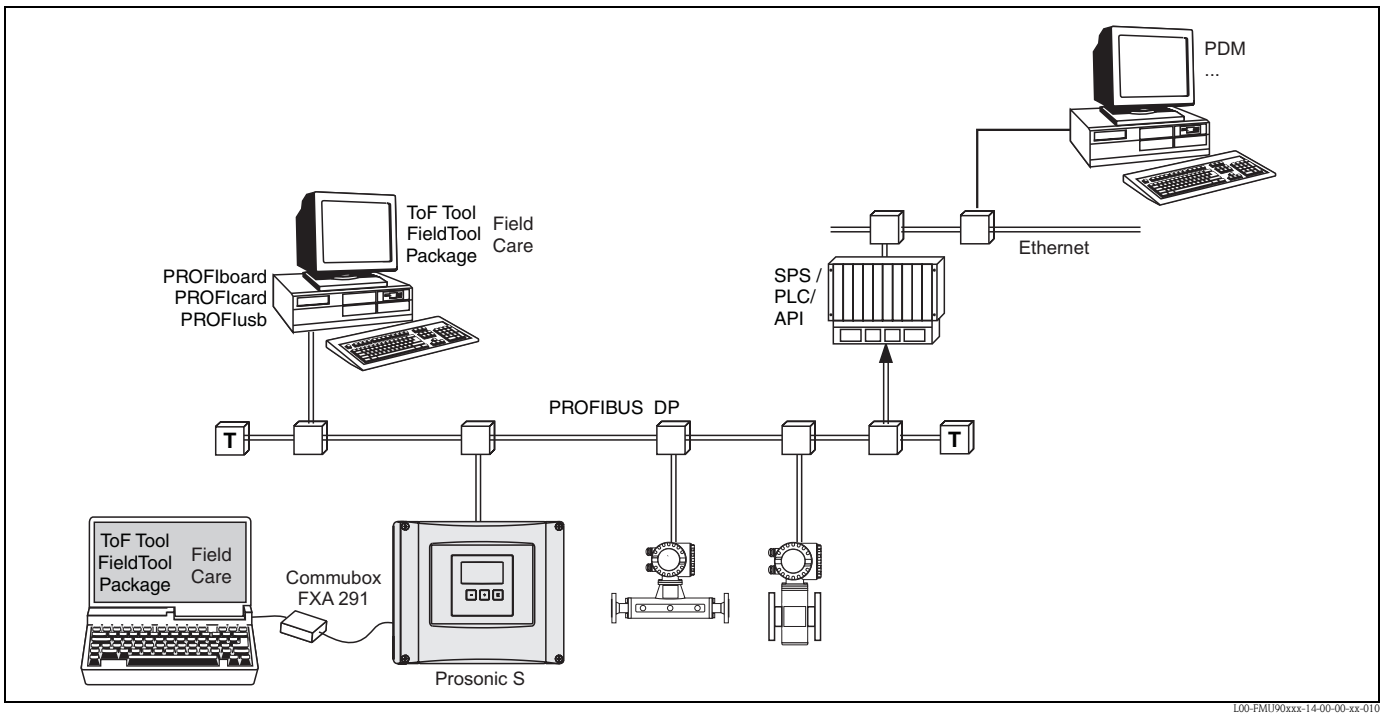
1 Operating options



1.1 On-site operation

- Display and operating module at the Prosonic S
- Endress+Hauser operating tool ("ToF Tool - FieldTool Package" or "FieldCare") with Commubox FXA291

Note!
Commubox FXA291 is an interface adapter from Endress+Hauser.

1.2 Remote oepration

- Endress+Hauser operating tool ("ToF Tool - FieldTool Package" or "FieldCare") with PROFIcard, PROFIboard or PROFIusb

Note!
PROFIboard, PROFIcard and PROFIusb are interface adapters from Endress+Hauser.

1.2.1 Acyclic data exchange

Remote operation makes use of the acyclic data exchange, which allows device parameters to be changed independently of the communication between the device and a PLC.
Acyclic data exchange is used
- to transmit device parameters during commissioning and maintenance;
- to display measured values that are not acquired in cyclic traffic.

The Prosonic S supports class 2 masters:

Acyclic communication with a Class 2 master (MS2AC)

In the case of MS2AC, a Class 2 master opens a communication channel via a so-called service access point (SAP) in order to access the device. Class 2 masters are for example:
- ToF Tool - FieldTool Package
- FieldCare

Before data can be exchanged via PROFIBUS, however, the Class 2 master must be made aware of the parameters contained within the field device. This can be done by:
- a device description (DD)
- a device type manager (DTM)
- a software component within the master, which accesses the parameters via slot and index addresses.

Note!
- The DD or DTM is supplied by the device manufacturer.
- The Prosonic S has two Service Access Points. Therefore, it can be simultaneously accessed by two Class 2 masters.
- The use of a Class 2 master increases the cycle time of the bus system. This must be taken into consideration when the control system or PLC is programmed.

1.2.2 Slot-Index tables

The Slot-Index tables for the general acyclic data exchange are summarized in the document BA346F (can be downloaded from www.endress.com).

2 Device address

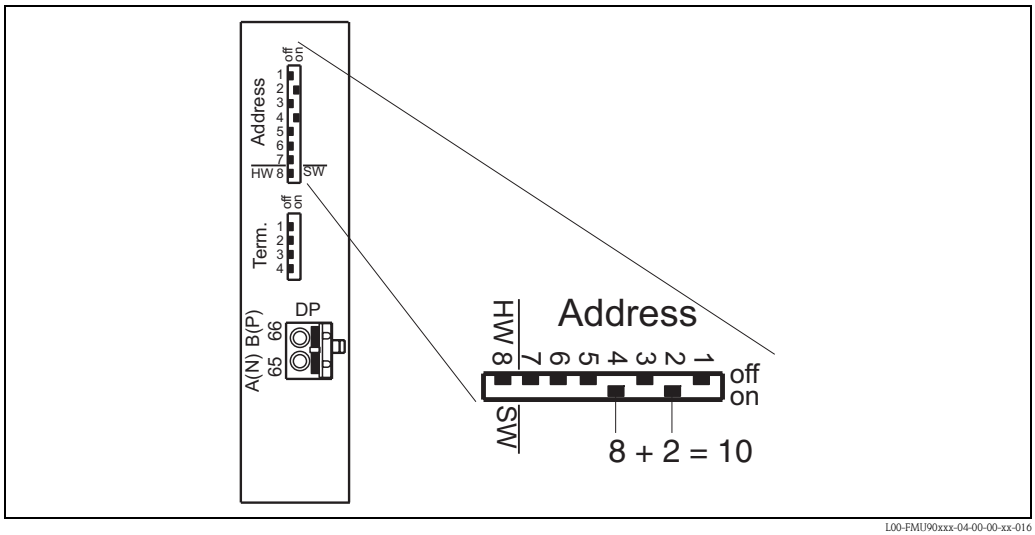
2.1 Selecting the device address

- Every PROFIBUS device must be given an address. If the address is not set correctly, the device will not be recognised by the process control system.
- A device address may appear only once within a particular PROFIBUS network.
- Valid device addresses are in the range between 1 and 126. All devices are delivered from the factory with the address 126, which is set by software.
- The default address can be used to check the function of the device and connect it to an operating PROFIBUS system. Afterwards the address must be changed to allow other devices to be connected to the network.

2.2 Software addressing

Software addressing comes into operation, when DIP-switch 8 on the Profibus DP terminal area is in the position "ON".
In this case, the address can be set by an operating tool ("FieldCare").
The address is displayed in the function "Output-calculations/Profibus DP/instrument address".

2.3 Hardware addressing



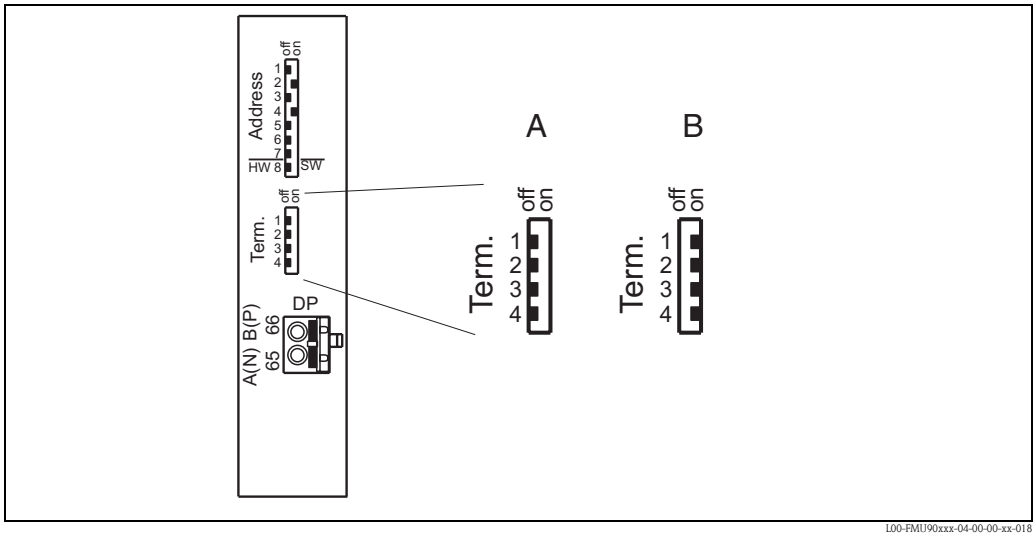
Hardware addressing comes into operation when DIP switch 8 is in the position "HW (OFF)". In this case the address is determinded by the position of DIP-switches 1 to 7 according to the following table:

Switch No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Value in position "OFF"	0	0	0	0	0	0	0
Value in Position "ON"	1	2	4	8	16	32	64

The new address becomes valid 10 seconds after switching.

3 Bus termination

The termination resistor must be activated for the last instrument on the bus. This is done by setting all four termination switches into the "on" position.



A: *termination off (factory setting);* ***B:*** *termination on*

4 Device database and type files (GSD)

4.1 Meaning of the GSD files

A device database file (GSD) contains a description of the properties of the PROFIBUS device, e.g. the supported transmission rates and the type and format of the digital information output to the PLC. Additional bitmap files are required in order to represent the device by an icon in the network design software. The device database and bitmap files are needed for the commissioning of a PROFIBUS DP network.

4.2 Name of the GSD file

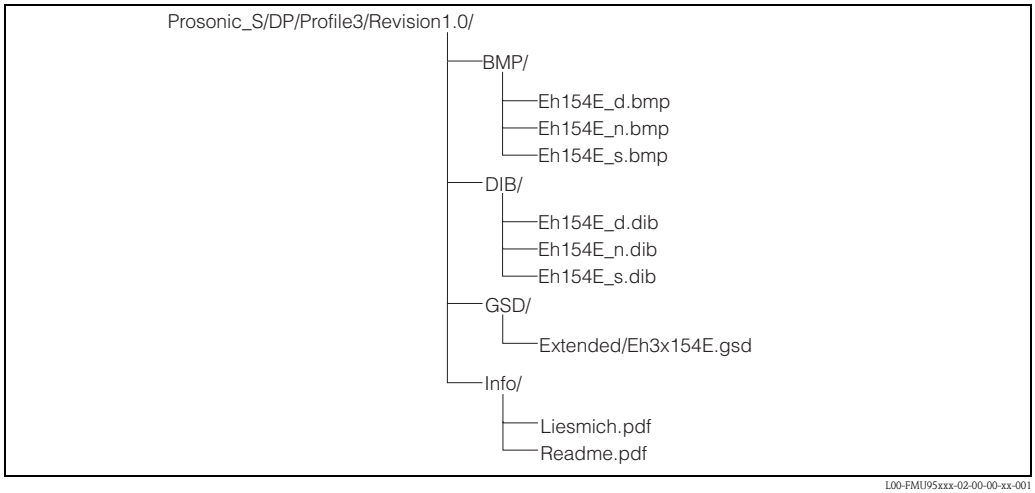
Every device is allocated an identity code by the PROFIBUS User Organisation (PNO). This appears in the device data base file name (.gsd).
The FMU95 has the ID number 154E(hex) = 5454 (dec).
Therefore, the name of the GSD file is: EH3x154E.gsd

4.3 Sources of supply

- www.endress.com
  click on "Download" and enter "GSD" into the "Text search" field. The "Software" link opens a list containing the links to all available GSD files.
- CD-ROM with GSD files for all E+H devices. Order-Code: 50097200
- GSD library of the PROFIBUS User Organisation (PNO):http: //www.PROFIBUS.com

4.4 Directory structure

The files are organized in the following structure:



4.5 Universal Database File

As an alternative to the device specific GSD file, the PNO provides an universal database file without instrument specific features.
When the universal database file is used, the option **"profile"** must be selected in the "**Output-calculation/Profibus DP/ident number**" parameter.

4.6 Usage of the GSD files

The GSD files must be loaded to a specific subdirectory of the PROFIBUS DP configuration software. Depending on the software, the GSD files must be copied into the directory or an import functionality of the software may be used.
Detailed information about the appropriate file location can be obtained from the manual of the respective configuration software.

5 Cyclic Data Exchange

Note!
- Basic information on the cyclic data exchange between the measuring instrument and an automation system (e.g. PLC) are given in the manual BA034S "PROFIBUS DP/PA - Guidelines for planning and commissioning"
- The cyclic data exchange requires that the correct device type files (GSD) have been loaded to the automation system. For details see chapter 6.1.3.

5.1 Data format

With PROFIBUS DP, analogue measuring values are transmittted to the PLC in blocks (modules) of 5 bytes each. The measured value is encoded in the first four bytes in the form of a floating point number accordint to the IEEE standard. The fifth byte containes a standardized status information about the instrument. For details refer to the manual BA034S, "PROFIBUS DP/PA - Guidelines on planning and commissioning".

5.2 Modules for the cyclic data telegram

Each AI Block of the Prosonic S FMU95 provides a module of five bytes for the cyclic data telegram. According to the PROFIBUS specifications "Profiles for process control devices" there are two options for each module:
- **AI (OUT)**: The module is contained in the cyclic data telegram.
- **Free Place**: The module is **not** contained in the cyclic data telegram.

The options are selected in the configuration tool of the respective PLC. For details refer to the manual of the tool.

5.3 Default configuration of the cyclic data telegram

5.3.1 5-channel version (FMU95 - *****A***)

AI Blocks 1 to 5 are contained in the data telegram and transmit one level value each. The other AI Blocks (AI6 to AI20) are not used by default. If required, they can be used to transmit sensor temperatures, averages or sums.

Byte	Block	Access type	Format	Measured value[1)]	Unit[2)]
0, 1, 2, 3	AI 1	read	IEEE754	level 1	m
4			Status byte	Status level1	-
5, 6, 7, 8	AI 2	read	IEEE754	level 2	m
9			Status byte	Status level2	-
10, 11, 12, 13	AI 3	read	IEEE754	level 3	m
14			Status byte	Status level3	-
15, 16, 17, 18	AI 4	read	IEEE754	level 4	m
19			Status byte	Status level4	-
20, 21, 22, 23	AI 5	read	IEEE754	level 5	m
24			Status byte	Status level5	-

1) The allocation of the measured values can be changed in "output calculations/analog input/analog input N/ measured value N" (N = 1 to 20).

2) The unit can be changed in
"level/level N/basic setup/unit level"
"device properties/operating params/distance unit"
"device properties/operating params/temperature unit"

5.3.2 10-channel version (FMU95 – *****B***)

The AI Blocks 1 to 10 are contained in the cyclic data telegram and transmit the respective level values. The other AI Blocks (AI11 to AI20) are not used by default. If required, they can be used to transmit sensor temperatures, averages or sums.

Byte	Block	Access type	Format	measured value[1)]	unit[2)]
0, 1, 2, 3	AI 1	read	IEEE754	level 1	m
4			Status byte	Status level1	-
5, 6, 7, 8	AI 2	read	IEEE754	level 2	m
9			Status byte	Status level2	-
10, 11, 12, 13	AI 3	read	IEEE754	level 3	m
14			Status byte	Status level3	-
15, 16, 17, 18	AI 4	read	IEEE754	level 4	m
19			Statu sbyte	Status level4	-
20, 21, 22, 23	AI 5	read	IEEE754	level 5	m
24			Status byte	Status level5	-
25, 26, 27, 28	AI 6	read	IEEE754	level 6	m
29			Status byte	Status level6	-
30, 31, 32, 33	AI 7	read	IEEE754	level 7	m
34			Status byte	Status level7	-
35, 36, 37, 38	AI 8	read	IEEE754	level 8	m
39			Status byte	Status level8	-
40, 41, 42, 43	AI 9	read	IEEE754	level 9	m
44			Status byte	Status level9	-
45, 46, 47, 48	AI 10	read	IEEE754	level 10	m
49			Status byte	Status level10	-

1) The allocation of the measured values can be changed in "output calculations/analog input/analog input N/ measured value N" (N = 1 to 20).

2) This unit can be changed in "level/level N/basic setup/unit level".