English

JOHANNES HÜBNER GIESSEN

ideas and solutions

Operating and configuration instructions

UO-EPB-1 PROFIBUS module

PROFIBUS-DP interface

U-ONE®-LWL

Universal encoder system – Generation II

Read the operating and assembly manual before assembly, before starting installation and before completing all other work!
Store the manual for future use.

Translation of the original operating and assembly instructions
ID 76611

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Further current information on this product series is available online in our Service Point.
Just scan the QR code and open the link in the browser.

scanme 76610

These instructions and the enclosed declaration of conformity can also be accessed via our Service Point. For this purpose, the QR code on the type plate of the corresponding device must be scanned.

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Copyright protection

Reservation of rights

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1 General information

1.1 Information on the Operating and configuration manual

This operating and configuration manual provides important information for using the UO-EPB-1 electronic function module. It must be read carefully before beginning any work and observed. The UO-EPB-1 electronic function module is referred to in the following documentation as the EPB.

Furthermore, the local accident prevention regulations and general safety regulations applicable for the area where the device will be used must be observed.

1.2 Scope of delivery

The declaration of conformity and the operating and configuration manual is included in the scope of delivery for the function module.
The scope of delivery for the EPB also includes the software & support CD.

1.3 Explanation of symbols

Warning information is designated using symbols. Information is proceeded by signal words which express the extent of the danger involved. Always comply with these notices, and use caution to avoid accidents, personal injury and property damage.

	**WARNING!** Indicates a potentially hazardous situation that could lead to death or severe injury if it is not avoided.
	**CAUTION!** Indicates a potentially hazardous situation that could lead to minor or slight injuries if it is not avoided.
	CAUTION! Indicates a potentially hazardous situation that could lead to property damage if it is not avoided.
	**NOTE!** Emphasises useful tips and recommendations, and provides information useful for efficient, smooth operation.

1.4 Warranty and liability

Only the “General Terms and Conditions” of Johannes Hübner Fabrik elektrischer Maschinen GmbH apply. These will be provided to the operator at the latest when the order is confirmed or when the contract is concluded. All warranty and liability claims for personal injury and property damage are excluded, and the operator's operating permit will be null and void if one or more of the following apply:

- Failure to observe the operating and configuration manual.
- Improper use of the function module.
- Improper assembly, installation, commissioning and programming of the function module.
- Operating the function module despite technical defects.
- Independently carrying out mechanical or electrical modifications to function modules.
- Independently carrying out repairs.
- Catastrophes due to external interference or force majeure.
- Use of non-qualified personnel.
- Opening the function module.

1.5 Organisational measures

- The operating and assembly manual must always be stored easily within reach in the area where the function module is used.
- In addition to the operating and configuration manual, general statutory and other binding regulations on accident prevention and environmental protection must be observed. Operators must be trained on these regulations.
- Applicable national, local, and system-specific provisions and requirements must be observed.
- The operator is obligated to inform personnel of special operating considerations and requirements.
- The type plate and any prohibitions or notice signs adhered to the function modules must always be legible.
- Repairs may only be carried out by the manufacturer, or by an agency or individual authorised by the manufacturer.

1.6 Copyright protection

	**NOTE!** Content information, texts, drawings, images, and other illustrations are copyright protected and subject to industrial property rights. Copying of any kind not associated with use of the function module is prohibited without a written declaration from the manufacturer. Violations will result in claims for damages.

1.7 Warranty provisions

Warranty provisions are outlined in the manufacturer's General Delivery Conditions.

1.8 Customer service

Contact persons are available by phone, fax, or e-mail for technical questions. See the manufacturer's address on page 2.

2 Basic safety information

CAUTION!

This section provides an overview of all significant safety aspects necessary to protect personnel and ensure safe, fault-free operation of the function module. Failure to observe this information may result in significant danger.

2.1 Responsibility of the operator

The function module is used in commercial areas. The operator of the function modules, therefore, is subject to statutory occupational safety requirements and the safety, accident prevention and environmental regulations applicable to the areas in which the function modules are used.

2.2 Selecting and qualifying personnel; basic obligations

- All work on the function module may be carried out only by qualified personnel. Qualified personnel are personnel with the training, experience, and instruction, as well as expertise on relevant standards, specifications, accident prevention regulations and operating circumstances necessary to carry out the required work, and who have been authorised to do so by the persons responsible for the safety of the system. They are able to identify and avoid potential hazards.
- In addition, please see standards VDE 0105-100 and IEC 60364 for the definition of "qualified personnel" (reference, e.g. Beuth Verlag GmbH, VDE-Verlag GmbH)
- Responsibilities for assembly, installation, commissioning and operation must be clearly defined. Personnel who are receiving instruction or training must be supervised.

2.3 Proper use

The system manufacturer must review whether the properties of the function module fulfil the safety requirements in its specific application. The system manufacturer is responsible for use of the function module and for deciding whether to use the module. Function modules are designed for unsupervised, continuous operation.

Proper use also includes:

- observing all information in this operating and configuration manual,
- observing type plates and any prohibition or information signs,
- observing the operating manual of the machine or system manufacturer,
- operating the function module within the limits stipulated in the technical data,
- not engaging in improper use.

2.4 Improper use

WARNING!

Danger of death, physical injury and property damage due to improper use of the function module!
In particular, the following uses are prohibited:

- Use in environments with an explosive atmosphere,
- Use in environments with radioactive radiation,
- Use for medical purposes.

2.5 Safety information

WARNING! CAUTION!

Destruction, damage or impact to the function of the function module.

- Only complete wiring work and only connect or disconnect electrical connections when the module is powered down.
- Review any potential hazards due to interactions with other systems and devices currently installed in the surrounding area, or which are to be installed. The user is responsible for taking relevant measures.
- Cables used must be suitable for the temperature range.
- Defective function modules may not be operated.
- Opening function modules is prohibited.
- The type plates specify the technical properties of the function modules. If a type plate is no longer legible, or if a type plate is missing entirely, the function module may not be operated. Contact Hübner service (see page 2).
- This module is not intended for use in residential areas and cannot provide adequate protection for radio reception in such areas. The device is classified in Group 1 and Class A according to EN 55011 and is intended for use in an industrial environment only.

NOTE!
Disposal:

If the function module needs to be disposed after its service life, applicable national regulations must be observed.

3 Assembly

3.1 Safety instructions

WARNING!

- Installation and removal may only be carried out by qualified personnel.
- In general, the requirements and acceptance conditions of the overall system must be taken into account for the installation.
- Equipotential bonding measures must be provided for the entire processing chain of the system. Uninterrupted, low-resistance machine earthing must be ensured across all parts of the system. Ensure that connections have good electrical contact.
- When laying the cables, ensure that there are no tripping hazards.

WARNING! CAUTION!

Risk of death, serious injury and/or damage to property due to overriding of the safety functions caused by an unsafe shaft drive!

In general, the requirements and acceptance conditions of the entire system must be taken into account for the attachment.

3.2 Basic rules

NOTE!

- The supply cable of the base unit must be laid at a sufficient distance from power and high-voltage cables.
- Shield the power cables between the frequency inverter and motor in accordance with the manufacturer's specifications.
- Generous mounting distances must be maintained to actuators/systems with high energy density or electromagnetic emissions (e.g. contactors, relays, inverters, motors, solenoid valves, brakes).
- Inductors (e.g. relays, contactors, solenoid valves, brakes) must be wired with interference suppressors to minimize both conducted and airborne interference.
- Further information on good installation practice can be found in the USL installation instructions electronics.

3.3 Connection

NOTE!

- The DC power distribution for one or more USL systems should be designed in a star configuration for function modules, base units, and cabling. Ensure symmetrical wiring of the forward and return conductors as a twisted pair or cable.
- Shielded cables must be used for all power and signal lines that are routed outside a cabinet. The cable shields must be connected to the machine ground at both ends.
- Shield connection terminals must be used in the control cabinet to connect the cable shields over a large area.

3.4 Replacing the function module

When replacing function modules, observe the following:

- The new function module must have the same item no. (ID) as the old one.
- When recommissioning the replaced function module, a secure test run must be completed first to ensure it functions correctly.

3.5 Type plate

The following image shows an example of a type plate.

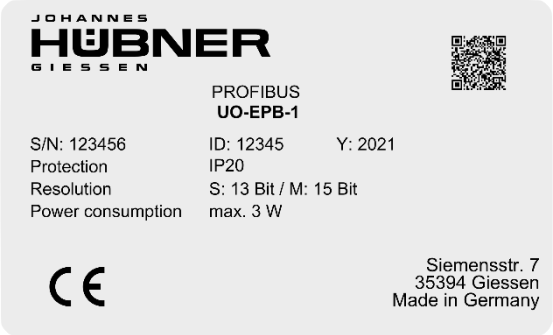


Fig. 3-1: Type plate (example)

The type plate is located on the outside of the housing, and includes the following information:

- Manufacturer
- Type, year of construction
- CE mark
- Serial number (S/N)
- Protective class
- ID number
- Certification information

3.6 Electrical data

Information	Value
Supply voltage	Delivered to the SCU module via the module bus connector
Device temperature range	-25°C…+ 60°C
Power consumption	< 3 W
Connection technology	Sub-D
Protective class in accordance with DIN EN 60529	IP20 for cabinet installation Degree of protection of cabinet: ≥ IP54
Elevation above sea level	≤ 3000 m

4 Commissioning

4.1 User manual

The module transmits the Multiturn and Singleturn absolute value for the basic device. It can be configured in profiles CLASS 1 (Hübner 1.0) with configuration of the counting direction and CLASS 2 (Hübner 2.0) with the additional setting for resolution / revolution and the overall resolution.

The profiles Hübner 2.1 and Hübner 2.2 are also available. These also provide the following functions:

- Expanded scaling function
- Setting the counting direction, preset and automatic scaling (teach in) during online operation in commissioning mode.
- Limit switch function
- Speed output

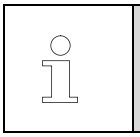
This function outsources part of the computing power from the Profibus® master to the function module and relieves the load placed on the overall system. If these additional

functions are not required, however, then to simplify configuration it may make sense to use CLASS 1 or CLASS2 profiles.

4.2 Profibus profile of the module

The module behaves like a Multiturn encoder designed for operation on the Profibus®. It can be configured and parameterised as either a Multiturn or Singleturn module in the following profiles:

Encoder profile	Configuration options
HÜBNER 1.0 Single / Multiturn (CLASS 1)	Counting direction
HÜBNER 2.0 Single / Multiturn (CLASS 2)	Counting direction Switch the HÜBNER 2.0 function on/off Switch the scaling function on/off Resolution / rotation Total resolution
HÜBNER 2.1 Single / Multiturn	Like HÜBNER 2.0, in addition: Desired measurement steps Desired resolution per - revolution - maximum total resolution - physical measurement steps Switching the commissioning module on/off Set preset value and change counting direction in online mode Determine gear factor (scale) Switch lower limit switch on/off Lower limit switch (position) Switch upper limit switch on/off Upper limit switch (position)
HÜBNER 2:2 Single / Multiturn	Like HÜBNER 2.1, in addition speed output



NOTE!
The module can be operated in HÜBNER 1.0, HÜBNER 2.0, HÜBNER 2.1 and HÜBNER 2.2 independent of whether CLASS 1 or CLASS 2 was selected.

4.3 Bus addressing

The addressing switch can be used to define the bus address:

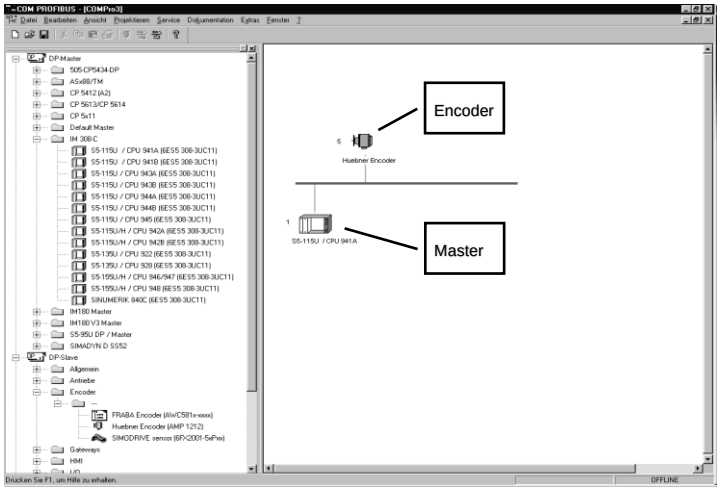
- x 10 = tens digit
- x 1 = ones digit

4.4 Connecting the module to the Profibus

After installing the module and connecting it to the power supply, connect the module to the Profibus system. This example describes the process using the COM PROFIBUS V 5.0 installation software and the PROFIBUS-DP master IM308C.

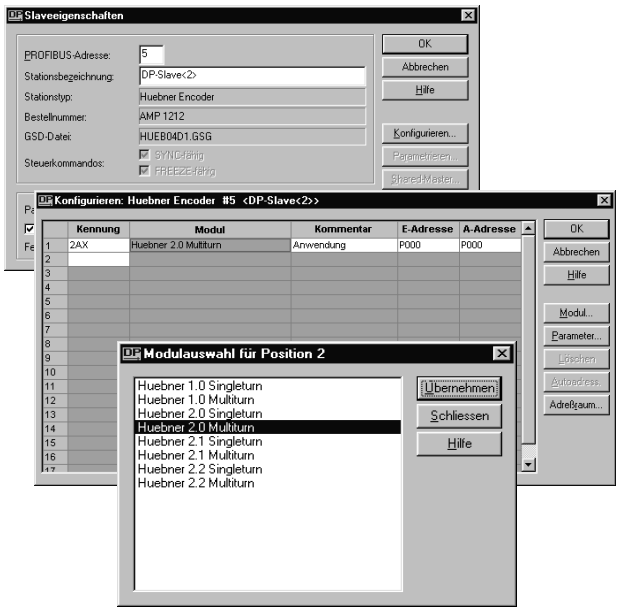
First, copy the manufacturer-specific bitmap files (.bmp, .dib) into the BITMAPS directory and copy the GSD file into the GSD directory of the COM PROFIBUS software. Then start the COM PROFIBUS installation software. Create a new configuration file using the NEW menu item under the FILE menu, or access a configuration file via the OPEN menu item. Then read in the GSD file in the menu item READ IN GSD FILES.

Now, search for type IM308C under the DP master and search for HÜBNER encoder AMP1212 under DP slave / encoder, then double click to integrate these into the bus graphic in the right window.



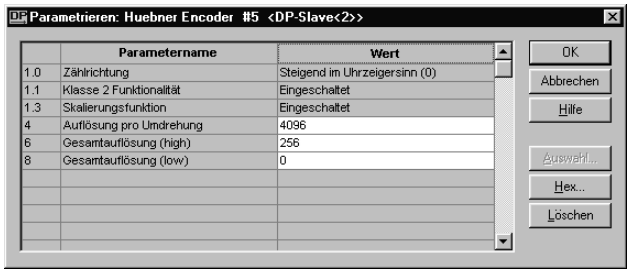
Use the menu PLAN / PLAN DP SLAVE or right click on the encoder symbol and PROPERTIES to access the SLAVE PROPERTIES window. Enter the module bus address matching the pre-selector switches on the module. Then continue using the CONFIGURE menu item.

4.5 Configure the module



Now, select the profile in which the module should work. Then assign the input and output addresses and complete configuration. This function can be accessed in the Configure window using the Parameter button, and offers a simple, easy to understand way to set the parameters. Configurations must be set in other windows in hexadecimal form, in contrast, and require a precise understanding of the meaning of the individual bits and bytes.

4.6 Configuring the module



In this example, the Configure window shows the setting options for an absolute encoder configured as HÜBNER 2.0.

NOTE!

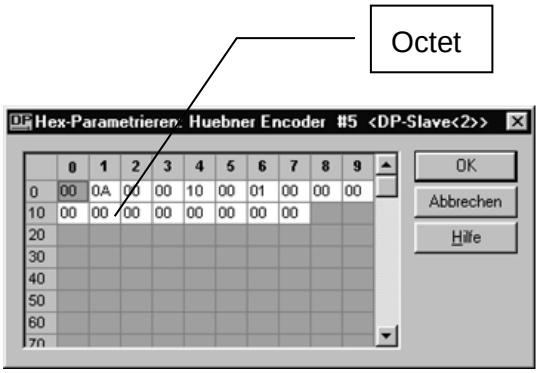
- If the class 2 function is switched off, then the module will work in HÜBNER 1.0 mode. In this case, only the counting direction can be changed.
- The resolution per revolution can be any value between 1 and 4096 and determines the step length.
- The total resolution indicates the number of revolutions the measurement by the basic device using the selected resolution per revolution lasts until the position zero is read out again.

	• Total resolution = resolution per revolution x number of revolutions. The number of revolutions must be equal to 2^n with a value between 0 and 12 for n.

If this is not observed, the module will detect a configuration error. This will be displayed in the junction box cover. The red LED will be continuously illuminated, and the green one will flash.

	**NOTE!** To activate configuration of resolution per revolution, the class 2 function and the scaling function must be switched on. The preset should then be reset in normal operation, since it refers to the scaled values.

4.7 Configuration in hex code

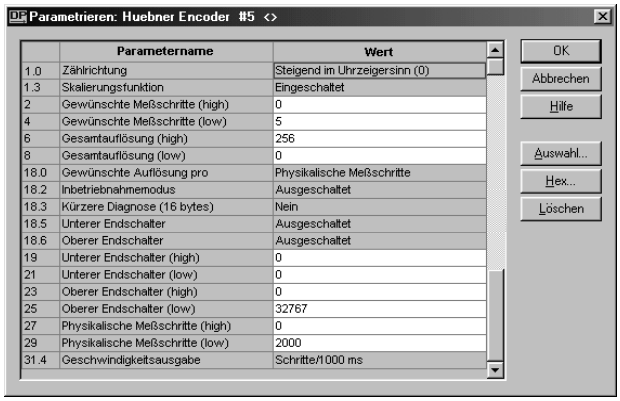


The configuration can also be carried out in the HEX – CONFIGURE window. However, this is time consuming and requires a precise knowledge of the functions of the individual bits and bytes.

4.8 Operating the module in the Hübner 2.1 and Hübner 2.2 profiles

These two profiles have some additional functions in addition to the standard profiles, the configuration of which is explained here based on COM Profibus®.

The scaling function must be switched on to operate the additional functions.



	Parametername	Wert
1.0	Zählrichtung	Steigend im Uhrzeigersinn (0)
1.3	Skalierungsfunktion	Eingeschaltet
2	Gewünschte Meßschritte (high)	0
4	Gewünschte Meßschritte (low)	5
6	Gesamtauflösung (high)	256
8	Gesamtauflösung (low)	0
18.0	Gewünschte Auflösung pro	Physikalische Meßschritte
18.2	Inbetriebnahmemodus	Ausgeschaltet
18.3	Kürzere Diagnose (16 bytes)	Nein
18.5	Unterer Endschalter	Ausgeschaltet
18.6	Oberer Endschalter	Ausgeschaltet
19	Unterer Endschalter (high)	0
21	Unterer Endschalter (low)	0
23	Oberer Endschalter (high)	0
25	Oberer Endschalter (low)	32767
27	Physikalische Meßschritte (high)	0
29	Physikalische Meßschritte (low)	2000
31.4	Geschwindigkeitsausgabe	Schritte/1000 ms

4.9 Desired resolution

In contrast to the profile Hübner 2.0 (CLASS 2), there are three different scaling options to choose from here:

Desired resolution per:

- revolution
- Maximum total resolution
- Physical measurement steps

4.9.1 Desired resolution per revolution

Here, the user can set the number of steps the basic device should output during a revolution.
In addition, the length of the total possible measurement path and therefore the number of revolutions are entered into the fields for the overall resolution.

Example:

8 steps / revolution are desired. The total measurement range should be completed after 8 revolutions, and should start over again. A total of

8 x 8 = 64

steps are required for this purpose. 8 steps should then be entered in the desired measurement step, and 64 steps in total resolution.

	**NOTE!** The number of revolutions must have a value of 2^n with (n = 1 ..12). Failure to observe these requirements will cause the output position values to be ambiguous, since the transition from the maximum basic device position to the position value of 0 will then always be completed at different basic device settings.

4.9.2 Desired resolution per maximum total resolution

In this type of scaling, the maximum possible measurement range for the basic device is divided into a defined number of steps. This number must be entered into the fields for DESIRED MEASUREMENT STEPS.

Example:

The total measurement range for the module should be divided into 16384 steps.

16384 : 4096 = 4 steps per revolution

The number of desired measurement steps must be less than the maximum total resolution.

This type of scaling is also used in commissioning mode with automatic scaling (teach in).

4.9.3 Desired resolution per physical measurement step

This setting always refers to dividing the code disc into 4096 measurement steps. The number indicating how many parts the value entered under physical measurement step was divided into must be entered in the input field for the desired measurement step.

Example:

Physical measurement steps =2048, desired measurement steps = 64.

2048 : 64 =32

Therefore, a desired measurement step is 32 physical measurement steps long.

	**NOTE!** This value must be contained in the total resolution 2^n. Failure to observe these requirements will cause the output position values to be ambiguous, since the transition from the maximum basic device position to the position value of 0 will then always be completed at different basic device settings.

4.10 Commissioning mode

If this mode is activated, the following functions are available in online mode:

- Changing the counting direction
- Setting the preset value
- Automatic scaling (teach in)

These values are set by the Profibus® master by manipulating the status bit in DDLM_DATA_EXCHANGE mode. A more detailed description is provided in a later section.

4.11 Limit switch

There are two software limit switches available that can be activated using the fields lower limit switch and upper limit switch. The desired positions of the switches refer to the selected total resolution, and may not exceed this total resolution. They must be entered into the fields Lower limit switch (HIGH/LOW) and Upper limit switch (HIGH/LOW).

For positions between the two switch positions, the relevant status bit (Bit 27) is set to LOW. Exceeding or falling below the specified relevant position will set the bit to HIGH.

4.12 Speed output

This function is only available with encoder profile HÜBNER 2.2. The following output options are available:

- Steps /1000 ms
- Steps /100 ms
- Steps /10 ms
- Revolutions / min

5 Data transmission modes on the Profibus

Three data transmission modes are required to operate the module on the Profibus®:

- The data required for configuration and parameterisation is transmitted by the master to the module connected to the slave when the system is started up in DDLM_Set_Prm mode. 16 – 39 Bytes (Octets) are required for this purpose, depending on the encoder profile.
- The master requests module output data in DDLM_Data_Exchange mode. Some parameters can be changed in online mode with a configuration as Hübner 2.1 or Hübner 2.2.
- The master requests diagnostic data from the module in DDLM_Slave_**Diag** mode.

Normally, configuration and parameterisation are carried out automatically in DDLM_Set_Prm mode when starting up the system and during continued operation in DDLM_Data_Exchange mode.

Settings for the required functions are set first via selection menus in Profibus system windows (COMProfibus).

In some cases, however, it is necessary to know the commands used for this purpose in order to change parameters manually.

5.1 Configuring and parameterising the module

The following section describes which bits can be set in DDLM_SET_PRM mode. Octets 1-8 contain Profibus®-specific data and should not be changed.

5.1.1 DDLM_Set_Prm mode for Class 1 and Class 2

Octet	Parameter	Bit no.	
9	Counting direction	0	Right = 0, left = 1
	Class 2 function	1	Off = 0, on = 1
	Commissioning Diagnostics	2	Not used for AMP 1212
	Scaling function	3	Off = 0, on = 1
	Reserved	4	---
	Reserved	5	---
	Optional for Hübner 2.1 and 2.2	6	Not for Class 1 and Class 2
	Reserved	7	
10 - 13	Resolution per revolution	$2^{31} - 2^{0}$	max. 4096
14 - 17	Overall resolution	$2^{31} - 2^{0}$	max. 4096 x 4096

Only the counting direction bit can be changed in Class 1 mode.

5.1.1.1 Class 2 function (Octet 9.1)

This bit can be set to 0 to switch into Class1 operation.

5.1.1.2 Scaling function (Octet 9.3)

If this bit is turned off, the module will have a resolution per revolution of 4096 steps and a total resolution of 4096 x 4096 steps. (corresponds to 4096 revolutions. Bit 3 = 1) can be used to scale the resolution per revolution and the total resolution.

5.1.1.3 Resolution per revolution (Octet10 – 13)

This value may not exceed 4096, so that the output code does not become ambiguous

5.1.1.4 Total resolution (Octet14 – 17)

A multiple of the resolution / revolution must be entered here, whereby the multiple represents the number of revolutions and may only have a value of 2^n (with $1 < n < 12$).

	**NOTE!** Total resolution = resolution per revolution x number of revolutions (2^n)

If other values are used for the number of revolutions, then there will be jumps when transitioning from the maximum position to the position 0, and the position data will no longer be unambiguous.

5.1.2 DDLM_Set_Prm - Modus for Hübner 2.1 and Hübner 2.2

The user profiles HÜBNER 2.1 and HÜBNER 2.2 are a supplement to the CLASS 2 profile. They offer additional functions the user can take advantage of. Unused functions can be switched off. Online configuration in DDLM_DATA_EXCHANGE mode is possible to set the counting direction, the preset and the gear factor.
In addition, speed output is available with the HÜBNER 2.2 profile.

Bits and bytes when configuring Hübner 2.1 and Hübner 2.2

Octet	Parameter	Bit no.	
9	Counting direction	0	Right = 0, left = 1
	Class 2 function	1	Off = 0, on = 1
	Commissioning Diagnostics	2	---
	Scaling function	3	Off = 0, on = 1
	Reserved	4	---
	Reserved	5	---
	Hübner 2.1 and 2.2	6	Off = 0, on = 1
	Reserved	7	
10 – 13	Measurement steps per xxx	$2^{31} – 2^0$	s. Oct. 26/Bit 1 + 0
14 – 17	Overall resolution		
18 - 25	Reserved for encoder profile		
26	Desired measurement steps	1 + 0	00H per revolution 01H per max. total resolution 10H physical measurement steps
	Commissioning mode	2	Off = 0, on = 1

Octet	Parameter	Bit no.	
	Reduced diagnostics	3	Off = 0, on = 1
	Reserved	4	---
	Software limit switch min. active	5	Off = 0, on = 1
	Software limit switch max. active	6	Off = 0, on = 1
	Octet 27 – 39 active	7	Off = 0, on = 1
27 - 30	Limit switch min.	$2^{31} – 2^{0}$	
31 - 34	Limit switch max.	$2^{31} – 2^{0}$	
35 - 38	Physical measurement steps	$2^{31} – 2^{0}$	
39	Reserved	0	---
	Singleturn/Multiturn	1	Singleturn = 0, Multiturn = 1
	Reserved	2	---
	Reserved	3	---
	Speed unit	5 + 4	00H steps/s 01H steps/100ms 10H steps/10ms 11H RPM
	Reserved	6	---
	Reserved	7	---

5.1.2.1 Hübner 2.1 and 2.2 (Octet 9.6)

This bit is used to release other module functions available in this profile (in Octet 26).

5.1.2.2 Measurement steps per xxx (Octet 10–13) + desired measurement steps (Octet 26.0, 26.1)

The bits for the desired measurement steps (Octet 26.0 and 26.1) can be used to save a value in Octet 10...13 that refers to the following ranges:

- Measurement steps per revolution
- Measurement steps per max. total resolution
- Physical measurement steps

Regarding measurement steps per revolution (Octet 26.0 and 26.1, 00H)

- This input is based on one revolution of the basic device, and indicates how many steps it is divided into. Values up to 4096 can be set. The measurement range of the module is defined in conjunction with the total resolution of the basic device, which is stored in Octet 14 – 17. (See total resolution)

Regarding measurement steps per max. total resolution (Octet 26.0 and 26.1, 01H)

- This indicates the number of measurement steps based on 4096 revolutions, and refers to the entire measurement range for the module.

Regarding physical measurement steps (Octet 26.0 and 26.1, 10H)

- The resolution is equal to that of the code disc with 4096 steps. The number of revolutions 2^n (1 < n < 12 see total resolution) is dependent on the value for total resolution. The set measurement range can be scaled in this mode.
- To do so, enter the number of steps into which the range for total resolution should be divided in Octets 35 to 39. Apart from direct input, scaling can also be determined via a teach-in process.

5.1.2.3 Commissioning mode (Octet 26.2)

This switch is used to set a special status in DDLM_Set_Prm mode in which the preset value and other parameters are transmitted to the module when the system is ready for operation and stored there in a failsafe memory. A gear factor can also be determined in this mode. These determined parameters should be noted, and then transmitted to the module when the bus is restarted in DDLM_Set_Para mode, and commissioning mode should be switched off.

5.1.2.4 Reduced diagnostics (Octet 26.4)

Some Profibus masters, generally older ones, cannot receive all diagnostic bytes of the module. (See the documentation for the master used). When the bit is set, only 16 diagnostic bits are transferred.

5.1.2.5 Octet 27 – 39 active (Octet 26.7)

If this bit is set, it provides access to Octets 27 – 39. This releases the functions limit switch min. and max., scaling via physical measurement steps, Singleturn / Multiturn, and speed units (only HÜBNER 2.2).

5.1.2.6 Software limit switch min. and max. (Octet 26.5 and 26.6) and (Octets 27 – 34)

If this bit is set, the software limit switches min. (Octet 26.5) and max. (Octet 26.6) are activated. The position values required for this purpose are stored for limit switch min. in Octets 27 – 30 and for limit switch max. in Octets 31 – 34. This function is only available when programming class HÜBNER 2.1 and 2.2.

5.1.2.7 Physical measurement steps (Octet 35 – 38)

The number of physical measurement steps is saved in these Octets. It divides the value of total resolution, and therefore serves to scale the module.

5.1.2.8 Singleturn / Multiturn (Octet 39.1)

This bit is normally set by selecting the class of the module and can be used to determine the type of coder.

5.1.2.9 Speed unit (Octet 39, 5+4)

The speed can be output when class Hübner 2.2 is selected. Bits 5 and 4 of Octet 39 can be used to set the following output types:

- 00H steps / s

- 01H steps / 100 ms
- 10H steps / 10 ms
- 11H RPM

5.2 Commissioning mode

Commissioning mode is a unique feature of normal operation in device classes HUEBNER 2.1 and 2.2. In addition to the preset value and counting direction, both of which can also be changed in normal operation, scaling is also possible via teach in process in online mode. To do so, only bit manipulation in the status of the DDLM_DATA_EXCHANGE mode is required. The data is transmitted as follows as a 4 eight bit wide word in each cycle:

Status $+2^{24}$	2^{23} - 2^{16}	2^{15} - 2^{8}	2^{7} - 2^{0}

Transmission of data within a DDLM_DATA_EXCHANGE cycle

The status bits have the following meaning:

Bit 25	0 = angular encoder not ready for operation	1 = angular encoder ready for operation
Bit 26	0 = commissioning mode	1 = normal mode
Bit 27	0 = software limit switch min < actual process value < max.	1 = software limit switch min > actual process value > max.
Bit 28	0 = counting direction clockwise (Looking towards end of shaft)	1 = counting direction anti-clockwise (Looking towards end of shaft)
Bit 31	0 = normal operation	1 = set preset value

5.2.1 Adopt preset value

the preset value can be adopted from the basic device settings both in normal mode and in commissioning mode. It is adopted regardless of whether bit 26 is set.

	Status bits							Data bits
	31	30	29	28	27	26	25	24 - 0
M->S	1	0	0	0	0	X	0	Process value = Preset value is transmitted
S->M	1	0	0	0	0	X	0	New process value is transmitted
M->S	0	0	0	0	0	X	0	Reset to commissioning mode
S->M	0	0	0	0	0	X	0	New process value is output
M = Master, S = Slave								

5.2.2 Set counting direction

The counting direction can be reversed in commissioning mode online using bit 28. The coder returns the current direction after the changeover to the master. A 0 means the counting direction is clockwise (looking toward the shaft) and 1 means anti-clockwise.

	Status bits							Data bits	
	31	30	29	28	27	26	25	24 – 1	0
M->S	0	0	0	**1**	0	0	0	Bit 28 switches the direction of rotation from 0 to 1 and vice versa	
S->M	0	0	0	**0/1**	0/1	0	1	Acknowledge the new direction of rotation in bit 0	1/0
M->S	0	0	0	**0**	0	0	0	End the changeover at bit 28 = 0	
S->M	0	0	0	**0/1**	0/1	0	1	Continue process value output	
M = Master, S = Slave									

NOTE!
The preset value must be reset after setting the direction of rotation.

5.2.3 Scaling the module in the teach in process

This process makes it possible to automatically scale the module. After starting the process, the system is moved along a defined path. Then after the process is stopped, the number of steps into which the travelled path should be divided is input. The path of travel may not exceed 2047 revolutions.

5.2.3.1 Start scaling

	Status bits							Data bits
	31	30	29	28	27	26	25	24 – 1
M->S	0	**1**	0	0	0	0	0	Bit 30 = 1 = Start scaling
S->M	0	**1**	0	0/1	0/1	0	1	Acknowledge through Bit 30 = 1
M->S	0	**0**	0	0	0	0	0	Reset previous scaling
S->M	0	**1**	0	0/1	0/1	0	1	process value output with scaling factor 1
M = Master, S = Slave								

After this function, the gear factor is set to 1 and the drift (preset) is deleted.
Now the system must be moved the defined path. The path of travel is displayed unscaled by process value output.

5.2.3.2 Stopping scaling

		Status bits						Data bits
	31	30	29	28	27	26	25	24 – 1
M->S	0	**0**	**1**	0	0	0	0	Bit 30 = 1 = Start scaling
S->M	0	**1**	**1**	0/1	0/1	0	1	Acknowledge through Bit 30 = 1
M->S	0	**0**	**0**	0	0	0	0	Reset previous scaling
S->M	0	**0**	**0**	0/1	0/1	0	1	process value output with scaling factor 1
M = Master, S = Slave								

The positive and negative direction of rotation and the amount by which the zero point is exceeded are taken into consideration in the scaling.

!	**CAUTION!** • The number of desired steps may not exceed the physical resolution in the path of travel. • Ensure the counting direction (bit 28) is correct. It may need to be reset after this function. • Since the preset value was deleted when scaling was started, it must be reset in another step.

Scaling is stored in the module in a failsafe manner. To continue using the scaling values when the basic device is replaced, it is a good idea to transmit the calculated total resolution to the Profibus master. It will be entered there into the field DESIRED MEASUREMENT STEPS and the switch RESOLUTION REFERENCE will be set to MAXIMUM TOTAL RESOLUTION.

6 Diagnostic messages

DDLM_SLAVE_DIAG mode allows the master to access diagnostic data from the module. The number of Octets is 57, with the exception of reduced diagnostics, in which the number of diagnostic bits is restricted to 16.

The following is a list of diagnostic messages supported by the Hübner absolute encoder / bus modules. Diagnostic data is output according to the specifications for Profibus® PROFILE FOR ENCODERS, PNO order no. 3.062.

Octet	Parameter	Bit no.			Class
1-3	Station status (see Profibus standard)				1
4	Diagnostic Master Add				1
5-6	PNO – number	15 - 0	PNO number of the encoder		1
7	Expanded diagnostic header		Number of diagnostic bytes		1
8	Alarm message	4	EEProm memory error	1 = error	1
9	Operating status	0 1 2 3	Direction Class 2 function Diagnostic routine Scaling function	0 = CW, 1 = CCW 0 = Off, 1 = On 0 = Off, 1 = On 0 = Off, 1 = On	1
10	Encoder type	1	Single/Multiturn	Singleturn = 0 Multiturn = 1	1
11-14	Resolution / revolutions (hardware)	0 – 23	Singleturn resolution	4096 (1000 H)	1
15-16		0 – 23	Multiturn resolution	4096 (1000 H)	1
20-21	Warning messages	20/4	Operating time warning after 10^5 hours	0 = no, 1 = yes	2
24-25	Profile version	15 – 8 7 - 0	Revision no. Index		2
26-27	Software version	15 – 8 7 - 0	Revision no. Index		2
28-31	Operating time	23 - 0	Incrementing every 6 minutes		2

Octet	Parameter	Bit no.			Class
			when operating voltage is on		
32-35	Drift	23 - 0	Preset value		2
40-43	Configured resolution per revolu-tion	23 - 0	Only if the value “Resolution per revolution” has been entered		2
44-47	Configured total resolu-tion	23 - 0	Configured or cal-culate by scaling		2
48-57	Serial num-ber		Bytes currently preset at 2AH		2

6.1 Operating statuses and displays

The status, Net1 and Net2 LEDs are on the front panel of the module housing. They are used to display the current module status.

6.1.1 Bus status

Net1 red	Net2 green	Error message / bus status
off	off	No power supply
on	on	Wait for configuration by the master (e.g. incorrect wiring, terminal resistance set incorrectly)
on	flashing	Coding and/or configuration error (such as data length too great, total resolution too high)
on	off	Module receives no signals from the mas-ter for a long period of time
flashing	on	Module registers data on the bus, but is not addressed (e.g. wrong address set on the module)
off	flashing	Commissioning mode in data exchange mode
off	on	Normal mode in data exchange mode

6.1.2 Status LED

Operating status	Status LED	Bus status
Start	flashing yellow/green 2 Hz	not ready for operation
normal	green	ready for operation
bootloader	flashing yellow/red 1 Hz	not ready for operation
Fault	Red	Fault

7 Inspections

The EPB can only be operated in conjunction with the UO-ECU or UO-SCU function module. Please observe the measures described in the relevant section of the UO-ECU operating manual.

8 Transportation, packaging and storage

8.1 Transportation safety information

!	**CAUTION!** **Property damage due to improper transportation!** These symbols and information on the packaging must be observed: Do not throw, risk of breakage, protect against wetness

8.2 Incoming goods controlling

The delivery must be checked promptly for transportation damage and to ensure it is complete upon receipt.
If there is transportation damage, the carrier must be informed directly upon delivery (take photos as evidence).

8.3 Packaging (disposal)

Packaging will not be taken back, and must be disposed of according to applicable statutory specifications and local regulations.

8.4 Storing packages (devices)

	**Protect against wetness!** Protect packages against wetness, store in a dry and dust-free location.

In case of long storage times (> 6 months), we recommend packaging the devices in protective packaging (with desiccants).

8.5 Returning equipment (repair/goodwill/warranty)

Service requests (repair/goodwill/warranty) can be initiated directly via the following online form:

https://www.huebner-giessen.com/en/service-support/after-sales-service/

There you will also find contact details for our service, as well as questions and answers regarding the processing.

Devices that have come into contact with radioactive radiation or materials will not be taken back.

Devices that have come into contact with biological or chemical substances that could be hazardous to health must be decontaminated before they are returned.

A clearance certificate must be enclosed.

8.6 Disposal

The manufacturer is not obligated to take back the devices.

The EPB must be treated as special electronic waste, and must be disposed of according to specific national law.

Local municipal authorities or speciality disposal companies can provide information on environmentally-appropriate disposal.

9 Documents

9.1 Dimensional drawing, wiring diagram