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Ingenuity for life

Innovative switching and control

LOGO! 8 in details part 1 of 3
Installation and overview of the functions blocks

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LOGO! in detail slides overview

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The LOGO! in detail slides are split up in three different parts

- **LOGO! in detail part 1**

  Installation and overview of the function blocks

- LOGO! in detail part 2

  Usage at the device and handling of the software

- LOGO! in detail part 3

  Tasks and features

LOGO!
Innovative switching & control … in detail

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LOGO! in detail overview

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Installation and wiring
- Hardware assembly
- Connecting power supply
- Connecting inputs and outputs
- Switch-on behavior

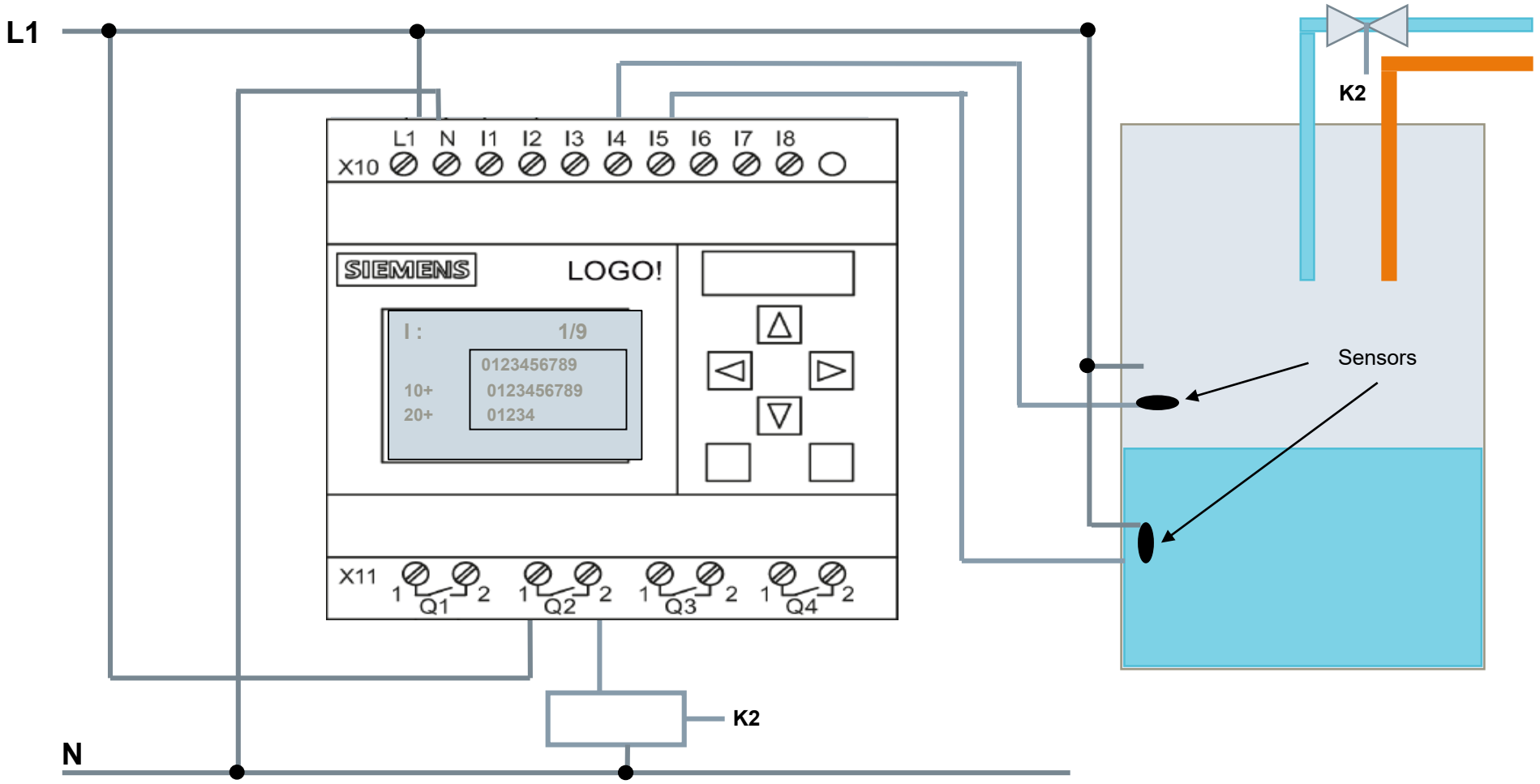
Integrated functions
- Basic functions
- Special functions

Operation device
- Control for operation
- First program
- LOGO! in run mode
- Configuring LOGO!

LOGO! Soft Comfort V8.0
- Help functions
- Realizing typical tasks step by step
- Modem wizard
- Other options

Application example
- Control of bottle filling conveyor

Installation and wiring



LOGO! 8 hardware structure

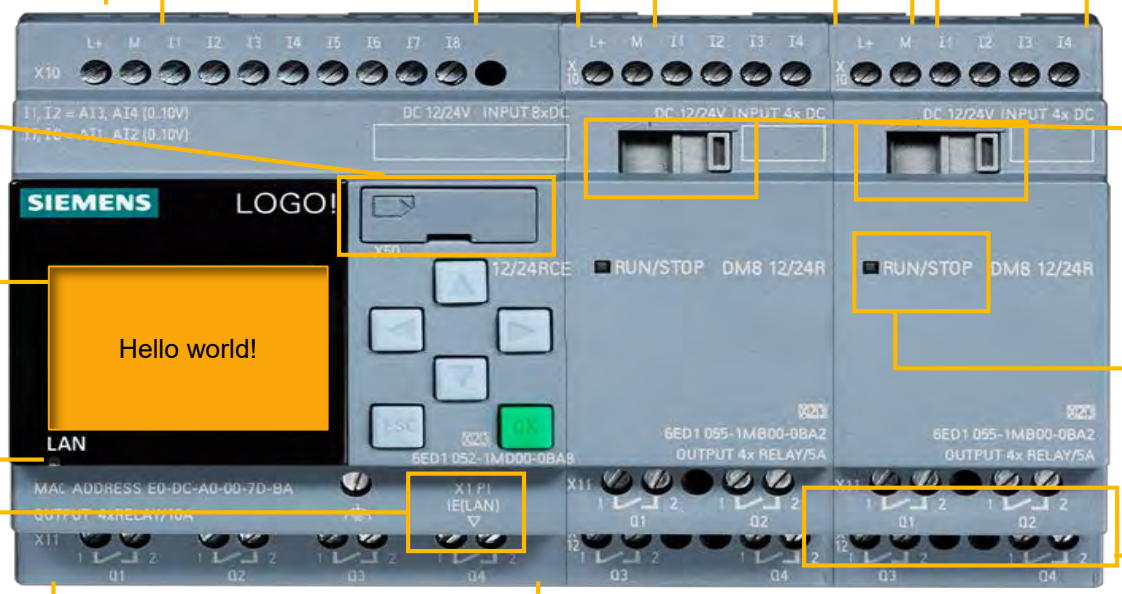
8 Inputs

Power supply connectors for expansion modules interface

Power supply connectors

4 Inputs

Micro-SD Card-Slot



Slider switch for bus connections

Display with 3 selectable colors

LED RUN/STOP

LED LAN

4 Outputs

Ethernet-connection

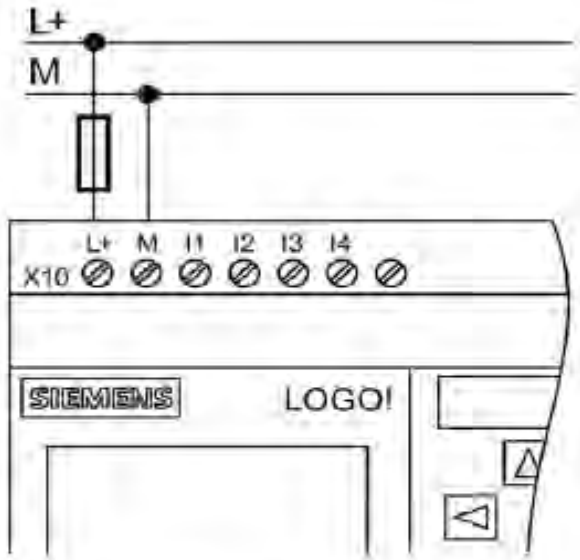
4 Outputs

Maximum Configuration: 24 digital inputs + 8 analog inputs
+ 20 digital outputs + 8 analog outputs

LOGO! wiring

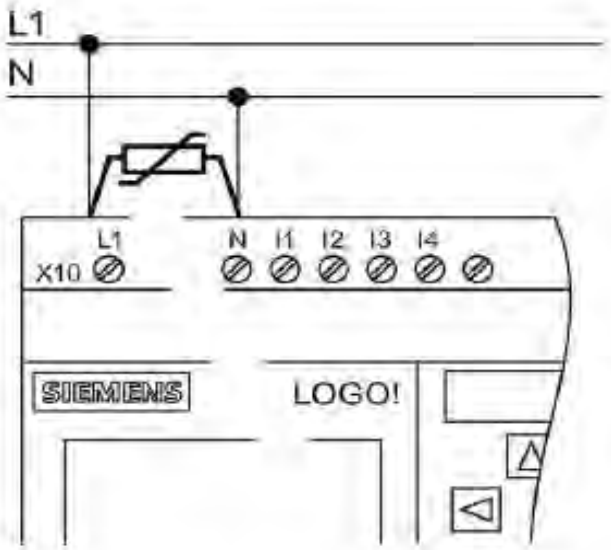
How to connect the power supply to LOGO!:

LOGO! ... with DC power supply



Protection with safety fuse
if required (recommended) for:
12/24 RC...: 0.8 A
24: 2.0 A

LOGO! ... with AC power supply



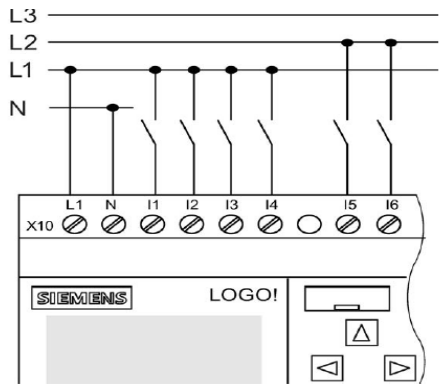
To suppress surge voltages, install varistors (MOV) with an operating voltage at least 20% above the rated voltage.

Connection LOGO! inputs

Connect sensors to the **inputs**.
Sensors may be:

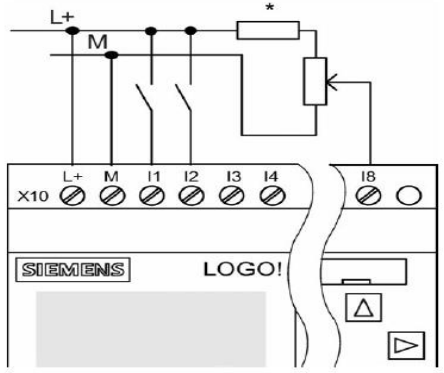
- pushbuttons, switches, photoelectric barriers, etc.
- temperature, pressure or ultrasound sensors (Beros) etc., with 0...10V outputs directly at 4 analog inputs of the LOGO! 12/24 RCE or LOGO! 24CE basic devices or the analog module AM2
- or the appropriate sensor with current output 0...20mA/4...20mA to the inputs of the analog module AM2
- or connect up to 2 temperature sensors PT100 or PT1000 to AM2 RTD in 2 or 3 wire connection technology

LOGO! 230 ...

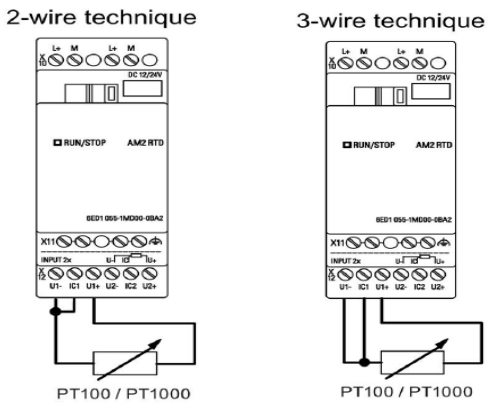


The inputs of these devices are grouped into 2 blocks of 4 each. You can use a different phase for each block. The 3 phase needs an expansion module

LOGO! 12/24 ...



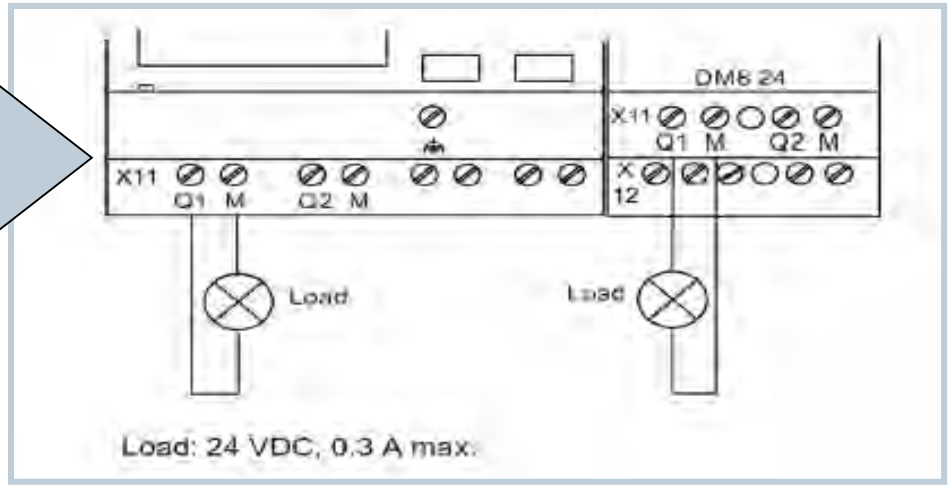
The inputs of these devices are non–isolated and therefore require the same reference potential (ground) as the power supply.



With 2-wire connections no correction of the impedance of the measurement line occurs. 3-wire connection suppresses this influence.

Connection LOGO! outputs

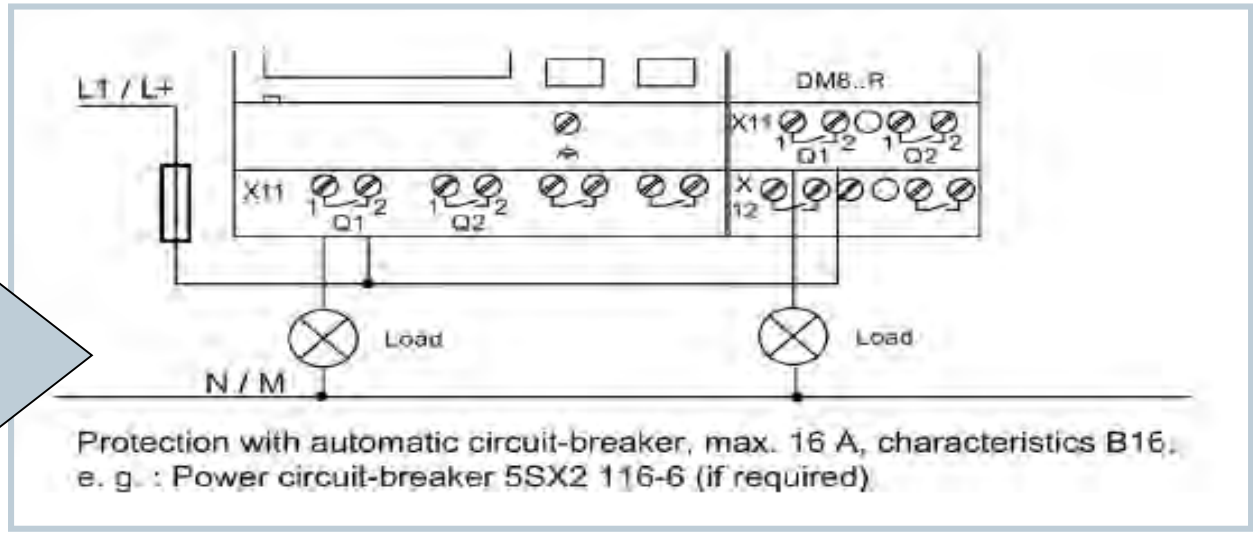
LOGO! with transistor outputs



You can connect different loads to the **outputs**, e.g.:

- lights
- motors
- switches
- etc. ...

LOGO! with relay outputs

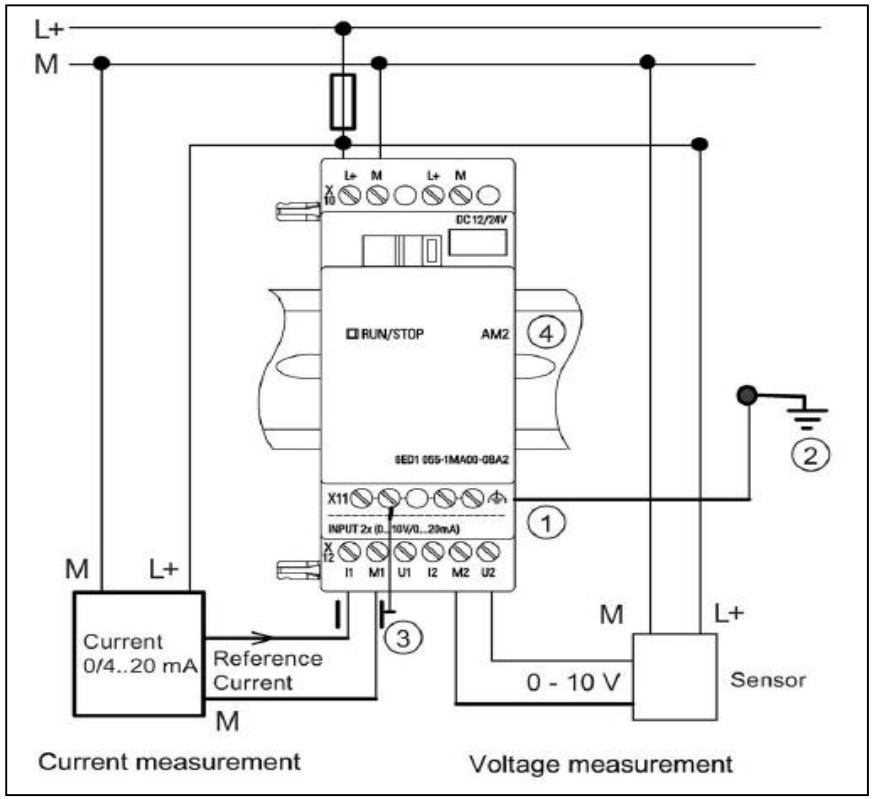


Connection LOGO! outputs

LOGO! with analog outputs

You can connect different devices to **analog outputs**, e.g.:

- frequency converter to control drives
- other devices with high impedance analog inputs



① FE terminal for connecting earth and shielding the analog measuring cable

② Earth

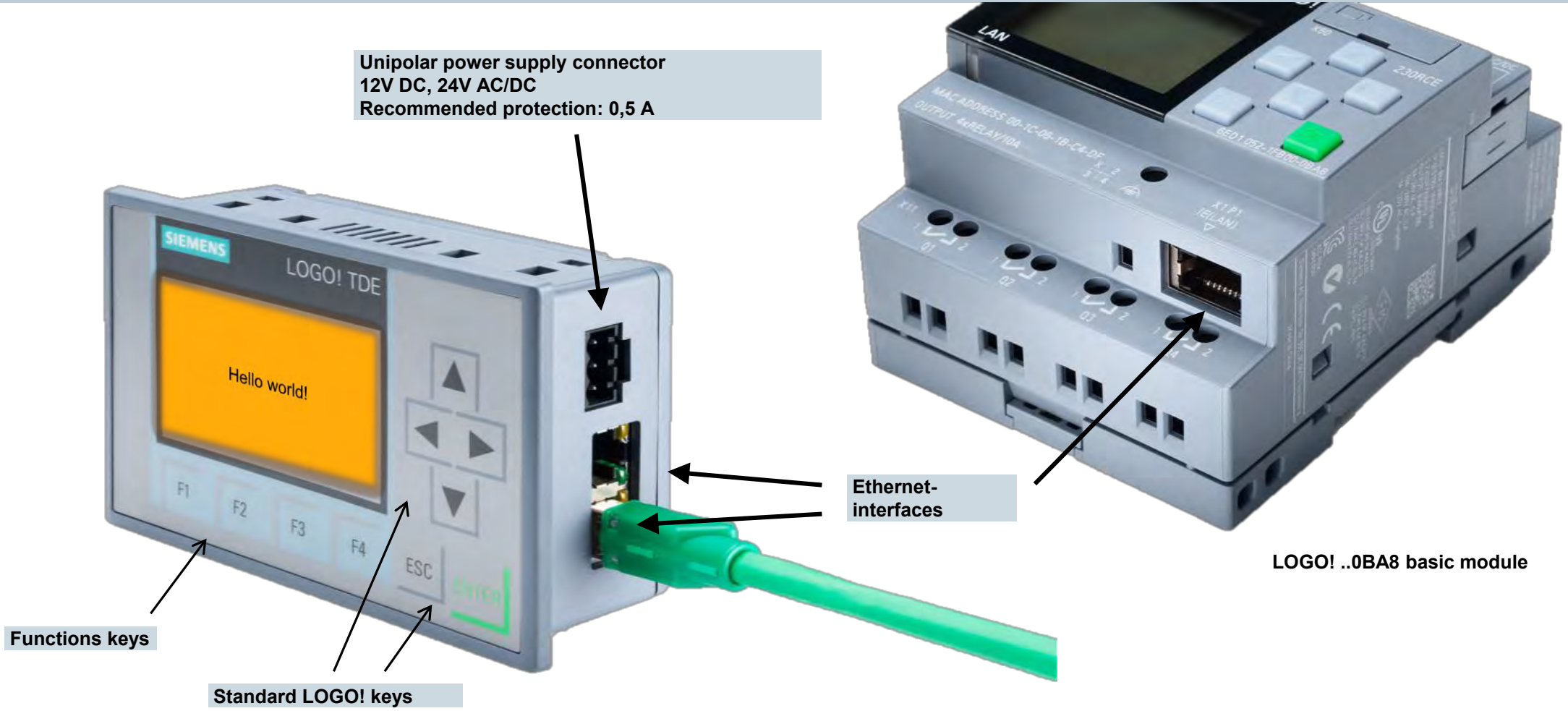
③ Cable shielding

④ Standard DIN rail

Warning!

Analog outputs cannot be loaded! The max. load of analog outputs is 0.2 mA.

Connecting LOGO! TD text display



LOGO! behavior when switched on depends on:

- **whether a program is stored in the internal LOGO! memory**

or

- **whether a Micro SD card is connected**

Micro SD-Card slot

No program on Micro SD-Card and no program in internal memory

Program on Micro SD-card or in internal memory

Warning!

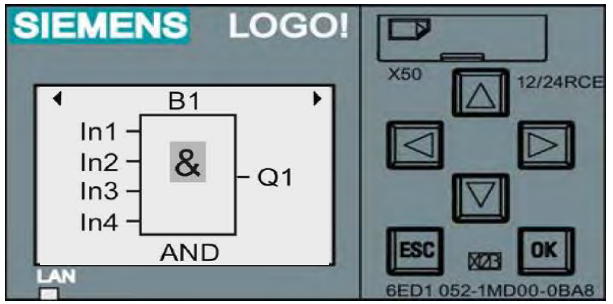
If there is a program on the Micro SD-card, it is automatically copied to the internal LOGO! memory when switching on . Any program in the internal LOGO! memory is overwritten.

LOGO! reaction when switched on depends on:

- **in which state LOGO! was prior to POWER–OFF**

In editing mode or menu in stop status

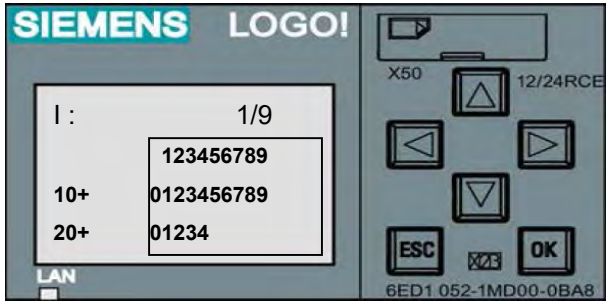
Prior to power-off



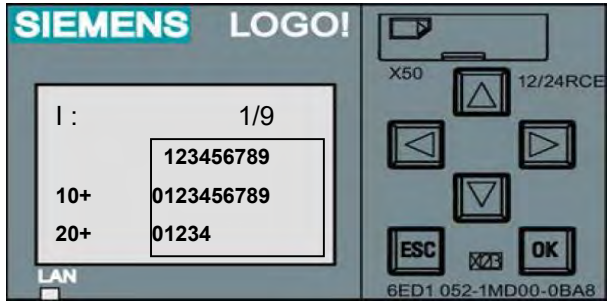
After power-on: menu

In RUN time showing the input status

Prior to power-off



After power-on: showing the input status



Connectors (CO)

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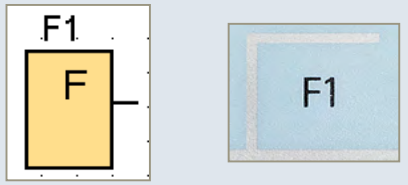
Digital I/O	
I1 – I24	Q1 - Q20
special digital I/O	
I1	AI3 *
I2	AI4 *
I3	Allows up to 5kHz switching-frequency on DC powered options
I4	
I5	
I6	
I7	AI1 *
I8	AI2 *

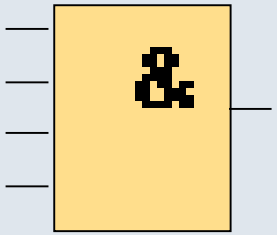
* Adjustment of the number of AI in LOGO! Soft Comfort
File → Properties → I/O settings

Analog I/O	
AI1 – AI8	AQ1 – AQ8

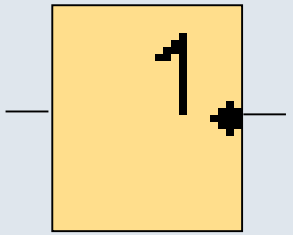
Digital/ analog flags	
M1 – M64	AM1 – AM64
Special flags	
M8	Initialization flag (In the first cycle = 1)
M27	Switching of the character set in the message text
M25	LOGO! displays white backlight
M26	LOGO! TDE white backlight
M28	LOGO! displays amber backlight
M29	LOGO! displays red backlight
M30	LOGO! TDE amber backlight
M31	LOGO! TDE red backlight

Miscellaneous	
LOGO! TDE Function Keys	
F1 … F4	
LOGO! Cursor Keys	
▶ ◀ ▲ ▼	
Signal status	
hi	“1”
lo	“0”
Open connector for formal closing	
4 shift register each 8 bit	

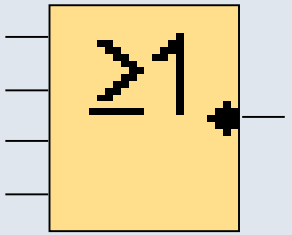
LOGO! Basic functions (BF)



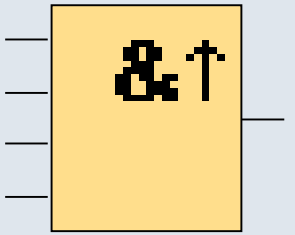
AND
Series connection
NO contact



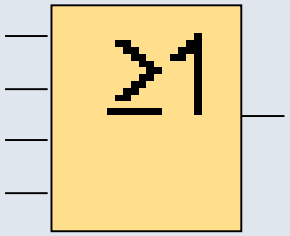
NOT
Inverter



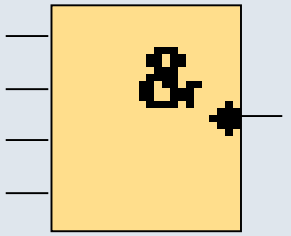
NOR
Series connection
NC contact



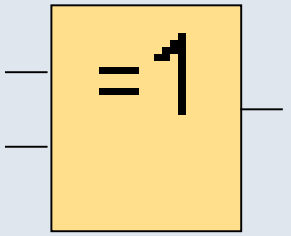
AND
With edge evaluation
(pos. Edge)



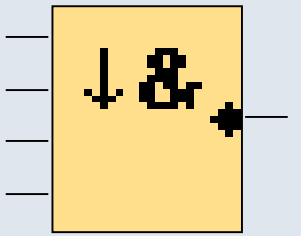
OR
Parallel connection
NO contact



NAND
Parallel connection
NC contact



XOR
Dual changeover
contact



NAND
With edge evaluation
(neg. edge)

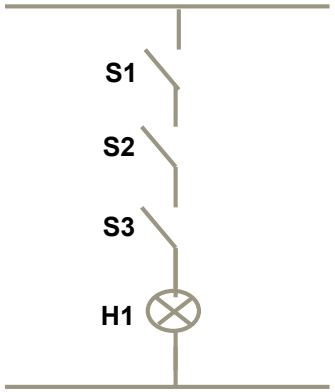
AND function

A look at the circuit diagram shows that the light H1 is only on when S1 and S2 and S3 are closed. Input and output states are dependent on each other.

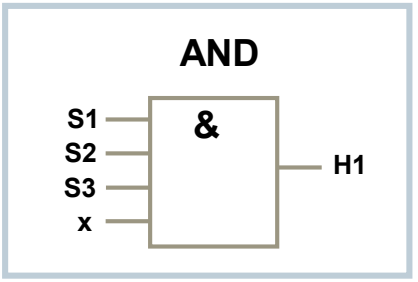
The circuit to the right is called AND logic.

In words contact S1 and S2 and S3 have to be closed for the light to burn.

Symbol for this connection is **&** .



Series circuit normally open contact



Output of the AND function is 1 only when all inputs are 1.

If one input pin of this block is not connected, the internal status is automatically 1.

Logic table for AND block:

Input 1	Input 2	Input 3	Output
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

OR function

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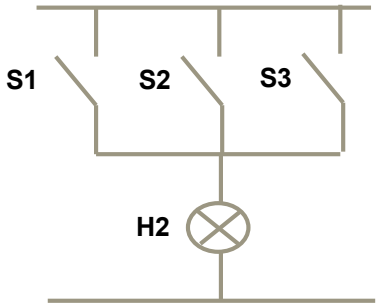
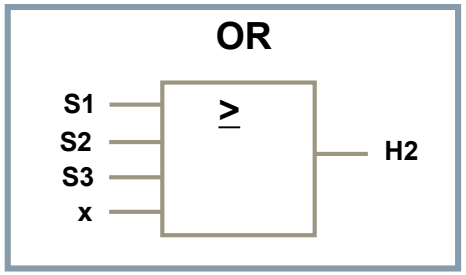
To turn the lamp H2 on, the contact S1 or S2 or S3 have to be closed. The dependence of output states from inputs states is called OR logic.

In words at least one of the contacts S1 or S2 or S3 have to be closed for the lamp H2 to light up.

Symbol for this connection is ≥1 .



Parallel circuit normally open contact



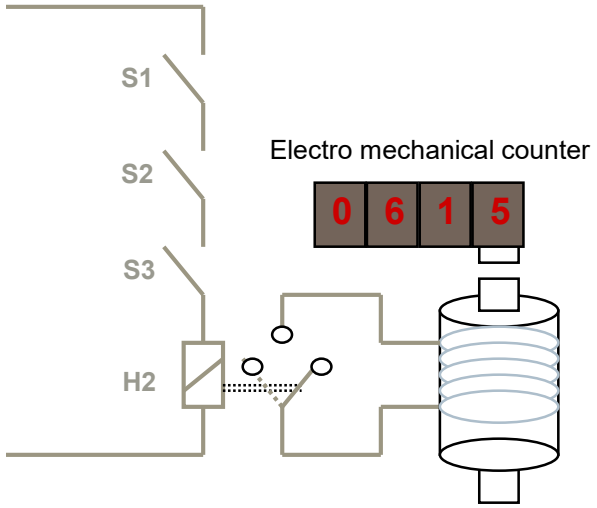
Output of the OR function is 1, when at least one input is 1.

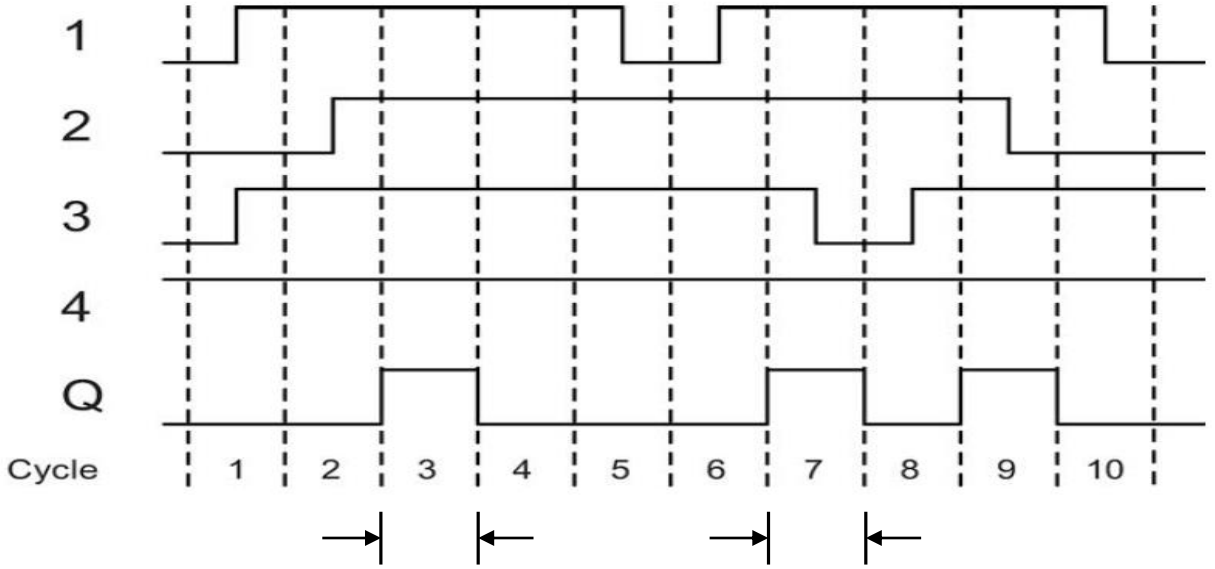
If one input pin of this block is not connected, the internal status is automatically 0.

Logic table for OR block:

Input 1	Input 2	Input 3	Output
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

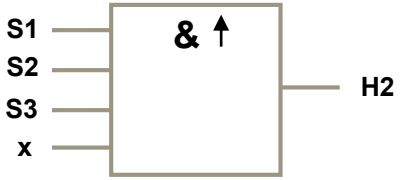
AND with edge triggering





Pulse length of one cycle

AND with edge triggering



Output of AND with edge triggering is 1, only when all inputs are 1 and in the previous cycle at least one input was 0. If one input pin of this block is not connected, the internal status is automatically 1.

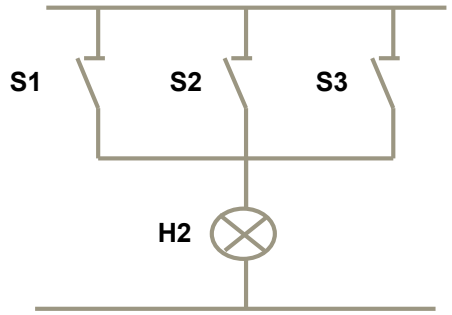
NAND (not-AND) function

A look at the circuit diagram shows that the light H2 is not on, only when all contacts are switched. The circuit to the right is called NAND logic.

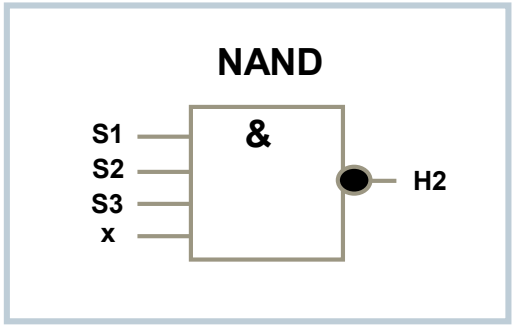
In words S1 and S2 and S3 have to be switched for the light H2 not to burn.

Symbol for this connection is 

.



Parallel circuit normally closed contact



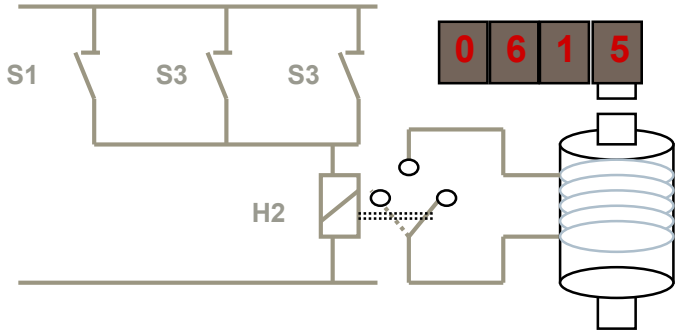
Output of NAND is 0, only when all inputs are 1.

If one input pin of this block is not connected, the internal status is automatically 1.

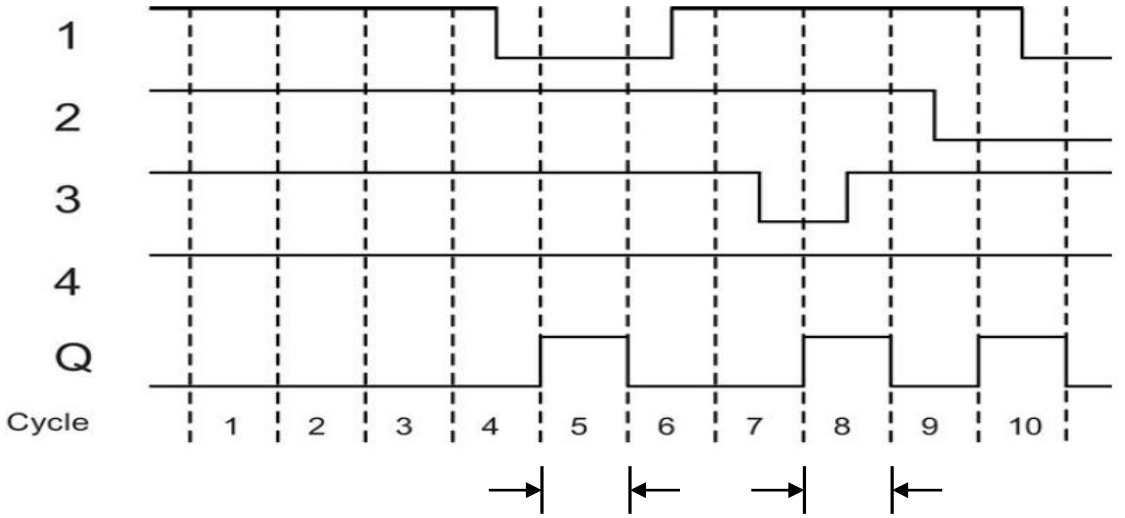
Logic table for NAND block:

Eingang 1	Eingang 2	Eingang 3	Ausgang
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

NAND (not-AND) with edge triggering

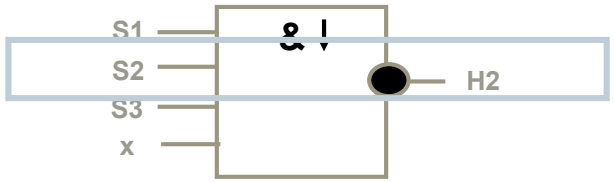


Electro mechanical counter



Pulse length of one cycle

NAND with edge triggering



Output of NAND with edge triggering is 1, only when at least one input is 0 and in the previous cycle all inputs were 1.

If one input pin of this block is not connected, the internal status is automatically 1.

NOR (not-OR) function

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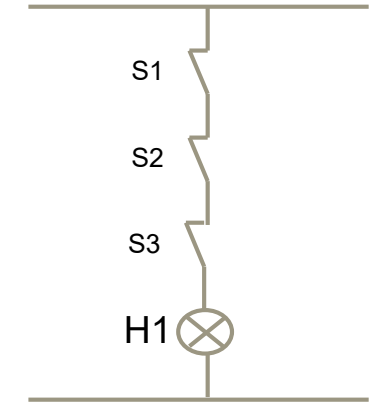
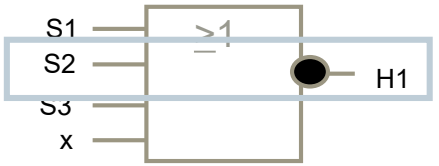
A look at the circuit diagram shows that the light H1 is only on, when the normally closed contact S1 and S2 and S3 are not switched.

The circuit to the right is called NOR logic. In words when S1 or S2 or S3 are switched, the light is not on. Symbol for this connection is ≥1 .



Series circuit normally closed contact

NOR



Output of NAND is 1, only when all inputs are 0. As soon as any input is switched (status 1), the output is switched off. If one input pin of this block is not connected, the internal status is automatically 0.

Logic table for NOR block:

Input 1	Input 2	Input 3	Output
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

XOR function

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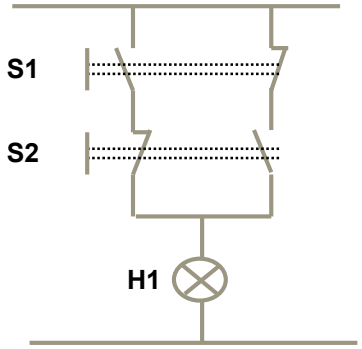
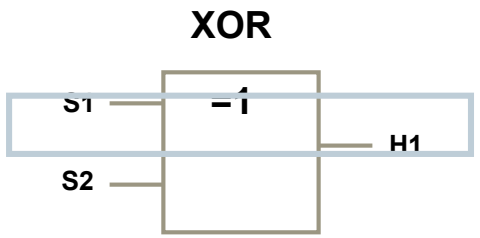
A look at the circuit diagram shows that the light H1 is only on, when only one of either S1 or S2 is switched. This circuit is called XOR logic. In words when either contact S1 or contact S2 are switched, the light is on. Symbol for this connection is =1 .





Output of XOR is 1, when inputs have different states.

If one input pin of this block is not connected, the internal status is automatically 0.

Logic table for XOR block:

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	0

NOT function

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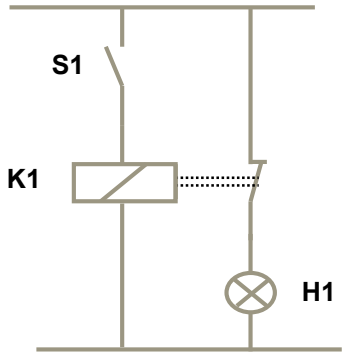
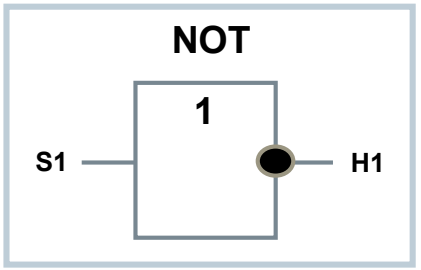
A look at the circuit diagram shows that the light H1 is only on, when the switch S1 is not switched.
This circuit is called NOT logic. Symbol for this connection is 1 .



Output is 1, when the input is 0, i.e. NOT inverts the status at the input. The advantage of NOT is for instance: You will not need a normally closed contact any more for LOGO!. You can use a normally open contact and change it with NOT to a normally closed contact. If the input pin of this block is not connected, the status is automatically 1.

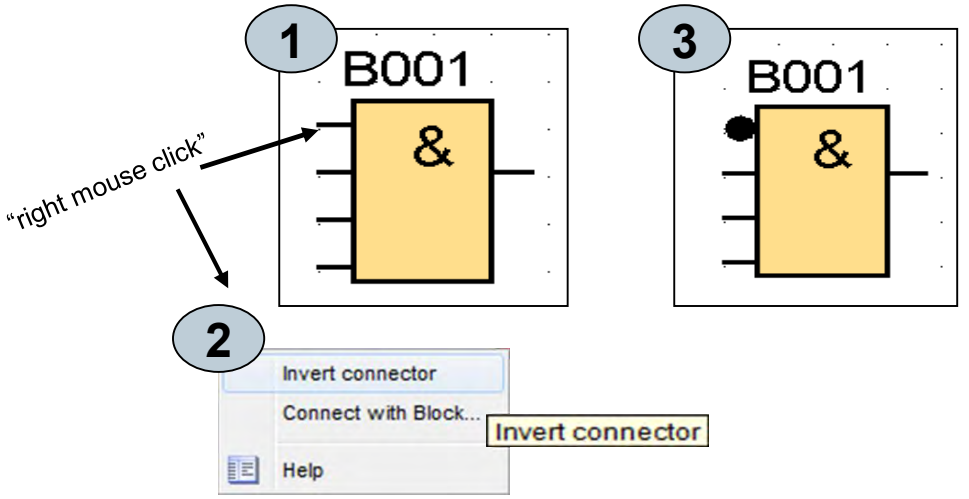
Logic table for NOT block:

Input 1	Output
0	1
1	0



BUT... there is a much easier way!

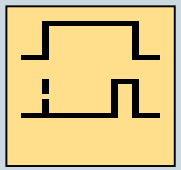
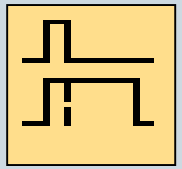
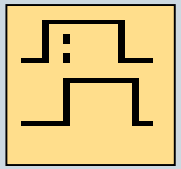
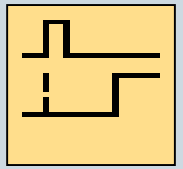
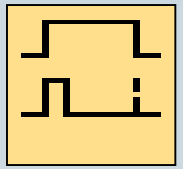
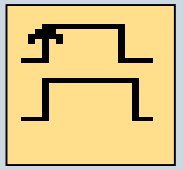
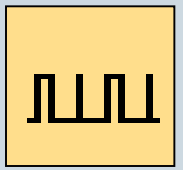
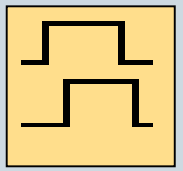
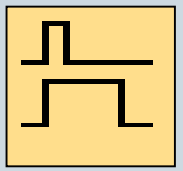
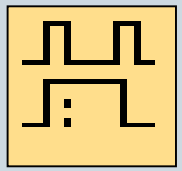
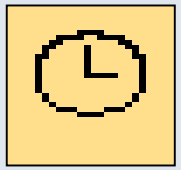
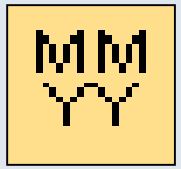
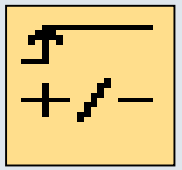
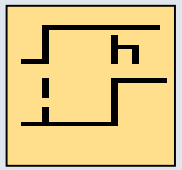
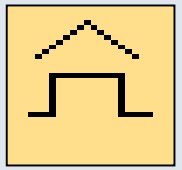
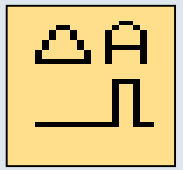
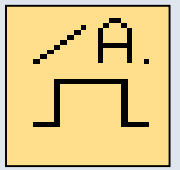
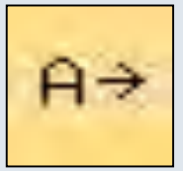
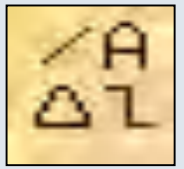
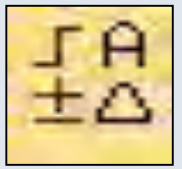
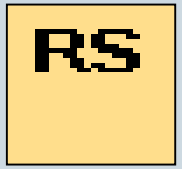
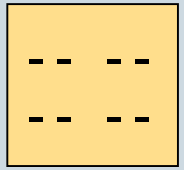
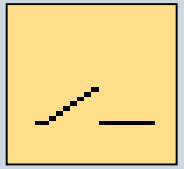
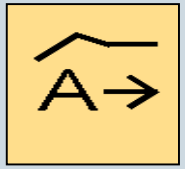
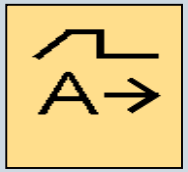
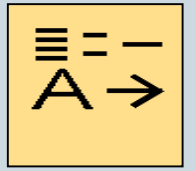
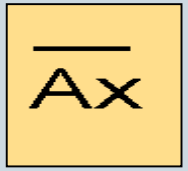
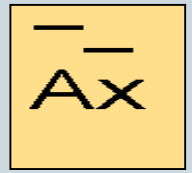
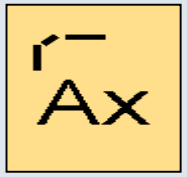
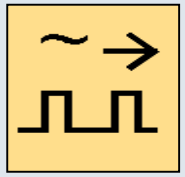
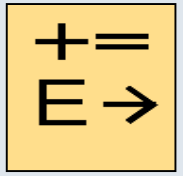
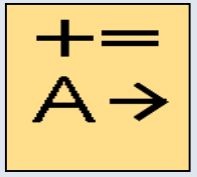
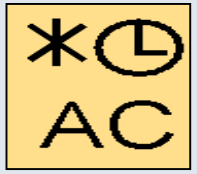
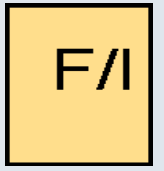
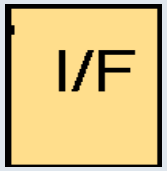
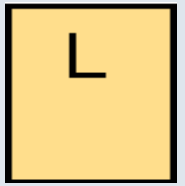
It´s possible to negate connectors by choosing “invert connector” on the window which appears after a right mouse click on a connector.
(Or double click with the left mouse key)
For an example have a look at the AND-Block on the right.



The NOT function has to be used in front of flags M and outputs Q .

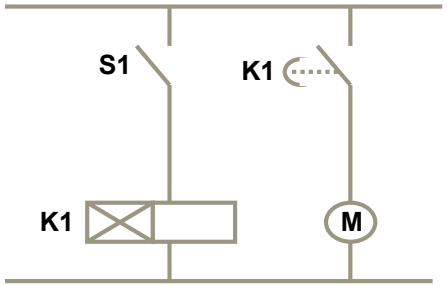
Special functions - overview

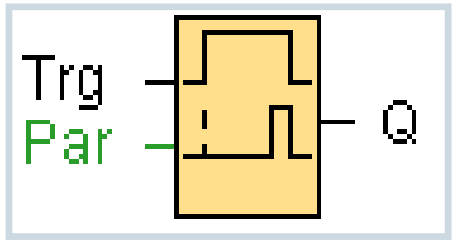
SIEMENS

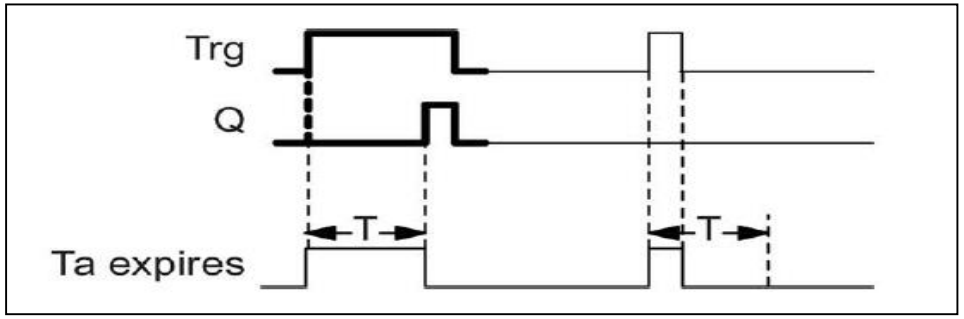
 ON delay	 OFF delay	 ON/OFF delay	 Retentive ON delay	 Wiping relay /Pulse output	 Edge-triggered wiping relay	 Asynchro. Pulse generator	 Random generator	 Staircase lighting switch	 Convenience switch
 Weekly timer switch	 Yearly timer switch	 Up and down timer	 Operating hours meter	 Frequency trigger	 Analog-comparator	 Analog trigger	 Analog amplifier	 Analog difference trigger	 Analog value information
 Latching relay	 Pulse relay	 Message texts	 Soft key	 Shift register	 PI control Panel	 Ramp functions	 Analog multiplexer (MUX)	 Mean	 Max/Min
 Analog filter	 Pulse duration modulator (PWM)	 Error detection	 Arithmetic instruction	 Stop watch	 Astronomical clock	 Annual time switch	 Float/Integer-Converter	 Integer/Float-Converter	 Data Log

Timer – On-delay

A look at the circuit diagram shows that the motor only starts after expiry of the delay time.
This function is called On-delay.
In words the motor will be switch on with a programmed ON delay time. Symbol for this function is .







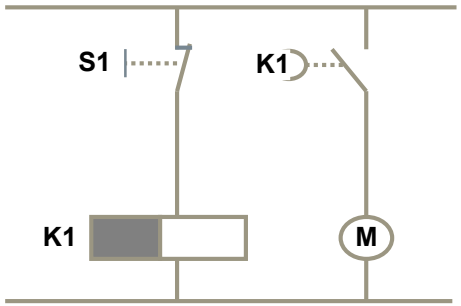
Description of the function:
With 0 to 1 transition of input Trg the timer starts. If the status of input Trg is 1 for long enough, the output is set to 1 on expiration of the time T. The output follows the input with on delay. The output is reset to 0 when the status at input Trg is 0.

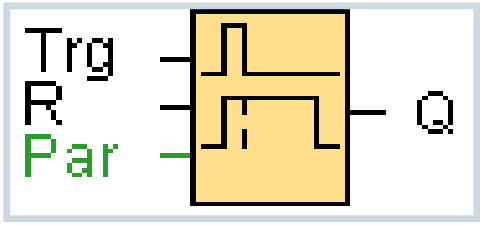
If the status of input Trg changes to 0 before the time T has expired, the time is reset. The time elapsed is reset after a power failure.

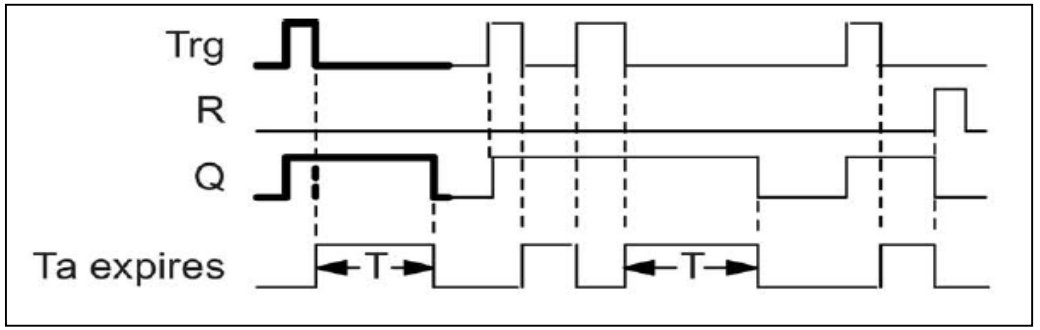
Timer – Off-delay

SIEMENS

A look at the circuit diagram shows that the motor only stops after expiry of the delay time.
This function is called Off-delay.
In words the motor will be switch off with a programmed OFF delay time. Symbol for this function is  .







Description of the function:

When the input Trg is 1, the output Q is switched instantaneously to 1. When the status of Trg changes from 1 to 0, the timer will be activated. The output remains set. When the timer reaches the configured value (Ta=T), output Q is reset to 0. When input Trg is switched on and off again, the time Ta restarts. Input R (Reset) is used to reset the time Ta and the output before Ta has expired.

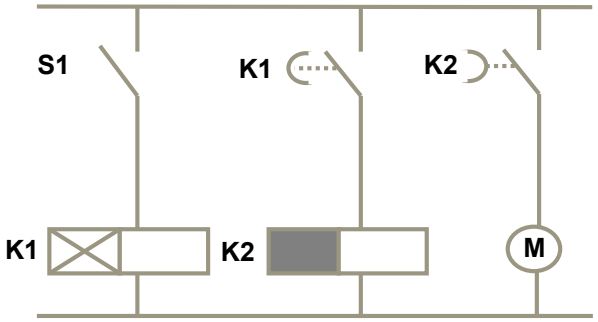
Timer – On-/Off-delay

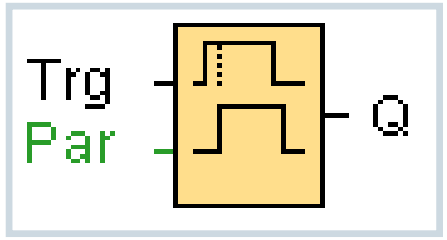
SIEMENS

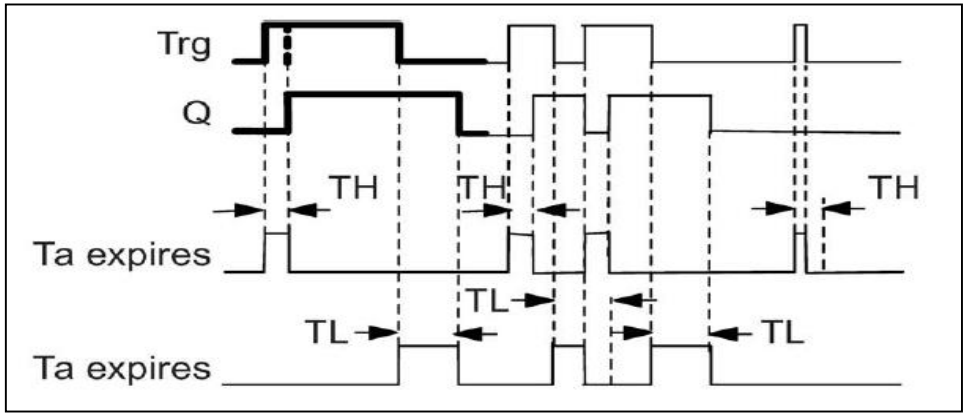
A look at the circuit diagram shows that:

- **when S1 is closed, contact K1 closes with a delay time and the motor runs.**
- **when S1 is opened, contact K2 opens with a delay time and the motor stops.**

This function is called On-/Off-delay. In words the motor is switched on and off with a programmed delay time.
Symbol for this function is  **.**







Description of the function:

The time TH starts after a 0 to 1 transition at input Trg. If the status at input Trg is 1 for the duration of the time TH, the output is set to 1 on expiration of the time TH. (the output follows the input on delayed).

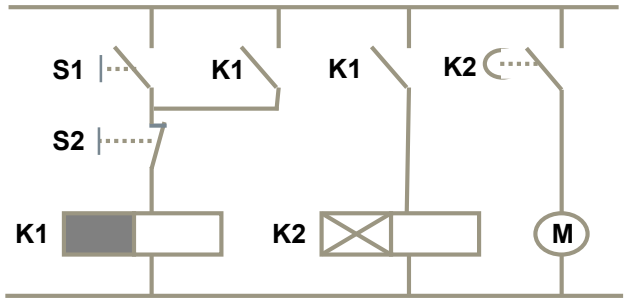
When the status at input returns to 0, TL starts. If the status at input Trg is 0 for the duration of time TL, the output is set to 0 on expiration of the time TL.

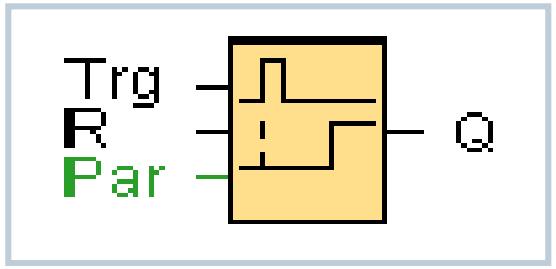
Timer – Retentive On-delay

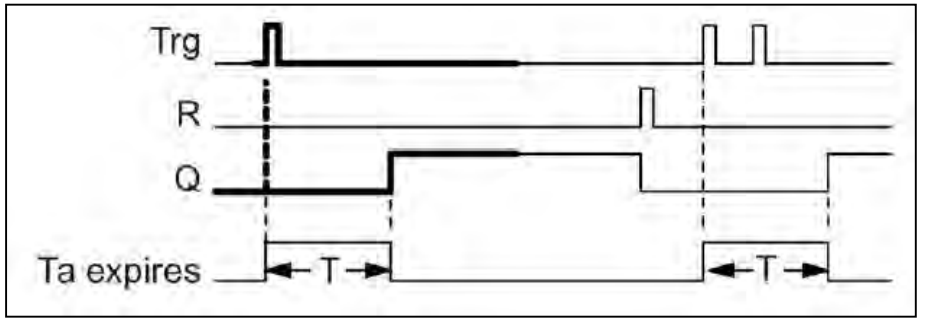
SIEMENS

A look at the circuit diagram shows that the motor M starts delayed after pressing the pushbutton S1. Pushbutton S2 (n.c. contact) stops the motor again.

This function is called retentive On-delay. Symbol for this connection is  .







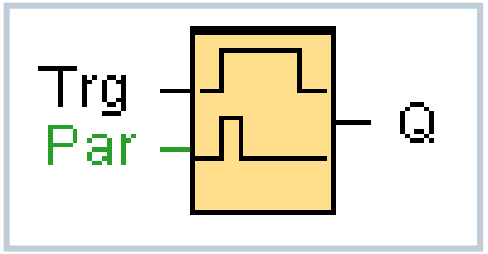
Description of the function:

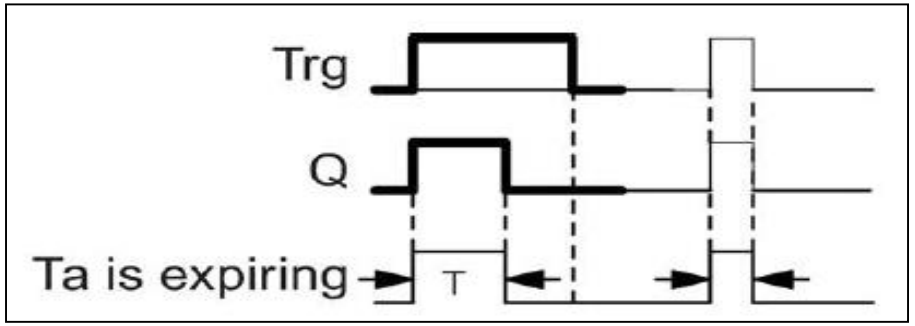
The current time Ta starts with a 0 to 1 transition at input Trg. Output Q is set to 1 when Ta reaches the time T. The output Q is only reset to 0 when the status at input R is 1. Further switching actions at input Trg have no influence on output Q.

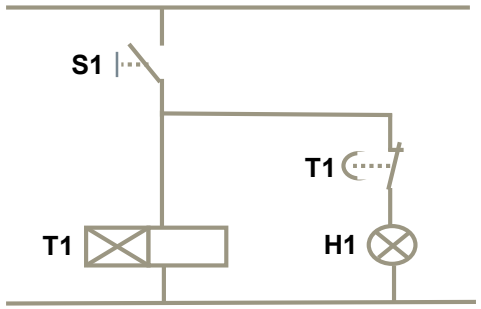
Timer – Wiping relay (pulse output)

A look at the circuit diagram shows that the light H1 is only on, when the switch S1 is closed, but only as long as the set time at timer T1.

Symbol for this connection is  .







Description of the function:

A 0 to 1 transition at input Trg sets the output, and triggers a time Ta during which the output remains set. LOGO! resets output Q to lo (pulse output) when Ta reaches the value preset at T (Ta = T). LOGO! sets the output immediately if there is a 1 to 0 transition at input Trg before the specified time expires.

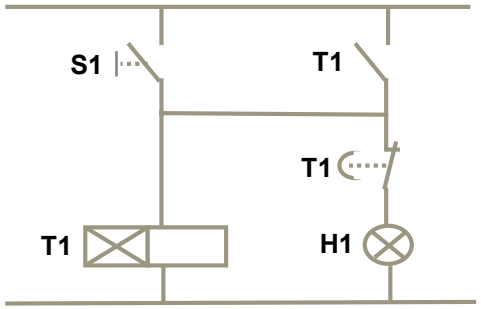
If the block is retentive, LOGO! resets output Q and the expired time to the values before a power failure; if the block is not retentive, LOGO! resets output Q and the expired time to defaults after a power failure.

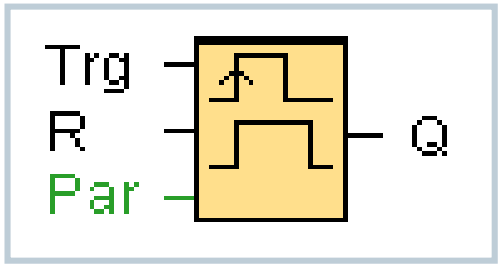
Timer – Edge triggered wiping relay

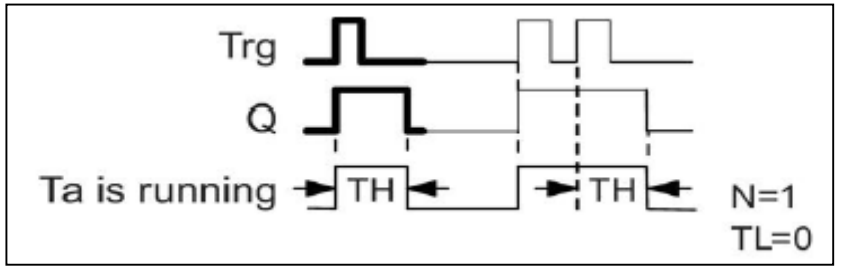
SIEMENS

A look at the circuit diagram shows that the light H1 remains on for the time specified on the timer T1 when the switch S1 is closed.

Symbol for this connection is  .







Description of the function:

A 0 to 1 transition at input Trg triggers the time TL (Time Low). After the time TL has expired, output Q is set for the duration of TH (Time High).

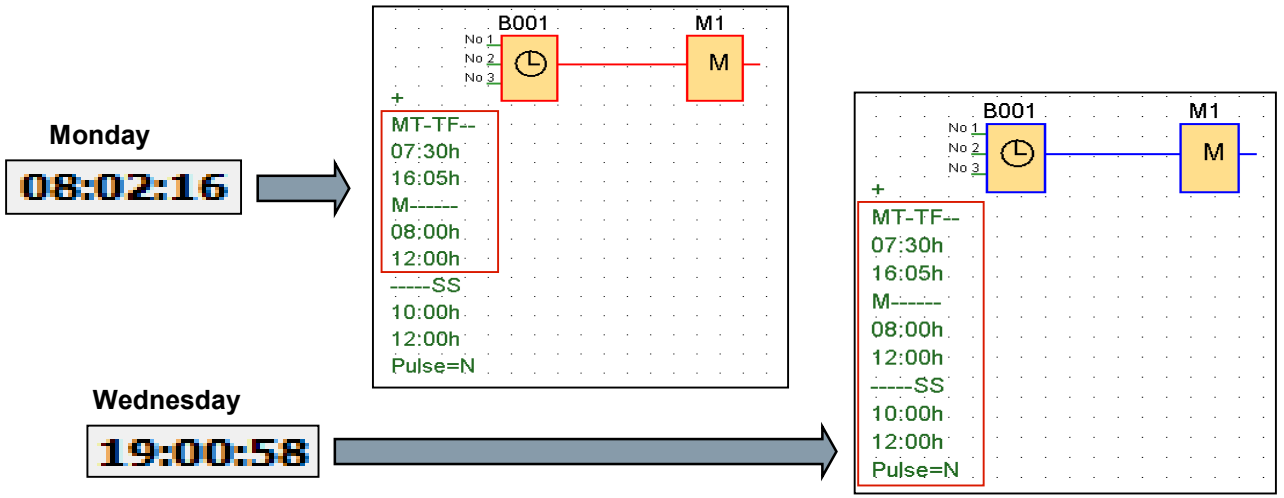
If there is a further 0 to 1 transition (retriggering pulse) at input Trg before the preset time (TL + TH) has expired, Ta is reset and the pulse/pause cycle has restarted.

If the block is retentive, LOGO! resets output Q and the expired time to the values before a power failure; if the block is not retentive, LOGO! resets output Q and the expired time to defaults after a power failure.

Timer – Weekly timer

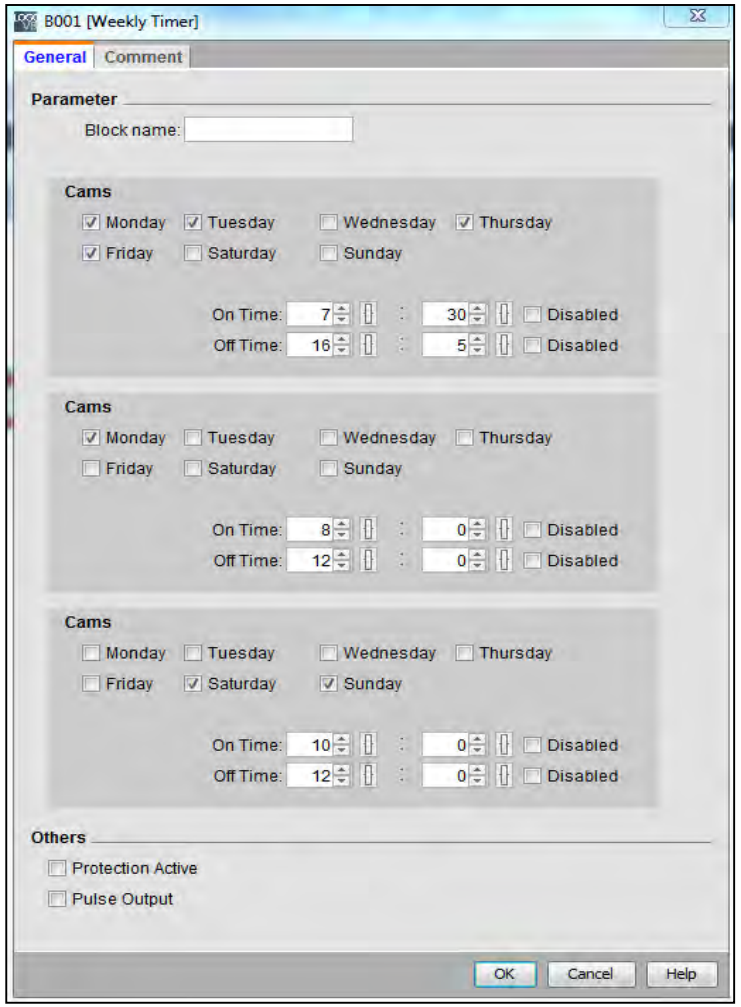
The output is controlled via a specified on–/ off–time for any week day. The function supports any combination of weekdays. Active weekdays have to be selected .

For activating On Time and OFF Time the disabled button has to be deselected.



Description of the function:

Every weekly timer has three cams. You can configure a time hysteresis for each cam. Within the cam setting you specify the on/off times. If you enable “pulse output”, the timer will be reset after one cycle. “Pulse output” applies to all three cams.



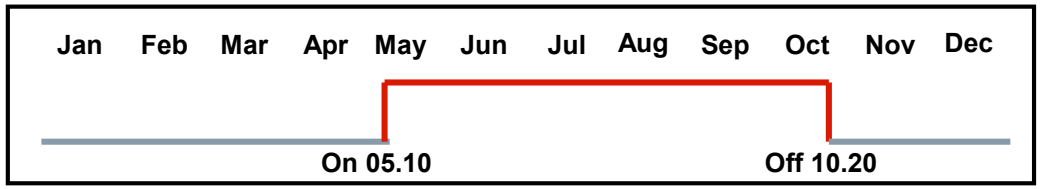
Timer – Yearly timer

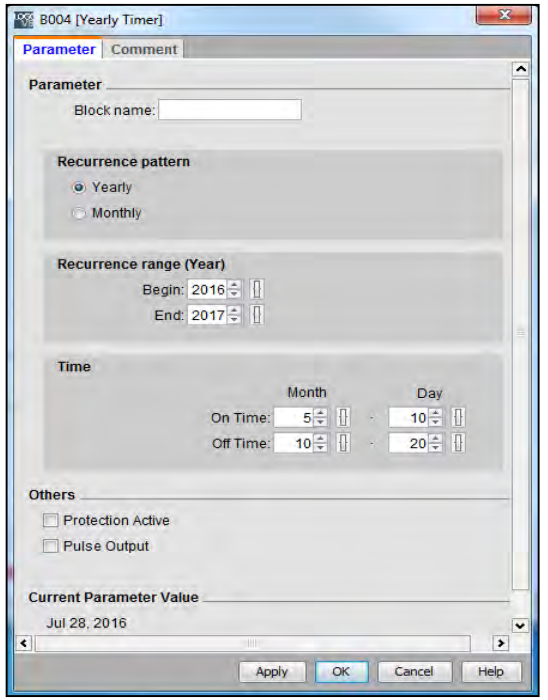
Description of the function:

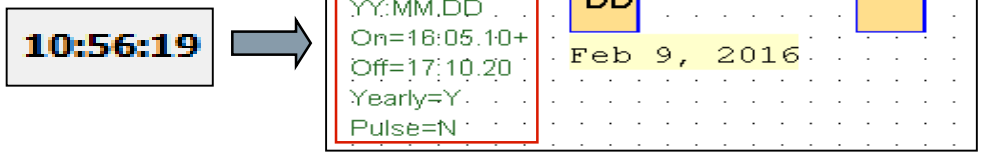
Every yearly timer has an on- and off-timer. At the specified on-time the yearly timer switches on the output. At the specified off–time the yearly timer switches off the output. The off–date specifies the day/year on which the output is reset to 0 again.

By selecting the option field

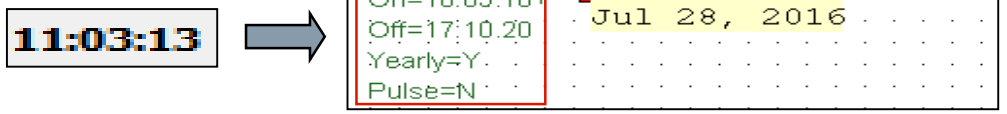
- **“Monthly”, the timer switches on or off at a specified day each month**
- **“Yearly”, the timer switches on or off each year at a specified month and day**
- **“Pulse”, the timer output switches on at the specified On Time for one cycle. Then it is reset.**

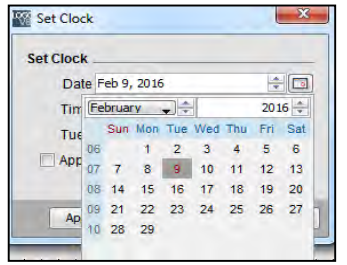






During a running simulation





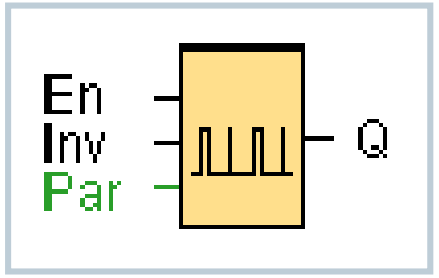
Timer – Asynchronous pulse generator

SIEMENS

The pulse profile of the output can be customized via pulse/ pause ratio.
Symbol for this function is  .

Diagram:

Pulse period / pause width

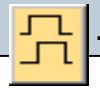


Description of the function:

In the parameters you can adjust the pulse period and the pause width. With input INV you can also invert the output. You can customized the time period in seconds, minutes or hours. The time basis of both parameters can be set independently. The input block INV immediately negates the output only if it is enabled via EN.

Timer – Random generator

SIEMENS

With a random generator the output is switched on and off again within a specified time.
Symbol for this function is  **.**

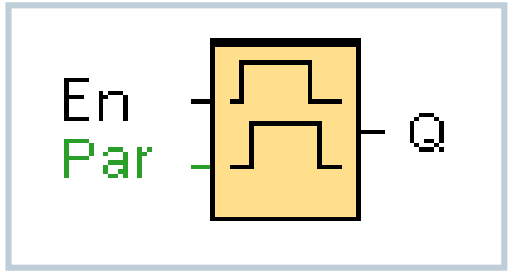
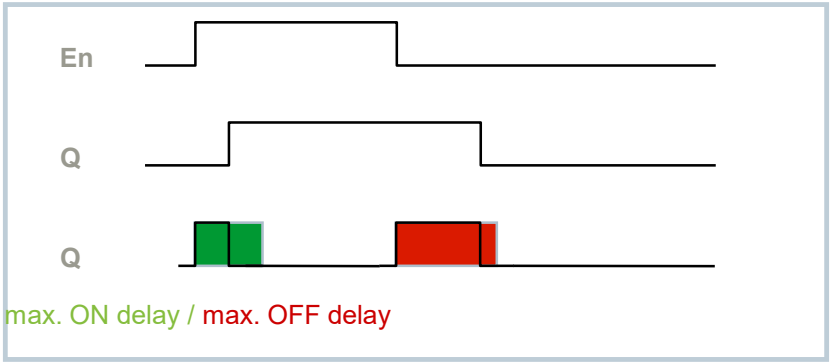


Diagram:



Description of the function:

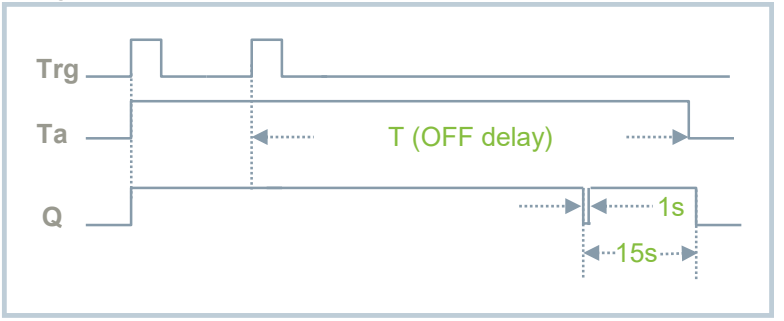
With a 0 to 1 transition of the input En a random time e.g. between 0 and 10 seconds is started. The output is set to 1 on expiration of the on delay time, if the input En is 1 at least for the duration of the on delay time. The time is reset if the status at input En returns to 0 before the on delay time has expired. When the input En changes from 1 to 0, a random off delay time between 0 and e.g. 15 seconds is started. The time is reset if the status at input En returns to 1 before the on delay time has expired.

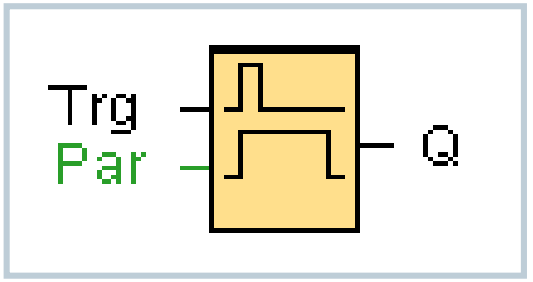
Timer – Stairway lighting switch

SIEMENS

The input pulse (edge control) starts a specified time. The output is reset on expiration of this time. Prior to the expiration of this time (e.g. 15 s) an off pre–warning is generated.
Symbol for this function is  **.**

Diagram:





Description of the function:

With a 0 to 1 transition at input Trg, the current time starts and the output Q is set to 1. E.g. 15 s before Ta reaches the time T, the output Q is reset to 0 for a time of 1 s (configurable time). When Ta reaches the time T, the output Q is reset to 0. When input Trg is switched on and off again before Ta expires, Ta is reset (retriggering option).

Timer – Multiple function switch

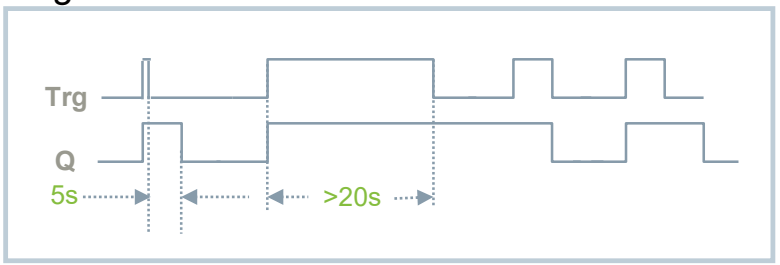
SIEMENS

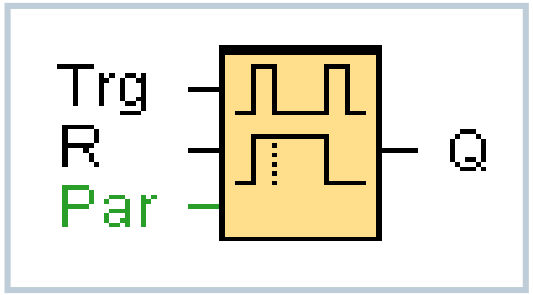
Switch with two different functions:

- **Pulse switch with off delay**
- **Switch (continuous lighting)**

Symbol for this function is  **.**

Diagram:





Description of the function:

The output Q is set to 1 with a 0 to 1 transition of the status at input Trg. When the input Trg changes to 0 before expiration of the continuous lighting time, the output resets to 0 with an off delay of e.g. 5 seconds. With a 0 to 1 transition of the status at input Trg and if the status '1' is set at least for the duration of e.g. 20 seconds, the continuous lighting function is enabled and the output Q is switched on continuously. If the input Trg is switched once again from 0 to 1 and again to 0, the output Q is switched off.

Timer - Stopwatch

SIEMENS

The stopwatch function counts the elapsed time between a start stopwatch signal and a stop stopwatch signal.

Functional description:

- If En = 1, the current time rises
- If En = 0, pauses the current time counting
- If En = 1 and Lap = 0, Using the selected time base, the stopwatch outputs the current time (CurT) to AQ.
- If En = 1 and Lap = 1, the stopwatch leaves AQ at its last value when Lap = 0. This value is recorded as LapT for stopwatch pause time.
- If En = 0 and Lap = 1, the stopwatch pauses counting time
- If En = 0 and Lap = 0, the stopwatch outputs the current time (CurT) to AQ.
- If R = 1, the current time as well as the pause time will be reset

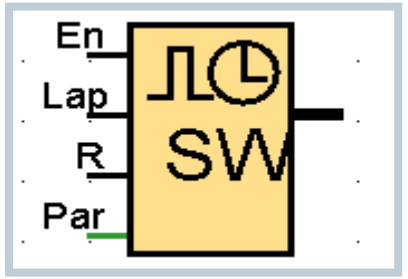
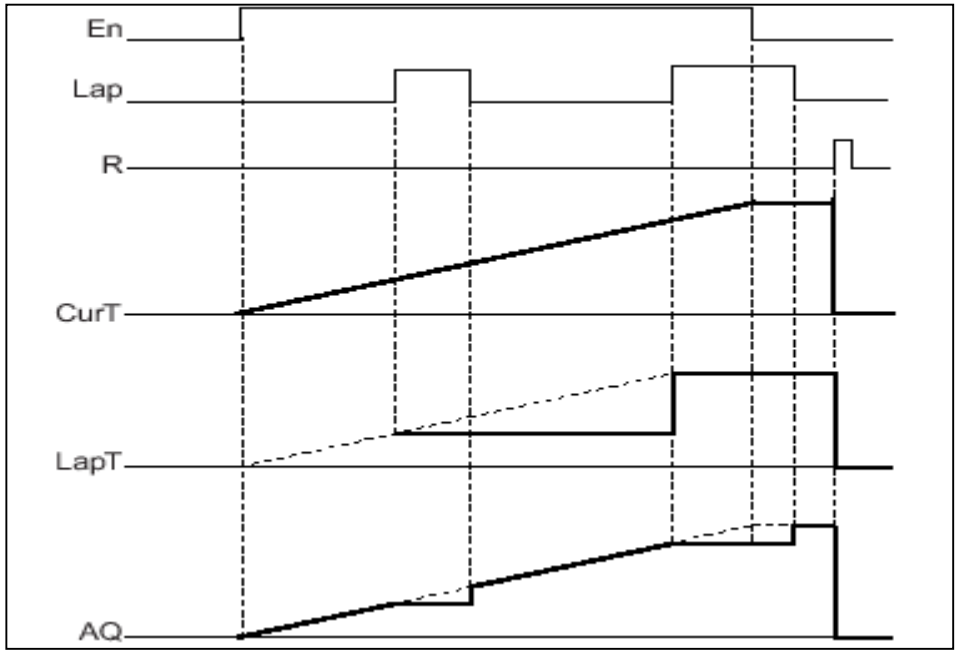


Diagram:



Timer – Astronomical clock

The astronomical clock function is used to set an output when the current time of your LOGO! Base Module is between the time of sunrise (TR) and the time of sunset (TS). LOGO! automatically calculates these times based on the geographical location, the settings for automatic summertime/ wintertime conversion, and the current time of the module.

Note

From LOGO! Soft Comfort V8.0, you can choose from several pre-defined time zone locations. If you select one of these locations, LOGO! Soft Comfort uses the latitude, longitude, and the time zone of your selection. This location pre-configuration is only possible from LOGO! Soft Comfort.

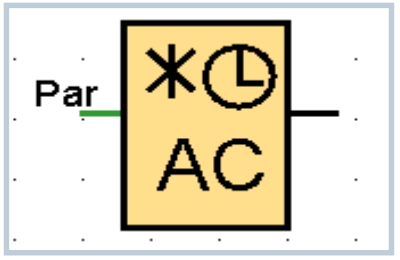
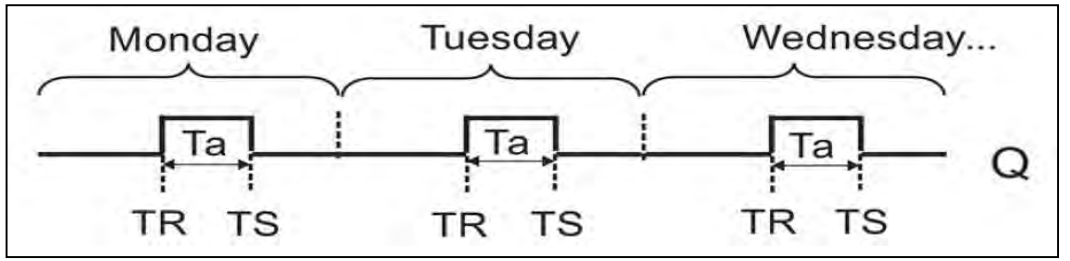


Diagram:



Functional description:

The function calculates the values at the input and sets Q when Ta (Ta is the current LOGO! time) is between TR and TS; otherwise, the function resets Q.

If automatic summertime/ wintertime conversion is enabled, the function takes the configured time difference into consideration when calculation the TR and TS values.

At a glance:

→ 10 pre-configured time zones

→ Configuration of user-defined coordinates of the installation place

→ On-/ Offtime in each case for +/- 59 minutes manipulable

→ E.g. usage in animal breeding, building technology, neon signs and many more…

Counter – Up and Down counter

SIEMENS

A look at the circuit diagram shows that the switch S1 triggers the counter pulses. Switch S2 determines whether the counter increases or decreases. When the counter status reaches a value >= 5, the light switches on.

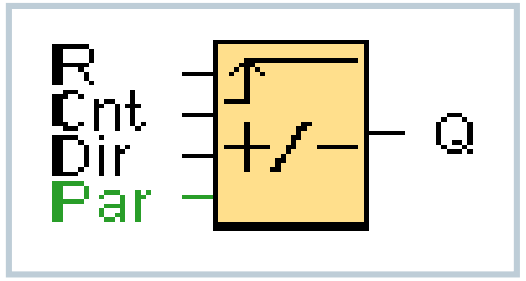
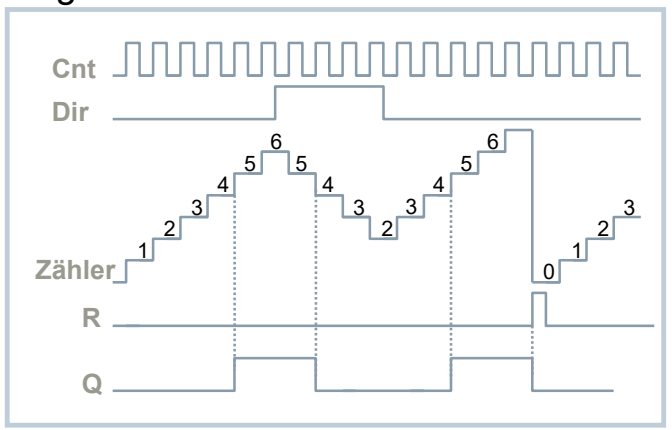
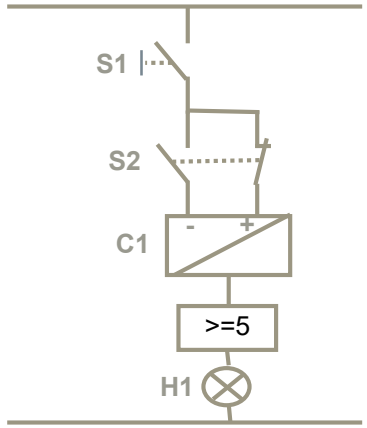


Diagram:



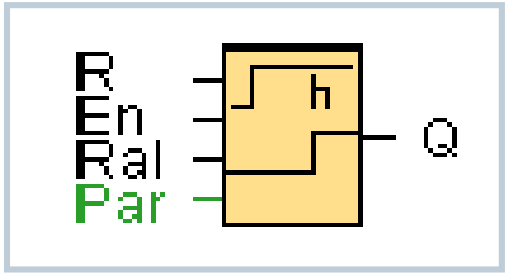


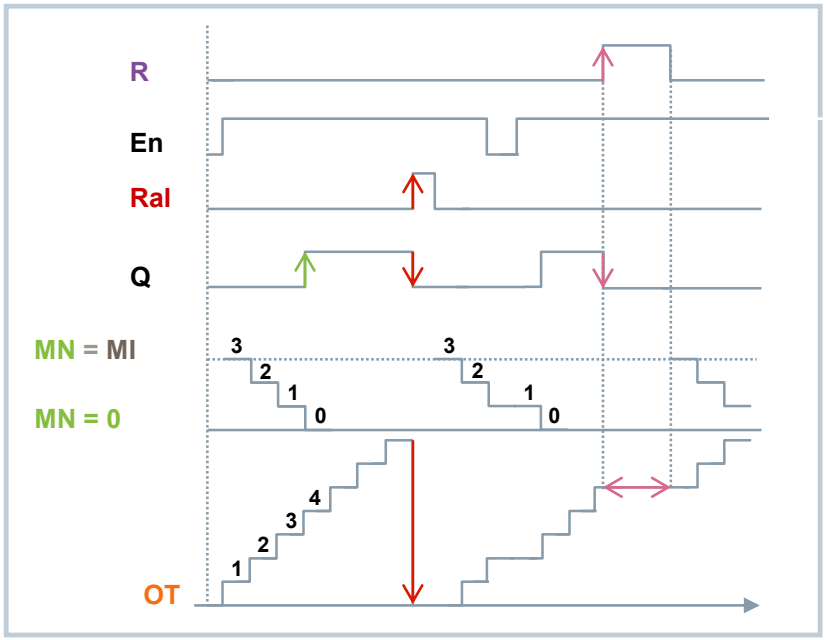
Description of the function:

With every positive edge at input Cnt the internal counter increments (Dir = 0) or decrements (Dir = 1) by one count. Output Q is set to 1 when the internal value is greater than or equal to the value specified in Par. You can use reset input R to reset the output and the internal count value to 0. When R=1, the output is 0 and the pulses at input Cnt are not counted.

If you set a "Start Value" the counter begins to count either up or down from this value.

Counter – Hours counter





Description of the function:

The hours counter monitors the input En. As long as the status of this input is 1, LOGO! determines the expired time OT and the time–to–go MN. LOGO! displays the times in parameter assignment mode. Output Q is set to 1 when the time–to–go MN = 0. Use input R to reset output Q and time–to–go counter to the specified value MI. The internal counter OT continues the count. Use input Ral to reset output Q and the time–to–go counter MN to the specified value MI. The internal counter OT is reset to 0.

Counter – Threshold trigger

SIEMENS

The output is switched on and off, depending on two specified frequencies.
Symbol for this function is  .

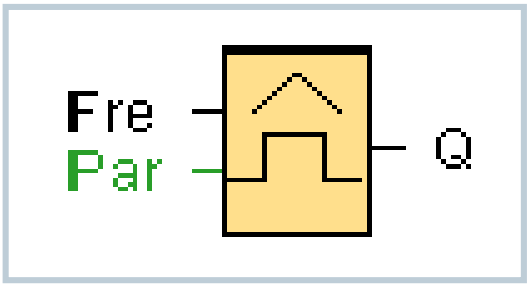
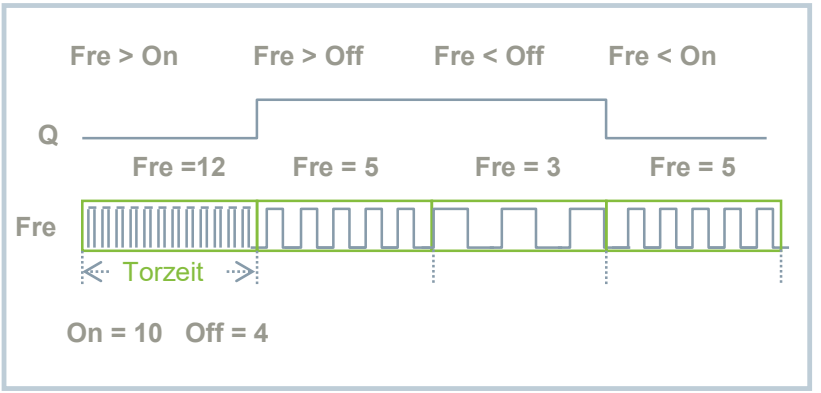


Diagram:



Description of the function:

The threshold trigger measures the signals at input Fre. The pulses are captured across a specified period (gate time).

Output Q is switched on, if the value measured within the gate time is higher than the ON threshold. Q is switched off again when the threshold drops below OFF.

On : is the ON threshold. It may be between 0000 and 9999.

Off : is the OFF threshold. It may be between 0000 and 9999.

Gate time: is the time interval during which the pulses at Fre are measured. It may be 00.05s and 99.95s.

Analog – Analog threshold trigger

Description of the function:

The output is switched on when the analog value exceeds a specified on threshold. The output is switched off when the analog value drops below a specified off threshold (hysteresis).

This function reads the analog value AI1 to AI8 as a value between 0 and 1000. The offset parameter is then added to the analog value. The result is multiplied by the gain parameter. Output Q is set to 1 if this value exceeds the on threshold (On). Q is reset to 0 again after the value drops below the off threshold (Off).

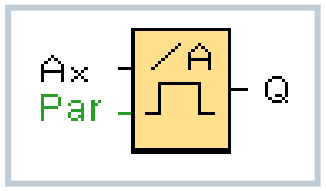
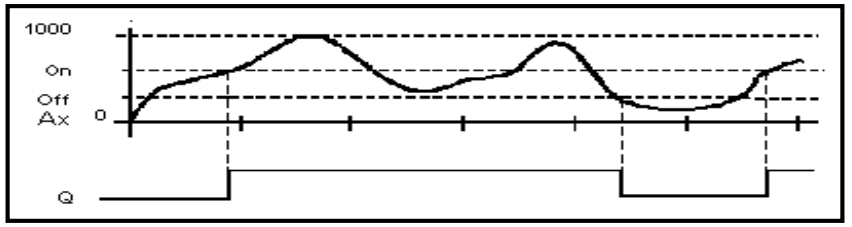
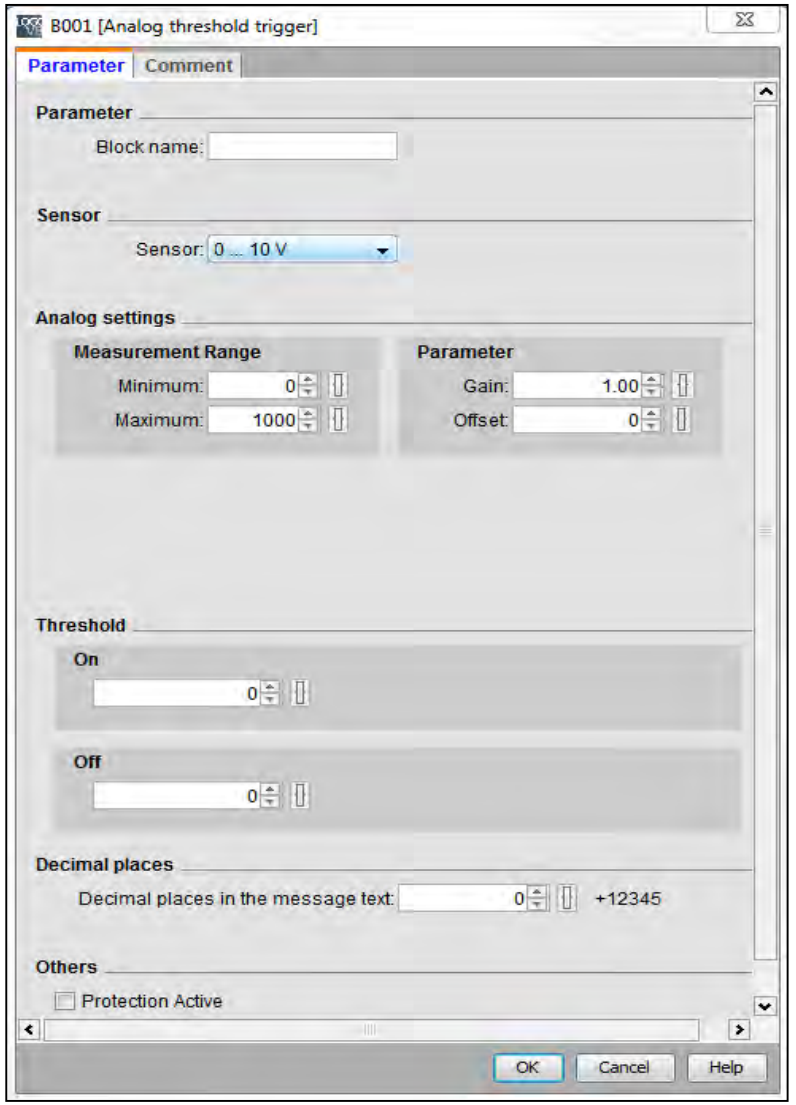


Diagram:





Analog – Analog comparator

Description of the function:

The function calculates the difference between the analog values Ax-Ay. The offset parameter is added to the difference.

Then the difference is multiplied by the gain parameter.

If this differential value exceeds the parameterized threshold, output Q is set to 1. Q is reset to 0, when the threshold drops below again.

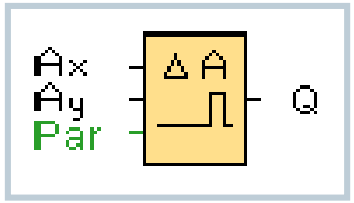
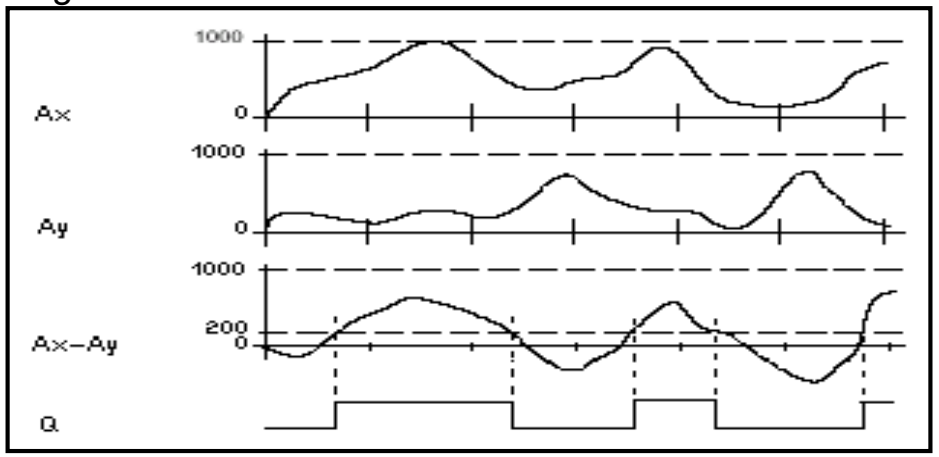
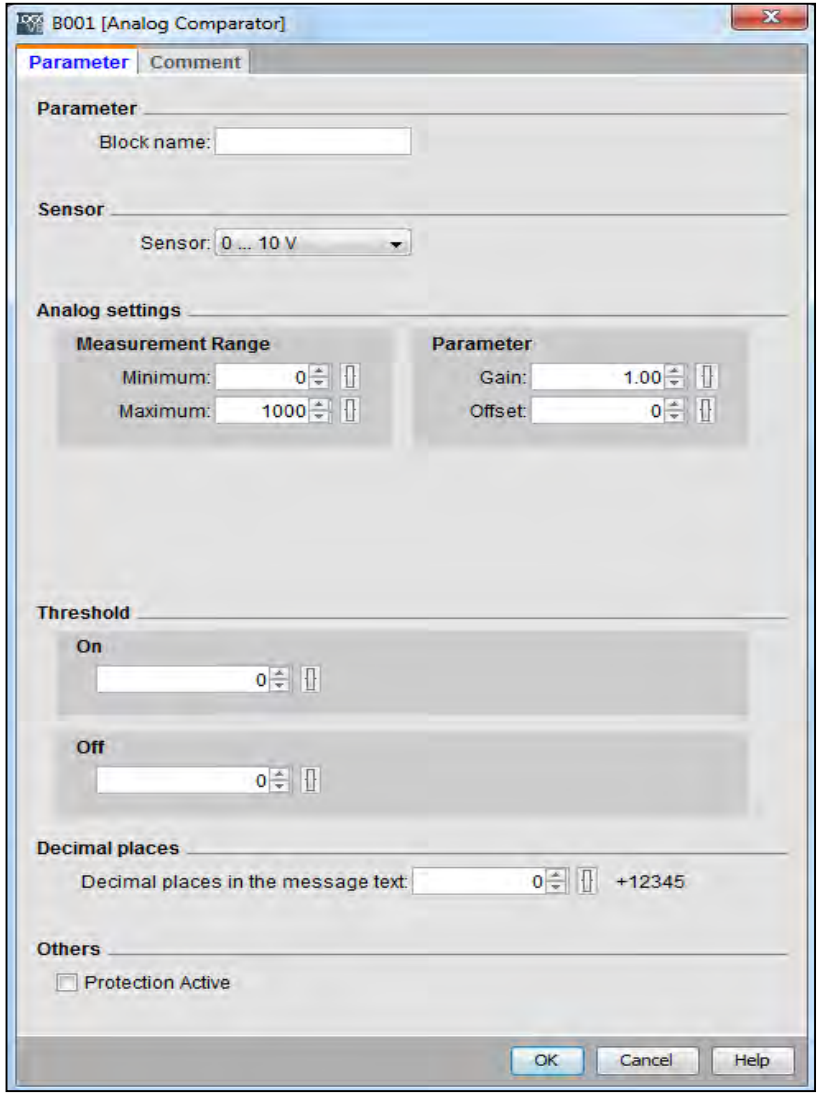


Diagram:



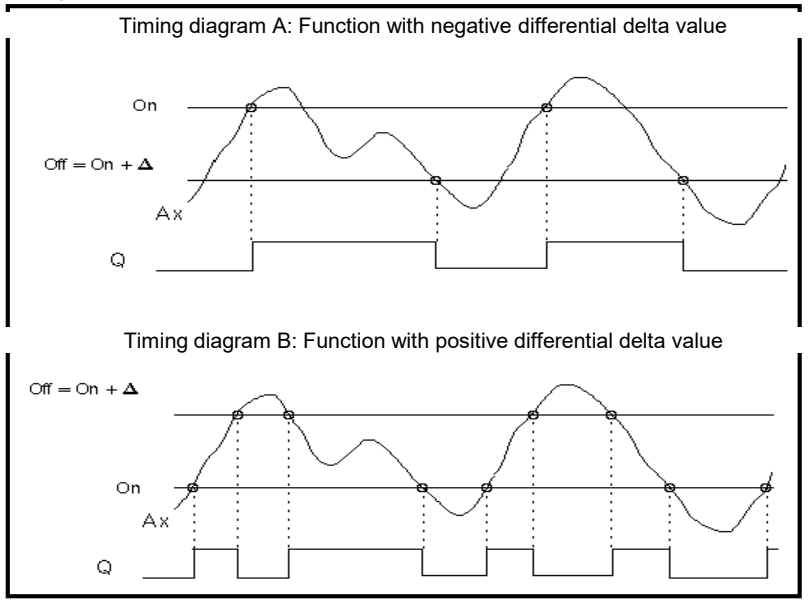


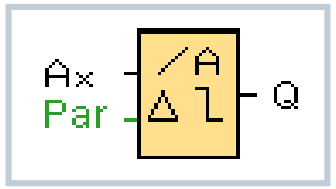
Analog - Analog differential trigger

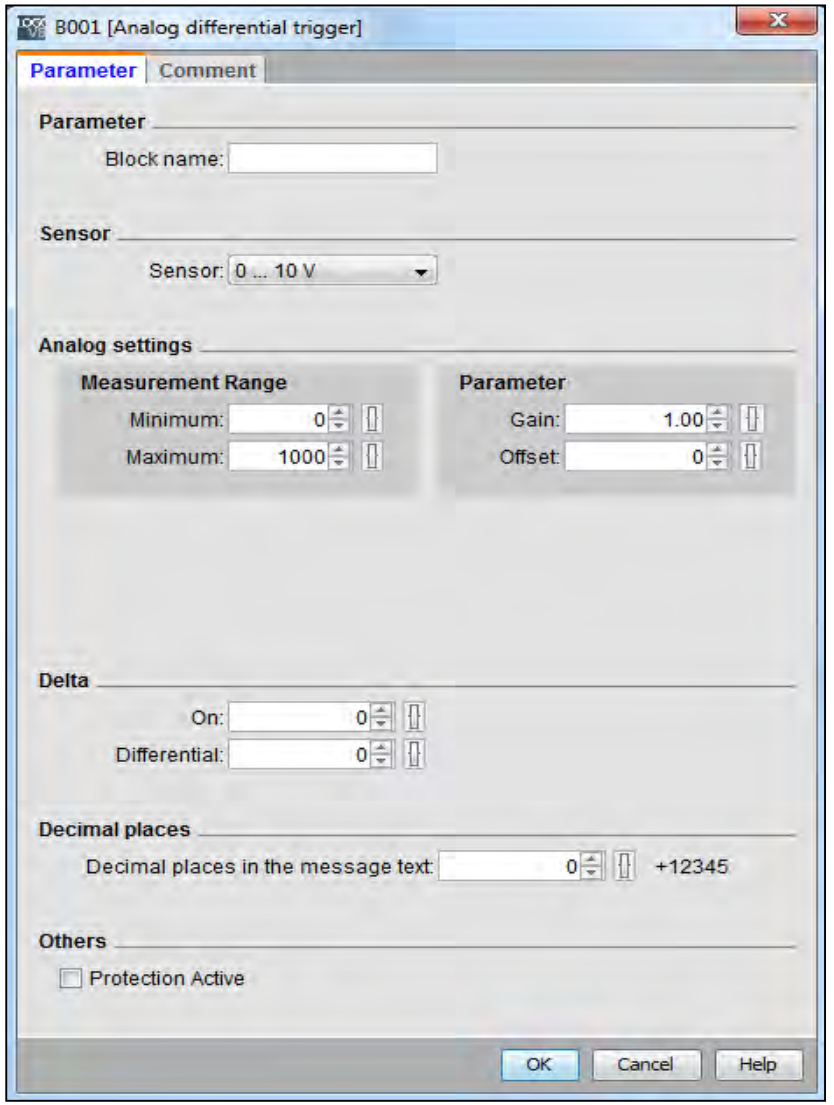
Description of the function:

The function reads the analog value of the signal at analog input Ax. This value is multiplied by the gain parameter. The offset parameter is added to the analog value. Output Q is set or reset depending on the specified threshold (On) and the differential value ( ).

Diagram:







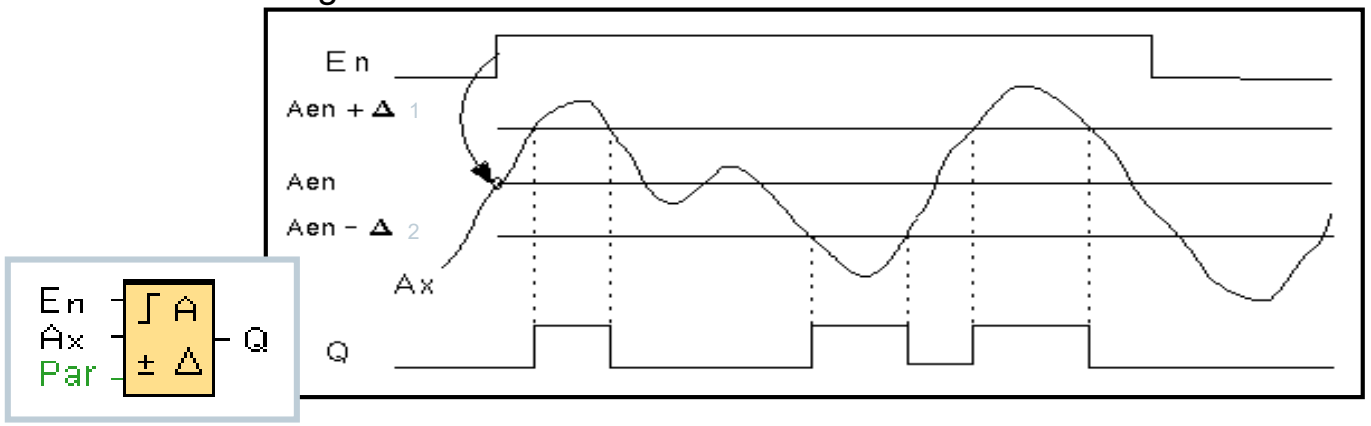
Analog – Analog watchdog

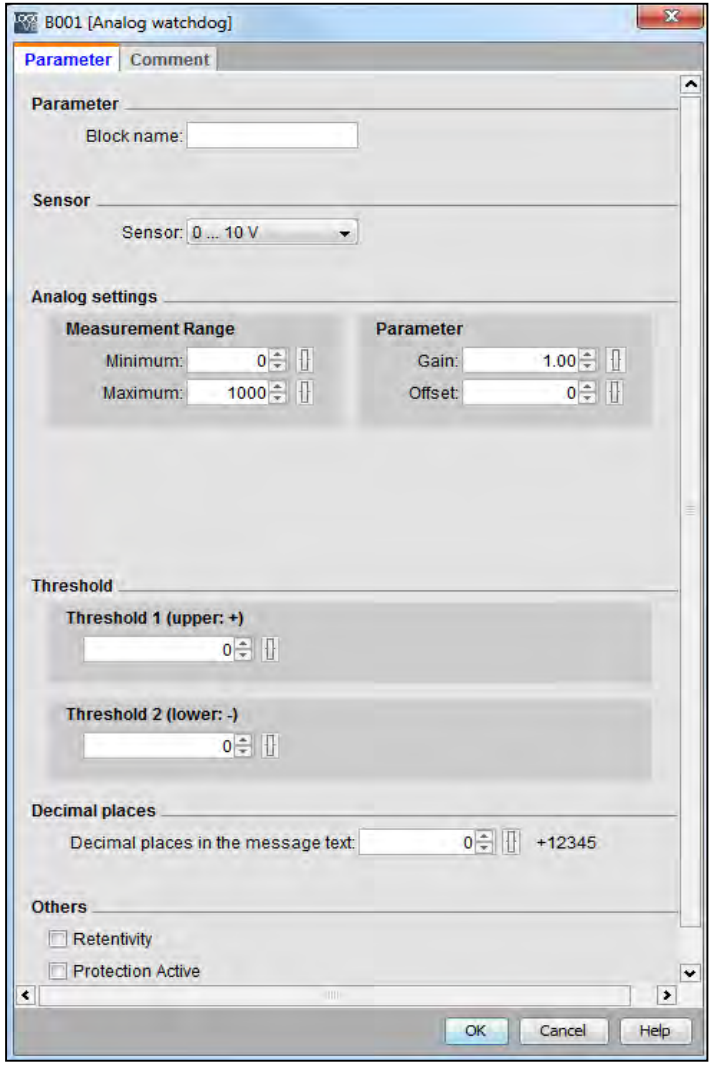
Description of the function:

If the status at input En changes from 0 to 1, then the analog value of the signal at analog input Ax will be saved. This saved value is called “Aen”. The updated values Ax and Aen are each multiplied by the gain parameter. Then the offset parameter is added to the analog value. Output Q is set, if the input En is 1 and the updated value at the input Ax is outside of the range of Aen +/- .

“Threshold 1” defines the difference value above Aen, “Threshold 2” defines the difference value below Aen.

Diagram:





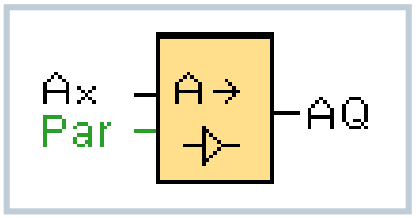
Analog – Analog amplifier

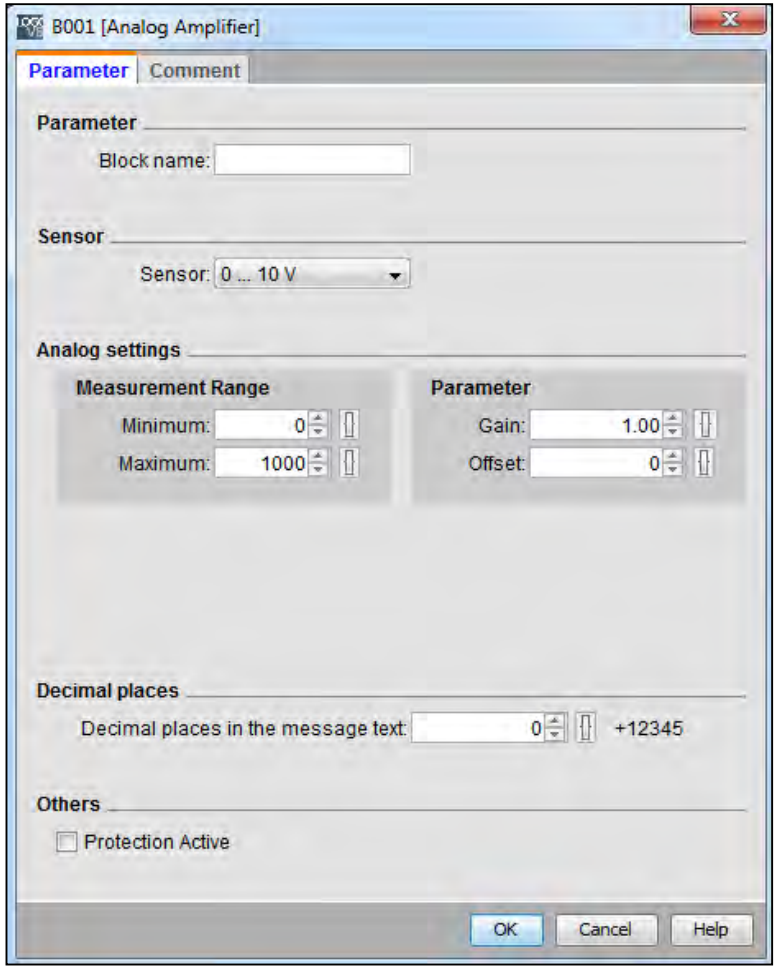
Description of the function:

The function reads the analog value of the signal at analog input Ax. This value is multiplied by the gain parameter. Then the offset parameter is added to the analog value, i.e.

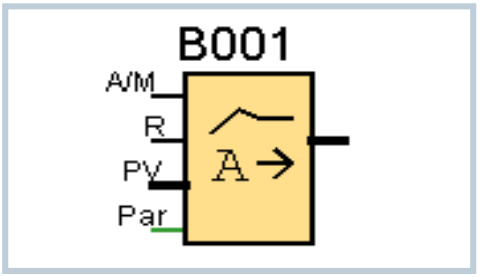
(Ax * gain) + offset = updated value Ax.

Output AQ shows the updated value Ax.





Analog – PI controller

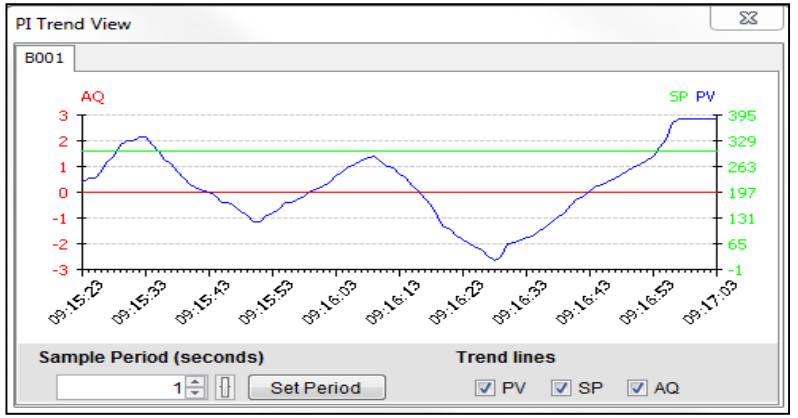


Description of the function:

If the input A/M is set to 0, then the special function sets output AQ with the value that is set with parameter Mq. If the input A/M is set to 1, then automatic mode commences. As an integral sum the value Mq is adopted, the controller function begins the calculations of the formulas.

The updated value PV is used within the formulas. Updated value PV = (PV * gain) + offset

If the updated value PV = SP, then the function does not change the value of AQ. With a disturbance, AQ continues to increase / decrease until the updated value PV again corresponds to SP. The speed with which AQ changes depends on the parameters KC and TI. If the input PV exceeds the parameter Max, then the updated value PV is set to the value of Max. If the PV falls short of the para-meter Min, then the updated value PV is set to the value of Min. If the input R is set to 1, then the AQ output is reset. As long as R is set, the input A/M is disabled. The sampling time is fixed at 500 ms.



Analog – PI controller

Parameter:

Sensor: Type of sensor used

Min: Minimum value for PV

Max: Maximum value for PV

Gain: Gain for PV

Offset: Zero offset for PV

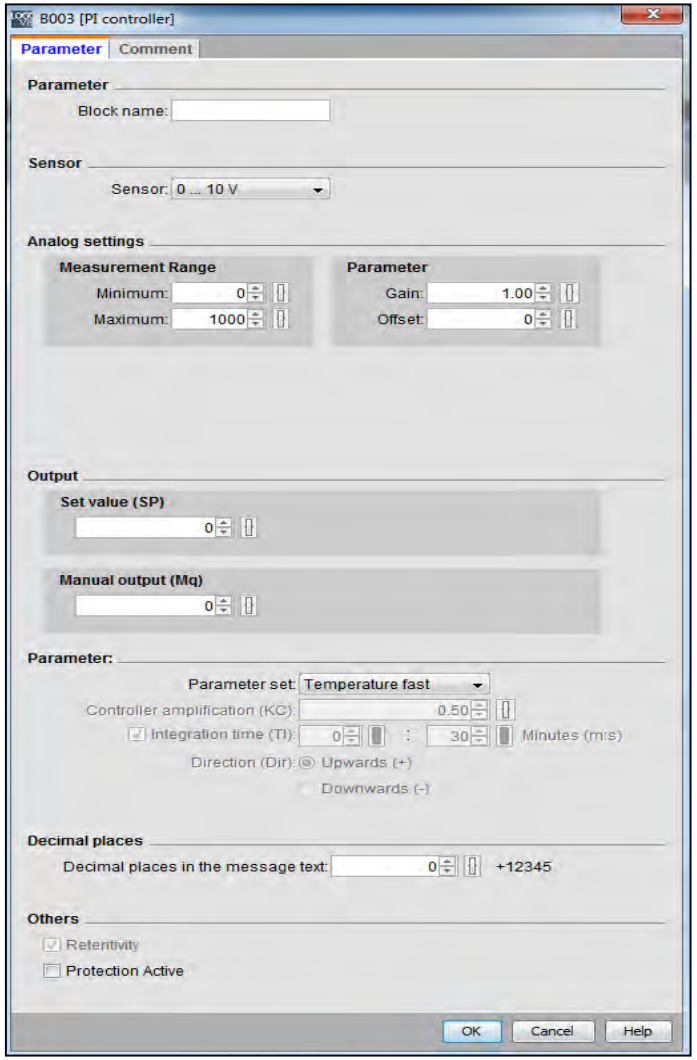
SP: Set point assignment

Mq: Value of AQ in manual mode Parameter sets: applied presets for KC, TI and Dir

KC: Gain

TI: Integral time

Dir: Action direction of the controller Number of decimal places in message text



Analog – PI controller

SIEMENS

Parameter sets:
To simplify the use of the PI controller, parameters for KC, TI and Dir are preset as sets for the following applications:

Parameter Set	Applications	Parameter KC	Parameter TI (s)	Parameter Dir
Temperature fast	Temperature, low temperature control for small rooms; small volumes	0.5	30	+
Temperature slow	Heater, ventilation, temperature, low temperature control for large rooms, large volumes	1.0	120	+
Pressure 1	Fast pressure change, compressor control	3.0	5	+
Pressure 2	Slow pressure change, Differential pressure control (flow control)	1.2	12	+
Filling level 1	Barrel, container filling without downpipe/ drain	1.0	1	+
Filling level 2	Barrel, container filling with downpipe/ drain	0.7	20	+

Parameters can manually be specified via the parameter set “User defined”.

Analog – Ramp

Description of the function:

At the analog output, this special function starts up one of two levels or offset. Here you can set how quickly the level should be reached.

If the input En is set, then the function issues the value StSp + offset at output AQ for the first 100 ms.

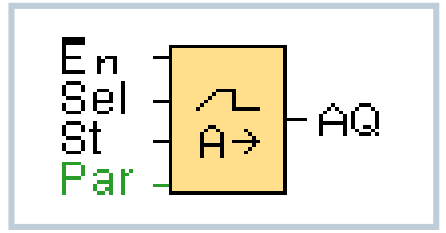
Then, depending on the connection of Sel, the function runs from value StSp + offset to either level 1 or level 2 at the acceleration set in Rate.

If the input St is set, the function runs to the value StSp + offset at the acceleration set in Rate. Then the function issues the value StSp + offset at output AQ for 100 ms. Finally offset is issued at output AQ.

If the input St is set, the function can only be restarted once the inputs St and En have been reset.

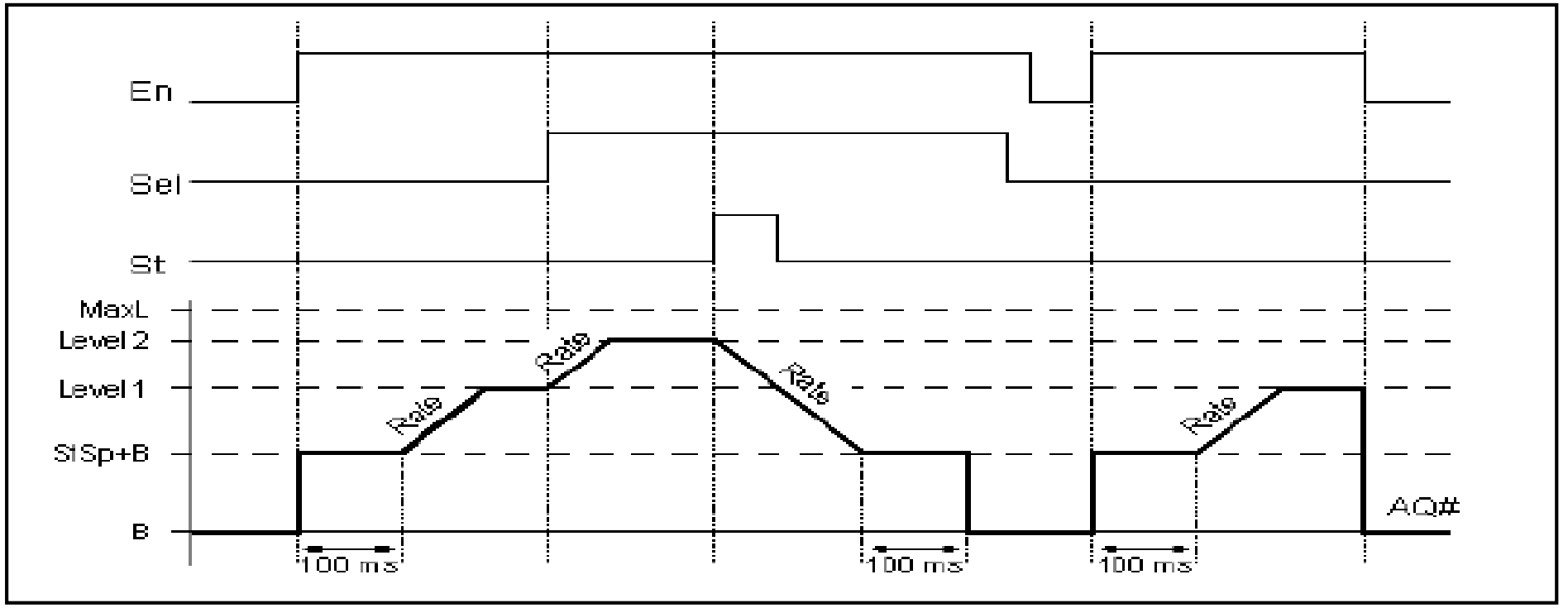
If input Sel has been changed, depending on the connection of Sel, the function runs from level 1 to level 2 or the other way round.

If the input En is reset, the function immediately issues offset at output AQ. The analog value at the output is recalculated every 100 ms.



Analog - Ramp

Diagram:



Analog - Ramp

Parameter:

Gain: Gain for AQ in message text

Offset: Zero offset for AQ in message text

L1 and L2: Levels to be reached

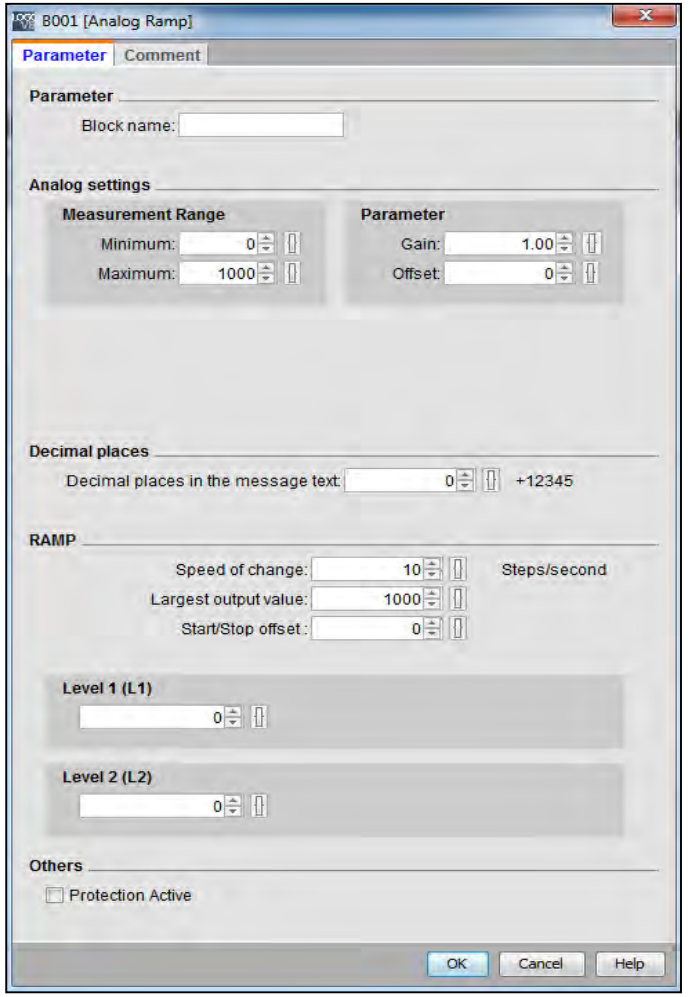
Largest output value: Maximum value that must not be exceeded under any circumstances

Start/ stop offset: value that is issued for 100ms in addition to parameter offset after starting the function and before reaching the offset value (prompted by input St). This parameter is intended for controlling motors.

Speed of change: Acceleration with which level 1, level 2 or offset is reached.

Steps/ second are input.

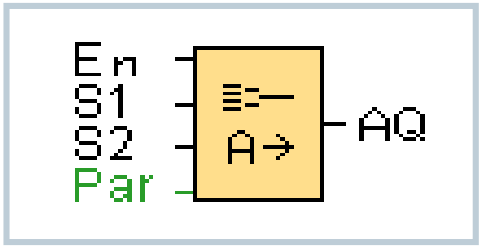
Number of decimal places in message text

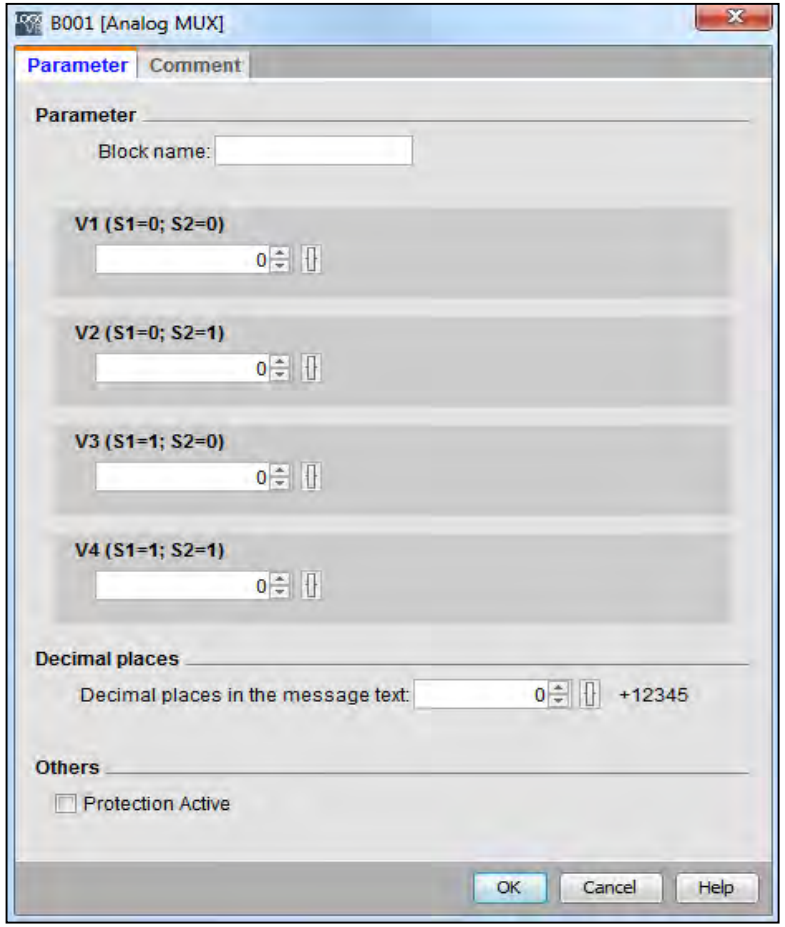


Analog – Analog MUX

Description of the function:

This special function outputs one of four predefined analog values or 0 at the analog output. If input En is set, then the function issues one of 4 possible analog values V1 to V4 at output AQ, depending on the value of S1 and S2. If the input En is not set, then the function issues the analog value 0 at output AQ. All 4 analog values V1 to V4 can be parameterized as a reference to another analog function, so the analog values can be dynamically changed in runtime (e.g. via potentiometer at an analog input).





Analog – Pulse Width Modulator (PWM)

The Pulse Width Modulator (PWM) modulates the analog input value Ax to a pulsed digital output signal. The pulse width is proportional to the analog value Ax.

As parameter besides the scaling of the analog value can be defined:

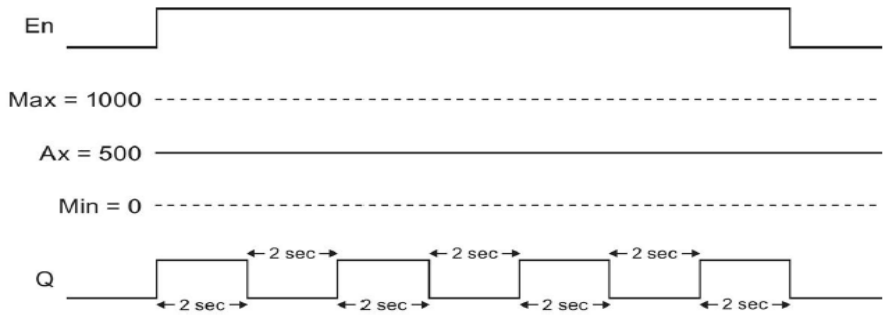
- Range Min./Max. for modulating as well as
- Periodic time PT

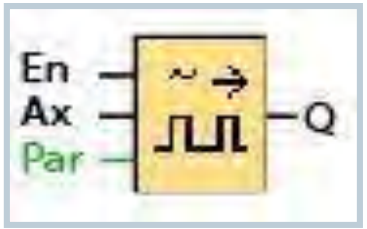
Functional description:

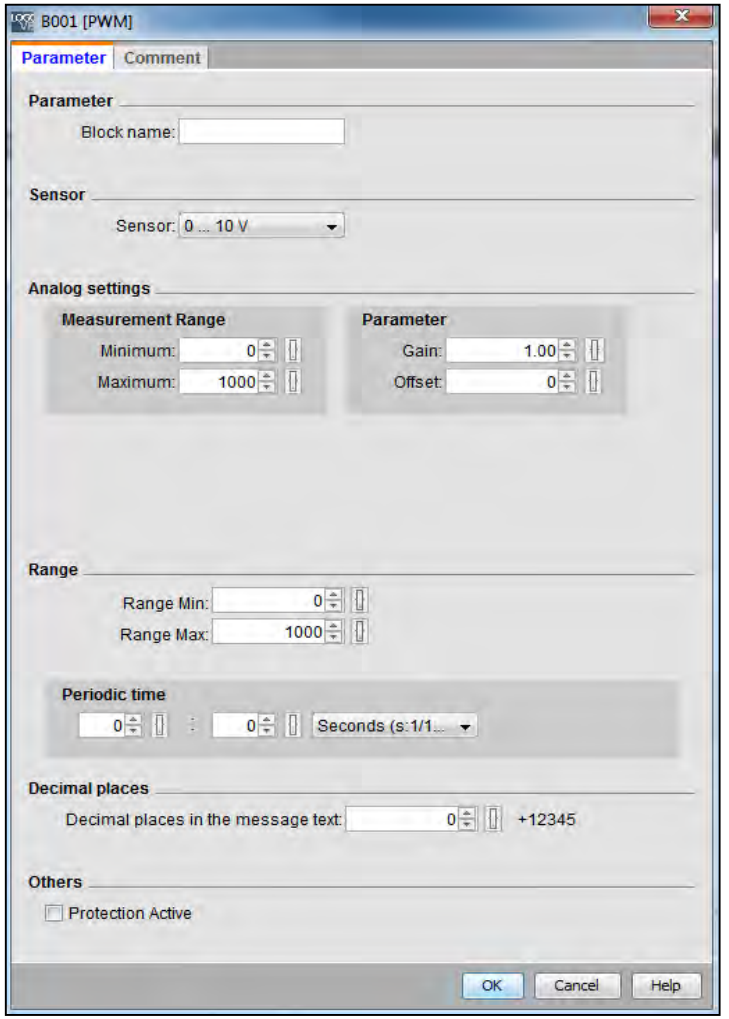
The function reads the value of the signal at the analog input Ax. This value is multiplied by the value of parameter A (gain). Parameter B (offset) is added to the product, as follows:

(Ax · Gain) + Offset = Actual value Ax

The function block calculates the proportion of the actual value Ax to the range. The block sets the digital output Q high for the same proportion of the T (periodic time) parameter, and sets Q low for the remainder of the time period.







Analog – Pulse Width Modulator (PWM)

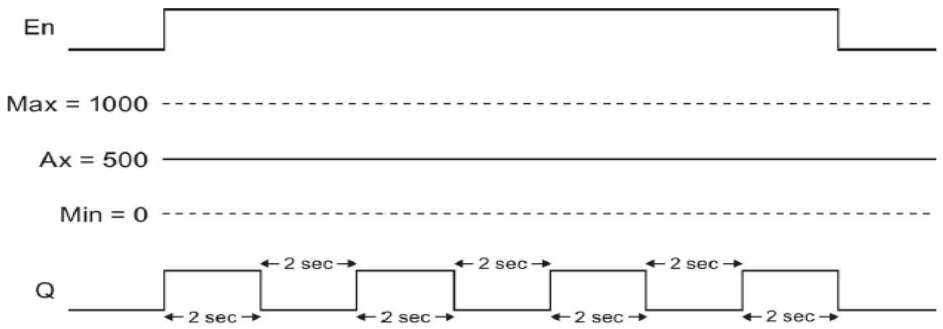
Calculation rule :

Q = 1, for Ax / (Max - Min) of time period PT
Q = 0, for PT - [Ax / (Max - Min)] of time period PT

Example 1:

Periodic time (PT) is set to 4 sec.
Ax = 500
500 / (1000-0) = 0,5
4 sec. * 0,5 = 2 sec.

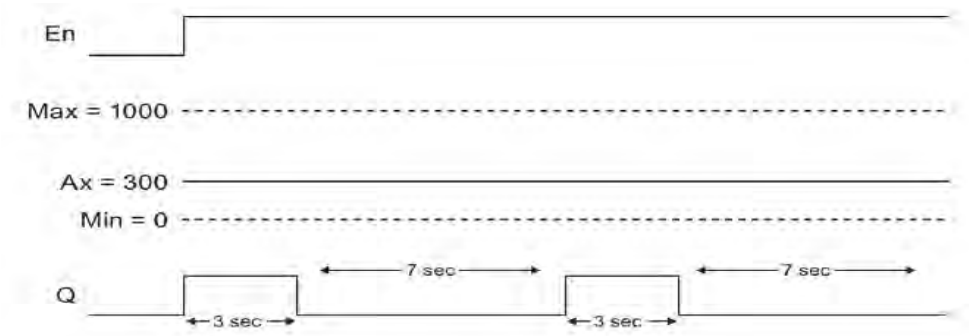
The proportion is: 2 sec. high , 2 sec. low



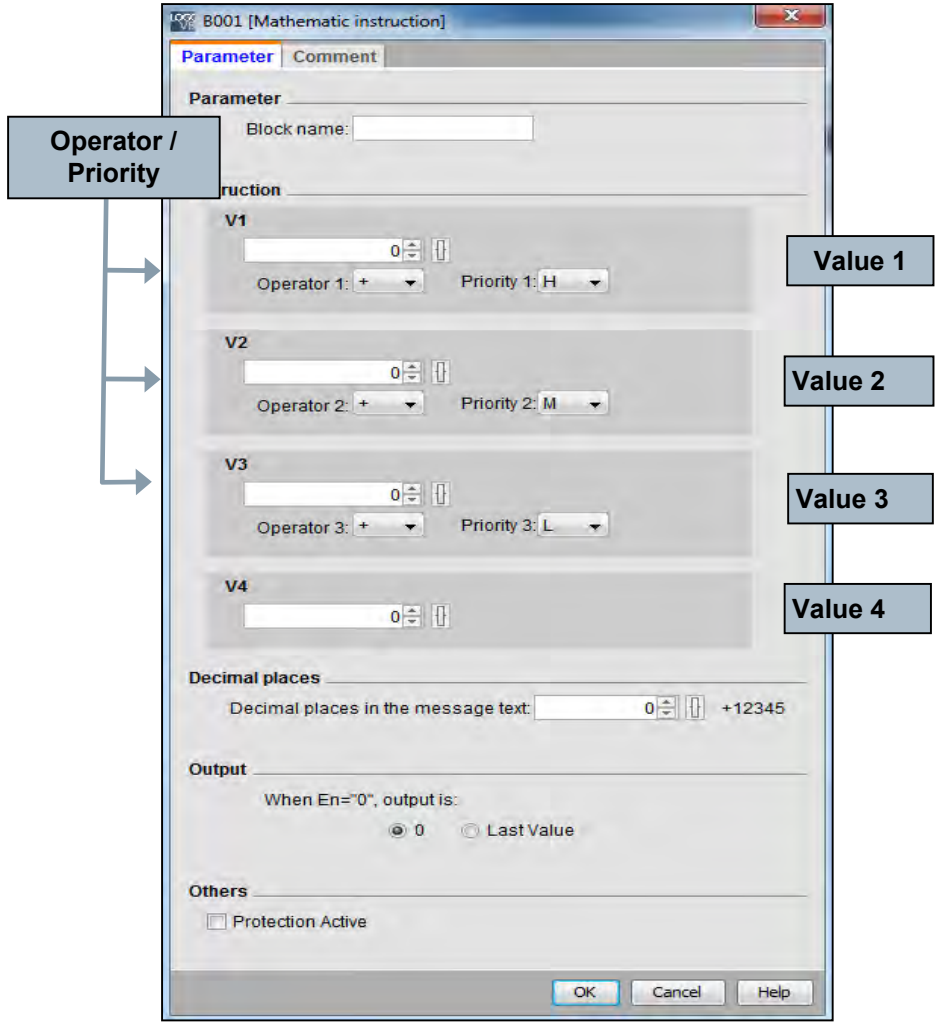
Example 2:

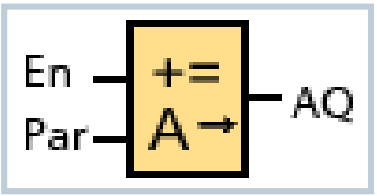
Periodic time (PT) is set to 10 sec.
Ax = 300
300 / (1000-0) = 0,3
10 sec. * 0,3 = 3 sec.

The proportion is: 3 sec. high , 7 sec. low



Analog – Mathematic instruction





Description of the function:

The analog math function combines the four operands and three operators to form an equation.

Practicable operations:
+ , - , x , /

To form the equations, 3 priorities are available:

H (High)
M (Mid)
L (Low)

The result is an internal analog value (-32768 to +32767).

Analog - Analog Math

SIEMENS

Examples :

Value1	Operator1 (Priority 1)	Value2	Operator2 (Priority 2)	Value3	Operator3 (Priority 3)	Value4
12	+ (M)	6	/ (H)	3	- (L)	1

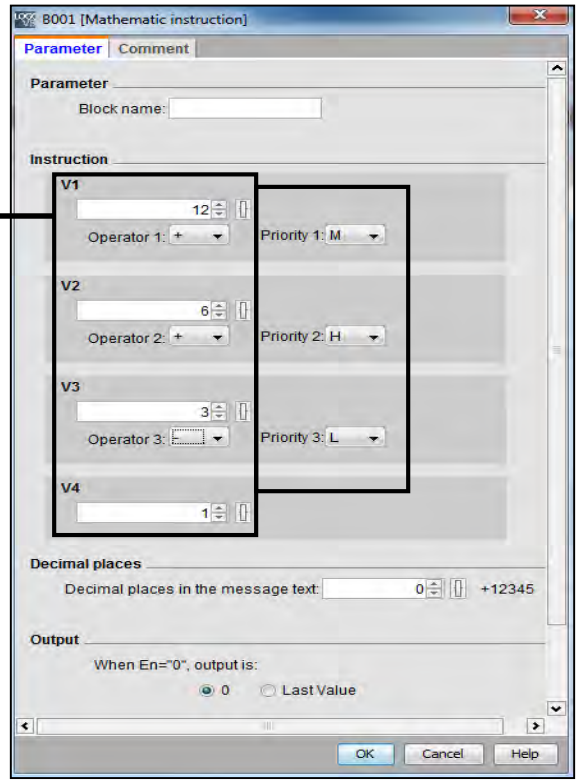
Equation: (12 + (6 / 3)) - 1

Result: 13

Value1	Operator1 (Priority 1)	Value2	Operator2 (Priority 2)	Value3	Operator3 (Priority 3)	Value4
100	- (H)	25	/ (L)	2	+ (M)	1

Equation: (100 - 25) / (2 + 1)

Result: 25



Analog – Max/Min

The Max/Min function records the maximum or minimum value of Ax.

Description of the function:

ERst = 1 and En = 0: The functions sets the AQ value to 0.

ERst = 1 and En = 1: The function outputs a value at AQ, depending on the settings of Mode and S1.

ERst = 0 and En = 1: The function holds the value of AQ at the current value.

ERst = 0 and En = 1: The function outputs a value at AQ, depending on the settings of Mode and S1.

Mode = 0: The function sets AQ to the minimum value.

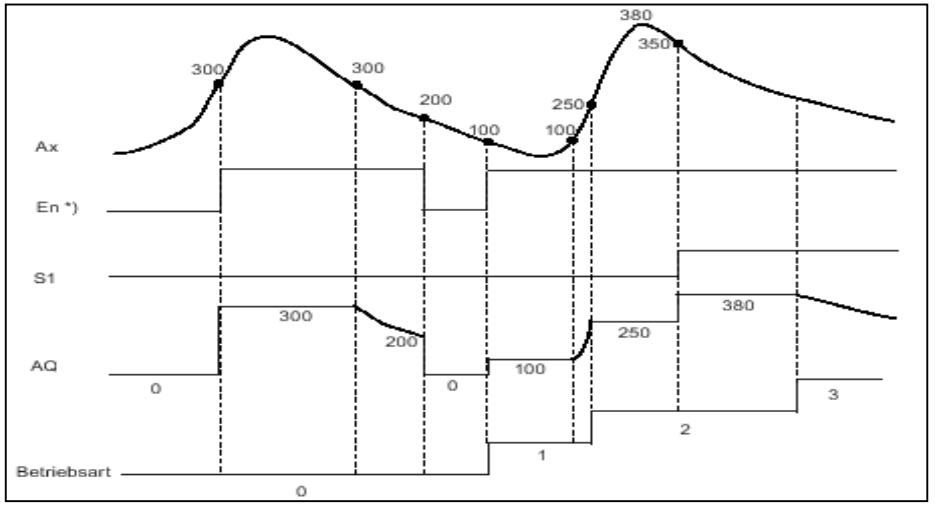
Mode = 1: The function sets AQ to the maximum value.

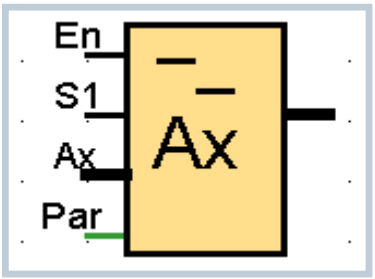
Mode = 2 and S1 = 0: The function sets AQ to the minimum value.

Mode = 2 and S1 = 1: The function sets AQ to the maximum value.

Mode = 3: The function outputs current analog input value.

Diagram:





Analog – Average value

The average value function calculates the average value of an analog input over a configured time period.

Description of the function:

This function fetches the analog input signal according to both the set sampling time St and the number of samples Sn and outputs the average value. A signal at R sets AQ to 0.

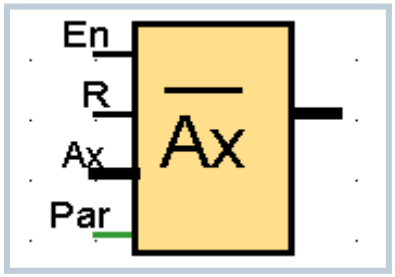
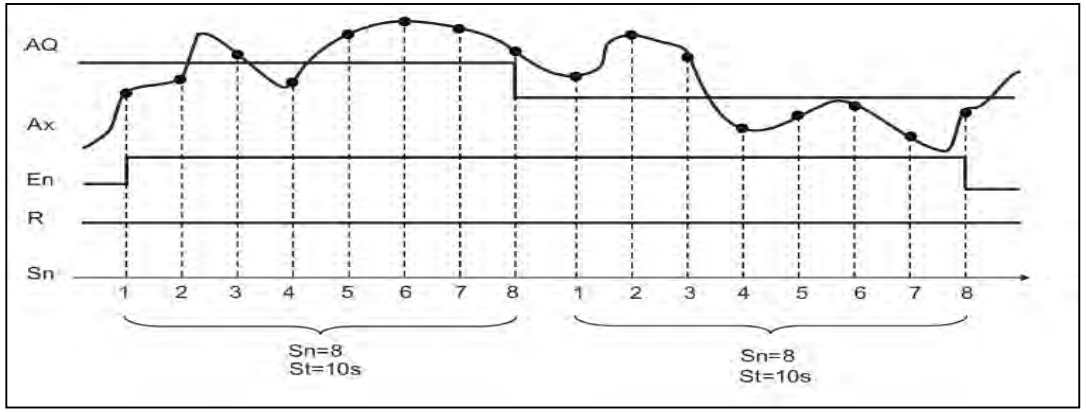


Diagram:



Analog – Analog filter

SIEMENS

The analog filter function smooths the analog input signal.

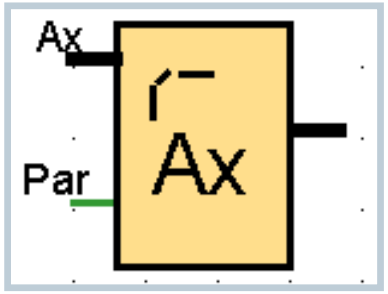
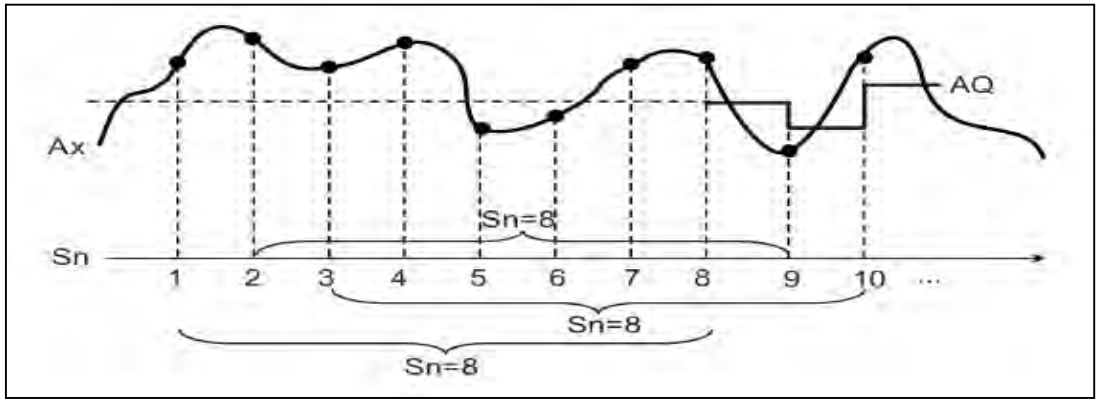


Diagram:



Description of the function:

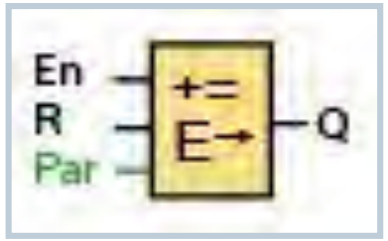
The function fetches the analog signal at input Ax based on the set number of samples (Sn) and outputs the average value.

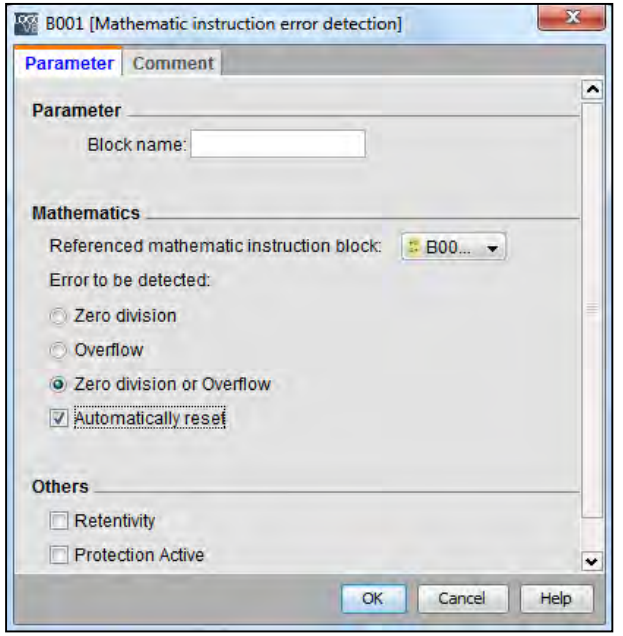
Note

There are a maximum of eight analog filter function blocks available for use in the circuit program in LOGO!.

Miscellaneous – Analog Math Error Detection

SIEMENS





Description of the function:

The analog math error detection block sets the output when the referenced analog math function block has an error. You can program the function to set the output on a zero division error, an overflow error, or when either type of error occurs.

If you select the "Automatically reset" checkbox, the output is reset prior to the next execution of the function block. If not, the output retains its state until the analog math error detection block is reset with the R parameter.

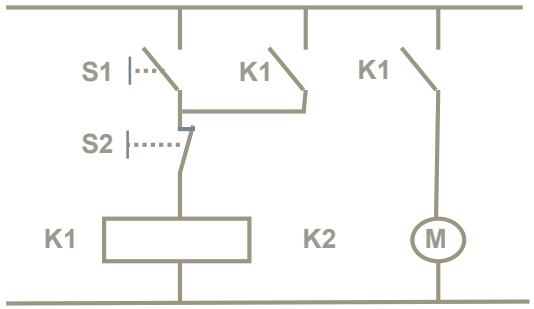
Miscellaneous – Latching relay

SIEMENS

A look at the circuit diagram shows that the coil K1 has current with the pushbutton S1. The switch K1 closes (latch).

This function is called latching relay.

Symbol for this connection is RS.



Description of the function:

Input S sets output Q, input R resets output Q again.

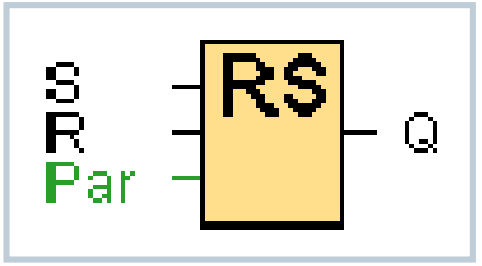
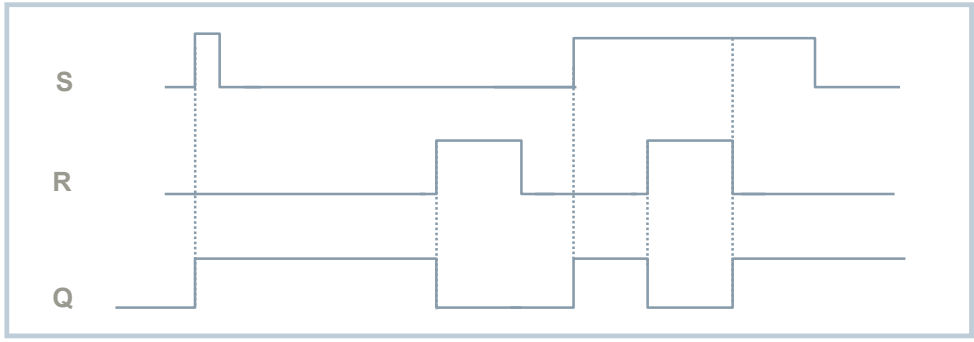


Diagram:



Miscellaneous – Pulse relay

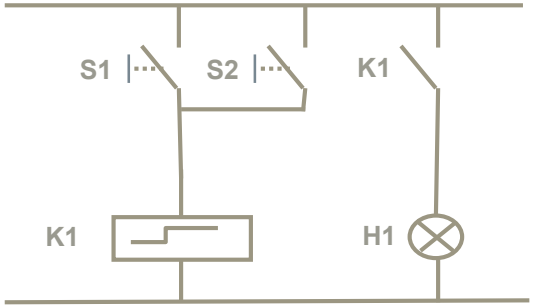
SIEMENS

A look at the circuit diagram shows that the light H1 is switched on and off with the pushbuttons S1 or S2.

This function is called pulse relay.

In words a short pulse at S1 or S2 switches the light H1 on and off.

Symbol for this connection is  .



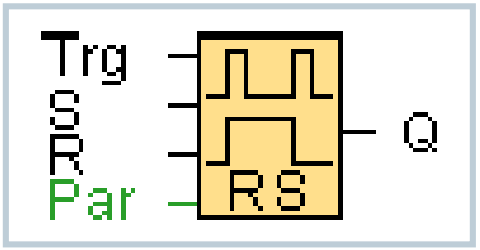
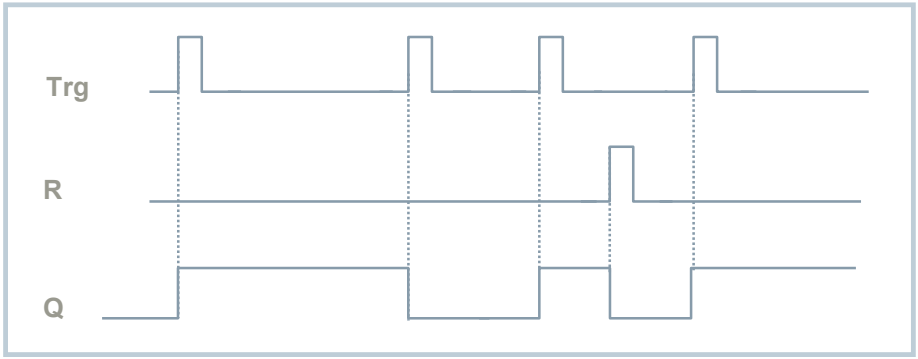


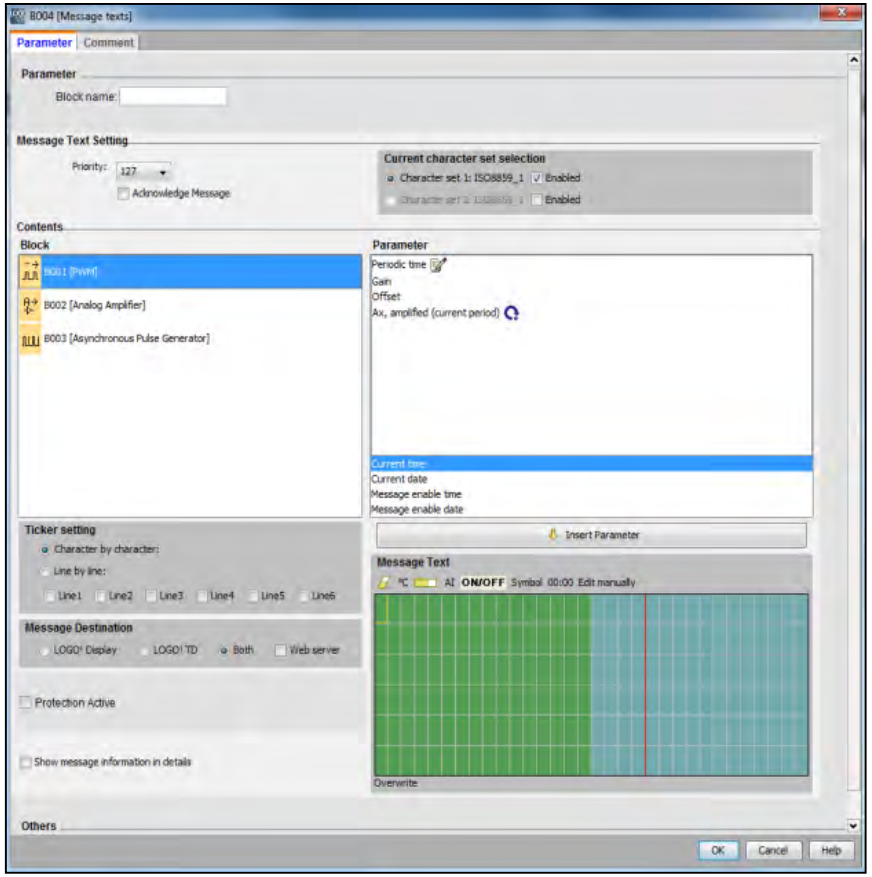
Diagram:



Description of the function:

Output Q changes its status, i.e. the output is set or reset, with each 0 to 1 transition at input Trg. You reset the pulse relay to 0 with a signal at input R.

Miscellaneous – Message text

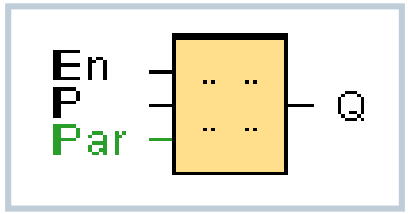


Features:

- **One programming tool LSC for basic module and LOGO! TDE**
- **Selection / enabling of different character sets**
- **Up to 16 (20) characters per line**
- **Ticker text (up to 32 (40) characters per line**
- **Selection of message destination (inc. webserver)**
- **Bar graph functionality**
- **Display state of analog values**
- **Digital I/O states**
- **Display of remaining time of all timers** (except weekly/yearly timer)

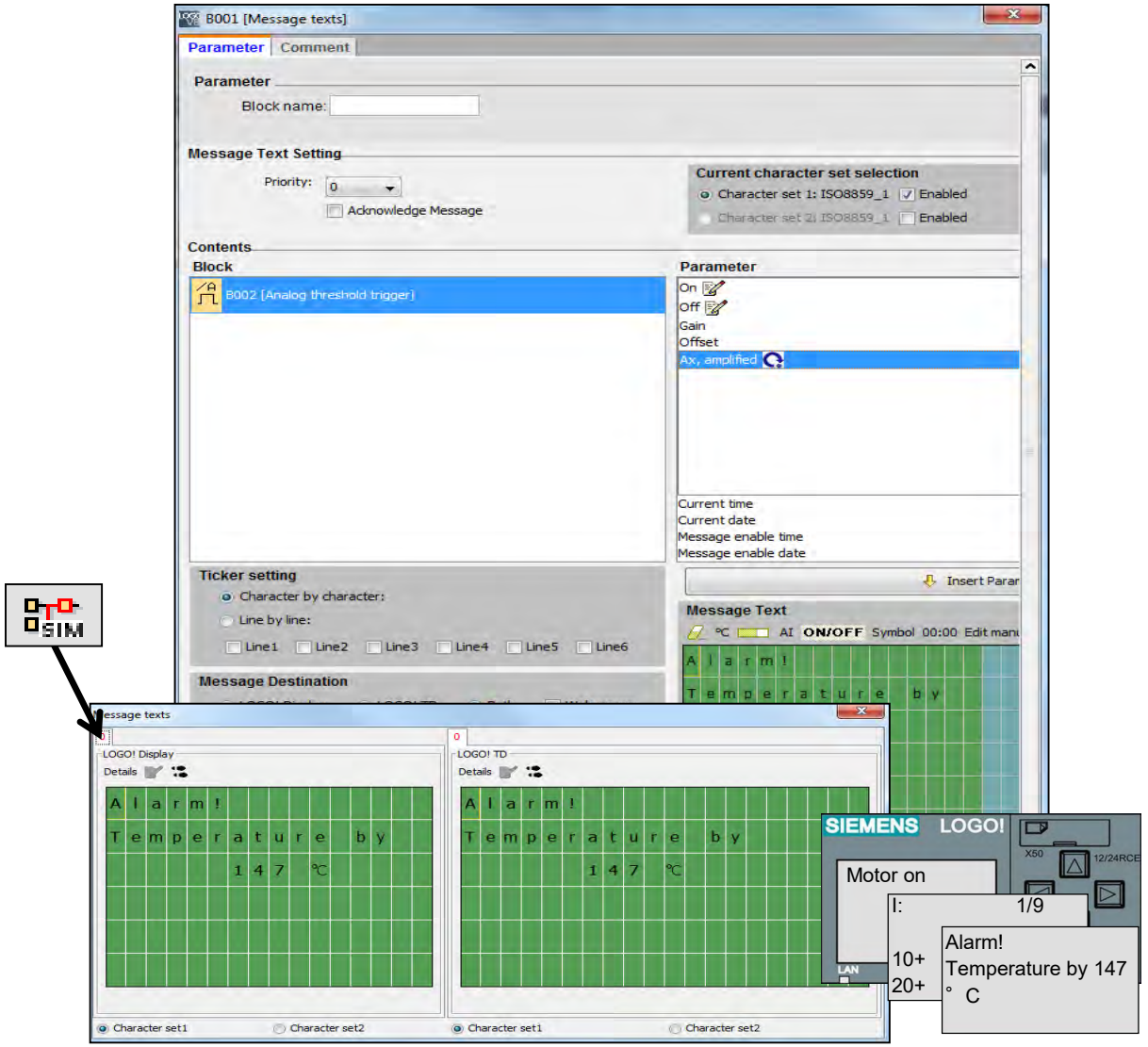
Miscellaneous – Message text

Display of a configured message text in run mode.
Symbol for this function is  **.**



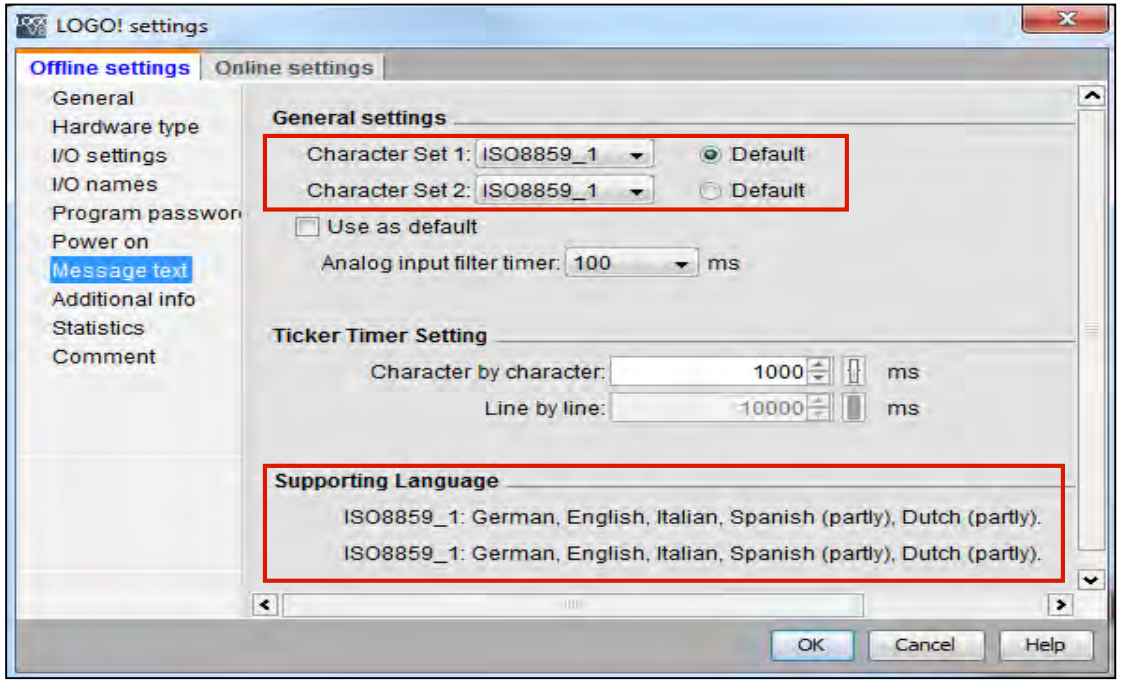
Description of the function:

With a 0 to 1 transition of the input signal and when the system is in RUN, the corresponding message text is output to the display. The message text is hidden when the status of the signal at input changes from 1 to 0. When multiple message text functions are triggered with En = 1, the message text that has the highest priority is shown. Changing between the standard display and the message texts display is possible by using the keys and . If "acknowledge message" is chosen, the respective message text will be hidden by pressing any key on LOGO!, if En = 0.



Miscellaneous – Message text
Selection/enabling of character sets

SIEMENS



To be able to use all features of the message text function in LOGO! ..0BA8, "Use new feature" must be enabled
(File -> Message text settings).

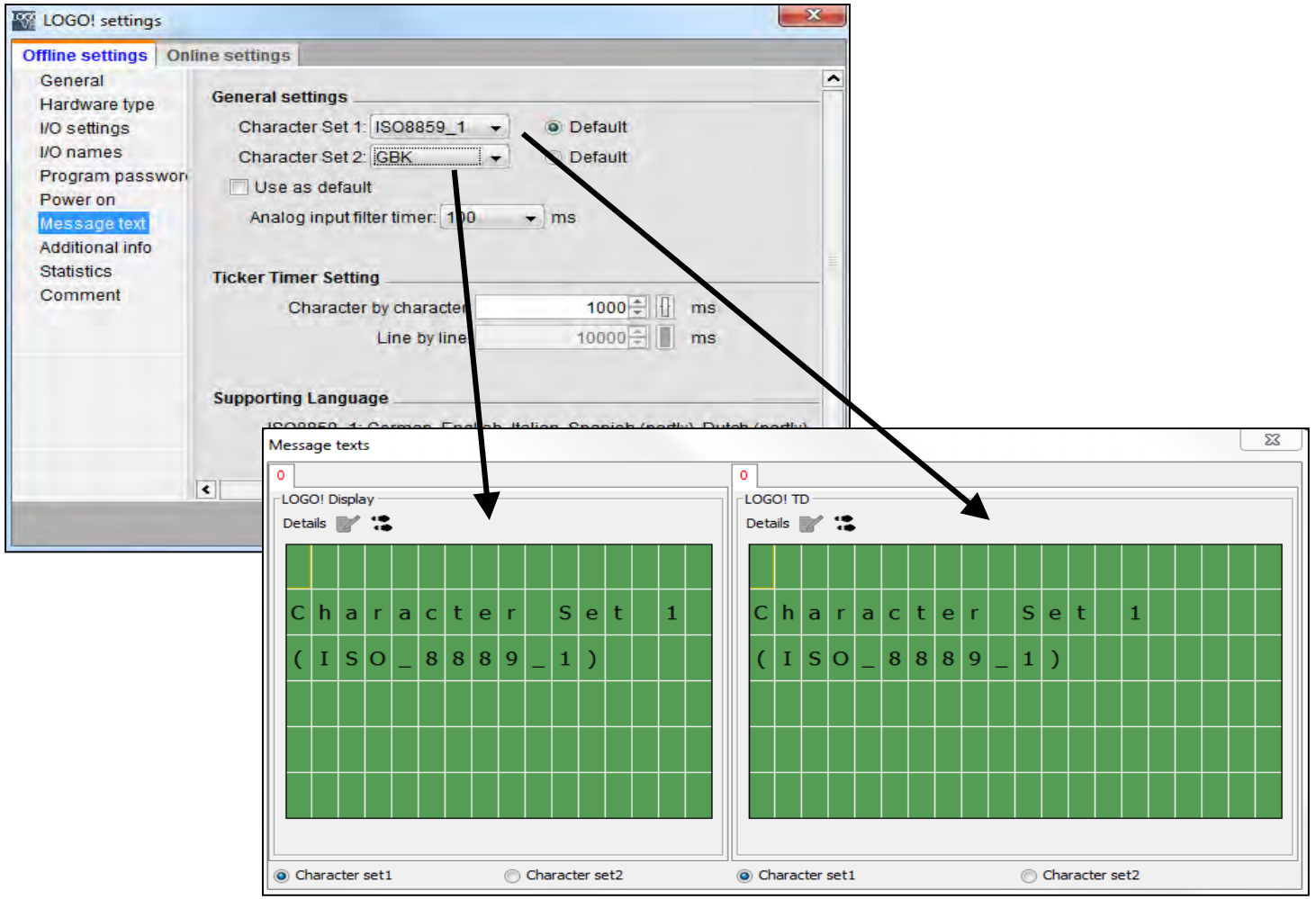
LOGO! ..0BA8 supports several languages.

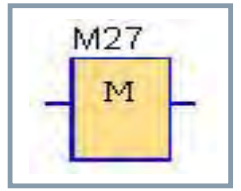
To ensure, that all characters / signs of a language used in a message text can be displayed correctly, it is necessary to activate an accordant character set.

5 character sets are available:

ISO_8859_1	**German, English, Italian, Spanish (partly), Dutch (partly)**
ISO_8859_5	**Russian**
ISO_8859_9	**Turkish**
ISO_8859_16	**French**
GBK	**Chinese**

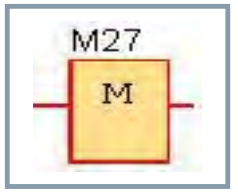
Miscellaneous – Message text
Selection/enabling of character sets





In the same message text 2 different character sets can be selected.

By using the Flag M27 character set 1 or character set 2 gets activated.

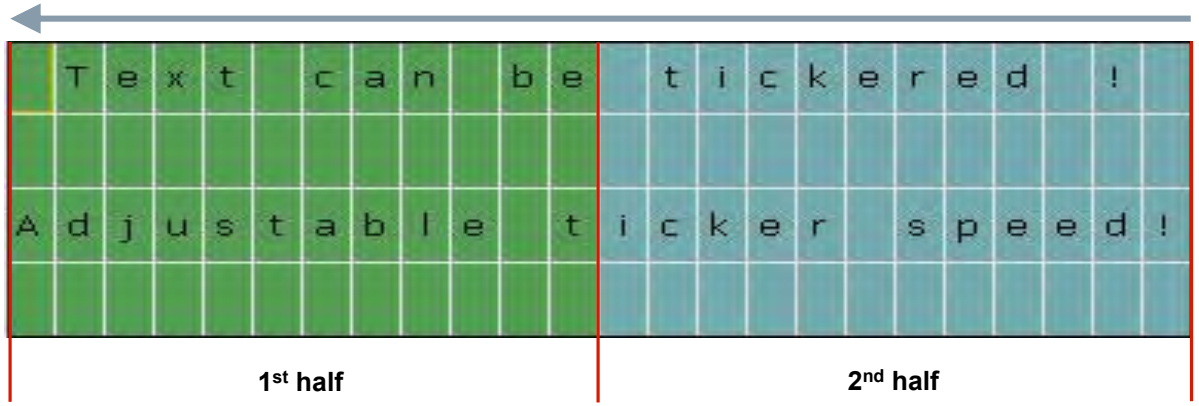


Miscellaneous – Message text
Settings for the ticker text

SIEMENS

For the LOGO! on-board display and for LOGO! TD ticker text can be used.
You can ticker the text in 2 ways:
- **Character by character or**
- **Line by line**

Character by character …
(one character after another tickers through the display)



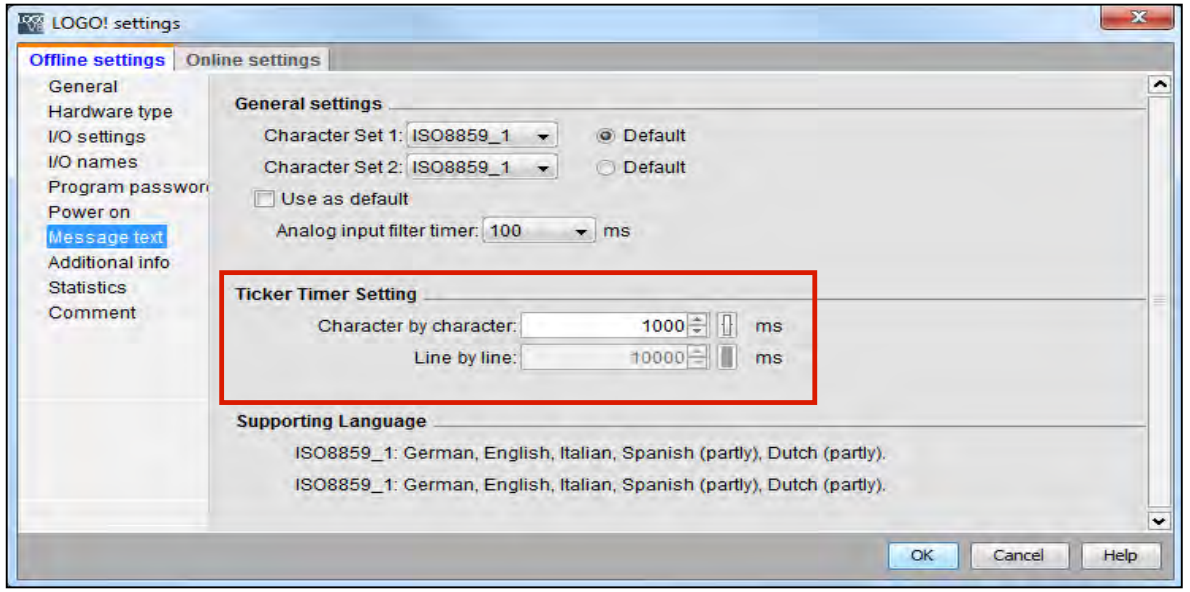
… or Line by line.
(the display alternates between the 1st half and the 2nd half of the message text)

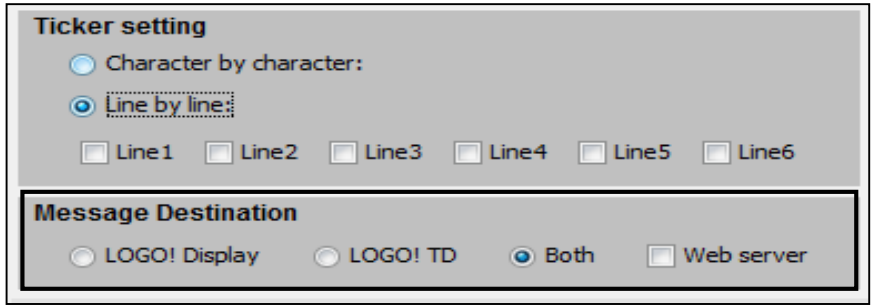
In the function block "message text" you can choose "Character by character" or "Line by line" and enable the line(s) which shall be tickered.

Miscellaneous – Message text
Settings for the ticker text

SIEMENS

The ticker speed can be adjusted via the menu item *File -> Message Text Settings -> Ticker Timer Setting.*
You can set the speed for "Character by character" in milliseconds. This time has also effect to the time for "Line by line" (Character by character x10).





"Message destination" is another properties parameter in the function block message text:

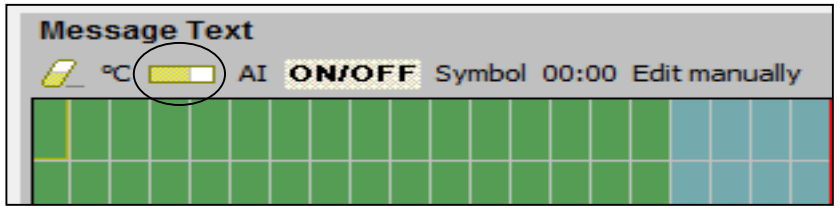
Here you can decide, on which device the message text shall appear:

- **LOGO! on-board display**
- **LOGO! TD**
- **Both displays**
- **Additionally you can enable the webserver**

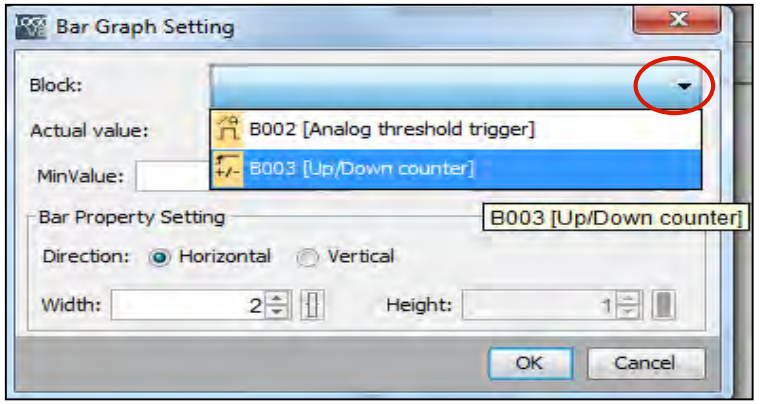
Miscellaneous – Message text
Inserting bar graphs

SIEMENS

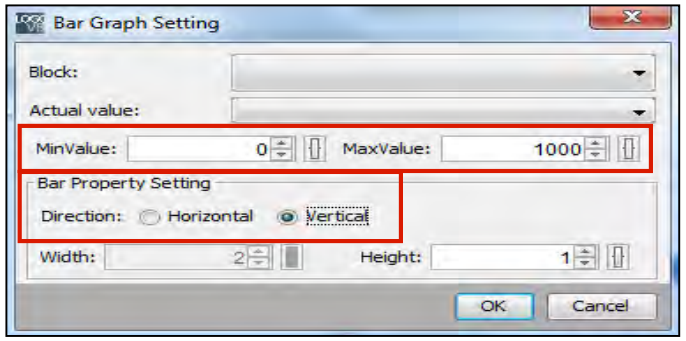
Step 1: Click at
„Insert a bar graph into the message“

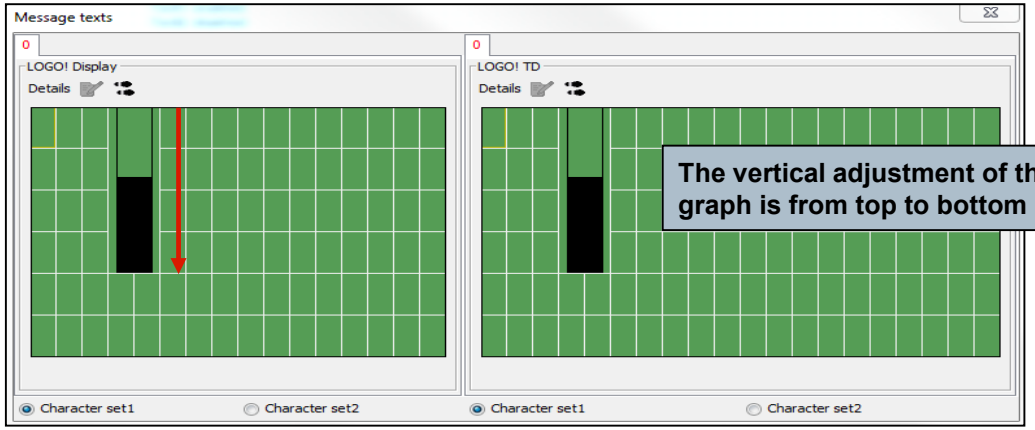


Step 2: Select a function block which is already placed in the circuit diagram to indicate its value.



Step 3: Scale it by defining the range of the value, bar graph size and its direction.





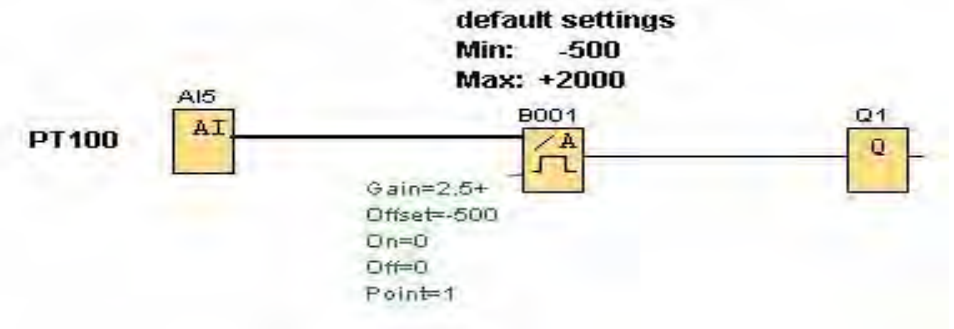
The vertical adjustment of the bar graph is from top to bottom !

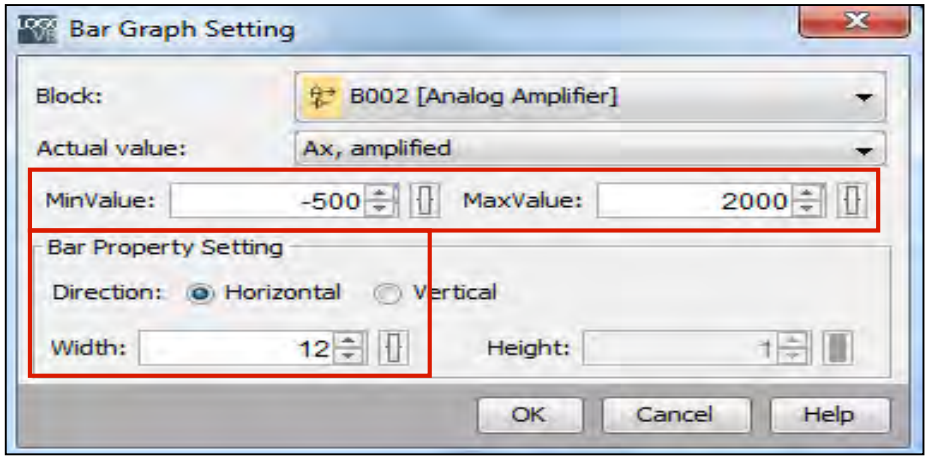
Miscellaneous – Message text
Inserting bar graphs

SIEMENS

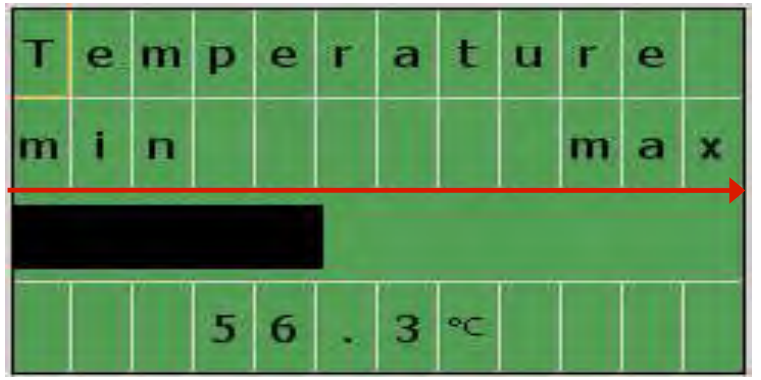
Example:

The analog value of a temperature sensor (PT100) is to be indicated over its entire measuring range as bar graph horizontally in the message text.

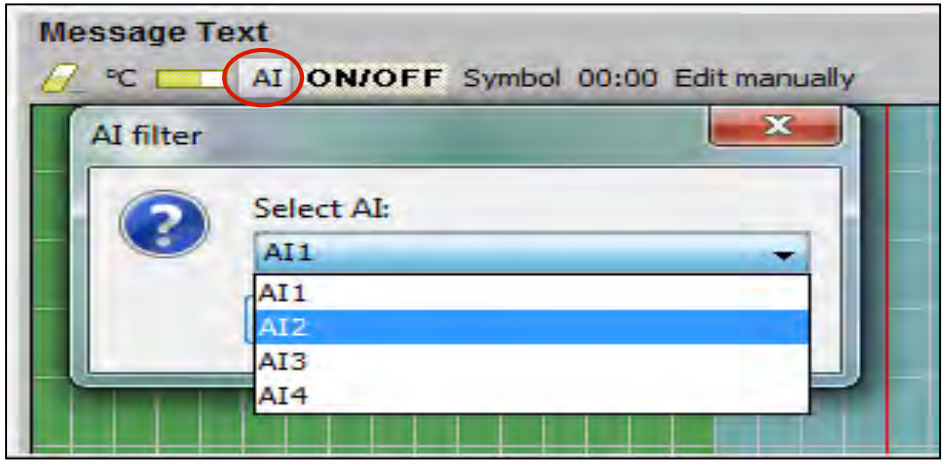


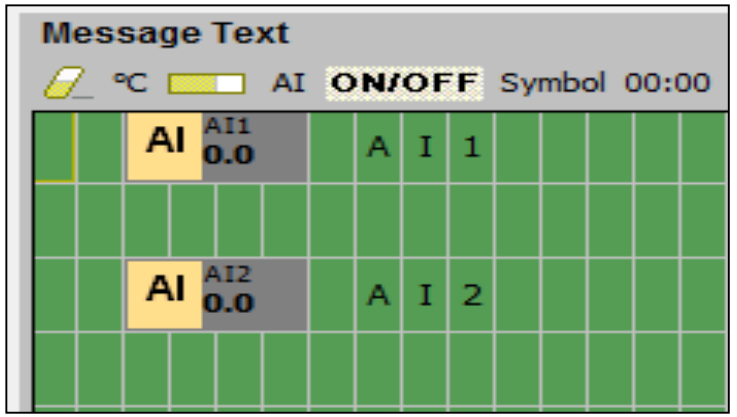


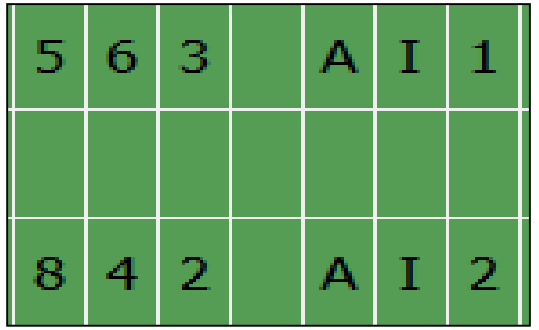
The horizontal adjustment of the bar graph is from left to right !



Miscellaneous – Message text Status indication of the analog input values







2 AI´s can be displayed in one message text.

The value is updated according to the "analog input filter timer".

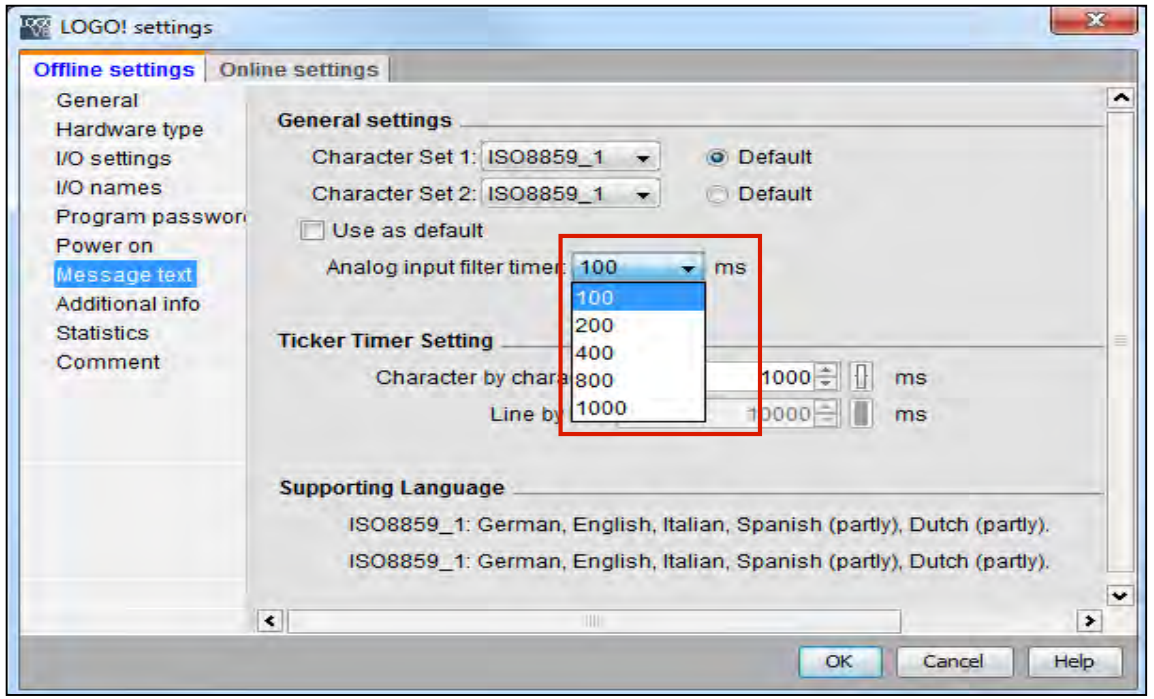
Miscellaneous – Message text
Analog input filter timer

SIEMENS

If an analog input value is indicated in a message text, user can choose filter functionality via the menu item

***File → Message Text Settings*.**

The adjusted time determines the frequency at which LOGO! refreshes the analog values in a message text.



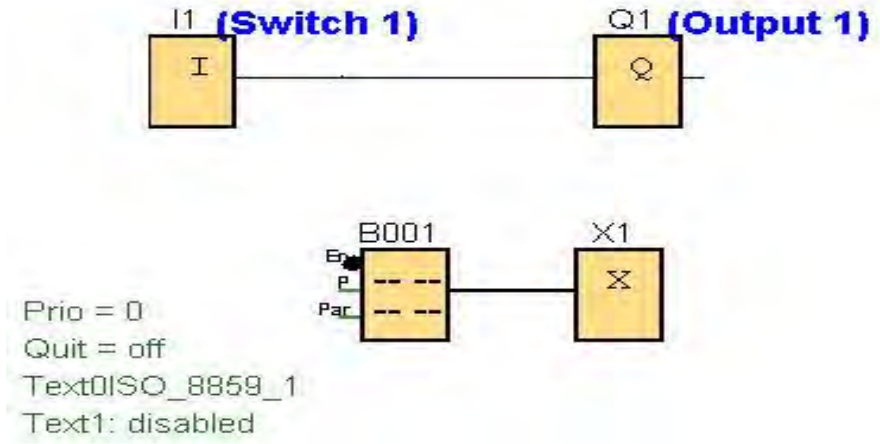
Miscellaneous – Message text Status indication of the digital inputs/outputs

SIEMENS

Example:

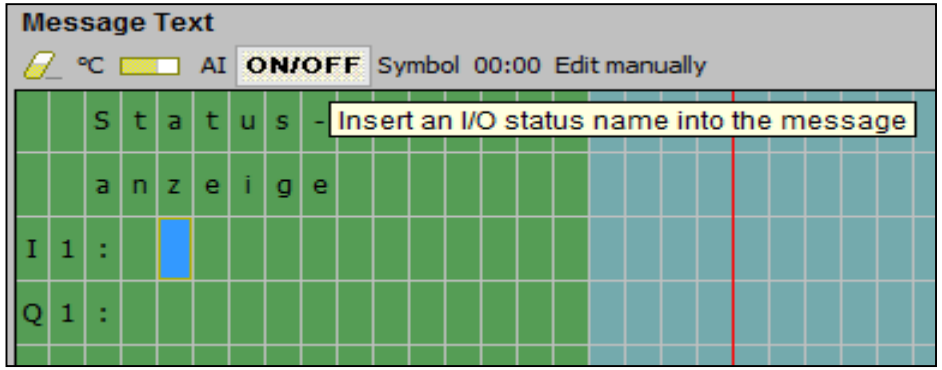
Step 1:

Place 1 input, 1 output and an enabled message text in your circuit diagram.



Step 2:

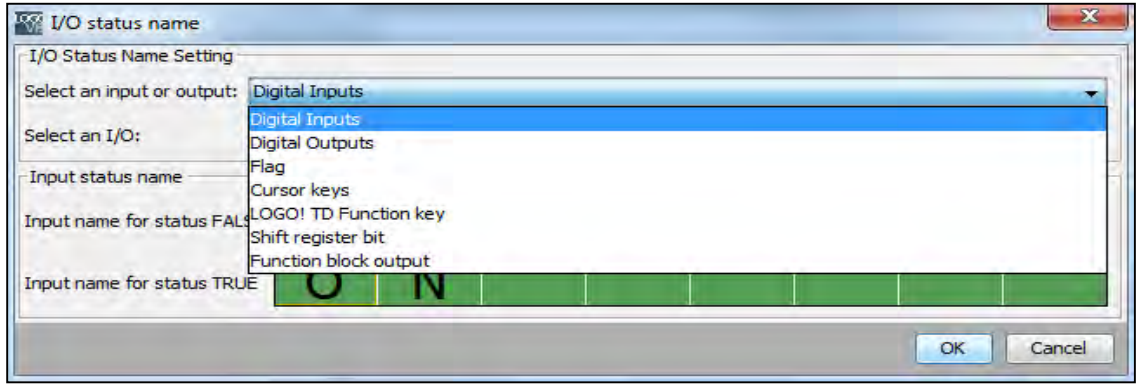
Open message text with a double click, define area for the status indication of “I1” with a mouse click and select “ON/OFF” button.



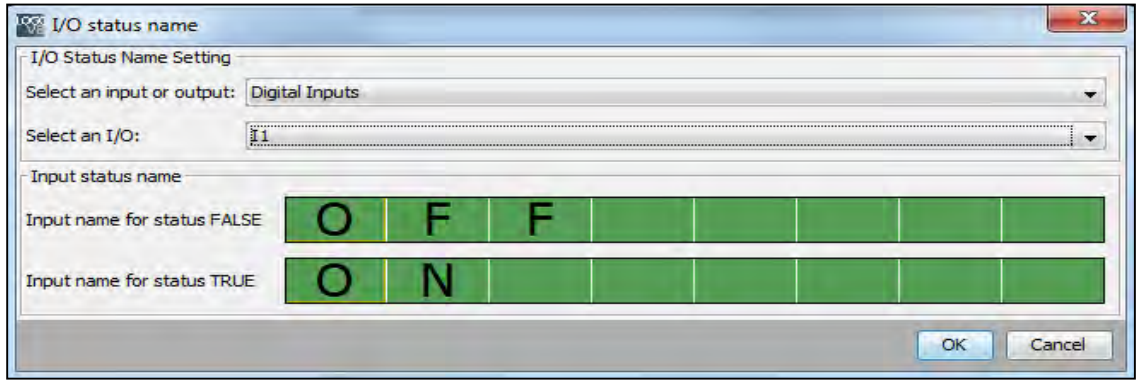
Miscellaneous – Message text Status indication of the digital inputs/outputs

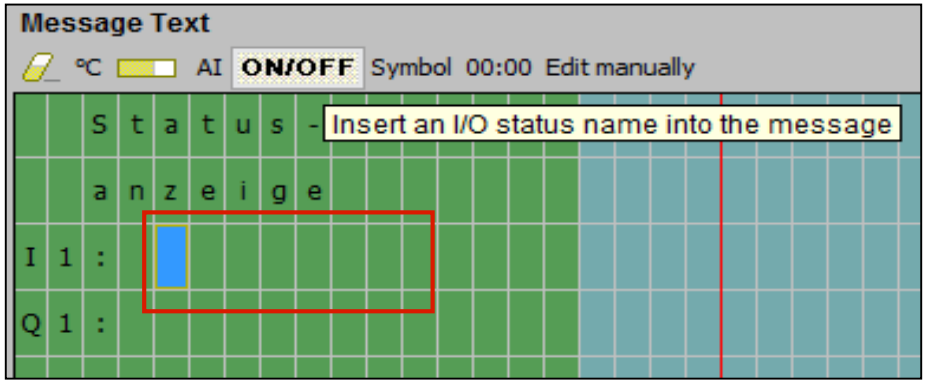
SIEMENS

Step 3: Select “Digital Inputs”



Step 4: Automatically the first input “I1” is selected.
Type in a text you want to display if status for “I1” is “FALSE / TRUE”





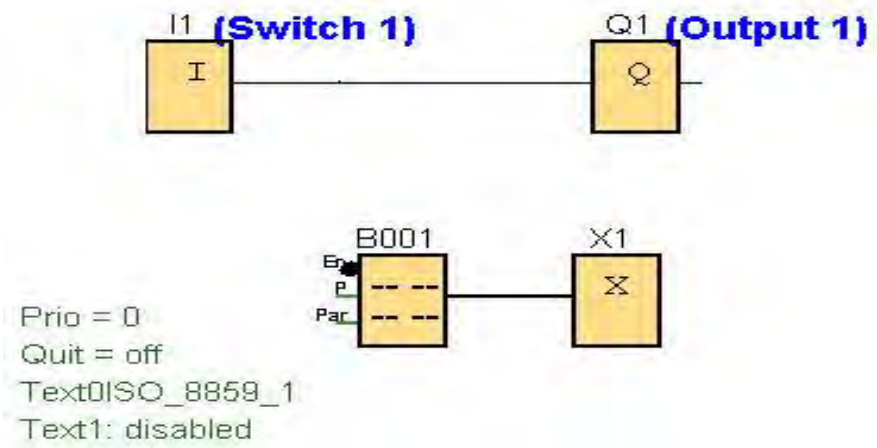
Miscellaneous – Message text
Status indication of the digital inputs/outputs

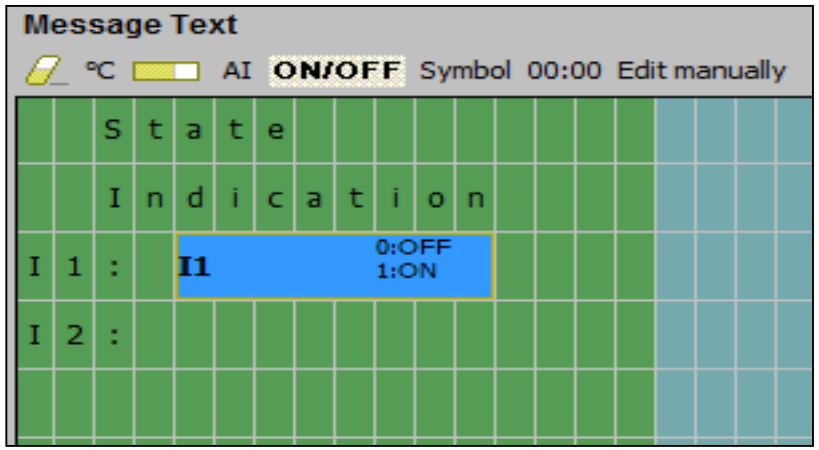
SIEMENS

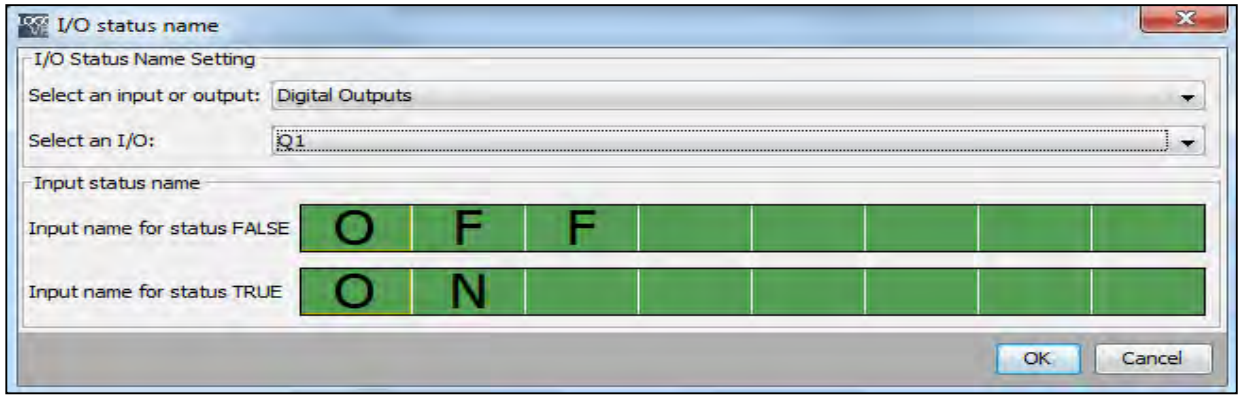
Step 5:

Do the same for “Digital Outputs” and display the state of “Q1”.

Now try out the program in simulation mode!







Miscellaneous – Message text
Static editor (Edit manually)

SIEMENS

LOGO! Soft Comfort V8.0 provides a static editor for message texts that can help when you need to reposition text elements.

For example, it has a “recycle bin” area where you can temporarily move message text elements in order to rearrange the position of elements on the display area. You can move elements up, down, left, or right without changing the position of any other elements.

To use the static editor, click the *"Edit manually"* button above the message text area. You will also be prompted to edit manually if you try to place or move elements in the message area that have a position conflict with existing elements.

Miscellaneous – Softkey

Description of the function:

This special function has the effect of a mechanical pushbutton or switch. In parameter assignment mode, the output is set with a signal at input En, if the ''Switch'' parameter is set to "On" and confirmed with OK. Whether the function was configured for pushbutton or switching action is of no concern here. The output is reset to "0" in the following three cases:

- **After a 0 to 1 transition at input En.**
- **When the function was configured for momentary pushbutton action, and one cycle has expired since it was switched on.**
- **When the position "Off" was selected at the "Switch" parameter and confirmed with OK in parameter assignment mode**

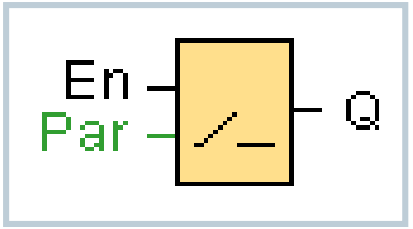
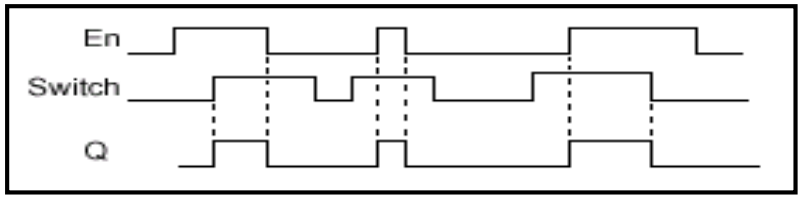
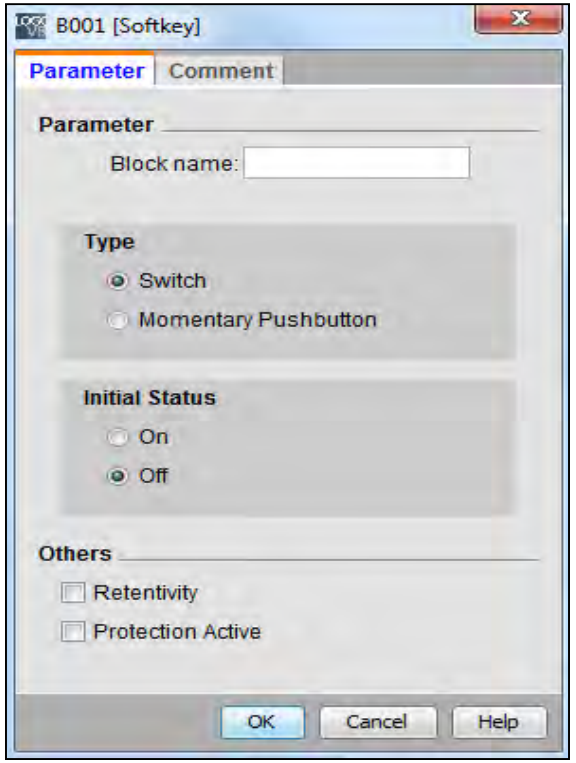


Diagram:





Miscellaneous – Shift register

Description of the function:

The function reads the value at input In with a positive edge at input Trg. This value is applied to shift register bit S1 to S8, depending on the shifting direction:

Shift up: The value at input In is set at S1; the previous value at S1 is shifted to S2; the previous value at S2 is shifted to S3 etc.

Output Q returns the value of the configured shift register bit. If retentivity is disabled, the shift function restarts at S1 to S8 after a power failure. When enabled, retentivity always applies to all shift register bits.

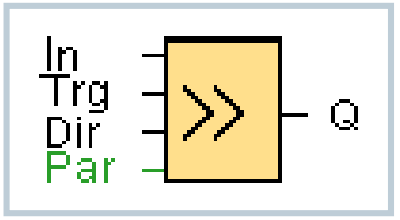
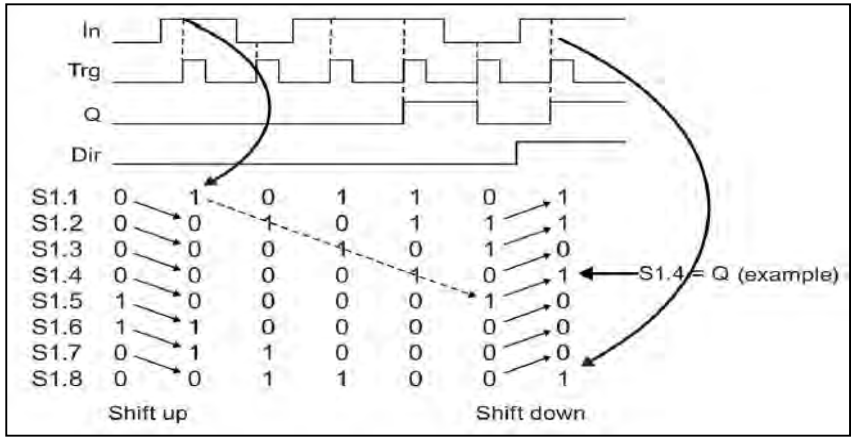
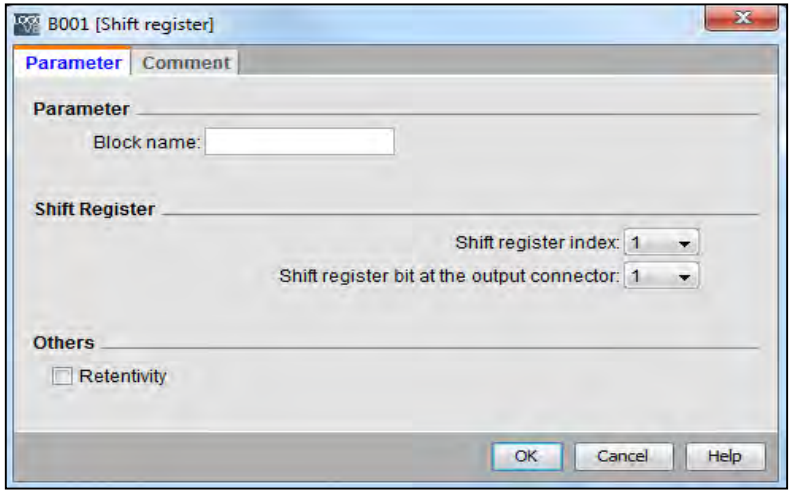


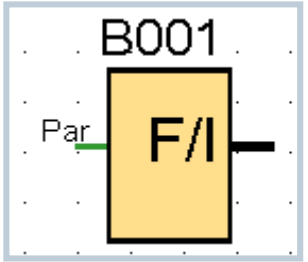
Diagram:





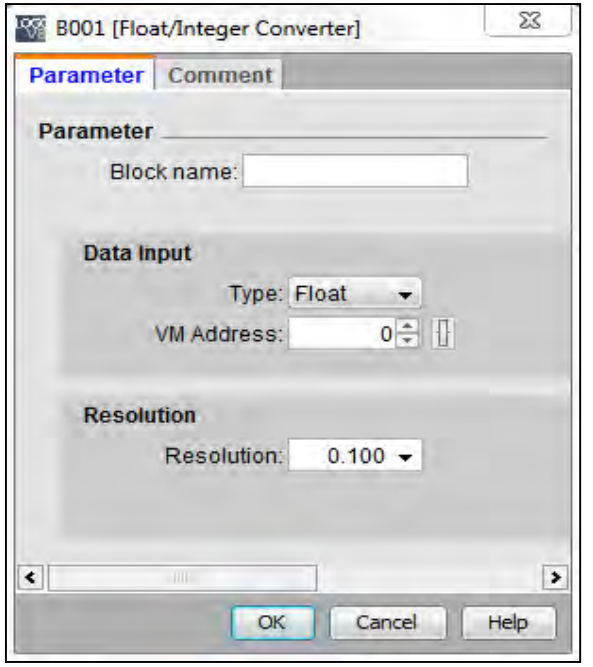
Miscellaneous – Float/Integer Converter

SIEMENS



This function convert a float stored in VM to an integer and output the result via the parameter (eAQ) or AQ.

LOGO! only deals with integers. If you transfer some float from outer system by network with S7/Modbus protocol, LOGO! cannot deal with it directly. With float to integer converter, you can convert floating numbers stored in VM to integers. This SFB does the conversion by dividing the float by a resolution. You need to set a suitable resolution for the input float in the parameter tab.



Description of the function:

You usually need both the blocks Float/Integer converter and Integer/Float converter to complete a task. A typical way to use these function blocks is:

Transfer the floats from outer system by network (with S7/Modbus protocol) and store them in VM.

Convert the floats stored in VM to integer by Float/Integer converter.

Process the integer with LOGO! BM.

Convert the result to floats by Integer/Float and store them in the VM.

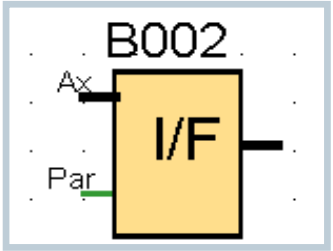
Transfer the floats to outer system (with S7/Modbus protocol).

Miscellaneous – Integer/Float Converter

SIEMENS

This function converts integers to floats, and store them in VM.

LOGO! only deal with integers. If you transfer some float from outer system by network with S7/Modbus protocol, LOGO! cannot deal with it directly. With this SFB, LOGO! can output floating numbers. This SFB converts integers to floating numbers by multiplying a resolution into the floating number. You need to set a suitable resolution for the input integers in the parameter tab.



Description of the function:

You usually need both the blocks Float/Integer converter and Integer/Float converter to complete a task. A typical way to use these function blocks is:

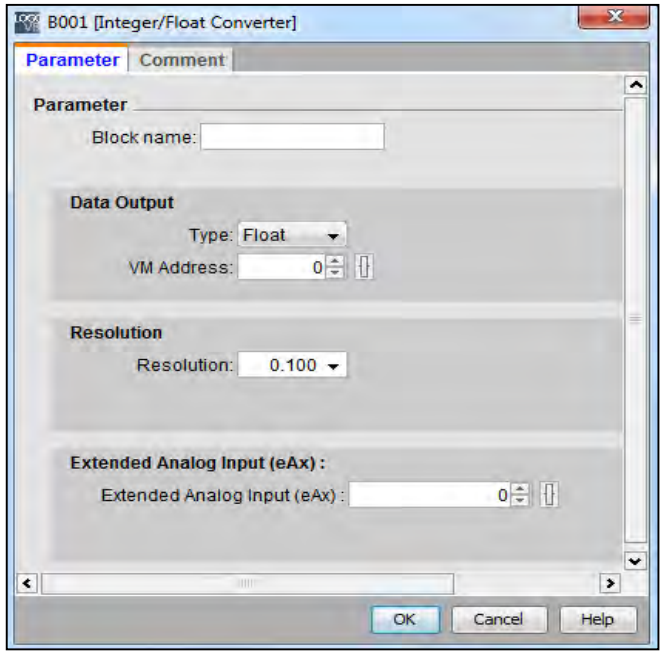
Transfer the floats from outer system by network (with S7/Modbus protocol) and store them in VM.

Convert the floats stored in VM to integer by Float/Integer converter.

Process the integer with LOGO! BM.

Convert the result to floats by Integer/Float and store them in the VM.

Transfer the floats to outer system(with S7/Modbus protocol).



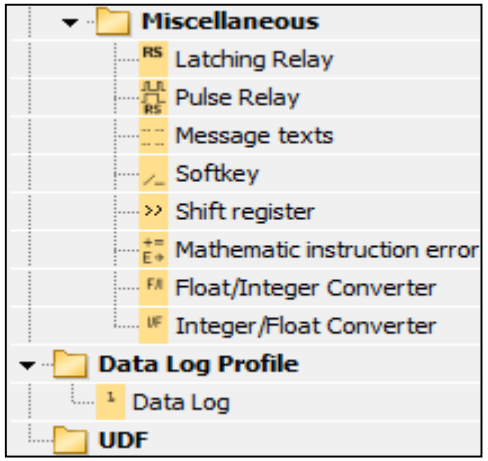
Data Log – Description

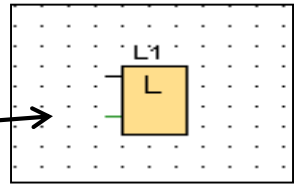
Functional description:

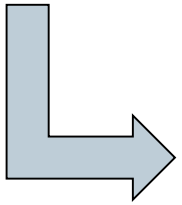
The Data Log – function block saves actual values of selected functions blocks and memory areas of a switching program which are able to be put out in a CSV-format on a PC or a standard micro SD-card. The internal memory can save up to 200 data records. With an external memory it is able to save up to 20.000 records (max. 50 log files).

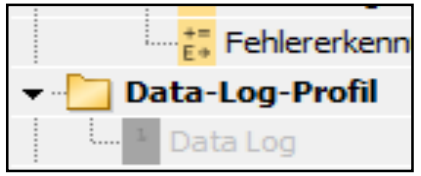
The Data Log starts recording data with a rising flank (change from 0 to 1) at the input En (Enable).

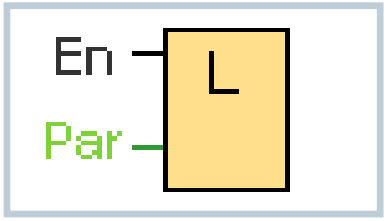
The usage per switching program is limited to one Data Log function block. After selection and inserting in the function chart, the symbol will be greyed out in the navigation register.











Data Log – Description

SIEMENS

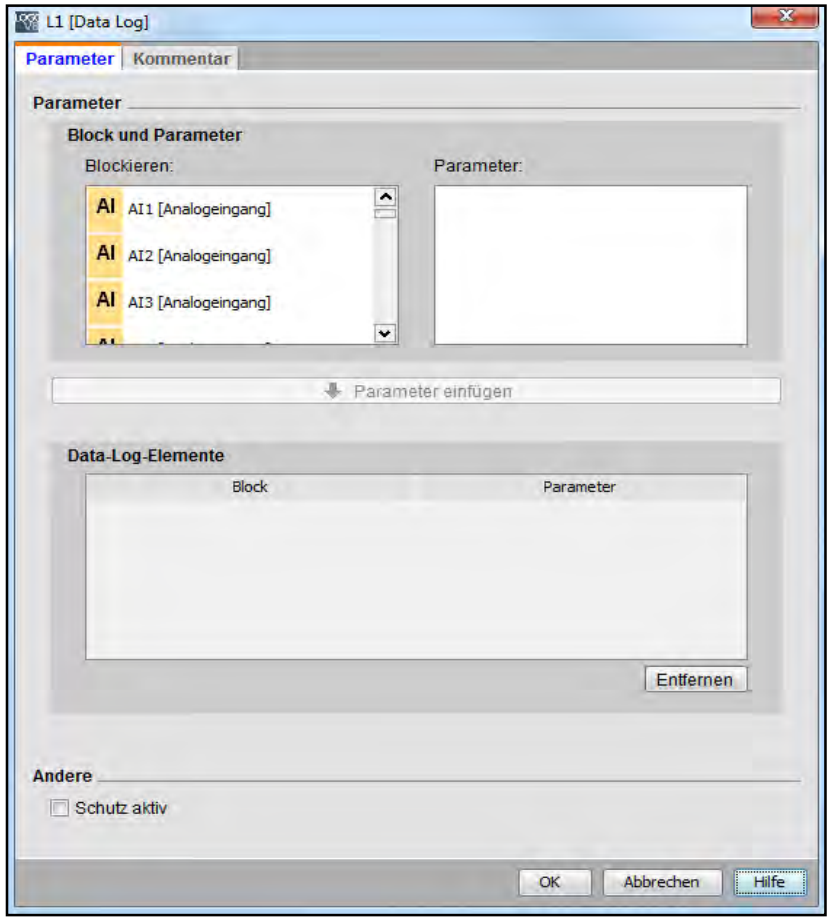
Current values of the following function blocks are able to be recorded with the Data Log function block:

- **I**
- **Q**
- **M**
- **AI**
- **AQ**
- **AM**

At digital I/O and memory the data have to be recorded in 8 bit groups, e.g. I1 to I8, Q9 to Q16, M17 to M24. For analog data you have to choose a to-be-recorded value, e.g. AI1, AQ2 or AM1. You configure function block values in 8 bit groups or single values, depending on the type of the value (digital or analog).

You can record a maximum of 32 elements in the Data Log (analog values or digital values in 8 bit groups).

You can configure the Data Log only in LOGO! SoftComfort. Via the LOGO! device it is not possible to create, configure or delete a Data Log function block.



UDF – Creating macro blocks

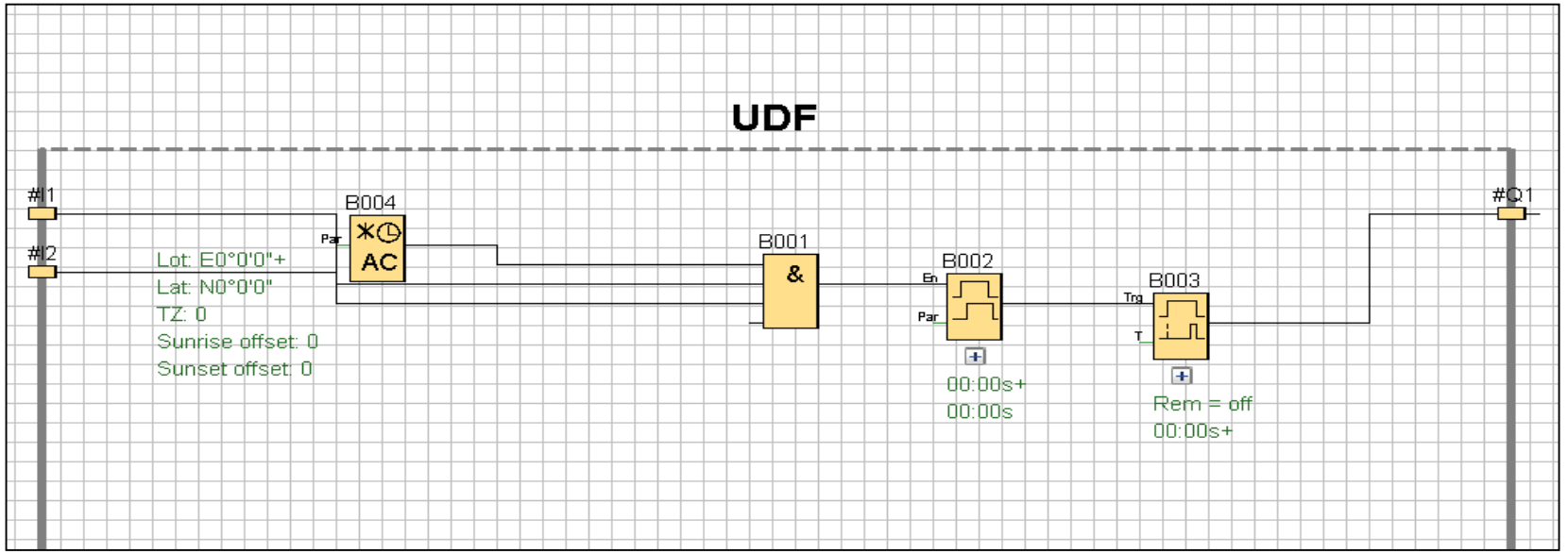
SIEMENS

UDF-blocks (UDF – user defined function) only can be configured in the LOGO! SoftComfort and complies with a personal created switching program which can be saved and afterwards added to other or further switching programs at any time (macro).

→ Editing at LOGO! 0BA8 only at the in- or outputs which are connected to the UDF-block.

→ Automatic version handling (changes at macros)

→ Creating of own UDF-library



Thank you for your attention!

DF FA S MP PLC 1

90475 Nürnberg

siemens.com/answers