SIMATIC S7 Software Redundancy

Warm standby with the S7 Software Redundancy

SIMATIC S7 Software Redundancy is a program package containing function blocks for SIMATIC S7 which, in the event of a fault, change over from the master system to the standby system.

It is suitable for high-availability processes with warm standby requirements (processes that are not time-critical with changeover times of the order of seconds). During changeover, the outputs retain their status.

Changeover time

To determine suitability for specific applications, the changeover time must be used as the selection criterion. It lies in the range of a few seconds and depends on several factors:

- Communications performance of the CPU used
- Communications medium, connection type used and transmission rate
- Transmitted quantity of data
- Cause of fault
- Data transfer rate of the PROFIBUS DP system and
- Number of DP slaves

With S7-300, two separate racks are assembled for the two CPUs. With S7-400, the CPUs can either be plugged into one or into two racks. The redundant link between the systems is implemented over the standard bus systems of PROFIBUS, PROFINET, or MPI.

In this example, a larger controller is used as a master controller for processing the redundant and normal areas.

A smaller controller is adequate as a backup controller because it is only responsible for the redundant area in the event of a fault.

Available CPUs

The standard CPUs of the S7-300 and S7-400 as well as WinAC can be used for the master and slave stations.

Different CPUs can be used for the master and backup stations.

Highlights

- Cost-optimized solution for non-time-critical processes
- Flexible software solution with almost all standard CPUs

Features of S7 Software Redundancy

S7 Software Redundancy is characterized by the following features:

I/O

The ET 200M distributed I/O station is connected over two IM 153-2 redundant DP slave interfaces over a single channel to both PROFIBUS DP lines. The complete I/O range of ET 200M is available.

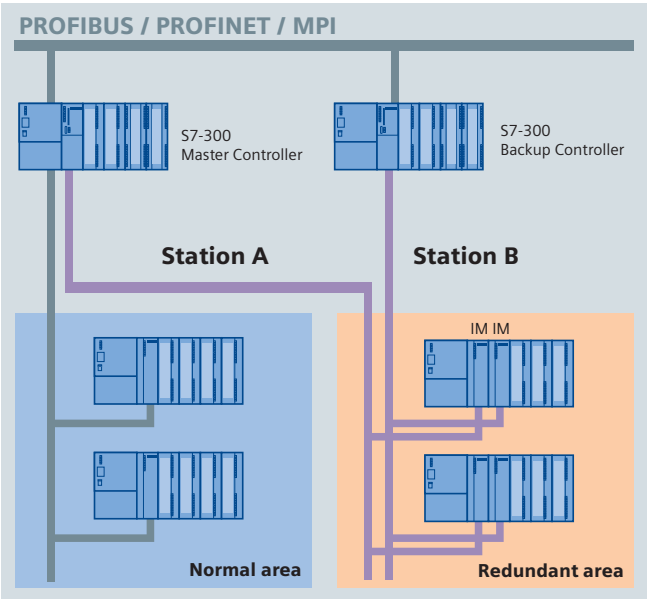
Either the complete process or only an especially critical part of it can be redundantly configured.

Redundant I/O, if required, must be implemented in the user program.

Engineering

The requirements for program development are STEP 7 and S7 Software Redundancy. The redundancy blocks are called at the beginning and end of the program and parameterized. The redundant data areas are specified. The redundancy data are then automatically transferred by the FBs.

The application program must be loaded on both CPUs.



Sample configuration of S7 Software Redundancy

Diagnostics and repair

All standard diagnostic functions are available, e.g.:

- Module status in the overview display
- Status and modification of inputs and outputs
- Program status of function blocks
- Variable status at the end of a cycle

If a CPU has to be repaired, the CPU must be replaced and the relevant program must be loaded onto the new CPU.

Communication

Communication with other devices is supported as follows:

- Redundancy scripts are available for linking to WinCC (not WinCC flexible).
- For linking to OP, TP, MP and TD, devices that can be switched over must be used (OP 7, OP 17, WinCE-based).
- Data communication with the PC and PLC must be programmed.

Technical features

Software *redundancy* for SIMATIC S7

Required software	■ STEP 7 basic package, Version V4.02 and higher ■ NCM S7 for PROFIBUS for planning the communication ■ Memory requirement for FBs in the CPU approx. 10 KB
Supported hardware	■ CPU 313C-2 DP, CPU 314C-2 DP, CPU 315-2 DP, CPU 317-2 DP ■ All S7-400 CPUs (without F or PN functionality) ■ WinAC Slot PLCs, Software PLCs ■ Not permissible for PCS 7
Communication between the CPUs	■ MPI ■ PROFIBUS ■ PROFINET (via CP; for communication, existing interconnections can be shared)
Modules that can be used for the ET 200M distributed I/O station	■ Redundant DP slave interface IM153-2/-2FO ■ All digital and analog modules for ET 200M ■ FM 350 counter module ■ CP 341
Supplementary conditions	■ Support from one PROFIBUS DP line ■ Only IEC timers/counters can be used
Programming	■ LAD, FBD, STL, CFC, SCL ■ Each device is programmed separately ■ The program for the redundant area is identical in both devices ■ The program for the normal area can be different
Reasons for changeover	■ Failure of the master device (power OFF or STOP) ■ Fault in the DP master system of the master device ■ Manual changeover
Changeover response	■ Outputs remain frozen during changeover ■ After changeover, the new master operates on the basis of the most recently received data
Changeover time	Several seconds, depending on: ■ Communications performance of the CPU ■ Communications medium ■ Data volume to be transferred ■ Cause of fault ■ Baud rate of the PROFIBUS DP network ■ Number of DP slaves
Delivery format	■ Function blocks on CD-ROM including electronic documentation in 5 languages (Eng., Fr., Ger., Ital., Span.) ■ Four loadable application examples ■ One WinCC faceplate
Order No. group	6ES7 862-0AC.