# Siemens
# Simatic C1 & C2
# Manuals and Guides

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# 4 General Operation

## 4.1 Parallel Program Execution with IP 265

**Remember**
In the case of conventional programmable controllers (PLCs), the user program for the control of an overall system is processed by a CPU. The individual instructions of the CPU user program are executed **sequentially** by the CPU.

The use of an FPGA in an S5-100U module makes it possible for the first time to handle process signals **in parallel** and therefore **very fast.**

By loading memory data (contents), hardware structures similar to the hardware wiring in SIMATIC C1, C2 and C3 systems are set up on the FPGA of the IP 265. In contrast to this, the FPGA used in the IP 265 is **programmable**, i.e. the hardware connections established on the FPGA can be "deleted" and configured again as often as desired by loading memory data.

The FPGA load data necessary for a hardware connection is defined by the user in the user program (referred to below as the IP 265 user program).

The IP 265 user program consists of basic functions such as logic operations, counters, timers and comparators and the connections necessary between these language elements. Both the language elements and the connections take up memory space (resources) on the IP 265. The resources of the IP 265 available for the language elements and their connections are limited. Only small user programs can be processed in the IP 265.

Between the IP 265 user program and the CPU user program, there are **insignificant differences** with regard to the language elements and the operands.

> **Note**
>
> The structure of the IP 265 user program resembles the CSF 5 method of representation (programming of SIMATIC CPUs) of the CPU user program. The use of FPGA systems causes slight deviations when programming the IP 265.

**There are basic differences** between the parallel program execution of the IP 265 user program and the sequential program execution of the CPU user program.

Figure 4-1 shows the essential differences between sequential and parallel user program execution.

**Comparison operations (>=<)**

Comparison operations make it possible to compare the BI output of a counter function ( Table 9-11) with a constant or input parameter in the IP 265 program.

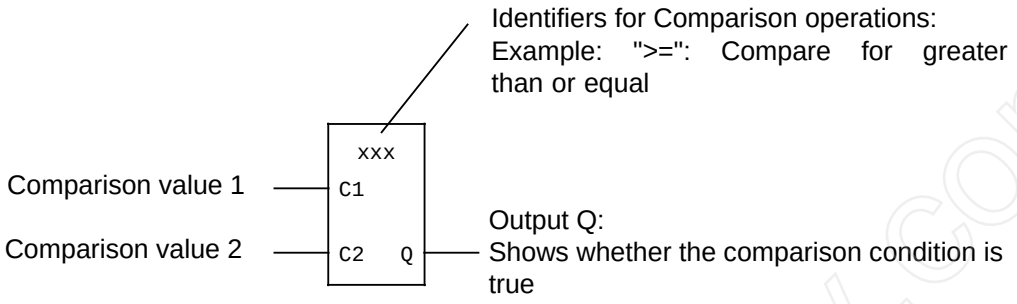
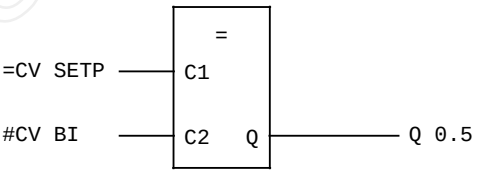



**Figure 9-6. Basic Structure of "Comparison Operations" Language Elements**

**Table 9-12. Comparison Operations**

| Comparison operation | CSF (example) |
|---|---|
| **Compare for equal "=":**<br>C1 and C2 are compared for equal. | **Example**: Compare for equal<br>  <br><br>Two counts are compared. If they are equal, output 0.5 is set. |
| **Compare for not equal "><":**<br>C1 and C2 are compared for not equal. | |
| **Compare for greater than or equal "> =":**<br>Comparison to see whether C1 is greater than or equal to C2. | |
| **Compare for greater than ">":**<br>omparison to see whether C1 is greater than C2. | |
| **Compare for less than or equal "< =":**<br>Comparison to see whether C1 is less than or equal to C2. | |
| **Compare for less than "<":**<br>Comparison to see whether C1 is less than C2. | |

Possible options for Comparison functions:

- *Output Q can be inverted if the Comparison function's output leads direct to the output bar.*
- Each Comparison function can be converted into another Compare function.