Programmable Systems

The H41q and H51q System Families

Data Sheet / Operating Instructions
for Module
F 8626

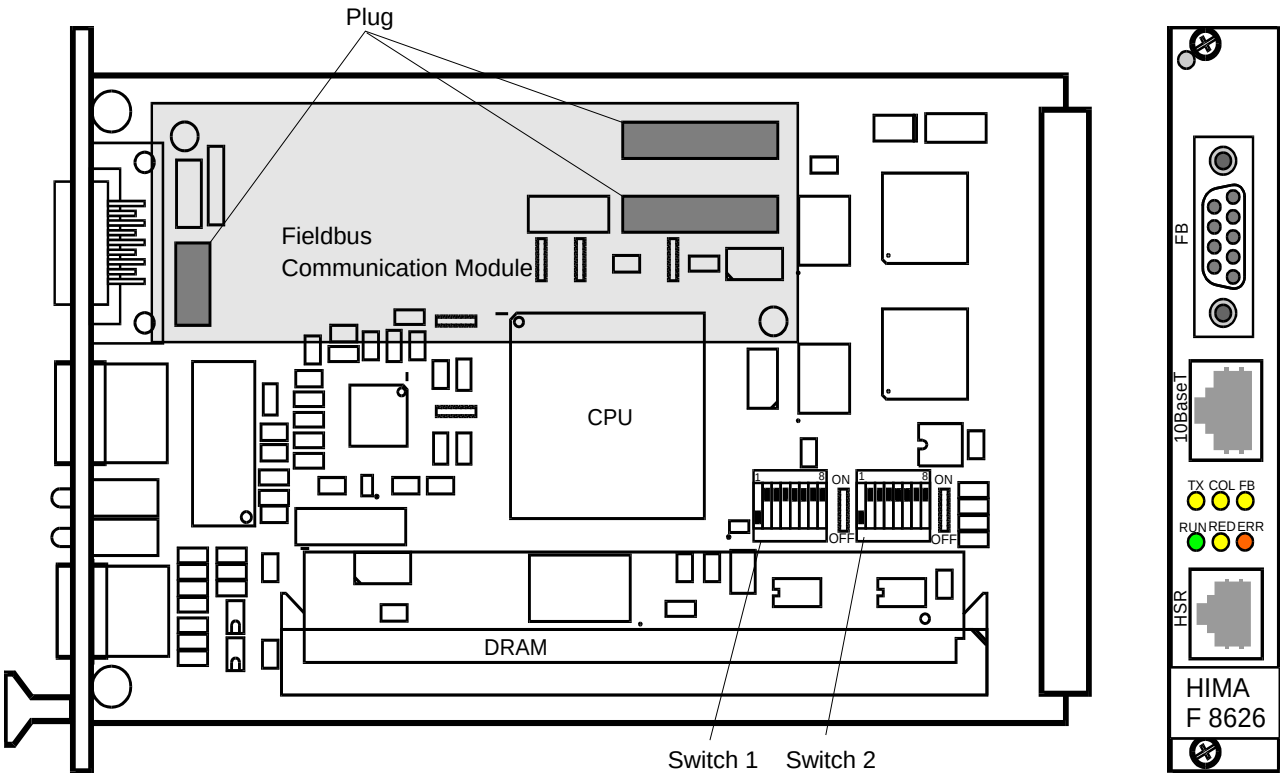
HIMA

F 8626

F 8626: Communication Module for PROFIBUS-DP Communication

Useable with H51q PES with OS 41q/51q from V7.0-7 (9835).

General



The communication module F 8626 provides a Fieldbus communication module (FB) with a PROFIBUS-DP slave.

Interfaces

- Serial interface FB with PROFIBUS-DP slave module
  Connection via a 9-pole SUB-D plug.
- Ethernet interface 10 BaseT according to the IEEE 802.3 standard.
  Connection via an RJ-45 plug.
- HSR (High Speed Redundancy) interface not used.

Technical Data

Processor	32 Bit Motorola CPU with integrated RISC communication controller
Operating current	5 VDC / 1 A
Space required	3 HE (units high), 4 TE (units width)

Table 1: Technical Data

Display Readings During Operation at the Module Front

Top row LEDs

TX	COL	FB	Operating status
OFF	OFF	-	TX and COL are not used (always OFF)
-	-	OFF	No PROFIBUS-DP slave activities on the bus
-	-	Flashing	Slave waits for its configuration from PROFIBUS-DP master
-	-	ON	Data exchange between Slave and PROFIBUS-DP master

Table 2: Display readings during operation, top row

Bottom row LEDs

RUN	RED	ERR	Operating status
ON	-	OFF	PROFIBUS-DP communication protocol active
Flashing	-	OFF	PROFIBUS-DP communication protocol inactive
Flashing	-	Flashing	Booting of the communication module
OFF	-	ON	Fatal error in communication module. Module must be replaced.
OFF	-	Flashes 3-times	Saving error code in Flash-EPROM (required for repair purposes) ***Do not unplug communication module!***

Table 3: Display readings during operation, bottom row

Switches on the Communication Module

Functions of Switch 1 (S1)

S1	ON	OFF	Description
1	1	0	The PROFIBUS-DP Slave address (0 up to 125) for the F 8626 is set via switches 1/1-7 (See Table 5).
2	2	0	
3	4	0	
4	8	0	
5	16	0	
6	32	0	
7	64	0	
8	-	-	Not used

Table 4: Functions of Switch 1 (S1)

Switches 1/1-7

The switches 1/1-7 are used for the settings of the PROFIBUS-DP Slave address (0 up to 125) for the communication module F 8626.

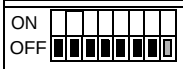
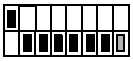
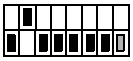
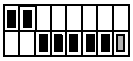
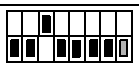
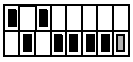
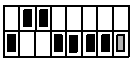
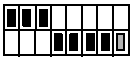
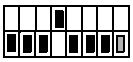
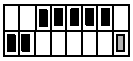
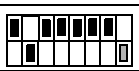
Switch 1	PROFIBUS-DP Address
	0
	1
	2
	3
	4
	5
	6
	7
	8
"	"
	124
	125

Table 5: Examples for settings of the PROFIBUS-DP address

▯ = is not used for setting the PROFIBUS-DP address.

Functions of Switch 2 (S2)

S2	ON	OFF	Description
1	1	2	The module number has no meaning for the operation as a PROFIBUS-DP slave. The module number is only required for the calculation of the IP address. The IP address is used for the upgrade/ downgrade of the operating system from module F 8626.
2	-	-	Not used
3	-	-	Not used
4	-	-	Not used
5	ON	OFF	The baud rate for the module F 8626 is set via switches 2/5-8 (See Table 7). From operating system 1.15 on.
6	ON	OFF	
7	ON	OFF	
8	ON	OFF	

Table 6: Functions of Switch 2 (S2)

Switch 2/5-8

The switches 2/5-8 are used for the setting of the baud rate with that communicate the module F 8626 as a PROFIBUS-DP slave.

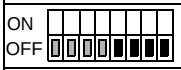
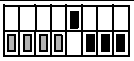
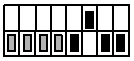
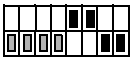
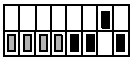
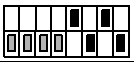
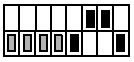
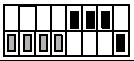
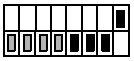
Switch 2	Baud rate
	9,6 kBit/s
	19,2 kBit/s
	93,75 kBit/s
	187,5 kBit/s
	500 kBit/s
	1,5 MBit/s
	3 MBit/s
	6 MBit/s
	12 MBit/s

Table 7: Baud rate settings with switch 2

▯ = is not used for setting the baud rate.

Parameter for the PROFIBUS-DP Master for a reload of a redundant H41q/H51q System

During a reload of a H41q/H51q system with a redundant PROFIBUS-DP connection, the PROFIBUS-DP communication is stopped for a short time after the switch over to the central module loaded first.
To avoid failure reactions during the reload, the downtime "t_{down}" must be considered when parameterizing the redundancy administration of the PROFIBUS-DP Master.

Estimation of downtime t_{down} for the PROFIBUS-DP Master

The following formula is used for the estimation of the downtime:

$$\mathbf{t_{down} < 200\ ms + WDT + t_{master}}$$

t_{down}: Within this time, both F 8626 can not communicate.
WDT: Watchdog time of the H41q/H51q system.
t_{master}: Time, which the PROFIBUS-DP Master requires to put the communication module F 8626 (of central unit module1) into the state for data exchange, after having loaded the central module1.
The time "t_{master}" can be estimated as 6 poll cycles of the PROFIBUS DP-Master (1 cycle Identification, 4 cycles SlaveDiag/SetPrm/ChkCfg/SlaveDiag, 1 cycle Data Exchange). The user must determine the actual number of poll cycles from the PROFIBUS-DP master settings.

Caution:	The estimation (formula) is only usable for PROFIBUS-DP slave modules of type F 8626. The PROFIBUS-DP slave modules must be set to a fix baud rate (via switch 2/5-8). It must be ensured, that the central module 1 is loaded first.

Upgrade/Downgrade of the operation system versions of the F 8626
The following instructions describe the upgrade from the operation system version 1.17 and smaller to version 1.18 and higher and the downgrade from operating system version 1.18 and higher to version 1.17 and smaller for the module F 8626.

Caution:	The upgrade/downgrade may be done only by HIMA service engineers. It is recommended to change the operating system only in the time of a shutdown of the plant.

Upgrade to Version 1.18 and higher
For the upgrade from version 1.17 and smaller to version 1.18 and higher the file **f8625_bs_v1_x.bin** must be loaded.
Since the F 8626 has the same operating system as the F 8625, the F 8626 must use the same operating system file **f8625_bs_v1_x.bin**.

Caution:	With the upgrade from version 1.17 and smaller it has to be made absolutely certain, that only the correct operating system file is loaded into the correct module. If the module F 8626 was loaded with any incorrect file, the functionality of the F 8626 is lost and can not be programmed any longer with the diagnostic dialog ComEth. In this case the module F 8626 must be reprogrammed by HIMA.

After the upgrade to Version 1.18 and higher a protection mechanism is activated, and only operating system files **8625_bs_v1_x.ldb** can be loaded.

Downgrade from Version 1.18 and higher
For the downgrade from version 1.18 and higher to version 1.17 and smallerthe file **f8625_bs_v1_x.ldb** must be loaded.
Since the F 8626 has the same operating system as the F 8625, the F 8626 must use the same operating system file **f8625_bs_v1_x.ldb**.

Caution:	After the downgrade to version version 1.17 and smaller the protection mechanism to prevent loading any incorrect file is not more active!

Determining the IP Address of the F 8626
The operating system download for the module F 8626 is done via the Ethernet interface.

Switch 2/1
The switch 2/1 is used for the calculation of the IP address.

Note:	The module number is independent of slot and number of the used F 8626 modules. With in one PES, several F 8626 modules may have the same IP address, which is used only for downloading the operating system. The IP address and the module number have no effect on the function of the F 8626 as a PROFIBUS-DP Slave.

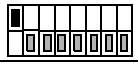
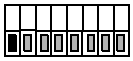
Switch 2	Module number
	1
	2

Table 8: Settings of module numbers

The IP address is composed of the network address and the host address.
The default network address is 192.168.0.
The last byte of the IP address 192.168.0.x is the Host address and is calculated as follows:

For a F 8626 with module number 1 (switch 2/1 = ON)
Host address = (the last two digits of the resource) ∗ 2 + 1

For a F 8626 with module number 2 (switch 2/1 = OFF)
Host address = (the last two digits of resource ∗ 2 + 2

Example:
Resource name MT200_33
Setting of module number = 1 (switch 2/1 = ON)
Host address = 33 ∗ 2 + 1= 67; IP address = 192.168.0.**67**

Resource name MT200_33
Setting of module number = 2 (switch 2/1 = OFF)
Host address = 33 ∗ 2 + 2 = 68; IP address = 192.168.0.**68**

Note:	The resource name **must** have eight characters and the last two characters **must** be numbers! Permitted ID's: 1 up to 64

Download of the operating system to the F 8626
The operating system download for the module F 8626 is done using the diagnosis dialog **ComEth**.

- Start the diagnosis dialog ComEth, and check in the error-state viewer that the
  - "main program version" is 0.8.0 or later
  - "diagnostic text version" is 0.2.0 or later.
- Select *Project->New* in the menubar of the diagnosis dialog ComEth, to create a new Project.
- Select *New Configuration* in the context menu of the new project, to create a new configuration.
- Select *New Resource* in the context menu of the new configuration, to create a new resource.
- Select *New F 8626* in the context menu of the new resource, to create a new F 8626 in the new resource.
- Connect the PADT (PC) to the Ethernet interface of the F 8626.
- Select *Properties* in the context menu of the new F 8626, to open the dialog window "Properties".
  Configure the input fields as follows:
  - Enter an arbitrary unique name for the F 8626 (e.g. CU1CM1) in the input field.
  - Enter the IP address of the module F 8626 in the input field "IP address", into which the operating system should be loaded. See page 8 to determine the IP address of the module F 8626.
  - In the view box "IP address PC", all IP addresses of the available network cards of the PADT (PC) are displayed. Select the IP address of the network card via which the connection to the module F 8626 should be created.

Note:
The IP address of the PADT (PC) must:
- be located in the same subnet as the module F 8626.
- own an IP address from192.168.0.201 up to 192.168.0.254.

If several network cards are available on the PADT (PC), then an accordant routing entry has to be set for the network card, which is used for connection to the F 8626.

- Select *Control Panel* in the context menu of the new F 8626, to open the Control Panel.
- Select *PADT->Connect* in the control panel, to create a connection to the module F 8626.

Caution:	The next step leads to a communication loss!

- Click the button *Stop Device* in the control panel of ComEth, to set the module F 8626 into the state STOP (green RUN LED flashes).
- Select *Extra->OS Update* in the control panel of ComEth, to open the standard dialog to open a file.
- Select and load the **proper** operating system for the upgrade/ downgrade into the selected module F 8626.
  (See page 7 “Upgrade from V 2.x to V 3.x“ and “Downgrade from V 3.x to V 2.x“).

Note:	After successfully downloading the operating system for the F 8626, **the module F 8626 must be rebooted**. After the reboot the new operating system is started. Until then the F 8626 works with the old operating system.

- The reboot of the F 8626 can be done by
  - withdraw and plug of the module F 8626 or
  - the function *Extra->Reboot Device* in the Control Panel of the dialog ComEth.
- Check the upgrade/downgrade
  - Select *PADT->Connect* in the control panel to create a connection to the module F 8626 again.
  - Select the tab *Version* and check that the shown OS-Version is the same as the OS Version of the Upgrade/Downgrade.

Note:	The ARP entry on the PADT (PC) must be deleted if another F 8626 should be loaded with the **same IP address** as the F 8626 loaded before. Otherwise no other F 8626 with the same IP address can be connected to the PADT (PC). Example: Delete the ARP entry of a F 8626 with the IP address **192.168.0.67**. • Start the "Dos Shell" on the PADT (PC) • Enter the command **arp -d 192.168.0.67**.

Serial Communication (Fieldbus)

Name Definition Table

To give an overview of and explain the terms used in the various standards.

	ELOP II (variables, data types)	Communication module	Data processing basis
Digital	Bool	Bool	1 Bit
Analog	Word (SINT USINT INT UINT)	Word	2 Byte

Table 9: Name definitions

In ELOP II, Word variables stand for all types of data which can be configured as 16 bit variables in the BUSCOM serial communication.

Notes: The resource name under ELOP II must consist of 8 characters, and the last two must be numbers. Numbers between 01 and 64 are permissible.

Caution: 

The mixed operation of safety-related communication via a coprocessor module F 8621A and a PROFIBUS-DP communication module F 8626 in parallel is only allowed in conjunction with the software function block HK-COM-3 and proper parameterisation (from ELOP II V 3.5 OS 41q/51q V 7.08 (0214)).

Data Imaging in the Communication Module

To transmit data in the Fieldbus format, the data of the central module of the PES are imaged into the communication module.

In ELOP II, the data to be transmitted are configured as BUSCOM variables in the context menu "HW Allocation".
A distinction is made between export and import variables.

The internal memory of the communication module contains two data pools into which the BUSCOM variables are copied.
Data pool 1 of the communication module reflects the export variables and data pool 2 reflects the import variables.
Within one data pool the individual variable is described by its identity number.

Within one range of the central unit, the Boolean data and the Word data are stored separately, but they may be stored under the same BUSCOM address (Table 10).

Ranges	Bool (BUSCOM addresses)	Word (BUSCOM addresses)
Import range 0 (IR-0000)	0000 to 2047	0000 to 2047
Import range 1 (IR-4096)	4096 to 8191	4096 to 8191
Export range 0 (ER-0000)	0000 to 2047	0000 to 2047
Export range 1 (ER-4096)	4096 to 8191	4096 to 8191

Table 10: BUSCOM variable ranges in the central unit

The **Word** variables from BUSCOM address 0 on begin with the identity number 0 (Figure 1), then they proceed in ascending order up to the Word variable with the highest address in range 0. The Word variables from BUSCOM address 4096 (range 1) on begin with identity number of the highest Word variable following (range 0) and then proceed in ascending order up to the Word variable with the highest address.

The **Boolean variables** having basis address 0 begin with the identity number following the identity number of the highest Word variable and then proceed in ascending order up to the Boolean variable with the highest address in the range 0 of the central unit (Figure 1). The Boolean variables from BUSCOM address 4096 (range 1) on begin with the identity number of the highest Boolean variable in range 0 following and then proceed in ascending order up to the Boolean variable with the highest address.
If only Boolean variables exist, they begin with identity number 0 corresponding to the Word variables (Figure 2).

This scheme of conversion of BUSCOM variables to identity numbers is used for import and export variables in the same way.

The sequence of the BUSCOM variables is determined by ELOP II and can be programmed by the user with setting the base address and relative address.

The BUSCOM addresses of the central unit is calculated as follows:

Base address + Relative address = BUSCOM address

The BUSCOM address must be in the same range as the belonging base address.
The blanks in the BUSCOM addresses of a data type of one range remain with the data type also in the data pool of the communication module.

Examples of Address Imaging (Export Range - Data Pool 1)

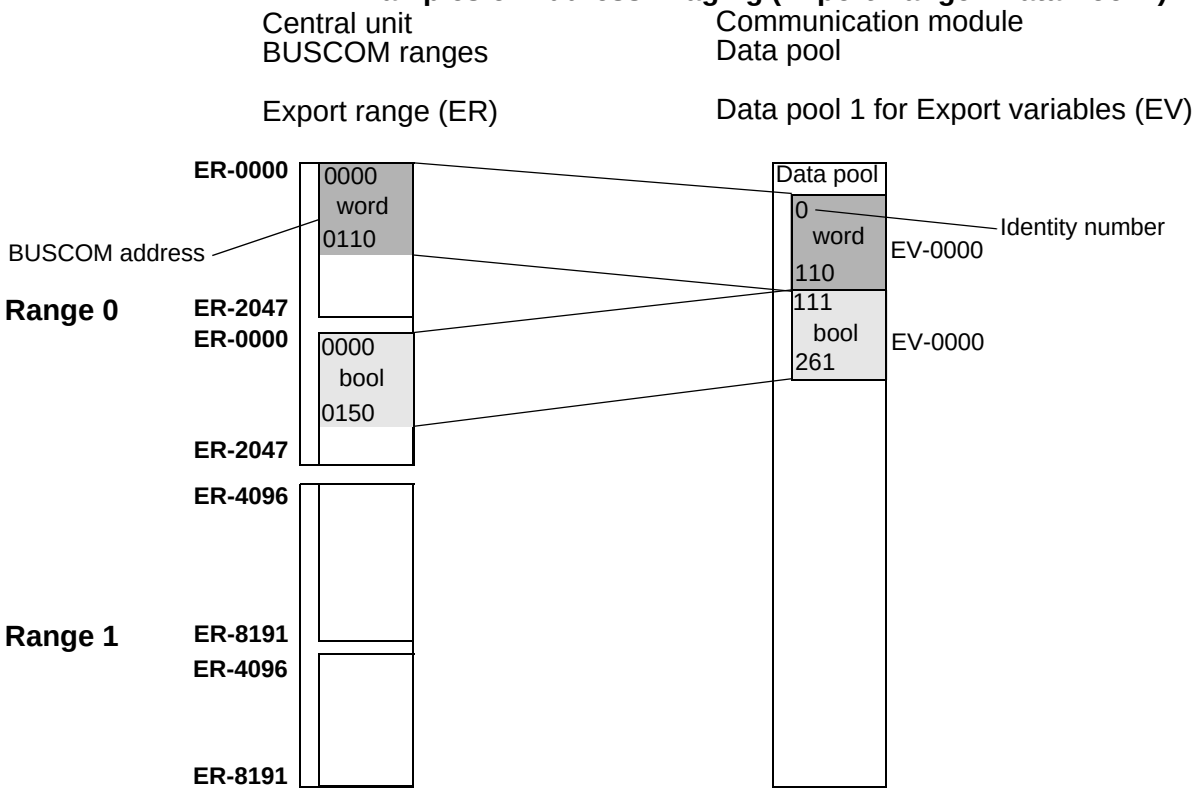


Figure 1: Example of address imaging for Word und Boolean export variables from the range 0 (ER-0000)

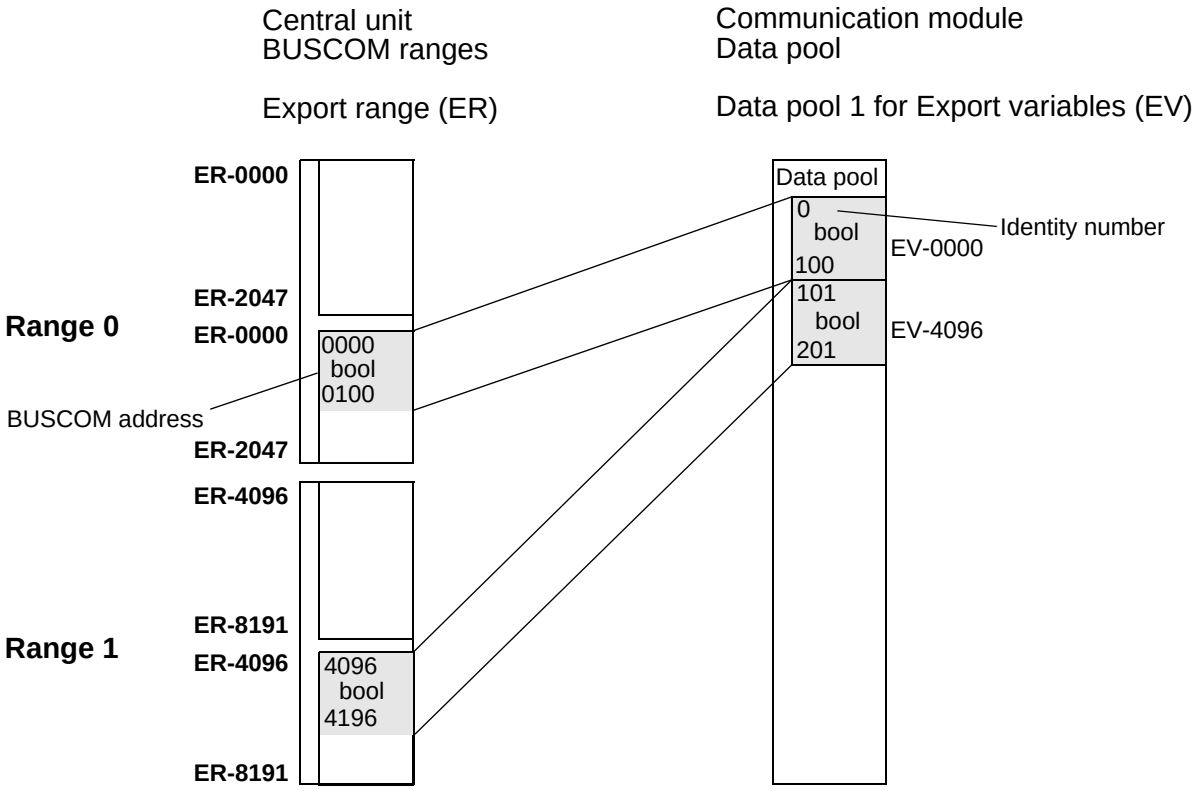


Figure 2: Example of address imaging for Boolean export variables from both ranges (ER-0000 and ER-4096)

The Boolean variables from BUSCOM address 0 on (range 0) begin at identity number 0 in the data pool. The Boolean variables from BUSCOM address 4096 (range 1) on begin with the identity number of the highest Boolean variable in range 0 following and then proceed in ascending order up to the Boolean variable with the highest address.

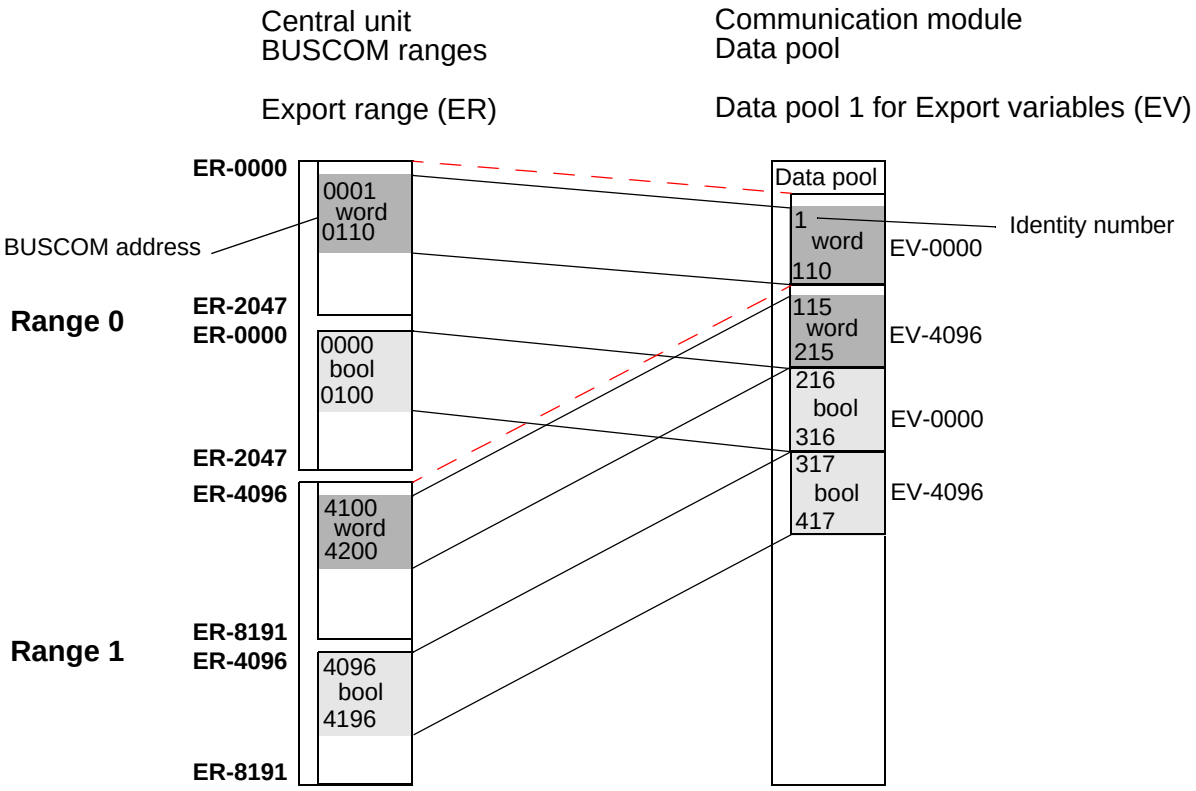


Figure 3: Example of address imaging for Word and Boolean export variables from both ranges

Beginning variables not at the top of an range will be complemented the part in the data pool of the communication module with dummies.

Address imaging of import variables in data pool 2 of the communication module has the same corresponding structure.

The HIMA PROFIBUS-DP slave Fieldbus Communication Module

PROFIBUS is an international, open Fieldbus standard which was standardized in the EN 50170 Fieldbus standard.

For further information, please contact your regional PROFIBUS user organization (PNO) or go to Internet site **http://www.profibus.com**.

The HIMA PROFIBUS-DP slave meets the requirements of this standard and is certified by the PNO.

Specifications of the HIMA PROFIBUS-DP slave

Range	Sizes	Comments
PNO ident number	0x00EA	Assigned by the PNO
GSD file	Until OS 1.14 -HIMA00EA.GSD From OS 1.15 -HIQ100EA.GSD	Device master data file
HIMA PROFIBUS-DP station address	To be set via switch 1	Permissible station address from 0 to 125
Baud rates	9,6 kBit/s 19,2 kBit/s 93,75 kBit/s 187,5 kBit/s 500 kBit/s 1,5 MBit/s 3 MBit/s 6 MBit/s 12 MBit/s	Baud rate to be set via switch 2.
Transmission	RS 485	Most frequently used transmission mode for PROFIBUS, often referred to as H2
Input max.	192 Byte	Inputs + outputs maximum number 256
Output max.	240 Byte	Inputs + outputs maximum number 256
Min. slave Interval	3 ms	
Accuracy of PROFIBUS-DP watchdog monitoring	+/- 10 ms	
Modes of connecting the HIMA PROFIBUS-DP slave	According to the international EN 50170 PROFIBUS standard	Cable lengths, terminating resistors etc. have to be considered

Table 11: Specifications of the HIMA PROFIBUS-DP slave

The Fundamental Characteristics of the RS 485 Transmission Technology

Range	Sizes	Comments
Network topology	Linear bus, active bus termination on either end	Spur lines are only permissible up to baud rates of 1,5 MBit/s
Medium	Shielded, twisted cable	Depending on the ambient conditions the shield may be dispensed with. Not recommended!
Number of stations	32 stations in each segment without repeater	May be extended to max. 126 stations with repeater
Plug-in connectors	9-pole SUB-D connector	

Table 12: Fundamental characteristics of the RS 485 transmission technology

Range in Dependence of the Transmission Rate

Baud rate	Range / Segment
9,6 kBit/s	1200 m
19,2 kBit/s	1200 m
93,75 kBit/s	1200 m
187,5 kBit/s	1000 m
500 kBit/s	400 m
1,5 MBit/s	200 m
3 Mbit/s	100 m
6 Mbit/s	100 m
12 MBit/s	100 m

Table 13: Range in dependence of the transmission rate

The data indicating the cable length in Table 13 refer to cable type A with the following parameters:

- Surge impedance 135 W bis 165 W
- Capacitance per unit length < 30 pf / m
- Loop resistance 110 W / km
- Core diameter 0,64 mm
- Core cross-section > 0,34 mm²

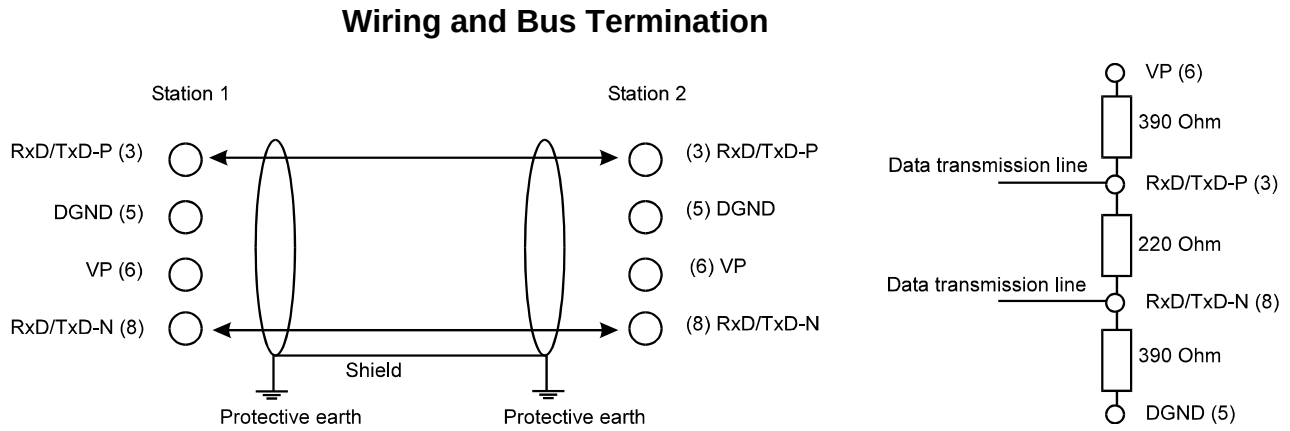


Figure 4: Wiring and bus termination for PROFIBUS-DP, pin allocation of the FB interface

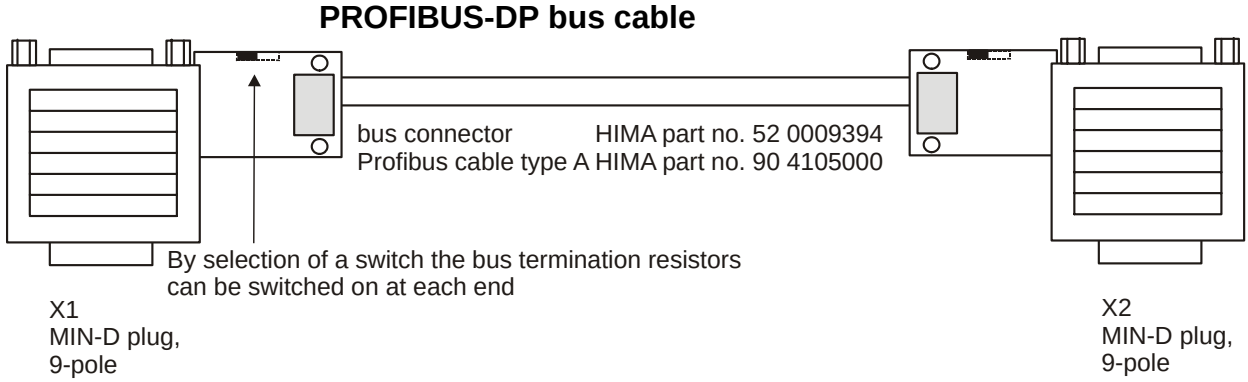


Figure 5: PROFIBUS-DP bus cable with bus connector and PROFIBUS cable type A

Configuration of the PROFIBUS-DP slave by the PROFIBUS-DP Master "Slave Configuration"

Via the FB interface, the HIMA PROFIBUS-DP slaves allows the connection of a PES to a PROFIBUS-DP.

This function enables a PROFIBUS-DP master to read and write BUSCOM variables.

To configure the HIMA PROFIBUS-DP slave, the HIMA PROFIBUS-DP master must have the PROFIBUS-DP configuration software. This software may look like that displayed in Figure 6.

The user has the possibility of defining variable windows. There are four windows each for reading and writing. These windows are to be configured in the PROFIBUS-DP configuration software of the master in the parameter range (parameter data), see Figure 8.

Thus the PROFIBUS-DP master is provided with the possibility of addressing data in conformance with the standards. The user data length of the PROFIBUS-DP telegrams results from the definition of the windows. The PROFIBUS-DP master must then parameterize and configure these telegrams for the HIMA PROFIBUS-DP slave as a modular slave according to the standard (via HIMA GSD file).

The HIMA PROFIBUS-DP slave is a modular slave. Therefore, modules are provided in the GSD file of the communication module (HIMA00EA.GSD or HIQ100EA.GSD). They are used to set the number of input and output bytes so that they correspond to the total of the parameterized windows (Figure 9).

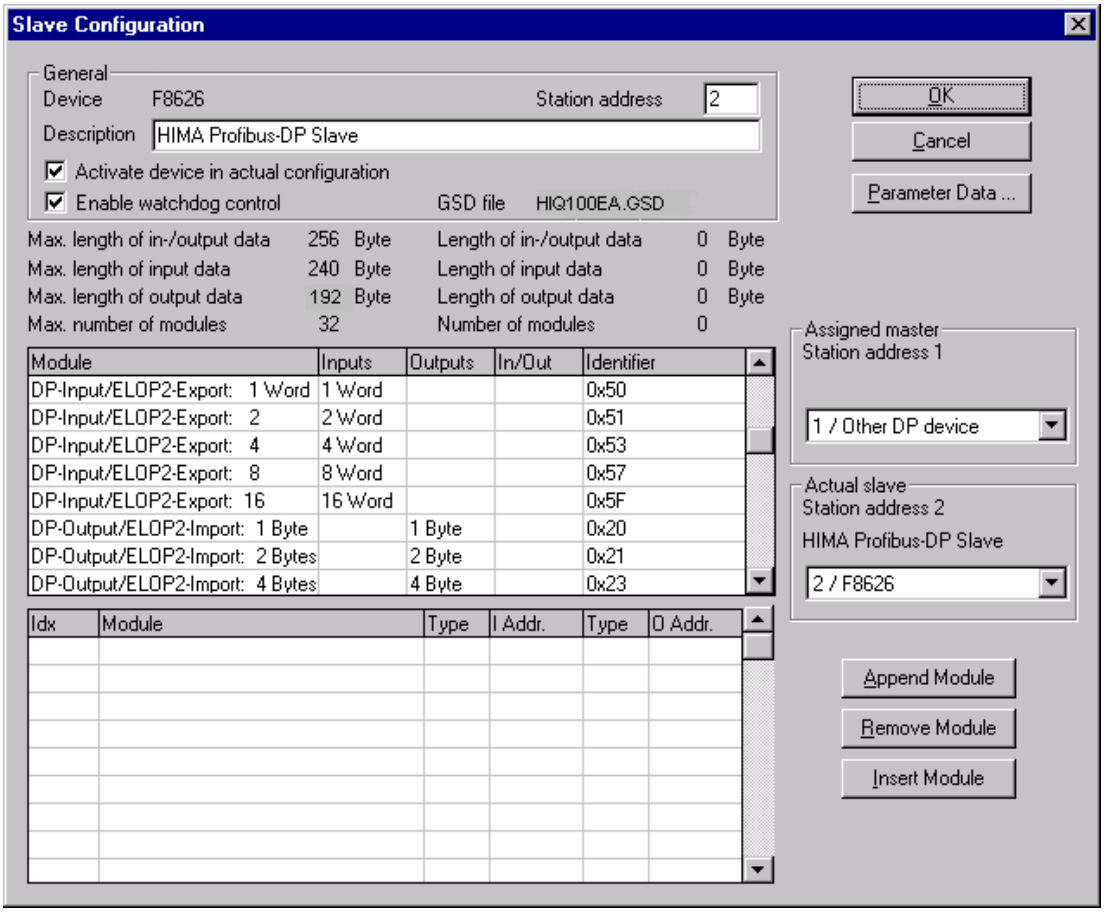


Figure 6: Representation of the slave configuration of the HIQ200EA.GSD file in a PROFIBUS-DP master with a selection of available modules

Data Formats

The following description concerns only the user data of the telegram. For the other data of the telegram we refer to the EN 50 170 standard.

The BUSCOM data type **WORD** in a telegram appears as 2 subsequent bytes in big-endian format.

The BUSCOM data type **BOOL** is compressed so that up to 8 subsequent variables defined in the import/export range are packed in one byte. The TRUE value hereby corresponds to 1, and the FALSE value corresponds to 0. The numbering of the Boolean BUSCOM variables in the bits of the byte begins at bit 0 and ends at bit 7. This then corresponds to Boolean variable [a] to Boolean variable [a+7]. If in one range/data pool integer multiples of 8 subsequent Boolean variables have not been defined, the remaining bits of the last byte will remain undefined.
If Word variables follow a row of Boolean variables, the Word variables begin in the subsequent byte.

Addressing

The BUSCOM variables are addressed by their identity number. This address replaces the BUSCOM address.

The definition of the windows for PROFIBUS INPUT and OUTPUT looks as follows:

Range	Parameters	PROFIBUS INPUT	PROFIBUS OUTPUT
Export 1	[0,1] = Start identity number [2,3] = Number of variables	**X**	
Export 2	[4,5] = Start identity number [6,7] = Number of variables	**X**	
Export 3	[8,9] = Start identity number [10,11] = Number of variables	**X**	
Export 4	[12,13] = Start identity number [14,15] = Number of variables	**X**	
Import 1	[16,17] = Start identity number [18,19] = Number of variables		**X**
Import 2	[20,21] = Start identity number [22,23] = Number of variables		**X**
Import 3	[24,25] = Start identity number [26,27] = Number of variables		**X**
Import 4	[28,29] = Start identity number [30,31] = Number of variables		**X**

Table 14: Definition of the windows for PROFIBUS-DP INPUT and OUTPUT

The parameter range (parameter data in the PROFIBUS-DP configuration software of the master) consists of 32 byte initialized with 00 hex. In the PROFIBUS-DP master they are adjusted to their values (Figure 8).

The first 16 bytes (byte 0 to 15) describe the windows of the export variables; the last 16 bytes (byte 16 to 31) describe the windows of the import variables of the communication module.
Export variables in ELOP II correspond to PROFIBUS input variables and import variables in ELOP II correspond to PROFIBUS output variables (modules in Figure 9).

The data in the parameter range (parameter data) each consist of 2 bytes forming a big-endian coded 16 bit word.
The start identity number corresponds to an identity number in the corresponding data pool of the communication module. The number of variables determines the number of variables to be transmitted from the start identification number on.
The size of window always comprises integer bytes and is determined by the data types defined by the window and the number of data types (compressed or uncompressed).
The total of the sizes of the 4 export windows determines the user data length of the PROFIBUS INPUT telegram. The total of the sizes of the 4 import windows determines the length of the OUTPUT telegram.
The user data length of INPUT and OUTPUT combined must not exceed 256 bytes. With this e.g. 2048 Boolean variables may be transmitted.

For INPUT or OUTPUT a maximum of 240 bytes may be configured according to the limit value of the PROFIBUS EN 50170 standard (i. e. up to 1920 Boolean variables in one direction).
The start identity number must have a value valid for the corresponding data pool of the communication module, i.e. a variable having this identity number must have been defined in this data pool. Also, beginning with this variable, a number of further variables must have been defined.
A window may comprise a sequence of variables of different types (i.e. both Bool and Word). Data are only compressed for the variables within one window.
If you do not want to use a window definition, enter 0 for the start identification number and the number of variables.

Addressing Example

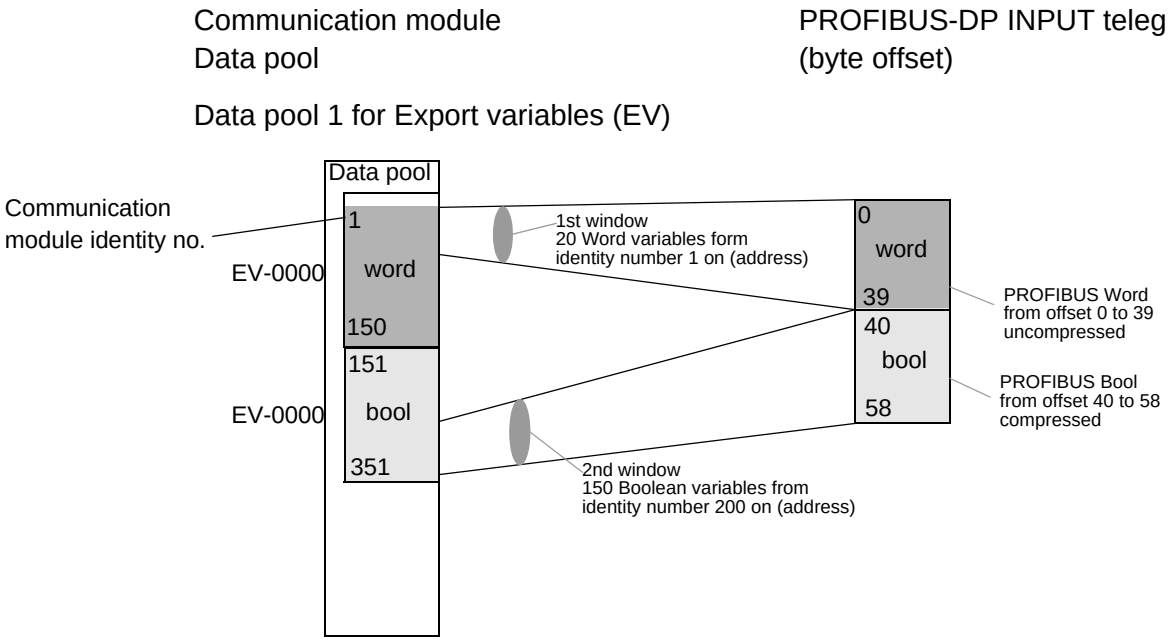


Figure 7: Example of address imaging for export variables from PROFIBUS-DP (accordingly for import variables)

The two export variable windows from data pool 1 are laid transparently onto the PROFIBUS-DP. The PROFIBUS-DP INPUT telegram has a user data length of 59 bytes (0 to 58). It has the following structure:

- 1st window: begin of the variables from identity no. 1 on. (1 dec = 0001 hex in big-endian format); number of variables: 20 (20 dec = 0014 hex).
  From identity no. 1 to 20, there are Word variables which cannot be compressed. Each word variable requires 2 bytes. A user data length of 40 bytes is generated (byte 0 to 39).
- 2nd window: begin of the variables from identity no. 200 on (200 dec = 00C8 hex); number of variables: 150 (150 dec = 0096 hex).
  From identity no. 200 to 349 there are Boolean variables which can be compressed into bytes (150 / 8 = 18,75). A user data length of 19 bytes is generated. (offset by 1st window, bytes 40 to 58)

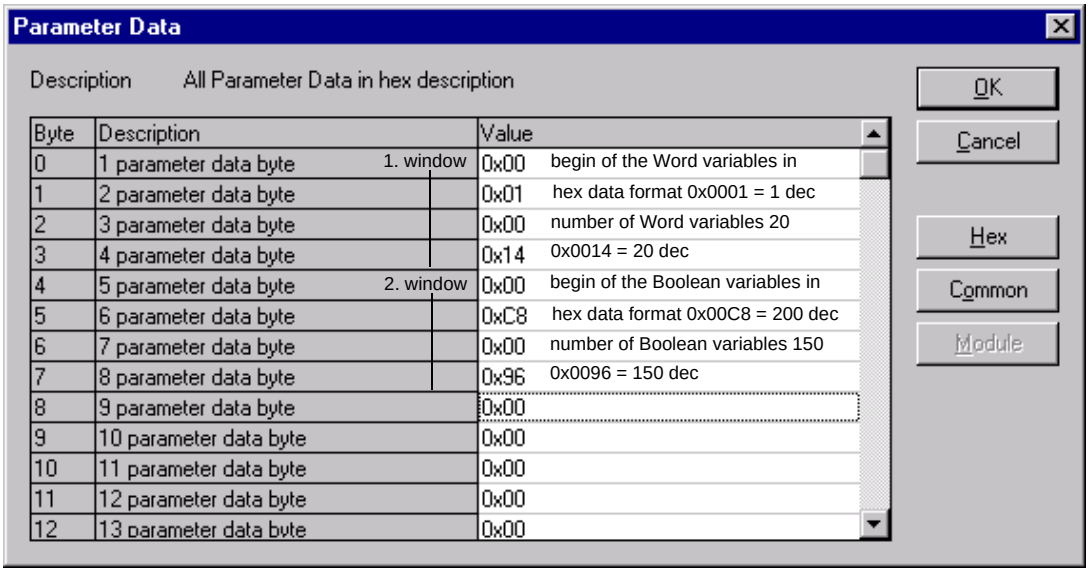


Figure 8: Example of address imaging of the export parameter data in the PROFIBUS-DP master

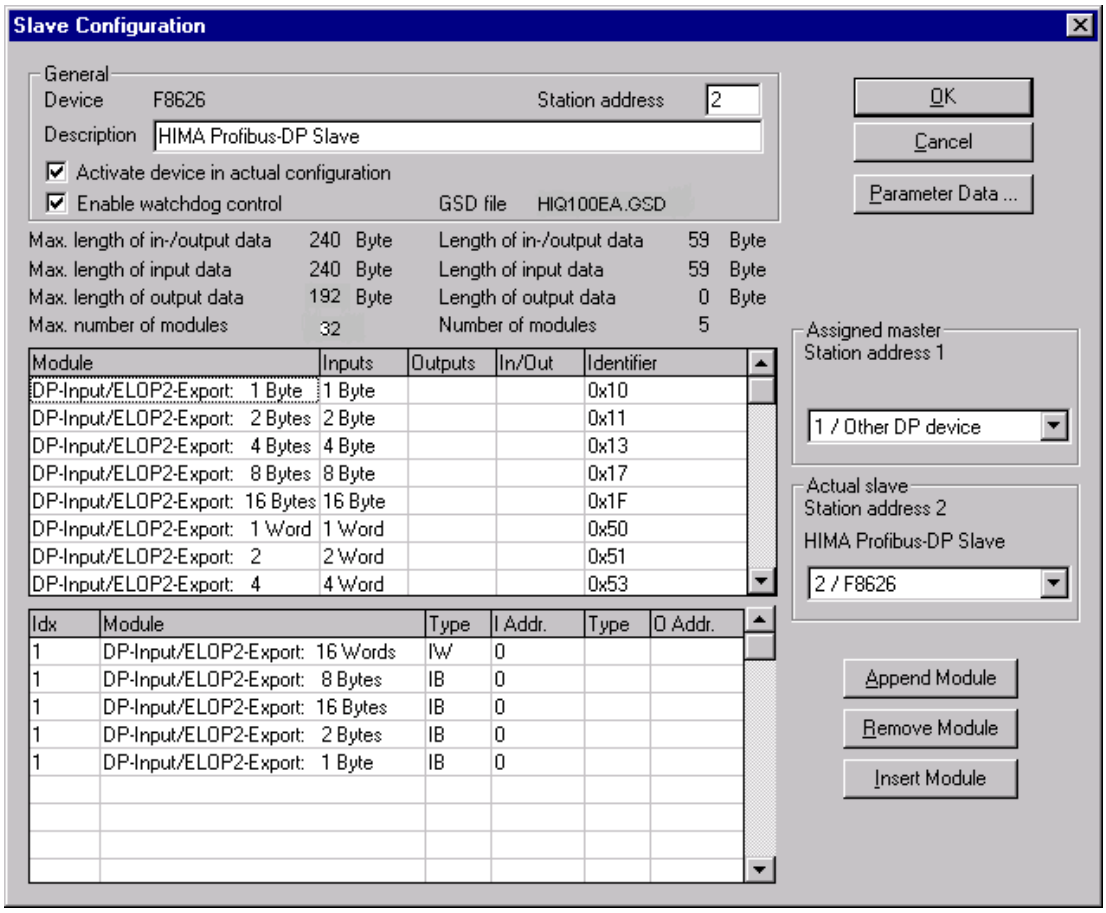


Figure 9: Example of address imaging of the PROFIBUS-DP input telegram, user data length of 59 bytes in 5 modules

HIMA Paul Hildebrandt GmbH + Co KG
Industrie-Automatisierung
P.O. Box 1261 68777 Brühl Germany
Telephone: (+49 06202) 709-0 Telefax (+49 06202) 709-107
e-mail info@hima.com Internet www.hima.com