halstrup walcher

Bus description

# PSxHub PROFINET


PROFINET

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**Original operating instructions**



The instruction manual is part of the product. Please read this manual carefully, follow our instructions, and pay special attention to the safety information provided. This instruction manual should be available at all times. Please contact the manufacturer if you do not understand any part of the instructions.

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

# Table of contents

# 1. General Information

The PSxHub is a PROFINET device that can supply and control up to ten PSD or PSE IO-Link drives. The IO-Link process data of the connected drives are merged into the PROFINET process data of the PSxHub.
The following limitations apply to the use with halstrup-walcher drives.

The PSxHub is currently compatible with halstrup-walcher IO-Link drives of type PSE3xx, PSW3xx, as well as all PSD with software modules 1 (Standard), M (Modulo Function), and P (target speed in process data). The designations PSD and PSE in the following bus description refer to the mentioned device types.

The technical data on the electrical connections of the PSxHub and the connected drives can be found in the connection and plug description on the website: www.halstrup-walcher.de/technicaldocu.

Please search for "PSxHub" and select your type, click on "Instruction manual" and download the connection and plug assignment offered for your bus system.

## 2. Conformity

This device corresponds to the state of the art. It meets the legal requirements according to the EC directives.
This is documented by the affixing of the CE mark.

PROFINET® is a registered trademark and patented technology, licensed by the user organization PROFIBUS & PROFINET International (PI).

# 3. Safety precautions

This section provides an overview of all important safety aspects for optimal protection of personnel as well as for safe and trouble-free operation.

## 3.1. Qualified personnel

This operating manual is intended for electricians and installers who are authorized to assemble, electrically connect, commission, and label devices and systems according to safety standards, as well as for the operator and manufacturer of the system.

The personnel must be provided with all applicable accident prevention and safety regulations that arise during the commissioning or installation of the system.

It must be ensured that the personnel are familiar with all applicable accident prevention and safety regulations.

## 3.2. Explanation of symbols

In this operating manual, the following highlights are used to indicate the dangers described below when handling the system:

| | |
|---|---|
| **DANGER** | **DANGER!**<br>Indicates a situation of imminent danger, which will lead to a fatality or serious injuries if not prevented. |
| **WARNING** | **WARNING!**<br>Indicates a potentially dangerous situation, which may lead to a fatality or serious injuries if not prevented. |
| **CAUTION** | **CAUTION!**<br>Indicates a potentially dangerous situation, which may lead to minor/slight injuries if not prevented. |
| **NOTICE** | **HINWEIS**<br>Indicates a potentially harmful situation, which may lead to material damage if not prevented. |

## 3.3. Appropriate use

The positioning systems used in conjunction with the PSxHub are particularly suitable for automatically setting tools, stops, or spindles on wood-processing equipment, packing lines, printing equipment, filling units and other types of special machines.

**This PSxHub is a not stand-alone device and may only be used if coupled to another machine.**

| **WARNING** |
|---|
| Personal injury and property damage due to incorrect use of the products! |

The PSxHub is designed for use in industrial environments and may only be used as intended. If it is not used as intended, situations can arise that result in property damage and personal injury.

| **NOTICE** |
|---|
| The device is used as intended if all instructions and information in these operating instructions are observed. |

- Only operate the device in perfect technical condition
- When attaching to a machine, observe the current safety regulations.
- Do not operate the product in all installed state unless all necessary protective measures have been taken.
- Observe the relevant regulations for the prevention of accidents (e.g. accident prevention regulations).
- In order to avoid the risk of accidents due to contact with moving parts, appropriate separating or non-separating guards must be provided.
- Use appropriate protective equipment (e.g. safety helmet, safety goggles, safety shoes, protective gloves).
- Use appropriate assembly and transport equipment.
- Store and transport the product in its original packaging, reuse protective caps for plugs if necessary.
- Adequate ventilation must be provided at the point of use to avoid excessive heating.
- During project planning, ensure that the device is always operated within its specifications. **See 7 Technical Data** and the corresponding bus description table of min-, max- and default values).

## 3.4. Inappropriate use

Use of the PSxHub outside the operating conditions and specified technical data described in the documentation is considered "improper use." The PSxHub is designed for proper operation under normal environmental conditions (according to EN / IEC / UL 61010-1).

- Operation inside buildings
- Operartion at altitudes up to 2000m above sea level
- Ambient temperatures deviating from standard: 0°C to 40°C
- Maximum relative humidity 80% at temperatures up to 31°C, decreasing linearly to 50% relative humidity at 45°C
- Fluctuations in the supply voltage between -5% to +15% of the nominal voltage at 50%
- The IP-protection rating is a manufacturer specification.

Any use of the device that goes beyond the intended use and/or is used differently can lead to dangerous situations:

- Underwater usage of the PSxHub is not allowed
- The PSxHub be used for certain applications, such as the tranport of people and animals or as a press-bending device for cold processing of metal.
- If the operating requirements stated in chapter **7 Technical Data** and in the corresponding bus description (table of min-, max- and default values) are exceeded, personal injury or material damage may occur.
- The PSxHUB cannot be used in hazardous areas.

## 3.5. Limitation of liability

The device may only be operated in accordance with these operating instructions.

All information and instructions in these operating instructions have been compiled taking into account the applicable standards and regulations, the state of the art and our many years of experience and knowledge.

The manufacturer accepts no liability arising from improper or unintended use. Warranty claims also expire in this case:

- non-observance of the operating instructions
- improper use
- improper installation
- Use by untrained personnel
- Modifications to the device
- Technical modifications
- Unauthorized modifications

The user is responsible for carrying out commissioning in accordance with the safety regulations of the applicable standards and all other relevant national or local regulations regarding conductor dimensioning and protection, grounding, circuit breakers, overcurrent protection, etc. The person who carried out the assembly or installation is liable for any damage caused during assembly or connection.

## 3.6. Faults, maintenance, repair, disposal

Faults or damage to the device must be reported immediately to the specialist personnel responsible for the electrical connection.

The device must be taken out of operation by the responsible specialist staff until the fault has been rectified and secured against accidental use.

The device does not require any maintenance.

Repair measures that require the housing to be opened may only be carried out by the manufacturer.

The electronic components of the device contain environmentally harmful substances and are also recyclable material carriers. The device must therefore be recycled after its final decommissioning. The environmental guidelines of the respective country must be observed for this purpose.

## 3.7. Product labeling

| Warning | Meaning |
|---|---|
|  | **Reference to further documentation**<br>Read the operating instructions and safety instructions before transportation, installation or commissioning |
|  | **Warning of hot surface**<br>The appliance can become very hot during operation. Temperatures of over 70°C can occur. In the event of a fault, internal components may be overloaded.<br>Use personal protective equipment or wait long enough for the appliance to cool down. |
|  | **Warning of dangerous electrical voltage**<br>Before working on the product, check that all power connections are de-energized**!** |
|  | **Disposal of batteries, electrical and electronic equipment**<br>• In accordance with international regulations, batteries, rechargeable batteries and electrical and electronic equipment must not be disposed of with household waste.<br>• The owner is legally obliged to dispose of these devices properly at the end of their service life.<br>WEEE: This symbol on the product, its packaging or in this document indicates that a product is subject to these regulations. |
| CE | **CE marking**<br>CE stands for "Conformité Européenne". The CE marking<br>expresses the conformity of a product with the relevant<br>EC directives. |
| UK CA | **UKCA marking**<br>UKCA stands for "UK Conformity Assessed". The UKCA marking expresses the conformity of a product with<br>all applicable legal requirements of the United Kingdom. |
| STO | **Safe torque off**<br>Corresponds to stop category 0 in accordance with EN 60204-1. The power supply to the drive is interrupted immediately and the drive is brought to an uncontrolled standstill |
|  | **GROUNDING**<br>Chassis grounding (description in chapter **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**) |

# 4. Start Up

**WARNING**

Risk of injury if used inappropriately.
The device must be installed by trained technical personnel.

**WARNING**

Improper assembly can lead to the destruction of the PSxHub.

**WARNING**

Make sure that the supply lines are not pinched or crushed.

Lay the supply lines in accordance with the general and special local laying regulations.

If the supply lines are not part of the delivery, please select suitable cables according to the application.

Do not operate the PSxHub if the supply lines are visibly damaged.

**WARNING**

Injury. In the event of functional errors, high contact voltages can occur.

This can be avoided by grounding.

**WARNING**

The PSxHub must be protected from excessive heating.
Appropriate protective measures must be ensured by the user / operator.

## 4.1. Electrical connection

| NOTICE |
| --- |
| The following information regarding the power supply should be observed |

If there are concerns about mechanical strength or in places where cables may be exposed to mechanical damage/stress, they must be protected accordingly. This can be ensured, for example, by a cable duct or a suitable armored pipe.

If the power supply cables are laid in the immediate vicinity of the drives or other heat sources, ensure that the cables have a temperature resistance of at least 90°C.
With appropriate design measures, e.g. sufficient ventilation or cooling, lower temperature resistances of the cables are also permissible. This must be checked and specified on site.

Make sure that the flammability class of the cable for USA is equivalent to UL 2556 VW-1, e.g. according to IEC 60332-1-2 or IEC 60332-2-2 depending on the cross-section. For Canada, the flammability class FT1 is required, FT4 exceeds this and is therefore also permitted. Cables for the North American market often meet both requirements.
The flammability class requirements are applied exclusively to the motor power supply of the PSxHub. The currents in the connections to the drives are limited by fuses in the PSxHub to the values of a Class 2 circuit. The control voltage must be limited on the side of the deployment by a suitable fuse. See **4.2 Protection of the engine and control supply** also for further information.

When installing in North America, please always observe the requirements of the National Electrical Code NFPA 70 and the Electrical Standard for Industrial Machinery NFPA 79 (USA) or the Canadian Electrical Code and C22.2 (Canada) in their respective valid versions.

Minimum cross-sections are required for connection to the power supply.

### 4.1.1. Wiring between PSxHub and connected drives

The drives are connected via the X1 - X10 connectors. 1-wire spring headers from the manufacturer WAGO are used for the connection (WAGO article number: 714-105). The following pin assignment applies, pin 1 is the left PIN for X1-X10, see also connector X1 in the figure in chapter 4.2 Protection of the engine and control supply → **Figure 1: connection diagram**.

PIN 1: L+
PIN 2: P24 (motor supply +24V)
PIN 3: L-
PIN 4: C/Q
PIN 5: N24 (GND Motor)

The following cable cross-section is recommended for the connecting cables that are mounted between the PSxHub and the connected actuators in order to minimize the voltage drop for longer cables.

| Connection | Cable cross-section |
| --- | --- |
| Power supply and communication | 0.75 $mm^2$ |

### 4.1.2. Power supply

The motor is powered by the X13 (+24V) and X14 (GND) connections. Corresponding conductor cross-sections are listed in the following table:

| | |
| --- | --- |
| Conductor cross-section rigid | 0.75 $mm^2$... 16 $mm^2$(conductor connection with open terminal point) |
| Conductor cross-section rigid | 0.75 $mm^2$... 16 $mm^2$(push-in connection) |
| Flexible conductor cross-section | 0.75 $mm^2$... 16 $mm^2$ |
| Conductor cross-section flexible with ferrule without plastic sleeve | 0.75 $mm^2$... 16 $mm^2$ |
| Conductor cross-section flexible with ferrule with plastic sleeve | 0.75 $mm^2$... 10 $mm^2$ |
| 2 conductors of the same cross-section flexible with TWIN ferrule and plastic sleeve | 0.75 $mm^2$... 4 $mm^2$ |
| Stripping length | 18 mm |
| Conductor cross-section AWG | 20… 4 |
| Connector X13 | +24V<br>(see figure **4.2 Protection of the engine and control supply**) |
| Connector X14 | GND<br>(see figure **4.2 Protection of the engine and control supply**) |

#### 4.1.3. Supply control side

Connector X15 and X16 are used to supply the control side. Both ports are identical. One of the connectors can be used to loop through the supply voltage of the control side, see also figure in 4.2 Protection of the engine and control supply The PIN assignments for X15 and X16 are:

- PIN 1: +24V
- PIN 2: GND

Corresponding conductor cross-sections are listed in the following table:

| | |
|---|---|
| Conductor cross-section rigid | 0.2 mm²... 1.5 mm² (conductor connection when the terminal point is open) |
| Conductor cross-section rigid | 0.34 mm²... 1.5 mm² (push-in connection) |
| Flexible conductor cross-section | 0.2 mm²... 1.5 mm² |
| Conductor cross-section flexible with ferrule without plastic sleeve | 0.25 mm²... 1.5 mm² (stripping length 8mm) |
| Conductor cross-section flexible with ferrule with plastic sleeve | 0.25 mm²... 0.75 mm² (stripping length 8mm) |
| 2 conductors of the same cross-section flexible with TWIN ferrule and plastic sleeve | 10 mm |
| Conductor cross-section AWG | 24… 16 |

## 4.2. Protection of the engine and control supply

**CAUTION!**

The PSxHub secures each output on the motor side via a 4A fuse, and there is also a replacement fuse on the PCB that could be used directly. The control side is protected with 2A and there is also a replacement fuse here.

The fuses F1 to F10 secure the power supply.
The fuse of the supply voltage is 40 A or: <number of drives> x 4A,

A spare fuse is located on the board below the motor fuses.

The F15 fuse protects the control system from overload. To protect the control system, a fuse with 2A is used. For line protection, the control voltage at the point of provision must also be protected against short circuits and overloads with a suitable fuse, depending on the cable cross-section.

A replacement fuse is located on the board to the right of the control fuse.

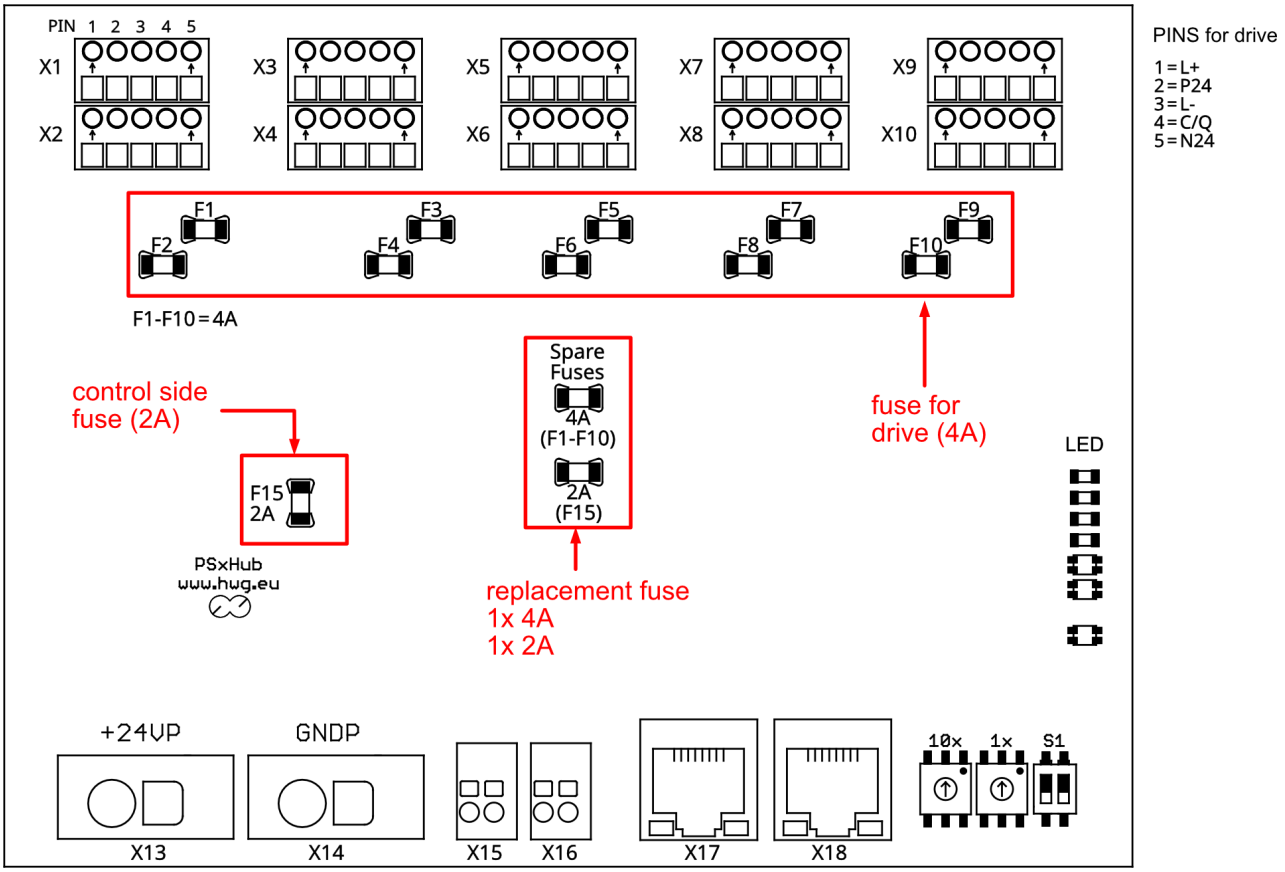



*Figure 1: connection diagram*

| | |
|---|---|
| X1 - X10 | Connection of drives |
| F1 - F10 | Fuse motor side of the drives (4 amps) |
| F15 | Fuse control side (2 amps) |
| X13, X14 | Power supply motor |
| X15, X16 | Power supply control side |
| X17, X18 | RJ45 |

## 4.3. Device Name Setting

**NOTICE**

On delivery, any address switches are set to 0, the internal EEPROM address is 0 and the device name is empty (→PROFINET compliant behaviour).

**NOTICE**

To identify the PSxHub during commissioning, the "Blinking Service" is supported, i.e. the drive can be addressed via the MAC address and, for example, a device baptism can be carried out.

The device name can be specified in 3 different ways:

| | |
|---|---|
| **1)** | **The device name is formed from a basic component and the address in the following way:** |
| | **`PSxHub-xx`** |

**NOTICE**

xx is the position of the address switches when the PSxHub is switched on, where the address must be > 0.

| | |
|---|---|
| **2)** | **If the device does not have an address switch or if the address switch is in the "00" position, the address stored in the internal EEPROM is used, provided it is > 0 (parameter 96). The device name is then composed as follows** |
| | **`PSxHub-xxxxx`** |

| | |
|---|---|
| **3)** | **If the device has no address switch or the address switch is set to "00" AND the address stored in the internal EEPROM = 0, the last device name assigned by the IO controller applies.** |

## 4.4. Switching on the device

After the supply voltages have been applied and the communication has been successfully initialized, the connected drives can be controlled.

## 4.5. Hotplugging

Connecting and disconnecting drives with switched on power supply is not recommended and can lead to undefined behaviour.
Identification of the connected halstrup-walcher drives only happens during startup. To restart the identification process parameter 245 of the PSxHub, "Delivery state" can be used with value "-4"

## 4.6. Restore delivery state (without PLC)

It is possible to set the PSxHub to the delivery state even without the presence of a PLC.

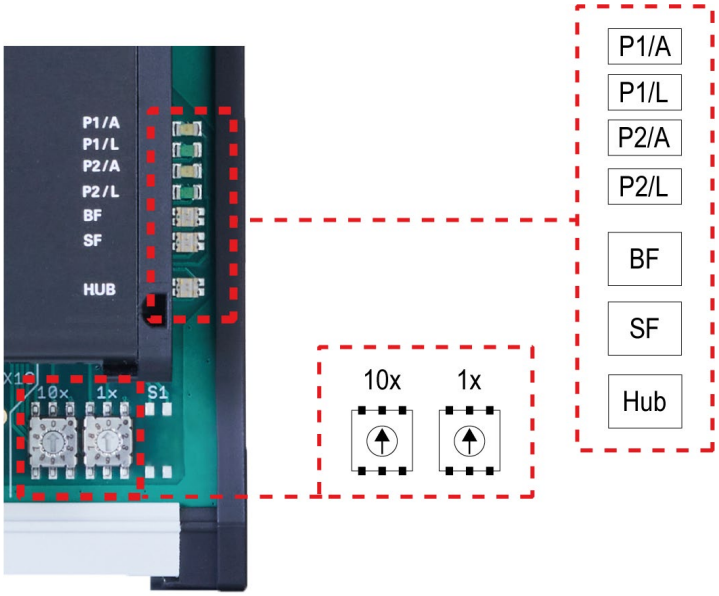
To restore the delivery state:

1) Disconnect the device from the supply voltage.
2) Set the address switch to 98.
3) Switch on the device (control and motor voltage).
4) The status LED of the PSxHub flashes after a few seconds for 10 s at 10 Hz (red).
   During this time, if the address is set to 99, the color of the status LED will change to green. All parameters of the PSxHub are set to delivery state and stored.
5) Set the address switch to 00 to complete the delivery status, the status LED of the PSxHub now lights up permanently green.
6) Turn off the device.

If the 10-second period is exceeded without the address switch being set to 99, the initialization of the device will continue.

# 5. PROFINET description

## 5.1. Status LEDs




| Next to the cover on the right side of the device are the following LEDs: | | |
|---|---|---|
| 1 | P1 / A | Yellow LED = Act |
| 2 | P1 / L | Green LED = Link |
| 3 | P2/A | Yellow LED = Act |
| 4 | P2 / L | Green LED = Link |
| 5 | BF | Red LED = PROFINET Bus Fault LED |
| 6 | SF | Red LED = PROFINET Status Error LED |
| 7 | HUB | PSxHub Status LED (Hub LED) |

| Below the LEDs are the following address switches: | |
|---|---|
| X10 | Address switch x10 |
| X1 | Address switch x1 |

**Meaning of LEDs:**

Each of the ports (P1/P2) has two associated LEDs (a green one for the "Link" status and a yellow one for the "Activity" status):

| **P1 & P2: The following states are possible per port (P1/P2):** | |
|---|---|
| Green (L) off AND<br>yellow (A) off | No connection |
| Green (L) on AND yellow (A) off | Connection is established, data transmission inactive |
| Green (L) on AND<br>yellow (A) flickers at 10 Hz | Connection is established, data transmission active |

| **BF: Bus error - Red LED PROFINET** | |
|---|---|
| Off | Drive in data exchange |
| Flashing at 2 Hz | Drive is connected to the Ethernet network and is not in the data exchange |
| On | Drive is not connected to the Ethernet network |

| **SF: Status Error - Red LED PROFINET** | |
|---|---|
| Off | No error, there is no diagnostic message |
| Flashing at 2 Hz for 3 seconds | DCP signal service is triggered via the bus |
| On | Watchdog Time-out; System error or diagnosis is present |

| **HUB: PSxHub Status LED** | |
|---|---|
| Slow flashing (0.5 Hz) | Initialization active |
| LED permanently on | Initialization successful, device ready for use |
| Flashing at 2Hz | Error condition |
| Flashing at 10Hz | Ready for ALZ without control |

| **PSxHub Status** | |
|---|---|
| Red | Initialization active |
| Green | Initialization Complete |

## 5.2. PROFINET interface

### 5.2.1. Process

The process data for the IO controller is a 176-byte output module and a 176-byte input module. Using the process data, the positioning orders are triggered and monitored, and parameters can also be written and read. The "PKW mechanism" specified in the "Profidrive" drive protocol is used for this purpose.

### 5.2.2. Detailed description of the process data

The content of the input and output data is in **Chapter 8.3 Table of the process data overview** listed.

The first 8 bytes of process data (input and output data) consist of the PSxHub's PKW interface. This is followed by 8 bytes of status or control word for the PSxHub. Among other things, the control word of the hub is used to operate the synchronization functionality, or to monitor it with the status word. Status and control word are divided into "status word 1" and "status word 2" or "control word 1" and "control word 2" and are also available as acyclic parameters. The drives themselves are controlled via 8 bytes of output data each via a control word, a target speed and a target position. Accordingly, the status of the drives can be recorded via 8 bytes of input data (status word, actual speed and actual value).
The target speed is only adopted by the drive if the connected device is a PSD4xxIO with the characteristic "Software Modules" = "P" or "Z". For other PSD4xxIO the target speed has no effect. For the PSE3xx devices, the process data format can be set using parameter 0x13D (ISDU116). For 8 bytes output data including target speed, this value has to be set to 2. For 6 bytes output data (ignoring the target speed), this value has to be set to 1. Value 0 (timestamp function) cannot be used with the PSxHub.

In addition, another 8 bytes are available for each connected drive as a "PKW" interface (parameter identifier value). With this PKW interface, the parameters of the connected IO-Link drives can be accessed directly via the process data as an alternative to the acyclic parameter commands.

The PKW mechanism is described in chapter 5.7 („PKW mechanism“).

### 5.2.3. Acyclic Read and Write Requests

All parameters of the PSxHub can be accessed via acyclic read and write requests.

In the case of acyclic read and write requests, it should be noted that an additional control byte must be transferred before the actual value. In the case of a write request, this control byte indicates whether a write command should be executed or ignored. If the write request is to be ignored, this control byte must be set to 0, otherwise the write request will be executed. The advantage of this method is that parameters from the project planning are optionally adopted during the parameterization during the device start-up or, alternatively, the values stored in the EEPROM of the PSxHub remain valid. This control byte is present in the GSDML file for each parameter and is displayed in the configuration. This control byte has no significance for read requests and only ensures that read and write requests for the same parameter do not differ in their data length.

**NOTICE**

This results in the data length of the read and write requests as follows:

| | |
|---|---|
| **8bit values** | **2 bytes** |
| **16bit values** | 3 bytes |
| **32bit values** | 5 bytes |

For the PSxHub, slot 1, subslot 1 must be selected in the PROFINET device model for acyclic access, for the connected drives from port 1-10, slot 1 with subslot 2 (drive at port 1) to subslot 11 (drive at port 10).

The ISDUs of the PSD and PSE3xx IO Link drives can be addressed via the PROFINET parameters listed in the table (section “**8.3 Table of the process data overview**”). The associated details on the ISDUs of the drives can be found in the IO-Link bus description of the PSD or the IO-Link operating instructions of the PSE.

Unassigned PN indices in the range 64-255 are considered reserved parameters for future functions.
A read and write attempt of a reserved parameter is mapped to one and the same 32-bit “Parameter reserved” object.

## 5.3. PROFINET parameters of the PSxHub

| Designation | PN Index | Function | Data Type/Range of Values | secured | Default value | R/W |
|---|---|---|---|---|---|---|
| Production date | 64 | Year and week of manufacture (as an integer number) in the form JJWW | uint16 | no | | R |
| Serial number | 65 | Device Serial Number | uint16 | no | | R |
| Hardware Version | 66 | Hardware version of the PSxHub | uint16 | no | | R |
| Software Version | 67 | Software version of the PSxHub | uint16 | no | | R |
| Voltage | 86 | Current supply voltage of the PSxHub in 0.1 V | uint16 | no | | R |
| Device temperature | 87 | Temperature inside the device in °C | int16 | no | | R |
| Limit for undervoltage | 91 | lower limit of the supply voltage of the PSxHub in 0.1 V (for bit "undervoltage") | uint16<br>180... 240 | yes | 190 | R/W |
| Overtemperature limit | 92 | upper limit of the device temperature of the PSxHub in °C (for bit "overtemperature") | uint16<br>10... 80 | yes | 70 | R/W |
| Reserved | 93 | | uint16 | no | | R |
| Current value hardware address switch | 95 | Currently set value of the address switch | uint16 | no | | R |
| Software Address | 96 | Adjustable address of the PSxHub | uint16 | yes | 0 | R/W |
| Synchronous group port 1 | 99 | Set Synchronous group port 1 | uint8<br>0.. 5 | yes | 0 | R/W |
| Synchronous group port 2 | 100 | Set Synchronous group port 2 | uint8<br>0.. 5 | yes | 0 | R/W |
| Synchronous group port 3 | 101 | Set Synchronous group port 3 | uint8<br>0.. 5 | yes | 0 | R/W |
| Synchronous group port 4 | 102 | Set Synchronous group port 4 | uint8<br>0.. 5 | yes | 0 | R/W |
| Synchronous group port 5 | 103 | Set Synchronous group port 5 | uint8<br>0.. 5 | yes | 0 | R/W |
| Synchronous group port 6 | 104 | Set Synchronous group port 6 | uint8<br>0.. 5 | yes | 0 | R/W |
| Synchronous group port 7 | 105 | Set Synchronous group Port 7 | uint8<br>0.. 5 | yes | 0 | R/W |
| Synchronous group port 8 | 106 | Set Synchronous group port 8 | uint8<br>0.. 5 | yes | 0 | R/W |
| Synchronous group port 9 | 107 | Set Synchronous group port 9 | uint8<br>0.. 5 | yes | 0 | R/W |
| Synchronous group port 10 | 108 | Set Synchronous group port 10 | uint8<br>0.. 5 | yes | 0 | R/W |
| Synchronization monitoring limit | 115 | Number of steps that drives in a synchronization group may deviatebefore a fault is detected | uint32<br>0... 100.000 | yes | 100 | R/W |
| PSxHub Status Word 1 | 116 | Bit 0: Undervoltage<br>Bit 1: Overvoltage<br>Bit 2: Overtemperature<br>Bit 3: EEPROM Error<br>Bit 4-5: reserved<br>Bit 6: Sync error occurred<br>Bit 7: reserved<br>Bit 8: Synchronization Error Detected<br>Bit 9-13: Deviation detected in Synchronous group x<br>Bit 14 - 31: reserved | uint32 | no | | R |
| PSxHub Status Word 2 | 117 | Bit 0 - 31: reserved | uint32 | no | | R |
| PSxHub Control Word 1 | 118 | Bit 0: Enable Synchronization<br>(0 disabled, 1 enabled)<br>Bit 1: Reset Synchronization Error Bit Status Word Hub | uint32 | no | | R |
| PSxHub Control Word 2 | 119 | Bit 0 - 31: reserved | uint32 | no | | R |

| Designation | PN Index | Function | Data Type/Range of Values | secured | Default value | R/W |
|---|---|---|---|---|---|---|
| Delivery State | 245 | **Writing a "-4":**<br>resets the PSxHub (equivalent to turning the control voltage off and on again)<br>**Writing a "-3":**<br>reserved<br>**Writing a "-1":**<br>sets the values of all parameters that can be stored in the hub to the delivery state without storing the parameters in the EEPROM<br>**Writing a "0":**<br>no action<br>**Writing a "1":**<br>stores the parameters in the EEPROM | int16<br>-4.. 1 | no | | R/W |
| free registers | 246<br>until<br>255 | Freely usable register | uint32 | - | 0 | R/W |

### 5.3.1. Parameter interface of the drives

**Acyclic access:**

The parameters of the drives can be parameterized via acyclic commands via PROFINET via **slot** 1, **subslot** 2 (drive on port 1) to **subslot** 11 (drive on port 10).

**Cyclic access:**

The parameters of the drives can alternatively be addressed via their respective PKW interface, see **5.7 PKW mechanism**. This would be a way of accessing the parameters independent of the underlying Industrial Ethernet protocol.

## 5.4. Process Data Layout

### 5.4.1. Output module (from the Device → IO controller's point of view)

| Byte | Meaning | corresponding par. no. |
|---|---|---|
| 0-7 | PSxHub PKW interface (Output)<br>(not functional yet) | 118 |
| 8-11 | PSxHub Control Word 1 | 119 |
| 12-15 | PSxHub Control Word 2 | |
| | **Drive 1** | |
| 16-23 | PKW Interface PSx Drive 1 | |
| 24-25 | Control Word PSx Drive 1 | |
| 26-27 | Target speed PSx drive 1 | |
| 28-31 | Target value PSx Drive 1 | |
| | **Drive 2** | |
| 32-39 | PKW Interface PSx Drive 2 | |
| 40-41 | Control Word PSx Drive 2 | |
| 42-43 | Target speed PSx drive 2 | |
| 44-47 | Target value PSx Drive 2 | |
| | **Drive 3** | |
| 48-55 | PKW Interface PSx Drive 3 | |
| 56-57 | Control Word PSx Drive 3 | |
| 58-59 | Target speed PSx drive 3 | |
| 60-63 | Target value PSx Drive 3 | |
| | **Drive 4** | |
| 64-71 | PKW Interface PSx Drive 4 | |
| 72-73 | Control Word PSx Drive 4 | |
| 74-75 | Target speed PSx drive 4 | |
| 76-79 | Target value PSx Drive 4 | |
| | **Drive 5** | |
| 80-87 | PKW Interface PSx Drive 5 | |
| 88-89 | Control Word PSx Drive 5 | |
| 90-91 | Target speed PSx drive 5 | |
| 92-95 | Target value PSx Drive 5 | |
| | **Drive 6** | |
| 96-103 | PKW Interface PSx Drive 6 | |
| 104-105 | Control Word PSx Drive 6 | |
| 106-107 | Target speed PSx drive 6 | |
| 108-111 | Target value PSx Drive 6 | |
| | **Drive 7** | |
| 112-119 | PKW Interface PSx Drive 7 | |
| 120-121 | Control Word PSx Drive 7 | |
| 122-123 | Target speed PSx drive 7 | |
| 124-127 | Target value PSx Drive 7 | |
| | **Drive 8** | |
| 128-135 | PKW Interface PSx Drive 8 | |
| 136-137 | Control Word PSx Drive 8 | |
| 138-139 | Target speed PSx drive 8 | |
| 140-143 | Target value PSx Drive 8 | |
| | **Drive 9** | |
| 144-151 | PKW Interface PSx Drive 9 | |
| 152-153 | Control Word PSx Drive 9 | |
| 154-155 | Target speed PSx drive 9 | |
| 156-159 | Target value PSx Drive 9 | |
| | **Drive 10** | |
| 160-167 | PKW Interface PSx Drive 10 | |
| 168-169 | Control Word PSx Drive 10 | |
| 170-171 | Target speed PSx drive 10 | |
| 172-175 | Target value PSx Drive 10 | |

**NOTICE**

The process data layout cannot be changed.
The target speed is only adopted by the drive if the connected device is a PSD4xxIO with the feature "Software Modules" = "P" or "Z". For other PSD4xxIO the target speed has no effect. For the PSE3xx devices, 8 bytes of output data must be selected with parameter 0x13D (ISDU 116).

### 5.4.2. Input module (from the Device → IO controller's point of view)

| Byte | Meaning | corresponding par. no. |
|---|---|---|
| 0-7 | PSxHub PKW interface (Input) (not functional yet) | 116 |
| 8-11 | PSxHub Status Word 1 | 117 |
| 12-15 | PSxHub Status Word 2 | |
| | **Drive 1** | |
| 16-23 | PKW Interface PSx Drive 1 | |
| 24-25 | Status Word PSx Drive 1 | |
| 26-27 | Actual Speed PSx Drive 1 | |
| 28-31 | Actual value PSx drive 1 | |
| | **Drive 2** | |
| 32-39 | PKW Interface PSx Drive 2 | |
| 40-41 | Status Word PSx Drive 2 | |
| 42-43 | Actual Speed PSx Drive 2 | |
| 44-47 | Actual value PSx drive 2 | |
| | **Drive 3** | |
| 48-55 | PKW Interface PSx Drive 3 | |
| 56-57 | Status Word PSx Drive 3 | |
| 58-59 | Actual Speed PSx Drive 3 | |
| 60-63 | Actual value PSx drive 3 | |
| | **Drive 4** | |
| 64-71 | PKW Interface PSx Drive 4 | |
| 72-73 | Status Word PSx Drive 4 | |
| 74-75 | Actual Speed PSx Drive 4 | |
| 76-79 | Actual value PSx drive 4 | |
| | **Drive 5** | |
| 80-87 | PKW Interface PSx Drive 5 | |
| 88-89 | Status Word PSx Drive 5 | |
| 90-91 | Actual Speed PSx Drive 5 | |
| 92-95 | Actual value PSx drive 5 | |
| | **Drive 6** | |
| 96-103 | PKW Interface PSx Drive 6 | |
| 104-105 | Status Word PSx Drive 6 | |
| 106-107 | Actual Speed PSx Drive 6 | |
| 108-111 | Actual value PSx drive 6 | |
| | **Drive 7** | |
| 112-119 | PKW Interface PSx Drive 7 | |
| 120-121 | Status Word PSx Drive 7 | |
| 122-123 | Actual Speed PSx Drive 7 | |
| 124-127 | Actual value PSx drive 7 | |
| | **Drive 8** | |
| 128-135 | PKW Interface PSx Drive 8 | |
| 136-137 | Status Word PSx Drive 8 | |
| 138-139 | Actual Speed PSx Drive 8 | |
| 140-143 | Actual value PSx drive 8 | |
| | **Drive 9** | |
| 144-151 | PKW Interface PSx Drive 9 | |
| 152-153 | Status Word PSx Drive 9 | |
| 154-155 | Actual Speed PSx Drive 9 | |
| 156-159 | Actual value PSx drive 9 | |
| | **Drive 10** | |
| 160-167 | PKW Interface PSx Drive 10 | |
| 168-169 | Status Word PSx Drive 10 | |
| 170-171 | Actual Speed PSx Drive 10 | |
| 172-175 | Actual value PSx drive 10 | |

**NOTICE**

The process data layout cannot be changed.

**NOTICE**

In the GSD file for the PSxHub, the two parameters "Control Word" and "Status" are marked as bit-oriented (i.e. the flag "UseAsBits" is set in each case). This allows configuration tools to list the individual bits of these parameters separately. Because of this property, the byte order of these two parameters is reversed compared to the rest of the parameters. If these parameters are read or written as a whole, this must be taken into account.

## 5.5. Detailed description of the PSxHub's status bits

Description of the individual bits of "PSxHub Status Word 1" (PN index 116):

| *Bit No.* | *Description* | |
|---|---|---|
| **Bit 0** | Undervoltage | is set:<br>• if the control voltage falls below the voltage value defined in parameter 91<br>is deleted:<br>• if the control voltage again exceeds the voltage value defined in parameter 91 |
| **Bit 1** | Overvoltage | is set:<br>• voltage on control side has exceeded 28V<br>is deleted:<br>• control voltage is below 27.2V after previous overvoltage (control side) |
| **Bit 2** | Overtemperature | is set:<br>• if the temperature value defined in parameter 92 is exceeded<br>is deleted:<br>• if the temperature value is below the value defined in parameter 92 again |
| **Bit 3** | EEPROM Error | is set:<br>• if there is an error in the device's memory<br>is deleted:<br>• after restarting the device |
| **Bit 4** | reserved | |
| **Bit 5** | reserved | |
| **Bit 6** | reserved | |
| **Bit 7** | reserved | |
| **Bit 8** | Synchronization error occurred | is set:<br>• if the maximum position difference of two drives exceeds the value of parameter 115 in one of the defined synchronization groups.<br>is deleted:<br>• if bit 1 of the control word is set |
| **Bit 9** | Errors in synchronization group 1 | is set:<br>• if in synchronization group 1 the maximum position difference of two drives exceeds the value of parameter 115.<br>is deleted:<br>• if in synchronization group 1 the maximum position difference of two drives no longer exceeds the value of parameter 115. |
| **Bit 10** | Error in synchronization group 2 | is set:<br>• if in synchronization group 2 the maximum position difference of two drives exceeds the value of parameter 115.<br>is deleted:<br>• if in synchronization group 2 the maximum position difference of two drives no longer exceeds the value from parameter 115. |
| **Bit 11** | Error in synchronization group 3 | is set:<br>• if in synchronization group 3 the maximum position difference of two drives exceeds the value of parameter 115<br>is deleted:<br>• if in synchronization group 3 the maximum position difference of two drives no longer exceeds the value from parameter 115. |

| *Bit No.* | *Description* | |
|---|---|---|
| **Bit 12** | Error in synchronization group 4 | is set:<br>• if in synchronization group 4 the maximum position difference of two drives exceeds the value of parameter 115.<br>is deleted:<br>• if in synchronization group 4 the maximum position difference of two drives no longer exceeds the value of parameter 115. |
| **Bit 13** | Error in synchronization group 5 | is set:<br>• if in synchronization group 5 the maximum position difference of two drives exceeds the value of parameter 115.<br>is deleted:<br>• if in synchronization group 5 the maximum position difference of two drives no longer exceeds the value of parameter 115. |
| **Bit 14 until Bit 31** | reserved | |

## 5.6. Detailed description of the control bits of the PSxHub

Description of the individual bits of "PSxHub Control Word 1" (PN index 118):

| *Bit No.* | *Description* |
|---|---|
| **Bit 0** | Synchronous monitoring active |
| **Bit 1** | Reset a synchronization error that has occurred |
| **Bit 2-32** | Reserved |

## 5.7. PKW mechanism

The PKW mechanism (PKW = parameter identifier value) can be used to write and read parameter values in cyclic data traffic.
The PSxHub itself and each drive has its own PKW interface.

The IO controller issues and transmits PKW commands. It repeats this command cyclically until the PSxHub has processed the command and given a response.

The PSxHub provides the answer until the IO controller formulates a new command. A parameter value that the PSxHub sends back in response to a read access refers to the time at which the command was issued. This means that if the value of a parameter shall be observed over a longer period of time, the IO controller must send a new request command after the current parameter value has been received. This is done by setting the order ID 0 "no order" and then waiting for the PSxHub to confirm this with response ID 0 (no response). The same parameter value can then be requested again.

Only one order can be processed per drive at any one time.

| PKW body | | | | | | | |
|---|---|---|---|---|---|---|---|
| PKE | | IND | | PWE | | | |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| PKE | Parameterization |
|---|---|
| IND | Index |
| PWE | Parameter |

**Structure of the identifier PKE (german: ParameterKennungWert):**

The information "Parameter identifier" (PKE) consists of a data word (bytes 0 and 1 of the PKW part) in which the type of order (or response) and the corresponding parameter number are encoded mapped:

| Parameter identifier PKE | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No | | | | | | | | | | | | | | | |
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| AK | | | | SPM | Parameter Number (PNU) | | | | | | | | | | |

| AK | Order or response identifier (german: Auftragskennung) |
|---|---|
| SPM | Toggle bit for spontaneous message (function not implemented) |
| PNU | Parameter number |

The parameter number PNU refers to the table "**5.3 PROFINET parameters of the PSxHub**" as well as the tables "**8.1 Parameter interface of PSD drives Parameter interface of the PSD drives**" and "**8.2 Parameter interface of PSE drives**" (see below).

**Order ID (IO controller → drive)**

| OrderID | Function | possible response identifier of the drive *) | |
|---|---|---|---|
| | | positive | negative |
| 0 | no order | 0 | 7 |
| 1 | Request Parameter Value | 1 or 2 | |
| 2 | Change Parameter Value (Word) | 1 | |
| 3 | Change Parameter Value (Double Word) | 2 | |
| 6 | Request Parameter Value (Array) | 4 or 5 | |
| 7 | Change Parameter Value (Array Word) | 4 | |
| 8 | Change Parameter Value (Array Double Word) | 5 | |
| 9 | Request Number of Array Elements | 6 | |

*) The column "Response identifier" contains the possible answers belonging to the order in the event of successful execution ("positive") or in the event of error ("negative").

**Response ID (IO → Controller Drive):**

| Answer-identifier | Function |
|---|---|
| 0 | no answer |
| 1 | Transfer Parameter Value (Word) |
| 2 | Transfer Parameter Value (Double Word) |
| 4 | Transfer Parameter Value (Array Word) |
| 5 | Transfer Parameter Value (Array Double Word) |
| 6 | Transfer Number of Array Elements |
| 7 | Order not executable |

**Subindex IND:**

For requests and responses related to array elements, the IND field contains the array subindex.

**Parameter value PWE:**

This field contains the numerical value associated with each parameter.

For non-executable jobs (i.e., response ID AK = 7), the drive responds with an error code according to the table below:

| Error code | Meaning |
|---|---|
| 0 | invalid parameter number |
| 1 | parameter value cannot be changed |
| 2 | lower or upper value limit exceeded |
| 3 | faulty subindex |
| 4 | no array |
| 5 | incorrect data type |
| 6 | no setting allowed (only resettable) |
| 17 | order cannot be executed due to operating condition |
| 18 | miscellaneous error |

In the case of successfully processed write requests of parameter values (i.e. request ID AK = 2, 3, 7 or 8), the response contains the same data as the reading of this parameter value. The response ID AK is then one of the values 1, 2, 4 or 5, depending on the data type.
The parameter number PNU, the index IND and the parameter value PWE are as specified in the request. This allows it to be checked again that the drive has adopted the requested values.

## 5.8. Behaviour of the outputs

1) Output behavior at IOPS = Bad (CPU in "Stop" state):
   Last-Value: Outputs retain the last valid value.
2) Behavior of the outputs in case of disconnection from the controller:
   Zero: Outputs are set to value 0.
3) Behavior of outputs on Power-on on (power-on without connected controller):
   Zero: Outputs are set to value 0.

# 6. Synchronization monitoring

The transmission of the target positions and target speeds to the drives via the process data takes place synchronously across all connections. As a result, drives with the same start and target position and the same target speed move synchronously.

The PSxHub offers the possibility to monitor this synchronization functionality. For this purpose, up to four drives can be combined in a synchronization group. For the drives within a synchronization group, it is monitored whether the set maximum step deviation (PSxHub parameter 115) has been exceeded. If a deviation occurs, e.g. due to blockage of a drive, the hub intervenes and resets the release bit of the drives of the affected synchronization group. It is recommended to change the parameters for synchronization only when the drives used are at a standstill, so as not to generate undefined behaviour.

## 6.1. Configuration

The following parameters are used to configure the synchronization function:

| Designation | Parameter number [decimal] | Function |
|---|---|---|
| Configuration for synchronization group | 99 | Synchronization group setting port 1 |
| | 100 | Synchronization group setting port 2 |
| | 101 | Synchronization group setting port 3 |
| | 102 | Synchronization group setting port 4 |
| | 103 | Synchronization group setting port 5 |
| | 104 | Synchronization group setting port 6 |
| | 105 | Synchronization group setting port 7 |
| | 106 | Synchronization group setting port 8 |
| | 107 | Synchronization group setting port 9 |
| | 108 | Synchronization group setting port 10 |
| Synchronization monitoring limit | 115 | Number of steps that drives in a synchronization group may deviate before a fault is detected |

Parameters 99 to 108 assign each of the ten connections to a synchronization group 0-5. To do this, these parameters are set to one of the values 0-5. Ports that are assigned to group 0 are not monitored. For synchronization groups 1-5, it is monitored whether the monitoring limit set in parameter 115 has been exceeded. A drive can only be added to a synchronous group if the corresponding synchronous group consists of fewer than four drives.

## 6.2. Error detection behaviour

To report an error to the controller, there is one bit per group in the hub's status word 1.

| PSxHub Status Word 1 | Function |
|---|---|
| ***Bit No.*** | |
| 0..7 | Reserved |
| 8 | Set when synchronization error occurred |
| 9 | Set when position deviation in Synchronous group 1 is detected |
| 10 | Set when position deviation in Synchronous group 2 is detected |
| 11 | Set when position deviation in Synchronous group 3 is detected |
| 12 | Set when position deviation in Synchronous group 4 is detected |
| 13 | Set when position deviation in Synchronous group 5 is detected |
| 14-63 | Reserved |

A bit in position 9-13 is set as soon as the deviation between the smallest and largest position of the drives of a synchronization group is greater than parameter 115.
The bit is reset again as soon as the deviation is less than (parameter 115)/2. As soon as an error is detected in a group, the bit 8 is also set in the status word 1 of the hub. This bit is not automatically reset by the PSxHub.

Control word 1 of the hub can be used to influence the behavior in the event of an error.

| Control word 1 bit | Function |
|---|---|
| 0 | Set to 1<br>→ automatic abort of positioning run in case of synchronization error |
| 1 | Setting to 1<br>→ status word bit 8 ("synchronization error occurred") is reset<br>Note: Position deviation has to be resolved before the bit can be reset |

If the bit 0 of control word 1 of the PSxHub is set, all drives assigned to this group will be stopped when a deviation is detected (warning of the corresponding group active). As a result, if a drive is blocked, for example, all drives in this group are automatically stopped. A further procedure via positioning runs is then no longer possible.

To correct the error, the drives must be returned to the same position and afterwards bit 1 of the control word must be reset.

## 6.3. Procedure for the Movement of Two Drives in Synchronization

To allow two or more drives to run in Synchronous mode, proceed as follows:

1. Set bit 0 of control word 1 of the PSxHub to 0 to prevent the drives from being locked directly during configuration.
2. Assign all ports that are to be moved in synchronization to the same group, e.g. port 1 and 5 should be moved in synchronization: Set parameter 99 and parameter 103 to the value 1.
3. Set the maximum allowable deviation via parameter 115.
4. Move all drives of the group to the same starting position.
5. Re-enable automatic blocking in case of position deviations within the group by setting bit 0 of control word 1 to 1.

Set a new target position for all drives in the group at the same time.

### 6.4. Procedure in case of synchronization error

Initial scenario:

- Drives at port 1 and at port 5 are assigned to synchronization group 1.
  - Parameter 99 and parameter 103 have a value of 1.
- Auto-block is active
  - Bit 0 of Control Word 1: Value 1
- Reset "Error Occurred" Bit Is Not Active
  - Bit 1 of Control Word 1: Value 0
- There is currently no error detected in Synchronous group 1
  - Bits 8 and 9 of Status Word 1: Value 0

During the positioning run, the drive at port 1 is blocked. The deviation exceeded the value of parameter 115.

- The hub automatically stops the drives at ports 1 and 5.
- Bits 8 and 9 of status word 1 have a value of 1.

The following procedure can correct the error.

1. Eliminate the reason for the blockage (disable engine supply if necessary).
2. Specify a new identical target position (this position will be used in the next step without active synchronization monitoring).
3. Reset bit 0 of control word 1 of the PSxHub to enable the drive to move again.
4. Once the new position has been reached by the drives: Reset the bit "synchronization Error" (bit 8 of status word 1 of the PSxHub) by briefly setting bit 1 of control word 1 of the PSxHub.
5. Reactivate synchronization monitoring by setting bit 0 of control word 1 of the PSxHub to 1, if necessary setting new target positions for the drives.

# 7. Technical Data

For the technical data and the drawing, please refer to the current data sheet on the website:
www.halstrup-walcher.de/technicaldocu.
Please search for "PSxHub" and select your type, click on "Datasheets".
Please contact us if you need further information.

# 8. Appendix

## 8.1. Parameter interface of PSD drives

| Designation | PN Index | PN Hex | ISDU No. | Subindex |
|---|---|---|---|---|
| Master command | 261 | 0x105 | 0 | 1 |
| Master cycle time | 262 | 0x106 | 0 | 2 |
| Minimum cycle time | 263 | 0x107 | 0 | 3 |
| Telegram capability | 264 | 0x108 | 0 | 4 |
| IO-Link Version ID | 265 | 0x109 | 0 | 5 |
| Process data length input | 266 | 0x10A | 0 | 6 |
| Process data length output | 267 | 0x10B | 0 | 7 |
| Manufacturer ID 1 | 268 | 0x10C | 0 | 8 |
| Manufacturer ID 2 | 269 | 0x10D | 0 | 9 |
| Device ID 1 | 270 | 0x10E | 0 | 10 |
| Device ID 2 | 271 | 0x10F | 0 | 11 |
| Device ID 3 | 272 | 0x110 | 0 | 12 |
| reserved | 273 | 0x111 | 0 | 13 |
| reserved | 274 | 0x112 | 0 | 14 |
| Reserved | 275 | 0x113 | 0 | 15 |
| Standard command | 276 | 0x114 | 0 | 16 |
| Standard command | 277 | 0x115 | 2 | |
| Device access locks | 284 | 0x11C | 12 | |
| Name of manufacturer | 285 | 0x11D | 16 | |
| Manufacturer text | 286 | 0x11E | 17 | |
| Product name | 287 | 0x11F | 18 | |
| Product ID | 288 | 0x120 | 19 | |
| Product text | 289 | 0x121 | 20 | |
| Serial number | 290 | 0x122 | 21 | |
| Hardware version | 291 | 0x123 | 22 | |
| Firmware version | 292 | 0x124 | 23 | |
| Application specific marking | 293 | 0x125 | 24 | |
| Status byte | 294 | 0x126 | 64 | |
| Actual speed | 295 | 0x127 | 66 | |
| Write actual position (not usable with PSxHub) | 296 | 0x128 | 67 | |
| Actual position | 297 | 0x129 | 68 | |
| Actual current | 298 | 0x12A | 69 | |
| Max. actual current during last run | 299 | 0x12B | 70 | |
| U control | 300 | 0x12C | 71 | |
| U motor | 301 | 0x12D | 72 | |
| Device temperature | 302 | 0x12E | 73 | |
| Production date | 305 | 0x131 | 76 | |
| Serial number | 306 | 0x132 | 77 | |

| Designation | PN Index | PN Hex | ISDU No. | Subindex |
|---|---|---|---|---|
| Device type | 307 | 0x133 | 78 | |
| Software version | 308 | 0x134 | 79 | |
| Number of steps in second positioning | 309 | 0x135 | 82 | |
| Raw position of absolute measurement unit | 310 | 0x136 | 83 | |
| Number of sectors in Modulo mode | 311 | 0x137 | 84 | |
| Available additional functions | 312 | 0x138 | 85 | |
| Write command byte (not usable with PSxHub) | 313 | 0x139 | 109 | |
| Command byte | 314 | 0x13A | 110 | |
| Write target value | 315 | 0x13B | 111 | |
| Target value | 316 | 0x13C | 112 | |
| Direction of rotation | 320 | 0x140 | 115 | |
| Actual value assessment numerator | 321 | 0x141 | 116 | |
| Actual value assessment, denominator | 322 | 0x142 | 117 | |
| Set referencing value (not usable with PSxHub) | 323 | 0x143 | 118 | |
| Referencing value | 324 | 0x144 | 119 | |
| Upper mapping end | 325 | 0x145 | 120 | |
| Upper limit | 326 | 0x146 | 121 | |
| Lower limit | 327 | 0x147 | 122 | |
| Positioning window | 328 | 0x148 | 123 | |
| Loop length | 329 | 0x149 | 124 | |
| Readjustment | 332 | 0x14C | 126 | |
| Target speed (rpm) for positioning runs | 341 | 0x155 | 137 | |
| Target speed (rpm) for manual runs | 344 | 0x158 | 138 | |
| Acceleration 1 | 345 | 0x159 | 139 | |
| Deceleration 1 | 347 | 0x15B | 141 | |
| Speed limit (rpm) for run abort | 349 | 0x15D | 143 | |
| Max. start-up current | 350 | 0x15E | 147 | |
| Maximum operating current | 351 | 0x15F | 148 | |
| Max. holding current at end of run | 352 | 0x160 | 149 | |
| Maximum holding current | 353 | 0x161 | 150 | |
| Time elapsed until speed falls below rpm limit for aborting run | 354 | 0x162 | 154 | |
| Time period for start-up current | 355 | 0x163 | 155 | |
| Duration of max. holding current at end of run | 356 | 0x164 | 157 | |
| UMot filter | 361 | 0x169 | 161 | |
| Communication timeout | 318 | 0x13E | 162 | |
| UMot Filter | 361 | 0x169 | 166 | |
| E-Ident value 1 | 414 | 0x19E | 167 | |
| E-Ident value 2 | 415 | 0x19F | 168 | |
| Free register | 374 | 0x176 | 169 | |
| UMot limit | 375 | 0x177 | 179 | |
| Temperature limit | 376 | 0x178 | 180 | |
| Modulo mode | 391 | 0x187 | 184 | |

| Designation | PN Index | PN Hex | ISDU No. | Subindex |
|---|---|---|---|---|
| Upper modulo position | 392 | 0x188 | 185 | |
| Lower modulo position | 393 | 0x189 | 186 | |
| Delivery state | 377 | 0x179 | 194 | |

## 8.2. Parameter interface of PSE drives

| Designation | PN Index | PN Hex | ISDU No. | Subindex |
|---|---|---|---|---|
| Master command | 261 | 0x105 | 0 | 1 |
| Master cycle time | 262 | 0x106 | 0 | 2 |
| Minimum cycle time | 263 | 0x107 | 0 | 3 |
| Telegram Capability | 264 | 0x108 | 0 | 4 |
| IO-Link Version ID | 265 | 0x109 | 0 | 5 |
| Process data length input | 266 | 0x10A | 0 | 6 |
| Process data length output | 267 | 0x10B | 0 | 7 |
| Manufacturer ID 1 | 268 | 0x10C | 0 | 8 |
| Manufacturer ID 2 | 269 | 0x10D | 0 | 9 |
| Device ID 1 | 270 | 0x10E | 0 | 10 |
| Device ID 2 | 271 | 0x10F | 0 | 11 |
| Device ID 3 | 272 | 0x110 | 0 | 12 |
| reserved | 273 | 0x111 | 0 | 13 |
| reserved | 274 | 0x112 | 0 | 14 |
| reserved | 275 | 0x113 | 0 | 15 |
| Standard command | 276 | 0x114 | 0 | 16 |
| Standard command | 277 | 0x115 | 2 | |
| Device Access Locks | 284 | 0x11C | 12 | |
| Manufacturer | 285 | 0x11D | 16 | |
| Manufacturer's Notes | 286 | 0x11E | 17 | |
| Product name | 287 | 0x11F | 18 | |
| Product ID | 288 | 0x120 | 19 | |
| Product text | 289 | 0x121 | 20 | |
| Serial number | 290 | 0x122 | 21 | |
| Hardware version | 291 | 0x123 | 22 | |
| Firmware version | 292 | 0x124 | 23 | |
| Application Specific. tag | 293 | 0x125 | 24 | |
| Status word | 294 | 0x126 | 64 | |
| Actual speed | 295 | 0x127 | 65 | |
| Set actual value (not usable) | 296 | 0x128 | 66 | |
| Actual value | 297 | 0x129 | 67 | |
| Actual torque | 298 | 0x12A | 68 | |
| Maximum torque | 299 | 0x12B | 69 | |
| U control | 300 | 0x12C | 70 | |

| Designation | PN Index | PN Hex | ISDU No. | Subindex |
|---|---|---|---|---|
| U motor | 301 | 0x12D | 71 | |
| Device temperature | 302 | 0x12E | 72 | |
| Production date | 305 | 0x131 | 77 | |
| Serial number | 306 | 0x132 | 78 | |
| Device model | 307 | 0x133 | 79 | |
| Software version | 308 | 0x134 | 80 | |
| Set control word (not usable with PSxHub) | 313 | 0x139 | 109 | |
| Control word | 314 | 0x13A | 110 | |
| Set target position (not usable with PSxHub) | 315 | 0x13B | 111 | |
| Target position | 316 | 0x13C | 112 | |
| Process data format | 317 | 0x13D | 116 | |
| Communication timeout | 318 | 0x13E | 118 | |
| Stack behaviour | 319 | 0x13F | 119 | |
| Direction of rotation | 320 | 0x140 | 123 | |
| Actual value assessment, numerator | 321 | 0x141 | 124 | |
| actual value assessment, denominator | 322 | 0x142 | 125 | |
| Write referencing value | 323 | 0x143 | 126 | |
| Referencing value | 324 | 0x144 | 127 | |
| Upper mapping end | 325 | 0x145 | 128 | |
| Upper limit | 326 | 0x146 | 129 | |
| Lower limit | 327 | 0x147 | 130 | |
| Positioning window | 328 | 0x148 | 131 | |
| Loop length | 329 | 0x149 | 132 | |
| Drag error | 330 | 0x14A | 133 | |
| Loop direction | 331 | 0x14B | 134 | |
| Jog increment | 334 | 0x14E | 135 | |
| Number breaking free steps | 335 | 0x14F | 136 | |
| Configuration for connection timeout | 336 | 0x150 | 137 | |
| save position for connection timeout | 337 | 0x151 | 138 | |
| Target rpm abs | 341 | 0x155 | 142 | |
| Target rpm CCW | 342 | 0x156 | 143 | |
| Target rpm CW | 343 | 0x157 | 144 | |
| Target rpm jog | 344 | 0x158 | 145 | |
| Rpm limit abort | 349 | 0x15D | 146 | |
| Acceleration | 345 | 0x159 | 147 | |
| Deceleration | 347 | 0x15B | 148 | |
| Maximum start-up torque | 350 | 0x15E | 152 | |
| Maximum torque | 351 | 0x15F | 153 | |
| Max. holding torque at end of run | 352 | 0x160 | 154 | |
| Holding torque | 353 | 0x161 | 155 | |

| Designation | PN Index | PN Hex | ISDU No. | Subindex |
|---|---|---|---|---|
| time elapsed until speed falls below rpm limit for aborting run | 354 | 0x162 | 159 | |
| time period for start-up torque | 355 | 0x163 | 160 | |
| duration of maximum holding torque at end of run | 356 | 0x164 | 161 | |
| idle period for direction change | 357 | 0x165 | 162 | |
| Wait time for manual drive | 358 | 0x166 | 163 | |
| Wait time for brake (drive start) | 359 | 0x167 | 164 | |
| Wait time for brake (drive end) | 360 | 0x168 | 165 | |
| UMot Filter | 361 | 0x169 | 166 | |
| Reserved | 363 | 0x16B | - | |
| UMot limit | 375 | 0x177 | 181 | |
| Temperature limit | 376 | 0x178 | 182 | |
| Delivery state | 377 | 0x179 | 193 | |

## 8.3. Table of the process data overview

| | | Output module (from the point of view of the IO controller) | | | | Input module (from the point of view of the IO controller) | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Device** | | **Process data layout** | | | | **Process data layout** | | | |
| | | | | | | | | | |
| **PSxHub PKW Interface** | Byte | 0 | 1 | | | 0 | 1 | | |
| | | PKE[8]↑ | PKE [9] | | | PKE[8] ↑ | PKE [9] | | |
| | Byte | 2 | 3 | | | 2 | 3 | | |
| | | IND[8] ↑ | IND[9] | | | IND[8] ↑ | IND[9] | | |
| | Byte | 4 | 5 | 6 | 7 | 4 | 5 | 6 | 7 |
| | | PWE[8]↑ | PWE[9] | PWE[10] | PWE[11] | PWE[8]↑ | PWE[9] | PWE[10] | PWE[11] |
| | Byte | 8-15 | | | | | | | |
| **PSxHub** | | CW_Hub | | | | SW_Hub | | | |
| **Port_1 PKW Interface** | Byte | 16 | 17 | | | 16 | 17 | | |
| | | PKE[8]↑ | PKE [9] | | | PKE[8] ↑ | PKE [9] | | |
| | Byte | 18 | 19 | | | 18 | 19 | | |
| | | IND[8] ↑ | IND[9] | | | IND[8] ↑ | IND[9] | | |
| | Byte | 20 | 21 | 22 | 23 | 20 | 21 | 22 | 23 |
| | | PWE[8]↑ | PWE[9] | PWE[10] | PWE[11] | PWE[8]↑ | PWE[9] | PWE[10] | PWE[11] |
| **Drive-Port_1 Control Interface** | Byte | 24 | 25 | | | 24 | 25 | | |
| | | CW[8] | CW[9] ↑ | | | SW[8] | SW[9] ↑ | | |
| | Byte | 26 | 27 | | | 26 | 27 | | |
| | | TS[8] ↑ | TS[9] | | | AS[8] ↑ | AS[9] | | |
| | Byte | 28 | 29 | 30 | 31 | 28 | 29 | 30 | 31 |
| | | TP[8] ↑ | TP[9] | TP[10] | TP[11] | AP[8] ↑ | AP[9] | AP[10] | AP[11] |
| | | | | | | | | | |
| **Drive-Port_ 10 to Drive-Port_9** | 32-159 | ... | | | | ... | | | |
| | | | | | | | | | |
| **Drive-Port_10 PKW Interface** | Byte | 160 | 161 | | | 160 | 161 | | |
| | | PKE[8] ↑ | PKE [9] | | | PKE[8] ↑ | PKE [9] | | |
| | Byte | 162 | 163 | | | 162 | 163 | | |
| | | IND[8] ↑ | IND[9] | | | IND[8] ↑ | IND[9] | | |
| | Byte | 164 | 165 | 166 | 167 | 164 | 165 | 166 | 167 |
| | | PWE[8]↑ | PWE[9] | PWE[10] | PWE[11] | PWE[8]↑ | PWE[9] | PWE[10] | PWE[11] |
| **Drive-Port_10 Control Interface** | Byte | 168 | 169 | | | 168 | 169 | | |
| | | CW[8] | CW[9] ↑ | | | SW[8] | SW[9] ↑ | | |
| | Byte | 170 | 171 | | | 170 | 171 | | |
| | | TS[8] ↑ | TS[9] | | | AS[8] ↑ | AS[9] | | |
| | Byte | 172 | 173 | 174 | 175 | 172 | 173 | 174 | 175 |
| | | TP[8] ↑ | TP[9] | TP[10] | TP[3] | AP[0] ↑ | AP[1] | AP[2] | AP[3] |

| Legend | | | | |
|---|---|---|---|---|
| PKE | Parameterkennung (engl. Parameter identification) | | TS | Target Speed |
| IND | Index | | TP | Target Position |
| PWE | Parameterwert (engl. Parameter value) | | SW | Statusword |
| CW_Hub | Controlword Hub | | ACE | Actual Speed |
| SW_Hub | Statusword Hub | | AP | Actual Position |
| CW | Controlword | | ↑ | msb - most significant byte |

# 9. Notes

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