Electrical installation solutions for buildings – Technical details
Control and automation

Index
AG Timer electro-mechanical time switches  7/2
DBT Timer digital time switches  7/5
E 232 staircase lighting time-delay switches  7/11
E 234 CT-D electronic timers  7/12
TL Line twilight switches  7/21
LCR load management relay  7/24
Control and automation technical details
AG Timer electro-mechanical time switches

How to program AD1NO-15m - AD1NO-R-15m
Connection diagrams

How to program AD1CO-15m - AD1CO-R-15m - AW1CO-R-120m
Connection diagrams

How to program AD1CO-30m - AD1CO-R-30m - AW1CO-R-210m
Connection diagrams

How to program AD1-R-15m-72
Connection diagrams

Diagram Description:
1. Battery cover
2. Programming dial
3. Index
4. Manual selector
5. Relay output
6. Power supply

Diagram Description:
1. Battery cover
2. Programming dial
3. Index
4. Manual selector
5. Manual selector
6. Manual selector

Diagram Description:
1. Battery cover
2. Programming dial
3. Index
4. Manual selector
5. Manual selector
6. Manual selector

Diagram Description:
1. Selector switch
2. Indicator
3. Trippers for programming
4. Trippers for programming
5. Accessory for panel mounting
6. Transparent protection cover
7. Extractable terminal block
8. Accessory for wall or DIN rail installation
Operating principle
The AG Timer electro-mechanical time switches enable to control the circuit opening/closing according to a daily or weekly program or to manually set permanent ON/OFF operation.

Application environments
The AG Timer electro-mechanical time switches are particularly indicated in any environment and situation where it is necessary to program system load operation according to a daily or weekly frequency (shop lighting system, public buildings, heating systems, irrigation systems, etc.).

Example of installation
As shown in the diagrams, one of the possible applications is to mount the AW1CO-R-120m electro-mechanical time switch inside the power supply circuit of a golf field. In this case the device programming enables the daily activation of the irrigation system at a preset time.
Control and automation technical details
AG Timer electro-mechanical time switches

AG Timer with panel/wall mounting

Operating principle
The AD1-R-15m-72 electro-mechanical switch enables to control the circuit opening/closing according to a daily program or to manually set permanent ON/OFF operation.

Example of installation
One of the possible applications is to use the AD1-R-15m-72 to command the heating activation at specific times during the day, allowing energy saving.

Application environments
The AD1-R-15m-72 electro-mechanical time switch is particularly indicated in any environment and situation where it is necessary to program system load operation according to a daily frequency (lighting system, heating systems, venting systems, etc.).
Control and automation technical details

DBT Timer digital time switches

Innovations

- DBT Timer range is equipped with impulse, cycle, random and holiday programs. They can have daily, weekly or annual mode.
- Holiday management with the possibility of programming them in various periods throughout the year
- Menu programming with 4 simple keys
- Astronomical management allows automatic setting, for each day of the year, of sunrise and sunset times
- Minimum switching time is 1 second for pulse program
- Multilingual menu with 6 language choices

Bluetooth communication combined with the DBT Timer APP available for Android and iOS ensure smart configuration and quick visualization. This functionality also allows to transfer programs from one device to another simply using the Smartphone.

The DY DCF77 antenna that receives the DCF77 radio synchronisation signal transmitted by the atomic clock installed c/o Mainflingen, near Frankfort, increases digital clock precision.

The DY GPS antenna that receives time from the Global Positioning System, that offers a more accurate value than land transmissions in addition to the possibility of receiving the signal anywhere in the world.
## Control and automation technical details

**DBT Timer digital time switches**

### Display description

| Channel 1 / Channel 2 status indication | Channel 1 | On/Off status
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Active manual program</td>
<td>C1</td>
<td>OK</td>
</tr>
<tr>
<td>Blocked switchings</td>
<td>C2</td>
<td></td>
</tr>
<tr>
<td>Active random switchings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(flashing): active cycle switchings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active holiday program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active pulse program</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Access to device

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>←</td>
<td>Turn on the display</td>
</tr>
<tr>
<td>C1</td>
<td>Decrease datum</td>
</tr>
<tr>
<td>C2</td>
<td>Increase datum</td>
</tr>
<tr>
<td>R</td>
<td>Hardware reset</td>
</tr>
<tr>
<td>3 sec</td>
<td>Random switching channel 1</td>
</tr>
<tr>
<td>3 sec</td>
<td>Random switching channel 2</td>
</tr>
<tr>
<td>3 sec</td>
<td>Active cycle switching on channel 1</td>
</tr>
<tr>
<td>3 sec</td>
<td>Active cycle switching on channel 2</td>
</tr>
</tbody>
</table>

### Menu description

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>←</td>
<td>Turn on the display</td>
</tr>
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<td>C1</td>
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</tr>
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</tr>
<tr>
<td>R</td>
<td>Hardware reset</td>
</tr>
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<td>Random switching channel 1</td>
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<tr>
<td>3 sec</td>
<td>Random switching channel 2</td>
</tr>
<tr>
<td>3 sec</td>
<td>Active cycle switching on channel 1</td>
</tr>
<tr>
<td>3 sec</td>
<td>Active cycle switching on channel 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Menu</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settings</td>
<td>Allows to change: language, date, time, daylight saving time (DST), astronomical coordinates, minimum and maximum duration of the interval between two switchings with random program, ON and OFF duration of cycle switchings and PIN for keyboard lock</td>
</tr>
<tr>
<td>Program</td>
<td>Allows to create a new program, check created programs, change or delete a created program, copy all created programs of channel 1 on channel 2 and vice versa.</td>
</tr>
<tr>
<td>Bluetooth</td>
<td>Allows to enable or disable the Bluetooth interface and to change the password used to associate devices (smartphone)</td>
</tr>
<tr>
<td>Hour counter</td>
<td>Allows to display the hours of usage (relay on) of connected load(s)</td>
</tr>
<tr>
<td>Reset</td>
<td>Allows to restore the initial state of the device</td>
</tr>
<tr>
<td>Firmware menu</td>
<td>Shows the firmware installed in the device</td>
</tr>
</tbody>
</table>
Control and automation technical details

DBT Timer digital time switches

**DY DCF77 antenna**
Operating principle:
This antenna receives scheduled messages broadcasted from the Frankfurt on Main (Germany) based DCF77 emitter. Thanks to this signal, the time switches are automatically set to: hour, date and proper daylight saving time. The broadcast power is 50 kW and the range is approximately 2500 kilometers from Frankfurt on Main. The signal is sometimes received intermittently and not in all locations, especially in countries far enough from the DCF77 emitter. For optimal signal reception the arrow marked side of the antenna must be rotated towards Frankfurt on Main.

**DY GPS antenna**
Operating principle:
The Global Positioning System provides an accurate location and time information for an unlimited number of people in all weather, day or night, anywhere in the world. The synchronization received from GPS is far more precise regarding to terrestrial broadcast. The GPS system relays upon time from satellite based atomic clocks, constantly controlled and corrected from a ground stations network. The time is derived from different sources simultaneously, the digital time switches can automatically compensate for propagation delays and other problems by providing more precise values than terrestrial.
Control and automation technical details

DBT Timer digital time switches

Operating principle
The DW2 two-channel digital weekly time switch enables to open and close circuits according to a daily or weekly program, controlling single loads or group ones even when they require different time controls with a common time reference. In this example, the digital time switch DW2 allows the operation of heating as well as lighting systems of a church when services are performed; when no service is performed, the device only controls the heating system.

Application environments
The DW2 two-channel digital weekly time switch is particularly indicated in environments and situations requiring the management of multiple loads according to a time program flexible enough to include or exclude their application based on the day of the week (offices, schools, public areas, etc.).

Example of installation
As shown in the diagrams, one of the possible applications is to mount the DW2 two-channel digital weekly time switch inside the power supply circuit of a church, where in the days when no service is performed only the heating system is activated (programmed on one of the two channels) at a preset time, while on Sundays and when services are performed the lighting system is also switched on (through a program on the second channel). According to the controlled system power, the activation is performed by an ESB contactor.
Control and automation technical details
DBT Timer digital time switches

Astronomical version – DWA
- Astronomical and time programming
- Impulse, cycle, random and holiday program
- Automatic summer and winter time change
- Up to 120 storable events
- Opportunity to correct the astronomical time up to ±120 min
- Up to 400 pre-defined cities
- 1 or 2 changeover contacts
- Latitude adjustment range from +90° North to -90° South.
- Longitude adjustment range from 180° East to 180° West.
- Manual and permanent override, activated with one touch on the front of the device
- Clear display of contact status
- Unlosable hinged window
- The protection code PIN is used to prevent interference by unauthorised persons
- Android and iOS application for quick and ease programming
- Wiring diagram printed on the side of the product

Programming example
Ex: Rome

- Longitude 12° EAST
- Latitude 41° NORTH
- Universal Date
  Time = +1 hour

Ex: Rome on the map:}

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Title: Control and automation technical details
Subtitle: DBT Timer digital time switches

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- Universal Date
  Time = +1 hour

Ex: Rome on the map:
Control and automation technical details

DBT Timer digital time switches

Operating principle
The installation of an astronomical time switch in a system is a particularly useful addition for settings and situations in which light sources, or other environmental conditions, can cause changes in the brightness level and falsify the reading. In these cases, the DWA1 and DWA2 astronomical switches can control the lighting system according to the sunrise and sunset times of the geographic zone in which the system is installed.

Application environments
The installation of the DWA1 and DWA2 astronomical time switches is particularly suitable for applications in which the operation of a twilight switch with external probe can be falsified or compromised by external agents (such as environmental pollution, overexposure to light, vandalism, etc.).

Example of installation
Atmospheric pollution is one of the causes of a reduction in the level of environmental light. Dust deposits on the external probe of a traditional twilight switch can compromise the operation of the device, preventing it from automatically switching off the controlled lighting system in the presence of external light.

As shown in the example, this problem can be solved by installing a DWA1 astronomical time switch that controls the lighting system according to the level of light calculated from the preset longitude and latitude parameters.
Control and automation technical details
E 232 staircase lighting time-delay switches

E 232E-230 Multi 10, 8/230 Multi 10

Operating principle
Activated by a pulse command through a pushbutton, the E 232 staircase light switch turns on the installation’s lights for a time T1. In order to avoid an unexpected darkness, the Multi10 devices are equipped with a switch-off warning (double flash).

Application environments
Installation of the E 232 staircase lighting with switch-off warning functionality is ideal wherever the lighting must be timed and unexpected darkness must be avoided (staircases and passageways in public places, cellars, garages, etc.).

Example of installation
One of possible applications of the E 232E-230 Multi 10 staircase switch is in the staircase lighting plant of a multistory building. Pushing the push-button, the timer of the E 232E-230 Multi 10 switch turns on the lights for a settable T1 time. At the end of the time the device gives a prewarning by blinking that the set time expires. The user can restart the timer again by pressing the button.
Remarks
Legend
☐ Control supply voltage not applied / Output contact open
☐ Control supply voltage applied / Output contact closed
☐ A1-Y1/B1 Control input with voltage-related triggering

Terminal designations on the device and in the diagrams
The 1st c/o contact is always designated 15-17/18.
The 2nd c/o contact is designated 25-27/28.
The n/o contacts of the star-delta timers are designated with 17-18 and 17-28.
Control supply voltage is always applied to terminals A1-A2.

Function of the yellow LED
The yellow LED R glows as soon as the output relay energizes and turns off when the output relay de-energizes.

ON-delay
(Delay on make)
CT-ERD, CT-MFD
This function requires continuous control supply voltage for timing.
Timing begins when control supply voltage is applied.
The green LED flashes during timing. When the selected time delay is complete, the output relay de-energizes and the flashing green LED turns steady. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input A1-Y1/B1 of the CT-MFD is disabled when this function is selected.

OFF-delay with auxiliary voltage
(Delay on break)
CT-AHD, CT-MFD
This function requires continuous control supply voltage for timing. If control input A1-Y1/B1 is closed, the output relay energizes immediately. If control input A1-Y1/B1 is opened, the time delay starts. The green LED flashes during timing. When the selected time delay is complete, the output relay de-energizes and the flashing green LED turns steady. If control input A1-Y1/B1 recloses before the time delay is complete, the time delay is reset and the output relay does not change state. Timing starts again when control input A1-Y1/B1 re-opens. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.
Control and automation technical details
E 234 CT-D electronic timers

1️⃣ Impulse-ON
(Interval)
CT-VWD, CT-MFD
This function requires continuous control supply voltage for timing. The output relay energizes immediately when control supply voltage is applied and de-energizes after the set pulse time is complete. The green LED flashes during timing. When the selected pulse time is complete, the flashing green LED turns steady. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input A1-Y1/B1 of the CT-MFD is disabled when this function is selected.

1️⃣ Impulse-OFF with auxiliary voltage
(Trailing edge interval)
CT-MFD
This function requires continuous control supply voltage for timing. If control supply voltage is applied, opening control input A1-Y1/B1 energizes the output relay immediately and starts timing. The green LED flashes during timing. When the selected pulse time is complete, the output relay de-energizes and the flashing green LED turns steady. Closing control input A1-Y1/B1, before the time delay is complete, de-energizes the output relay and resets the time delay. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

重要作用，如图所示

2️⃣ Flasher, starting with the ON time
(Recycling equal times, ON first)
CT-EBD, CT-MFD
Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an ON time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input A1-Y1/B1 of the CT-MFD is disabled when this function is selected.

2️⃣ Flasher, starting with the OFF time
(Recycling equal times, OFF first)
CT-MFD
Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an OFF time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input A1-Y1/B1 of the CT-MFD is disabled when this function is selected.
Control and automation technical details

E 234 CT-D electronic timers

## Pulse former (Single shot)
**CT-MFD**

This function requires continuous control supply voltage for timing.

Closing control input **A1-Y1/B1** energizes the output relay immediately and starts timing. Operating the control contact switch **A1-Y1/B1** during the time delay has no effect. The green LED flashes during timing. When the selected ON time is complete, the output relay de-energizes and the flashing green LED turns steady. After the ON time is complete, it can be restarted by closing control input **A1-Y1/B1**. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

## Pulse generator, starting with the ON or OFF time
(Recycling unequal times, ON or OFF first)
**CT-TGD**

This function requires continuous control supply voltage for timing.

Applying control supply voltage, with open control input **A1-Y1/B1**, starts timing with an ON time first. Applying control supply voltage, with closed control input **A1-Y1/B1**, starts timing with an OFF time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time. The ON & OFF times are independently adjustable. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

## Star-delta change-over
(Star-delta starting)
**CT-SDD, CT-SAD**

This function requires continuous control supply voltage for timing.

Applying control supply voltage to terminals **A1-A2**, energizes the star contactor connected to terminals **17-18** and begins the set starting time t₁. The green LED flashes during timing. When the starting time is complete, the first output contact de-energizes the star contactor.

Now, the transition time t₂ starts. When the transition time is complete, the second output contact energizes the delta contactor connected to terminals **17-28**. The delta contactor remains energized as long as control supply voltage is applied to the unit.
Control and automation technical details
E 234 CT-D electronic timers – Technical data

Data at $T_a = 25$ °C and rated values, unless otherwise indicated

<table>
<thead>
<tr>
<th>Input circuit - Supply circuit</th>
<th>CT-D with 1 c/o contact</th>
<th>CT-D with 2 c/o contacts</th>
<th>CT-MFD.21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated control supply voltage $U_s$</td>
<td>24-240 V AC / 24-48 V DC</td>
<td>12-240 V AC/DC</td>
<td></td>
</tr>
<tr>
<td>Rated control supply voltage $U_s$ tolerance</td>
<td>-15...+10 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated frequency</td>
<td>DC or 50/60 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency range AC</td>
<td>47-63 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical power consumption</td>
<td>max. 3.5 VA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power failure buffering time</td>
<td>min. 20 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release voltage</td>
<td>&gt; 10 % of the minimum rated control supply voltage $U_s$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Input circuit - Control circuit | | | |
|--------------------------------| | | |
| Control input, control function | A1-Y1/B1 | start timing external |
| Kind of triggering | voltage-related triggering |
| Resistance to reverse polarity | yes |
| Parallel load / polarized | yes / yes |
| Maximum cable length to the control inputs | 50 m - 100 pF/m |
| Minimum control pulse length | 20 ms |
| Control voltage potential | see rated control supply voltage |
| Current consumption of the control input | see data sheet |

| Timing circuit | | | |
|----------------| | | |
| Time ranges | 7 time ranges 0.05 s - 100 h | 1.) 0.05-1 s | 2.) 0.5-10 s | 3.) 5-100 s | 4.) 0.5-10 min |
| | | 5.) 5-100 min | 6.) 0.5-10 h | 7.) 5-100 h |
| | 4 time ranges 0.05 s - 10 min (CT-SDD, CT-SAD) | 1.) 0.05-1 s | 2.) 0.5-10 s | 3.) 5-100 s | 4.) 0.5-10 min |
| Recovery time | < 50 ms |
| Accuracy within the rated control supply voltage tolerance | $\Delta t < 0.005$ % / V |
| Accuracy within the temperature range | $\Delta t < 0.06$ % / °C |
| Repeat accuracy (constant parameters) | $\Delta t < \pm 0.5$ % |
| Setting accuracy of time delay | $\pm 10$ % of full-scale value |
| Star-delta transition time | CT-SDD / CT-SAD | fixed 50 ms / adjustable: 20 ms, 30 ms, 40 ms, 50 ms, 60 ms, 80 ms or 100 ms |
| Star-delta transition time tolerance | CT-SDD / CT-SAD | $\pm 3$ ms |

| Indication of operational states | | | |
|--------------------------------| | | |
| Control supply voltage / timing | $U_s$ LED | 1: control supply voltage applied |
| | | 2: timing |
| Relay energized | R, R1, R2: yellow LED | 1: output relay energized |

| Operating elements and controls | | | |
|--------------------------------| | | |
| Adjustment of the time range | front-face rotary switch, direct reading scales |
| Fine adjustment of the time value | front-face potentiometer |
| Preselection of the timing function at multifunction devices | front-face rotary switch, direct reading scales |
| Adjustment of the transition time | CT-SAC | front-face potentiometer |
## Control and automation technical details

### E 234 CT-D electronic timers – Technical data

<table>
<thead>
<tr>
<th>Output circuit</th>
<th>CT-D with 1 c/o contact</th>
<th>CT-D with 2 c/o contacts</th>
<th>CT-MFD.21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kind of output</td>
<td>15-16/18 Relay, 1 c/o contact</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>15-16/18; 25-26/28 -</td>
<td>Relay, 2 c/o contacts</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>17-18; 17-28 -</td>
<td>Relay, 2 n/o contacts (CT-SDC, CT-SAC)</td>
<td>-</td>
</tr>
<tr>
<td>Contact material</td>
<td>AgNi alloy, Cd free</td>
<td>250 V</td>
<td>-</td>
</tr>
<tr>
<td>Rated operational voltage $U_o$</td>
<td>250 V</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minimum switching voltage / minimum switching current</td>
<td>12 V / 100 mA</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Maximum switching voltage / maximum switching current</td>
<td>250 V AC / 6 A</td>
<td>250 V AC / 5 A</td>
<td>-</td>
</tr>
<tr>
<td>Rated operational current $I_e$</td>
<td>AC-12 (resistive) at 230 V 6 A</td>
<td>5 A</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>AC-15 (Inductive) at 230 V 3 A</td>
<td>3 A</td>
<td>n/o: 3 A n/c: 0.75 A</td>
</tr>
<tr>
<td></td>
<td>DC-12 (resistive) at 24 V 6 A</td>
<td>5 A</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>DC-13 (Inductive) at 24 V 2 A</td>
<td>2 A</td>
<td>1 A</td>
</tr>
<tr>
<td>AC rating (UL 508) utilization category (Control Circuit Rating Code)</td>
<td>B 300</td>
<td>n/o: B 300 n/c: C 300</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>max. rated operational voltage 300 V AC</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>maximum continuous thermal current at B300 5 A</td>
<td>n/o: 5 A</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>maximum continuous thermal current at C300 n/c: 2.5 A</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>max. making/breaking apparent power at B300 3600 VA / 360 VA</td>
<td>n/o: 3600/360 VA</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>max. making/breaking apparent power at C300 n/c: 1800/180 VA</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mechanical lifetime</td>
<td>30 x $10^6$ switching cycles</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Electrical lifetime</td>
<td>0.1 x $10^6$ switching cycles</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Max. fuse rating to achieve short-circuit protection</td>
<td>n/c contact 6 A fast-acting</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>n/o contact 10 A fast-acting</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>General data</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mean time between failures (MTBF)</td>
<td>on request</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Duty time</td>
<td>100%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dimensions</td>
<td>see ‘Dimensional drawings’</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mounting</td>
<td>DIN rail (IEC/EN 60715), snap-mounting without any tool</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mounting position</td>
<td>any</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minimum distance to other units</td>
<td>horizontal / vertical no / no</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Material of housing</td>
<td>UL 94 V-2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>housing / terminals IP50 / IP20</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Connecting capacity fine-stranded with(out) wire and ferrule</td>
<td>2 x 0.5-1.5 mm² (2 x 20-16 AWG)</td>
<td>1 x 0.5-2.5 mm² (1 x 20-14 AWG)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>rigid 2 x 0.5-1.5 mm² (2 x 20-16 AWG)</td>
<td>1 x 0.5-4 mm² (1 x 20-12 AWG)</td>
<td>-</td>
</tr>
<tr>
<td>Stripping length</td>
<td>7 mm (0.28 in)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tightening torque</td>
<td>0.5-0.8 Nm (4.43-7.08 lb.in)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Environmental data</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ambient temperature range operation / storage</td>
<td>-20 ... +60 °C / -40 ... +85 °C</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Climatic class</td>
<td>EC/EN 60068-2-30 3K3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Relative humidity range</td>
<td>25-85%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vibration, sinusoidal</td>
<td>IEC/EN 60068-2-6 20 m/s²; 10 cycles, 10...150...10 Hz</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Shock (half-sine)</td>
<td>IEC/EN 60068-2-27 150 m/s², 11 ms</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
## Control and automation technical details

**E 234 CT-D electronic timers – Technical data**

<table>
<thead>
<tr>
<th>Isolation data</th>
<th>CT-D with 1 c/o contact</th>
<th>CT-D with 2 c/o contacts</th>
<th>CT-MFC.21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage $U_i$</td>
<td>input circuit / output circuit</td>
<td>300 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>output circuit 1 / output circuit 2</td>
<td>300 V</td>
<td>300 V</td>
</tr>
<tr>
<td>Rated impulse withstand voltage $U_{imp}$</td>
<td>between all isolated circuits</td>
<td>4 kV; 1.2/50 μs</td>
<td></td>
</tr>
<tr>
<td>Power-frequency withstand voltage test (test voltage)</td>
<td>between all isolated circuits</td>
<td>2.5 kV; 50 Hz; 60 s</td>
<td></td>
</tr>
<tr>
<td>Basic insulation (IEC/EN 61140)</td>
<td>input circuit / output circuit</td>
<td>300 V</td>
<td></td>
</tr>
<tr>
<td>Protective separation (pollution degree 2, overvoltage category 2)</td>
<td>input circuit / output circuit</td>
<td>250 V</td>
<td></td>
</tr>
<tr>
<td>Pollution degree</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Overvoltage category</td>
<td></td>
<td>III</td>
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</tr>
</tbody>
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### Standards / Directives

<table>
<thead>
<tr>
<th>Standards / Directives</th>
<th>Standards</th>
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<tbody>
<tr>
<td>Low Voltage Directive</td>
<td>2014/35/EU</td>
<td></td>
</tr>
<tr>
<td>EMC Directive</td>
<td>2014/30/EU</td>
<td></td>
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<tr>
<td>RoHS Directive</td>
<td>2011/65/EU</td>
<td></td>
</tr>
</tbody>
</table>

### Electromagnetic compatibility

<table>
<thead>
<tr>
<th>Interference immunity to</th>
<th>Standards/Environments</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>electrostatic discharge</td>
<td>IEC/EN 61000-4-2</td>
<td>(6 kV / 8 kV)</td>
<td>(2 kV L-L)</td>
</tr>
<tr>
<td>radiated, radio-frequency, electromagnetic field</td>
<td>IEC/EN 61000-4-3</td>
<td>(10 V / m)</td>
<td>(2 kHz / 5 kHz)</td>
</tr>
<tr>
<td>electrical fast transient / burst</td>
<td>IEC/EN 61000-4-4</td>
<td>(2 kV / 5 kHz)</td>
<td>(4 kHz / 5 kHz)</td>
</tr>
<tr>
<td>surge</td>
<td>IEC/EN 61000-4-5</td>
<td>(2 kHz / 5 kHz)</td>
<td>(2 kHz / 5 kHz)</td>
</tr>
<tr>
<td>conducted disturbances, induced by radio-frequency fields</td>
<td>IEC/EN 61000-4-6</td>
<td>(10 V)</td>
<td>(2 kHz / 5 kHz)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interference emission</th>
<th>Standards/Environments</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>high-frequency radiated</td>
<td>IEC/CISPR 22, EN 55022</td>
<td>B</td>
</tr>
<tr>
<td>high-frequency conducted</td>
<td>IEC/CISPR 22, EN 55022</td>
<td>B</td>
</tr>
</tbody>
</table>
Control and automation technical details
E 234 CT-D electronic timers – Technical diagrams

Example of application - Star-delta changeover

Control circuit diagram

Power circuit diagram
Control and automation technical details
E 234 CT-D electronic timers – Technical diagrams

Connection diagrams

CT-MFD.21

A1 15 25

Y1/B1 A1 15 25

A2 16 18 26 28

A1-A2  Supply: 12-240 V AC/DC

A1-Y1/B1  Control input

15-16/18 1st c/o contact

25-26/28 2nd c/o contact

CT-MFD.12

A1 15 Y1/B1

A1-A2  Supply: 24-48 V DC or 24-240 V AC

A1-Y1/B1  Control input

15-16/18 1st c/o contact

CT-ERD.22

A1 15 25

Y1/B1 A1 15 25

A2 16 18 26 28

A1-A2  Supply: 24-48 V DC or 24-240 V AC

15-16/18 1st c/o contact

25-26/28 2nd c/o contact

CT-ERD.12

A1 15 25

A1-A2  Supply: 24-48 V DC or 24-240 V AC

15-16/18 1st c/o contact

CT-AHD.22

A1 15 25

Y1/B1 A1 15 25

A2 16 18 26 28

A1-A2  Supply: 24-48 V DC or 24-240 V AC

A1-Y1/B1  Control input

15-16/18 1st c/o contact

25-26/28 2nd c/o contact

CT-AHD.12

A1 15 Y1/B1

A1-A2  Supply: 24-48 V DC or 24-240 V AC

A1-Y1/B1  Control input

15-16/18 1st c/o contact

CT-VWD.12

A1 15 25

Y1/B1 A1 15 25

A2 16 18 26 28

A1-A2  Supply: 24-48 V DC or 24-240 V AC

A1-Y1/B1  Control input

15-16/18 1st c/o contact

CT-TGD.22

A1 15 25

Y1/B1 A1 15 25

A2 16 18 26 28

A1-A2  Supply: 24-48 V DC or 24-240 V AC

A1-Y1/B1  Control input

15-16/18 1st c/o contact

25-26/28 2nd c/o contact

CT-TGD.12

A1 15 Y1/B1

A1-A2  Supply: 24-48 V DC or 24-240 V AC

A1-Y1/B1  Control input

15-16/18 1st c/o contact

CT-SDD.22

A1 17

A1-A2  Supply: 24-48 V DC or 24-240 V AC

17-18 1st n/o contact (delta contactor)

17-28 2nd n/o contact (delta contactor)

CT-SAD.22

A1 17

A1-A2  Supply: 24-48 V DC or 24-240 V AC

17-18 1st n/o contact (star contactor)

17-28 2nd n/o contact (delta contactor)
Control and automation technical details
E 234 CT-D electronic timers – Technical diagrams

Load limit curves

AC load (resistive)

CT-D.1x

DC load (resistive)

CT-D.1x

Derating factor F for inductive AC load

Wiring notes for devices with control input

A parallel load to the control input is possible

CT-D devices with 1 c/o contact or 2 n/o contacts

CT-D devices with 2 c/o contacts

Dimensions in mm, inches
Main features of DIN rail version - TL1

DIN-Rail version
- 2 indication leds: one for contact status and one for threshold
- Adjustable switching delay
- Preset with 10 LUX from factory
- Brightness range from 2 to 200 lux
- Screw-less version
- 1 module width

Main features of pole version - TL1 Pole
- Innovative design for direct installation on a pole/wall
- Quick and easy to install, thanks to the simple wiring and ease of adjustment
- Laser etched connection diagram on the back of the product
- Integrated brightness sensor preset at 10 LUX from factory
- Adjustable threshold value from 2 to 200 LUX
- Switching delay of 25 sec. ±10% for ON and 35 sec. ±10% for OFF
- Unlosable screw terminals
- Protection degree IP54

TL1 Pole operating principle
Control and automation technical details
TL Line twilight switches

TL Line with DIN rail mounting – TL1

Operating principle
The diagram shows an example of the installation of the TL1 twilight switch in the lighting system of a commercial building. When the external light falls below a certain level (e.g. during the evening when the shop is closed), the device switches on the window lights and the shop sign. The lights can be switched off late evening to reduce power consumption thanks to the AD1NO-15m switch timer.

Application environments
The installation of the TL1 twilight switch with an AG Timer is particularly useful in settings and situations where energy saving is a prime concern (shops, office corridors and public passageways, car parks, parks, etc.).

Example of installation
As shown in the diagrams, one of the possible applications is the installation of a TL1 twilight switch in the lighting system of a commercial building. When the external light falls below a certain level (e.g. when the shop is closed), the twilight switch switches on the window lights and the sign. The lights can be switched off late evening to reduce power consumption thanks to the AD1NO-15m switch timer which keeps the circuit open until the next morning. When the external light returns to above the threshold value, the twilight switch relay returns to the open position.
**Control and automation technical details**

**TL Line twilight switches**

**Operating principle**

The diagram shows an example of the installation of the pole-mounted TL1 Pole twilight switch for motorway lighting systems. When the external light falls below a certain level, 10 lux for example, the device switches on the lights present in tunnels, service areas, near to junctions, etc. The lights are then switched off by the TL1 Pole in the morning when the 10 lux value is exceeded.

**Application environments**

The installation of the TL1 Pole twilight switch is particularly suitable for controlling public street lighting, thanks to the fact that they can be installed on poles, lamp standards, etc.

**Example of installation**

As shown in the diagrams, one of the possible applications is the installation of a TL1 Pole twilight switch in the motorway lighting system.

When the external light falls below a certain level (for example at sunset), the pole-mounted twilight switch switches on the lights to provide the correct lighting for the setting. At sunrise, the external brightness exceeds the threshold value and the twilight relay returns to the open position.
Control and automation technical details
LCR load management relay

Operating principle
LCR load management relay are used in case of exceeding of consumption threshold allowed in the system by switching off in sequence one or two loads, if necessary. At preset intervals and until current consumption is not below the reference level, the switch tries to reset the disconnected loads.

Application environments
The installation of the LCR load management relay is suitable for any environment and situation where it is necessary to control electric energy consumption within consumption limits allowed in the system.

Example of installation
As shown in the diagrams, one of the possible applications is the installation of the LCR load shedding switches in a printing office system, where the conditioning switch-on causes the exceeding of the energy consumption threshold defined with the supplying company by contract. The LCR load shedding switch preserves printing machines operation by switching off one or two primary loads automatically (i.e. night conditioning and lighting), where ON red leds indicate temporary OFF. After a preset interval, the switch checks that current consumption values fall within the limits again trying to reset the previously disconnected loads.
Control and automation technical details
LCR load management relay

Description

1 - Terminals for power supply and current measurement
2 - Relay terminals
3 - Red led: on indicates disconnected load
4 - Programming keys
5 - Backlit display (for 30 s from the pressure of one key)
6 - Measured power
7 - Active buzzer (Tbe)
8 - Disconnected load
9 - Setpoint is exceeded
10 - Icons for text guide keys function
   - 📣 (PR) Buzzer silencing
   - 🚫 (OK) Disconnected load rejection
11 - Not disconnectable loads
12 - Disconnectable loads

Connection via normally open contacts NO with $I_1 \leq 16\ A$ and $I_A + I_B + I_C \leq 32\ A$

Connection via normally closed contacts NC with $I_1 \leq 16\ A$ and $I_A + I_B + I_C \leq 32\ A$