SIEMENS

MOBY® I

Configuration, Installation and Service

Manual

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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.

Caution

indicates that 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

The device/system may only be set up and operated in conjunction with this manual.

Only **qualified personnel** should be allowed to install and work on this equipment. 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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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.

Technical support

The specialists of Technical Support are ready to advise and support you when you have questions on the functions and handling of our MOBY products.
You can reach us around the clock anywhere in the world.

Telephone: +49 (0) 180 5050-222
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E-mail: adsupport@siemens.com

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.siemens.de/moby

Introduction to MOBY I

2

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	8 kbytes 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)	≥ 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)

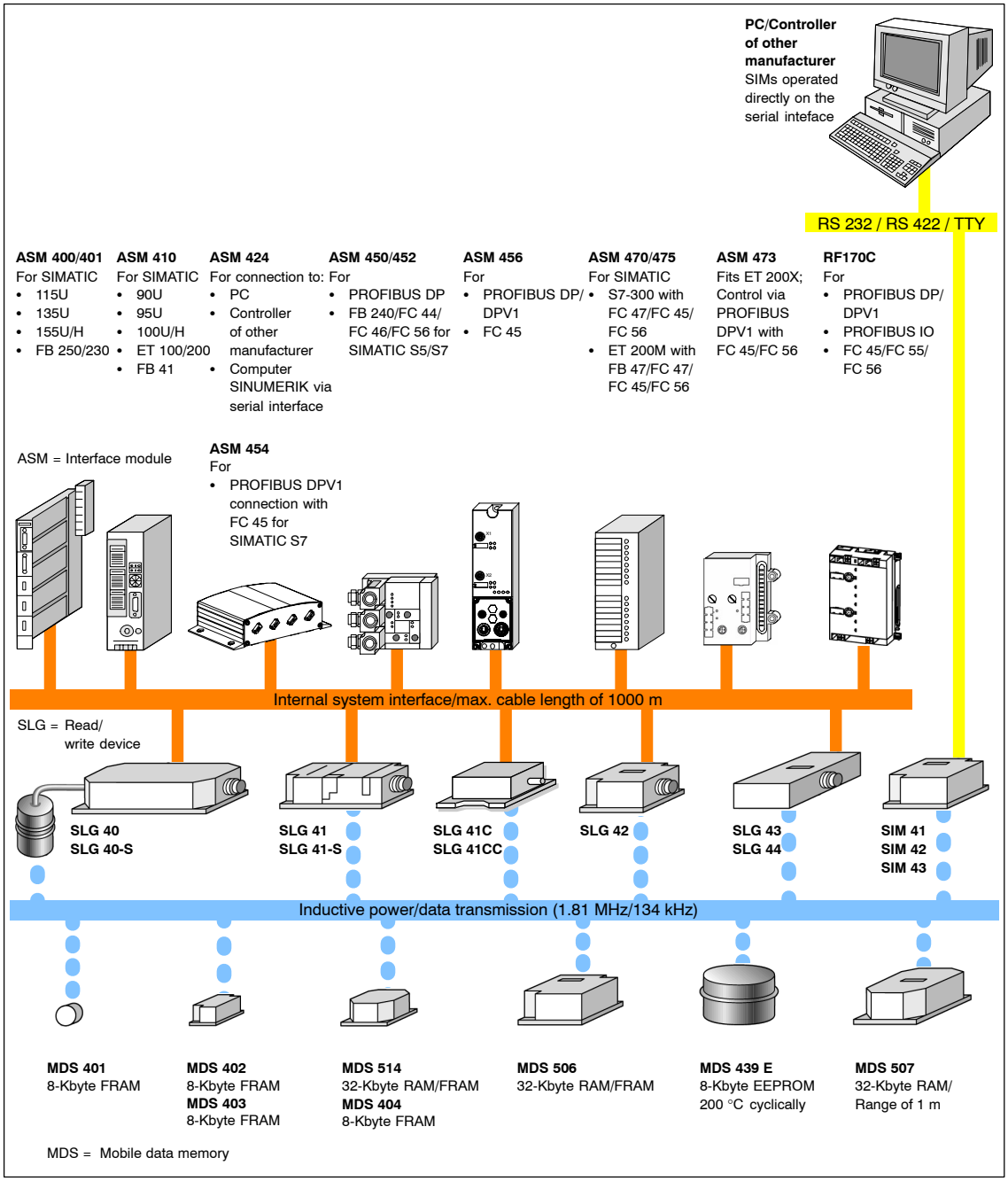


Figure 2-1 Overview of MOBY I components

Configuration and Mounting Guidelines 3

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 changes and modifications to this device could void the user's authority to operate the equipment.

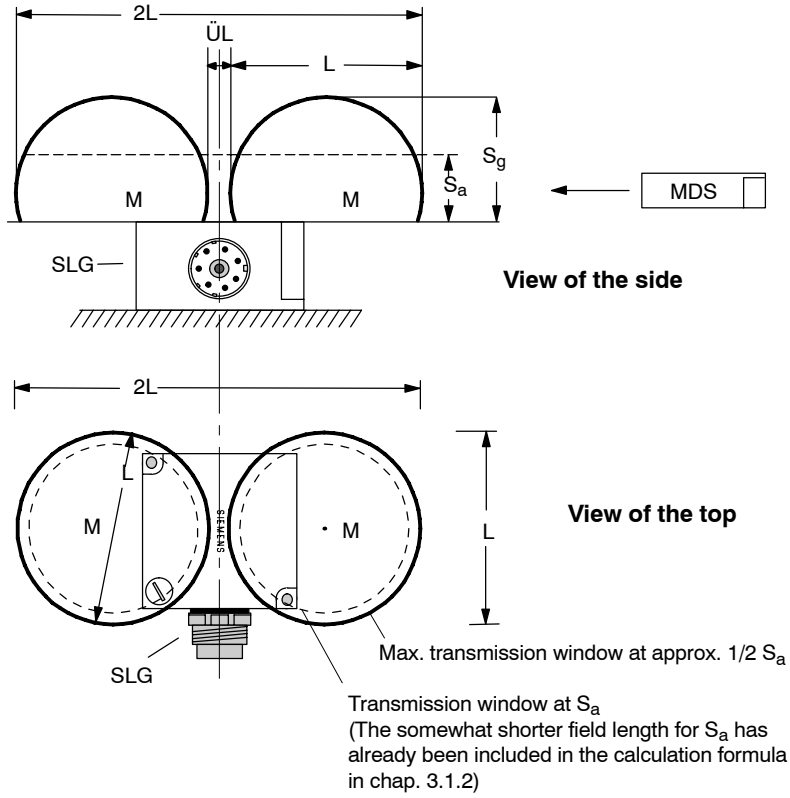
To choose the correct MOBY I components, apply the following criteria to your particular application.

- 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 Remember that a transmission hole (ÜL) exists in the middle of the window. When an MDS stops there, it cannot be processed.

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 402, 403 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.

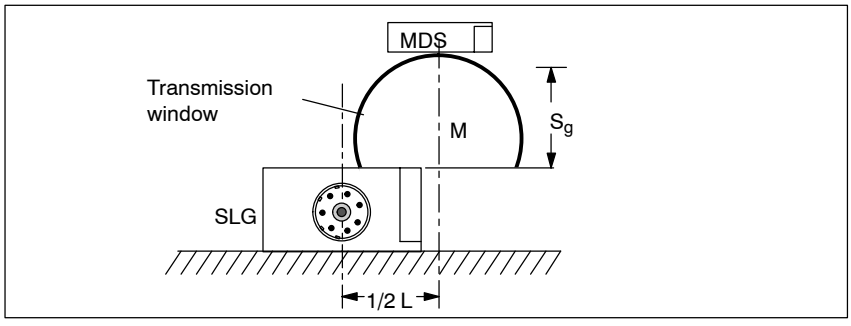


Figure 3-2 Working in static operation

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

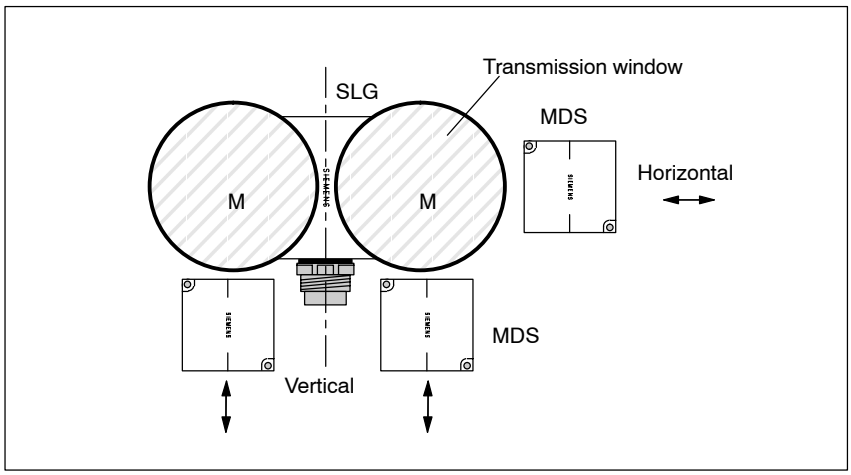


Figure 3-3 Working in dynamic operation

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

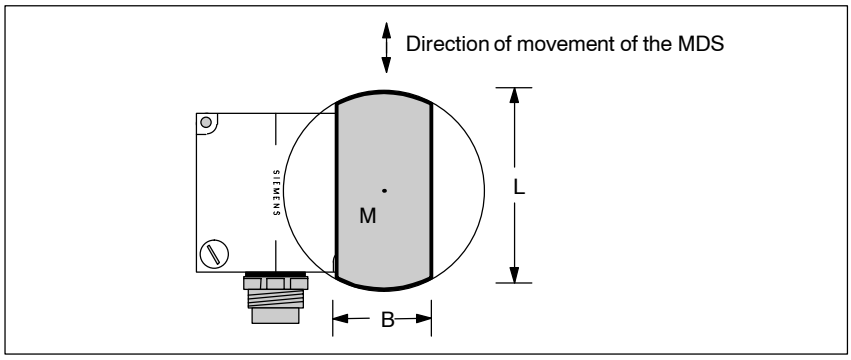


Figure 3-4 Vertical direction of movement

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

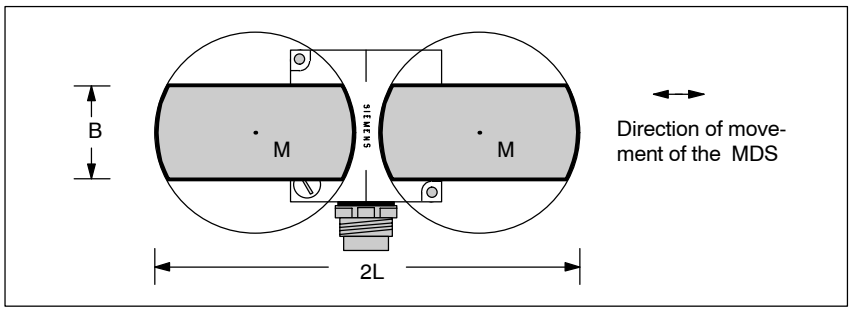


Figure 3-5 Horizontal direction of movement

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.

Transmission window of the MDS 403

The transmission window of the MDS 403 is described in chap. 4.4.

Transmission window of the MDS 507

The transmission window of the MDS 507 is described in chap. 3.6.

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:

$$t_K = K + t_{Byte} \cdot n \quad ^{1}$$

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).

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

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[2]	
66	16	0.8	RAM/FRAM	All	R/W	Normal operation
66	16	0.8	EEPROM	8 Kbytes	R	
66	16	3.8	EEPROM	8 Kbytes	W	
88[3]	38[3]	1.4	RAM/FRAM	All	R	ECC-operation[4]
88[3]	38[3]	1.4	EEPROM	8 Kbytes	R	
107[3]	57[3]	1.4	RAM/FRAM	All	W	
190[3]	140[3]	4.4	EEPROM	8 Kbytes	W	
110	60	1	RAM/FRAM	All	R/W	Filehandler
190	140	1.4	EEPROM	8 Kbytes	R	
190	140	3.8	EEPROM	8 Kbytes	W	
190	140	2.6	RAM/FRAM	All	R	Filehandler with ECC[4]
190	140	3.0	RAM/FRAM	All	W	
270	220	3.5	EEPROM	8 Kbytes	R	
330	280	8.6	EEPROM	8 Kbytes	W	

2 Operation: R = Read, W = Write
3 Worst-case values. Usually not reached.
4 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.

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 filehandler

- The time constant K already contains a read and write operation which the filehandler 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/FRAM		8-Kbyte RAM/FRAM	
	With-out ECC	**With ECC**	**With-out ECC**	**With ECC**	**With-out ECC**	**With ECC**
Read directory + FAT	580	950	940	1600	580	950
Write directory entry [1]	300	310	330	400	220	270
Write directory entry + FAT [1]	1190	1260	540	750	410	600

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, FC 45
  - Filehandler: FB 230, FC 46, FB 246, FC 56

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

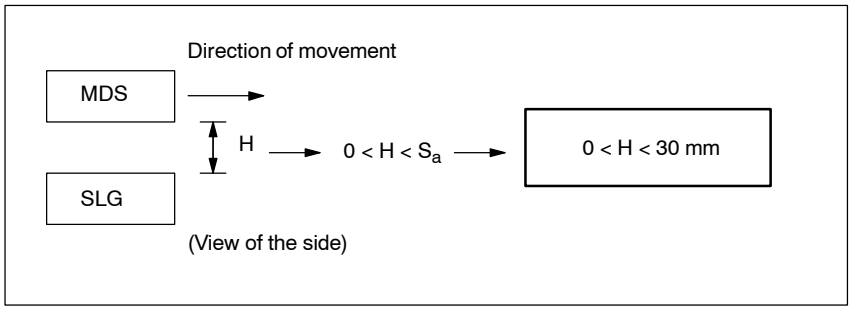


Figure 3-6 Tolerances of the height allowance of the pallet

Tolerances of the side allowance of the pallet

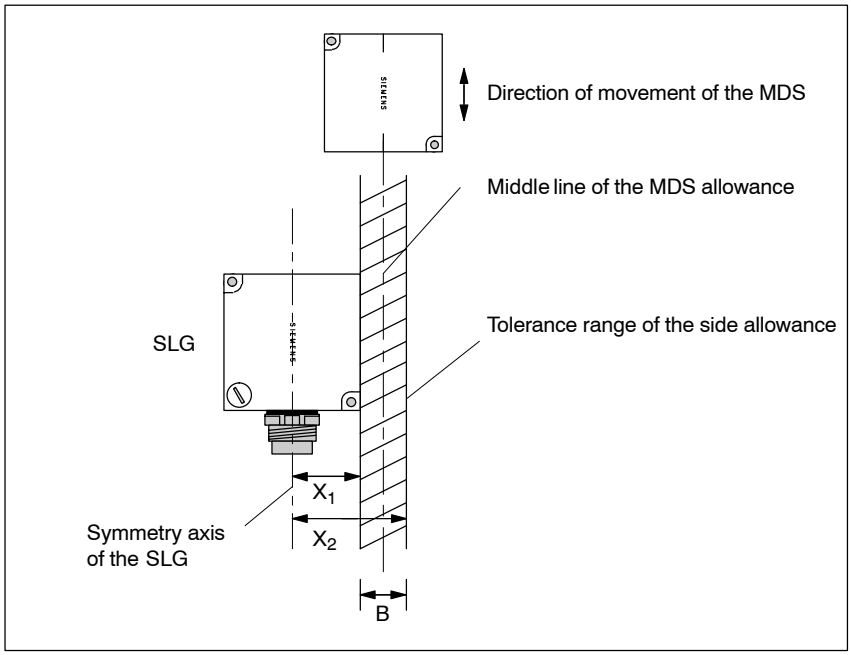


Figure 3-7 Tolerance of the side allowance of the pallet

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 514 MDS 404		MDS 506		MDS 439 E		MDS 401 MDS 402		MDS 403	MDS 507
Length of the Transmission Window in mm (L)										
	L	2L	L	2L	L	2L	L	2L	L[1]	L[1]
SLG 40	–	–	–	–	–	–	L_d = 18[2]		–	–
SLG 40-S	–	–	–	–	–	–	L_d = 9[2]		–	–
SLG 41[3]	36	72	–	–	–	–	30	50	65	–
SLG 41C	30	60	–	–	–	–	20	40	65	–
SLG 42	90	180	120	190	120	210	–	–	110	–
SLG 43	140	260	220	400	190	330	–	–	–	–
SLG 44	–	–	–	–	–	–	–	–	–	1200
SIM 4x	60	80	85	100	75	100	–	–	80	–
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		25	–
SLG 41C	12		–		–		8		25	–
SLG 42	36		48		48		–		50	–
SLG 43	60		88		76		–		–	–
SLG 44	–		–		–		–		–	300
SIM 4x	20		30		30		–		45	–
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 6		4 to 15	–
SLG 41C	0 to 12		–		–		0 to 6		4 to 15	–
SLG 42	0 to 30		10 to 35		10 to 55		–		10 to 30	–
SLG 43	0 to 50		20 to 100		20 to 80		–		–	–
SLG 44	–		–		–		–		–	100 to 800
SIM 4x	0 to 20		0 to 25		0 to 25		–		0 to 25	–

1 **Caution:** The MDS 507 and MDS 403 must be positioned based on the direction. The geometry of the transmission window differs from the other MDSs. Cf. chap. 3.6 or 4.4.

2 L_d: Due to the special characteristics of the antenna of the MDS 402/401, 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 514 MDS 404	MDS 506	MDS 439 E	MDS 401 MDS 402	MDS 403	MDS 507
Limit distance in mm (S_g)						
SLG 40	-	-	-	10	-	-
SLG 40-S	-	-	-	8	-	-
SLG 41[3]	25	-	-	10	30	-
SLG 41C	25	-	-	10	30	-
SLG 42	60	70	70	-	80	-
SLG 43	90	150	125	-	-	-
SLG 44	-	-	-	-	-	1000
SIM 4x	33	40	33	-	40	-
Distance from MDS to MDS in mm (D1)						
SLG 40	-	-	-	> 50	-	-
SLG 40-S	-	-	-	> 50	-	-
SLG 41[3]	> 90	-	-	> 80	> 120	-
SLG 41C	> 90	-	-	> 80	> 120	-
SLG 42	> 250	> 300	> 500	-	> 200	-
SLG 43	> 500	> 600	> 600	-	-	-
SLG 44	-	-	-	-	-	> 4000
SIM 4x	> 200	> 300	> 300	-	> 200	-

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 SLG 41-S SLG 41C	SLG 42	SLG 43	SLG 44	SIM 4x
SLG 40/40-S	> 50/80	-	-	-	-	-
SLG 41/41-S/41C	-	> 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

How it works

During the MOBY I dialog, one ASM exchanges data with another ASM while both SLGs are in the transmission window. When parameterizing the two ASMs, always make sure that one ASM uses normal mode (station_N) and the other uses dialog mode (station_D).
As soon as the ASM for dialog mode is parameterized as such, a memory area is created there called VMDS (see figure 3-8). The VMDS is then used for communication memory. Its setup is like a dual port RAM. Station_N and station_D can be read and write accessed in the same way on the VMDS. Station_D supplies data to the VMDS (write access). These data are read by station_N as soon as both SLGs meet.

Dialog setup

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

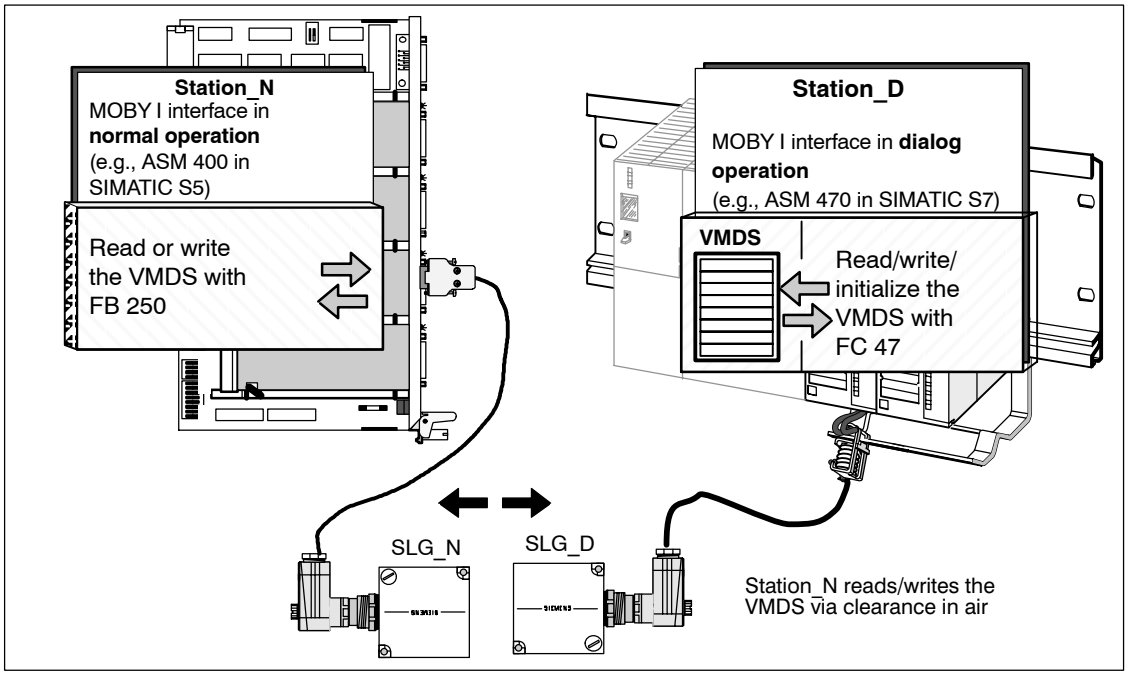


Figure 3-8 Dialog setup for MOBY I

Table 3-5 Definition of terms

Designation	Explanation
Station_N	Normal ASM of MOBY I (all MOBY ASMs as per chap. 6) 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 (ASM 452 = 1280 bytes) 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.

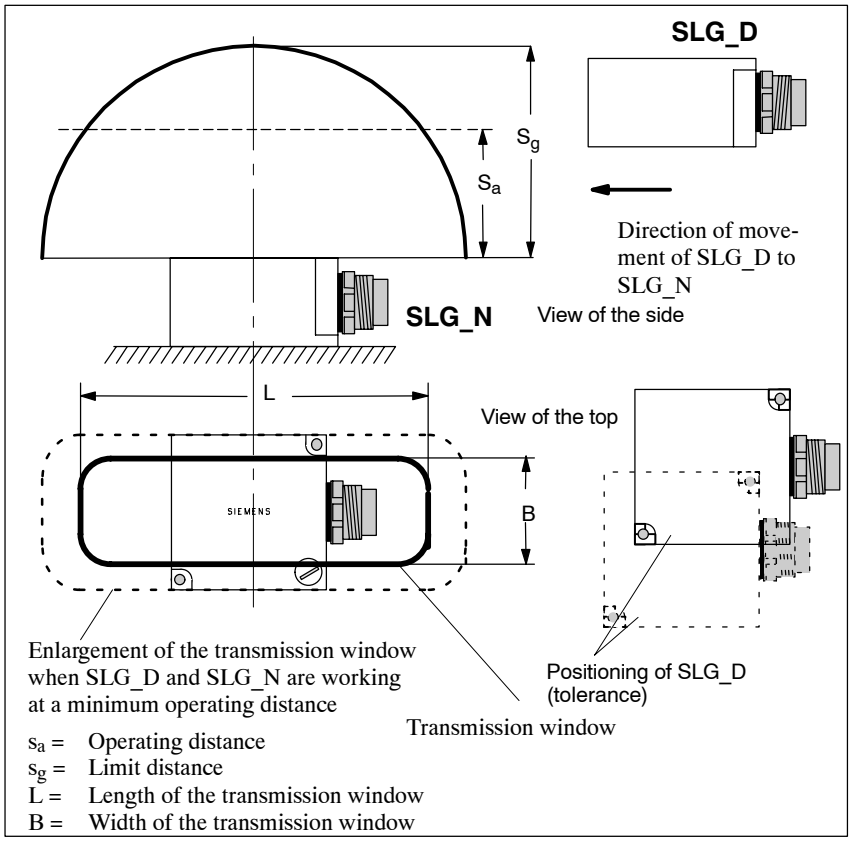


Figure 3-9 Transmission window during dialog

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).

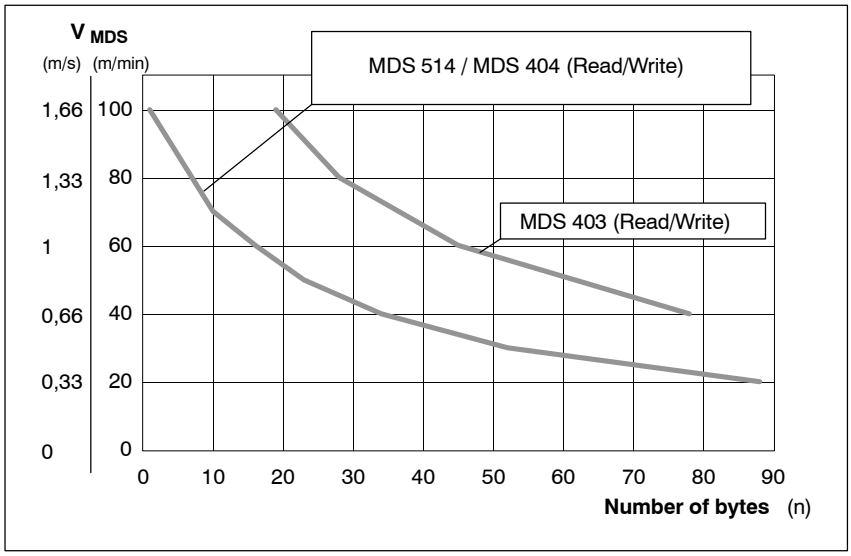


Figure 3-10 SLG 41 (vertical operation)

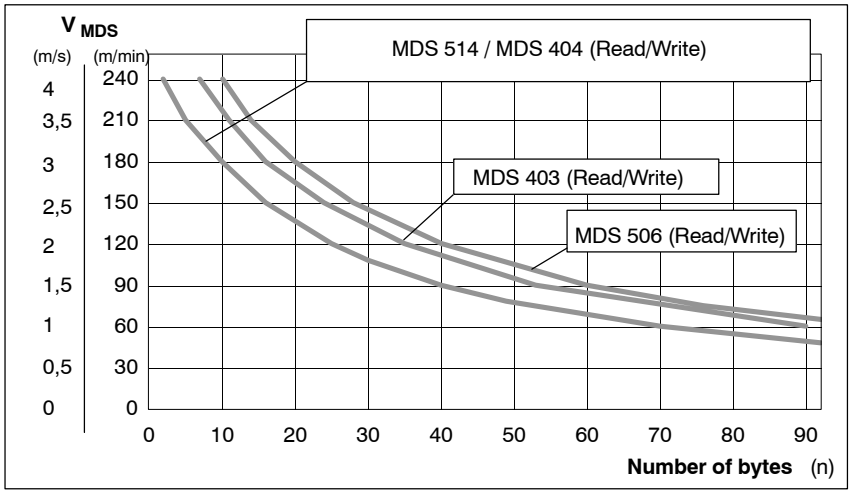


Figure 3-11 SLG 42 (vertical operation)

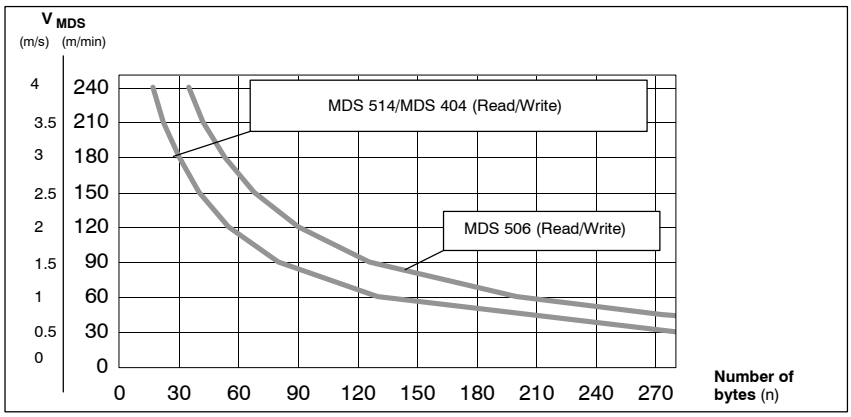


Figure 3-12 SLG 43 (vertical operation)

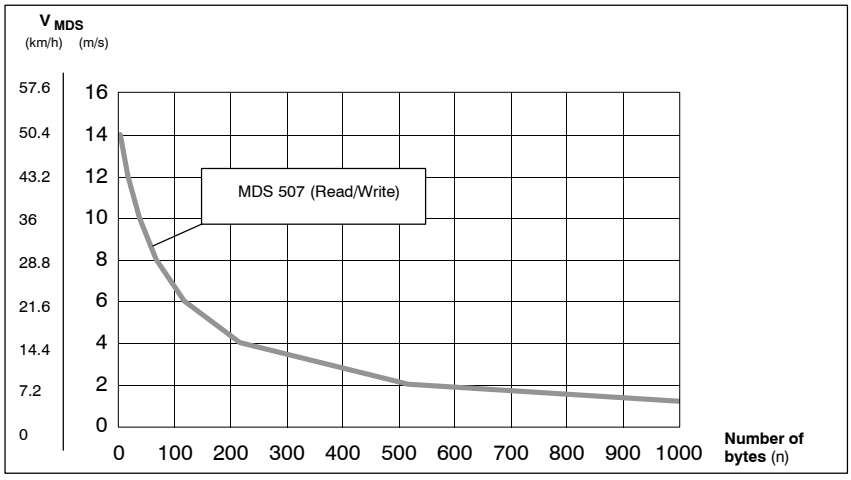


Figure 3-13 SLG 44 (data quantity at low speed)

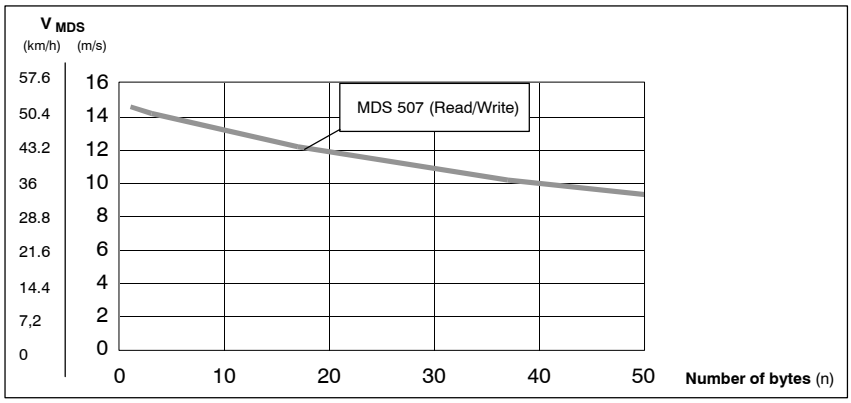


Figure 3-14 SLG 44 (enlarged section of figure 3-13)

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

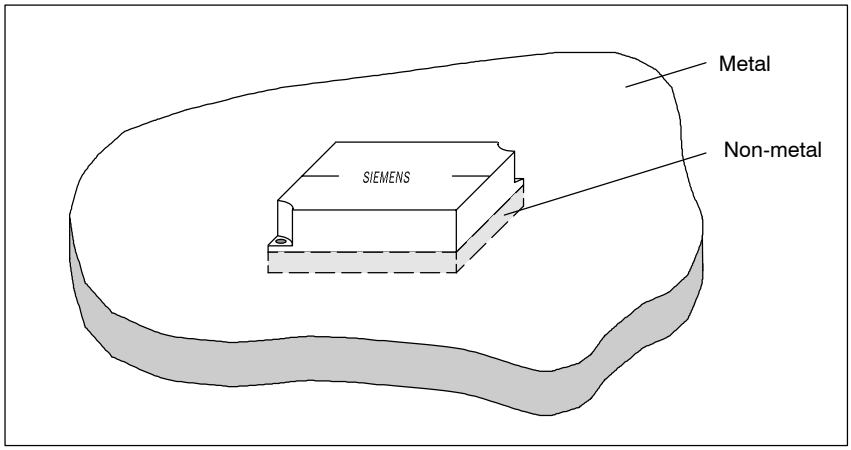


Figure 3-15 Installation on metal carrier

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.

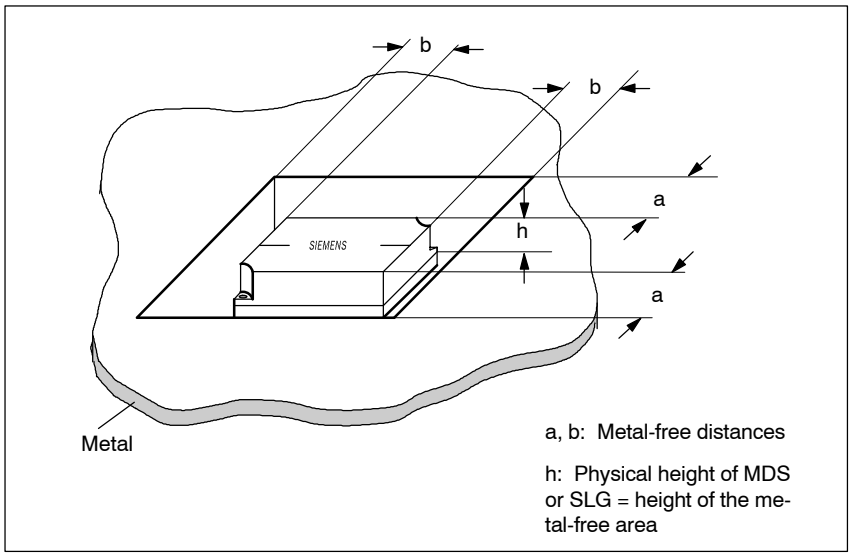


Figure 3-16 Flush installation

Table 3-7 Dimensions for flush installation

Dimensions in mm	a	b	h
MDS 404/514	10	10	20
MDS 402	10/0*	10	15
MDS 403	10	10	15
MDS 401	10/0*	–	9
MDS 506	40	40	40/60**
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 41C	20	20	30
SLG 42	30	30	40
SLG 43	>50	>30	40/60**
SLG 44	80	40	40/60**
SIM 4x	30	30	40

* See MDS description in chap. 4
** Recommended value

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.

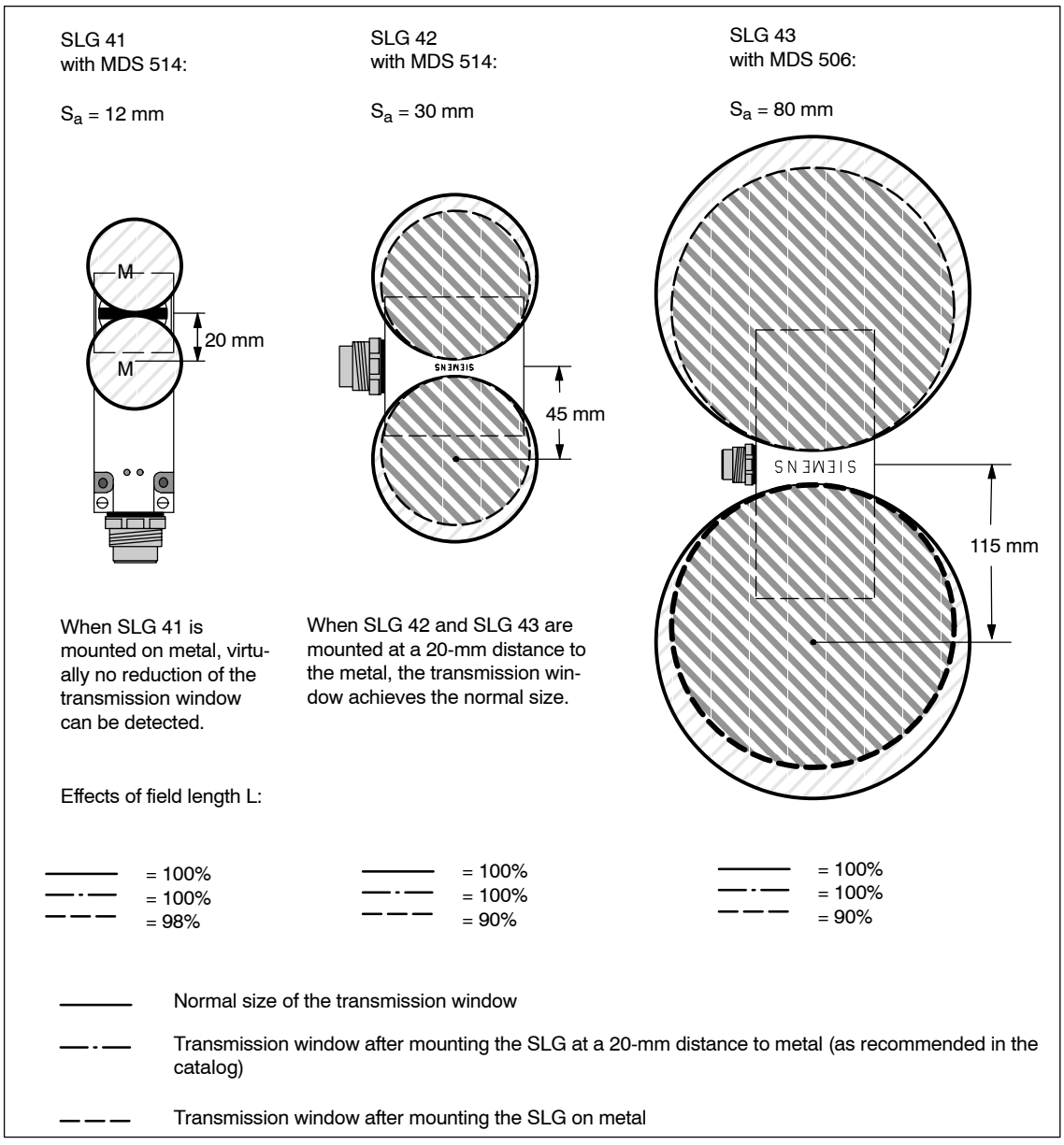


Figure 3-17 Mounting the SLG on metal

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.

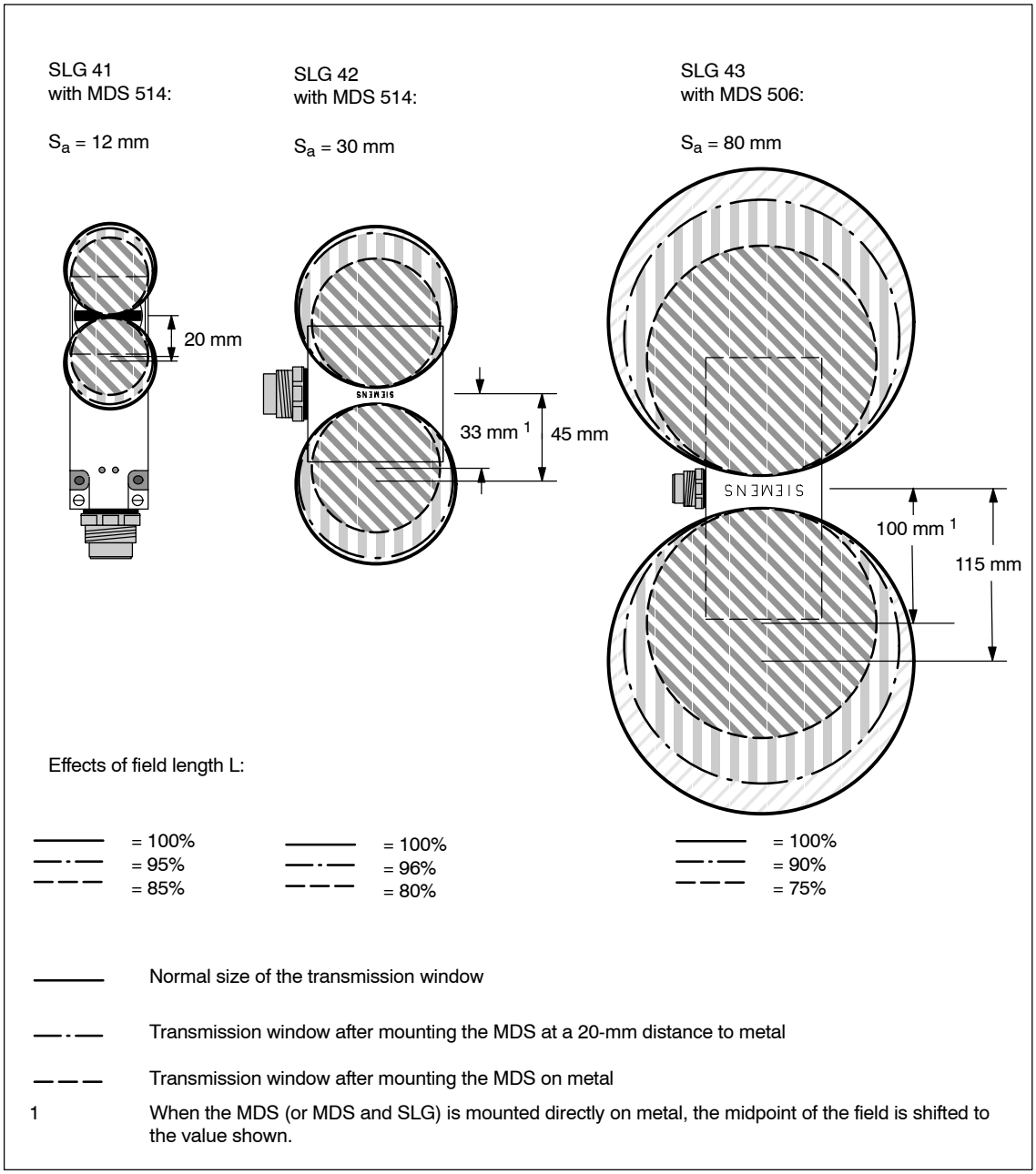


Figure 3-18 Mounting the MDS on metal

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.

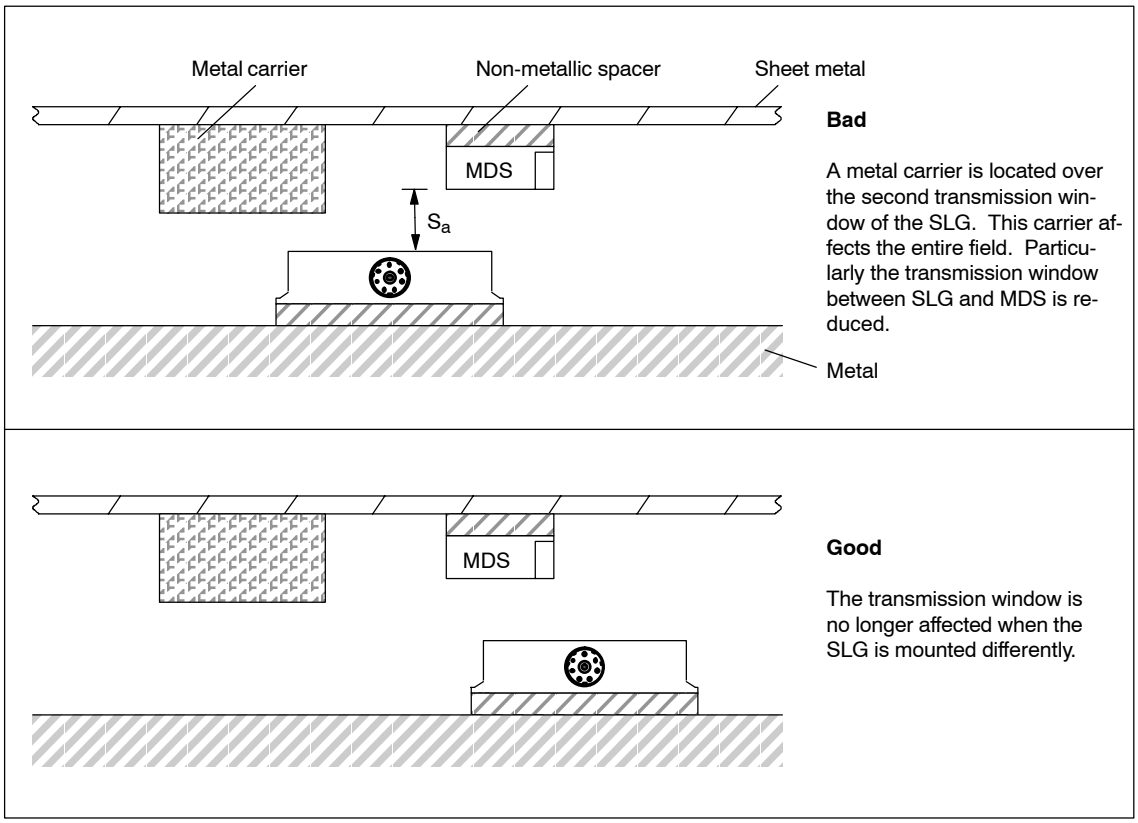
Table 3-8 Reduction of the field data due to metal. Specifications in % as related to non-metal

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

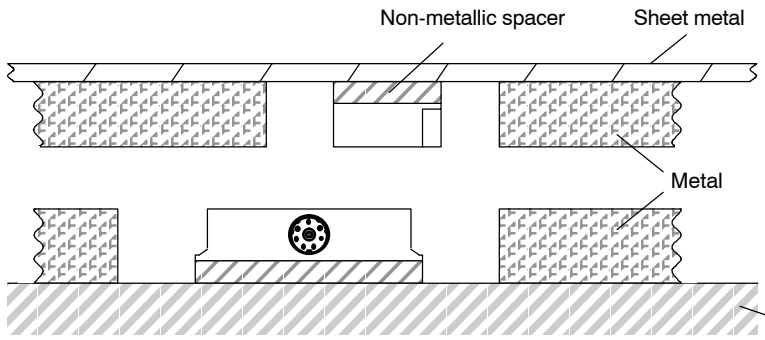
A metal carrier is located over the second transmission window of the SLG. This carrier affects the entire field. Particularly the transmission window between SLG and MDS is reduced.

Good

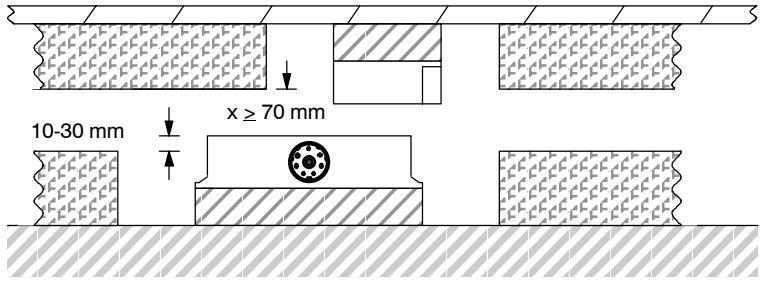
The transmission window is no longer affected when the SLG is mounted differently.

Figure 3-19 Interfering metal carriers

Flush installation

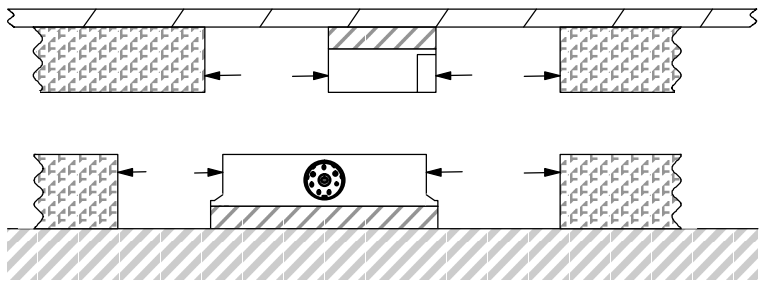


Although flush installation of MDS and SLG is generally possible, the size of the transmission window is sharply reduced. The following measures can be used to counteract reduction of the window.



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

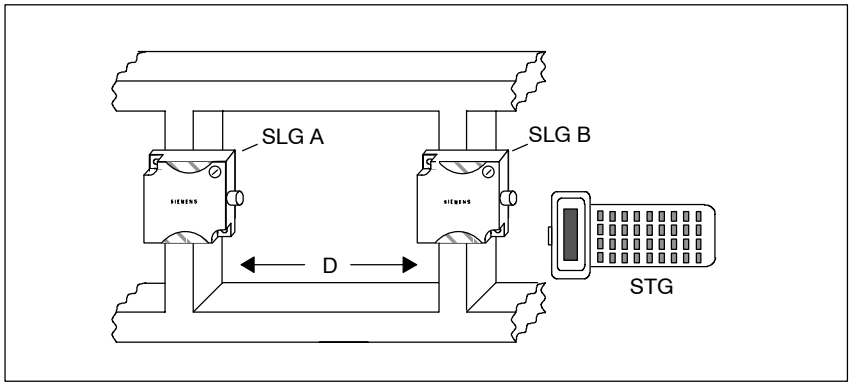
Installation of several SLGs on metal frame or carrier

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

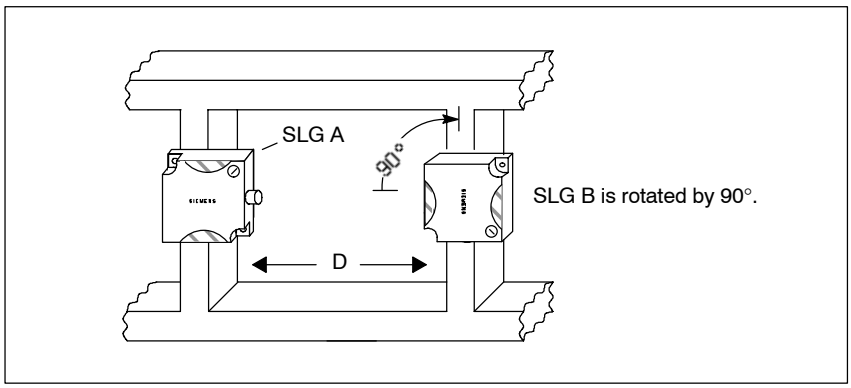
a) Using the service and test device and the "HELP" key + "A," the presence of an inductive interference field can be proven. An LED on the SLG 44 indicates the presence of such a field of interference.



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

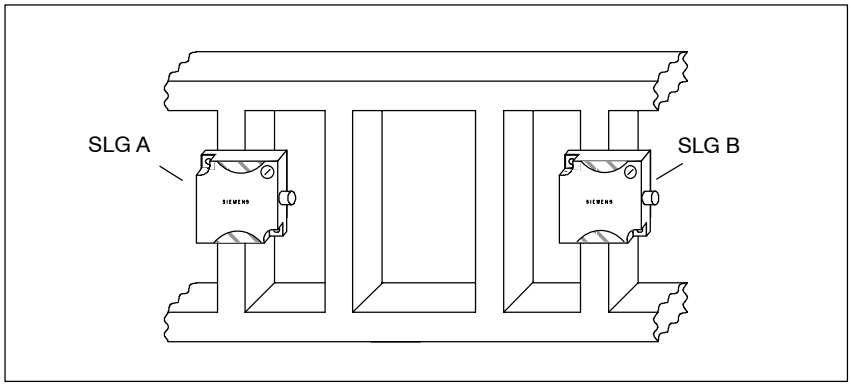
c) Turn one or both SLGs by 90°. This rotates the inductive fields so that they can no longer affect each other.



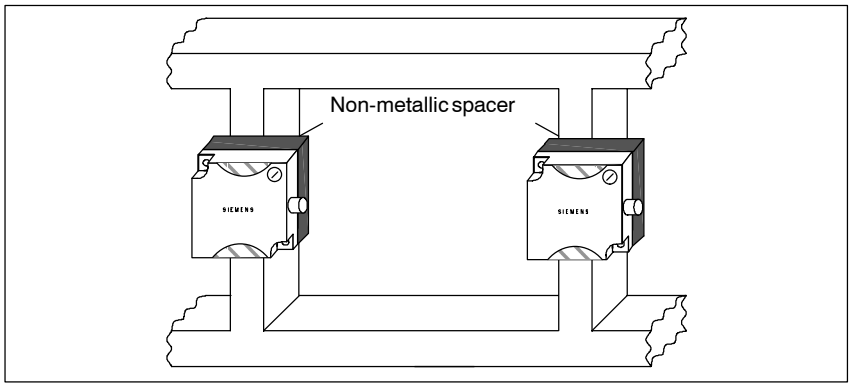
Caution

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 Using Side Lobes

In addition to the arrangement of MDS and SLG as described in chapter 3.1, other arrangements within the transmission window are possible. With some applications (e.g., assembly lines), this can help simplify a plant.

The following example shows how an MDS is processed from two different sides.

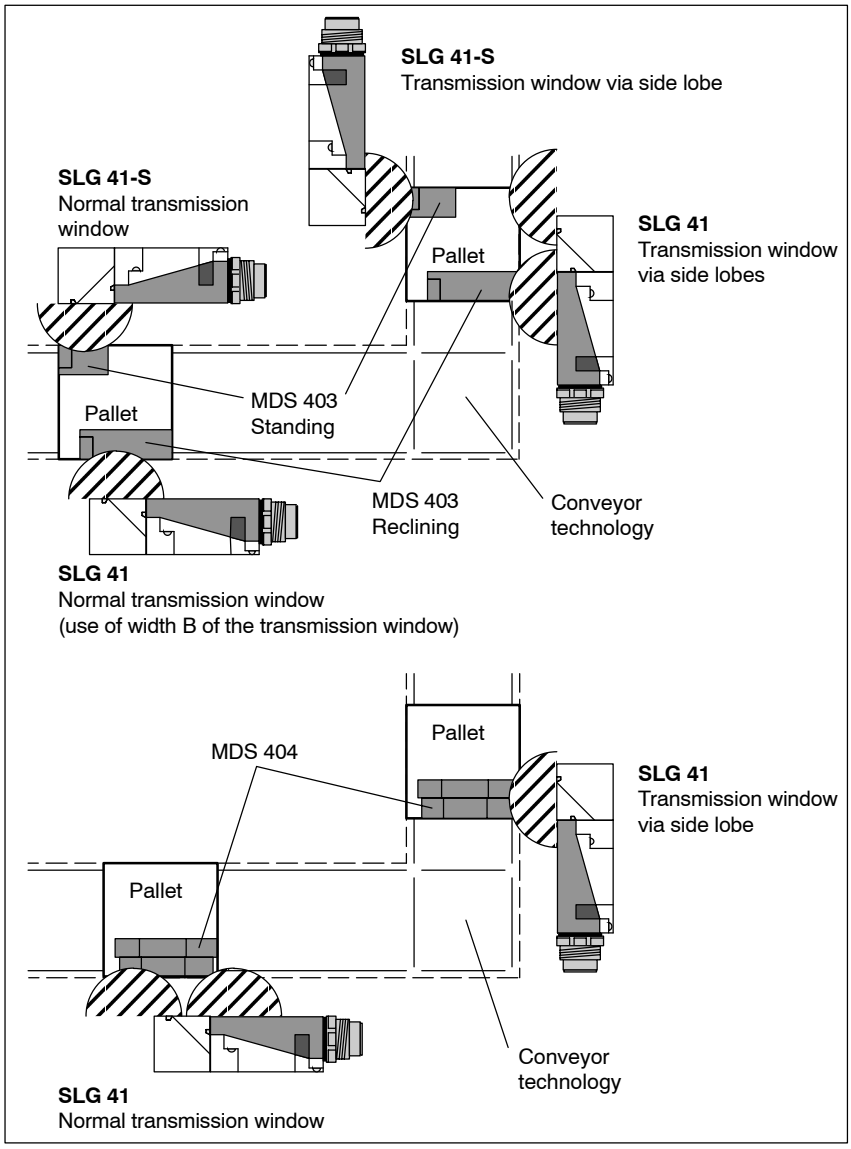


Figure 3-21 Assembly line with MDS 403 reclining or standing (top) and MDS 404 (bottom)

The size of the side lobes can as large as the normal transmission window. However, remember that a metallic environment greatly affects the size and location of the side lobes. We recommend determining the side lobes with a test setup in an actual environment (e.g., pallet).

3.5.5 Chemical Resistance of the Mobile 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 filehandler, 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.

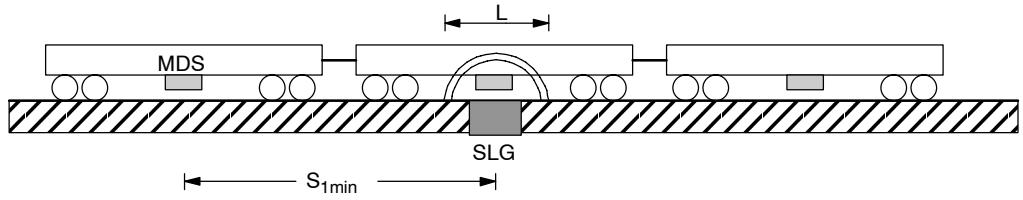
Note

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.
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 3-22 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.

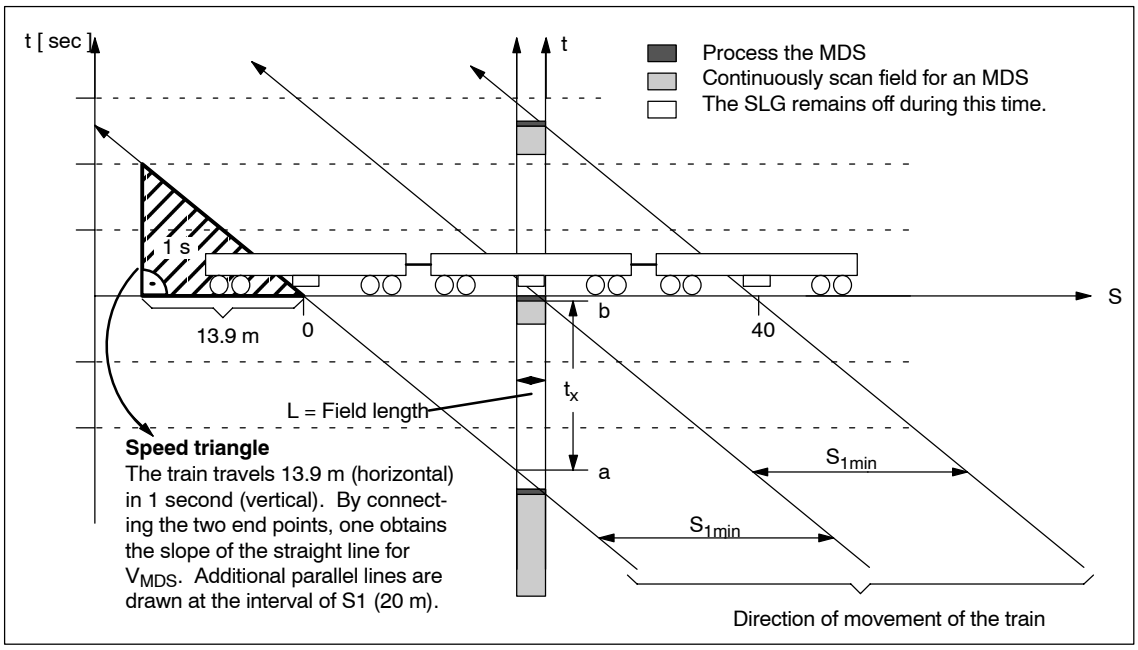


Figure 3-23 Diagram of the configuration (drawn to scale)

Requirements for maximum t_{ABTAST}

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

as shown by the diagram: tx $\approx$ 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.

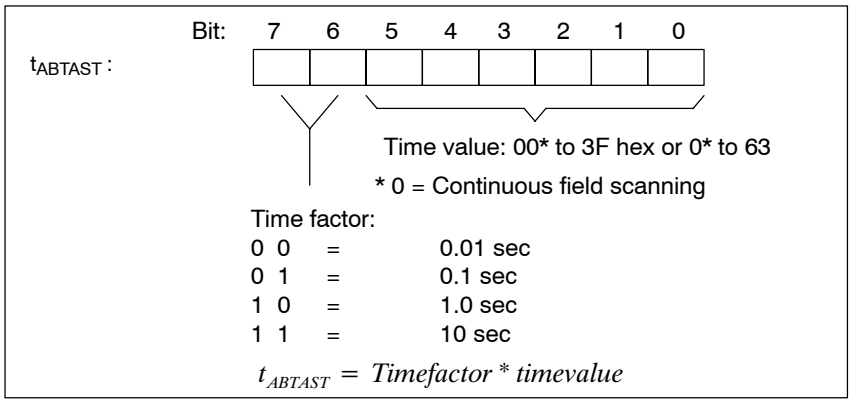


Figure 3-24 Coding for t_{ABTAST}

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.

0401, 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.

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.

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.

FC 45

MDS 507 mode is enabled by setting the parameter MOBY_mode = 1 in UDT 10 of the FC 45 project. t_{ABTAST} is set with the parameter scanning_time.

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.

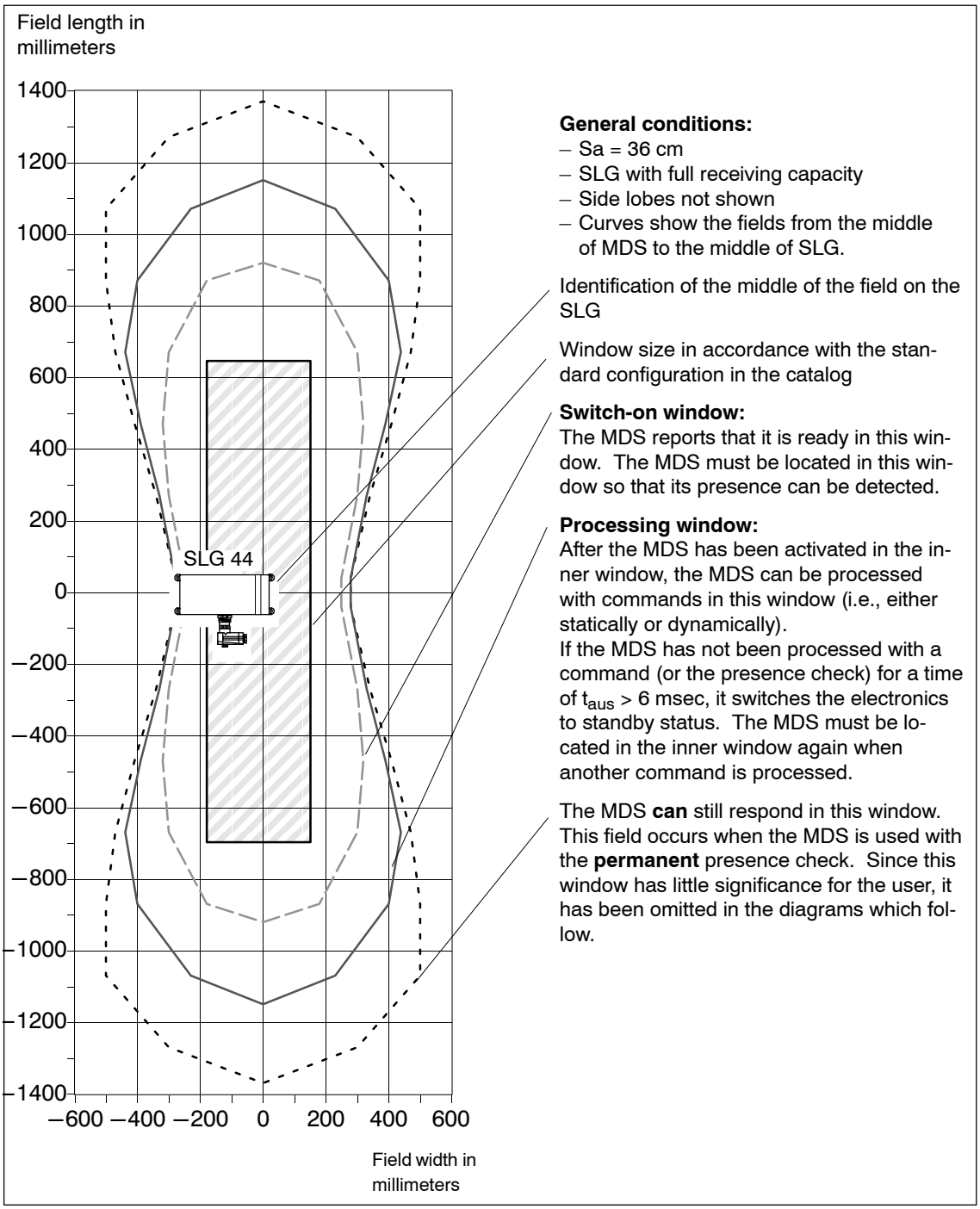


Figure 3-25 Real transmission window between the MDS 507 and the SLG 44

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

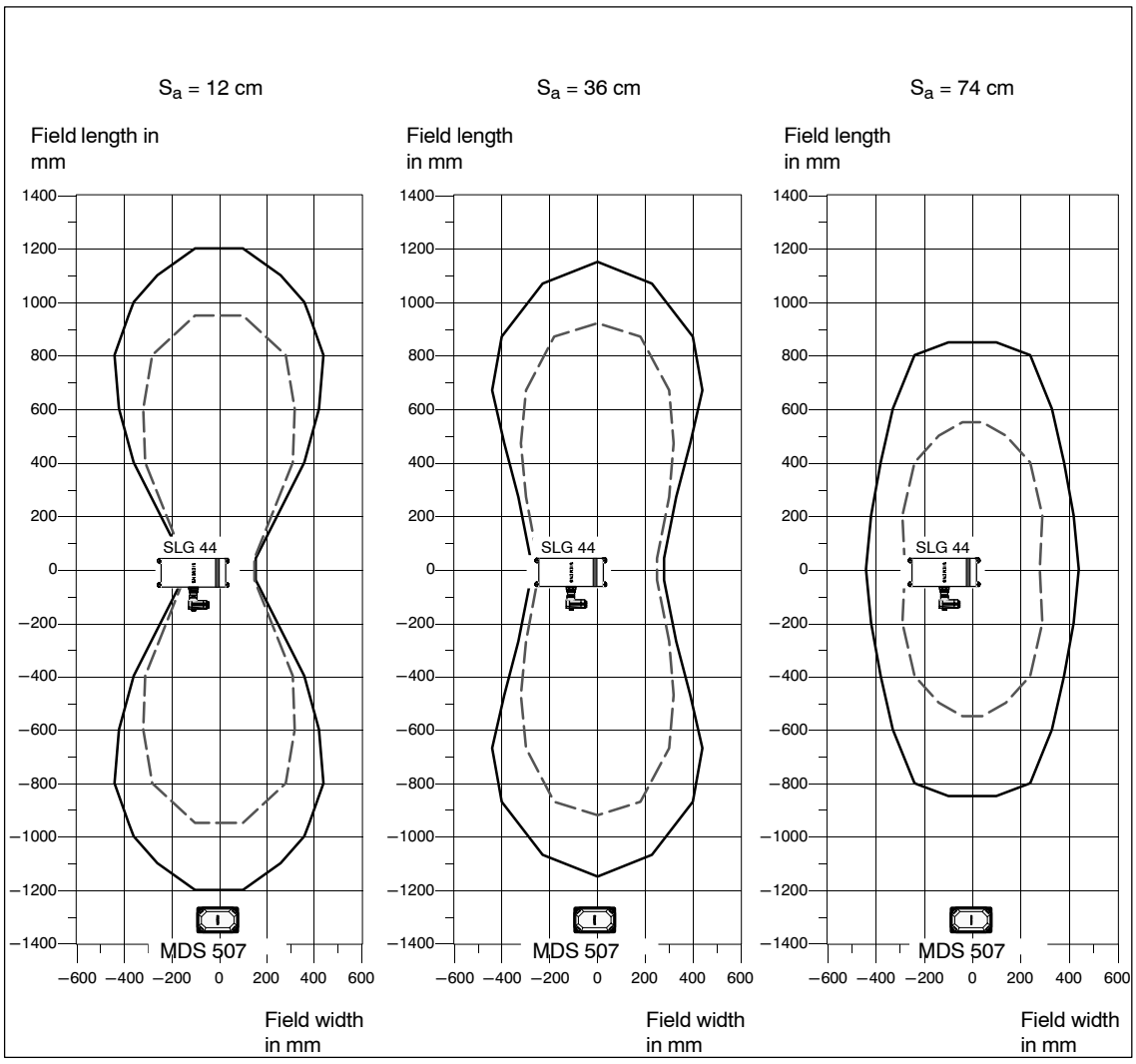


Figure 3-26 Main lobe with different operating distances

Main and side lobes with different operating distances

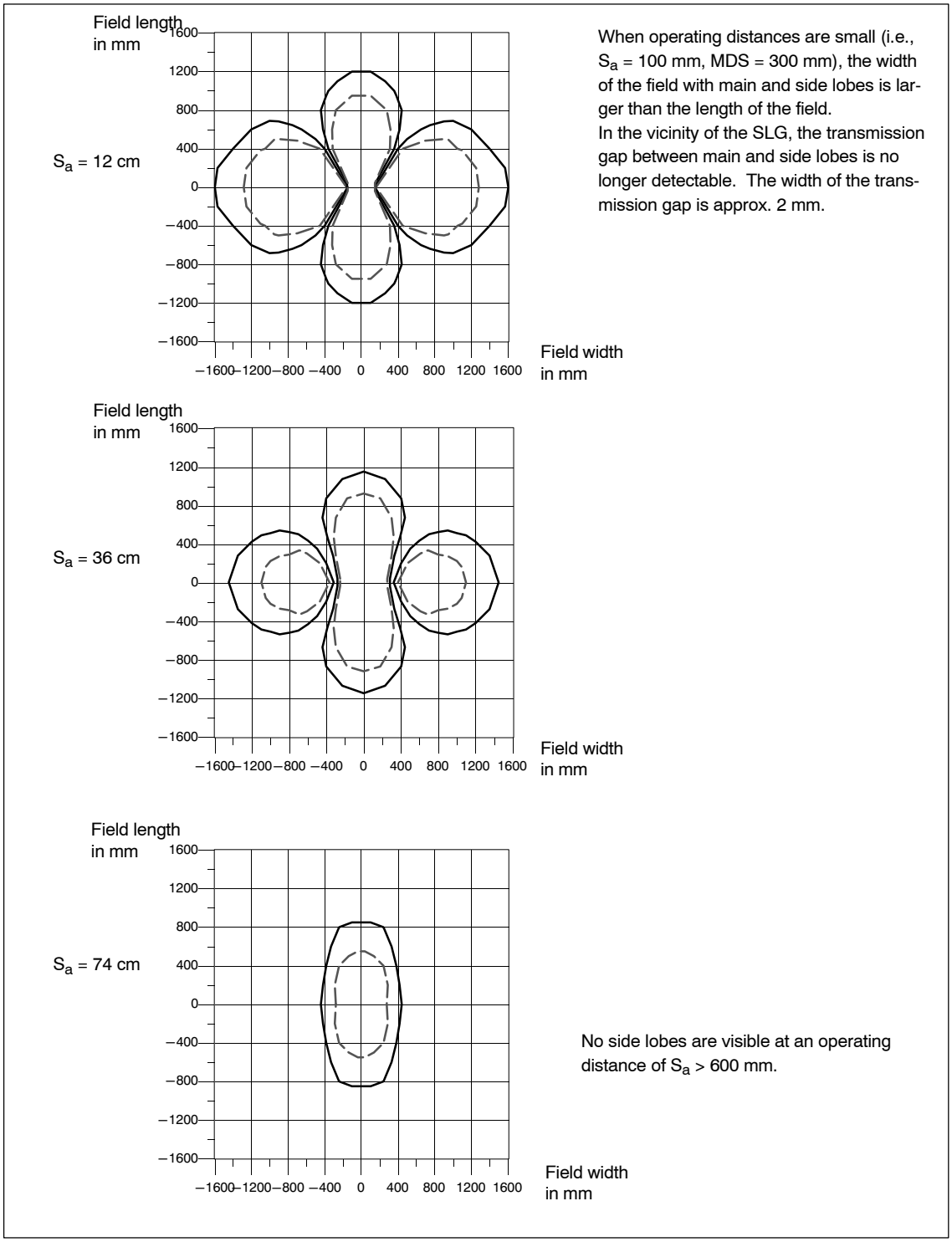


Figure 3-27 Main and side lobes with different operating distances

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.

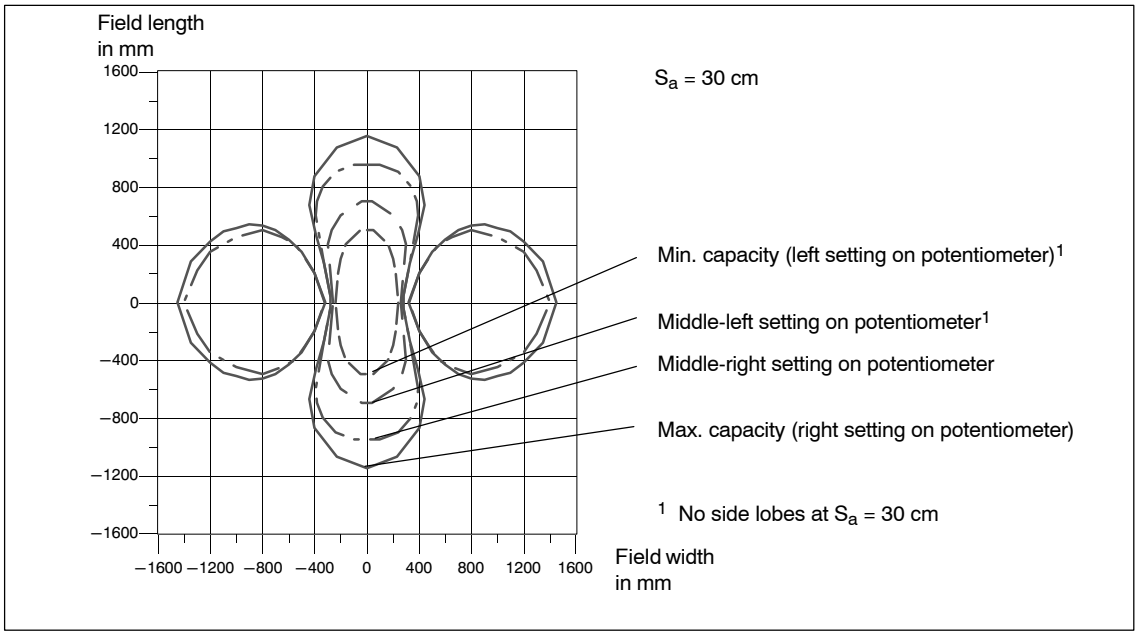


Figure 3-28 Switch-on window for various receiving capacities

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).

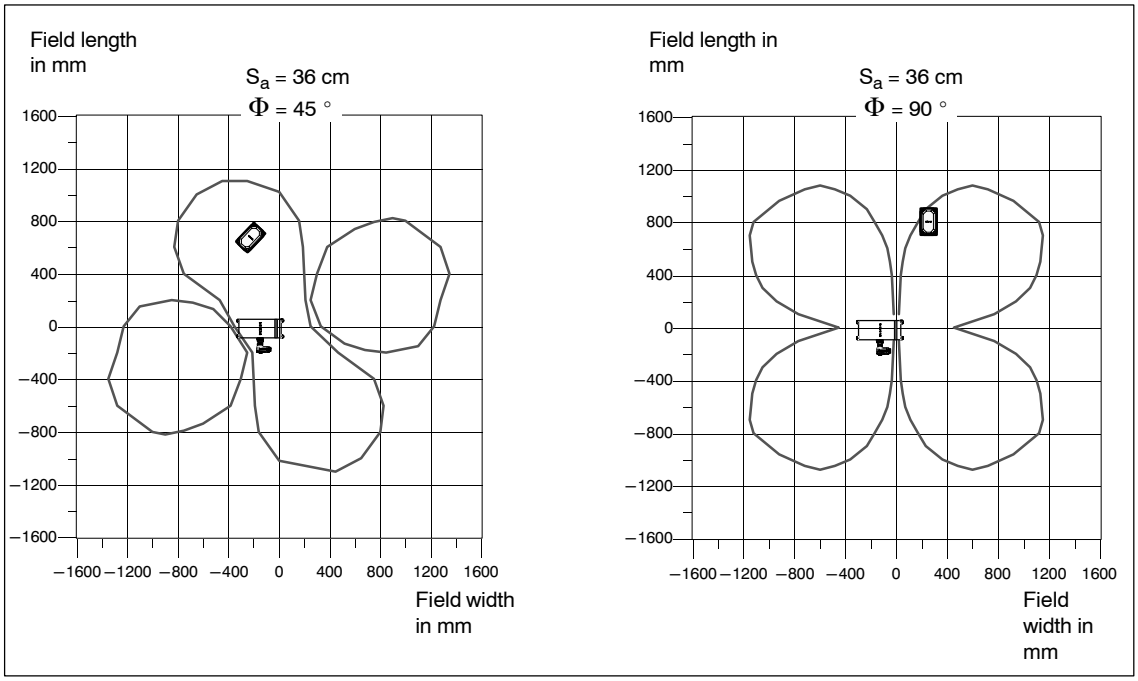


Figure 3-29 Switch-on window with various angle deviations

Distance D or D1

The following values are specified for the general configuration.

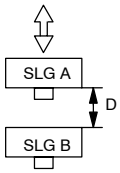
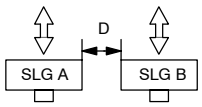
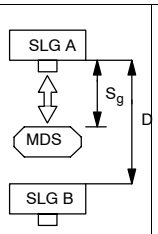
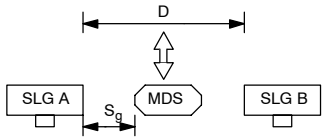
$D = 6\,m$ (SLG ↔ SLG)

$D1 = 4\,m$ (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. 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 3-30.

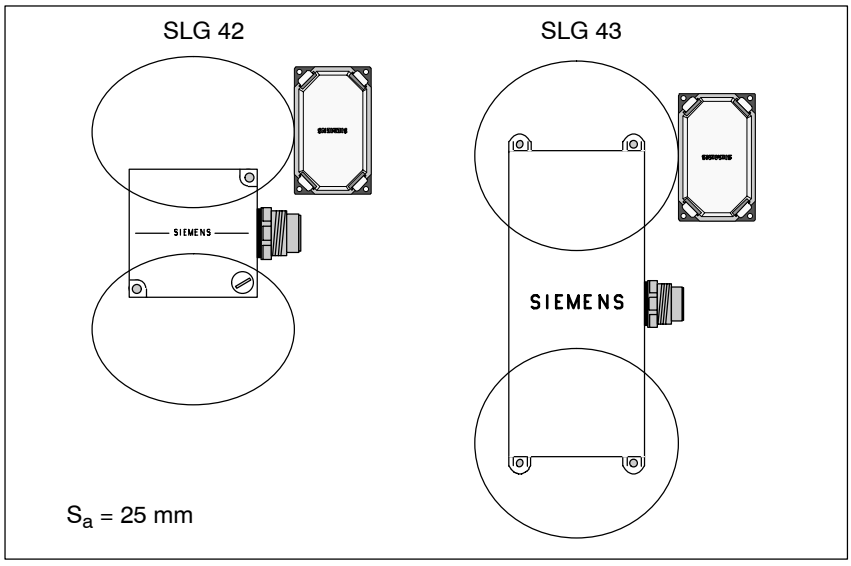
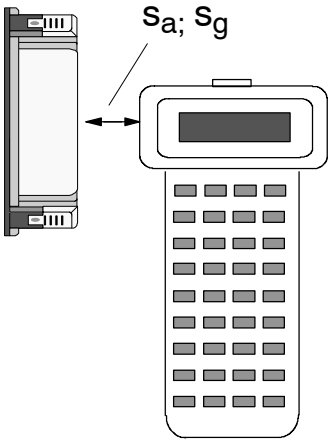


Figure 3-30 Transmission window of the MDS 507 with dead battery

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:

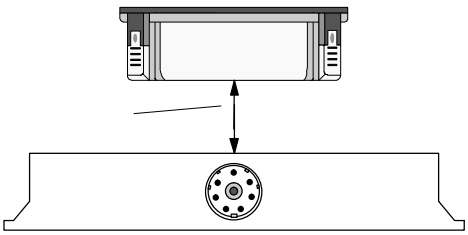
The dialog battery is okay when MDS can be processed at S_a > 40 mm.

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 3-31 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.

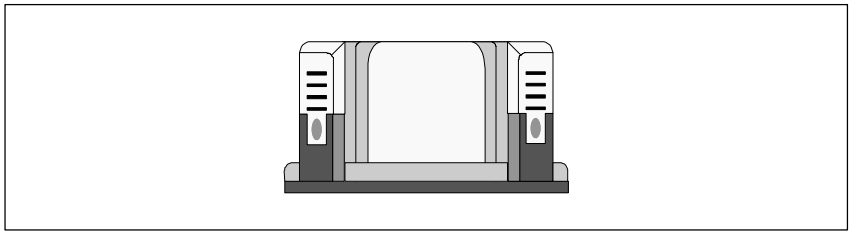
Remember:

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

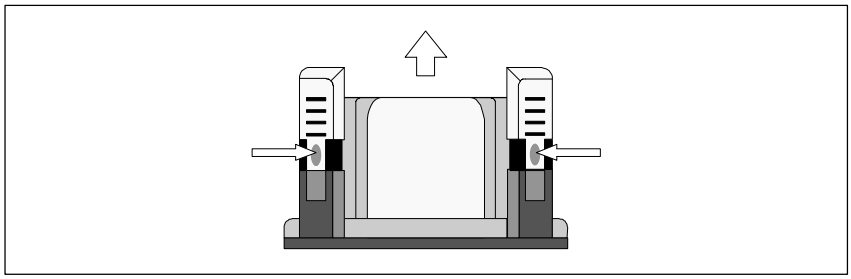
Figure 3-32 Dead battery message with SLG 43

Changing the battery

a) Unlock the four housing locking mechanisms.



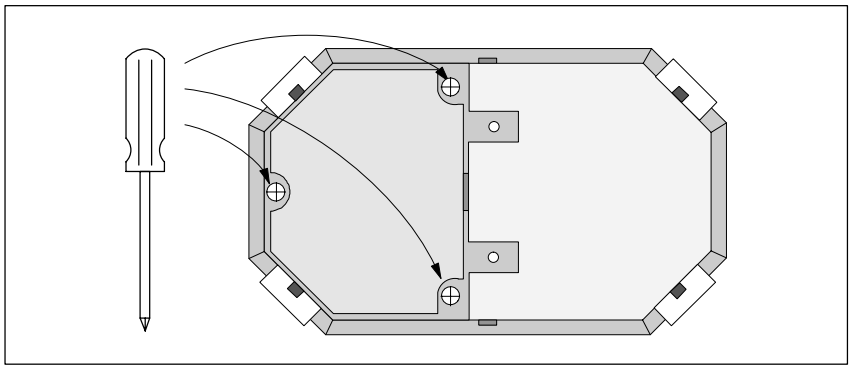
b) At the lower ends, press the locks simultaneously towards the inside, and lift the upper part of the housing with the electronics.



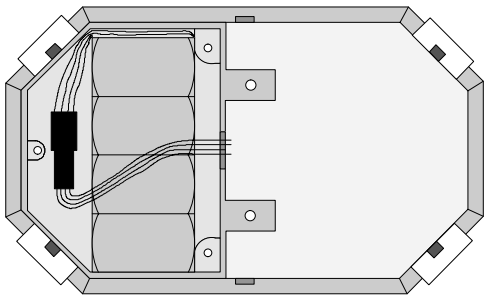
Note

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.

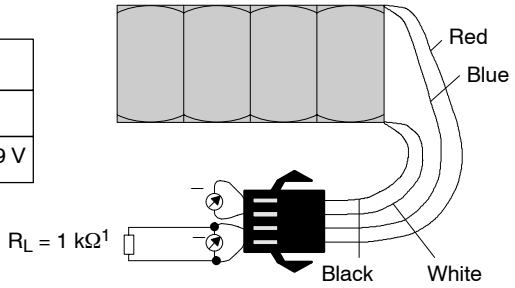


d) Using the plug-in terminal, remove the used battery block from the MDS and install the new battery block. Install cable, plug connector and battery in the battery compartment as shown.



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



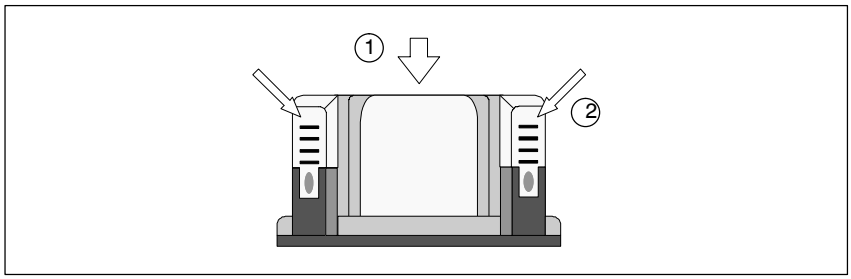
1 To measure voltage U_2, install a load resistor (R_L = 1 kΩ) in parallel to the measuring instrument. This is particularly important for bad batteries.

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.

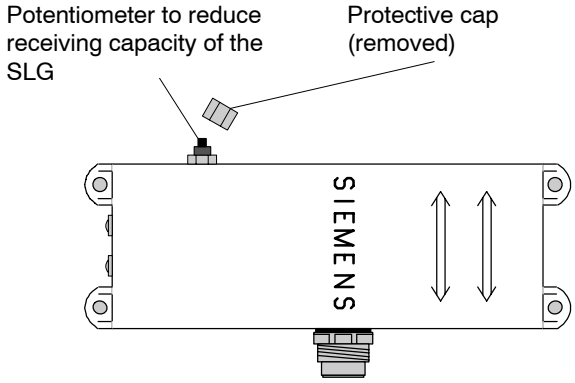
3.6.5 Reducing the Sensitivity of the SLG 44

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 3-33 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.

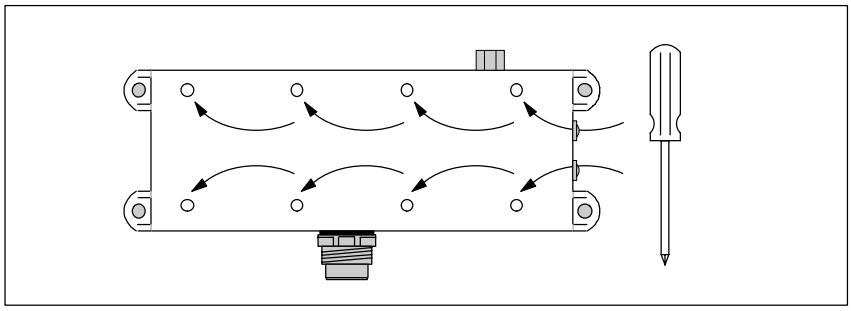


Figure 3-34 Opening the cover of the SLG 44

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

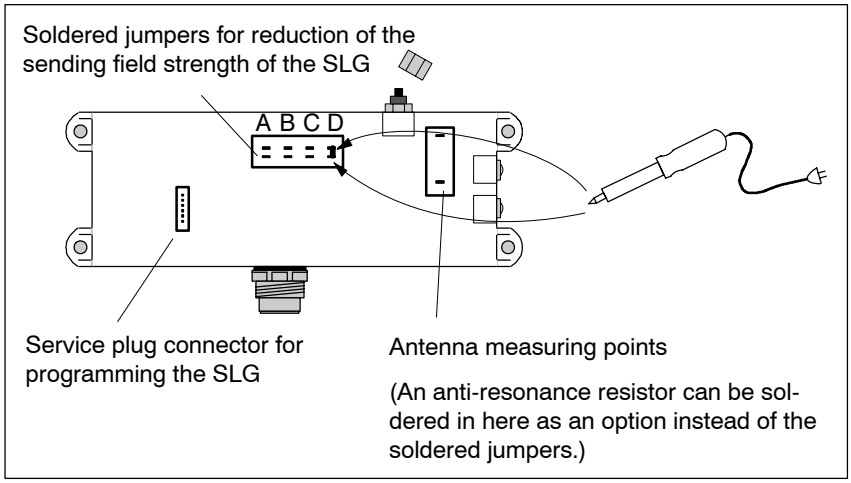


Figure 3-35 Soldered jumpers and antenna measuring points on the SLG 44

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.

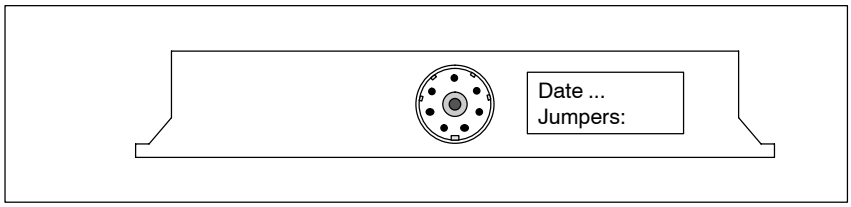


Figure 3-36 Label for identification of the hardware status

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. figure 3-37)
t_V	=	Transmit period of the MDS

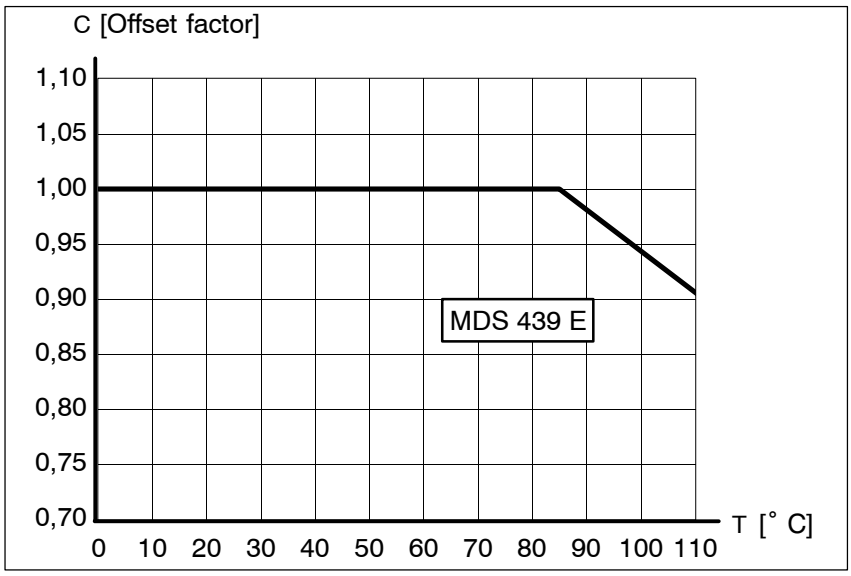


Figure 3-37 Offset factor C in relation to the temperature

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).

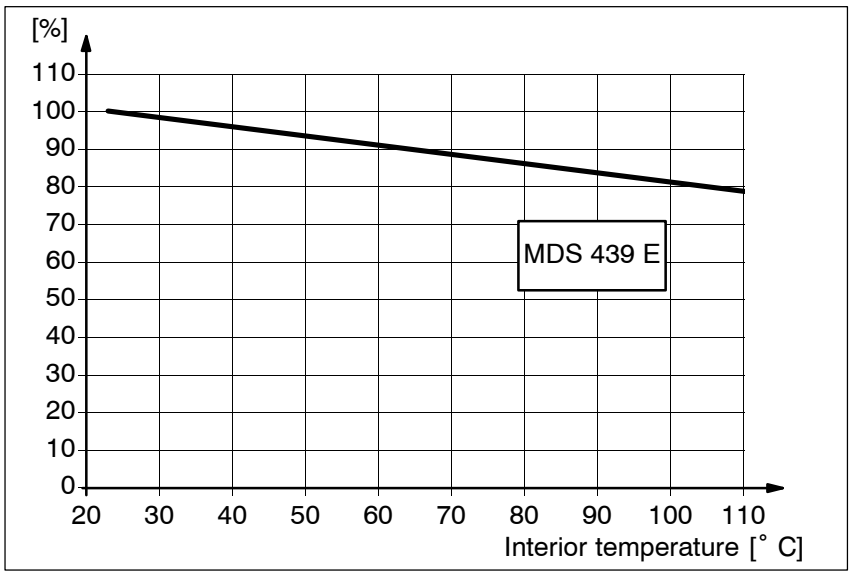


Figure 3-38 Reduction of field length and limit distance

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 > 110° 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
220˚ C	0,5 h	25˚ C	> 2 h
200˚ C	1 h	25˚ C	> 2 h
190˚ C	1 h	25˚ C	> 1 h 45 min
180˚ C	2 h	25˚ C	> 5 h
170˚ C	2 h	25˚ C	> 4 h

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 > 220° C

Exposing the data memories to ambient temperatures over 220° 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 MDS at i-Point	Time Duration (Min.)	Ambient Temperature (° C)
KTL bath	20	30
KTL dryer	60	200
Transport	60	25
PVC dryer	25	170
Transport	60	25
Filler dryer	60	160
Transport	60	25
Base coat dryer	60	120
Transport	60	25
Wax dryer	25	100
Transport	150	25

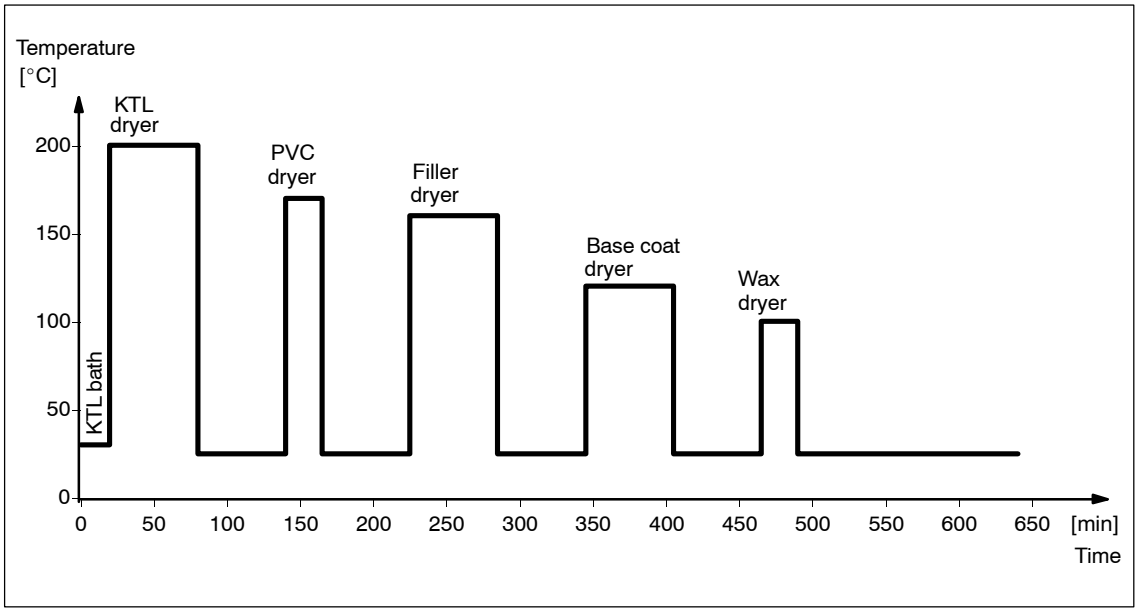


Figure 3-39 Diagram of the temperature progression from table 3-14

The results of the simulation are listed below.

After a simulation time of 36.5 hours, a total of 3 cycles were passed through, and an interior temperature of 90 degrees Centigrade was reached.

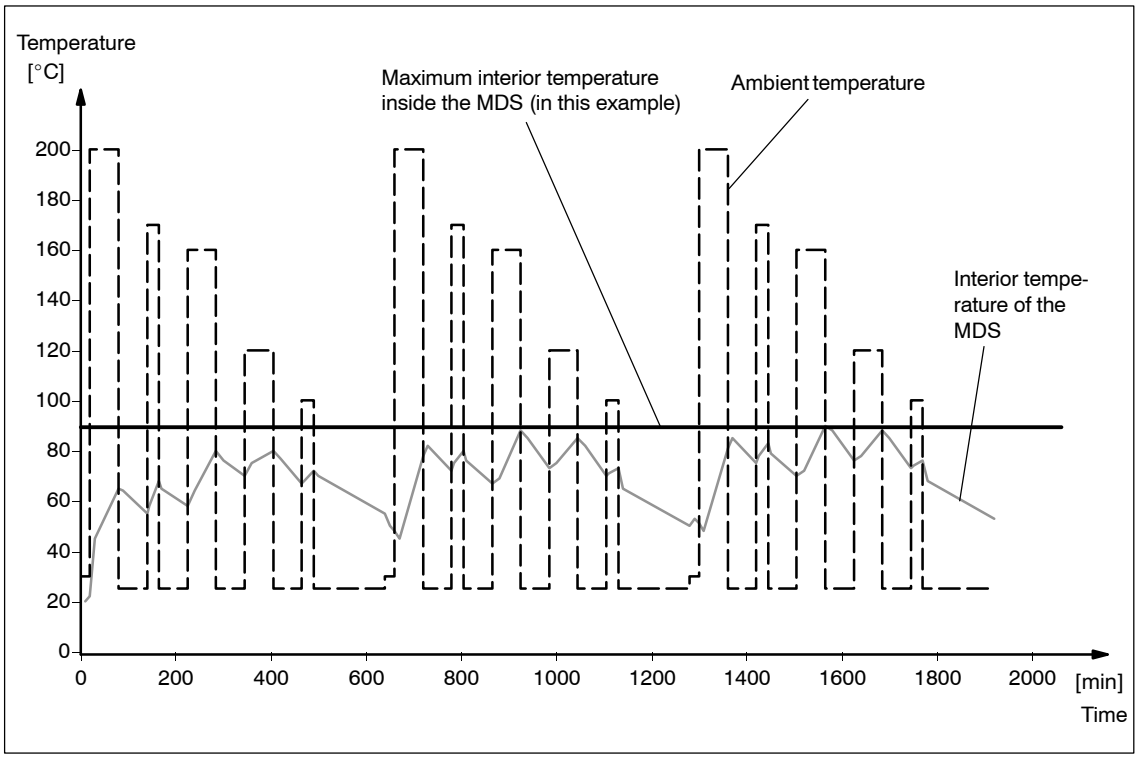


Figure 3-40 Complete temperature progression during simulation

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
- Mechanical stress

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. 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.

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

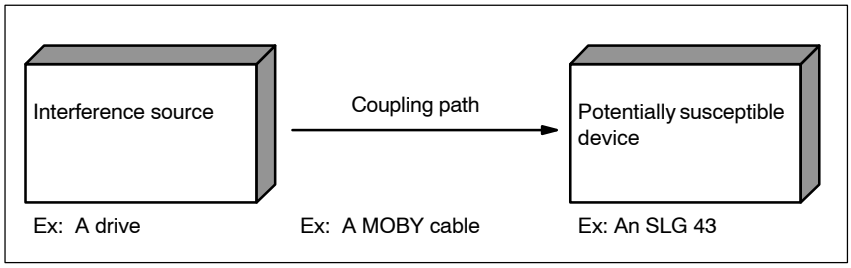


Figure 3-41 Spreading of interference

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.

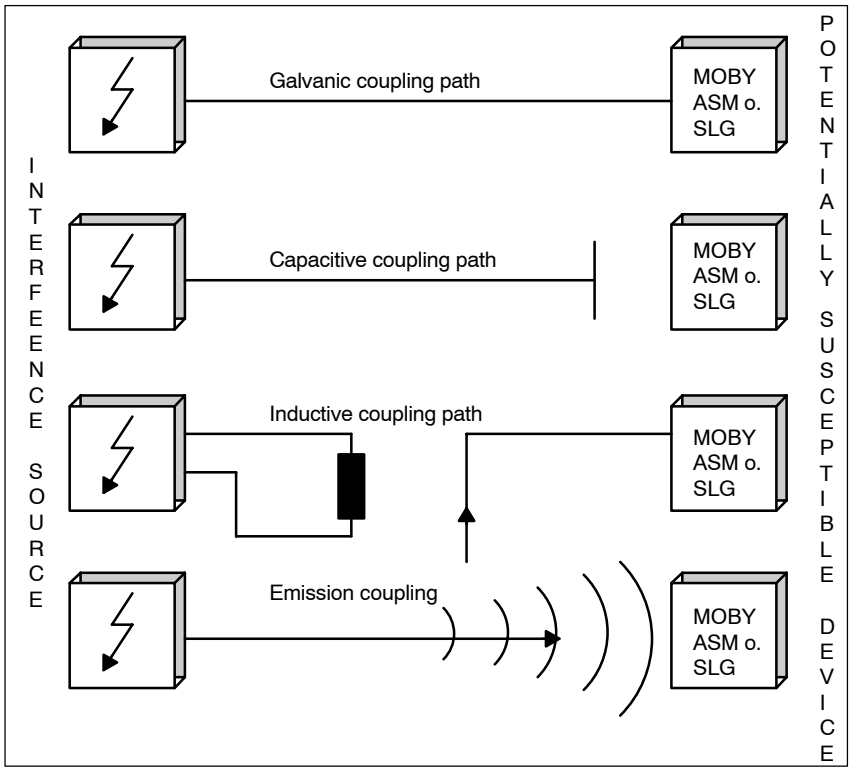


Figure 3-42 The four kinds of interference coupling

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).

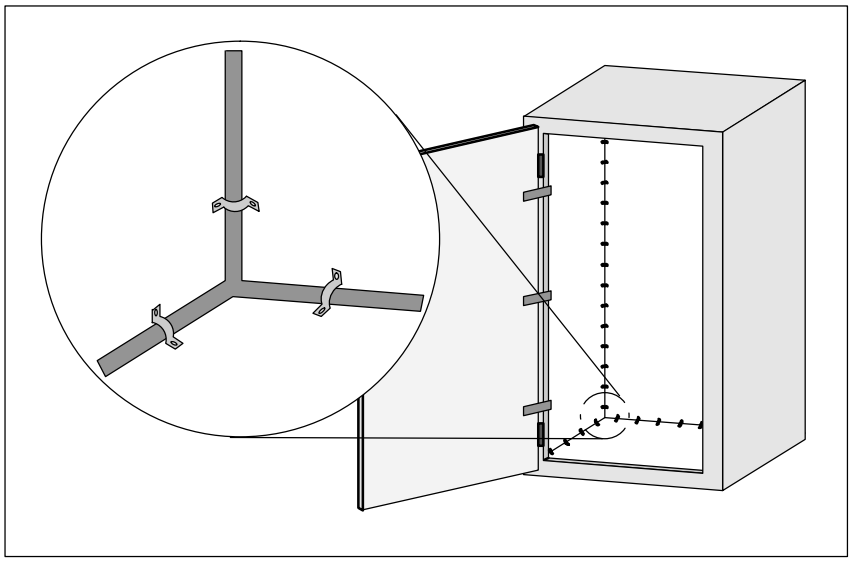


Figure 3-43 Shielding via housing

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.

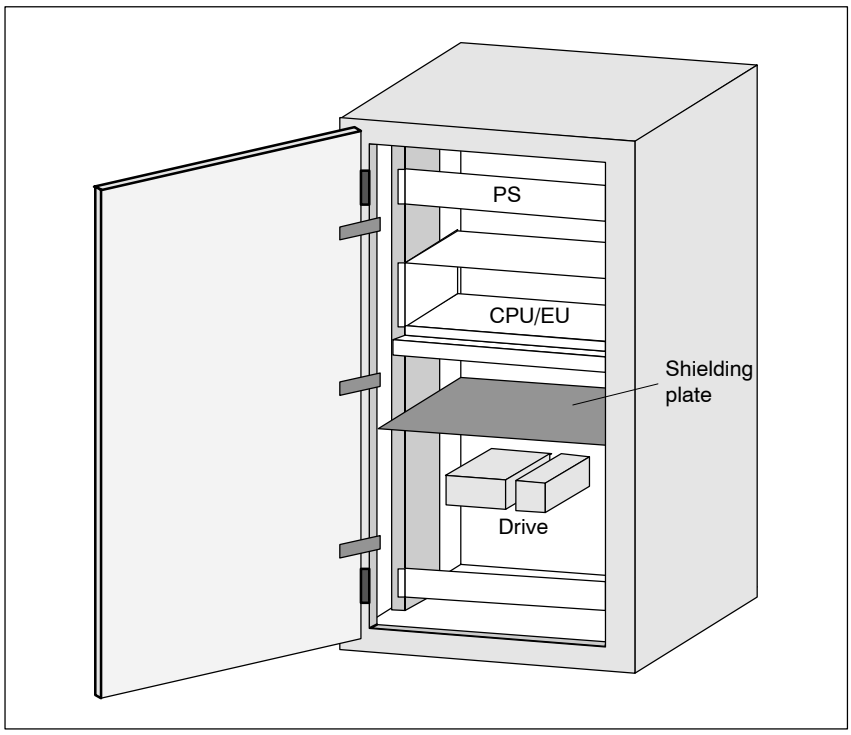


Figure 3-44 Avoidance of interference via optimal layout

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.

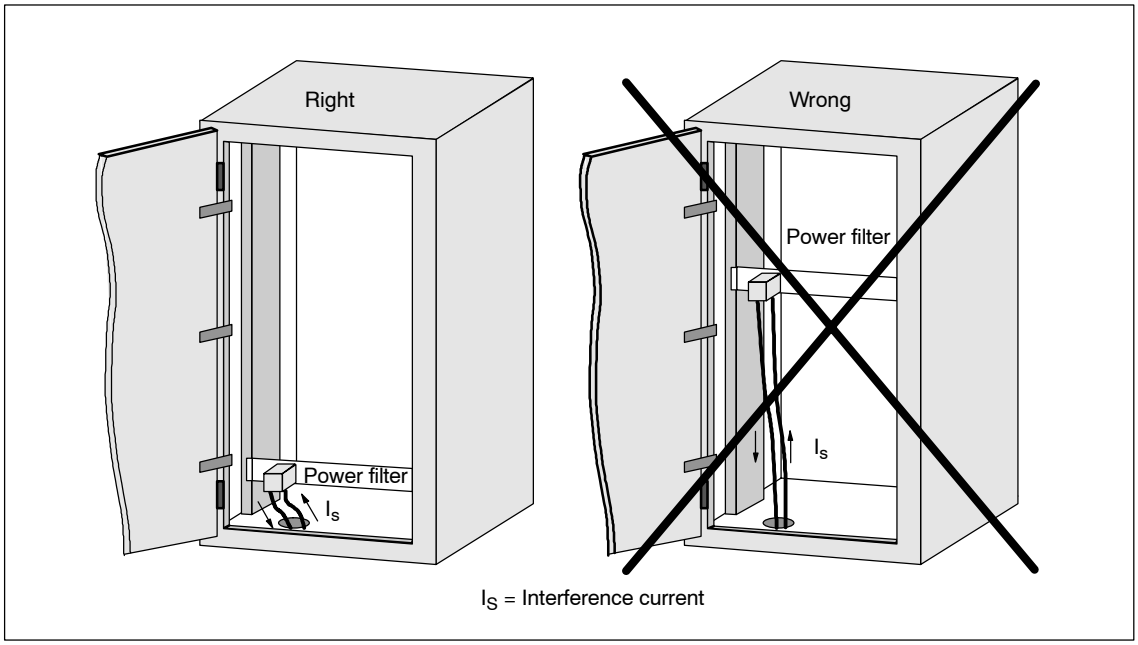


Figure 3-45 Filtering the supply voltage

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.

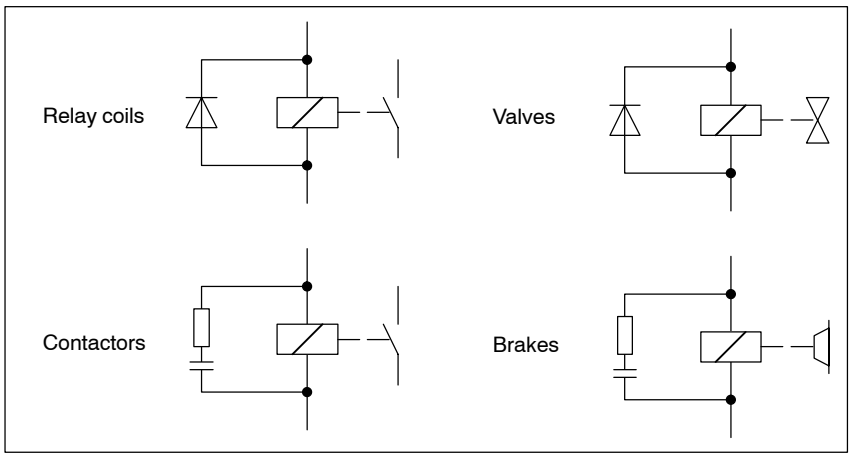


Figure 3-46 Suppression of inductive interference

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.

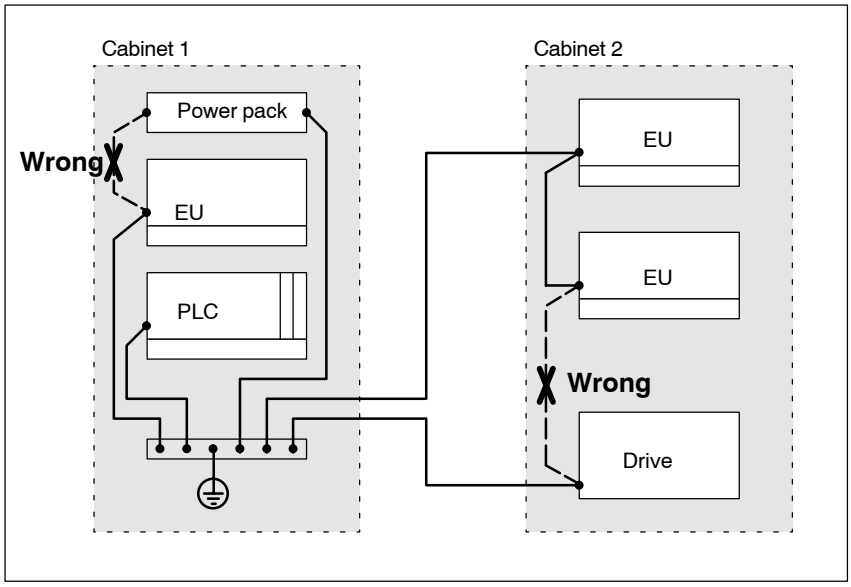


Figure 3-47 Equipotential bonding

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

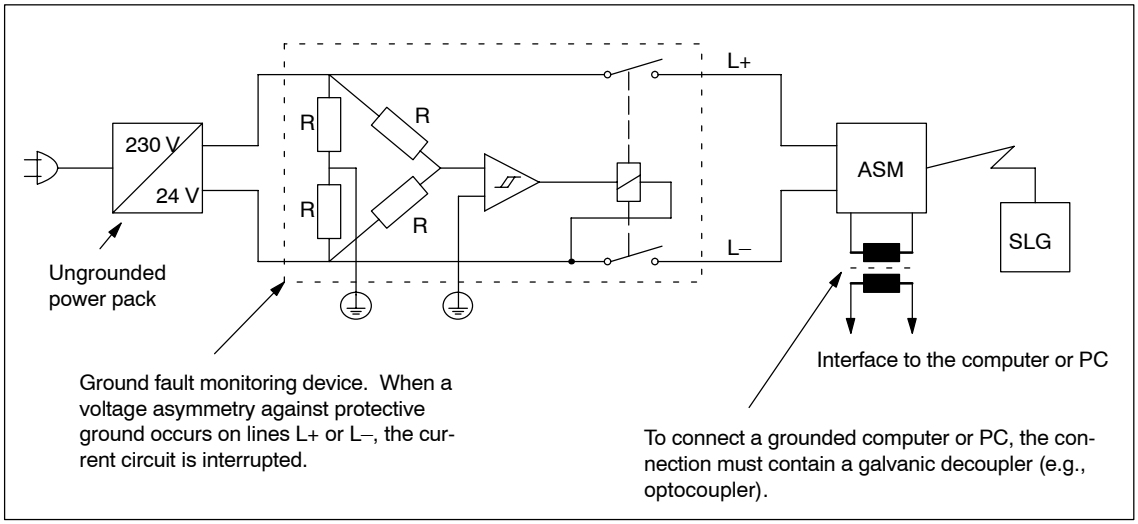


Figure 3-48 Circuit diagram of the principle of grounding fault monitoring

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

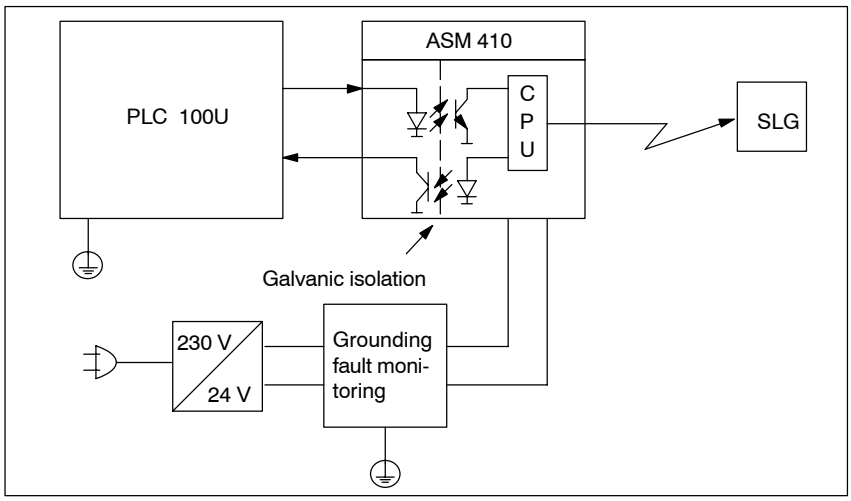


Figure 3-49 SIMATIC PLC 100U with ASM 410

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

Serial interface SIM

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).

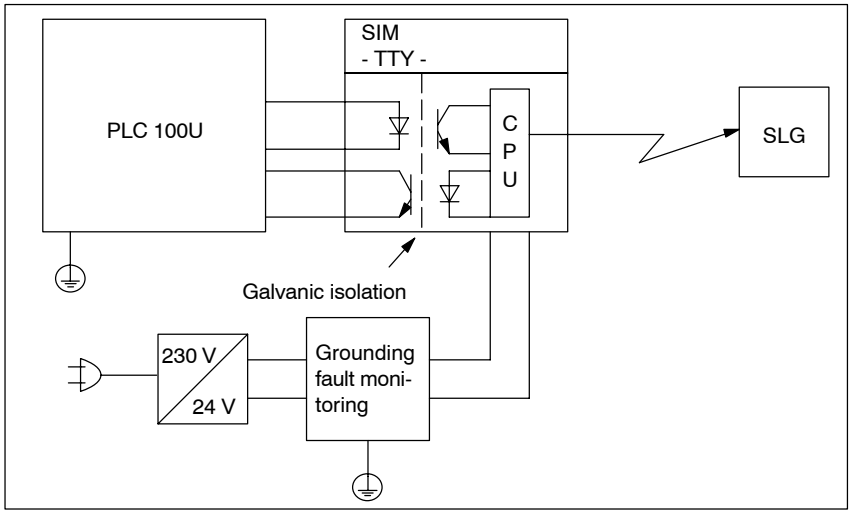


Figure 3-50 Serial interface SIM with TTY interface

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.

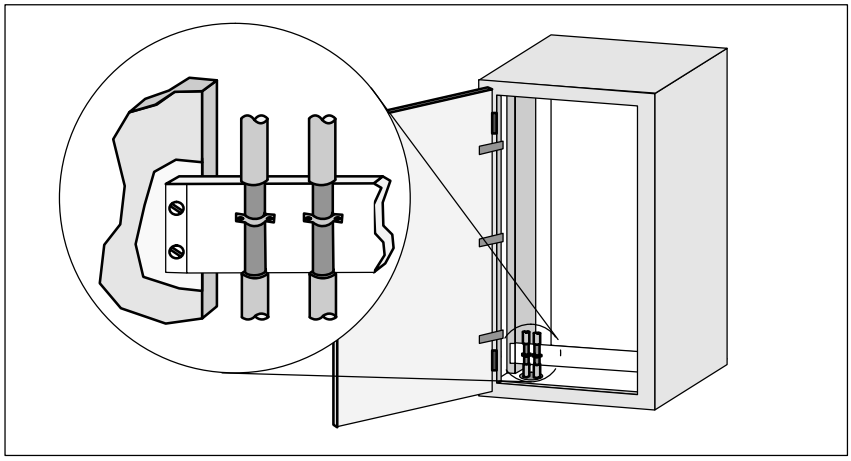


Figure 3-51 Shielding of the cables

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.

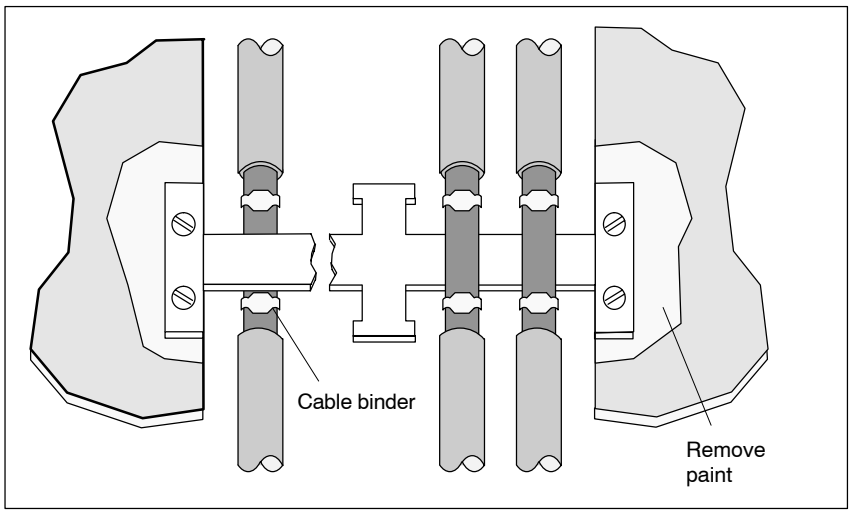


Figure 3-52 Connection of the shield rail

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.

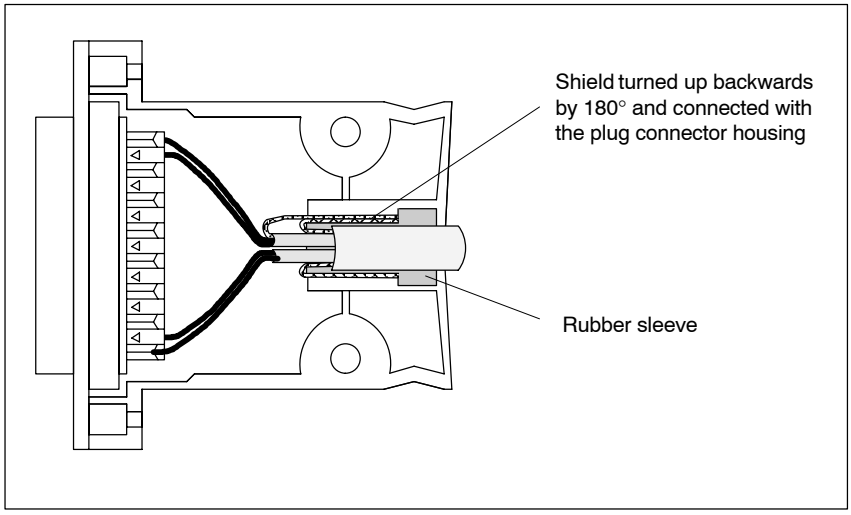


Figure 3-53 Interruption of shielded cables

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.

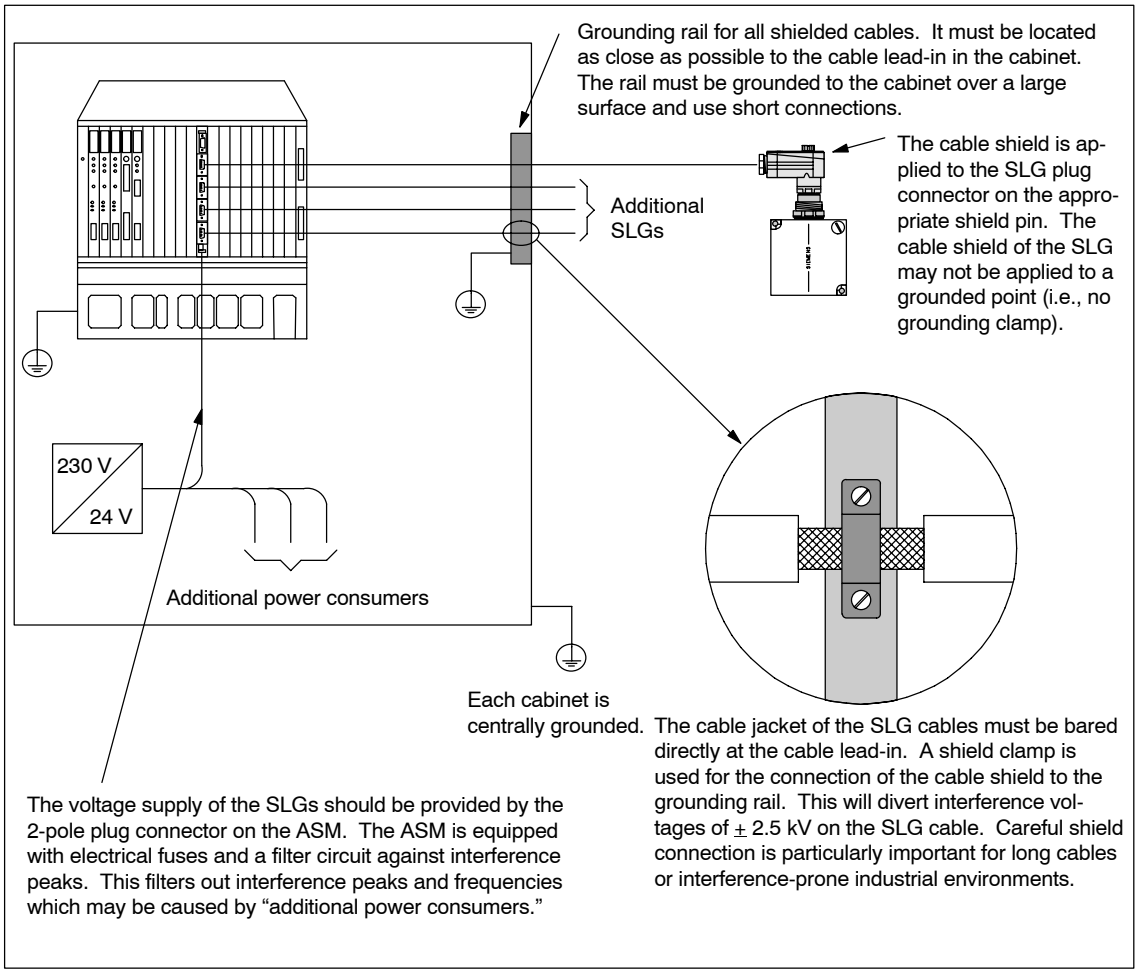


Figure 3-54 Simple layout with ASM 400/401

Layout of an S7-300 with MOBY

When connecting the SLG to the ASM 470/475, 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.

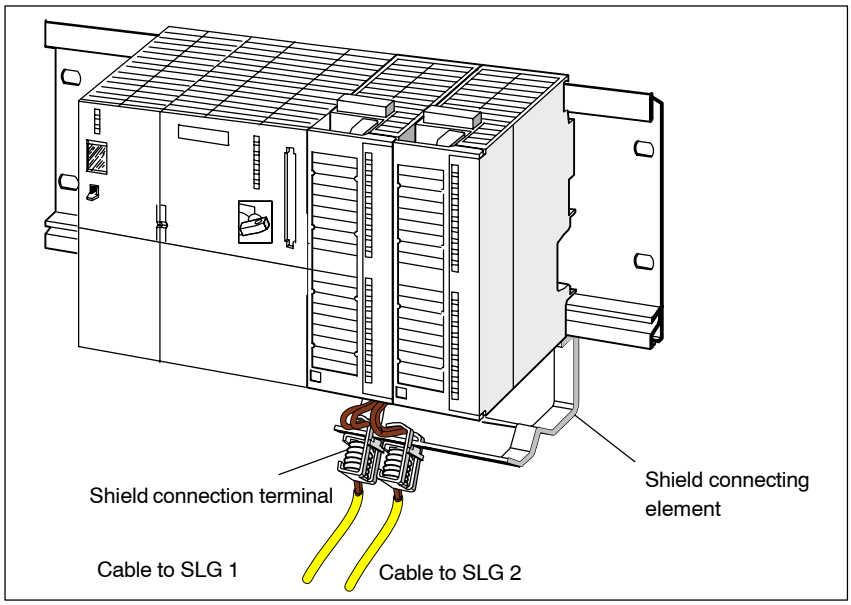


Figure 3-55 Layout of the ASM 470/475 with shield connecting element

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.
Please also observe the information in chapter 6.8 “Setup and Function” when using a Serial Interface Module (SIM).
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 6GT2 090-0A...

Gounding of the SLG cable

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

Cable with drag capability

The SLG/SIM can also be connected with a cable that can be dragged.
Recommended cable type: HPM Paartronic 3340-C-PUR 3 x 2 x 0.25.
The cable can be made by the customer.

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.

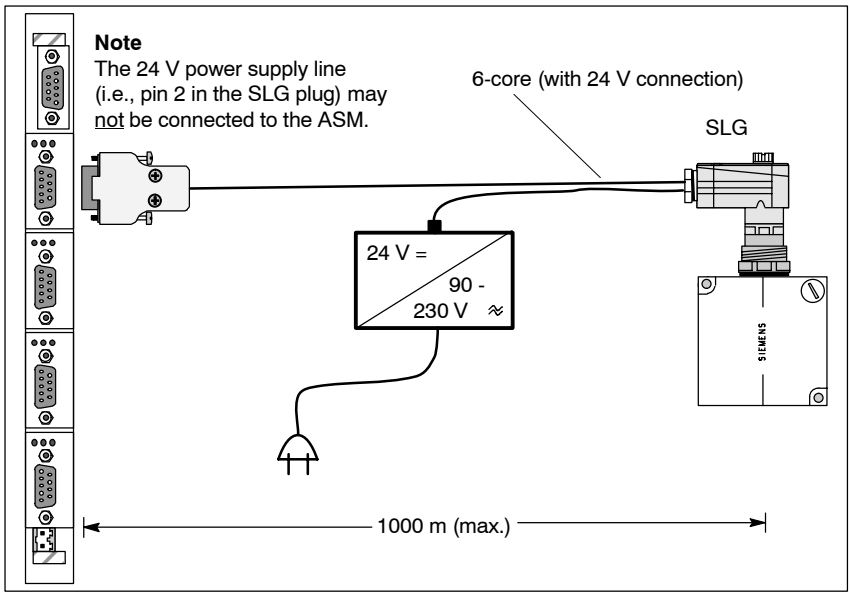


Figure 3-56 SLG with supplementary power pack

The power pack shown in the drawing is available from Siemens under order number 6GT2 494-0AA00 (see chapter 7.2).
The customer must provide the cable from the supplementary power pack to the SLG.

Note

The power pack can also be used as the main power pack for the ASM 400, ASM 424 or ASM 454. See figure 3-57.

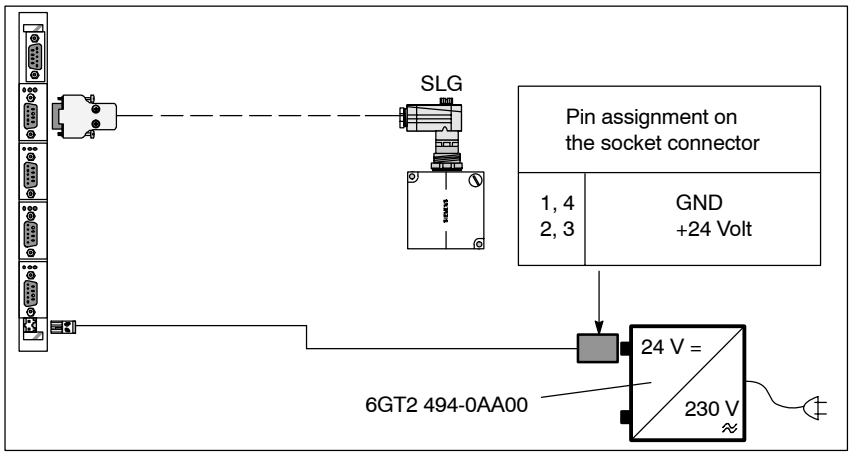


Figure 3-57 MOBY wide-range power pack on the ASM 400

3.10.2 Plug Connector Assignment

Plug connector on the SLG

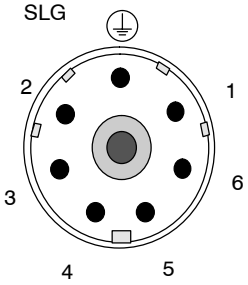


Table 3-18 Plug connector assignment of the SLG plug connector[1]

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

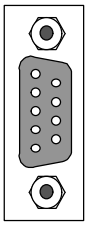


Table 3-19 Plug connector assignment of the 9-pin subminiature D plug connector[1]

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 424, ASM 454, ES 030 => SLG
ASM 400, ASM 410 (STG plug connector).

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 the +24 Volt pin to the ASM. Cf. table 3-19.

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.

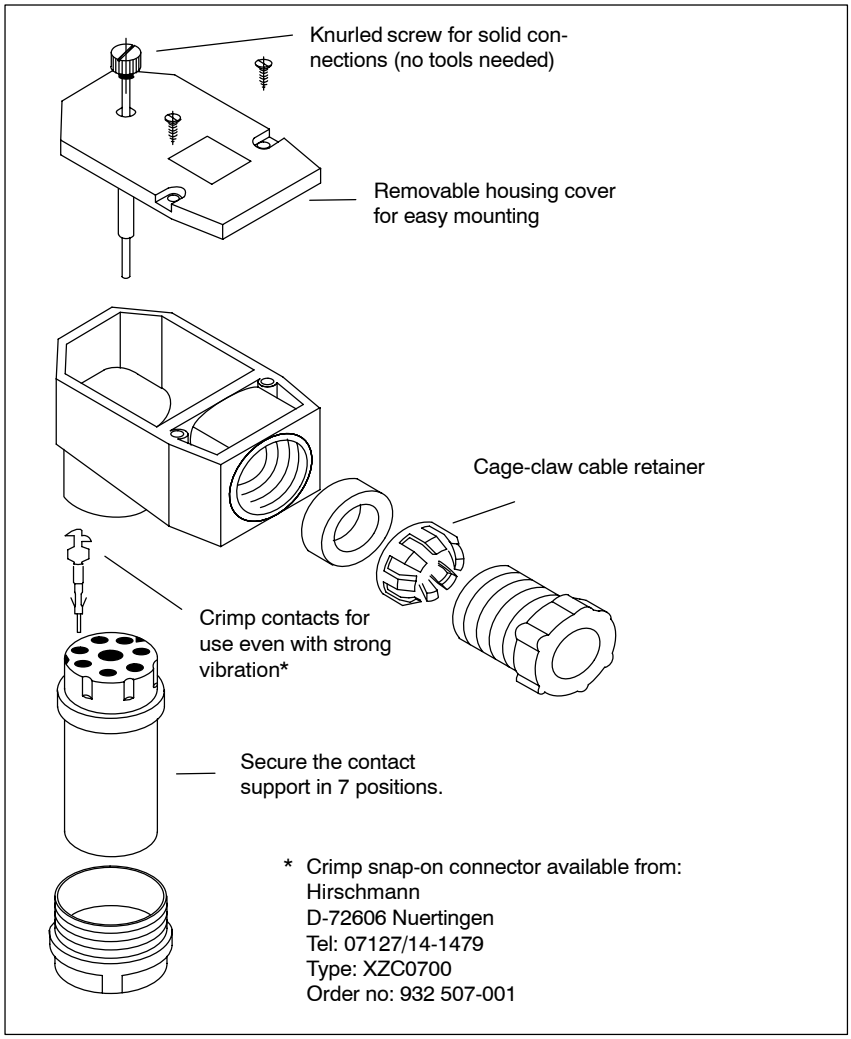


Figure 3-58 Drawing of mounting the SLG plug connector

Ordering data

Table 3-20 Ordering data for the SLG plug connector

SLG-side, 6-pin plug with socket contacts for crimping with bent output (Contact support must be secured in 7 positions.)	
• 1 each	6GT2 090-0BA00
• 1 package (10 each)	6GT2 090-0BA10
with straight output	
• 1 each	6GT2 090-0UA00

3.10.3 Connection Cables

Connection cable for ASM 400/401/ 424/454, ES 030 ↔ SLG 6GT2 091-0A... or 6GT2 091-2A...

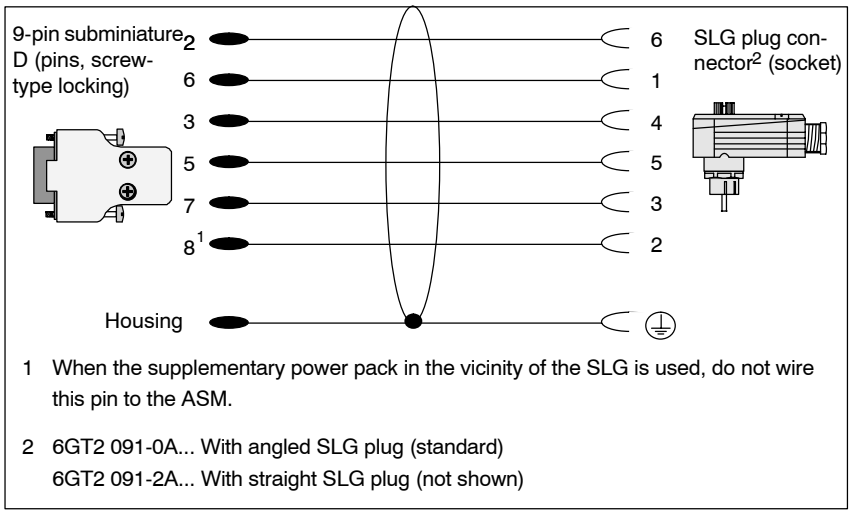


Figure 3-59 Connection cable: ASM 400/401/424/454, ES 030 ↔ SLG

Connection cable for ASM 450/452/ 473 ↔ SLG 6GT2 091-1CH20

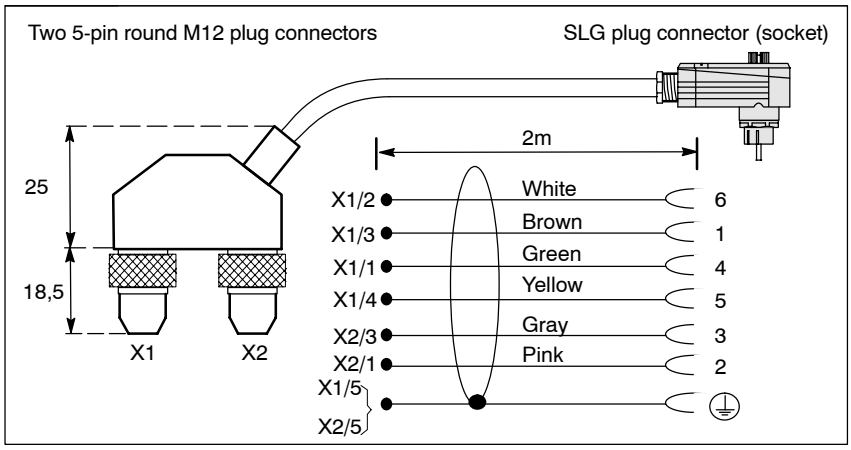
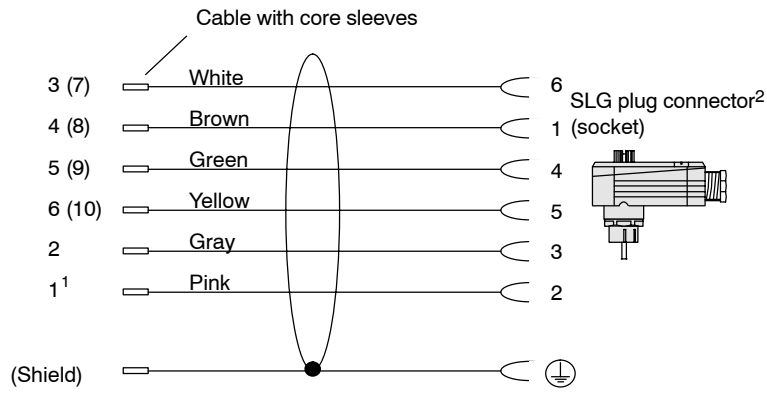


Figure 3-60 Connection cable: ASM 450/452/473 ↔ SLG

Connection cable for ASM 410 ↔ SLG 6GT2 091-0D... or 6GT2 091-2D...



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

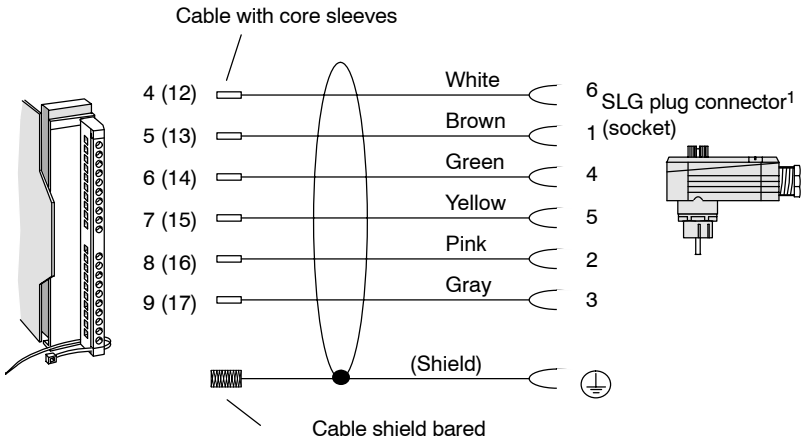
2 6GT2 091-0D... With angled SLG plug (standard)
6GT2 091-2D... With straight SLG plug (not shown)

Figure 3-61 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 470/475 ↔ SLG 6GT2 091-0E... or 6GT2 091-2E...



1 6GT2 091-0E... With angled SLG plug (standard)
6GT2 091-2E... With straight SLG plug (not shown)

Figure 3-62 Connection cable: ASM 470/475 ↔ SLG

Connection cable RS 232 PC ↔ ASM 424 6GT2 391-0B...

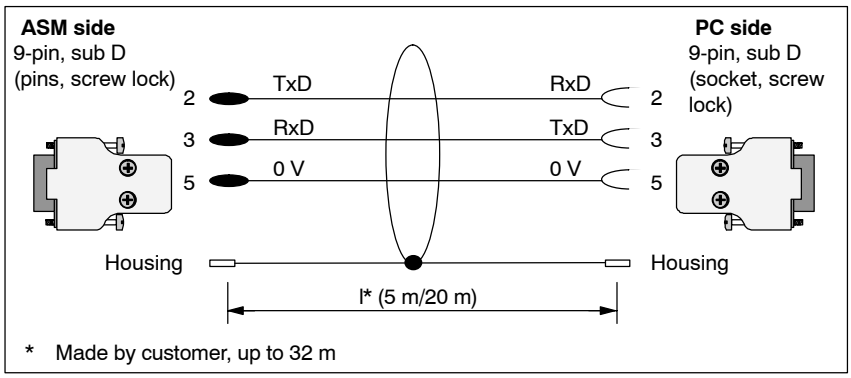


Figure 3-63 Connection cable RS 232 PC ↔ ASM 424

3.10.4 Cable Lengths

Starting on 10.01.2001 the length key is no longer supported for MOBY cables. Cables are now only offered in certain lengths. See table 3-21.

The cables are based on the following rules.

- Loose cables only in the lengths 50 m, 120 m, and 800 m
- Fabricated cables only in the lengths 2 m, 5 m, 10 m, 20 m and 50 m

Customers may make their own cables in all lengths. See table 3-17.

Table 3-21 Ordering data for MOBY cables

SLG stub line, fabricated			
Between ASM 400/401/424/454, ES 030-K and SLG			
• SLG plug bent			
	Length:	5 m	6GT2 091-0AH50
		10 m	6GT2 091-0AN10
		20 m	6GT2 091-0AN20
		50 m	6GT2 091-0AN50
• SLG plug straight			
	Length:	10 m	6GT2 091-2AN10
		50 m	6GT2 091-2AN50
Between ASM 410 and SLG			
• SLG plug bent			
	Length:	5 m	6GT2 091-0DH50
		10 m	6GT2 091-0DN10
		20 m	6GT2 091-0DN20
• SLG plug straight			
	Length:	5 m	6GT2 091-2DH50
Between ASM 470/475 and SLG			
• SLG plug bent			
	Length:	2 m	6GT2 091-0EH20
		5 m	6GT2 091-0EH50
		10 m	6GT2 091-0EN10
		20 m	6GT2 091-0EN20
		50 m	6GT2 091-0EN50
• SLG plug straight			
	Length:	2 m	6GT2 091-2EH20
		5 m	6GT2 091-2EH50
		10 m	6GT2 091-2EN10
		50 m	6GT2 091-2EN50

Table 3-21 Ordering data for MOBY cables

SLG stub line, fabricated			
Between ASM 450/452/473 and SLG			
• SLG plug bent			
	Length:	2 m (standard)	6GT2 091-1CH20
		5 m	6GT2 091-1CH50
		10 m	6GT2 091-1CN10
		20 m	6GT2 091-1CN20
		50 m	6GT2 091-1CN50
• SLG plug straight			
	Length:	2 m	6GT2 091-2CH20
Stub line, 24 V			
Stub line, 2-core for the 24 V DC power supply of the ASM 400/401. Stub line is equipped with pin cable shoes on both sides.			
	Length:	2 m	6GT2 091-0CH20
		5 m	6GT2 091-0CH50
RS 232 stub line			
Between PC and ASM 424			
	Length:	5 m	6GT2 391-0BH50
		20 m	6GT2 391-0BN20
Cables, without plug connectors			
SLG cable, without plug connector between ASM and SLG. Type: 6 x 0,25 mm^2			
	Length:	50 m	6GT2 090-0AN50
		120 m	6GT2 090-0AT12
		800 m	6GT2 090-0AT80

Mobile Data Memories

4

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 (replacement parts not included in the table)

MDS Type	Memory Size	Temperature Range (During Operation)	Dimensions (L x W x H in mm)	Protection Rating
MDS 401	8 (7)[1] Kbyte FRAM	–25 to +85 ° C	Ø 30 x 10	IP67
MDS 402	8 (7)[1] Kbyte FRAM	–25 to +70 ° C	47.5 x 25 x 15	IP68
MDS 403	8 (7)[1] Kbyte FRAM	–25 to +85 ° C	47.5 x 25 x 15	IP68
MDS 404	8 (7)[1] Kbyte FRAM	–25 to +85 ° C	50 x 50 x 20	IP68
MDS 506	32 (28)[1]Kbyte FRAM	–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 FRAM	–25 to +85 ° C	50 x 50 x 20	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

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 EN 60529/ VDE 0470-1 [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 401

Figure 4-1 MDS 401

Ordering data

Table 4-3 Ordering data for MDS 401

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

Technical data

Table 4-4 Technical data of MDS 401

Memory size	8189-byte FRAM
Memory organization	Random access
MTBF (at 40° C)	1.5 x 10^6 hours
Battery	None
Read cycles	10^{10} (at 25° C)
Programming cycles	10^{10} (at 25° C)
Data retention time	10 years
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Torsion and bending stress	Not permitted
Direction dependency	No
Securing of MDS	Screws or glue
Protection rating in accordance with DIN EN 60529/VDE 0470-1	IP67
Housing • Color • Material • Chemical resistance – Resistant to – Less resistant to • Dimensions in mm	 Black Macromelt (MM) Caustic soda, cutting oil, transmission oil, cooler fluid, petroleum Toluol, aceton, alcohol Approx. ∅ 27 x 9
Ambient temperature • During operation • During transportation and storage	 –25° to +85° C –40° to +85° C
Weight	Approx. 7 g

Field data (in mm)

Table 4-5 Field data of MDS 401

	SLG 40	SLG 40-S	SLG 41/ SLG 41-S	SLG 41C
Operating distance (S_a)	2 to 8	2 to 6	0 to 6	0 to 6
Limit distance (S_g)	10	8	10	10
Transmission window				
• L: Vertical	–	–	30	20
• 2L: Horizontal	–	–	50	40
Diameter of transmission window	d = 18	d = 9	–	–
Minimum distance from MDS to MDS	> 50	> 50	> 80	> 80

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

Dimensions (in mm)

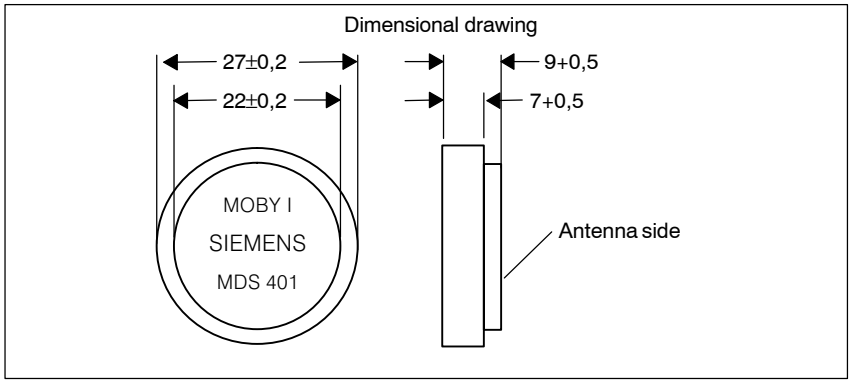
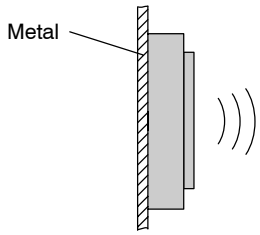
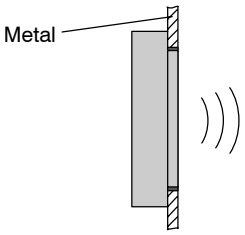


Figure 4-2 Dimensions of MDS 401

Mounting on metal

Table 4-6 Decrease in field data with mounting of the MDS 401 on or in metal

Mouting position	SLG 40	SLG 40-S	SLG 41
	100 %	95 %	60 %
	70 %	75 %	Not permit-ted

Mounting methods

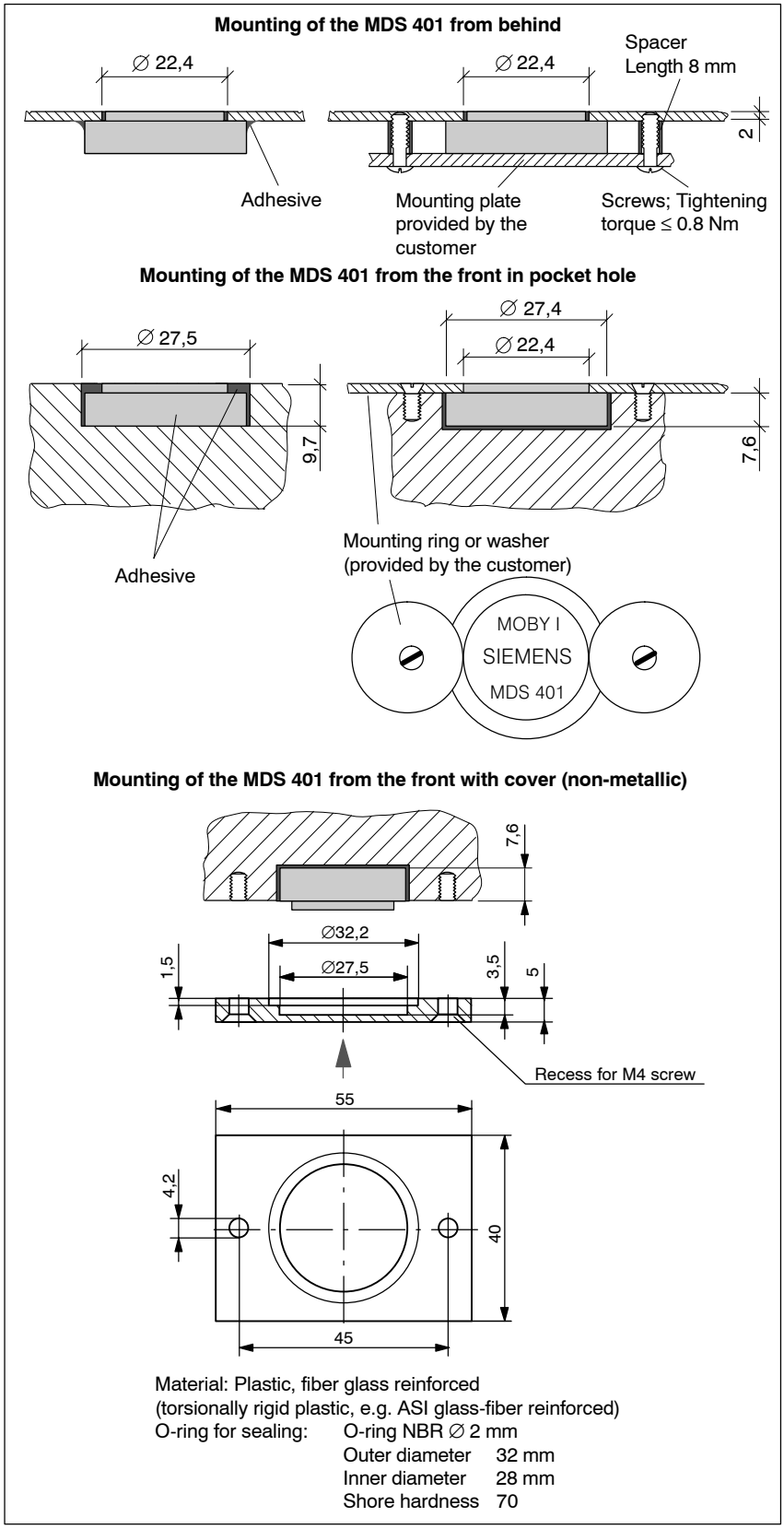


Figure 4-3 Ways to mount the MDS 401

Definition of the field midpoints

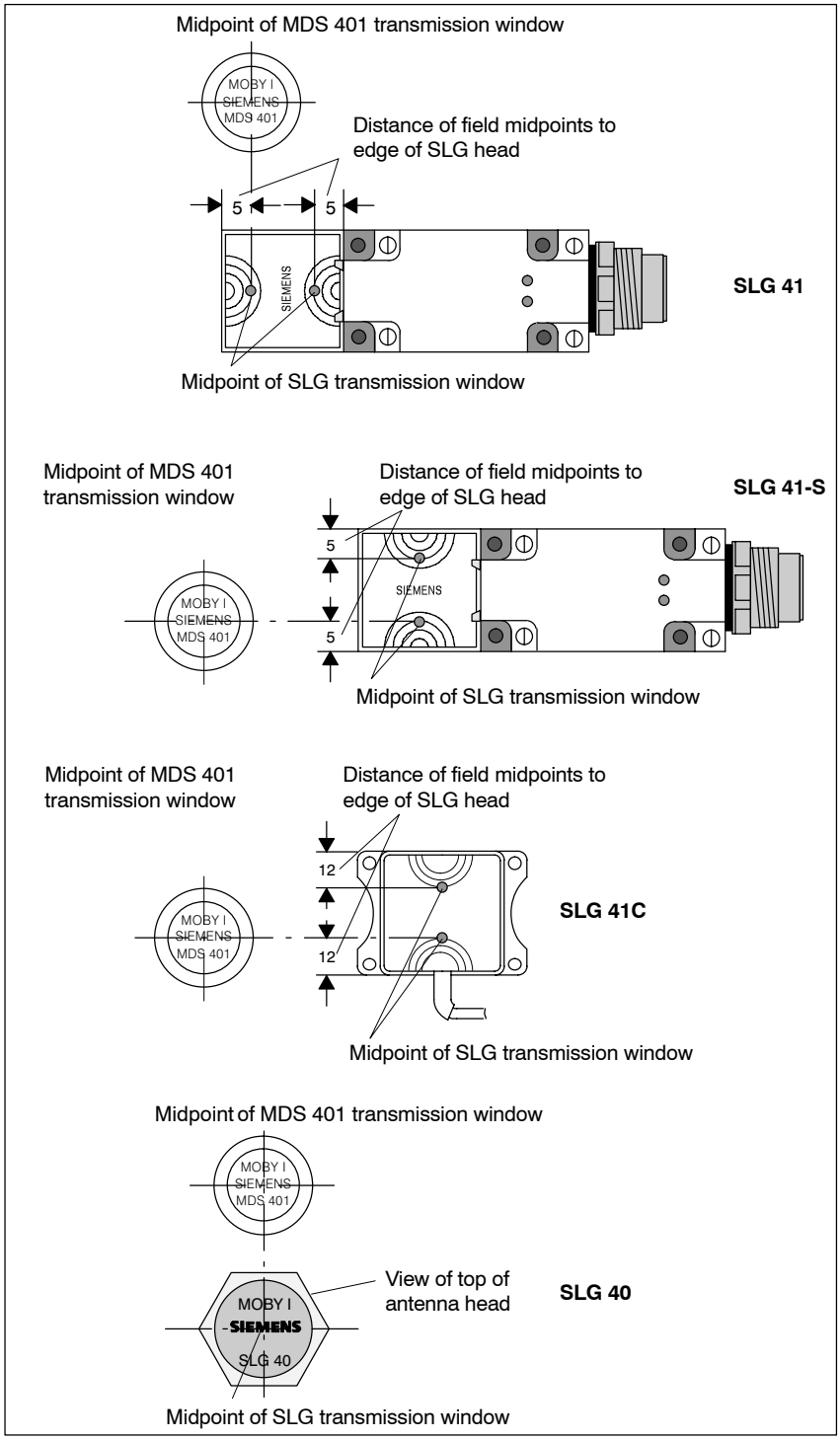


Figure 4-4 Field midpoints of MDS 401

Note

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

4.3 MDS 402

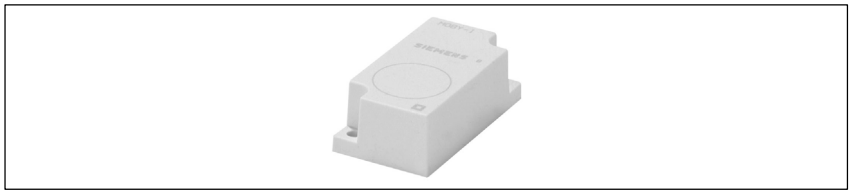


Figure 4-5 MDS 402

Ordering data

Table 4-7 Ordering data for MDS 402

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

Technical data

Table 4-8 Technical data of MDS 402

Memory size	8189-byte FRAM
Memory organization	Random access
MTBF (at 40° C)	1.5 x 10^6 hours
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 M3 screws
Tightening torque (at room temperature)	≤ 0.7 Nm
Protection rating • In acc. w. DIN EN 60529/VDE 0470-1	 IP 68/IP X9K (steam jet: 150 mm; 10 - 15 l/min; 100 bar; 75° C)
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 47.5 x 25 x 15
Ambient temperature • During operation • During transportation and storage	 –25° to +70° C –40° to +70° C
Weight	25 g

Field data (in mm)

Table 4-9 Field data of MDS 402

	SLG 40	SLG 40-S	SLG 41/ SLG 41-S	SLG 41 C
Operating distance (S_a)	2 to 8	2 to 6	0 to 6	0 to 6
Limit distance (S_g)	10	8	10	10
Transmission window • L: Vertical • 2L: Horizontal	 – –	 – –	 30 50	 20 40
Diameter of transmission window	d = 18	d = 9	–	–
Minimum distance from MDS to MDS	> 50	> 50	> 80	> 80

Dimensions (in mm)

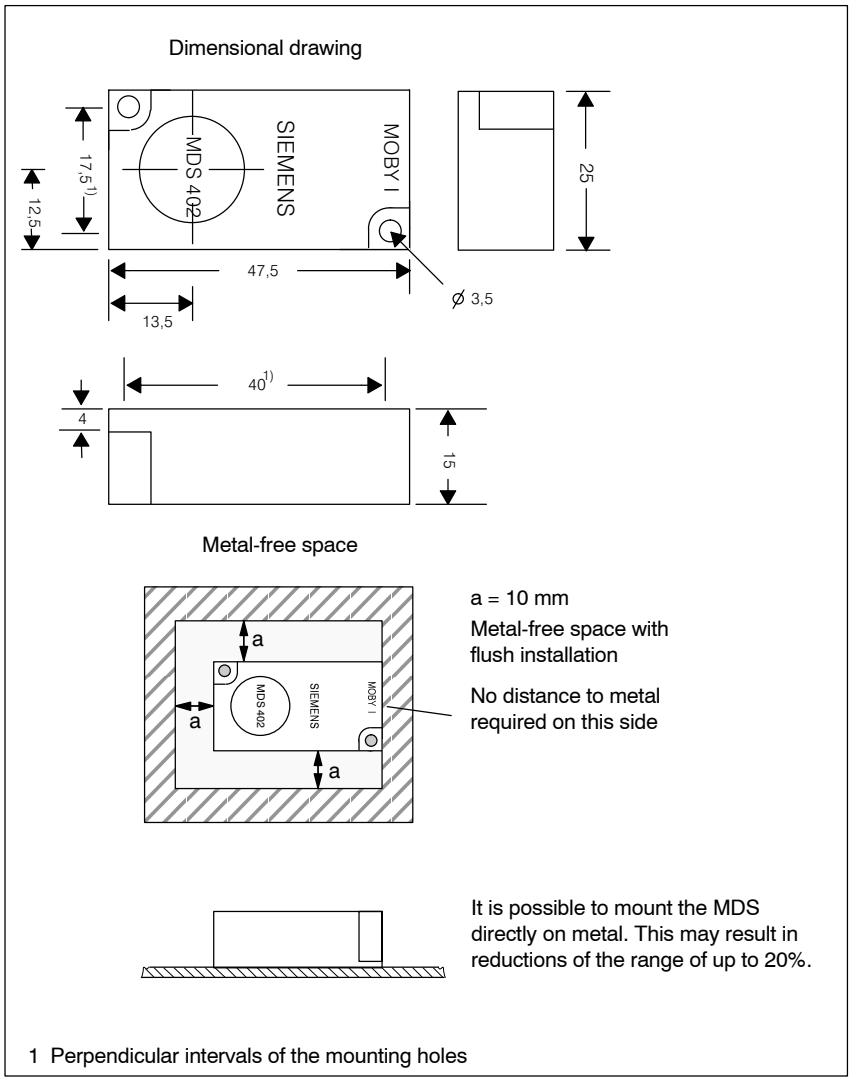


Figure 4-6 Dimensions of MDS 402

Definition of the field midpoints

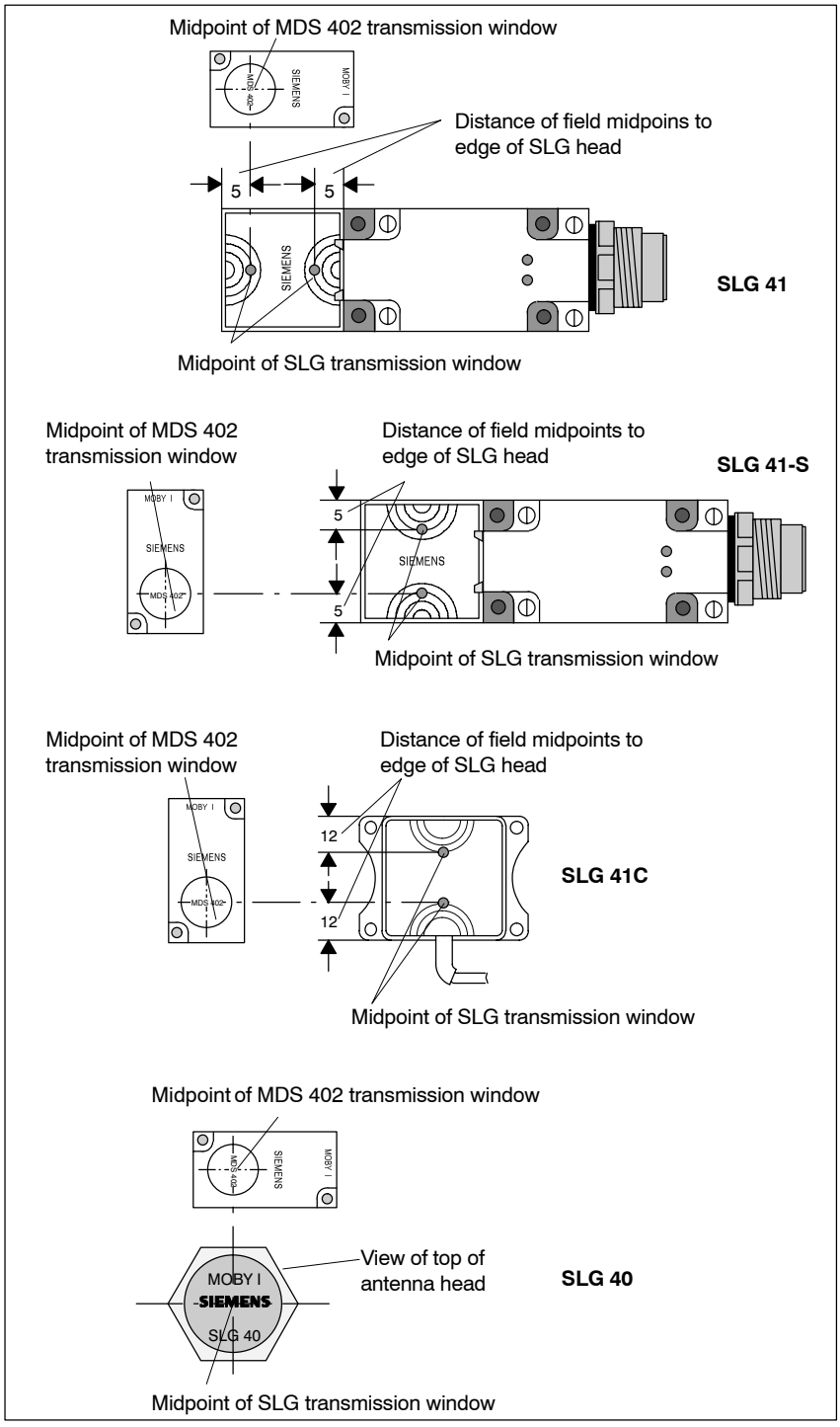


Figure 4-7 Field midpoints of MDS 402

Note

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

4.4 MDS 403

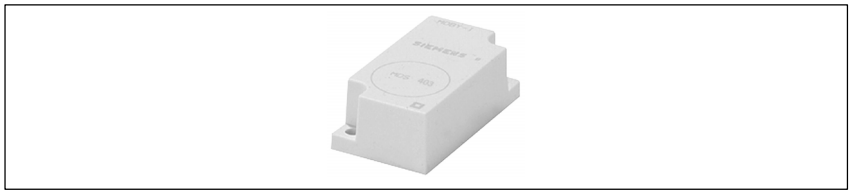


Figure 4-8 MDS 403

Ordering data

Table 4-10 Ordering data for MDS 403

Mobile data memory MDS 403 with 8-Kbyte FRAM	6GT2 000-1CF00

Technical data

Table 4-11 Technical data of MDS 403

Memory size	8189-byte FRAM
Memory organization	Random access
MTBF (without battery; at 40° C)	1.5 x 10^6 hours
Battery	No battery
Read cycles	10^{10} (at 25° C)
Programming cycles	10^{10} (at 25° C)
Data retention time	10 years
Read/write intervals	See field data.
Shock	50 g
Vibration	20 g
Direction dependency • Max. angle deviation	Yes ± 45 °
Securing of MDS	2 M3 screws
Tightening torque (at room temperature)	≤ 0.7 Nm
Protection rating • In acc. w. DIN EN 60529/VDE 0470-1	 IP 68/IP X9K (steam jet: 150 mm; 10 - 15 l/min; 100 bar; 75° C)
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 47.5 x 25 x 15

Table 4-11 Technical data of MDS 403

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

Field data (in mm)

Table 4-12 Field data of MDS 403

	SLG 41/ SLG 41-S/ SLG 41C	**SLG 42**	**SIM 4x**
Operating distance (S_a)	4 to 15	10 to 30	0 to 25
Limit distance (S_g)	30	80	40
Transmission window (L x W)	65 x 25	110 x 50	80 x 45
Minimum distance from MDS to MDS	> 120	> 200	> 200

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

Dimensions (in mm)

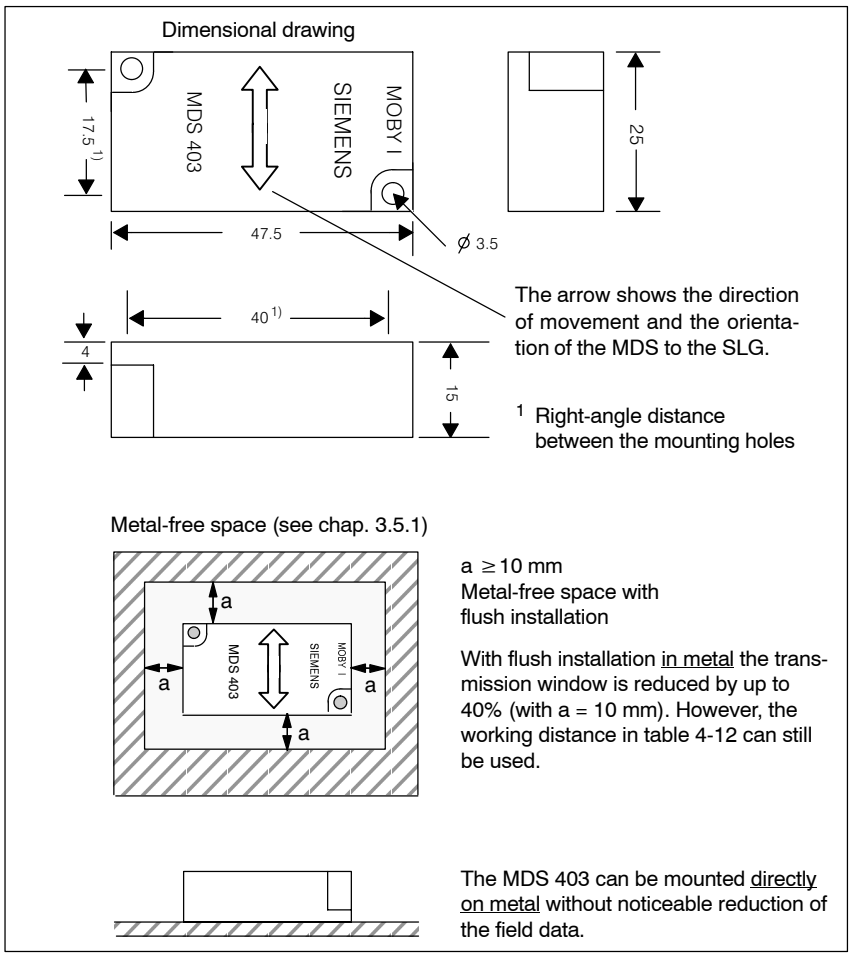


Figure 4-9 Dimensions of MDS 403

The transmission window

The transmission window is the basis for the configuration of communication in dynamic mode.
Use the formula in chap. 3.1 to calculate the max. amount of data which can be processed in dynamic operation.

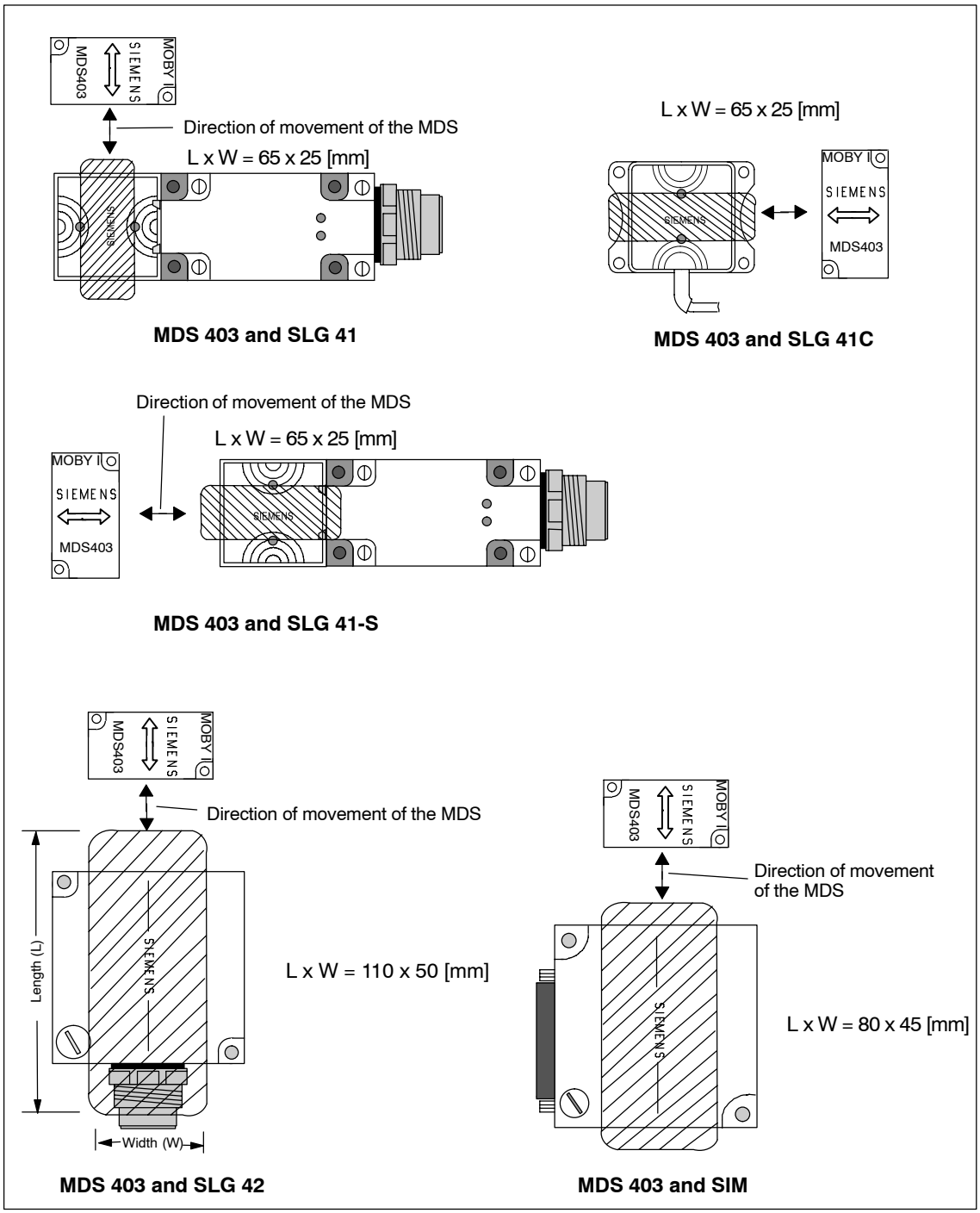


Figure 4-10 Transmission window of the MDS 403

Transmission window with auxiliary lobes

Figure 4-11 shows the complete transmission window of the MDS 403 with the auxiliary lobes. Although auxiliary lobes are always present, they should only be used in exceptional cases since their read distances are very limited.

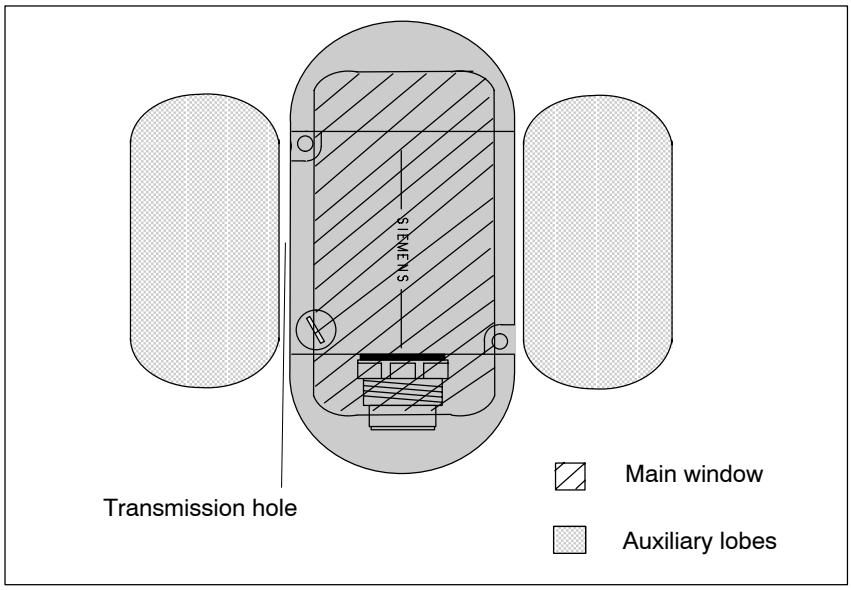


Figure 4-11 Transmission window of the MDS 403 with auxiliary lobes

Exact information on the field geometry of the auxiliary lobes is not available since the values vary widely depending on the particular working distance and application.

4.5 MDS 404

Figure 4-12 MDS 404

Ordering data

Table 4-13 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 4-14 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
Tightening torque (at room temperature)	≤ 1.2 Nm
Protection rating • In acc. w. DIN EN 60529/VDE 0470-1	 IP 68/IP X9K (steam jet: 150 mm; 10 - 15 l/min; 100 bar; 75° C)
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 50 x 50 x 20

Table 4-14 Technical data of MDS 404

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

Field data (in mm)

Table 4-15 Field data of MDS 404

	SLG 41/ SLG41-S	SLG 41C	SLG 42	SLG 43	SIM 41/42/43
Operating distance (S_a)	0 to 12	0 to 12	0 to 30	0 to 50	0 to 20
Limit distance (S_g)	25	25	60	90	33
Transmission window • L: Vertical • 2L: Horizontal	 36 72	 30 60	 90 180	 140 260	 60 80
Minimum distance from MDS to MDS	> 90	> 90	> 250	> 500	> 200

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

Dimensions (in mm)

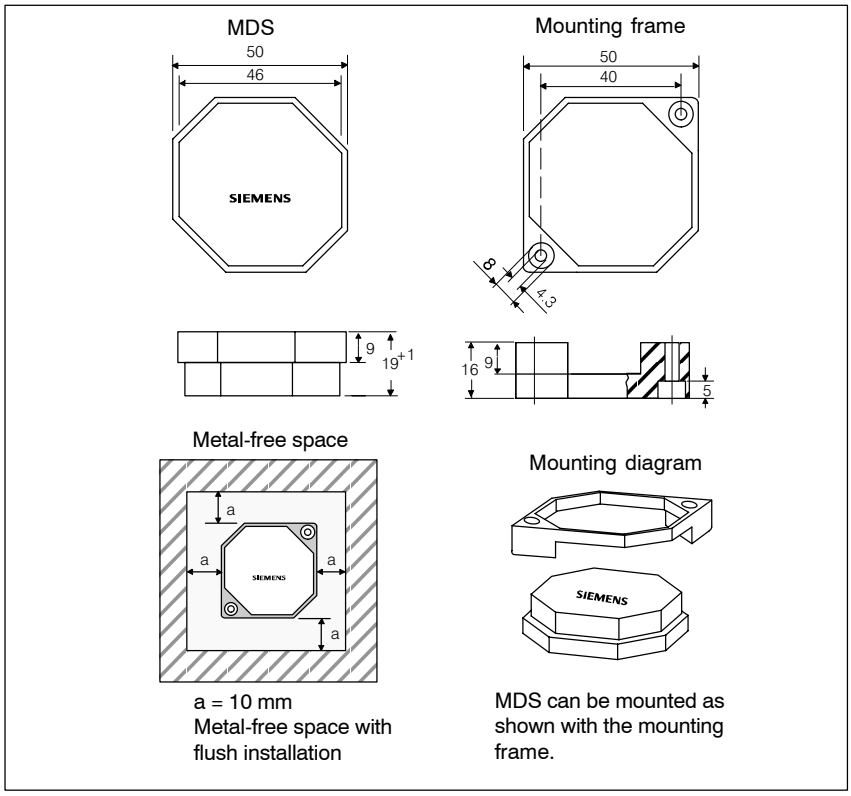


Figure 4-13 Dimensions of MDS 404

4.6 MDS 506

Figure 4-14 MDS 506

Ordering data

Table 4-16 Ordering data for MDS 506

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

Technical data

Table 4-17 Technical data of MDS 506

Memory size	32765-byte FRAM
Memory organization	Random access
MTBF (at 40° C)	1.5 x 10^6 hours
Battery	No battery (starting with E of MDS)
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 M5 screws
Tightening torque (at room temperature)	≤ 2 Nm
Protection rating in acc. w. DIN EN 60529/ VDE 0470-1	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 4-18 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)

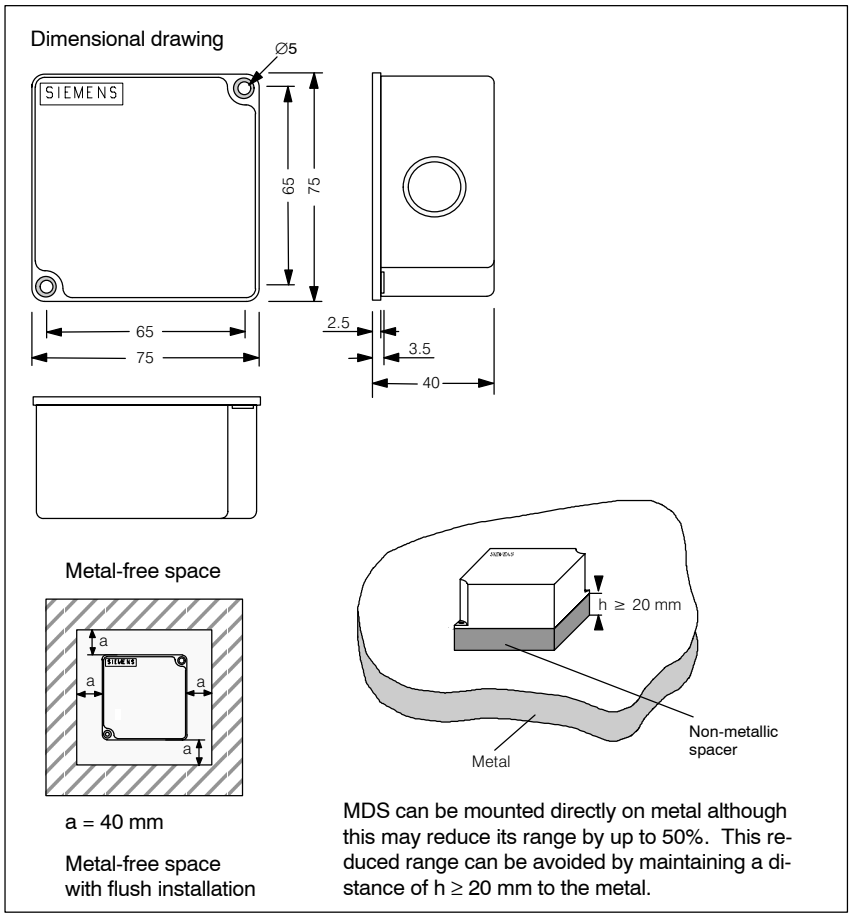


Figure 4-15 Dimensions of MDS 506

4.7 MDS 507 [1]

Description

The MDS 507 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, 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 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 can still be processed with an SLG 42/43 or an STG I. This provides the user with information on the status of the dialog or backup battery.

Physical layout

The MDS 507 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 4-16 MDS 507

1 Only available now as a spare part

Ordering data

Table 4-19 Ordering data for MDS 507

Mobile data memory MDS 507 with 32-Kbyte RAM	6GT2 000-0DC01-0AA0
Configuring manual SLG 44/MDS 507 German English	 On “Software MOBY” CD
Accessories (order separately) Magnet holder for MDS 507[1] Replacement battery[1]	 6GT2 090-0PA00 6GT2 094-0AA0

1 Only available now as a spare part

Technical data

Table 4-20 Technical data of MDS 507

	MDS 507
Memory size	32 Kbytes
Memory type	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
Life span of dialog battery • 15-min processing time/day • 5-min processing time/day • < 1 min processing time/day	 Approx. 2 years Approx. 5 years Approx. 10 years
Battery for data backup	Yes
Battery for dialog with SLG	Yes
Read cycles	Unlimited
Programming cycles at 70° C (min.)	Unlimited
Programming cycles at 40° C (typical)	Unlimited
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
Tightening torque (at room temperature)	≤ 2 Nm
Protection rating	IP65

Table 4-20 Technical data of MDS 507

	MDS 507
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 4-21 Field data of MDS 507

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

Note

Using the field data specified here, the MDS 507 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)

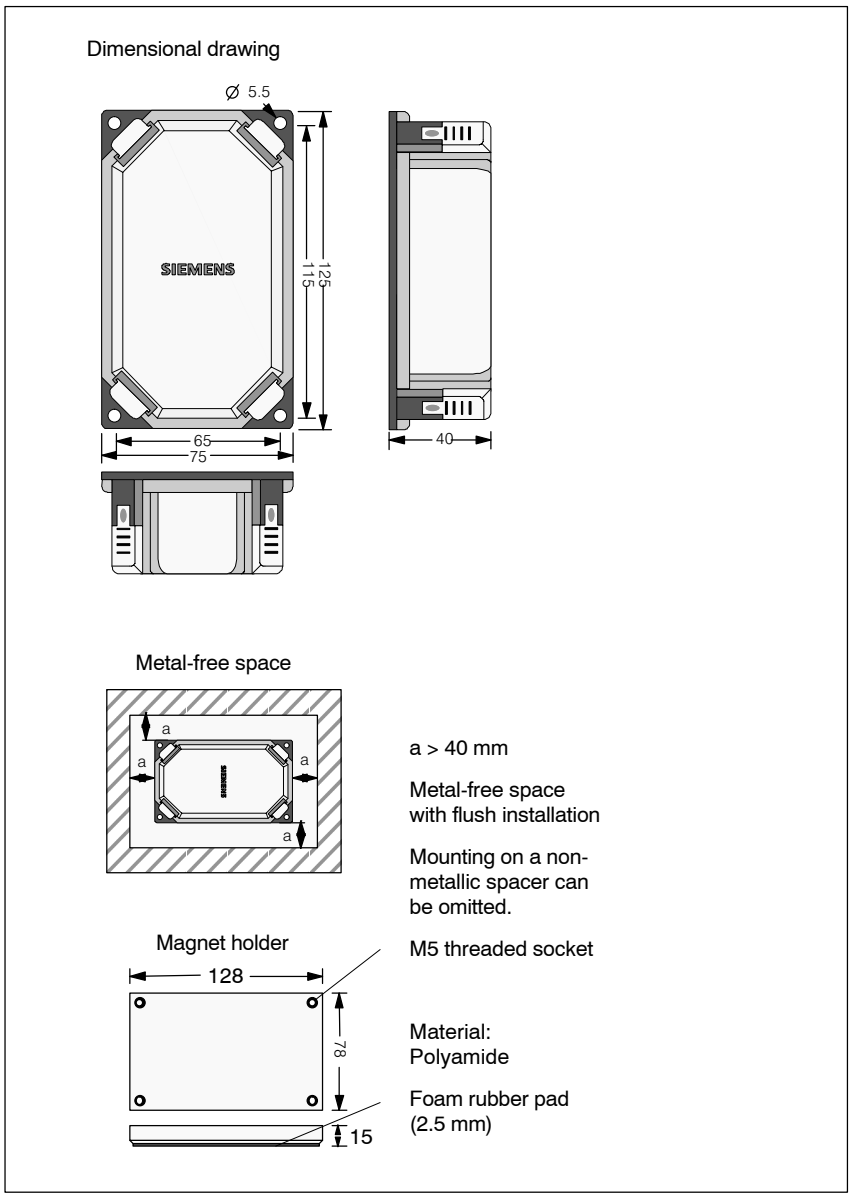


Figure 4-17 Dimensions of MDS 507

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.

4.8 MDS 514

Figure 4-18 MDS 514

Ordering data

Table 4-22 Ordering data for MDS 514

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

Technical data

Table 4-23 Technical data of MDS 514

Memory size	32765-byte FRAM
Memory organization	Random access
MTBF (without battery; at 40° C)	1.5 x 10^6 hours
Battery	No, starting with D of MDS
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
Tightening torque (at room temperature)	≤ 1.2 Nm
Protection rating • In acc. w. DIN EN 60529/VDE 0470-1	 IP 68/IP X9K (steam jet: 150 mm; 10 - 15 l/min; 100 bar; 75° C)
Housing • Color • Material • Dimensions (L x W x H) in mm	 Gray Polyamide 12 50 x 50 x 20

Table 4-23 Technical data of MDS 514

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

Field data (in mm)

Table 4-24 Field data of MDS 514

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

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

Dimensions (in mm)

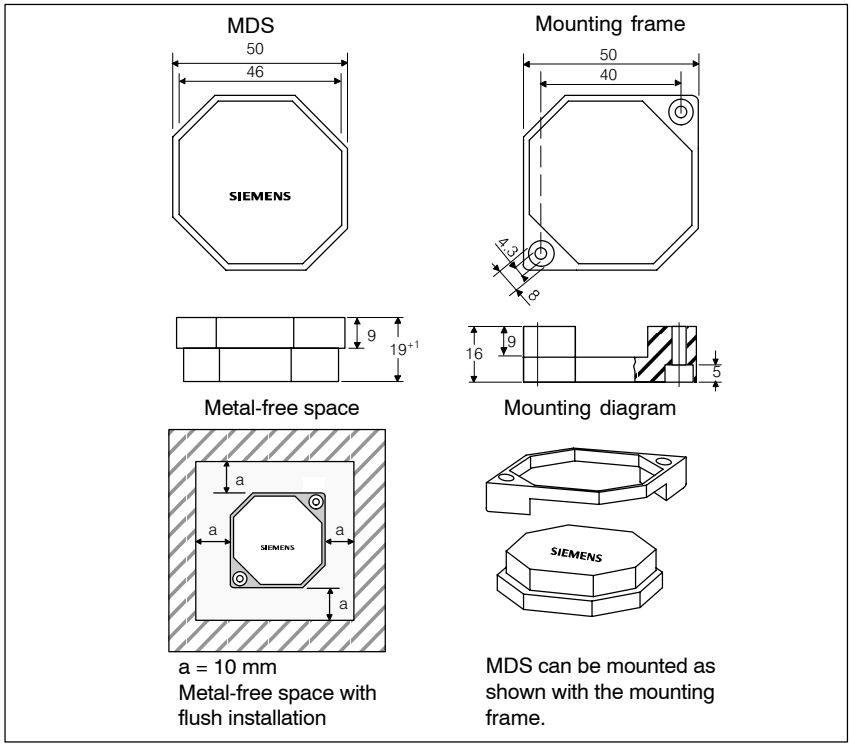


Figure 4-19 Dimensions of MDS 514

4.9 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 220° 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, KTL area and cataphoretic dip coating with the related drying chambers
- Surface painting and related drying chambers
- Washing at temperatures > 85° C
- Other applications with higher temperatures

Figure 4-20 MDS 439 E

Ordering data

Table 4-25 Ordering data for MDS 439 E

Mobile data memory MDS 439 E with 8-Kbyte FRAM	6GT2 000-0CD30-0AD0
Order separately:	
Holder	
Short version	6GT2 090-0QA00
Covering hood	6GT2 090-0QB00
Description - MDS 439 E	
German	6GT2 097-3AJ00-1DA1
English	6GT2 097-3AJ00-1DA2

Technical data

Table 4-26 Technical data of MDS 439 E

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

Table 4-26 Technical data of MDS 439 E

Read cycles in acc. w. DIN EN 60529/ VDE 0470-1	Unlimited
Write cycles • At 70° C (min.) • At 40° C (typ.)	 10000 10^9
Read/write intervals	See field data.
Shock[1]	50 g
Vibration[1]	5 g
Direction dependency	No
Hazardous area approval	No
Protection rating in acc. w. DIN EN 60529/ VDE 0470-1	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 +220° C –40° to +110° C
Weight	900 g
Silicone free	Yes (all materials)

1 Applies only when used with original holder

Field data (in mm)

Table 4-27 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)

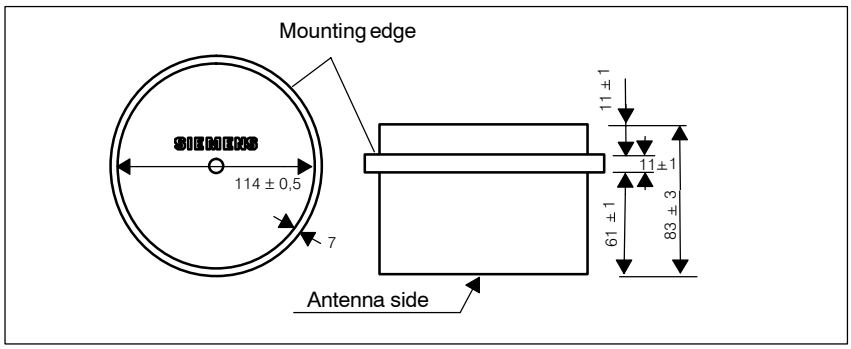


Figure 4-21 Dimensional drawing of MDS 439 E

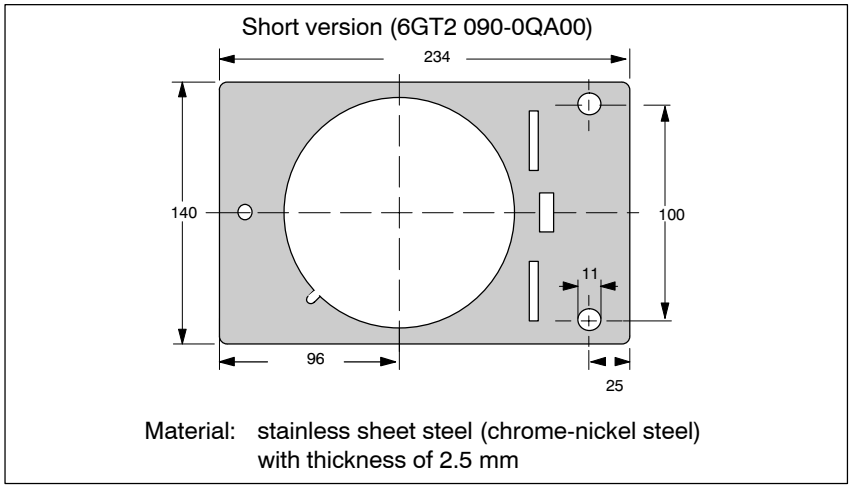


Figure 4-22 Holder of the MDS 439 E data memory

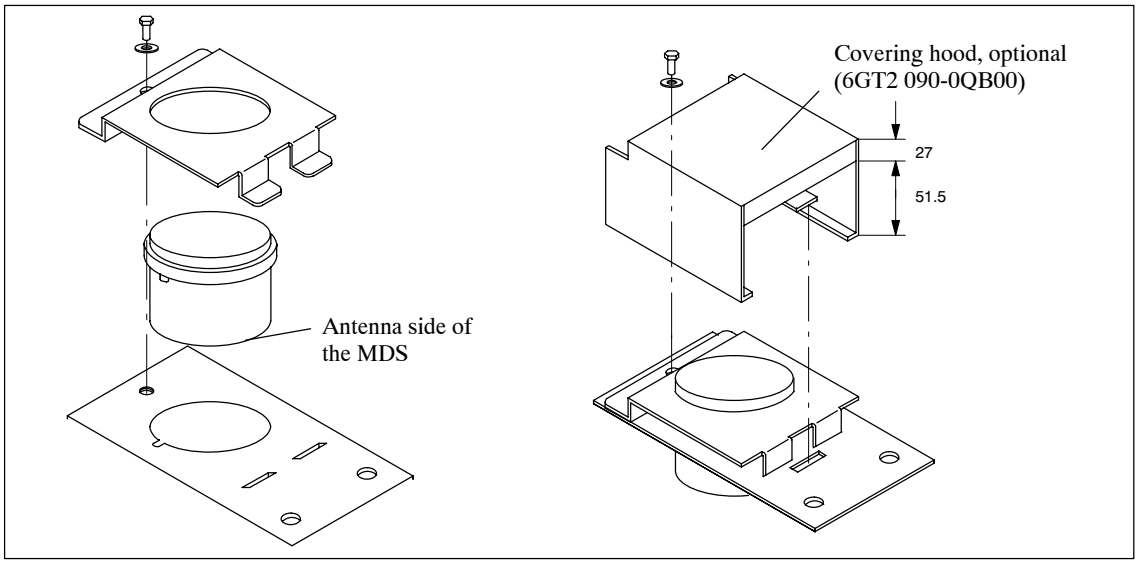


Figure 4-23 Assembly of MDS 439 E with holder

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 mounting screws have a diameter of M10. The minimum length is 25 mm. 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.

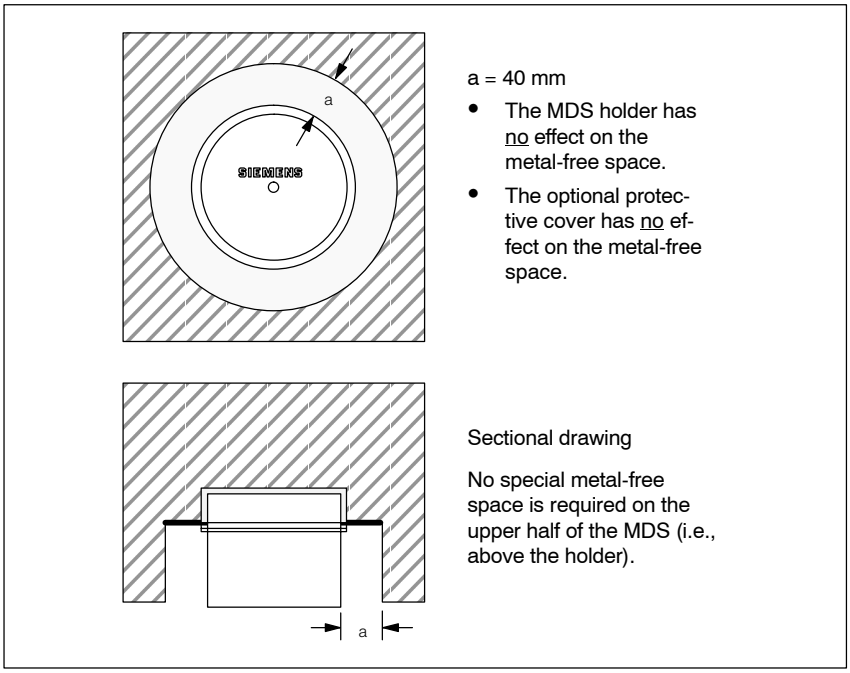


Figure 4-24 Metal-free space for MDS 439 E

Cyclic MDS operation at temperatures > 110° C

At ambient temperatures > 110° 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 4-28 Limit cycles of MDS 439 E

T_u (Heat-Up)	Heating Up	T_u (Cool-Down)	Cooling Down
220° C	0,5 h	25° C	> 2 h
200° C	1 h	25° C	> 2 h
190° C	1 h	25° C	> 1 h 45 min
180° C	2 h	25° C	> 5 h
170° C	2 h	25° C	> 4 h

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

Note

For further configuration notes, see chapter 3.7 or the description of MDS 439 E (6GT2 097-3AJ00-1DA2).

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, FRAM, 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 41C/41CC	0 to 15 mm	25 mm	–25 to +70° C	55 x 75 x 30	IP67
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 included screw nuts, the antenna head can be positioned with extreme precision for each application.

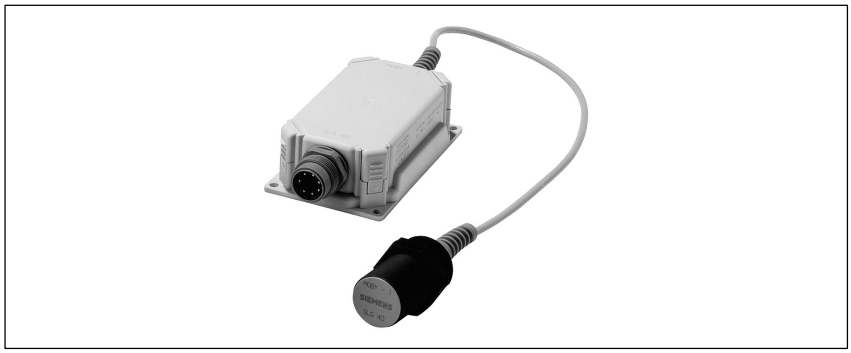


Figure 5-1 Read/write device SLG 40

Ordering data

Table 5-2 Ordering data for SLG 40

Read/write device SLG 40 up to 10 mm (low power), incl. screw nuts	6GT2 001-0EA10
Accessories:	
SLG plug connector and stub lines	See chapter 3.10
Mounting clamp	3SX6 284

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
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	2×10^6

Table 5-3 Technical data of SLG 40

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
Tightening torque (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
Certifications		EN 300 330 FCC Part 15 UL/CSA

Field data

Applicable for MDS 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

FCC information

Made in Germany

SIEMENS MOBY I SLG 40

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, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

Note

The manufacturer is not responsible for any radio or TV interference caused by unauthorized changes and modifications to this equipment:
Such modifications could void the user's authority to operate the equipment.

Transmission window

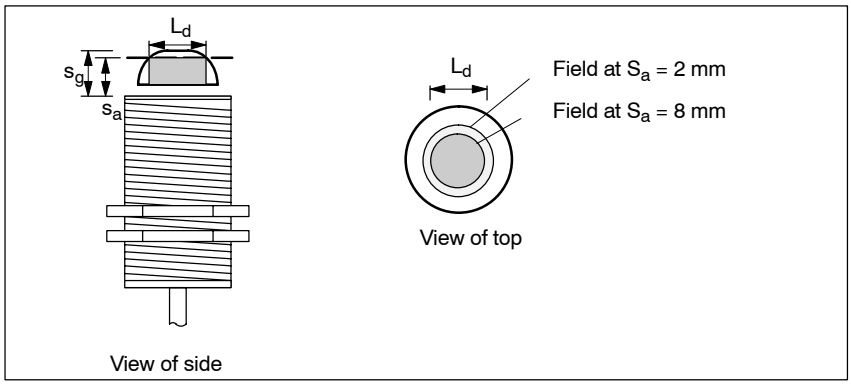


Figure 5-2 View of the antenna

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

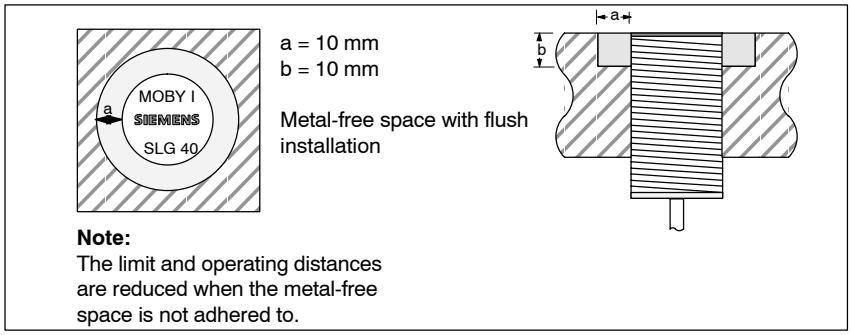


Figure 5-3 Metal-free space for SLG 40

Optional mounting clamp

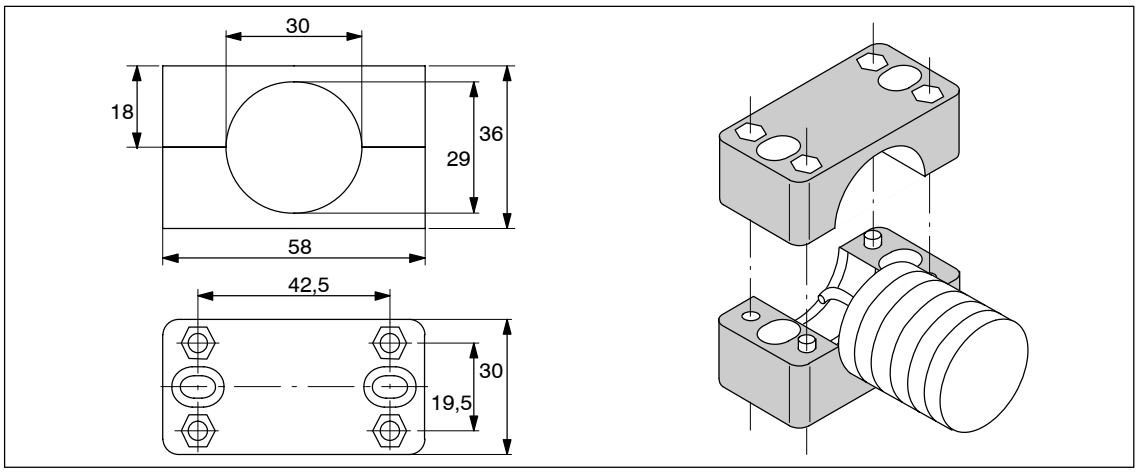
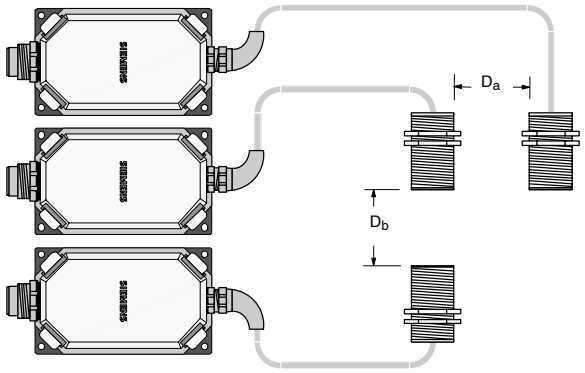


Figure 5-4 Mounting diagram and dimensions of SLG 40 with mounting clamp

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 5-5 Distance D for SLG 40

Dimensions (in mm)

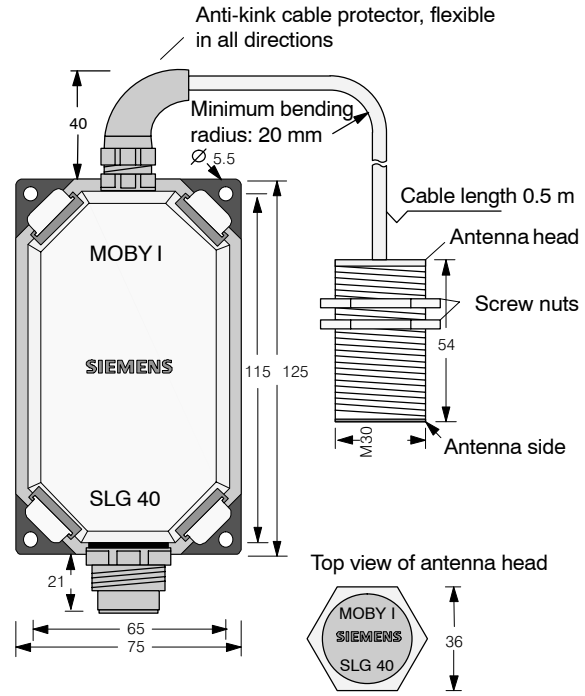


Figure 5-6 Dimensional diagram of SLG 40

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 included screw nuts, the antenna head can be positioned with extreme precision for each application.

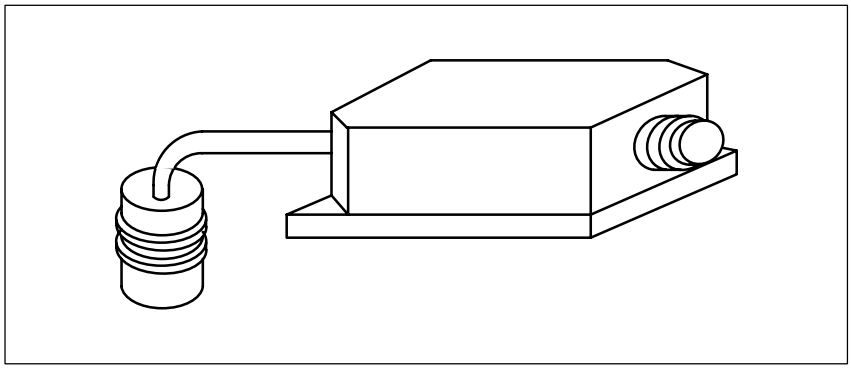


Figure 5-7 Read/write device SLG 40-S

Ordering data

Table 5-5 Ordering data for SLG 40-S

Read/write device SLG 40-S up to 8 mm (low power), incl. screw nuts	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 x 10^6
Transmission frequency		
• Power		134 kHz
• Data		1.81 MHz
Mounting of SLG		4 M5 screws
Tightening torque (at room temperature)		≤ 2 Nm
Mounting of SLG head (included)		2 nuts (M18 x 1.0)
Weight (approx.)		200 g
Certifications		EN 300 330 FCC Part 15 UL/CSA

Field data

Applicable for MDS 401/402

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	± 4.5 mm from middle
Minimum distance from SLG to SLG (D)	$D_a \geq 50$ mm
	$D_b \geq 80$ mm

FCC information

Made in Germany

SIEMENS MOBY I SLG 40S

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, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

Note

The manufacturer is not responsible for any radio or TV interference caused by unauthorized changes and modifications to this equipment:
Such modifications could void the user's authority to operate the equipment.

Transmission window

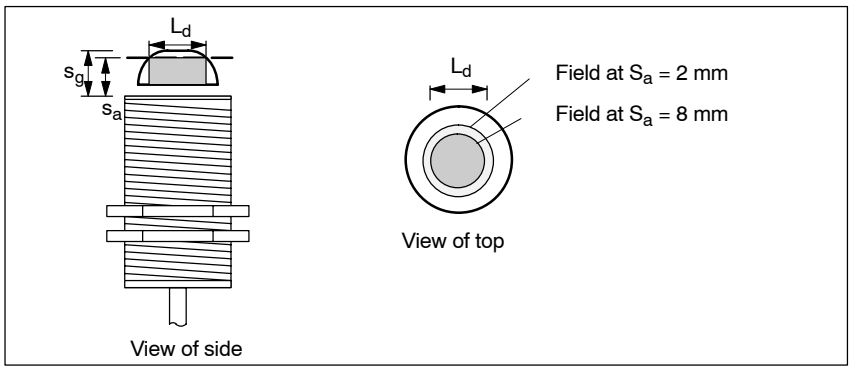


Figure 5-8 View of the antenna

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

Metal-free space

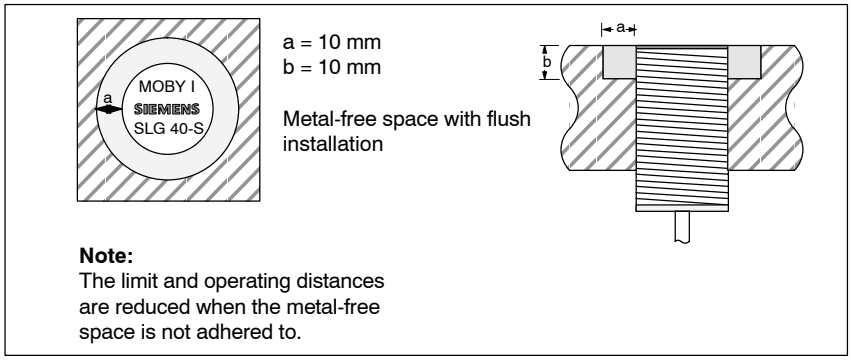


Figure 5-9 Metal-free space for SLG 40-S

Definition of distance D

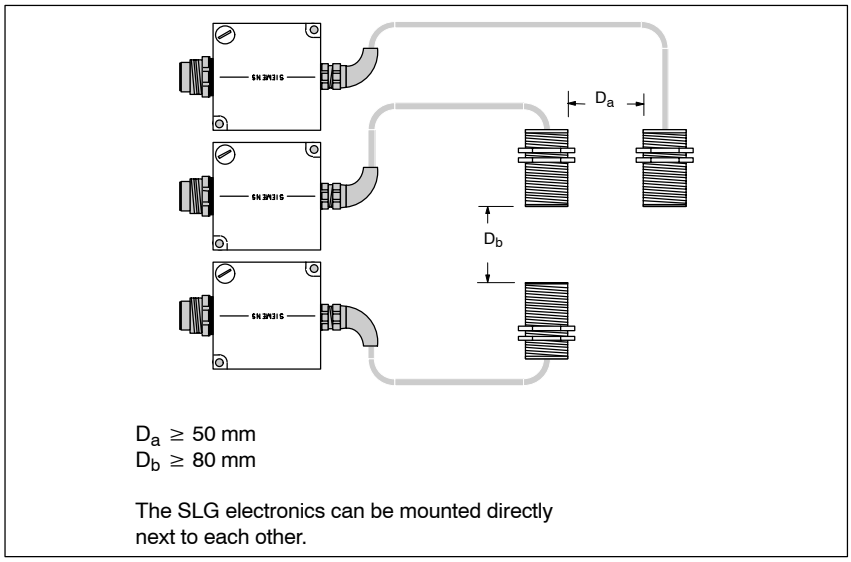


Figure 5-10 Distance D for SLG 40-S

Dimensions (in mm)

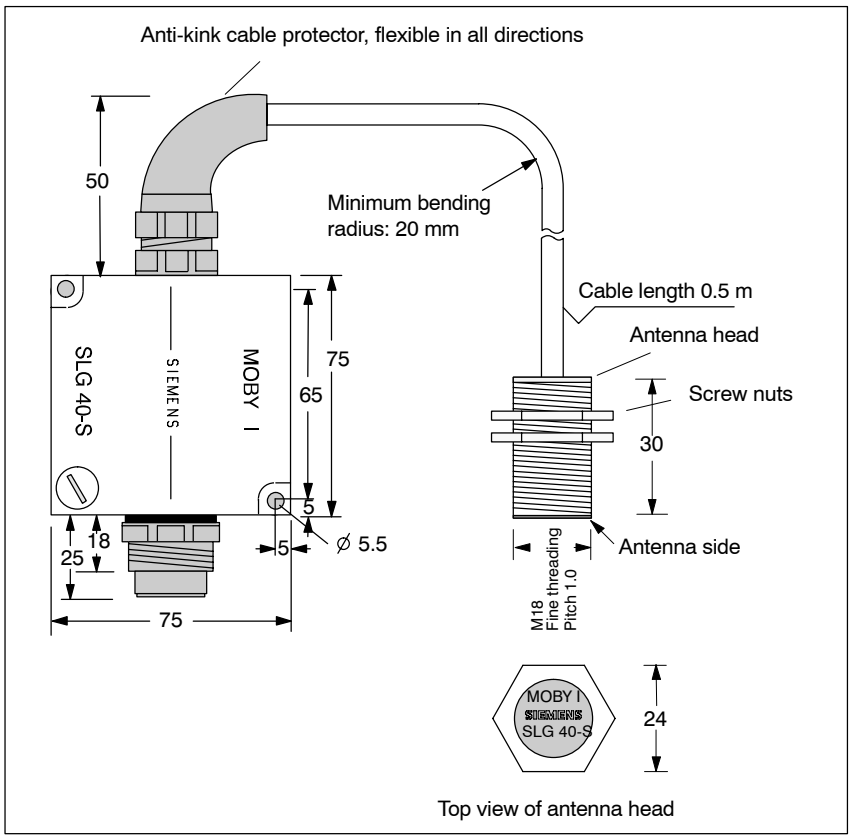


Figure 5-11 Dimensional diagram of SLG 40-S

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.

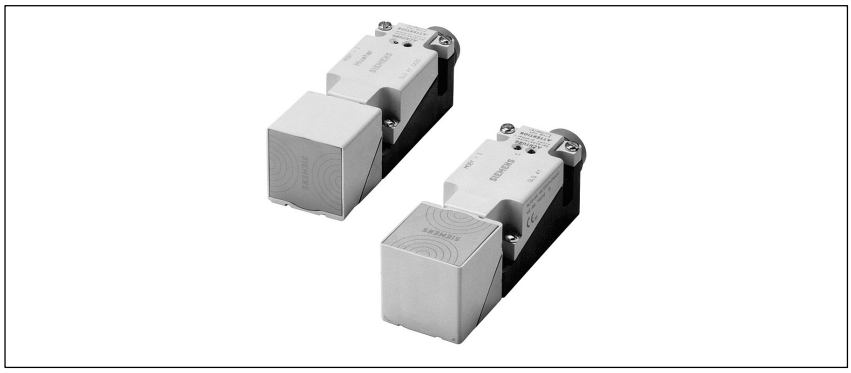


Figure 5-12 SLG 41/SLG 41-S

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 001-0AA00-0AX0
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.)	30 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	Crastin
Plug connection	DIN 43651
Protection rating	IP65
Shock	50 g
Vibration	20 g
Mounting of SLG	4 M5 screws
Tightening torque (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)	0 to 15 mm
Limit distance (S_g)	30 mm
Median deviation (L)	Depends on MDS
Minimum distance from SLG to SLG (D)	> 200 mm

FCC information

Made in Germany

SIEMENS MOBY I SLG 41

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, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

Note

The manufacturer is not responsible for any radio or TV interference caused by unauthorized changes and modifications to this equipment:
Such modifications could void the user's authority to operate the equipment.

Transmission window

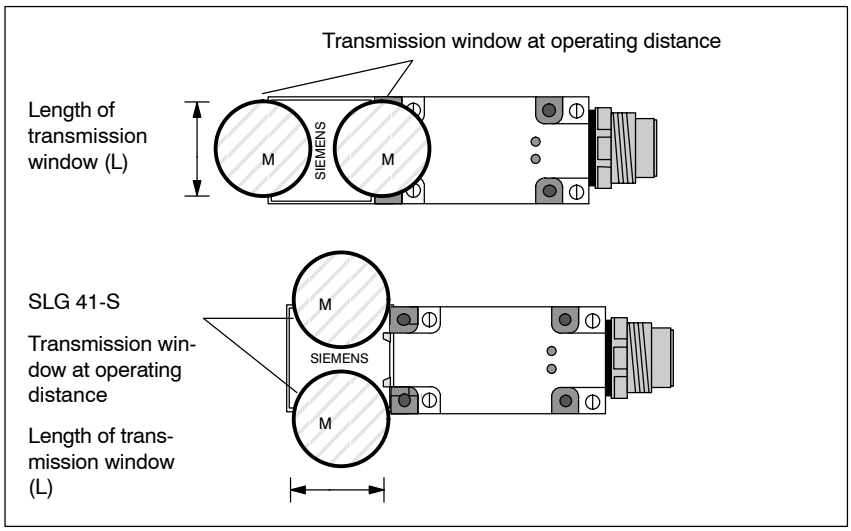


Figure 5-13 Transmission window of SLG 41/SLG 41-S

Metal-free space

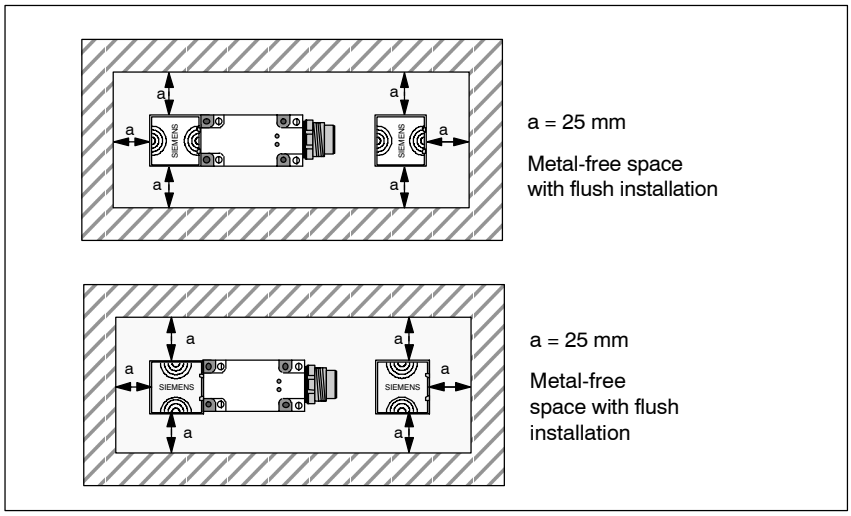


Figure 5-14 Metal-free space for SLG 41/SLG 41-S

Definition of distance D

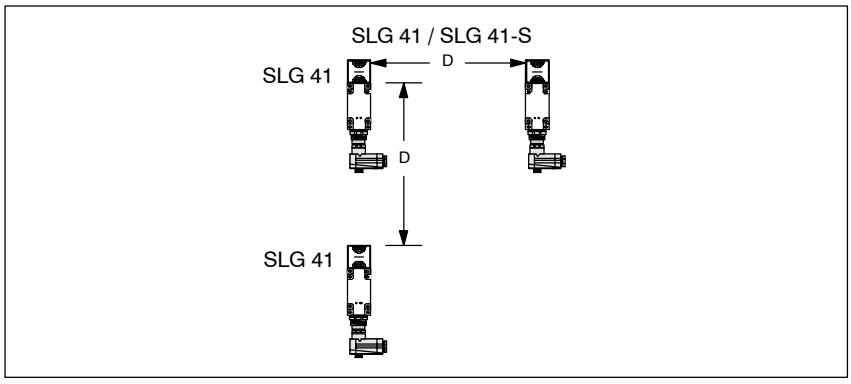


Figure 5-15 Distance D for SLG 41/SLG 41-S

Dimensions (in mm)

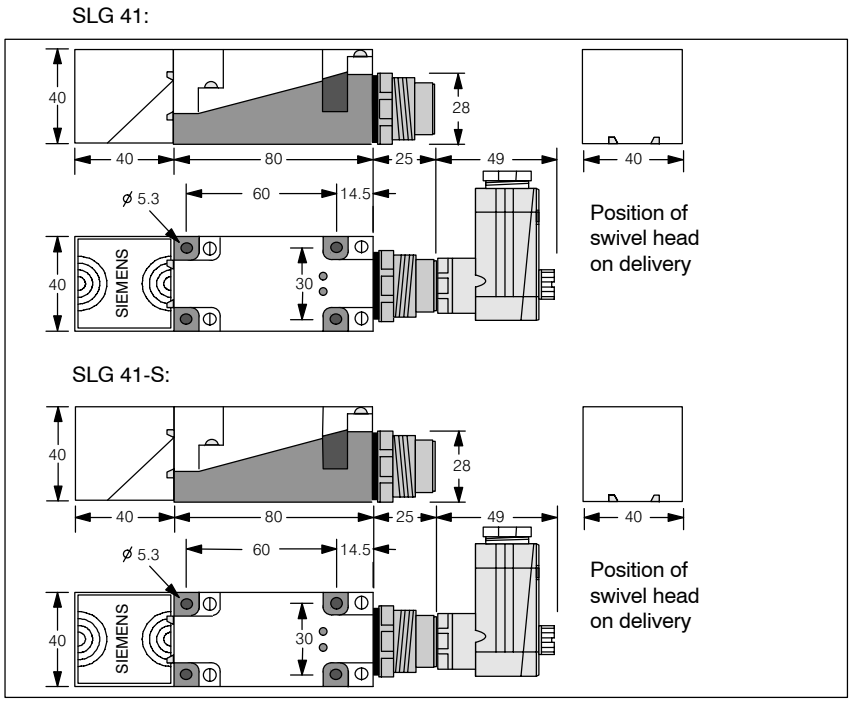


Figure 5-16 Dimensional diagram of SLG 41/SLG 41-S

Possible read head changes with the swivel head

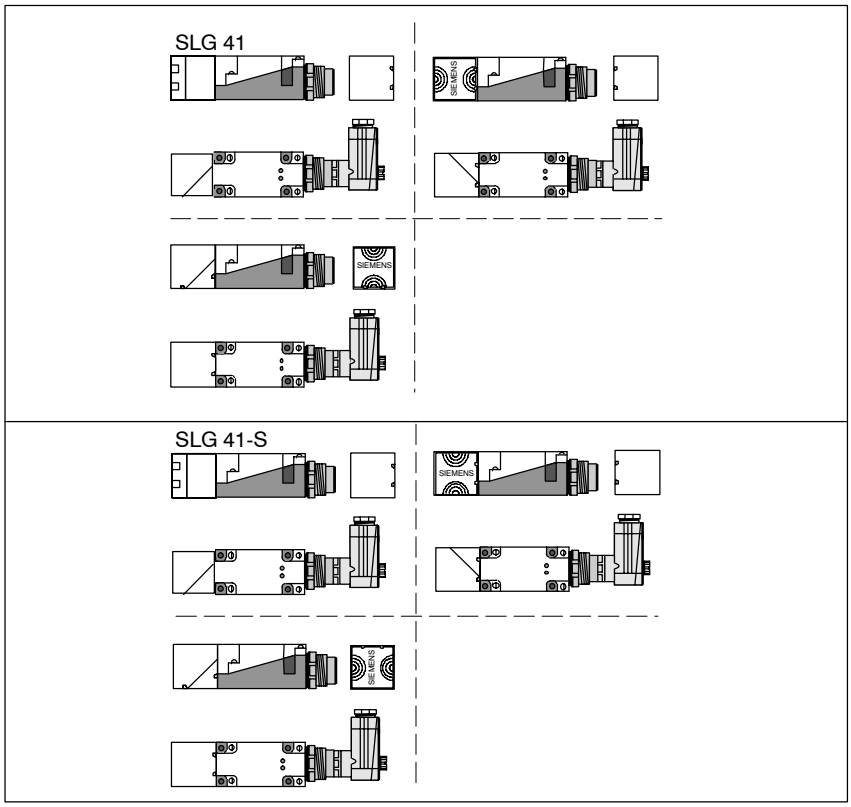


Figure 5-17 Read head changes of SLG 41/SLG 41-S

5.5 SLG 41C/SLG 41CC

Application area

The SLG 41C is a low-end read/write device. It is small and compact and is excellent for use in small assembly lines.
The high protection rating and use of high-quality materials ensure that the SLG 41C can easily handle even most rugged industrial conditions.
It is connected with a 3-m cable which is equipped with core sleeves at the end. This connection line can be extended with terminals or a user-provided connection plug. This connection plug of the ASM is used for the connection to the ASM.
The cable length of the SLG 41CC is 2 m. The end of the cable is equipped with a twin M-12 plug. This can be used to connect the SLG 41CC directly to an ASM 450/452/473.

Figure 5-18 SLG 41C/41CC read/write device

Ordering data

Table 5-11 Ordering data of SLG 41C/41CC

Read/write device SLG 41C	6GT2 001-0AC00
SLG 41CC read/write device with twin M-12 plug	6GT2 001-0AC00-0AX0
Accessories:	
Extension cable (not fabricated)	6GT2 090-0A...
Connection plug for ASM 450/473	6GT2 090-0BC00

Technical data

Table 5-12 Technical data of SLG 41C/41CC

Inductive interface to MDS	
Read/write distance, SLG-MDS, max.	30 mm (see field data)
Transmission frequency	
Power	134 kHz
Data	1.81MHz
Serial interface to evaluation unit	RS 422
Data transmission rate	19 200 Baud
Line length, ASM-SLG max. (for 24V DC)	360 m

Table 5-12 Technical data of SLG 41C/41CC

Serial interface to user	
SLG 41C	3 m connection line; open end
SLG 41CC	2 m connection line; twin M-12 plug for ASM 450/452/473
Voltage	
Nominal value	24 V DC
Permissible range	20 V to 30 V DC
Current consumption at room temerature	
Standby	30 mA
Operation	70 mA (typical)
Housing	
Dimensions (L x W x H) in mm	55 x 75 x 30
Color	Gray
Material	Plastic (polyamide 12)
Connection	3 m connection line, cable ends with core sleeves and labels
Protection rating an acc. w. EN 60 529	IP67
Shock	50 g
Vibration	20 g
Mounting of SLG	4 M 5 screws
Tightening torque (at room temperature)	< 2 Nm
Ambient temperature	
During operation	–25° C to +70° C
During transpostation and storage	–40° C to +85° C
Weight approx.	210 g

Field data (in mm)

Table 5-13 Field data of SLG 41C/41CC

	MDS 401/402	MDS 403	MDS 404/514
Working distance (S_a)	0 to 6	4 to 15	0 to 12
Limit distance (S_g)	10	30	25
Transmission window • L: Vertical • 2L: Horizontal	 20 40	 65 –	 30 60
Width of transmission window (W)	8	25	12
Minimum distance from SLG to SLG	≥ 200	≥ 200	≥ 200

FCC Information

Made in Germany

SIEMENS MOBY I SLG 41C/41CC

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(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

Note

The manufacturer is not responsible for any radio or TV interference caused by unauthorized changes and modifications to this equipment.
Such modifications could void the user's authority to operate the equipment.

Transmission window

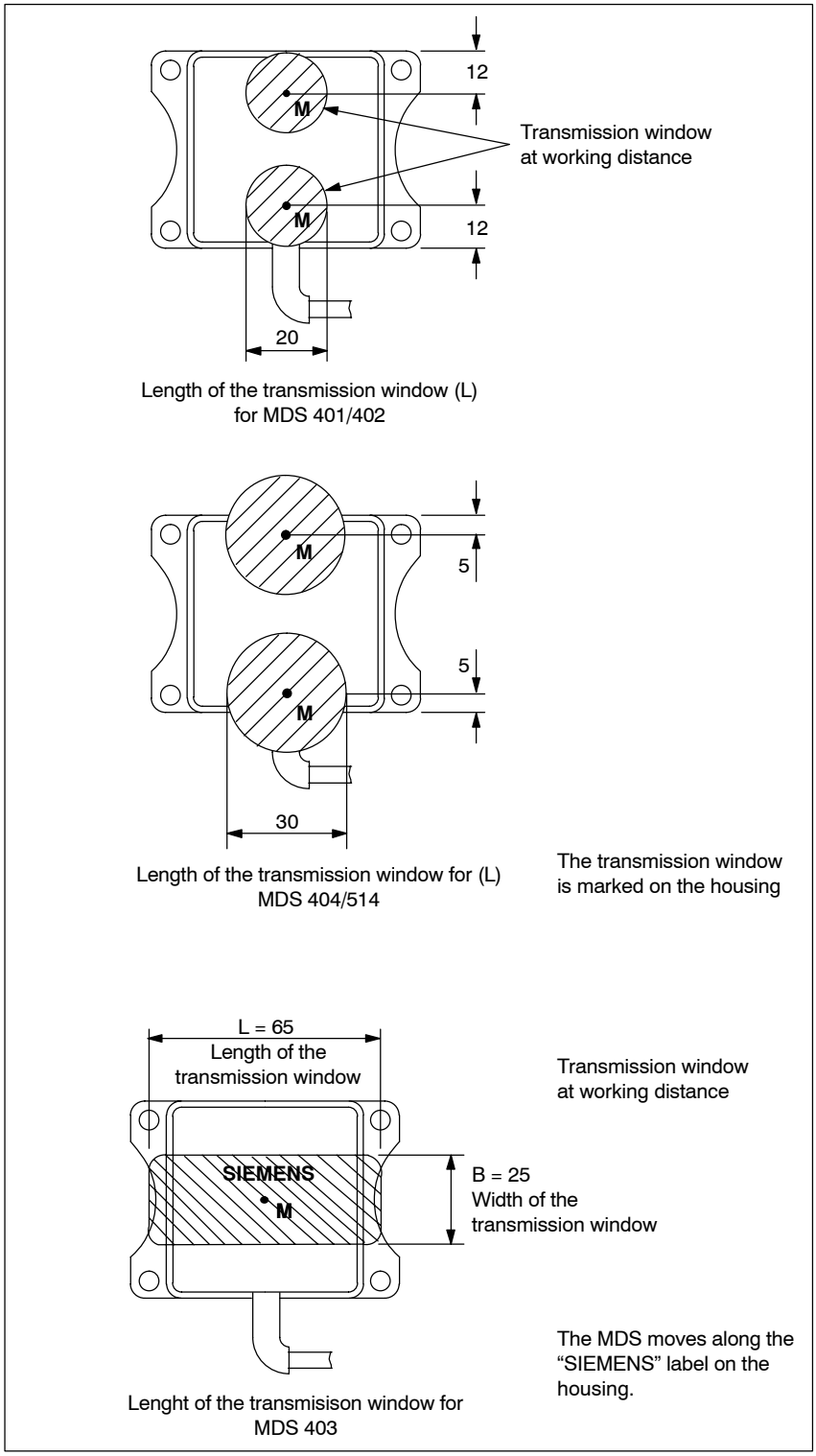


Figure 5-19 Transmission window of SLG 41C/41CC

Metal-free space

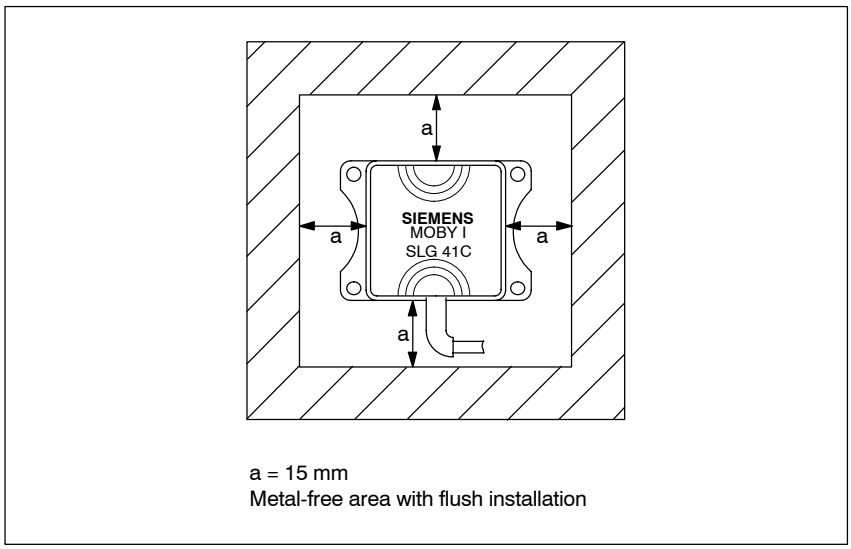


Figure 5-20 Metal-free area of SLG 41C/41CC

Definition of distance D

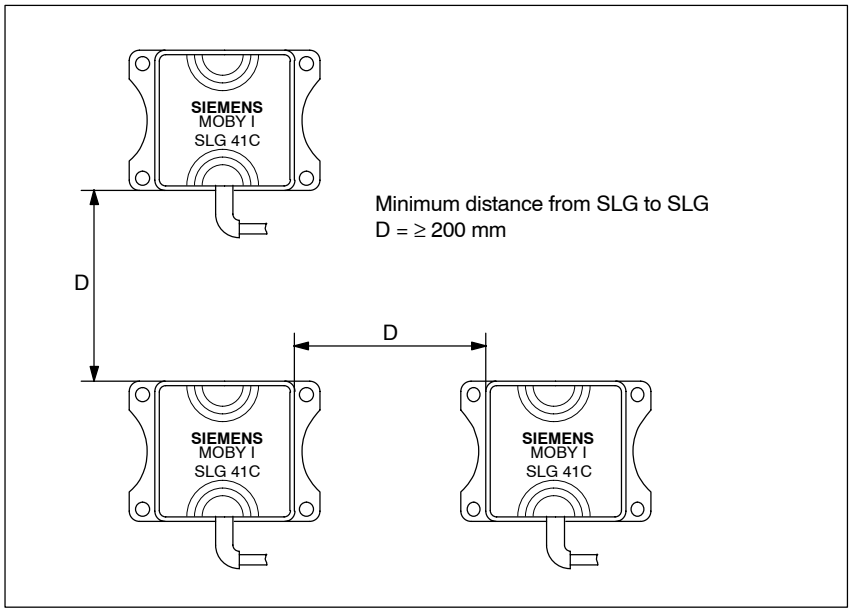
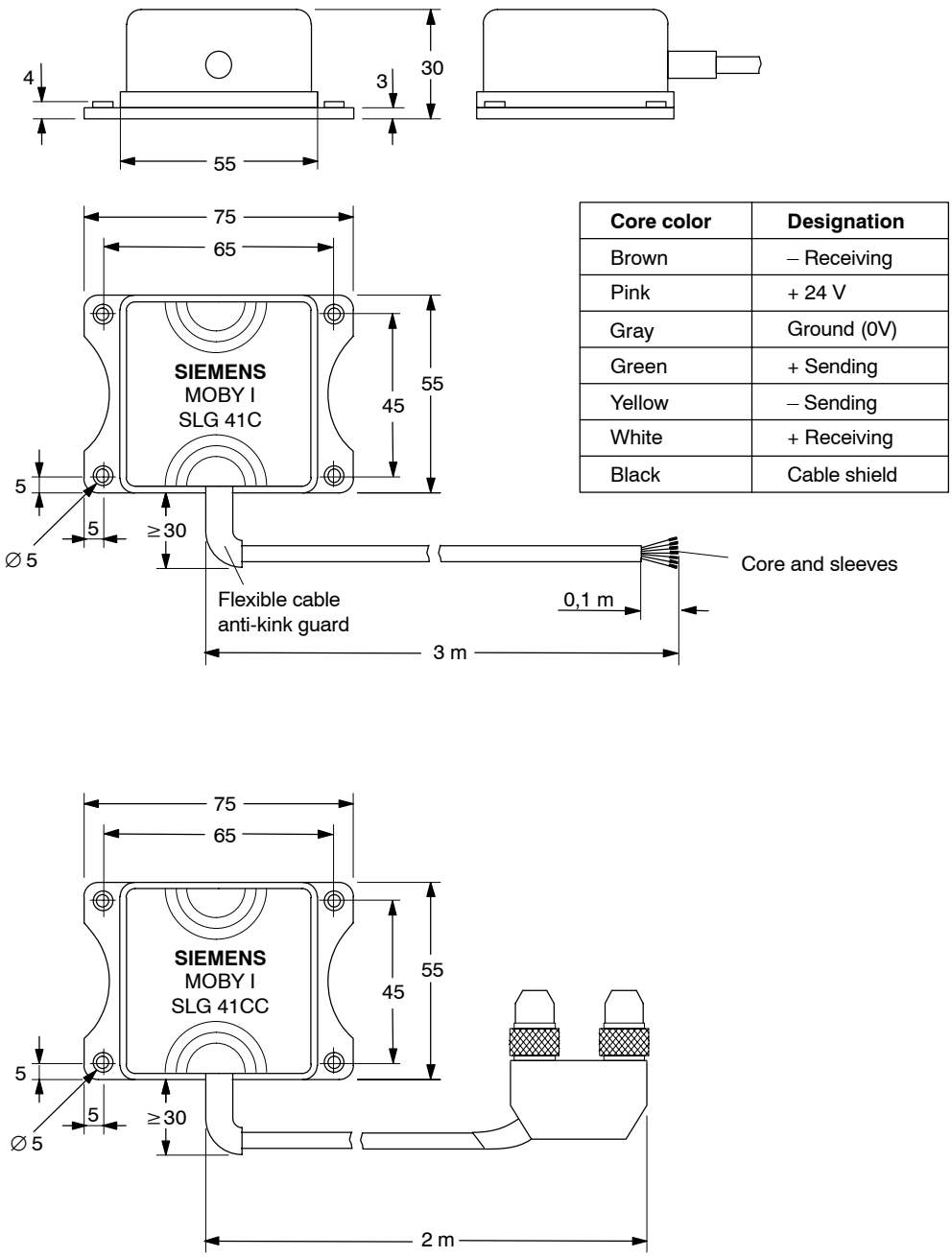


Figure 5-21 Distance D: SLG 41C/41CC

Dimensions
(in mm)



Core color	Designation
Brown	– Receiving
Pink	+ 24 V
Gray	Ground (0V)
Green	+ Sending
Yellow	– Sending
White	+ Receiving
Black	Cable shield

Figure 5-22 Dimensions of SLG 41C/41CC

5.6 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 3.4.

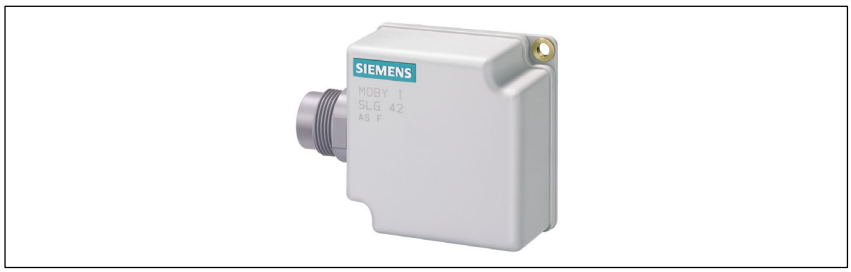


Figure 5-23 SLG 42 read/write device

Ordering data

Table 5-14 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 5-15 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	2×10^6

Table 5-15 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	2 M5 screws
Tightening torque (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
Silicone free	Yes

Field data

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

Table 5-16 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

FCC information

Made in Germany

SIEMENS MOBY I SLG 42

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, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

Note

The manufacturer is not responsible for any radio or TV interference caused by unauthorized changes and modifications to this equipment:
Such modifications could void the user's authority to operate the equipment.

Transmission window

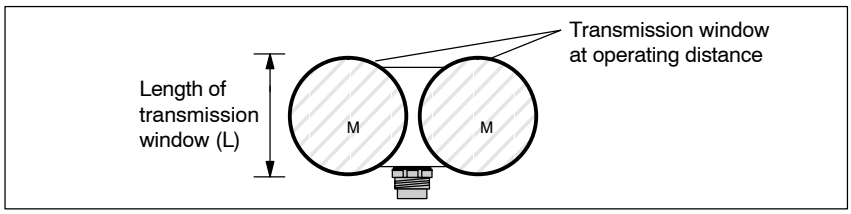


Figure 5-24 Transmission window of SLG 42

Metal-free space

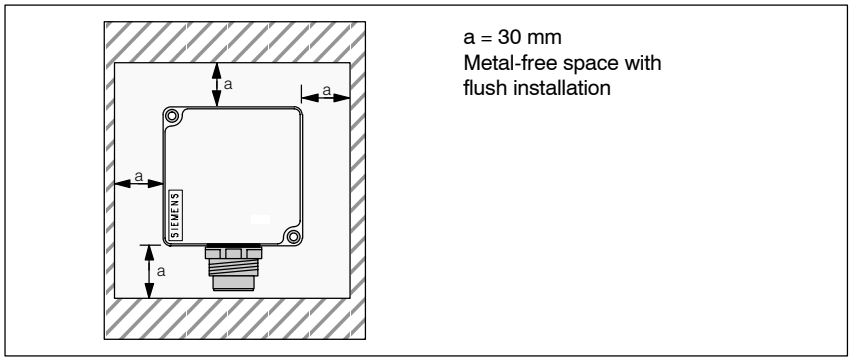


Figure 5-25 Metal-free space for SLG 42

Definition of distance D

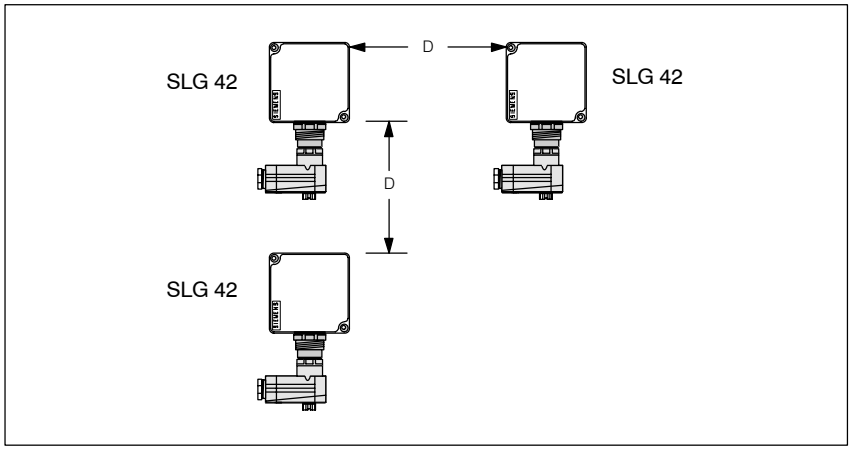


Figure 5-26 Distance D: SLG 42

Dimensions (in mm)

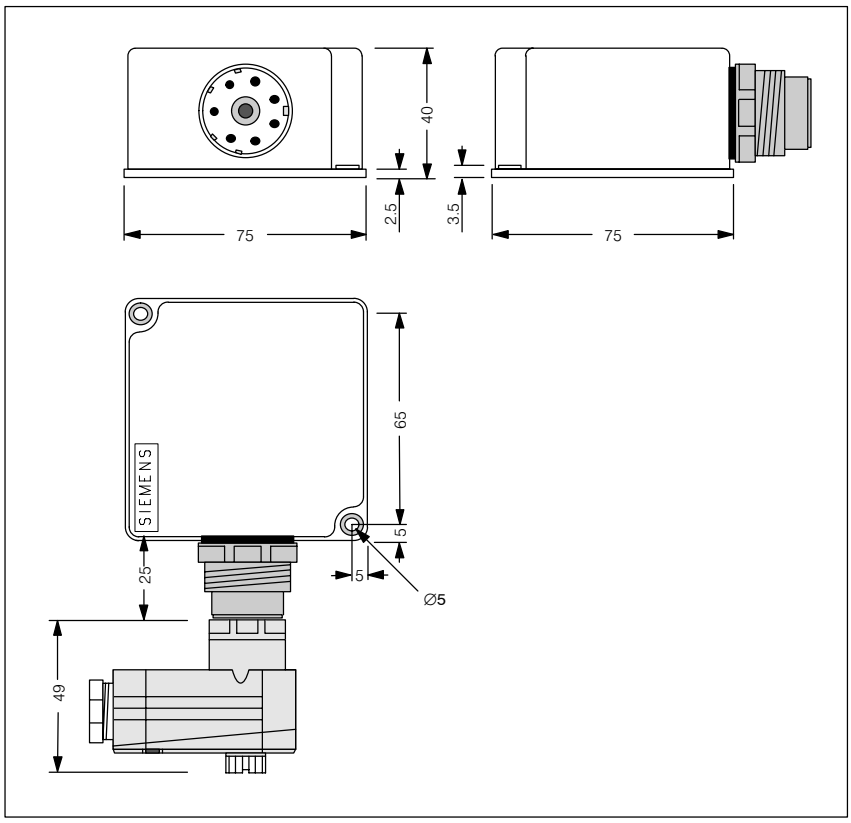


Figure 5-27 Dimensional diagram of SLG 42

5.7 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 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.

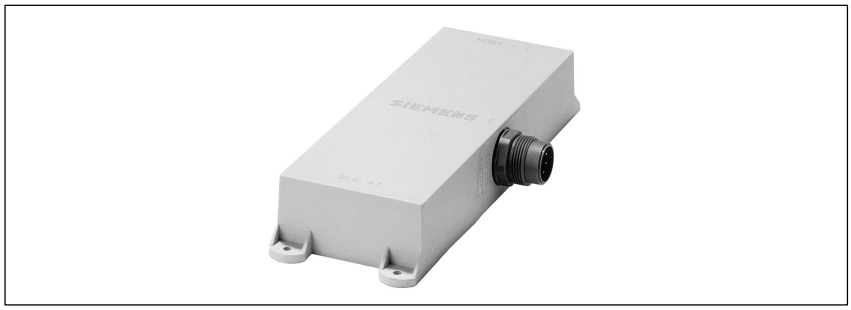


Figure 5-28 Read/write device SLG 43

Ordering data

Table 5-17 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 5-18 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
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

Table 5-18 Technical data of SLG 43

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
Tightening torque (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
Silicone free	Yes

Field data

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

Table 5-19 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

FCC information

Made in Germany

SIEMENS MOBY I SLG 43

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, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

Note

The manufacturer is not responsible for any radio or TV interference caused by unauthorized changes and modifications to this equipment:
Such modifications could void the user's authority to operate the equipment.

Transmission window

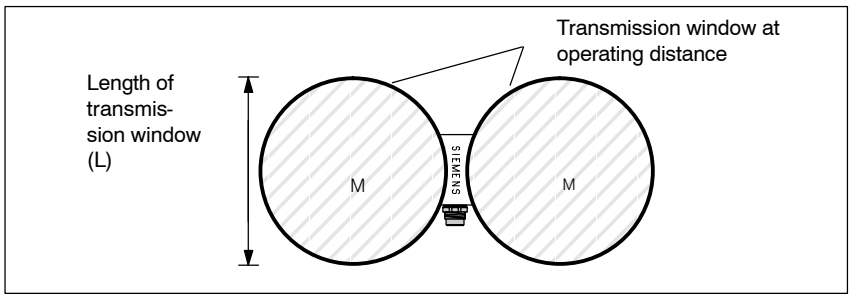


Figure 5-29 Transmission window of SLG 43

Metal-free space

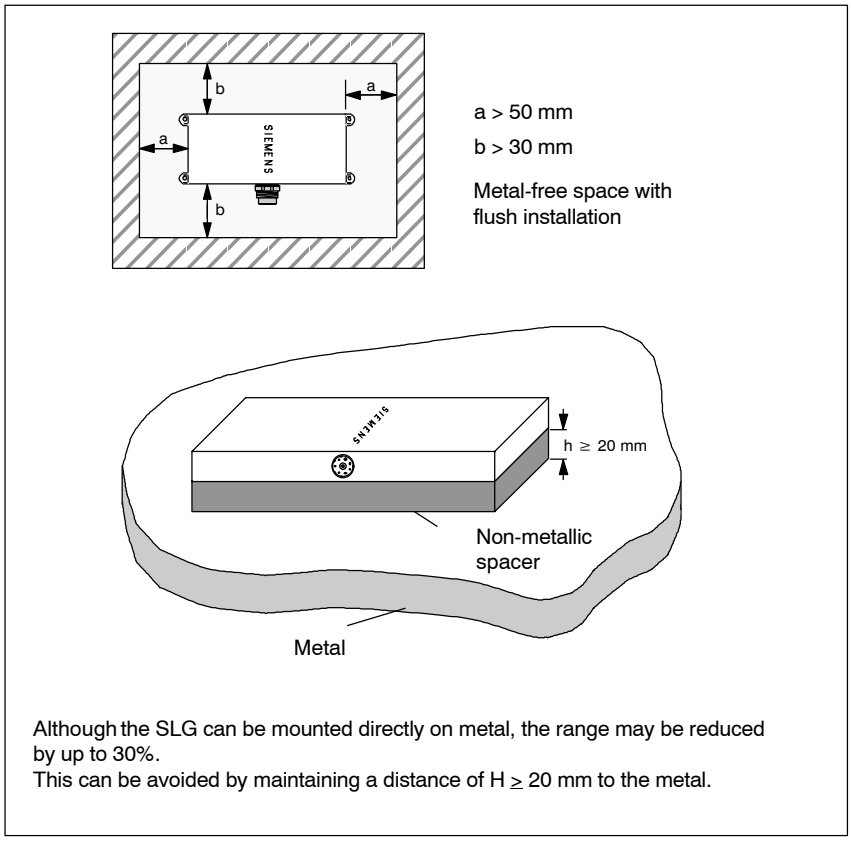


Figure 5-30 Metal-free space for SLG 43

Definition of distance D

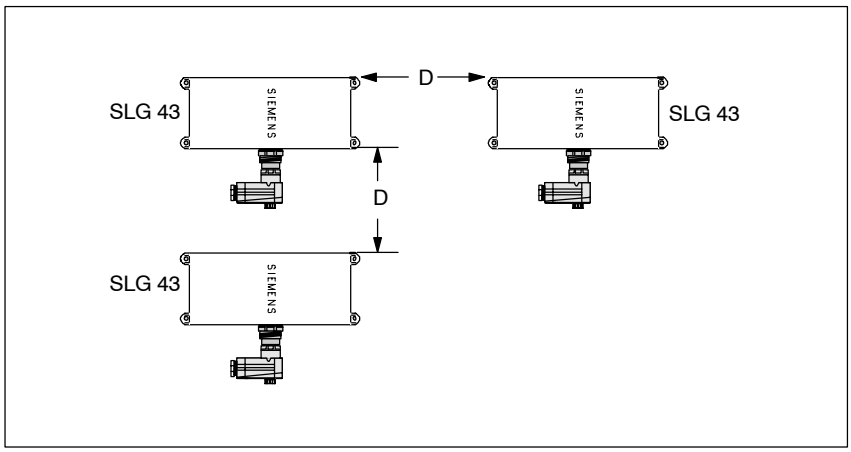


Figure 5-31 Distance D: SLG 43

Dimensions (in mm)

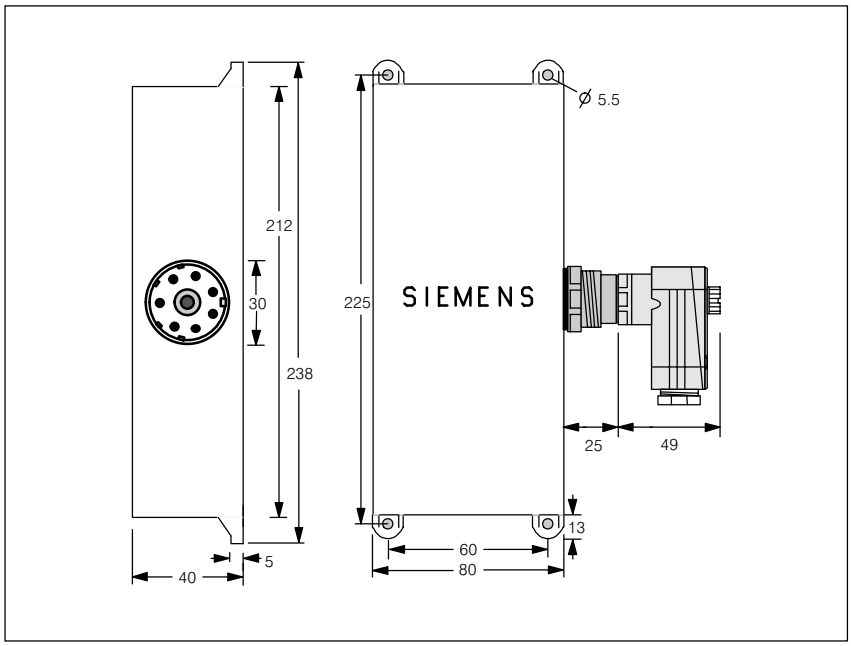


Figure 5-32 Dimensional diagram of SLG 43

5.8 SLG 44 [1]

Application area

The SLG 44 permits the MDS 507 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 can still be processed with SLG 44 even at top speeds of 120 km/h.

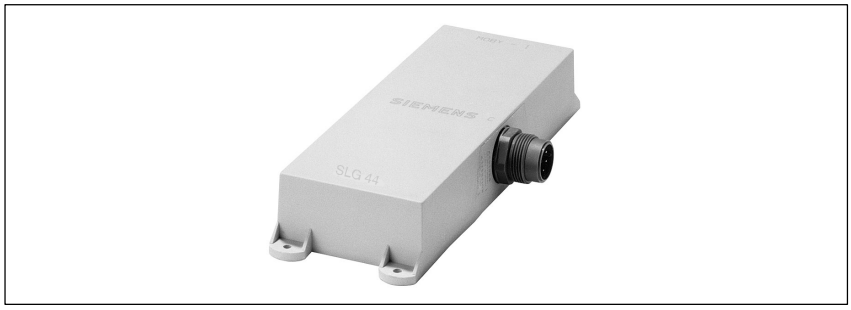


Figure 5-33 Read/write device SLG 44

Ordering data

Table 5-20 Ordering data for SLG 44

Read/write device SLG 44 up to 1000 mm (long range)	6GT2 001-0DA10-0AX0
Configuration manual SLG 44/MDS 507 German English	 On “Software MOBY” CD
SLG plug connector and stub lines	See chapter 3.10

1 Only available now as spare part

Technical data

Table 5-21 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	2×10^6
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
Tightening torque (at room temperature)	$\leq$ 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 5-22 Field data of SLG 44

MDS 507 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

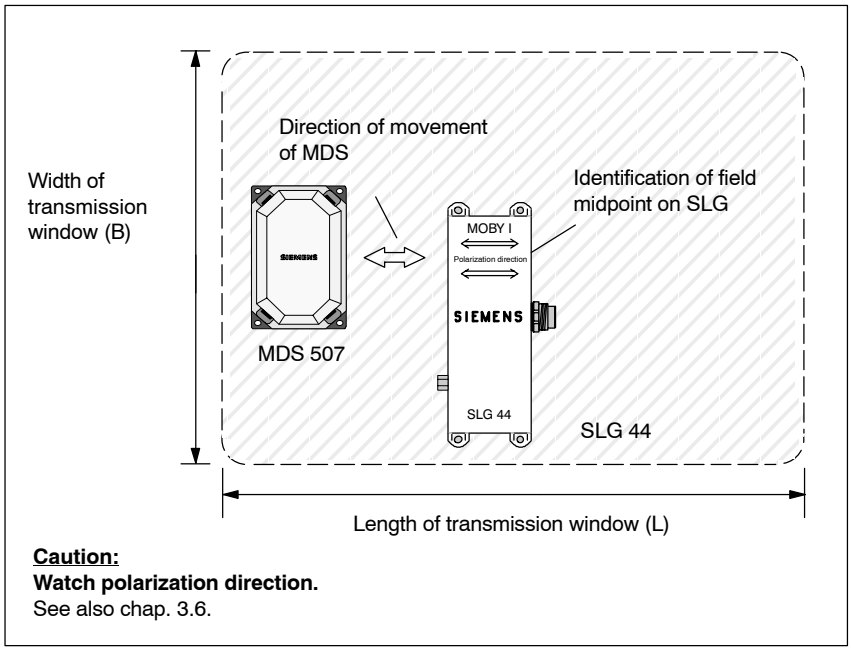
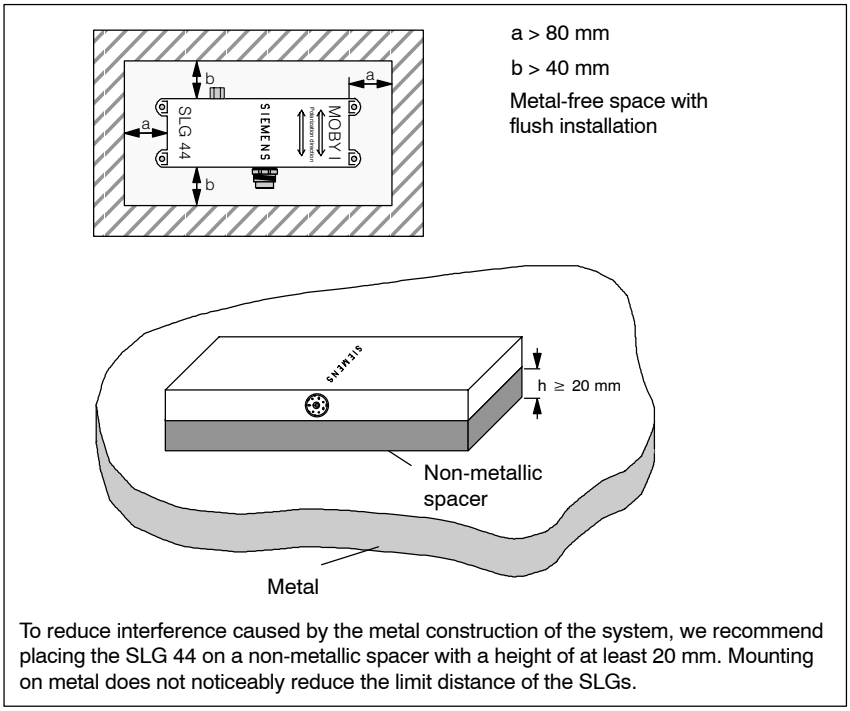


Figure 5-34 Transmission window of SLG 44

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 5-35 Metal-free space of SLG 44

Definition of distance D

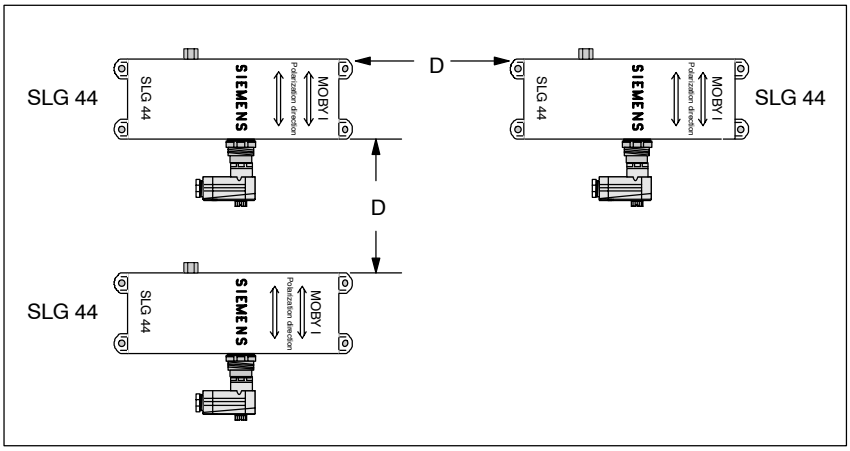


Figure 5-36 Distance D: SLG 44

Dimensions (in mm)

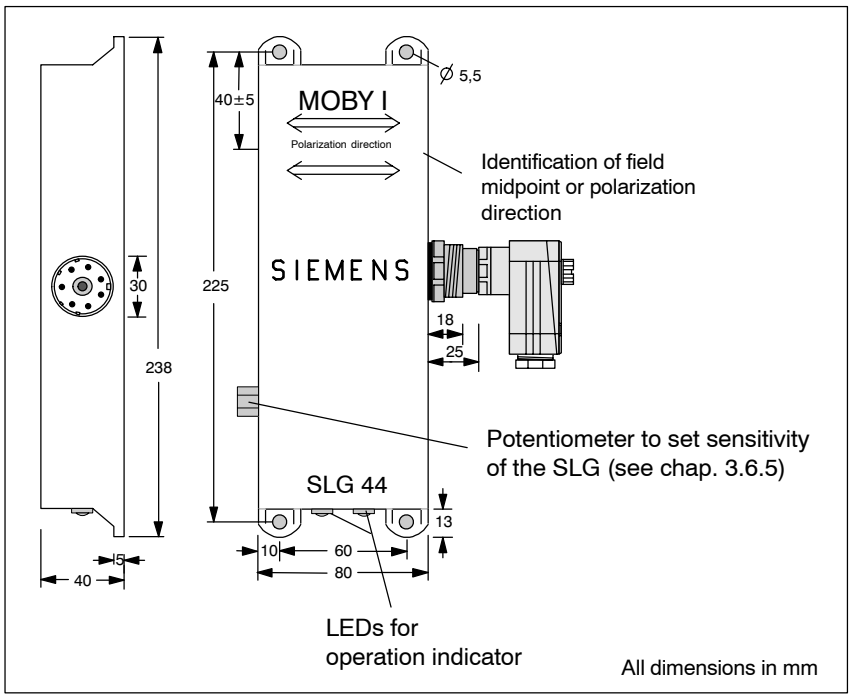


Figure 5-37 Dimensional diagram of SLG 44

LEDs for operation indicator

Yellow:
Interference on SLG or MDS in boundary area.

The LED also goes on briefly when the SLG performs a power startup.

Green:
MDS is in the field. The LED flashes in accordance with the parameterized time t_{ABTAST}.

Interfaces

6

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 S5-115 to 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 424	RS 232 RS 422	9-pin sub D socket	MOBY-API	4 (parallel)	205 x 130 x 60	–25 to +55° C	IP40
ASM 450	PROFIBUS DP	2 5-pin proximity switch plug connectors	FB 240 FC 44	2 (multiplex)	134 x 110 x 55	0 to +55° C	IP67
ASM 452	PROFIBUS DPV1	2 5-pin proximity switch plug connectors	FC 45 FB 246 FC 46, FC 56	2 (pseudo parallel)	134 x 110 x 55	0 to +55° C	IP67
ASM 454	PROFIBUS DPV1	9-pin sub D socket	FC 45	4 (parallel)	205 x 130 x 60	–25 to +55° C	IP40
ASM 456	PROFIBUS DP/DPV1	8-pin proximity switch plug connector	FC 45	2 (parallel)	60 x 210 x 30	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
ASM 473	Can be installed in ET 200X	2 5-pin proximity switch plug connectors	FC 45 FC 56	1	87 x 110 x 55	0 to +55° C	IP67
ASM 475	Can be installed in S7-300/ ET 200M	via screw terminals	FC 45 FC 56	2 (parallel)	40 x 125 x 120	0 to +60° C	IP20
RF170C	Can be installed in ET 200pro	2 M12 plug connectors	FC 45 FC 55 FC 56	2 (parallel)	90 x 130 x 60	–25 to +55° C	IP67
SIM	V.24, RS 422, TTY	(Integrated)	3964R Driver		75 x 75 x 40	0 to +60° C	IP54

6.2 ASM 400/401

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 function

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., filehandler).

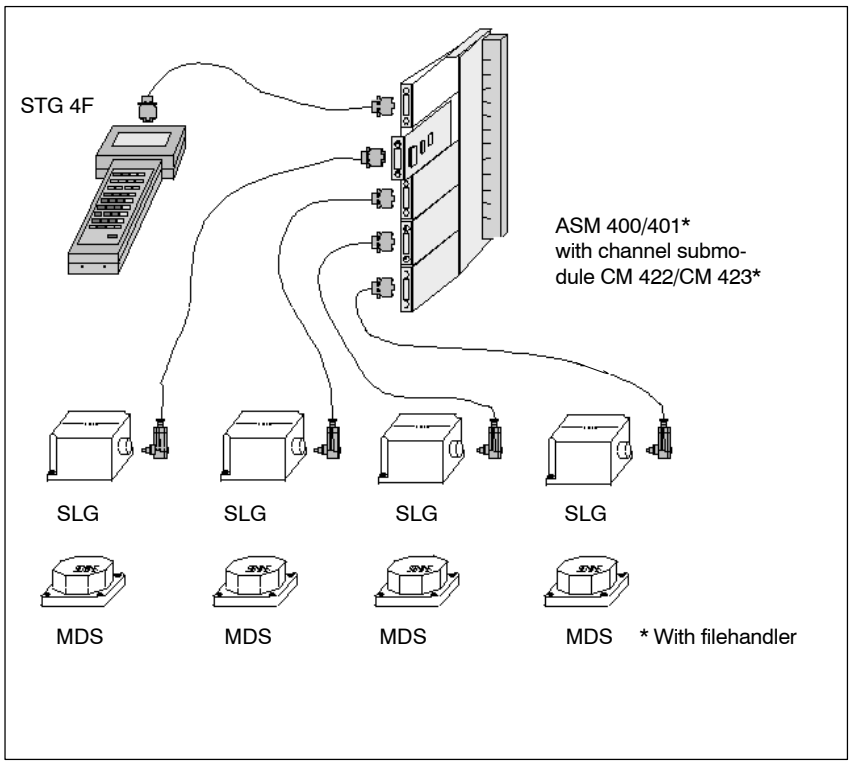


Figure 6-1 Configurator of ASM 400/401

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[1] with FB 230/250	6GT2 080-2AA10
ASM-SLG stub lines (see also chap. 3.10)	6GT2 091-0A...
Accessories:	
Plug connector, ASM side 9-pin submin D plug connector with screw lock for customer cable making	
• 1 each	6GT2 090-0BB00
• 10 each	6GT2 090-0BB10
Description-ASM 400/401	
German English	electronically available on “Software MOBY” CD
Description-FB 230 for ASM 401	
German English	electronically available on “Software MOBY” CD
Description-FB 250 for ASM 400	
German English	electronically available on “Software MOBY” CD

1 See chap. 7.1.

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

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 filehandler is used, the amount of user data on the MDS is reduced. The filehandler 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 filehandler is used

MDS Type	Operating 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

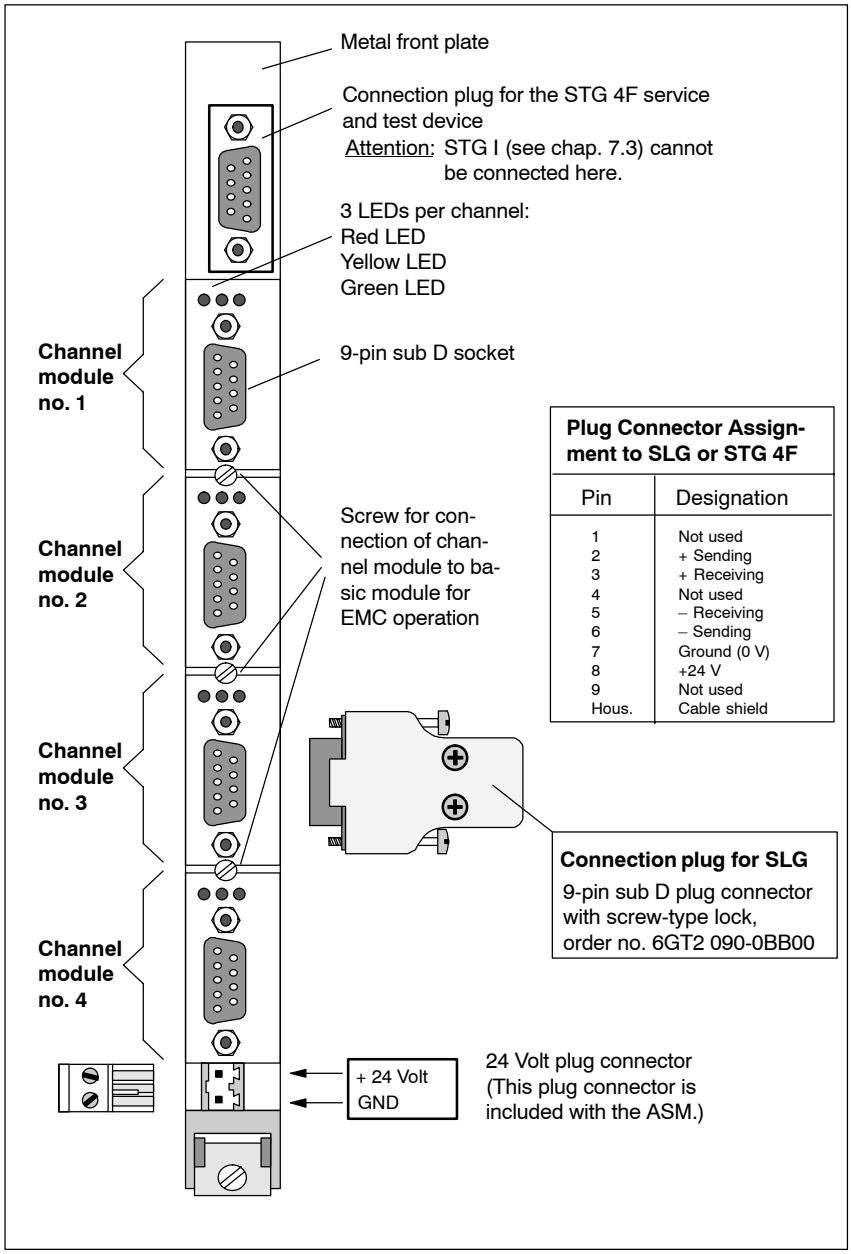


Figure 6-2 Plug connectors and their assignment for ASM 400/401

Switches and plug-in jumpers

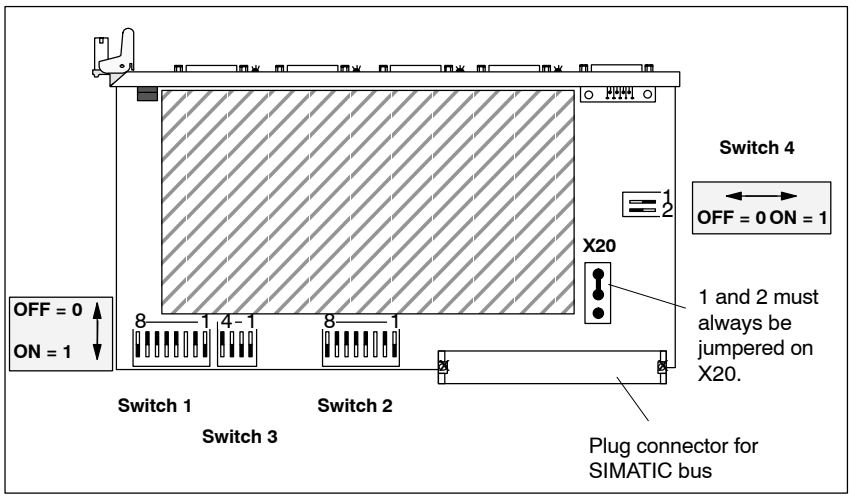


Figure 6-3 Switches and plug-in jumpers for ASM 400/401

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

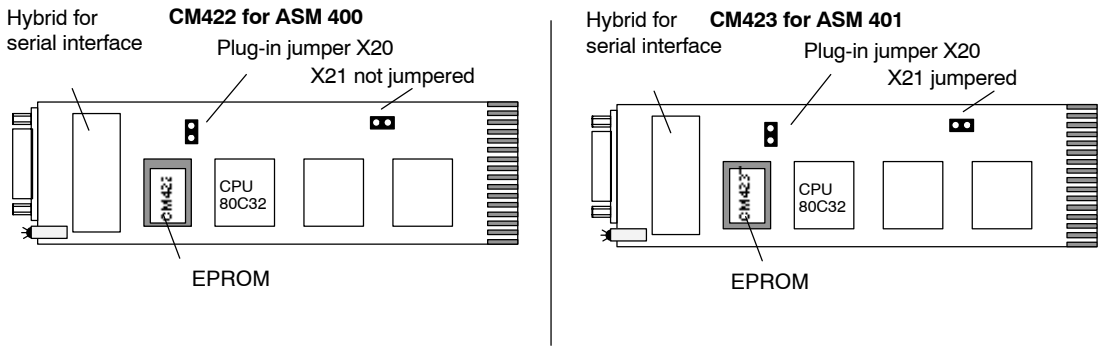
Table 6-5 Use of page frame addressing for FB 230

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.)	Not available		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)

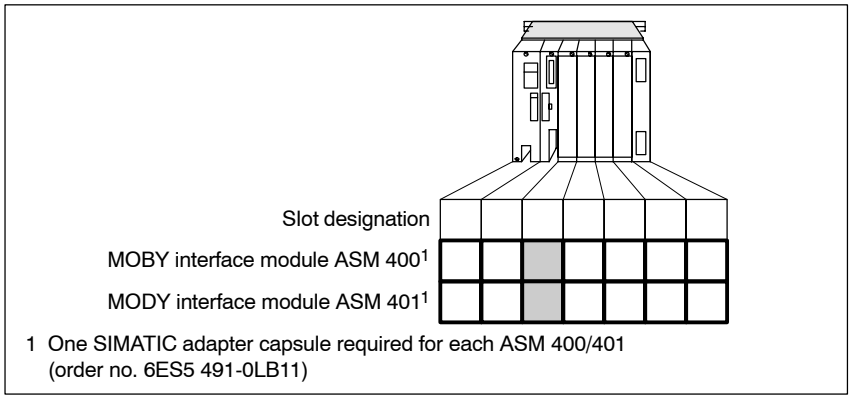


Figure 6-5 CR 700-0LA module rack (S5-115U)

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

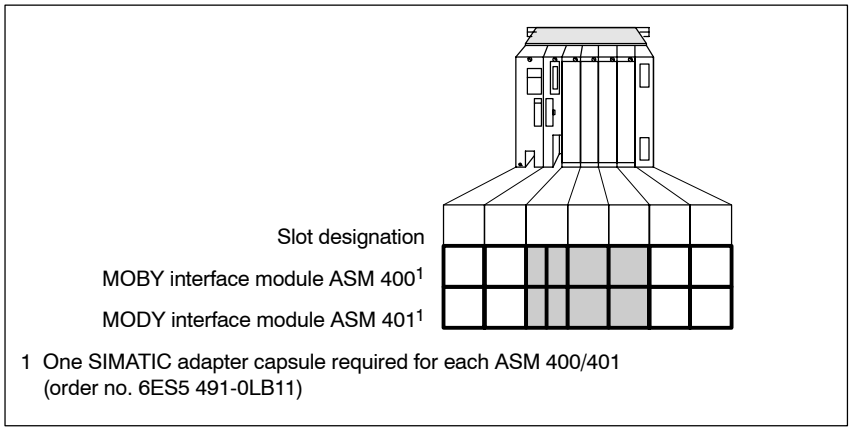


Figure 6-6 CR 700-0LB module rack (S5-115U)

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

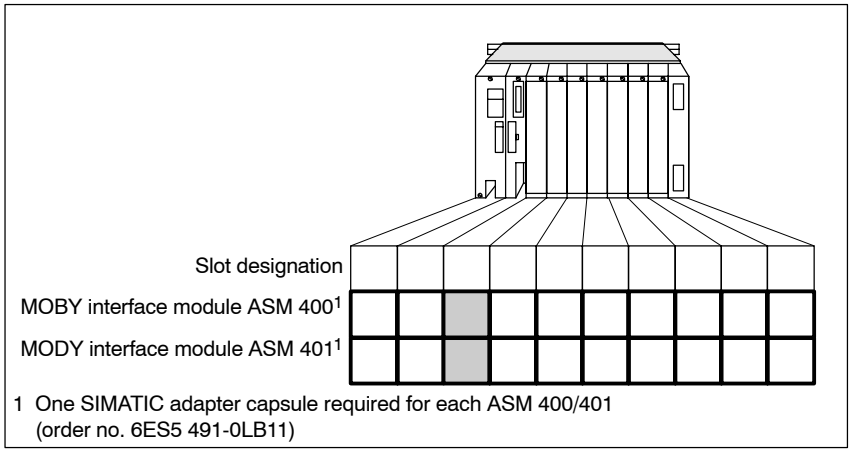


Figure 6-7 CR 700-1 module rack (S5-115U)

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

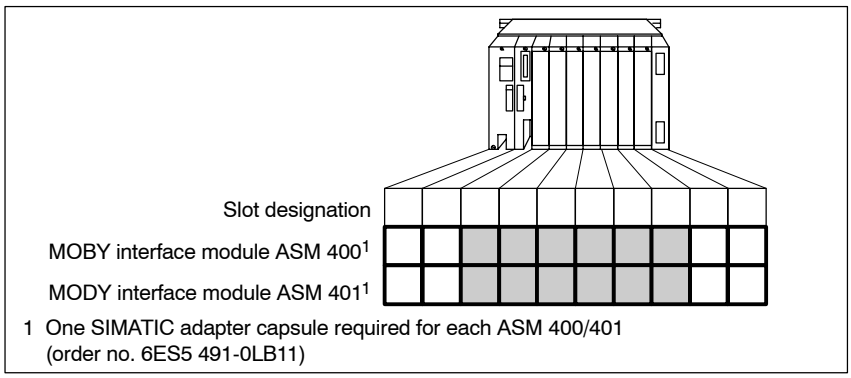


Figure 6-8 CR 700-2 module rack (S5-115U)

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

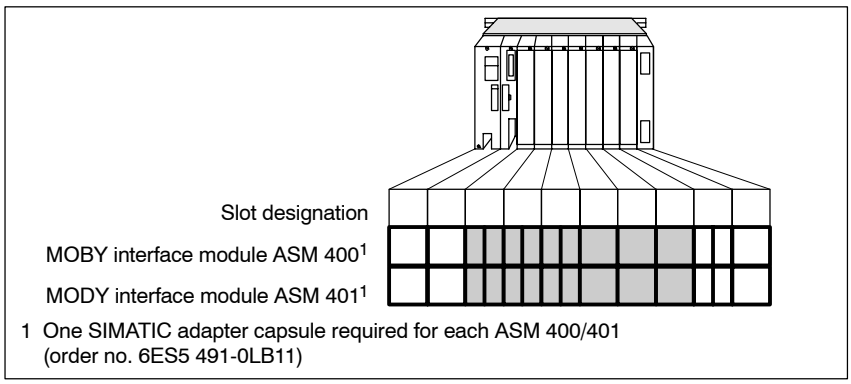


Figure 6-9 CR 700-3 module rack (S5-115U)

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

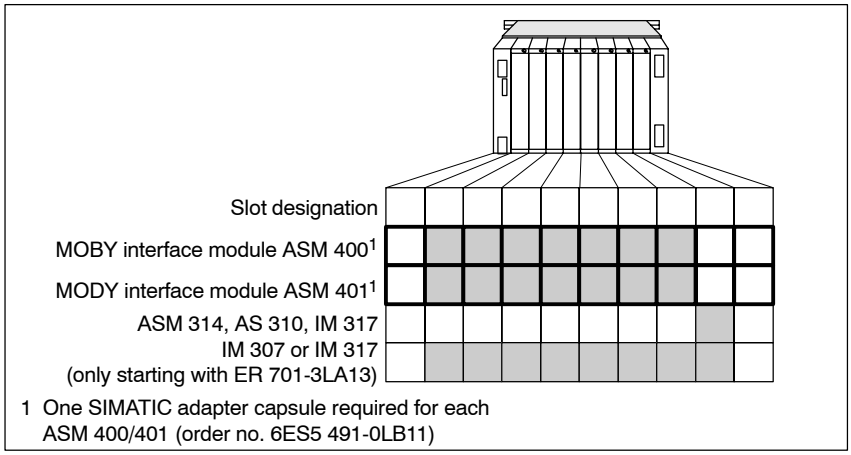


Figure 6-10 ER 701-3 module rack (S5-115U)

Central controller S5-135U/155U

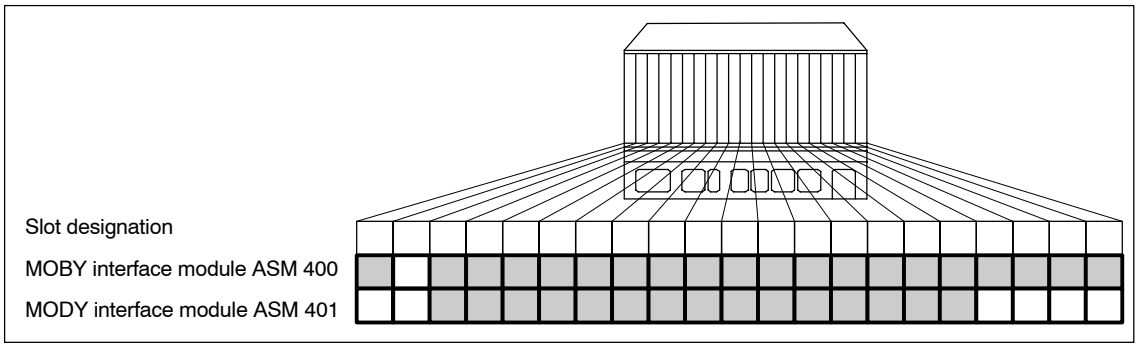


Figure 6-11 S5-135U/155U central controller

Central controller S5-155U/155H

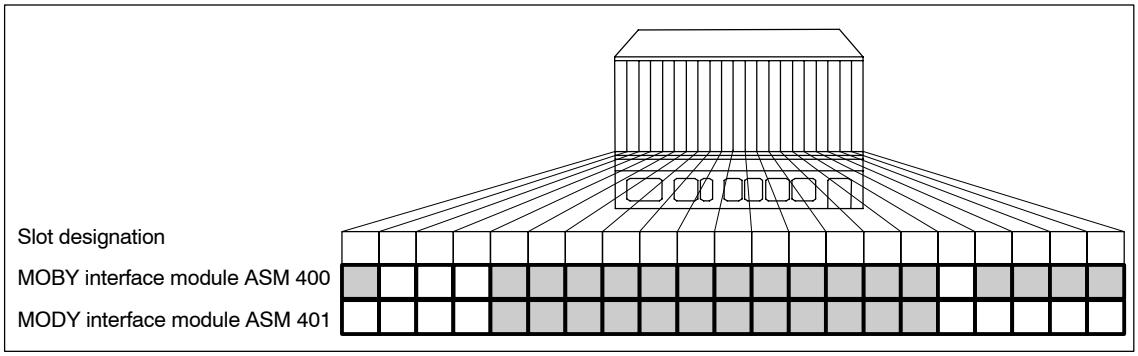


Figure 6-12 S5-155U/155H central controller

Expansion device S5-183U

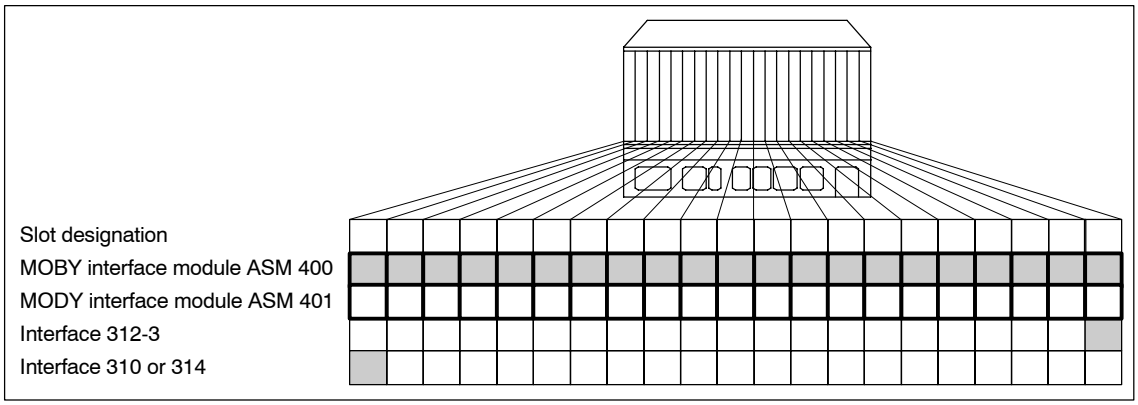


Figure 6-13 S5-183U expansion device for S5-135U/155U

Expansion device S5-184U

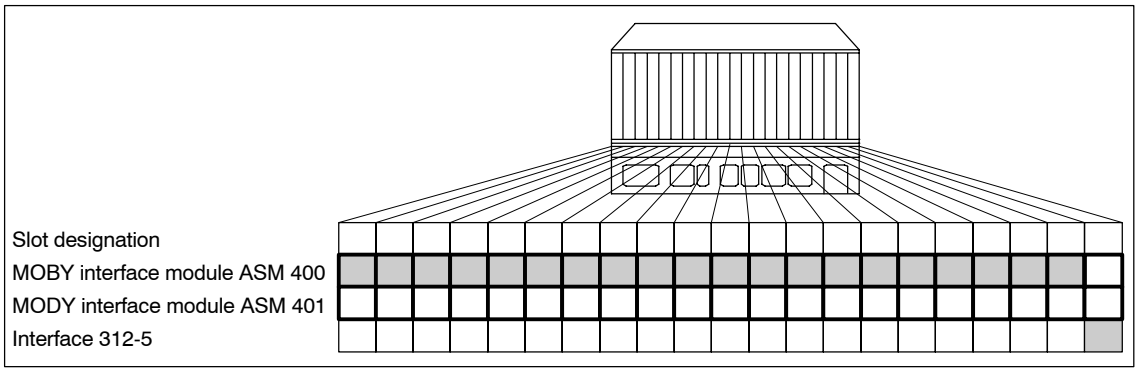


Figure 6-14 S5-184U expansion device for S5-135U/155U

Expansion device S5-185U

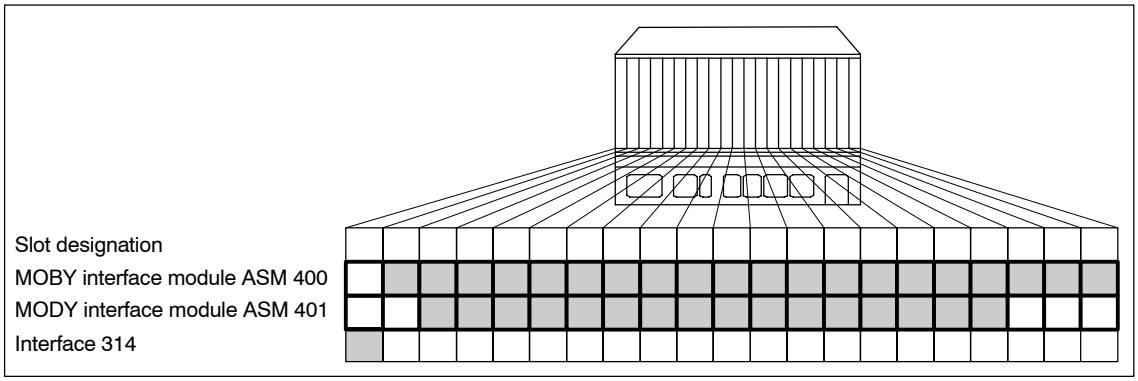


Figure 6-15 S5-185U expansion device for S5-135U/155U/155H

Expansion device S5-187U

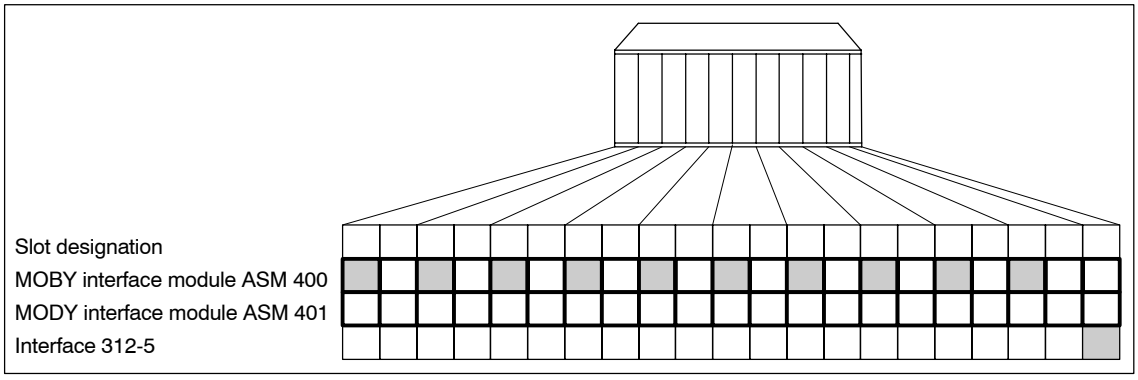


Figure 6-16 S5-187U expansion device for S5-135U/155U

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 the 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.

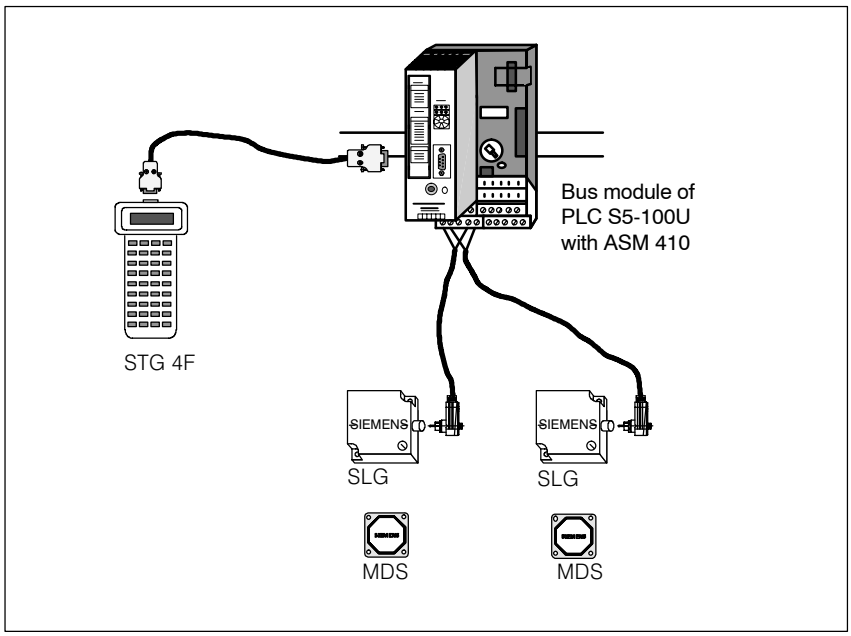


Figure 6-17 Configurator for the ASM 410 in SIMATIC S5

Ordering data

Table 6-7 Ordering data for ASM 410

Interface ASM 410	6GT2 002-0BA00
SIMATIC S5, bus module for 2 ASMs with Screw connection Crimp connection, with crimp contacts	 6ES5 700-8MA11 6ES5 700-8MA22
Stub lines for ASM - SLG See also chap. 3.10	6GT2 091-0D...
Description-ASM 410 German Englisch	 electronically available on “Software MOBY” CD

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

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

Slot 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.

Slot in PLC S5-95U

The 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.

Slot in PLC S5-100U

The 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).

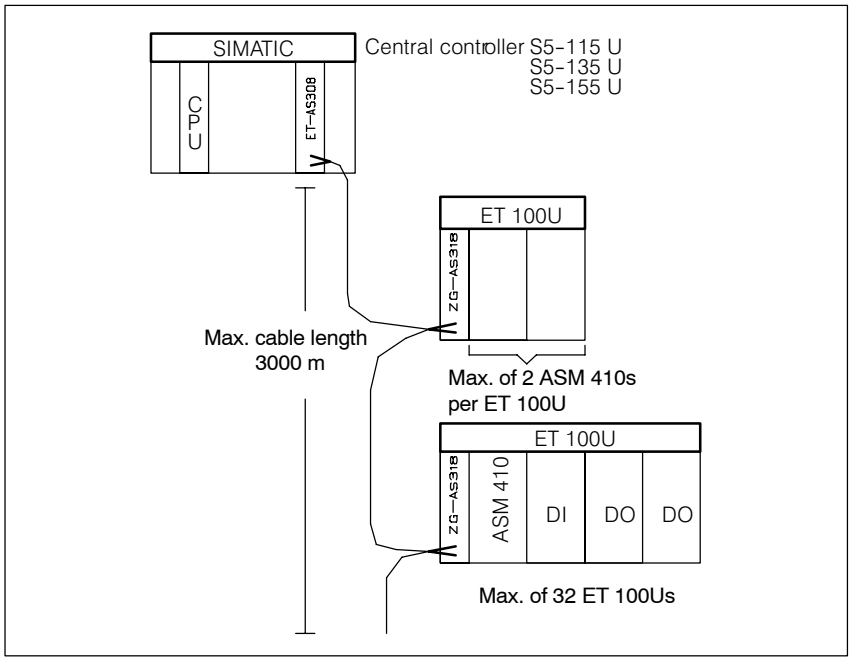


Figure 6-18 Configurator for ASM 410 in ET 100U

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).

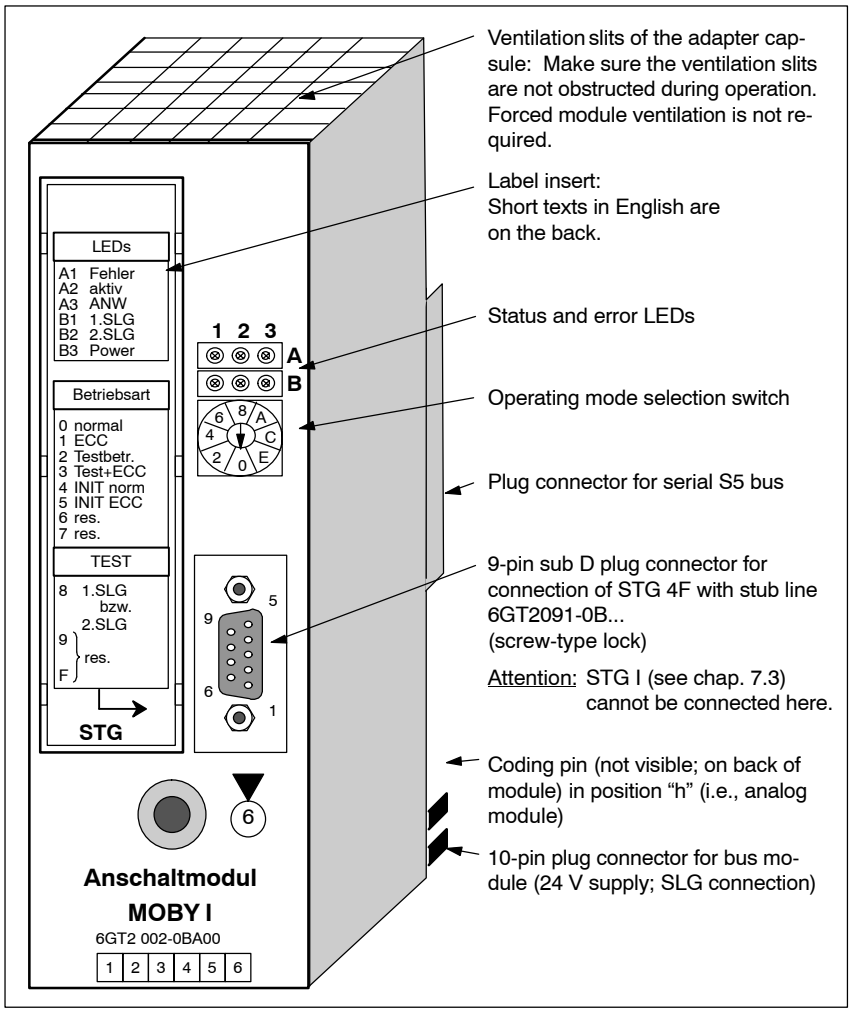


Figure 6-19 ASM 410 interface with operational and indicator elements

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.

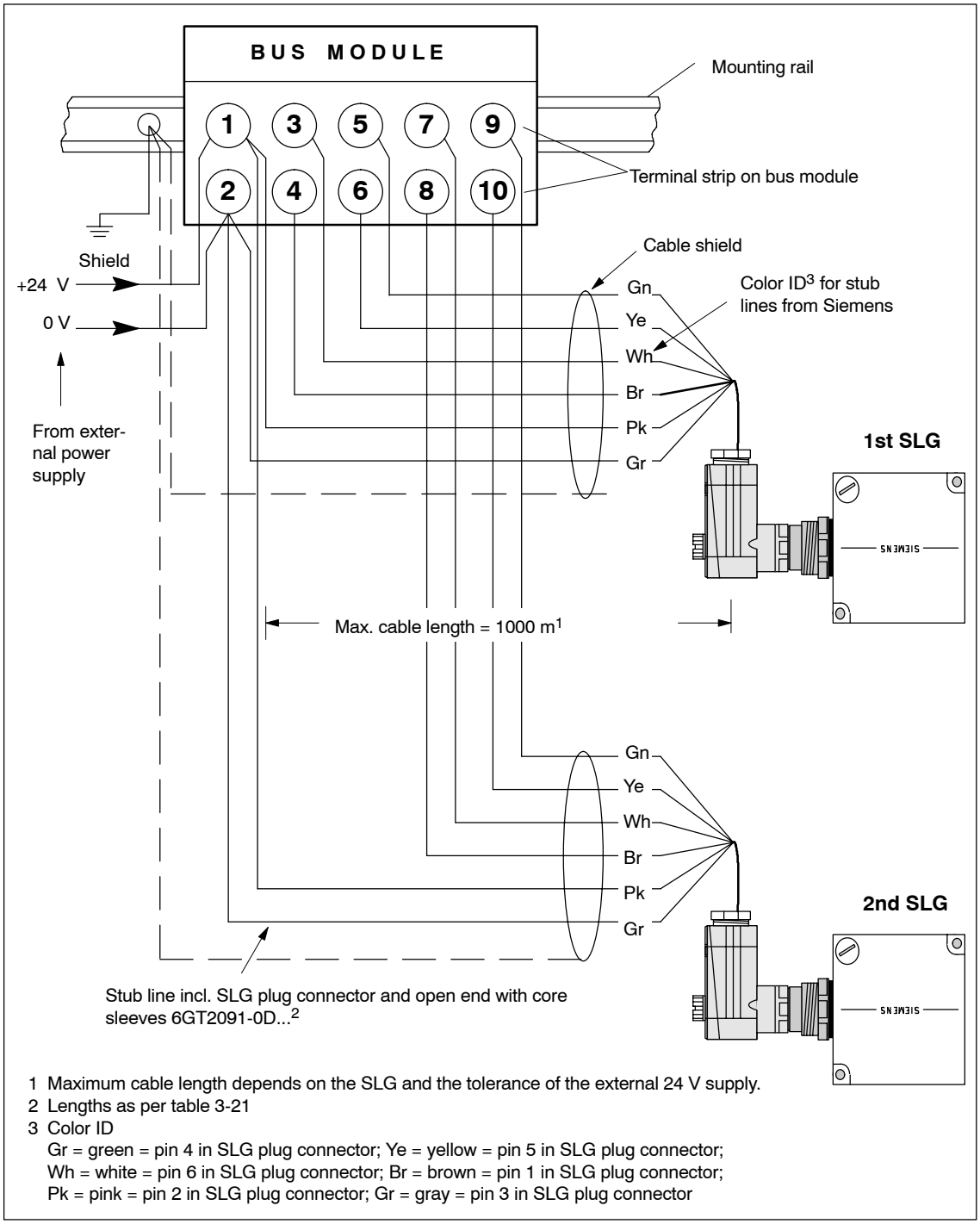
Note

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 Lengths as per table 3-21
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 450/452

Application area

The ASM 450/452 interfaces are modules for operation of MOBY devices via PROFIBUS DP / DPV1 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 6-21 ASM 450/452 interface

ASM 450

The ASM 450 accesses data on the MDS directly with physical addresses.

The ASM 450 uses cyclic operation with function block FB 240 (S5) or FC 44 (S7). Appendix B of the FC 44 description is available to the SIMATIC S5 user. All other users must use the description of the FC 44 function for the ASM 450.

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 452

The ASM 452 is the further development of the familiar ASM 450/451 interface modules. Use of non-cyclic data communication on PROFIBUS DPV1 ensures that optimum data throughput is achieved even with large PROFIBUS configurations. The minimum cyclic data load of the ASM 452 on PROFIBUS guarantees the user that other PROFIBUS stations (e.g., DI/DQ) can continue to work at very high speeds.
Up to 2 SLGs can be run on the ASM 452 in pseudo parallel mode. Pseudo parallel mode means that the user can start one command on 2 SLGs at the same time (via FC 45) although the ASM has only one serial channel. The ASM automatically handles the multiplexing between SLG 1 and SLG 2. The SLG is processed on which an MDS happens to be. This delays the processing of the second MDS. For this reason, we recommend only processing the MDS statically when 2 SLGs are connected to the ASM. The MDS data are accessed via physical addressing of the MDS. The SIMATIC S7 offers FC 45 for this purpose. FC 45 gives the S7 user an easy-to-use interface with powerful commands (e.g., one command processes an entire MDS; command chaining; S7 data structures with UDTs).
The ASM 452 can also be parameterized as a dialog station. Only 1 SLG can be used on channel 1 in this mode.
The available memory (VMDS) is 1280 bytes.

The MOBY I filehandler is also implemented on the ASM 452. The filehandler is a DOS-like file management system of the MOBY I identification system. It consists of a progam which is executed on the interface module.
FC 46 or FC 56 (S7) or FB 246 (S5) are available to SIMATIC users.
On PROFIBUS the ASM 452 exclusively uses non-cyclic mode via DPV1. This provides excellent data throughput.

ASM 452 in ASM 451 mode

The ASM 452 can be used in an ASM 451-compatible mode if you turn switch 8 to OFF (see figure 6-30).
This means the GSD file siem804d can continue to be used.

Note

This mode only applies to systems which use the ASM 452 as a direct substitute for the discontinued ASM 451.

Ordering data

Table 6-11 Ordering data for ASM 450/452

ASM 450 interface for PROFIBUS DP, max. of 2 SLGs connectable	6GT2 002-0EB00
ASM 452 interface for PROFIBUS DPV1, max. of 2 SLGs connectable	6GT2 002-0EB20
Accessories Plug connector for PROFIBUS DP connection and 24 V power supply	6ES7 194-1AA01-0XA0
Connection cable, ASM 450/452 ↔ SLG 2-m in length (standard); for other lengths see chapter 3.10.4.	6GT2 091-1CH20
Opt. connection plug, ASM 450/452 ↔ SLG	6GT2 090-0BC00
M12 covering caps for unused SLG connection (only ASM 450 and ASM 452) 1 package = 10 each	3RX9 802-0AA0
MOBY software [1] with FB 246, FC 46, FC 56, FB 240, FC 44, FC 45, GSD file	6GT2 080-2AA10
Other accessories for ASM 450/452 (network components)	See SIMATIC catalog ST 70 and SIMATIC ET 200X manual.
Replacement part: Plug connector plate; T-functionality for PROFIBUS connection	6ES7 194-1FC00-0XA0
Description-ASM 450/FC 44 German English French	Electronically on “Software MOBY” CD
Description-ASM 451/FC 46 German English	Electronically on “Software MOBY” CD
Description-FC 56 (filehandler) German English	Electronically on “Software MOBY” CD
Description-FC 45 (for ASM 452) German English French	Electronically on “Software MOBY” CD
Description-FB 246 for ASM 451 with S5 German	Electronically on “Software MOBY” CD

1 See chapter 7.1.

Technical data

Table 6-12 Technical data of ASM 450/452

	ASM 450	ASM 452 (Normal Addressing)	ASM 452 (Filehandler)
Serial interface to the user	PROFIBUS DP	PROFIBUS DPV1	PROFIBUS DPV1
Procedure in acc. w.	EN 50170, vol. 2, PROFIBUS		
Connection	PG 11 screw connection PROFIBUS and supply voltage plug connectors are not included.		
Transmission speed	9600 baud to 12 Mbaud (automatic recognition)		
Max. block length	208 bytes	2 words cyclic/ 240 bytes acyclic	2 words cyclic/ 240 bytes acyclic
Serial interface to the SLG			
Plug connector	2 coupling plug connectors (M12)		
Line length (max.)	1000 m, depends on SLG (2 m = standard length, other cables: see chap. 3.10.4)		
SLGs which can be connected	2 SLG 4x (multiplex operation)	2 SLG 4x (pseudo parallel mode)	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 44	FC 45 (Normal addressing)	FC 46 (filehandler, no multitag) FC 56 (filehandler, with and without multitag)
MDS addressing	Direct access via addresses	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	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	Yes/yes (Only 1 SLG can be used on channel 1 in VMDS mode.)	No/no
Dialog: memory size VMDS	–	1280 bytes	–
Supply voltage			
Nominal value	24 V DC		
Permissible range	20 to 30 V DC		
Current consumption	180 mA (without SLG, DO not loaded)		

Table 6-12 Technical data of ASM 450/452

	ASM 450	ASM 452 (Normal Addressing)	ASM 452 (Filehandler)
Digital inputs			
Number	2	None	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	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 (without bus plug)		
Mounting	4 M5 screws, mounting on any plate or wall		
Weight (approx.)	0.5 kg		
Protection rating	IP67		

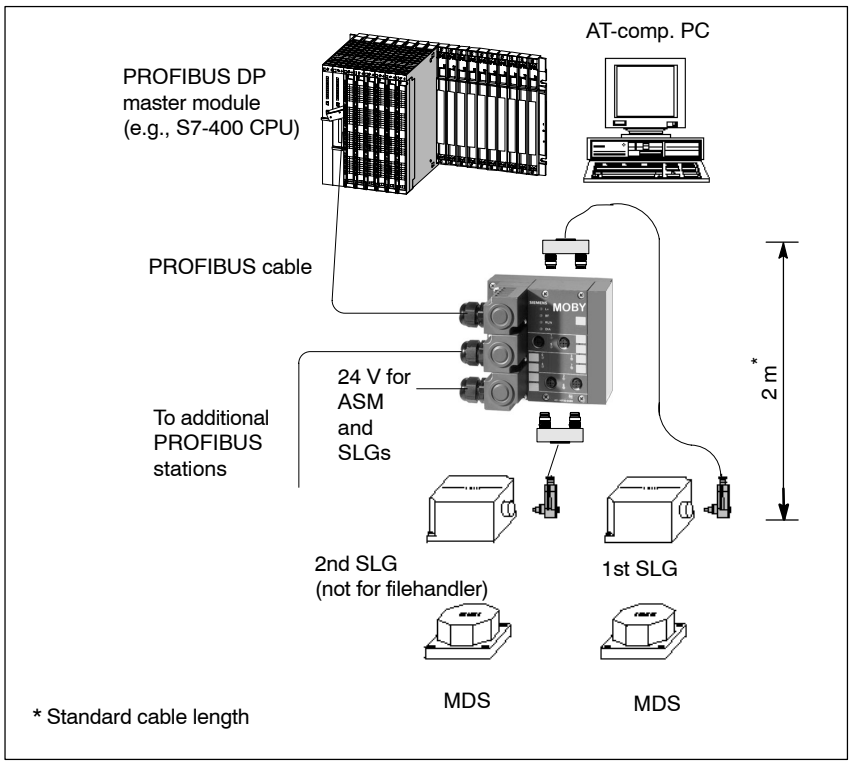


Figure 6-22 Configurator of ASM 450/452

Hardware description

The ASM 450/452 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 on the ASM 450/452 (e.g., mounting, operation and wiring, and general technical specifications). Accessories and power supply components are also described in this manual.

PROFIBUS configuration

The ASM 450/452 is integrated in the hardware configuration with a GSD file. The ASM can then be configured via HWCONFIG of the SIMATIC Manager or another PROFIBUS tool. The “Software MOBY” CD contains a separate GSD file for each ASM model.

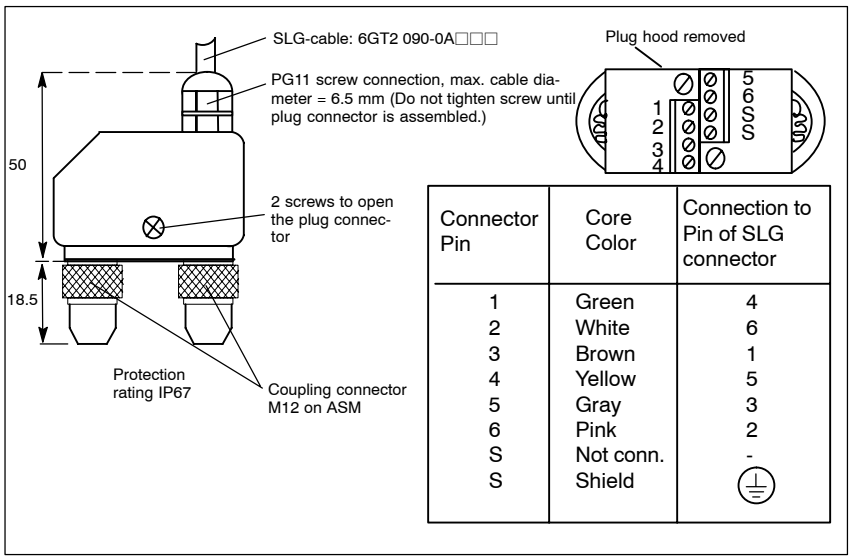
Operating mode of ASM 452

The GSD file describes the permissible modes of the ASM 452. The hardware configuration tool (e.g. STEP 7 HW-Config) is used to set the mode.

SLG connection technique

Since an SLG always occupies two M12 connection sockets on the ASM 450/452, a prefabricated cable (cf. figure 6-24 or chapter 3.10) makes it easy to connect the SLG. In its standard version, the connection cable has a length of 2 m. For other cable lengths, see chapter 3.10.4.

An SLG plug connector with screw-type terminals is available for users who want to make their own cable (see figure 6-23). 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 6-23 Connection plug, ASM 450/452/473 ↔ SLG (6GT2 090-0BC00)

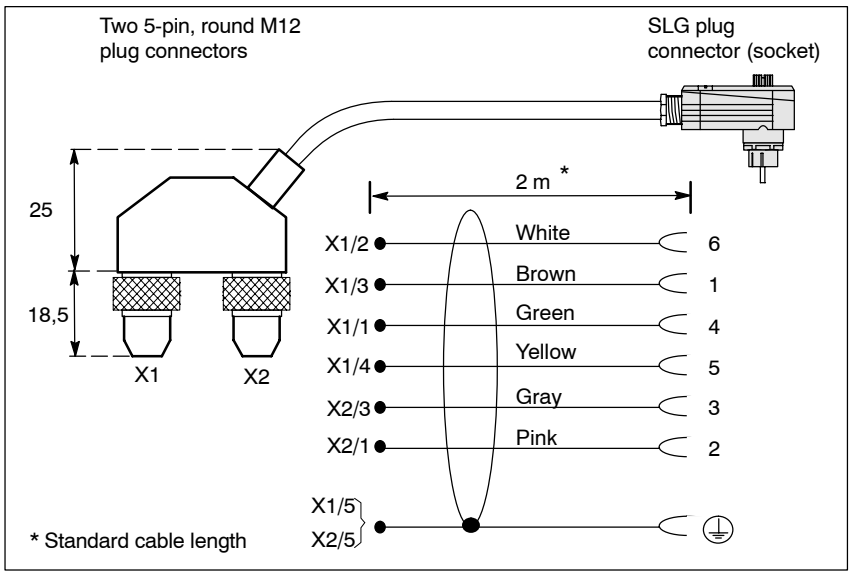


Figure 6-24 Connection cable, ASM 450/452/473 ↔ SLG (6GT2 091-1CH20)

PROFIBUS cable with 24 V power

The ASM 450/452 can also be used with the “green” PROFIBUS cable. Make sure that a 24 V cable is installed from X12 to X13. The 24 V line on plug X12 can be connected to pin 5, 6.

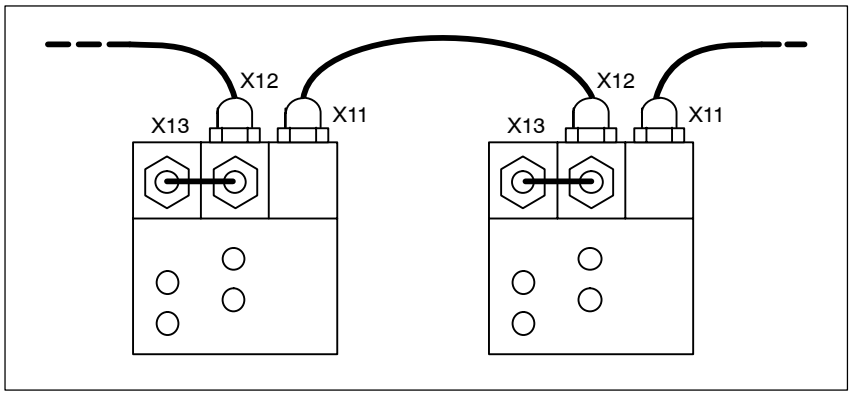
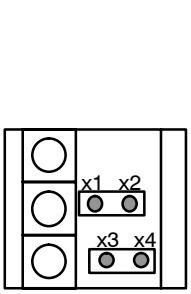


Figure 6-25 PROFIBUS cable with 24 V power

SLG and DI/DO configuration for ASM 450/452



ASM 450

Plug \ Config	1st	2nd	3rd	4th	5th *
x1 – x2	SLG	-	SLG	2xDA	SLG
x3 – x4	-	SLG	2xDE	SLG	SLG

ASM 452 Normal addressing

Plug \ Config	1st	2nd	3rd *
x1 – x2	SLG	-	SLG
x3 – x4	-	SLG	SLG

ASM 452 Filehandler

Plug \ Config	1st
x1 – x2	SLG
x3 – x4	-

* This configuration only applies to static processing of the MDS.

Figure 6-26 SLG and DI/DO configuration for ASM 450/452

The versions shown in figure 6-26 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 450/452 with mounting holes

The following figure shows a dimensional drawing of an ASM 450/452 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.

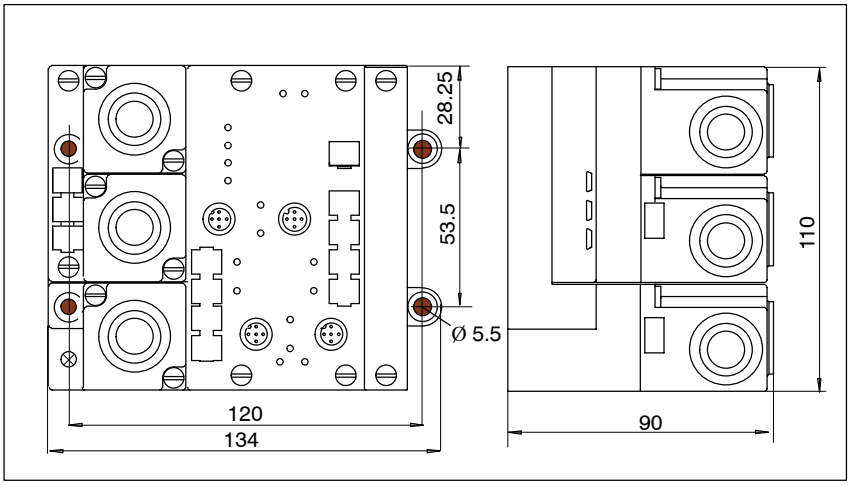
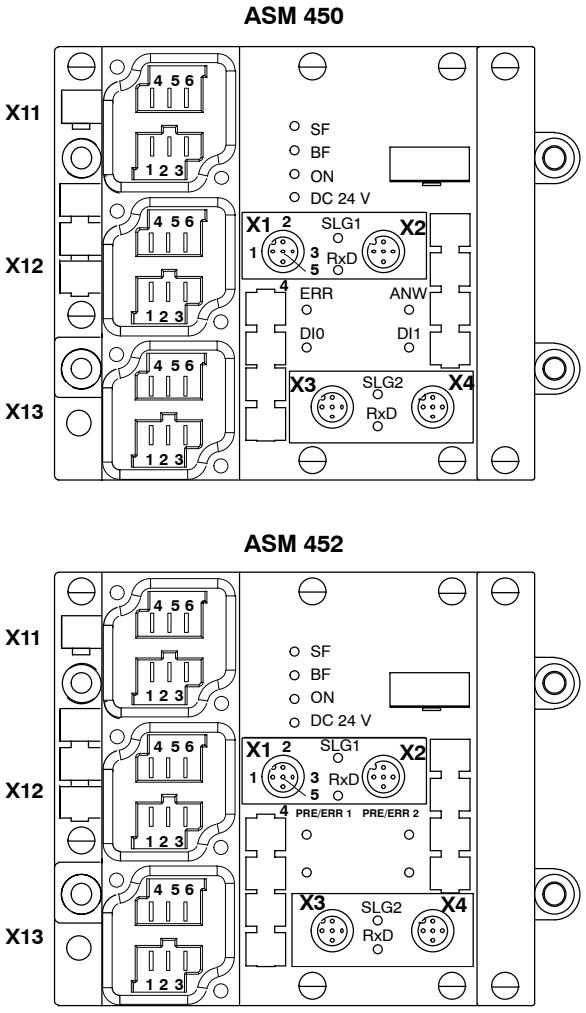


Figure 6-27 Dimensional drawing of the ASM 450/452

Pin allocation The following figure shows the pin allocation of the ASM 450/452.



LEDs for PROFIBUS DP

SF:	System fault (see table 6-13)
BF:	Bus fault (see table 6-13)
ON:	On when the logic voltage is present on ASM (is generated from the 24 V suply voltage)
DC 24 V:	On when the 24 V supply voltage is connected to ASM

LEDs for MOBY and ASM 450

RxD:	SLG active
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

LEDs for MOBY and ASM 452

RxD:	SLG with command active
PRE/ERR 1, PRE/ERR 2:	MDS present or error indication for each SLG. ("MDS present" always takes priority. The error indication only appears when no MDS is present.) **MDS present:** The LED is permanently ON. If more than one MDS is in the field, the number of MDSs is indicated by brief interruptions of the light. No error output is made. **Error indication:** The LED is permanently OFF. The last error no. is indicated by brief pulses of light.
SLG 1:	SLG 1 is selected.
SLG 2:	SLG 2 is selected. Only SLG 1 or SLG 2 can be selected at one time.

Socket	Pin	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	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 6-28 Pin allocation and LEDs of ASM 450/452

Table 6-13 LED indication for PROFIBUS diagnosis

LED "BF"	LED "SF"	Cause of Error	Error Handling
On	*	• ASM is starting up.	–
		• Connection to the DP master has failed. • ASM found no baud rate.	• Check PROFIBUS DP connection. • Check the DP master.
		• Bus failure • DP master is out of order.	• Check all cables in your PROFIBUS DP network. • Check to determine whether connection plug for PROFIBUS DP is securely plugged into the ASM.
Flashing	On	• The configuration data sent by the DP master to the ASM does not match the setup of the ASM.	• Check the configuration of the ASM (input/output, PROFIBUS address). • Correct GSD file used? (SIEM804C.GSD or SIEM80B6.GSD)
Flashing	Off	• ASM has found the baud rate but is not addressed by the DP master. • ASM was not configured.	• Check the PROFIBUS address on the ASM or in the configuration software. • Check the configuration of the ASM (station type).
On	Flashing	• The ASM has a hardware defect	• Replace the ASM.

* Status is irrelevant.

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.

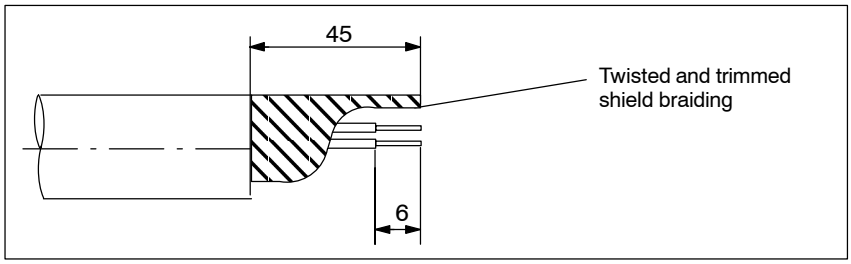


Figure 6-29 Length of baring for a PROFIBUS cable

PROFIBUS address and terminating resistance

The plug plate must be removed from the ASM 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 and a sample setting of each.

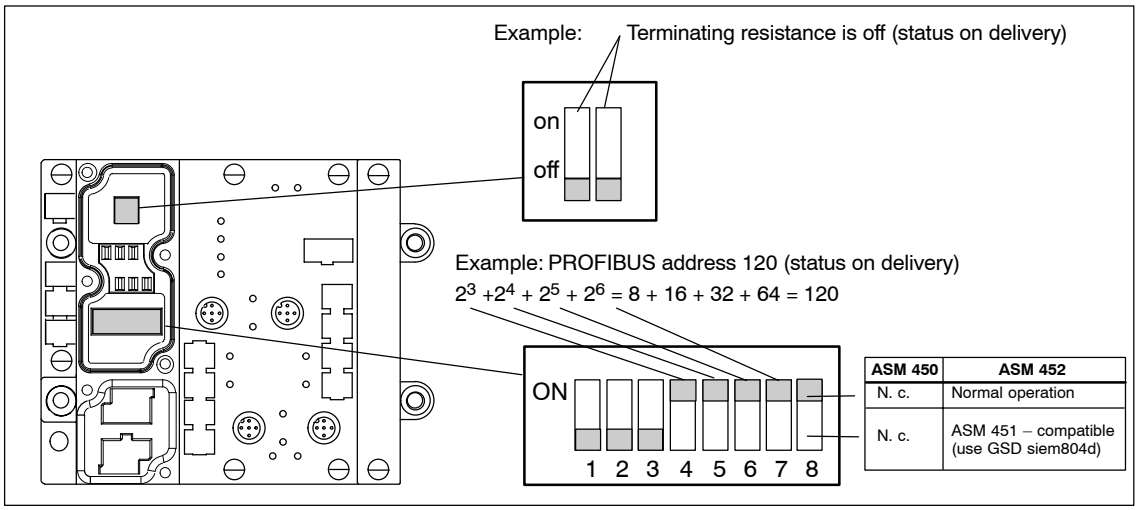


Figure 6-30 Setting the PROFIBUS address and circuiting the terminating resistance

Note

- The PROFIBUS address on the ASM 450/452 must always correspond to the PROFIBUS address specified for this ASM with the configuration software.
- For correct functioning of the terminating resistance, always switch both DIP switches of the terminating resistance to “On” or “Off”.

6.5 ASM 454/424

Application area

The ASM 454/424 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 DPV1 (ASM 454)
- RS 232, serial interface to the PC (ASM 424)

Figure 6-31 ASM 454/424 interface

ASM 454

The ASM 454 uses physical addresses to directly access the data on the MDS. The non-cyclic protocol service of PROFIBUS DPV1 is used for communication with the user. Function FC 45 is available to SIMATIC S7 users for easy integration.

The description of the PROFIBUS DPV1 implementation is available for programmers of other controllers. See appendix of the FC 45 description.

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 (MOBY API) is available for the PC user for his/her applications.

Ordering data

Table 6-14 Ordering data for ASM 454/424

ASM 454 interface for use of MOBY I components via PROFIBUS DPV1, without filehandler	6GT2 002-2EE00
ASM 424 interface with serial interface RS 232/RS 422; 3964R procedure for PC, SICOMP and external controllers	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...
Plug connector for power supply (socket) for ASM 454/424	6GT2 390-1AB00
Adapter floor plate for top hat rail mounting	6GT2 390-0BA00
Wide-range power pack 100 to 230 V AC/24 V DC, 2.2 A (without 24 V cable)	6GT2 494-0AA00
24 V DC stub line for wide-range power pack 6GT2 494-0AA00 (see chapter 7.2) Length: 5 m	6GT2 491-1HH50
PROFIBUS plug connector 9-pin sub D conn. for 2 stub lines	6ES7 972-0BA12-0XA0 (see catalog ST 70 or IK PI for more connectors)
Software MOBY[1] with C library for ASM 424 (MOBY API), and FC 45, GSD file for ASM 454	6GT2 080-2AA10
Description, FC 45 (for ASM 454) German English French	Electronically on “Software MOBY” CD
Description, MOBY API (C-lib for ASM 424) German English	Electronically on “Software MOBY” CD

1 See chapter 7.1.

Technical data

Table 6-15 Technical data of ASM 454/424

	ASM 454	ASM 424
Serial interface to the user	PROFIBUS DPV1	RS 232/RS 422
Line length (max.)	See PROFIBUS configuration	30/500 m
Procedure/protocol	EN 50 170 vol. 2 PROFIBUS	3964R
Connection	9-pin sub D socket (screw lock)	
Transmission speed	9600 baud to 12 Mbaud (automatic recognigion)	9.6; 19.2; 38.4 Kbaud (automatic recognition with 3964R)
Max. block length	4 words (cyclic)/238 bytes (non-cyclic)	238 bytes
Serial interface to the SLG	4 x 9-pin submin. D socket (screw lock)	
Line length	Max. of 1000 m; depends on SLG (see chap. 3.10)	
Connectable SLG	4 x SLG 4x (parallel operation)	
Software functions		
Programming	Depends on PROFIBUS DPV1 master	MOBY API: C lib for PC with Windows 98/NT
SIMATIC S7 function block	FC 45	–
MDS addressing	Direct access via addresses	Direct access via addresses
Commands	Initialize MDS, read data from MDS, write data to MDS	Initialize MDS, read data from MDS, write data to MDS
Dialog	No (on request)	No (on request)
Supply voltage		
Connection plug	4-pin M12 round plug (pin)	
Nominal value	24 V DC	
Permissible range	20 to 30 V DC	
Current consumption (max.)	250 mA (without SLG)	
Max. switch-on current	1.1 A (without SLG)	
UL/CSA	Yes, when used with an NEC class 2 power supply	
Ambient temperature		
During operation	–25 to +55 °C (no condensation)	
Transportation and storage	–40 to +85 °C (no condensation)	

Table 6-15 Technical data of ASM 454/424

	ASM 454	ASM 424
Housing		
Dimensions (W x H x D) in mm	205 x 130 x 60 (without plug)	
Material	Aluminum	
Color	Anthracite	
Mounting	4 M5 screws Optional: Top hat rail mounting	
Tightening torque	≤ 3 Nm	
Approx. weight	1300 g	
Protection rating	IP40 (higher ratings on request)	
MTBF (at 40 ° C)	$1 \cdot 10^5$ hours	

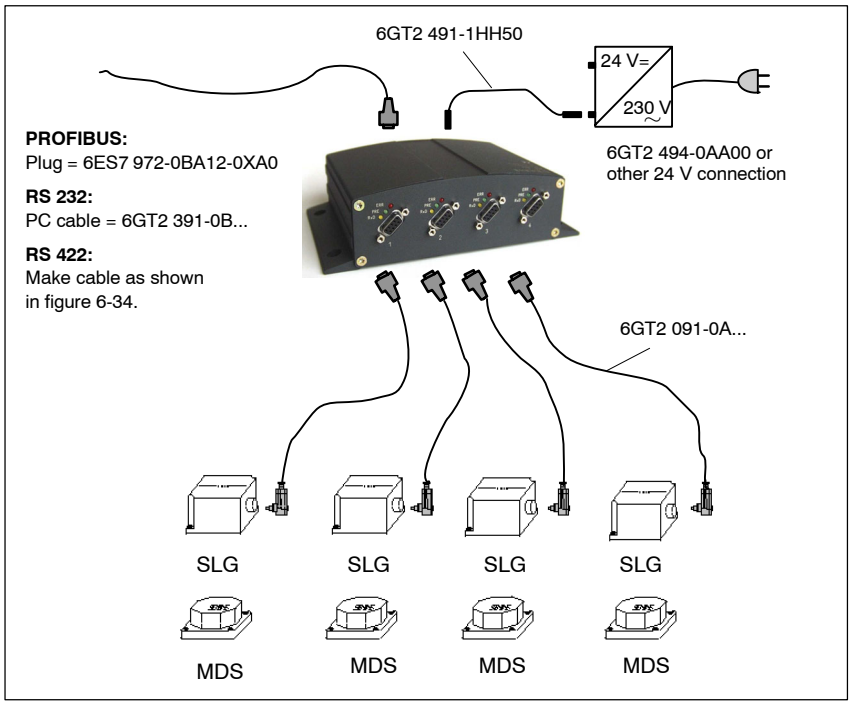
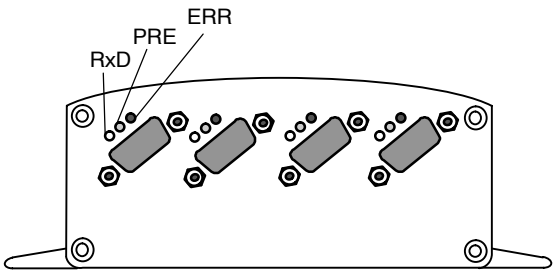


Figure 6-32 Configurator for ASM 454/424

Pin assignment and switches



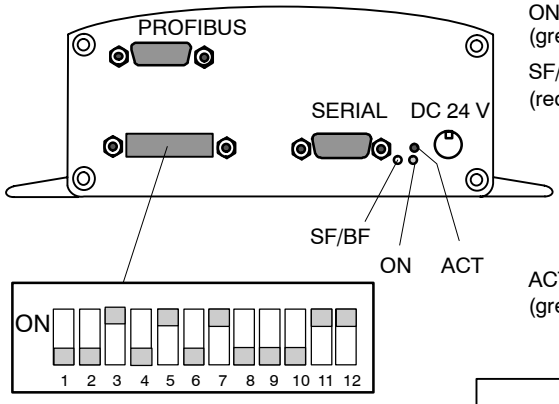
Plugs 1 to 4 to the SLG	
Socket	**Designation**
1	Not used
2	+ Sending
3	+ Receiving
4	Nor used
5	– Receiving
6	– Sending
7	Ground (0 V)
8	+ 24 V
9	Not used
Hous.	Cable shield

RxD: SLG with active command

PRE: "Presence" indicates presence of an MDS in the transmission window.

ERR: Error indicated by flashing LED

Figure 6-33 Serial interfaces of the ASM 454/424 to the SLG



ON: (green) 24 V present on ASM

SF/BF: (red) System fault/bus fault, RAM error

ASM 424: flashes after power-on. Flashing stops after first real telegram.

ACT: (green) This LED briefly flashes once when a command has been processed.

Switch 1 to 7: PROFIBUS address [1]

Switch 1 ON: 2^0
Switch 2 ON: 2^1
:
Switch 7 ON: 2^6
Example: PROFIBUS address= 84
($2^2 + 2^4 + 2^6$)

Switch 1 to 7: Operating mode, serial interface [2]

Switch 1 to 7 = 0FF: Default: 3964R
Switch 1 to 7 ≠ 0FF: See other operating modes of the ASM 424

Switch 8: Interface [2]

ON: RS 422
OFF: RS 232

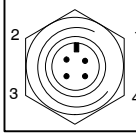
Switches 9 to 11: Not used

Switch 12: Presence check in 1-channel mode [2]

ON: Presence check by firmware
OFF: Presence check off

1 Only for ASM 454
2 Only for ASM 424

DC 24 V



Pin	Designation
1	Ground
2	+ 24V
3	+ 24V
4	Ground

PROFIBUS [1]

Socket	Designation
1	Not used
2	Not used
3	B line (red)
4	Request to Send (RTS)
5	Ground 5 V (M5)
6	Potential 5 V (floating, 60 mA)
7	Not used
8	A line (green)
9	Not used
Hous.	Cable shield

SERIAL [2]

Socket	RS 232	RS 422
1	Not used	Not used
2	TxD (sending)	–TxD
3	RxD (receiving)	–RxD
4	Not used	Not used
5	Ground (0V)	Ground
6	Not used	Not used
7	Not used	Not used
8	Not used	+TxD
9	Not used	+RxD
Hous.	Cable shield	Cable shield

Figure 6-34 Serial interfaces of the ASM 454/424 to the user

Further operating modes of the ASM 424

Starting with release status C, the ASM 424 offers more operating modes. The expanded operating modes are set with switches 1 to 8 and 12.

ON = 1 OFF = 0	1 2 3 4 5 6 7 8	12	Switches
	0 0 0 0 0 0 0 s	0	**Default; 3964R**
	0		Serial interface = RS 232
	1		Serial interface = RS 422
			(Baud rates 9600, 19200 and 38400 are recognized automatically.)
	0 0 y y y 0 1 s	0	**LAUF driver***
	0 0 0		2400 Baud
	0 0 1		4800 Baud
	0 1 0		9600 Baud
	0 1 1		19200 Baud
	1 0 0		38400 Baud
	0 1 y y y m 0 s	p	**1-channel mode**; 3964R**
	0		Slave with 3964R
	1		Master with 3964R
		0	Presence check off
		1	Presence check on
	0 1 y y y 0 1 s	p	**1-channel mode**; LAUF driver***

* With the LAUF driver, each user byte is transferred with two ASCII bytes.
Example:
The data string with the user data 01 02 00 00 hex must appear on the line as shown below:

02	30 31	30 32 30 30 30 30	0A	03 (hex)
STX	Channel (ASCII)	User data (ASCII)	CR (opt.)	ETX

** 1-channel mode
1-channel mode is compatible with the ASM 420. In this mode the ASM 424 replaces an ASM 420. Only one SLG can be run on channel 1. The channel byte is omitted in the protocol.

Dimensional drawing with mounting holes

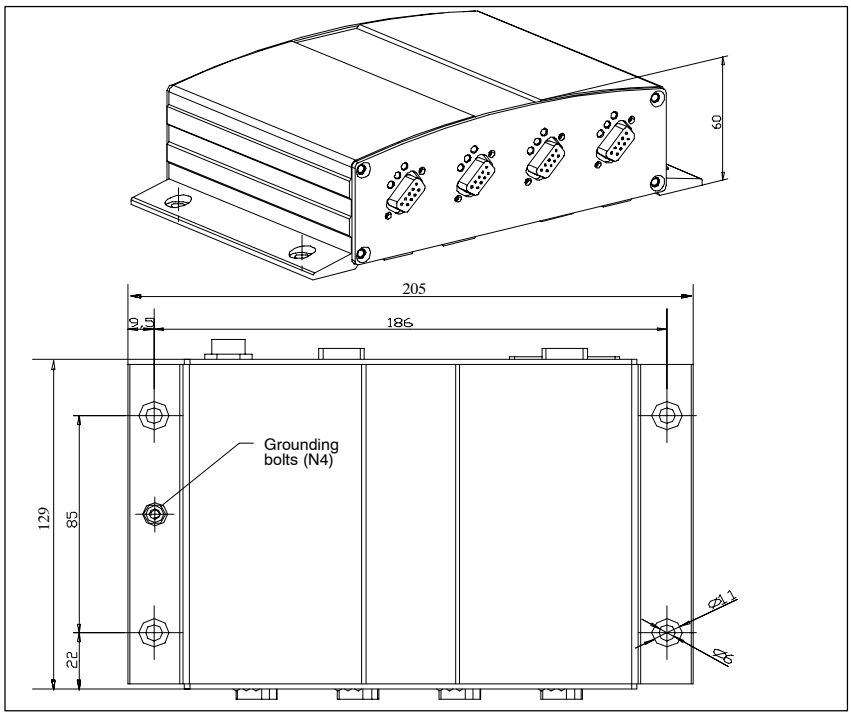
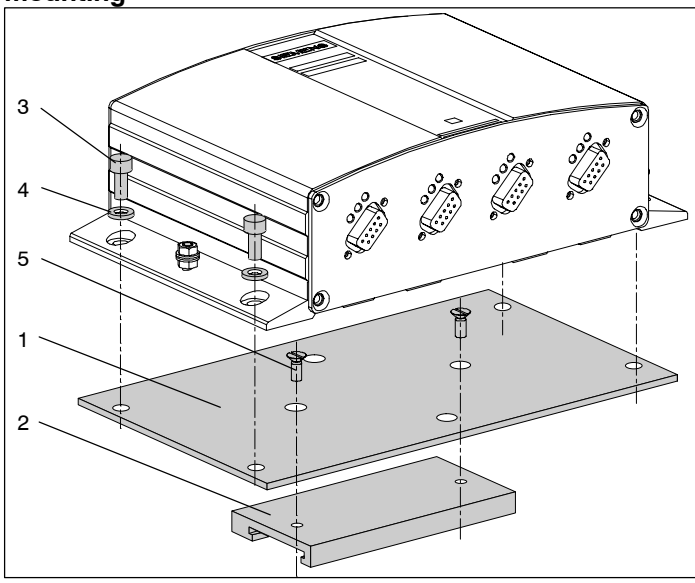


Figure 6-35 Dimensional drawing of ASM 454/424

Adapter floor plate for top-hat-rail mounting



Item	Designation	Quantity
1	Floor plate	1
2	Profile	1
3	Oval headscrew, M5 x 10	4
4	Washer, A5.3	4
5	Countersunk screw, M4 x 10	2

Figure 6-36 Mounting diagram for the adapter floor plate

Note

To adjust to the particular situation, the profile section (item 2) can be turned by 90° and then installed on the floor plate.

6.6 ASM 470/475

Application area

The ASM 470/475 interface can be installed in the SIMATIC S7-300 and ET 200M. It can be used for all MOBY systems.

Up to eight ASM 470/475 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 470/475 can be installed and operated in each of these module racks. In a maximum SIMATIC S7-300 configuration, up to 32 ASM can be used centrally. The ASMs can also be used in the distributed I/O ET 200M on PROFIBUS. This makes use in an S7-400 environment possible. Up to 7 ASMs can be operated per ET 200M.

Error messages and operational states are indicated with LEDs. Galvanic isolation between SLG and the SIMATIC S7-300 bus ensure layouts which are not as susceptible to interference.

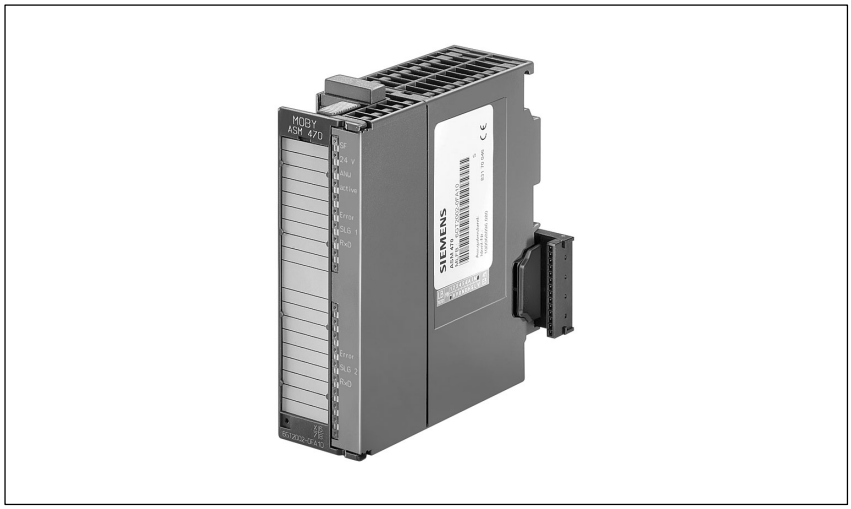


Figure 6-37 ASM 470/475 interface

ASM 470

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. The FC 47 can be used with both the S7-300 and the S7-400. 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.

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.

ASM 475

The ASM 475 (order number 6GT2 002-0GA10) is a parameterizable module. This means the basic functions have already been specified when the module was configured in HW-Config (e.g., normal addressing or filehandler).

ASM 475 (normal addressing)

The ASM 475 accesses the data on the MDS directly with physical addresses. The FC 45 function controls use in a SIMATIC S7.

Together the ASM 475 and FC 45 form a unit which can be used to read the MDS data easily and at optimum speed. A 32-Kbyte MDS memory can be read in 24 seconds, almost without regard to the S7 cycle time.

ASM 475 (filehandler)

The MOBY I filehandler is implemented on the ASM 475. The filehandler 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. The MDS and SLG MOBY I components are identical, with and without filehandler. The FC 56 function controls operation in a SIMATIC S7.

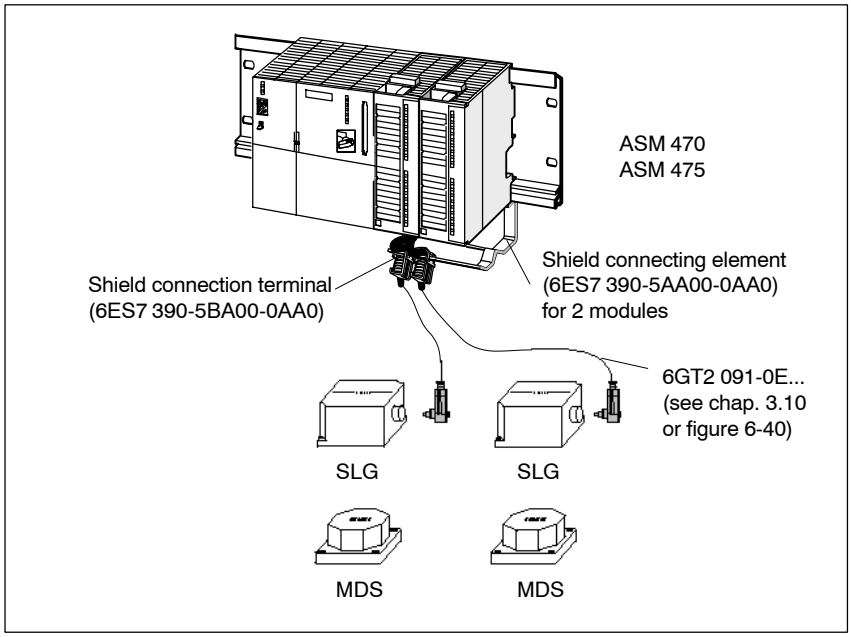


Figure 6-38 Configurator for ASM 470/475

Ordering data

Table 6-16 Ordering data for ASM 470/475

Interface ASM 470 for SIMATIC S7-300; 2 SLG multiplex; no front plug	6GT2 002-0FA10
Interface ASM 475 for SIMATIC S7-300; 2 SLG parallel; normal addressing; no front plug	6GT2 002-0GA10
Accessories	
Front connector (1 per ASM)	6ES7 392-1AJ00-0AA0
Shield connection terminal (1 per SLG cable)	6ES7 390-5BA00-0AA0
Shield connecting element (1 per 2 ASMs)	6ES7 390-5AA00-0AA0
Connection cable, ASM ↔ SLG	6GT2 091-0E...
MOBY software[1] with FC 47, FB 47 for ASM 470, FC 45 for ASM 475 with normal addressing FC 56 for ASM 475 with filehandler	6GT2 080-2AA10
Description-ASM 470/FC 47 for S7 German English	Electronically on the “Software MOBY” CD
Description-ASM 470/FB 47 for S5 German Englisch	Electronically on the “Software MOBY” CD
Description-FC 45 (ASM 475) German Englisch French	Electronically on the “Software MOBY” CD
Description-FC 56 (ASM 475, filehandler) German Englisch	Electronically on the “Software MOBY” CD

1 See chapter 7.1.

Technical data

Table 6-17 Technical data of ASM 470/475

ASM Type	ASM 470	ASM 475 (Normal Addressing)	ASM 475 (Filehandler)
Interface to S7-300 or ET 200M	P-bus; I/O input and I/O output	P-bus; cyclic and non-cyclic services	
Communication	16 bytes I/O	2 words (cyclic); 238 bytes (non-cyclic)	
Command buffer on ASM	1 x 12 bytes per ASM	70 x 238 bytes per SLG	1 x 238 bytes per SLG
Serial interface to the SLG			
Plug connector	Via screw terminals on front plug Front plug connector is not included.		
Line length, max.	Standard cable = 2 m, 5 m, 10 m, 20 m, 50 m (up to 1000 m on request)		
MOBY systems supported	I/E/F/V	I/E/F/U	I/U
Connectable SLGs	Multiplex 2 x SLG	Parallel 2 x SLG	Parallel 2 x SLG
Software functions			
Programming	SIMATIC user: With FC/FB Other users: Telegram description as per appendix of FC description		
Function block			
SIMATIC S7	FC 47	FC 45	FC 56
SIMATIC S5	FB 47	–	–
MDS addressing	Direct access via addresses		Access via logical file names
Commands	Initialize MDS, read data from MDS, write data to MDS		Format MDS, read file, write file, etc.
MOBY I dialog: Normal station/VMDS	Yes/yes	Yes/no	No/no
PROFIBUS diagnosis	Yes. Can be parameterized via RESET.		
S7 diagnosis	No	Yes. Can be called via S7 OM.	
Firmware reloadable	No	Yes. Via SIMATIC Manager.	
Power supply			
Nominal value	24 V DC		
Permissible range	20 V to 30 V DC	20.4 V to 28.8 V DC	
Current consumption			
• Without SLG at U = 24 V DC, max.	50 mA	350 mA	
• With SLG connected	Max. of 600 mA with one SLG Max. of 300 mA per SLG when two SLGs are connected	Max. of 500 mA per connected SLG	

Table 6-17 Technical data of ASM 470/475

ASM Type	ASM 470	ASM 475 (Normal Addressing)	ASM 475 (Filehandler)
Power loss of the module, typical	1 W	2 W	
Current consumption from P-bus, max.	100 mA	80 mA	
Galvanic isolation between S7-300 and MOBY	Depends (100 kΩ between S7-300 and 24 V DC)	Yes. Use for ungrounded operation of a separate power pack for the ASM.	
Fuse, 24 V to SLG	Yes. Electronic.	Yes. Electronic.	
Ambient temperature			
During operation			
• SIMATIC horizontal	0° C to +60° C		
• SIMATIC vertical	0° C to +40° C		
During transportation and storage	–40° C to +70° C		
Dimensions in mm (W x H x D)	40 x 125 x 120		
Weight, approx.	0.2 kg		

Wiring

The ASM 470/475 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.

Note

To ensure interference-free operation of the ASM 475, make sure that ASM and SIMATIC CPU (or ASM and IM 153 with ET 200M) are run on the same voltage.
Non-adherence may cause possible error messages on the CPU not to be cleared when the ASM is turned on.

Front panel

The following figure shows the front plate of the ASM 470/475 and the inside of the front door with the related connection diagram. The SLGs must be connected to the ASM as shown in the connection diagram.

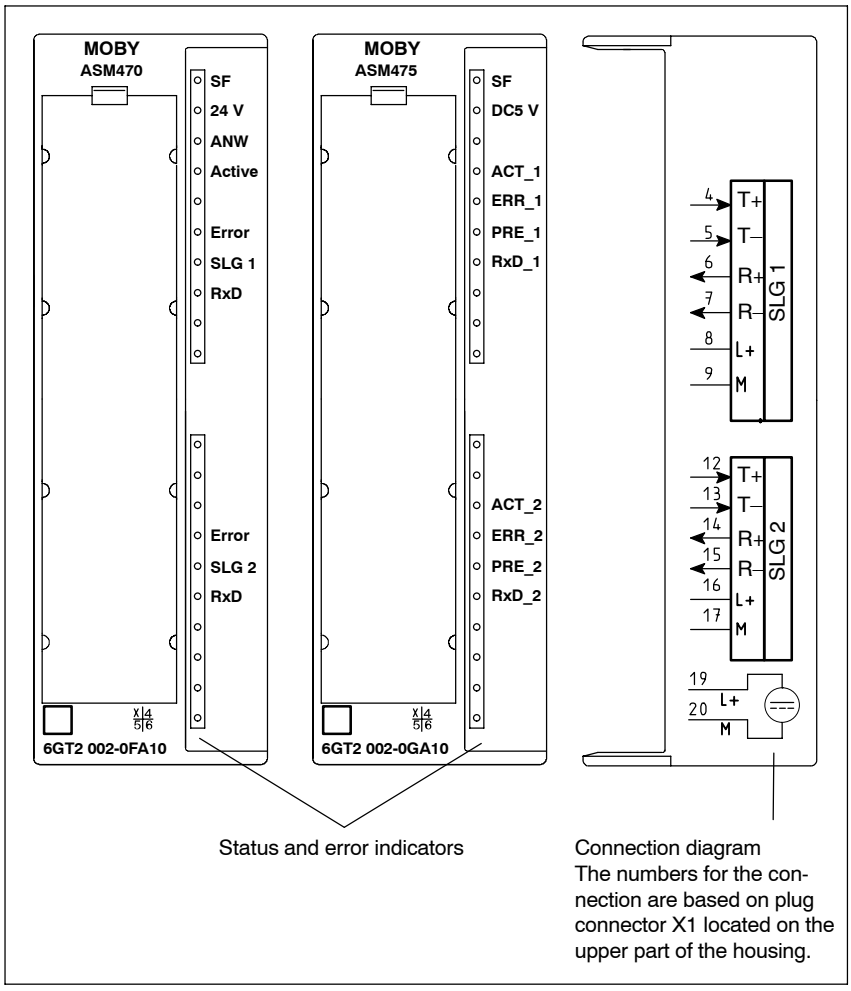


Figure 6-39 Front plate and inside of the front door of the ASM 470/475

Indicator elements on ASM

Table 6-18 Function of the LEDs on ASM 470/475

ASM 470	ASM 475	Meaning
SF	SF	System fault (hardware error on ASM)
24 V	DC 5 V	24 V are connected to ASM. 5 V voltage on ASM is okay.
Active	ACT_1, ACT_2	The appropriate SLG is processing a user command.

Table 6-18 Function of the LEDs on ASM 470/475

ASM 470	ASM 475	Meaning
Error	ERR_1, ERR_2	The flashing pattern shows the last error. This indicator can be reset with the option_1 parameter.
ANW	PRE_1, PRE_2	Indicates the presence of an MDS
RxD	RxD_1, RxD_2	Indicates communication to the SLG . Interference on SLG can also cause this LED to light up.
SLG 1, SLG 2	–	Indicates the SLG which was selected by the user command. Only one LED may light up at a time (multiplex operation).

Additional operational states are indicated on the ASM 475 on the LEDs PRE, ERR, and SF.

Table 6-19 Additional LEDs on the ASM 475

SF	PRE_1	ERR_1	PRE_2	ERR_2	Description, Causes, Remedy
ON	OFF/ON	ON (perm.)	OFF/ON	ON (perm.)	Hardware is defective (RAM, flash, ...)
ON	OFF	ON	OFF	OFF	Loader is defective (can only be fixed at the plant).
OFF	2 Hz	OFF	2 Hz	OFF	Firmware is being loaded or no firmware detected. → Load firmware. → Do not turn off ASM.
OFF	2 Hz	2 Hz	2 Hz	2 Hz	Firmware loading terminated with error → New start required. → Load firmware again. → Check update files.
Any	5 Hz	5 Hz	5 Hz	5 Hz	Operating system error → Turn ASM on/off.
OFF	OFF	1 x flash every 2 sec	OFF	1 x flash every 2 sec	ASM has booted and is waiting for a RESET (init_run) from the user.

Wiring to the SLG

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

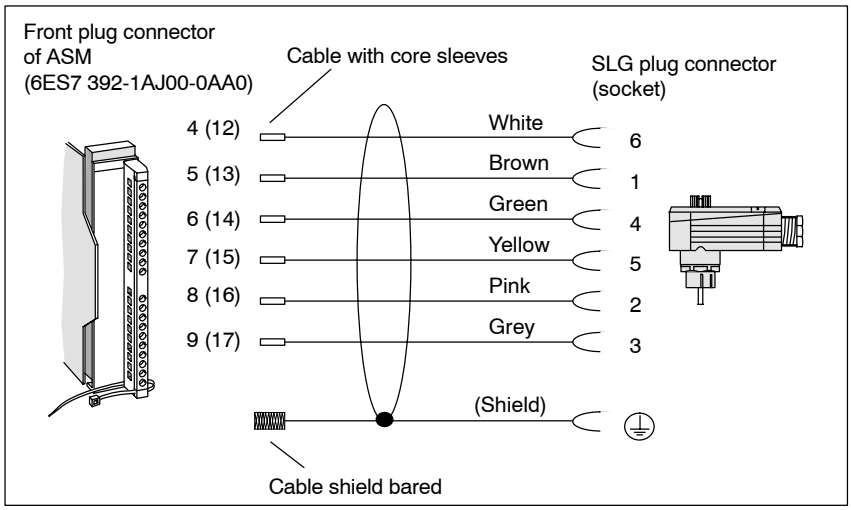


Figure 6-40 Wiring of ASM 470/475 to SLG (6GT2 091-0E...)

Shield connection

See chapter 3.9 or figure 6-38.

Lightning protection

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

Customer cable fabricating

To ensure EMC, the SLG cable must be led over an S7-300 shield connecting element. When customers make their own cables, the shield of the SLG cable must be bared as shown in figure 6-41.

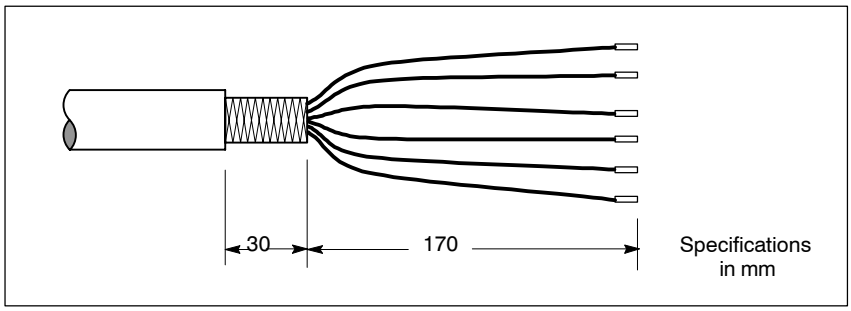


Figure 6-41 Baring of the cable shield when customer makes own cable

Configuration of ASM for SIMATIC S7 under STEP 7

Note

Installation of MOBY requires functional STEP 7 software on the PC/PG.

Installation and configuration of the ASM 470/475 in the SIMATIC is handled by an installation program. The installation program is included with the "MOBY software" product (6GT2 080-2AA10).

Installation

The "Software MOBY" CD contains the installation files in subdirectory S7_om. Installation is almost completely automatic when Setup.exe is called. The specified steps during SETUP must be responded to.

Note

Remember that you will have to execute a separate Setup for installation of ASM 470 and ASM 475.

The ASM 470/475 module is located in the hardware catalog of HWCONFIG under the following subdirectory for hardware configuration of the SIMATIC S7.

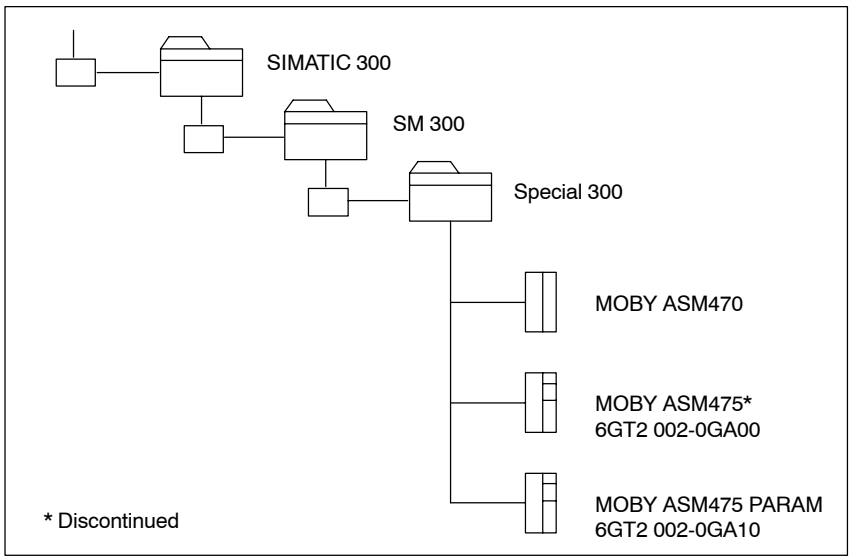


Figure 6-42 ASM 470/475 directory in the hardware catalog

FC 45/47 with sample project

You can use the file-dearchivation function of the SIMATIC Manager to load the FC with a sample project from the applicable subdirectory of the "Software MOBY" CD. Afterwards, the sample project is located in the directory S7PROJ of the SIMATIC Manager.

ASM Type	Directory in "Software MOBY"	Project Name in SIMATIC Manager	Path Name in SIMATIC Manager
ASM 470	FC47	ASM470_CPU416	ASM470_C
ASM 475	FC45	MOBY FC45	Moby_f_1

6.7 ASM 473

Application area

The ASM 473 interface is a MOBY module for the SIMATIC S7. It can be installed in the ET 200X and DESINA distributed I/O device. The interface of the ET 200X to the user is PROFIBUS DPV1. An S7-300 or S7-400 with integrated PROFIBUS connection can be used as the controller.

The ASM 473 supplements the SIMATIC S7 MOBY interface modules ASM 470 and ASM 475. Its protection rating of IP67 permits it to be set up and operated directly in the process without additional protection.

Other features:

- Up to 7 ASM 473s can be operated in one ET 200X station.
- All I/O modules from the ET 200X family can be run parallel to the ASM 473.

ASM 473 (normal addressing)

The MDS data are accessed by physically addressing the MDS.

The FC 45 function is available for use in a SIMATIC S7. The hardware configuration of the ASM 473 is performed with an Object Manager which is integrated in the SIMATIC Manager.

ASM 473 (filehandler)

The MOBY I filehandler is implemented on the ASM 473. The filehandler 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. The MDS and SLG MOBY I components are identical, with and without filehandler. The FC 56 function controls operation in a SIMATIC S7.

Figure 6-43 ASM 473 interface

Ordering data

Table 6-20 Ordering data of ASM 473

ASM 473 interface module	6GT2 002-0HA10
Accessories: SLG cable (2 m = standard cable) For other lengths, see chapter 3.10.4	6GT2 091-1CH20
Opt. ASM connection plug without SLG cable (for cable lengths up to 1000 m)	6GT2 090-0BC00
Software MOBY with [1] FC 45 for normal addressing FC 56 for filehandler	6GT2 080-2AA10
Description of FC 45 German English French	Electronically on “Software MOBY” CD
Description of FC 56 German English	Electronically on “Software MOBY” CD

1 See chapter 7.1.

Technical data

Table 6-21 Technical data of ASM 473

	Normal Addressing	**Filehandler**
Interface to ET 200X	SIMATIC S7 P-bus Cyclic and non-cyclic services	
Communication	2 words (cyclic)/ 238 bytes (non-cyclic)	
Command buffer in ASM	70 x 238 bytes	1 x 238 bytes
Serial interface to SLG		
Plug connector	2 x coupling plug, M12	
Line length, max.	20 m 2 m = standard length Other fabricatable cables = 5 m, 10 m, 20 m, 50 m (up to 1000 m on request)	
Connectable SLGs	1 x SLG 4x	

Table 6-21 Technical data of ASM 473

	Normal Addressing	Filehandler
Software functions		
Programming	Depends on PROFIBUS DP master	
SIMATIC S7 function block	FC 45	FC 56
MDS addressing	Direct access via addresses	Access via logical file names
Commands	Initialize MDS, read data from MDS, write data to MDS	Format MDS, read file, write file, etc.
MOBY I dialog: Normal station/VMDS	Yes/no	No/no
PROFIBUS diagnosis	Yes; ET 200X basic station.	
S7 diagnosis	Yes. Can be called via S7 OM.	
Reloadable firmware	Yes. Via SIMATIC Manager.	
Power supply		
Nominal value	24 V DC	
Permissible range	20.4 V to 28.8 V DC	
Current consumption		
• From encoder voltage	75 mA, typical	
• From load voltage (SLG power)	Max. of 500 mA (or see technical data of connected SLG)	
Power loss of module	1.6 W, typical	
Digital inputs	Via expansion modules from ET 200X family	
Digital outputs	Via expansion modules from ET 200X family	
Ambient temperature		
During operation	0° C to +55° C	
During transportation and storage	–40° C to +70° C	
Dimensions (W x H x D) in mm		
Dimensions of single devices	87 x 110 x 55	
Dimensions of scale	60 x 110 x 55	
Mounting	2 M5 screws (customer) 2 M3 screws (device)	
Protection rating	IP67	
Weight	0.275 kg	
MTBF (at 40° C)	10^6 hours	

For setup guidelines and other general technical data, see the ET 200X manual (order no. 6ES7 198-8FA01-8AA0).

Configuration

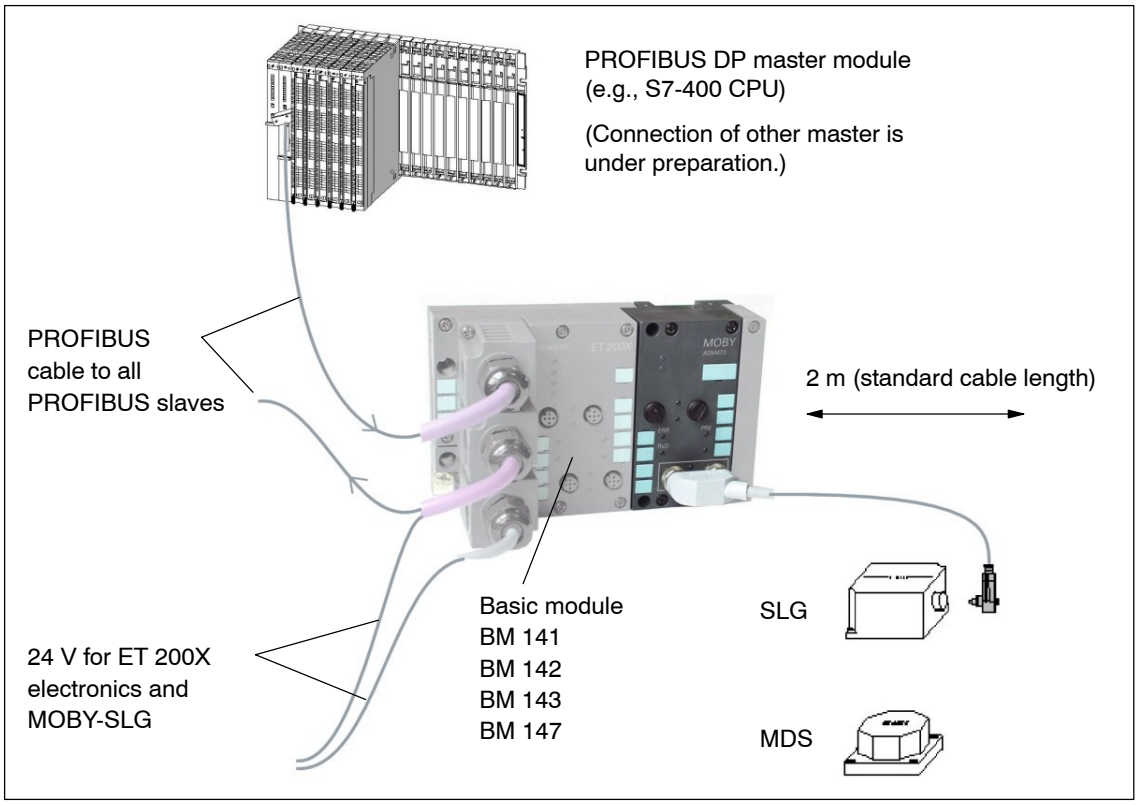


Figure 6-44 Configurator for an ASM 473

Note

In contrast to ASM 45x (see figure 6-22), the 24 V power must be provided on the PROFIBUS plug and the load voltage plug. For details, see ET 200X manual.

Basic module – prequisites for use of ASM 473

The following table shows the status of the ET 200X basic modules as of 10/2002. The functions of new basic modules are stored in HW-Config of SIMATIC Manager.

Table 6-22 Prerequisites for use of ASM 473

Order Number of ET 200X Basic Module	Can Be Run with ASM 473 (6GT2 002–0HA00)*	Can Be Run with ASM 473 PARAM (6GT2 002-0HA10)
6ES7 141-1BF00-0XB0	No	No
6ES7 141-1BF00-0AB0	Yes	Yes
6ES7 141-1BF01-0XB0	No	No
6ES7 141-1BF10-0XB0	No	No
6ES7 141-1BF11-0XB0	Yes	Yes
6ES7 141-1BF40-0AB0	Yes	Yes
6ES7 142-1BD10-0XB0	No	No
6ES7 142-1BD11-0XB0	No	No
6ES7 142-1BD20-0XB0	No	No
6ES7 142-1BD21-0XB0	Yes	Yes
6ES7 142-1BD22-0XB0	No	Yes**
6ES7 143-1BF00-0AB0	Yes	Yes
6ES7 143-1BF00-0XB0	Yes	Yes
6ES7 147-1AA00-0XB0	No	No
6ES7 147-1AA01-0XB0	No	Yes

* Discontinued

** Prerequisites for use: Please parameterize the module 6ES7 142-1BD21-0XB0 in HW-Config.

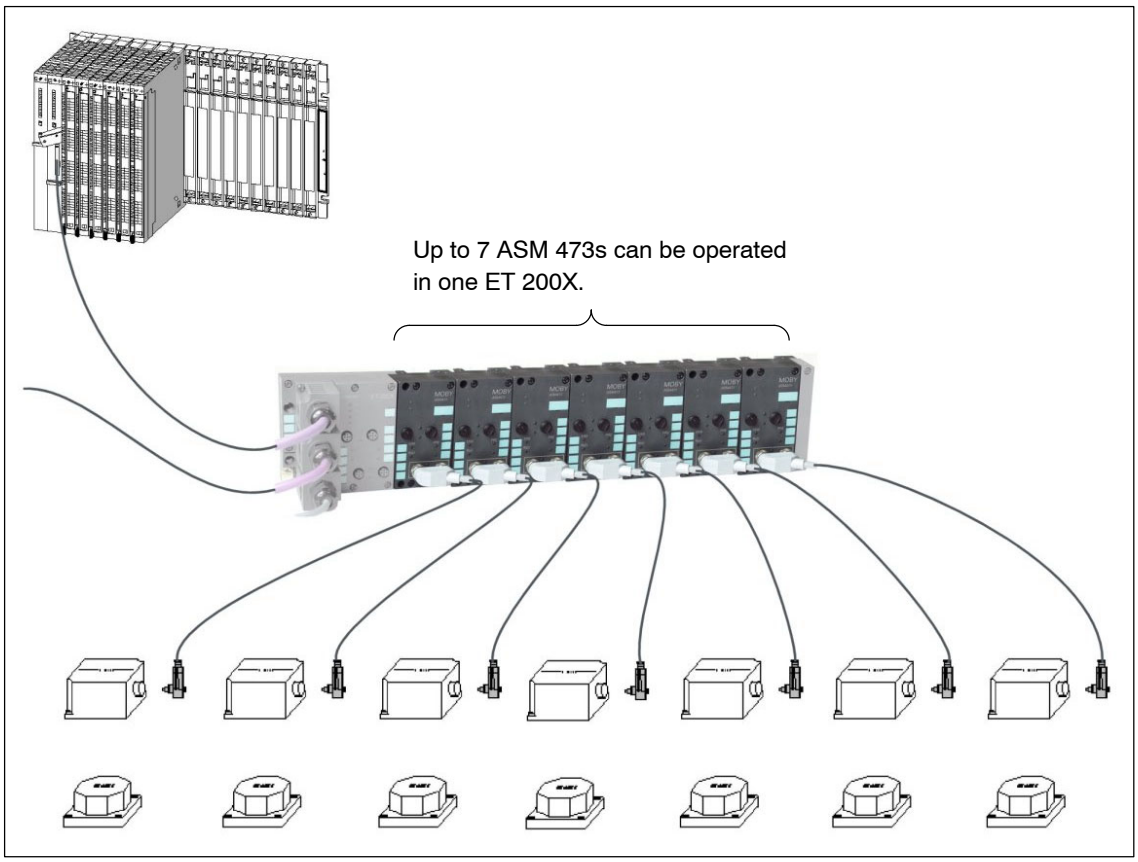


Figure 6-45 Maximum configuration of ASM 473 on an ET 200X

Depending on the PROFIBUS master, up to 123 ET 200X modules can be run on one PROFIBUS branch.

Hardware configuration

The ASM 473 is integrated in the hardware configuration of SIMATIC Manager by calling Setup.exe in the directory Daten\S7_OM on the “Software MOBY” CD. Currently, the ASM 473 cannot be integrated in other masters.

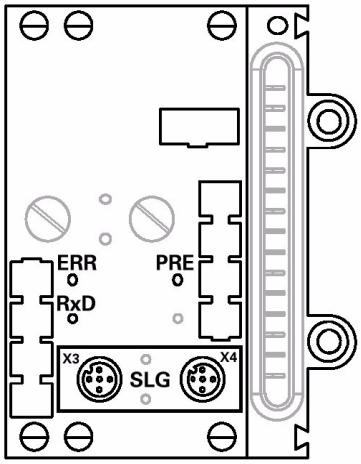
SLG connection

An SLG always occupies the two M12 connection sockets (X3 and X 4) on the ASM 473. A prefabricated cable (cf. figure 6-24 or chapter 3.10) ensures easy connection of the SLG. The standard version of this cable is 2 m in length. Other lengths are available on request.

An SLG connection plug with screw terminals (see figure 6-23) is available for users who want to make their own cable. Cable and SLG connection plug can be ordered from the MOBY catalog.

Pin assignment

The following figure shows the pin assignment to the SLG and the indicator elements.



Socket	Pin assignment (SLG)	
X3	1	+RxD
	2	+TxD
	3	–TxD
	4	–RxD
	5	PE
X4	1	+24 V
	2	n. c.
	3	0 V
	4	n. c.
	5	PE

LEDs for PROFIBUS DP

General operational indicators (SF, BF, ON, DC24 V) are located on the basic module of the ET 200X.

LEDs for MOBY

RxD: SLG is busy with a command.
PRE: Indicates the presence of an MDS
ERR: Flashing pattern (see appendix B.1) indicates error.

Additional operational states of the ASM are indicated on the LEDs PRE and ERR.

PRE	ERR	Description, Causes, Remedy
OFF/ON	ON (perm.)	Hardware is defective (RAM, flash, ...).
ON	OFF	Loader is defective (can only be repaired at the plant).
2 Hz	OFF	Firmware is being loaded or no firmware detected. → Load firmware. → Do not turn off ASM.
2 Hz	2 Hz	Firmware loading terminated with error → New start required. → Load firmware again. → Check update files.
5 Hz	5 Hz	Operating system error → Turn ASM or ET 200X basis station off/on.
OFF	1 x flash every 2 sec	ASM booted and is waiting for a RESET (init_run) from the user.

Figure 6-46 Pin asssignment and LEDs of ASM 473

Dimensions for the mounting holes

The figure below shows the dimensions for the positions of the holes for the screws. This information applies to a basic module and an expansion module (ASM 473).

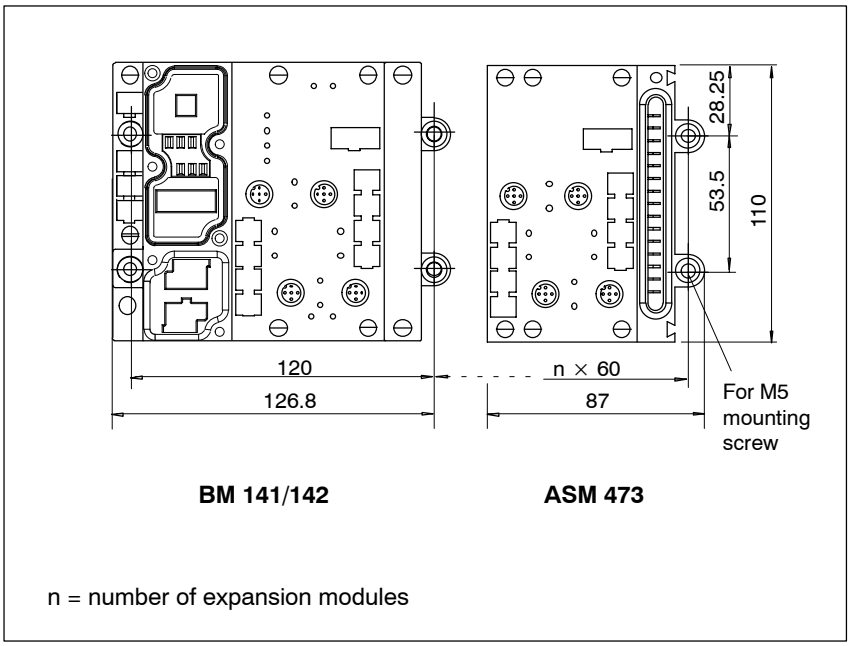


Figure 6-47 Dimensions for mounting holes for basic and expansion modules.

6.8 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 function

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).

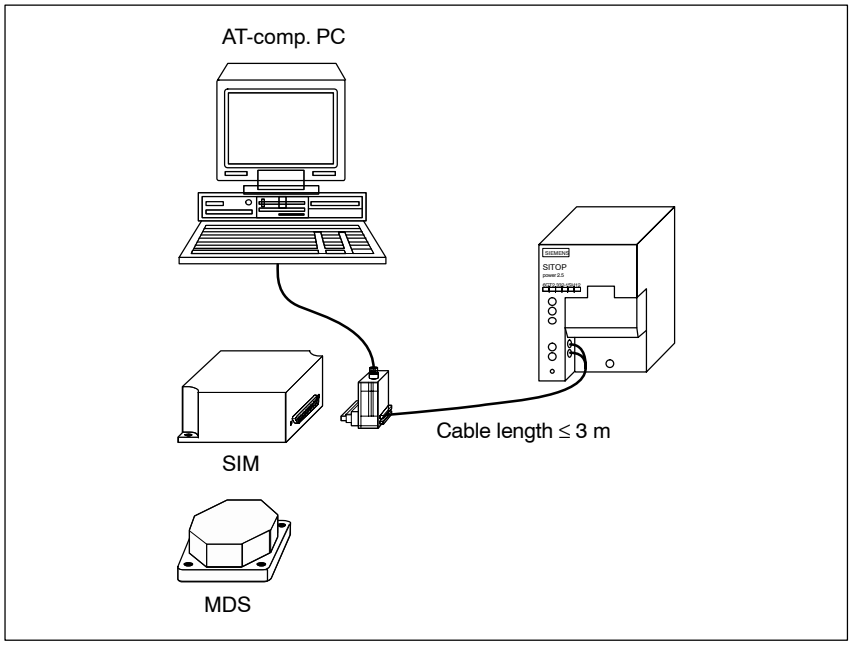


Figure 6-48 Configurator for SIM

The connecting cable between the power supply unit and the SIM may not exceed a length of 3 m. Power supply units which are to be operated in connection with a SIM must have a feedback attenuation of at least 20 dB at 134 kHz. One suitable power supply unit is, for example, the SITOP power 2.5 from Siemens (order number 6EP1 332-1SH12).

SIM hardware

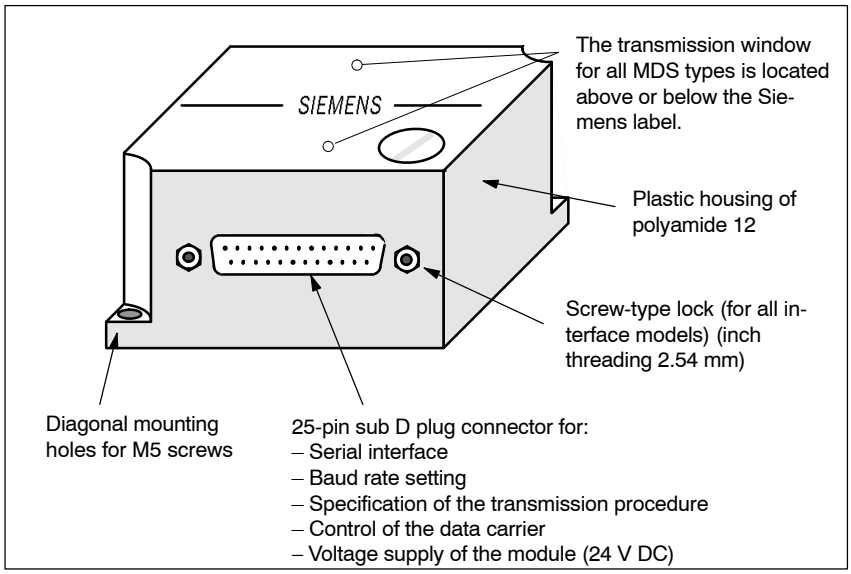


Figure 6-49 SIM serial interface module

Ordering data

Table 6-23 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[1] with 3964R drivers and tools for DOS and Windows 95/NT	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 English	Electronically on “Software MOBY” CD
Description-T3964R (DOS), stapled	
German English	Electronically on “Software MOBY” CD

1 See chapter 7.1.

Technical data

Table 6-24 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 6-25 Field data of SIM

MDS 514		MDS 506		MDS 439 E	
Length of transmission window in mm (L)					
L	2L	L	2L	L	2L
60	80	85	100	75	100
Width of transmission window in mm (W)					
20		30		30	
Operating distance in mm (S_a)					
0 to 20		0 to 25		0 to 25	
Limit distance in mm (S_g)					
33		40		33	
Distance from MDS to MDS in mm (D1)					
>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.

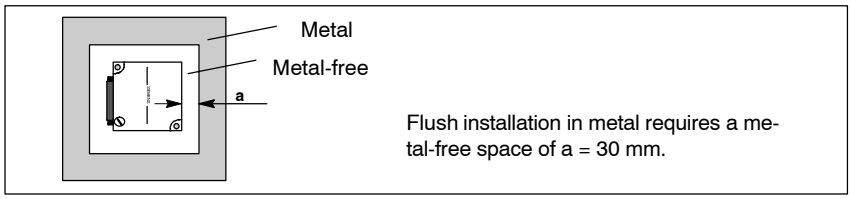


Figure 6-50 Flush installation of SIM in metal

Transmission window

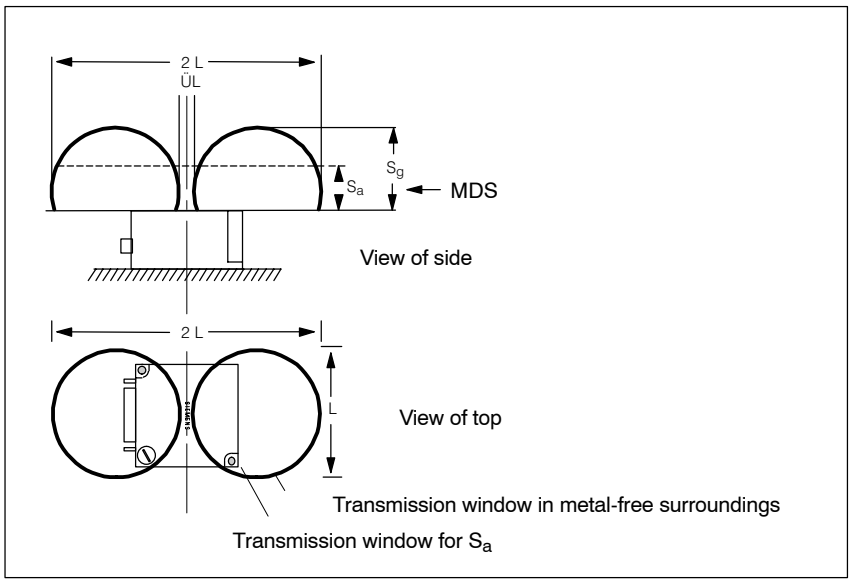


Figure 6-51 Transmission window of SIM

Dimensions (in mm)

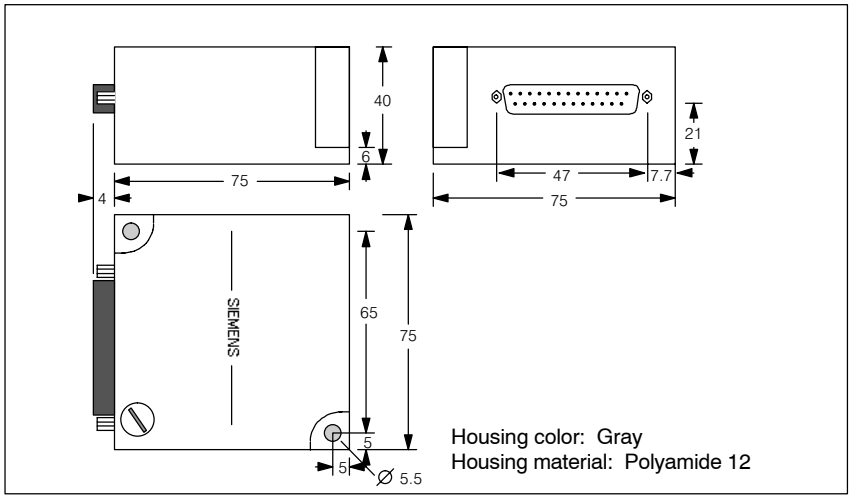


Figure 6-52 Dimensions of SIM serial interface module

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 6-26 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) Cable length between the power supply unit and the SIM: max. 3 m	
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*) 24	Plug pin*) 25	Meaning
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*) 18	19	20	21	22	23	Meaning
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”

Accessories

7

7.1 MOBY Software

Starting with version 3.0, the “MOBY Software” product will be delivered on CD. All function blocks and drivers for the MOBY identification system are included. The “Les_mich” (i.e., read_me) file in the main directory of the CD gives a brief explanation of the programs listed below.

- FB 230: Function block for ASM 401; filehandler for SIMATIC S5
- FB 240: Function block for 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.
- FC 44 permits 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.
- FC 45: S7 function for ASM 452/454/473/475
- FC 46 for ASM 452 (filehandler mode). The block can be used on the S7-300 and S7-400.
- FB 246 for ASM 452 (filehandler mode). The block can be used on the S5-115U with IM 308-C.
- Function FC 47 for ASM 470
- 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.
- FC 56 for ASM 452, ASM 473, ASM 475 in filehandler mode. FC 56 has the same functions as FC 46, but offers a new, trend-setting interface to the application.
- 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 424 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
- Current status of the MOBY documentation in PDF format
- Tools: Includes useful programs for MOBY configuration
- S7_OM: Installation program and Object Manager for interface modules ASM 470, ASM 475 and ASM 473
  Sample projects with the appropriate FCs are not installed here.
  They are located in the respective FC directories.

User prompting

The “Software MOBY” CD offers user-friendly prompting based on HTML. When Start.exe is called, a screen appears with the following main items in the upper menu bar:

- FC für S7
- FB für S5
- PC Support
- Doku
- Tools
- Demo
- News

Note

On Software MOBY or licensing

When an interface module or SIM is purchased, no software or documentation is supplied. The **“Software MOBY” CD-ROM must be ordered separately**. It contains all available FBs/FCs for the SIMATIC, C-libraries for Windows 98/NT, demo programs and so on. In addition, the CD-ROM contains the complete MOBY documentation (in German, English and French) in PDF format.

When an interface module or SIM is purchased, the percentile price of utilization of the software incl. documentation on the “Software MOBY” CD-ROM is included. The purchaser obtains the right to make copies (copy license) as needed by the customer-specific application or development for the system.

In addition, the enclosed contract applies to the use of software products against one-time payment.

Ordering data

Table 7-1 Ordering data for MOBY software

	Order No.
MOBY software	6GT2 080-2AA10

7.2 MOBY Wide-Range Power Supply

Description

The MOBY® wide-range power pack is a compact, primary-pulsed power supply. It is designed for use on single-phase, alternating current networks with two DC outputs (socket connector, parallel circuited).
Its robust construction features an aluminum housing which gives the fine-tuned system physical strength while protecting it from electromagnetic interference and providing it with optimal heat dissipation.
A built-in current limitation circuit protects the primary-pulsed power supply against overload and ensures continuous short circuit resistance.
The integrated overvoltage protection (SIOV) which is standard protects the connected electronics from excessively high voltage.

Figure 7-1 MOBY wide-range power pack

Ordering data

Table 7-2 Ordering data of the MOBY wide-range power pack

	Order No.
MOBY wide-range power pack, 100 to 230 V AC/24 V DC/2.2 A; incl. counterplug for the output voltage	6GT2 494-0AA00
24 V stub line for ASM 424, ASM 454; length: 5 m	6GT2 491-1HH50

Technical data

Table 7-3 Technical data of MOBY wide-range power pack

Input	
Input voltage	
Nominal value	100 to 230 V AC
Range	90 to 253 V AC
Frequency	50/60 Hz
Input current	0.85 to 0.45 A
Efficiency	≥ 80% at full load
Power connection	2 m power line with protective contact connector
Power failure backup	≥ 10 msec
Undervoltage switchoff	Yes
Overvoltage protection	SIOV

Table 7-3 Technical data of MOBY wide-range power pack

Output	Socket contacts
Nominal output voltage	24 V DC
Nominal output current	2.2 A
Residual ripple	20 mV_{ss} Up to 160 kHz 50 mV_{ss} Greater than 160 kHz
Startup current limitation	NTC
Continuous short circuit protection	Yes
Ambient conditions	
Ambient temperature	
During operation	-20°C to +40°htC (max. of +60° C; see notes on safety)
During transportation and storage	-40° C to +80° C
Cooling	Convection
General specifications	
Dimensions of power supply incl. mounting plate (L x W x H) in mm	205 x 80 x 60 (without connection plug)
Weight	Approx. 1000 g
Color	Anthracite
Mounting	4 M5 screws
Electromagnetic compatibility	
Interference emission (EN 50 081-1)	Class B in acc. w. EN 55 022
Interference immunity (EN 50 082-2)	EN 61 000-4-2
Safety	
Certifications	CE, GS
Electrical safety check	EN 60 950/VDE 0805 and VDE 106 (part 1)
Galvanic isolation, primary/secondary	4 kV AC
Protection class	I, in acc. w. EN 60 950 (VDE 0805)
Protection rating	IP 65, in acc. w. EN 60 529 (only when connected)

Connector assignment 24 V output

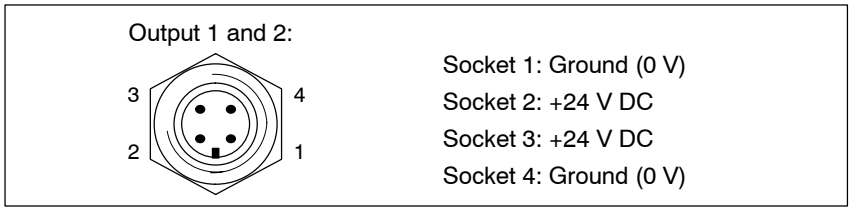


Figure 7-2 Connection assignment of 24 V output

Dimensions (in mm)

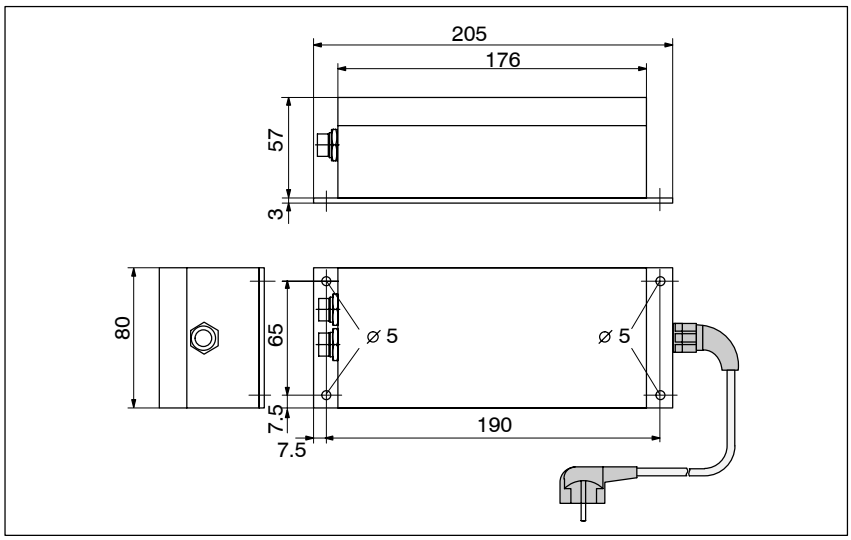


Figure 7-3 Dimensions of MOBY wide-range power pack

Notes on safety

Caution

Do not open the devices or modify them.
Non-adherence will invalidate CE certification and the manufacturer's warranty. When installing the power pack, adhere to the applicable DIN/VDE regulations of your country.The application area of the power pack is limited to "information technology of electrical office equipment" as stated in the standard EN 60 950/VDE 0805.
Devices may only be commissioned and operated by qualified personnel. For the purposes of the safety notes on this product, qualified personnel are those persons who are authorized to commission, ground and tag devices, systems and electrical circuits in accordance with safety standards. The device may only be used for the applications described in the catalog and technical description and only in connection with devices and components recommended by Siemens. If devices and components of other manufacturers are used, they must be recommended or approved by Siemens.
Correct operation of the product includes proper storage, setup and mounting, and careful operator control and maintenance.
When installing, make sure that the power outlet socket can be easily accessed.
During operation, the housing may heat up to +40° C. This is no cause for concern. However, at an ambient temperature of more than +40° C, be sure to cover the power pack (power pack must still receive sufficient ventilation) so that people cannot touch the hot housing.

7.3 MOBY STG I Hand-Held Terminal

Application areas

The STG I adds to the MOBY I identification system a powerful mobile hand-held terminal for applications in the areas of logistics, distribution and service. The service and test device (STG) is an indispensable aid for commissioning and testing. All MOBY I data memories can be read and write-accessed inductively. The STG I replaces the familiar STG 4F hand-held terminal which is now only available as a replacement part.

Figure 7-4 MOBY STG I hand-held terminal

Setup and function

The STG I mobile hand-held terminal consists of a basic device (PSION Workabout^{mx}) and a plug-in compact read/write head. It has a housing which is protected against splashed water (IP54), an LCD monitor screen with 240 x 100 pixels, an alphanumeric keyboard and various interfaces (for EEPROM card, charging battery, RS 232/TTL for MOBY I read head, battery charging interface including RS 232 for the PC coupling, and so on).

The included MOBY software (memory card) provides service and test functions for reading, writing, etc. of all MOBY I data memories.

- Read data from the data memory
- Write data to the data memory
- Delete entire data memory (write with filler value)
- Present and edit the data in hexadecimal or ASCII format
- Store read data in a file
- Enable/disable password protection for all write functions
- Choice of English or German as menu language

Using the optional C library as a basis, it is very easy to program your own applications including a customized user interface for reading and writing data memories. Various development tools are available for the PC, and a large selection of accessories is available directly from PSION. New applications are opened up in the area of logistics and distribution (e.g., goods commissioning data can be recorded offline with the hand-held terminal or processed and forwarded to the PC/computer later).

Filehandler functions

With MOBY I, the “FILEHANDLER” program can be called on the STG I. This provides you with very convenient functions for handling your data.

- Format the MDS
- Set up files on the MDS
- Write files on the MDS and the hand-held terminal
- Read files on the MDS and the hand-held terminal
- Read and display the directory of the MDS or hand-held terminal
- Delete files from the MDS and the hand-held terminal

Optional components

See http://www.psion.com/industrial/ on the Internet.

- 3link adapter cable to the PC for easy exchange of data between PC and PSION Workabout^{mx}
- PSION Workabout^{mx} basic device with large function keys and numeric keyboard
- Additional memory card with up to 8 Mbytes of memory
- Docking station including high-speed charging device and software for convenient data exchange between PSION Workabout^{mx} and PC

System prerequisites for customer-specific applications

The following prerequisites must be met when the library for SIBO ‘C’ (SIBO ‘C’ is the C developmental environment for the PSION Workabout) is used.

- PC — The C development package for the PSION Workabout must be installed on the PC. This development package is available directly from PSION.
  See: http://www.psion.com/industrial/.
- Hand-held terminal — The PSION Workabout with wall bracket and power pack. Use of the STG I MOBY hand-held terminal is recommended.
- PC cable — You will need a 3link adapter cable from PSION for the connection to the PC.
  See: http://www.psion.com/industrial/. The cable is only required if not already included with the C development package.
- C library — The following files are required for MOBY programming.
  - Normal addressing
    MOBY_I.H
    MOBY_STG.LIB
  - Filehandler
    FH_CMD.H
    FH_STG.LIB
    FH_STRUC.H
    FHDEF.H
    FHERR.H
    FHEXTERN.H

  These are supplied by Siemens with the MOBY SIBO ‘C’ library.

Note

In principle, applications can also be developed in the Basic programming language OVAL. However, the MOBY library cannot be used.

Hardware

The following figure shows the primary hardware interfaces which you can use to write your own applications.

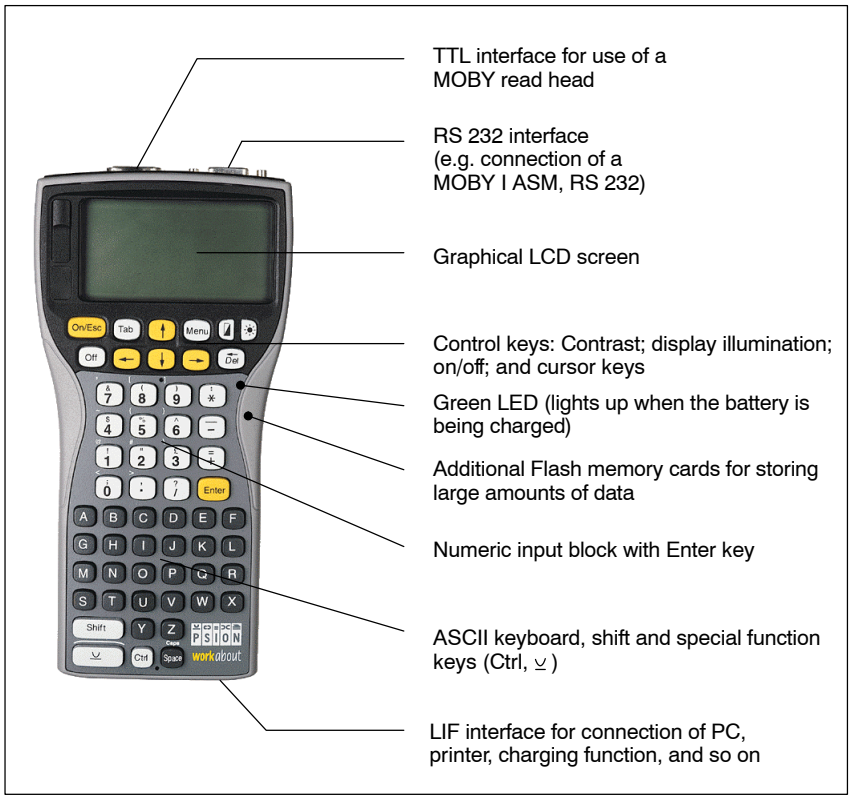


Figure 7-5 Hardware of the MOBY STG I hand-held terminal

If you are using another type of PSION Workabout, other interfaces are also available. A few examples are listed below.

- Infrared interface
- Numeric keyboard and function keys

Ordering data

Table 7-4 Ordering data of the STG I hand-held terminal

	Order No.
Mobile STG I hand-held terminal Basic device (PSION Workabout^{mx}) with MOBY I read/write head, battery, standard software including STG functionality and filehandler software on EEPROM card, user's guide, without charging station	6GT2 003-0CA00
Charging station for a mobile hand-held terminal with 230 V AC plug connector power pack	6GT2 303-1DA00
Accessories:	
MOBY I read/write head, 1.81 MHz + 134 KHz without software and without description	6GT2 003-1CA00
Memory card with STG software and filehandler software for MOBY D/E/F/I/U, including user's guide	6GT2 303-1CA00
C library for MOBY D/E/F/I/U for development of customer-specific screen dialogs, without development tools, including description	6GT2 381-1AB00
Extra battery	6GT2 094-0AB00 or 2 AA batteries (NiCd, Ni-MH, alkali)
Additional PSION components (e.g., 3link cable and C developmental user interface)	Obtain from local dealer or PSION. (http://www.psion.com/industrial/)

Technical data

Table 7-5 Technical data of the STG I hand-held terminal

Hardware	
Processor	NEC V30mx 27.68 MHz (80C86-compatible)
RAM memory	2 Mbytes of which approx. 1.8 Mbytes can be used as desired
ROM memory	2 Mbytes for operating system
User program	1 Mbyte (with MOBY service and test program)
Monitor screen	Graphic LCD monitor screen with 240 x 100 pixels, gray-stage scale, backlighting can be turned on
Keyboard	Alphanumeric with 57 keys
Sound	Piezo signal encoder
Power supply	NiCd battery pack with 2 type-AA cells (850 mAh) High-speed chargeable, automatic switch-off
Operation time	20 hours (read head inactive, display not lighted)
	4.5 hours (read head active, display not lighted)
	10 hours (read head inactive, display lighted)

Table 7-5 Technical data of the STG I hand-held terminal

Interfaces	LIF interface (LIF = Low Insertion Force) 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 multitasking, graphics support, GUI interface, Interpreter similar to MS-DOS	
File management	MS-DOS-compatible	
Integrated software	MOBY service and test program, spread sheet calculation, data base, pocket calculator, communication	
MOBY STG program	Read, write, delete MDS, read MDS-ID. Store MDS data and charge. Menus in German or English. Entry and presentation of data in ASCII or HEX.	
MOBY filehandler program	Read, write, set up, delete files of the MDS and hand-held terminal; display directory; format, lock MDS, status; display for directory and editor	
Technical Data	**Complete Device (Incl. Batteries)**	**Read head**
Dimensions Weight	260 x 90 x 35 [mm] Approx. 440 g	90 x 64 x 35 [mm] Approx. 110 g
Temperature	During operation –20° C to +60° C During transportation and storage –25° C to +80° C (without battery)	
Relative humidity	0% to 90%, no condensation	
Type of protection	IP54 (protected against splashed water)	
Shock resistance	Max. fall onto concrete: 1 m	
EMC	EN 55022; FCC Part 15 Low Power Transmitter	
Electrostatic, RF, EFT	IEC 801-2; IEC 801-3; IEC 801-4	
Certifications	ETS 300 330 reg. no. TTJ-P-G 128/96 FCC ID: KR5 MIS–I	
RF Read/Write Head		
MOBY I	134 kHz energy/1.81 MHz data	
Maximum read/ write distances	MDS Type	Distance in mm
	401/402 403 404/514 506 439E	6 8 20 12 12

FCC information

Made in Germany

SIEMENS MOBY I STG I

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, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

Note

The manufacturer is not responsible for any radio or TV interference caused by unauthorized changes and modifications to this equipment:
Such modifications could void the user's authority to operate the equipment.

7.4 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 and MOBY L 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 and MOBY L identification systems, barcode wands, scanners and swipe readers
- Integrated function blocks for frequently used functions
- With master/slave function for SINEC L1

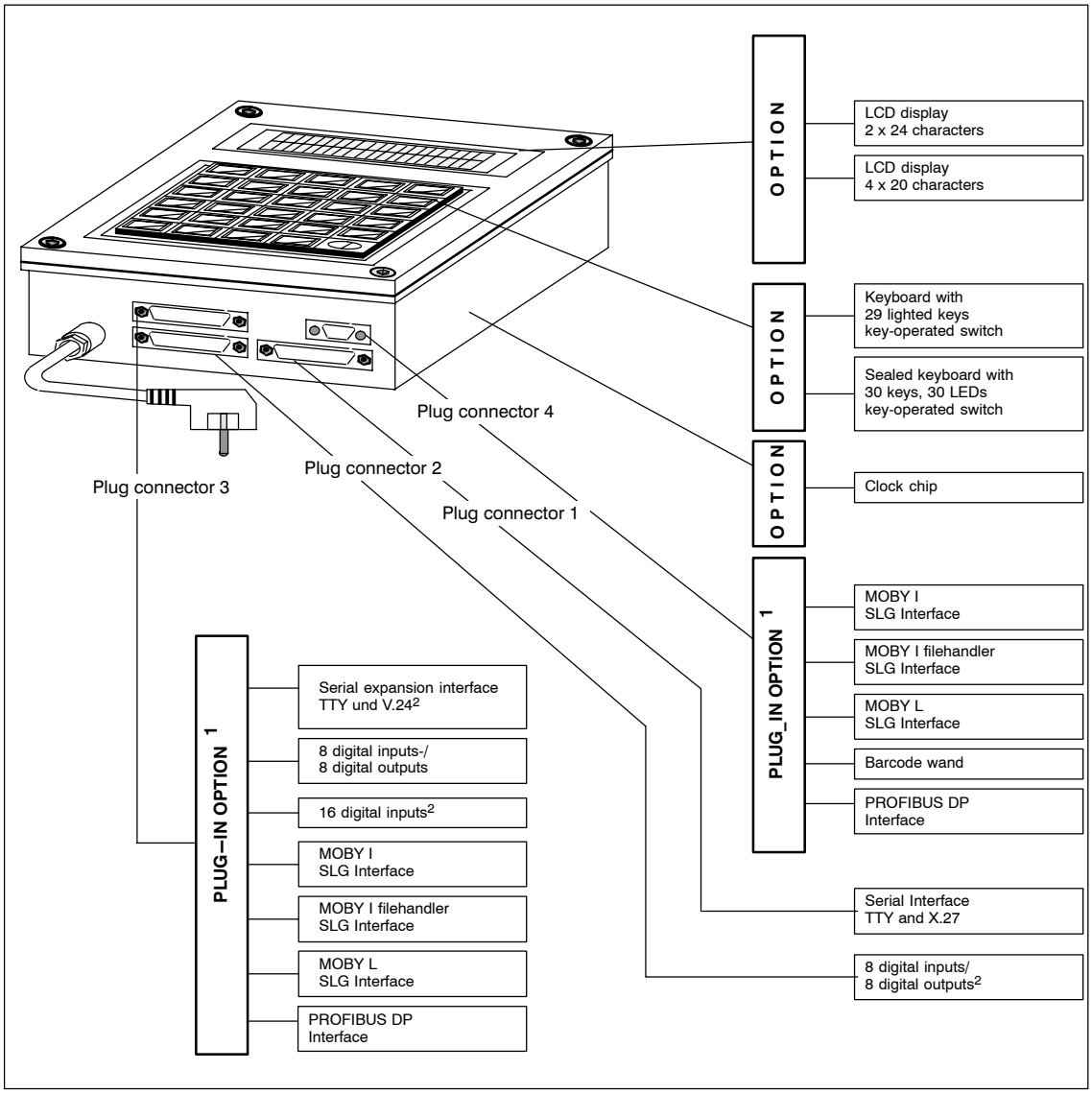


Figure 7-6 Configurator of ES 030-K

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 7-6 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
Plug connector 3	
Not used	A
MOBY I, MOBY E interface	C
8 DI + 8 DO	D
16 DI	E
MOBY I filehandler	F
MOBY L interface	L
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 filehandler	F
MOBY L interface	L
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 7-7 Technical data of ES 030-K

Microprocessor	80C32
Clock pulse frequency	14.7 MHz
Storage capacity (basic model)	
EEPROM	32 Kbytes = 16 K instruction
RAM	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	2 x 24-character LCD or 4 x 20-character LCD
Digital inputs/outputs	
Always included	8 DI and 8 DO, floating
Optional module	8 DI and 8 DO, floating
Optional module	16 DI, floating
• Digital input	Logical “0”: -2 to +2 V Logical “1”: 16 to 33 V (R_i = approx. 5 kΩ) Common ground of all DI
• Digital output	Logical “1”: +24 V I = 100 mA, I = 50 mA Short-circuit proof Common +24 V of all DO
Serial interface	
(plug connector 1)	TTY or RS 485
Procedure	3964R, Lauf, SINEC L1
Speed	150 to 19200 baud
Serial interface	Interface module
(plug connector 3)	20 mA single current Active/passive or V.24 Procedure: Lauf or 3964R
Fieldbus	PROFIBUS DP (slave) certified in acc. w. part III of DIN 19245
Baud rate	9.6 kbaud to 1.5 Mbaud
Connection	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
MOBY I	
Connectable SLGs (max. of 2)	SLG 40/SLG 40-S SLG 41/SLG 41-S/SLG 41C SLG 42 SLG 43 SLG 44

Table 7-7 Technical data of ES 030-K

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, $\pm$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
Silicone free	Yes

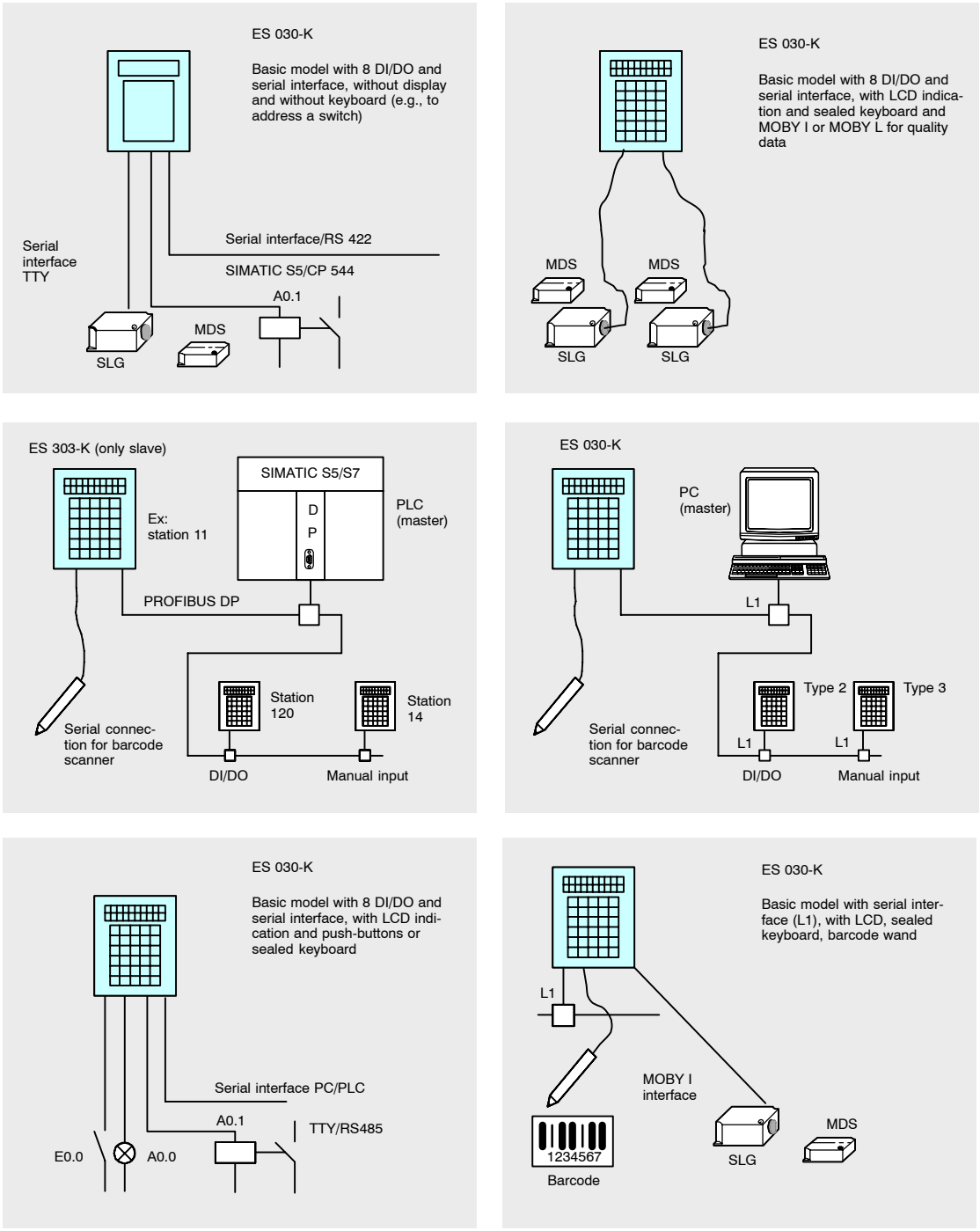


Figure 7-7 Sample configuration of ES 030-K

Documentation

A

Starting 10.01.2004, the technical documentation of MOBY is only available electronically on the “Software MOBY” CD with the order number 6GT2 080-2AA10.

Technical descriptions

- Description ASM 400/401 (German/English)
- Description ASM 410 (German/English)
- Description ASM 450/FC 44 (German/English/French)
- Description FC 45 (German/English/French)
- Description ASM 451/FC 46 (German/English)
- Description FC 56 (German/English)
- Description FB 246 (German)
- Description ASM 470/FC 47 for SIMATIC S7 (German/English)
- Description ASM470/FB 47 for SIMATIC S5 (German/English)
- Description SIM (for SIM 4x) (German/English)
- Description FB 230 (German/English)
- Description FB 240 (German/English)
- Description FB 250 for ASM 400/401 (German/English)
- Description 3964 R for Win 95/NT (German/English)
- Description T3964R for DOS (German/English)
- Description MOBY API (German/English)
- Description MDS 439 E (German/English)

Operator control guides

- Operator control guide for STG MOBY hand-held terminal (English/ German) (also included with STG I)
- Programming instructions for STG MOBY hand-held terminal (English/ German)

Manuals

- Configuration manual SLG 44/MDS 507/MDS 407 E (German/English)
- Equipment manual for ES 030-K (German/English)

Error Messages

B

This appendix 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, FC 45 and FC 47) provide additional messages on the status of the hardware. These special messages are described in this section.

B.3 All filehandler messages are grouped in the third section. These messages apply to ASM 401 with FB 230 as well as ASM 452, ASM 473 and ASM 475 with FC 46, FC 56.

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 450, ASM 452, the error codes can also be optionally reported via PROFIBUS as device-related diagnoses.

FC 45 images this error code with the “error_MOBY” variable.

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. MDS 507 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 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 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.
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.

Table B-3 Error messages of FB 47/FC 47

ANZ (Right-Hand Byte)	Description
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 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 450 is too small. • Parameterize master module correctly.
00000111 (07H/07D)	The received acknowledgment is too long. • Input and output area of the ASM 450 is too small (check GSD file). • 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 450 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 450 is too small (check GSD file). • 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.
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 450. • No RESET was performed after an error message which requires a RESET as the next command. • Start RESET command.

Table B-4 Error messages of FB 240

ANZ (Right-Hand Byte)	Description
00010100 (14H/20D)	Synchronization error between ASM 450 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 450 has performed a startup or a PROFIBUS DP bus error has occurred. • Possible problem with the ASM 450's plug-in contacts in the module rack • Supply voltage of the ASM 450 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 Error Indication with FC 45

FC 45 shows the error codes in 3 variables.

- error_MOBY: MOBY error in acc. w. table B-1
- error_FC: Errors generated by FC 45 due to wrong parameterization (cf. table B-5)
- error_BUS: Errors reported by system functions SFC 58/59 (cf. table B-6)

Table B-5 Error variable error_FC

error_FC (B#8#..)	Description
00	No error. Standard value if everything's okay.
01	SIMATIC does not have Params_DB.
02	Params_DB is too small. ⇒ UDT 10/11 was not used for the definition. ⇒ Params_DB must be 300 bytes long (for each channel). ⇒ Check Params_DB and Params_ADDR for correctness.
03	SIMATIC does not have the DB after the "command_DB_number" pointer.
04	The "command_DB" on SIMATIC is too small. ⇒ UDT 20/21 was not used for the command definition. ⇒ The last command in "command_DB" is a chained command. Reset the chaining bit.
05	Invalid command type
06	The acknowledgment received is not the acknowledgment expected. The parameters of command and acknowledgment telegram do not match (command, length, address_MDS). ⇒ The user changed the "command_DB_number/command_DB_address" pointer while the command was being processed. ⇒ The user changed the command parameters in data block MOBY CMD (UDT 20) while the command was being pro- cessed.
07	The MOBY_mode parameter (defined in UDT 10) has an illegal value.
08	A bus error is reported by system functions SFC 58/59. Variable error_Bus contains more information on the error.
09	The ASM failed. ⇒ Power failure on the MOBY-ASM ⇒ PROFIBUS plug pulled or PROFIBUS cable disconnected The error is indicated when the ASM_Failure bit was set in OB 122. OB 122 is called when FC 45 is no longer able to access the cyclic word for the MOBY-ASM.
0A	While the init_run command was being executed, the user started another init_run command without waiting for "ready." ⇒ Do <u>not</u> set init_run cyclically.

Table B-5 Error variable error_FC

error_FC (B#8#..)	Description
0B	Init_run cannot be executed. Cyclic process image to the ASM is faulty. FC 45 reports timeout of PII. (This error can be eliminated by writing #00 to address DBB 58 in UDT 10. However, in certain error situations, FC 45 won't generate an error message and will "hang up.") ⇒ ASM_address in UDT 10 is parameterized incorrectly. ASM_address may be pointing to a wrong module. ⇒ ASM hardware/firmware is faulty.
0C	Area length error. Error_BUS contains the error 8x22 or 8x23. ⇒ DAT_DB doesn't exist or is parameterized too small. Check DAT_DB_number and DAT_DB_address in UDT 20. ⇒ Perform init_run.

Table B-6 Error variable error_Bus

Error Code (W#16#...)	Description
800A	ASM is not ready. Temporary message. ⇒ This message is received by the user who is not using FC 45 and who is polling the ASM non-cyclically very quickly in succession.
8x7F	Internal error in parameter x. Cannot be corrected by the user.
8x22 8x23	Area length error while reading a parameter Area length error while writing a parameter This error code indicates that parameter x is completely or partially outside the operand range or the length of a bit field of an ANY parameter is not divisible by 8.
8x24 8x25	Area error while reading a parameter Area error while writing a parameter This error code indicates that parameter x is located in an area which is illegal for the system function.
8x26	The parameter contains a number of a time cell which is too large.
8x27	The parameter contains a number of a counter cell which is too large.
8x28 8x29	Orientation error while reading a parameter Orientation error while writing a parameter The reference to parameter x is an operand whose bit address is not 0.
8x30 8x31	The parameter is located in the write-protected global DB. The parameter is located in the write-protected instance DB.
8x32 8x34 8x35	The parameter has a DB number which is too large. The parameter has an FC number which is too large. The parameter has an FB number which is too large.
8x3A 8x3C 8x3E	The parameter has the number of a DB which is not loaded. The parameter has the number of an FC which is not loaded. The parameter has the number of an FB which is not loaded.

Table B-6 Error variable error_Bus

Error Code (W#16#...)	Description
8x42 8x43	An access error occurred while the system was trying to read a parameter from the I/O area of the inputs. An access error occurred while the system was trying to write a parameter to the I/O area of the outputs.
8x44 8x45	Error during nth (n>1) read access after an error occurred Error during nth (n>1) write access after an error occurred
8090	Specified logical base address is invalid. No assignment exists in SDB1/SDB2x or it isn't a base address.
8092	A type other than BYTE is specified in ANY reference.
8093	The area identifier contained in the configuration (SDB1, SDB2x) of the logical address is not permitted for these SFCs. Permitted: 0 = S7-400 1 = S7-300 2.7 = DP modules
80A0	Negative acknowledgment while reading from the module (module removed during the read procedure or module is defective)
80A1	Negative acknowledgment while writing to the module (module removed during the write procedure or module is defective)
80A2	DP protocol error in layer 2. Hardware may be defective.
80A3	DP protocol error in Direct-Data-Link-Mapper or User-Interface/User Hardware may be defective.
80B0	• SFC not possible for this module type • Module doesn't recognize the data record. • A data record number ≥ 241 is illegal. • Data records 0 and 1 are not permitted for SFC58 "WR_REC."
80B1	The length in the RECORD parameter is wrong.
80B2	Although configured, the slot is not occupied.
80B3	Actual module type is not the module type configured in SDB1.
80C0	• RD REC: The module has the data record but no read data yet. • WR REC: ASM is not ready for new data. ⇒ Wait for the cyclic counter to be incremented.
80C1	The module has not yet processed the data of the previous write job for the same data record.
80C2	The module is currently processing the maximum number of jobs for a CPU.
80C3	Required resources (memory, etc.) not available at the moment.
80C4	Communication error • Parity error • SW-Ready not set • Error in block length management • Checksum error on CPU side • Checksum error on module side
80C5	Distributed I/O not available

B.3 Filehandler Error Messages for ASM 401/452/473/475

These error messages are indicated by FB 230, FB 246, FC 46 and FC 56.

Table B-7 Filehandler error messages

ASCII Error Code	Description
A0 06	The command ID (KK) of the started command is not permitted or not defined. Specify the correct command ID.
A0 11	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 filehandler 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. • Replace MDS if the battery monitoring bit is set • Test MDS by attempting to initialize it with the STG • Format MDS with FORMAT

Table B-7 Filehandler error messages

ASCII Error Code	Description
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.

Table B-7 Filehandler error messages

ASCII Error Code	Description
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 filehandler is not working correctly. • Check command layout or command sequence. • The hardware of the ASM 401 (firmware) has a defect.
D0 01	The filehandler will only accept a RESET command. • The filehandler 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 filehandler 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 filehandler 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.

Table B-7 Filehandler error messages

ASCII Error Code	Description
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 filehandler 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 filehandler 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). • FC 56: Params_DB is too small.
H0 03	The command index is illegal. Change the command index.
H0 04	This command ID and thus this command is unknown to FB/FC. 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.

Table B-7 Filehandler error messages

ASCII Error Code	Description
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 16**.

Table B-7 Filehandler error messages

ASCII Error Code	Description
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 filehandler or PROFIBUS DP master 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. • FC 46/56: Communication blocks SFC 58/59 have reported an error. The exact cause is located in a separate data word (FC 46 = ANZ2; FC 56 = error_BUS).
H1 31	The parameterized channel number (MOBY DB) is outside the legal area (1 to 8).
H1 32	ASM doesn't react to startup procedure. This error is reported when the ASM doesn't react when the FC sets the startup bit and this makes the handshake procedure during the RESET fail. Error bit and ready bit are set and the command is terminated.
H1 33	Timeout for init_RUN If the init_RUN procedure is not concluded within a parameterizable time (e.g., due to an error on the ASM), this is reported to the user with error H1 33. Error bit and ready bit are set and the command is terminated.
H1 34	init_RUN executed more than once The user sets the init_RUN bit again while an init_RUN is already running without waiting for the ready bit. The FC recognizes this and reports this error. Error bit and ready bit are set and the command is terminated.

Table B-7 Filehandler error messages

ASCII Error Code	Description
H1 35	ASM_Fehler When the FC ”realizes” that the ASM can no longer be addressed (reported by OB 122), the command is terminated, the error bit and ready bit are set and error H1 35 is reported. The failure can have various causes. – Voltage failure on the ASM – Bus plug disconnected or bus cable interrupted
H1 36	• The DB of the pointer ”command_DB_number” doesn’t exist on the SIMATIC. • The ”command_DB” on the SIMATIC is too small (minimum of 30 bytes).
H1 37	Parameter error in MOBY_mode The MOBY_mode parameter is checked each time the FC is called. When a value larger than 0Fhex is set, PC processing is terminated and error H1 37 is entered in the MOBY DB. Error bit and ready bit are set.
H1 38	ANW outside permissible area (0 to 7)
H1 39	There is a gap between two consecutive acknowledgments. The telegram counter DBN indicates to the FC that acknowledgments have been lost.
H1 40	DBN is greater than ADB.
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

dec.	hex.	+0 +00	+1 +01	+2 +02	+3 +03	+4 +04	+5 +05	+6 +06	+7 +07	+8 +08	+9 +09	+10 +0A	+11 +0B	+12 +0C	+13 +0D	+14 +0E	+15 +0F
0	0x00																
16	0x10																
32	0x20																
48	0x30																
64	0x40																
80	0x50																
96	0x60																
112	0x70																
128	0x80																
144	0x90																
160	0xA0																
176	0xB0																
192	0xC0																
208	0xD0																
224	0xE0																
240	0xF0																

Compatibility

D

The following table provides customers and service personnel with a list of all types of MDSs, SLGs and ASMs 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: September 2004)

Type Designator	Description/Remarks	Replacement Type
MDS 114 [1]	Discontinued on 12.31.2000	MDS 404
MDS 115 [1]	Replacement type has different housing with same mounting dimensions	MDS 404
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 404
MDS 213 E [1]	Discontinued	MDS 404
MDS 213 E-ZA22[3]	MDS 213 E for Ex zone. No CE. Discontinued as of 01.01.96.	
MDS 302 [1]	Replacement type has 8-KB memory.	MDS 402
MDS 401		
MDS 402	8-KB RAM/FRAM	
MDS 403		
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	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	Order numbers 6GT2 000-0CD30-0AB0 and 6GT2 000-0CD30-0AC0 are compatible for the user.	
MDS 505 [1]	Greater temperature range. Temperatures up to 85° C possible.	MDS 514
MDS 506		
MDS 507	Discontinued as of 10.01.2003	
MDS 514		
MDS 515 [1]	Different housing with same mounting dimensions	MDS 514

Table D-1 Compatibility of MDS and SLG types (status: September 2004)

Type Designator	Description/Remarks	Replacement Type
SLG 40	Read head with diameter of M30	
SLG 40-S	Read head with diameter of M18	
SLG 41		
SLG 41-S	SLG 41 with turned antenna. As of 10.01.2004 the ordering number was changed from 6GT2 001-0AA00-ZA23 to 6GT2 001-0AA00-0AX0	
SLG 41C		
SLG 41CC		
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 [1]	Discontinued with effect from October 1, 2003	SLG 44-ZA07
SLG 44-ZA28 [1]	SLG 44 with wider range (1 m)	SLG 44-ZA07
SLG 44-ZA30 [1]	SLG 44 with adjustable receiving sensitivity	SLG 44-ZA07
SLG 44-ZA07	SLG 44 with adjustable range	6GT2 001-0DA10-0AX0
SLG 44 (6GT2 001-0DA10-0AX0)	SLG 44 with adjustable range, 100% identical with SLG 44-ZA07 (August 2004)	
ASM 400	Phased-out with effect from October 1, 2004	
ASM 401	Phased-out with effect from October 1, 2004	
ASM 410	Phased-out with effect from October 1, 2004	
ASM 420	Replacement type SIM is protocol-compatible; ASM is compatible with SLG connection.	SIM/ASM 424
ASM 421	Discontinued as of 07.01.2002. No replacement with serial interface.	
ASM 424		
ASM 440	Successor type uses same FB 240. The GSD file is new as well as mechanics and plug.	ASM 450
ASM 441	Replacement type is PROFIBUS DPV1and not PROFIBUS-FMS.	ASM 452
ASM 450		ASM 456
ASM 451 [1]	Discontinued with effect from July 1, 2002	ASM 456
ASM 452		ASM 456
ASM 454		
ASM 456		
ASM 470		
ASM 473 [2] (6GT2 002-0HA00)	Discontinued with effect from July 1, 2002 Replacement type is FC-compatible.	ASM 473 (6GT2 002-0HA10)
ASM 475 [2] (6GT2 002-0GA00)	Discontinued with effect from July 1, 2002 Replacement type is FC-compatible. New HW parameterization necessary.	ASM 475 (6GT2 002-0GA10)
RF170C		
SIM		

1 Discontinued. Replacement type is 100% compatible.
2 Discontinued. Replacement type is somewhat compatible.
3 Discontinued. No replacement type

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Numbers

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TO:

Siemens AG

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D–90713 Fuerth

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