SIEMENS

MOBY I
Configuration, Installation and Service

Manual Release 10/99

SIEMENS

MOBY® I

Configuration, Installation and Service

Manual

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6GT2097-4BA00-0EA2

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Safety Guidelines

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger.

Danger

indicates that death, severe personal injury or substantial property damage **will** result if proper precautions are not taken.

Warning

indicates that death, severe personal injury or substantial property damage **can** result if proper precautions are not taken.

Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken.

Note

draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

Qualified Personnel

Only **qualified personnel** should be allowed to install and work on this equipment. For the purposes of the safety notes contained in this manual; qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Correct Usage

Note the following.

Warning

This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

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Disclaimer of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

Siemens Aktiengesellschaft

Order No. 6GT2097-4BA00-0EA2

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General

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This configuration, installation and service manual will help you to plan and configure your MOBY-I system. It covers the guidelines on configuration and installation and provides complete technical data on the individual components.

MOBY hotline

A MOBY hotline has been set up for optimum customer service to MOBY users.

We are available under the following telephone numbers from 8:30 AM to 11:30 AM and from 1:00 PM to 4:00 PM Mondays through Fridays:

++49(0)0911/750-2859
++49(0)0911/750-2861

Our hotline is not available on the Friday or Monday prior to or following legal holidays.

Of course, you can also fax us your questions or send them via Internet:

Fax: ++49(0)0911/750-2737 or 750-2960
e-mail-address: MOBY-HOTLINE@fthw.siemens.de

Internet

General news on MOBY-I or an overview of our other identification systems are available on the Internet under the following address.

http://www.ad.siemens.de/moby

e-mail

In addition, you can send us your special questions on products, Siemens representatives in your area, customer-related requirements and so on at the following e-mail address:

moby@fthw.siemens.de

Introduction to MOBY-I

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MOBY-I is an RF identification system for optimization of material flow and production processes in the upper performance sector. This high-performance, high-capacity, long-distance system permits high data transmission speeds between data memories (MDS) and read/write devices (SLG).

Principal application areas

MOBY-I is primarily used when object identification must be inductive (i.e., without contact), reliable and fast and production and manufacturing parameters must be carried on the object.

- Processing manufacturing
  (e.g., data memory affixed to the product carrier)
- Assembly
  (e.g., data memory affixed to the work piece carrier)
- Conveyors
  (e.g., data memory on suspended rails)
- Transportation

Technical data of MOBY-I

Table 2-1 Technical data of MOBY-I

Storage capacity	62 bytes to 32 kbytes
Memory type	RAM, EEPROM and FRAM
Data organization	File or address-oriented
Protection rating	IP65 to IP68
Operating temperature	-25 to +70/85° C, 200° C (cyclic)
Data transmission speed (SLG - MDS)	$\geq$ 0.8 msec/byte
Read/write distance	0 to 1000 mm
Can be connected to	SIMATIC S5/7, PCs, computers, PLCs of other manufacturers, and PROFIBUS

Overview of MOBY-I components

- MDS (mobile data memory)
- SLG (read/write device)
- ASM (interface module)
- STG (service and test device)

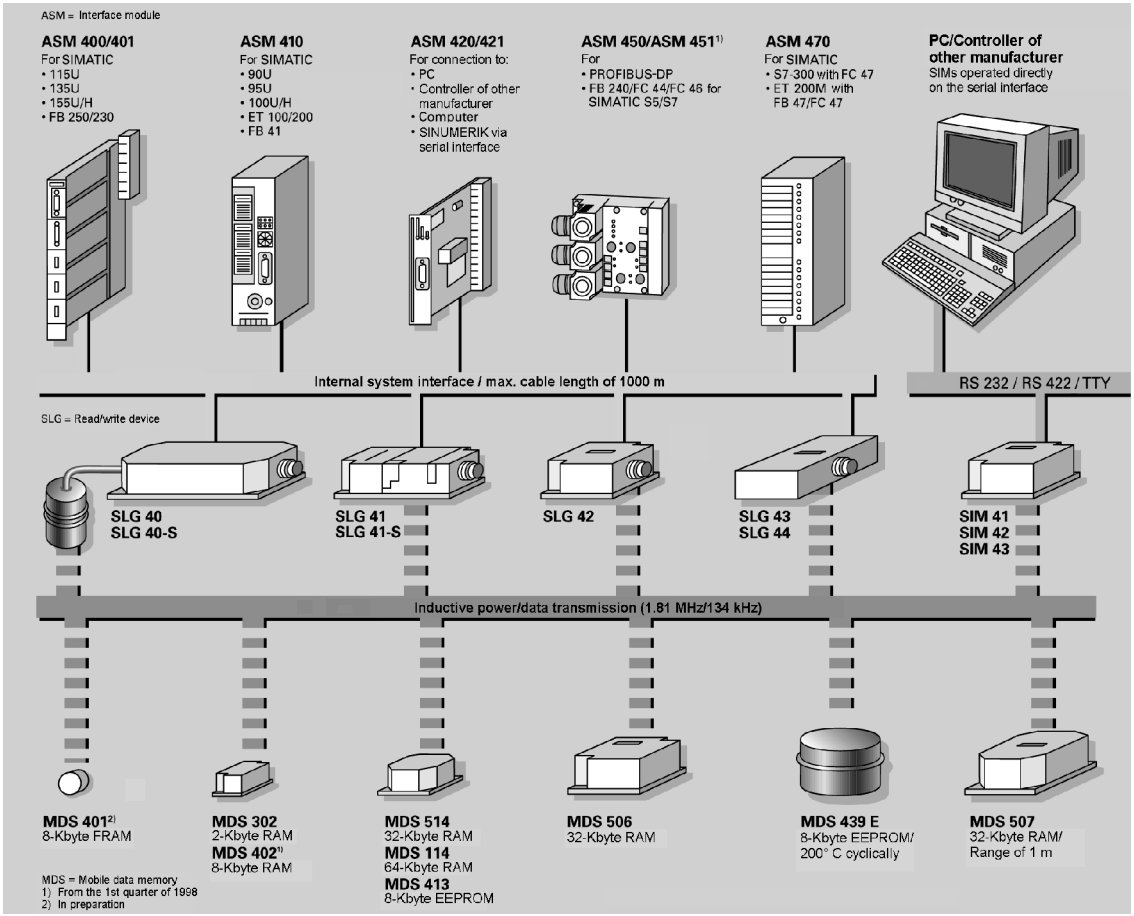


Figure 2-1 Overview of MOBY-I components

3 Configuration and Mounting Guidelines

3.1 Basic Requirements

Warning

Do not make changes to the devices.
Violation will invalidate interference emission certification (BZT, FCC), CE and the manufacturer's warranty.

FCC Compliance Statement

This device complies with part 15 of the FCC Rules.
Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Note

Any unauthorized modifications to this device could void the user's authority to operate the equipment.

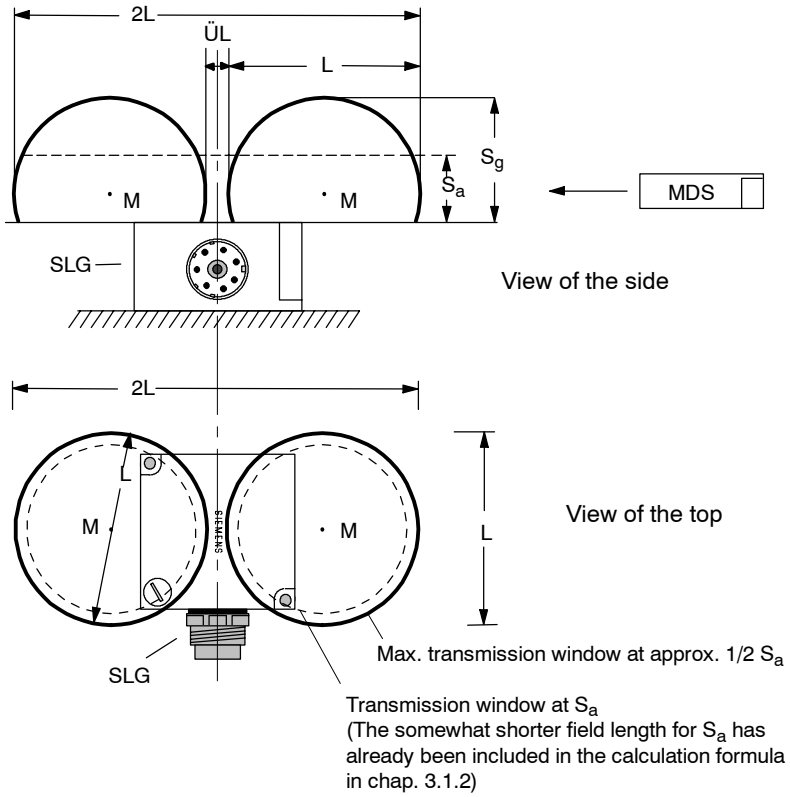
To choose the correct MOBY-I components, apply the following criteria to your particular application.

- Transmission distance (i.e., read/write distance)
- The amount of data to be transferred
- Metal-free spaces for MDS and SLG
- Static or dynamic transmission of the data
- Speed for dynamic transmission
- Tolerances of the tracking
- Environmental conditions (e.g., moisture, temperature, chemical influences and so on)

3.1.1 Transmission Window

The read/write device (i.e., SLG) generates an inductive alternating field. The field is strongest in the vicinity of the SLG and decreases in strength the greater the distance from the SLG. Distribution of the field depends on the layout and geometry of the antennas on the SLG and the MDS.

MDS functionality requires a minimum field strength on the MDS achieved at a distance of S_g from the SLG. The figure below shows the transmission window between the MDS and the SLG.



M: Midpoint of the transmission window

S_a: Operating distance

S_g: Limit distance (The limit distance is the maximum clearance between the top of the SLG and the top of the MDS at which the transmission will still function under normal conditions.)

L: Length of a transmission window for vertical direction of movement of the MDS

2L: Length of a transmission window for horizontal direction of movement of the MDS

ÜL: The transmission gap is located between the two transmission windows. Processing with the MDS in this area is not possible. The transmission gap is several millimeters in length. ÜL will be disregarded in the rest of this chapter (i.e., ÜL = 0 mm).

Figure 3-1 Transmission window

The shape of the active field corresponds to two symmetrically positioned circles (cf. view of top). The strength of the field drops (i.e., transmission gap) in the area of the symmetry axis of the SLG. The direction of movement and rotation of the MDS can be disregarded (exception: MDS 302 and 507).

The above figure also shows that operation in the area between S_a and S_g is possible. The greater the distance, the smaller the active working area becomes until it is reduced to one point at distance S_g. For this reason, only static operation should be used in the area between S_a and S_g.

Moving the MDS over both transmission windows produces an active length of 2L. 2L can be substituted for L in the formula for the transmit period (see chap. 3.1.2). In actual practice, a precisely doubled transmit period does not occur (see chap. 3.2). The following points must be considered when configuring the system.

Note

Data transmission can be briefly interrupted in the area of the symmetry axis of the SLG. This interruption is transparent for the user. Execution of the interrupted command is automatically continued as soon as the MDS arrives in the second active area. The duration of the interruption can be any length of time. This is the case when the MDS stops prcisely on the symmetry axis. The user can determine this with the presence signal (i.e., ANW) which can disappear in the transmission gap. The presence signal can be scanned by the user. This signal shows whether an MDS is currently located in one of the two transmission windows.

Working in static operation

The greatest operating distance (S_g) is achieved vertically over the midpoint (M) of the transmission window. Figure 3-2 illustrates this distance at which transmission is still possible.

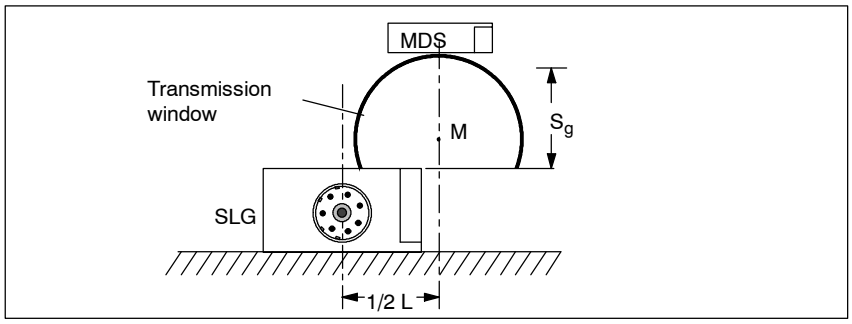


Figure 3-2 Working in static operation

The optimum distance between the two symmetry axes is 1/2L. The “transmission gap” in the middle of the SLG can be disregarded.

Working in dynamic operation

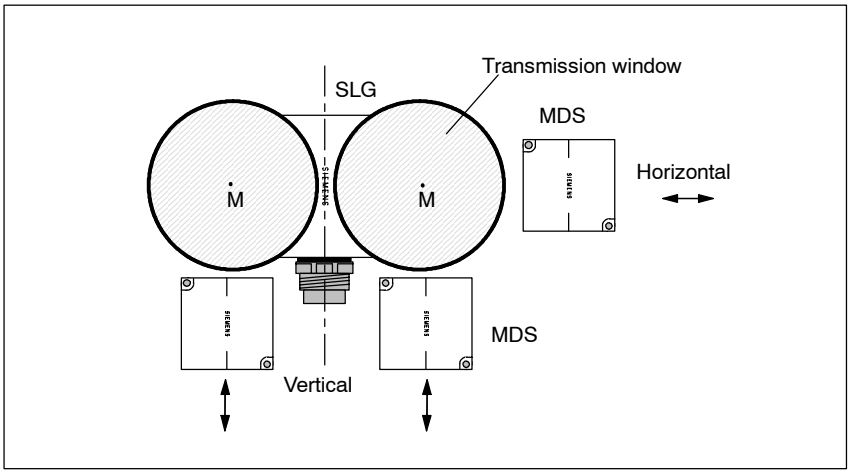


Figure 3-3 Working in dynamic operation

Width of the transmission window

The following approximation formula applies to practical applications.

$$B = 0.4 \cdot L$$

B: Width of the transmission window

L: Length of the transmission window

The width of the transmission window (B) is particularly important for the tolerance of mechanical tracking. When B is maintained, the formula can be used without restriction for the transmit period. The active area can be represented as shown below.

Vertical direction of movement

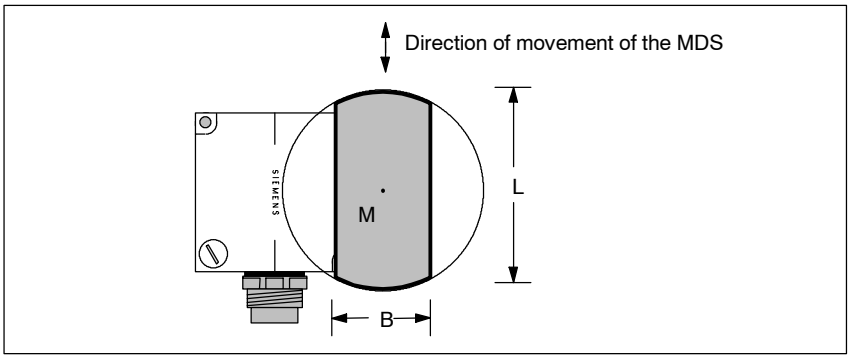


Figure 3-4 Vertical direction of movement

This direction of movement does not produce a “gap” in data transmission. The presence signal (i.e., ANW) precisely indicates the presence of an MDS. This direction of movement is always recommended when the configuration permits.

Horizontal direction of movement

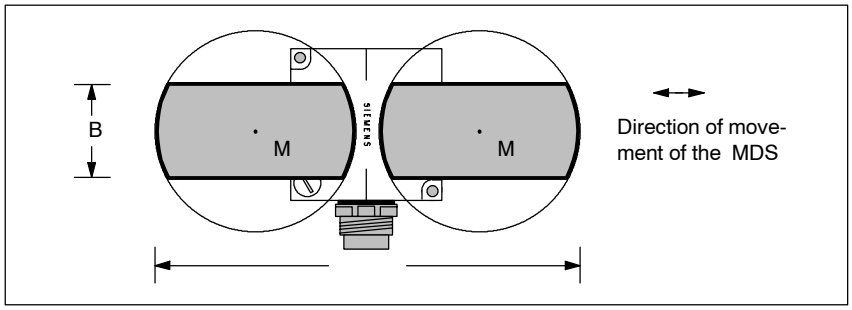


Figure 3-5 Horizontal direction of movement

This direction of movement should only be used when the simple field length (L) is not sufficient for transmission during dynamic operation. The use of the presence check or the evaluation of this signal for control purposes is not recommended in this operation mode. When located in the data transmission “gap” at the symmetry axis, the presence signal could cause control errors in the user program.

3.1.2 Transmit Period of the MDS

The transmit period is the time during which the MDS is located in the transmission window of an SLG. During this time, the SLG can exchange data with the MDS.

The formula used to calculate the transmit period is shown below.

$$T_V = \frac{L \cdot 0.8\,[m]}{V_{MDS}\,[m/s]}$$

$t_{V:}$ Transmit period of the MDS

L: Length of the transmission window (cf. table 3-3)

$V_{MDS:}$ Speed of the data memory in dynamic operation

0.8: Constant factor. Compensates for temperature influences and production tolerances.

During static operation, the transmit period can be any length of time. The transmit period must last at least as long as necessary to conclude communication with the MDS.

During dynamic operation, the transmit period is determined by the system environment. The amount of data to be transferred must be adjusted to the transmit period or vice versa.

General formula:

$$t_V \geq t_K$$

$t_{V:}$ Transmit period of the data memory in the field of the SLG

$t_{K:}$ Communication time between MDS and ASM

3.1.3 Communication between ASM, SLG and MDS

Communication between ASM, SLG and MDS is asynchronous with a transmission speed of 19200 baud.

General formula:

$$t_K = K + t_{Byte} \cdot n$$

Calculation of the maximum amount of user data:

$$n_{max} = \frac{t_V - K}{t_{Byte}}$$

t_K: Communication time between ASM, SLG and MDS

t_V: Transmit period

n: Amount of user data in bytes

n_{max}: Maximum amount of user data in bytes during dynamic operation

t_{byte}: Transmission time for 1 byte (cf. table 3-1)

K: Constant. The constant represents an internal system time. It contains the time required for power buildup on the MDS and the time required for command transmission (cf. table 3-1).

Table 3-1 Time constants K and t_{byte}

Constant K [msec]		t_{Byte} [msec]	Data Memory			Operating Mode
MDS 507	All Other MDSs		Memory Type	Memory Size	Operation[1]	
66	16	0.8	RAM/FRAM	All	R/W	Normal operation
66	16	0.8	EEPROM	8 Kbytes	R	
-	17	0.8	EEPROM	128 bytes	R	
66	16	3.8	EEPROM	8 Kbytes	W	
-	16	40.5	EEPROM	128 bytes	W	
88[2]	38[2]	1.4	RAM/FRAM	All	R	ECC-operation[3]
88[2]	38[2]	1.4	EEPROM	8 Kbytes	R	
107[2]	57[2]	1.4	RAM/FRAM	All	W	
190[2]	140[2]	4.4	EEPROM	8 Kbytes	W	
-	38[2]	1.4	EEPROM	128 bytes	R	
-	1200[2]	41	EEPROM	128 bytes	W	
110	60	1	RAM/FRAM	All	R/W	File handler
190	140	1.4	EEPROM	8 Kbytes	R	
190	140	3.8	EEPROM	8 Kbytes	W	
190	140	2.6	RAM/FRAM	All	R	File handler with ECC[3]
190	140	3.0	RAM/FRAM	All	W	
270	220	3.5	EEPROM	8 Kbytes	R	
330	280	8.6	EEPROM	8 Kbytes	W	

1 Operation: R = Read, W = Write
2 Worst-case values. Usually not reached.
3 ECC operation: The above table does not contain the ASM computing times for error correction of data when MDS is defective. Net capacity of the MDS is reduced.

This table applies to all commands. When a user command consists of several subcommands, the formula for t_K must be applied to each subcommand.

The t_K MDS calculation applies to interference-free transmission. When transmission is briefly interrupted due to external interference, the ASM continues the command automatically.

Special features of the MDS 507

When the MDS 507 is used, an additional 50 msec is added to K. This time is required to activate the switch-on logic of the MDS 507.

The MDS 507 automatically switches off immediately after each command. t_{AUS} is the time between the last communication with the MDS and its switch-off.

$$t_{AUS} \approx 6\ msec$$

If the MDS is processed with an additional command after switch-off, it requires another switch-on time of K = 50 msec until the command can be executed. MDS switch-off can be avoided by using the permanent presence check (t_{ABTAST} = 0). Remember, however, that continuous use of the presence check puts a heavy strain on the dialog battery of the MDS 507.

Caution

If an MDS 507 is subject to strong interference during and after processing, the MDS may not switch off since the dialog battery may have gone dead. Such fields of interference can be caused by incorrectly wired frequency converters or defective motor controllers, for example.

Brief interference pulses at intervals of t > 20 msec will not cause the MDS to malfunction.

Remarks on the operation mode with file handler

- The time constant K already contains a read and write operation which the file handler automatically executes when a new MDS arrives.
- Read and write operations of the directory and the file allocation table (i.e., FAT) are not included in the above table. These operations are required when something has been changed in the directory area. Examples:
  - MDS with altered data structure enters the field.
  - Files are written with data for the first time.
  - New files are created with “create.”
- The following times (in msec) apply to directory operations.

Table 3-2 Times for directory operations

	8-Kbyte EEPROM		32-Kbyte RAM		8-Kbyte RAM		2-Kbyte RAM	
	Without ECC	**With ECC**	**Without ECC**	**With ECC**	**Without ECC**	**With ECC**	**Without ECC**	**With ECC**
Read directory + FAT	580	950	940	1600	580	950	295	510
Write directory entry [1]	300	310	330	400	220	270	137	227
Write directory entry + FAT [1]	1190	1260	540	750	410	600	237	420

1 These time include the calculation of the checksum of DIR + FAT.
Times: 8 KB = 160 msec
32 KB = 270 msec

3.1.4 Communication between ASM and User Program

The time required for communication between ASM and user depends on the following factors.

- Cycle time and type of programmable controller
- Software used
  - Normal mode: FB 41, FB 250, FC 47, FB 47, FB 240, FC 44
  - File handler: FB 230, FC 46, FB 246

Communication between the ASM 400 and the user can be divided into three steps.

a) The user issues a command and starts it. When the FB is called the next time, the command is transferred to the ASM and is acknowledged by the ASM.

b) The ASM executes the command with the MDS. The user or the FBs are in wait status. Data communication with the MDS starts as soon as an MDS enters the transmission window of the SLG. The MDS data are stored intermediately on the ASM and checked for correctness.

c) Communication of the ASM with the MDS has been concluded. When the FB is called the next time, the read data or the results of a write command are transferred from the ASM to the user. The user receives a finished message.

See applicable documentation for the exact communication times between ASM and user.

3.1.5 Sample Calculation

The customer application

A conveyor system moves the pallets with the MDS at a maximum speed of V_{MDS} = 2 m/sec. The direction of movement is vertical. The following MOBY-I components were selected.

- ASM 400 (with FB 250)
- SLG 42
- MDS 514

Task:

a) Physical specifications are to be provided to the constructor of the plant.

b) The maximum number of bytes in dynamic operation is to be provided to the programmer.

For technical data of the components, see the tables in chapter 3.2 (“field data of MDS and SLG”).

Tolerance of the height allowance of the pallet

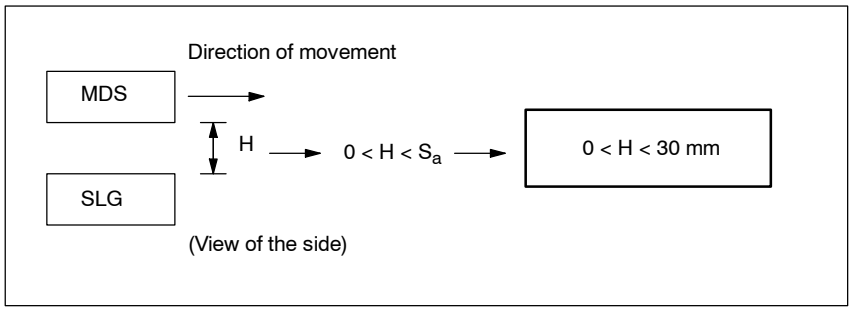


Figure 3-6 Tolerances of the height allowance of the pallet

Tolerances of the side allowance of the pallet

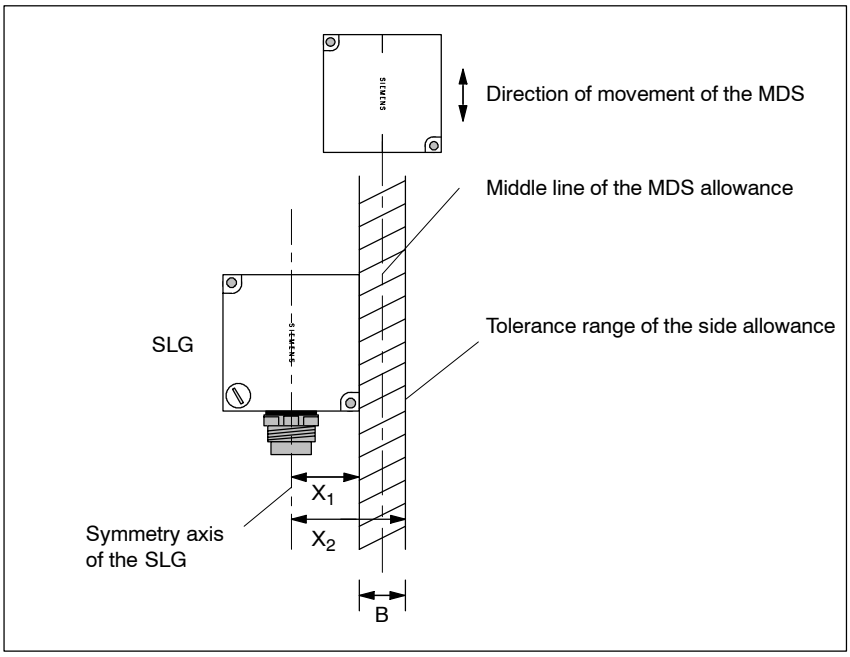


Figure 3-7 Tolerance of the side allowance of the pallet

L: Length of the transmission window

B: Width of the transmission window

[X_1, X_2]: Distance of the symmetry axes between MDS and SLG including tolerance range

$$x_1 = \frac{1}{2}L - \frac{1}{2}B = 45\,mm - 18\,mm \quad x_1 = 27\,mm$$

$$x_2 = \frac{1}{2}L + \frac{1}{2}B = 45\,mm + 18\,mm \quad x_2 = 63\,mm$$

Minimum distance between SLG and SLG

See table 3-4 for this value.

$$D > 800\,mm$$

Minimum distance between MDS and MDS

See table 3-3 for this value.

$$D > 250\,mm$$

Maximum number of bytes

$$t_V = \frac{L \cdot 0.8}{V_{MDS}} = \frac{0.09\,m \cdot 0.8}{2\,msec} = 0.036\,s = 36\,msec$$

For normal operating mode, see table in chap. 3.1.3 for the values of K and t_{byte}.

K = 16 msec ; t_{byte} = 0.8 msec

Calculation of n_{max}

$$n_{max} = \frac{t_V - K}{t_{byte}} = \frac{36\,msec - 16\,msec}{0.8\,msec} = 25 \quad n_{max} = 25\,bytes$$

Up to 25 bytes can be read while the MDS is passing by in vertical operation.

3.2 Field Data of MDS and SLG

The table below shows the field data of all MOBY-I MDS and SLG components. This makes selecting an MDS and an SLG particularly easy.

The technical data represent average data and are valid for an ambient temperature of 0° to 50° C, a supply voltage of 22 V to 27 V DC, and metal-free surroundings. Tolerances of ± 20% are permitted for production conditions and temperature fluctuations.

Additional tolerances apply to the field data when the total voltage range from 20 V to 30 V DC is utilized for the SLG, and/or the entire temperature range is utilized for MDS and SLG.

Table 3-3 Field data of all MDS and SLG components

MDS / SLG	MDS 114 MDS 514 MDS 404		MDS 413 E		MDS 506		MDS 439 E		MDS 302 MDS 401 MDS 402		MDS 507
Length of the Transmission Window in mm (L)											
	L	2L	L	2L	L	2L	L	2L	L	2L	L[1]
SLG 40	-	-	-	-	-	-	-	-	L_d = 18[2]		-
SLG 40-S	-	-	-	-	-	-	-	-	L_d = 9[2]		-
SLG 41[3]	36	72	30	60	-	-	-	-	30	50	-
SLG 42	90	180	80	160	120	190	120	210	-	-	-
SLG 43	140	260	120	230	220	400	190	330	-	-	-
SLG 44	-	-	-	-	-	-	-	-	-	-	1200
SIM 4x	60	80	55	70	85	100	75	100	-	-	-
Width of the Transmission Window in mm (B)											
SLG 40	-		-		-		-		L_d = 18[2]		-
SLG 40-S	-		-		-		-		L_d = 9[2]		-
SLG 41[3]	15		12		-		-		12		-
SLG 42	36		32		48		48		-		-
SLG 43	60		52		88		76		-		-
SLG 44	-		-		-		-		-		300
SIM 4x	20		20		30		30		-		-
Operating Distance in mm (S_a)											
SLG 40	-		-		-		-		2 to 8		-
SLG 40-S	-		-		-		-		2 to 6		-
SLG 41[3]	0 to 12		0 to 10		-		-		0 to 6		-
SLG 42	0 to 30		0 to 25		10 to 35		10 to 55		-		-
SLG 43	0 to 50		0 to 50		20 to 100		20 to 80		-		-
SLG 44	-		-		-		-		-		100 to 800
SIM 4x	0 to 20		0 to 20		0 to 25		0 to 25		-		-

1 **Caution:** The MDS 507 must be positioned with SLG based on the direction. The geometry of the transmission window differs from the other MDSs. Cf. chap. 3.6.3.

2 L_d:Due to the special characteristics of the antenna of the MDS 302, a round transmission window is produced when used with the SLG 40. In static operation, a maximum median deviation Lm of ± 9 mm is permitted.

3 Also applies to the SLG 41-S

Table 3-3 Field data of all MDS and SLG components

MDS / SLG	MDS 114 MDS 514 MDS 404	MDS 413 E	MDS 506	MDS 439 E	MDS 302 MDS 401 MDS 402	MDS 507
Limit distance in mm (S_g)						
SLG 40	-	-	-	-	10	-
SLG 40-S	-	-	-	-	8	-
SLG 41[3]	25	22	-	-	10	-
SLG 42	60	55	70	70	-	-
SLG 43	90	80	150	125	-	-
SLG 44	-	-	-	-	-	1000
SIM 4x	33	30	40	33	-	-
Distance from MDS to MDS in mm (D1)						
SLG 40	-	-	-	-	> 50	-
SLG 40-S	-	-	-	-	> 50	-
SLG 41[3]	> 90	> 90	-	-	> 80	-
SLG 42	> 250	> 250	> 300	> 500	-	-
SLG 43	> 500	> 500	> 600	> 600	-	-
SLG 44	-	-	-	-	-	> 4000
SIM 4x	> 200	> 200	> 300	> 300	-	-

3 Also applies to the SLG 41-S

Table 3-4 Minimum distance from SLG to SLG in mm (D)

SLG / SLG	SLG 40 SLG 40-S	SLG 41 SGL 41-S	SLG 42	SLG 43	SLG 44	SIM 4x
SLG 40/40-S	> 50/80	-	-	-	-	-
SLG 41/41-S	-	> 200	> 800	> 2000	> 6000	> 700
SLG 42	-	> 800	> 800	> 2000	> 6000	> 800
SLG 43	-	> 2000	> 2000	> 2000	> 6000	> 2000
SLG 44	-	> 6000	> 6000	> 6000	> 6000	> 6000
SIM 4x	-	> 700	> 800	> 2000	> 6000	> 700

Note

Adherence to the values specified in table 3-4 is essential. There is a danger of affecting inductive fields if the values are underranged. This would increase the time for data transmission incalculably or a command would be terminated with errors.

3.3 MOBY-I Dialog

Dialog setup Figure 3-8 shows the setup of dialog communication with MOBY-I.

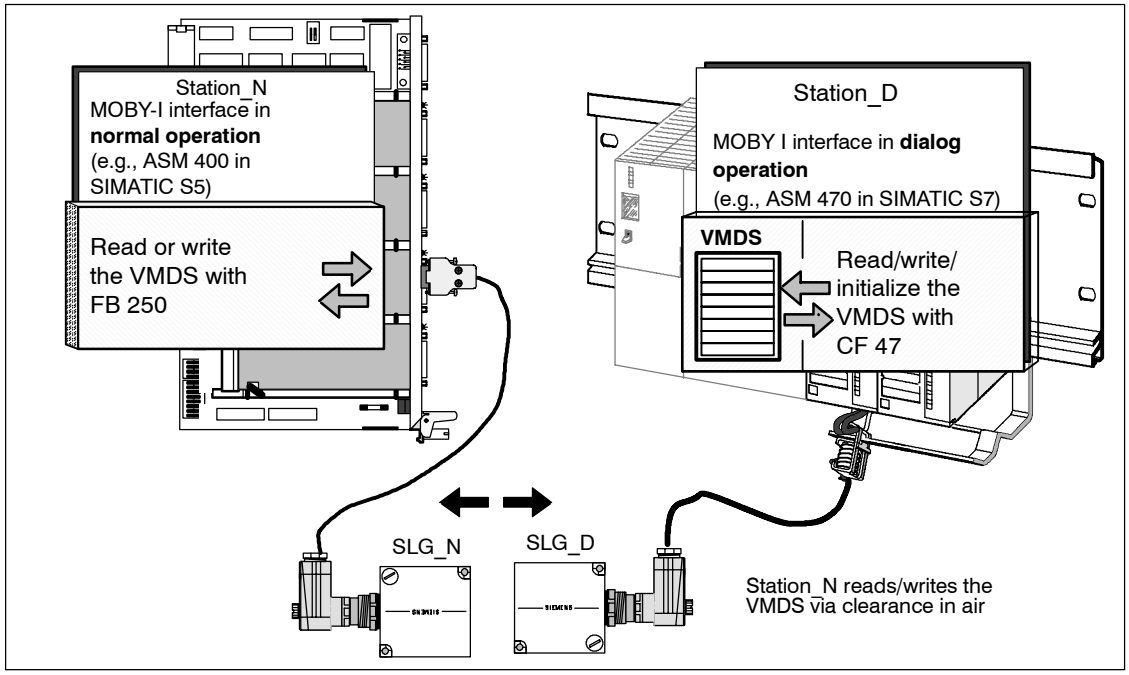


Figure 3-8 Dialog setup for MOBY-I

Table 3-5 Definition of terms

Designation	Explanation
Station_N	Normal ASM of MOBY-I (ASM 400, ASM 410, ASM 420, ASM 440, ASM 470 and SIM4x) Station_N is used by the user in the normal manner (i.e., as if the user wanted to exchange data with an MDS).
SLG_N	An SLG (SLG 41, SLG 42, SLG 43 and SLG 44) which is connected to station_N
Station_D	Dialog ASM of MOBY-I (ASM 400, ASM 410 and ASM 470) When switched on by a user command, station_D is parameterized as the dialog ASM. During parameterization, a 16-Kbyte memory area is defined on station_D. This memory is called the VMDS (i.e., virtual MDS). It is used for communication storage. Processing of station_D by the user is identical to the program in station_N. Station_D uses the same tools as station_N (e.g., FC 47).
SLG_D	An SLG (SLG 41, SLG 42, SLG 43 and SLG 44) which is connected to station_D
VMDS	Virtual mobile data memory = VMDS. The VMDS is a 16-Kbyte memory area on station_D. When station_D is turned on and parameterized, the VMDS is defined and cleared.

Communication time during dialog

When configuring the communication time, the same times apply as described in chap. 3.1.3.

$$t_k = 16\,msec + 0.8\,msec \cdot n_{byte}$$

Transmission window during dialog

The transmission window from SLG_D to SLG_N has a polarization direction (i.e., SLG_D and SLG_N must be directed towards each other at certain angles). Figure 3-9 shows the transmission window during dialog.

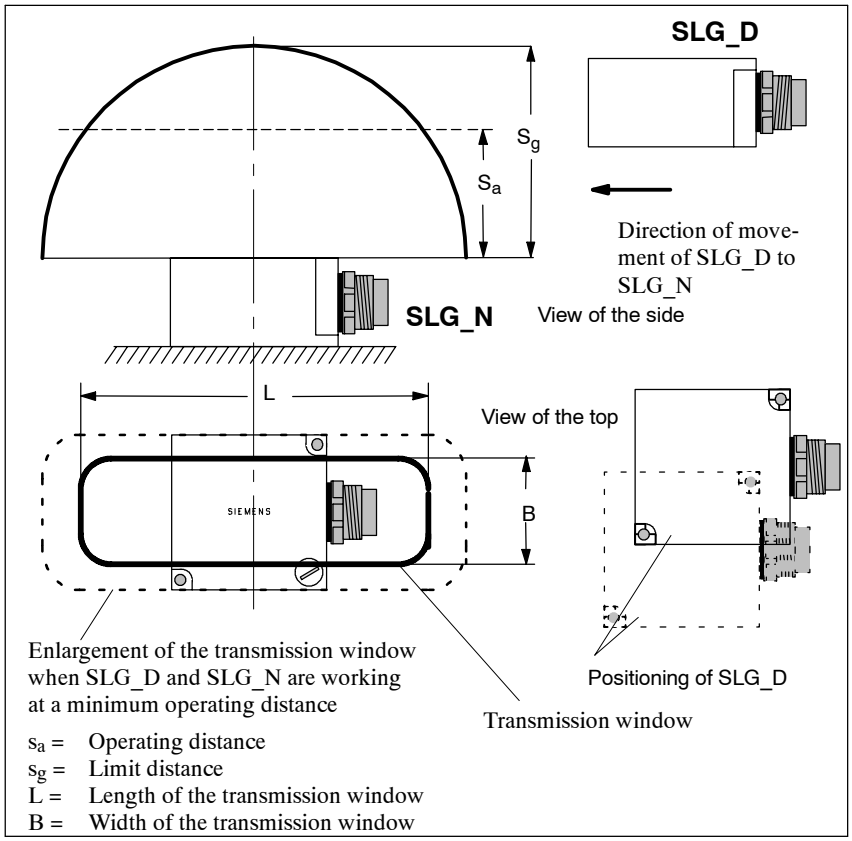


Figure 3-9 Transmission window during dialog

Field data during dialog operation

Table 3-6 shows the field data during dialog operation. Dimensions are given in millimeters.

Table 3-6 Field data during dialog operation

All dimensions in mm	SLG 41-SLG 41	SLG 42-SLG 42	SLG 43-SLG 43	SLG 44-SLG 44
Length of the transmission window (L)	60	230	600	3000
Width of the transmission window (B)	30	80	280	1300
Operating distance (s_a)	0 to 15	0 to 70	20 to 250	200 to 1000
Limit distance (s_g)	30	130	450	2500
Distance from SLG to SLG (D)	> 200	> 800	> 2000	> 10000

3.4 Presentation of Speed to Amount of Data

The curves shown here will simplify selection of MOBY-I MDS and SLG components for dynamic operation. Information from the table in chapter 3.1.3 was used to calculate the curves. The curves apply to vertical operation with a single length of the transmission window (L).

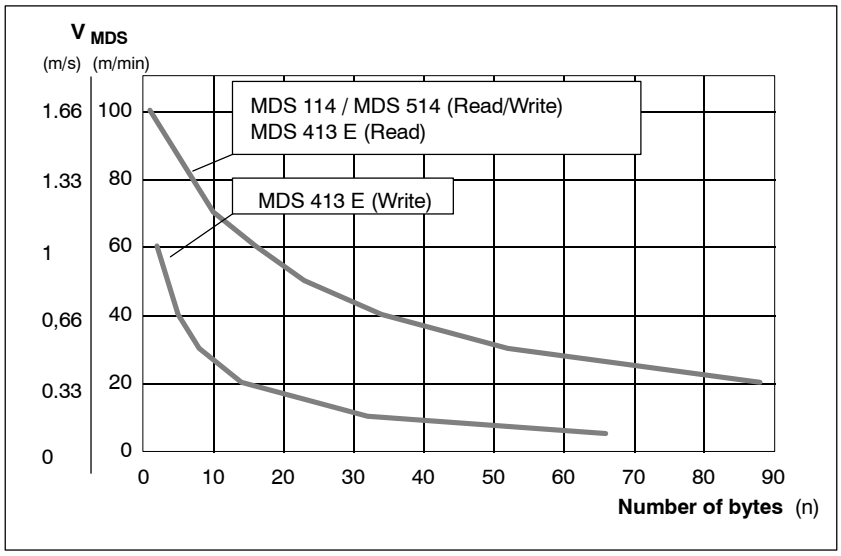


Figure 3-10 SLG 41 (vertical operation)

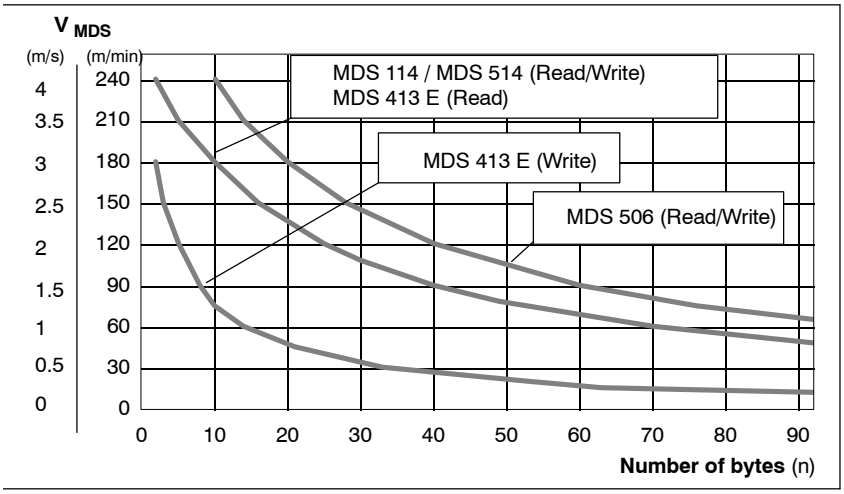


Figure 3-11 SLG 42 (vertical operation)

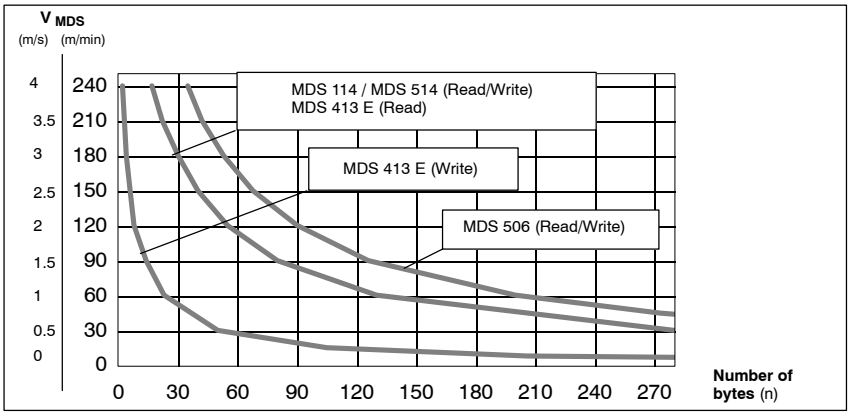


Figure 3-12 SLG 43 (vertical operation)

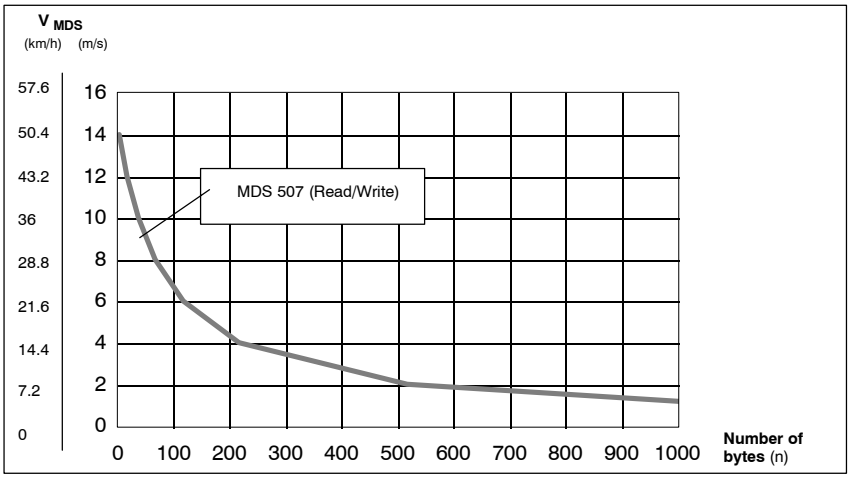


Figure 3-13 SLG 44 (data quantity at low speed)

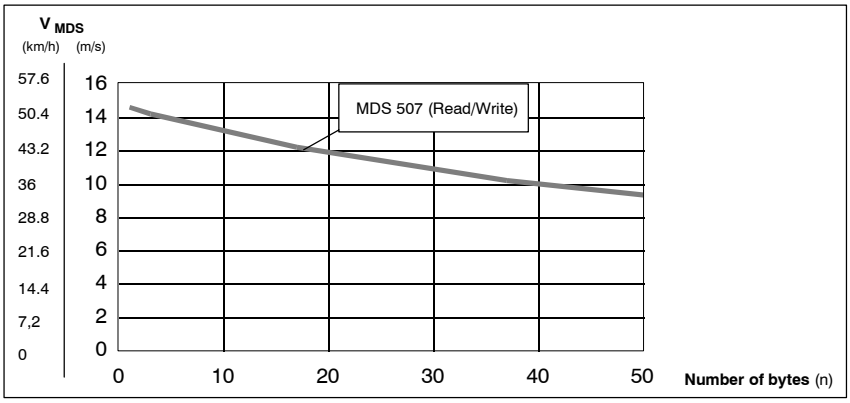


Figure 3-14 SLG 44 (enlarged section of figure 3-13)

3.5 Installation Guidelines

The MDS and SLG are devices which work with induction. Every type of metal, particularly iron and ferromagnetic materials, in the vicinity of these devices influences their field geometry. To ensure that the field data described in chapter 3.2 retain their validity, several points must be adhered to when configuring and installing the devices.

- Minimum distance between two read/write devices. See data sheets of the SLG.
- Minimum distance between two adjacent data memories. See data sheets of the MDS.
- Metal-free area with flush installation of SLG and MDS in metal
- Installation of several SLGs in metal frames or carriers

The next few chapters describe how installation in metallic surroundings affects the identification system.

3.5.1 Definition of the Metal-Free Area

Installation on metal carriers

When an MDS or SLG is mounted directly on metal, no attention must usually be paid to additional metal-free areas. The physical height of the MDS/SLG housing ensures a sufficient distance between the antenna and the metal.

However, the technical characteristics S_g, S_a and L can be reduced by up to 50% when the MDS is mounted on metal objects whose dimensions are greater than those of the MDS.

Although the formula for the transmit period (see chapter 3.1.2) includes a constant factor for such effects, you should counteract a reduction of the transmission window when critical applications are involved.

The following solutions are open to you.

- Installation on plastic holder (see figure 3-15)
- Installation of MDS at a 8 to 20-mm distance from the metal (e.g., plastic washer)
- Keep the metal plate for the holder as small as possible

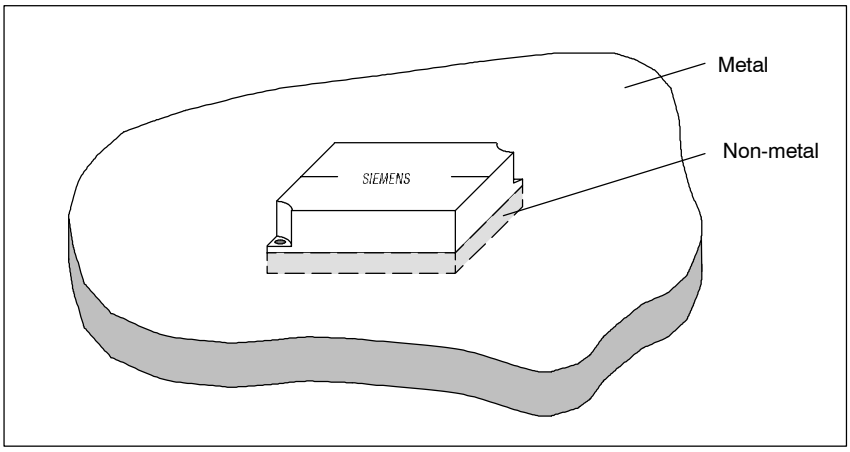


Figure 3-15 Installation on metal carrier

Flush installation

Flush installation of MDS and SLG in metal is also permitted. However, minimum distances between the edge of the housing and the metal must be maintained.

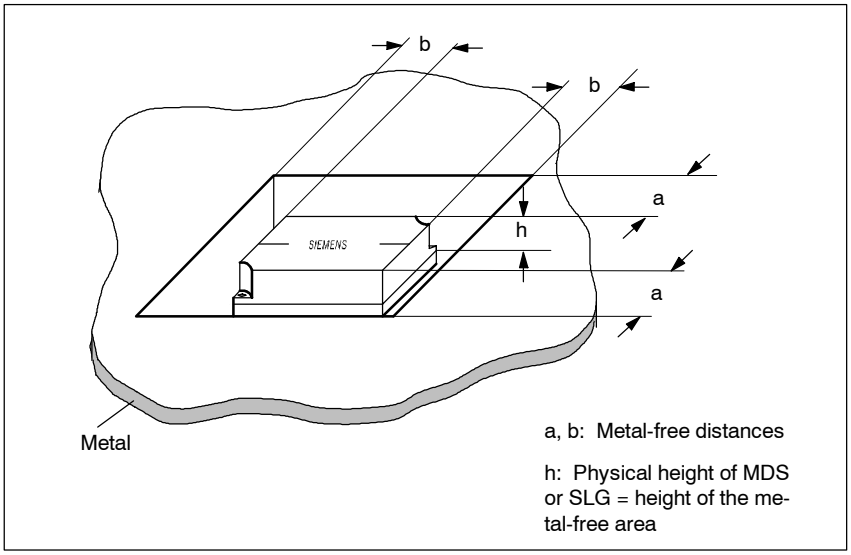


Figure 3-16 Flush installation

Table 3-7 Dimensions for flush installation

Dimensions in mm	a	b	h
MDS 114	10	10	20
MDS 302	10/0*	10	15
MDS 402	10/0*	10	15
MDS 404	10	10	20
MDS 514	10	10	20
MDS 413 E	10	10	20
MDS 506	40	40	40
MDS 507	40	40	40
MDS 439 E	40	40	60
SLG 40/40-S	10	-	10
SLG 41/41-S	25	25	40
SLG 42	30	30	40
SLG 43	>50	>30	40
SLG 44	80	40	60
SIM 4x	30	30	40

* See chapter 4.3 or 4.5.

3.5.2 Effects of Metal on the Transmission Window

As already described in chapter 3.5.1, installation on metal can reduce the size of the transmission window. The midpoint is shifted to the middle of the SLG.

The figures below illustrate this point.

Installation of the SLG on metal

In figure 3-17, a 30 x 30-cm iron plate is used as the mounting plate. The surroundings of the MDS are free of metal.

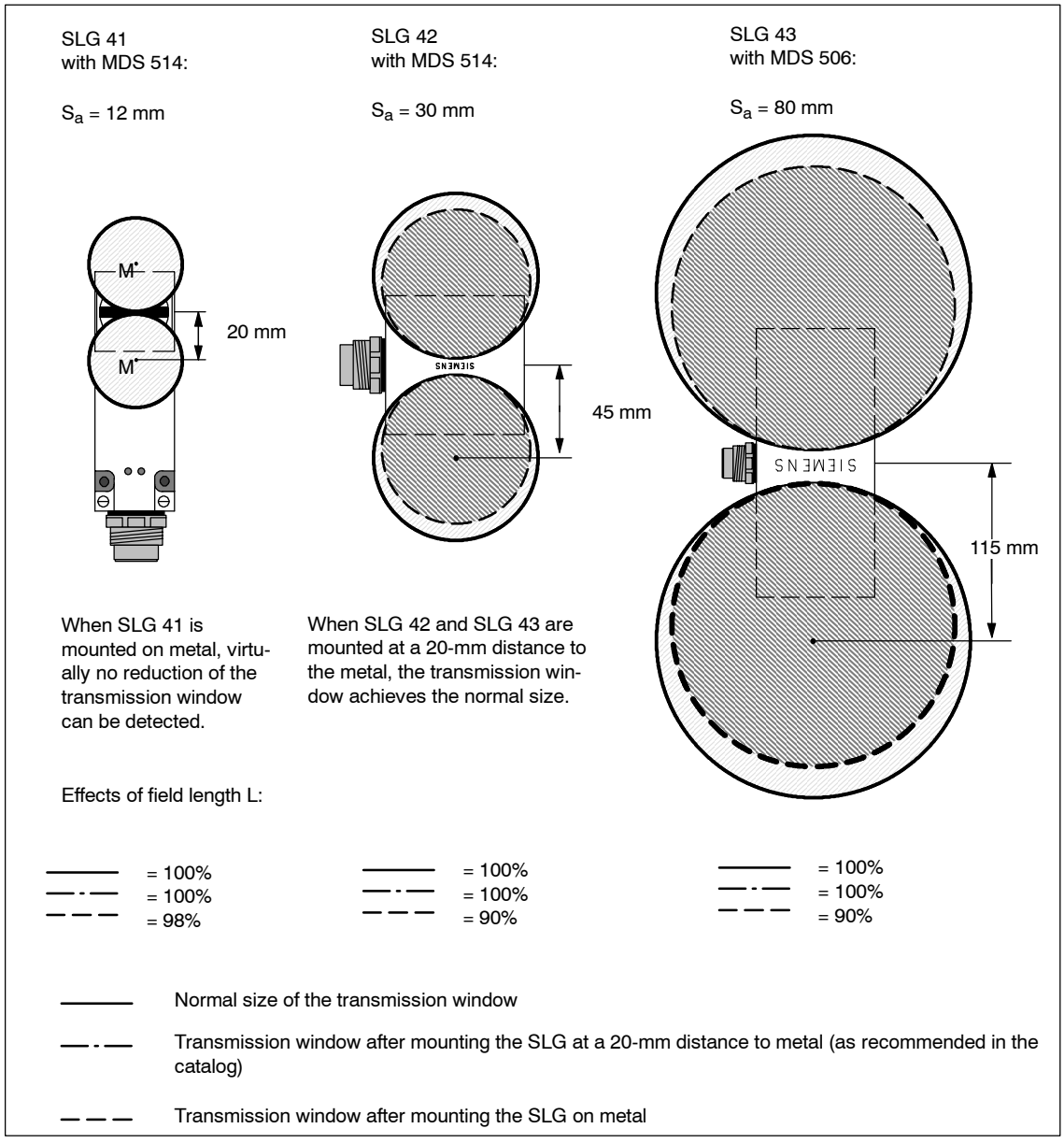


Figure 3-17 Mounting the SLG on metal

Mounting the MDS on metal

In figure 3-18, a 30 x 30-cm iron plate is used as the mounting plate. The SLG is operated in a metal-free environment.

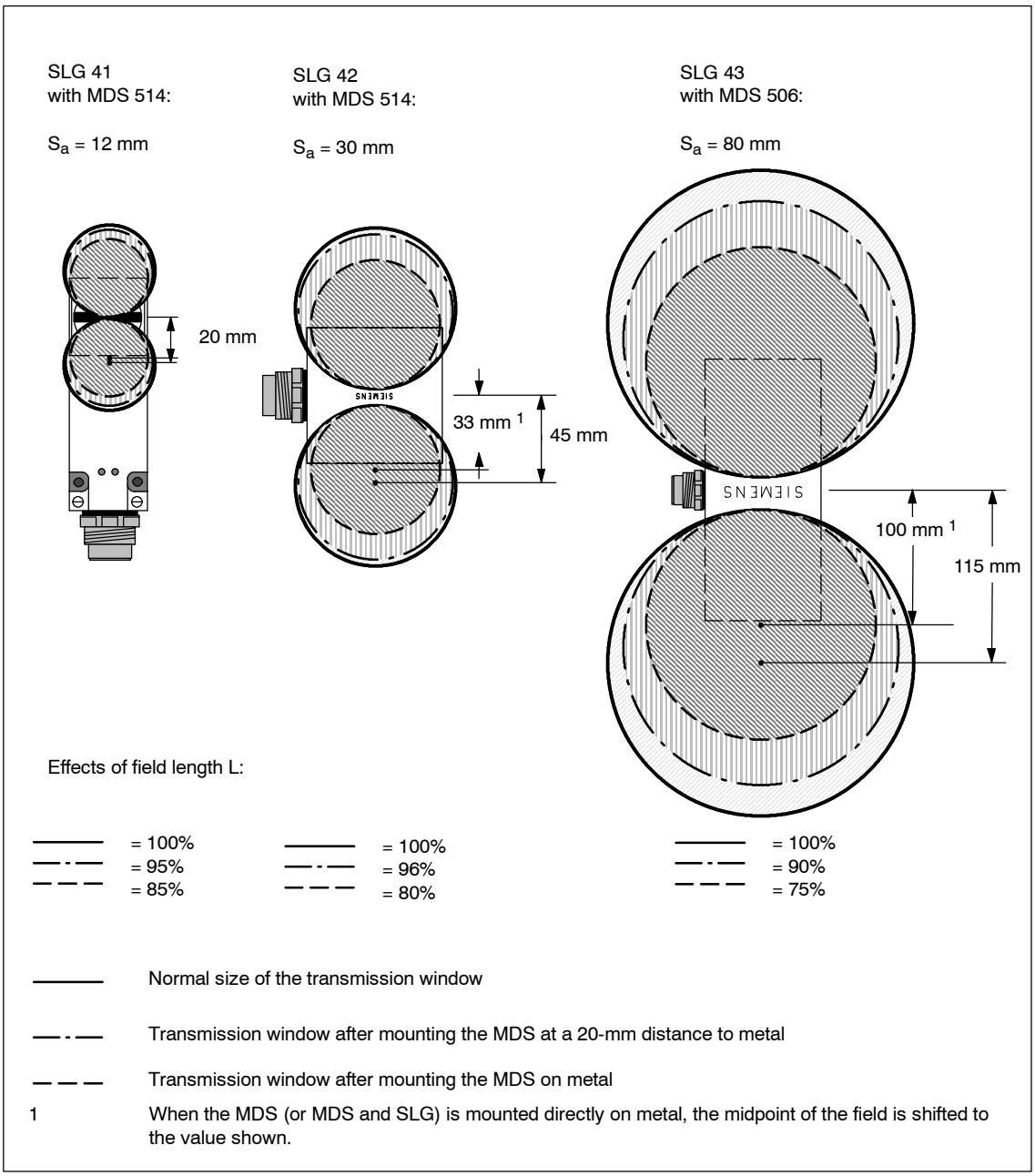


Figure 3-18 Mounting the MDS on metal

Effects of various metals on the field data

Table 3-8 provides a summary of the figures shown on the preceding pages in tabulated format. Details describing the effect of various metals on the SLG and MDS have been added.

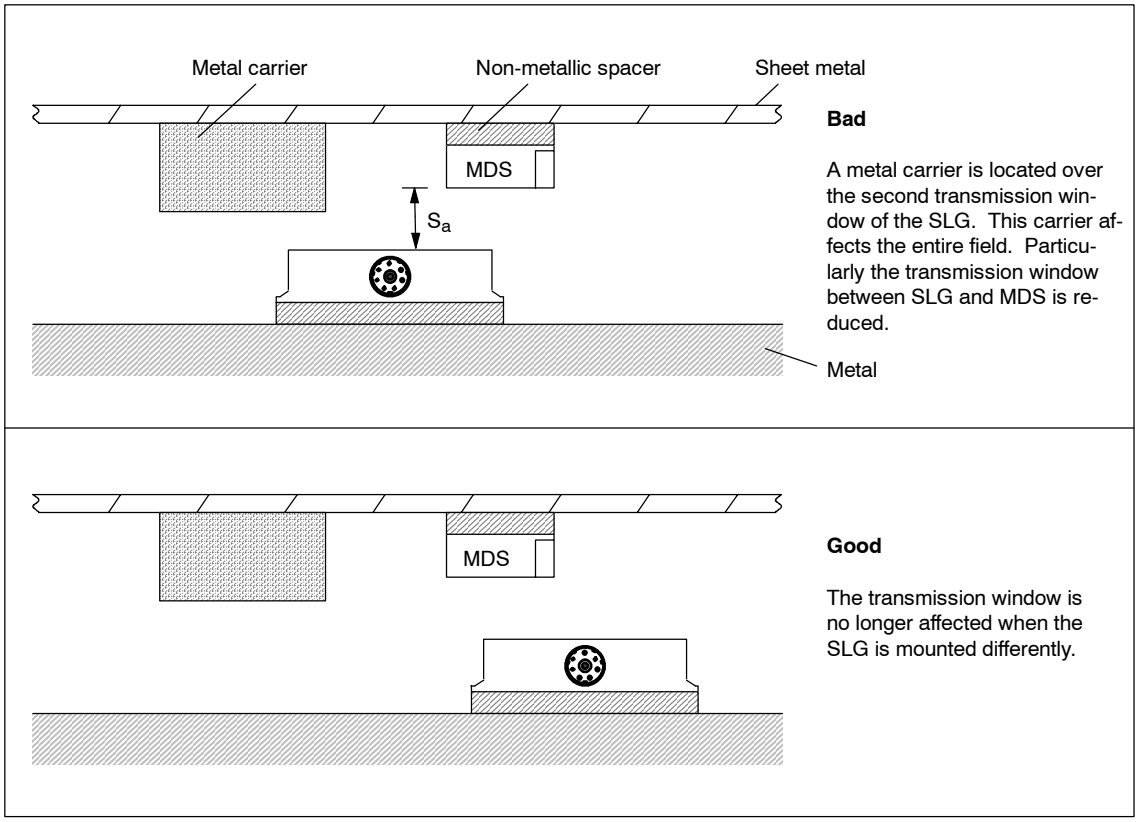
Table 3-8 Reduction of the field data due to metal. Specifications in % as related to non-metal

S_g, S_a, L, B [%]		SLG 41 / MDS 514			SLG 42 / MDS 514			SLG 43 / MDS 506		
Mounted on metal		**SLG**	**MDS**	**SLG +MDS**	**SLG**	**MDS**	**SLG +MDS**	**SLG**	**MDS**	**SLG +MDS**
Reference non-metal		100	100	100	100	100	100	100	100	100
Iron	Direct	100	80	75	75	75	50	65	85	50
	20 mm distance	100	95	90	95	100	85	95	90	95
Alumi-num	Direct	100	80	75	65	80	55	65	85	50
	20 mm distance	100	95	95	95	100	90	95	95	95
Copper	Direct	100	75	80	75	85	65	75	75	50
	20 mm distance	100	100	95	100	95	95	100	90	90

- The table applies to a 30 x 30-cm metal plate. Reduction of the metal plate to a minimum size will improve the field data.
- Flush installation of components in metal reduces the field data further. A test is recommended when critical mounting configurations are involved.
- When working in one of the two transmission windows, it must be ensured that no metal rail (or similar) is located in the second transmission window. The metal rail would also reduce the limit distance or the field length.
- Remember that metal will shift the midpoint of the field to the middle of the SLG.
- Distances of 40 mm or more to metal have virtually no more effect on the field.

3.5.3 Reduction of Metallic Effects

Interfering metal carriers



Bad

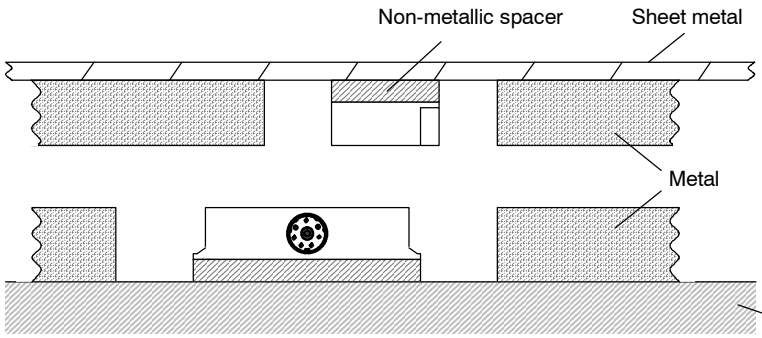
A metal carrier is located over the second transmission window of the SLG. This carrier affects the entire field. Particularly the transmission window between SLG and MDS is reduced.

Good

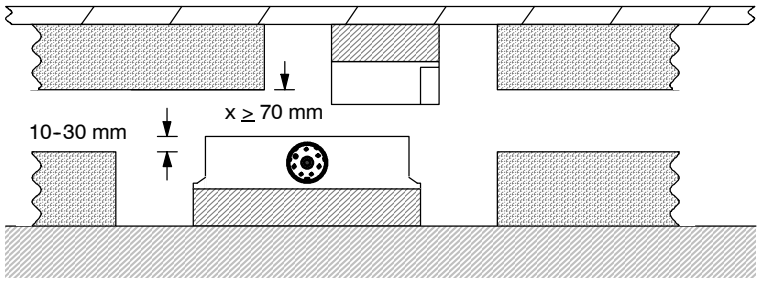
The transmission window is no longer affected when the SLG is mounted differently.

Figure 3-19 Interfering metal carriers

Flush installation

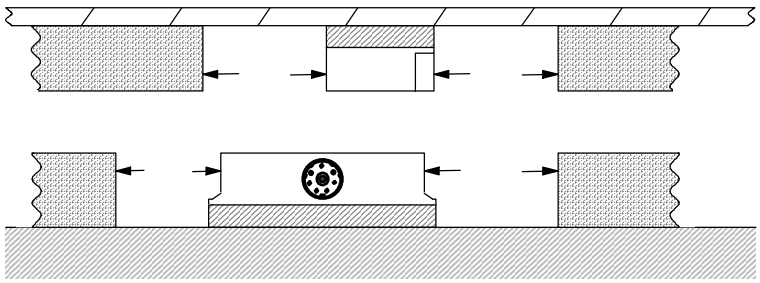


Although flush installation of MDS and SLG is generally possible, the size of the transmission window is sharply reduced. The following measures can be used to counteract reduction of the window.



Enlargement of the non-metallic spacer under the MDS and/or SLG. MDS and/or SLG are 10 to 30 mm higher than the metallic surroundings.

The value x ≥ 70 mm applies to the SLG 42 and SLG 43. This value specifies that, at a distance of x ≥ 70 mm, the SLG is no longer noticeably affected by the metal.



Enlargement of non-metallic distances a and b

The following rules of thumb apply.

- Select a and b increased with a factor of 2 to 3
- For SLG/MDS with large limit distance (SLG 43/MDS 506), enlargement of a and b has more effect than for SLG/MDS with small limit distance.
- This measure is not necessary for SLG 44/MDS 507.

Figure 3-20 Flush installation

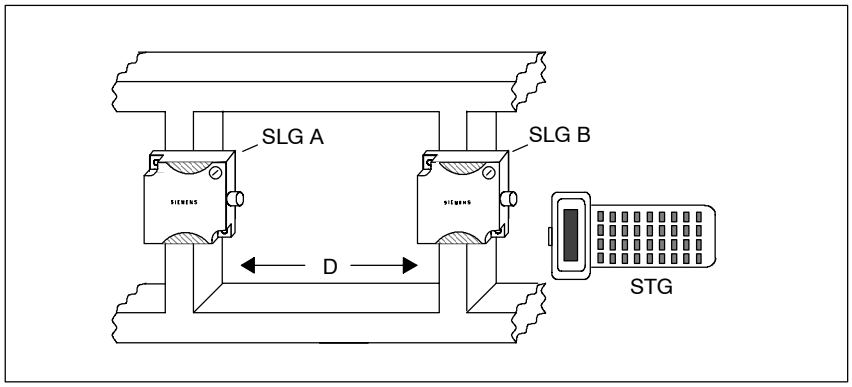
Installation of several SLGs on metal frame or carrier

Every SLG which is mounted on metal couples part of the field on the metal carrier. When minimum distance D is maintained and metal-free areas a and b are adhered to, there are usually no effects. However, when the location of an iron frame is particularly poor, there may be some effects. This will lengthen data transmission times or causes sporadic error messages on the interface.

This point is particularly important when a long-range SLG is used (i.e., SLG 43/44).

Necessary actions

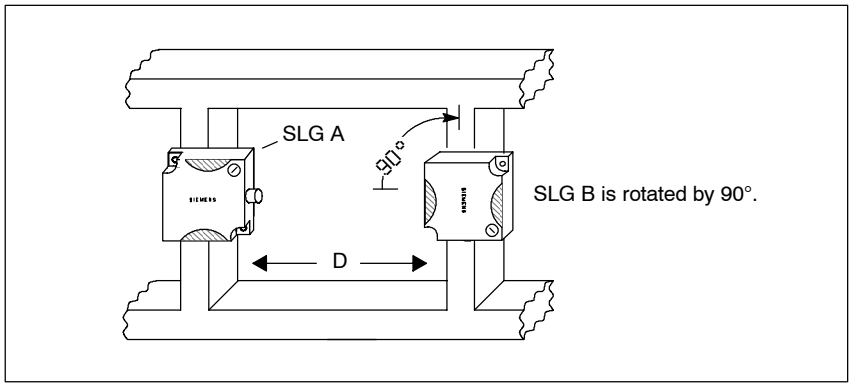
a) Using the service and test device and the "HELP" key + "A," the presence of an inductive interference field can be proven. An LED on the SLG 44 indicates the presence of such a field of interference.



Only SLG A is active. In the vicinity of SLG B, the field is measured on the metal carrier. When an interference field appears on the display, the following measures can be used to correct the situation.

b) Lengthen distance D between the two SLGs

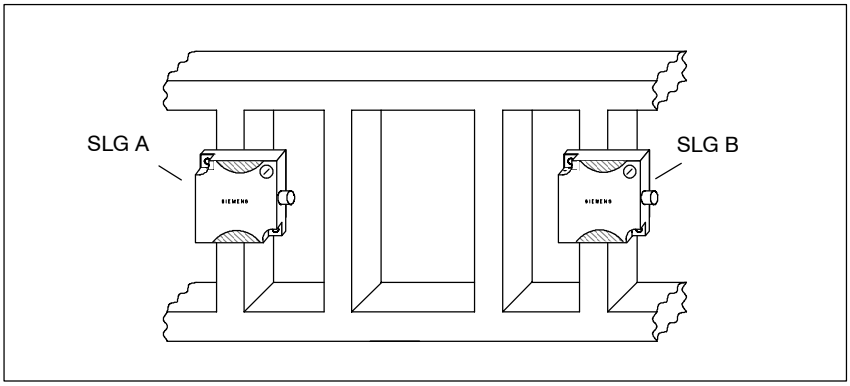
c) Turn one or both SLGs by 90°. This rotates the inductive fields so that they can no longer affect each other.



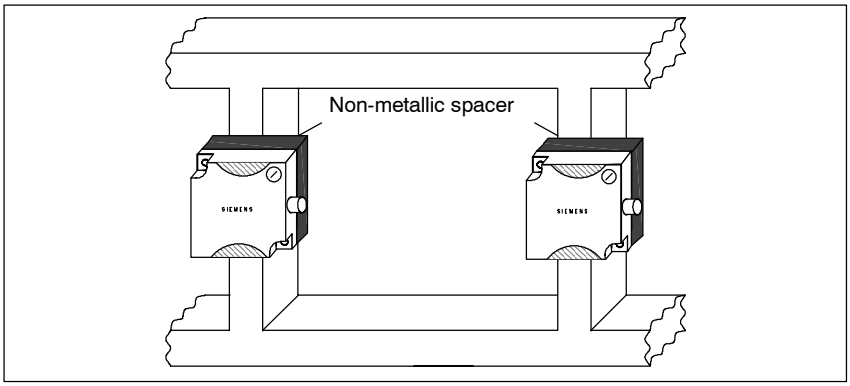
Caution

Turning the SLG alters the physical mounting of the MDS.

d) Install one or more iron struts to short circuit the parasitic fields



e) Install a non-metallic spacer of 20 to 40 mm in thickness between the SLG and the iron frame. This significantly reduces parasitic coupling of the field on the carrier.



3.5.4 Chemical Resistance of the Data Carriers

Polyamide

Table 3-9 provides an overview of chemical resistance of data memories made of polyamide 12. It should be emphasized that the plastic housing is very resistant to chemicals found in the automotive sector (e.g., oils, grease, diesel fuel, gasoline and so on) which are not listed separately here.

Table 3-9 Chemical resistance of data memories made of polyamide 12

	Concentration	20° C	60° C
Battery acid	30	●	□
Ammonia, gaseous		■	■
Ammonia, w.	Conc.	■	■
	10	■	■
Benzine		■	▲
Bleaching lye (12.5% chlorine solution)		●	□
Butane, gaseous, liquid		■	■
Butyl acetate (acetic acid butylester)		■	■
n-butyl alcohol (n-butanol)		■	▲
Calcium chloride, w.		■	▲
Calcium nitrate, w.	k.g.	■	▲
Chorine		□	□
Chrome baths, tech.		□	□
Ferrous salts, w.	k.g.	■	■
Acetic acid, w.	50	□	□
Ethyl alcohol, undenatured	96	■	▲
	50	■	■
Formaldehyde, w.	30	▲	□
	10	■	▲
Formalin		▲	□
Glycerin		■	■
Isopropanol		■	▲
Caustic potash solution, w.	50	■	■
Lysol		●	□
Magnesium salts, w.	k.g.	■	■
Methyl alcohol, w.	50	■	■
Lactic acid, w.	50	●	□
	10	▲	●
Sodium carbonate, w. (soda)	k.g.	■	■

Table 3-9 Chemical resistance of data memories made of polyamide 12

	Concentration	20° C	60° C
Sodium chloride, w.	k.g.	■	■
Sodium hydroxide		■	■
Blue salts, w.	k.g.	■	■
Nitrobenzene		▲	●
Phosphoric acid	10	○	□
Propane		■	■
Mercury		■	■
Nitric acid	10	○	□
Hydrochloric acid	10	○	□
Sulfur dioxide	Slight	■	■
Sulfuric acid	25	●	□
	10	▲	□
Hydrogen sulfide	Slight	■	■
Carbon tetrachloride		■	■
Toluol		■	▲
Laundry detergent	High	■	■
Softeners		■	■

Symbols:

■	Resistant
▲	Practically resistant
●	Somewhat resistant
○	Slightly resistant
□	Not resistant
w.	Hydrous solution
k.g.	Cold saturated

Polyphenylene sulfide (PPS)

The housing of the heat-proof MDS 439 E data memory is made of polyphenylene sulfide (i.e., PPS). The chemical resistance of the data memory is excellent. No known solvent can dissolve this substance below 200° C. Deterioration of the physical characteristics can be observed in hydrous solutions of hydrochloric acid (HCl) and nitric acid (HNO_3) at 80° C.

Resistance to all types of fuel, including methanol, is very good. The table below provides an overview of the chemicals tested.

Table 3-10 Chemical resistance of the MDS 439 E made of polyphenylene sulfide

Substance	Test Conditions		Evaluation
	Time [Days]	Temperature [°C]	
Acetone	180	55	+
n-butanol (butyl alcohol)	180	80	+
Butanone-2 (methylethylketone)	180	60	+
n-butyl acetate	180	80	+
Brake fluid	40	80	+
Calcium chloride (saturated)	40	80	+
Diesel fuel	180	80	+
Diethyl ether	40	23	+
Freon 113	40	23	+
Anti-freeze	180	120	+
Kerosene	40	60	+
Methanol	180	60	+
Motor oil	40	80	+
Sodium chloride (saturated)	40	80	+
Sodium hydroxide (30%)	180	80	+
Sodium hypochlorite (5%)	30	80	/
	180	80	-
Caustic soda (30%)	40	93	+
Nitric acid (10%)	40	23	+
Hydrochloric acid (10%)	40	80	-
Sulfuric acid (10%)	40	23	+
(10%)	40	80	/
(30%)	40	23	+
Test fuels	40	80	+
(FAM-DIN 51604-A)	180	80	/
Toluol			
1, 1, 1-trichloroethane	180	80	+
Xylene			
Zinc chloride (saturated)	180	80	/
	180	75	+
	180	80	+
	40	80	+

Evaluation:
+ Resistant, weight gain < 3% or weight loss < 0.5% and/or drop in resistance to tearing < 15%
/ Somewhat resistant, 3 to 8% weight gain or 0.5 to 3% weight loss and/or 15 to 30% drop in resistance to tearing
- Not resistant, weight gain > 8% or weight loss > 3% and/or drop in resistance to tearing > 30%

3.6 Configuration with MDS 507 and SLG 44

3.6.1 Configuring the Presence Check

Since the MDS 507 requires current from the dialog battery for communication with the SLG 44, the MDS should only be processed when a data transfer is actually to be performed. If the user uses the presence check or the file handler, there is a danger that the MDS 507 battery will be drained in a short time. This is particularly true when the MDS 507 stops opposite the SLG and remains there.

The MDS battery would be dead in a few weeks.

For this reason, the ABTAST parameter was introduced for the MDS 507.

ABTAST is a time interval which should be configured realistically. A sample configuration is shown on the next few pages.

Function

- When no MDS is in the field, the field is continuously scanned for an MDS as before. This ensures that an MDS command will be processed immediately when the MDS enters the transmission window.
- When an MDS has been detected (i.e., MDS present), the surroundings of the SLG are only scanned cyclically for an MDS. At the time intervals specified by ABTAST, the ASM inquires whether the MDS is still present.
- When the MDS has left the field, continuous scanning begins again, and a new MDS is detected immediately.
- When the user sends an MDS command, this command is processed immediately with the MDS regardless of ABTAST.

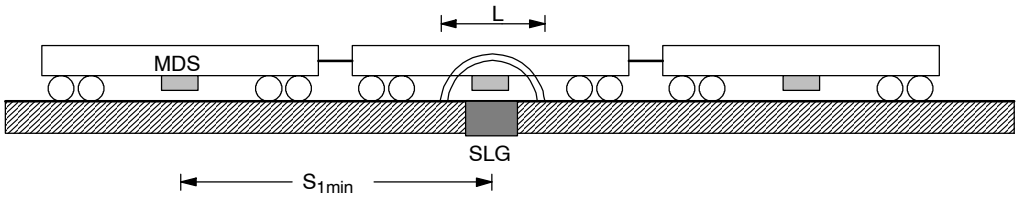
Note

If the MDS is removed from the field and a new MDS enters while the ABTAST time is running, the ASM does not detect a change in presence and this information is not forwarded to the user.

Sample configuration of ABTAST

A train consists of several cars. An MDS is attached to the middle of each car. Each car must be clearly identified (i.e., the user must be able to detect the ”non-presence” of an MDS after an MDS has left the field but before the next MDS enters the field of the SLG).

Since the train, and thus the MDS, may remain stopped opposite an SLG for a very long period of time, MDS dialog battery discharging should be optimized.



V_{max}	=	50 km/h	→	Maximum speed of the train at which the MDS is processed
S_{1min}	=	20 m	→	Shortest distance between two data memories
L	=	2 m	→	Field length of the SLG with the MDS 507. Contrary to general configuration guidelines, the maximum possible field length of the SLG should be used here. Cf. chap. 2.2.
t_{NANW}	=	80 msec	→	Time which the system requires to detect and report (constant) the “non-presence” of an MDS
t_{ABTAST}			→	Maximum time to be configured between two scanning intervals between MDS and SLG

Figure 3-21 Sample configuration of t_{ABTAST}: Train with several cars

The following relationship exists.

$$t_{ABTAST} \leq \frac{S_{1min} - L}{V_{max}} - t_{NANW}$$

$$t_{ABTAST} \leq \frac{20\,m - 2\,m}{50\,km/h} - 0.08\ \text{sec} = 1.296\ \text{sec} - 0.08\ \text{sec}$$

$$t_{ABTAST} \leq 1.2\ \text{sec}$$

With this configuration, the MDS is processed at intervals of 1.2 sec for a duration of 20 msec. If the MDS remains in front of the SLG for an entire day, the MDS is only processed for the following time during one day.

$$t = \frac{0.02\,s}{1.2\,s} \cdot 24\,h = 0.4\,h = 24\ \text{min}$$

The battery of the MDS is only used 24 minutes per day. See also table 3-11.

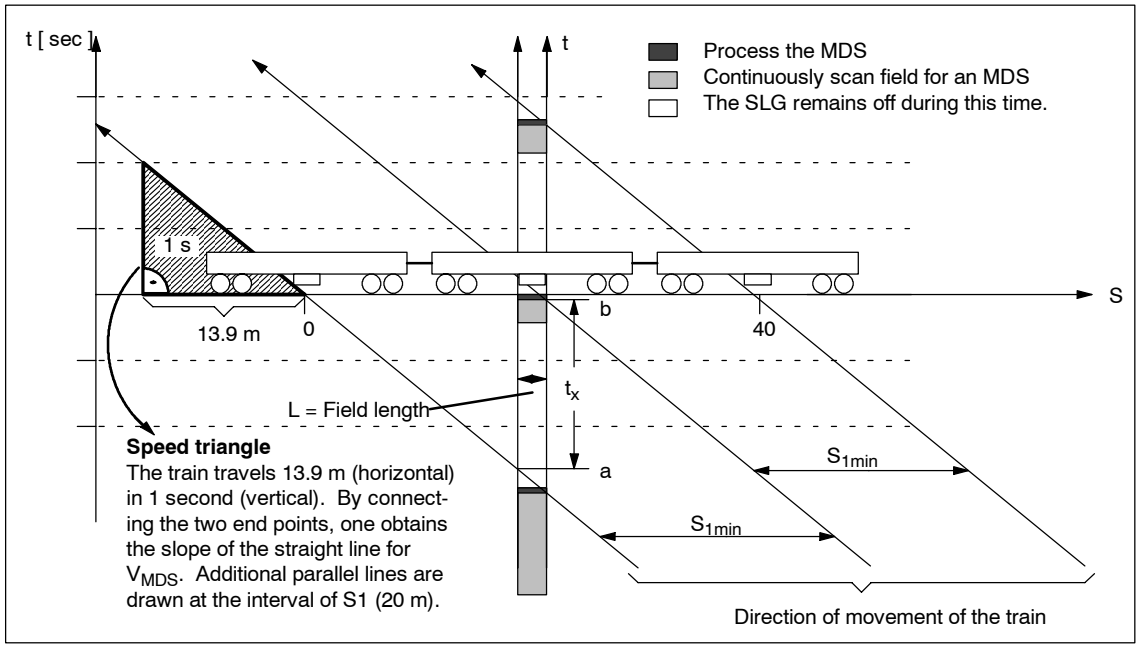


Figure 3-22 Diagram of the configuration (drawn to scale)

Requirements for maximum t_{ABTAST}

$$t_{ABTAST} \leq t_x - t_{NANW}$$

as shown by the diagram: tx ≈ 1.3 sec

t_x = Shown in the diagram: Time after which an MDS has left the field but before the next MDS has entered the field of the SLG
- a: MDS leaves the transmission window.
- b: The next MDS enters the transmission window.

3.6.2 Parameterization of the MDS 507 in the Software

Special parameterization of the MDS 507 is required so that the presence check can be set.

The value t_{ABTAST} must be calculated and then forwarded to the interface module. The time t_{ABTAST} is stored in one byte which is coded as shown below.

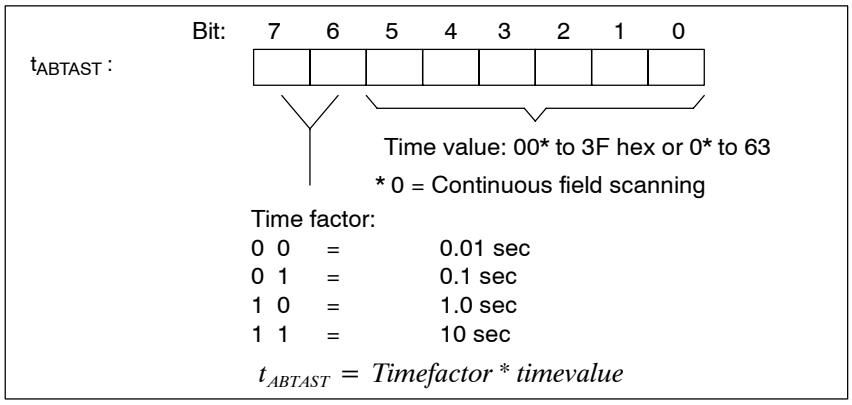


Figure 3-23 Coding for t_{ABTAST}

The following table provides several rules of thumb on the actual processing time per day of an MDS which has stopped permanently in front of the SLG.

Table 3-11 Actual processing time of an MDS

Time t_{ABTAST} [Sec]	t_{ABTAST} [H]	MDS-Processing[1] per Day	Min. Life Span of MDS Battery[2] (100 h for Continuous Operation)
0	00	24 h	4.2 days
0.01	01	16 h	6.2 days
0.05	05	9.6 h	10.5 days
0.1	40	4,8 h	20 days
0.5	45	58 min	104 days
1	80	29 min	207 days
5	85	5.8 min	3 years
10	C0	2.9 min	> 5 years [3]
50	C5	34 s	> 5 years [3]
100	CA	17 s	> 5 years [3]

1 The MDS is turned on for 20 msec for each ANW processing.
2 The values apply to an ambient temperature of T_u = 20° to 30° C. Spontaneous discharge of the battery increases for higher ambient temperatures.
3 With an MDS battery older than 5 years, the life span of the battery is primarily determined by spontaneous discharge of the battery.

FB 250

t_{ABTAST} is transferred via the FB parameter assignment TYP=3. DB ZUW contains the following parameters.

1. Data value = 0401
2. Data value = 0000

t_{ABTAST} is specified in the 1st byte of DB DAT (left-hand data byte).

ASM 410

With the ASM 410, the MDS 507 is parameterized via the PIO (bit 4 of byte 1). t_{ABTAST} is transferred in byte 4 of the PIO during the RESET command.

ASM 420/ASM 440

t_{ABTAST} is transferred with an extended RESET command. t_{ABTAST} is transferred as a hex value in the 4th byte. The old 2-byte RESET command can continue to be used.

The t_{ABTAST} parameter cannot be assigned for SINUMERIK operation.

FB 230/FB 246/ FC 46

When FB 230 is called, t_{ABTAST} is set with the ABTA parameter. It is transferred as a hex value from 0000 to 00FF.

Bit 12 in BEST has the following meaning when used with the MDS 507.
1 = The dialog battery of the MDS 507 has passed below the threshold value.

ASM 421

The t_{ABTAST} parameter is transferred with an extended RESET command. The old RESET command can continue to be used.

FB 240/FC 44

MDS 507 operation is set via the M507 parameter when FB 240 is called. M507 must be set to 1. t_{ABTAST} time is then transferred in the ABTA parameter.

FC 47/FB 47

MDS 507 operation is set via the MOBY=2 parameter when FC 47 is called. t_{ABTAST} time is then transferred in the ABTA parameter.

3.6.3 Extended Configuration Aids

The transmission window

The figure below shows the real transmission window between the MDS 507 and the SLG 44.

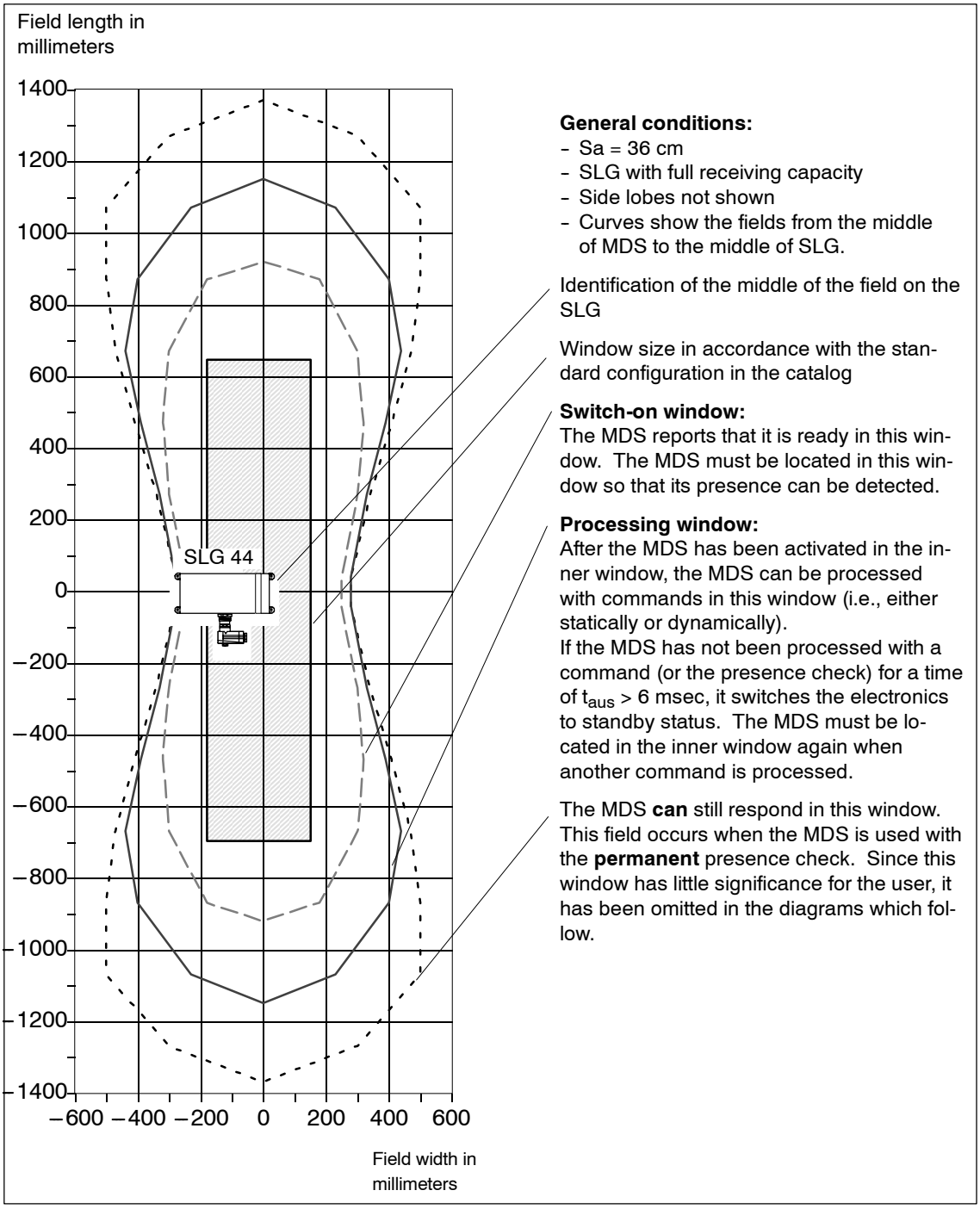


Figure 3-24 Real transmission window between the MDS 507 and the SLG 44

This figure shows the middle of the transmission window in accordance with the standard configuration. The real transmission window is usually larger depending on various factors. On the next few pages, the transmission window is shown under different general conditions. The general conditions are listed below.

- Operating distance
- Main lobe or main and side lobe
- Reduction of SLG receiving capacity
- Angle deviation

Main lobe with different operating distances

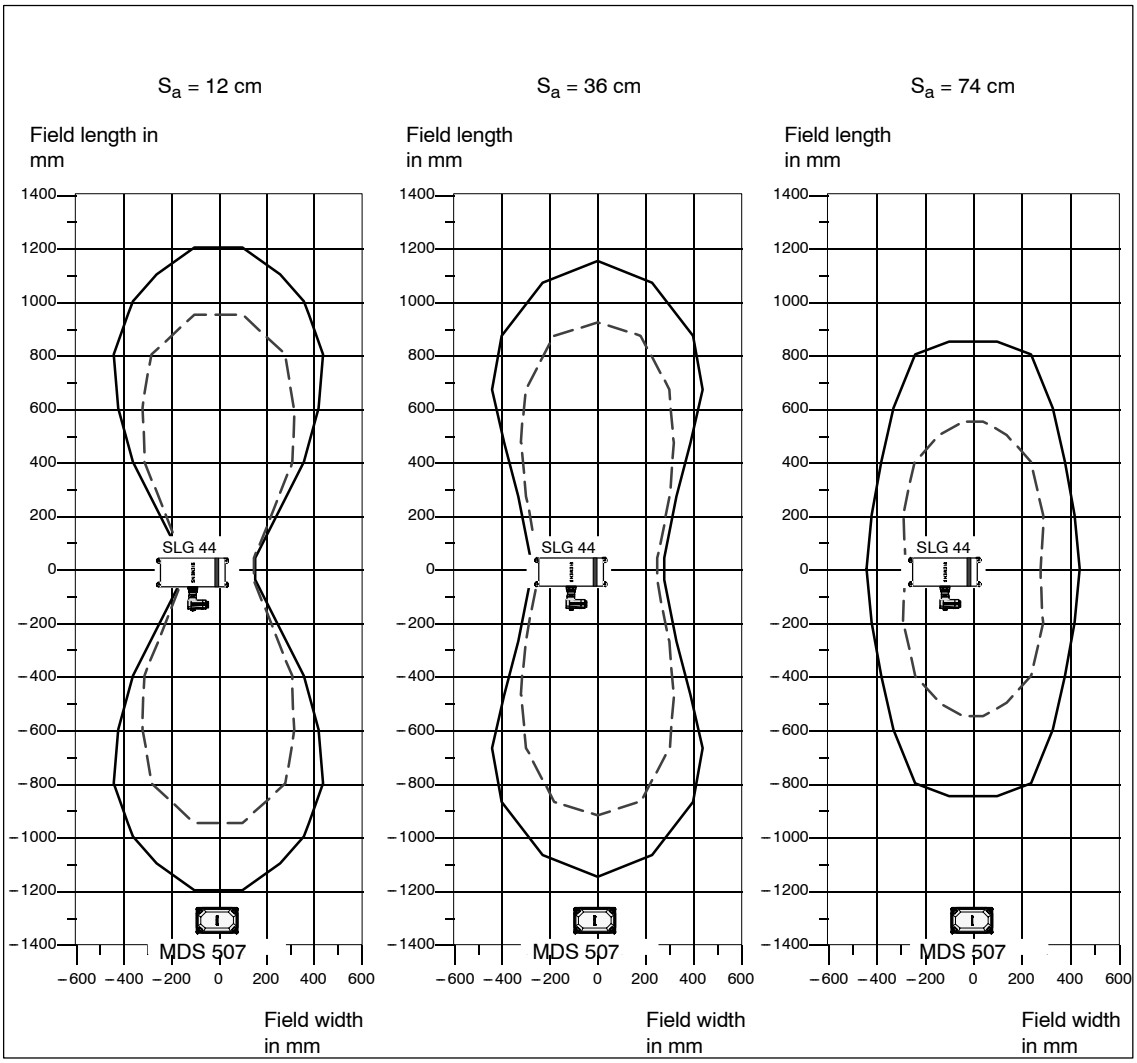
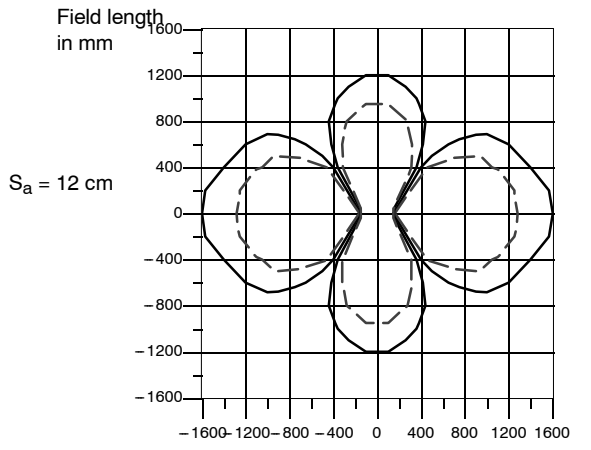
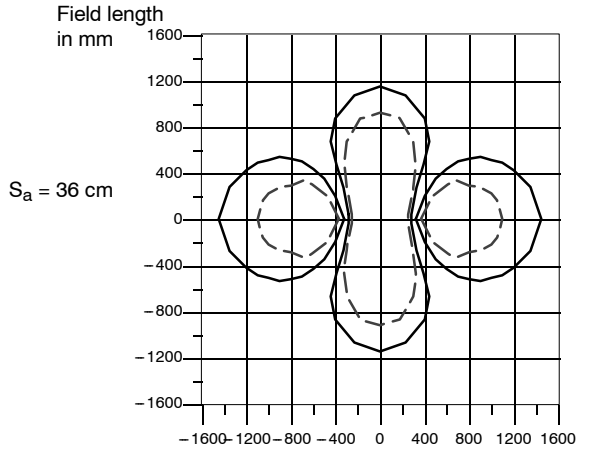


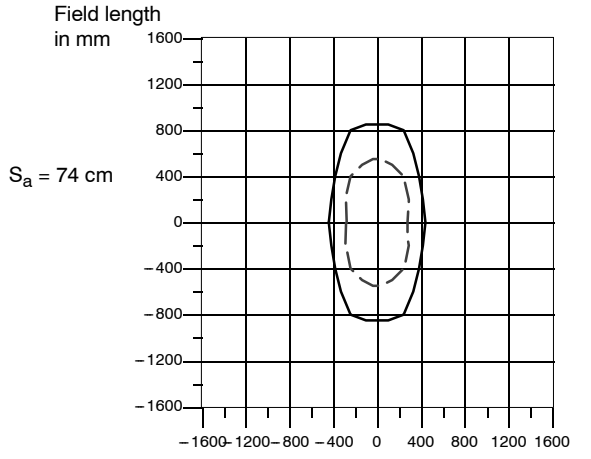
Figure 3-25 Main lobe with different operating distances

Main and side lobes with different operating distances



When operating distances are small (i.e., S_a = 100 mm, MDS = 300 mm), the width of the field with main and side lobes is larger than the length of the field.
In the vicinity of the SLG, the transmission gap between main and side lobes is no longer detectable. The width of the transmission gap is approx. 2 mm.





No side lobes are visible at an operating distance of S_a > 600 mm.

Figure 3-26 Main and side lobes with different operating distances

Reduction of SLG receiving capacity

Under interference-prone industrial conditions, the receiving capacity of the SLG 44 can be reduced. Cf. chap. 3.6.5.

The figure below shows the transmission window of an SLG 44 with varying receiving capacities. The switch-on window is shown for each.

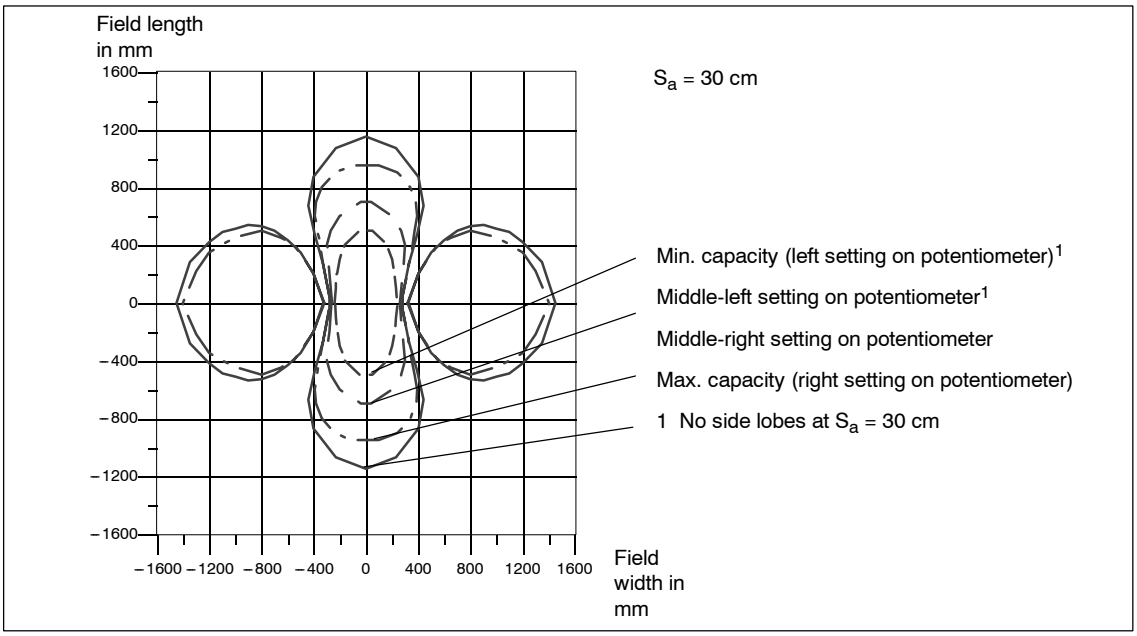


Figure 3-27 Switch-on window for various receiving capacities

Angle deviation

When the MDS 507 is used, the antennas of MDS and SLG must be aligned. The following transmission windows result at an angle deviation (Φ).

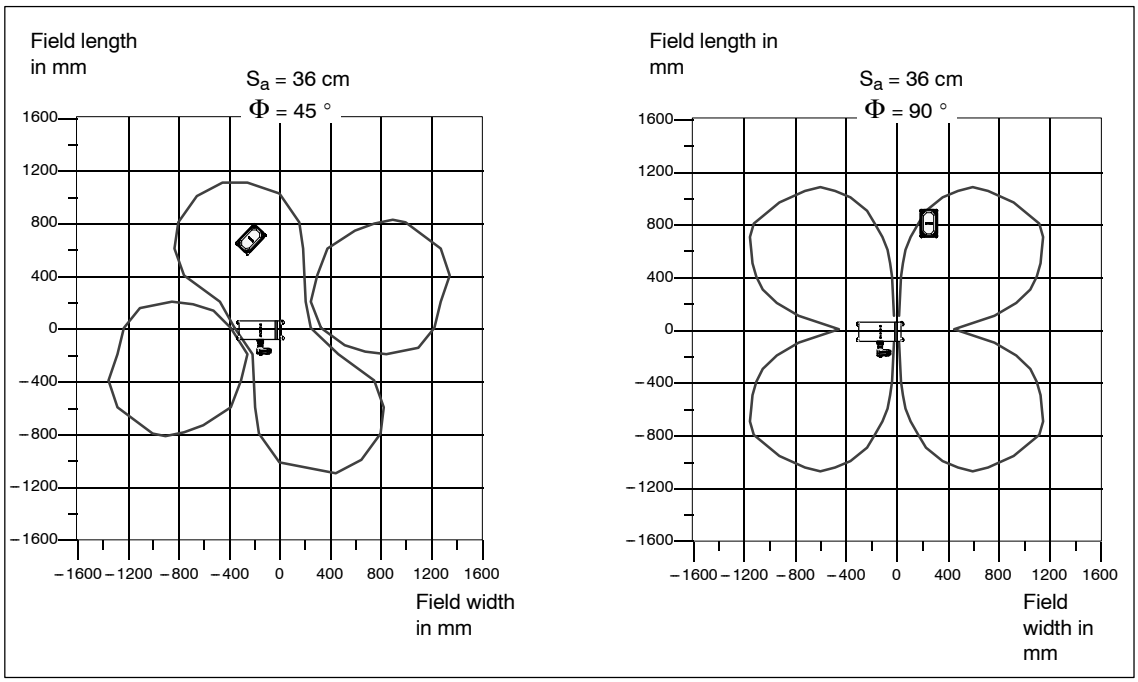


Figure 3-28 Switch-on window with various angle deviations

Distance D or D1

The following values are specified for the general configuration.

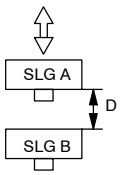
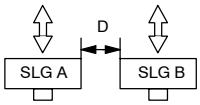
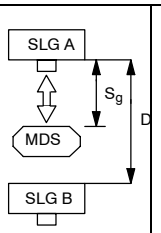
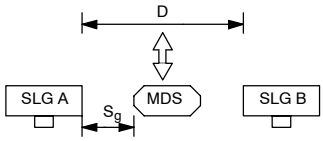
$D = 6\,m$ (SLG ↔ SLG)

$D1 = 4\,m$ (MDS ↔ MDS)

When these values are adhered to, there are usually no reciprocal influences even when SLG and MDS are installed under poor conditions. However, the actual space available often makes it impossible to adhere to these required minimum distances.

It is frequently possible to underrange the minimum distances. Field measurement with suitable measuring instruments may have to be performed.

The following tables shows the absolute minimum distances (D).

Configuration / SLG 44 5)	1) 	2) 	3) 	4) 
Max. sensitivity	2.4	3.0	3.1	4.2
Middle setting	1.8	1.8	2.9	3.5
Min. sensitivity	0.45	0.45	1.6	2.1

All specifications in meters (m)

1) Both SLGs have the main lobe pointed at each other. When the MDS (not shown) moves from SLG A to SLG B, the configuration shown in column 3 results.
2) Both SLGs have the side lobes pointed at each other.
3) SLG A communicates with the MDS at the boundary of the main lobe. D is the minimum distance at which SLG B stops receiving information from the MDS. The operating distance between MDS and SLG A is only a few centimeters.
4) Setting of the receiving capacity is performed via the potentiometer as described in chapter 3.6.5. The strength of the sending field remains unchanged at the maximum value.
⇳ Shows the direction of movement of an MDS
S_g The MDS is located on the boundary of the SLG.
5) Setting of the receiving capacity is performed via the potentiometer as described in chapter 3.6.5. The strength of the sending field remains unchanged at the maximum value.

Applicable in general:

- The values in the table are based on non-metallic surroundings.
- Installation on metal may increase distance D significantly.
- The special definition of D1 (minimum distance MDS ↔ MDS) must be: Two MDSs must never be located in the field of one SLG at the same time. However, it must be remembered that metallic surroundings may increase the limit distance (and thus D1). The transmission windows shown in this chapter can be used for the configuration of D1 (but only when D1 must be < 4 m).
- Since the values specified here are subject to tolerances, we recommend configuring all values with ± 20%.

Processing the MDS 507 with the SLG 42/43

There are 2 modes with which MDS 507 can be processed with SLG 42 or SLG 43.

a) The dialog battery on the MDS 507 is okay.

- The field of the SLG 42/43 has the same shape as when working with SLG 44. The middle of the field is the middle of the SLG.
- MDS 507 is direction-dependent.
- The field data of the MDS are sharply reduced in comparison to operation with SLG 44.
- Rules of thumb for the limit distance
  SLG 42 ↔ MDS 507: 150 mm
  SLG 43 ↔ MDS 507: 300 mm

Caution

The distance from MDS to MDS (D1) must have the specified value (cf. chap. 3.3). If D1 is not adhered to, other MDSs which appear not to be in the field may be processed by mistake.

Remember that, when still approx. 1 to 3 m away from the SLG, the MDS 507 is switched on already by the field of the SLG 42/43. The battery of the MDS will be discharged continuously when the MDS is located between the stated S_g and 1 m. Between 1 and 3 m, the MDS can still be switched on occasionally.

b) The dialog battery of the MDS 507 is discharged or does not exist.

- The MDS 507 can no longer be processed with the SLG 44.
- The MDS 507 has a receiving antenna for power transmission (i.e., the MDS can be processed with the SLG 42/43 without a dialog battery).
- The data transmission of the MDS 507 is direction-dependent.
- Rules of thumb for the limit distance:
  SLG 42 ↔ MDS 507: 70 mm
  SLG 43 ↔ MDS 507: 100 mm
  Due to the transmission of power to the MDS, the limit distances specified here are much smaller than the values listed under a).
- General functionality of the MDS 507 can always be checked in this operating mode.
- A dead dialog battery is **not** reported to the user when the MDS 507 is not positioned in the middle. Cf. figure 3-29.

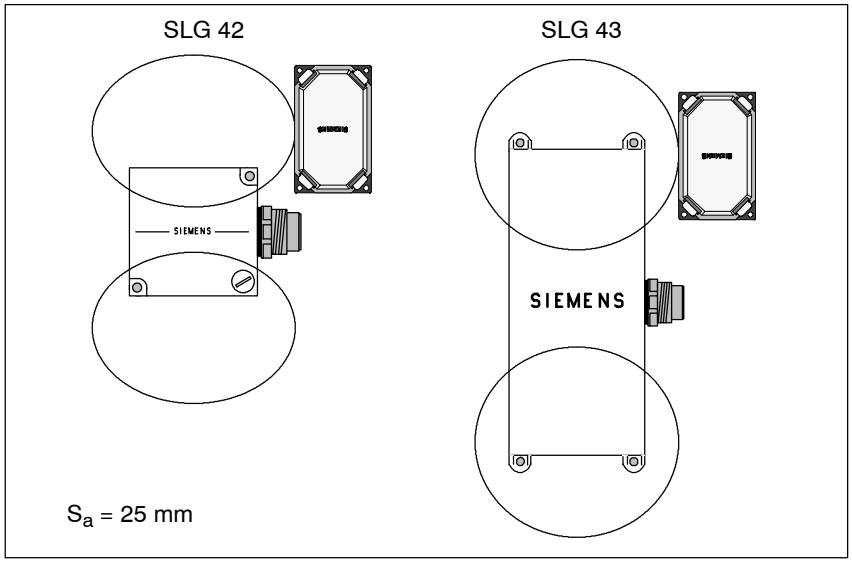
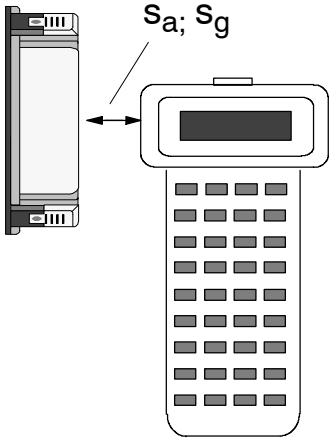


Figure 3-29 Transmission window of the MDS 507 with dead battery

3.6.4 Dead Battery Measurement and Changing the Battery for MDS 507

Dead battery measurement with the STG



Dialog battery full: Limit distance S_g is approx. 60 mm.

Dialog battery empty: Limit distance S_g is approx. 25 mm.

Applicable in general:

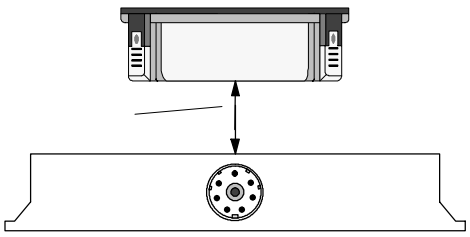
The dialog battery is okay when MDS can be processed at S_a > 40 mm.

Remember:

The dead battery message on the display of the STG is only indicated when the MDS is operated in the boundary area of communication (e.g., at S_a = 20 mm). When the MDS is operated close to the STG (e.g., S_a = 10 mm), power transmission from STG to MDS becomes so strong that no dead battery message is displayed even though the battery is actually dead.

Figure 3-30 Dead battery measurement with the STG

Dead battery measurement with SLG 43



Dialog battery full: Limit distance S_g is approx. 340 mm.

Dialog battery empty: Limit distance S_g is approx. 50 to 100 mm.

Applicable in general:

The dialog battery is okay if the MDS can be processed at Sa > 50 mm and positioning of SLG to MDS is in the middle, and if no dead battery message is indicated.

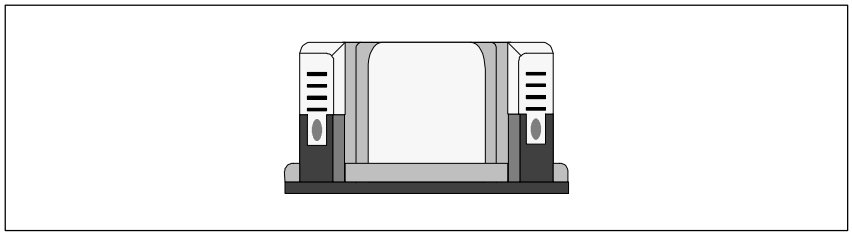
Remember:

The dead battery message will not be generated correctly when the MDS is not positioned in the middle.

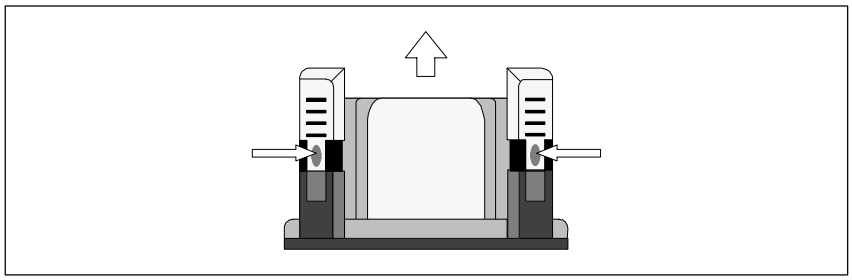
Figure 3-31 Dead battery message with SLG 43

Changing the battery

a) Unlock the four housing locking mechanisms.



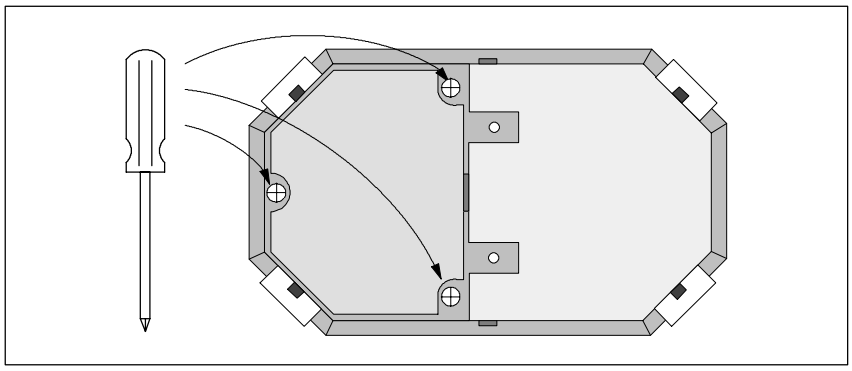
b) At the lower ends, press the locks simultaneously towards the inside, and lift the upper part of the housing with the electronics.



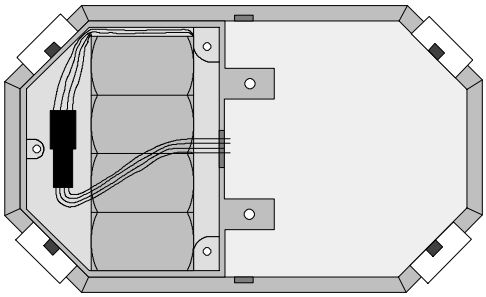
Note

Temperature fluctuations can create a semi vacuum inside the MDS making it difficult to lift the upper part of the housing. If this happens, use a small screw driver to separate the upper part of the housing from the lower part while pressing the locking mechanisms at the same time.

c) Open the battery compartment with a crosstip screw driver.

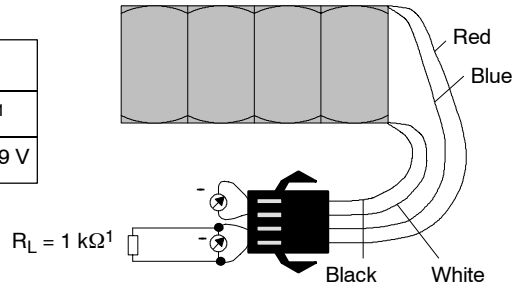


d) Using the plug-in terminal, remove the used battery block from the MDS and install the new battery block. Install cable, plug connector and battery in the battery compartment as shown.



The battery voltages can be checked as shown in the adjacent drawing.

New Battery		Bad Battery	
U1	U2	U1	U2 [1]
3.1 V	9.3 V	< 2.7 V	< 7.9 V



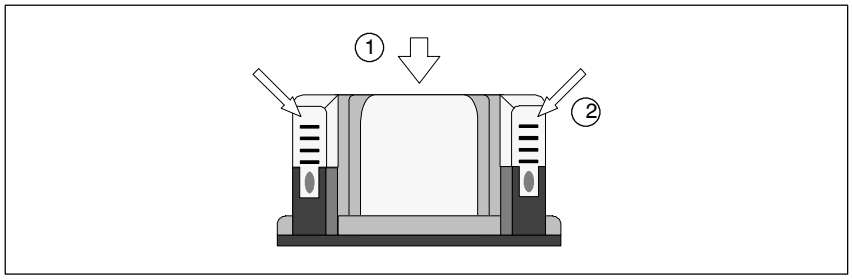
1 To measure voltage U_2, install a load resistor (R_L = 1 kΩ) in parallel to the measuring instrument. This is particularly important for bad batteries.

Caution

Use original replacement batteries only.

e) Place cover on battery compartment, and tighten the screws slightly. The clamps on the cover of the battery compartment should now hold the new batteries in place. This can be checked by shaking the MDS. There should be no rattling inside.

f) Place the MDS back on the housing cover (1), and close the locking mechanisms (2).



g) Before being used again, the MDS 507 must be initialized or formatted.

Caution

The contents of the RAM are lost when the battery is changed. If necessary, the user data can be stored intermediately on an STG.

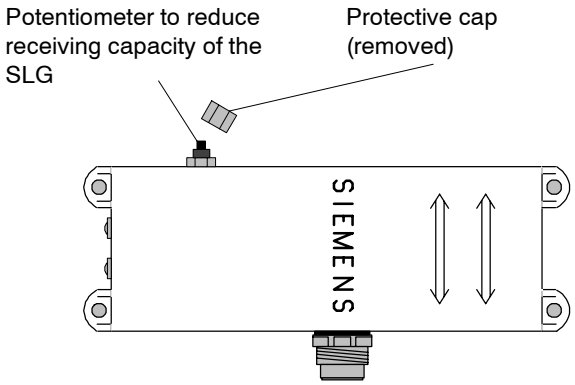
3.6.5 Reducing the Sensitivity of the SLG 44

The measures described in this chapter are only required when the SLG is receiving excessive interference from other devices. Such interference is indicated by the yellow LED on the SLG.

Reducing the receiving capacity

A reduction of the receiving capacity should not be necessary when all components of a system adhere to the guidelines on radio technology. The sensitivity of an SLG 44 should not be reduced before system interference is correctly suppressed. To accomplish this, follow the steps below.

1. Install the SLG, and make sure that no MDS is in the vicinity. If the yellow LED goes on, this means that the location at which the SLG is installed is causing interference. The receiving capacity of the SLG must be reduced.
2. Turn the potentiometer counter clockwise until the yellow LED goes off.
3. Move an MDS 507 into the field of the SLG 44. The green LED indicates how great the limit distance still is with reduced sensitivity.



Limit Distance at Reduced Sensitivity (Approx. Values)	
To the right	1 m
Middle position	0.65 m
To the left	0.3 m

Factory setting:

"To the right" corresponds to maximum sensitivity.

Figure 3-32 Reduction of the receiving capacity of the SLG 44

Caution

The sending strength of the SLG is retained even when the receiving capacity is reduced. This creates an area in the boundary area of the SLG in which the MDS has already been switched on but the SLG cannot yet communicate with the MDS. Measures should be provided in the system to prevent an MDS from remaining overly long in the boundary area of an SLG whose receiving capacity has been reduced.

When an MDS does remain in this boundary area for a longer period of time anyway (e.g., several days), premature failure of the MDS battery must be expected.

If this happens, the strength of the sending field can be reduced. Since this involves a manipulation of the circuitry, only authorized personnel may perform this task.

The procedure is described in the next section.

Option: reduction of the strength of the sending field

Caution

The following procedure involving the circuitry of the SLG 44 may only be performed by authorized personnel.

The procedure may only be performed when the voltage is off. The EMC/ ESD protective measures for electronic circuits must be adhered to.

Reduction of the strength of the sending field of the SLG 44 may become necessary under one or more of the following conditions.

- An MDS remains in the boundary area of a “sensitivity-reduced” SLG for a long period of time.
- A second SLG is to be positioned in the immediate vicinity.

The receiving capacity of the SLG must have already been reduced as described above before the measures below may be performed.

The SLG 44 is always delivered with maximum sending field strength. The sending field strength is reduced by soldering in short-circuit jumpers in the electronics. The following steps must be performed.

a) After removing the eight crosstip screws, open the cover of the SLG 44.

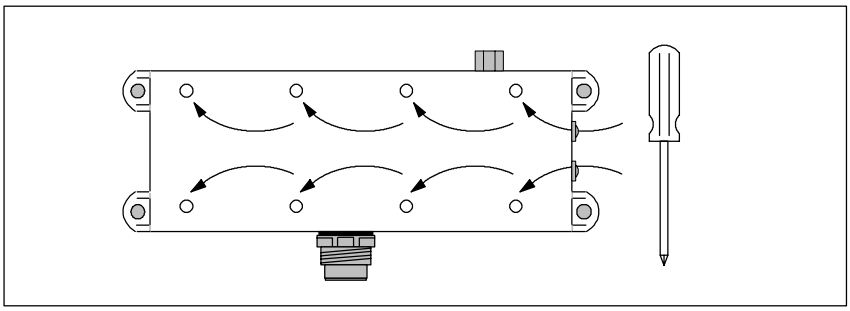


Figure 3-33 Opening the cover of the SLG 44

b) On the protruding soldering bases (A, B, C and D), solder in 1 to 4 soldered jumpers with an electronics soldering iron.

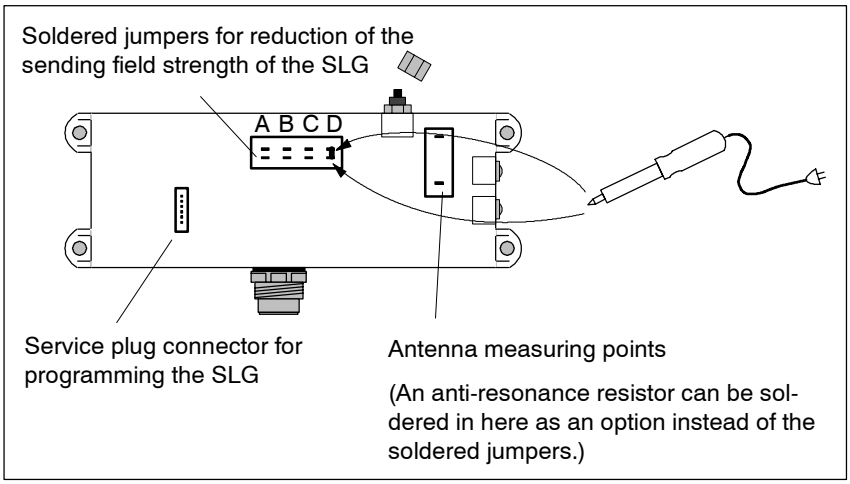


Figure 3-34 Soldered jumpers and antenna measuring points on the SLG 44

Table 3-12 Limit distance S_g for reduced sending field strength

Jumper	S_g
None	1 m
A + D	0.9 m
A + D + B	0.8 m
A + D + B + C	0.5 m

These limit distances have been measured for an SLG with full receiving capacity.

When setting the jumpers, make sure that the range of the sending field strength is smaller than or equal to the receiving range.

c) A test should be performed before the SLG is closed again. Several jumper combinations may have to be tested.

d) Identification of the hardware status

The modified status of the SLG must be marked on the outside. A label with date and jumpers used must be affixed next to the SLG plug connector.

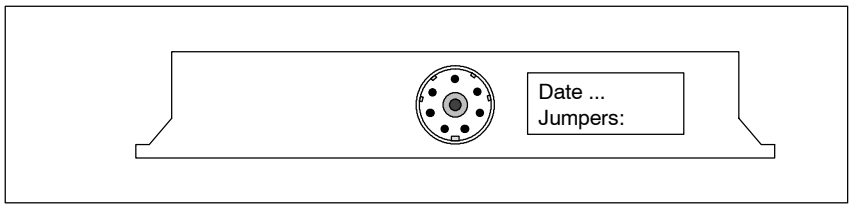


Figure 3-35 Label for identification of the hardware status

e) Close the housing as shown below.

Caution

Fulfillment of protection rating IP65 requires that the SLG be provided with a new seal.

Carefully place new seal on the cover. Place the SLG on top, and press together.

Make sure that the seal is not pinched. Then tighten the screws.

3.7 Configuration with MDS 439 E (Heat-Proof)

3.7.1 Temperature Dependency of the Transmission Window

With the exception of the limit distance and the field length at temperatures in excess of 85° C, the same guidelines as described in chap. 3.1 for the other MDSs apply to the configuration of heat-proof data memories. For example, the calculation of the transmission window includes the factor 0.8, and the production tolerances and temperature influences up to 85° C have been considered. However, this factor is not a constant. Instead, it is a function of the temperature which must be considered when 85° C (up to 110° C) is exceeded (i.e., when the mean temperature inside the data memory exceeds 85° C, an additional offset factor must be included in the calculation).

$$t_{v[T<85\,^{\circ}C]} = \frac{L \cdot 0.8}{V_{MDS}}$$

$$S_{g[T>85\,^{\circ}C]} = S_g \cdot C \qquad L_{[T>85\,^{\circ}C]} = L \cdot C$$

$$t_{v[T>85\,^{\circ}C]} = \frac{L \cdot C \cdot 0.8}{V_{MDS}} \frac{[m]}{[m/sec]}$$

L	=	Field length
S_g	=	Limit distance between MDS - SLG
V_{MDS}	=	Speed of the MDS
C	=	Offset factor for temperatures > 85° C (cf. table)
t_V	=	Transmit period of the MDS

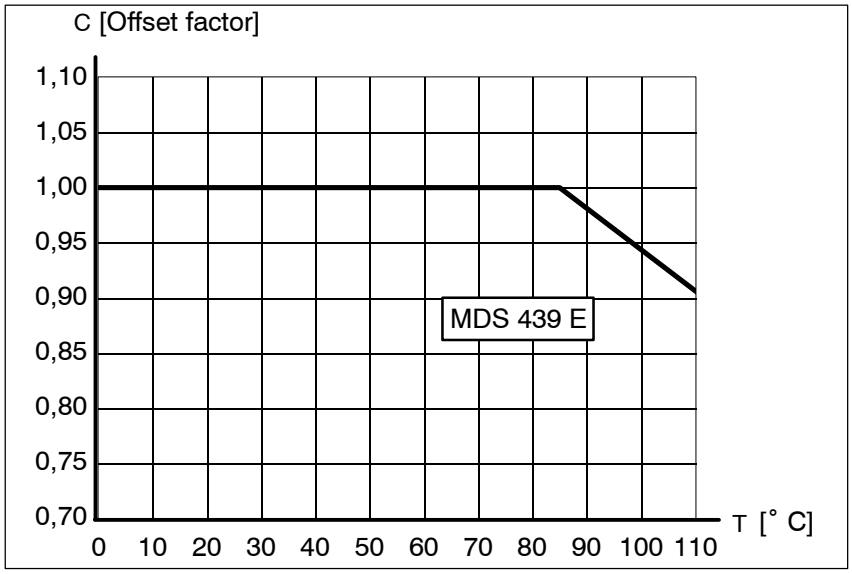


Figure 3-36 Offset factor C in relation to the temperature

The following chart shows the reduction of the limit distance and the field length under excessive processing temperatures (i.e., inner temperatures of the MDS).

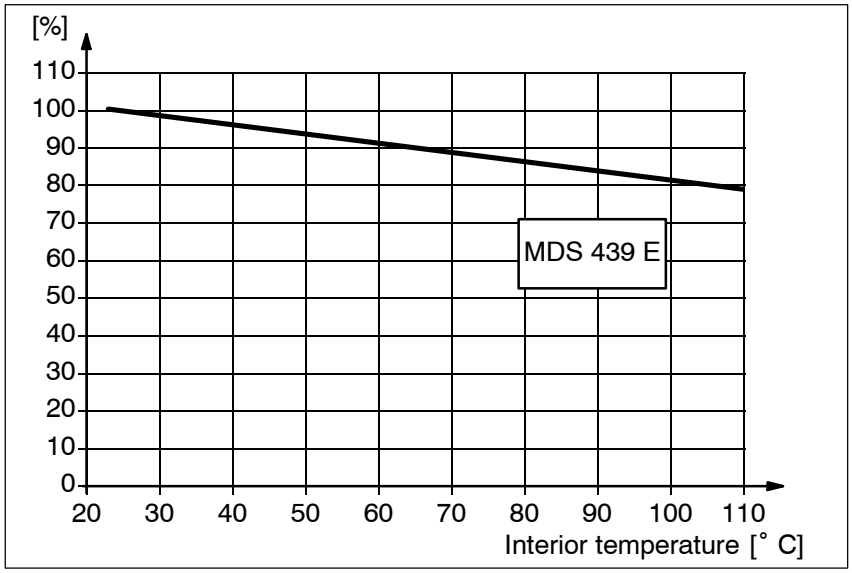


Figure 3-37 Reduction of field length and limit distance

The decrease in field data under high temperatures is caused by the higher current consumption of the electronics.

3.7.2 Temperatures During Cyclic Operation

Cyclic operation is not required for ambient temperatures up to 110° C (i.e., up to this temperature, the MDS can be used continuously).

For ambient temperatures between 110° C and 200° C, it must be ensured that the interior temperature of the MDS does not exceed the critical threshold (i.e., 110° C). Each period of heating up must be followed by a period of cooling off. Several limit cycles are shown in the following table.

Table 3-13 Limit cycles of the temperature for MDS 439 E

T_u (Heating Up)	Heating Up	T_u (Cooling Off)	Cooling Off
200˚ C	2 h	25˚ C	> 8 h
200˚ C	1 h	25˚ C	> 2 h
190˚ C	2 h	25˚ C	> 7 h
190˚ C	1 h	25˚ C	> 1 h 45 min
180˚ C	2 h	25˚ C	> 5 h 30 min
170˚ C	2 h	25˚ C	> 4 h 30 min

The interior temperature of the MDS follows an e-function. This makes it possible to calculate in advance the interior temperature or the functionality of the MDS. This is particularly important for applications in which temperature is a critical factor or which work with a complex temperature profile.

Note

On request, Siemens will calculate the temperature curves.

A precise knowledge of the interior temperature simplifies configuration of applications in which temperature is a critical factor.

Caution

Ambient temperatures > 200° C

Exposing the data memories to ambient temperatures over 200° C will invalidate all rights to warranty claims.

However, physical stability is maintained up to 230° C!

Example of a cyclic process

Table 3-14 Typical temperature profile of an application in a paint shop

Start of the MDS at the i-Point		Duration (in Minutes)	Ambient Temperature (° C)
Base coat		20	25
Drying chamber		25	135
Surface coat		45	25
Drying chamber	Preheat	15	90
	Dry	20	200
	Cool	15	110
Transfer out		45	25

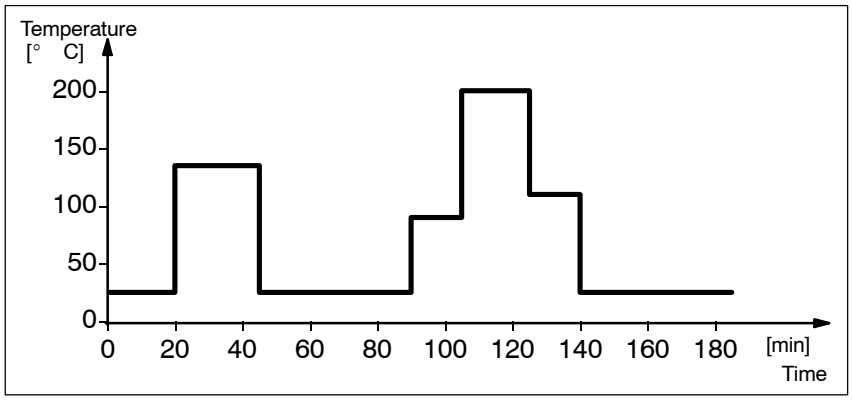


Figure 3-38 Graphic progression of the temperature profile from table 3-14

The results of the simulation are listed below.

After a simulation time of 12 hours, a total of 3 cycles were passed through, and an interior temperature of 84 degrees Centigrade was reached.

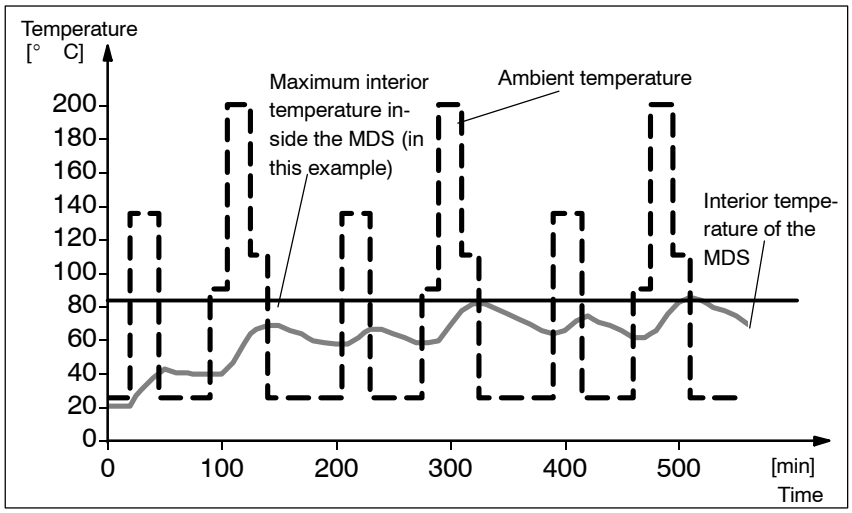


Figure 3-39 Complete temperature progression during simulation

3.7.3 Life Span of the Mobile Data Memory

The life span of the data memory is affected by several factors.

- Life span of the electronics
- Number of temperature cycles
- Type of temperature cycles
- Number of write-accesses
- Aging of the housing
- Aging of the heat insulation
- Frequency of write-accesses
- Data retention time of the EEPROM

The frequency of write-accesses is the primary factor affecting the life span of the data memory.

Operation with ECC driver

The ECC driver provides additional security on the correctness of MDS data.

The manufacturer of the data memory guarantees only 10,000 write-accesses.

When the ECC driver is used, the user is ensured the same data security up to the actual end of the MDS life span.

Notes on ECC use

- Accesses times to MDS data are increased (i.e., less data can be processed during dynamic operation).
- The net capacity of the MDS is reduced.
- When a data correction is performed, the result may be delayed by as much as one second.

Caution

Interior temperature > 110° C

When the MDS is used at an interior temperature > 110° C, all rights to guarantee claims are invalidated. Interior temperatures under 180° C will not electrically destroy the data memory. This applies to the electronics in particular. The data contents of the EEPROM may be lost at interior temperatures > 110° C. An error message is generated during the next processing procedure, and the error status can be corrected by initializing the MDS.

Under extraordinary conditions, the MDS can also be used for applications in which internal temperatures of up to 125° C can occur. Use in such applications must always be coordinated in advance with Siemens.

3.8 EMC Guidelines

3.8.1 Foreword

The EMC guidelines contain the following information.

- Why are the EMC guidelines necessary?
- What interference affects the controller from the outside?
- How can interference be prevented?
- How can interference be corrected?
- Which standards apply to the EMC guidelines?
- Examples of an interference-suppressed system setup

The description is directed to “qualified personnel.”

- Configuration engineers and planners who plan system configuration with the MOBY modules and who must adhere to the required guidelines
- Skilled personnel and service engineers who install the connection cables based on this description or who can correct deficiencies in this area when a malfunction occurs.

Warning

Non-adherence to especially highlighted notes can cause dangerous states in the system or destroy either single components or the entire system.

3.8.2 General

The continuously growing use of electrical and electronic devices brings with it the following characteristics.

- Greater concentration of components
- Increasing capacity of power electronics
- Rising switching speeds
- Lower current consumption of the components

The higher the degree of automation, the greater the danger that devices will interfere with one another.

Electromagnetic compatibility (i.e., EMC) is the ability of a piece of electrical or electronic equipment to function correctly in an electromagnetic environment without interfering with or adversely affecting its surroundings within certain limits.

EMC can be divided into three areas.

- Intrinsic interference immunity
  Resistance to internal (i.e., own) electrical interference
- Free interference immunity
  Resistance to external electromagnetic interference
- Degree of interference emission
  Interference emission and effects of the electrical environment

All three areas are included in the test of an electrical device.

MOBY modules are tested for adherence to certain limit values. Since MOBY modules are only one of many components in a total system and the combination of various components may also create sources of interference, certain guidelines must be adhered to when setting up a system.

EMC measures usually consist of an entire package of measures all of which must be taken in order to obtain an interference-immune system.

Note

- The system provider is responsible for adherence to the EMC guidelines, while the user is responsible for the interference suppression of the complete system.
- All measures taken while the system is being set up will eliminate the need for expensive modifications and removal of interference sources later.
- Although the regulations of specific countries must also be adhered to, this information is not covered in the documentation.

3.8.3 Spreading of Interference

Three factors are required before interference can affect a system.

- Source of interference
- Coupling path
- Potentially susceptible equipment

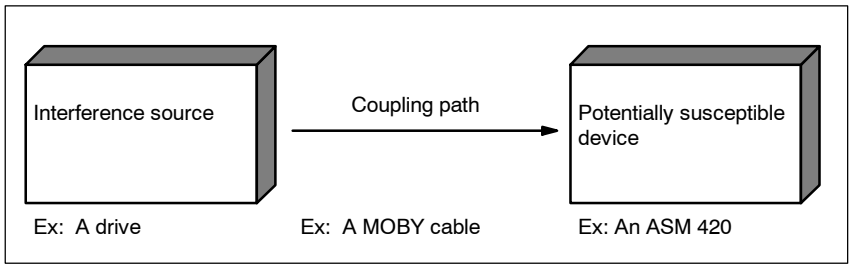


Figure 3-40 Spreading of interference

If one of these factors is missing (e.g., the coupling path between the source of the interference and the potentially susceptible device), the susceptible device will not be affected even when strong interference is being emitted.

The EMC measures affect all three factors to prevent any malfunctions caused by interference. When a system is set up, the provider must take all possible measures to prevent the creation of sources of interference.

- Only equipment which meets limit value class A of VDE 0871 may be used in a system.
- All interference caused by devices must be suppressed. This includes all coils and windings.
- The layout of the cabinet must be such that reciprocal interference of the individual components is avoided or kept as low as possible.
- Measures must be taken to eliminate interference from external sources.

The next few chapters provide information and tips on how to set up a system.

Sources of interference

It is necessary to be familiar with the most frequent sources of interference in order to achieve a high degree of electromagnetic compatibility (i.e., a very low degree of interference in the environment) in a system. These sources of interference must be eliminated by taking appropriate measures.

Table 3-15 Interference sources: Origin and effects

Interference Source	Interference Origin	Effect on Potentially Susceptible Equipment
Contactor, electronic valves	Contacts	Power network malfunctions
	Coils	Magnetic field
Electric motor	Collector	Electrical field
	Winding	Magnetic field
Electric welding device	Contacts	Electrical field
	Transformer	Magnetic field, power network malfunction, equalizing currents
Power pack, switched-mode	Circuit	Electrical and magnetic field, power network malfunction
High-frequency devices	Circuit	Electromagnetic field
Sender (e.g., industrial radios)	Antenna	Electromagnetic field
Difference in grounding or reference potential	Voltage difference	Equalizing currents
Operator	Static charging	Electrical discharging currents, electrical field
High-voltage current cable	Current flow	Electrical and magnetic field, power network malfunction
High-voltage cable	Voltage difference	Electrical field

Coupling paths

A coupling path is required before interference generated by the source can take effect. There are four kinds of interference coupling.

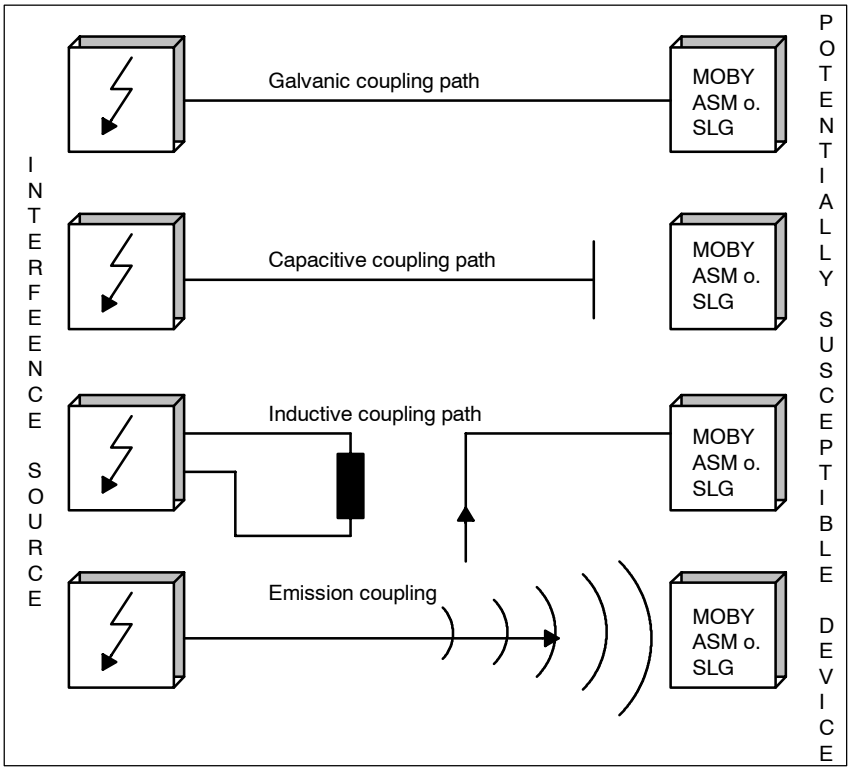


Figure 3-41 The four kinds of interference coupling

When MOBY modules are used, various components of the total system can act as coupling paths.

Table 3-16 Causes of coupling paths

Coupling Path	Cause
Cables and lines	Incorrect or unfavorable installation
	Missing or incorrectly connected shields
	Cables spaced unfavorably
Switching cabinet or SIMATIC housing	Missing or incorrectly wired equalizing line
	Missing or incorrect grounding
	Cables spaced unfavorably
	Modules not installed securely
	Poor cabinet layout

3.8.4 Cabinet Layout

User influence on the configuration of an interference-immune system includes the cabinet layout, cable installation, grounding connections and correct shielding of lines.

Note

For notes on correct cabinet layout in accordance with EMC guidelines, see the layout guidelines of the SIMATIC controller.

Shielding via housing

Metal housings for potentially susceptible equipment can be used to keep out magnetic and electrical fields and electromagnetic waves. The better the induced interference current can flow, the greater the spontaneous weakening of the field of interference. All sheet metal on the housings or sheet metal in the cabinet must be well connected together (i.e., with a high degree of conductivity).

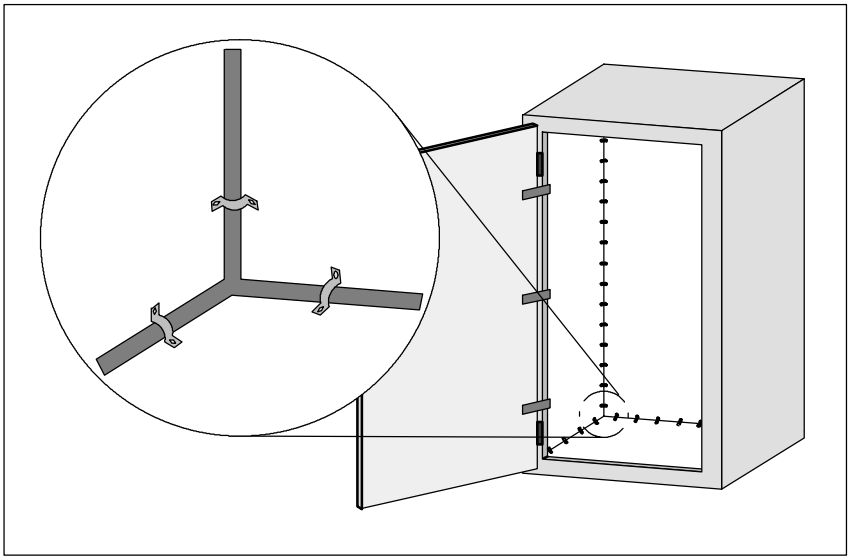


Figure 3-42 Shielding via housing

When the sheet metal parts of switching cabinets are insulated against each other, a high-frequency conductive connection with the ribbon cables and high-frequency terminals or HF conductive paste can be created. The greater the connection surface, the better the high-frequency conductive capacity. This cannot be achieved by connection with simple wires.

Avoiding interference via optimal layout

Good interference diversion is achieved by installing SIMATIC controllers on conductive mounting plates (unpainted). When setting up the switching cabinet, interference can be easily avoided by adhering to guidelines. Power components (e.g., transformers, drives and load power supplies) should be installed separately (i.e., separated by space) from the controller components (e.g., relay controllers and SIMATIC S5).

The following basic principles apply.

1. The effect of interference decreases, the greater the distance between interference source and potentially susceptible equipment.
2. Interference is further reduced by installing shielding plates.
3. Load lines and high-voltage current cables must be installed separately from the signal lines at a distance of at least 10 cm.

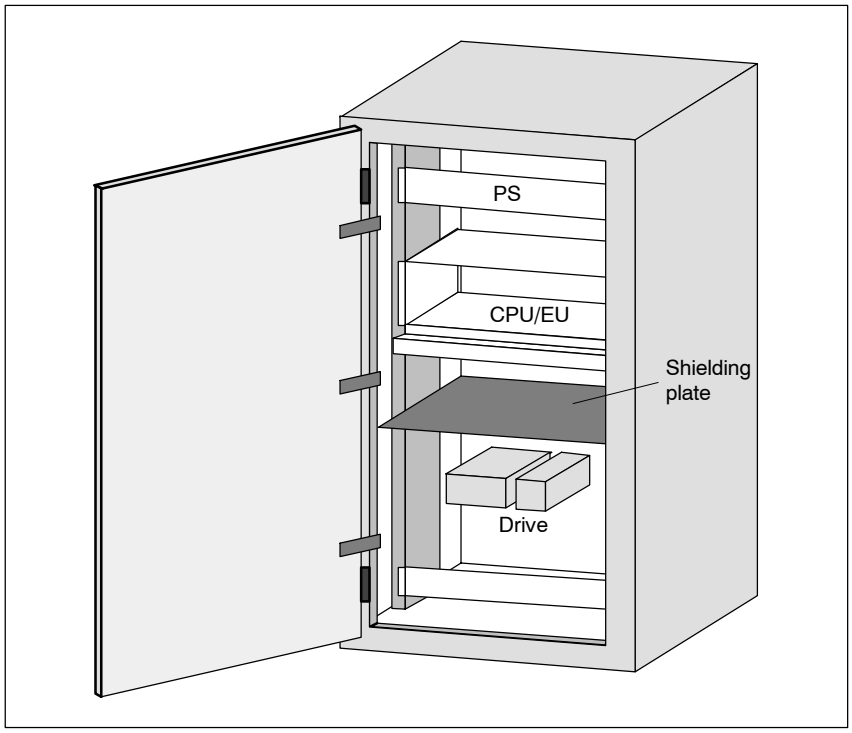


Figure 3-43 Avoidance of interference via optimal layout

Filtering the supply voltage

External interference from the power network can be avoided by installing power network filters. In addition to correct dimensioning, proper installation is very important. It is imperative that the power network filter be installed directly at the entrance to the cabinet. Interference currents are filtered out early at the entrance and not conducted through the cabinet.

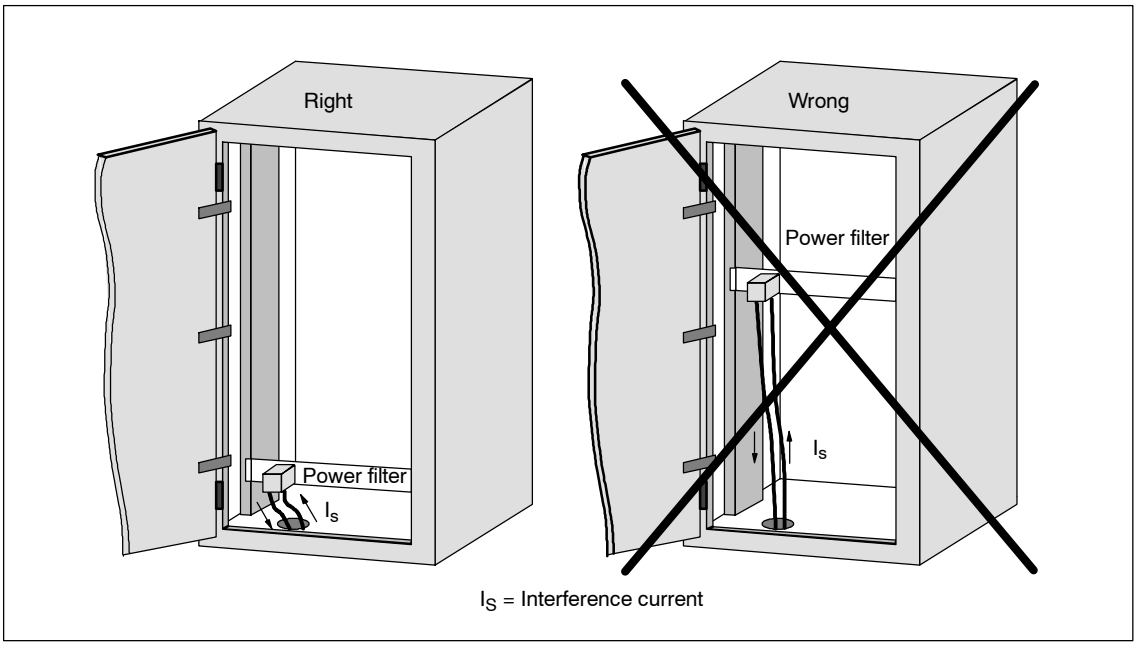


Figure 3-44 Filtering the supply voltage

3.8.5 Avoiding Interference Sources

Sources of interference in a system must be avoided so that a higher degree of interference immunity can be achieved. All circuited inductivities are a frequent cause of interference in a system.

Interference suppression of inductivities

Since relays, contactors and so on generate interference voltages, this interference must be suppressed with one of the following circuits.

When the coil is switched, up to 800 V can be created on 24 V coils even with small relays. Several kV of interference voltagecan be created on 220 V coils. By using free-wheeling diodes or RC circuitry, the interference voltage is prevented and, with it, the inductive interference in the lines parallel to the coil lines.

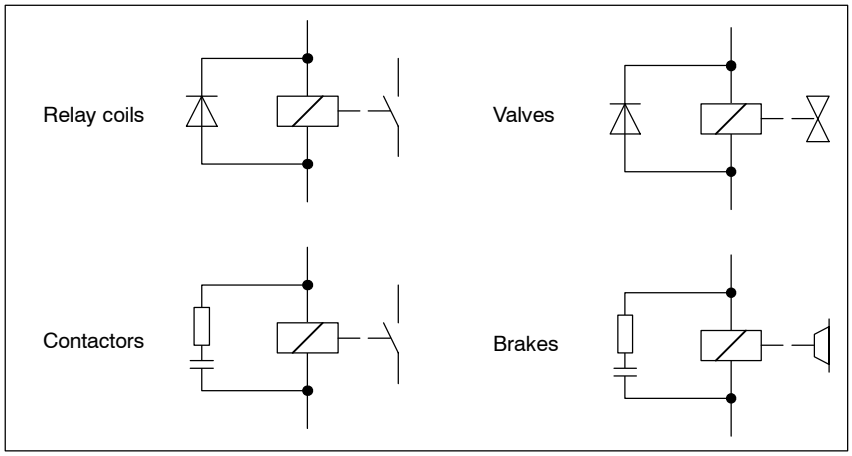


Figure 3-45 Suppression of inductive interference

Note

All coils in the cabinet must be interference-suppressed. Values and motor brakes are frequently forgotten. Fluorescent lamps in the switching cabinet must be subjected to a special test.

3.8.6 Equipotential Bonding

Differing layouts of the system parts and differing voltage levels can cause differences in potential between the parts of a system. When the system parts are connected via signal lines, equalizing currents flow through these signal lines. These equalizing currents can distort the signals.

This makes correct equipotential bonding imperative.

- The cross section of the equipotential bonding line must be large enough (i.e., at least 10 mm^2).
- The space between signal cable and related equipotential bonding line must be kept as small as possible (i.e., antenna effect).
- A fine-wire line must be used (i.e., better conduction of high frequencies).
- When connecting equipotential bonding lines to the central equipotential bonding rail, power components and non-power components must be combined.

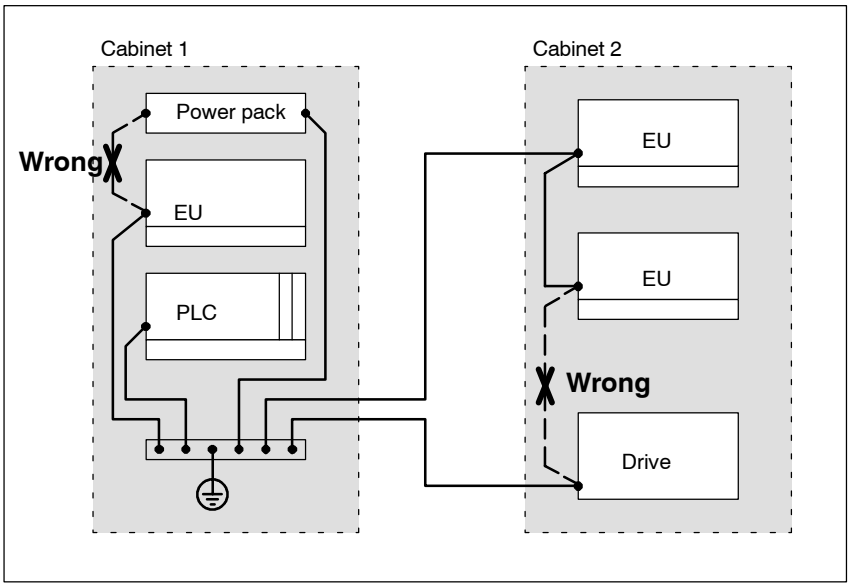


Figure 3-46 Equipotential bonding

The better the equipotential bonding in a system, the smaller the chance of interference caused by fluctuations in potential.

Equipotential bonding should not be confused with the protective grounding of a system. Protective grounding prevents the creation of excessive touch voltages when devices malfunction.

3.8.7 Ground Fault Monitoring with MOBY

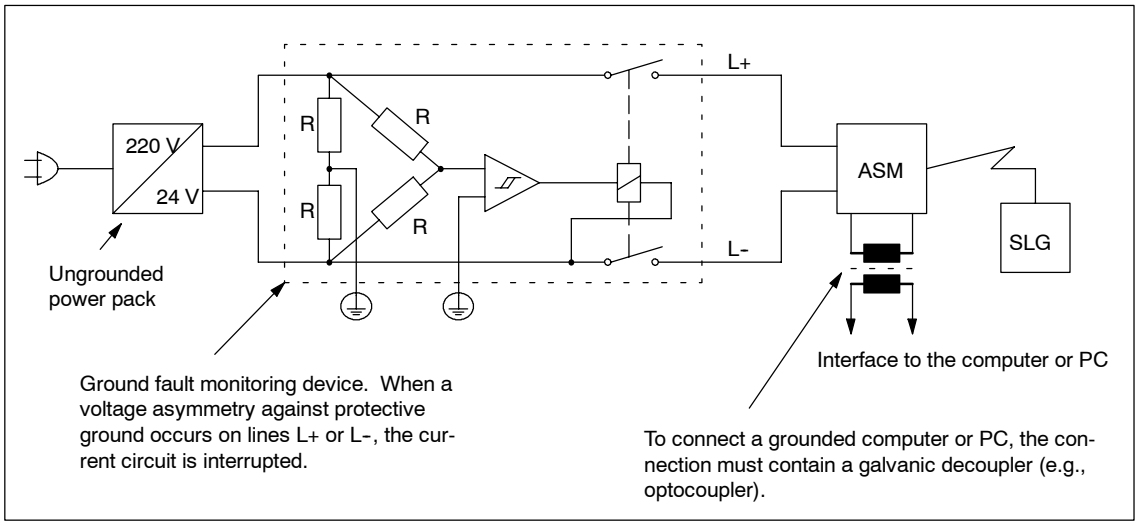


Figure 3-47 Circuit diagram of the principle of grounding fault monitoring

SIMATIC with ASM 400/401

The SIMATIC is a grounded system. In the power pack of the SIMATIC, 0 V (i.e., signal ground) is connected to the housing. On the ASM 400/401, the 0 V signal of the external 24 V power pack is connected with 0 V of the SIMATIC. The connection between the ASM 400/401 (SIMATIC) and the SLG is equipotentially bonded (i.e., RS 422 interface without galvanic isolation). **A direct setup with grounding fault monitoring is not possible.** Proceed as described in the SIMATIC manual if grounding fault monitoring is necessary.

SIMATIC PLC 100U with ASM 410

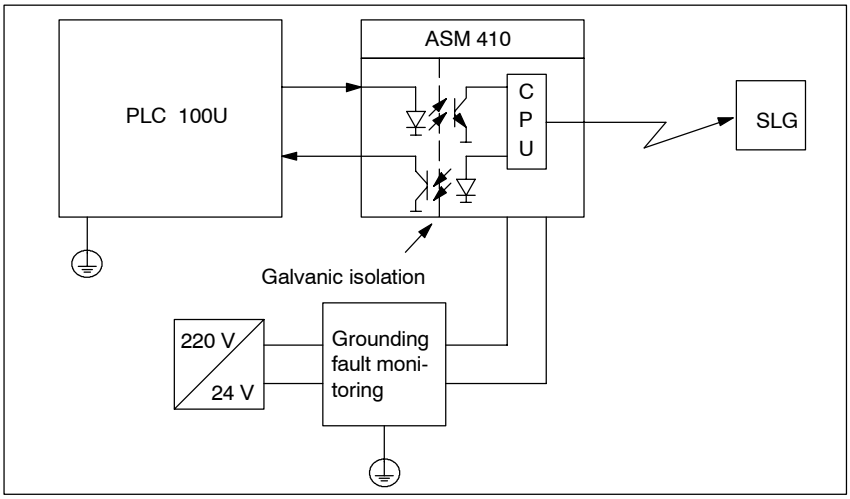


Figure 3-48 SIMATIC PLC 100U with ASM 410

The ASM 410 is equipped with galvanic isolation to the SIMATIC CPU. A layout with grounding fault monitoring is simple.

Serial interface ASM 420/421 and SIM

The ASM 420/421 or the SIM is available with RS 422, V.24 and TTY interfaces.

A layout with grounding fault monitoring requires galvanic isolation (i.e., a layout with the TTY interface).

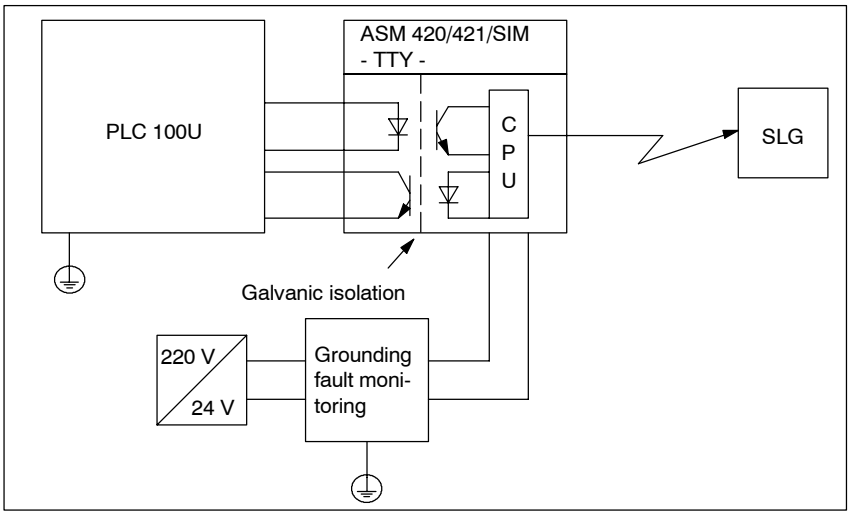


Figure 3-49 Serial interface ASM 420/421 and SIM with TTY interface

3.8.8 Shielding the Cables

To suppress interference in the signal cables, these cables must be shielded. The best shielding effect is achieved by installation in steel piping. However, this is only necessary when the signal lines must pass through an interference-prone environment. In most cases, the use of cables with braided shields is sufficient. In either situation, correct connection is decisive for the shielding action.

Note

A shield which is not connected at all or is connected incorrectly has no shielding effect.

The following principles apply.

- For analog signal lines, the shield connection must be one-sided and on the receiver side.
- For digital signal lines, the shield connection must be two-sided on the housing.
- Since interference signals are frequently in the HF range (i.e., > 10 kHz), connection of the HF-capacity shield must be provided over a large surface.

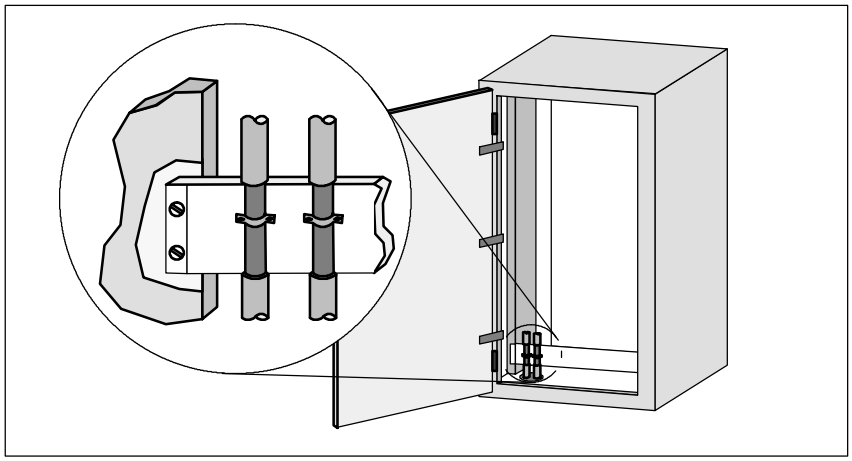


Figure 3-50 Shielding of the cables

The shield rail must be connected to the housing of the switching cabinet over a large surface (i.e., good conductivity) and must be located as close to the cable lead-in as possible. The cables must be bared and clamped (high-frequency clamp) to the shield rail or bound with cable binders. The position must have good conductivity.

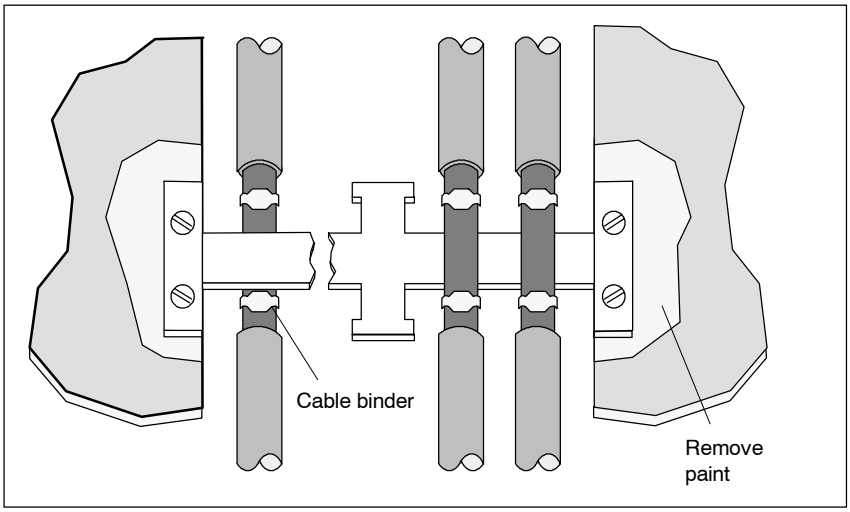


Figure 3-51 Connection of the shield rail

The shield rail must be connected with the protective ground (PE) rail.

When shielded cables must be interrupted, the shield must also be applied to the plug connector housing. Only suitable plug connectors may be used.

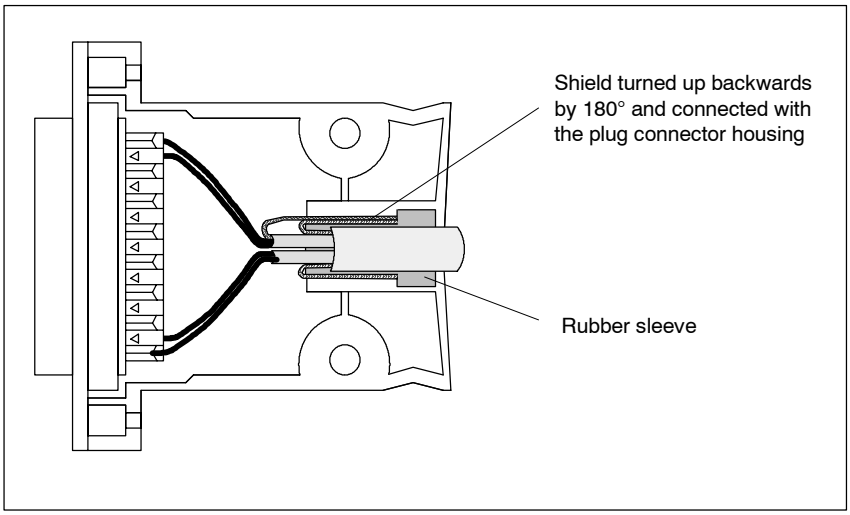


Figure 3-52 Interruption of shielded cables

When adapter plugs which do not have suitable shield termination are used, the shield must be continued through cable clamps to the point of interruption. This ensures a large-surface, HF conductive connection.

3.8.9 Basic Rules on EMC

Electromagnetic compatibility (i.e., EMC) can often be ensured by following a few elementary rules. Rules which apply to the layout of the cabinet are listed below.

Shielding via housing

- Protect the programmable controller from external interference by installing it in a cabinet or housing. The cabinet or the housing must be included in the grounding connection.
- Shield electromagnetic fields of inductivity from the programmable controller with separator plates.
- Use metallic plug housings for shielded data transmission lines.

Large-surface grounding connection

- Connect all inactive metal parts with low HF resistance over a large surface.
- Provide a large-surface connection between the inactive metal parts and the central grounding point.
- Remember to connect the shield rail to ground (i.e., a large-area connection of the shield rail to ground must be provided).
- Aluminum parts should not be used for grounding connections.

Planning the cabling

- Organize the cables into groups, and install these groups separately.
- Always install high-voltage current lines and signal lines in separate ducts or bundles.
- Introduce all cabling into the cabinet from only one side and, if possible, at one level.
- Install the signal lines as close to the grounding surfaces as possible.
- Twist the feeder and return conductors of individually installed conductors.

Shielding the lines

- Shield the data transmission lines, and apply the shield on both sides.
- Shield the analog lines, and apply the shield on one side (e.g., on the drive).
- Always apply the line shields at the cabinet entrance to the shield rail over a large surface, and secure these with clamps.
- Continue the applied shield without interruption to the module.
- Use braided shields and not foil shields.

Power supply and signal filter

- Only use power supply filters with metal housings.
- Connect the filter housing (i.e., connection must be low HF resistant and over a large surface) to cabinet ground.
- Never secure the filter housing to painted surfaces.
- Secure the filter at the cabinet entrance or in the direction of the interference source.

3.9 Concept of MOBY Shielding

With MOBY-I, the data are transferred between ASM and SLG over an RS 422 interface at a speed of 19200 baud. The distance between ASM and SLG may be up to 1000 m. MOBY cable installation should be treated the same as that of a data processing system. Special attention should be paid to shielding of all data cables. The following figures show the primary points required for a secure layout.

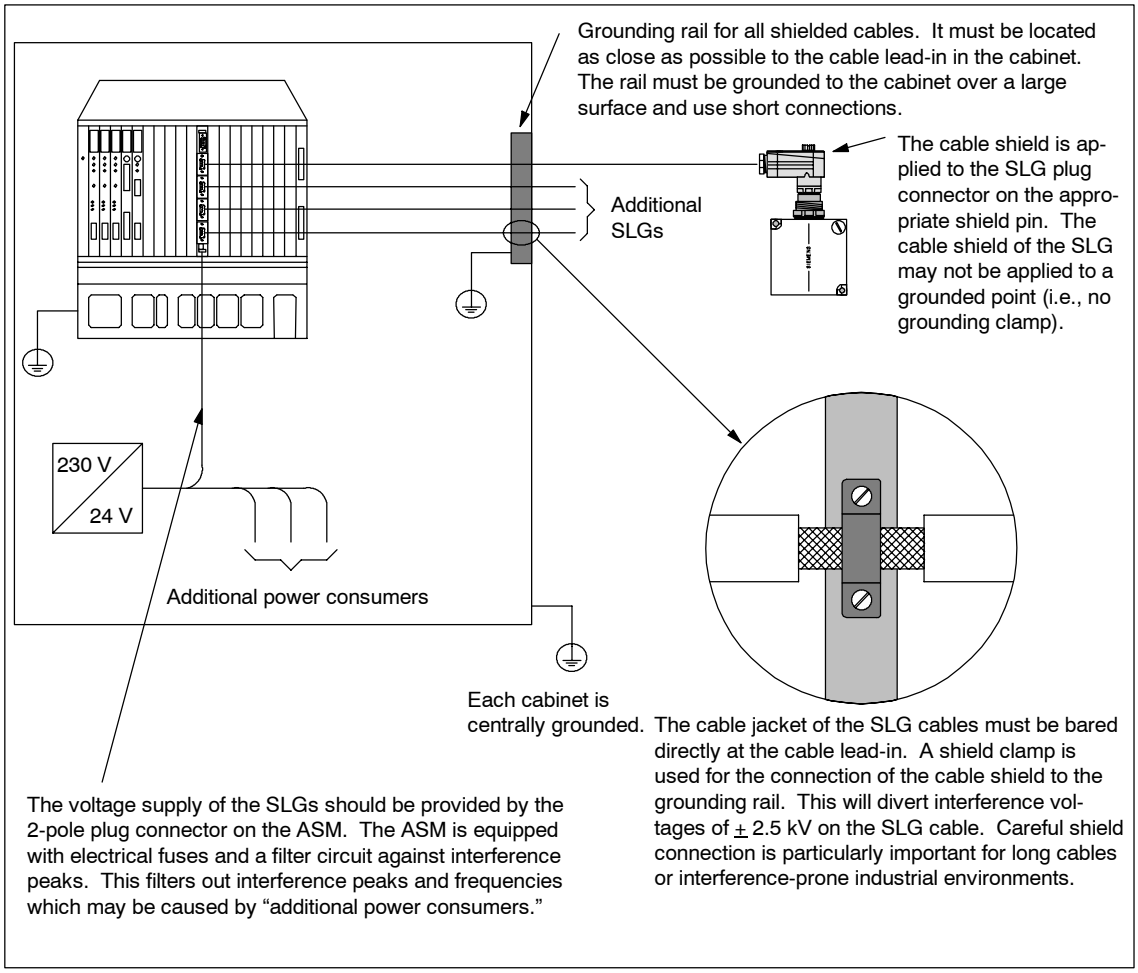


Figure 3-53 Simple layout with ASM 400/401

Layout with ASM 420 and ASM 440

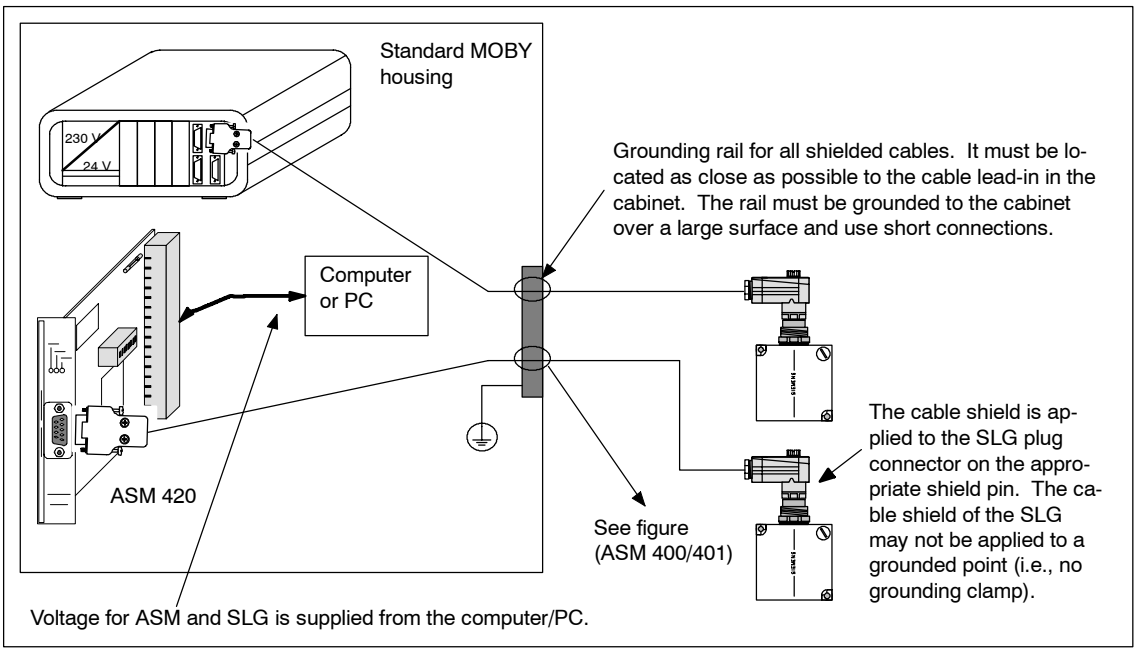


Figure 3-54 Layout with ASM 420 and ASM 440

Standard MOBY housing

The standard MOBY housing can be used as a stand-alone housing or as a built-in housing. When used as a stand-alone housing, connection of the SLG to the standard MOBY cable is sufficient for an EMC layout.

Layout of an S7-300 with MOBY

When connecting the SLG to the ASM 470, it is essential that a shield connection terminal be used for the cable shield. Shield connection terminals and holders are standard components of the S7-300 product family.

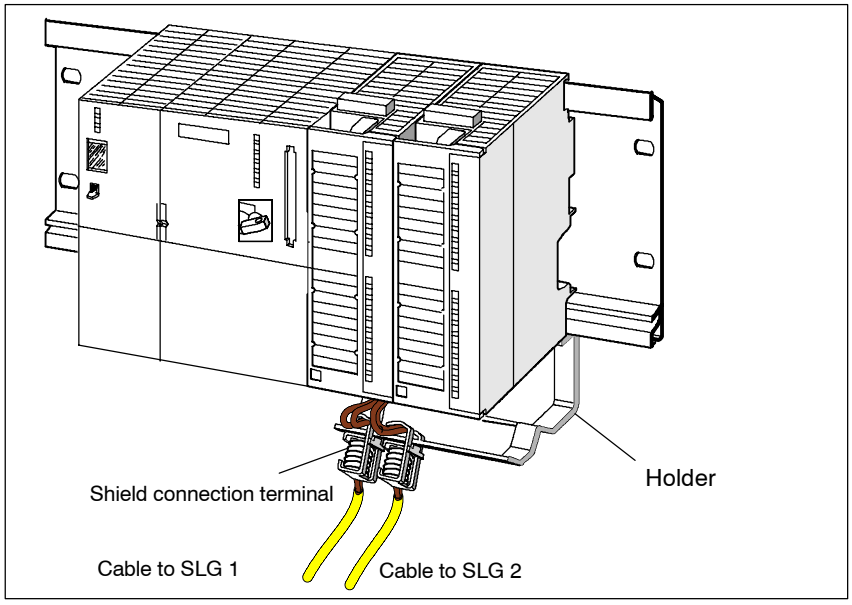


Figure 3-55 Layout of the ASM 470 with shield connecting element

Cabling for ASM 470

To ensure EMC, an S7-300 shield connecting element must be used for the SLG cable. See figure 3-55. The shield of the SLG cable must be bared as shown in figure 3-56.

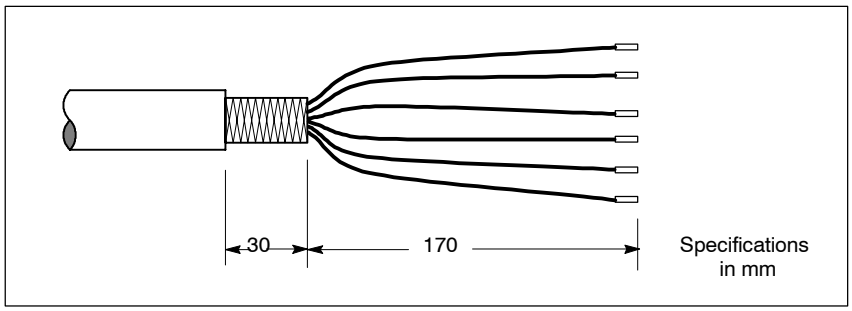


Figure 3-56 Baring of the cable shield

Voltage supply of the SLG with power pack

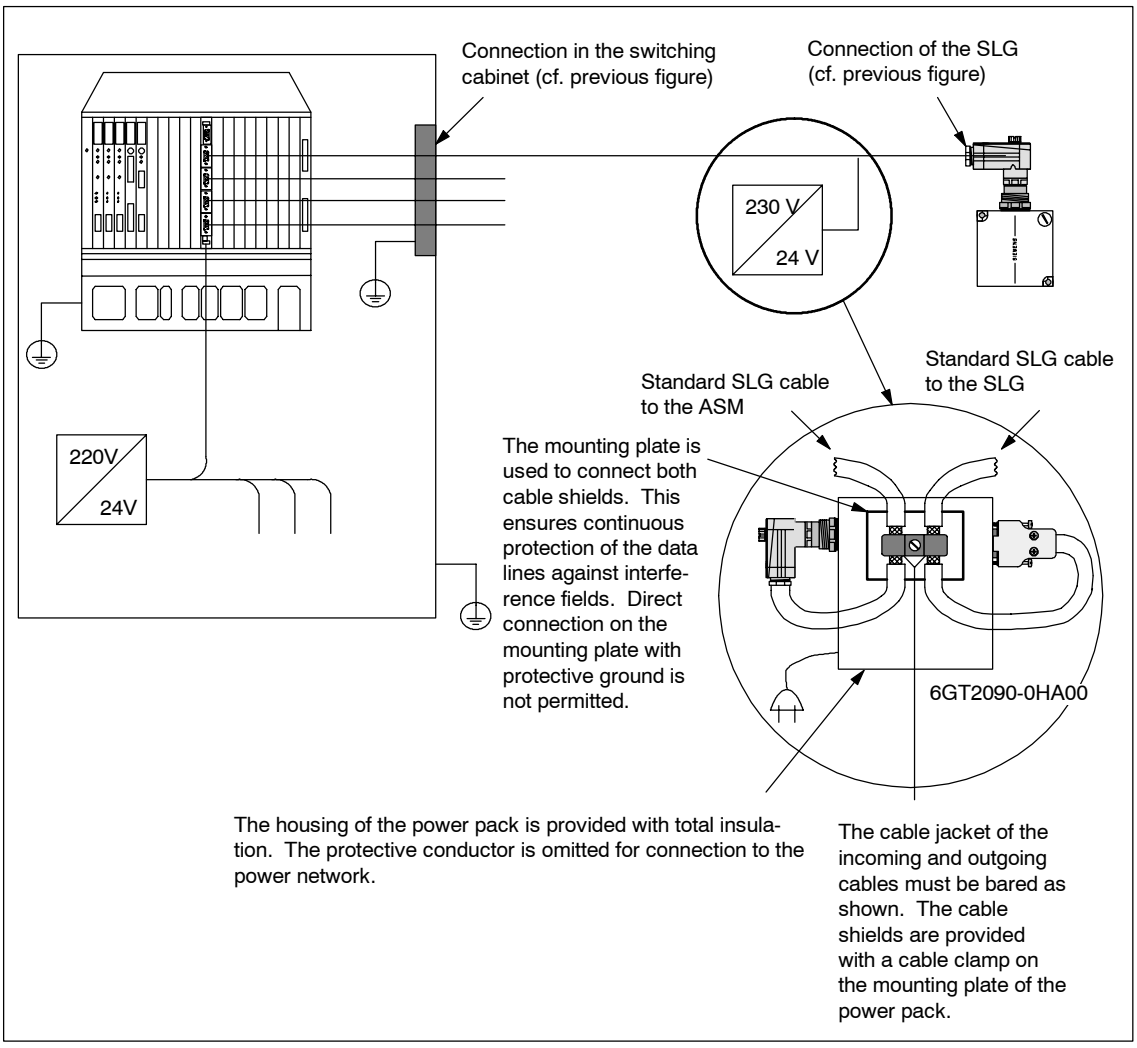


Figure 3-57 Voltage supply with power pack

Connection of other modules (e.g., ASM 410)

To divert interference which may occur on the connection cable to the SLG, proceed as described for the ASM 400.

3.10 Cable and Plug Connector Assignments

The cable jacket of SLG connection cables used with MOBY is made of polyurethane (i.e., PUR in accordance with VDE 0250). This ensures very good cable resistance to oils, acids, caustic solutions and hydraulic fluids.

3.10.1 Cable Configuration

The cable between ASM and SLG requires six cores + shield. Four of these cores are assigned to the serial data interface. The power supply of the SLG requires two cores. The data can be transferred over distances of up to 1000 m, almost without regard to the diameter of the wire.

Since voltage is present on the connection cable due to the current consumption of the SLG, permitted cable lengths are usually shorter than 1000 m. The length depends on the current consumption of the SLG and the ohmic resistance of the connection cable. The following table gives an overview of permissible cable lengths.

Table 3-17 Cable configuration

Conductor Cross Section in mm^2	Conductor Diameter in mm	Resistance Ω/km[1]	SLG 40/SLG 41 (I = 90 mA) Max. Cable Length at		SLG 42 (I = 180 mA) Max. Cable Length at		SLG 43 (I = 250 mA) Max. Cable Length at		SLG 44 (I = 80 mA) Max. Cable Length at	
			U_V=24V	U_V=30V	U_V=24V	U_V=30V	U_V=24V	U_V=30V	U_V=24V	U_V=30V
0.07 [2]	0.3 [2]	550	120	240	40	100	30	70	90	200
0.2	0.5	185	360	720	120	300	85	210	250	650
0.5	0.8	70	950	1000	310	790	230	570	700	1000
0.8 [2]	1.0 [2]	50	1000	1000	440	1000	320	800	1000	1000
1.5 [2]	1.4 [2]	24	1000	1000	920	1000	660	1000	1000	1000

1 The resistance values are average values. They refer to the forward and return conductors. A single wire has half the resistance.

2 Use of these conductor cross sections requires crimp contacts (not included) in the SLG connection plug.
Field with gray background:
Recommended by Siemens: Standard cable, LiYC11Y, 6 x 0.25, shielded. The cable is available from Siemens under the order number 6GT2090-0A...

Gounding of the cable

We recommend always applying the shield of the SLG cable to a grounding rail over a large surface.

Supplementary power pack for SLG

When a supplementary power pack is installed in the vicinity of the SLG, the maximum cable length (i.e., 1000 m) between ASM and SLG can always be used.

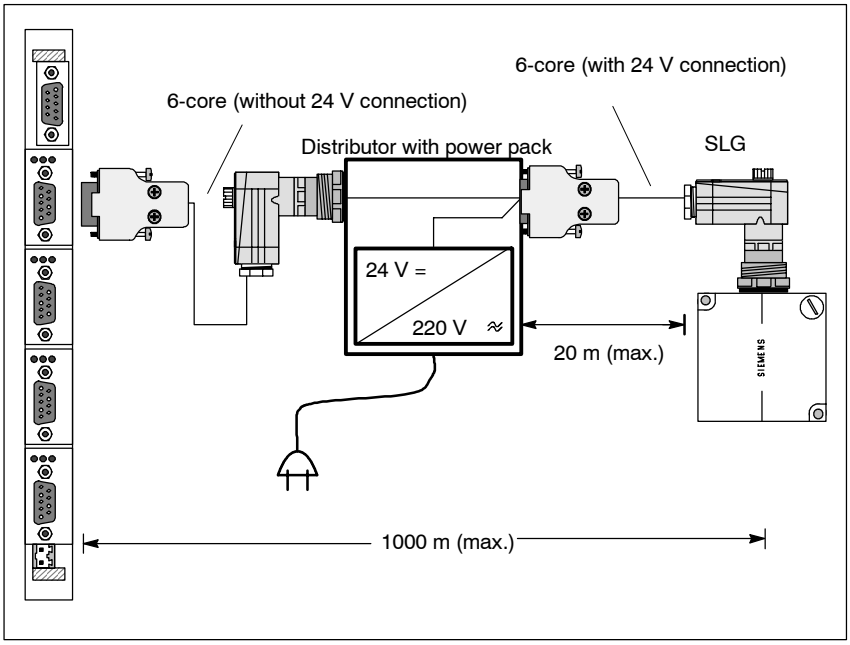


Figure 3-58 SLG with supplementary power pack

The power pack shown in the drawing is available from Siemens under order number 6GT2090-0HA00. Two stub lines (type 6GT2091-0A...) are used for the connection to the power pack.

Technical data of the power pack

Table 3-18 Technical data of the power pack

Primary	230 V AC, 47 to 63 Hz, -15%/+8%
Power line	2.8 m with grounding-type outlet. On device: PG screw connection
Secondary	U:24 V DC (± 10 %) I_{max}: 800 mA (short-circuit proof)
Protection rating	IP54
Protection class	2
Max. ambient temperature	55° C

You can connect your own power pack using equivalent technical data.

Note

The 24 V power supply line (i.e., pin 2 in the SLG plug) may not be connected to the ASM.

Note

With restrictions, the power pack can also be used as the main power pack for the ASM 400 or ASM 420. See figure 3-59.

However, the ASM may then only be equipped with one or two channel modules. The maximum current of the power pack (i.e., 800 mA) may not be exceeded.

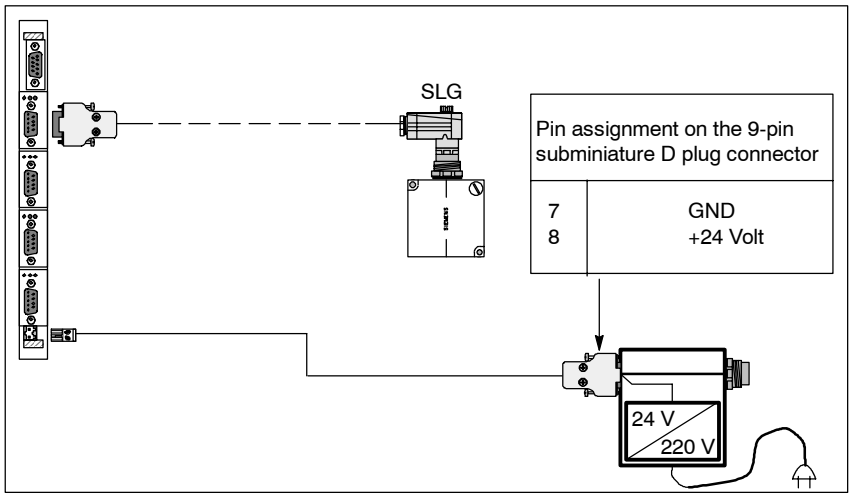


Figure 3-59 MOBY power pack on the ASM 400

3.10.2 Plug Connector Assignment

Plug connector on the SLG

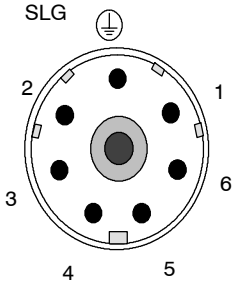


Table 3-19 Plug connector assignment of the SLG plug connector[1]

Pin	Designation
1	- Receiving
2	+ 24 Volt
3	Ground (0 V)
4	+ Sending
5	- Sending
6	+ Receiving
⏚	Cable sield

1 This plug connector applies to SLG 40, SLG 41, SLG 42, SLG 43 and SLG 44.

9-pin subminiature D plug connector with screw-type lock

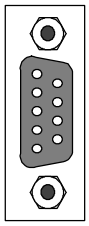


Table 3-20 Plug connector assignment of the 9-pin subminiature D plug connector[1]

Pin	Desigantion
1	Not used
2	+ Sending
3	+ Receiving
4	Not used
5	- Receiving
6	- Sending
7	Ground (0 V)
8	+24 Volt (see caution note)
9	Not used
Geh.	Cable shield

1 This plug connector assignment applies to:
ASM 400, ASM 420 and ASM 421 => SLG
ASM 400, ASM 410 (STG plug connector) and ASM 421 => STG
STG 4F
ES 030 => SLG

Note

When making your own cables, remember that the “sending” signal of the SLG must be connected to the “receiving” signal of the ASM, and vice versa.

Caution

When using the supplementary power pack in the vicinity of the SLG, do not wire this pin to the ASM. Cf. table 3-20.

Installing the SLG plug connector

If the SLG plug connector has to be turned in a different direction when using a prefabricated cable, proceed as shown in the drawing below to position the contact support differently.

The plug connector on the SLG cannot be turned.

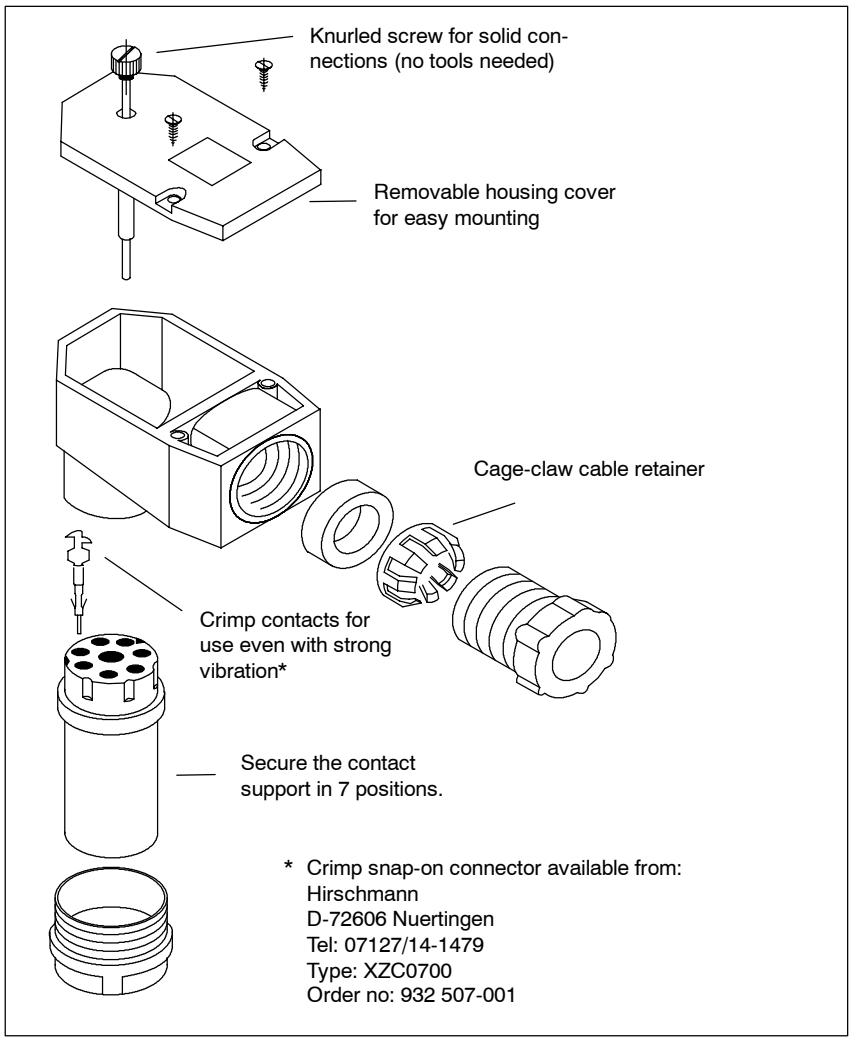


Figure 3-60 Drawing of mounting the SLG plug connector

3.10.3 Connection Cables

Connection cable for ASM 400/401/420/421/ 440/441, ES 030 <-> SLG 6GT2091-0A...

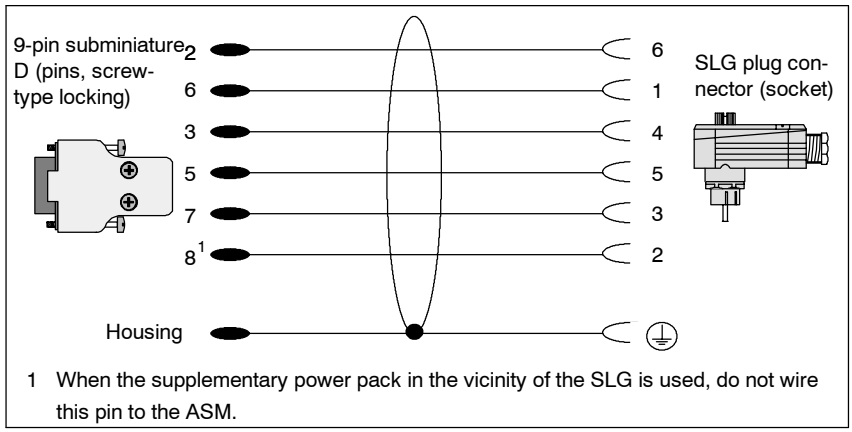


Figure 3-61 Connection cable: ASM 400/401/420/421/440/441, ES 030 <-> SLG

Connection cable for ASM 400/401/410 <-> STG 4F 6GT2091-0B...

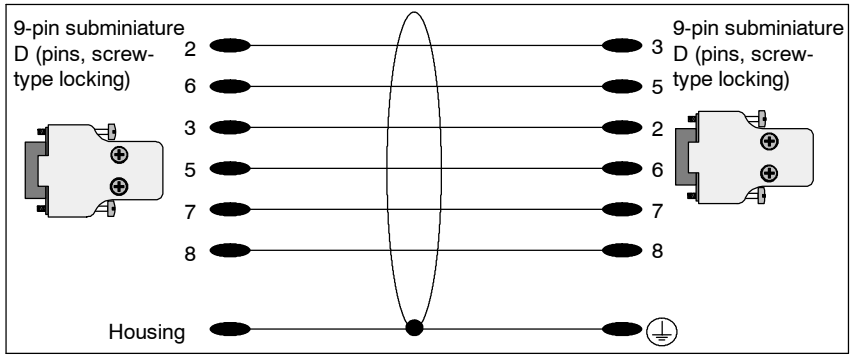


Figure 3-62 Connection cable: ASM 400/401/410 <-> STG 4F

Connection cable for ASM 450/451 ↔ SLG 6GT2091-1CH20

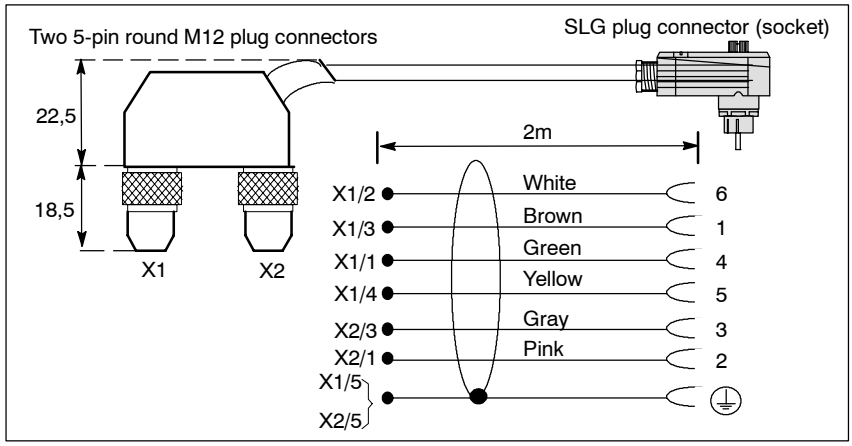
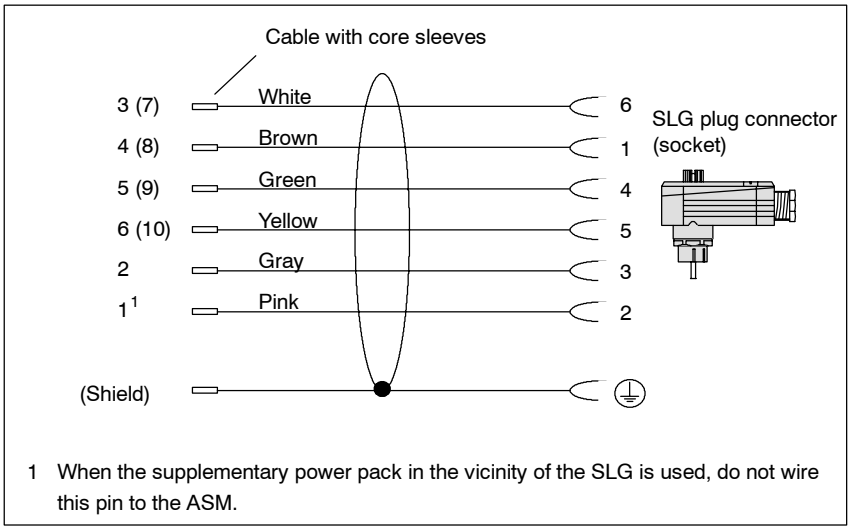


Figure 3-63 Connection cable: ASM 450/451 <-> SLG

Connection cable for ASM 410 <-> SLG 6GT2091-0D...



1 When the supplementary power pack in the vicinity of the SLG is used, do not wire this pin to the ASM.

Figure 3-64 Connection cable: ASM 410 <-> SLG

Caution

The cable shield must be secured with a shield clamp directly on the interface module and grounded on a grounding rail.

Connection cable for ASM 470 <-> SLG 6GT2091-0E...

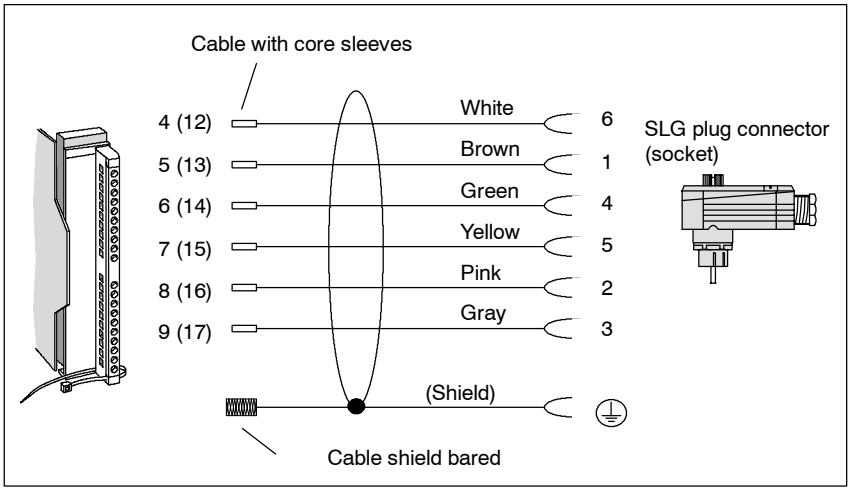


Figure 3-65 Connection cable: ASM 470 <-> SLG

3.10.4 Length Key

The following length key can be used for all connection cables listed in chapter 3.10.3.

Table 3-21 Length key

Length of the Stub Line	Order No. Supplement 6GT2 09.-0.□□□ ↑ ↑ ↑
0.8 m	E 8 0
1.2 m	H 1 2
1.6 m	H 1 6
2.0 m	H 2 0
2.5 m	H 2 5
2.8 m	H 2 8
3.2 m	H 3 2
3.6 m	H 3 6
5.0 m	H 5 0
8.0 m	H 8 0
10.0 m	N 1 0
12.0 m	N 1 2
16.0 m	N 1 6
20.0 m	N 2 0
32.0 m	N 3 2
50.0 m	N 5 0
80.0 m	N 8 0
120.0 m	T 1 2
160.0 m	T 1 6
200.0 m	T 2 0
320.0 m	T 3 2
500.0 m	T 5 0
800.0 m	T 8 0

4 Mobile Data Memories

4.1 Introduction

Application area

MOBY identification systems ensure that useful data accompany a product from the very beginning.

Mobile data memories are attached to the product or its conveyor or packaging unit and are written, changed and read - all without contact. All important information related to production and material flow control is located right on the product.

A sturdy housing permits use in rugged environments and makes the MDS resistant to many chemical substances.

Layout and functions

The primary components of the mobile data memories (i.e., MDS) include logic, antenna, FRAM, and RAM (with battery) or EEPROM.

When an MDS moves into the transmission field of the read/write device (i.e., SLG), the power supply unit generates and monitors the necessary power for all switching elements. The pulse-coded information is conditioned for further processing as purely digital signals. In addition to managing the various memories, the monitoring unit takes care of data handling and the test routines.

Overview

Table 4-1 Overview table of MDS

MDS Type	Memory Size	Temperature Range (During Operation)	Dimensions (L x W x H in mm)	Protection Rating
MDS 114	62 (42)[1] byte RAM	-25 to +85 ° C	50 x 50 x 20	IP68
MDS 302	2 (1.8)[1] Kbyte RAM	-25 to +70 ° C	47,5 x 25 x 15	IP68
MDS 401	8 (7)[1] Kbyte FRAM	-25 to +70 ° C	Ø 30 x 10	IP68
MDS 402	8 (7)[1] Kbyte RAM	-25 to +70 ° C	47,5 x 25 x 15	IP68
MDS 404	8(7)[1] Kbyte FRAM	-25 to +70 ° C	50 x 50 x 20	IP68
MDS 506	32 (28)[1] Kbyte RAM	-25 to +70 ° C	75 x 75 x 40	IP68
MDS 507	32 (28)[1] Kbyte RAM	-25 to +70 ° C	125 x 75 x 40	IP65
MDS 514	32 (28)[1] Kbyte RAM	-25 to +85 ° C	50 x 50 x 20	IP68
MDS 213 E	128 (112)[1] byte EEPROM[2]	-25 to +85 ° C	50 x 50 x 20	IP68
MDS 407 E	8 (7)[1] Kbyte EEPROM[2]	-25 to +70 ° C	125 x 75 x 40	IP65
MDS 413 E	8 (7)[1] Kbyte EEPROM[2]	-25 to +85 ° C	50 x 50 x 20	IP68
MDS 438 E	8 (7)[1] Kbyte EEPROM	Up to +200 ° C (cyclic)	Ø: 145 x 160	IP68
MDS 439 E	8 (7)[1] Kbyte EEPROM	Up to +200 ° C (cyclic)	Ø: 114 x 83	IP68

1 Net capacity during ECC operation
2 Only replacement part

Substitute types

Table 4-1 shows an overview of all current MDS types. See appendix D for a complete table of all old and new MDSs. This table also specifies substitute types for components which are no longer available.

Operational requirements/ environmental requirements

Table 4-2 Operational requirements/environmental requirements of MDS

Proof of mechanical stability is provided by oscillation test with variable frequency in acc. w. part 2-6 of DIN IEC 68 Loading in succession in three vertical axes	
• Frequency range	10 to 500 Hz
• Amplitude	1.5 mm (10 to 58 Hz)
• Acceleration	20 g (10 to 500 Hz)
• Test duration per axis	20 frequency cycles
• Speed of passage	1 octave/min.
Proof of mechanical stability via continuous shock stress in acc. w. part 2-29 of DIN IEC 68	
• Test conditions	50 g, 6 msec, 500 impacts per axis
Protection rating	IP65/IP68 in acc. w. DIN 40050[1]
Ambient temperature	
• During operation	-25° to +70° C (+85° C)
• During transportation and storage	-40° to +70° C (+85° C)
Temperature gradient over storage temperature range in acc. w. part 2-4 of DIN IEC 68	Transition from 0° C to 70° C (85° C) in 10 sec; duration 30 min; Transition from 70° C (85° C) to 0° C in 15 sec; duration 30 min; 100 cycles
Cleaning with water jet	Max. of 5 min at max. water pressure of 2 bar

1 **Definition of IP65**
- Protection against penetration of dust (i.e., dust-proof)
- Full protection against touch
- Protection against water jet

Definition of IP68
- Protection against penetration of dust (i.e., dust-proof)
- Full protection against touch
- MDS can be continuously submerged in water. Contact manufacturer for requirements.

4.2 MDS 114

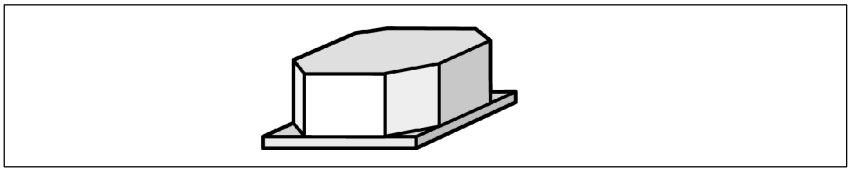


Figure 4-1 MDS 114

Ordering data

Table 4-3 Ordering data for MDS 114

Mobile data memory MDS 114 with 62-byte RAM, including mounting frame	6GT2 000-0AG10
Replacement part; Mounting frame for MDS 114	6GT2 090-0CA10

Technical data

Table 4-4 Technical data of MDS 114

Memory size	62-byte RAM
Memory organization	Random access
MTBF (without battery; at 40° C)	2.5 x 10^6 hours
Battery life span • At 25° C • At 70° C	 Approx. 10 years 6 years
Replacement battery	No (cannot be changed)
Read cycles	Unlimited
Programming cycles	Unlimited
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Direction dependency	No
Securing of MDS	2 M4 screws
Turning moment (at room temperature)	1.2 Nm
Protection rating	IP68
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 50 x 50 x 50
Ambient temperature • During operation • During transportation and storage	 -25° to +85° C -40° to +85° C
Weight	50 g

Field data (in mm)

Table 4-5 Field data (in mm)

	SLG 41/ SLG 41-S	SLG 42	SLG 43	SIM 41/42/43
Operating distance (S_a)	0 to 12	0 to 30	0 to 50	0 to 20
Limit distance (S_g)	25	60	90	33
Transmission window				
• L: Vertical	36	90	140	60
• 2L: Horizontal	72	180	260	80
Minimum distance from MDS to MDS	> 90	> 250	> 500	> 200

The field data apply to read and write-accesses of the MDS.

Dimensions (in mm)

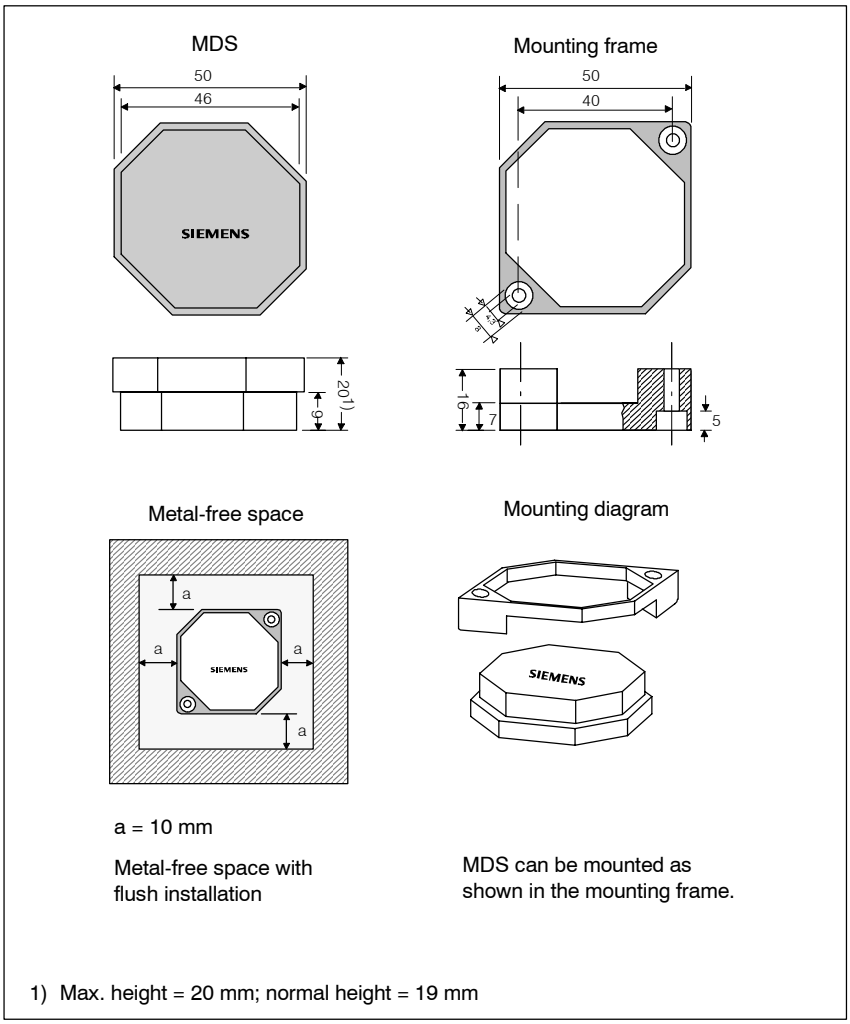


Figure 4-2 Dimensions of MDS 114

4.3 MDS 302

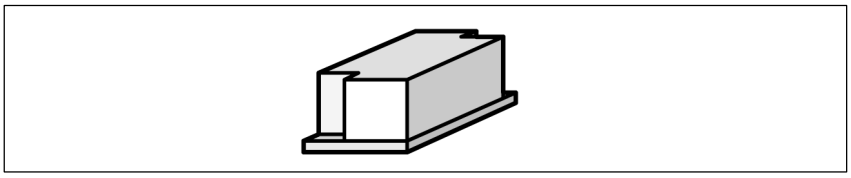


Figure 4-3 MDS 302

Ordering data

Table 4-6 Ordering data for MDS 302

Mobile data memory MDS 302 with 2-Kbyte RAM	6GT2 000-0EF00

Technische Daten

Table 4-7 Technical data of MDS 302

Memory size	2045-byte RAM
Memory organization	Random access
MTBF (without battery; at 40° C)	1.5 x 10^6 hours
Battery life span • At 25° C (continuous temperature) • At 50° C (continuous temperature)	 Approx. 10 years Approx. 5 years
Replacement battery	No (cannot be changed)
Read cycles	Unlimited
Programming cycles	Unlimited
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Direction dependency	No
Securing of MDS	2 M3 screws
Turning moment (at room temperature)	≤ 0.7 Nm
Protection rating	IP68
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 47.5 x 25 x 15
Ambient temperature • During operation • Short-term ambient temperature (10 min per 1 hour of operation) • During transportation and storage	 -25° to +60° C -25° to +70° C -40° to +60° C
Weight	25 g

Field data (in mm)

Table 4-8 Field data of MDS 302

	SLG 40	SLG 40-S	SLG 41/ SLG 41-S
Operating distance (S_a)	2 to 8	2 to 6	0 to 6
Limit distance (S_g)	10	8	10
Transmission window • L: Vertical • 2L: Horizontal	 - -	 - -	 30 50
Diameter of transmission window	d = 18	d = 9	-
Minimum distance from MDS to MDS	> 50	> 50	> 80

The field data apply to read and write-accesses of the MDS.

Dimensions (in mm)

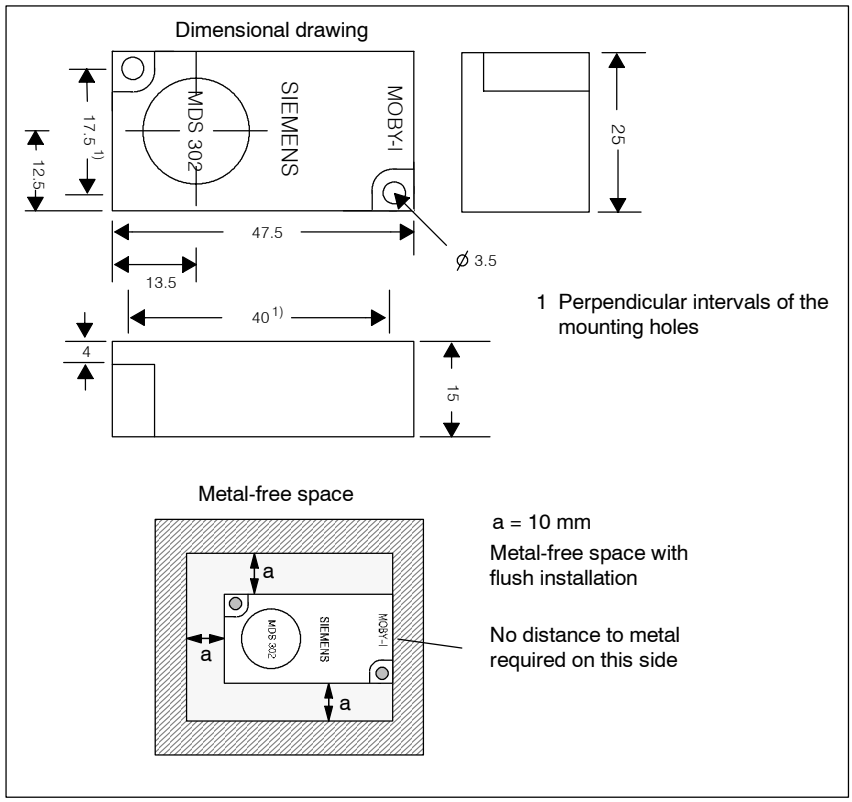


Figure 4-4 Dimensions of MDS 302

Definition of the field midpoints

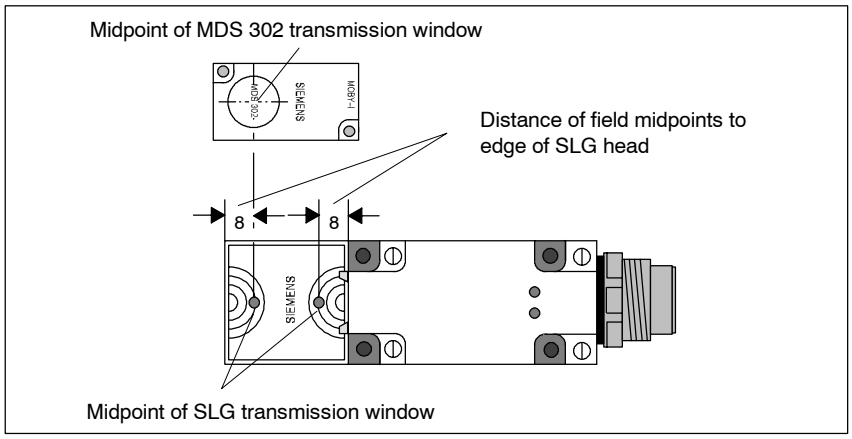


Figure 4-5 Definition of the field midpoints of SLG 41

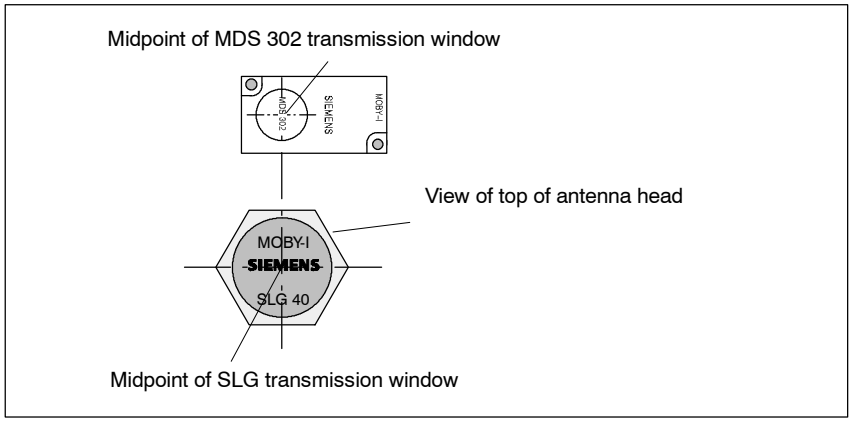


Figure 4-6 Definition of the field midpoints of SLG 40/40-S

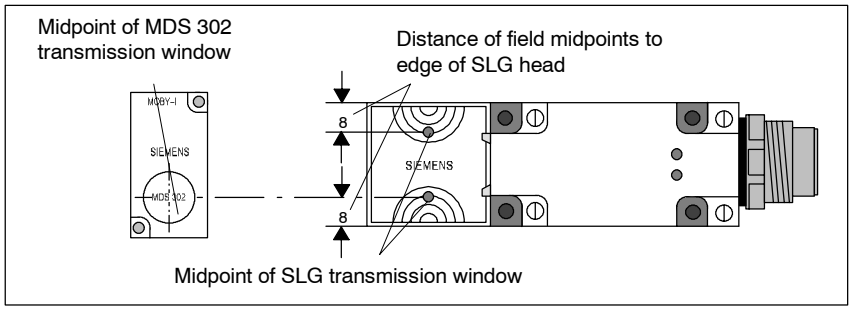


Figure 4-7 Definition of the field midpoints of SLG 41-S

Note

The midpoint of the MDS 302 transmission window must be positioned exactly over an SLG field midpoint.

4.4 MDS 401 (Preview)

Ordering data

Table 4-9 Ordering data for MDS 401

Mobile data memory MDS 401 with 8-Kbyte FRAM	6GT2 000-0CA10

Technical data

Table 4-10 Technical data of MDS 401

Memory size	8189-byte FRAM
Memory organization	Random access
Battery	None
Read cycles	10^{10}
Programming cycles	10^{10}
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Direction dependency	No
Securing of MDS	Screws or glue
Protection rating	IP68
Housing • Color • Material • Dimensions in mm	 Anthracite Epoxy resin Approx. ∅ 30 x 10
Ambient temperature • During operation • During transportation and storage	 -25° to +55° C -40° to +70° C
Weight	?

Field data (in mm)

Table 4-11 Field data of MDS 401

	SLG 40	SLG 40-S	SLG 41/ SLG 41-S
Operating distance (S_a)	2 to 8	2 to 6	0 to 6
Limit distance (S_g)	10	8	10
Transmission window • L: Vertical • 2L: Horizontal	 - -	 - -	 30 50
Diameter of transmission window	d = 18	d = 9	-
Minimum distance from MDS to MDS	> 50	> 50	> 80

The field data apply to read and write-accesses of the MDS.

Dimensions (in mm)

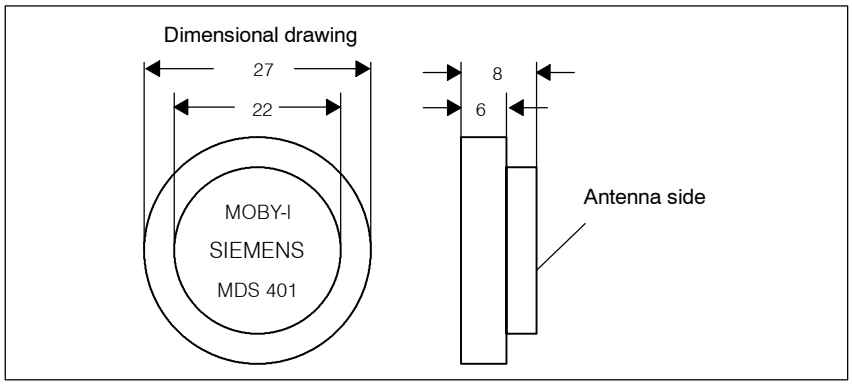


Figure 4-8 Dimensions of MDS 401

Definition of the field midpoints

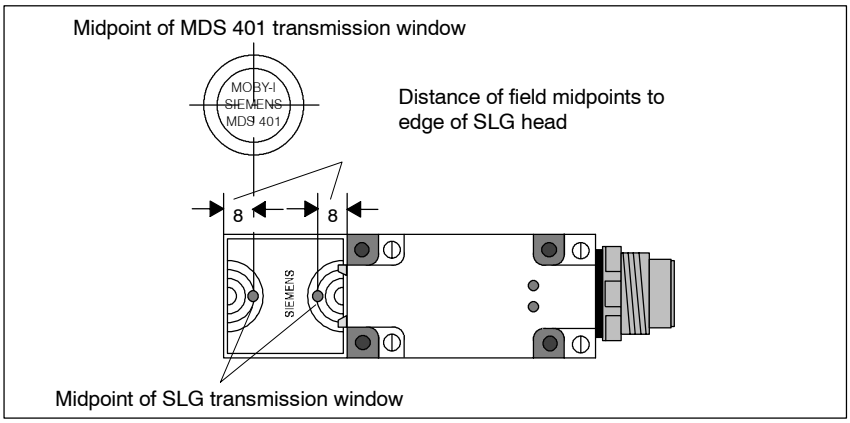


Figure 4-9 Definition of the field midpoints of SLG 41

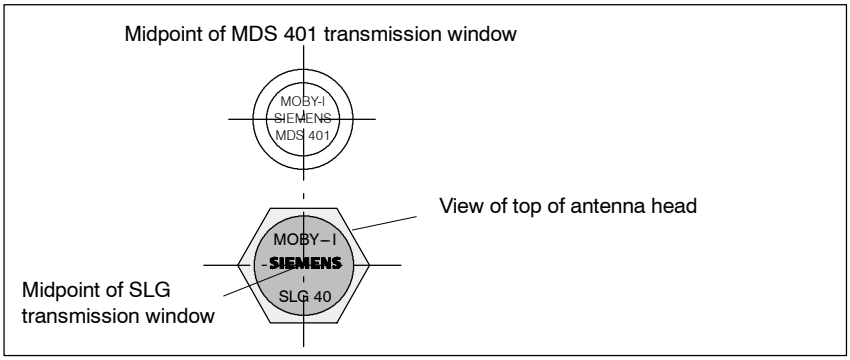


Figure 4-10 Definition of the field midpoints of SLG 40

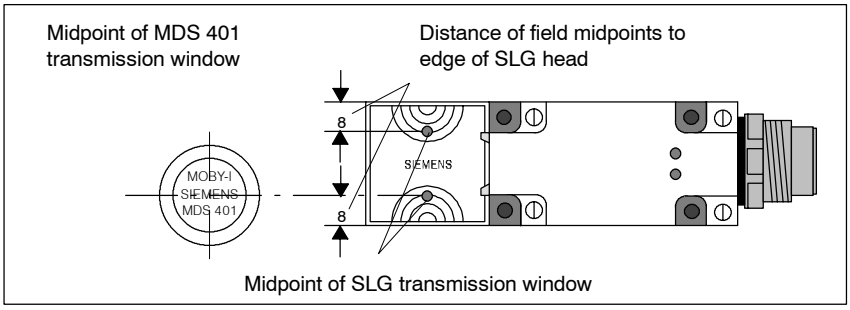


Figure 4-11 Definition of the field midpoints of SLG 41-S

Note

The midpoint of the MDS 401 transmission window must be positioned exactly over an SLG field midpoint.

4.5 MDS 402

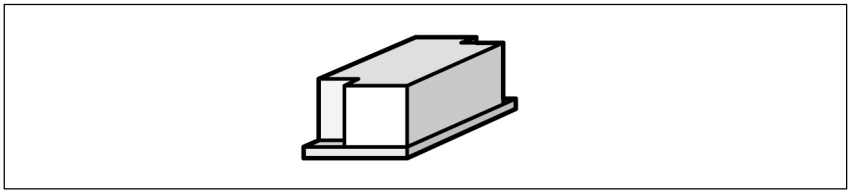


Figure 4-12 MDS 402

Ordering data

Table 4-12 Ordering data for MDS 402

Mobile data memory MDS 402 with 8-Kbyte RAM	6GT2 000-0CA20

Technical data

Table 4-13 Technical data of MDS 402

Memory size	8189-byte RAM
Memory organization	Random access
MTBF (without battery, 40° C)	1.5 x 10^6 hours
Lifespan of the battery 25° C 50° C Replacement battery	 Approx. 10 years Approx. 5 years None
Read cycles	Unlimited
Programming cycles	Unlimitted
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Direction dependency	No
Securing of MDS	2 M3 screws
Turning moment (at room temperature)	≤ 0.7 Nm
Protection rating	IP68
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 47.5 x 25 x 15
Ambient temperature • During operation • Brief ambient temperature (10 min. for 1 hour of operation) • During transportation and storage	 -25° to +60° C -25° to +70° C -40° to +60° C
Weight	25 g

Field data (in mm)

Table 4-14 Field data of MDS 402

	SLG 40	SLG 40-S	SLG 41/ SLG 41-S
Operating distance (S_a)	2 to 8	2 to 6	0 to 6
Limit distance (S_g)	10	8	10
Transmission window • L: Vertical • 2L: Horizontal	 - -	 - -	 30 50
Diameter of transmission window	d = 18	d = 9	-
Minimum distance from MDS to MDS	> 50	> 50	> 80

Dimensions (in mm)

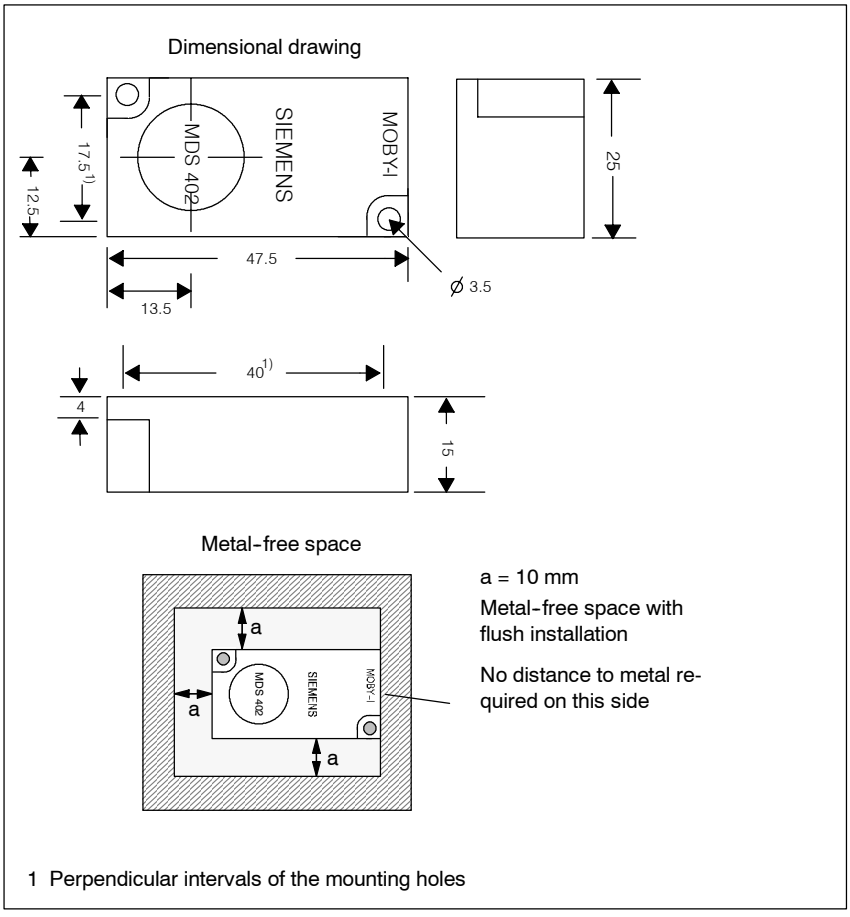


Figure 4-13 Dimensions of MDS 402

Definition of the field midpoints

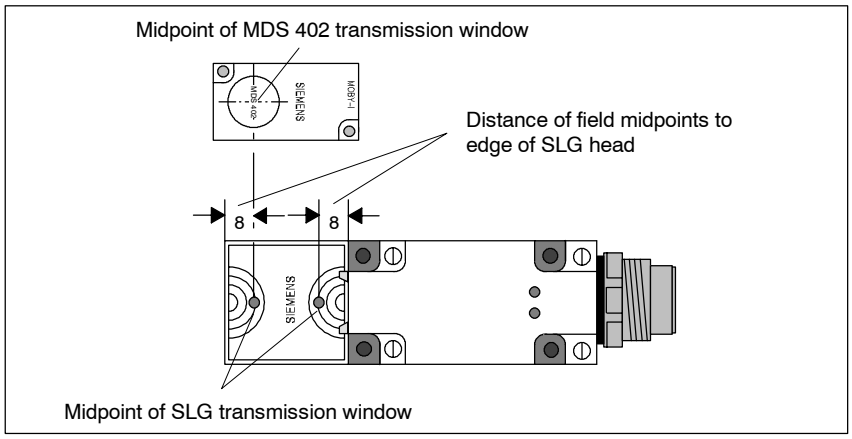


Figure 4-14 Definition of the field midpoints of SLG 41

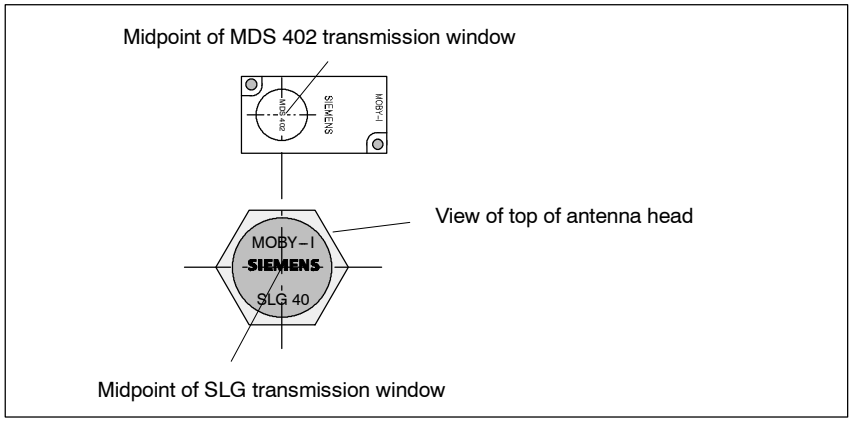


Figure 4-15 Definition of the field midpoints of SLG 40

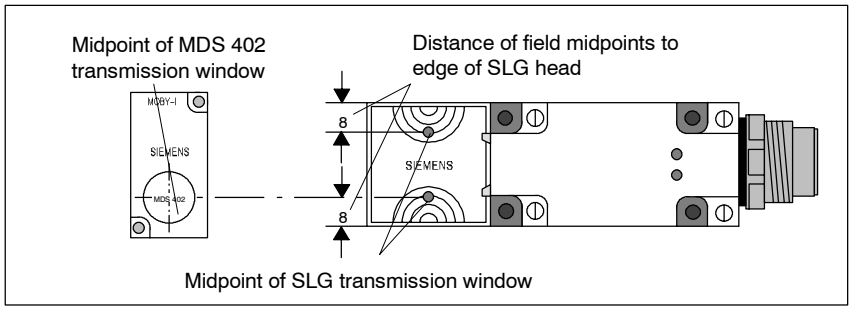


Figure 4-16 Definition of the field midpoints of SLG 41-S

Note

The midpoint of the MDS 402 transmission window must be positioned exactly over an SLG field midpoint.

4.6 MDS 404

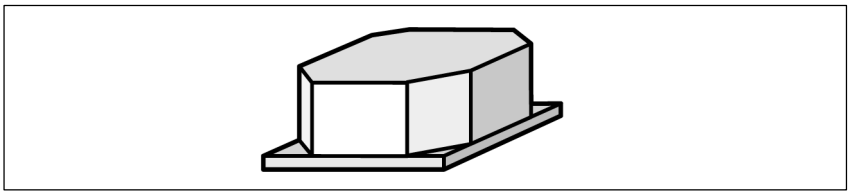


Figure 4-17 MDS 404

Ordering data

Table 4-15 Ordering data for MDS 404

Mobile data memory MDS 404 with 8-Kbyte FRAM including mounting frame	6GT2 000-0EG00
Replacement parts: Mounting frame	6GT2 090-0CA10

Technical data

Table 4-16 Technical data of MDS 404

Memory size	8189-byte FRAM
Memory organization	Random access
MTBF (without battery; at 40° C)	1.5 x 10^6 hours
Battery	**None**
Read cycles	10^{10}
Programming cycles	10^{10}
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Direction dependency	No
Securing of MDS	2 M4 screws
Turning moment (at room temperature)	≤ 1.2 Nm
Protection rating	IP68
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 50 x 50 x 20
Ambient temperature • During operation • During transportation and storage	 -25° to +70° C -40° to +70° C
Weight	50 g

Field data (in mm)

Table 4-17 Field data of MDS 404

	SLG 41/ SLG 41-S	SLG 42	SLG 43	SIM 41/42/43
Operating distance (S_a)	0 to 12	0 to 30	0 to 50	0 to 20
Limit distance (S_g)	25	60	90	33
Transmission window • L: Vertical • 2L: Horizontal	 36 72	 90 180	 140 260	 60 80
Minimum distance from MDS to MDS	> 90	> 250	> 500	> 200

The field data apply to read and write-accesses of the MDS.

Dimensions (in mm)

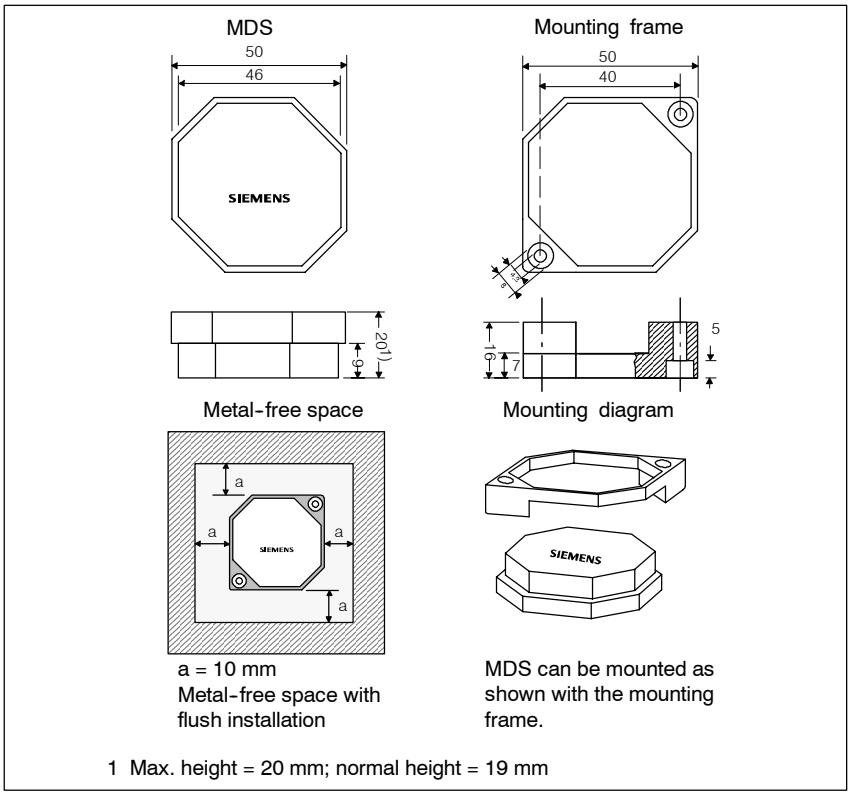


Figure 4-18 Dimensions of MDS 404

4.7 MDS 506

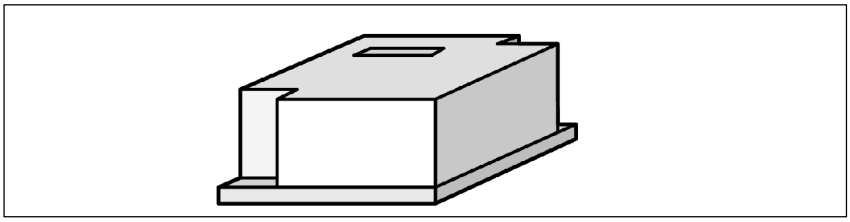


Figure 4-19 MDS 506

Ordering data

Table 4-18 Ordering data for MDS 506

Mobile data memory MDS 506 with 32-Kbyte RAM	6GT2 000-0DC00-0AA0

Technical data

Table 4-19 Technical data of MDS 506

Memory size	32765-byte RAM
Memory organization	Random access
MTBF (without battery; at 40° C)	1.5 x 10^6 hours
Battery life span • At 25° C (continuous temperature) • At 70° C (continuous temperature)	 Approx. 10 years Approx. 6 years
Replacement battery	No
Read cycles	Unlimited
Programming cycles	Unlimited
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Direction dependency	No
Securing of MDS	2 M5 screws
Turning moment (at room temperature)	≤ 2 Nm
Protection rating	IP68
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 75 x 75 x 40
Ambient temperature • During operation • During transportation and storage	 -25° to +70° C -40° to +70° C
Weight	200 g

Field data (in mm)

Table 4-20 Field data of MDS 506

	SLG 42	SLG 43	SIM 41/42/43
Operating distance (S_a)	10[1] to 35	20[1] to 100	0 to 25
Limit distance (S_g)	70	150	40
Transmission window • L: Vertical • 2L: Horizontal	 120 190	 220 400	 85 100
Minimum distance from MDS to MDS	> 300	> 600	> 300

1 Underranging the minimum operating distance can cause a transmission gap in the middle of the field. No communication with the MDS can take place in this transmission gap.

The field data apply to read and write-accesses of the MDS.

Dimensions (in mm)

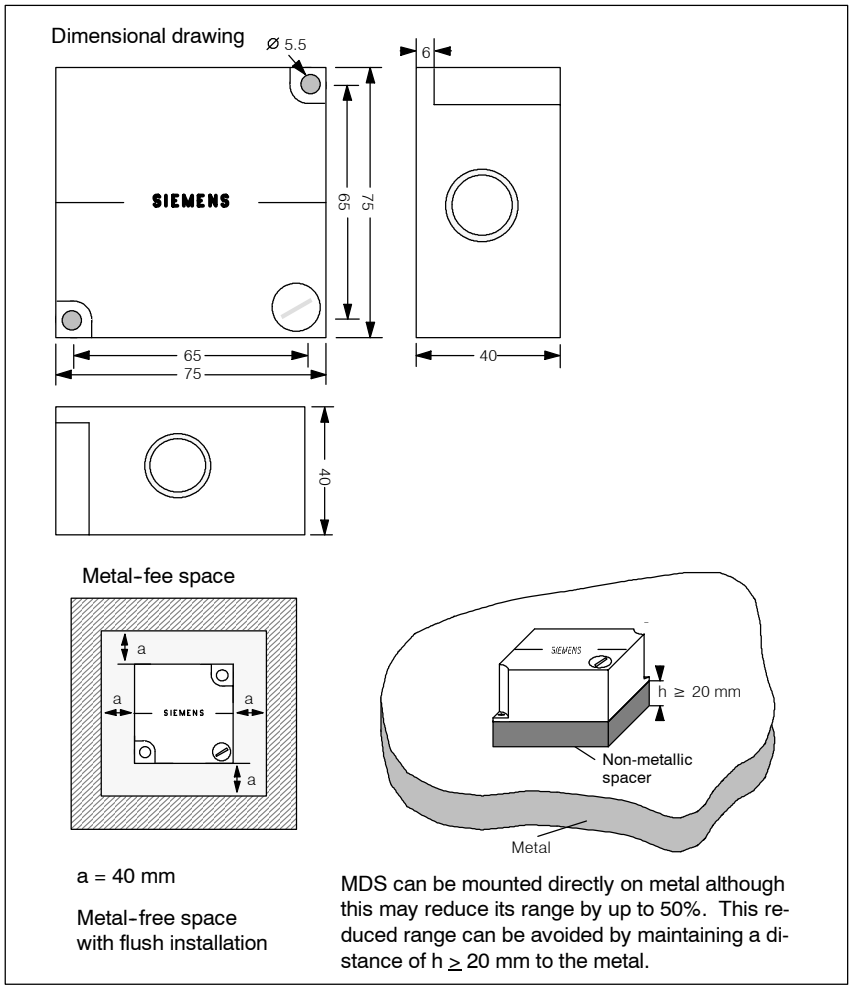


Figure 4-20 Dimensions of MDS 506

4.8 MDS 507/MDS 407 E[1]

Description

The MDS 507/407 E data memories were designed for read and write-accesses from great distances. They are equipped with a battery block containing 2 batteries (i.e., the RAM battery and the dialog battery).

The RAM battery is used to buffer the RAM data and to turn on the MDS as soon as it enters the transmission window of an active SLG.

The dialog battery is used to power the control logic of the MDS. Both batteries are contained in a battery block. This battery block can be replaced via plug-in contacts. The dialog battery is only activated when the MDS is located in the transmission window of an SLG. Outside the transmission window, the dialog battery is in standby mode, and virtually no discharging takes place.

When using the MDS 507/407 E, make sure that the SLG (presence) is switched off after the MDS is processed or the MDS leaves the transmission window. This will ensure long dialog battery life.

The MDS 507/407 E can also be used with an SLG 42 or SLG 43 although its range is reduced. It can also be used with the STG 4F.

Even with a dead dialog battery, the MDS 507/407 E can still be processed with an SLG 42/43 or an STG 4F. This provides the user with information on the status of the dialog or backup battery.

Physical layout

The MDS 507/407 E consists of a floor plate and the upper housing portion. The upper housing portion contains the electronics and the batteries. Changing the batteries is very simple with the plug-in contacts.

Floor plate and upper housing portion are held together with a snap-in catch. The upper housing portion can be removed by opening the four catches. The floor plate on the MDS carrier may remain in place (i.e., screwed in) while the batteries are being changed.

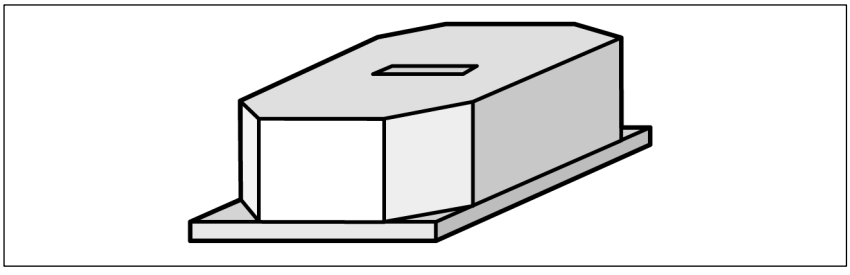


Figure 4-21 MDS 507/MDS 407 E

1 Discontinued

Ordering data

Table 4-21 Ordering data for MDS 507/407 E

Mobile data memory MDS 507 with 32-Kbyte RAM	6GT2 000-0DC01-0AA0
Mobile data memory MDS 407 E with 8-Kbyte EEPROM	6GT2 00-0CE01
Configuring manual SLG 44/MDS 507/407 E	
German	6GT2 097-4AB00-0EA1
English	6GT2 097-4AB00-0EA2
Accessories (order separately)	
Magnet holder for MDS 507/407 E	6GT2 090-0PA00
Replacement battery	6GT2 094-0AA0

Technische Daten

Table 4-22 Technical data of MDS 507/407 E

	MDS 507	**MDS 407 E[1]**
Memory size	32-Kbyte RAM	8-byte RAM
Memory type	RAM	EEPROM
Memory organization	Random access	
MTBF (without battery; at 40° C)	1.5 x 10^6 hours	
Battery life span		
• At 25° C (continuous temperature)	Approx. 10 years	
• At 70° C (continuous temperature)	Approx. 6 years	
Life span of dialog battery		
• 15-min processing time/day	Approx. 2 years	
• 5-min processing time/day	Approx. 5 years	
• < 1 min processing time/day	Approx. 10 years	
Battery for data backup	Yes	No
Battery for dialog with SLG	Yes	
Read cycles	Unlimited	
Programming cycles at 70° C (min.)	Unlimited	10000
Programming cycles at 40° C (typical)	Unlimited	500000
Read/write intervals	See field data.	
Shock	50 g	
Vibration	20 g	
Direction dependency	Yes	
Maximum angle deviation	± 45°	
Securing of MDS	4 M5 screws	
Turning moment (at room temperature)	≤ 2 Nm	
Protection rating	IP65	

Table 4-22 Technical data of MDS 507/407 E

	MDS 507	MDS 407 E[1]
Housing		
• Color	Gray	
• Material	Polyamide 12	
• Dimensions (L x W x H) in mm	125 x 75 x 40	
Ambient temperature		
• During operation	-25° to +70° C	
• During transportation and storage	-40° to +70° C	
Weight	330 g	

1 Discontinued

Field data (in mm)

Table 4-23 Field data of MDS 507/407 E

	SLG 44
Operating distance (S_a)	100 to 800
Limit distance (S_g)	> 1000
Transmission window	
• L: Vertical	1200
• 2L: Horizontal	300
Minimum distance from MDS to MDS	> 4000

Note

Using the field data specified here, the MDS 507/407 E can be configured without any special knowledge. However, more complex configurations require the exact transmission window as described in chapter 3.6.

Dimensions (in mm)

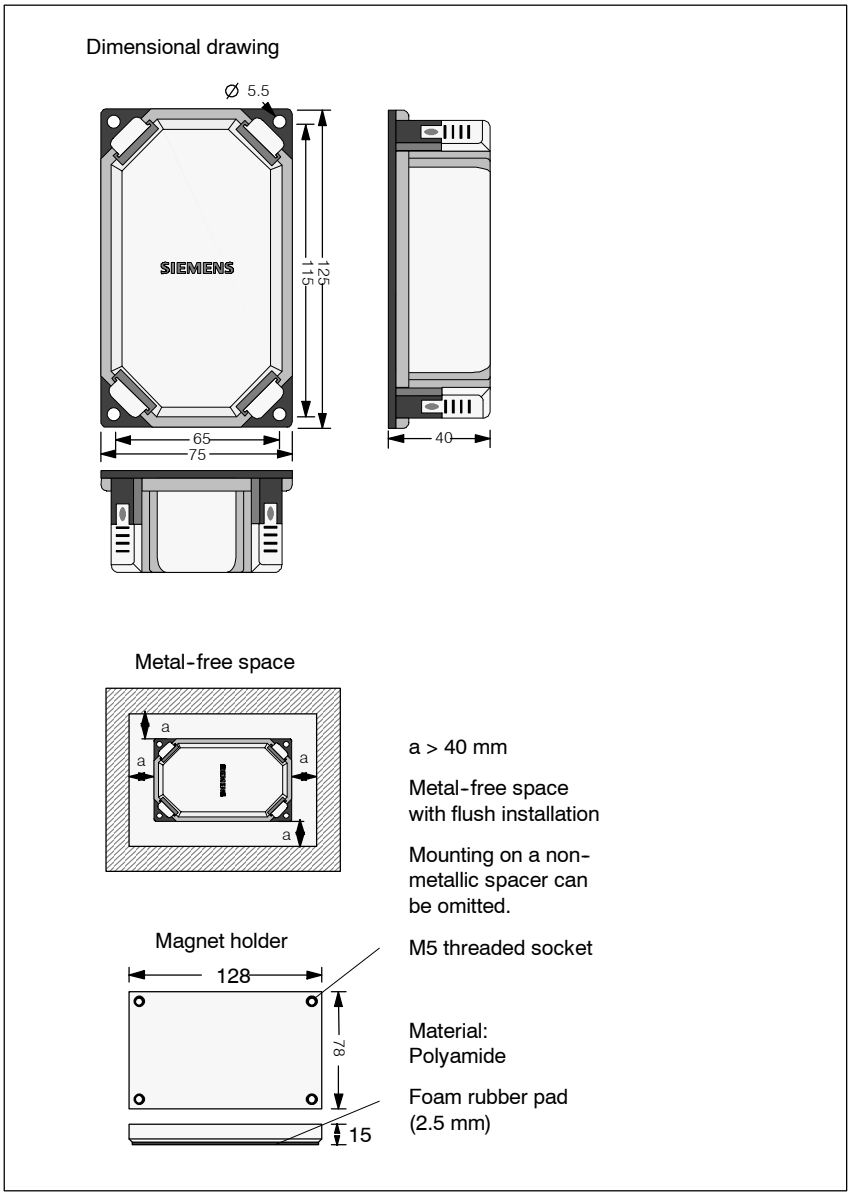


Figure 4-22 Dimensions of MDS 507/MDS 407 E

Mounting screws and washer for the MDS are **not** included.

The magnet holder can be used in all situations in which the MDS must be removed very quickly from one object and affixed to another.

Using the foam rubber pad, the MDS magnet holder can be placed directly on painted iron surfaces.

4.9 MDS 514

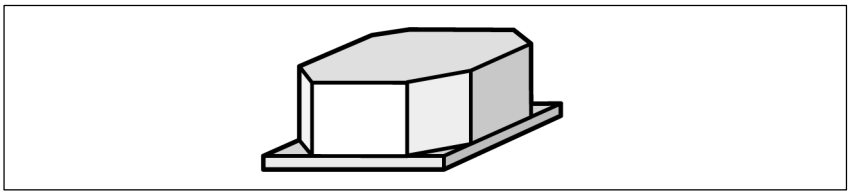


Figure 4-23 MDS 514

Ordering data

Table 4-24 Ordering data for MDS 514

Mobile data memory MDS 514 with 32-Kbyte RAM including mounting frame	6GT2 000-0DG10
Replacement parts: Mounting frame	6GT2 090-0CA10

Technical data

Table 4-25 Technical data of MDS 514

Memory size	32765-byte RAM
Memory organization	Random access
MTBF (without battery; at 40° C)	1.5 x 10^6 hours
Battery life span • At 25° C (continuous temperature) • At 70° C (continuous temperature) • At 85° C (continuous temperature)	 Approx. 10 years Approx. 5 years Approx. 2.5 years
Replacement battery	No (cannot be changed)
Read cycles	Unlimited
Programming cycles	Unlimited
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Direction dependency	No
Securing of MDS	2 M4 screws
Turning moment (at room temperature)	≤ 1.2 Nm
Protection rating	IP68
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 50 x 50 x 20

Table 4-25 Technical data of MDS 514

Ambient temperature • During operation • During transportation and storage	 -25° to +85° C -40° to +70° C
Weight	50 g

Field data (in mm)

Table 4-26 Field data of MDS 514

	SLG 41/ SLG 41-S	SLG 42	SLG 43	SIM 41/42/43
Operating distance (S_a)	0 to 12	0 to 30	0 to 50	0 to 20
Limit distance (S_g)	25	60	90	33
Transmission window • L: Vertical • 2L: Horizontal	 36 72	 90 180	 140 260	 60 80
Minimum distance from MDS to MDS	> 90	> 250	> 500	> 200

The field data apply to read and write-accesses of the MDS.

Dimensions (in mm)

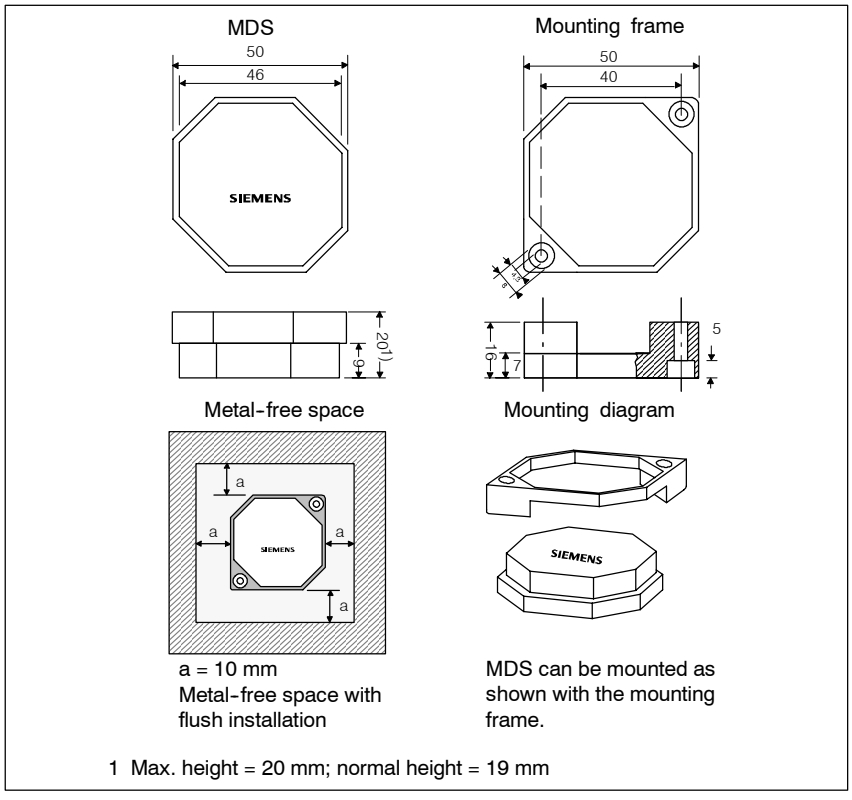


Figure 4-24 Dimensions of MDS 514

4.10 MDS 213 E[1]

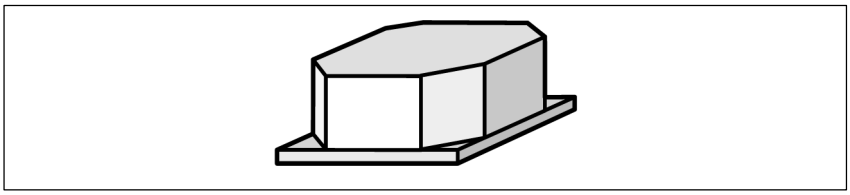


Figure 4-25 MDS 213 E

Ordering data

Table 4-27 Ordering data for MDS 213 E

Mobile data memory MDS 213 E with 128-Kbyte EEPROM	6GT2 000-0BB10-0AA0
Order separately: Mounting frame	6GT2 090-0CA00

Technical data

Table 4-28 Technical data of MDS 213 E

Memory size	128-byte EEPROM
Memory organization	Random access
MTBF	2.5 x 10^6 hours
Battery	No
Read cycles	Unlimited
Write cycles • At 70° C (min.) • At 40° C (typ.)	 10000 500000
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Direction dependency	No
Securing of MDS	2 M4 screws
Turning moment (at room temperature)	≤ 1.5 Nm
Protection rating	IP68
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 50 x 50 x 20
Ambient temperature • During operation • During transportation and storage	 -25° to +85° C -40° to +85° C
Weight	33 g

1 Discontinued

Field data (in mm)

Table 4-29 Field data of MDS 213 E

	SLG 41/ SLG 41-S	SLG 42	SIM 41/42/43
Operating distance (S_a)	0 to 10	0 to 25	0 to 20
Limit distance (S_g)	22	55	30
Transmission window			
• L: Vertical	30	80	55
• 2L: Horizontal	60	160	70
Minimum distance from MDS to MDS	> 90	> 120	> 200

The field data apply to read and write-accesses of the MDS.

Dimensions (in mm)

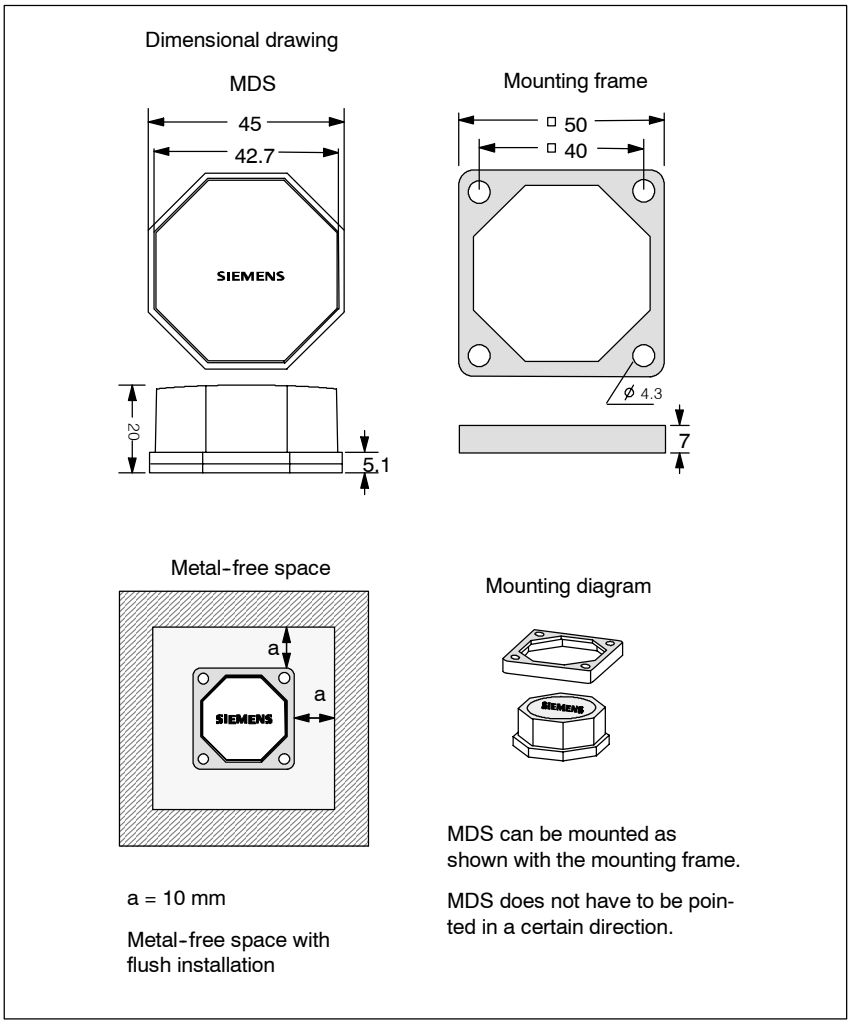


Figure 4-26 Dimensions of MDS 213 E

4.11 MDS 413 E

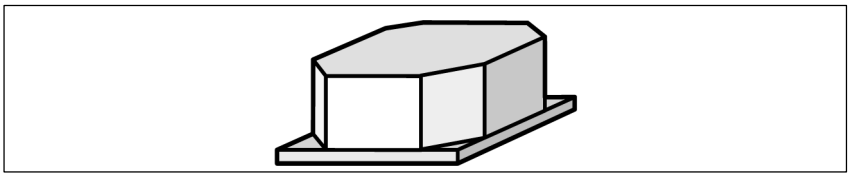


Figure 4-27 MDS 413 E

Ordering data

Table 4-30 Ordering data for MDS 413 E

Mobile data memory MDS 413E with 8-Kbyte EEPROM	6GT2 000-0CB10-0AA0
Order separately: Mounting frame	6GT2 090-0CA00

Technical data

Table 4-31 Technical data of MDS 413 E

Memory size	8189-byte EEPROM
Memory organization	Random access
MTBF (at 40° C)	2.5 x 10^6 hours
Battery	No
Read cycles	Unlimited
Write cycles • At 70° C (min.) • At 40° C (typ.)	 10000 500000
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Direction dependency	No
Securing of MDS	2 M4 screws
Turning moment (at room temperature)	≤ 1.5 Nm
Protection rating	IP68
Housing • Color • Material • Dimensions (L x W x H) in mm (with mounting frame)	 Gray Polyamide 12 50 x 50 x 20
Ambient temperature • During operation • During transportation and storage	 -25° to +85° C -40° to +85° C
Weight	33 g

Field data (in mm)

Table 4-32 Field data of MDS 413 E

	SLG 41/ SLG 41-S	SLG 42	SLG 43	SIM 41/42/43
Operating distance (S_a)	0 to 10	0 to 25	0 to 50	0 to 20
Limit distance (S_g)	22	55	80	30
Transmission window				
• L: Vertical	30	80	120	55
• 2L: Horizontal	60	160	230	70
Minimum distance from MDS to MDS	> 90	> 250	> 500	> 200

Dimensions (in mm)

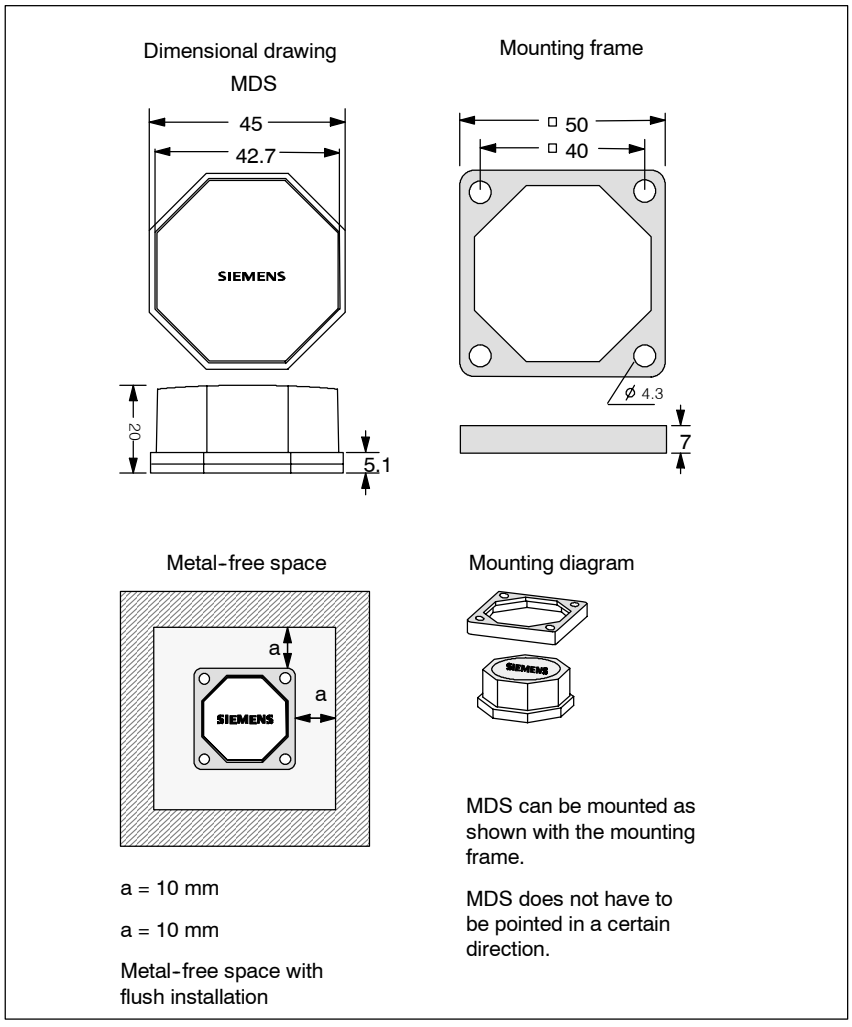


Figure 4-28 Dimensions of MDS 413 E

4.12 MDS 438 E[1]

Application area

This heat-proof data memory can be used when processes expose the data memory to temperatures in excess of 85° C. Its IP68 protection rating ensures reliable service under rugged operating conditions.

Some typical applications are listed below.

- Priming and cataphoretic dip coating with the related drying chambers
- Surface painting and related drying chambers
- Washing at temperatures > 85° C

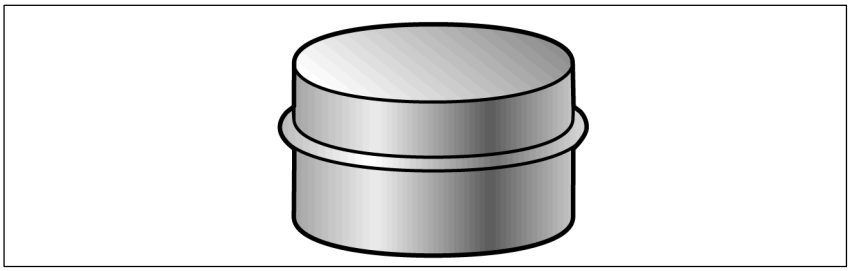


Figure 4-29 MDS 438 E

Ordering data

Table 4-33 Ordering data for MDS 438 E

Mobile data memory MDS 438 E with 8-Kbyte EEPROM	6GT2 000-0CD30-0AA0
Description - MDS 438 E	
German	6GT2 097-3AE00-0DA1
English	6GT2 097-3AE00-0DA2
Order separately:	
Holder	
flat version	6AW5 453-8KA
bent version	6AW5 453-8KB

Technical data

Table 4-34 Technical data of MDS 438 E

Memory size	8189-byte EEPROM
Memory organization	Random access
MTBF (at 40° C)	2.5 x 10^6 hours
Battery	No
Read cycles	Unlimited

Table 4-34 Technical data of MDS 438 E

Write cycles • At 70° C (min.) • At 40° C (typ.)	 10000 500000
Read/write intervals	See field data.
Shock[1]	50 g
Vibration[1]	5 g
Direction dependency	No
Protection rating	IP68
Housing • Color • Material • Dimensions (∅ x H) in mm Ambient temperature • Permanent operation • Cyclic operation • Transportation and storage	 Brown Polyphenylene sulfide (PPS) 145 x 160 -25° to +100° C -25° to +200° C -40° to +100° C
Weight	1300 g

1 Applies only when used with original holder

Field data (in mm)

Table 4-35 Field data of MDS 438 E

	SLG 42	**SLG 43**	**SIM 41/42/43**
Operating distance (S_a)	10[1] to 55	20[1] to 80	0 to 25
Limit distance (S_g)	70	125	33
Transmission window • L: Vertical • 2L: Horizontal	 120 210	 190 330	 75 100
Minimum distance from MDS to MDS	> 500	> 600	> 300

1 Underranging the minimum operating distance can cause a transmission gap in the middle of the field. No communication with the MDS can take place in this transmission gap.

Dimensions (in mm)

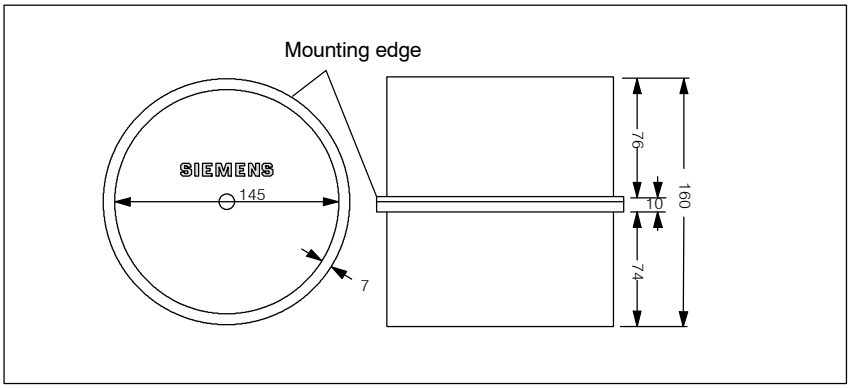


Figure 4-30 Dimensional drawing of MDS 438 E

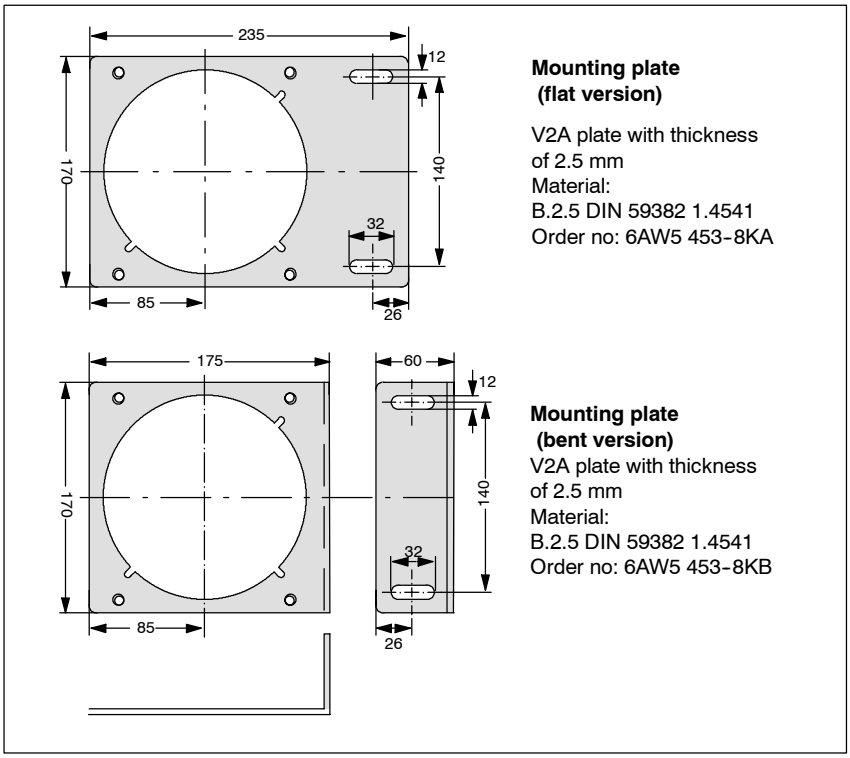


Figure 4-31 Holder of MDS 438 E

The holder includes all mounting materials and a drawing. Mounting screws (diameter of M10 and minimum length of 25 mm) to secure the holder are not included.

Caution

We strongly recommend only using the MDS with its original holder. Only this holder can ensure that the MDS adheres to the values specified for shock, vibration and temperature. A protective cover is recommended for use in painting applications.

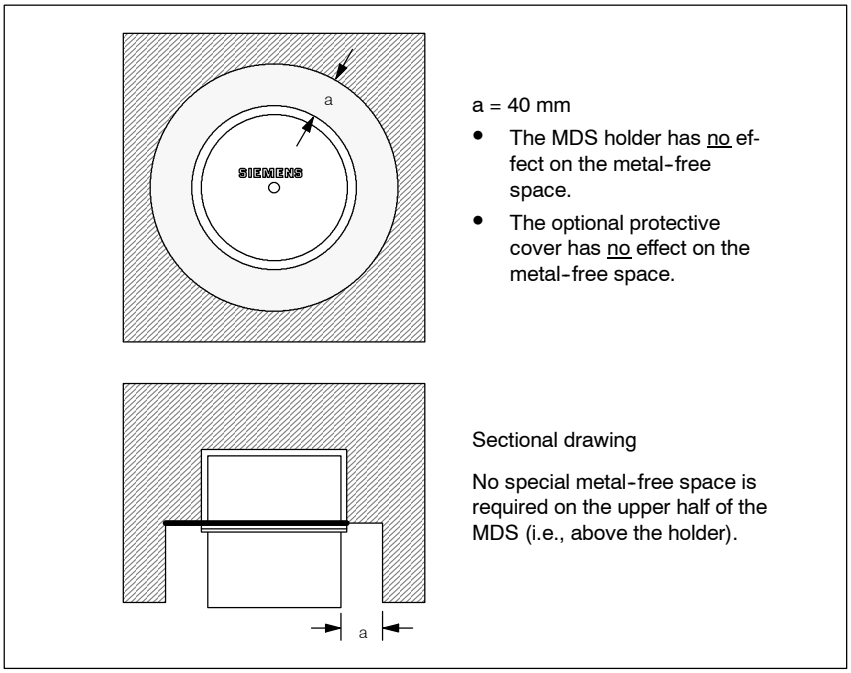


Figure 4-32 Metal-free space for MDS 438 E

Cyclic MDS operation at temperatures > 100° C

At ambient temperatures between 100° and 200° C, it must be ensured that the interior temperature of the MDS does not exceed the critical threshold of 100° C. Each heat-up phase must be followed by a cool-down phase. Some limit cycles are listed in the following table.

Table 4-36 Limit cycles of MDS 438 E

T_u (Heat-Up)	Heating Up	T_u (Cool-Down)	Cooling Down
200° C	2 h	25° C	> 8 h
200° C	1 h	25° C	> 1 h 20 min
190° C	2 h	25° C	> 5 h
190° C	1 h	25° C	> 1 h 10 min
180° C	2 h	25° C	> 4 h
170° C	2 h	25° C	> 3 h
160° C	3 h	25° C	> 5 h
150° C	3 h	25° C	> 3 h

Calculation of a temperature profile is available from Siemens on request.

4.13 MDS 439 E

Application area

This heat-proof data memory can be used when processes expose the data memory to temperatures in excess of 85° C but less than 200° C. Its IP68 protection rating ensures reliable service under rugged operating conditions. The MDS is dimensioned so that it can be secured both on a skid and directly on a chassis.

Some typical applications are listed below.

- Priming and cataphoretic dip coating with the related drying chambers
- Surface painting and related drying chambers
- Washing at temperatures > 85° C

Figure 4-33 MDS 439 E

Ordering data

Table 4-37 Ordering data for MDS 439 E

Mobile data memory MDS 439 E with 8-Kbyte EEPROM	6GT2 000-0CD30-0AB0
Order separately:	
Holder	
Short version	6GT2 099-0QA00
Long version	6GT2 090-0QA00-ZA31
Covering hood	6GT2 090-0QB00
Description - MDS 439 E	
German	6GT2 097-3AJ00-1DA1
English	6GT2 097-3AJ00-1DA2

Technical data

Table 4-38 Technical data of MDS 439 E

Memory size	8189-byte EEPROM
Memory organization	Random access
MTBF (at 40° C)	2.5 x 10^6 hours
Battery	No
Read cycles	Unlimited

Table 4-38 Technical data of MDS 439 E

Write cycles • At 70° C (min.) • At 40° C (typ.)	 10000 500000
Read/write intervals	See field data.
Shock[1]	50 g
Vibration[1]	5 g
Direction dependency	No
Protection rating	IP68
Housing • Color • Material • Dimensions (∅ x H) in mm	 Brown Polyphenylene sulfide (PPS) 114 x 83
Ambient temperature • Permanent operation • Cyclic operation • Transportation and storage	 -25° to +100° C -25° to +200° C -40° to +110° C
Weight	900 g

1 Applies only when used with original holder

Field data (in mm)

Table 4-39 Field data of MDS 439 E

	SLG 42	**SLG 43**	**SIM 41/42/43**
Operating distance (S_a)	10[1] to 55	20[1] to 80	0 to 25
Limit distance (S_g)	70	125	33
Transmission window • L: Vertical • 2L: Horizontal	 120 210	 190 330	 75 100
Minimum distance from MDS to MDS	> 500	> 600	> 300

1 Underranging the minimum operating distance can cause a transmission gap in the middle of the field. No communication with the MDS can take place in this transmission gap.

The field data apply to read and write-accesses of the MDS.

Dimensions (in mm)

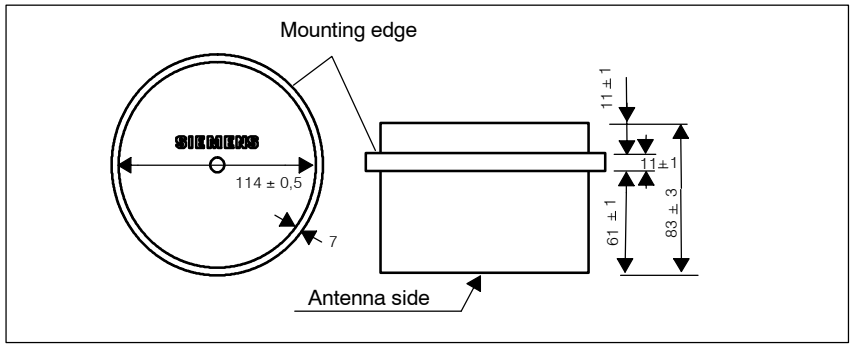


Figure 4-34 Dimensional drawing of MDS 439 E

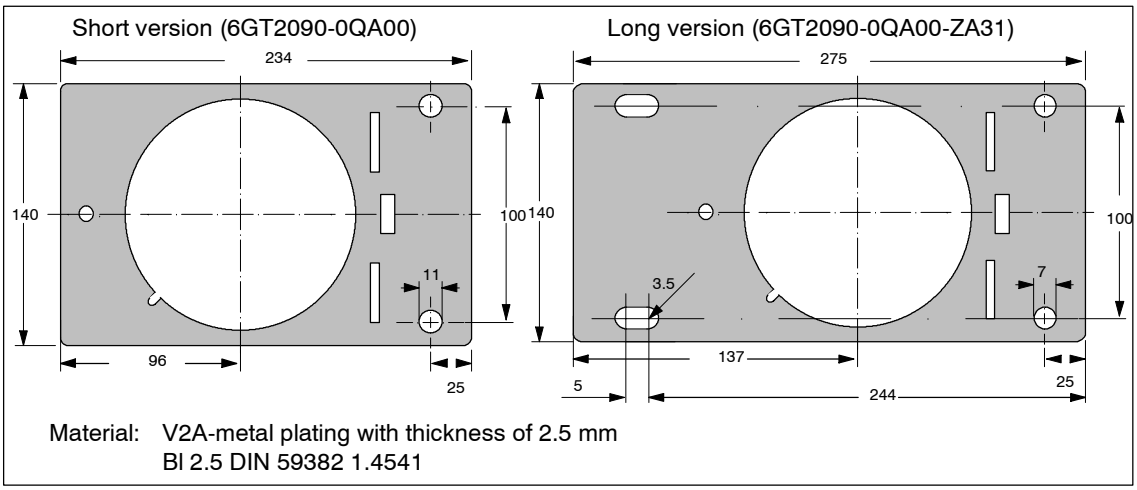


Figure 4-35 Holder of the MDS 439 E data memory

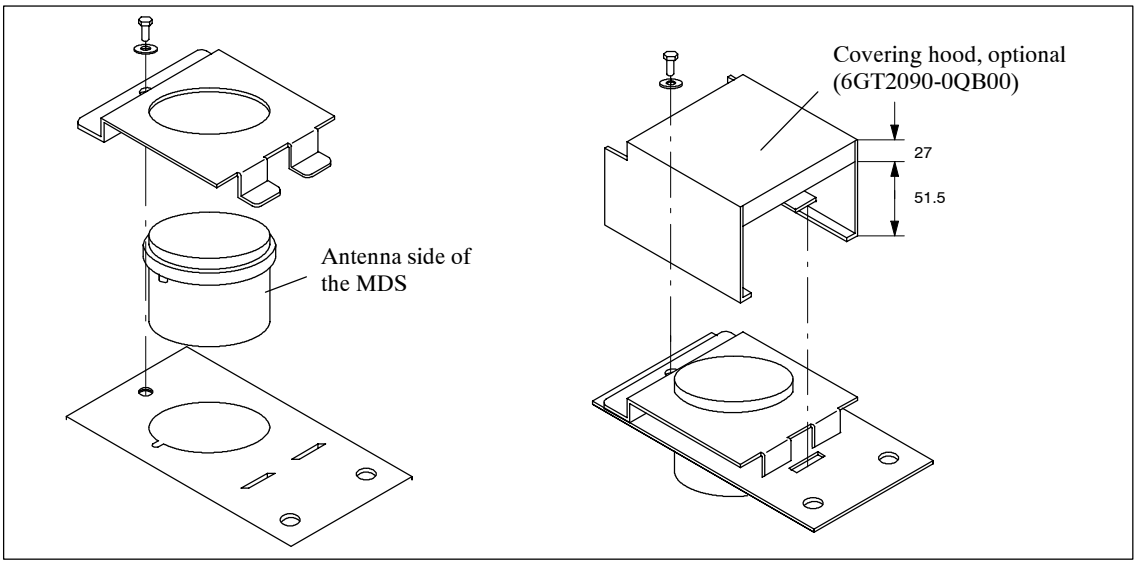


Figure 4-36 Assembly of MDS 439 E with holder

The holder includes all mounting materials and a drawing. Mounting screws (diameter of M10 and minimum length of 25 mm) to secure the holder are not included. The optional covering hood can be used for the long and short version of the holder.

Caution

We strongly recommend only using the MDS with its original holder. Only this holder can ensure that the MDS adheres to the values specified for shock, vibration and temperature. A protective cover is recommended for use in painting applications.

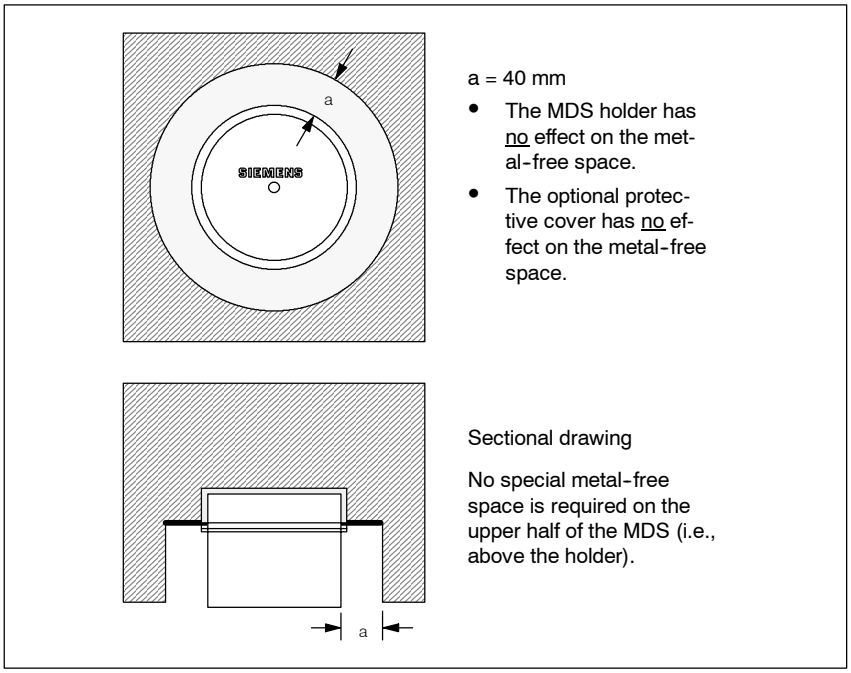


Figure 4-37 Metal-free space for MDS 439 E

Cyclic MDS operation at temperatures > 110° C

At ambient temperatures between 110° and 200° C, it must be ensured that the interior temperature of the MDS does not exceed the critical threshold of 110° C. Each heat-up phase must be followed by a cool-down phase. Some limit cycles are listed in the following table.

Table 4-40 Limit cycles of MDS 439 E

T_u (Heat-Up)	Heating Up	T_u (Cool-Down)	Cooling Down
200˚ C	2 h	25˚ C	> 8 h
200˚ C	1 h	25˚ C	> 2 h
190˚ C	2 h	25˚ C	> 7 h
190˚ C	1 h	25˚ C	> 1 h 45 min
180˚ C	2 h	25˚ C	> 5 h 30 min
170˚ C	2 h	25˚ C	> 4 h 30 min

Calculation of a temperature profile is available fro Siemens on request.

Note

For further configuration notes, see chapter 3.7 or the description of MDS 439 E (6GT2097-3AJ00-1DA2).

Read/Write Devices

5

5.1 Introduction

Application area

The read/write devices (i.e., SLGs) provide inductive communication with the mobile data memories (i.e., MDSs) and the serial link to the interfaces (i.e., ASMs).

Various SLG models – for short, medium and long distances to the MDS – are available to meet customer requirements.

Layout and functions

The SLG executes commands received from the interface. These commands for reading and writing data are converted via a modulator/demodulator circuit.

Communication between MDS and SLG takes place via inductive alternating fields.

The amount of data which can be transferred between SLG and MDS depends on the factors listed below.

- The speed at which the MDS moves through the transmission window of the SLG
- The length of the transmission window
- The type of MDS (i.e., RAM or EEPROM)

Overview table

Table 5-1 Overview table of the SLG

SLG Type	Operating Distance S_a (Depending on MDS)	Limit Distance S_g	Temperature Range (During Operation)	Dimensions (WxHxD) in mm	Protection Rating
SLG 40	2 to 8 mm	10 mm	-25 to +70° C	∅ 30 x 54 (head)	IP65
SLG 40-S	2 to 6 mm	8 mm	-25 to +70° C	∅ 18 x 30 (head)	IP65
SLG 41/41-S	0 to 15 mm	25 mm	-25 to +70° C	120 x 40 x 40	IP65
SLG 42	0 to 55 mm	70 mm	-25 to +70° C	75 x 40 x 75	IP65
SLG 43	0 to 100 mm	150 mm	-25 to +70° C	238 x 40 x 80	IP65
SLG 44	100 to 800 mm	1000 mm	-25 to +70° C	238 x 40 x 80	IP63

5.2 SLG 40

Application area

The SLG 40 is extremely suited for use on small assembly lines. The short installation distance between several SLG 40 antennas is a special feature. With the 2 screw nuts, the antenna head can be positioned with extreme precision for each application.

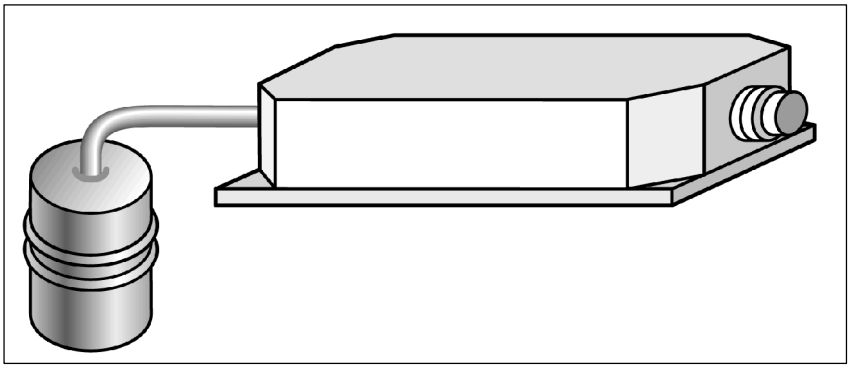


Figure 5-1 Read/write device SLG 40

Ordering data

Table 5-2 Ordering data for SLG 40

Read/write device SLG 40 up to 10 mm (low power)	6GT2 001-0EA10
SLG plug connector and stub lines	See chapter 3.10

Technical data

Table 5-3 Technical data of SLG 40

Inductive interface to MDS	
Data transmission speed	19200 baud
Read/write distance SLG to MDS (max.)	10 mm (see field data table)
Transmission frequency	
• Power	134 kHz
• Data	1.81 MHz
Serial interface to ASM	6-pin SLG plug connector in acc. w. DIN 43651
Transmission speed	19200 baud, RS 422
Line length, ASM to SLG (max.) at 24 V DC	360 m

Table 5-3 Technical data of SLG 40

Supply voltage (via serial interface)		
Nominal value		24 V DC
Permissible range		20 to 30 V DC
Current consumption		
Idle/operation		25 mA/90 mA
MTBF		2 x 10^6
Housing		
Dimensions (in mm)		
For antenna head (∅ x threading x L)		M30 x 1.5 x 54
For electronics w/o plug (WxHxD)		125 x 40 x 75
Color	Antenna	Anthracite with orange head
	SLG housing	Ergo-gray
Material	Antenna	"Crastin"
	SLG housing	Polyamide 12
Plug connection		DIN 43651
Protection rating		
Antenna and SLG housing		IP65
Shock		50 g
Vibration		20 g
Mounting of SLG		4 M5 screws
Turning moment (at room temperature)		≤ 2 Nm
Ambient temperature		
During operation		-25° to +70° C
During transportation and storage		-40° to +85° C
Weight (approx.)		215 g

Field data

Applicable for MDS 302/402/401

Table 5-4 Field data of SLG 40

Operating distance (S_a)	2 to 8 mm
Limit distance (S_g)	10 mm
Median deviation (L_d)	18 mm (± 9 mm from middle)
Minimum distance from SLG to SLG (D)	$D_a \geq 50$ mm $D_b \geq 80$ mm

Transmission window

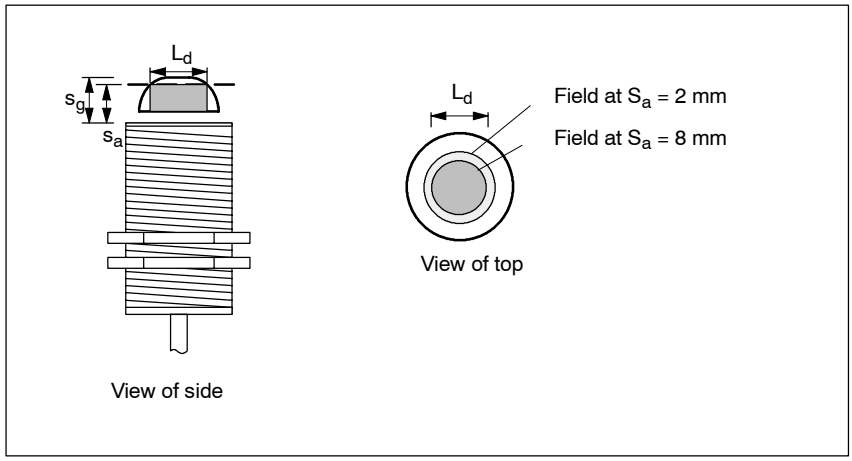


Figure 5-2 View of the antenna

Transmission window:

To ensure reliable data communication, the antenna of the MDS must be positioned within this field. A diameter of L_d = 18 mm can be configured for the operating distance (2 to 8 mm).

Metal-free space

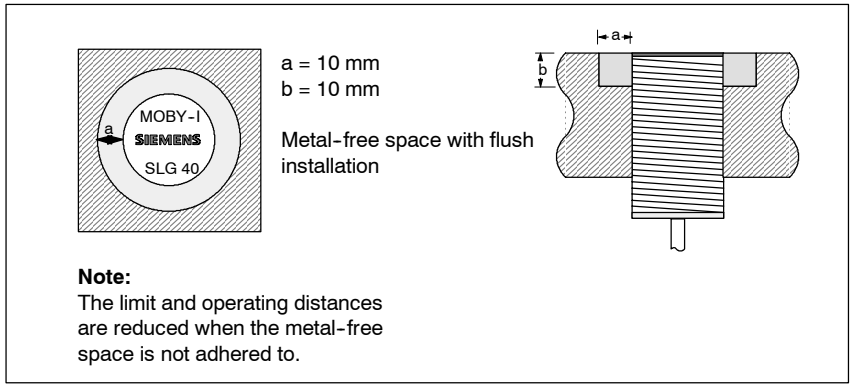
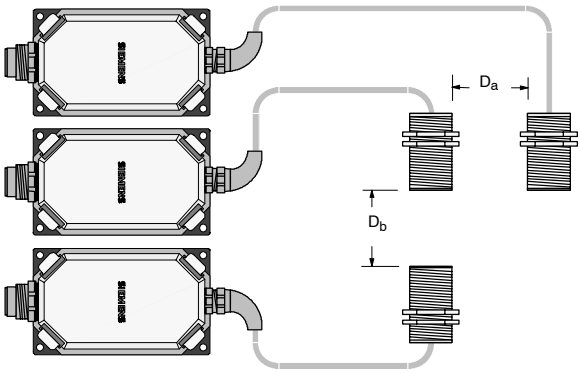


Figure 5-3 Metal-free space for SLG 40

Definition of distance D



$D_a \geq 50$ mm
$D_b \geq 80$ mm

The SLG electronics can be mounted directly next to each other.

Figure 5-4 Distance D for SLG 40

Dimensions (in mm)

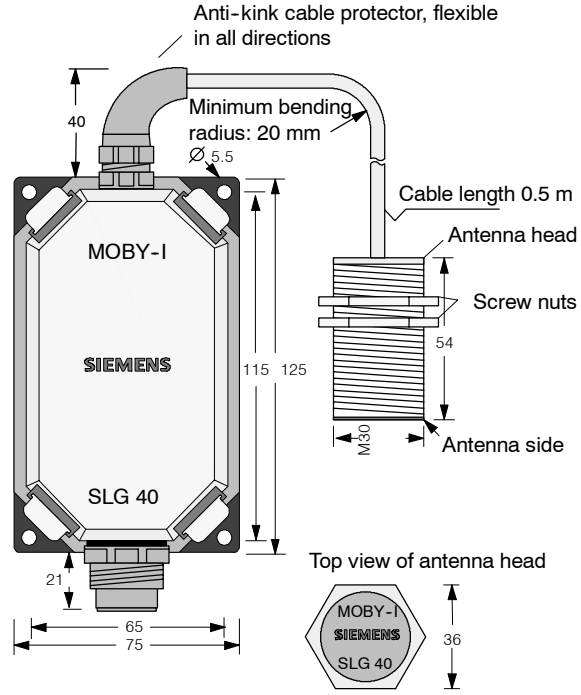


Figure 5-5 Dimensional diagram of SLG 40

5.3 SLG 40-S

Application area

The SLG 40 is extremely suited to use in small assembly lines. The short installation distance between several SLG 40-S antennas is a special feature. With the 2 screw nuts, the antenna head can be positioned with extreme precision for each application.

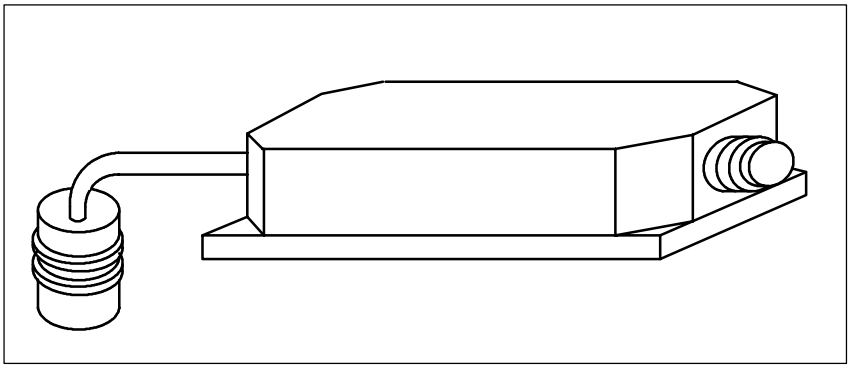


Figure 5-6 Read/write device SLG 40-S

Ordering data

Table 5-5 Ordering data for SLG 40-S

Read/write device SLG 40-S up to 8 mm (low power)	6GT2 001-0EB00
SLG plug connector and stub lines	See chapter 3.10

Technical data

Table 5-6 Technical data of SLG 40-S

Housing		
Dimensions (in mm)		
For antenna head (∅ x threading x L)		M18 x 1.0 x 30
For electronics w/o plug (L xW x H)		75 x 75 x 40
Color	Antenna	Anthracite with orange head
	SLG housing	Ergo-gray
Material	Antenna	"Crastin"
	SLG housing	Polyamide 12
Plug connection		DIN 43651
Protection rating		
Antenna and SLG housing		IP65
Shock		50 g
Vibration		20 g
Storage temperature		-40° to +85° C
Operation temperature		-25° to +70° C

Table 5-6 Technical data of SLG 40-S

Operating voltage		17 to 30 V DC
Current consumption	Idle	25 mA
	Operation	90 mA
Serial interface		RS 422
Transmission speed		19200 baud
Max. cable length (cf. chap. 3.10.1; standard cable)		360 m
MTBF		2×10^6
Transmission frequency		
• Power		134 kHz
• Data		1.81 MHz
Mounting of SLG		4 M5 screws
Turning moment (at room temperature)		$\leq$ 2 Nm
Mounting of SLG head (included)		2 nuts (M18 x 1.0)
Weight (approx.)		200 g

Field data

Applicable for MDS 302

Table 5-7 Field data of SLG 40-S

Operating distance (S_a)	2 to 6 mm
Limit distance (S_g)	8 mm
Diameter of transmission window (L_d)	9 mm
Median deviation	$\pm$ 4.5 mm from middle
Minimum distance from SLG to SLG (D)	$D_a \geq 50$ mm $D_b \geq 80$ mm

Transmission window

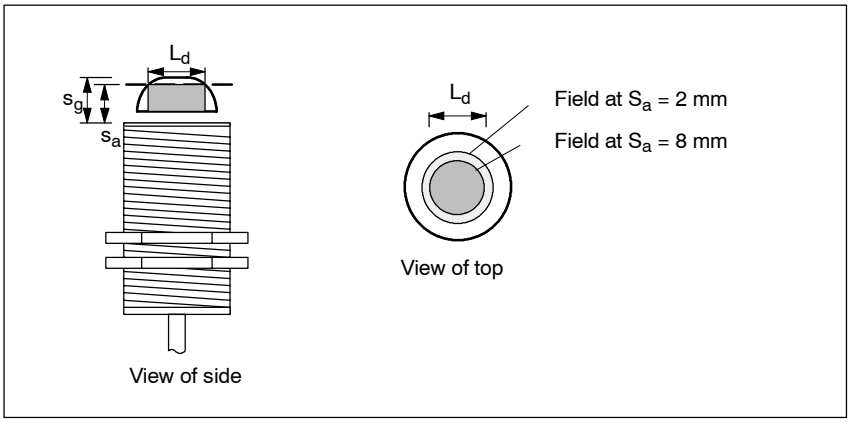


Figure 5-7 View of the antenna

Transmission window:
To ensure reliable data communication, the antenna of the MDS must be positioned within this field.

Metal-free space

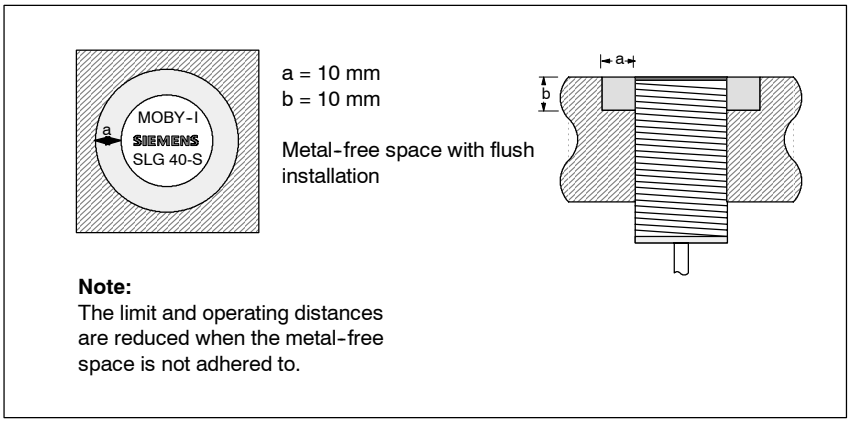


Figure 5-8 Metal-free space for SLG 40-S

Definition of distance D

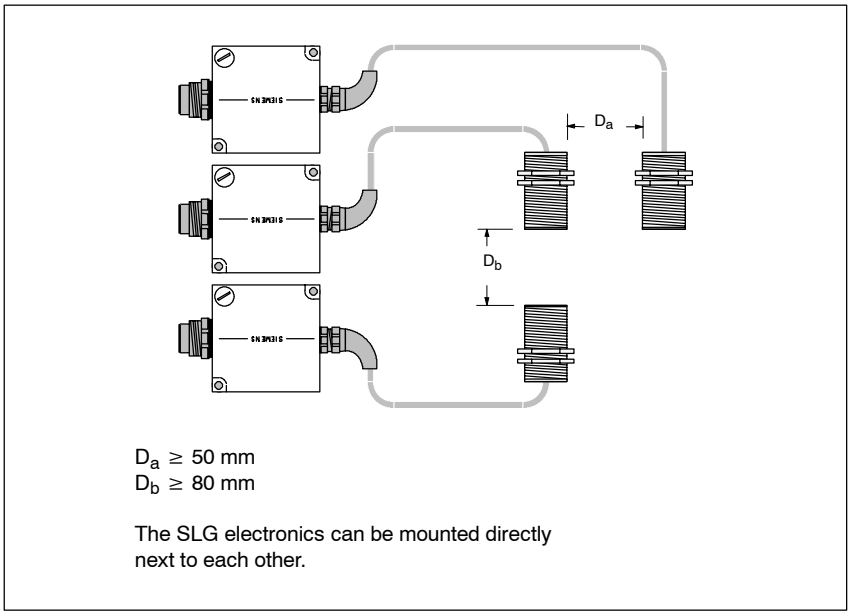


Figure 5-9 Distance D for SLG 40-S

Dimensions (in mm)

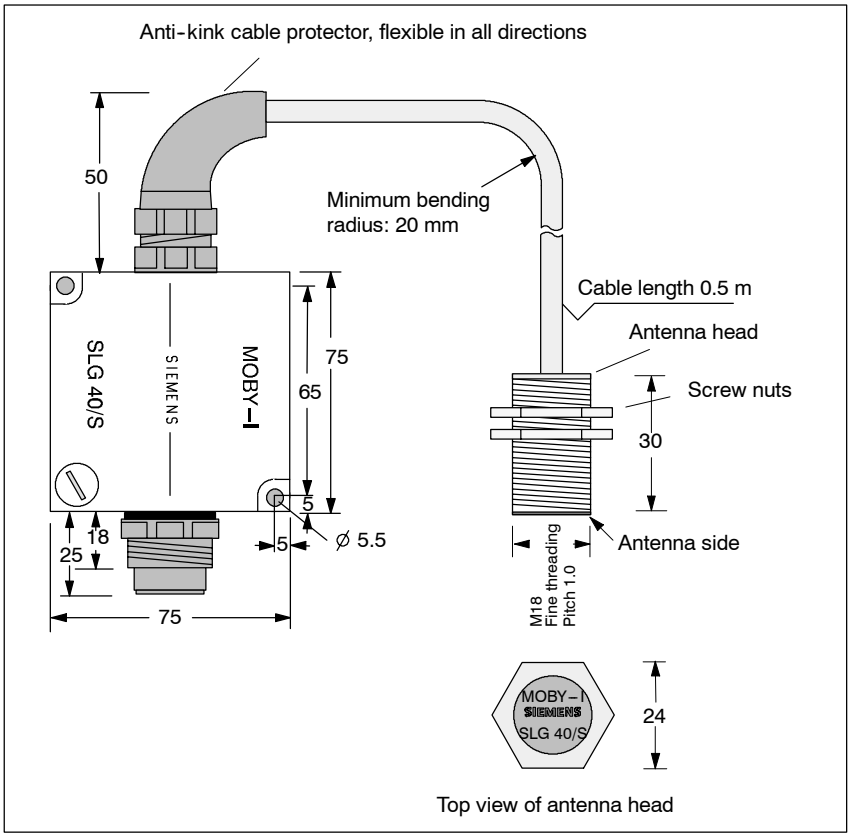


Figure 5-10 Dimensional diagram of SLG 40-S

5.4 SLG 41/SLG 41-S

Application area

The SLG 41 is a low-end read/write device. It is particularly suitable for use when the MDS conveyor system (e.g., pallets) can be physically positioned relatively precisely. The swivel head of the SLG 41 makes it very adaptable to the transportation system.

In dynamic operation, only a small amount of data can be read or written between SLG 41 and MDS.

In contrast to the SLG 41, the antenna of the SLG 41-S is rotated by 90° in the swivel head so that all positions of the transmission window can be implemented.

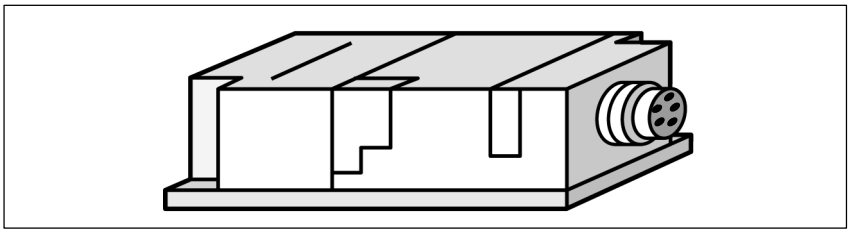


Figure 5-11 SLG 41

Ordering data

Table 5-8 Ordering data for SLG 41/SLG 41-S

Read/write device up to 25 mm SLG 41 SLG 41-S (antenna turned 90°)	 6GT2 001-0AA00 6GT2 001-0AA00-ZA23
SLG plug connector and stub lines	See chapter 3.10

Technical data

Table 5-9 Technical data of SLG 41/SLG 41-S

Inductive interface to MDS	
Data transmission speed	19200 baud
Read/write distance SLG to MDS (max.)	25 mm (see field data table)
Transmission frequency	
• Power	134 kHz
• Data	1.81 MHz
Serial interface to ASM	6-pin SLG plug connector in acc. w. DIN 43651
Transmission speed	19200 baud, RS 422
Line length, ASM to SLG (max.) at 24 V DC	360 m

Table 5-9 Technical data of SLG 41/SLG 41-S

Supply voltage (via serial interface)	
Nominal value	24 V DC
Permissible range	20 to 30 V DC
Current consumption	
Idle/operation	20 mA / 90 mA
MTBF	2 x 10^6
Housing	
Dimensions in mm (W x H x D)	120 x 40 x 40
Color	Anthracite/ergo-gray
Material	Polyamide 12
Plug connection	DIN 43651
Protection rating	IP65
Shock	50 g
Vibration	20 g
Mounting of SLG	4 M5 screws
Turning moment (at room temperature)	≤ 3 Nm
Ambient temperature	
During operation	-25° to +70° C
During transportation and storage	-40° to +85° C
Weight (approx.)	210 g

Field data

The exact field data are dependent on the type of MDS used.

Table 5-10 Field data of SLG 41/SLG 41-S

Operating distance (S_a)	2 to 15 mm
Limit distance (S_g)	25 mm
Median deviation (L)	Depends on MDS
Minimum distance from SLG to SLG (D)	> 200 mm

Transmission window

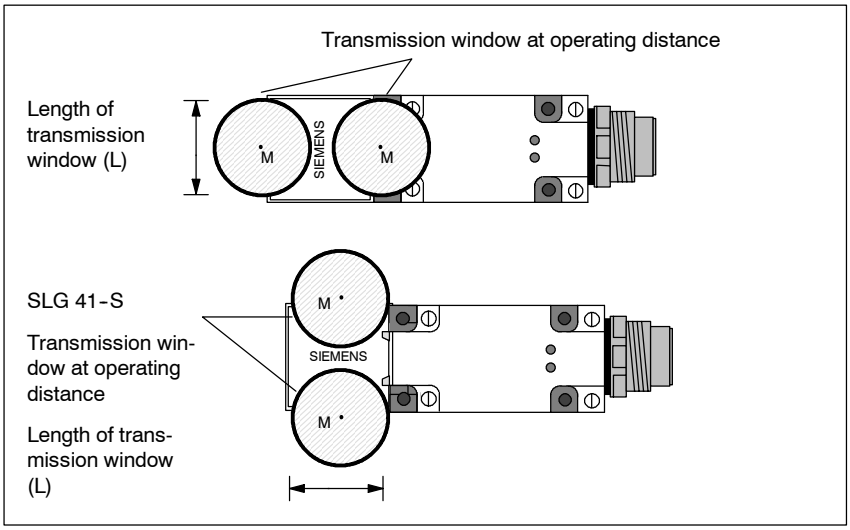


Figure 5-12 Transmission window of SLG 41/SLG 41-S

Metal-free space

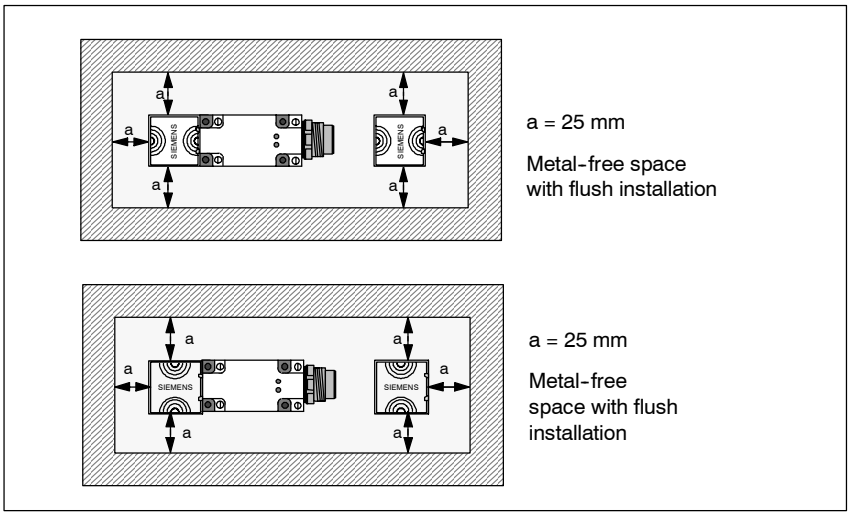


Figure 5-13 Metal-free space for SLG 41/SLG 41-S

Definition of distance D

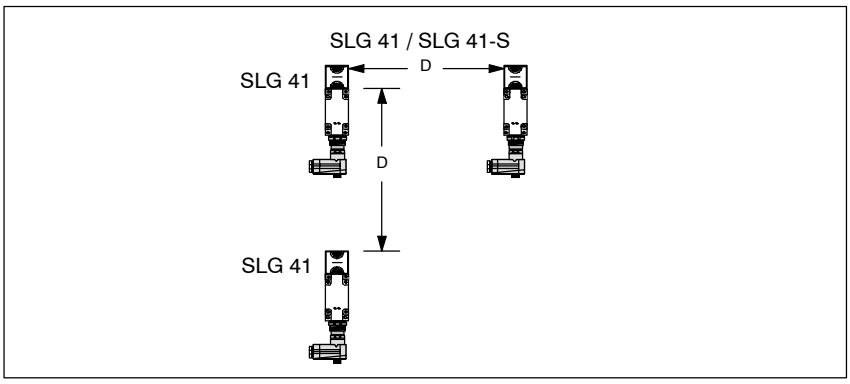


Figure 5-14 Distance D for SLG 41/SLG 41-S

Dimensions (in mm)

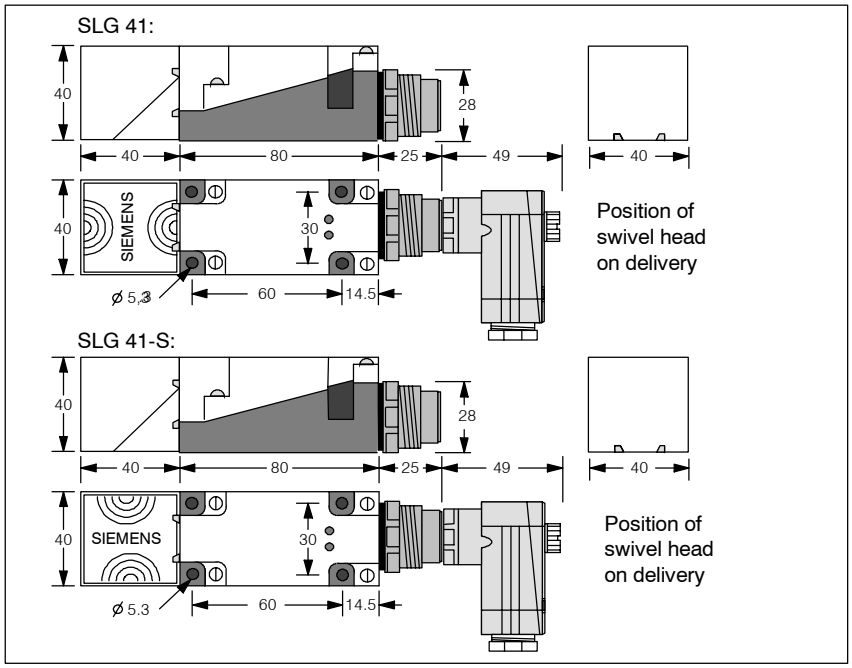


Figure 5-15 Dimensional diagram of SLG 41/SLG 41-S

Possible read head changes with the swivel head

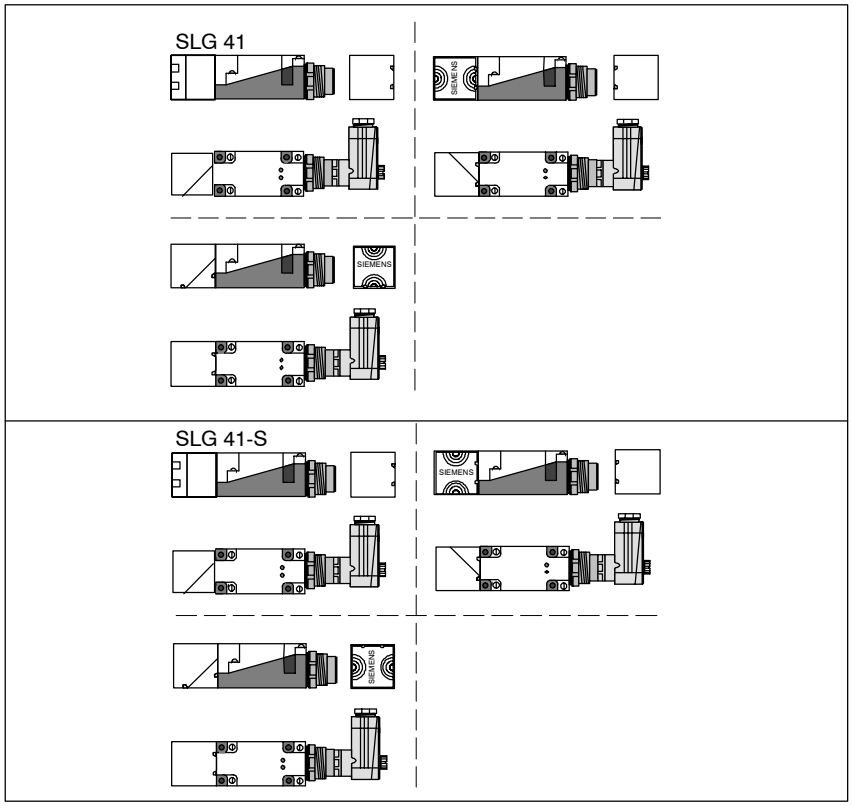


Figure 5-16 Read head changes of SLG 41/SLG 41-S

5.5 SLG 42

Application area

The SLG 42 is a middle-of-the-line read/write device. With its larger antenna, the SLG 42 generates a much larger field than the SLG 41, and a greater range can be achieved with the same data memories. In dynamic operation, larger amounts of data can be read from and written to the MDS. See chapter 3.3.

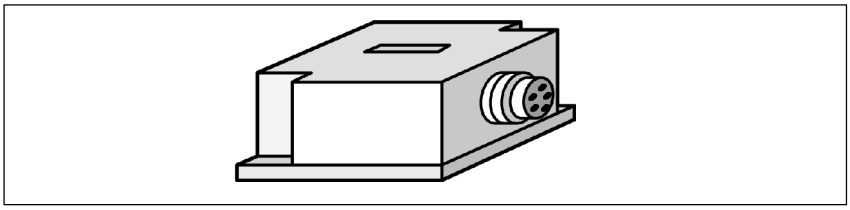


Figure 5-17 SLG 42 read/write device

Ordering data

Table 5-11 Ordering data for SLG 42

Read/write device SLG 42 up to 70 mm (medium power)	6GT2 001-0BA00
SLG plug connector and stub lines	See chapter 3.10

Technical data

Table 5-12 Technical data of SLG 42

Inductive interface to MDS	
Data transmission speed	19200 baud
Read/write distance SLG to MDS (max.)	70 mm (see field data table)
Transmission frequency	
• Power	134 kHz
• Data	1.81 MHz
Serial interface to ASM	6-pin SLG plug connector in acc. w. DIN 43651
Transmission speed	19200 baud, RS 422
Line length, ASM to SLG (max.) at 24 V DC	120 m
Supply voltage (via serial interface)	
Nominal value	24 V DC
Permissible range	20 to 30 V DC
Current consumption	
Idle/operation	60 mA/180 mA
MTBF	2 x 10^6

Table 5-12 Technical data of SLG 42

Housing	
Dimensions in mm (W x H x D)	75 x 40 x 75
Color	Gray
Material	Polyamide 12
Plug connection	DIN 43651
Protection rating	IP65
Shock	50 g
Vibration	20 g
Mounting of SLG	4 M5 screws
Turning moment (at room temperature)	≤ 2 Nm
Ambient temperature	
During operation	-25° to +70° C
During transportation and storage	-40° to +85° C
Weight (approx.)	250 g

Field data

The exact field data depend on the type of MDS used.

Table 5-13 Field data of SLG 42

Operating distance (S_a)	0 to 55 mm
Limit distance (S_g)	70 mm
Median deviation (L)	Depends on MDS
Minimum distance from SLG to SLG (D)	> 800 mm

Transmission window

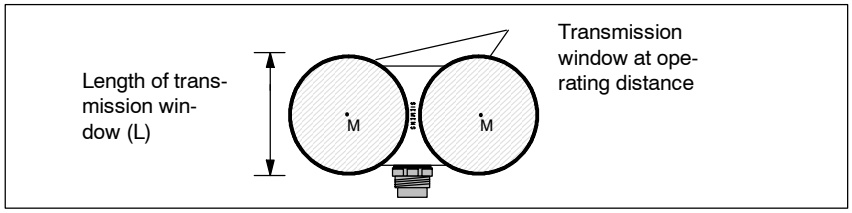


Figure 5-18 Transmission window of SLG 42

Metal-free space

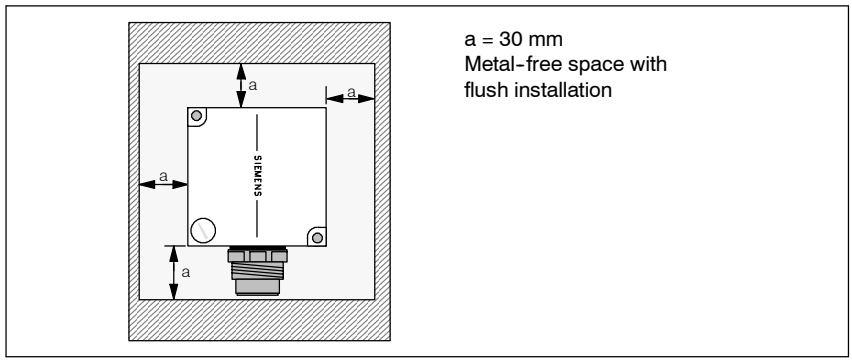


Figure 5-19 Metal-free space for SLG 42

Definition of distance D

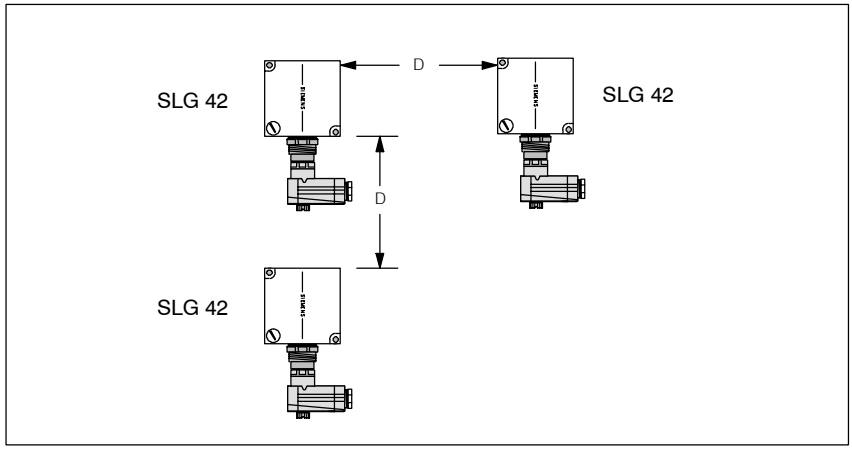


Figure 5-20 Distance D: SLG 42

Dimensions (in mm)

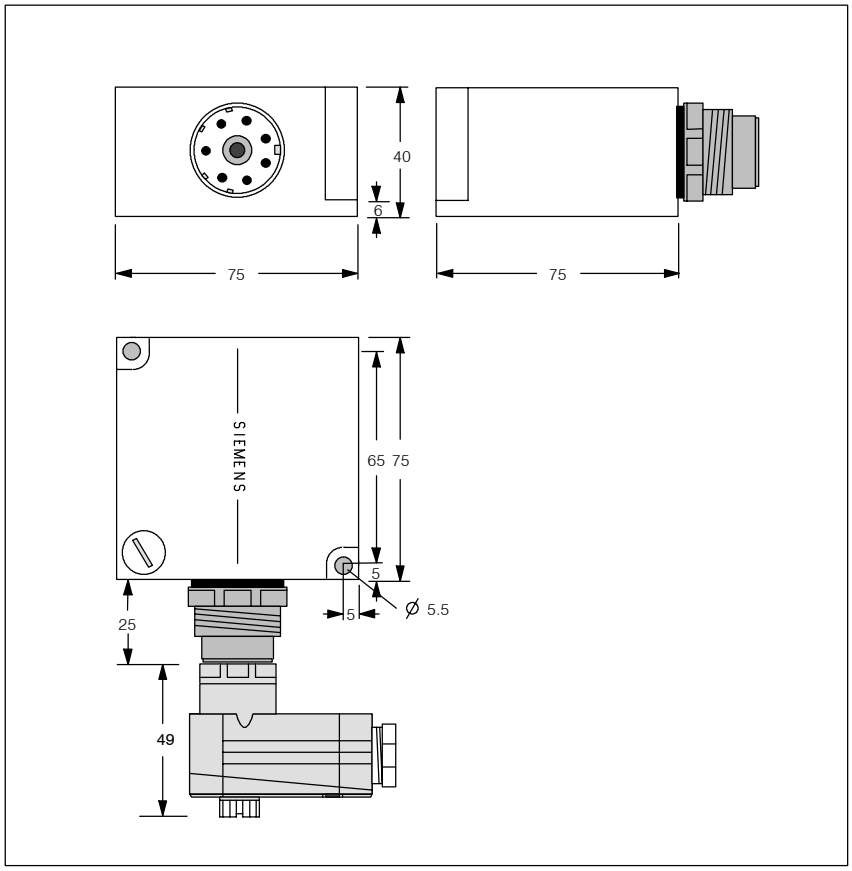


Figure 5-21 Dimensional diagram of SLG 42

5.6 SLG 43

Application area

The SLG 43 is a high-performance read/write device. This SLG is particularly suitable for use with large MDS types (i.e., MDS 506/MDS 438 E/ MDS 439 E). The size of its transmission window is one of its primary features. The physical tolerances of conveyor systems can be well compensated for with this transmission window. In dynamic operation, the large transmission window permits large amounts of data to be read from or written to the MDS. See chapter 3.4.

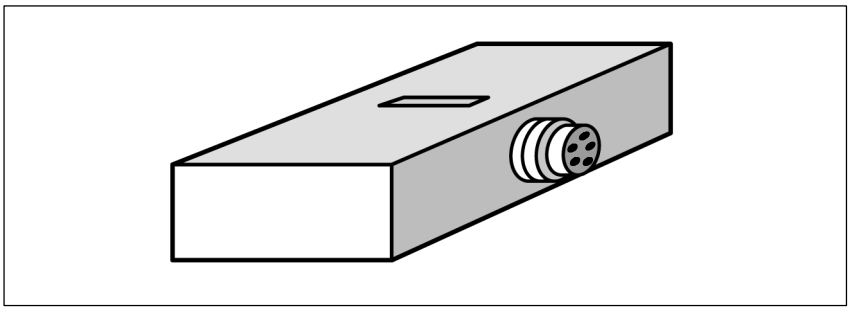


Figure 5-22 Read/write device SLG 43

Ordering data

Table 5-14 Ordering data for SLG 43

Read/write device SLG 43 up to 150 mm (high power)	6GT2 001-0CA10
SLG plug connector and stub lines	See chapter 3.10

Technical data

Table 5-15 Technical data of SLG 43

Inductive interface to MDS	
Data transmission speed	19200 baud
Read/write distance SLG to MDS (max.)	150 mm (see field data table)
Transmission frequency	
• Power	134 kHz
• Data	1.81 MHz
Serial interface to ASM	6-pin SLG plug connector in acc. w. DIN 43651
Transmission speed	19200 baud, RS 422
Line length, ASM to SLG (max.) at 24 V DC	85 m

Table 5-15 Technical data of SLG 43

Supply voltage (via serial interface)	
Nominal value	24 V DC
Permissible range	21 to 30 V DC
Current consumption	
Idle/operation	60 mA/250 mA
MTBF	2 x 10^6
Housing	
Dimensions in mm (W x H x D)	238 x 40 x 80
Color	Gray
Material	Polyamide 12
Plug connection	DIN 43651
Protection rating	IP65
Shock	50 g
Vibration	20 g
Mounting of SLG	4 M5 screws
Turning moment (at room temperature)	≤ 2 Nm
Ambient temperature	
During operation	-25° to +70° C
During transportation and storage	-40° to +85° C
Weight (approx.)	800 g

Field data

The exact field data depend on the type of MDS used.

Table 5-16 Field data of SLG 43

Operating distance (S_a)	0 to 100 mm
Limit distance (S_g)	150 mm
Median deviation (L)	Depends on MDS
Minimum distance from SLG to SLG (D)	> 2000 mm

Transmission window

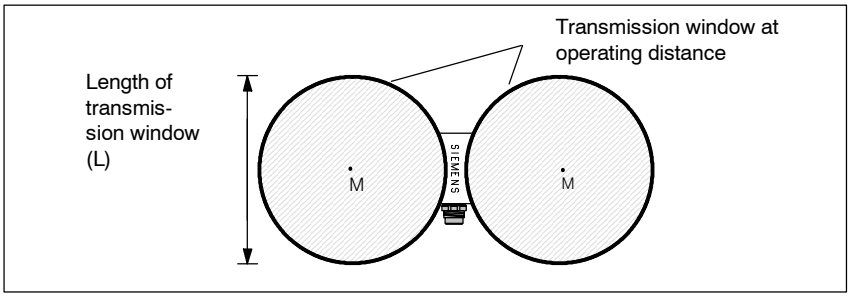


Figure 5-23 Transmission window of SLG 43

Metal-free space

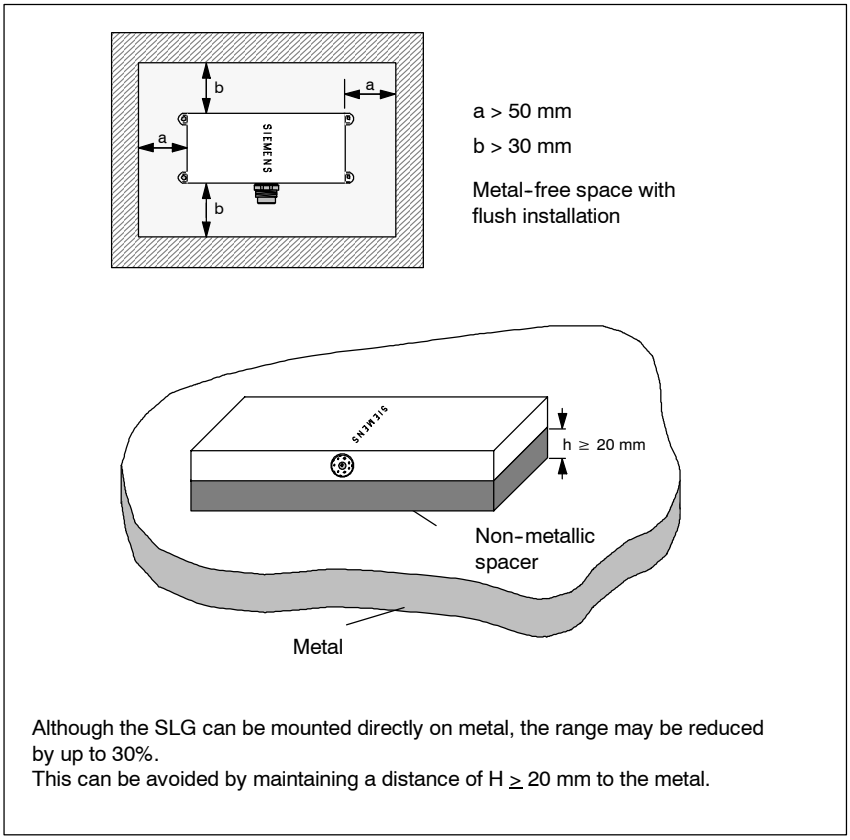


Figure 5-24 Metal-free space for SLG 43

Definition of distance D

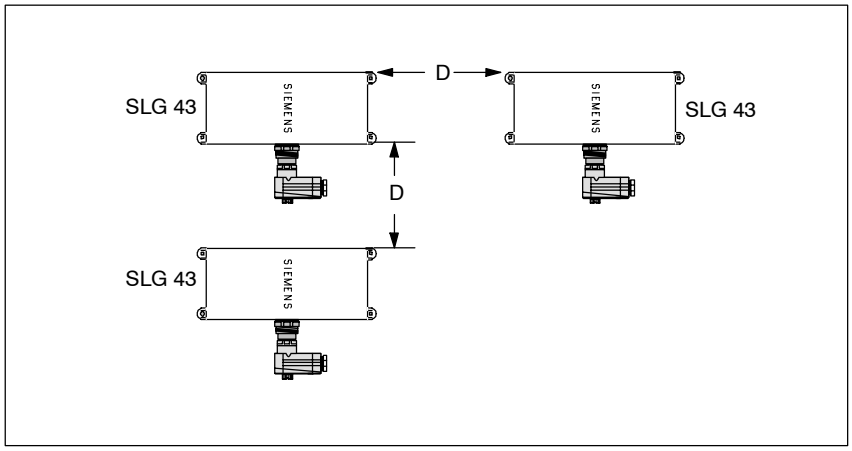


Figure 5-25 Distance D: SLG 43

Dimensions (in mm)

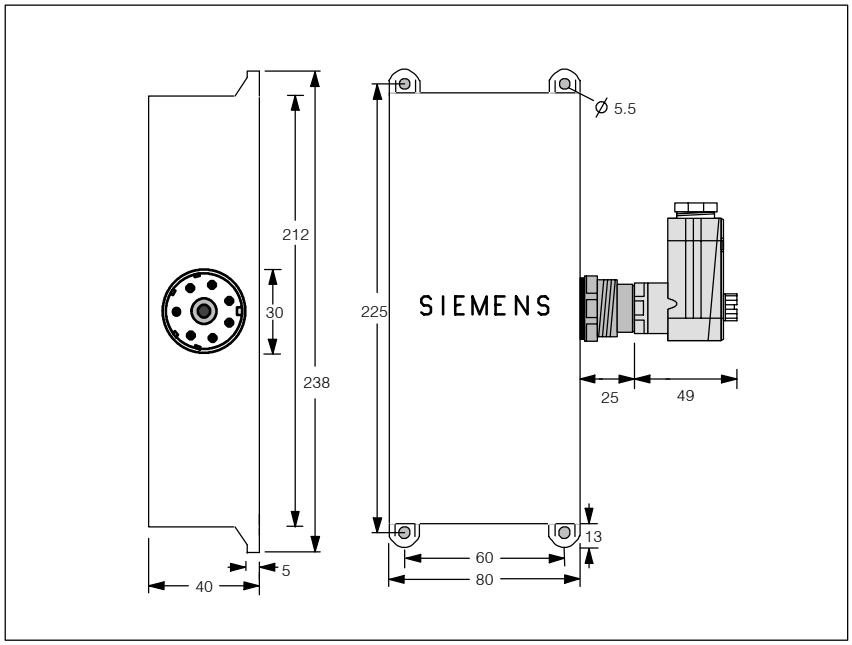


Figure 5-26 Dimensional diagram of SLG 43

5.7 SLG 44

Application area

The SLG 44 permits the MDS 507/407 E data memory to be processed reliably from a great distance.

This combination of SLG/MDS is particularly suitable for use in systems in which positioning to the MDS cannot be performed precisely at all or a long distance between SLG and MDS is required for safety reasons.

The large transmission window between SLG and MDS opens up further application areas. In dynamic operation, large amounts of data can be transferred since the MDS remains in the transmission window for a long period of time.

In addition, MDS 507/407 E can still be processed with SLG 44 even at top speeds of 120 km/h.

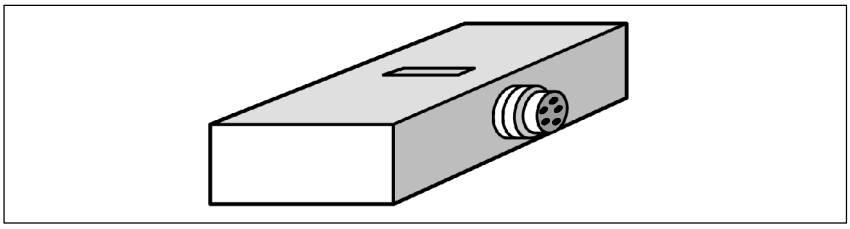


Figure 5-27 Read/write device SLG 44

Ordering data

Table 5-17 Ordering data for SLG 44

Read/write device SLG 44 up to 1000 mm (long range)	6GT2 001-0DA10
Configuration manual SLG 44/MDS 507/MDS 407 E	
German	6GT2 097-4AB00-0EA1
English	6GT2 097-4AB00-0EA2
SLG plug connector and stub lines	See chapter 3.10

Technical data

Table 5-18 Technical data of SLG 44

Inductive interface to MDS	
Data transmission speed	19200 baud
Read/write distance SLG to MDS (max.)	1000 mm (see field data table)
Transmission frequency	
• Power	No power
• Data	1.81 MHz
Serial interface to ASM	6-pin SLG plug connector in acc. w. DIN 43651
Transmission speed	19200 baud, RS 422
Line length, ASM to SLG (max.) at 24 V DC	270 m
Supply voltage (via serial interface)	
Nominal value	24 V DC
Permissible range	20 to 30 V DC
Current consumption	
Idle/operation	70 mA/110 mA
MTBF	2 x 10^6
Housing	
Dimensions in mm (W x H x D)	238 x 40 x 80
Color	Gray
Material	Polyamide 12
Plug connection	DIN 43651
Protection rating	IP63
Shock	50 g
Vibration	20 g
Mounting of SLG	4 M5 screws
Turning moment (at room temperature)	≤ 3 Nm
Ambient temperature	
During operation	-25° to +70° C
During transportation and storage	-40° to +85° C
Weight (approx.)	770 g

Field data

The exact field data depend on the type of MDS used.

Table 5-19 Field data of SLG 44

MDS 507/407 E With	SLG 44
Operating distance (S_a)	100 to 800
Limit distance (S_g)	≤ 1000
Transmission window L	1200
Transmission window B (at S_a)	300
Minimum distance from SLG to SLG (D)	> 6000

Interference-prone environments (e.g., frequency converters) may reduce the sensitivity of the SLG and thus affect the field data. See chapter 3.6.5.

The field data are valid for a supply voltage of 24 V DC and a temperature range of 0° to 50° C.

The field data may be reduced when temperatures are higher or lower.

Transmission window

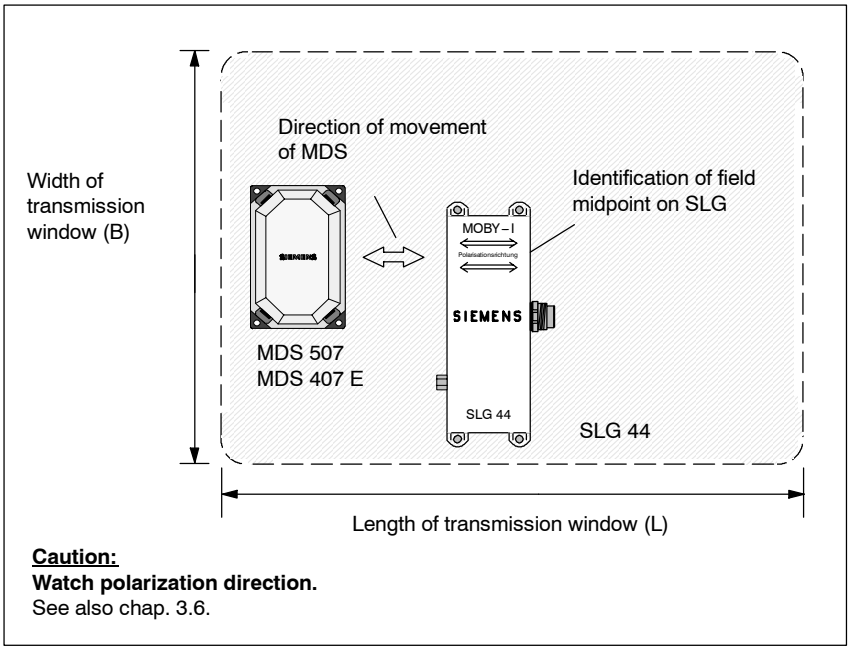
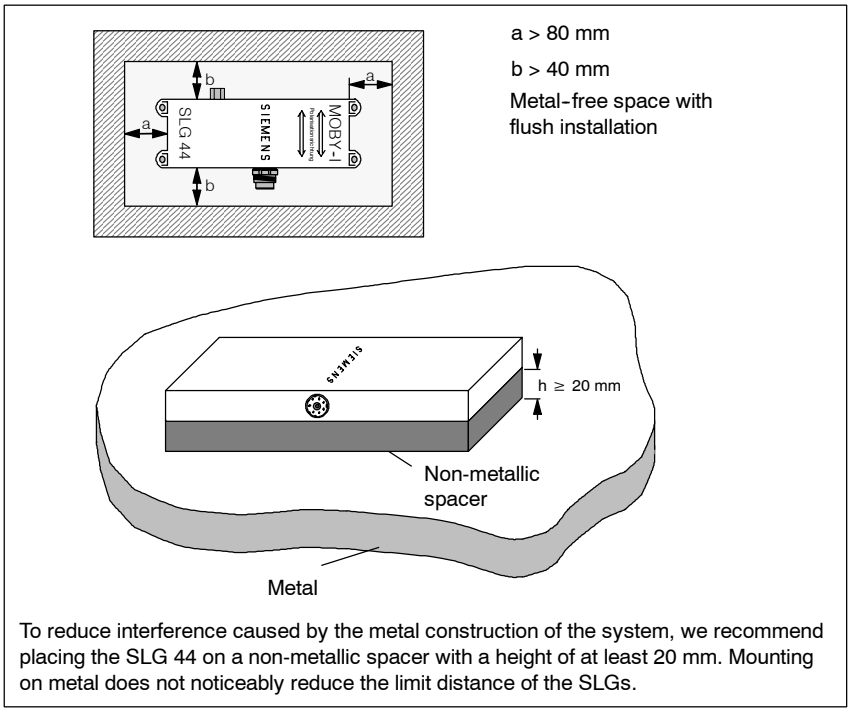


Figure 5-28 Transmission window of SLG 44

Metal-free space



To reduce interference caused by the metal construction of the system, we recommend placing the SLG 44 on a non-metallic spacer with a height of at least 20 mm. Mounting on metal does not noticeably reduce the limit distance of the SLGs.

Figure 5-29 Metal-free space of SLG 44

Definition of distance D

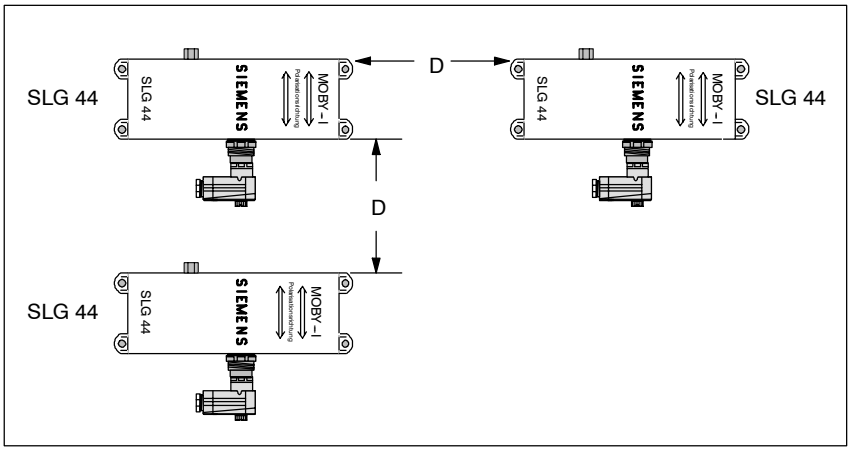


Figure 5-30 Distance D: SLG 44

Dimensions (in mm)

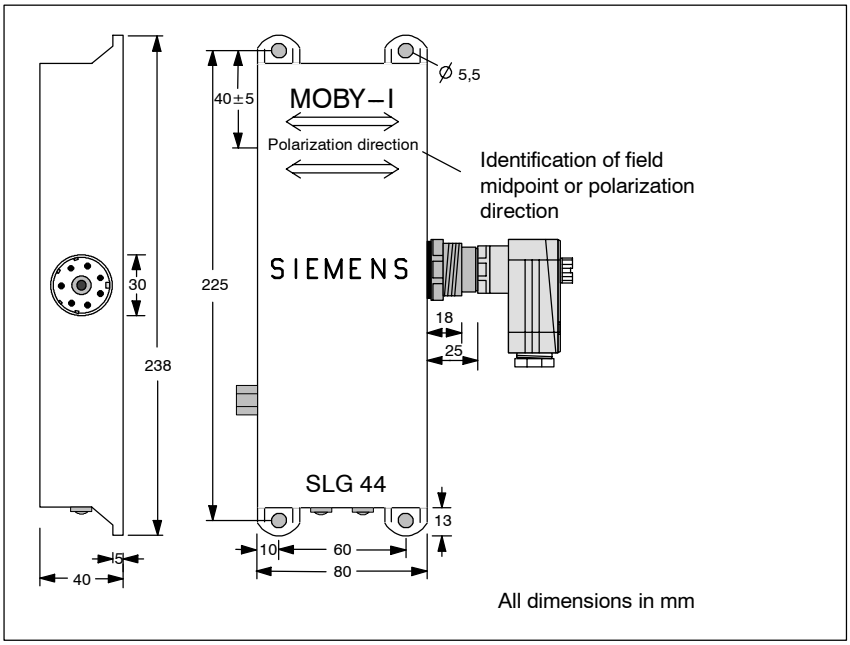


Figure 5-31 Dimensional diagram of SLG 44

6 Interfaces

6.1 Introduction

Application area

ASM interfaces provide the link between MOBY-I components (i.e., SLGs and MDSs) and higher level controllers (e.g., SIMATIC S5/S7), PCs or computers. Up to four SLGs can be connected depending on the interface used.

Layout and functions

An ASM consists of a microcontroller system with its own program stored on a PROM. The CPU receives commands via the user interface and stores these in the RAM. The user receives an acknowledgment that the command has arrived. When the command is correct, the CPU begins execution.

Overview

Table 6-1 Overview of the interfaces

ASM-Type	Interfaces to PC/Computer	Interfaces to SLG	Function Blocks	SLG Connections	Dimensions (WxHxD in mm)	Temperature Range (During Operation)	Protection Rating
ASM 400/401	Can be installed in S5-115-155U	9-pin sub D socket	FB 250/252 FB 230	1 per CM 4 per ASM		0° to +55° C	IP00
ASM 410	Can be installed in S5-100U/ ET 200U	Can be connected via bus module	Opt: FB 41 for ASM 410	2 (multiplex)	45 x 135 x 100	0° to +60° C	IP20
ASM 420/421	V.24, RS 422, TTY (w. multi-point terminal strip, model F, DIN 41612)	9-pin sub D socket	3964R Driver	1	20 x 100 x 160	0° to +55° C	IP00
ASM 440/441	To PROFIBUS-DP/FM (9-pin sub D socket)	9-pin sub D socket	FB 240 FC 44	1	20 x 100 x 160	0° to +55° C	IP00
ASM 450/451	To PROFIBUS-DP (screw connection)	2 5-pin proximity switch plug connectors	FC 46 FB 246 FB 240 FC 44	2 (multiplex)	134 x 110 x 55	0° to +55° C	IP67
ASM 470	Can be installed in S7-300/ ET 200M	Via screw terminals	FC 47 FB 47	2 (multiplex)	40 x 125 x 120	0° to +60° C	IP20
SIM	V.24, RS 422, TTY (25-pin sub D plug connector)	(Integrated)	3964R Driver		75 x 75 x 40	0° to +60° C	IP54

6.2 ASM 400/ASM 401

6.2.1 Overview

Application area

ASM 400/401 interfaces can be directly installed and operated in the following SIMATIC S5 programmable controllers.

- S5-155U/F (all CPUs)
- S5-135U (all CPUs)
- S5-155U/H (all CPUs)

Layout and functions

ASM 400/401 interfaces consist of the basic module in double Europe format and the CM 422 or CM 423 channel submodule. The basic module can be equipped with one to four channel submodules. Mixed configuration is not permitted.

ASM 400

The ASM 400 with the CM 422 operates in the I/O area of the SIMATIC S5. When used with function block FB 250, up to 32 channel submodules (i.e., eight 4-channel interfaces) can be operated in one SIMATIC. When FB 252 is used, the maximum number of channel submodules is increased from 32 to 96 per SIMATIC S5. All MDS models can be processed via the FBs. The user addresses the data on the MDS via a command table in the data block. The user addresses user data via absolute addresses.

Using the “dialog” function, two ASMs can exchange data via the SLG.

ASM 401

The ASM 401 with the CM 423 operates in the page-frame area of the SIMATIC S5. If appropriately configured, the ASM 401 can be used as a communications processor. The ASM 401 uses function block FB 230. Up to 255 submodules (i.e., 1020 channel submodules) can be addressed on one SIMATIC S5.

The data on the MDS are addressed by files with logical names (i.e., file handler).

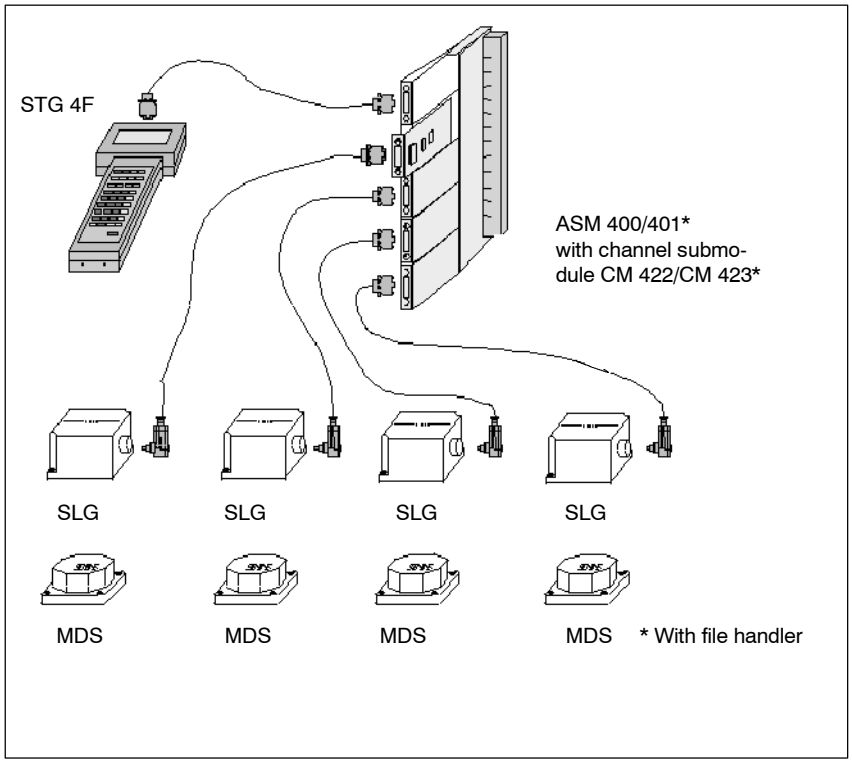


Figure 6-1 Configurator of ASM 400/401

Communication between ASM 400 and user program

Communication time between ASM 400 and user depends on two factors.

- Cycle time and type of programmable controller
- Software used (i.e., FB 230 and FB 250)

Communication between ASM 400 and user can be divided into three steps.

- The user issues a command and starts it. The next time the FB is called, the command is transferred to the ASM and acknowledged by the ASM.
- The ASM executes the command with the MDS. The user or the FBs are in wait status. Data communication with the MDS begins as soon as an MDS enters the transmission window of the SLG. The MDS data are stored intermediately on the ASM and checked for correctness.
- ASM communication with the MDS is concluded. When the FB is called the next time, the data which have been read or written are transferred from the ASM to the user. The user receives a finished message.

Ordering data

Table 6-2 Ordering data for ASM 400/401

Interfaces ASM 400/401 consisting of basic module and channel module CM 422/CM 423	
Basic module with connection to STG 4F, with 4 insertion slots for channel module CM 422/CM 423, without channel module, mixed configuration not permitted	6GT2 002-0AA00
Channel module CM 422	6GT2 002-0AB00
Channel module CM 423	6GT2 002-1AB00
MOBY software with FB 230/250, 3.5” floppy disk (DOS-format)	6GT2 080-2AA10
Description-ASM 400/401	
German	6GT2 097-3AB00-0DB1
English	6GT2 097-3AB00-0DB2
Description-FB 230 for ASM 401	
German	6GT2 097-3AG00-0DA1
English	6GT2 097-3AG00-0DA2
Description-FB 250 for ASM 400	
German	6GT2 097-3AA00-0DA1
English	6GT2 097-3AA00-0DA2
Stub lines and accessories	See chapter 3.10

Technical data

Table 6-3 Technical data of ASM 400/401

Channel Submodule	CM 422	CM 423
Serial interface to SLG	RS 422	
Plug connector	9-pin sub D socket	
Max. interface/line length	RS 422/1000 m, depending on SLG type	
No. of SLGs	1 SLG per CM	
Software functions		
Programming	With STEP5 function block	
	FB 250	FB 230
Commands	Read data, write data, initialize MDS	Create file, read, write, delete, format MDS etc.
	Access directly via addresses	Access via file handler (similar to DOS)
Dialog operation	Yes	No
Supply voltage	5/24 V DC via internal bus	
Interfaces	**ASM 400/401**	
Interfaces for CM/SLG		
ASM 400 (max.)	2 CM 422s	
ASM 401 (max.)	4 CM 423s	
	(mixed configuration not permitted)	
Interface to STG 4F	RS 422, 9-pin sub D socket	
Interface for 24 V DC	2-pin plug connector (included)	
Supply voltage		
Nominal value	5/24 V DC	
Permissible range		
Internal (at 5 V)	4.75 to 5.25 V DC	
External (at 24 V)	20 to 30 V DC	
Current consumption (max.)		
Internal (at 5 V)	1 channel	370 mA
	2 channels	490 mA
	3 channels	610 mA
	4 channels	730 mA
External (at 24 V)	1 channel	400 mA
	2 channels	800 mA
	3 channels	1200 mA
	4 channels	1600 mA
Fine-wire fuse	M 1.25 A/250 V	
Ambient temperature		
During operation	0° to +55° C	
During transportation and storage	-20° to +70° C	
Rel. humidity at 25° C	< 95%	
Space requirements	1 SEP (1 SEP = 15.24 mm)	
Weight (approx.)		
ASM 400/401	0.44 kg	
CM 422/CM 423	0.1 kg	

Function block FB 250

Function block FB 250 controls data transmission between the STEP5 program and the ASM 400 interface module.

FB 250 can be used on the following “programmable controllers.”

- 115U/F - CPU 941/942/943/944/945
- 135U-R/S - CPU 928/928B
- 155U/H - CPU 948

FB 250 does not use system commands. All MDSs can be processed with FB 250.

Primary functions of FB 250

- Convert data from user parameterization structure to structure of an ASM
- All communication with the ASM via command and data exchange
- Preparation of errors for the user error handling: Command repetition

Chaining of several partial commands into one complete command

- Reading and writing with a user command
- Any address areas of a mobile data memory can be processed with one command.
- Control of PLC cycle load via the user

Data transmission between FB and MDS can be divided into three phases.

- Supply interface with the appropriate command and the data or parameters
- Transmit the data between ASM 400 and MDS
- Supply S5 with appropriate parameters or data from the interface

If the P address area is not available, FB 252 also supports operation of the ASM 400 in the expanded Q address area.

Function block FB 230 for ASM 401

By using the file handler management system, the ASM 401 interface module simplifies data management of the mobile data memory for users of MOBY-I identification systems. The file handler appears to the user as an MDS operating system. It offers the following advantages (similar to the DOS file handler management system).

- The user addresses user data via logical names (i.e., file names) which can consist of up to 8 alpha-numerical characters. This eliminates absolute addressing of the data.
- Related data are called files.
- Management of differing file lengths
- Specification of access rights to files
- Create/delete/read/write (etc.) files

A function block (i.e., FB 230) has been created so that the SIMATIC user can take advantage of the file handler.

Since this function block uses system commands, the following function blocks have been created for the PLCs listed below.

- FB 230/234 for PLC 115U
- FB 231 for PLC 135U
- FB 232 for PLC 155U
- FB 235 for PLC 155U
  (QUEUE-read command added)

When the file handler is used, the amount of user data on the MDS is reduced. The file handler stores various management data on the MDS (e.g., system area, directory, and file allocation table). The following table shows how much user data is still available to the user.

Table 6-4 Storage capacity of the mobile data memories when the file handler is used

MDS Type	eOperating Mode		Max. Number of Files	User Data
62-byte RAM	01	Without ECC	1	27
	02	Without ECC	2	12
	81	With ECC	1	7
128-byte EEPROM	03	Without ECC	3	60
	83	With ECC	3	45
2-Kbyte RAM	04	Without ECC	16	1680
	84	With ECC	16	1440
8-Kbyte EEPROM	05	Without ECC	32	7456
	85	With ECC	32	6464
32-Kbyte RAM	06	Without ECC	64	31488
	86	With ECC	64	27520

6.2.2 Hardware Description

Plug connectors and their assignment

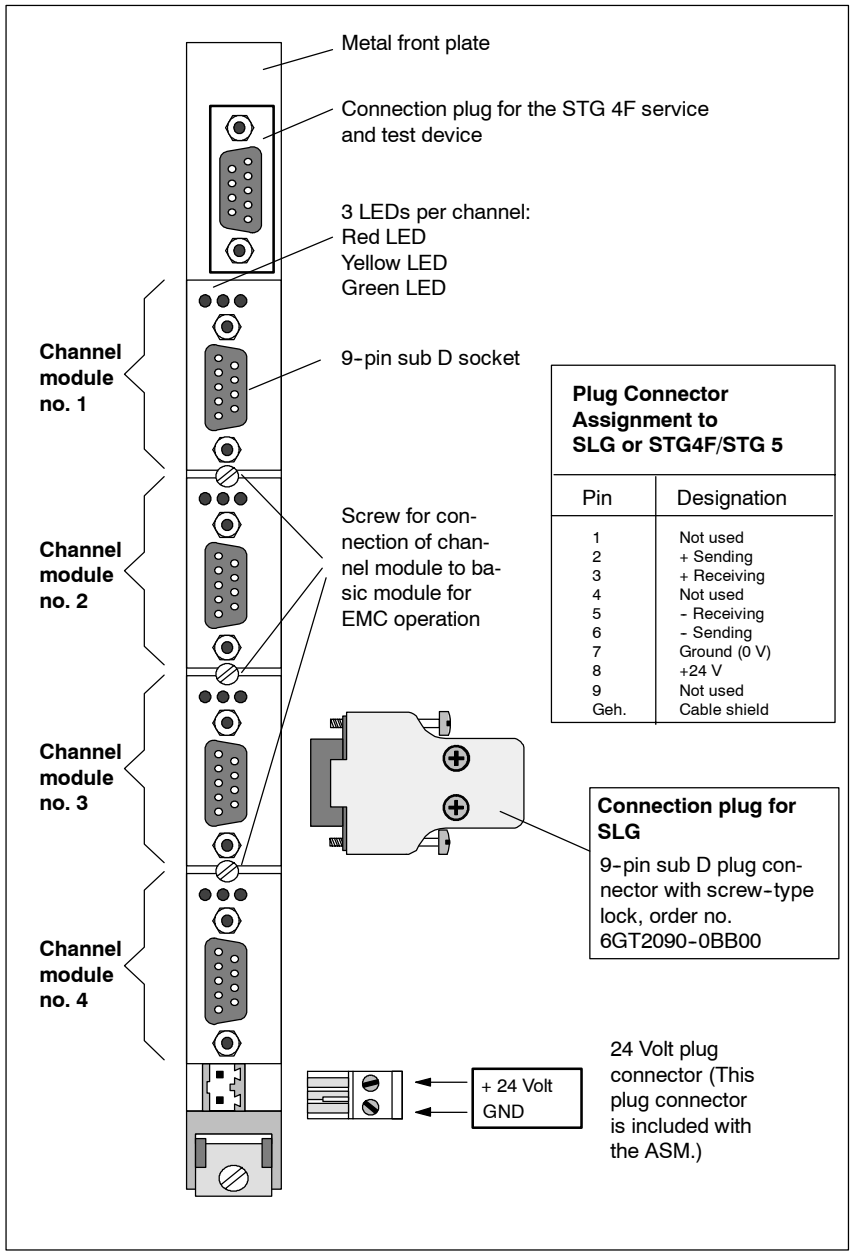


Figure 6-2 Plug connectors and their assignment for ASM 400/401

Switches and plug-in jumpers

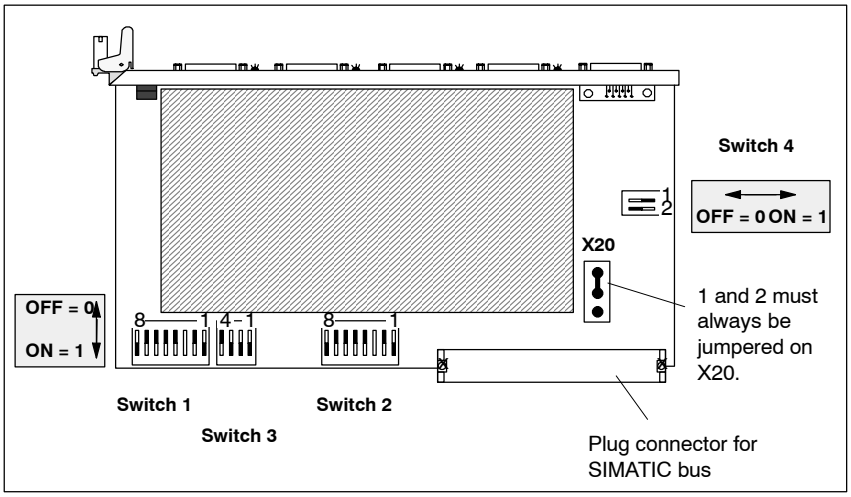


Figure 6-3 Switches and plug-in jumpers for ASM 400/401

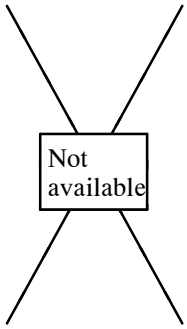
Address settings

S4 = Setting of the type of addressing
S2 = Setting of the page frame number
S3 = Setting of the module address (linear addressing with PESP)
S1 = Address setting when PESP is not used

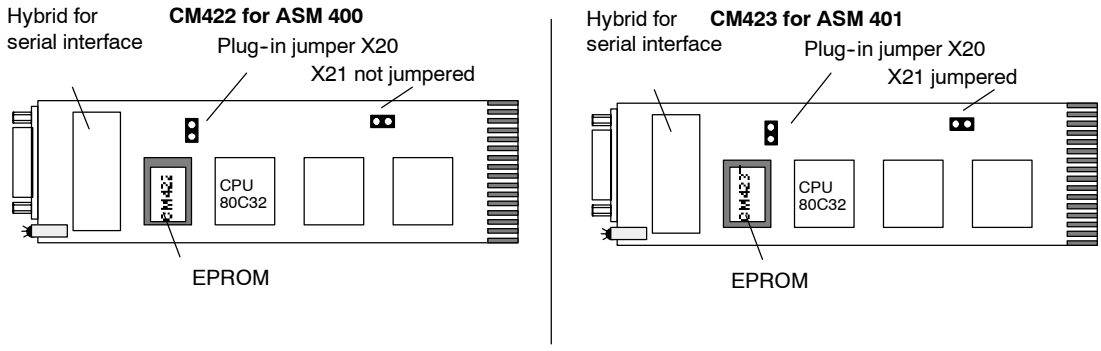
Table 6-5 Use of page frame addressing for FB 230

Page Frame		S4	S3	S2	S1	S1
KH	KY	1 2	4 3 2 1	8 7 6 5 4 3 2 1	8 7 6 5	4 3 2 1
00	0	OFF ON	Not used	1 1 1 1 1 1 1 1	1 1 1 1	⌣
01	1			1 1 1 1 1 1 1 0	1 1 1 1	Not used
02	2			1 1 1 1 1 1 0 1	1 1 1 1	
03	3			1 1 1 1 1 1 0 0	1 1 1 1	
04	4			1 1 1 1 1 0 1 1	1 1 1 1	
05	5			1 1 1 1 1 0 1 0	1 1 1 1	
06	6			1 1 1 1 1 0 0 1	1 1 1 1	
07	7			1 1 1 1 1 0 0 0	1 1 1 1	
08	8			1 1 1 1 0 1 1 1	1 1 1 1	
.	.			. . .	. . .	
.	.			. . .	. . .	
FD	253			0 0 0 0 0 0 1 0	1 1 1 1	
FE	254			0 0 0 0 0 0 0 1	1 1 1 1	
FF	255			0 0 0 0 0 0 0 0	1 1 1 1	

Table 6-6 Address settings for ASM 400 with FB 250/252

ASM 400/401 Switch Setting			FB 250 Parameterization		FB 252 Parameterization	
Start Address of ASM	**Switch S3 4 3 2 1**	**Switch S4 2 1**	**ADR**	**KAN***	**QADR**	**KAN**
0	0 0 0 0	0 1 (This setting of switch 4 must always be used when the module is operated in standard mode.)			0	1 - 4 (Corresponds to channel module 1 to 4)
16	0 0 0 1				16	
32	0 0 1 0				32	
48	0 0 1 1				48	
64	0 1 0 0				64	
80	0 1 0 1				80	
96	0 1 1 0				96	
112	0 1 1 1				112	
128	1 0 0 0		128	1 - 4 (Corresponds to channel module 1 to 4)	128	
144	1 0 0 1		144		144	
160	1 0 1 0		160		160	
176	1 0 1 1		176		176	
192	1 1 0 0		192		192	
208	1 1 0 1		208		208	
224	1 1 1 0		224		224	
240	1 1 1 1		240		240	

Settings on the channel module



Plug-in jumper X20:

- Removed:
  Normal operation
- Inserted:
  Test operation; dialog to the mobile data memory is aborted earlier when malfunctions occur. This helps to pinpoint weak spots and malfunctions during commissioning.

Figure 6-4 Settings on the channel module

Note

The CM 422 cannot be upgraded to CM 423 or vice versa. In addition to jumper X21, several hardware changes must be made.

6.2.3 SIMATIC S5 Configuration

Module rack CR 700-0LA (S5-115U)

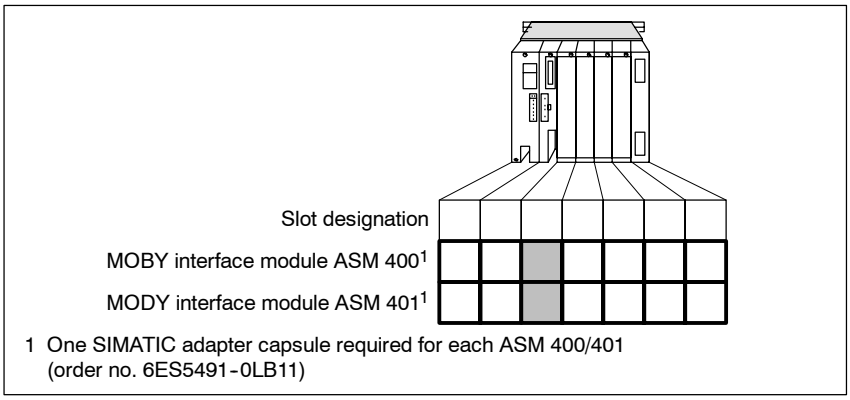


Figure 6-5 CR 700-0LA module rack (S5-115U)

Module rack CR 700-0LB (S5-115U)

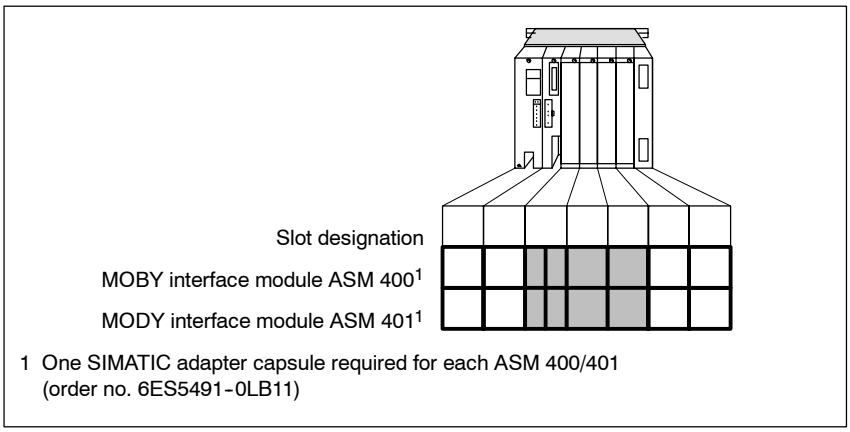


Figure 6-6 CR 700-0LB module rack (S5-115U)

Module rack CR 700-1 (S5-115U)

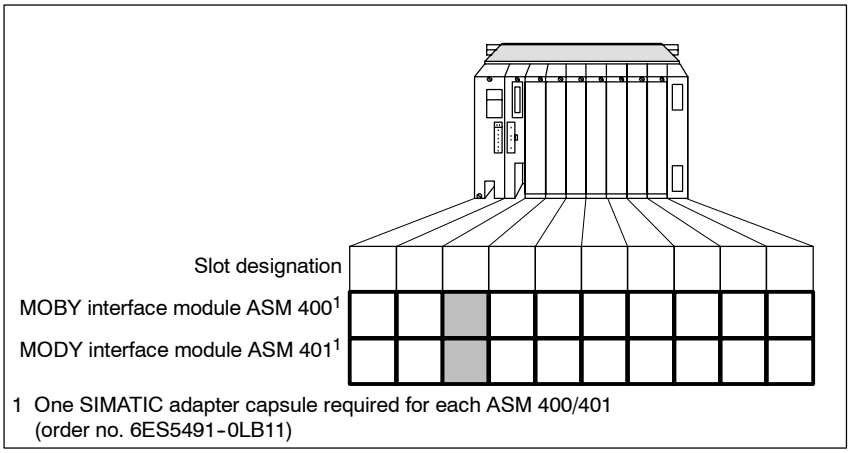


Figure 6-7 CR 700-1 module rack (S5-115U)

Module rack CR 700-2 (S5-115U)

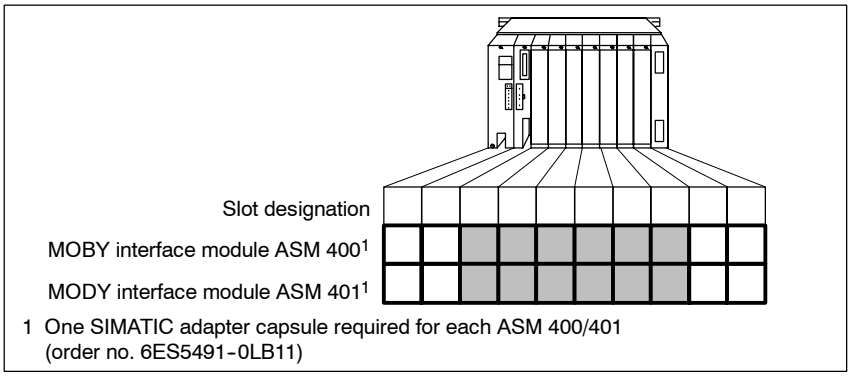


Figure 6-8 CR 700-2 module rack (S5-115U)

Module rack CR 700-3 (S5-115U)

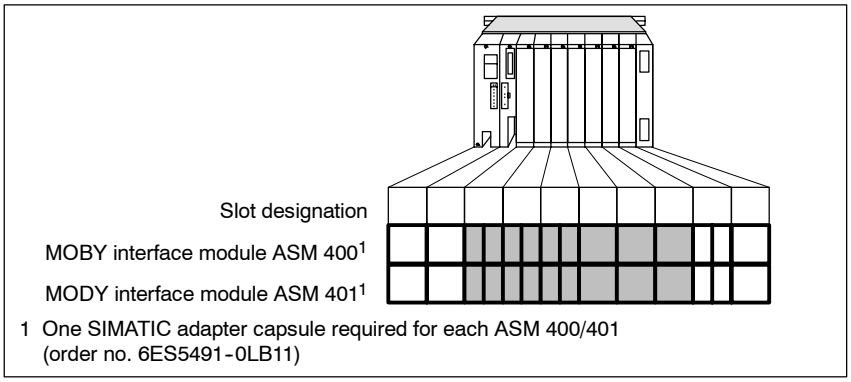


Figure 6-9 CR 700-3 module rack (S5-115U)

Module rack ER 700-0, ER 701-1 and ER 701-2

MOBY interface modules ASM 400 and ASM 401 cannot be used.

Module rack ER 701-3

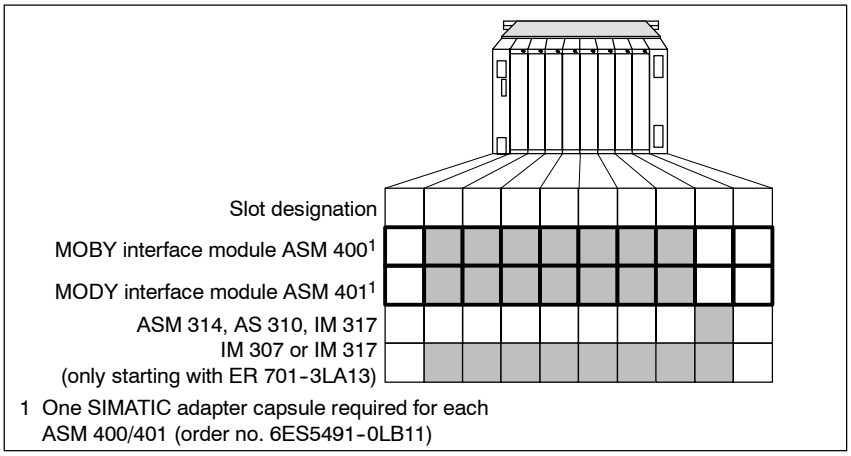


Figure 6-10 ER 701-3 module rack (S5-115U)

Central controller S5-135U/155U

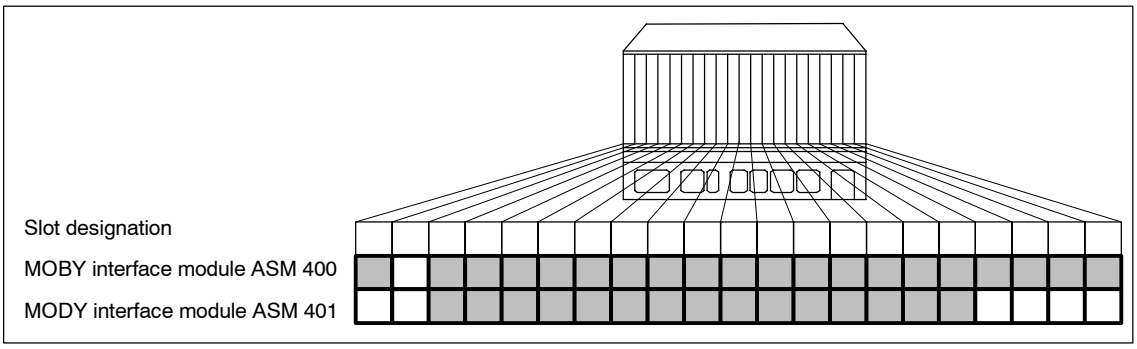


Figure 6-11 S5-135U/155U central controller

Central controller S5-155U/155H

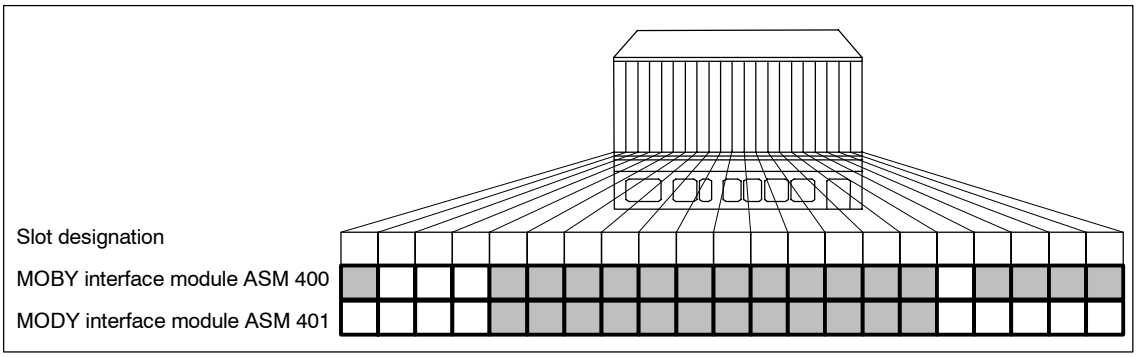


Figure 6-12 S5-155U/155H central controller

Expansion device S5-183U

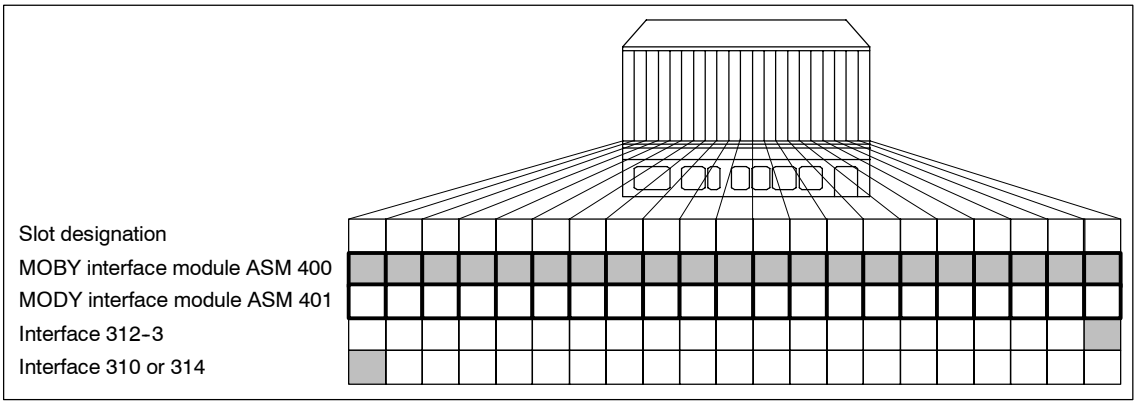


Figure 6-13 S5-183U expansion device for S5-135U/155U

Expansion device S5-184U

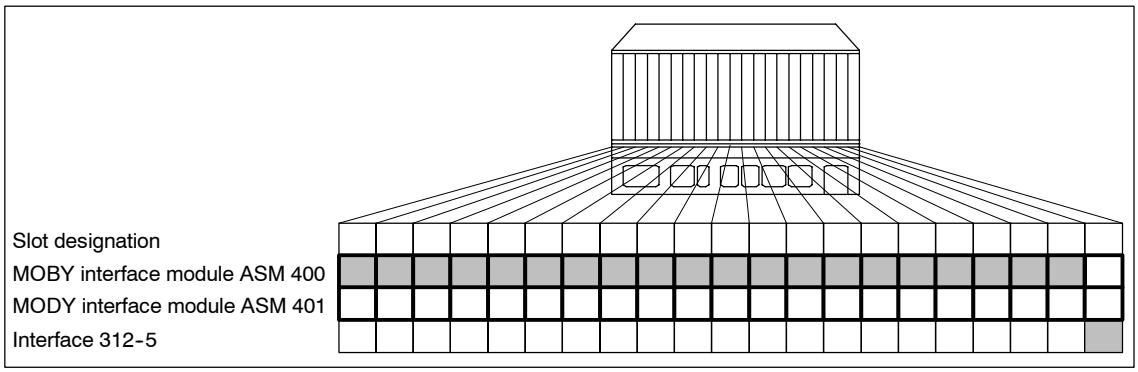


Figure 6-14 S5-184U expansion device for S5-135U/155U

Expansion device S5-185U

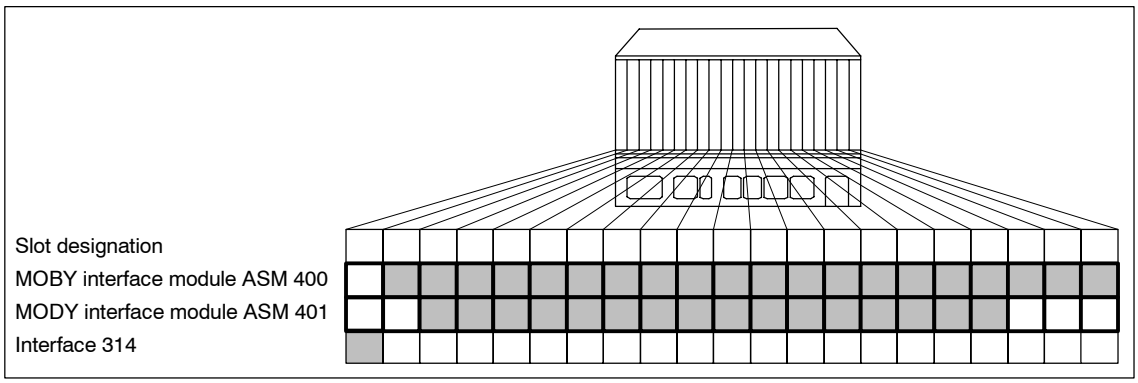


Figure 6-15 S5-185U expansion device for S5-135U/155U/155H

Expansion device S5-187U

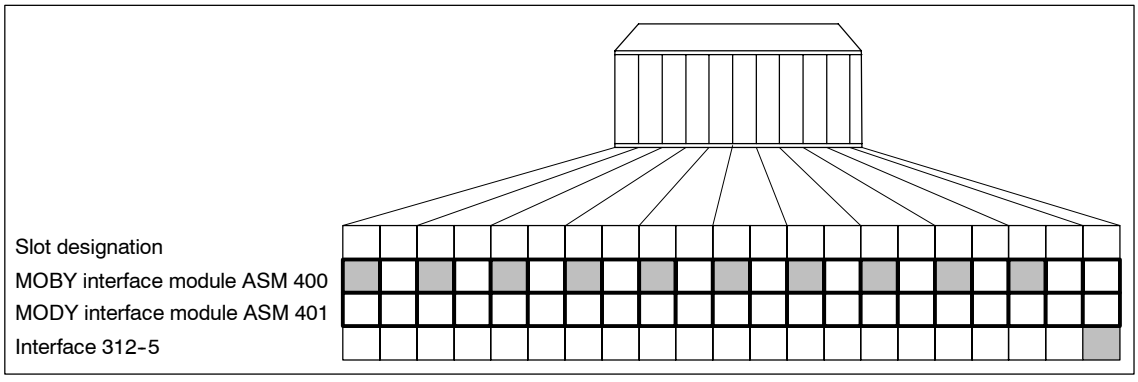


Figure 6-16 S5-187U expansion device for S5-135U/155U

6.3 ASM 410

Application area

Interface ASM 410 can be used in the SIMATICs listed below.

- S5-90U (max. of 2)
- S5-95U (max. of 4)
- S5-100U (max. of 8)
- ET 100U (max. of 2)
- ET 200U (max. of 4)

Since this ASM can be used with all mobile data memories, read/write devices and the STG 4F service test device, compatibility with all MOBY-I components is ensured.

Layout and function

LEDs for status and error indications are located on the front. Interference-immune design is provided by the galvanic isolation of the MOBY-I interface to the SIMATIC S5 bus. The MOBY commands are started and data are fetched by setting and scanning a few control bits in the process image (PIO/PII), and eight input/output bytes are assigned. In time-multiplex operation, one or two SLGs can be used. The MDS data are accessed via their absolute addresses.

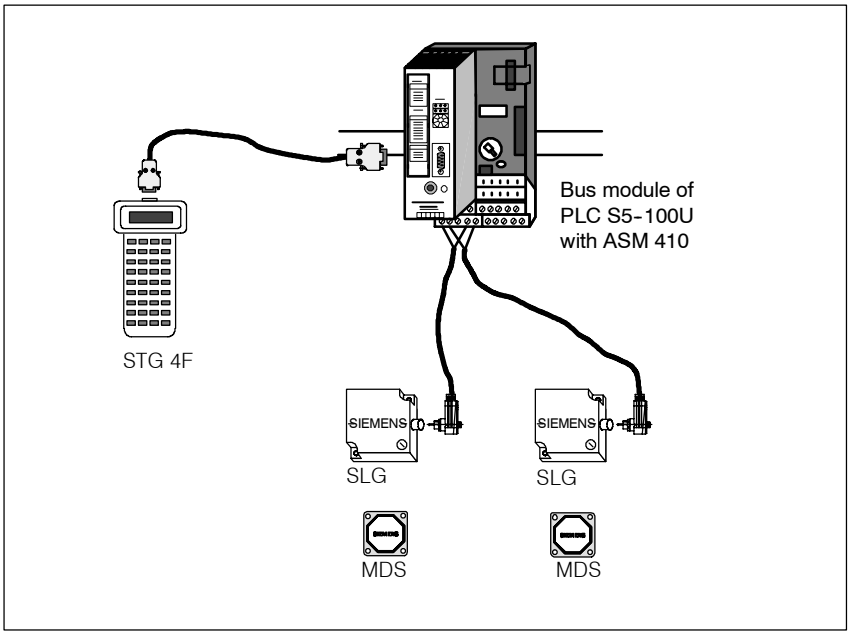


Figure 6-17 Configurator for ASM 410 in SIMATIC S5

Ordering data

Table 6-7 Ordering data for ASM 410

Interface ASM 410 SIMATIC S5, bus module with Screw connection Crimpconnection, with crimp contacts	6GT2 002-0BA00 6ES5 700-8MA11 6ES5 700-8MA22
Description-ASM 410 German Englisch	 6GT2 097-3AC00-0DA1 6GT2 097-3AC00-0DA2
Stub lines and accessories	See chapter 3.10

Technical data

Table 6-8 Technical data of ASM 410

Serial interface to SLG	RS 422
Connection (max.)	2 SLGs 4x can be connected via a separate bus module.
Line length (typ. max.)	1000 m/RS 422, depending on SLG and type of cable
Number of SLGs	
• Static operation	2 SLG 4x
• Dynamic operation	1 SLG 4x
Interface to STG 4F	RS 422, 9-pin sub D plug connection
Interface for 24 V DC	Via a separate bus module
Software functions	
Programming	With STEP5 directly via process image (PIO/PII); no function block required; 5 bytes processed per command Optional: FB 41 for ASM 410. This FB is available on the “MOBY Software” floppy disk. Description is provided by FB 250 documentation.
Commands	Select channel 1 or 2, read MDS, write MDS, initialize MDS, etc.
Dialog operation	Yes
Supply voltage	
Nominal value	24 V DC (residual ripple, max. of 10%)
Permissible range	20 to 30 V DC
Current consumption	
Internal (at 5 V) Typical	20 to 60 mA (20 mA = long cycle time) (60 mA = short cycle time)
Max.	110 mA (PLC in STOP status)
External (at 24 V DC)	
All SLGs switched off	90 mA
Power consumption, typ. (without SLG)	2.5 W

Table 6-8 Technical data of ASM 410, Fortsetzung

Cooling	Convection cooling
Isolation group	C in acc. w. VDE 0110
Protection rating	IP20 in acc. w. IEC 529
Physical stress	IEC 68-2-27
Ambient temperature	
During operation	
• Horizontal SIMATIC layout	0° to +60° C
• Vertical SIMATIC layout	0° to +40° C
During transportation and storage	-25° to +70° C
Dimensions (W x H x D)	45 x 135 x 100 mm
Weight (approx.)	0.25 kg

Slots in PLC S5-90U

PLC S5-90U provides a maximum of four slots for additional modules. Up to two of these can be used by the ASM 410 module.

Slots in PLC S5-95U

ASM 410 can only be operated with PLC S5-95U in slots 0 to 7. Up to four modules can be used on one PLC.

Starting with CPU release status -8MA-3, 8 modules can be used.

Slots in PLC S5-100U

ASM 410 can only be operated with PLC S5-100U in slots 0 to 7. Up to eight modules can be used on one PLC. See the following table for slot-oriented addressing.

	0	1	2	3	4	5	6	7	8
S5-100U	64 to 71	72 to 79	80 to 87	88 to 95	96 to 103	104 to 111	112 to 119	120 to 127	

Slot number

Address assignment

Free slots for additional digital modules

Configuration of ASM 410 in ET 100U

The ASM 410 must be operated as an analog module in the ET 100U. When parameterizing the module with the "COM ET 100U" software, the module must be specified with "4AX" in the appropriate slot. The ASM 410 occupies eight input bytes and eight output bytes (i.e., 16 bytes). Since a maximum of 32 bytes can be assigned per ET 100U in the address image of the main controller, a maximum of two modules per ET 100U are permitted. When other modules are used with an ET 100U in addition to the ASM 410, only one MOBY-I module can be connected.

On the ET 100U, the ASM 410 can be addressed via all address areas of the PLC (i.e., P, Q, IM3 and IM4).

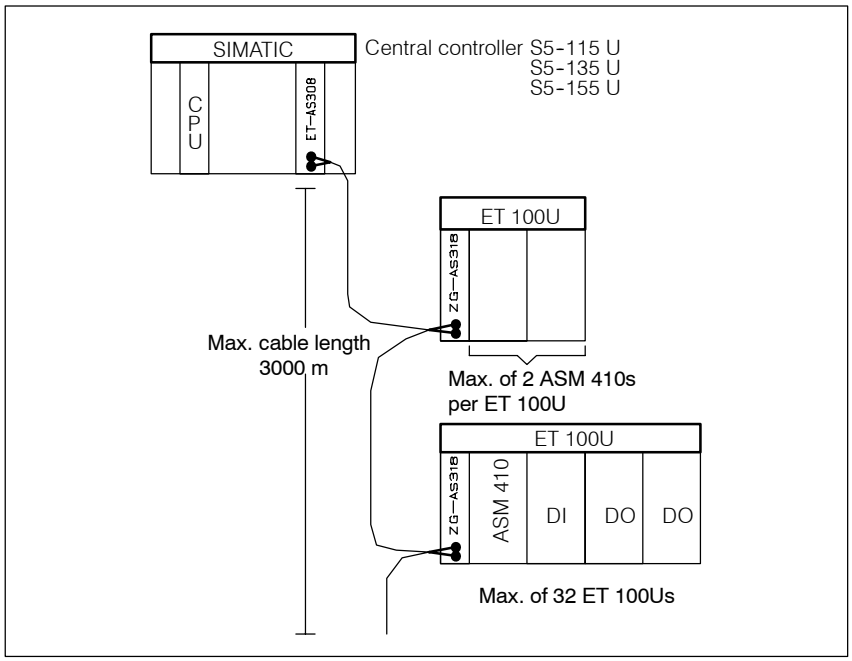


Figure 6-18 Configurator for ASM 410 in ET 100U

Configuration of ASM 410 in ET 200U

The ASM 410 can be used with the ET 200U under the following conditions.

- The ET 200U with an ASM 410 installed must be operated in slow mode. See ET 200U manual for how to set slow mode.
- The "COM ET 200U" software is used to parameterize the ASM 410. The ASM 410 module must be parameterized there with "095".
- Up to four ASM 410s can be used with one ET 200U. When DI/DO or other periphery is used with the ET 200U, fewer ASM 410s can be used.

Otherwise the same conditions as for the ET 100U apply.

Physical layout

The ASM 410 interface has the same dimensions as any standard module for the SIMATIC S5-100U. The interface can be installed directly on the bus module (6ES5 700-8MA11 or 6ES5 700-8MA21).

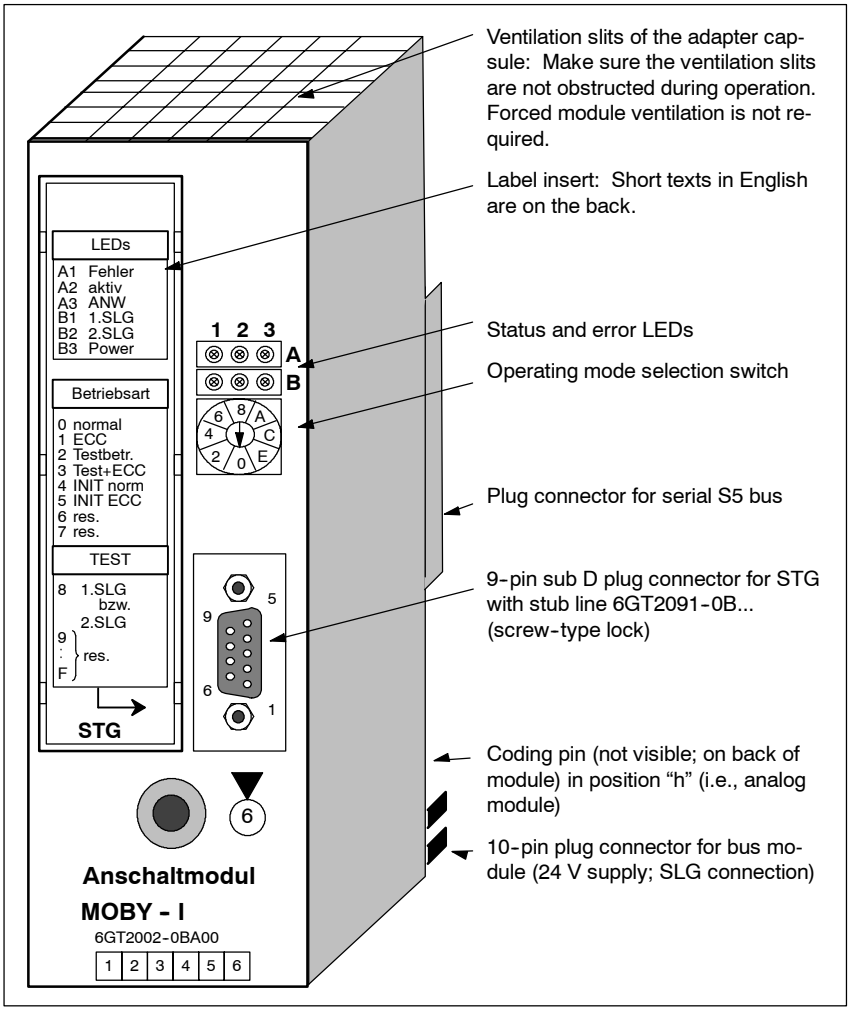


Figure 6-19 ASM 410 interface with operational and indicator elements

Table 6-9 Status and error LEDs of ASM 410

No.	Color	Meaning
A1	Red	Error: The last command was concluded with an error, or the hardware of the module is defective.
A2	Yellow	Rapid irregular flashing indicates running dialog with the SLG or mobile data memory (MDS). This LED is always on when the presence check is enabled.
A3	Green	Data memory is in the field of the SLG. The SLG which detected the MDS is indicated via LEDs B1-B2. LED is only active when presence check is being used.
B1	Green	B1 = 1st SLG is in operation. Remember: Only one of the LEDs (i.e., B1 or B2) may be on at a time. If both LEDs are on, check the wiring to the SLG.
B2	Green	B2 = 2nd SLG is in operation. Remember: Only one of the LEDs (i.e., B1 or B2) may be on at a time. If both LEDs are on, check the wiring to the SLG.
B3	Green	B3 = power on This LED is always on when 24 V is applied to the module. The interface module can be tested with the STG.

Setting the operating mode

The operating mode is set with the operating mode selection switch on the front of the ASM.

Positions 0 to 7

Setting of the operating mode:
ASM 410 uses the serial S5 bus. The STG interface is switched off.

Positions 8 to F

Test operation with the STG:
Telegrams from the S5 are no longer processed.

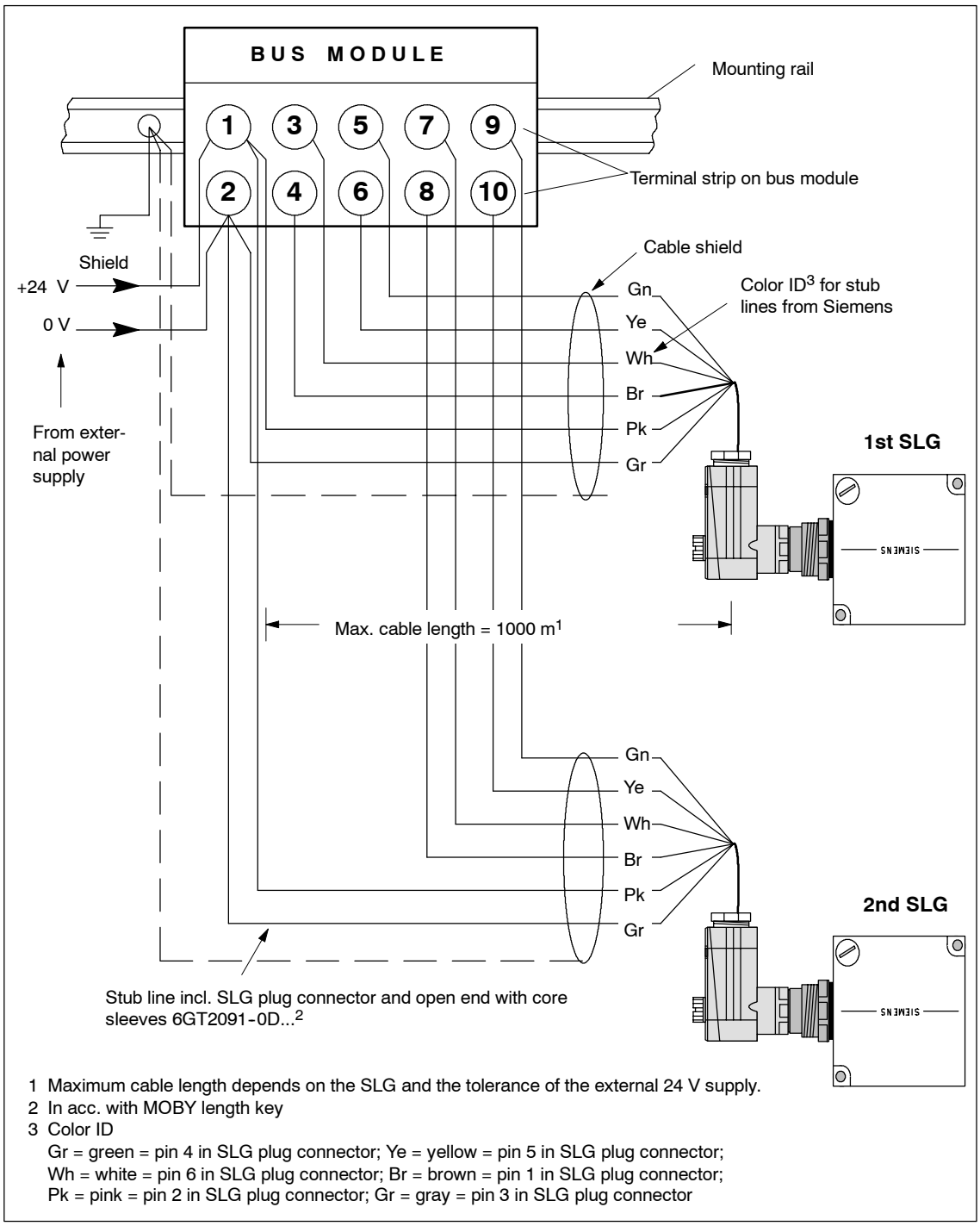
Note

The serial S5 bus functions are not affected by switching to test operation since this interface has its own microprocessor and is not dependent on MOBY activities.

Table 6-10 Operating modes for ASM 410

Switch Setting	Short Description on Label Insert	Description
0	Normal	Normal operating mode; read and write all MDS types; ECC driver is disabled.
1	ECC driver	Read and write all MDS types; EEC driver is enabled.
2	Test operation	All MDS types can be processed during test operation. The ASM 410 performs stricter error checks for communication with the MDS so that weak points and malfunctions can be detected during commissioning.
3	Test + ECC	The ECC driver is enabled. Otherwise same as switch setting 2.
4	INIT normal	Initializes the MDS. When a write command is started via the process image, an INIT command to the MDS is started. The contents of the MDS are deleted.
5	INIT ECC	Initializes the MDS with ECC driver. Otherwise same as switch setting 4.
6	Reserved	-
7	Reserved	-
8	Test 1st or 2nd SLG	An STG can be connected via the 9-pin sub D plug connector so that all MOBY-I hardware can be tested.
9 to F	Reserved	-

Wiring of one or two SLGs



1 Maximum cable length depends on the SLG and the tolerance of the external 24 V supply.
2 In acc. with MOBY length key
3 Color ID
Gr = green = pin 4 in SLG plug connector; Ye = yellow = pin 5 in SLG plug connector;
Wh = white = pin 6 in SLG plug connector; Br = brown = pin 1 in SLG plug connector;
Pk = pink = pin 2 in SLG plug connector; Gr = gray = pin 3 in SLG plug connector

Figure 6-20 Wiring of one or two SLGs for ASM 410

6.4 ASM 420/ASM 421

Application area

ASM 420/421 interfaces all general-purpose modules for the operation of MOBY-I devices with a serial interface to the following components.

- All computers
- PCs
- Controllers of other manufacturers

Layout and functions

ASM 420/421 interfaces are available with one of three physical interfaces (i.e., RS 422, V.24 or TTY). They are available in single Europe format and can be installed in all standard module racks.

ASM 420

The ASM 420 accesses data on the MDS directly with physical addresses.

ASM 421

The MOBY-I file handler is implemented on the ASM 421. The file handler for the MOBY-I identification system is similar to the file management system used by DOS. It consists of a program which is executed on the interface. The MDS and SLG MOBY-I components with and without the file handler are identical.

Possible installation of ASM 420/421

The ASM 420/421 is a plug-in card without a special protection rating. Several possible methods of card installation are available to the user.

- The user's own plug-in card holder which is mounted in a switching cabinet. The user provides the 24 V voltage supply.
- Four or 8 ASM 420/421s can be installed in module rack BGT 4/BGT 8. The module rack includes a power pack. Cf. chapter 7.2.
- An ASM 420/421 can be installed in the "plastic housing." The housing is small and is equipped with a plug connector power pack. Cf. chapter 7.3.

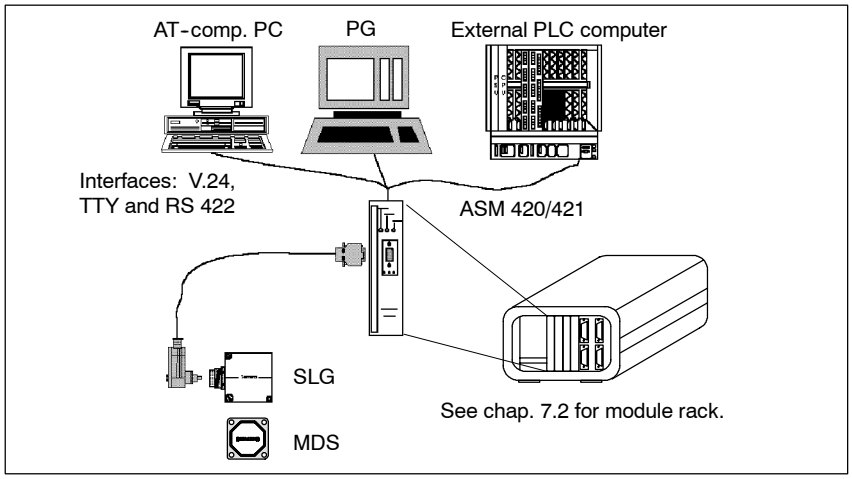
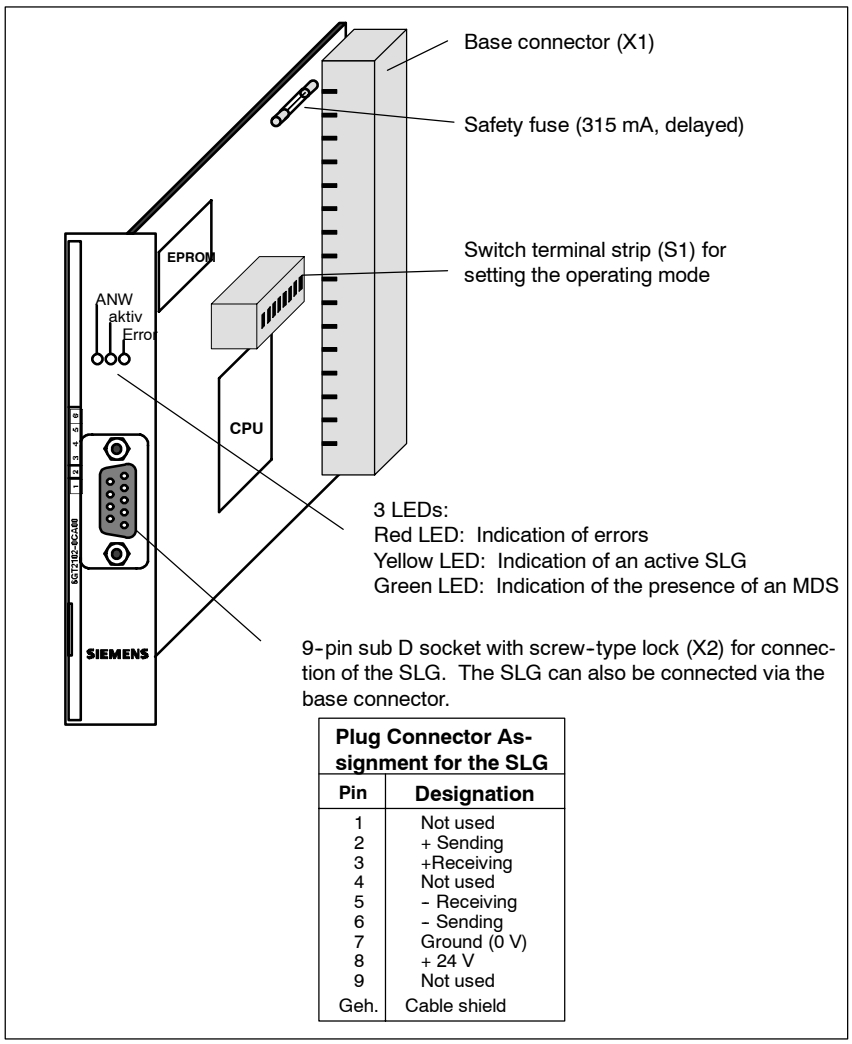


Figure 6-21 Configurator for ASM 420/421



Plug Connector Assignment for the SLG

Pin	Designation
1	Not used
2	+ Sending
3	+Receiving
4	Not used
5	- Receiving
6	- Sending
7	Ground (0 V)
8	+ 24 V
9	Not used
Geh.	Cable shield

Figure 6-22 ASM 420/421 interface with operational and indicator elements

Ordering data

Table 6-11 Ordering data for ASM 420/421

Interface ASM 420	
With V.24 (RS 232) interface	6GT2 002-0CA00
With RS 422 (RS 485, V.11) interface	6GT2 002-0CB00
With TTY (linear current) interface	6GT2 002-0CC00
Interface ASM 421	
With V.24 (RS 232) interface	6GT2 002-0DA00
With RS 422 (RS 485, V.11) interface	6GT2 002-0DB00
With TTY (linear current) interface	6GT2 002-0DC00
MOBY software with 3964R drivers for DOS and Windows 95/NT	6GT2 080-2AA10
Module rack with power pack	
For 4 ASMs 420/421/440/441/520	6GT2 090-0KA00
For 8 ASMs 420/421/440/441/520	6GT2 090-0LA00
Description-ASM 420	
German	6GT2 097-3AF00-0DA1
English	6GT2 097-3AF00-0DA2
Description-ASM 421	
German	6GT2 097-3AH00-0DA1
English	6GT2 097-3AH00-0DA2
Description-T3964R (DOS), stapled	
German	6AW5 450-4BX00-0K
English	6AW5 450-4BX00-1K
Stub lines and accessories	See chapter 3.10

Technical data

Table 6-12 Technical data of ASM 420/421

	ASM 420	**ASM 421**
Interface to PC/computer		
Connection	Via multi-point terminal strip (model F, DIN 41612)	
Procedure	3964R SINEC L1 LAUF SINUMERIK protocol	3964R - - -
Transmission rate	2400 to 9600 baud and 38400 baud	
Line length (typ. max.)	1000 m (shielded)/TTY 1000 m (shielded)/RS 422 30 m (shielded)/V.24	
Serial interface to SLG	RS 422	
Connection	9-pin sub D socket	
Line length	Depends on SLG; max. of 1000 m (shielded)	
Number of SLGs connectable	1	

Table 6-12 Technical data of ASM 420/421

	ASM 420	ASM 421
Software functions		
Programming	Depends on PC, computer, external PLC	
Driver for MS-DOS	3964R driver with MS-C interface	
Driver for Windows 95 and Windows NT	3964R driver on request	
MDS addressing	Direct access via addresses	Access via file system similar to DOS
Commands	Initialize MDS, read data, write data, and so on	Format MDS, create file, delete file, write data in file, and so on
Dialog	On request	No
Supply voltage		
Nominal value	24 V DC	
Permissible range	20 to 30 V DC	
Current consumption		
No-load current (max.) (without SLG, DO not loaded)	200 mA	
Ambient temperature		
During operation	0° to +55° C	
During transportation and storage	-40° to +70° C	
Protection rating in acc. w. IEC 529	IP00	
Dimensions (WxHxD) in mm	20 x 100 x 160 (single Europe format)	
Weight (approx.)	0.2 kg	

Assignment of base connector X1

The following components are connected to base connector X1.

- Voltage supply of ASM and SLG
- Serial interface to user
- Protective ground (shield)
- Control and signal lines (optional)
- SLG (optional)

Table 6-13 Assignment of base connector X1 for ASM 420/421

Pin	Assignment			Pin	Assignment		
b2	0 V			z2	24 V		
	Depends on type of interface				Depends on type of interface		
	V.24	RS 422	TTY		V.24	RS 422	TTY
b4	-	R+	+EM	z4	TxD	E+	-EM
b6	RxD	D+	+SE	z6	-	R-	-SE
b8	-	D-	-[1]	z8	GND	E-	-
b10				z10			
b12	DI0	2 digital inputs and outputs each for data carrier controller		z12	DI1	2 digital inputs and outputs each for data carrier controller	
b14	DO0			z14	DO1		
b16	ASM has user data or ($\overline{\text{Request}}$) acknowledgment			z16	Select module ($\overline{\text{Select}}$)		
b18	Error code (same as red LED)			z18	Presence (ANW) (same as green LED)		
b20	SLG receiving +			z20	SLG receiving –		
b22	SLG sending +			z22	SLG sending –		
b24				z24			
b26				z26			
b28				z28			
b30	Protective ground ⏚			z30	Protective ground ⏚		
b32	0 V			z32			

1 Do not wire pin b8 for TTY mode.

R+	(Terminal resistance)	TxD	(Transmit data)
E+	(Receiving)	RxD	(Receive data)
D+	(Sending)	+EM	(Receiving)
R-	(Terminal resistance)	-EM	(Receiving)
D-	(Sending)	+SE	(Sending)
E-	(Receiving)	-SE	(Sending)

Setting operating mode for ASM 420

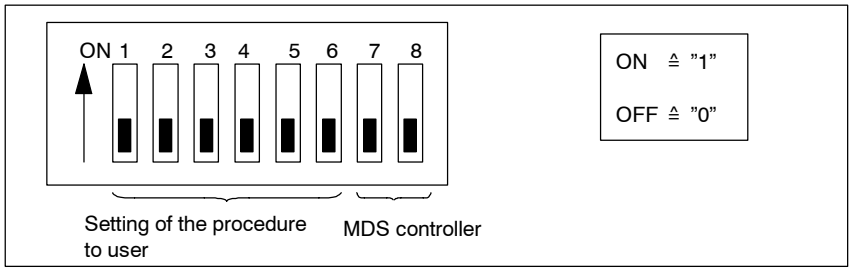


Figure 6-23 Switch strip S1 of ASM 420

The operating modes which can be set here simplify controlling and monitoring the data memories by the user.

Table 6-14 MDS controller and presence check

Switch		Meaning
7	8	
		No data memory controller; presence check is disabled; DI/DO can be programmed as desired with the status command.
		Presence check via ASM firmware; DI can be used as desired; can be scanned with the DI/DO command.[1]
		Presence check via DI0 and DI1 DI0 = 1 -> MDS entering DI1 = 1 -> MDS leaving
		Presence check via DI1 DI1 = 1 -> MDS leaving DI0 is free and can be scanned with the status command.[1]

1 A time factor can be set with the RESET command for field scanning when the MDS 507 is used. This setting is not available for SINUMERIK.

Table 6-15 Setting the procedure

Switch						Meaning
1	2	3	4	5	6	
b	b	1	0	0	0	**39964R: ASM = slave**
b	b	1	1	0	0	**3964R: ASM = master** Standard 3964R procedure for all interfaces: Standard telegrams are processed by the ASM. b b = baud rate (see below)

Table 6-15 Setting the procedure

<table>
<tr><th colspan="6">Switch</th><th>Meaning</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th></th></tr>
<tr><td>b</td><td>b</td><td>a</td><td>a</td><td>1</td><td>0</td><td>SINUMERIK 850/880 protocol (without response telegram)
Switch:
<table>
<tr><th>3</th><th>4</th><th>ASM-Address (= a a)</th></tr>
<tr><td>0</td><td>0</td><td>0 (always present)</td></tr>
<tr><td>0</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>2</td></tr>
<tr><td>1</td><td>1</td><td>3</td></tr>
</table>
b b = baud rate
Caution:
When SINUMERIK is used, switches 7 and 8 must be used to switch on a type of presence check.</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Baud rate: (= b b)
(Applies to Lauf, 3964R and SINUMERIK procedures)</td></tr>
<tr><td>1</td><td>1</td><td>x</td><td>x</td><td>x</td><td>x</td><td>38400 baud (not permitted for TTY interface)</td></tr>
<tr><td>0</td><td>0</td><td>x</td><td>x</td><td>x</td><td>x</td><td>9600 baud</td></tr>
<tr><td>0</td><td>1</td><td>x</td><td>x</td><td>x</td><td>x</td><td>4800 baud</td></tr>
<tr><td>1</td><td>0</td><td>x</td><td>x</td><td>x</td><td>x</td><td>2400 baud</td></tr>
<tr><td>a</td><td>a</td><td>a</td><td>a</td><td>1</td><td>1</td><td>SINEC L1 (only RS 422 and TTY)
aaaa = Address of ASM on SINEC L1 bus
(ASM is always the slave.)
The following address assignment applies:
Switch:
<table>
<tr><th>4</th><th>3</th><th>2</th><th>1</th><th>SINEC-Address</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td>:</td><td>:</td><td>:</td><td>:</td><td>:</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>16</td></tr>
</table>
SINEC addresses 17 to 31 are not available since they cannot be set on the ASM.</td></tr>
<tr><td>b</td><td>b</td><td>1</td><td>1</td><td>0</td><td>1</td><td>Lauf procedure
The standard telegrams are processed by the ASM. All interfaces are available.
b b = baud rate</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>STG connection
3964R procedure; ASM = slave
Baud rate = 4800 baud</td></tr>
</table>

Setting the operating modes of ASM 421

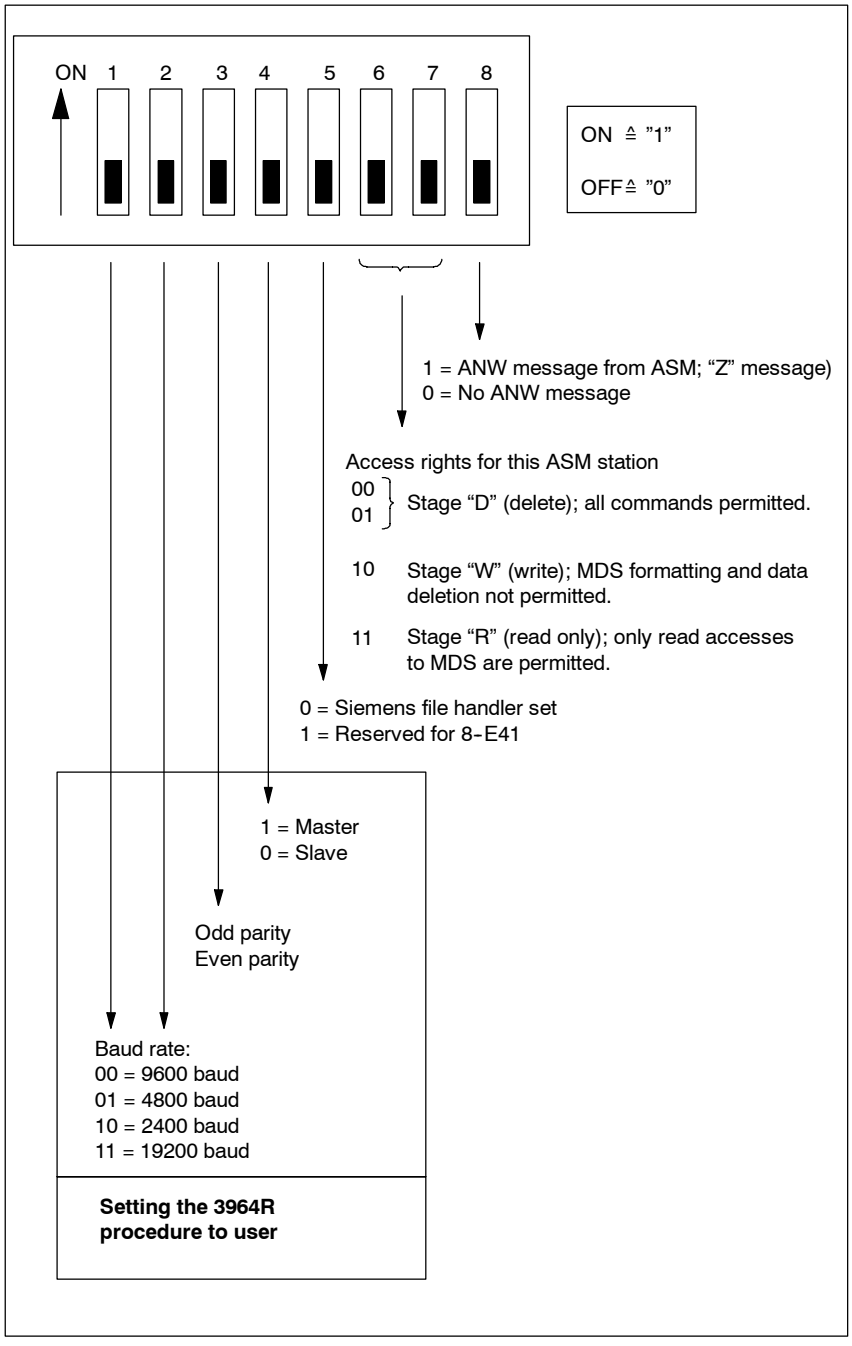


Figure 6-24 Switch strip S1 for ASM 421

6.5 ASM 440[1]/441

Application area

The ASM 440/441 interfaces can be used with all PROFIBUS-DP/FMS masters (e.g., S5-115U with IM 308-B/C).

Layout and functions

ASM 440/441 interfaces are modules in single Europe format. They can be installed in all standard module racks. The operating status can be checked with five LEDs. One SLG can be connected to each ASM.

ASM 440

The PROFIBUS-DP procedure in accordance with part 3 of DIN 19245 is implemented on the ASM 440. Absolute addresses are used to access the data on the MDS. STEP5 function block FB 240 is available for PROFIBUS-DP master module IM 308-B/C (SIMATIC S5).

SIMATIC S7 users use the FC 44 function together with the description of FB 240. Users of controllers of other manufacturers and PCs use the description of the ASM 440. The simple program interface is described there.

ASM 441

The PROFIBUS-FMS procedure in accordance with part 2 of DIN 19245 and the MOBY-I file handler are implemented on the ASM 441. File names are used to access the data on the MDS. The interface is programmed directly via “Services” at the FMS level.

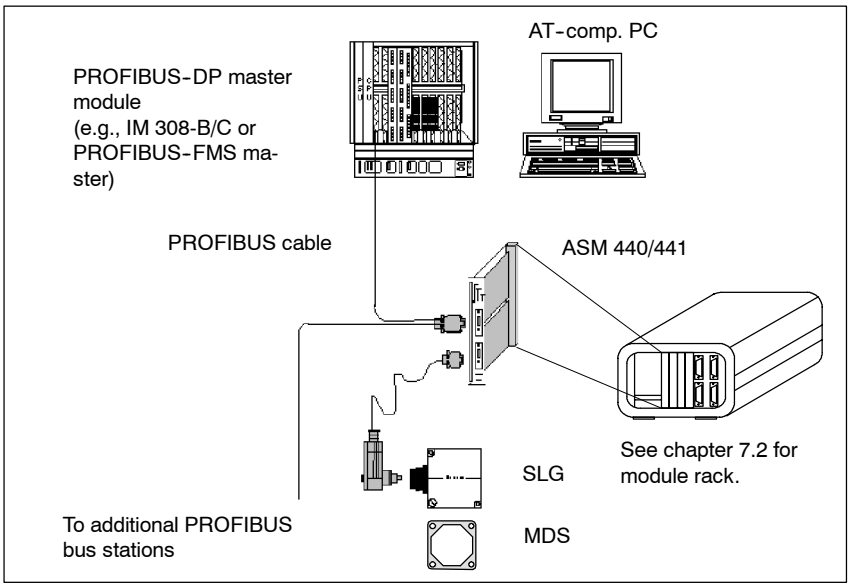


Figure 6-25 Configurator for ASM 440/441

1 ASM 440 has been discontinued, ASM 450 is successor product.

Ordering data

Table 6-16 Ordering data for ASM 440/441

Interface ASM 440 for PROFIBUS-DP	6GT2 002-0EA00
Interface ASM 441 for PROFIBUS-FMS	6GT2 002-0EA10
MOBY software with FB 240, FC 44, 3.5” floppy disk (DOS format)	6GT2 080-2AA10
Description-ASM 440 German English Description-ASM 441 German English Description-FB 240 for MOBY-I German English	 6GT2 097-3AC10-0DA1 6GT2 097-3AC10-0DA2 6GT2 097-3AC20-0DA1 6GT2 097-3AC20-0DA2 6GT2 097-3AA10-0EA1 6GT2 097-3AA10-0EA2
Module rack with power pack	See chapter 7.2.
Plastic housing	See chapter 7.3.
Stub lines and accessories	See chapter 3.10.
Plug connector (PROFIBUS) 9-pin submin D plug connector with 2 stub line leads and stub line	See catalog IK 10.

Technical data

Table 6-17 Technical data of ASM 440/441

	ASM 440	**ASM 441**
Serial interface to user	PROFIBUS-DP	PROFIBUS-FMS
Procedure	Certified in acc. w. part 3 of DIN 19245	Part 2 of DIN 19245
Connection	9-pin sub D socket or base connector (multi-point terminal strip, model F, DIN 41612)	
Transmission speed	9600 baud up to 1.5 Mbaud (automatic recognition)	
Serial interface to SLG plug connector	9-pin sub D socket or base connector (multi-point terminal strip, model F, DIN 41412)	
Cable length (max.)	1000 m (depends on SLG)	
SLGs which can be connected	SLG 4x	

Table 6-17 Technical data of ASM 440/441

	ASM 440	ASM 441
Software functions		
Programming	Depends on PROFIBUS-DP/FMS master	
Function block	FB 240 for SIMATIC S5 IM 308-B/C; FC 44 for SIMATIC S7	Not available; programming via FMS interface
MDS addressing	Direct access via addresses	Access via file system similar to DOS
Commands	Initialize MDS, read data from MDS, write data to MDS, and so on	Format MDS, create file, delete file, write data in file, and so on
Dialog	Yes	No
Supply voltage		
Nominal value	24 V DC	
Permissible range	20 to 30 V DC	
Current consumption	200 mA (without SLG, DO not loaded)	
DI/DO; select; request, error, ANW		
Digital inputs:		
Number	5	None
Galvanic isolation	No	
Input voltage		
For logical “0”	0 to 8 V DC	
For logical “1”	15 to 24 V DC (R_i = 10 kΩ)	
Delay time	< 10 msec	
Digital outputs:		
Number	7	None
Galvanic isolation	No	
Cable length (max.)	100 m	
Ambient temperature		
During operation	0° to +55° C	
During transportation and storage	-40° to +70° C	
Dimensions (WxHxD) in mm	20 x 100 x 160 (single Europe format, 4 TE mounting width)	
Weight (approx.)	0.24 kg	

Hardware of the ASM 440/441

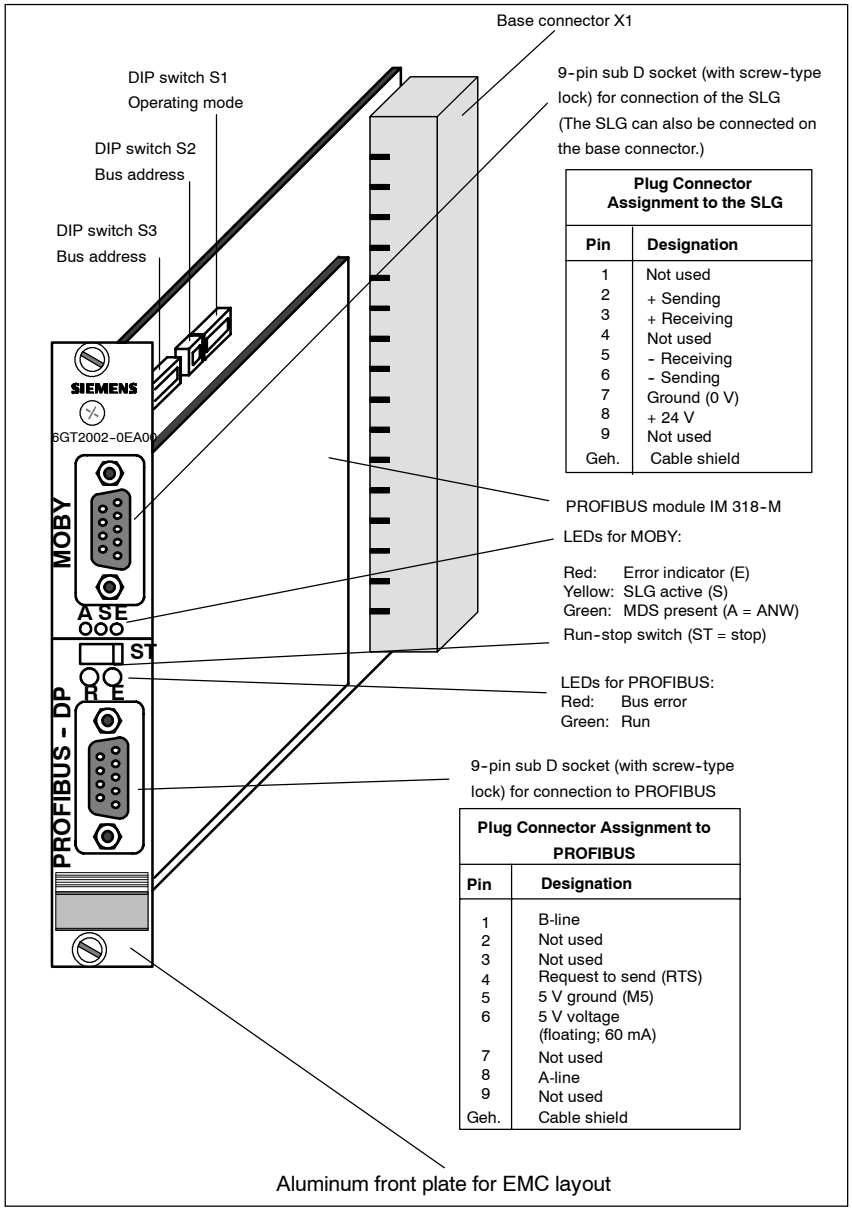


Figure 6-26 ASM 440/441 interfaces with operational and indicator elements

Assignment of base connector X1

The following components are connected on base connector X1.

- Voltage supply of ASM and SLG
- Protective ground (shield)
- The PROFIBUS, SLG and DI/DO connections are available as options.

Table 6-18 Assignment of base connector X1 for ASM 440/441

Pin	Assignment	Pin	Assignment
b2	0 V	z2	24 V
b4	RTS (PROFIBUS interface[1])	z4	
b6	B-line (PROFIBUS interface[1])	z6	5 V (PROFIBUS interface[1])
b8	A-line (PROFIBUS interface[1])	z8	M5 (PROFIBUS interface[1])
b10		z10	
b12	DI0 (Digital inputs and outputs for data carrier controller)	z12	DI1 (Digital inputs and outputs for data carrier controller)
b14	DO0 (Digital inputs and outputs for data carrier controller)	z14	DO1 (Digital inputs and outputs for data carrier controller)
b16	24 V reset input[2]	z16	24-V-reset output
b18	24 V output for error code (same as red LED, inverted)	z18	24 V output for error code (same as green LED, inverted)
b20	SLG receiving +	z20	SLG receiving -
b22	SLG sending +	z22	SLG sending -
b24	DI2 (Digital inputs and outputs for use as desired)	z24	DI3 (Digital inputs and outputs for use as desired)
b26	DO2 (Digital inputs and outputs for use as desired)	z26	DO3 (Digital inputs and outputs for use as desired)
b28		z28	
b30	Protective ground ⏚	z30	Protective ground ⏚
b32	0 V	z32	

1 When the PROFIBUS interface is used on this base connector, only one stub line can be connected. The length of the stub line should not exceed 15 cm. At 1.5 Mbaud, total stub line capacity may not exceed 0.2 nF. The stub line itself does not require terminal resistors.

2 A 24 V level on the input resets the ASM. The ASM does not start up again until the 24 V level is removed. The signal is output in inverted format on the reset output. The RUN/STOP switch and the RESET command do not affect the reset output.

The total current of all 24 V outputs (i.e., DO0 to DO3, reset, error code and presence) must be limited to 200 mA.

Setting the operating mode of ASM 440/441

Operation of the module requires the following settings.

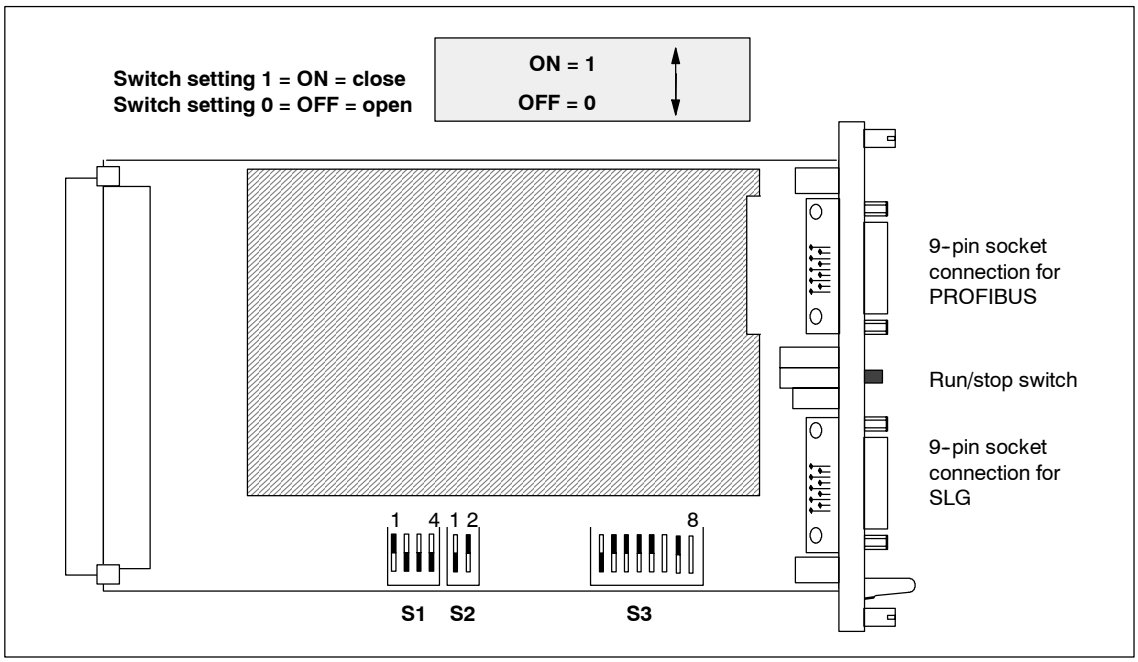


Figure 6-27 Setting the operating mode for ASM 440

Meaning of the switches for ASM 440

Table 6-19 Setting the operating mode for ASM 440

S1				Presence Check (ANW)
1	2	3	4	
x^1	x^2	1	1	**Operating mode 0:** No control of data memory; presence check is disabled; DI/DO can be programmed as desired.
x^1	x^2	1	0	**Operating mode 1:** Presence check via ASM 440 firmware; DI can be used as desired.
x^1	x^2	0	1	**Operating mode 2:** Presence check via DI0 and DI1
x^1	x^2	0	0	**Operating mode 3:** Presence check via DI1

1 MOBY operation
- 0: Set test operation of ASM 440. No connection to PROFIBUS-DP. This mode is not available to the user.
- 1: Normal operation

2 MOBY parameterization
- 0: Operation as MOBY-I module
- 1: Operation as MOBY-L module

Table 6-20 Setting the slave address on ASM 440 (BCD-coded)

Slave Address	S2		S3							
	Hundreds		Tens				Ones			
	1	2	1	2	3	4	5	6	7	8
3	1)	0	0	0	0	0	0	0	1	1
4		0	0	0	0	0	0	1	0	0
5		0	0	0	0	0	0	1	0	1
6		0	0	0	0	0	0	1	1	0
7		0	0	0	0	0	0	1	1	1
. .		. .	. .	. .	. .	. .	. .	. .	. .	. .
97		0	1	0	0	1	0	1	1	1
98		0	1	0	0	1	1	0	0	0
99		0	1	0	0	1	1	0	0	1
100		1	0	0	0	0	0	0	0	0
101		1	0	0	0	0	0	0	0	1
102		1	0	0	0	0	0	0	1	0
. .		. .	. .	. .	. .	. .	. .	. .	. .	. .
113		1	0	0	0	1	0	0	1	1
114		1	0	0	0	1	0	1	0	0
. .		. .	. .	. .	. .	. .	. .	. .	. .	. .
124		1	0	0	1	0	0	1	0	0

1) Not used

Meaning of the switches for ASM 441

Table 6-21 Operating mode settings of ASM 441

S1				Access Rights of the ASM Station
1	2	3	4	
x[1]	x[2]	1	1	**Stage "R"** (read only); only read-accesses to MDS are permitted.
x[1]	x[2]	1	0	**Stage "W"** (write); MDS formatting and file deletion not permitted.
x[1]	x[2]	0	1	**Stage "D"** (delete); all commands are permitted.
x[1]	x[2]	0	0	

1 MOBY operation
- 0: Set test operation of ASM 441. No connection to PROFIBUS-FMS. This operating mode is not available to the user.
- 1: Normal operation

2 MOBY parameterization
- 0: Operation as MOBY-I module
- 1: Not available

Table 6-22 Setting the slave address on ASM 441 (binary-coded)

Object Length		Setting the Slave Address on ASM 441 (Binary-Coded)								
S2		S3								
1	2	Slave Address		64	32	16	8	4	2	1
			1	2	3	4	5	6	7	8
1)	0: Object length 128 bytes	3	1)	0	0	0	0	0	1	1
		4		0	0	0	0	1	0	0
		5		0	0	0	0	1	0	1
		6		0	0	0	0	1	1	0
	1: Object length 230 bytes	. .		. .	. .	. .	. .	. .	. .	. .
		97		1	1	0	0	0	0	1
		98		1	1	0	0	0	1	0
		99		1	1	0	0	0	1	1
		100		1	1	0	0	1	0	0
		. .		. .	. .	. .	. .	. .	. .	. .
		113		1	1	1	0	0	0	1
		114		1	1	1	0	0	1	0
		. .		. .	. .	. .	. .	. .	. .	. .
		124		1	1	1	1	1	0	0

1) Not used

6.6 ASM 450/451

Application area

The ASM 450/451 interfaces are modules for operation of MOBY devices via PROFIBUS-DP on the following components.

- All computers and PCs
- All controllers

When the interfaces are used on a SIMATIC S7, function blocks are available to the user.

Figure 6-28 ASM 450/451 interface

ASM 450

The ASM 450 accesses data on the MDS directly with physical addresses. Two interfaces are available to the user.

- The ASM 450 uses cyclic operation with function block FB 240 or FC 44. The description of FB 240 is available to the SIMATIC S5 user. All other users must use the description of the FC 44 function for the ASM 450.
- The ASM 450 uses acyclic operation with PROFIBUS-DP-V1 (available by mid 2000). The FC 45 function block is available for the SIMATIC S7. In this mode, very large quantities of data can be transferred to and from the ASM without overloading the PROFIBUS cycle. In addition, the ASM can execute chained MDS commands very quickly in this mode.

Up to 2 SLGs can be connected to one ASM 450. Connection of two SLGs is only recommended when static operation is used. When MDSs are processed while passing by (i.e., dynamic operation), there is usually not enough time to switch over the second SLG.

ASM 451

The MOBY-I file handler is implemented on the ASM 451. Similar to the one used by DOS, this file handler is the file management system for the MOBY-I identification system. It consists of a program which is executed on the interface. FC 46 or FB 246 is available for SIMATIC users.
Since the ASM 451 uses only acyclic operation via DP-V1 on PROFIBUS, this makes data throughput excellent.

Ordering data

Table 6-23 Ordering data for ASM 450/451

ASM 450 interfaces for PROFIBUS-DP, max. of 2 SLGs connectable	6GT2 002-0EB00
ASM 451 interfaces for PROFIBUS-DP, with MOBY file handler, only 1 SLG 4x connectable	6GT2 002-0EB10
Accessories Plug connector for PROFIBUS-DP connection and 24 V power supply	6ES7 194-1AA00-0XA0
Connection cable, ASM 450/451 ↔ SLG	6GT2 091-1CH20
Opt. connection plug, ASM 450/451 ↔ SLG	6GT2 090-0BC00
MOBY software with FB 246, FC 46, FB 240, FC 44, 3.5” floppy disk (DOS format)	6GT2 080-2AA10
Other accessories for ASM 450 (network components)	See SIMATIC catalog ST 70 and SIMATIC ET 200X manual.
Replacement part: Plug connector plate; T-functionality for PROFIBUS	6ES7 194-1FC00-0XA0
Description-ASM 450/FC 44 German English	 6GT2 097-3AC30-0DA1 6GT2 097-3AC30-0DA2
Description-ASM 451/FC 46 German English	 6GT2 097-3AC40-0DA1 6GT2 097-3AC40-0DA2
Description-FB 246 for ASM 451 with S5 German	 6GT2 097-3AC60-0DA1

Technical data

Table 6-24 Technical data of ASM 450/451

	ASM 450	ASM 451
Serial interface to the user	PROFIBUS-DP/DP-V1	PROFIBUS-DP-V1
Procedure in acc. w.	EN 50170, vol. 2, PROFIBUS	
Connection	PG 11 screw connection PROFIBUS and supply voltage plug connectors are not included. Cf. catalog ST 70: 6ES7 197-1AA00-0XA0)	
Transmission speed	9600 baud to 12 Mbaud (automatic recognition)	
Max. block length	208 bytes	Cyclic: 1 byte/ acyclic: 240 bytes
Serial interface to the SLG		
Plug connector	2 coupling plug connectors (M12)	
Line length (max.)	1000 m, depends on SLG (2 m = standard length)	
SLGs which can be connected	2 SLG 4x (multiplex operation)	1 SLG 4x
Software functions		
Programming	Depends on PROFIBUS-DP master	
Function blocks		
SIMATIC S5	FB 240	FB 246 (for 155U with IM 308-C)
SIMATIC S7	FC 45[1] or FC 44	FC 46
MDS addressing	Direct access via addresses	Access via file system similar to DOS
Commands	Initialize MDS, read data from MDS, write data to MDS, and so on	Format MDS, read file, write file, and so on
Dialog: Normal Station/VMDS	Yes/no	No/no
Supply voltage		
Nominal value	24 V DC	
Permissible range	20 to 30 V DC	
Current consumption	180 mA (without SLG, DO not loaded)	

1 Available by mid 1998

Table 6-24 Technical data of ASM 450/451

	ASM 450	ASM 451
Digital inputs		
Number	2	None
Galvanic isolation	Yes	
Input voltage		
For logical “0”	0 to 5 V DC	
For logical “1”	13 to 30 V DC	
Input current for signal “1”	7 mA (typ.)	
Delay time	< 10 msec	
Digital outputs		
Number	2	None
Galvanic isolation	Yes	
Max. permissible current	0.5 A	
Short-circuit protection	Yes (electronic)	
Line length (max.)	30 m	
Ambient temperature		
During operation	0° to +55° C	
During transportation and storage	-40° to +70° C	
Dimensions (WxHxD) in mm	134 x 110 x 55	
Mounting	4 M5 screws, mounting on any plate or wall	
Weight (approx.)	0.5 kg	
Protection rating	IP67	

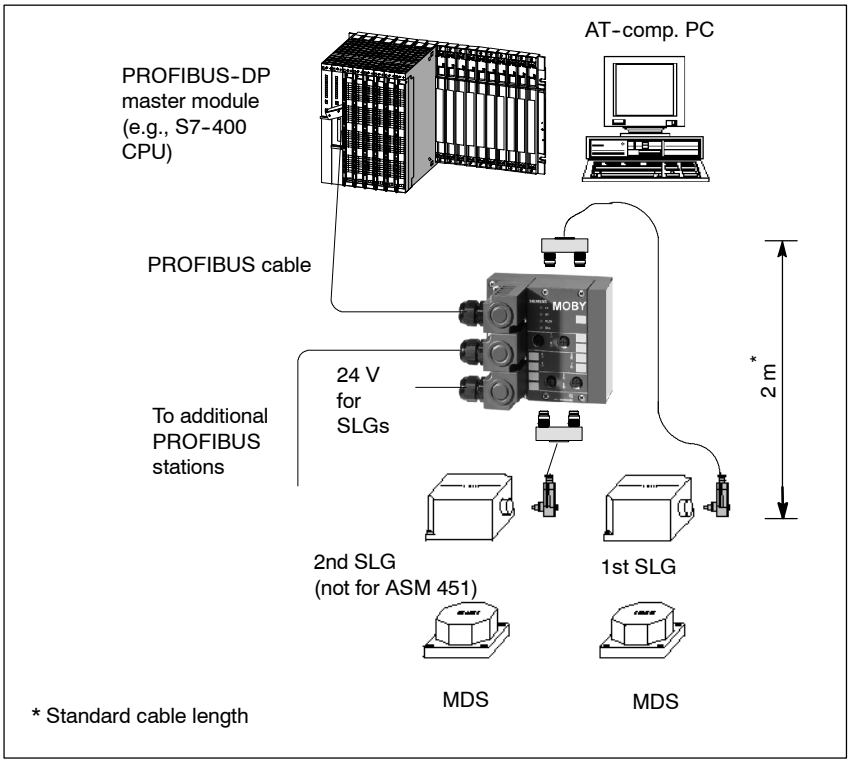


Figure 6-29 Configurator of ASM 450/451

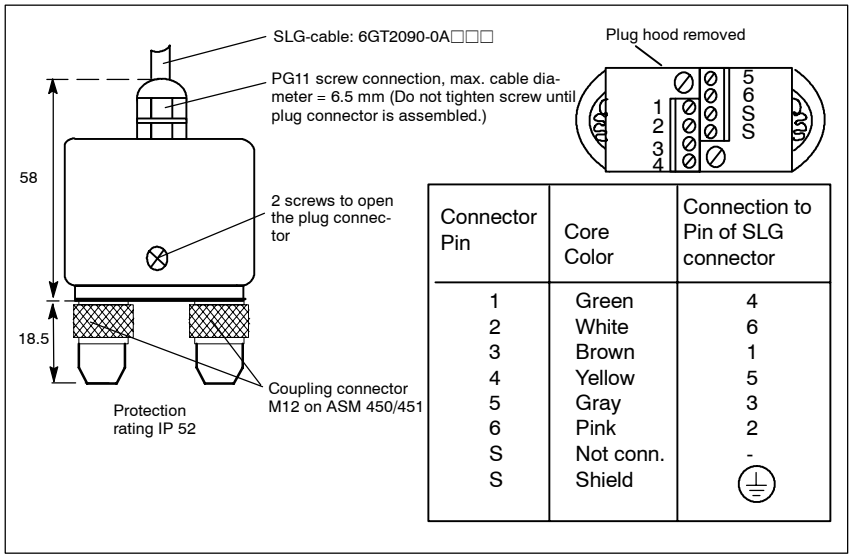
Hardware description

The ASM 450/451 is equipped with the same housing as the ET 200X decentral I/O device. See ET 200X manual (order no. 6ES7 198-8FA00-8AA0) for general technical information (e.g., mounting, operation and wiring, and general technical specifications). Accessories and power supply components are also described in this manual.

SLG connection technique

Since an SLG always occupies two M12 connection sockets on the ASM 450/451, a prefabricated cable (cf. chapter 3.10) makes it easy to connect the SLG. In its standard version, the connection cable has a length of 2 m. Other cables are available on request.

An SLG plug connector with screw-type terminals is available for users who want to make their own cable. Cable and SLG plug connector can be ordered from the MOBY catalog.



Connector Pin	Core Color	Connection to Pin of SLG connector
1	Green	4
2	White	6
3	Brown	1
4	Yellow	5
5	Gray	3
6	Pink	2
S	Not conn.	-
S	Shield	⏚

Figure 6-30 Connection plug, ASM 450/451 ↔ SLG (6GT2090-0BC00)

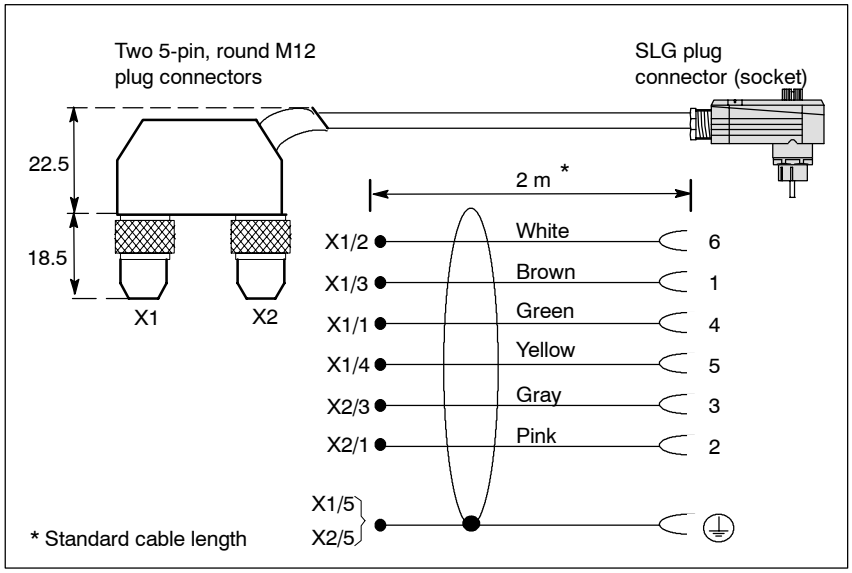


Figure 6-31 Connection cable, ASM 450/451 ↔ SLG (6GT2091-1CH20)

SLG and DI/DO configuration for ASM 450

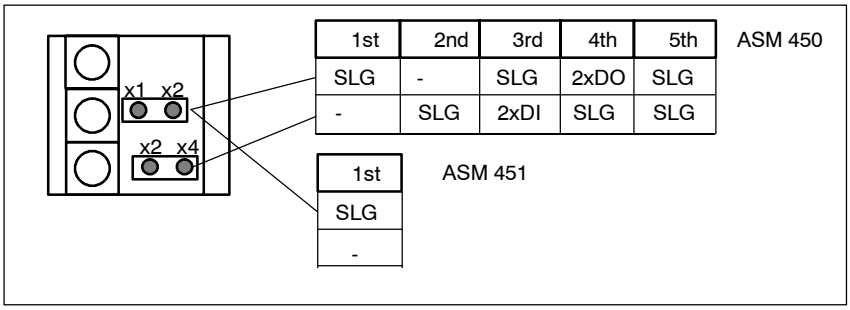


Figure 6-32 SLG and DI/DO configuration for ASM 450/451

The versions shown in figure 6-32 can be set up with the standard cables of MOBY or ET 200X.

Note

Although the configuration with 2 SLGs + DI + DO is also possible with the ASM 450, the components require special customer-related wiring.

Dimensional drawing of ASM 450/451 with mounting holes

The following figure shows a dimensional drawing of an ASM 450/451 with bus connection plugs. You must add the length of the PG screw connection and the radius of the cable used to the total width and depth specified.

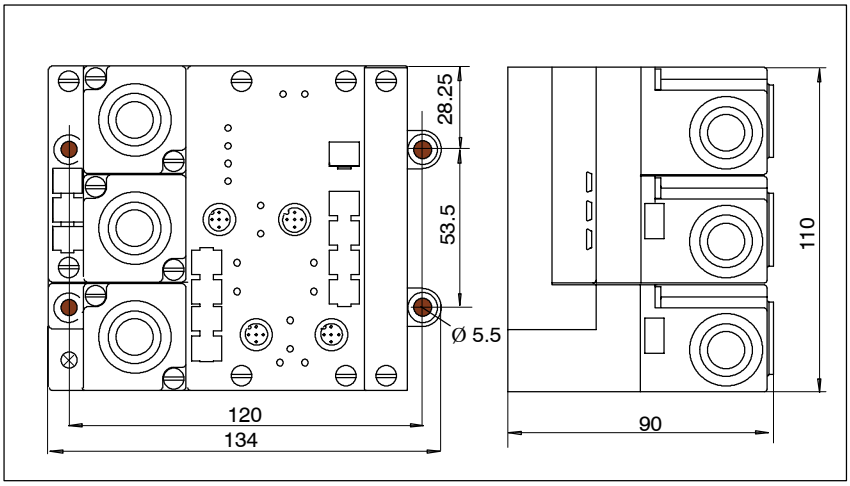
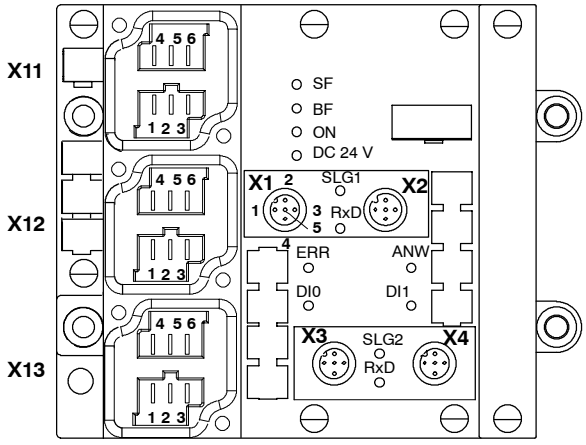


Figure 6-33 Dimensional drawing of the ASM 450/451

Pin allocation The following figure shows the pin allocation of the ASM 450/451.



LEDs for PROFIBUS-DP

SF:	System fault (hardware error on ASM 450/451)
BF:	Bus fault (error on PROFIBUS-DP)
ON:	On when the logic voltage is present on ASM 450/451 (is generated from the 24 V suply voltage)
DC 24 V:	On when the 24 V supply voltage is connected to ASM 450/451

LEDs for MOBY

RxD:	SLG active with command
ANW:	MDS present or status of DA1
ERR:	Error indication or status of DA0
SLG1/2:	Indicates the selected SLG. Only SLG 1 or SLG 2 can be selected.
DI0/1 :	Status of the digital inputs

Socket	Pin Allocation	
X11 and X12 (PROFIBUS-DP)	1	Signal B (red)
	2	PE
	3*	PE
	4	Signal A (green)
	5*	L+
	6*	M
X13 (Supply voltage)	1	PE
	2	L+
	3	M
	4	PE
	5	L+
	6	M

* Do not circuit

Socket	Pin Allocation (SLG)		
X1/X3	1	+RxD	
	2	+TxD	
	3	-TxD	
	4	-RxD	
	5	PE	
X2/X4		**X2**	**X4**
	1	+ 24 V	+ 24 V
	2	DO1	DI1
	3	0 V	0 V
	4	DO0	DI0
	5	PE	PE

Figure 6-34 Pin allocation and LEDs of ASM 450/451

Example for bared lengths

The following figure shows an example of bared lengths. The lengths are valid for all cables which you can connect to the connection plug. Any shield braiding must be twisted, inserted in a core end sleeve, and the excess cut off.

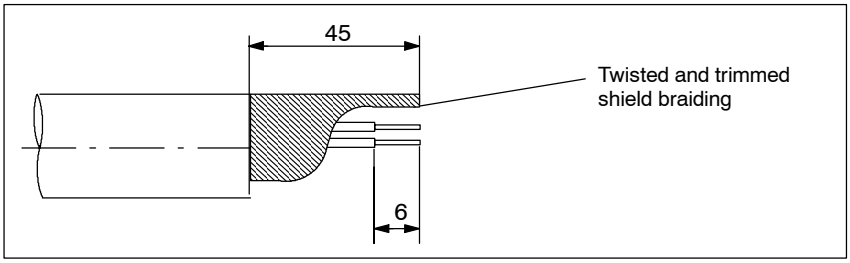


Figure 6-35 Length of baring for a PROFIBUS cable

PROFIBUS address and terminating resistance

The plug plate must be removed from the ASM 450/451 before you can set the PROFIBUS address or circuit the terminating resistance. The plug plate covers the DIP switches. The following figure shows the location of the DIP switches on the ASM 450/451 and a sample setting of each.

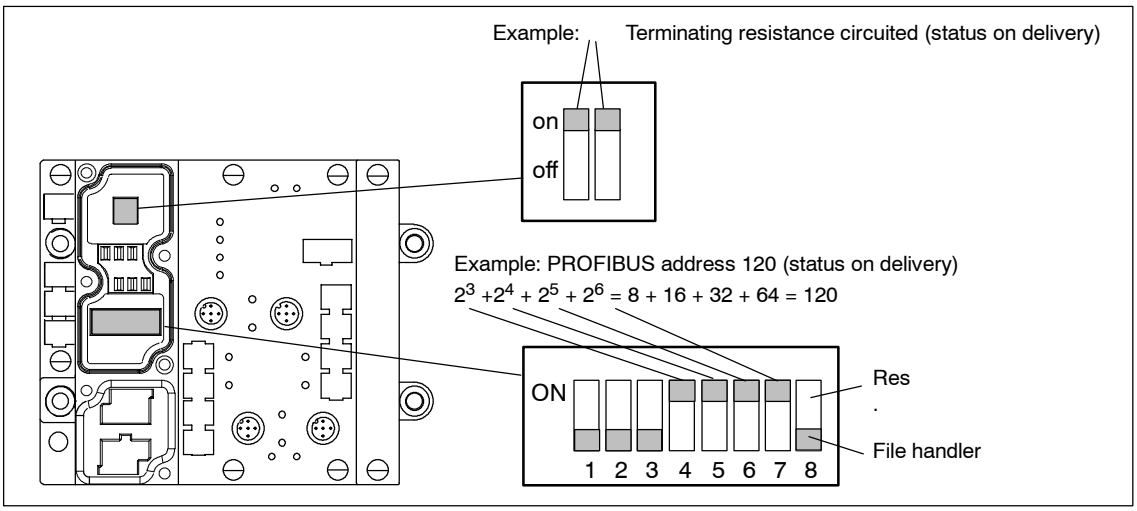


Figure 6-36 Setting the PROFIBUS address and circuiting the terminating resistance

Note

- The PROFIBUS address on the ASM 450/451 must always correspond to the PROFIBUS address specified for this ASM 450/451 with the configuration software.
- For correct functioning of the terminating resistance, always switch both DIP switches of the terminating resistance to “On” or “Off”.

6.7 ASM 454/455/424 (Advance Announcement)

Application area

The ASM 454/455/424 interfaces have been developed for decentralized setup with assembly lines. The attractive but robust housing fits anywhere. Up to four read/write devices from the MOBY-I family can be connected and operated simultaneously. This ensures dynamic operation of the connected SLG. The user can choose between the following two interfaces.

- PROFIBUS-DP-V1 (ASM 454, ASM 455)
- RS 232, serial interface to the PC (ASM 424)

Figure 6-37 ASM 454/455/424 interface

ASM 454

The ASM 454 uses physical addresses to directly access the data on the MDS. The non-cyclic protocol service of PROFIBUS-DP-V1 is used for communication with the user. Function FC 45 is available to SIMATIC S7 users for easy integration.

ASM 455

The MOBY-I file handler is implemented on the ASM 455. The file handler is a file management system similar to DOS for the MOBY-I identification system. It consists of a program which is executed on the interface module. FC 46 is available for the SIMATIC user.

Since the ASM 455 uses only non-cyclic operation via DP-V1 with PROFIBUS, data throughput is excellent.

ASM 424

The ASM 424 uses physical addresses to directly access the data on the MDS. A serial RS 232 interface with the 3964R protocol is used for communication with the user. This makes it easy to connect external controllers to the MOBY-I identification system. A C library is available for the PC user for his/her applications.

Ordering Data

Table 6-25 Ordering data for ASM 454/455/424

ASM 454 interfaces for use of MOBY-I components via PROFIBUS-DP-V1, without file handler; maximum of four standard SLG 4x can be connected (parallel operation).	6GT2 002-2EE00
ASM 455 interfaces for use of MOBY-I components via PROFIBUS-DP-V1, with file handler; maximum of four standard SLG 4x can be connected (parallel operation).	6GT2 002-2EF00
ASM 424 interfaces with serial interface RS 232/RS 422; 3964R procedure for PC, SICOMP and external controllers; maximum of four standard SLG 4x can be connected (parallel operation).	6GT2 002-2CE00
Accessories:	
RS 232 stub line between PC <-> ASM 424; can be fabricated up to a max. of 32 m based on the length key (see chapter 3.10.4).	6GT2 391-0B...
SLG stub line (see chapter 3.10)	6GT2 091-0A...
Adapter floor plate for top hat rail mounting	6GT2 390-0BA00
Wide-range power pack 100 to 230 V AC/24 V, 2.2 A	6GT2 494-0AA00
24 V DC stub line for wide-range power pack 6GT2 494-0AA00	6GT2 491-1HH50

Technical Data

Table 6-26 Technical data of ASM 454/455/424

	ASM 454	ASM 455	ASM 424
Serial interface to the user	PROFIBUS-DP-V1		RS 232
Procedure/protocol	EN 50 170 vol. 2 PROFIBUS		3964R
Transmission speed	9600 baud to 12 Mbaud (automatic recognigion)		38.4 Kbaud
Max. block length	4 words (cyclic)/238 bytes (non-cyclic)		238 bytes
Serial interface to the SLG	4 x 9-pin submin. D socket		
Line length	Max. of 1000 m; depends on SLG		
Connectable SLG	4 x SLG 4x		

Table 6-26 Technical data of ASM 454/455/424

	ASM 454	ASM 455	ASM 424
Software functions			
Programming	Depends on PROFIBUS-DP master		C lib for PC
SIMATIC S7 function block	FC 45	FC 46	-
MDS addressing	Direct access via addresses	Access via file system similar to DOS	Direct access via addresses
Commandss	Initialize MDS, read data from MDS, write data to MDS	Format MDS, read file, write file, etc.	Initialize MDS, read data from MDS, write data to MDS
Dialog	Yes	No	Yes
Supply voltage			
Nominal value	24 V DC		
Permissible range	20 to 30 V DC		
Current consumption	250 mA		
Max. switch-on current (without SLG)	1.1 A		
Ambient temperature During operation Transportation and storage	 -25 to +55 °C (no condensation) -40 to +85 °C (no condensation)		
Dimensions (W x H x D) in mm	205 x 130 x 60 (without plug)		
Mounting	4 screws (M5)		
Weight, approx.	1300 g		
Protection rating	IP40 (higher protection ratings on request)		
MTBF (at 40 °C)	$1 \bullet 10^5$ hours		
Housing material	Aluminum		
Housing color	Anthracite		

Dimensional drawing with mounting holes

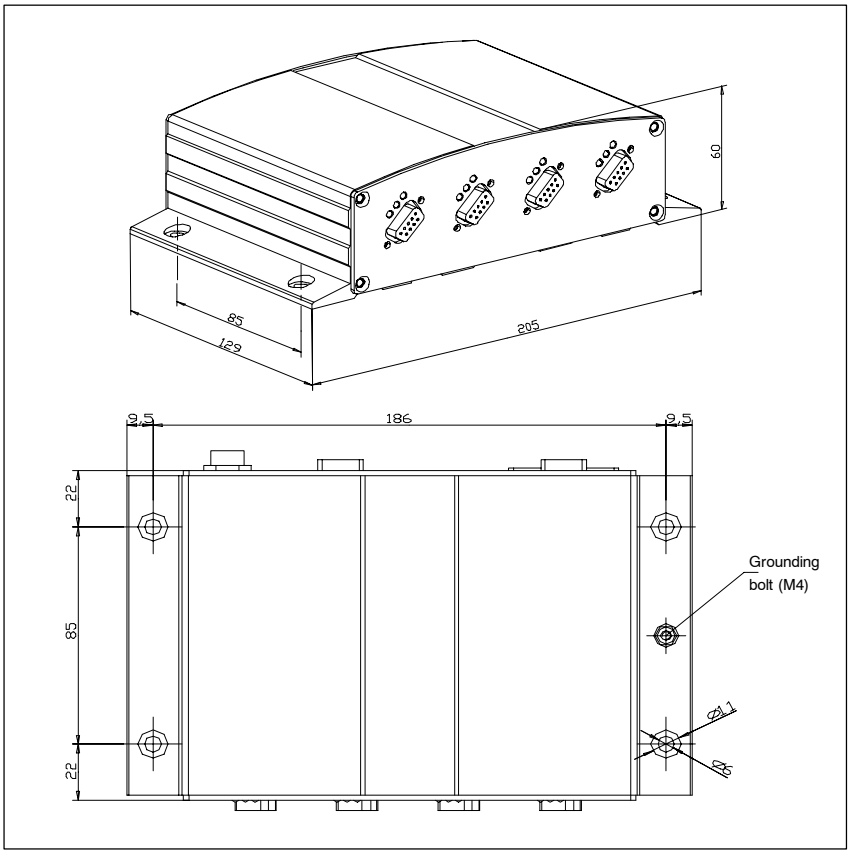


Figure 6-38 Dimensional drawing of the ASM 454/455/424

6.8 ASM 470

Application area

The ASM 470 interface can be installed in the SIMATIC S7-300 and ET 200M. It can be used for all MOBY systems.

Layout and functions

Up to eight ASM 470 interfaces can be installed and operated in one module rack of the SIMATIC S7-300. When a layout with several module racks (maximum of four) is used, the ASM 470 can be installed and operated in each of these module racks. In a maximum SIMATIC S7-300 configuration, up to 32 ASM 470s can be used.

In multiplex operation, up to two SLGs can be connected to the ASM 470. The FC 47 function block ensures simple programming via SIMATIC S7 tools. FC 47 can be used with both the S7-300 and the S7-400. When the S7-400 is used, the ASM 470 is connected via the ET 200M. The ET 200M can also be used to operate the ASM 470 in a SIMATIC S5 environment. FB 47 is available for PLCs 115U to 155U.

Error messages and operational states are indicated with LEDs. On the hardware side, communication between ASM 470 and the S7-300 CPU is handled by a 16-byte address area so that up to 12 bytes of user data can be transferred with each read/write command. Galvanic isolation between SLG and the SIMATIC S7-300 bus ensure layouts which are not as susceptible to interference.

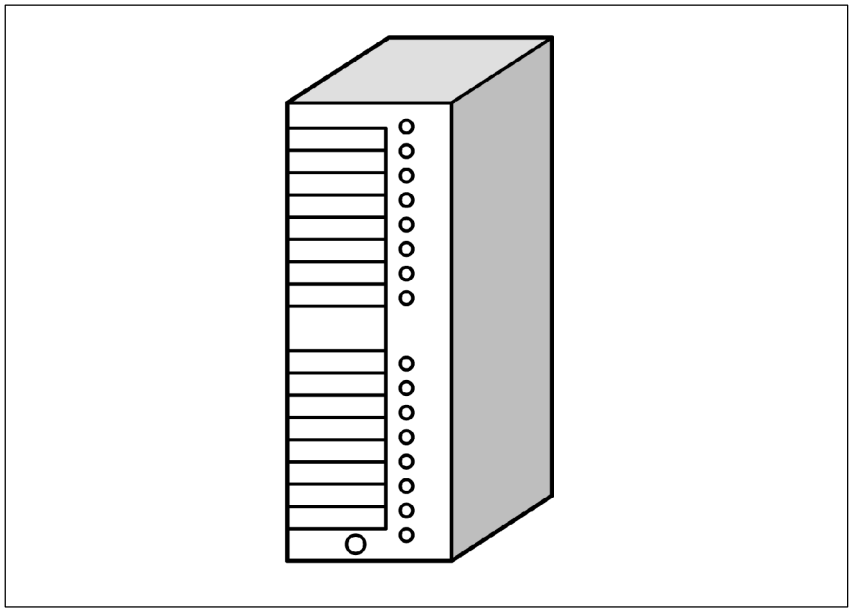


Figure 6-39 ASM 470 interface

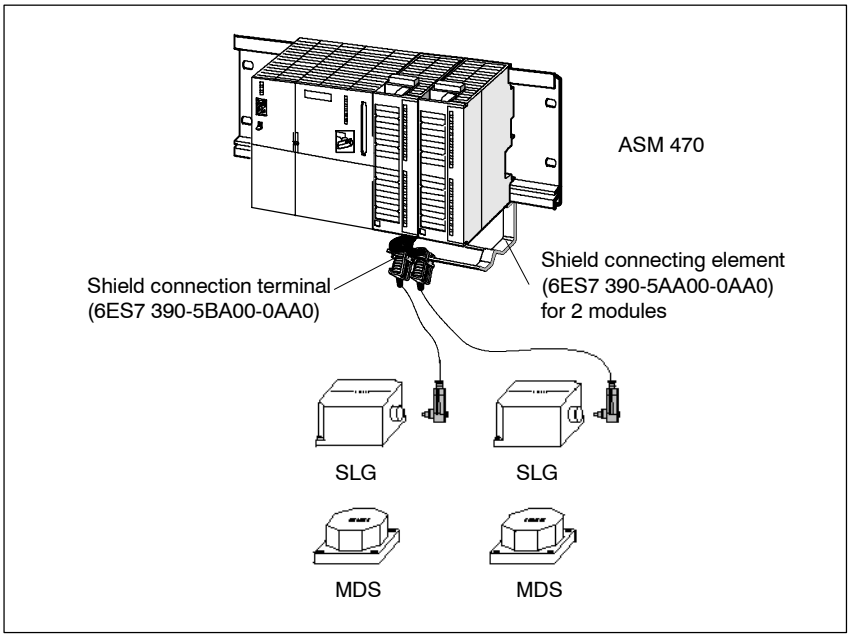


Figure 6-40 Configurator for ASM 470

Ordering data

Table 6-27 Ordering data for ASM 470

Interface ASM 470 for SIMATIC S7-300, without front connector	6GT2 002-0FA10
Accessories	
Front connector (1 per ASM 470)	6ES7 392-1AJ00-0AA0
Shield connection terminal (1 per SLG cable)	6ES7 390-5BA00-0AA0
Shield connecting element (1 per 2 ASM 470s)	6ES7 390-5AA00-0AA0
MOBY software with FC 47, FB 47 3.5” floppy disk (DOS format)	6GT2 080-2AA10
Description-ASM 470/FC 47 for MOBY-I	
German	6GT2 097-3AL00-0DA1
English	6GT2 097-3AL00-0DA2
Description-ASM 470/FB 47	
German	6GT2 097-3AL10-0DA1
Englisch	6GT2 097-3AL10-0DA2
Stub lines and accessories	See chapter 3.10

Technical data

Table 6-28 Technical data of ASM 470

Serial interface to the SLG	
Connection	Via screw-type terminals The front plug connector is not included. (See catalog ST 70: 6ES7 392-1AJ00-0AA0)
Line length (typ. max.)	1000 m/RS 422, depends on SLG
SLGs which can be connected	All SLGs from MOBY-E/F/I/V/L
Interface for 24 V DC	Via ASM 470
Software functions	
Programming	With STEP7 function FC 47 or FB 47 for STEP5 (contained in MOBY software)
FC 47 can be used with	S7-300 and S7-400
FB 47 can be used with	S5-115U/135U/155U
Commands	Read data from MDS, write data on MDS, and initialize MDS
Dialog	Yes
Supply voltage	
Nominal value	24 V DC
Permissible range	20 to 30 V DC
Galvanic isolation between S7-300 and MOBY	Restricted (100 kOhm between S7-300 and 24 V DC)
Current consumption At U = 24 V DC (max.) From SIMATIC S7 bus (max.)	 50 mA 100 mA
Current consumption of the SLGs	Max. of 600 mA for one SLG Max. of 300 mA per SLG with two SLGs connected
Power loss (typ.)	1 W
Ambient temperature	
During operation	
Horizontal SIMATIC layout	0° to +60° C
Vertical SIMATIC layout	0° to +40° C
During transportation and storage	-40° to +70° C
Dimensions (WxHxD) in mm	40 x 125 x 120
Weight (approx.)	0.2 kg

Wiring

The ASM 470 is commissioned with the following steps.

- Mount module
- Mount module on the S7-300 mounting rail. See S7-300 manual.

Note

The CPU of the S7-300 must be switched to STOP status before the module is mounted.

Warning

The S7-300 may only be wired when the voltage is off.

Front panel

The following figure shows the front plate of the ASM 470 and the inside of the front door with the related connection diagram. The SLGs must be connected to the ASM 470 as shown in the connection diagram.

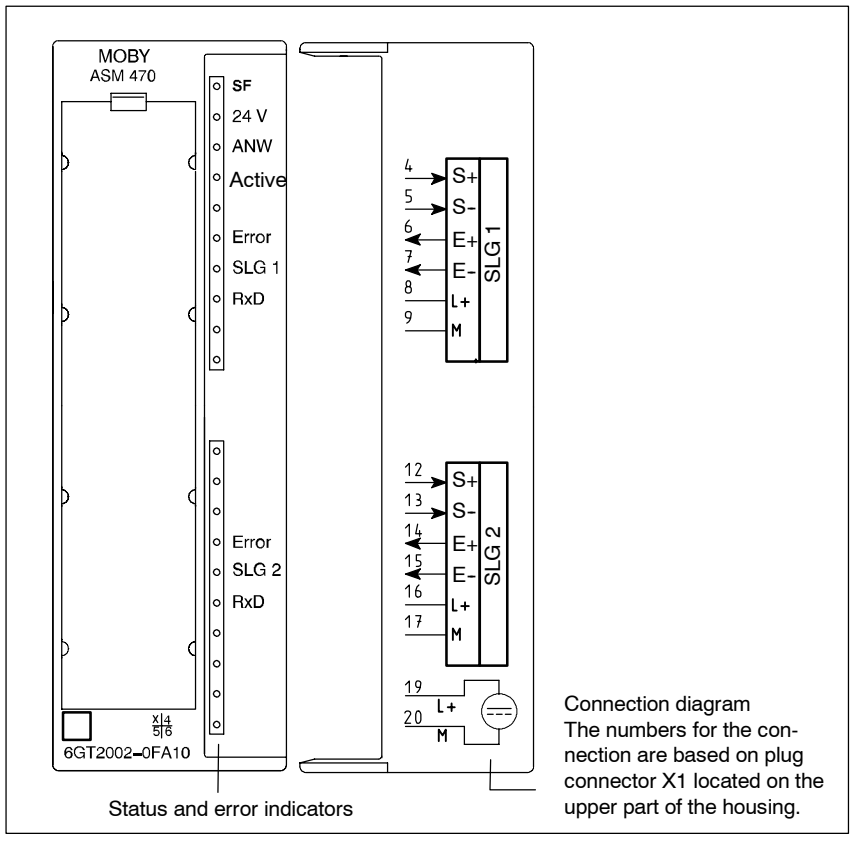


Figure 6-41 Front plate and inside of the front door of the ASM 470

Wiring to the SLG

The figure below shows a connection cable between ASM 470 and SLG. The colors apply to the standard MOBY cable for the ASM 470. See chapter 3.10.3.

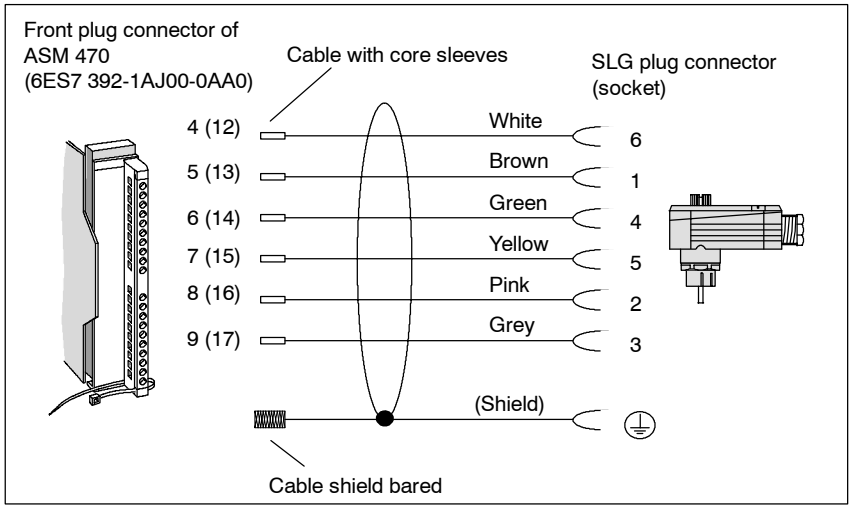


Figure 6-42 Wiring of ASM 470 to SLG

Shield connection

See chapter 3.9

Lightning protection

Implement the lightning protection and grounding measures required for your application. Lightning protection measures always require individual consideration of the entire system.

Cabling from ASM to SLG

See chapter 3.9.

Configuration of ASM 470 for S7-300 under STEP7

Note

Installation of MOBY requires functional STEP7 software on the PC/PG.

Installation and configuration of the ASM 470 in the SIMATIC is handled by an installation program. The installation program is included with the "MOBY software" product (6GT2080-2AA10).

Installation

Installation is almost completely automatic. The specified steps during SETUP must be responded to.

FC 47 function

During installation, the MOBY project “P7_MO01X” is set up in the directory “S7PROJ”. Using the SIMATIC Manager, the sample MOBY program can be processed or the FC 47 function can be copied to another project.

The ASM 470 module is located in the hardware catalog under the following subdirectory for hardware configuration of the SIMATIC S7.

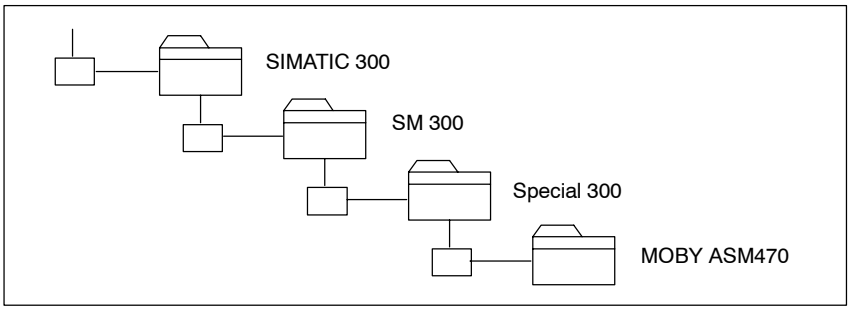


Figure 6-43 ASM 470 directory in the hardware catalog

6.9 SIM Serial Interface Module

Application area

SIM (i.e., Serial Interface Module) is a general-purpose module for operation of MOBY-I via a serial interface on any of the components below.

- Computers
- PCs
- PLC of other manufacturers

Its sturdy housing permits it to be used in rugged environments and makes it resistant to many chemical substances.

Layout and functions

SIM combines an ASM interface and an SLG read/write device in one housing.

It is available with one of three interfaces (i.e., RS 422, TTY or V.24).

All SIM models can be operated with various procedures (i.e., 3964R, Lauf, SINEC L1 and the SINUMERIK protocol).

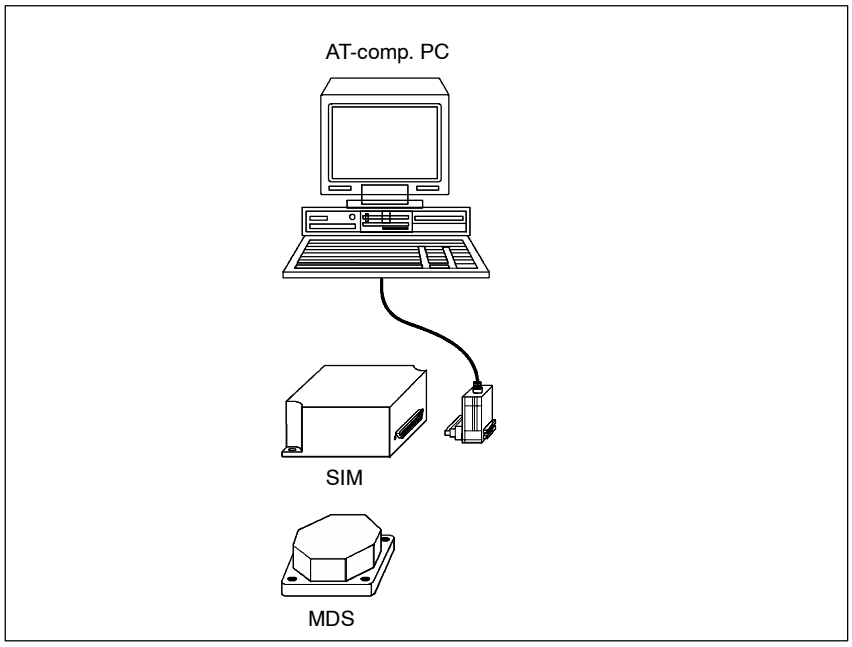


Figure 6-44 Configurator for SIM

SIM hardware

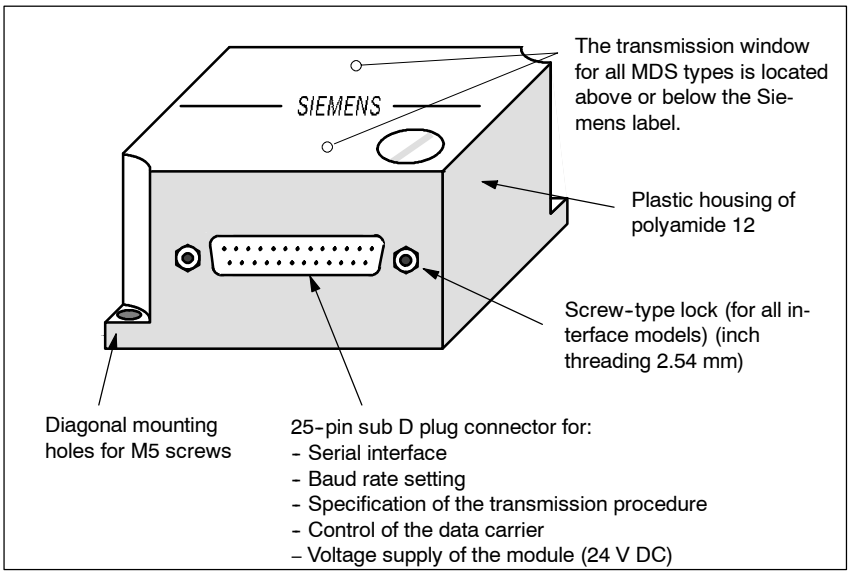


Figure 6-45 SIM serial interface module

Ordering data

Table 6-29 Ordering data for SIM

Serial interface module SIM consisting of ASM interface and read/write device	
SIM 41 with V.24 (RS 232) interface	6GT2 005-0AA10
SIM 42 with RS 422 (RS 485, V.11) interface	6GT2 005-0BA10
SIM 43 with TTY (20 mA linear current) interface	6GT2 005-0CA10
MOBY software with 3964R drivers and tools for DOS and Windows 95/NT 3.5” floppy disk (DOS format)	6GT2 080-2AA10
25-pin submin. D plug connector (not included)	6AW5 418-4F
Stub lines and accessories	See chapter 3.10
Description-SIM	
German	6GT2 097-3AD00-0DA1
English	6GT2 097-3AD00-0DA2
Description-T3964R (DOS), stapled	
German	6AW5 450-4BX00-0K
English	6AW5 450-4BX00-1K

Technical data

Table 6-30 Technical data of SIM serial interface module

Serial interface	25-pin subminiature plug connector
Transmission speed	2400 to 9600 baud
Procedure	3964R, SINEC L1, Lauf and SINUMERIK protocol
Line length (typ. max)	1000 m (shielded) TTY
	1000 m (shielded) RS 422
	30 m (shielded) V.24
Software functions	
Commands	Read MDS, write, initialize, scan DI/DO, Next
Programming	Depends on computer, PC or PLC of other manufacturer. 3964R driver with interface to MS-C available for PC. 3964R driver also available for Windows 95 and Windows NT.
Digital inputs	Via 25-pin sub D plug connector
Number	2
Galvanic isolation	No
Input voltage	
For logical "0"	-2 to +5 V
For logical "1"	+12 to +33 V (R_i = 10 kΩ)
Delay time	< 10 msec
Digital outputs	Via 25-pin sub D plug connector
Number	2
Galvanic isolation	No
	(internal voltage supply) short-circuit proof
	I_{max} = 200 mA (per DO; or for 2 DO)
Inductive interface to MDS	
(integrated SLG)	
Read/write distance between SLG - MDS	Max. of 40 mm, see field data
Transmission frequency	
• Power	134 kHz
• Data	1.81 MHz
Supply voltage	Via 25-pin sub D plug connector
Nominal value	24 V DC
Permissible range	20 to 30 V DC
Current consumption (max.)	220 mA (DO not loaded)
Permissible shock stress	30 g
Protection rating in acc. w. IEC 529	IP54 (with special plug connector)
Ambient temperature	
During operation	0° to +60° C
During transportation and storage	-20° to +70° C
Dimensions (WxHxD) in mm	75 x 75 x 40
Weight (approx.)	0.3 kg

Field data of SIM

All technical data listed here are typical data and apply to a room temperature of 25° C, a supply voltage of 24 V and a metal-free environment.

Tolerances of ± 20% are permitted for special production conditions or temperatures.

Table 6-31 Field data of SIM

MDS 114/514		MDS 213 E/ MDS 413 E		MDS 506		MDS 438 E MDS 439 E	
Length of transmission window in mm (L)							
L	2L	L	2L	L	2L	L	2L
60	80	55	70	85	100	75	100
Width of transmission window in mm (W)							
20		20		30		30	
Operating distance in mm (S_a)							
0 to 20		0 to 20		0 to 25		0 to 25	
Limit distance in mm (S_g)							
33		30		40		33	
Distance from MDS to MDS in mm (D1)							
>200		>200		>300		>300	

Minimum distance from SIM to SIM

D ≥ 700 mm

Caution

Adherence to the value specified here is essential. If this value is underranged, there is a danger that the inductive fields will be affected. The time for the data transmission would be increased by an incalculable amount of time or a command would be terminate with errors.

Metal-free space

SIM can be mounted on metal without adversely affecting its range.

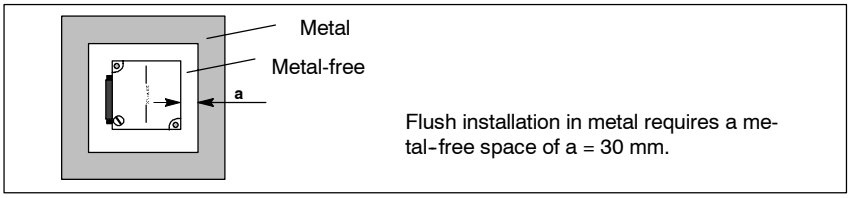


Figure 6-46 Flush installation of SIM in metal

Transmission window

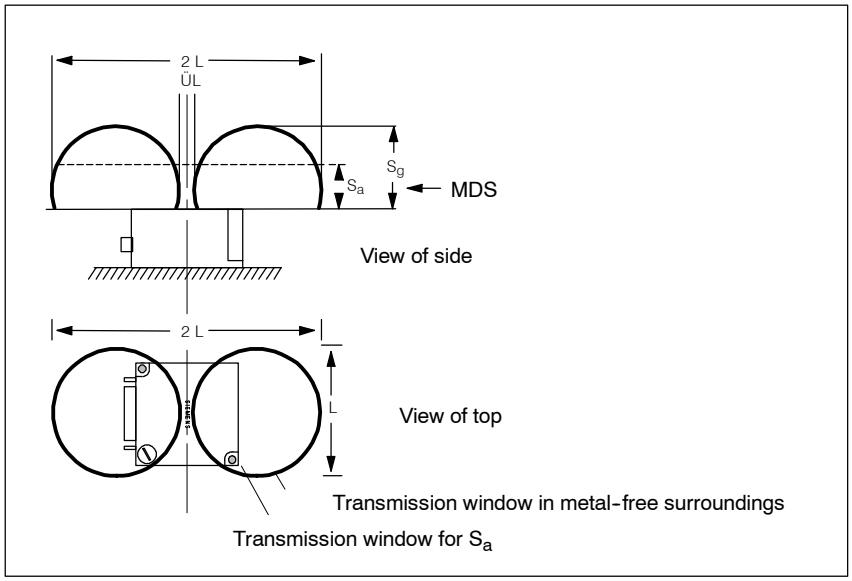


Figure 6-47 Transmission window of SIM

Dimensions (in mm)

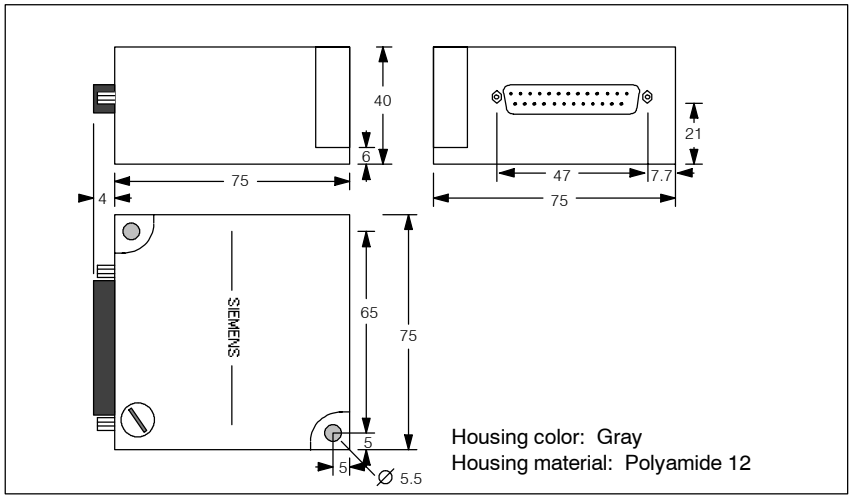


Figure 6-48 Dimensions of SIM serial interface module

Plug connector assignment

The 25-pin subminiature D plug connector is used for the following purposes.

- Voltage supply of SIM
- Connection to PC/computer
- Parameterization of SIM

Table 6-32 Overview of plug connector assignment for SIM

Pin	Meaning		
	Pins 1 to 8 Connection of SIM to a computer or PC		
	Interface (depends on type)		
	SIM 41 → V.24 (RS 232)	SIM 42 → RS 422 (V.11)	SIM 43 → TTY (only passive)
1	-	R * (terminal resistance)	+ EM (receiving)
2	TxD (Transmit Data)	E + (receiving)	- EM (receiving)
3	RxD (Receive Data)	D + (sending)	+ SE (sending)
4	-	R - (terminal resistance)	- SE (sending)
5	-	D - (sending)	- [1]
6	Not used	Not used	Not used
7	GND (signal ground)	E - (receiving)	-
8	Plug housing shield	Plug housing shield	Plug housing shield
9 10 11 12	DI0 DI1 DO0 DO1 } Two digital inputs and outputs each (e.g., for data carrier control)		
13 14	+ 24 V 0 V (ground) } Voltage supply of SIM (20 V to 30 V)		
15	Not used		
16	Not used		
17 18 19 20 21 22 23 24 25	S ground: S0 S1 S2 S3 S4 S5 S6 S7 } 0 V for plug connector pins 18 to 25 For setting: – Baud rate - SINEC L1 address - Transmission procedure - Type of MDS control		

1 SIM 43 with TTY: Pin 5 of the connection plug may not be wired.

Parameterization of pins 17 to 25

Plug pin*)		Meaning
24	25	
1	1	No data memory control. Presence check is switched off. The DI/DO can be programmed as desired with the system command.
1	0	Presence check by firmware of SIM DIs can be used as desired. They can be scanned with the DI/DO command.
0	1	Presence check via DI0 and DI1, whereby DI0 = 1 → MDS entering DI1 = 1 → MDS leaving
0	0	Presence check via DI1, whereby DI1 = 1 → MDS leaving DI0 is free and can be scanned with the status command.

Plug pin*)						Meaning
18	19	20	21	22	23	
a	a	a	a	0	0	**SINEC L1** aaaa = Address of SIM on the SiNEC L1 bus (SIM is always the slave.) Address allocation: Pin *) 21 20 19 18 → SINEC-Address 1 1 1 1 → 1 1 1 1 0 → 2 : : : : → : 0 0 0 0 → 16
b	b	0	0	1	0	**Lauf procedur**
1	0	0	1	1	0	**STG connection**
b	b	0	1	1	1	**3694R: SIM = Slave**
b	b	0	0	1	1	**3694R: SIM = Master**
b	b	a	a	0	1	SINUMERIK 850/880-protocol (without reaction telegram) Pin *) 20 21 → SIM-Address (=a a) 1 1 → 0 (always present) 1 0 → 1 0 1 → 2 0 0 → 3 **Caution:** When SINUMERIK is used, a kind of presence check must be switched on with switches 7 and 8.
						Baud rate (= bb) (Applies to Lauf, 3964R and SINUMERIK procedures)
1	1	x	x	x	x	9600 Baud
1	0	x	x	x	x	4800 Baud
0	1	x	x	x	x	2400 Baud
0	0	x	x	x	x	(Reserved)

*) no jumper → log. “1”
Jumper to pin 17 → log. “0”

7 Accessories

7.1 MOBY Software

The “MOBY Software” product currently consists of three 3.5” floppy disks. Included on these floppy disks are all function blocks and drivers for the MOBY identification system. The “Les_mich” (i.e., read_me) file on floppy disk 1 gives a brief explanation of the programs listed below.

- FB 230: Function block for ASM 401; file handler for SIMATIC S5
- FB 240: Function block for ASM 440 and ASM 450; MOBY on PROFIBUS-DP with SIMATIC S5 (including master device file for PROFIBUS-DP)
- FB 250: Function block for ASM 400
- FB 41 contains a function block for the ASM 410. The call interface of this function block is almost identical to that of FB 250.
  See the description of FB 250 for programming the ASM 440.
- FC 44 permits the ASM 440 or the ASM 450 to be used in a SIMATIC S7 environment. Be sure to read the “Read_me” file in the FC 44 directory carefully.
  See the documentation of FB 240 for programming the ASM 440.
  The description of FC 44 for ASM 450 is available for operation of ASM 450.
- FC 46 for ASM 451: The block can be used on the S7-300 and S7-400.
- FB 246 for ASM 451: The block can be used on the S5-115U with IM 308-C.
- Function FC 47 for ASM 470: This function is located on floppy disks 2 and 3.
  Version V2.4
  Floppy disk 2 contains the MOBY SETUP for STEP7 V4.x.
  Floppy disk 3 contains the MOBY SETUP for STEP7 > V3.x.
- FB 47 contains a function block for the SIMATIC S5-115U to 155U. It permits the ASM 470 to be used in a SIMATIC S5 environment with an ET 200M.
- Loading program for ES 030 and a master device file for connection of the ES 030 to PROFIBUS-DP
- Test and demonstrator programs for presenting the functions (e.g., “read from MDS”, “write to MDS” and so on) on a PC (e.g., with DOS or Windows). MOBY modules ASM 420, ASM 421 or SIM 41 are connected by a serial interface cable to the PC (i.e., COM1 or COM2).
- Brief explanations of the individual directories in German or English. Cf. “les_mich.txt” or “read_me.txt”.
- 3964R driver for DOS, Windows 95 and Windows NT

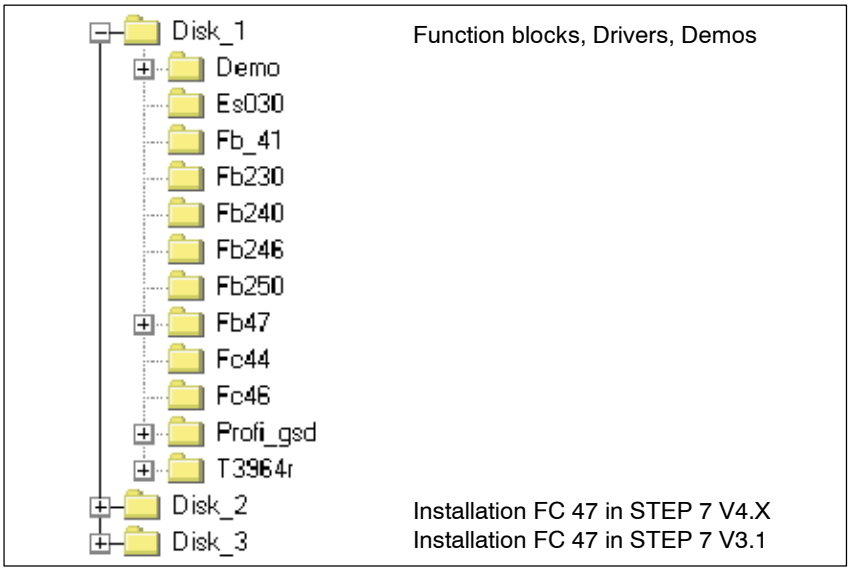


Figure 7-1 Program directories of “MOBY software” (version V 2.4)

Software products/ function blocks/ drivers

The applicable software must always be purchased once for every SIMATIC controller or for every PC on which the MOBY software is run.

Although the price of the function block is included when an interface is purchased, the function block must be ordered with a separate item in the “BZ.” For the environment’s sake, only as many function blocks should be ordered as programmable controllers used in the system.

When ordering with a separate “BZ,” the function blocks are only free of charge when the number of the original “BZ” is specified.

When a function block is required but no device is ordered, the price indicated in the price list will be charged.

The agreement pertaining to the use of one-time-purchase software products applies.

Ordering data

Table 7-1 Ordering data for MOBY software

	Order No.
MOBY software	6GT2 080-2AA10

7.2 Module Rack BGT 4/BGT 8

The BGT 4/BGT 8 module racks consist of an attractive housing in which the module rack, power pack and backplane bus are installed.

The following MOBY-I interfaces can be used in a module rack.

ASM 420, ASM 421, ASM 440 and ASM 441

Features

- Attractive, partially painted housing including module rack and power pack
- Available in 2 models (i.e., for 4 modules and for 8 modules)
- Integrated voltage supply (230 V AC, 24 V DC; 10 A)
- Integrated fan
- Internal bus wiring for 4 interfaces
- Plug connector PCB with 4 or 2 x 4 serial interfaces
- Maximum of 8 ASMs can be connected.
- Several physically different interfaces can be used.
- Multiplex operation with TTY, RS 485 and PROFIBUS-DP interfaces can be parameterized via plug-in PCB.

Ordering data

Table 7-2 Ordering data for BGT 4/BGT 8

	Order No.
BGT 4/BGT 8 module rack with power pack (without dummy covers)	
• For 4 ASMs (420/421/440/441/520)	6GT2 090-0KA00
• For 8 ASMs (420/421/440/441/520)	6GT2 090-0LA00
Description of the 4/8-module rack	
German	6GT2 097-3AK00-1EA1
English	6GT2 097-3AK00-1EA2
Accessories	
Dummy cover for module rack	6GT2 090-0LA10

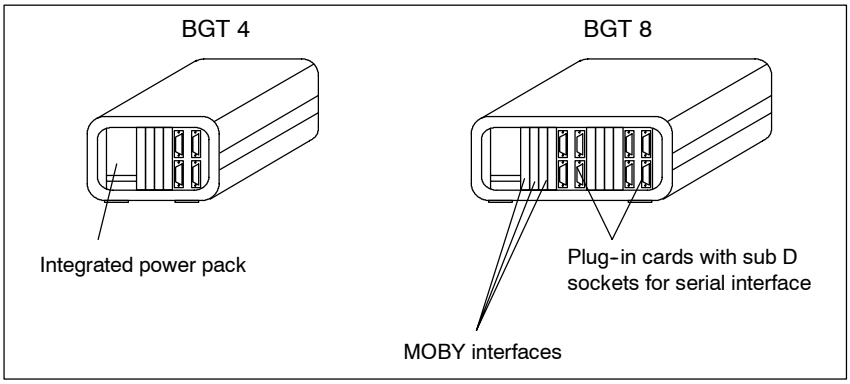


Figure 7-2 BGT 4/8 module rack

Technical data

Table 7-3 Technical data of BGT 4/BGT 8

Supply voltage	
Via internal power pack	
• Primary	230 V AC, 50 to 60 Hz Power pack can be switched to 110 V AC if necessary.
• Secondary	24 V DC, 10 A
Length of the power supply cable (approx.)	2.8 m, with grounding-type plug connector in acc. w. DIN 49441
Power pack classification	
• Overvoltage resistance	VDE 0160/2
• Safety of data processing equipment including electric office machines	VDE 0805, EN 60950
• Interference suppression of HF devices	VDE 0871/B, EN 55022/B
Plug connector PCB	
Connections	4 sub D sockets
Dimensions (WxHxD) in mm	
• BGT for 4 interfaces	257 x 147 x 315
• BGT for 8 interfaces	364 x 147 x 315
Material	Steel plate
Protection rating in acc. w. IEC 529	IP20
Ambient temperature	
During operation	0° to +55° C
During transportation and storage	-40° to +70° C

7.3 Plastic Housing for ASM

The following MOBY-I interfaces can be used in the plastic housing.

ASM 420/421/440/441

This housing is designed for desk and wall mounting. The voltage supply for the electronics is provided by a 230 V plug-in power pack. The power pack supplies one ASM and the connected SLG. Connections to the user and to the SLG are subminiature D plug connections.

Ordering data

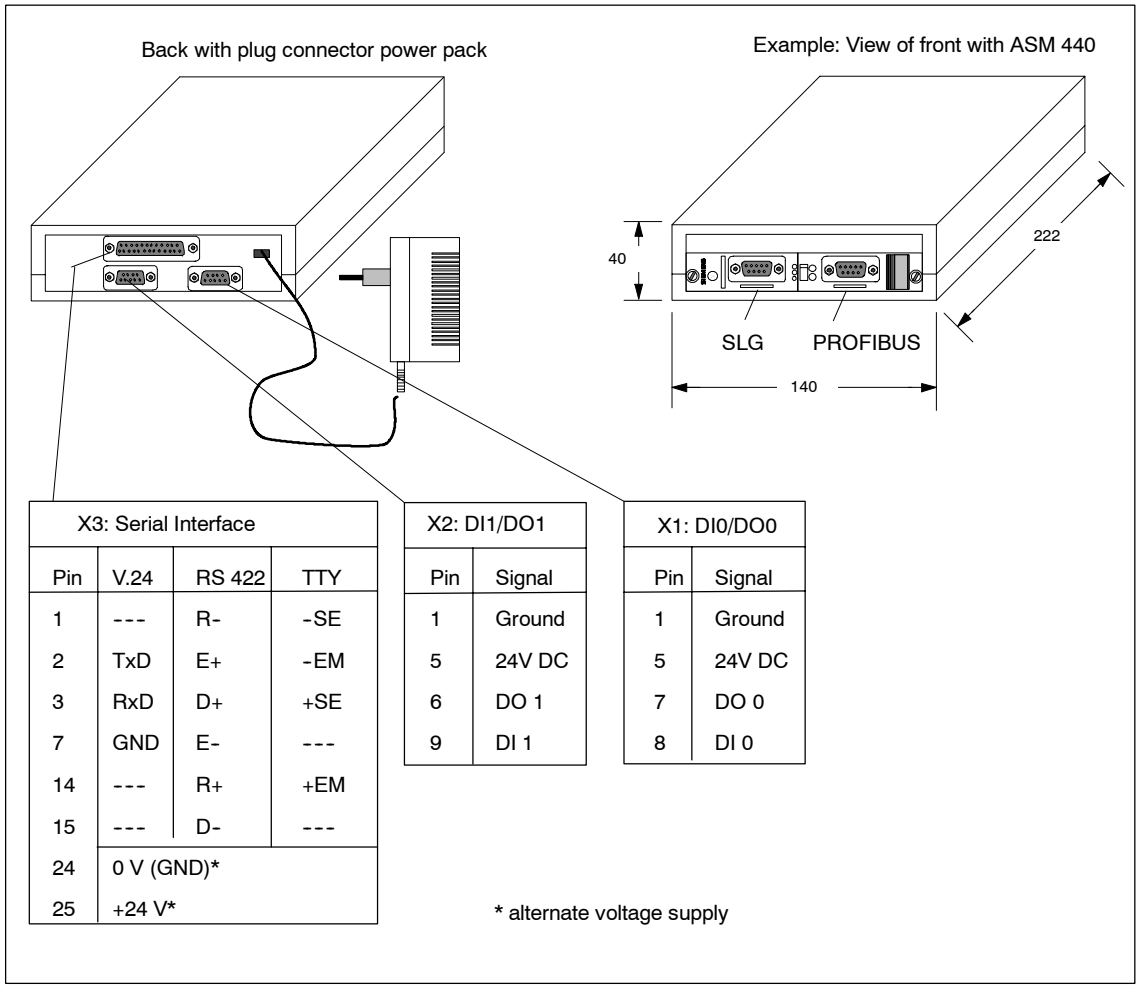
Table 7-4 Ordering data for plastic housing for ASM

Desktop housing for ASM 420/421/440/441 (incl. power pack)	6GT2 090-0MA00
Desktop housing (without power pack)	6GT2 090-0MA10
Stub line for PC (RS 232; 5 m)	6GT2 091-1BH50

Technical data

Table 7-5 Technical data of plastic housing for ASM

Voltage supply	
Via internal power pack	
• Primary	230 to 240 V AC, 50 Hz
• Secondary	24 V DC, 1.2 A
Length of the connection cable	2 m
Connections	
SLG	9-pin sub D (from ASM)
PC (ASM 420/421 only)	25-pin sub D
PROFIBUS (ASM 440/441 only)	9-pin sub D (from ASM)
DI/DO	2 9-pin sub D
Dimensions (WxHxD) in mm	140 x 40 x 222
Material	ABS
Protection rating in acc. w. IEC 529	IP20
Ambient temperature	
During operation	0° to +55° C
During transportation and storage	-40° to +70° C



X3: Serial Interface			
Pin	V.24	RS 422	TTY
1	---	R-	-SE
2	TxD	E+	-EM
3	RxD	D+	+SE
7	GND	E-	---
14	---	R+	+EM
15	---	D-	---
24	0 V (GND)*		
25	+24 V*		

X2: DI1/DO1	
Pin	Signal
1	Ground
5	24V DC
6	DO 1
9	DI 1

X1: DI0/DO0	
Pin	Signal
1	Ground
5	24V DC
7	DO 0
8	DI 0

* alternate voltage supply

Figure 7-3 Plug connector assignment and dimensions

7.4 MOBY-I Hand-Held Terminal SLG (Advance Announcement)

Application area/ function

The MOBY hand-held terminal SLG is an indispensable aid in commissioning, maintenance of, and testing all MOBY-I field components.

Figure 7-4 MOBY-I hand-held terminal SLG

It consists of a basic device and a MOBY-I reader head. The basic device is a PSION Workabout^{mx}. This device is the internationally recognized standard for hand-held terminals. In addition, a memory card with the MOBY service and test program including an operator's guide is included. The memory card is inserted in the basic device. The service and test program starts automatically when the hand-held terminal is turned on. All data memories of MOBY-I can be processed with the hand-held terminal. The following functions can be executed.

- Read data from the MDS
- Write data to the MDS
- Clear the entire data memory (i.e., write with a filler value)
- Read and indicate the ID number of the MDS
- Present and edit the data in hexadecimal and ASCII
- Save the read data in a file
- Enable and disable password protection for all write functions
- Switch menu language between English and German
- Switch between normal addressing and file handler addressing

A C library with the read head functions is available to the user for applications. Users can develop their own programs with the optional C developer user interface for the PSION Workabout.

Hardware

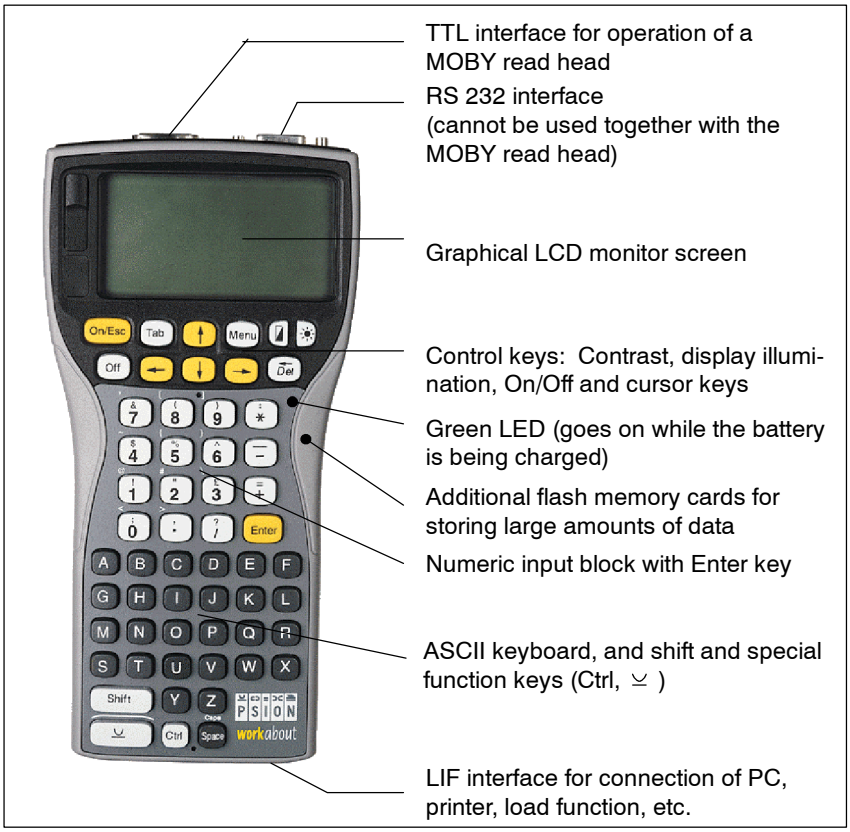


Figure 7-5 Hardware of the MOBY-I hand-held terminal STG

Ordering data

Table 7-6 Ordering data of the hand-held terminal STG I

	Order No.
Mobile hand-held terminal STG I Basic device (PSION Workabout^{mx}) with MOBY-I read/write head, battery, standard software incl. STG functionality on EEPROM card, operator's guide, without charging station	6GT2 003-0CA00
Charging station for a mobile hand-held terminal incl. plug-in power pack (230 V AC)	6GT2 303-1DA00
Accessories:	
MOBY-I read/write head, without software and without description	6GT2 003-1CA00
Memory card with STG software for MOBY-E, MOBY-F and MOBY-I, incl. operator's guide	6GT2 303-1CA00
C library for MOBY-E, MOBY-F and MOBY-I, for development of customer-specific screen dialogs, without development tools, incl. description	6GT2 381-1AB00
Extra battery	Available from retailers 2 AA batteries (NiCd, Ni-MH, alkali)

Technical data

Table 7-7 Technical data of the hand-held terminal STG I

Hardware		
Processor	NEC V30mx 27.68 MHz (80C86-compatible)	
RAM	2 Mbytes of which approx. 1.8 Mbytes can be used as desired	
ROM	2 Mbytes for operating system	
User program	256 Kbytes (with MOBY service and test program)	
Monitor screen	Graphic LCD monitor screen with 240 x 100 pixels, gray scales, back-lighting can be switched through	
Keyboard	Alphanumeric with 57 keys	
Sound	Piezo buzzer	
Power supply	NiCd battery pack with 2 type-AA cells (850 mAh), high-speed charging capability, automatic switch-off	
Operational life	20 hours (read head inactive, display not illuminated) 4.5 hours (read head active, display not illuminated) 10 hours (read head inactive, display illuminated)	
Interfaces	LIF interface (low insertion force interface) for battery charging and communication with PC and printer (3link cable not included)	
	RS 232 and TTL interface for connection of a MOBY read head	
Security	Locking mechanism for battery and program memory	
Software		
Operating system	EPOC/16 multi-tasking, graphics support, GUI interface, Interpreter similar to MS-DOS	
File management	MS-DOS-compatible	
Integrated software	MOBY service and test program, spreadsheet calculation, data base, pocket calculator, communication	
Technical data	**Complete device (incl. batteries)**	**Read head**
Dimensions	260 x 90 x 35 [mm]	90 x 64 x 35 [mm]
Weight	Approx. 440 g	Approx. 110 g
Temperature	Operation: -20° C to +60° C Storage: -25° C to +80° C (without battery)	
Relative humidity	0% to 90% without condensation	
Protection rating	IP54 (protected against splashed water)	
Shock resistance	Max. falling height onto concrete: 1 m	
EMC	EN 55022	
Electrostatic, RF, EFT	IEC 801-2; IEC 801-3; IEC 801-4	
RF read/write head		
MOBY-I	134 kHz energy/1.81 MHz data Max. read distance: XXX mm	

7.5 Service and Test Device STG 4F

Note

Remember that the STG 4F has been discontinued and is only available as a spare part. For its successor device, see chapter 7.4.

Application area/ functions

The STG 4F is an essential aid when commissioning, maintaining and testing all MOBY-I components. It is not dependent on the power network and offers many different functions.

- Inductive reading and writing of all MOBY-I mobile data memories
- On-line operation with S5 interfaces (ASM 400/401/410) via a serial interface permits all MOBY hardware to be tested without using S5 programs.
- Choice of menu languages (i.e., German, English, French and Italian)
- Eight function keys for selecting functions directly
- Detection of interference fields
- Input/output of MDS data in various formats (i.e., ASCII, hexadecimal, decimal and binary)
- File handler functions
- Password protection prevents unauthorized write-access to data memories.

Figure 7-6 Service and test device STG 4F

Hardware

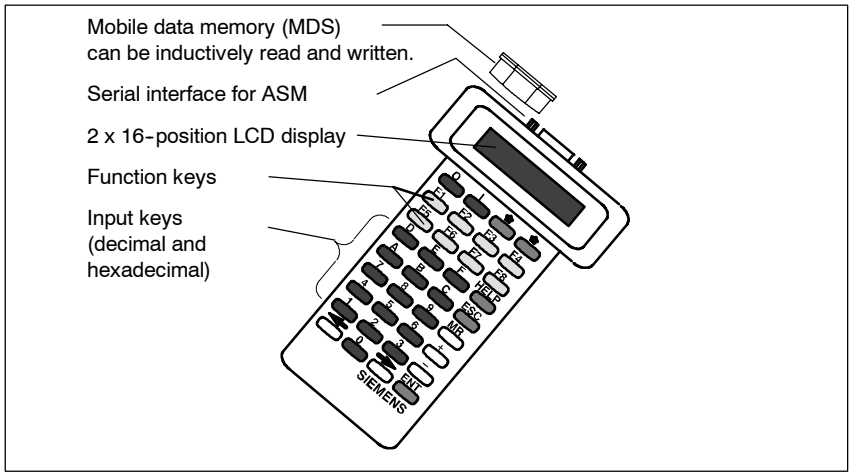


Figure 7-7 Hardware layout of the STG 4F

Ordering data

Table 7-8 Ordering data for STG 4F

Service and test device STG 4F (without documentation, charging device and stub line)	6GT2 003-0BA00
Charging device for STG 4F (220 V AC)	6GT2 003-1AA0
Operating instructions, STG 4F	
German	6GT2 097-5AD01-0DA1
English	6GT2 097-5AD01-0DA2
Stub lines and accessories	See chapter 3.10

Technical data

Table 7-9 Technical data of STG 4F

Microprocessor	80C537
Memory	128-Kbyte EPROM, 32-Kbyte RAM
Indicators	
Type	LCD
Lines/characters per line	2 x 16 (alphanumeric)
Control elements	32 input keys
	2 keys for on/off
	2 keys for contrast adjustment
Interfaces	1 RS 422, 4800 or 19200 baud
	1 inductive MOBY interface (integrated in device)
	1 External power supply/auxiliary charge, 5 to 30 V/220 mA

Table 7-9 Technical data of STG 4F

Power supply via	
4 built-in NC batteries	500 mAh
Charging time	
With STG charger	14 h
With ASM, continuous charging possible	24 h when STG charger off
Duration during battery operation	
Inductive interface off, min.	8 h
Inductive interface on	2 h
Protection rating	IP51
Ambient temperature	
Operation	0° to +50° C
Transportation and storage	0° to +50° C
Dimensions (LxWxH) in mm	210 x 70 x 30
Weight (approx.)	0.5 kg

Function key assignment for normal mode

All functions of the device can be called by pressing the HELP key several times. The following display appears when the HELP key is pressed for the first time.

Select OP-Mode
Keys F1...F8, 0...F

You can now select the desired function directly with the F1 to F8 keys or with HELP 0 to F. If you do not know the desired key, press the HELP key several times to display all functions in succession.

Table 7-10 Commands in normal mode

Display	Meaning
Byte-Mode **F1=Read F2=Write**	F1 = Read any data byte from the MDS F2 = Write any data byte to the MDS
Block-Mode **F3=Read F4=Write**	**F3 = Read a 1 to 240-byte data block from the MDS. The data can be indicated at the appropriate location in the STG memory.** **F4 = Write a 1 to 240-byte data block to the MDS. The write data must be located in the STG memory before the write-access.**
INIT-Mode **F5=Type**	F5 = Initialize an MDS. The MDS is completely cleared and is then ready for operation. F6 = In reserve
MDS complete **F7=Read F8=Write**	F7 = Read entire MDS or read a 16-Kbyte segment. The data are then located in the STG memory. F8 = Write the entire MDS or write a 16-Kbyte segment. The write data must be located in the memory of the STG beforehand.
STG PARAM **0=Type 1=Mode**	0 = Setting the MDS type All MDS types supported can be indicated with + / - . The desired MDS type must be acknowledged with ENT . 1 = Setting the STG mode Enable/disable ECC mode and switch to file handler mode (with + / - key)
STG PARAM **7=MDS507**	7 = MDS 507 operation on/off
STG PARAM **9=Hex/Dec**	9 = Switch representation of address and data: Hexadecimal, decimal, ASCII and binary. (When ASCII and binary are used, only the data in this format are represented. The address is represented in hexadecimal.)
STG TEST **A=Field B=HWTEST**	A = Field indicator (detecting interference fields) B = Turn on hardware test of STG. This test deletes all default settings of the STG.
Language Mode **D=Ger E=GB F=Fra**	D = Language selection: German E = Language selection: English F = Language selection: French
Language Mode **C=Ita**	C = Language selection: Italian

Function key assignment for file handler mode

All functions of the device can be called by pressing the HELP key several times. The following display appears when the HELP key is pressed for the first time.

```
Select OP-Mode
Keys F1...F8, 0...F
```

You can now select the desired function directly with the F1 to F8 keys or with HELP 0 to HELP F. If you do not know the desired key, press the HELP key several times to display all functions in succession.

Table 7-11 Commands in file handler mode

Display	Meaning
MDS FILE **F1=Read F2=Write**	F1 = Read a data file from the MDS F2 = Write a data file. File data can be appended or the complete file can be overwritten.
MDS FILE **F3=Crea. F4=Del.**	F3 = Create a new file on the MDS F4 = Delete a file from the MDS
MDS **F5=Format F6=Dir**	F5 = Format an MDS. The file structure is set up again. All data are deleted. F6 = Read and indicate directory of MDS
MDS **F7=Stat. F8=Attr**	F7 = MDS status. Various MDS parameters are read and indicated. F8 = Set/delete attribute. Single files can be write or delete-protected.
STG PARAM **0=Type 1=Mode**	0 = Setting the MDS type All MDS types supported can be indicated with + / -. The desired MDS type must be acknowledged with ENT. 1 = Setting the STG mode Enable/disable ECC mode and switch to normal mode (with + / - key)
STG PARAM **2=RES.PAR. 3=SLG**	2 = Indicate and change parameters set on the ASM (only in on-line operation) 3 = Set SLG number
STG PARAM **7=MDS507**	MDS 507 operation on/off

Table 7-11 Commands in file handler mode

Display			Meaning
STG-PARAM 9=HEX/DEC	9	=	Switch representation of address and data: Hexadecimal, decimal, ASCII and binary. (When ASCII and binary are used, only the data in this format are represented. The address is represented in hexadecimal.)
General commands 4=Next 5=Direct.	4	=	Next-MDS: The Next command is used to control the MDS. It is only available when the STG is operated on-line on the ASM.
	5	=	Indicate current directory The last directory read from the MDS is indicated on the display. The directory is retained on the STG even when the device is turned off.
General commands 8=Cover	8	=	Protect the file structure of the MDS from unauthorized access or open
MDS TEST 6=File structure	6	=	Test the file structure on the MDS. Conclusion of the command with okay means that the file handler can work with this MDS.
STG TEST A=Field B=HWTEST	A	=	Field indicator (detection of interference fields)
	B	=	Hardware test of STG. Starting with V3.0, this test can only be performed in FH:AUS mode.
Language Mode D=GER E=GB F=FRA	D	=	Language selection: German
	E	=	Language selection: English
	F	=	Language selection: French
Language Mode C=ITA	C	=	Language selection: Italian

7.6 Acquisition Station ES 030-K

Application area

Acquisition station ES 030-K is a microprocessor-controlled terminal for general-purpose use in all sectors of industry. It offers several interfaces. This station is particularly suitable for use with the MOBY-I, MOBY-L and MOBY-M identification systems and with barcodes to lessen the load of higher-level host systems. Its modular design permits configuration of functions and design to meet the requirements of individual applications.

Features/layout

- Can be programmed as desired with PG and PC in programming language STEP5
- Dialog or process-oriented with keys which can be assigned as desired
- Sturdy construction (IP54) for industrial environments (e.g., for control even when operator is wearing protective gloves)
- Flexible hardware layout
- Serial interfaces (i.e., TTY, RS 485, (RS 422), and V.24) for connection to higher-level computers, PLCs or printer with Lauf, 3964R, SINEC L1 and PROFIBUS-DP procedures
- Additional interfaces for MOBY-I, MOBY-L and MOBY-M identification systems, barcode wands, scanners and swipe readers
- Integrated function blocks for frequently used functions
- With master/slave function for SINEC L1

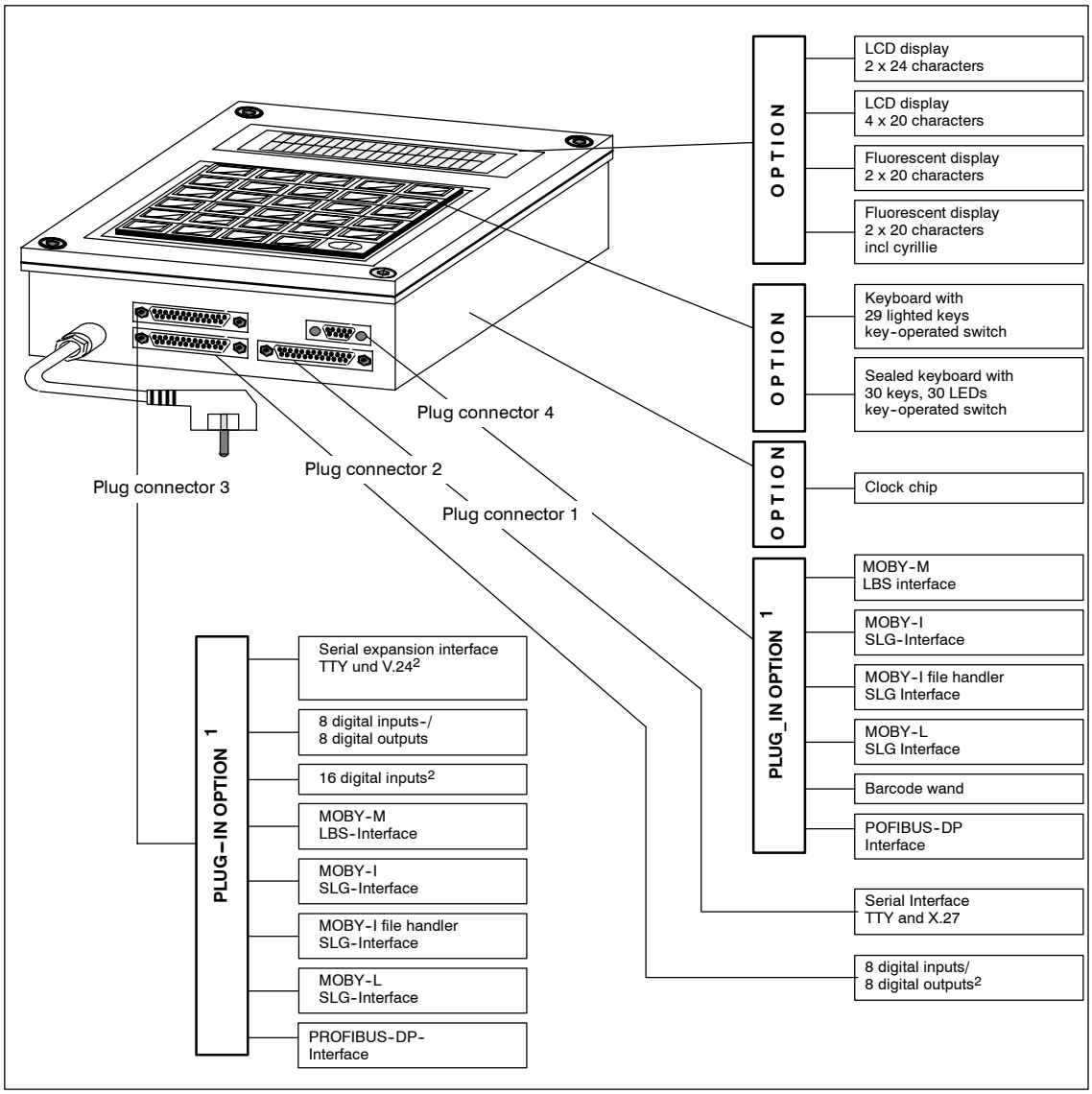


Figure 7-8 Configurator of ES 030-K

1 Each plug-in option is a hardware module requiring one slot on the ES 030-K.
2 The options “serial expansion interface” and “16 digital inputs” can also be led out on plug connector 2 as a special version.

Ordering data

Table 7-12 Ordering data for ES 030-K

Acquisition station ES 030-K with serial interface (TTY and X.27) on plug connector 1 8 DI + 8 DO on plug connector 2	6AW5 451- ■ ■ ■ ■ 3
Display	
Without display	0
LCD, 2 x 24 characters	1
LDC, 4 x 20 characters	2
Fluorescent indication, 2 x 20 characters	3
Fluorescent indication, 2 x 20 characters (incl. cyrillic char. set)	5
Plug connector 3	
Not used	A
MOBY-I, MOBY-E interface	C
8 DI + 8 DO	D
16 DI	E
MOBY-I file handler	F
MOBY-L interface	L
MOBY-M interface	M
PROFIBUS-DP interface[1]	P
Serial interface (TTY, V.24)	S
Plug connector 4	
Not used	A
Barcode (incl. wand)	B
MOBY-I, MOBY-E interface	C
MOBY-I file handler	F
MOBY-L interface	L
MOBY-M interface	M
Barcode (without wand)	N
PROFIBUS-DP interface[1]	P
Keyboard	
No Keyboard	0
Sealed Keyboard, 30 keys. 30 LEDs	2
Keyboard with 29 illuminated buttons	3
Charging kit for ES 030	6AW5 451-8AU

1 Alternate: Plug 4 recommended

Technical data

Table 7-13 Technical data of ES 030-K

Microprocessor Clock pulse frequency Storage capacity (basic model) EEPROM RAM	80C32 14.7 MHz 32 Kbytes = 16 K instruction 128 Kbytes, battery-buffered for approx. 8 years (DB1-DB120)
Command set (STEP5)	Almost same as SIMATIC 100U (e.g., logical link operations, storage operations, load and transfer operations, time and counting operations, comparison operations, and processing operations)
Display	20 x 20-character fluorescent display or 2 x 20-character fluorescent display with cyrillic character set or 2 x 24-character LCD or 4 x 20-character LCD
Digital inputs/outputs Always included Optional module Optional module • Digital input • Digital output	 8 DI and 8 DO, floating 8 DI and 8 DO, floating 16 DI, floating Logical “0”: -2 to +2 V Logical “1”: 16 to 33 V (R_i = approx. 5 kΩ) Common ground of all DI Logical “1”: +24 V I = 100 mA, I = 50 mA Short-circuit proof Common +24 V of all DO
Serial interface (plug connector 1) Procedure Speed Serial interface (plug connector 3)	 TTY or RS 485 3964R, Lauf, SINEC L1 150 to 19200 baud Interface module 20 mA single current Active/passive or V.24 Procedure: Lauf or 3964R
Fieldbus Baud rate Connection	PROFIBUS-DP (slave) certified in acc. w. part III of DIN 19245 9.6 kbaud to 1.5 Mbaud 9-pin sub D plug connector on plug connector 4 (optionally on plug connector 3)
Connectable barcode interface (max. of 2)	Reading wand, swipe reader, hand-held laser scanner

Table 7-13 Technical data of ES 030-K

MOBY-I	
Connectable SLGs (max. of 2)	SLG 40/SLG 40-S SLG 41/SLG 41-S SLG 42 SLG 43 SLG 44
MOBY-L	
Connectable SLGs (max. of 2)	SLG 52
Connection to SIMATIC S5	RS 485, V.24, TTY or SINEC L1
Keyboard	
Push-button keyboard	29 illuminated push-buttons 1 key-operated switch
Sealed keyboard	30 keys, 30 LEDs 1 key-operated switch
Power connection, normal	230 V AC, ±10%; 48 to 62 Hz Grounding-type plug connector in acc. w. DIN 49441
Optional	24 V DC (20 to 30 V)
Current consumption	Approx. 20 VA
RAM/clock backup	Backup battery for approx. 8 years
Interference suppression	Interference class B in acc. w. VDE 0871
Protection rating	IP54
Ambient temperature	
Operation	0° to +40° C
Transportation and storage	-40° to +70° C
Relative humidity	Up to 95%
Housing	Die-cast zinc
Dimensions (WxHxD) in mm	180 x 280 x 95
Weight (approx.)	5 kg

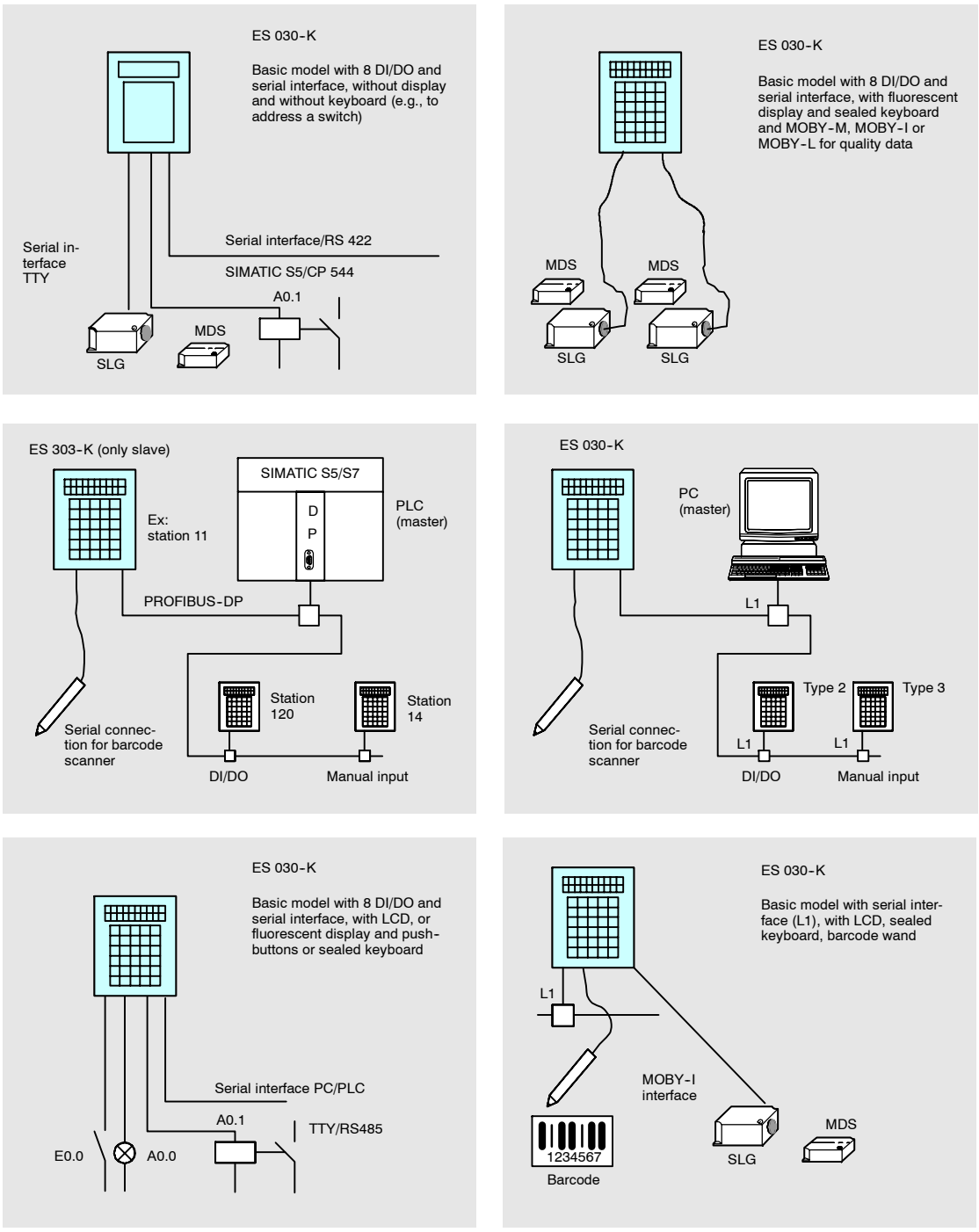


Figure 7-9 Sample configuration of ES 030-K

Documentation

A

Descriptions, bound

Table A-1 Ordering data for descriptions

	Order Number
Description - ASM 400/401 German English	 6GT2 097-3AB00-0DB1 6GT2 097-3AB00-0DB2
Description - ASM 410 German English	 6GT2 097-3AC00-0DA1 6GT2 097-3AC00-0DA2
Description - ASM 420 German English	 6GT2 097-3AF00-0DA1 6GT2 097-3AF00-0DA2
Description - ASM 421 German English	 6GT2 097-3AH00-0DA1 6GT2 097-3AH00-0DA2
Description - ASM 440 German English	 6GT2 097-3AC10-0DA1 6GT2 097-3AC10-0DA2
Description - ASM 441 German English	 6GT2 097-3AC20-0DA1 6GT2 097-3AC20-0DA2
Description - ASM 450/FC 44 German English	 6GT2 097-3AC30-0DA1 6GT2 097-3AC30-0DA2
Description - ASM 451/FC 46 German English	 6GT2 097-3AC40-0DA1 6GT2 097-3AC40-0DA2
Description - FB 246 German	 6GT2 097-3AC60-0DA1
Description - ASM 470/FC 47 for SIMATIC S7 German English	 6GT2 097-3AL00-0DA1 6GT2 097-3AL00-0DA2
Description - ASM 470/FB 47 for SIMATIC S5 German English	 6GT2 097-3AL10-0DA1 6GT2 097-3AL10-0DA2
Description - SIM German English	 6GT2 097-3AD00-0DA1 6GT2 097-3AD00-0DA2

Table A-1 Ordering data for descriptions

	Order Number
Description - FB 230 German English	 6GT2 097-3AG00-0DA1 6GT2 097-3AG00-0DA2
Description - FB 240 German English	 6GT2 097-3AA10-0EA1 6GT2 097-3AA10-0EA2
Description - FB 250 for ASM 400/401 German English	 6GT2 097-3AA00-0DA1 6GT2 097-3AA00-0DA2
Description - T3964R for DOS (stapled) German English	 6AW5 450-4BX00-0K 6AW5 450-4BX00-1K
Description - MDS 438 E (stapled) German English	 6GT2 097-3AE00-1DA1 6GT2 097-3AE00-1DA2
Description - MDS 439 E German English	 6GT2 097-3AJ00-1DA1 6GT2 097-3AJ00-1DA2
Description - 4/8-module rack German English	 6GT2 097-3AK00-1EA1 6GT2 097-3AK00-1EA2

Operator control guides

Table A-2 Ordering data for operator control guides

	Order Number
Operator control guide for STG 4F German English	 6GT2 097-5AD01-0DA1 6GT2 097-5AD01-0DA2

Manuals

Table A-3 Ordering data for manuals

	Order Number
Configuration manual SLG 44/MDS 507/MDS 407 E German English	 6GT2 097-4AB00-0EA1 6GT2 097-4AB00-0EA2
Equipment manual for ES 030-K German English	 6AW5 451-6XX01-0K 6AW5 451-6XX01-1K

Error Messages

B

This chapter contains a list of MOBY-I error messages. These messages are divided into three groups.

B.1 Error numbers 01 hex to 1F hex are described in the first section. These messages are the same for all interfaces which use direct MDS addressing.

B.2 Some function blocks (e.g., FB 250, FB 240 and FC 47) provide additional messages on the status of the hardware. These special messages are described in the second section.

B.3 All file handler messages are grouped in the third section. These messages apply to ASM 401 with FB 230, ASM 441, ASM 421 and ASM 451 with FC 46.

B.1 General Errors

The following error codes can occur during MOBY-I operation. They are transferred in the status byte during telegram communication or via the red LED on the front plate. On most ASM modules, this LED always indicates the last error even when this error has already been corrected.

On ASM 440, the error codes can also be optionally reported via PROFIBUS as device-related diagnoses.

Table B-1 General errors

Error Code in Hex	LED	Cause/Remedy	SIN[1]
00	00	No error. Result is okay.	0000
-	01	See error code 0F.	
01	02	Presence error. MDS has moved out of the transmission window of the SLG. The MOBY command could only be executed partially. Read command: No data are supplied to the computer. Write command: The data memory which just left the field contains an incomplete data record. -> S_a (operating distance from SLG to MDS) not adhered to -> Configuration error: Data block to be processed is too large (during dynamic operation). The next command (READ, WRITE or NEXT) is automatically related to the next MDS. **Remark:** The red error LED on the front plate shows error code 02.	0003
02	02	Presence error -> A mobile data memory has passed by the SLG and was not processed with a command or concluded with the NEXT command. -> An INIT command was aborted with RESET. This error message cannot be transferred until the next command (read, write, status, RESET, DI/DO or NEXT). The command is not executed but causes this error message. The ASM executes the next command correctly again. Error 02 is reported immediately via external diagnosis. **Remark:** The red error LED does not distinguish between errors 01 and 02. See error code 01.	0005
03	03	Error in the connection to the SLG -> Supply voltage of ASM < 20 V or not connected -> 24 V voltage has voltage drops. -> Fuse on ASM has triggered. Check wiring. -> Cable between ASM and SLG is wired incorrectly or a cable break has occurred. -> Hardware defect (ASM or SLG) -> Another SLG in the vicinity is active. -> Interference on SLG cable or bus cable	0040
04	04	Error in memory of the MDS The data memory has never been write-accessed or has lost its contents due to a battery failure. -> Initialize data memory with STG. -> With ASM: Call initialization command. -> Check battery of MDS or replace MDS (battery bit). -> Data memory is defective. -> Initialization was performed with wrong memory size.	0041
05	05	Unknown command code in byte 2 of the telegram MDS reports address error. Check telegram.	0002/ 0004

Table B-1 General errors

Error Code in Hex	LED	Cause/Remedy	SIN[1]
06	06	Field interference on SLG The SLG is receiving interference pulses from its surroundings. -> External interference field. The interference field can be located with the inductive field indicator of the STG: -> The distance between two SLGs is too short and does not correspond to configuration guidelines. -> The connection cable to the SLG has malfunctioned, is too long or does not meet specifications.	0044
07	07	Too many sending errors The MDS could not receive the command or the write data from the SLG correctly even after several attempts. -> The MDS is located in the boundary area of the transmission window. -> The data transmission to the MDS is being affected by external interference.	0045
08	08	CRC sending error - The monitoring circuit has detected an error during sending. -> Cause same as error 06 - The MDS reports CRC errors very frequently. -> The MDS is located in the boundary area of the SLG. -> The MDS and/or the SLG have a hardware defect.	0044
09	09	Only for initialization. CRC error during acknowledgment receipt from MDS -> Cause same as error 06	-
0A	10	Only for initialization. MDS cannot execute INIT command. -> MDS is defective.	-
0B	11	Only for initialization. Timeout while initializing the MDS -> MDS is located exactly on the boundary of the transmission window. -> The MDS is using too much current (i.e., defective). -> Only for MDS 507/407 E. MDS 507/407 E operation was not enabled with the “RESET with parameter transfer” command.	-
0C	12	Memory of the MDS can no longer be written. -> Memory of MDS is defective. -> EEPROM-type MDS was write-accessed too often and has reached the end of its life. -> An incorrect end address was parameterized for the INIT command.	0046
0D	13	Address error (address area exceeded) -> Specified address does not exist on the MDS. -> Check and correct the command for telegram layout. -> The status byte is not 00 for the command.	0002/ 0004
0E	14	ECC error The data could not be read from the MDS. -> MDS data have been lost (i.e., MDS defective). -> The MDS was not initialized with the ECC driver. -> Initialize MDS. -> MDS with EEPROM has reached the end of its life. The data have been lost. -> Replace MDS. -> The MDS moved out of the field during a write-access. -> The MDS is not positioned correctly. -> Command to ASM was issued incorrectly by the user.	0047

Table B-1 General errors

Error Code in Hex	LED	Cause/Remedy	SIN[1]
0F	01	Startup message The ASM always sends this message after every startup. A startup is considered performed after operational voltage is applied, after the front switch is activated, after a reset via plug connector X1 or after a bus error. The startup message is retained until the user issues a RESET command to the ASM. This enables the user to recognize when voltage returns to the ASM (i.e., readiness for operation).	
10	16	NEXT command is not possible or is not permitted. -> ASM is operating without the presence check. -> ASM has already received a NEXT command.	1043
11	17	Short circuit or overload of the 24 V outputs Next command must be a RESET command. -> The affected output is switched off. -> All 24 V outputs are switched off when a total overload occurs. -> A reset can only be performed by turning the supply voltage off and on again.	
12	18	Internal ASM communication error The connection to the MOBY processor has malfunctioned. Next command must be a RESET command. -> Hardware of ASM is defective. -> EMC interference	
14	20	Internal ASM error Stack overflow. Next command must be a RESET command. -> Turn 24 V supply off and on again.	
15	21	Erroneous operational parameterization -> Check switch on ASM.	
16	22	The command cannot be executed with the current bus configuration. -> Input or output areas are too small for the telegram length used. -> Read or write command with excessive length used -> Adjust bus configuration of the master module.	
17	23	Handshake error Next command must be a RESET command. -> The user set an incorrect bit in the command byte of the telegram during the handshake procedure. -> Check user program and correct.	
18	24	Only RESET command permitted -> An error has occurred which must be acknowledged with a RESET command. Cause may be a brief short circuit on PROFIBUS.	

Table B-1 General errors

Error Code in Hex	LED	Cause/Remedy	SIN[1]
19	25	Previous command is active. A new command was issued to the ASM although the last command is still active. -> An active command can only be terminated with a RESET command. -> The new command is concluded with error 19 hex. The old command is executed by the ASM, and the finished message is reported after completion.	0042
1A	26	PROFIBUS-DP error has occurred. -> Bus connection has been interrupted (e.g., wire break or plug pulled). -> Master no longer addresses the ASM. -> The error is reported as soon as the bus connection is restored again.	
1E	30	- The telegram does not have the correct format. - AB byte does not correspond to the user data length. -> Check and correct the telegrams in the user program.	-
1F	31	Communication with the MDS was terminated with a RESET. This error can only be reported back with a RESET command.	-
20 (binary xx1x xxxx)	32	**Not an error message** Only occurs when working with the ECC driver enabled. It indicates that the driver recognized and corrected a 1-bit error. The read/write data are okay.	0052[2]
40 (binary x1xx xxxx)	64	**Not an error message** This bit is normally always set. It is reserved for the status indication of a 2nd battery on the MDS.	0051[2]
80 (binary 1xxx xxxx)	128	**Not an error message** Battery voltage of the MDS has fallen below the threshold value. Immediate replacement of the MDS is recommended. This status bit is always set for EEPROM-type MDSs. When SINUMERIK is involved, the battery message is provided in IDENTIFICATION without the “F“ ID. To detect poor battery stats, the “fnr” field can be evaluated at one location for the entire system.	0050[2]

1 SIN = Equivalent error number for SIM and ASM 420 in SINUMERIK operating mode
2 When several states occur at the same time, the following sequence applies: 0052, 0050 and 0051.

B.2 ASM-Related Errors

B.2.1 ASM 400 with FB 250

The messages shown in table B-2 are indicated in data word 5 of FBDB.

Table B-2 Error messags of FB 250

Error Message	Cause/Remedy
Bit 1 = "1": **Synchronization error**	• FB 250 has received the result for a command which is not located in ZUWDB (i.e., not at this location). The pointer (ZUW) to ZUWDB may have been changed while a command was active. • EMC effects have caused the ASM to execute another command than programmed by the user. -> Check the entire SIMATIC system. Check the grounding concept.
Bit 2 = "1": **FB 250 is synchronized (SYNCH)**	General communication capability with a channel module of the ASM 400 module. This bit is set after a positive check of the FB parameterization. This takes place during the 1st RESET immediately after bootstrap loading of the programs and data blocks. When a RESET command does not function, the bit is not set or reset. ASM 400 module cannot be addressed by the FB. • Wrong address set on the ASM 400 • ASM 400 is defective. -> A RESET must always be performed after the sync bit is reset.
Bit 4 = "1": **Parameterization error**	• The "ADR" parameter does not contain the correct values. • The "KAN" parameter is specified incorrectly. Permitted values are 1 or 2. • The "TYP" parameter was specified incorrectly. Permitted values are 0, 1, 3, 5, and 6. • The "ANW" parameter is not "0" or "1". • The command is not permitted in ZUWDB.
Bit 5 = "1": **ASM error**	• The exact ASM error is located in bits 8 to 15 of ANZ. If bits 8 to 15 = 0: • The FB did not receive an acknowledgment from the ASM in time after command transfer. • FB 250 was not called by the user within 4 seconds after command start (no cyclic FB call). • The user changed data in the FBDB (DW 0 to DW 24) - particularly DW 0/1.

Table B-2 Error messags of FB 250

Error Message	Cause/Remedy
Bit 6 = "1": **Time error**	Loop counter monitor in FB 250 has been triggered. • The command data could not be or could not be completely transferred to the ASM 400. • The ASM 400 cannot be addressed by the FB. The "ADR" parameter may not correspond to switch setting S3 on the ASM 400. • Length = 0 was transferred with a write command. • The "AG" parameter is set incorrectly. • The user has changed data in FBDB (particularly DW 0/1). -> Check ASM 400 hardware, addressing parameterization and user program.
Bit 7 = "1": **Repetition error**	The command to the ASM 400 was repeated. • Error in BEST = 0 The command was not concluded correctly after command repetition (not an error). • Error in BEST = 1 Communication malfunction between ASM and FB 250. Despite command repetition, the command still could not be executed correctly. When the repetition bit is set sporadically, all hardware must be checked. Special attention should be paid to the grounding concept.
Bits 8 to 12	Error message as shown in table B-1
Bit 13 = "1"	ECC offset was performed.
Bit 14 = "1"	Dialog battery of MDS 507/407 E has dropped below threshold value.
Bit 15 = "1"	RAM battery has dropped below threshold value.

B.2.2 ASM 470 with FB 47/FC 47

The indication word for FC 47 is DBB 6/7.

The indication word for FB 47 is DW 3.

- MOBY errors are indicated in DBB 6 or DL 3. Cf. table B-1.
- Internal errors of the function block are indicated in DBB 7 or DR 3. Cf. table B-3. The red LED does not flash for these error messages from FB 47/FC 47. The contents of the byte are specified in hexadecimal format (i.e., HEX) and as fixed point numbers (i.e., DEC).

Table B-3 Error messages of FB 47/FC 47

ANZ (Right-Hand Byte)	Description
02 HEX/ 02 DEC	Illegal command code or command parameter was entered. • Parameterize data words in BEDB correctly in accordance with the command description.
06 HEX/ 06 DEC	The command code and the received acknowledgment code are not identical. • ASM 470 not parameterized correctly • Internal processing error • BEDB is being overwritten by other program segments.
07 HEX/ 07 DEC	Synchronization error during execution of FB 47/FC 47 • Internal processing error • BEDB is being overwritten by other program segments.
08 HEX/ 08 DEC	The parameterized user data length of the read/write command and the user data length received in the acknowledgment are not identical. • ASM 470 not parameterized correctly • BEDB is being overwritten by other program segments.
09 HEX/ 09 DEC	The received or written user data are too long. • ASM 470 not parameterized correctly • Read command: The length specified for the data to be read is too long. Maximum of 12 bytes is permitted.
10 HEX/ 10 DEC	Read or written user data length too short. User data length is 0 bytes. • Internal processing error • BEDB is being overwritten by other program segments.
17 HEX/ 17 DEC	The formal operands of FB 47/FC 47 were parameterized incorrectly. • Parameterize FB 47/FC 47 correctly. • Then start RESET command.

Table B-3 Error messages of FB 47/FC 47

ANZ (Right-Hand Byte)	Description
19 HEX/ 19 DEC	FB 47/FC 47 reports that only a RESET command is permitted as the next command. • No RESET was performed after a startup message of the ASM 470. • No RESET was performed after an error message after which a RESET must be the next command. • Start RESET command.
20 HEX/ 20 DEC	Synchronization error between ASM 470 and FB 47/FC 47 • The handshake of the command and acknowledgment telegrams is out of step. There may be a contact problem or the supply voltage may be unstable. • BEDB is being overwritten by other program segments. • Start RESET command.
21 HEX/ 21 DEC	ASM 470 has performed a startup. • There may be a problem with the plug-in contact of the ASM 470 in the S7-300. • Supply voltage of the ASM 470 is unstable. • Interference pulse • DEDB is being overwritten by other program segments. • Start RESET command.
1B HEX/ 27 DEC[1]	• The data field (i.e., number of user data bytes) between DAT-Z and the end of DATDB is less than the length given in the write command (DR 4 in BEDB). Exception: DATDB consists of 256 data words (DW 0 to DW 255). • DAT-Z must be adjusted to the user data length. Make DAT-Z smaller. • Reduce length of read/write data. • Start RESET command.

1 Can only occur with FB 47

B.2.3 ASM 440/450 with FB 240

The error indications (ANZ) of FB 240 are located in data word DW 2 of the BEDB.

- The MOBY errors listed in table B-1 are located in the left-hand byte of the data word (DL 2).
- Internal FB errors are located in the right-hand byte of the data word (DR 2). The red LED does not flash for these FB 240 error messages. The contents of the byte are specified in binary format, in hexadecimal format (H) and as fixed point numbers (D).

Table B-4 Error messages of FB 240

ANZ (Right-Hand Byte)	Description
00000010 (02H/02D)	Illegal command code or command parameter was entered. • Parameterize data words in BEDB correctly as specified in the command description.
00000110 (06H/06D)	The command code and the received acknowledgment code are not identical. • Input and output area of the ASM 440 is too small. • Parameterize master module correctly.
00000111 (07H/07D)	The received acknowledgment is too long. • Input and output area of the ASM 440 is too small (i.e., less than 32 bytes). • Read command: The length of the data to be read is too long. • Parameterize master module correctly.
00001000 (08H/08D)	The parameterized length of the user data of the read/write command and the user data length received in the acknowledgment are not identical. • Input and output area of the ASM 440 is too small. • Parameterize master module correctly.
00001001 (09H/09D)	The length of the received user data is too long. • Input and output area of the ASM 440 is too small (i.e., less than 32 bytes). • Read command: The length of the data to be read is too long. • Parameterize master module correctly.
00010001 (11H/17D)	The formal operands of FB 240 were parameterized incorrectly or the parameterization in the EPROM of IM 308-B is wrong. • Parameterize FB 240 correctly. • Parameterize master module correctly. Check the “ADR” parameter in particular. • Then start RESET command.

Table B-4 Error messages of FB 240

ANZ (Right-Hand Byte)	Description
00010011 (13H/19D)	FB 240 reports that only a RESET is permitted as the next command. • No RESET was performed after a startup message of the ASM 470. • No RESET was performed after an error message which requires a RESET as the next command. • Start RESET command.
00010100 (14H/20D)	Synchronization error between ASM 440 and FB 240 • The handshake of the command and acknowledgment telegrams is out of step. There may be a contact problem or the supply voltage may be unstable. • Start RESET command.
00010101 (15H/21D)	The ASM 440 has performed a startup or a PROFIBUS-DP bus error has occurred. • Possible problem with the ASM 440's plug-in contacts in the module rack • Supply voltage of the ASM 440 is unstable. • Interference pulse on the reset input of base connector X1 • PROFIBUS-DP error occurred (e.g., bus connection interrupted) • Start RESET command.

B.2.4 File Handler Error Messages for ASM 401/421/441/451

File handler error messages

A0 06: The command ID (KK) of the started command is not permitted or not defined. Specify the correct command ID.

A0 011: The telegram monitoring parameters (DBN or KK) are not being sent in the correct order. Two or more telegrams are being written in the same page frame memory area. Parameterization of the FB call parameters ("SSNR" and "KAN") must be checked for all channels.

- For 1st command block: DBN (i.e., byte 8/9 in the telegram) does not have the value 0001.
- For next block: DBN of the user is not in correct ascending sequence or the KK parameter (i.e., byte 4) does not correspond to the command just executed.

A0 15: Check byte mode is enabled. The check byte generated by FB 230 does not correspond to the command telegram. Correction same as **A0 11**.

A0 16: The file handler is executing the commands of another user (e.g., the STG, can be recognized in bit 6 ("STG active/ASM test") of BEST). Command execution is delayed until the other user finishes. Start command again if necessary.

B0 01: Error in connection to the SLG

- Cable between ASM and SLG is incorrectly wired, or a cable break has occurred.
- 24 V supply voltage is not connected or has been turned off.
- Fuse on the ASM 401 is defective.
- Hardware defect: Channel module or SLG

This error does not occur during the start of system commands (i.e., RESET, NEXT and ASM STATUS).

B0 02:

EAKO 1: - A command was started, but there is no MDS in the transmission window of the SLG.

EAKO 0:
- The old/current MDS has left the transmission window, and the new/next MDS has entered the transmission window. A command was started (not NEXT). This command refers to the new MDS, but the old/current MDS has not yet been concluded with NEXT.
- A new MDS enters the transmission window of the SLG but leaves it again without a command being executed for this MDS (i.e., an MDS has "slipped through").

C0 02:

The MDS reports a memory error.

The MDS has never been write-accessed or has lost its contents after a battery failure (not applicable to EEPROM-MDSs).

- Replace MDS if the battery monitoring bit is set
- Test MDS by attempting to initialize it with the STG
- Format MDS with FORMAT

C0 06:

During certain important procedures (e.g., write system area of the MDS or format MDS), the MDS may not leave the transmission window of the SLG or the command will be terminated with this error message.

- Start command again.
- MDS is located in the boundary area of the SLG transmission window.
- EAKO = 1: MDS was not located in the transmission window of the SLG when the command was started.

C0 07:

- The FORMAT or TRACE command was issued with the wrong parameters. This physical address given in the command does not exist on the MDS. MDS memory is smaller than specified in the command.
- READ/WRITE/UPDATE: Pointer in the FAT is faulty. It indicates a block which does not exist on the MDS.

C0 08:

Field interference on the SLG. The SLG is receiving interference from its surroundings. Some sources are listed below.

- External field of interference. The interference field can be documented with the "inductive field indicator" of the STG.
- The distance between two SLGs is too short and does not adhere to configuration guidelines.
- The connection cable to the SLG has malfunctioned, is too long or does not meet specifications.

C0 09: Too many sending errors have occurred. The MDS could not receive the command or the write data from the ASM correctly even after several attempts.

- The MDS is located exactly in the boundary area of the transmission window.
- The data transmission to the MDS is being affected by external interference.

C0 10:

- CRC sending error. The monitor receiving circuit has detected an error while information was being sent. Error cause same as **C0 08**.
- The MDS reports CRC errors very frequently. The MDS is located in the boundary area, or the MDS or SLG is defective.

C0 11: Same as **C0 08**

C0 12: The MDS is unable to perform the FORMAT command. The MDS is defective.

C0 13: While being formatted, the MDS must remain in the transmission window of the SLG. Otherwise a timeout error will occur. This means:

- The MDS is located exactly in the boundary area of the transmission window.
- The MDS is using too much current (i.e., is defective).
- The EEPROM-MDS type is parameterized incorrectly for FORMAT.

C0 14: The memory of the MDS cannot be written. This means:

- The MDS has a smaller memory than specified in the FORMAT command (i.e., parameterize the MDS type correctly).
- The memory of the MDS is defective.
- The EEPROM-type MDS has been write-accessed too often and has reached the end of its life.

C0 15: Address error. The address area of the MDS was exceeded.

- The MDS is not the right type.

C0 16: An ECC error has occurred. The data cannot be read from the MDS.

- Data of the MDS have been lost (i.e., MDS is defective).
- The MDS was not formatted with the ECC driver. Format the MDS again.
- An EEPROM-type MDS has reached the end of its life, and the data have been lost. Replace the MDS.
- The MDS moved out of the field while being write-accessed. The MDS is not positioned correctly. **Remember:** The system area of the MDS is automatically written on every SLG station.

C0 17: The file handler is not working correctly.

- Check command layout or command sequence.
- The hardware of the ASM 401 (firmware) has a defect.

D0 01: The file handler will only accept a RESET command.

- The file handler has not yet been initialized with a RESET command.
- This state can only be canceled with a RESET command.

D0 05: The FORMAT, CREATE, WRITE, ATTRIB, UPDATE, COVER, QUEUE-READ or QUEUE-WRITE commands were issued with illegal parameters.

- FORMAT with illegal MDS name or MDS type
- CREATE with illegal file name
- WRITE/UPDATE with length 0 (DLNG = 0)
- Illegal attribute
- QUEUE-READ or QUEUE-WRITE with illegal option
- COVER with illegal user (only 0 or 1 permitted)

D0 07:

- The system data transferred with the LOAD command are incorrect.
  - DLNG parameterized incorrectly for LOAD
  - Wrong data block specified or incorrectly parameterized
  - MOVE command executed incorrectly. DIR + FAT on the MDS do not correspond to the checksum.
- The MOVE command cannot be executed. The checksum does not correspond to DIR + FAT. The data memory probably left the transmission window while system operations (e.g., write DIR + FAT) were being executed, or the data structure of the MDS is wrong.

D0 09: The RESET command was transferred to the file handler with the wrong parameters.

- Check bytes 11 to 17 of the telegram

D0 14: WRITE command: Sufficient memory space on the MDS is no longer available. The data are not completely written to the MDS.

CREATE command: No further data blocks can be reserved for creation of a file. No more blocks are free.

D0 15: The file handler was unable to identify the MDS. The MDS must be formatted again.

D0 18: The logical address specified for the address is located outside the file. The FAT contains an error. The MDS must be formatted again.

D0 22: The data memory has been covered with the COVER command. A write command (e.g., UPDATE and CREATE) may not be allowed to destroy the data memory layout and is thus rejected.

D0 23: COVER command: The MDS name specified in the command does not match the actual MDS name.

E0 01:

- The type of MDS in front of the SLG does not correspond to the set ECC mode. The MDS must be formatted again in accordance with the desired ECC mode.
- The MDS is not a file handler MDS. Format the MDS again.

E0 02: No more directory entries are free. The file specified with the CREATE command can no longer be created.

E0 03: The file specified with the CREATE command already exists in the directory. Two files with the same name are not permitted.

E0 05:

- A FAT block sequence error has been determined for a READ or WRITE command. The file allocation table (FAT) is faulty. The MDS must be formatted again.
- Wrong address given for the TRACE command.

F0 01:

- The file addressed by a command (e.g., WRITE) does not exist in the directory. The file must be set up with CREATE.
- Check file name. It may not be in ASCII format.
- One or more files are to be read with QUEUE-READ but these files do not exist on the MDS. Valid data were not transferred to the user.

F0 05: Write-access (WRITE, UPDATE or DELETE) to a file which may not be changed (i.e., protected by an appropriate attribute).

- Use the ATTRIB command to change the access rights, and then start the WRITE/UPDATE/DELETE command again.

F0 06: The RWD switch on the ASM does not have sufficient rights for this command. The command was ignored. Check the switch.

F0 07: QUEUE-READ: File length specified is shorter than the file length.

F0 08: QUEUE-READ: The skip calculated by the file handler is greater than 0FFF hex (4095 decimal).

H1 01: The FB 230 call parameter or the DATDB/DATDW was parameterized incorrectly for the absolute call.

Change the FB parameter in the calling program, and start a RESET command.

H1 02:

- The length of the loaded BEDB is less than 50 data words (i.e., FB 230 does not have sufficient space for the internal FB parameters). A new BEDB with the correct length must be loaded. Then start a RESET command.
- The FB 230 for this type of PLC was not called (i.e., FB 230 for PLC 115U, FB 231 for PLC 135U and FB 233 for PLC 155U).

H0 03: The command index is illegal. Change the command index.

H0 04: This command ID and thus this command is unknown to FB 230. Check the command ID.

H0 05: The access rights of the corresponding SLG do not permit this command. For example, when "R" access rights (i.e., read only) were granted to the SLG, WRITE commands cannot be executed for this SLG. Either the "RWD" FB parameter must be changed (and then a RESET command started to accept the change), or a legal command must be started.

H0 06: The WRITE/UPDATE/LOAD/QUEUE-WRITE or QUEUE-READ command parameter specified in DW 9 (DLNG) of the DEDB is not permitted. Only a user data length of 7FF0 hex (32752 decimal) is permitted or a maximum of 210 decimal bytes for QUEUE-READ. Change DLNG accordingly.

H1 07: The data block specified in DW 1 (BEDB) does not exist on the PLC. The applicable data block must be loaded. Then start a RESET command so that the absolute addresses can be calculated.

H1 08: This is a pure software error which cannot occur during normal operation. A RESET command must be started if this error does occur anyway. Two or more telegrams are written in the same page frame memory area. This means:

- Check actual FB 230 operands, particularly SSNR" and KAN."
- The user program contains an error.
- Check the hardware.
  - SIMATIC bus
  - ASM 401 - basic module and/or channel module
  - SIMATIC CPU

H1 09: The check byte of the acknowledgment telegram which was read and the check byte calculated by FB 230 do not match (if check byte mode was enabled). A RESET command must be started. For remedy, see also **H1 08**.

H1 10: The channel module has performed a hardware reset. This could have been caused by a voltage drop in the device rack or a plug-in contact problem, for example. The user must start a RESET command to parameterize the SLG again.

H1 11: The acknowledgment which was received has absolutely no connection with running operation. This is a pure software or synchronization error which cannot occur during normal operation. A RESET command must be started if this error should occur anyway. For remedy, see also **H1 08**.

H1 12: The command ID of the command and the corresponding acknowledgment do not match. This is a software or synchronization error which cannot occur during normal operation. A RESET command must be started if this error should occur anyway. For remedy, see also **H1 08**.

H1 13: The first command block was not acknowledged correctly (i.e., the telegram monitoring parameters do not match). This is a pure software or synchronization error which cannot occur during normal operation. A RESET command must be started if this error should occur anyway. For remedy, see also **H1 08**.

H1 14: An error was determined while reading the interface monitoring register. This means that synchronization no longer exists between writing command blocks and reading corresponding acknowledgments. This is usually caused by a plug-in contact problem of the channel module. A RESET command must be started to set synchronization again. For remedy, see also **H1 08**.

H1 15: The pointer to the start address of the user data calculated from the DATDB and DATDW (DW 1 in BEDB) parameters is located outside the specified data block (i.e., the pointer is too long). Either DATDW must be shortened, or the DATDB must be lengthened. Then start a RESET command.

H1 16: The telegram monitoring parameters of the command and acknowledgment blocks do not match. This is a pure software or synchronization error which cannot occur during normal operation. If this error occurs anyway, a RESET command must be started. For remedy, see **H1 08**.

H1 17: See error **H1 06**.

H1 18: While a command is being executed (i.e., ready bit not yet set), the pointer to the start address of the data calculated from DATDB and DATDW was changed, and the absolute addresses are no longer correct. A RESET command must be started to calculate the absolute addresses again.

H1 19: The absolute address which is accessed for reading and writing the data block is located outside the data block. Either the data block must be lengthened, or the pointer to the start address of the user data (DATDB and DATDW) must be corrected (i.e., give the data block more space). Then start a RESET command.

H1 20: During running operation (i.e., FB 230 is being called cyclically), the PLC memory was compressed or the absolute location of the BEDB and/or DATDB data blocks was changed. The absolute addresses are no longer correct. A RESET command must be started.

H1 21: This message tells the user that only a RESET command is permitted as the next command. All other commands will be rejected.

H1 22: The ASM 401 (page frame memory) cannot be accessed (only for FB 231 and PLC 135U). This is a plug problem (i.e., hardware error) or a parameterization error (FB parameter SSNR and/or KAN). Check switch settings, and then start a RESET command.

H0 25: QUEUE-READ: QUDBTYP or QUANZ parameter is not permitted.

H0 26: QUEUE-READ: DB or DX from the specified DB/DX area does not exist on the PLC.

H0 27: QUEUE-READ: QUDW pointer is located outside the DB or DX specified in QUDB.

H0 28: QUEUE-READ: DB or DX are missing on the PLC or are too short to read in the user data.

H1 30: FB 230 has found a system error. The acknowledgment of the file hander is not permitted.

- Contact problem of the CM 423 channel module in the ASM 401
- Contact problems of the ASM 401 in the backplane bus of the S5
- Static charging on the SLG cable
- Configuration not grounded or poorly grounded
- A RESET command must then be started.

Kx xx:

QUEUE-WRITE was parameterized incorrectly (DATDB/DATDW or DLNG).

Option 0000 hex: The file entry parameterized in DATDB with the number xxx or xxx +1 is not correct. Counting of the file entries in DATDB starts with 1.

Option 0001 hex: The file entry parameterized in DATDB with the number xxx or xxx +1 contains a file name which already exists on the MDS. Counting of the file entries in DATDB starts with 1.

Note

The file entries are incremented decimally.

ASCII Table

C

Character	Decimal	Hex
NUL	0	00
SOH	1	01
STX	2	02
ETX	3	03
EOT	4	04
ENQ	5	05
ACK	6	06
BEL	7	07
BS	8	08
HT	9	09
LF	10	0A
VT	11	0B
FF	12	0C
CR	13	0D
SI	14	0E
SE	15	0F
DLE	16	10
DC1	17	11
DC2	18	12
DC3	19	13
DC4	20	14
NAK	21	15
SYN	22	16
ETB	23	17
CAN	24	18
EM	25	19
SUB	26	1A
ESC	27	1B
FS	28	1C
GS	29	1D
RS	30	1E
US	31	1F
SP	32	20
!	33	21
”	34	22
#	35	23
$	36	24
%	37	25
&	38	26
’	39	27
(	40	28
)	41	29
*	42	2A

Character	Decimal	Hex
+	43	2B
,	44	2C
-	45	2D
.	46	2E
/	47	2F
0	48	30
1	49	31
2	50	32
3	51	33
4	52	34
5	53	35
6	54	36
7	55	37
8	56	38
9	57	39
:	58	3A
;	59	3B
<	60	3C
=	61	3D
>	62	3E
?	63	3F
@	64	40
A	65	41
B	66	42
C	67	43
D	68	44
E	69	45
F	70	46
G	71	47
H	72	48
I	73	49
J	74	4A
K	75	4B
L	76	4C
M	77	4D
N	78	4E
O	79	4F
P	80	50
Q	81	51
R	82	52
S	83	53
T	84	54
U	85	55

Character	Decimal	Hex
V	86	56
W	87	57
X	88	58
Y	89	59
Z	90	5A
[	91	5B
¥	92	5C
]	93	5D
^	94	5E
—	95	5F
\	96	60
a	97	61
b	98	62
c	99	63
d	100	64
e	101	65
f	102	66
g	103	67
h	104	68
i	105	69
j	106	6A
k	107	6B
l	108	6C
m	109	6D
n	110	6E
o	111	6F
p	112	70
q	113	71
r	114	72
s	115	73
t	116	74
u	117	75
v	118	76
w	119	77
x	120	78
y	121	79
z	122	7A
f	123	7B
j	124	7C
g	125	7D
!	126	7E
z	127	7F

The characters shown with the gray background cannot be represented on the STG display.

Compatibility

D

The following table provides customers and service personnel with a list of all types of MDSs and SLGs from the MOBY-I family. These type designators are also used on the name plates of the components. When types have been discontinued, this table can be used to look for a suitable replacement.

Table D-1 Compatibility of MDS and SLG types (status: October 1999)

Type Designator	Description/Remarks	Replacement Type
MDS 114		
MDS 115[1]	Replacement type has different housing with same mounting dimensions	MDS 114
MDS 115-ZA22[3]	MDS 115 for Ex zone. No CE. Discontinued as of 01.01.96.	
MDS 115-ZA24[1]	The MDS has no cover and is not welded.	MDS 114
MDS 213 E[1]	Discontinued	MDS 413 E
MDS 213 E-ZA22[3]	MDS 213 E for Ex zone. No CE. Discontinued as of 01.01.96.	
MDS 302[1]	Replacement type available starting 10/98	MDS 402
MDS 401	On request. Button	
MDS 402	Available starting 10/98. 8-Kbyte RAM	
MDS 404		
MDS 407 E[1]	Replacement type delivered with larger RAM memory. The data are lost when the battery is replaced.	MDS 507
MDS 413 E[1]	Replacement type with FRAM, restricted to 85° C	MDS 404
MDS 438 E [2]	MDS 439 E is smaller than MDS 438 E and requires a different mounting plate. The mounting holes are different for the user.	MDS 439 E
MDS 439 E		
MDS 505[1]	Greater temperature range. Temperatures up to 85° C possible.	MDS 514
MDS 514		
MDS 515[1]	Different housing with same mounting dimensions	MDS 514
MDS 506		
MDS 507		
SLG 40	Read head with diameter of M30	
SLG 40-S	Read head with diameter of M18	
SLG 41		
SLG 41-S (ZA23)	SLG 41 with turned antenna	
SLG 42		
SLG 42-ZA22[3]	SLG 42 with smaller range for Ex zone. No CE. Discontinued as of 01.01.96.	
SLG 43		
SLG 44		SLG 44 (A)
SLG 44-ZA28[1]	SLG 44 with wider range (1 m)	SLG 44 (A)
SLG 44-ZA30[1]	SLG 44 with adjustable receiving sensitivity	SLG 44 (A)
SLG 44-ZA07[1]	SLG 44 with range $\leq$ 0.75 m	

1 Discontinued. Replacement type is 100% compatible.
2 Discontinued. Replacement type is somewhat compatible.
3 Discontinued. No replacement type

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❒ Mechanical engineering
❒ Petrochemistry
❒ Pharmaceutics industry
❒ Plastics processing
❒ Paper industry
❒ Textiles industry
❒ Transportation industry
❒ Other _ _ _ _ _ _ _ _ _ _ _ _ _

Remarks/Suggestions

Your remarks and suggestions help us to improve the quality of our documentation. Please complete this questionnaire as soon as you have time, and return it to Siemens.

Title of your manual:_ _

Order number of your manual:_ _

Please enter your personal evaluation from 1 (good) to 5 (poor).

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2. Is it easy to find the information you need ? ☐
3. Is the information written in an easy-to-understand manner ? ☐
4. Does the amount of technical detail meet your requirements ? ☐
5. What is your opinion of the figures and tables ? ☐

If you encountered concrete problems, please use this space to explain.

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