioning run, the difference between the actual and target values is larger than the positioning window. The bit is deleted during the subsequent positioning run.

7.1.13 Manual rotation

Following a positioning run, an external load moment was applied to the drive, rotating it out of its final position.

7.1.14 No supply voltage available to motor

The power supply to the motor fell below a value of roughly 17 V. Deleting this bit requires a 1→0 transition for the confirmation bit in the command byte.

7.1.15 Upper range limit

The drive has exceeded the upper limit of the user-defined positioning range and can no longer move in the positive direction. This bit is deleted as soon as the drive is within the permissible range. If the drive is switched off in this position, the instrument may produce positioning errors when switched back on.

7.1.16 Lower range limit

The drive has exceeded the lower limit of the user-defined positioning range and can no longer move in the negative direction. This bit is deleted as soon as the drive is within the permissible range. If the drive is switched off in this position, the instrument may produce positioning errors when switched back on.

7.2 Actual position

In this modul the drive is sending current actual position in target-value increments

7.3 Control byte configuration

| Bit | Meaning |
|---------|----------------------------------|
| 15(MSB) | not assigned |
| 14 | not assigned |
| 13 | not assigned |
| 12 | not assigned |
| 11 | not assigned |
| 10 | not assigned |
| 9 | not assigned |
| 8 | confirmation for hardware error |
| 7 | release bit |
| 6 | manual run release |
| 5 | run with no reference loop |
| 4 | set value for reference position |
| 3 | set and save reference position |
| 2 | accept and proceed to position |
| 1 | manual run, down |
| 0(LSB) | manual run, up |

7.3.1 Confirmation

When this bit undergoes a 1→0 transition, all hardware errors and the error status are transferred to the error memory and deleted. The save command can be used to transfer the error memory to the internal EEPROM memory (performed automatically in firmware version 7 and up once the error is confirmed). Having the error memory analyzed by the manufacturer can be extremely helpful when performing an error search.

7.3.2 Release bit

If this bit is set, the drive can run. If it is deleted during a run, the drive will stop.

7.3.3 Manual run release

If this bit is set and the 'accept and proceed to position' bit is not set, status information from the external jog keys will be used to control the positioning unit directly.

7.3.4 Run with no reference loop

If this bit is set, the reference loop can be suppressed, even if it has been activated during the parameter setting process.

7.3.5 Set value for reference position

The drive can be assigned a reference position ('set and save reference position') when it is mounted. This reference position, which serves as the new zero position for the drive, is saved in the instrument and can be assigned a new numerical value via the control unit. The new numerical value is written into the target position module and this bit is then activated briefly. In order to prevent an unwanted run, no other bit can be set in the command byte; otherwise the value will not be accepted.

For firmware version 7 and higher, this value should be transferred when setting the reference position for the target position, as it can now be saved permanently.

7.3.6 Set and save reference position

If this bit has been activated and the remaining bits in the command byte have not been set, the current position will be saved as the instrument's new zero position. All positional data now use this point as a reference. In order to prevent an unwanted run, no other bit can be set in the command byte; otherwise the value will not be accepted.

For firmware version 7 and higher (parameter software: 15507), the current position transferred in the target position module is assigned to the reference point and saved permanently.

Example: Set reference point, target position = 1000 → new actual position = 1000.

7.3.7 Accept and proceed to position

This bit signals the positioning unit that a valid target value has been provided. The drive will begin a new positioning run as soon as this bit is set (provided the release bit has been set). For this to occur, the release bit must be set and no errors may be active.

7.3.8 Manual run, down

A manual run is started if this bit is set and the 'accept position' bit has not been set. The run begins with a single increment, the length of which can be set via the 'jog key increment size' parameter. The drive then waits the amount of time specified by the 'jog key pause' parameter; afterwards the run continues at the speed set in the 'manual run' parameter until the operator disengages the key. A manual run will not be performed if the pause is set to 0 ms, in which case the run can only proceed in single increments.

7.3.9 Manual run, up

See 7.2.8 Manual run, down

7.4 Target position

This 32Bit Value will send the next position to be achieved in target value increments to the drive. When activating the 'accept and proceed to position' bit in the control word the drive will start to move towards this position. If the bit remains set, the drive will follow each change of this value immediately.

7.5 Parameters

| Index | Meaning | Default | Range of values | Access |
|-------|------------------------------------|---------|-------------------------------------|--------|
| 0 | direction of rotation | +1 | -1 = left +1 = right | R |
| 1 | direction of travel | 0 | -1 = left 0 = none +1 = right | R/W |
| 2 | position correction | 0 | 0 = off; 1 = on | R/W |
| 3 | jog key operation | 0 | 0 = off; 1 = on | R/W |
| 4 | hardware resolution | 1024 | 1 ... 1024 | R/W |
| 5 | software resolution (0.01 mm/rev.) | 400 | 1 ... 1024 | R/W |
| 6 | positioning window | min | 1 ... 100 [1/1024 revolutions] | R/W |
| 7 | max. run distance, positive | 9880 | -100.00% ... 100.00% [0.01%] | R/W |
| 8 | max. run distance, negative | -40 | -100.00% ... 100.00% [0.01%] | R/W |
| 9 | target rpm, positioning run | 1000 | 1 ... 120.0% [0.1%] | R/W |

| Index | Meaning | | Range of values | Access |
|---------|---------------------------------------|------|---|--------|
| 10 | target rpm, manual run | 100 | 1 ... 120.0% [0. 1%] | R/W |
| 11 | max. rpm, left | 1200 | 1 ... 120.0% [0. 1%] | R/W |
| 12 | max. rpm, right | 1200 | 1 ... 120.0% [0. 1%] | R/W |
| 13 | max. torque | 1000 | 1 ... 100.0% [0. 1%] | R/W |
| 14 | max. torque, left | 1000 | 1 ... 100.0% [0. 1%] | R/W |
| 15 | max. torque, right | 1000 | 1 ... 100.0% [0. 1%] | R/W |
| 16 | max. starting torque | 1000 | 1 ... 125.0% [0. 1%] | R/W |
| 17 | duration of starting torque | 100 | 1 ... 1000 [ms] | R/W |
| 18 | holding torque | 500 | 1 ... 100.0% [0. 1%] | R/W |
| 19 | drag error | 100 | 20 ... 2000 [0.01mm] | R/W |
| 20 | Min. rpm for detecting an obstacle | 10 | 1 .. 60% [1%] | R/W |
| 21 | time required to detect an obstacle | 100 | 1 ... 500 ms | R/W |
| 22 | wait time between runs | 50 | 20 ... 10000 ms | R/W |
| 23 | min. supply voltage | 190 | 15.0 ... 24.0 V | R/W |
| 24 | filter value for voltage monitoring | 100 | 100 ... 1000 [1ms] | R/W |
| 25 | loop length | 100 | 0 ... 1000 [1/1024 revolutions] | R/W |
| 26 | jog key increment size | 10 | 1 ... 1000 [0.01mm] | R/W |
| 27 | jog key pause | 500 | 0 ... 1000 [ms] | R/W |
| 28 | factor for ramp length | 1000 | 1000...5000 [1/1000] | R/W |
| 29 | limiting temperature | 70 | 50 ... 100 [°C] | R/W |
| 30 | LSW reference position (lower 16 bit) | 0 | +/- 1000000 [0.01mm] | R/W |
| 31 | MSW reference position (upper 16 bit) | 0 | | R/W |
| 32 | production date | | WWYY | R |
| 33 | serial number | | 0 ... 30000 | R |
| 34 | device type | | 3xx,312,315 | R |
| 35 | software version | | 155xx, xx = software design specification | R |
| 36 | hardware version | | 0 ... 999 | R |
| 37 | device temperature | | 0 ... 100 [°C] | R |
| 38 | actual rpm | | rpm | R |
| 39 | max. actual torque (current) | | 0 ... 200.0 % [0. 1%] | R |
| 40 | run time LSW | | [ms] | R |
| 41 | run time MSW | | [ms] | R |
| 42 | drag position | | | R |
| 43 | power supply to motor | | [0.1V] | R |
| 44 | motor current | | [mA] | R |
| 45 | supply voltage for control unit | | [0.1V] | R |
| 46 | error code | | | R |
| default | drive model | | | R |

These parameters can be set and/or read out via the parameter module (read-only parameters are those for which access is designated as 'R'). All parameters are transferred as 16-bit integer values.

7.5.1 Direction of rotation

This parameter specifies the direction in which the drive rotates. A value of +1 means that the drive will rotate clockwise (with respect to the output shaft) when increasing the position, whereas a -1 causes the drive to rotate counterclockwise under the same conditions.

7.5.2 Direction of travel

If the length of the reference loop has been defined, this parameter establishes the direction in which the drive will approach the target position. If the direction of travel = 0, each position will be approached without a reference loop. A value of +1 indicates movement to the right (clockwise) and -1 indicates movement to the left. A reference loop is automatically inserted whenever a position has been approached from a different direction.

7.5.3 Position correction

If, after a correctly executed positioning run, the drive is forcibly moved out of position in the opposite direction, the drive will attempt to correct the position provided this parameter is set to 1. A value of 0 switches this function off. Using devices with an optional holding brake this parameter must be set to 0.

7.5.4 Jog key operation

This parameter can be used to determine whether jog key commands are sent directly to the drive. If this parameter is set to 1 and the 'accept and proceed to position' bit is not set, then drive will execute all commands entered via the jog keys. If this parameter is set to zero, jog key commands are merely signaled in the status byte. The user can then either perform a manual run using the bits in the command byte or redirect this action to a different drive.

7.5.5 Hardware resolution

This parameter specifies the internal resolution of the drive and is involved in the process of translating external positions into an internal position. If this parameter remains at 1024, the following parameter can be used to set the drive resolution per rotation. (400 corresponds to 400 increments per rotation or 0.01 mm/ increment at a spindle pitch of 4.0 mm.) Changing this parameter will interrupt any positioning run that is underway and may result in positioning errors.

7.5.6 Software resolution

This parameter, along with the preceding parameter, specifies the drive resolution per rotation when transmitting the position via the Profibus.

$$\frac{\text{increments}}{\text{rotation}} = \frac{1024 * \text{software_resolution}}{\text{hardware_resolution}}$$

The most practical approach is to leave the hardware resolution set to 1024 and then set the increments/rotation by adjusting the software resolution. Changing this parameter will interrupt any positioning run that is underway and may result in positioning errors.

7.5.7 Positioning window

If the discrepancy between the actual and target positions is larger than the value specified in the 'positioning window' parameter, the 'target position reached' bit will not be activated. Values should be entered in 1/1024 rotations.

7.5.8 Max. run distance, positive

This parameter is used for setting the maximum run distance for positive rotation. Values should be entered as a % of the absolute run distance (256 rotations). The instrument checks to make certain that the sum of the maximum positive run distance and maximum negative run distance does not exceed 99.2%; if this is not the case, the value entered will be reduced by the appropriate amount.

7.5.9 Max. run distance, negative

This parameter is used for setting the maximum run distance for negative rotation. Values should be entered as a % of the absolute run distance (256 rotations). The instrument checks to make certain that the sum of the maximum positive run distance and maximum negative run distance does not exceed 99.2%; if this is not the case, the value entered will be reduced by the appropriate amount.

7.5.10 Target rpm, positioning run

This parameter stipulates the target rpm for a positioning sequence. The percentage value is based on the nominal rated speed of the drive in question.

7.5.11 Target rpm, manual run

This parameter stipulates the target rpm for a manual run. The percentage value is based on the nominal rated speed of the drive in question.

7.5.12 Max. rpm, left

This parameter allows the user to set the maximum rpm for positioning sequences in which the drive is rotating counterclockwise.

7.5.13 Max. rpm, right

This parameter allows the user to set the maximum rpm for positioning sequences in which the drive is rotating clockwise.

7.5.14 Max. torque

This parameter allows the user to set the maximum torque for positioning sequences. Torque is limited by limiting the current to the motor. Values should be entered as a percentage of the nominal torque.

7.5.15 Max. torque, left

This parameter allows the user to set the maximum torque for positioning sequences in which the drive is rotating counterclockwise.

7.5.16 Max. torque, right

This parameter allows the user to set the maximum torque for positioning sequences in which the drive is rotating clockwise.

7.5.17 Max. starting torque

This parameter allows the user to set the maximum torque for the start of a positioning sequence, thus making it possible to overcome a large breakaway torque if necessary. The following parameter allows the user to set the duration of this starting torque.

7.5.18 Duration of starting torque

This parameter can be used to stipulate how long the elevated starting torque is to remain active.

7.5.19 Holding torque

For many applications, the drive requires a level of holding torque greater than the very low self-holding torque generated by the drive's EC motor. This parameter allows the user to set that holding torque value.

Current is then supplied to one of the motor windings when the drive is not operating. The level of holding torque should be entered as a percentage of the nominal torque. The smallest possible level of torque should be selected in order to prevent the drive from heating up unnecessarily, which would reduce the OT.

7.5.20 Drag error

Because the load profile changes over the course of a positioning run, it sometimes happens that the drive fails to reach its target rpm. This can lead to problems for applications involving the synchronous operation of two drives. The 'drag error' bit will be set in the status byte if, over the course of the run, the drive falls short of its theoretical position (target rpm * run time) by more than the distance specified by the 'drag error' parameter. The control unit can then often take steps to correct the situation. If relatively short distances are involved, the drive itself will attempt to compensate for the discrepancy by raising its speed by a small amount (+/- 1 rpm). This corrective function can be deactivated by setting the drag error distance to zero.

7.5.21 Min. rpm for detecting an obstacle

The drive registers an obstacle if the actual rpm = 0 or if the drive speed falls below a certain percentage of the target rpm for a specific amount of time. This parameter allows the user to set that percentage value. If the instrument detects an obstacle, the current positioning run will be aborted and the 'positioning error' and 'positioning run aborted' bits are set in the status byte.

7.5.22 Time required to detect an obstacle

This parameter specifies how long the drive speed must be less than the minimum rpm described above before the instrument registers an obstacle.

7.5.23 Wait time between runs

The parameter specifies the minimum amount of time (in ms) that the drive will pause before reversing its course.

7.5.24 Min. supply voltage

This parameter indicates the voltage at which the 'motor supply voltage' bit in the status byte is activated. No positioning runs can be executed if this bit is not activated. When setting the voltage level, it is important to consider that, due to a number of different components, the power supply to the motor is lower than the voltage applied externally. The positioning sequence will not be aborted if the power supply falls below the required voltage by only a small amount during a run.

7.5.25 Filter value for voltage monitoring

This parameter allows operators to bridge brief voltage dips, such as may occur as a result of the initial current. The 'motor supply voltage OK' bit is only set when the voltage dip lasts longer than the amount of time specified in this parameter.

7.5.26 Loop length

The 'direction of travel' parameter can be used to instruct the drive to approach all positions from the same direction. If a positioning run is performed in the opposite direction, the drive will first move past its target and then perform a second positioning sequence, which takes it to the desired target position. This parameter allows the user to specify the length of this loop (value should be entered in hardware increments).

7.5.27 Jog key increment size

Briefly depressing the jog keys causes the drive to move a defined distance in a given direction. This parameter allows the user to specify this distance (value should be entered in software increments).

7.5.28 Jog key pause

Briefly depressing a jog key causes the drive to move a defined distance, after which it will wait for the amount of time specified by this parameter and then start again in the corresponding direction at the speed indicated in the 'target rpm, manual run' parameter. Manual operation is suppressed if the jog key pause is set to zero, allowing the jog keys to function only in increments.

7.5.29 Factor for ramp length

This parameter allows the user to influence the length of the deceleration ramp for applications in which large moments of inertia need to be overcome.

The value should be entered as an integer, where 1000 corresponds to a factor of 1.0 and 800 corresponds to a value of 0.8, i.e., a shorter ramp. Positioning times will be decreased if the ramp is reduced; the risk of positioning errors increase, however.

7.5.30 Limiting temperature

The drive is equipped with a temperature sensor. If the measured temperature exceeds the temperature limit specified by this parameter, the 'temperature exceeded' bit in the status byte is activated and the drive stops. No new runs may be performed until the drive temperature has returned to below the temperature limit.

7.5.31 Reference position MSW

This parameter can be used to read out and/or set the upper 16 bits of the reference position value. The reference position is the position value that the drive displays when it reaches the point corresponding to its assigned reference position (internal zero point).

7.5.32 Reference position LSW

This parameter can be used to read out and/or set the lower 16 bits of the reference position value. The reference position is the position value that the drive displays when it reaches the point corresponding to its assigned reference position (internal zero point).

7.5.33 Production date

This parameter is available only for read-out. The manufacturer has saved the production date plus the year and day of manufacture in this parameter as an aid in documenting the technical status of the instrument.

7.5.34 Serial number

The serial number is stored in this parameter as an aid in documenting the technical status of the instrument.

7.5.35 Device type

The device model is stored here as a hexadecimal figure.

Format: xxxy (xxx = design and torque, y = diameter of the output shaft $\$E = 14$ mm, 8 = 8 mm).

7.5.36 Software version

This parameter contains the version number for the firmware stored on the instrument. The output value is given as a decimal 155xx(xx = firmware design specification).

7.5.37 Hardware version

This parameter contains the design specification number for the instrument.

7.5.38 Device temperature

This parameter can be used for querying the current temperature measured inside the instrument (in °C).

7.5.39 Actual rpm

This parameter can be used for querying the current drive speed (output in rpm) while a positioning run is still in progress. Values should be entered in rpm.

7.5.40 Max. actual torque (current)

Torque is monitored throughout a positioning sequence from the end of the initial torque period until the current is slowed. The highest value measured here is used to calculate maximum torque. This parameter can be used to monitor the mechanical equipment in that the value will increase when motion becomes difficult. This increase would then serve as a reason for inspecting the equipment.

7.5.41 Run time MSW

This parameter reads out the upper 16 bits of the run time (in ms) for the most recent positioning sequence.

7.5.42 Run time LSW

This parameter reads out the lower 16 bits of the run time (in ms) for the most recent positioning sequence.

7.5.43 Drag position

This parameter reads out the difference between the current and theoretical actual positions (target rpm * time).

7.5.44 Motor supply voltage

This parameter reads out the motor supply voltage (measured internally) in 0.1V increments. While the measured value can then serve as an indicator, the measurement precision, however, is very poor (ca. +/-1V).

7.5.45 Motor current

This parameter reads out the present motor current in mA.

7.5.46 Supply voltage for control unit

This parameter can be used for reading out the supply voltage to the drive control unit. Resolution: 0.1V; precision: approx. +/- 1V.

7.5.47 Error code

This byte is used as a more precise diagnostic tool for troubleshooting a number of different errors, especially hardware errors. The meanings of individual bits are shown in the following table:

| Bit | Hexadec. | Meaning |
|---------|----------|--|
| 15(MSB) | 0x8000 | learn mode active (for manufacturer's use only) |
| 14 | 0x4000 | for internal use |
| 13 | 0x2000 | temperature too high |
| 12 | 0x1000 | error in motor memory |
| 11 | 0x0800 | error in DP address memory |
| 10 | 0x0400 | device parameters have been reset |
| 9 | 0x0200 | supply voltage to motor was less than 16V |
| 8 | 0x0100 | saved parameters incorrect |
| 7 | 0x0080 | Profibus chip is registering an error |
| 6 | 0x0040 | Profibus communication disrupted |
| 5 | 0x0020 | release was reset during a run |
| 4 | 0x0010 | invalid target position = outside of positioning range |
| 3 | 0x0008 | invalid parameter values |
| 2 | 0x0004 | encoder error |
| 1 | 0x0002 | supply voltage to motor is too low |
| 0(LSB) | 0x0001 | actual position lies outside of positioning range |

A few of these errors prevent the drive from performing any further runs, in which case the error code byte must be reset. This is accomplished by resetting the release in the command byte, an action that also saves the most recent error code in the internal EEPROM, where the manufacturer can access it at a later date for determining the mechanism, if necessary, by which a given error occurred.

7.6 Changing parameter values

Change parameter values by first using the index to select the parameter in question. The current value is reported in the 'Data In' module. The 'Current Index' module returns the set index as an echo signal and the new value is written in the 'Data Out' module. The instrument then checks the plausibility of the new value and, if it detects an error, sets the 'invalid target and/or parameter value' bit in the status byte. If it does not set this bit, the MSB(0x80) in the index byte can be set in order to transmit the value to the instrument. If the value is accepted, it is then in read out in the 'Data In' module. The MSB(0x80) in the index byte must now be reset to prevent any accidental writing processes when changing the index byte.

8 Backing up parameter data and the error memory

A special command allows the user to store parameter data in the EEPROM area, a process which does not affect the functioning of the instrument for the user. Every time the Profibus DP starts up, parameter data are reloaded through the bus, making saved data are irrelevant. What is important, however, is saving data when hardware errors crop up during operation. In this case, this procedure can be used to transfer the contents of the error memory to the EEPROM.

Parameter index = 0x7D (dec 125)
Parameter data = 0x55 (dec 85)

This back-up procedure takes less than 1 s, after which the drive must register the value '0000' as parameter data.



Important: Do not turn off the instrument while backing up data, as this could cause important parameter data to be deleted.

9 Technical data

9.1 Drive speed and torque

| | | | | | |
|----------------------------------|------------------------------------|------------------------------------|--------------------------|--------------------------|--------------------------|
| drive model PSE and PSS | 301_8 301_14 311_8 311_14 | 302_8 302_14 312_8 312_14 | 305_8 305_14 315_8 | 322_14 332_14 | 325_14 335_14 |
| nominal output torque (30 % OT) | 1 Nm | 2 Nm | 5 Nm | 2 Nm | 5 Nm |
| temporary breakaway torque | ~ 1.25 Nm | ~ 2.5 Nm | ~ 6.25 Nm | ~ 2.5 Nm | ~ 6.25 Nm |
| self-holding torque (w/ current) | ~ 0.5 Nm | ~ 1 Nm | ~ 2.5 Nm | ~ 1 Nm | ~ 2.5 Nm |
| nominal output speed | 230 rpm | 100 rpm | 40 rpm | 150 rpm | 68 rpm |

| | | | | | |
|----------------------------------|--------|-----------|-----------|-----------|-----------|
| drive model PSE and PSS | 338-14 | 3210-14 | 3218-14 | 3310-14 | 3325-14 |
| nominal output torque (30 % OT) | 7 Nm | 10 Nm | 18 Nm | 10 Nm | 25 Nm |
| temporary breakaway torque | ~ 8 Nm | ~ 12,5 Nm | ~ 22,5 Nm | ~ 12.5 Nm | ~ 27,5 Nm |
| self-holding torque (w/ current) | ~ 3 Nm | ~ 5 Nm | ~ 9 Nm | ~ 5 Nm | ~ 12.5 Nm |
| nominal output speed | 45 rpm | 30 rpm | 17 rpm | 25 rpm | 10 rpm |

| | | | | | |
|----------------------------------|------------------------------------|------------------------------------|--------------------------|--------------------------|--------------------------|
| drive model PSW | 301_8 301_14 311_8 311_14 | 302_8 302_14 312_8 312_14 | 305_8 305_14 315_8 | 322_14 332_14 | 325_14 335_14 |
| nominal output torque (30 % OT) | 1 Nm | 2 Nm | 5 Nm | 2 Nm | 5 Nm |
| temporary breakaway torque | ~ 1.25 Nm | ~ 2.5 Nm | ~ 6.25 Nm | ~ 2.5 Nm | ~ 6.25 Nm |
| self-holding torque (w/ current) | ~ 0.5 Nm | ~ 1 Nm | ~ 2.5 Nm | ~ 1 Nm | ~ 2.5 Nm |
| nominal output speed | 180 rpm | 90 rpm | 35 rpm | 125 rpm | 50 rpm |

9.2 Drive speed and torque PSE34xx

| | | | |
|----------------------------------|---------------|---------------|--------------|
| drive model | PSE3410 | PSE3418 | PSE3430 |
| nominal output torque (30 % OT) | 10 Nm | 18 Nm | 30 Nm |
| temporary breakaway torque | ca.12,5Nm | ca.22,5Nm | ca.37,5Nm |
| self-holding torque (w/ current) | 5 Nm | ca. 9 Nm | ca.15 Nm |
| positioning range | 256 rotations | 256 rotations | 85 rotations |
| nominal output speed | 80 rpm | 60 rpm | 30 rpm |

9.3 Ambient conditions

| | | | |
|---|--|---|-------------------|
| ambient temperature | 0 °C to +45 °C | | |
| storage temperature | -10 °C to +70 °C | | |
| shock resistance according to DIN IEC 68-2-27 | 50 g 11 ms | | |
| resistance to vibration according to DIN IEC 68-2-6 | 10 Hz to 55 Hz 1.5 mm 55 Hz to 1000 Hz 10 g 10 Hz to 2000 Hz 5 g | | |
| EMC standards | CE | | |
| conformity | CE declaration of conformity available upon request | | |
| protection class | PSE | IP 54 | |
| | PSS | IP 65 | |
| | PSW | IP 66 (in operation) IP 68 (at standstill) | |
| duty cycle | Device model | Duty cycle in % | Base time in sec. |
| | PSE34xx | 20 | 300 |
| | PSE30xx to 33xx | 30 | 300 |
| | PSS | 20 | 600 |
| | PSW | 20 | 600 |

9.4 Electrical data

| | | |
|-------------------------------|--|----------------------------|
| nominal power output | PSx30xDP, PSx31xDP, PSE31xxDP | 25 W with 30 % duty cycle |
| | PSx32xDP, PSx33xDP | 35 W with 30 % duty cycle |
| | PSx34xxDP | 100 W with 20 % duty cycle |
| supply voltage | 24 VDC \pm 10 % (supply voltages for motor and control unit are galvanically isolated) advice: use regulated power supplies | |
| nominal current, control unit | 0.15 A | |
| nominal current, motor | PSx30xDP, PSx31xDP, PSE31xxDP | 2.2 A |
| | PSx32xDP, PSx33xDP | 3.0 A |
| | PSE34xxDP | 7.8 A |
| positioning resolution | 0.9° | |
| positioning accuracy | 0.9° | |
| Profibus DP | addresses set via decade switches 0...99 9.6, 19.2, 45.45, 93.75, 187.5, 500, 1500, 3000, 6000, 12000 kBaud | |
| absolute value acquisition | optical - magnetic | |

9.5 Physical data

| | | |
|--|---|--|
| positioning range | 250 usable rotations, no mechanical limits measuring system has a span of 256 turns, minus 3 turns security stock at upper and lower range limit | |
| torsional rigidity (angle of rotation when switching from operation without backlash to maximum torque) | max. 0.2° | |
| gear backlash (without spindle compensation run) | max. 0.5° | |
| spindle lash compensation | automatic loop after every positioning run (may be deactivated) | |
| output shaft | PSE30xDP-8 PSE31xDP-8 | 8H9 hollow shaft with adjustable collar |
| | PSE30xDP-14, PSE31xDP-14, PSE32xDP, PSE33xDP | 14H7 hollow shaft with adjustable collar |
| | PSE338DP PSE31xxDP PSE32xxDP PSE33xxDP PSE34xxDP | 14H7 hollow shaft with clamp and feather key |
| | PSS3xxDP-8 PSW3xxDP-8 | 8H9 hollow shaft with adj. collar or 8h8 solid shaft |
| | PSS3xxDP-14 PSW3xxDP-14 | 14H7 hollow shaft with adj. collar or 14h8 solid shaft |
| recommended diameter of the spindle head | according to the hollow shaft diameter with an interference fit of h9 | |
| maximum radial force | 40 N | |
| maximum axial force | 20 N | |
| dimensions (l x w x h) | see catalog data on our website | |
| weight (approx.) | PSx30xDP-8 | 650 g |
| | PSx30xDP-14, PSx32xDP | 1200 g |
| | PSx31xDP-8 | 700 g |
| | PSx31xDP-14, PSx33xDP | 700 g |
| | PSE31xxDP | 1200 g |
| | PSE34xxDP | 1900 g |

For additional specifications and dimension drawings, please visit our website at

<http://www.halstrup-walcher.de/en/produkte/positioniertechnik/positioniersysteme/index.php>

EG-Konformitätserklärung im Sinne der
EG- Richtlinie 2014/30/EU, EMV

Certificate of Conformity based on the
European Standard 2014/30/EU

Der Hersteller
The manufacturer

**halstrup-walcher GmbH
Stegener Straße 10
79199 Kirchzarten
Deutschland**

erklärt, dass die Bauart des Produktes
declares, that the construction of instrument type

**Gerätebezeichnung PSE3xx, PSS3xx, PSW3xx
Device designation PSE3xx, PSS3xx, PSW3xx**

entwickelt, konstruiert und gefertigt ist in Übereinstimmung mit den EG – Richtlinien
is developed, designed and manufactured in accordance with the EC Directives.

EN 61000-6-2 : 2005
EN 61000-6-4 : 2011

abgegeben durch / stated by:

Sura, Christian
(Nachname, Vorname / Surname, first name)

Geschäftsführer, Managing Director
(Stellung im Betrieb des Herstellers / Position)

Kirchzarten, 10. 10. 2016
(Ort, Datum / City, Date)


(Rechtsgültige Unterschrift/ Signature)

