

22 HANDLING AN S7-CPU

22.1 S7-CPU with Micro Memory Card (MMC) by SIEMENS

The 2nd generation of SIEMENS S7-300® controllers do not contain an integrated load memory. This means that the load memory has to be inserted in form of an MMC card in order to make the PLC operable.

The memory of the MMC card should always be **twice as big** as the working memory. The MMC stores code blocks, data blocks and system data blocks.

The following information concerning the durability of an MMC card is provided within the SIEMENS manual:

The durability of a SIMATIC® Micro Memory Card primarily depends on the following factors:

1. *The number of delete and programming processes, external influences such as e.g. the surrounding temperature.*
2. *Within a surrounding temperature of up to 60°C the maximum number of delete/write processes on the SIMATIC® Micro Memory Card is 100.000.*

100.000 write processes sounds good. However, if you frequently create and delete DBs within your PLC program via calling an SFC, then you should think it over.

The working memory, on the other hand, cannot be expanded within SIEMENS S7 controllers. Therefore, you should ensure that the PLC already has enough working memory before buying it.

22.1.1 Handling the MMC

For safety reasons, the MMC should always be inserted or removed whenever the PLC is not connected to a power source.

The **memory setup of the MMC could become invalid**, if the program is writing on the MMC at the moment when the supply of voltage fails or the MMC is being removed.

In this case, the MMC can no longer be used and needs to be reformatted.

If the MMC is invalid, the S7 controller will request the general reset (STOP-LED will flash slowly).

In this case, the MMC can be formatted by means of the mode selector switch:

1. Set the mode selector switch to the MRES position and hold it down until the STOP-LED remains lit.
2. Release the switch within the next three seconds and set it back once again to the MRES position.

The STOP-LED will now flash while the MMC is being reformatted.

22.1.2 Mode Selector Switch

The mode selector switch has three positions:

Position of switch	Function
RUN	In this switch position the PLC-program will be processed.
STOP	In this switch position the PLC-program will <u>not</u> be processed.
MRES	Initiation of general reset (see section 'General Reset' below).

Older S7-300® controllers distinguished between **RUN** and **RUN-P**. In the state RUN it was not possible to transfer blocks to the controller. This was only allowed in the position **RUN-P** (P=programmable).

Current S7-300® controllers have only one RUN position which corresponds to the RUN-P position. This means that transferring blocks to the CPU in RUN state is allowed.

22.1.3 General Reset

The process of general reset enables a reorganisation of the memory management.

The content of the MMC card remains unchanged!

When a general reset is applied, the working memory is deleted and thereafter the process relevant blocks are copied from the MMC card to the working memory.

In doing so, data blocks will reobtain their initial values.

Remanent data will be deleted during general reset.

The following areas will be maintained after a general reset:

- User program/ data block within load memory (MMC card)
- Diagnostic buffer, run-time meter
- MPI address, DP address, baud rate

A general reset can be started via the programming device (WinPLC7) or by means of the mode selector switch.

Initiating general reset via the mode selector switch:

1. Set switch to STOP position
2. Press the switch in MRES position and keep the switch in this position. Release the switch when the STOP-LED has flashed for the second time and remains lit.
3. Reset the switch to the position MRES within the next three seconds and hold it until the STOP LED flashes (2 Hz). Then, release the switch.

A general reset will now be carried out. Once the process has been completed, the STOP-LED will quit flashing and remain lit.

22.1.4 Copying RAM to ROM

The function "Copy RAM to ROM" which initiates the programming software is of limited use with respect to MMC cards, because all blocks are located permanently on the MMC card.

However, this function can still be of some use, because the actual values of the data blocks are adopted into the MMC by means of "Copy RAM to ROM". If the PLC is switched on and off, the actual values will then be within the data blocks.

22.1.5 Remanence

Remanence is the feature that maintains the memory content unaltered in case of a power failure.

Which areas of an S7-300® controller are remanent?

- Blocks within the load memory are always remanent.
- The working memory is always remanent (except for CPU 317 and 319)
- Bit memory, timers and counters can be set remanent within the hardware configuration (properties of the CPU).
- Diagnostic buffer, MPI address and set baud rate are always stored within the remanent memory area of the CPU.
This is important in order to ensure that the CPU will continue communicating with the projected settings in case of a power failure.

Note concerning CPU 317 and CPU 319:

CPU 317	256 KByte of the working memory can be used for remanent data blocks.
CPU 319	700 KByte of the working memory can be used for remanent data blocks.

Remanent data within working memory:

The content of remanent data blocks is always remanent on restarts and return of power. CPUs of V2.1.0 and above also support non-remanent data blocks. In this case, the actual values within a data block will be set to the parameterized initial values on the restart or return of power.