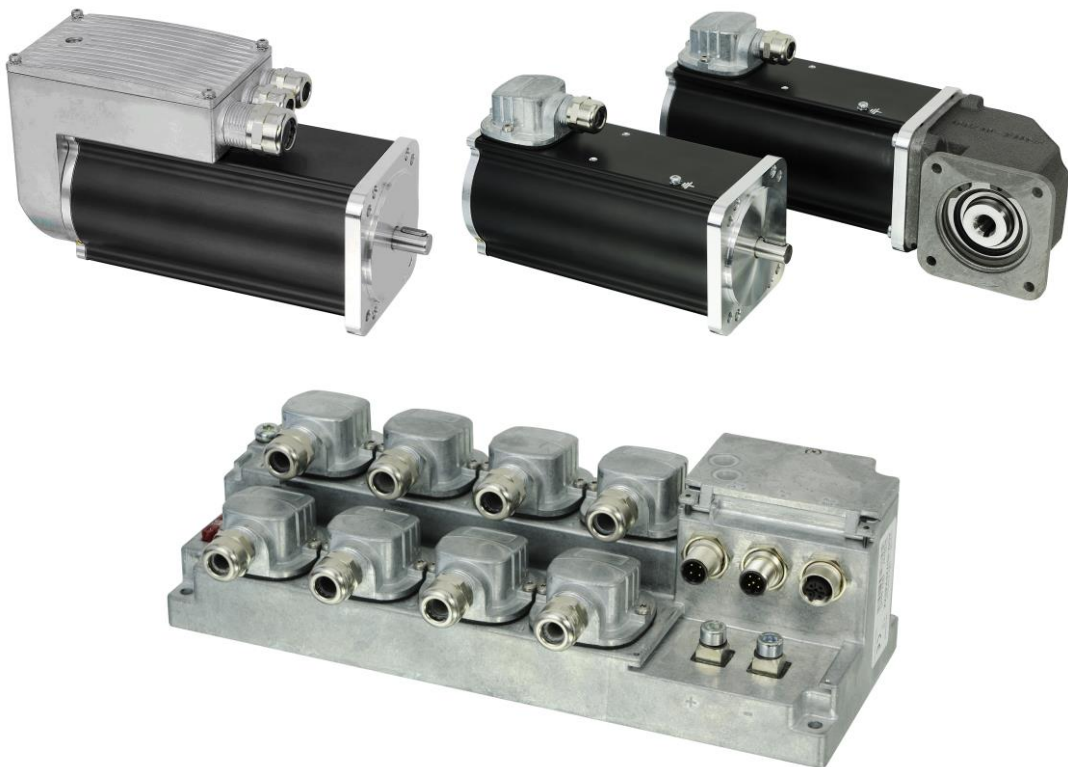

Instruction Manual HIPERDRIVE with Profinet



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Purpose of instruction manual

This instruction manual describes the features of the HIPERDRIVE positioning system and provides guidelines for its use.

Improper use of these devices or failure to follow these instructions may cause injury or damage equipment. Every person who uses the devices must therefore read the manual and understand the possible risks. The instruction manual, and in particular the safety precautions contained therein, must be followed carefully. **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 devices.
- It must be provided to any individuals who assume responsibility for operating the device at a later date.
- It must include any supplementary materials provided by the manufacturer.

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.

Conformity

This device is state of the art. It complies with the legal requirements of EC directives. This is shown by the CE mark.



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The manufacturer owns the copyright to this instruction manual. It contains technical data, instructions and drawings detailing the devices' features and how to use them. It must not be copied either wholly or in part or made available to third parties.

1 Safety precautions

1.1 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.

HIPERDRIVE positioning systems are not stand-alone devices 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 device may only be handled as indicated in this manual. Modifications to the device 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.

1.2 Shipping, assembly, electrical connections and start-up

Assembly and the electrical connections should only be handled by professionals. They should be given proper training and be authorised by the operator of the facility.

The device 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.

1.3 Troubleshooting, maintenance, repairs, disposal

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

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

This device requires no maintenance.

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

The electronic components of the device contain environmentally hazardous materials and materials that can be reused. The device must therefore be sent to a recycling plant when you no longer wish to use it. The environment codes of your particular country must be complied with.

1.4 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 device properly.

2 The HIPERDRIVE concept

The HIPERDRIVE 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 Profinet interface. The integrated absolute measuring system eliminates the need for time-consuming reference runs. Connecting to a bus system simplifies the wiring. 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.

There are two options for the Profinet connection:

- 1) The HIPERDRIVE units are connected to a central connecting station. This connecting station is called the "HIPERDRIVE Hub". Up to eight drives can be connected to a hub, all drives are used via the same bus address.
In addition, the HIPERDRIVE Hub distributes the operating voltage for the drives. This means that only one cable is required to connect a drive. Both data and power for the drives are transmitted via the same cable. For the HIPERDRIVE Hub itself, apart from the fieldbus and 24 V motor supply voltage, only a 24 V auxiliary voltage is required for the hub electronics.
- 2) The HIPERDRIVE drives are equipped with a bus adapter. The bus adapter has a fixed connection to the drive. Each drive unit therefore has its own bus address and its own fieldbus connection.
In the same way, each adapter has an input for the 24V power supply to the bus adapter and the 24V power supply to the drive.

3 Device description: HIPERDRIVE Hub

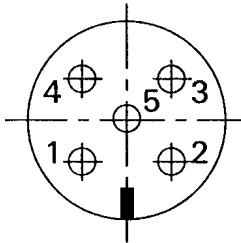
3.1 Pin assignment HIPERDRIVE Hub

A round, 5-pin plug, series 713/763 (A-coded) manufactured by Binder for the supply voltage is located on the housing cover of the HIPERDRIVE Hub.

Two round 4-pin sockets, series 825 (D-coded) are provided for connection to the bus.

Round plug for the power supply of the control unit:

(External top view)



- 1 +24V control unit
- 2 NC
- 3 Ground (control unit)
- 4 NC
- 5 NC

Supply for the drives connected to the HIPERDRIVE Hub:

The motor power supply (24VDC and GND) is connected using two screw connections for cable lugs M6. These are concealed under a cover on the front side of the hub.

Screw terminal for each of the drives connected to the HIPERDRIVE Hub:

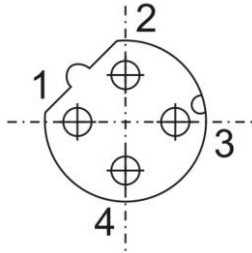
For each drive to be connected to the HIPERDRIVE Hub, there is a flange adapter containing a screw terminal with the following pin assignment:

Pin	Signal	Wire colour
1	RS485 data +	white
2	RS485 data -	green
3	+24V	orange
4	GND	black
5	+24V	red
6	GND	blue

Terminals 3 and 5 are connected internally in the hub, as are terminals 4 and 6.

Round socket for the bus

(External top view)



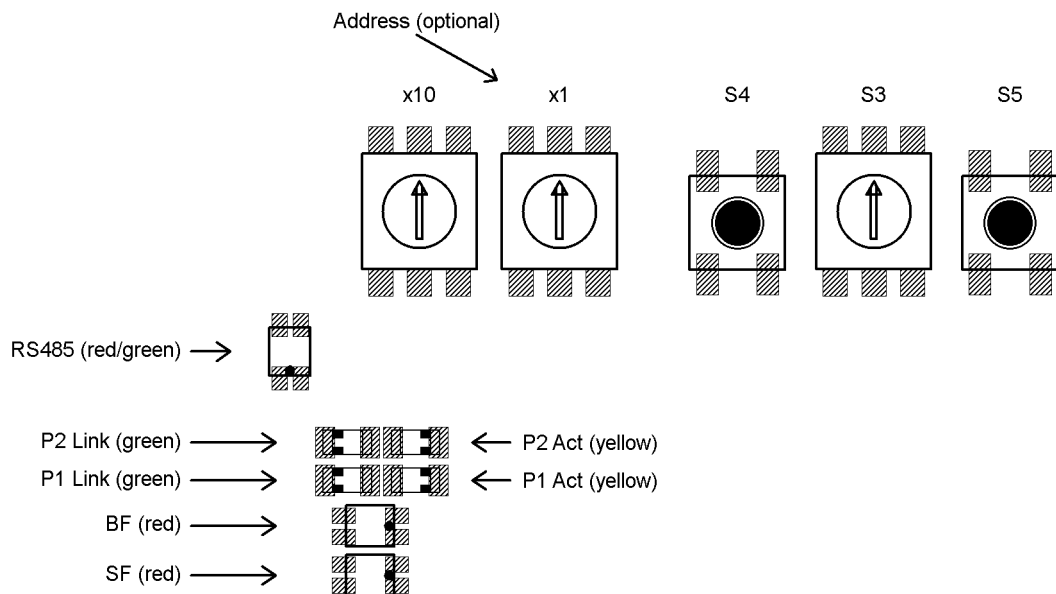
- 1 TD+ (WH/GN, white/green)
- 2 RD+ (WH/OR, white/orange)
- 3 TD- (GN, green)
- 4 RD- (OR, orange)



Due to the use of 4-pin sockets, only four-wire cables should be used.

3.2 LEDs and jog keys for the HIPERDRIVE Hub

Opening the housing cover on the top side of the hub provides access to the following operating and observation elements:



The LEDs are visible through two windows in the housing cover even when it is closed.

Meaning of the LEDs:

- 1) Each of the ports (P1/P2) has two associated LEDs (one green for the “Link” state and one yellow for the “Activity” state).

For each port the following states are possible:

- green off, yellow off → no line connection
- green on, yellow off → line connection is active, no data activity
- green on, yellow is flickering with 10 Hz → line connection is active, data activity

2) Red Profinet LED “bus fault” (BF)

- Off → HIPERDRIVE Hub is in the process of exchanging data.
- Flashing with 2Hz → HIPERDRIVE Hub is connected to the Ethernet network and is not in the process of exchanging data.
- On → HIPERDRIVE Hub is not connected to the Ethernet network.

3) Red Profinet LED “status fault” (SF)

- Off → No fault, no diagnostic message is present.
- Flashing with 2Hz, duration 3 sec. → DCP signal service is initiated via the bus
- On → Watchdog Time-out; system fault or diagnostic message is present

4) Red/green LED “RS485”

The LED “RS485” signals the status of the RS485 connections to the connected motors

Switch S3 = 0 → displays a collective message,

Switch S3 > 0 → status of the RS485 connection to the motor selected with S3

(see also following section)

Meaning of the rotary switches and keys:

- | | |
|--------|--|
| S1/S2: | Definition of the station name (see Section 5) |
| S3: | Selection of the drive to be jogged or to identify a faulty drive |
| S4: | Jog the drive selected with S3. Starts a jog step with the parameters 163, 164, 165 (jog 2; default 1/16 rotation backwards) |
| S5: | Jog the drive selected with S3. Starts a jog step with the parameters 160, 161, 162 (jog 1; default 1/16 rotation forwards) |



Important: Always replace the housing cover after completing the operating and observation task. This will prevent dust and contaminants from entering the device.



The HIPERDRIVE drives can only be run via the bus if S3 is set to 0.

3.3 Meaning of the LED statuses of LED “RS485”

The LED RS485 shows a collective message. When switch S3 is set to 0, the meanings are as follows:

Status	Meaning
off	No power supply to the HIPERDRIVE electronics.
flashes red+green alternately (5 Hz)	Presence test The hub is detecting the ports to which drive are connected
red on	Communication error for at least one of the drives marked as “required”
red+green on	Drive error for at least one of the drives marked as “required” (communication to these drives is functioning correctly)
flashes green (2 Hz)	All drives marked as “required” are functioning without communication or drive errors. At least one further drive exists, which is not marked as “required”. No drive errors for any “non-required” drive.
flashes red+green simultaneously (2 Hz)	All drives marked as “required” are functioning without communication or drive errors. At least one further drive exists, which is not marked as “required”. At least one of the “non-required” drives has a drive error.
green on	Only the drives marked as “required” are available and none of these have a drive error.

When S3 is set to a value > 0, the LED RS485 shows the status of the drive selected using the switch S3:

Status	Meaning
off	Not available and not required.
red on	Communication error
red+green on	Communication OK, but drive error
green on	Communication OK, no drive error

When the S3 switch is set to 0, it is therefore possible to view the communication status with the drives and, if a problem arises, identify the specific drive causing the problem by setting the S3 switch to the next corresponding position.

3.4 Start-up: HIPERDRIVE Hub

After connecting the supply voltage, the hub automatically performs a presence test.

During this test, the hub detects the ports to which drives are connected. For each drive, the baud rate is set to the last value saved in the hub for the specific drive. The "RS485 message complete time" (time after which the drive evaluates a received message) is set to a value corresponding to the desired baud rate. The RS485 address of the drive is set to 1 (steady-state).

In addition, the hub loads the most recently saved information about the ports at which drives were most recently required, i.e. were released for issuing run commands.

If at least one drive requested recently is not found, the LED RS485 is illuminated red.

If precisely the number of drives requested recently is found, the LED RS485 is illuminated green.

If more drives than last required are found, the LED RS485 flashes green (frequency 2 Hz).

In the delivery state, no drive is marked as "required".



A drive must first be "required" at the hub in order to execute run commands. For the drive "n", this is done by setting the parameter (151 + (n-1) * 100) to 1.

The presence test can also be repeated at any time after switching on the supply voltage by setting parameter 29 to -4.

4 Device description: HIPERDRIVE bus adapter

4.1 Assembly of the HIPERDRIVE drives with bus adapter

The drives are fixed in position using 4x M5 screws via the centring spigot flush on the mounting surface. Please ensure that the screw depth in the mounting surface is at least 10mm.

The mounting flange is symmetrical, i.e. the drives can be mounted in four different angle positions on the mounting surface depending on the cable outlet.

The shaft connection with the feather key shows a positive engagement. When installing mechanical coupling elements, please take note of the permitted axial and radial forces stated in the “Technical data” section. If necessary, use a suitable coupling element to balance the axial and radial tolerances.



To prevent damage to electromechanical components, please avoid banging or knocking the output shaft.

4.2 Pin assignment: HIPERDRIVE bus adapter

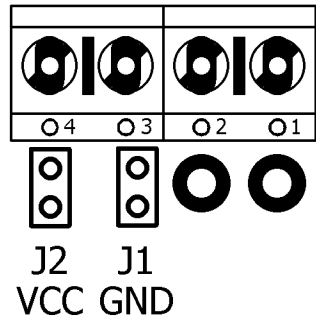
A 4-pin screw terminal for connecting the supply voltage is located in the housing cover of the HIPERDRIVE bus adapter. A PG threaded connection through which the screw terminal can be accessed is provided as standard. Optionally, these terminals can be factory-wired together with the pin of a 7/8" plug (manufacturer: Lumberg; designation RSF 50/11-04). In this case, the PG threaded connection is omitted.

Two round 4-pin sockets, series 825 (D-coded) are provided for connection to the bus.

Screw terminal for the power supply of the HIPERDRIVE drive unit with bus adapter:

- | | |
|---|------------------|
| 1 | GND drive |
| 2 | +24V drive |
| 3 | GND bus adapter |
| 4 | +24V bus adapter |

The bus adapter electronics can either be powered via separate connection points (terminals 3/4) or be interconnected with the motor power supply via the jumpers J1 and J2 in the adapter:

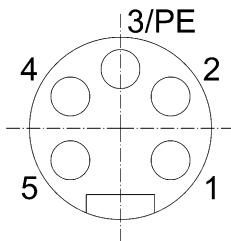


The former is generally selected if the motor power supply is run in a safety circuit with the EMERGENCY STOP and the databus has to remain active during an EMERGENCY STOP, or if the motor power supply does not permit correct operation of the bus adapter due to inadequate voltage stability or high interference voltages.



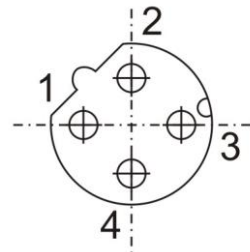
The jumper J1 for the connection between the two GND potentials always must be closed, because otherwise the differences in the potential between the two GND could become unacceptable high. In addition, the two GND potentials should be connected outside the device (e.g. directly at the power supplies which provide the two supply voltages) so that potential compensating currents will not flow through the device.

Round plug for power supply (optional):
(External top view)



- | | |
|---|-----------------------|
| 1 | +24V Motor |
| 2 | Ground (motor) |
| 3 | Housing |
| 4 | Ground (control unit) |
| 5 | +24V control unit |

Round socket for the bus
(External top view)



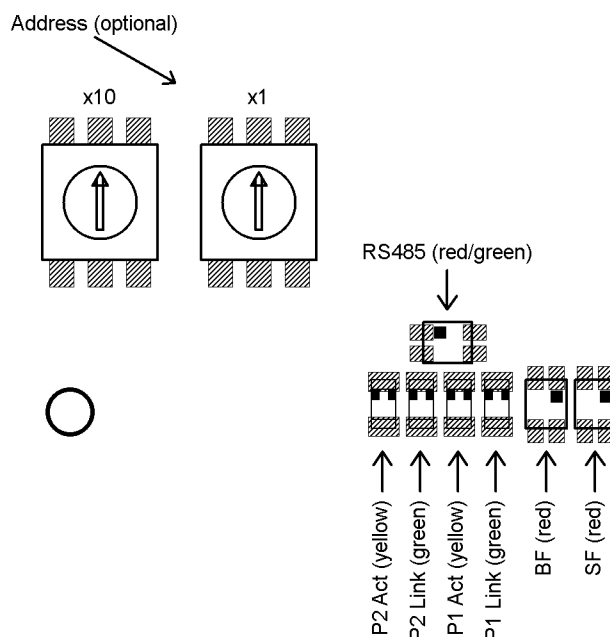
- | | |
|---|---------------------------|
| 1 | TD+ (WH/GR, white/green) |
| 2 | RD+ (WH/OG, white/orange) |
| 3 | TD- (GR, green) |
| 4 | RD- (OR, orange) |



Due to the use of 4-pin sockets, only four-wire cables should be used.

4.3 LEDs for the HIPERDRIVE bus adapter

Opening the cover of the bus adapter provides access to the following operating and observation elements:



The LEDs are visible through two windows even when the bus adapter cover is closed.

Meaning of the LEDs:

1) Each of the ports (P1/P2) has two associated LEDs (one green for the “Link” state and one yellow for the “Activity” state).

For each port the following states are possible:

- green off, yellow off → no line connection
- green on, yellow off → line connection is active, no data activity
- green on, yellow is flickering with 10 Hz → line connection is active, data activity

2) Red Profinet LED “bus fault” (BF)

- Off → The drive is in the process of exchanging data.
- Flashing with 2Hz → The drive is connected to the Ethernet network and is not in the process of exchanging data.
- On → The drive is not connected to the Ethernet network.

3) Red Profinet LED “status fault” (SF)

- Off → No fault, no diagnostic message is present.
- Flashing with 2Hz, duration 3 sec. → DCP signal service is initiated via the bus
- On → Watchdog Time-out; system fault or diagnostic message is present

4) Red/green LED “RS485”

The LED “RS485” signals the status of the RS485 connection to the connected motor (collective message, see also following section).

Meaning of the rotary switches:

The two rotary switches are used to define the station name (see Section 5). These can be accessed by opening the cover of the bus adapter.



Important: Always close the cover of the bus adapter after completing the operating and observation task. This will prevent dust and contaminants from entering the device.

4.4 Meaning of the LED statuses of LED “RS485”

LED-RS485 shows a collective message.

Status	Meaning
Off	No power supply to the HIPERDRIVE electronics.
flashes red+green alternately (5 Hz)	Presence test The bus adapter determines whether communication with the basic unit has been established.
red on	Communication error to the drive, if this is marked as “required”
red+green on	Drive error (communication to the drive is functioning correctly)
flashes green (2 Hz)	The drive is not marked as “required”, no drive error.
flashes red+green simultaneously (2 Hz)	The drive is not marked as “required”, the drive has a drive error.
green on	Communication to the drive is functioning correctly; the drive has no drive error.

4.5 Start-up: HIPERDRIVE bus adapter

After connecting the supply voltage, the bus adapter automatically performs a presence test:

During this test, the adapter determines whether a drive is connected to the adapter. If so, the transfer rate is set to the last value saved in the adapter. The “RS485 message complete time” (time after which the drive evaluates a received message) is set to the value corresponding to the desired baud rate. The RS485 address of the drive is set to 1 (steady-state).

If no drive is found, the LED RS485 is illuminated red.

If the drive is found, the LED RS485 is illuminated green.

5 Setting the station name

The station name can be set in 3 different ways:

- 1) The station name comprises a basic component and the address set using the address switches as follows:

```
hiperdrive-xx
```

(xx is the setting of the address switches when powering up the HIPERDRIVE Hub or adapter, provided that the address is > 0)

- 2) If the setting of the address switches is "00", the address stored in the internal EEPROM will be used as long as this is > 0 (Parameter 28). The station name is then constructed as follows:

```
hiperdrive-xxxxxx
```

- 3) If the setting of the address switches is "00" AND the address saved in the internal EEPROM is equal 0, the last station name assigned by the IO controller is valid.

In the delivery state, the address switches are set to 0, the address which is stored in the internal EEPROM is 0 and the station name is empty (→ PROFINET compliant behaviour).

In order to identify the HIPERDRIVE Hub or adapter during start-up, the "blinking service" is supported, i.e. the HIPERDRIVE can be accessed via the MAC address and a device naming can be executed.

6 The Profinet interface

6.1 Operating principle

When setting up the project, care should be taken to use the appropriate GSD (either the file for the HDA70 or for the HUB-3, HUB-4 or HUB-8). If the wrong GSD is selected, communication will not be established. Only one DAP exists per GSD file, no selection can be made here. If the HIPERDRIVE Hub or adapter is already connected to the PLC, the PLC will recognise the appropriate GSD file using the product code ("Device ID") of the connected HIPERDRIVE.

To move the drive, the control word, the percentaged target speed, percentaged maximum torque and the target position have to be set appropriately. These are encapsulated in the output module together with the output data of the parameter interface (PLC output data).

The acknowledgement from the HIPERDRIVE Hub or adapter (PLC input data, input module) consists of a state ("status word") and the actual values of speed and position ("actual speed", "actual position") as well as the input data of the parameter interface.

The parameters (e.g. lower limit) can be set in three different ways:

- 1) via the parameterization while establishing the connection
- 2) via the parameter interface in the process data (output/input module)
- 3) acyclically with read/write requests

The parameter values are stored in a non-volatile manner in the drive, i.e. if particular (or all) values are not parameterised; the HIPERDRIVE works with the saved value. These are the default values in the delivery state and are suitable for many applications.



Although the mode "IRT" is mentioned in the GSD file associated to the device, currently only the mode "RT" is supported.

Process data:

The process data for the IO controller consists of an output module and an input module. These modules have a length of 16 bytes for the HIPERDRIVE bus adapter and a length of [8 bytes * (max. number of connectable drives + 1)] for the HIPERDRIVE Hub. Process data are used to activate and monitor positioning runs as well as reading and writing parameters. The "PKW parameter interface" described in the drive profile "Profidrive" is used for this purpose.

Acyclic read and write requests:

All parameters can also be accessed with acyclic read and write requests instead of via the PKW parameter interface. The parameter number is the same in both cases.

When using acyclic write requests, please note, that a control byte has to be transmitted before the actual value to be adopted by a parameter. This specifies whether the HIPERDRIVE Hub or adapter should execute or ignore the write request. If the write request is to be ignored, this control byte must be set to 0, otherwise the write request will be executed.



This results in a data length of 3 bytes for write requests for 16-bit values and of 5 bytes for 32-bit values.



For acyclic reading, the data length of the value returned by the HIPERDRIVE Hub or adapter is 2 bytes for 16-bit values and 4 bytes for 32-bit values.

Setting parameters:

Acyclic write requests are used while setting parameters. Consequently, a control byte has to be transmitted before the actual value to be adopted by a parameter (as described above). This specifies whether the HIPERDRIVE should execute or ignore the configuration value. If the configuration value is to be ignored, this control byte must be set to 0, otherwise it will be adopted.

Example: In order to adopt the lower limit while setting the parameters, the control bit “enable” must be set to 1 for the parameter “lower limit”. The following value will then be adopted as the lower limit.

The advantage of this method is that when a parameterization is performed in the context of running up a device, parameters may be adopted from the project design or alternatively, the values stored in the EEPROM of the HIPERDRIVE Hub or adapter may remain valid. This is controlled by the control byte, described above, which is available for each parameter in the GSD file and displayed in the project design.

The configuration contains the parameters 17 to 28 and $151 + (n-1) * 100$ to $171 + (n-1) * 100$ where n is the number of the drive.

6.2 Table of implemented parameter entries

The area up to parameter 99 of the parameter range contains those parameters that only exist once regardless of whether the HIPERDRIVE unit is a drive with a bus adapter or a hub and independently of the number of drives that can be connected to a hub.

Name, designation	Parameter number	Function	Range of values	Back up?	Delivery state	R/W
U control	1	Current supply voltage to control unit, in 0.1 V	16 bit			R
Device temperature	3	Internal device temperature in °C	16 bit			R
Address switch	4	Current setting of the address switches	16 bit			R
HIPERDRIVE category	5	Adapter → "HIPERDRIVE SINGLE" 4-port hub → "HIPERDRIVE HUB-4" 8-port hub → "HIPERDRIVE HUB-8"				R
HIPERDRIVE name	7	Type designation as string				R
Item number	8	halstrup-walcher article number as string (format xxxx.xxxx)				R
Serial number	9	Serial device number of the hub or adapter	0... 65535 16 bit			R
Production date	10	Year and week of manufacture as string (format WW/YYYY)				R
Version	11	Software version number as string (format x.xx)				R
general purpose register	17-26	10 general purpose registers	32 bit	yes	0	R/W
Address	28	<p>If the setting of the address switches is "00", this value is effective as address, in case it is > 0. The station name then is built up in the following way:</p> <p><code>hiperdrive-xxxxxx</code></p> <p>When writing, this value only will be valid after saving (see Par. 29) and restart.</p> <p>If additionally to the address switch setting "00" parameter 28 is zero, the name which was assigned by the IO controller during device naming is valid.</p>	16 bit	yes	0	R/W

Name, designation	Parameter number	Function	Range of values	Backup?	Delivery state	R/W
Delivery state	29	<p><u>Writing a "-4":</u> resets all the connected drives and sets the desired baud rate</p> <p>The execution of this command may take up to 2 sec for the HIPERDRIVE bus adapter and up to 8 sec for the HIPERDRIVE Hub → Watch acknowledgement of drive (receiving of Response identifier if PKW parameter interface is used or answer to the write request).</p> <p><u>Writing a "-3":</u> sets the values of all parameters to the delivery state, deletes the station name and the IP address and saves all parameters in EEPROM</p> <p><u>Writing a "-2":</u> sets the values of all the parameters that can be saved in the hub or adapter to the last values saved by the user, without saving the parameters in EEPROM</p> <p><u>Writing a "-1":</u> sets the values of all the parameters that can be saved in the hub or adapter to the delivery state, without saving the parameters in EEPROM (station name and IP address remain unaffected)</p> <p><u>Writing a "1":</u> saves the parameters in EEPROM</p> <p><u>Reading after booting:</u> 0 → Memory content correct ≠ 0 → Memory content incorrect</p> <p><u>Reading after saving:</u> 0 → Saving successfully completed ≠ 0 → Saving not yet completed or completed incorrectly (saving can take up to 200ms)</p>	-4, -3, -2, -1 or 1 (during writing) 0..3 (during reading) ±15 bit	no		R/W

For HIPERDRIVE Hubs, the following section is repeated for each additional drive:

The area above parameter 100 of the parameter range contains those parameters that exist once for each connectable drive.

The following table describes the parameters for the first drive connected, i.e. drive 1 on the hub or the drive connected to the HIPERDRIVE bus adapter.

For each additional drive, a parameter number is created for a specific parameter by adding $n * 100$ to the stated number. i.e.

$$\text{Parameter number}_{\text{Drive } n} = \text{Parameter number}_{\text{Drive } 1} + (n - 1) * 100$$

Name, designation	Parameter number	Function	Range of values	Back up?	Delivery state	R/W
Control word (can only be written in process data)	101	Start and finish positioning runs (see diagram)	16 bit	no	0	R
Percentaged target speed (can only be written in process data)	102	Sets the speed (r.p.m.) as a % of the max. value (parameter 158)	1...100 8 bit	no	100	R
Percentaged maximum torque (can only be written in process data)	103	Sets the torque as % of the maximum value. Internally, the value is rounded up to multiples of 25%.	1...100 8 bit	no	100	R
Target position (can only be written in process data)	104	Target position The upper 16 bits represent the number of rotations, the lower 16 bits represent the desired angle within a rotation (applicable for default values of the scale setting, parameters 152-153)	±31 bit	no	0	R
Status word	105	Status of the drive (see diagram)	16 bit			R
Actual r.p.m.	106	Current speed in [0.1 r.p.m.] (applicable for default values of the scale setting, parameters 156-157)	±15 bit			R
Actual position	107	Current position of the output shaft The upper 16 bits represent the number of rotations, the lower 16 bits represent the desired angle within a rotation (applicable for default values of the scale setting, parameters 152-153)	±31 bit			R

Name, designation	Parameter number	Function	Range of values	Backup?	Delivery state	R/W
Fault buffer *)	108-115	The most recent causes of faults or errors Parameter 108: Latest cause of errors ... Parameter 115: Oldest cause of errors (still filed) <u>Error codes:</u> 0x8200 Overcurrent 0x8201 Undervoltage 0x8202 Temperature too high 0x8203 Drag error 0x8300 block detection in backward direction 0x8301 block detection in forward direction 0x8304 Lower limit reached 0x8305 Upper limit reached 0x8401 Internal error (control loop) 0x8410 Internal error (EEPROM) 0x8500 Attempted start of a positioning run not possible (e.g. due to an RS485 communication error) 0x8501 Value transferred to the parameter is not valid 0x8502 Internal error (SINCOS evaluation) 0x8503 Target position invalid 0x8601 Communication timeout (drive received no message from the RS485 master) 0x8603 RS485 communication error (no valid response from the drive)	16 bit ... 16 bit			R ... R
Error status 'HD_Err'	116	Status 'HD_Err' from the last transfer	16 bit			R
Error status 'Motion_Status'	117	Status 'Motion_Status' from the last transfer	16 bit			R

*) In case the Profinet interface is switched on continuously, the fault buffer might be filled with one or more values after switching off and on again the motor power supply. This neither influences the processing of the flow chart (see section “Flow chart”) nor the actual values of the status bits.

However, after switching on the motor power supply again, the fault buffer might be flushed in the following way as needed:

If the only error code which is contained is error code 0x8603, a simple flushing of the fault buffer is sufficient (by setting parameter 197 to 0). However, if additional error codes are listed, rather a reset of all connected drives has to be carried out. This takes place by setting parameter 29 to -4. Alternatively, the reset might also be executed by a positioning run, e.g. to the actual position. After this run has been finished, the fault buffer also might be flushed by setting parameter 197 to 0.

Name, designation	Parameter number	Function	Range of values	Backup?	Delivery state	R/W
Error status 'SCI_Err'	118	Status 'SCI_Err' from the last transfer (independent of the state of the drive) 0x0000 → no error or no communication is requested 0xFFFF → no communication is possible (eventually the power supply of the connected drive is missing) other values → communication is present, but with errors	16 bit			R
Drive temperature	119	Internal drive temperature in °C	8 bit			R
Drive variant number	120	0 → No drive connected 1 → HRA25A 2 → HRA25B 3 → HRA25E 4 → HRA35A 5 → HRA35B 6 → HRA35E 7 → HDA30A 8 → HDA30B 9 → HDA30E 10 → HDA45A 11 → HDA45B 12 → HDA45E 13 → HDA70 0xFFFF → other	16 bit			R
Drive variant name	121	Name of the drive variant as string				R
Item number of the drive	122	halstrup-walcher article number of the drive as string				R
Serial number of the drive	123	Serial number of the drive as string				R
Production date of the drive	124	Year and week of manufacture of the drive as string (format WW/YYYY)				R
Version of the drive	125	Software version number of the drive as string (format x.xx)				R
Nominal data of the drive	126-129	126: Nominal voltage [V] 127: Nominal current [A] 128: Nominal torque [Nm] 129: Nominal rated speed [r.p.m.] The data are displayed as a string. An "A" preceding any value signifies that this value must be divided by 10.				R R R R

Name, designation	Parameter number	Function	Range of values	Backup?	Delivery state	R/W
Drive required	151	0 → The drive is not accepting run commands issued via Profinet, the actual values (status word, actual r.p.m. and actual position) are not being updated. 1 → The drive can be run via Profinet, the actual values are updated cyclically. A transition from 0 to 1 sets the drive to the last baud rate saved in the hub or adapter and performs a reset.	0...1 8 bit	yes	0 (at the hub) 1 (at the adapter)	R/W
Position scaling	152, 153	Scaling of the position 152: Numerator value 153: Denominator value	16 bit 16 bit	yes yes	256 1	R/W R/W
Position lower limit	154	Minimum permitted target position	The upper limit must be min. 1 higher than the lower limit. Values will only be accepted if the current actual position is within the newly defined positioning range.	yes	see table	R/W
Position upper limit	155	Maximum permitted target position		see table ±31 bit	yes	see table
Speed scaling	156, 157	Scaling of speed (r.p.m.) 156: Numerator value 157: Denominator value	16 bit 16 bit	yes yes	10 1	R/W R/W
Max. target speed (r.p.m.)	158	100% value of the target speed [0.1 r.p.m.]	5...350 16 bit	yes	350	R/W
Jog 1	160-162	Inching run with switch "S5" ("Jog +") 160: step width: Number of increments a drive is moved by pressing the switch "S5" 161: Sets the speed (r.p.m.) as a % of the max. value (parameter 158) 162: Sets the torque as % of the maximum value	±31 bit 1...100 8 bit 1...100 8 bit	no no no	4096 100 100	R/W R/W R/W
Jog 2	163-165	Inching run with switch "S4" ("Jog -") 163: step width: Number of increments a drive is moved by pressing the switch "S4" 164: Sets the speed (r.p.m.) as a % of the max. value (parameter 158) 165: Sets the torque as % of the maximum value	±31 bit 1...100 8 bit 1...100 8 bit	no no no	-4096 100 100	R/W R/W R/W
Idle period for manual run	166	Length of time a manual run key must be held pressed in order to begin a manual run [ms]	100... 10000 16 bit	no	1000	R/W

Name, designation	Parameter number	Function	Range of values	Backup?	Delivery state	R/W
Timeout	168	<p>Time for RS485 communication timeout If the status of the drive is at least "Ready for operation" and no telegram is received from the RS485 bus master within the stated time, the drive enters the error state. If the drive is running at that moment, it will stop. Specification is made in [0.1s]. Value 255 means that the monitoring is deactivated.</p>	1... 100 or 255 16 bit	yes	20	R/W
Address (drive)	169	<p>RS485 address of the drive The change of address will only come into effect after a reset. The address is not important for the Profinet connection of the drive. Every activation of the drive via Profinet sets the address to 1.</p>	0...253 8 bit	yes	1	R/W
Baud rate	170	<p>RS485 baud rate of the drive The values 9600, 19200 and 38400 are permitted. The appropriate value for the "message complete time" is also transmitted at the same time as the baud rate is being written. The change to the baud rate will only come into effect after a reset as well as after every activation of the operated drive (parameter 151 from 0 to 1). A change to the baud rate will also be noticed in the hub or adapter and, if necessary, saved in its EEPROM (by setting parameter 29 to 1), so that the desired baud rate is also valid for a new drive if the old drive has to be replaced.</p>	32 bit	yes	38400	R/W
Complete time	171	<p>RS485 message complete time [ms] The drive considers the transmission of a message to have been completed if no further byte is received within the stated period of time. The parameter is reset automatically during every power-up and every time the drive is activated (parameter 151 from 0 to 1) with the value corresponding to the desired baud rate (parameter 170). The change of the message complete time will only come into effect after a reset.</p>	16 bit	yes		R/W

Name, designation	Parameter number	Function	Range of values	Backup?	Delivery state	R/W
Number of faults	197	Number of faults that have occurred since the last clearing of the fault buffer (or since the last activation of the axle) Setting to 0 clears the error list, other values are not permitted.	8 bit	no		R/W
New target position	198	Actual position to be displayed at the current position The new actual position must be located within the position range defined by the limits. The value is used for referencing the internal measuring system to the physical conditions. Resetting has no effect. Setting to the delivery state sets the value to 0, the new actual position then corresponds to the position of the output shaft and is located between 0 and 1 revolution. The value entered is rounded up or down to a multiple of 64.	±31 bit	yes	0	R/W
Delivery state (for the drive)	199	0 → The drive performs a reset (corresponds to switching off and back on again) 1 → The drive parameters are reset to the delivery state. The changes come into effect immediately. (The RS485 parameters "message complete time", "address" and "baud rate" are not affected.)	0...1 8 bit	no		W

Table of rated speed and torque values for various models of gears

	Device type	HDA 30 HDA 45	HDA 70	PSE441
Name, designation	Parameter number	Range of values delivery state	Range of values delivery state	Range of values delivery state
Position lower limit	154	-512 rot...+512 rot -511 rot	-16000 rot...+16000 rot -16000 rot	-127 rot...+127 rot -127 rot
Position upper limit	155	-512 rot...+512 rot +511 rot	-16000 rot...+16000 rot +16000 rot	-127 rot...+127rot +127 rot
New target position	198	-512 rot...+512 rot 0	-16000 rot...+16000 rot 0	-127 rot...+127 rot 0

6.3 Process data format

The following table describes the process data for the first drive connected, i.e. drive 1 on the hub or the drive connected to the HIPERDRIVE bus adapter.

The process data for each additional drive (on the hub) are attached in each case at the end, i.e. the following applies:

$$\text{Byte number}_{\text{Drive } n} = \text{Byte number}_{\text{Drive } 1} + (n - 1) * 8$$

The parameters for the PKW parameter interface are located at the beginning of the output and input modules.

1) Output module (from the perspective of the IO controller)

Assignment (cannot be modified):

Byte	Meaning	Corresponding parameter number
0-1	PKE	
2-3	IND	
4-7	PWE	
8-9	Control word	101
10	Percentaged target speed	102
11	Percentaged maximum torque	103
12-15	Target position	104

2) Input module (from the perspective of the IO controller)

Assignment (cannot be modified):

Byte	Meaning	Corresponding parameter number
0-1	PKE	
2-3	IND	
4-7	PWE	
8-9	Status	105
10-11	Current r.p.m.	106
12-15	Actual position	107

6.4 Detailed description of status bits

The functions of the status and control bits are based on the PROFIDRIVE protocol:

- Bit 0:* Ready to switch on
This bit is set:
- when bit 10 of the control word is set (set control word to 0x0400)
This bit is reset:
- when bit 10 is reset (set control word to 0x0000)
- Bit 1:* Ready for operation
This bit is set:
- when bit 0 of the control word is set in the state “Ready to Switch on” (set control word to 0x0401)
This bit is reset:
- when bit 0 is reset
- Bit 2:* Operation enabled
This bit is set:
- when bit 3 of the control word is set in the state “Ready for operation” (set control word to 0x0409)
This bit is reset:
- when bit 3 is reset
- Bit 3:* Fault
This bit is set:
- when an error arises if the state is at least “Ready for operation”
This bit is reset:
- in the case of a negative edge of bit 7 of the control word
- Bit 4:* No OFF2
This bit is set:
- when a drive is being detected during the presence test
- when a drive is marked as “required” by the PLC
This bit is reset:
- at the beginning of a presence test
- Bit 5:* No OFF3
This bit is set:
- when a drive is being detected during the presence test
- when a drive is marked as “required” by the PLC
This bit is reset:
- at the beginning of a presence test
- Bit 6:* Switch on inhibit
This bit is set:
- in the case of a negative edge of bit 7 of the control word in the state “Fault”
This bit is reset:
- in the case of a negative edge of bit 0 of the control word

- Bit 7:** Warning
This bit is set:
 - when an error arises (independent of the operating status)
This bit is reset:
 - when all the errors present have been eliminated
 When the bit "Fault" is active, the bit will only be reset together with the bit "Fault" once the state "Fault" has been acknowledged.
- Bit 8:** No drag error
This bit is set:
 - when no drag error occurred during a movement (i.e. the difference between the target and actual position is within in the drag error window)
This bit is reset:
 - at the beginning of a presence test
 - when a drag error occurred during a movement (i.e. the difference between the target and actual position is not within in the drag error window)
- Bit 9:** Control requested
This bit is set:
 - when a drive is being detected during the presence test
 - when a drive is marked as "required" by the PLC
This bit is reset:
 - at the beginning of a presence test
- Bit 10:** Target position reached
This bit is set:
 - when a drive has arrived at its target position
This bit is reset:
 - at the beginning of a positioning run
 - when the state is less than "Ready for operation" (in the states "Fault" and "Switch on inhibit", the bit initially retains its old value)
- Bit 11:** Reference point set
This bit is set:
 - when a drive is being detected during the presence test
 - when a drive is marked as "required" by the PLC
This bit is reset:
 - at the beginning of a presence test
- Bit 12:** Acknowledgement of target value
This bit is set:
 - at the start of a movement when bit 6 of the control word is set
This bit is reset:
 - at the start of a movement when bit 6 of the control word is reset
 - when the state is less than "Ready for operation"
 (In the state "Ready for operation" a new movement will only be started if bit 6 of the control word complements the bit "acknowledgement of target value" in the status word → toggle function.)
- Bit 13:** Drive at standstill
This bit is set:
 - when the drive has completed a run
This bit is reset:
 - at the beginning of a run

- Bit 14:** Motor overcurrent
This bit is set:
- when the maximum current for the drive is exceeded (in this case the drive enters the state "Fault")
This bit is reset:
- when the state "Fault" is acknowledged (negative edge of bit 7 of the control word)
- Bit 15:** Position limit reached
This bit is set:
- when the actual position of the drive is located outside the range defined by the positioning range limits
This bit is reset:
- when the actual position of the drive is again located within the range defined by the positioning range limits

6.5 Detailed description of control bits

- Bit 0:** ON
The drive goes from the state "Ready to Switch on" into the state "Ready for operation" (bit 10 must still be set).
- Bit 1:** No OFF2
reserved, must be set to 0
- Bit 2:** No OFF3
reserved, must be set to 0
- Bit 3:** Operation enabled
The drive goes from the state "Ready for operation" to the state "Operation enabled" (bits 0 and 10 must still be set).
- Bit 4:** Function in positioning mode:
No stop
The bit must be continuously active to execute a run command. When the bit is reset, the drive stops immediately, the current run command is dismissed. The run command is activated by an edge to bit 6.

Function in speed control mode:
CLOCKWISE
If the bit is set, the movement will start in a CLOCKWISE direction, otherwise it will be COUNTERCLOCKWISE.
- Bit 5:** Function in positioning mode:
No intermediate stop
The bit must be continuously active to execute a run command. When the bit is reset, the drive stops immediately but the current run command is not dismissed. The run command is continued when bit 5 is set once again.

Function in speed control mode:
Endless
When this bit is set, the movement in speed control mode is endless, otherwise until it reaches the respective end of the positioning range.

- Bit 6:* Function in positioning mode:
 Activate run command
 Every edge releases a run command or new target value (toggle bit). A rising or falling edge may only be carried out if bit 12 of the status word acknowledges that the previous run command has been accepted.
 I.e. the run command is activated if this bit complements the current state of bit 12 of the status word.
- Function in speed control mode:
 Start speed control mode
 A rising edge triggers a run in speed control mode, a falling edge completes it.
- Bit 7:* Acknowledge fault
 A negative edge acknowledges a current fault condition.
- Bit 8:* Inching 1 ON
 The drive runs with jog target value 1 with the step width and in the direction indicated in the parameters.
- Bit 9:* Inching 2 ON
 The drive runs with jog target value 2 with the step width and in the direction indicated in the parameters.
- Bit 10:* Control by the automation equipment
 The drive goes from the state "Not ready to Switch on" to the state "Ready to Switch on".
- Bit 11:* Start referencing
 Reserved, must be set to 0.
- Bit 12:* Speed control mode
 If this bit is set and the drive is in the state "Operation enabled", an edge of bit 6 triggers a run in speed control mode rather than a positioning run to the desired position.
- Bit 13:* Reserved, must be set to 0.
- Bit 14:* Reserved, must be set to 0.
- Bit 15:* Reserved, must be set to 0.

6.6 PKW parameter interface

The PKW parameter interface can be used to write and read parameter values by using the cyclic process data connection, besides, also other values might be retrieved from the HIPERDRIVE Hub or adapter.

In the PKW parameter interface, the IO controller sets and transmits a new command. It repeats this command cyclically until the HIPERDRIVE Hub or adapter has processed the command and has sent back a response. The HIPERDRIVE Hub or adapter keeps this response available until the IO controller has formulated a new command. A parameter value sent back by the HIPERDRIVE Hub or adapter as a response to a read request, relates to the point in time at which the IO controller has been issued the command. I.e. if the progress of a parameter value is to be observed over a longer period of time, the IO controller has to send another command after taking over the current parameter value. This is done by setting the request identifier 0 (“no request”) and subsequent waiting until the HIPERDRIVE Hub or adapter confirms this request with the response identifier 0 (“no response”). Afterwards the same parameter value might be requested again.

Only one request can be processed per HIPERDRIVE Hub or adapter at any time.

Structure of the PKW parameter interface:

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

PKE = Parameter identifier

IND = Index

PWE = Parameter value

Structure of the parameter identifier PKE:

The information “parameter identifier” (PKE) consists of a data word (bytes 0 and 1 of the PKW parameter interface), in which the type of the request (or the response) and the related parameter number are coded:

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 = request identifier or response identifier

SPM = Toggle bit for spontaneous message (function not implemented, set to 0)

PNU = Parameter number

The parameter number (PNU) refers to the table above (“Table of implemented parameter entries”).

Request identifier (IO controller → HIPERDRIVE):

Request identifier	Function	Possible response identifiers of the HIPERDRIVE Hub or adapter *)	
		positive	negative
0	No request	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 responses for a certain request, distinguished between a successful completion of the request (“positive”) or an error (“negative”).

Response identifier (HIPERDRIVE → IO controller):

Response identifier	Function
0	No response
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	Cannot process request (with error number)

Subindex IND:

The field IND contains the array subindex for requests and responses relating to array elements.

Parameter value PWE:

This field contains the numerical value which belongs to the related parameter.

When a request cannot be completed successfully (i.e. response identifier AK = 7), the HIPERDRIVE Hub or adapter reports an error code according to the following table:

Error code	Meaning
0	Illegal parameter number
1	Parameter value cannot be changed
2	Minimum/maximum limit exceeded
3	Faulty subindex
4	No array
5	Incorrect data type
6	Setting not allowed (resetting only)
17	Request cannot be processed due to operating status
18	Other error

When a write request is being completed successfully (i.e. request identifier AK = 2, 3, 7 or 8) the response contains the same data as a read request of this parameter. The response identifier then is 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 the same as given in the request. Hence it is possible to check again that the HIPERDRIVE Hub or adapter actually took over the requested values.

6.7 Flow chart

The following flow chart shows the possible states of a drive as well as the transitions between the states.

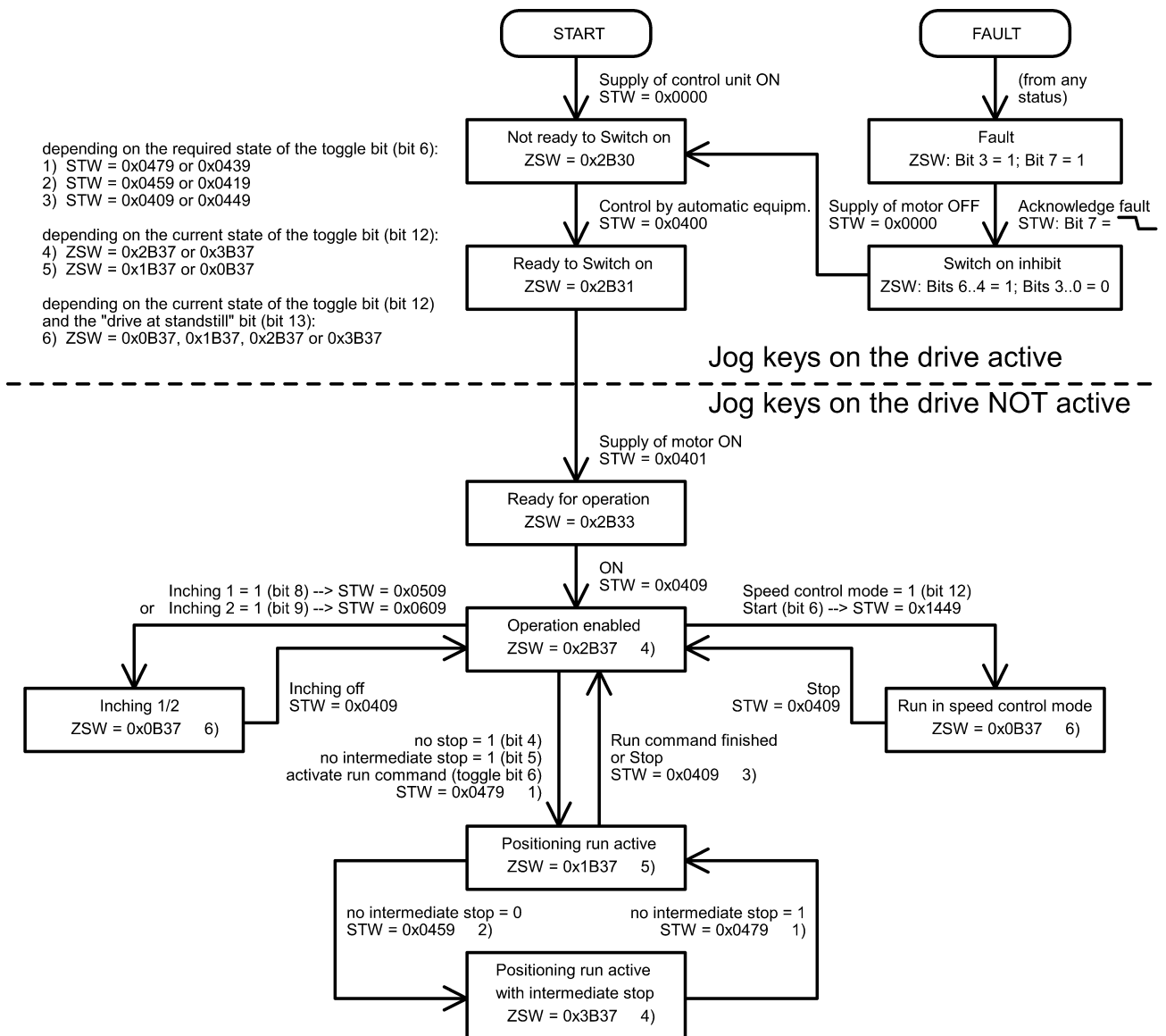
Abbreviations used:

STW = Control word

ZSW = Status ("status word")

The requirement for each run is that the "percentaged target speed" and "percentaged maximum torque" have a value > 0. In addition, for a run command, the target position must be set to a permitted value.

Any jog keys which are eventually present at the drive are only active in the states "Not ready to Switch on", "Ready to Switch on", "Fault" and "Switch on inhibit". In all other cases, the PLC has sole access to the drive.



7 Jog function

7.1 Jog function with jog keys on the drive

Some versions of the drive have two integrated jog keys for running left and right.

These keys are always active when the drive is not connected to a control module. When connected to a control module, they are active in the following states:

- Not ready to Switch on
- Ready to Switch on
- Fault
- Switch on inhibit

7.2 Jog function with jog keys in the HIPERDRIVE Hub

The two jog keys in the HIPERDRIVE Hub can always be used to run the drive selected using the switch S3 (located in the middle between the two jog keys) and independently of the PLC.

S4 (“Jog -”) starts a jog step with the parameters 163-165 (Jog 2),
S5 (“Jog +”) starts a jog step with the parameters 160-162 (Jog 1).

The parameterization of the jog steps is done with the values of these parameters:

Parameterization for the jogging with jog key S4 (“Jog -”):

- Parameter 163 = increment and direction (default 1/16 rotation counter-clockwise)
- Parameter 164 = Sets the speed (r.p.m.) as a % of the max. value from Parameter 158
- Parameter 165 = Sets the torque as a % of the nominal torque

Parameterization for the jogging with jog key S5 (“Jog +”):

- Parameter 160 = increment and direction (default 1/16 rotation clockwise)
- Parameter 161 = Sets the speed (r.p.m.) as a % of the max. value from Parameter 158
- Parameter 162 = Sets the torque as a % of the nominal torque

If the key is released during the movement, the jog step still runs until it has been completed. This makes it possible to run to a precisely defined angle. The run can be aborted before it has been completed at any time by pressing both keys simultaneously. A new jog step can only be triggered when both keys have been completely released.

If the key remains pressed after the jog step has been completed, it will be followed by a manual run, which continues until the key is released or the end of the positioning range has been reached. The parameter “idle period for manual run” (parameter 166 on drive 1) is available in order to provide better control of the transition to a manual run. The manual run begins once the set time, measured from the start of the jog step, has expired.

A manual run can also be aborted by pressing both keys simultaneously.

8 Special features

8.1 Target speed (r.p.m.) and torque

These values are stated as a percentage of a reference value. The 100% value for the target speed (r.p.m.) is stated in parameter 158 (for drive 1), the 100% value for the target torque is fixed and is the same as the nominal torque for the drive.

The maximum values valid for each movement are indicated at the beginning of each movement. Positioning runs can only be started using the process data (i.e. not using acyclic write requests).

8.2 Response of the drive in case of block

If the drive detects an block, the drive aborts the run and enters the state "Fault".

An entry is then made in the fault buffer (Parameter 108-115 on drive 1). The fault must be acknowledged by a negative edge to bit 7 of the control word. The drive then enters the state "Switch on inhibit", which can be exited by a negative edge to bit 0.

8.3 Response of the drive if it is turned manually (readjustment function)

After switching on the voltage, the drive readjusts its position if the divergence between the current actual value and the target value saved before it was last powered down is $< 5^\circ$.

After reaching a target position or stopping, the drive always adjusts its position as soon as it is turned beyond the tolerance range by external forces.

8.4 Using actual value assessment factors to set the spindle pitch

Parameter numbers 152 (numerator factor) and 153 (denominator factor) can be used to modify the device's spindle resolutions as required.

$$\text{number of steps per revolution} = 256 * \frac{\text{numerator factor}}{\text{denom. factor}}$$

The default setting for the numerator factor is 256, the denominator factor is set to 1, giving a resolution of 65,536 increments per revolution.

The numerator factor makes it simple to set the spindle pitch and resolution. The denominator factor is primarily used for setting "unlevel" resolutions.

Examples:

Spindle pitch	Resolution	Numerator factor	Denominator factor
4 mm	1/100 mm	400	256
1 mm	1/100 mm	100	256
2 mm	1/10 mm	20	256

8.5 Aborted run when the master fails

If the connection to the master is interrupted during a positioning run, the master cannot abort a run that is already underway. Communication with the IO controller is monitored in the HIPERDRIVE Hub or adapter so that an automatic run abort can be generated in such a case. An abort of any positioning is triggered in all connected drives in the case of a timeout.

9 Technical data

9.1 HIPERDRIVE Hub

Ambient conditions

Ambient temperature	0 °C to +70 °C
Storage temperature	-25 °C to +75 °C
Shock resistance as stipulated in DIN IEC 68-2-27	8 g / 50 ms
Resistance to vibration as stipulated in DIN IEC 68-2-6	10 ... 500 Hz: 10 g
EMC standards	CE
Conformity	CE declaration of conformity available upon request
Protection class	IP 65
Duty cycle	100 %

Electrical data

Supply voltage	24 VDC ±15 % Recommendation: Use a regulated power adapter
Nominal current, control unit	0.15 A
Motor connections	One 6-pin screw terminal per motor Max. cross section of conductor 1.5mm ²
Supply voltage connection for the motors	2 x cable lug M6 Recommendation: Use a regulated power adapter
Bus connection	M12, 4-pin Type D (2 x)
Protocol	Profinet (IEC 61158-6-10)
Status information	2 x Link/Act (green/yellow) 1 x Profinet status BF (red) 1 x Profinet status SF (red) 1 x RS485 status (red/green)

Physical data

Dimensions (l x w x h)	see drawings
Weight (approx.)	1.5 kg

9.2 Drives with HIPERDRIVE bus adapter

Ambient conditions

Ambient temperature	0 °C to +60 °C
Storage temperature	-25 °C to +75 °C
Shock resistance as stipulated in DIN IEC 68-2-27	11 g / 30 ms
Resistance to vibration as stipulated in DIN IEC 68-2-6	10 ... 150 Hz: 10 g
EMC standards	CE
Conformity	CE declaration of conformity available upon request
Protection class	IP 65

Electrical data

Nominal power output	HDA 30	30 W
	HDA 45	45 W
	HDA 70	42 W
Supply voltage	24 VDC \pm 15 % Recommendation: Use a regulated power adapter	
Nominal current	HDA 30	3.5 A
	HDA 45	4.8 A
	HDA 70	4.8 A
Connection for supply voltage	4-pin screw terminal (either with separate or shared power supply with the HIPERDRIVE electronics and the motor) Max. cross section of conductor 1.5mm ² Optional: 7/8" plug	
Bus connection	M12, 4-pin Type D (2 x)	
Protocol	Profinet (IEC 61158-6-10)	
Status information	2 x Link/Act (green/yellow) 1 x Profinet status BF (red) 1 x Profinet status SF (red) 1 x RS485 status (red/green)	
Absolute value acquisition	Magnetic and with EEPROM	

Physical data

Positioning range	HDA 30, HDA 45: 1024 rotations HDA 70: 32000 rotations (no mechanical limits)
Positioning accuracy	max. $\pm 2.5^\circ$
Repeat accuracy	max. $\pm 1.0^\circ$
Output shaft	type "S": 10 mm solid circular shaft with feather key type "H": 12 mm hollow shaft
Maximum radial force	linear type: 200 N radial type: 440 N
Maximum axial force	linear type: 150 N radial type: 165 N
Dimensions (l x w x h)	see drawings
Weight (approx.)	HDA 30, HDA 45 linear: 2.8 kg HDA 30, HDA 45 radial: 3.2 kg HDA 70 linear: 2.5 kg HDA 70 radial: 3.7 kg

10 Dimension drawings

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

www.halstrup-walcher.de/en/produkte/positioniertechnik/positioniersysteme/index.php

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