

Installation and operating instructions for astronomical timer switch DTSW Astro 1

Operating instructions

The DTSW Astro 1 is a digital timer switch with astronomical synchronisation that has been developed for the control of electrical systems that require solar reference parameters for sunrise and sunset times at a specific location on each day of the year. It can carry out specific actions at a specific time of day and switch on or off when the sun rises or sets. A correction value of up to ± 9 hours 59 minutes can be specified for channels C₁ and C₂ for the astronomical switching operations. The timer switch also has a range of additional functions such as automatic daylight saving adjustment, four holiday periods and adjustable screen brightness. The menus can be displayed in multiple languages and a schedule for the current day is displayed. The device has two independent, volt-free circuits that allow for up to 40 actions to be programmed for channel 1 and/or channel 2.

Installation

Warning: installation and mounting work on electrical equipment must only be carried out by a qualified electrician.

The device is protected from interference by a safety circuit. However, especially strong fields may affect its function. Prevent interference by observing the following installation guidelines:

- » Do not install the device near inductive loads (motors, transformers, contactors, etc.)
- » Use a separate supply line if possible (with network filter if necessary).
- » Fit inductive loads with suppressor elements e.g. varistor, RC filter.

If the timer switch is used together with other equipment in a system, ensure that the entire unit does not generate external interference.

Mounting


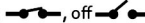
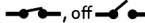
Electronic controls mounted independently in distribution board, with symmetrical profile of 35 mm, for installation on mounting rail as per DIN EN 60715.

Wiring

Connect electrical wiring as per the diagram in Figure 2. The device may be damaged permanently if connected incorrectly.

Commissioning

The power supply to the DTSW Astro 1 must be connected for system control. The backlighting switches on automatically and the main screen is displayed. The back-lighting remains off if there is no external power supply. All programmed dates and times are retained for a period of ten years thanks to the integrated lithium battery. If no battery is installed, dates and times are only retained for approx. 4 days. Four keys are used to configure and program the equipment. The display shows the following information:

- » Schedule of actions for the day in question (goes out during a holiday period). One schedule per channel with 24 segments, each segment corresponding to one hour.
- » The display has a text line that alternatively shows the following information:
 - › Times of sunrise and sunset for the day with corresponding symbol: sun ☀ = sunrise, moon ☾ = sunset
 - › Selected city
 - › Date and time
 - › Permanent operation
 - › Active holiday period
- » Manual operation symbol . Flashes when manual operation is activated. Permanent switching: symbol illuminates constantly
- » Status of circuits C₁/C₂: on , off 

Settings

DTSW Astro 1 timer switches are programmed with the following default settings:

- » Current time: GMT+1
- » Astronomical correction: deactivated
- » Adjustment to summer time (daylight saving): automatic
- » Adjustment to standard time (daylight saving): automatic
- » Holidays: none (all four time periods deactivated)
- » Programmes: C₁ to C₂ on at sunset/
C₁ and C₂ off at sunrise (see Fig. 4)

Manual operation

Press the ▼ C₁ or ▲ C₂ key on the main screen to occasionally switch the status of the circuits and activate or deactivate manual operation. The symbol above the chan-

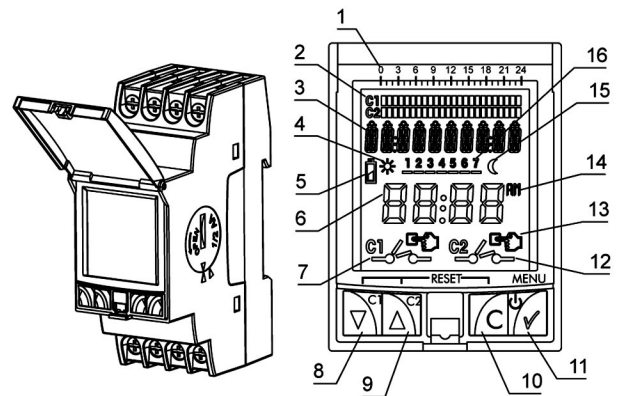
nel in operation flashes until ▼ C₁ or ▲ C₂ is pressed again and the original state is restored.

Programming

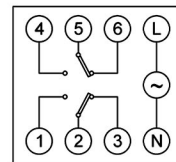
The menus and sub-menus are used to program the device, under programming or device settings. Press the ✓ key to access the main menu from the standby screen. Use ▼ and ▲ to scroll through the different menus and select ✓ to view a specific menu. Press C to return to the previous screen. The information to be programmed flashes constantly on the screen.








Figure 1

- | | |
|--|---|
| 1. Time scale | 9. Scroll up in the menu/
C ₂ manual operation |
| 2. Schedule | 10. Cancel/return to menu |
| 3. Text line | 11. Confirm/access menu/ Turn on
the device without supply |
| 4. Sunrise symbol | 12. C ₂ relay status symbol |
| 5. Battery display | 13. Manual operation (flashes)
permanent (illuminates
constantly) |
| 6. Date/time | 14. Hour display 12/24 h |
| 7. C ₁ relay status symbol | 15. Sunset symbol |
| 8. Scroll down in the menu/
C ₁ manual operation | 16. Weekday |

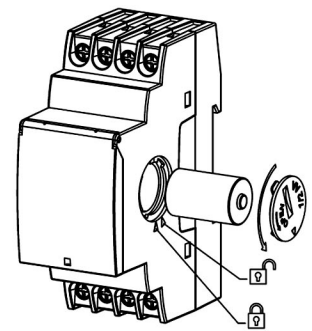


▲ Figure 1

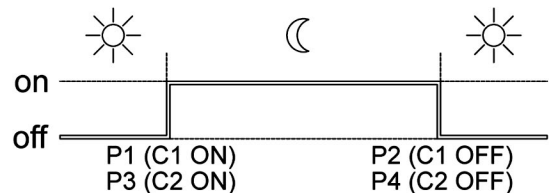


- | | |
|---|-----------|
|  | — 3000 W |
|  | — 1200 VA |
|  | — 2000 VA |
|  | — 3000 W |
|  | — 600 VA |
|  | — 400 VA |
|  | — 90 VA |

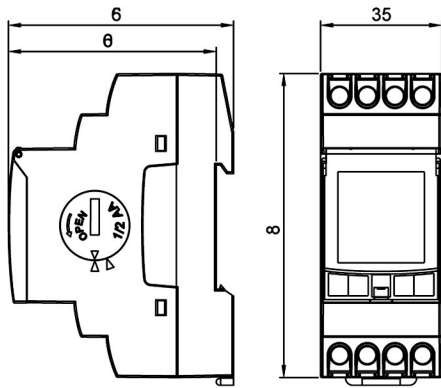
▲ Figure 2



▲ Figure 3



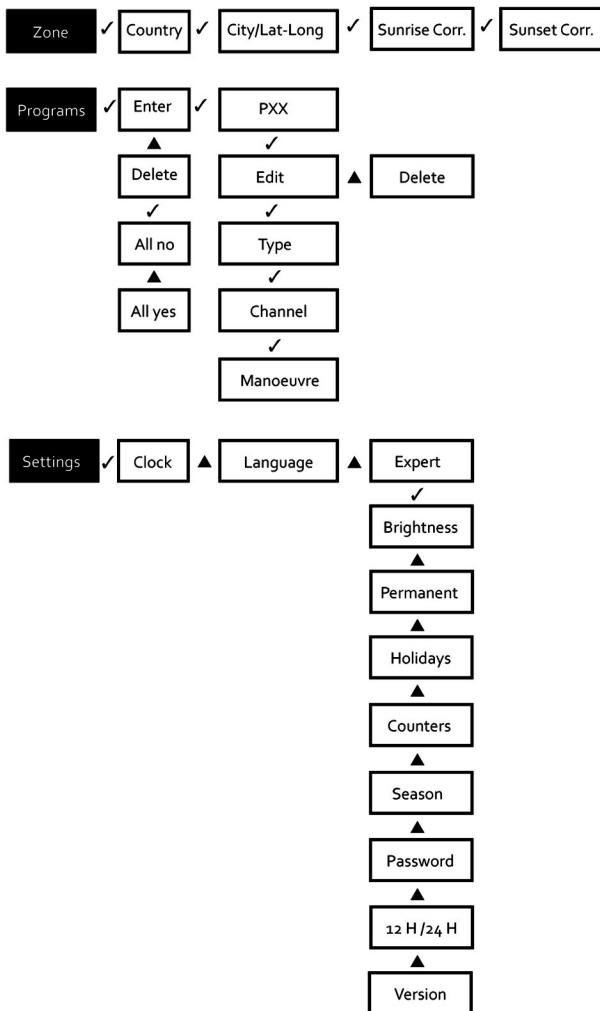
▲ Figure 4



▲ Figure 5

The menus are structured as follows:

Main menu

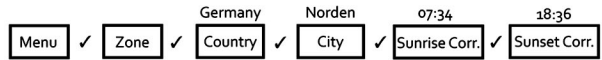


Zone

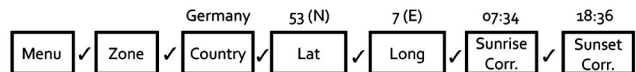
The country in which the device is installed can be selected from a list, as well as the closest city. The astronomical timer switch uses the geographic location and date to determine the time of sunrise and sunset for each day of the year.

- » Astronomical correction: as soon as the city is selected, the time of sunrise and sunset can be corrected and adjusted for various topographical conditions (such as fences, neighbouring buildings, etc.) The sunrise and sunset times can be adjusted forward or backward by up to 9 hours 59 minutes; the correct time is shown on the display during programming.

The closest city to the location is selected



The location is selected by entering the latitude and longitude coordinates (latitude: +40° north, longitude: -3° east)



Programmes

The various actions are programmed using this menu. There are 40 memory slots (from PROG_01 to PROG_40).

- » Enter: press the ✓ key to access the menu. Once the menu is open, the active programme is indicated (P-01 to P-40) and the following options are provided:
 - » Edit: (if programmed already) When ✓ is pressed to confirm, the text 'Po1: EDIT' appears on the display.
 - » Type: press ▼ and ▲ to select the action type: on, off. Confirm with ✓.
 - » Channel: select the channel to be programmed (C1 and/or C2).
 - » Action: select the type of action:
 - » Fixed: action is carried out at a pre-set time.
 - » Sunset: action is carried out at sunset. The time of sunset can be adjusted.
 - » Sunrise: action is carried out at sunrise. The time of sunrise can be adjusted.
 - » Start Red.: action is carried out at a pre-set time previously selected based on the sunset.
 - » End Red.: action is carried out at a pre-set time, if this time occurs before sunrise, as the time of sunrise takes precedence in this case.
 - » The hour, minute and combination of weekdays are then selected for the action.

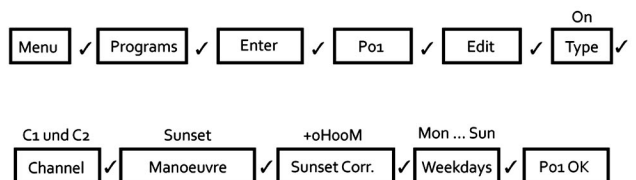
Programme for holidays

If when selecting the last weekday the ✓ key is held down, this action is limited to holidays. The word 'Holiday' appears on the display. Use the ▼ and ▲ keys to choose one of the four holiday periods.

- » Delete: confirming with ✓ deletes the selected programme. As all programmes are saved consecutively, deleting a programme may cause other programmes to be assigned a different number.
- » Delete: allows the user to delete all actions for all 40 programmes in one step.

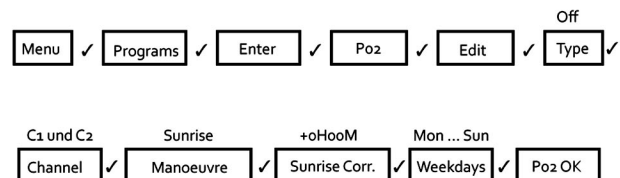
Programme for switching on at sunset

The device is programmed to switch "on" at sunset by default.

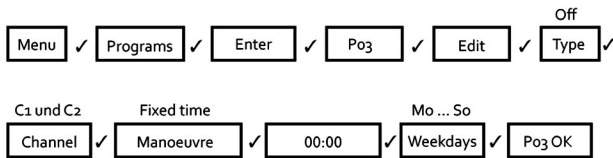


Programme for switching off at sunrise

The device is programmed to switch "off" at sunrise by default.



Programme for switching off at midnight



Settings

The device is configured using this menu.

- » Clock: sets the device date and time. The variables to be configured are (in this order): year, month, day, hour and minute. The weekday is worked out automatically.
- » Language: this menu is used to select the device language.
- » Expert: this menu is used to carry out the majority of the device configurations.
 - » Brightness: menu used to select the brightness of the display: minimum, low, medium, high or maximum. When the displayed level is confirmed, the display brightness remains set.
 - » Permanent: this menu is used to define permanent operation (on/off) for channel C1 and channel C2. Use the ▼ and ▲ keys to scroll through the various options: C1: yes → C1: no → C2: yes → C2: no. Press ✓ to confirm the desired option. If 'yes' is selected, the device ignores the action programming for the selected channel. The contact can be switched manually (see 'Manual operation').
 - » Holidays: four holiday periods can be programmed in order to carry out the selected actions in the programming only during holidays. If no actions are programmed for a time period, the channels remain switched off during this holiday period.
 - » Edit: programme the month, day, hour and minute of the period start and month, day, hour and minute of the period end. This period is repeated every year.
 - » Delete: the selected period is deleted.
 - » Counter: this menu shows the switch-on time (in hours) of each circuit. Press the ✓ key to access the counter for each channel and reset it. Delete: select 'yes' and confirm.
 - » Daylight saving: allows the time to be changed from summer to standard time and vice versa.
 - » Active: automatically adjusts the time for daylight saving based on the country's specific time settings. In the EU, this occurs on the last Sunday in March and the last Sunday in October.
 - » Inactive: no automatic adjustment for daylight saving occurs.
 - » Password: menu for activating or deactivating the key lock which prevents unauthorised access to the device configuration.
 - » Inactive: key lock is disabled.
 - » Active: key lock is enabled. The user is prompted to choose a four-digit password. The key lock activates 30 seconds after the user exits the settings and returns to the standby display. If a key is pressed after this point, the message 'Password' appears on the screen. The password chosen during activation must then be entered in order to access the device. The device is unlocked for 10 seconds, during which time the user must open the device configuration menu by pressing ✓ or defining some other setting. If after this point no further action is taken, the device locks again after 30 seconds.
 - » Hour display 12/24 h: press the ▼ and ▲ keys to choose how the time is displayed. Confirm the selection with ✓.
 - » Version: this menu shows the software version of the device.

Note that if actions are programmed to be carried out at the same time, some actions take precedence over others. Actions are prioritised in the following order:

Permanent mode → Manual → PROG_01 → PROG_02 → → PROG_40

Resetting the device

In standby mode (main screen), hold down the C key and ▼ and ▲ keys at the same time for over 3 seconds. The display switches off and all programming is deleted. Only the four default programmes are retained in the memory. The device must be connected to the power supply. Pressing all four keys simultaneously deletes options more quickly, but does not reset the programming. The device must be connected to the power supply.

Changing the battery

Figure 3

The device contains a replaceable lithium battery and therefore has a backup power supply of up to ten years. To replace the battery, remove the cover on the right-hand side of the device. The battery symbol appears on the display when the battery has died and the device is running off the mains supply.

Note: when the battery is changed the device programming and the current time are retained.

Switch off the power when changing the battery.

To open, turn the battery cover anticlockwise using a coin or other flat object until the marks on the cover line up with the "open" mark on the device. After changing the battery, reposition the battery cover and turn clockwise.

Technical data

Operating voltage	230 V AC
Tolerance	± 10%
Switching power	µ 2x16 (10) A / 250 V-
Recommended max. loads	see Figure 2
Internal consumption	max. 16 VA inductive (1.3 W)
Contact	AgSnO ₂ changeover contact
Display	LCD with backlighting
Accuracy rate	± 1 sec. per day at 23°C
Deviation	± 0.15 sec. per °C and 24 h period
Reserve power	10 years (without power supply from the mains) 48 hours (without power supply from the battery or the mains)
Software class and structure	class A
Memory capacity	40 slots
Number of channels	2 slots
Action type	sunrise/sunset, pre-set time: on/off, red.
Astronomical adjustment	daily
Action accuracy	± 1 sec.
Operating temperature	-10°C to +45°C
Transport and storage temperature	-20 °C to +60 °C
Pollution degree	2 slots
Degree of protection	IP20 as per EN 60529
Protection class	II when mounted correctly
Transient pulse voltage	2.5 kV
Temperature test for thrust ball	+ 80°C / 21.2.5
Keypad cover	sealable
Wiring	via ring terminal/max. cable cross-section 4 mm ²
Battery	½ AA – 3.6 V – 1000 mAh – Li/SOCI ₂
Housing dimensions	2 DIN modules (35 mm), see Figure 5

Warning

This timer switch has a battery with contents that are potentially harmful to the environment. Dispose of used batteries properly or return the product to the manufacturer for proper disposal.

Warranty

All professionally installed, unaltered devices are covered by warranty during the statutory guarantee period from the day of purchase by the end user. The warranty is not applicable to damage incurred during transport or caused by short-circuit, overloading or improper use. In the event of defects in workmanship or material, which are discovered within the warranty period, the company will provide repair or replacement free of charge. The warranty will be rendered null and void if the device is opened without authorisation.