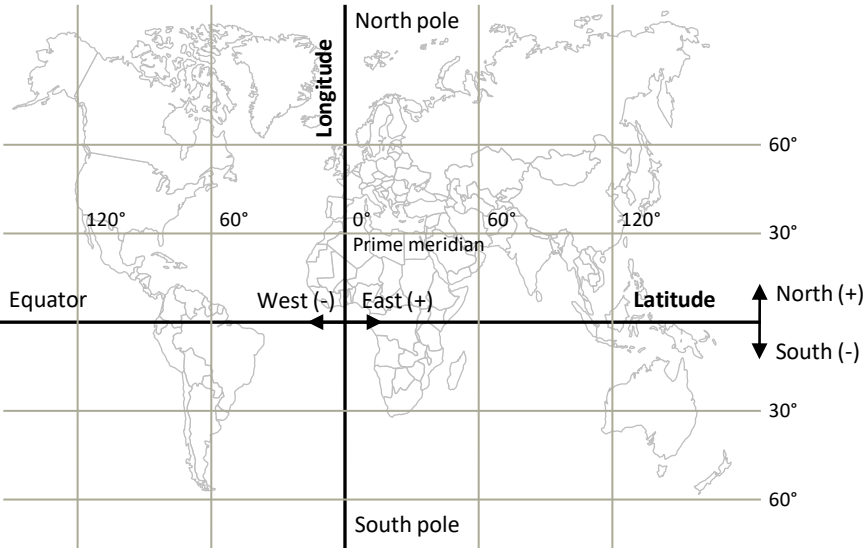


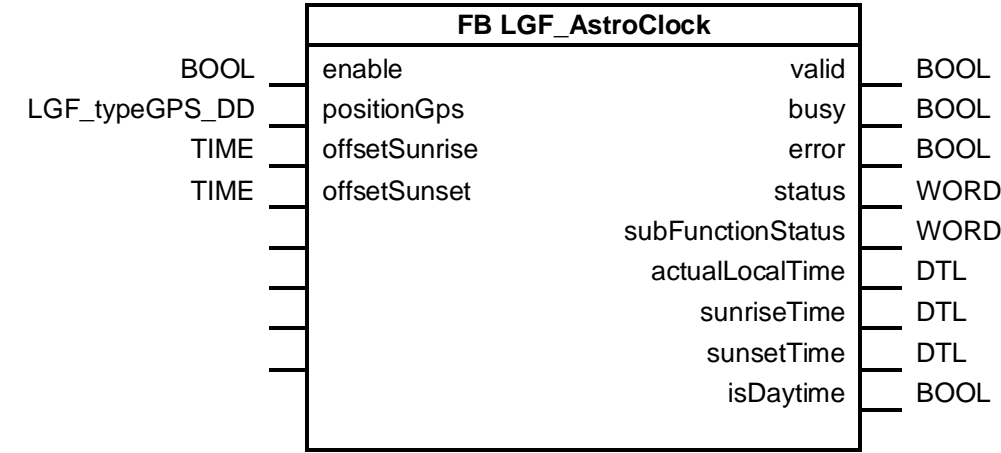
LGF_AstroClock

Short description

This block calculates the times of sunrise and sunset for a specific place on Earth. The exact position is transferred to the block in the form of geographical coordinates (longitude and latitude).



Block



Input parameters

Parameters	Data type	Description
enable	BOOL	TRUE: Activates the functionality of the FB
positionGps	LGF_typeGPS_DD	GPS position to calculate the time of sunrise and sunset
offsetSunrise	TIME	Offset to sunrise
offsetSunset	TIME	Offset to sunset

Output parameters

Parameters	Data type	Description
valid	BOOL	TRUE: Output values at FB valid
busy	BOOL	TRUE: FB is not finished and new output values can be expected.
error	BOOL	FALSE: No error TRUE: An error occurred during the execution of the FB.
status	WORD	16#0000-16#7FFF: Status of the FB, 16#8000-16#FFFF: Error identification (see following Table).
subFunctionStatus	WORD	Status or return value of the called FCs and system blocks.
actualLocalTime	DTL	Current time (local time)
sunrise	DTL	Sunrise time (local time)
sunset	DTL	Sunset time (local time)
isDaytime	BOOL	TRUE: If the local time of the controller is between "sunrise" and "sunset".

Status and error displays

status	Meaning	Remedy / notes
16#0000	No error	-
16#7001	Block is being processed	-
16#8204	Wrong Latitude DD value	Check the actual value at the input.
16#8205	Wrong Longitude DD value	Check the actual value at the input.
16#8601	Error in "RD_SYS_T" command.	Check the error code in "subFunctionStatus"
16#8602	Error in "RD_LOC_T" command.	Check the error code in "subFunctionStatus"

Note

The status of called commands is output in "subFunctionStatus". In this case, the output value in "status" indicates which command caused the error. In this case, refer to the TIA Portal Online Help section for information on the respective commands.

LGF_typeGPS_DD data type

Parameters	Data type	Description
latitude	REAL	Degrees latitude with decimal places (Unit: degree decimal), North = positive; South = negative valid value range [-90.00000..90.00000]
longitude	REAL	Longitude in degrees with decimal places (Unit: degree decimal), East = positive; West = negative valid range [-180.0000..180.0000]

Principle of operation

If processes must run automatically depending on the change between day and night, the function of an astronomical clock is required. Examples of this would be switching outdoor lighting on and off or opening and closing roller shutters.

If these processes are to be executed with a time delay i.e. a defined time before or after sunrise or sunset an offset is required in each case.

Note

For precise execution of the function, it must be ensured that system time and local time of the SIMATIC controller are set correctly.

Based on the system time/local time of the SIMATIC controller and the set coordinates, the block calculates the times for sunrise and sunset. The offset times are added to the sunrise and sunset and output on the "sunrise" and "sunset" outputs. If the system time of the SIMATIC controller is between these values, the output "daytime" is set to the value "TRUE".

Note

Since the times for sunrise and sunset change daily, it is possible that the "daytime" output remains permanently on "TRUE" or "FALSE" over a longer period of time:

- with correspondingly large offset values
- for a place on the other side of the Arctic Circle

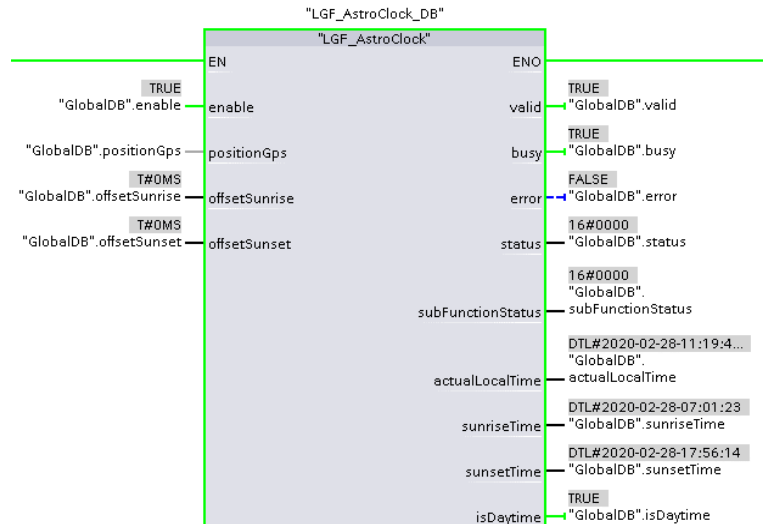
The input of the GPS coordinate values is checked for valid values. If there are invalid values, an appropriate error code is output to "status".

If there is an invalid coordinate value for a formal parameter, the outputs "sunrise" and "sunset" are set to the value DTL#1970-01-01-00:00:00.

Example

The following example illustrates the block's functionality.

Longitude:	+ 11.07675°		
Latitude:	+ 49.45203°		
Date:	02/28/2020	Local time:	11:22:37
		Sonnenaufgang	07:01:23
		Sunset	17:56:14



Name	Anzeigeformat	Beobachtungswert
"GlobalDB".enable	BOOL	TRUE
"GlobalDB".positionGps.latitude	Gleitpunktzahl	49.45203
"GlobalDB".positionGps.longitude	Gleitpunktzahl	11.07675
"GlobalDB".offsetSunrise	Zeit	T#0MS
"GlobalDB".offsetSunset	Zeit	T#0MS
"GlobalDB".valid	BOOL	TRUE
"GlobalDB".busy	BOOL	TRUE
"GlobalDB".error	BOOL	FALSE
"GlobalDB".status	Hex	16#0000
"GlobalDB".subFunctionStatus	Hex	16#0000
"GlobalDB".actualLocalTime	DATE AND TIME	DTL#2020-02-28-11:22:37 220143296
"GlobalDB".sunriseTime	DATE_AND_TIME	DTL#2020-02-28-07:01:23
"GlobalDB".sunsetTime	DATE_AND_TIME	DTL#2020-02-28-17:56:14
"GlobalDB".isDaytime	BOOL	TRUE

Further information on libraries in TIA Portal:

- Topic page libraries
<https://support.industry.siemens.com/cs/ww/en/view/109738702>
- Guideline on Library Handling
<https://support.industry.siemens.com/cs/ww/en/view/109747503>
- Programming Guideline for S7-1200/1500 in chapter "Libraries"
<https://support.industry.siemens.com/cs/ww/en/view/81318674>
- Programming Styleguide
<https://support.industry.siemens.com/cs/ww/en/view/81318674>