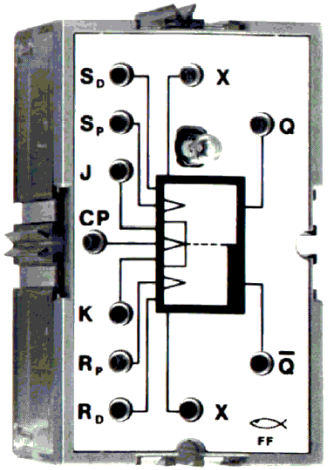
fischertechnik h4 FF

FLIP-FLOP

Electronic-Module

Order No. 30815



Technical Data:

Rated operating voltage:		9 Volt DC ±20%
Max. Output load capacity:		20mA
Signal Lamp:		6V, 20mA
Current Consumption	Q = "0"	16mA
	Q = "1"	28mA
Signal Voltage (nominal)		0-signal voltage V ≥ 3V
		1-signal voltage V ≤ 2V
Max. Input frequency:		2kHz

With the flip-flop module, you can expand the many possibilities offered by the hobby 4 kit. The "flip-flop" has a linguistic meaning that indicates the jumping or flipping of the output voltage (a relay could be called a "click-flop"). The flip-flop can be connected: as a memory, counter, divider or shift register. It is also called a "bistable multivibrator".

Before starting, please insert one of the two signal lamps supplied into the socket. The flip-flop module is automatically connected to power by attaching the unit to a rectifier or other module and inserting the enclosed red connector.

The flip-flop can be used to control all fischertechnik electronic components, but not lamps, motors, etc. This is only possible via the relay module.

The following signal definitions apply to the fischertechnik electronics system:

0-Signal	The corresponding socket carries the Voltage V ≥ 3V
1-Signal	The corresponding socket carries the Voltage V ≤ 2V
dynamic 1-Signal	Signal change from "0" to "1", e.g. Switching from "+" to "–" ("0"-"1" transition)

Under no circumstances should the 0-signal be confused with a missing signal (= input terminal not connected).

The flip-flop module has 3 different inputs and two outputs Q and $\overline{Q}$.

The built-in lamp indicates which signal is present at output Q (lamp lit = 1-signal, lamp not lit = 0-signal). The output $\overline{Q}$ is the inverse to the Q output. It therefore supplies the respective opposite signal to Q.

Direct inputs S_D and R_D

If S_D is connected to the 1-signal (S_D = "–"), the signal lamp lights up (Q = "1"). This is called the "set state" of the flip-flop, so this is the set input for direct set-up. This state remains continuously (remains stored) whether S_D has a 1-signal or a 0-signal (Q = "0"), the lamp (Q = "0") will go out flip-flops. (R_D is therefore the reset for direct reset.) This state remains until a 1-signal is given again at S_D. (Exception: there is still a 1-signal at R_D).

Pulse inputs Sp and Rp

A pulse (hence the abbreviation P) is understood in digital technology as a change of a signal, for example, from "0" to "1". Such an impulse, however, is not produced by merely opening and closing the connection to "–". Thus, to ensure a "0-1" transition on the set input Sp, the input is first connected to the "+" socket and then to the "–" socket. Likewise a "0-1" transition on the reset input Rp, causes a reset of the flip-flop to Q = "0" provided that the inputs SD and RD are not "1". On the other hand, when setting or resetting the flip-flop via the "pulse inputs" Sp or Rp, the signal at the other pulse input is applied.

Clock pulse input CP

The flip-flop can also be set or reset with only a single pulse input. The CP connection is available for this purpose. The flip-flop transitions with every signal change from "+" to "–" (0-1 transition): the signal lamp alternatively lights up (Q = 1) or goes out (Q = 0).

J-K inhibit inputs for clock input CP

With the J and K inputs, the effect of the CP input can be influenced as follows:

J = "0"and K = "0": All "0-1" transitions at CP are ineffective. The state that is present at Q is always retained.

J = "1"and K = "0": All "0-1" transitions to CP result in Q = "1", further impulses are ineffective.

J = "0"and K="1": All "0-1" transitions to CP results in Q = "0", further impulses are ineffective.

J = "1" and K = "1": All "0-1" transitions to CP alternatively results in a change in Q. If Q = "1" then Q ="0" and visa-a-versa (the same effect occurs when J and K are not connected).

Extension inputs X

The "dynamic AND" block is connected to the flip-flop via these two connections (see the description of the dynamic AND). The additional pulse inputs obtained with this function are independent of the pulse inputs Sp and Rp.

You will find the circuit diagram of the flip-flop module, explanations of the circuit as well as numerous excitations and models in the hobby experiment and model books, volumes 4-3 and 4-4.

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