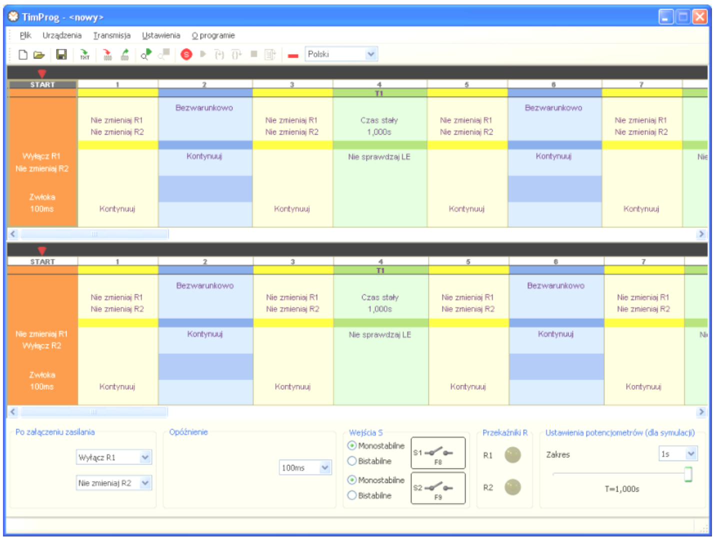
User Manual Software TimProg for universal timer relays MTR17-TPA/TPD-U240-XXX



START	1	2	3	4	5	6	7
				T1			
	Nie zmieniaj R1 Nie zmieniaj R2	Bezwarunkowo	Nie zmieniaj R1 Nie zmieniaj R2	Czas stały 1,000s	Nie zmieniaj R1 Nie zmieniaj R2	Bezwarunkowo	Nie zmieniaj R1 Nie zmieniaj R2
Wyłącz R1 Nie zmieniaj R2		Kontynuuj		Nie sprawdzaj LE		Kontynuuj	
Zwłoka 100ms	Kontynuuj		Kontynuuj		Kontynuuj		Kontynuuj

START	1	2	3	4	5	6	7
				T1			
	Nie zmieniaj R1 Nie zmieniaj R2	Bezwarunkowo	Nie zmieniaj R1 Nie zmieniaj R2	Czas stały 1,000s	Nie zmieniaj R1 Nie zmieniaj R2	Bezwarunkowo	Nie zmieniaj R1 Nie zmieniaj R2
Nie zmieniaj R1 Wyłącz R2		Kontynuuj		Nie sprawdzaj LE		Kontynuuj	
Zwłoka 100ms	Kontynuuj		Kontynuuj		Kontynuuj		Kontynuuj

Po załączeniu zasilania: Wyłącz R1; Nie zmieniaj R2

Opóźnienie: 100ms

Wejścia S
- ● Monostabilne ○ Bistabilne — S1 F8
- ● Monostabilne ○ Bistabilne — S2 F9

Przekaźniki R: R1, R2

Ustawienia potencjometrów (dla symulacji)
Zakres: 1s
T=1,000s

Table of Content

1. Introduction

Programmable timer relays MTR17-TPA-U240-XXX and MTR17-TPD-U240-205 are universal timing circuits, which implemented time function is defined by the user and loaded into the programmable relay with TimProg applications. The flexible structure of the program allows for quick and easy implementation of both standard and non-standard time functions, allowing the construction of control systems tailored to individual needs. Use the USB interface allows easy programming of the relay with a standard mini-USB cable, making it easier and minimizing the cost of the final starting of terminal units. Options viewing the current status of the relay and work simulation software make defining and running time functions easier.

Timer relay MTR17-TPD-U240-205 has two independent control inputs S1 and S2, two implementing relays R1 and R2 and the logical structure of a software that allows you to define two different time functions that perform in parallel. This solution allows implementation of two timer relays placed in one housing, reducing construction costs of terminal equipment and reducing the amount of occupied space in the control cabinet.

Depending on user’s needs, control inputs S1, S2 and implementing relays R1, R2 can be used in two different or only one time program. There is a possibility of mutual relations of the two programs, so that the action of one depends on the state of the relays controlled by another program.

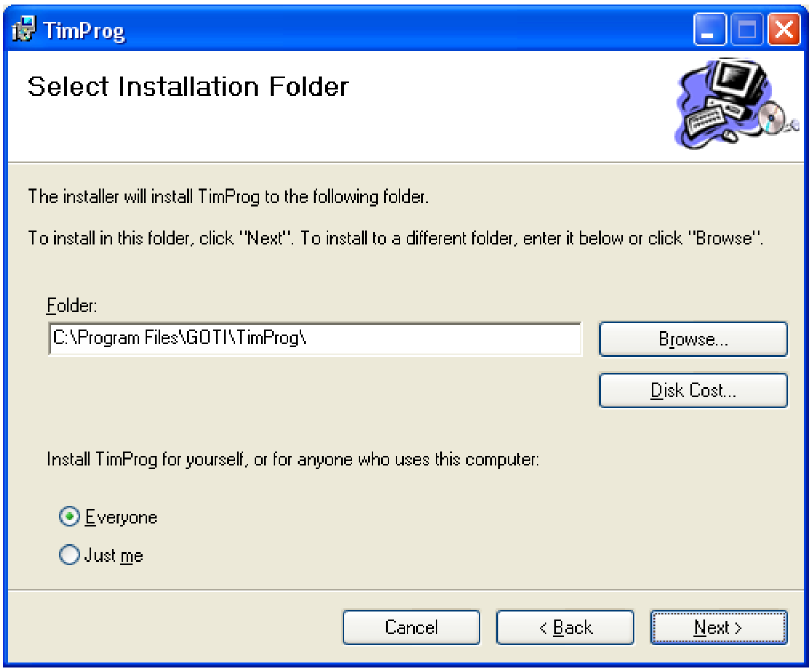
Relay MTR17-TPD-U240-205 is a low-cost alternative for simple applications where the complexity of the control logic required the use of programmable relays.

2. Installation

In order to install the software TimProg download the installation file with the extension *.msi from the manufacturer’s website:

http://www.dobry-czas.pl/Produkty/Przekazniki-czasowe-programowalne/Przekaznik-MTR17-TPD-U240-205

After running the file dialog appears, in which the field of possible folder is the selection of the target software installation path.



TimProg

Select Installation Folder

The installer will install TimProg to the following folder.

To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".

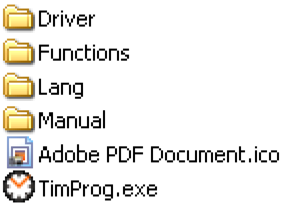
Folder: C:\Program Files\GOTI\TimProg\

Install TimProg for yourself, or for anyone who uses this computer:

● Everyone

○ Just me

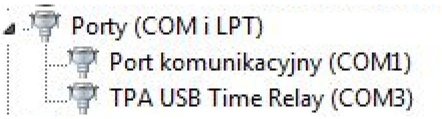
After the installation is completed in the specified location on the disk, you will see the file of TimProg and its subdirectories *Driver, Functions, Lang* and *Manual.*



Driver
Functions
Lang
Manual
Adobe PDF Document.ico
TimProg.exe

Installing the driver

When you first connect the relay to the computer, the operating system will start searching for the driver of your USB device. You must manually select a file named TPx.inf located in a subdirectory of the Driver at the place of installation of the application. As a result of the installation of the driver to the list of devices will be added to the virtual serial port USB TPA Time Relay number depending on the current configuration of your computer.



Porty (COM i LPT)
Port komunikacyjny (COM1)
TPA USB Time Relay (COM3)

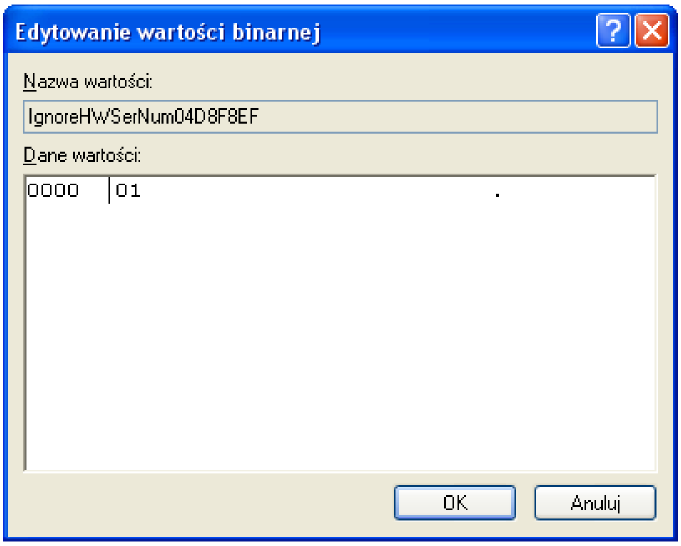
After you have successfully installed the driver software TimProg is ready to go.

Installing the driver for the serial programming.

USB controller used in programmable relay contains a unique identifier linked to a USB port, which includes the VID, PID and serial number. Therefore, each connection of the next relay to the computer causes the detection of a new device, which requires you to reinstall the USB driver. As for the user using a single piece of this is not a problem, in the case of more programming relays, each time you install a driver can become a nuisance.

It is possible to configure Windows to install the driver after the first programmable relay, he did not try to install subsequent pieces. To do this, you must:

1. Start the Windows Registry Editor regedit command.
2. Go to HKEY_LOCAL_MACHINE →SYSTEM→CurrentControlSet→Control→UsbFlags.
3. Right mouse button to call the command New→Binary value.
4. In the name of the new entry give IgnoreHWSerNum04D8F8EF and press Enter.
5. After double clicking on the added box enter a value of 01.



Nazwa wartości:
IgnoreHWSerNum04D8F8EF
Dane wartości:
```
0000    01                          .
```

From that point on, the one-time install programmable relay driver is enough to program any number of units of the product.

Relay driver series of TPA and TPD is identical. One-time installation allows for communication with any type of relay.

3. Software Resources.

Programmable timers in its programme structure contain four types of resources: the START field, Status Control field R, Conditional Block and Time Block. The analysis of these resources relay settings performs the function of measuring the time defined by controlling the state of the inputs S and R. regulations controlling relays.

In the version of the TPA can define only one time function, controlled by a single input S and controlling one executive relay R. Version of the TPD is a dual relay timed, with the ability to define two independent programs, equipped with two inputs S1 and S2, and implementing two relays R1 and R2.

3.1. Software Resources TPA

Software resources for TPA series are shown in the table below.

TPA Software Resource

Resource	Lot	Description
START	1	1. Defines the initial state of the relay R Executive after attached the supply voltage. • R=0 • R=1 2. Specifies additional delay after switching on power supply, enabling the detection of the input signal (S) prior to the commencement of the implementation of the preset function (see "minimum pulse duration" in the technical data). • 0ms (no delay) • 50ms • 100ms • 150ms
Status control R	18	1. Defines the operation for implementing relay. • Do not change the State of the R • Turn Off R • Enable R • Deny R (change to oppose) 2. After you have completed the relay operation specifies the next phase of the project. • Continue (the next stage) • Jump to… (performs a jump to the specified stage
Conditional block	9	1. Checks the set condition and performs a jump to the specified level. • Unconditionally (performs a jump without checking the condition) • Wait for the S=0 • Wait for the S=1 • Wait for the change S from 0 to 1 • Wait for the change S from 1 to 0 • Wait for any change S • If S=0 • If S=1 • If R=0 • If R=1 2. Defines the stage or stages, which will jump. For the last four conditions should provide two first jumping is essential when the condition is true, the other for the opposite situation.
Time block	8	1. Allows you to set the time being measured. • Ranges: 1s, 10s, 1m, 10m, 1h, 10h, 100h • Adjustable 0,1…1,0 range values • Ability to download settings from potentiometer mounted on relay panel. 2. During timing, it is possible the contact control S. Fulfilment of the condition causes an immediate stop and timer jump to the stage set in the block. • Do not check for contact (S) • Jump if S = 0 • Jump if S = 1 • Jump if the change in S from 0 to 1 • Jump if the change in S from 1 to 0 • Jump if any change in S 3. After a complete end of the measuring time-oriented program goes to the next stage in the current block.

START

The *START* box is the first block under consideration after the power is attached that defines the initial state of the relay R Executive. Setting parameters *R=1* or *R=0* means that the work program starts up from or the attached output relay.
In the START box is also defined the initial delay, which may be needed for an analysis of the status of the control input. Measurement of the voltage on the S and assigning him the logical values 0 or 1 is for maximum DC power, and 45ms for AC-90ms. This means that when you connect the power supply by the time the State S is 0 even when to S the voltage is given.
If for some reason the State S is essential from the beginning of the program, you must set the initial delay, which will make it possible to measure the real value of the S before the start of the analysis of proper functions. This is especially important if you want the program to respond to the status S change from 0 to 1. This change may be erroneously detected not as a result of the emergence of tension on the clamp S, but due to the update of the measurement. The possible values for the delay are 0ms (no delay), *50ms, 100ms and 150ms.*

Status control R

Box *Status control R* (relay status) is used to attach the relay outputs on and off. There are four settings: *Do not change the State of the R*, *Switch R off, Switch R on* and *Invert R. Invert R* turns to the opposite output state. Control box also has a spring, which is the number of the stage to which you want the program to go after the operation on the relay. Value *Continue* to go to the next step, and *Jump* option (Go to) allows further analysis of the program from any given location. Analysis of Status Control field R is negligibly small.

Conditional block

The conditional block is used to verify the condition and execution to jump to the defined stage. The following settings are possible:

- ***Unconditionally*** - this condition means that the program will always jump to the specified location. Setting the space jump to Continue is synonymous with the transition to the stage number 1 greater than the current.
- ***Wait for the S = 0*** - the condition stops program execution until the State of the control S input accepts a Boolean value 0. When it detects the status of 0 followed by a leap to the stage is defined by the user.
- ***Wait for the S = 1*** - this condition stops program execution until the State of the control S input accepts a Boolean value 1. When it detects the status of 1 followed by a leap to the stage is defined by the user.
- ***Wait for the change S from 0 to 1*** - is a condition to stop program execution until change is detected the status of input S from 0 to 1. This is tantamount to giving the S. Upon detection of a change followed by a leap to the stage is defined by the user.
- ***Wait for the change S from 1 to 0*** - is the condition to stop program execution until input status change is detected from 1 to 0. This is equivalent to disconnecting from the voltage from the input S. Upon detection of a change followed by a leap to the stage is defined by the user.
- ***Wait for any change in S*** - is the condition to stop program execution until change is detected the status of input from 0 to 1 or from 1 to 0. Upon detection of a change followed by a leap to the stage is defined by the user.
- ***If S = 0*** - is the condition to check the status of the control input S. Depending on the current value (S) the program can go to one of the two given phases.
- ***If S = 1*** - condition causes the check on the condition of entry into the control S. depending on the current value (S) the program can go to one of the two given phases.
- ***If R = 0*** - the condition causes check the relay R Executive. Depending on the current value of R, the program can go to one of the two given phases.
- ***If R = 1*** - the condition causes check the relay R Executive. Depending on the current value of R, the program can go to one of the two given phases.

Time block

The Time Block is a component used to measure time. Block time analysis means that the program will stop at the set time, the timing of which will go always to the next stage is located directly behind the current Time Block. Time can be defined in the program by setting a time source for Time. Then the block parameters are in scope, which can take on values of 1s, 10s, 1 m, 10 m, 1 h, 10 h, 100 h and linear conversion which accepts values from 0.1 to 1.0. For example, a delay of 30 minutes can be set by specifying a range of 1 h and linear rate of 0.5, which gives 1 h · 0.5 = 30 min. Delay configuration program displays the current time set by the user. Frontpanel relay has two potentiometers for setting the time delay. If the program as a source of time we'll potentiometers, the program will set the delay depending on the current setting of the range and a linear scale on the front panel.

In the course of time, it is possible to analyze the status of the control input (S) by checking the condition specified by the user. If the condition is false, follows the timing interrupt and instant jump to the stage specified in the configuration of Time Block. It is possible to define the following terms:.

- ***Do not check for S*** - condition overrides the entry analysis of S. Move to the next step only after the end of the measuring time-driven.
- ***If S = 0*** - in the case of detection of logical state 0 at the entrance to the control S, followed by the immediate discontinuation of timing and leap to the stage set in the Time Block.
- ***If S = 1*** - in case of detection of the logic state of 1 at the control input S, the immediate cessation timing and leap to the stage set in the Time Block.
- ***If the change S from 0 to 1*** - if the change from 0 to 1, in the case of detection of logical status changes from 0 to 1 at the entrance to the control S, followed by the immediate discontinuation of timing and leap to the stage set in the Time Block.
- ***If the change S from 1 to 0*** - in the case of detection of logical status changes from 1 to 0 on input control (S), followed by the immediate discontinuation of timing and leap to the stage set in the Time Block.
- ***If any change (S)*** - in the case of detection of logical status changes from 0 to 1 or from 1 to 0 on input control (S), followed by the immediate discontinuation of timing and leap to the stage set in the Time Block.

3.2. Zasoby programowe TPD

Software resources for TPD series are considerably expanded compared to the version of the TPA, for this reason are described in a separate section.

Software resources TPD (resources are identical for each of the two available programs)

Resource	Lot	Description
START	**1**	1. Defines the initial state relays R1 and R2 implementation after attached the supply voltage. • On Rx (disable) • Off Rx (enable) • Do not change the Rx * Rx – any relay R1 or R2 2. Specifies an additional delay after power, enabling the detection of input signals Sx before the start of the programmed function (see "Minimum pulse duration" in the specification). • 0ms (no delay) • 50ms • 100ms • 150ms
Status Control R	**18**	1. Defines the operation for implementing relay. • Do not change the status of Rx • Off Rx • On Rx • Invert Rx (change to oppose) 2. After the operation, the relay determines the next stage of the program implemented. • Continue (next step) • Jump to …… (performs a jump to the specified stage)

Conditional Block	**9**	1. Checks the set condition and performs a jump to the specified level. • Unconditionally (performs a jump without checking the condition) • Wait for LE=1 • Wait for change ę LE from 1 to 0 • If LE=0 • Wait for LE=0 • Wait for change LE from z 0 to 1 • Wait for any change LE • If LE=1 LE (*Logical Expression*) is a logical expression up to three variables defined by the user. There are operators AND, OR, and XOR and a set of arguments, S1, ~S1, S2, ~S2, R1, ~R1, R2 and ~R2.. The Symbol ~ means the negation operator. A more detailed description of logical expressions described in chapter 3.3. 2. Defines the stage or stages, which will jump. For the last two terms should be given two seats jumping - the first is essential if the condition is met, the second to the contrary.
Time Block	**8**	1. It allows you to set the time. • Ranges: 1s, 10s, 1m, 10m, 1h, 10h, 100h • Ability to download settings from potentiometer mounted on relay panel • Adjustable 0,1 ...1.0 range values 2. During the interval, it is possible to control the condition set LE, the fulfilment of which immediately stops the timer and jump to the stage set for Time Block. • Do not check for LE • If LE=1 • If the change LE from 1 to 0 • If LE=0 • If the change LE from 0 to 1 • If any change LE 3. After a complete end of the measuring time-oriented program goes to the next stage in the current block.

START

The START box is the first block under consideration after the power is attached that defines the initial state of enforcement relays R1 and R2 (hereinafter referred to as Rx). Setting parameters to disable (*Off)* RX or enable (*On)* Rx causes that work program starts up from or the attached output relay. Because the relay TPD has two independently acting programs containing the START, there is the situation in which the selected program interferes with the status of a single relay Rx and should not modify the State of the second Rx. For this purpose, do not change the option was introduced in the Rx. The task of the user is setting the fields START to the Rx relay was set only once (in the program). In another case the situation logically incorrect will appear.

In the START box is also defined predelay, whose function has been described in programming resources for TPA series.

Status control R

Box *Status Control R* relays (R1 or R2) is used for switching on and off their outputs. There are four settings: do not change the State of the Rx, , Turn off Rx, Turn on Rx and Deny Rx. Deny Rx option replaces the exit status to the opposite. Each block of R can modify both relays available, allowing their use only in one or both programs independently. Attention should be paid to the configuration of the Rx, to modify the relay status in one of the programs, was not in an unexpected way to carry out temporary functions carried out in the second. Control box also has a spring, which is the number of the stage to which you want the program to go after the operation on the relay. This option is described in the resource program relays TPA, the jump is only possible under the current program..

Conditional Block

The Conditional Block is used to check the logical condition set LE (*Logical Expression*). Once the condition following surgery jump to the selected step in the current program. The following settings are possible::

- ***Unconditionally*** – this condition means that the program will always jump to the specified location. Setting the space jump to Continue is synonymous with the transition to the stage number 1 greater than the current.

- *Wait for LE = 0* – this condition stops program execution until the State of the condition accepts a Boolean value 0. When it detects the status of 0 followed by a leap to the stage is defined by the user.
- *Wait for LE = 1*- this condition stops program execution until the State of the condition accepts a Boolean value 1. When it detects the status of 1 followed by a leap to the stage is defined by the user.
- *Wait for change LE from 0 to 1*- is a condition to stop program execution until status change is detected the condition LE from 0 to 1. When it detects changes followed by a jump to the stage is defined by the user.
- *Wait for change LE from 1 to 0* - is the condition to stop program execution until status change is detected the condition from 1 to 0. When it detects changes followed by a jump to the stage is defined by the user.
- *Wait for any change in* LE - a condition to stop program execution until status change is detected the condition LE from 0 to 1 or from 1 to 0. When it detects changes followed by a jump to the stage is defined by the user.
- *If LE = 0* - is the condition to check on the condition of the LE. Depending on the current values of the LE program can go to one of the two given phases.
- *If LE = 1* – a condition causes the check on the condition of the LE. Depending on the current values of the LE program can go to one of the two given phases.

Time Block

The principle of time setting are identical to those for TPA series relays.
In the course of time, it is possible to analyze the state of a logical condition LE. If the condition is false, follows the timing interrupt and instant jump to the stage set in the block.
It is possible to define the following terms:

- *Do not check for LE* - condition overrides the State of analysis condition. The transition to the next stage occurs only after the end of the measuring time-driven.
- *If LE = 0* - in the case of detection of the expression LE = 0, followed by the immediate discontinuation of timing and leap to the stage set in the block.
- *If LE = 1* - if the expression condition LE = 1, followed by the immediate discontinuation of timing and leap to the stage set in the block.
- *If the change LE from 0 to 1* - in the case of detection of expression of status changes from 0 to 1, followed by the immediate discontinuation of timing and leap to the stage set in the block.
- *If the change LE from 1 to 0* – in the case of detection of expression of status changes from 1 to 0, followed by the immediate discontinuation of timing and leap to the stage set in the block.
- *If any change of LE* - in the case of detection of any change in the status of an expression followed by immediate discontinuation timing and leap to the stage set in the block.

3.3. Rules define the logical condition LE

Stages of conditional blocks and blocks of time using Boolean expressions LE (Logical Expression), which allow for time dependence of the function of the control inputs Sx states and state regulations Rx relays.
A logical expression consists of up to three of the following arguments:

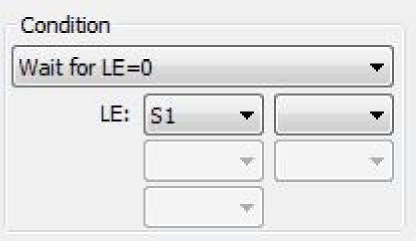
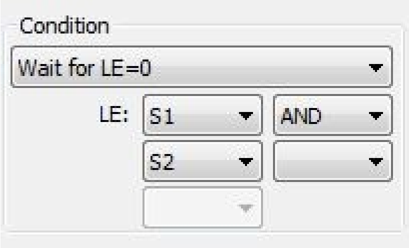
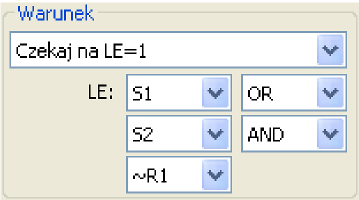
S1, ~S1, S2, ~S2, R1, ~R1, R2 i ~R2,

the character ' ~ ' means a negation symbol.

A logical expression LE may consist of logical operations AND, OR, or XOR, whose truth tables are shown in the table below.

Argument 1	Argument 2	The result AND	The result OR	The result XOR
0	0	0	0	0
0	1	0	1	1
1	0	0	1	1
1	1	1	1	0

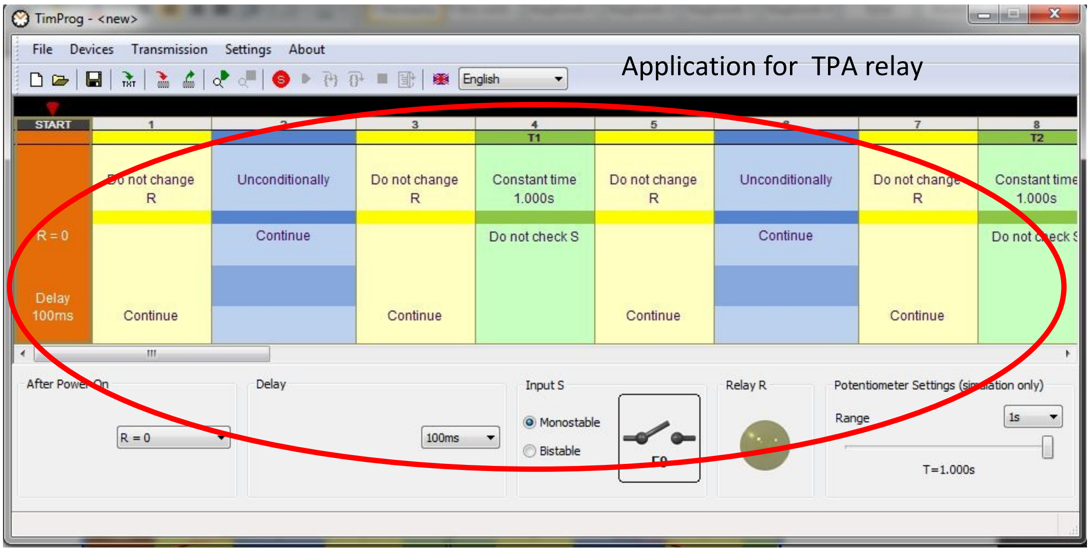
Logical operations are performed in the order in which they write and is not retained the order of actions resulting from the generally accepted principles. In order to define the desired expression, you may need to change the order of arguments in writing. A few examples of Boolean operations have been described below.

Set in the program	A logical expression LE
 Condition Wait for LE=0 LE: S1	**LE = S1** A logical expression is made up of one argument S1. Given the condition will be satisfied if S1 = 0 (S1 inactive).
 Condition Wait for LE=0 LE: S1 AND S2	**LE = S1 AND S2** A logical expression consists of two arguments S1 and S2. Given the condition will be met if at least one input SX accepts 0 status.
 Warunek Czekaj na LE=1 LE: S1 OR S2 AND ~R1	**LE = (S1 OR S2) AND ~R1** A logical expression consisting of three arguments S1, S2 and ~R1. Specified condition is met if at least one of the inputs S1 and S2 will be set to 1, and the output relay R1 is disabled.

4. The rules for defining and analyzing the time function

TimProg software has a user interface, using which it is possible to define the schema of the time function or sequential. Depending on the type of relay TPA or TPD, the application window will show up one or two fields configured by the user. Each program consists of logical elements described earlier: the *START*, *Control Block*, *Conditional Blocks* and *Time Blocks*. At the end of each program is a *STOP* block that does not have any configuration values and serves only to stop the operation of the program.

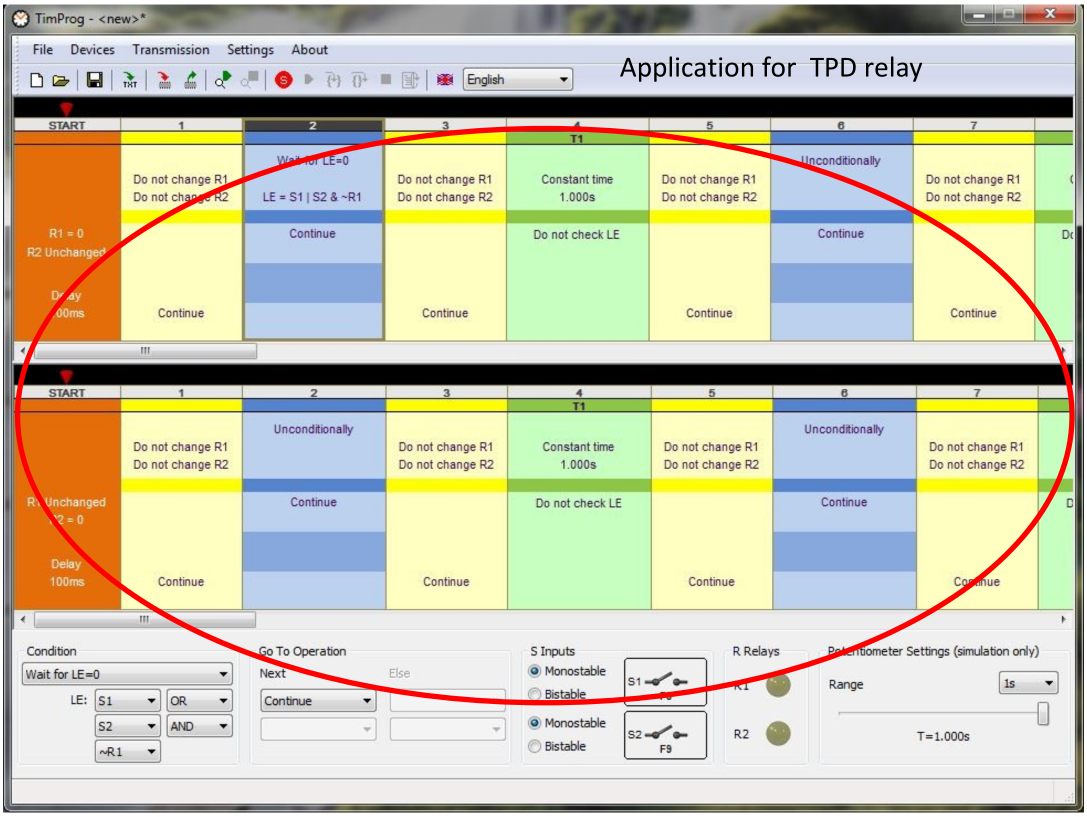
Look for relay applications TPA and TPD programs with selected fields are shown below.



Application for TPA relay

START: R = 0, Delay 100ms
1: Do not change R; Continue
2: Unconditionally; Continue
3: Do not change R; Continue
4 T1: Constant time 1.000s; Do not check S
5: Do not change R; Continue
6: Unconditionally; Continue
7: Do not change R; Continue
8 T2: Constant time 1.000s; Do not check S

After Power On: R = 0
Delay: 100ms
Input S: ● Monostable ○ Bistable
Relay R
Potentiometer Settings (simulation only): Range 1s, T=1.000s



Application for TPD relay

START: R1 = 0, R2 Unchanged, Delay 100ms
1: Do not change R1, Do not change R2; Continue
2: Wait for LE=0, LE = S1 | S2 & ~R1; Continue
3: Do not change R1, Do not change R2; Continue
4 T1: Constant time 1.000s; Do not check LE
5: Do not change R1, Do not change R2; Continue
6: Unconditionally; Continue
7: Do not change R1, Do not change R2; Continue

START: R1 Unchanged, R2 = 0, Delay 100ms
1: Do not change R1, Do not change R2; Continue
2: Unconditionally; Continue
3: Do not change R1, Do not change R2; Continue
4 T1: Constant time 1.000s; Do not check LE
5: Do not change R1, Do not change R2; Continue
6: Unconditionally; Continue
7: Do not change R1, Do not change R2; Continue

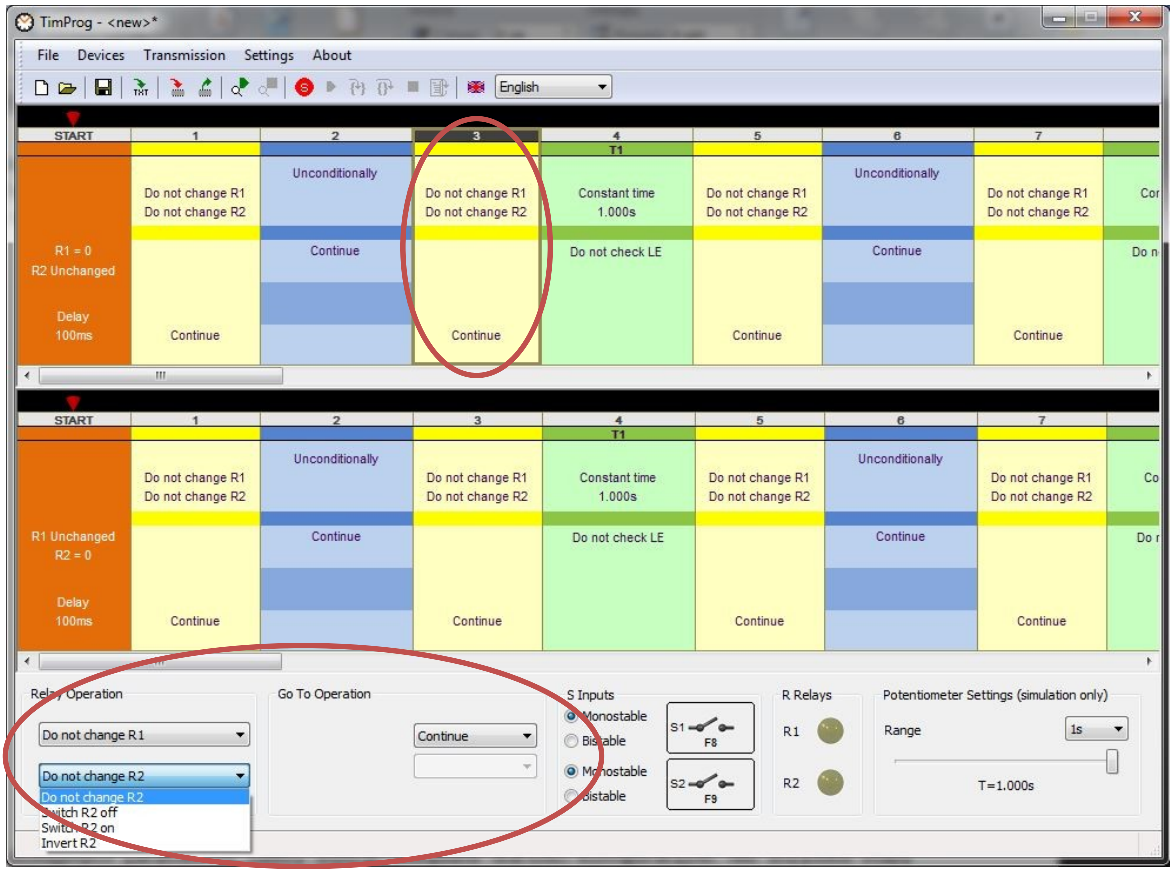
Condition: Wait for LE=0; LE: S1 OR S2 AND ~R1
Go To Operation: Next: Continue; Else
S Inputs: S1 ● Monostable ○ Bistable; S2 ● Monostable ○ Bistable
R Relays: R1, R2
Potentiometer Settings (simulation only): Range 1s, T=1.000s

All the elements of the logical relay, beyond the fields *START* and *STOP*, have a unique number from 1 to 35, referred to in the rest of the instructions on the **Stage**. The stage is to be understood as one of the common building blocks that you use to perform the specified logical operation. The number of used blocks in the program depends entirely on the user who is defining the parameters determines how the time function.

Configuration stages – general principles

The values of individual configuration steps differ depending on the selected version of the relay TPA or TPD, but the general principles set parameters are identical in both cases. Therefore, the operation is discussed using version TPD.

To define the settings of the relay, the left mouse button click on the selected step. It will be framed and in the lower part of the applications configuration options appear appropriate for the selected field. The following figure shows an example of the configuration of *Status Control R* field as a step number 3 of the first program.



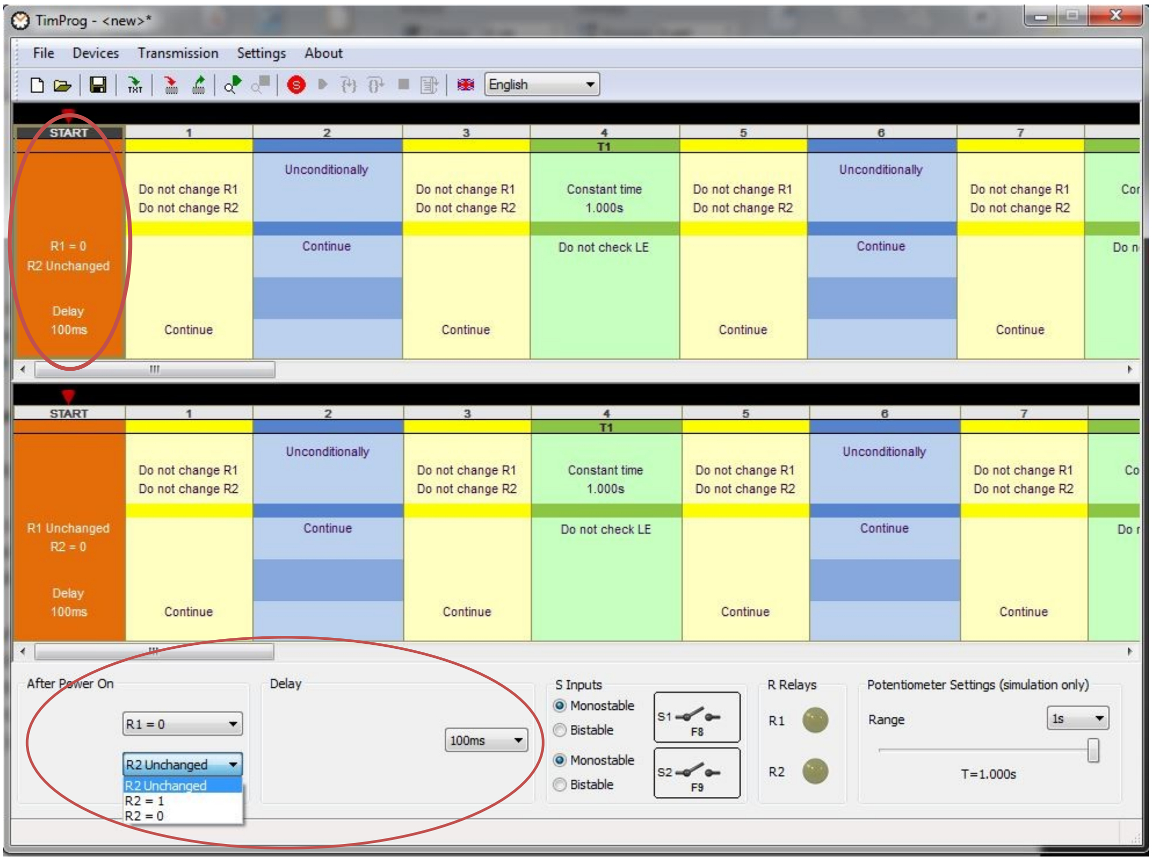
From the available parameters, select the desired configuration values. Not all stages must be in configured and used. In truth they are always active, but jumping settings made by the user can affect the number and the order of the fields in the analysis.

Field configuration START

When you click on the stage START at the bottom of the app will be activated the operation performed after power and attached an initial delay.

In the following example, the timer will start from the excluded both relays regulations Rx (NO contacts open), and the transition to the next stage will be delayed about 100ms. The purpose of the introduction of the delay has been described in Chapter 3. For the START the next stage of the Status Control R block is always executed state number 1.

Each of the two programs has its own relay Starter box, which can be used to restart the time defined function. You must configure the parameters fields START to mutually not exclude relay settings. Permissible, but logically invalid is a situation in which the same relay is enabled in one program and the second off. You can accept the principle that setting or deleting Rx in one of the programs, forces "do not change the Rx" in the second.



START	1	2	3	4	5	6	7	
R1 = 0 R2 Unchanged Delay 100ms	Do not change R1 Do not change R2 Continue	Unconditionally Continue	Do not change R1 Do not change R2 Continue	T1 Constant time 1.000s Do not check LE	Do not change R1 Do not change R2 Continue	Unconditionally Continue	Do not change R1 Do not change R2 Continue	Cor Do n

START	1	2	3	4	5	6	7	
R1 Unchanged R2 = 0 Delay 100ms	Do not change R1 Do not change R2 Continue	Unconditionally Continue	Do not change R1 Do not change R2 Continue	T1 Constant time 1.000s Do not check LE	Do not change R1 Do not change R2 Continue	Unconditionally Continue	Do not change R1 Do not change R2 Continue	Co Do r

After Power On
R1 = 0
R2 Unchanged
R2 Unchanged
R2 = 1
R2 = 0

Delay
100ms

S Inputs
● Monostable
○ Bistable
S1 F8
● Monostable
○ Bistable
S2 F9

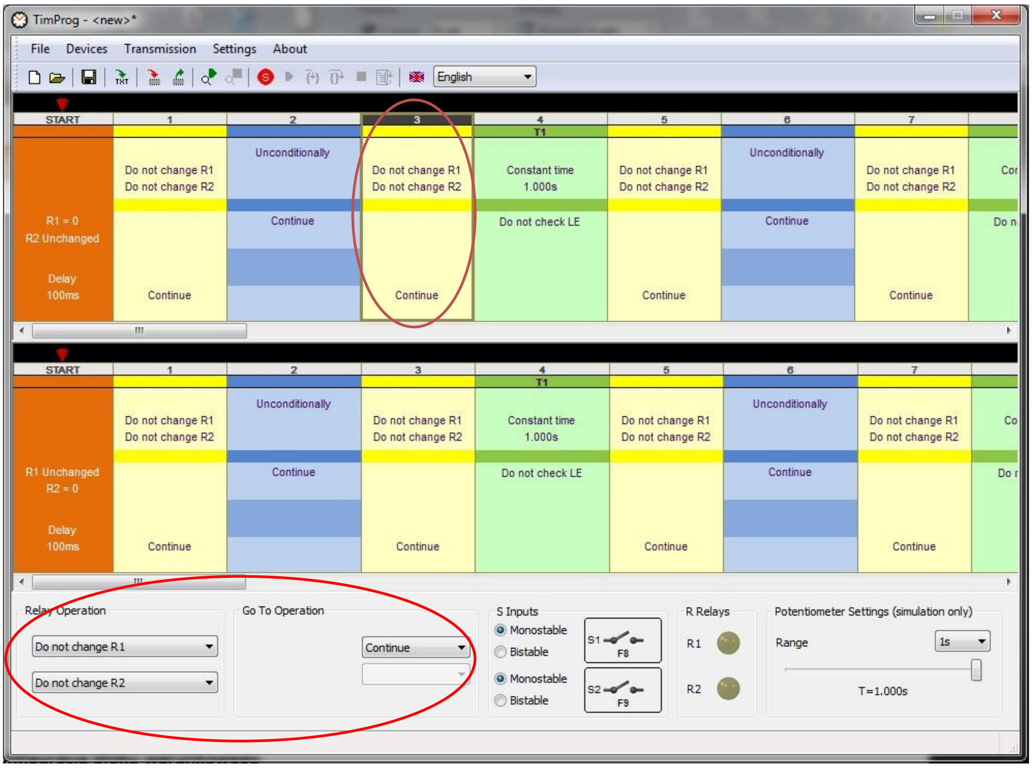
R Relays
R1
R2

Potentiometer Settings (simulation only)
Range 1s
T=1.000s

Configuration Field of Status Control R

Status Control Field R (marked in yellow) was introduced to modify the State of the contacts Rx and described in Chapter 3. During the analysis of the field in the first place, the program will introduce changes to the settings for Rx, then under the current program will jump to the stage set up in the configuration box Operation. You can define any number of the stage along with fields START and STOP. Jump to the stage STOP means the immediate stopping of the work programme. Restart the program retained is only possible after turning off and restarting voltage. If you set the stroke Operation value Continue, the program will proceed to the next stage, located just behind the current block. This is a general rule concerning all of the settings available in the conditional blocks, time blocks and Status Control Fields R. Control field is negligible and does not affect the final value of the measured time. In the following example, the analysis of the phase 3 will change the status of the relay R1 to the opposite, disabling R2 and subsequently move to stage 4 (*Continue*).

Please note that Rx relays can be used in both programs at the same time. Rx switch in one program may unexpectedly affect the operation of another, if Rx is also supported.



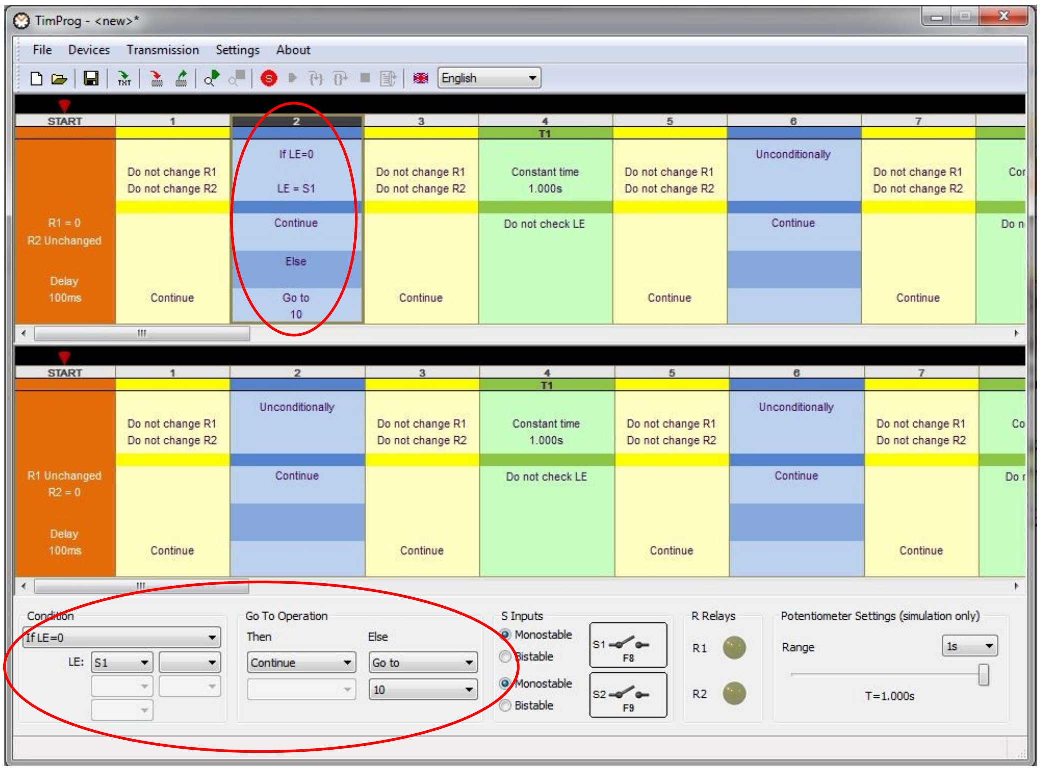
Relay Operation: Do not change R1; Do not change R2

Go To Operation: Continue

Conditional block configuration

The conditional block (blue) is the element in which, depending on the type of condition checks the status of the control input S and output R (for TPA) or the state of the logical expression LE (for TPD). The function of this unit is to introduce the possibility of conditional execution of the program or stop the execution of the function until the occurrence of a particular event. After fulfilling the conditions set program jumps to step number selected.

An example of a logical operation is to determine whether, when examining the conditional Block, the input state S1 is equal to 1.



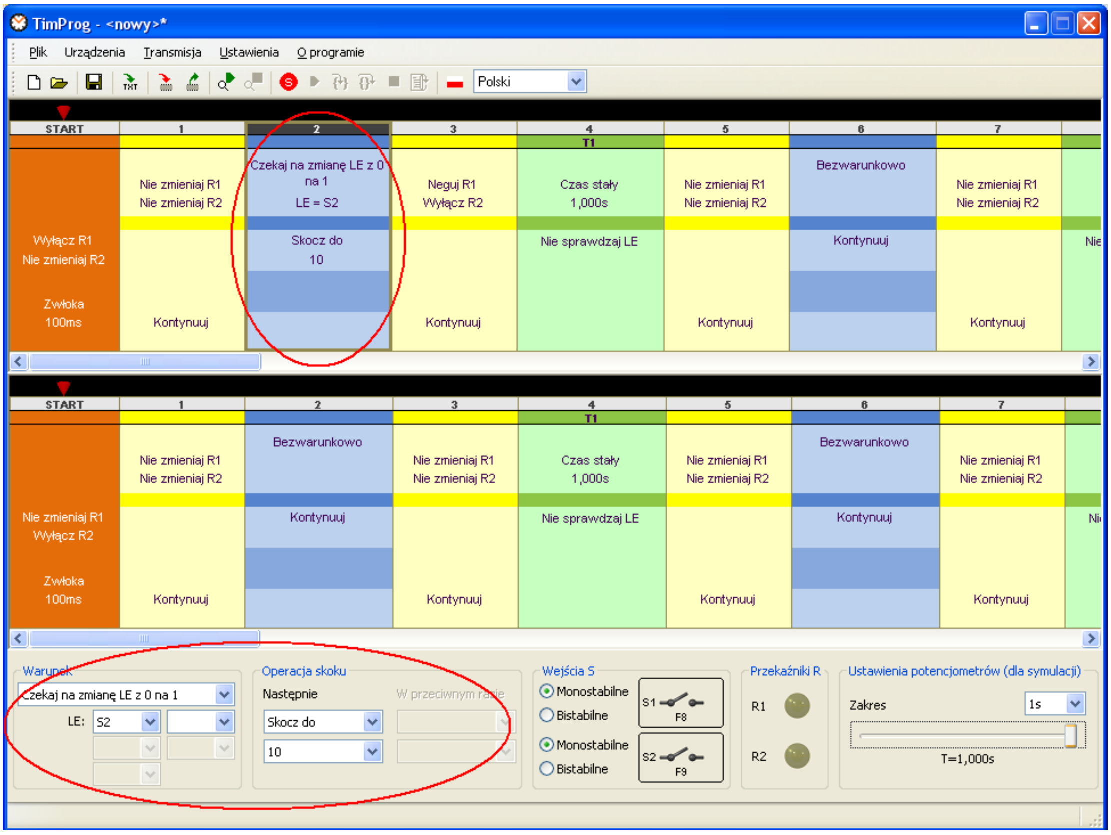
Condition: If LE=0

LE: S1

Go To Operation: Then: Continue; Else: Go to 10

If the condition was fulfilled, namely S1 = 1, there will be a transition to the next stage (Continue). In the opposite case, when S1 = 0, the program will jump to number 5 and since then the place will be analyzed further.

The conditional block allows you to stop the analysis in anticipation of the event, for example, to change the State of a logical expression LE from 0 to 1. The following conditional Block expression is set to LE = S2, which is synonymous with the changing state of S2 from 0 to 1.



Warunek: Czekaj na zmianę LE z 0 na 1

LE: S2

Operacja skoku: Następnie: Skocz do 10

Zakres: 1s

T=1,000s

The Program will wait for the moment of tension on the S2. When this occurs, the operation will jump to the given space, i.e. in the example above to number 10. Because both programs perform time independently, waiting for an event in one of them shall not affect the operation of the user-defined function in the second.

However, it is possible to link the action of both programs by checking the status of relays Rx. If the status Rx is modified in the first, the second, through proper configuration of conditional Blocks may make its operation from the current value of Rx.

In a situation where any condition analysis is unnecessary, set unconditionally. When the analysis will be an instant jump to specified stage, together with the Continue is equivalent to omitting the Conditional Block.

Time Block Configuration

A Time Block (green color) is used in measuring time. Allowed are two ways to specify the delay: The time constant and Potentiometers. Time constant allows you to enter from the top of the specified configuration and liner Range by delaying the time scale of 0,1 to 1,0. Configured delay is displayed in the lower part and is given by:

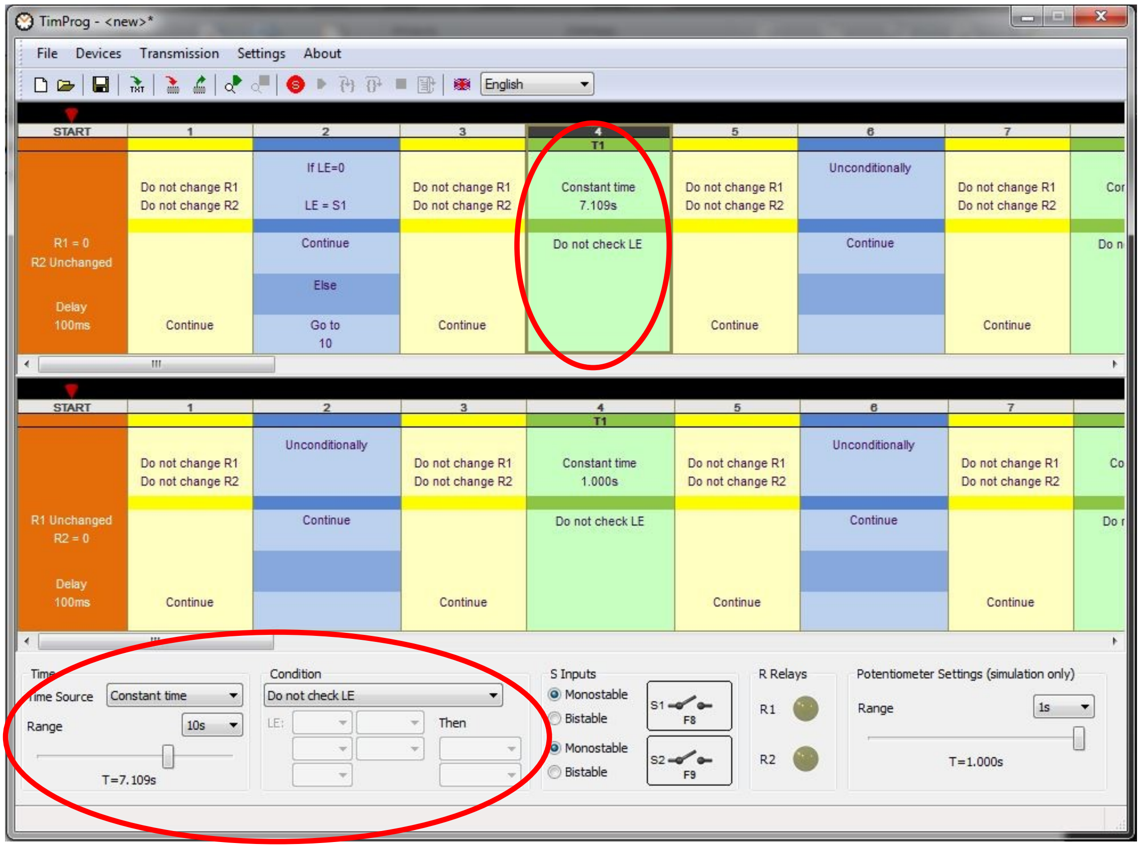
:

$$Time = linear\ scale * range$$

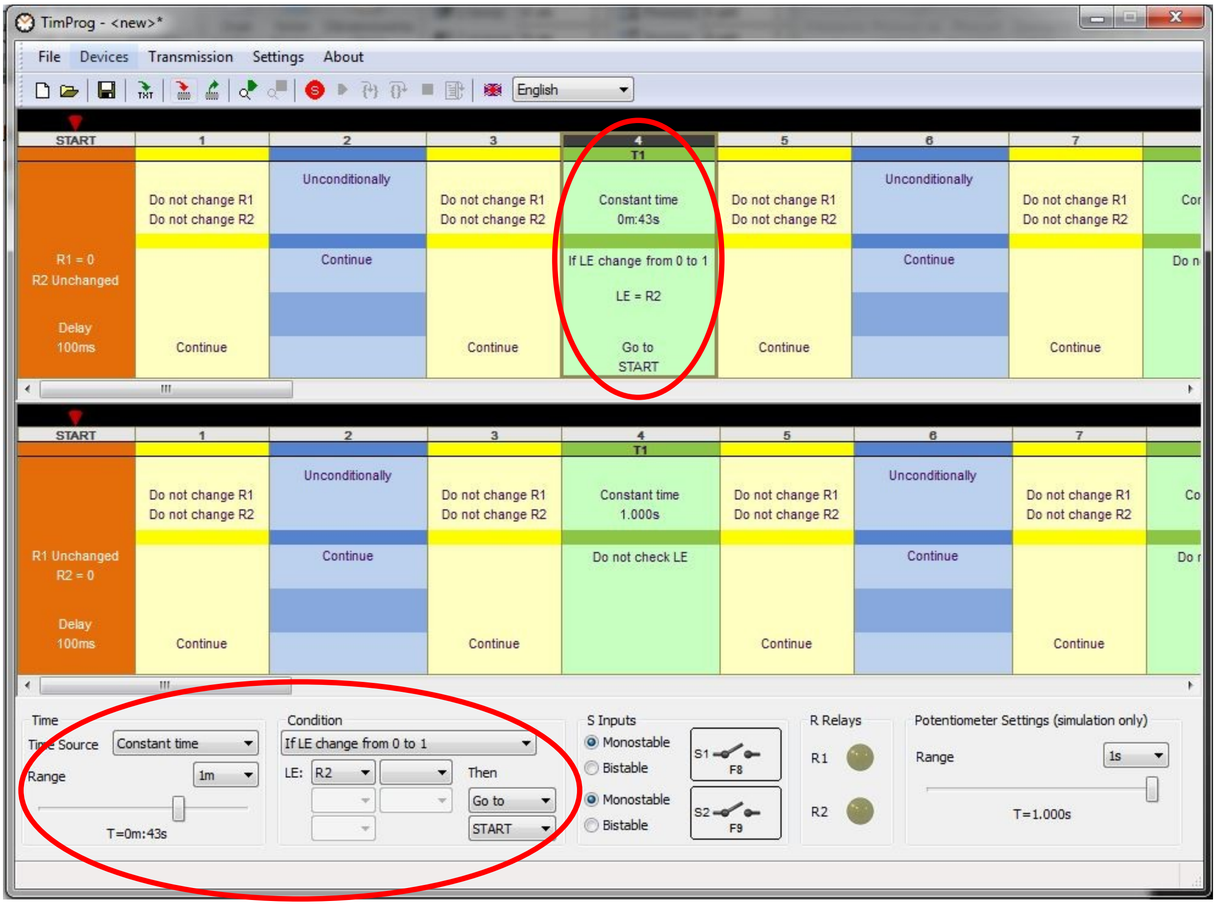
A Panel of leading the relay has two potentiometers for linear and time-scale adjustment Range. In a situation where the delay target is not known or you may want to change it, as a time source, select Potentiometers. The elapsed time will not be permanently registered in the program, and its value will be determined on the basis of the position of the potentiometer at the start of the timing. This makes it easy to adjust the relay using a regular screwdriver without need to connect your computer and modify the software.

During the operation of the relay, when parsing a Time Block, the program stops on the box set the time, and his timing always go to the next step immediately following the time Block.

During the implementation of some of the time functions you might need to respond to certain events that occur during the timing. Hence the temporary Block is equipped with the option to control expression LE (TPD) or the status of the control contact S (TPA). The fulfillment of the condition specified in the Time Block causes an immediate stop and timer go to the stage set in the Time Block. In the following example, the time T1 for the stage 4 is set to 7,109s while logical expression LE is not checked by preventing the same previous interrupt timing.



If you want the program to start working from the beginning (from the START), when the relay R2-controlled in the second will change its State from 0 to 1. The temporary field configuration is as follows:



START	1	2	3	4 T1	5	6	7	
R1 = 0 R2 Unchanged Delay 100ms	Do not change R1 Do not change R2	Unconditionally	Do not change R1 Do not change R2	Constant time 0m:43s	Do not change R1 Do not change R2	Unconditionally	Do not change R1 Do not change R2	Cor
		Continue		If LE change from 0 to 1 LE = R2		Continue		Do n
	Continue		Continue	Go to START	Continue		Continue	

START	1	2	3	4 T1	5	6	7	
R1 Unchanged R2 = 0 Delay 100ms	Do not change R1 Do not change R2	Unconditionally	Do not change R1 Do not change R2	Constant time 1.000s	Do not change R1 Do not change R2	Unconditionally	Do not change R1 Do not change R2	Co
		Continue		Do not check LE		Continue		Do r
	Continue		Continue		Continue		Continue	

Time
Time Source: Constant time
Range: 1m
T=0m:43s

Condition
If LE change from 0 to 1
LE: R2
Then: Go to
START

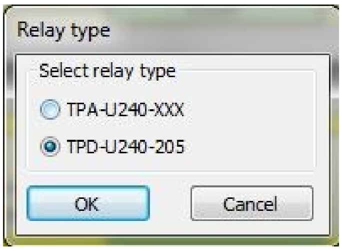
S Inputs
● Monostable
○ Bistable
S1 F8
● Monostable
○ Bistable
S2 F9

R Relays
R1
R2

Potentiometer Settings (simulation only)
Range: 1s
T=1.000s

5. Read and write configuration.

When you run the application TimProg selection dialog box appears, allowing you to open a program to support a series of relays in TPA or TPD.



○ TPA-U240-XXX

● TPD-U240-205

After accepting the choice in the application window appear one or two user programs filled with fields set to their default values. They are so chosen to load them into relay caused the passage through all subsequent blocks and stopping at the STOP.

At any time it is possible to completely erase the relay program and setting it to default values using the command *File* → *New* or through icon 🗋. At the opening of the new program, you should provide the type of TPA relay again or TPD, for which you want to open a new configuration.

Save the current configuration on your computer takes place through the *File*→ *Save* 💾 *or File*→ *Save as* . The default file extension of the relay is *. tpa.

Reading existing configuration can be done by the *File* → *Open* 📂, but you will lose the current settings and replace them with values placed in the *. tpa.

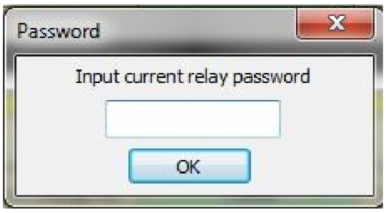
6. Loading configuration to relay

TimProg application allows you to save configuration to non-volatile memory of the relay, which will not be erased even after the supply voltage is disconnected. In order to make writing, at any time, run the command *Transmission → Send settings* or icon . Relay operation is stopped, the new values loaded, followed by running the program from the START.

⚠ **When loading the program, care should be taken to stop the work of the relay and start implementation of the new program does not affect the safety of the device, in which the relay is installed.**

Work at any time it is possible to read settings from the relay and update the fields in the TimProg application (command *Transmission → Read settings* or icon). Read the program does not affect the operation of the relay and the implementation of the function.

In the case of access to secured series of relays TPD, the program will ask for the password in the relay. Read or write configuration is possible only after entering the correct password.

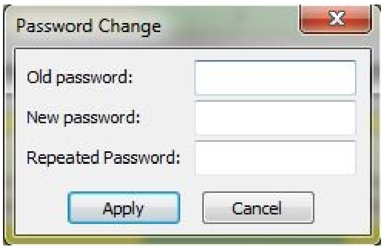


7. Securing access to the relay password

Securing access to the password applies only to TPD series relays.

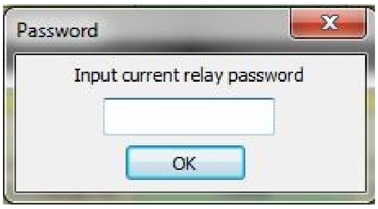
TimProg application allows you to protect access to the program located in the relay TPD with a password. This protects the current configuration before modification by unauthorized persons and to prevent unauthorized copying of the developed solution.

In the new relay password is not set, and when trying to access the user program TimProg application uses the default password blank. Its setting is possible using the command *Transmission→Change the password*.



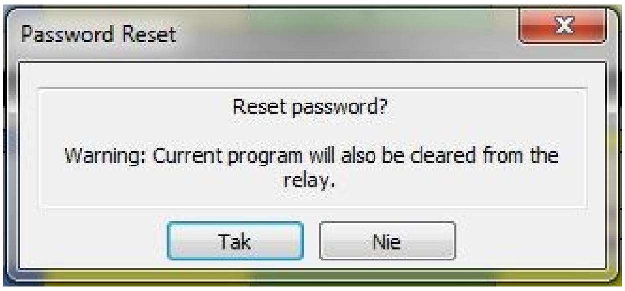
In order to change your password you must provide your current password and a new twice, up to a maximum of eight characters. In the case of modification of the relay, in which the password was not previously used, leave the old password box blank. After setting the password will be saved in the application TimProg for the current session and there is no need for typing at each access to a relay.

The first time you try to access a secure relay TimProg, application asks you to enter the current password.



Input current relay password

In case the password is lost, security access to the relay is not possible. TimProg application lets you unlock relay command *Transmission→Reset password and program* ..., <u>but with the reset password reset is also saved on the relay user program</u>.



Reset password?

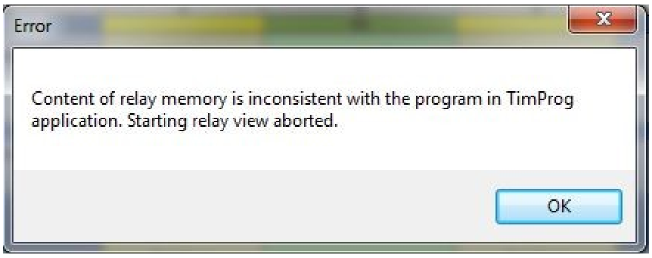
Warning: Current program will also be cleared from the relay.

After resetting relay new password is blank.

8. Preview of the current state of the relay work

TimProg application allows you to preview the current state of the work of the relay without affecting his work. This makes the process of defining the time functions and analysis of their actions in the real device. When you connect the USB cable and attached supply voltage Transmission function should be called *Transmission* → *Run a preview* or click on the icon 🟩. To stop the preview command is used *Transmission* →*Stop preview* or 🟥.

At the start of the preview is evaluated program stored in the relay with the current application configuration TimProg, as in the case of discrepancies continue to monitor the program is useless. When the message



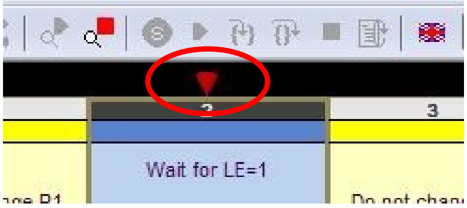
Error

Content of relay memory is inconsistent with the program in TimProg application. Starting relay view aborted.

OK

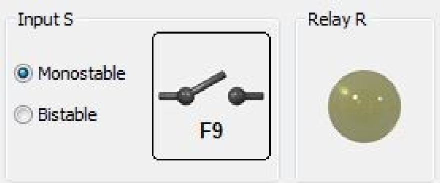
means that the relay is another program than in the application.

During the preview operation of the relay, with a red arrow indicates the current application step in which the program is located.

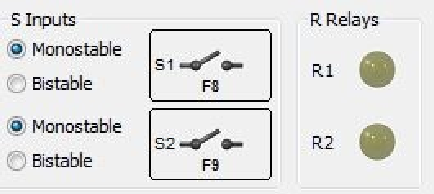


In addition, the current value of the control inputs Sx and implementing relays Rx are at the bottom of the application. Contact closure Sx means that its entry has been given control voltage.

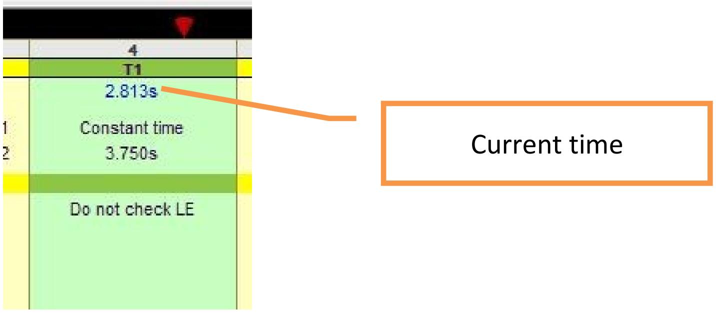
Version of TPA



Version of TPD



At the time, measured value Block analysis time is refreshed and displayed in the current field in the blue. It is the present value, rather than the target set in the program!



2.813s
Constant time
3.750s
Do not check LE

The application TimProg refreshes the relay settings four times per second. This means that the steps, which the analysis time is slightly small, may be disregarded when determining the index tracking the number of the current stage.

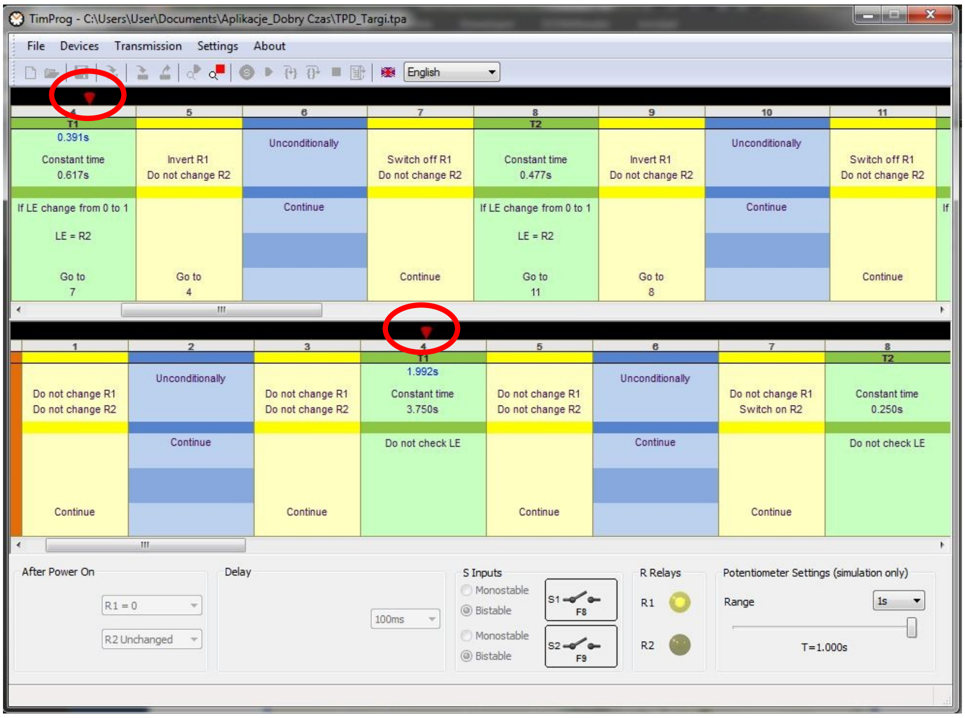
9. Software-based simulation work relay

TimProg application software allows you to simulate the working time defined function without having to connect a relay. Any attempt to and create your own program are possible immediately after the installation of the application, without the need to purchase the finished product.

Entering the simulation mode is done using the *command Transmission → Simulation Mode* or icon Ⓢ. Simulation mode does not mean automatic start analysis program, and only activate commands that allow you to track the action defined functions..

Continuous work

Transmission → Run the Simulation or icon ▶ starts the analysis of the program continuously. This means that at a specific rate application will go through the various stages of the settings made by the user, and red arrows indicate the current fields.


TimProg - C:\Users\User\Documents\Aplikacje_Dobry Czas\TPD_Targi.tpa
File
Devices
Transmission
Settings
About
English

4 T1	5	6	7	8 T2	9	10	11	
0.391s Constant time 0.617s	Invert R1 Do not change R2	Unconditionally	Switch off R1 Do not change R2	Constant time 0.477s	Invert R1 Do not change R2	Unconditionally	Switch off R1 Do not change R2	
If LE change from 0 to 1 LE = R2 Go to 7	Go to 4	Continue	Continue	If LE change from 0 to 1 LE = R2 Go to 11	Go to 8	Continue	Continue	If

1	2	3	4 T1	5	6	7	8 T2
Do not change R1 Do not change R2	Unconditionally	Do not change R1 Do not change R2	1.992s Constant time 3.750s	Do not change R1 Do not change R2	Unconditionally	Do not change R1 Switch on R2	Constant time 0.250s
Continue	Continue	Continue	Do not check LE	Continue	Continue	Continue	Do not check LE

After Power On
R1 = 0
R2 Unchanged

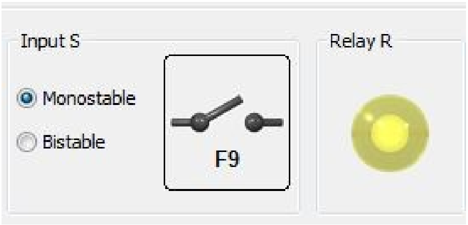
Delay
100ms

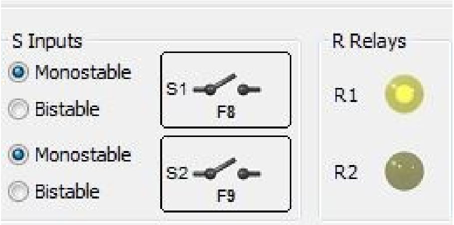
S Inputs
○ Monostable
● Bistable
S1 F8
○ Monostable
● Bistable
S2 F9

R Relays
R1
R2

Potentiometer Settings (simulation only)
Range 1s
T=1.000s

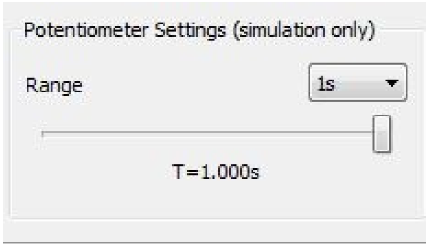
At the bottom of the application window are the control elements-control inputs Sx and yellow lights reflecting the status of relays regulations Rx.





Using your mouse or shortcut keys you can change the status to enter Sx and thus affect the operation of the prepared program. For the convenience of the manual control buttons Sx have two modes of operation. In the MONOSTABLE mode entry Sx are attached as long as pressed will the corresponding shortcut key or mouse button. Bistable operation allows you to alternate, permanent switching on and off of these zones.

Setting the *time sources* of potentiometers in Time Blocks means that its value is not known, as it depends entirely on the position of the knobs on the front panel of the relay. For simulation purposes, set the desired time in the panel located in the lower right corner of the application.


Potentiometer Settings (simulation only)

Range 1s

T=1.000s

To stop the continuous work we should use the option Transmission → *Stop View* or the icon ■. It should be noted that the actual timing in the simulation is not compatible with the set. Time value in each step of the simulation is increased by a certain percentage of the current scope to the analysis of temporary blocks didn't last too long.

Step by step

The simulation program in continuous mode takes place so quickly that captures enough detail functionality can be cumbersome. To this end, introduced the option to work when running step through *Transmission → Step Into* or icon . Each call to this option is the one running the simulation step, which corresponds to the analysis of a single field of *Status Control R*, *Conditional Block* or in *Time Block* the increase of time counter on a certain percentage of the value of the set range.

Time Block analysis often requires multiple steps of simulation, which is related to incrementing a counter for a percentage of the value of the scope. It is usually on the enough that introduces the option *Transmission → Step Over* that the call will stop timing and the transition to the next stage of the simulation located at Time Block.

Reset simulation

Stopping simulation running in continuous mode sets the red indicator on the final analysis field and all the parameters of the program are remembered. Restart the simulation results in a continuation of the program from the place of detention. Starting from the beginning of the simulation is only possible after prior command is *invoked Transmission → Reset* or clicking on the icon .

10. Export settings

Use this option *File → Export document* to save program settings to a text file. This facilitates the preparation of documentation, since the description of the configuration can be easily copied to any editor.

Small example of the TPA relay settings file is as follows:

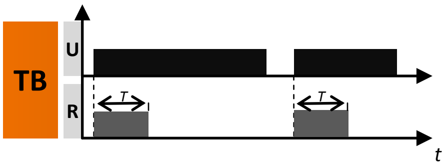
```
Program 1/Stage START
----------------------------------------------------
   After Power On                : R1 = 0, R2 Unchanged
   Delay                         : 100ms

Program 1/Stage 1
----------------------------------------------------
   Relay Operation               : Switch R1 off, Do not change R2
   Go To Operation               : Continue

Program 1/Stage 2
----------------------------------------------------
   Condition                     : Wait for LE=1; (LE = S1 | S1 | S1)
   Go To Operation               : Go To 4

Program 1/Stage 3
----------------------------------------------------
   Relay Operation               : Switch R1 on, Do not change R2
   Go To Operation               : Continue

Program 1/Stage 4
----------------------------------------------------
   Time Source                   : Constant time
   Time Set                      : 1.000s
   Condition                     : If LE change from 0 to 1; (LE = S1 | S1)
   Go To Operation               : Go To START

Program 1/Stage 5
----------------------------------------------------
   Relay Operation               : Do not change R1, Do not change R2
   Go To Operation               : Continue

Program 1/Stage 6
----------------------------------------------------
   Condition                     : Unconditionally
   Go To Operation               : Continue

Program 1/Stage 7
----------------------------------------------------
   Relay Operation               : Do not change R1, Do not change R2
   Go To Operation               : Continue
```

11. Sample functions

At the place of installation of the software Timprog there is a subdirectory called Functions in which is placed the file in PDF format with descriptions of all the common functions of time offered in the company's products Dobry Czas Sp. z o.o. This directory also contains the ready files in the format *. tpa for TPA series relays.

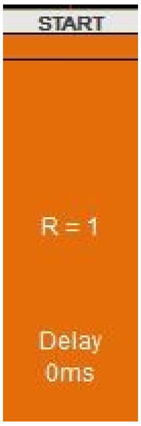
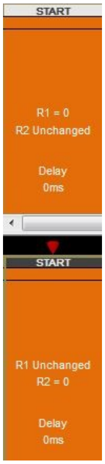
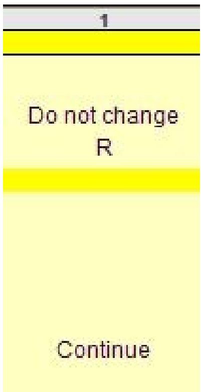
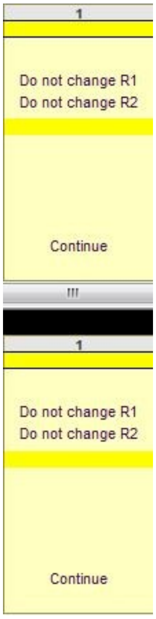
The first program - TB Response Timing (ON for the set interval)

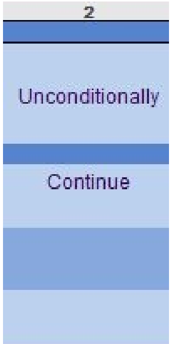
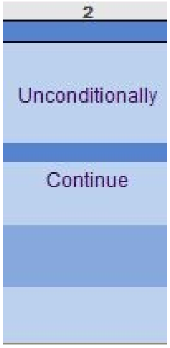
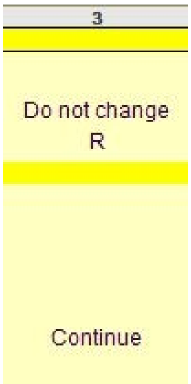
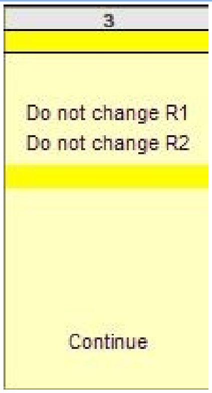
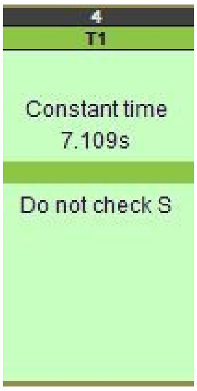
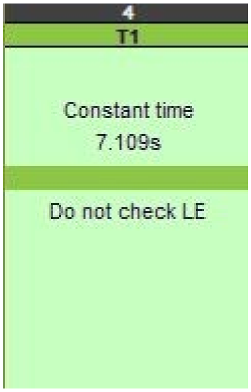
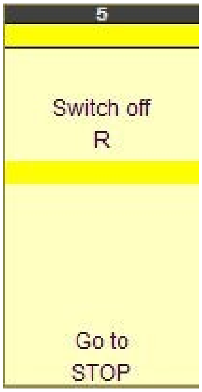
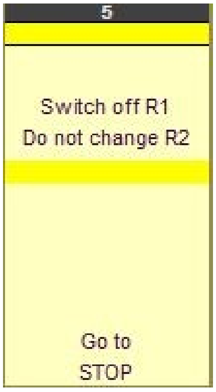
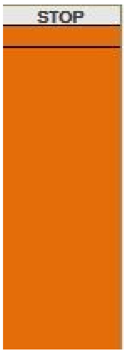
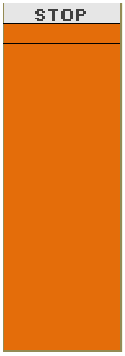
A function TB that generates a pulse for the duration of a single T is one of the basic features offered by manufacturers of relays. The plot is as follows:



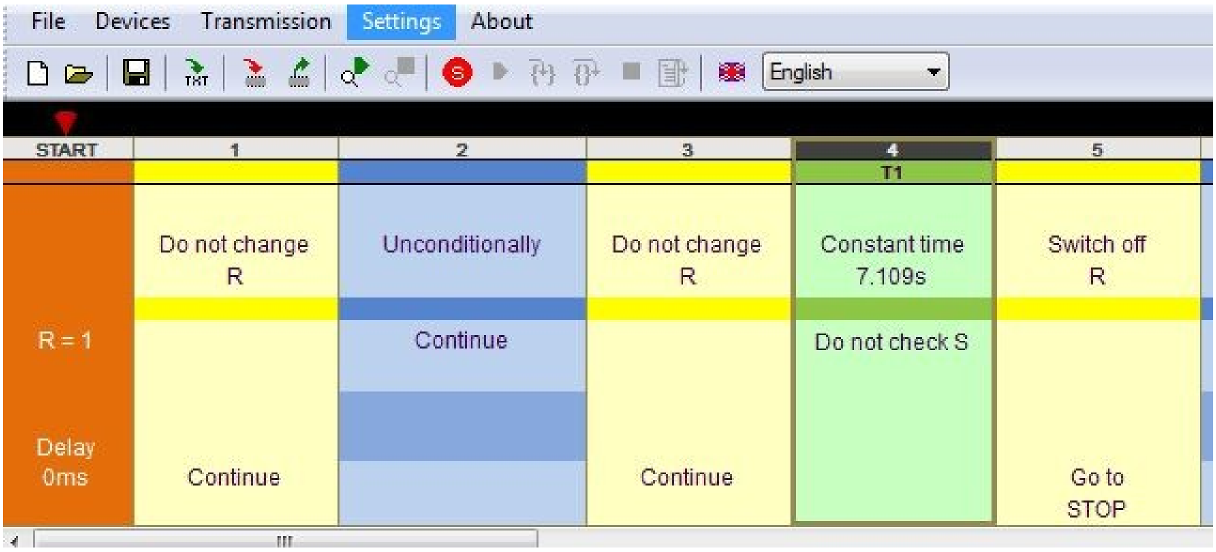
Measuring the response tima (TB) - Applying the supply voltage U immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R
switches off.

Let's look at the how to implement this feature in a programmable time relays TPA and TPD.

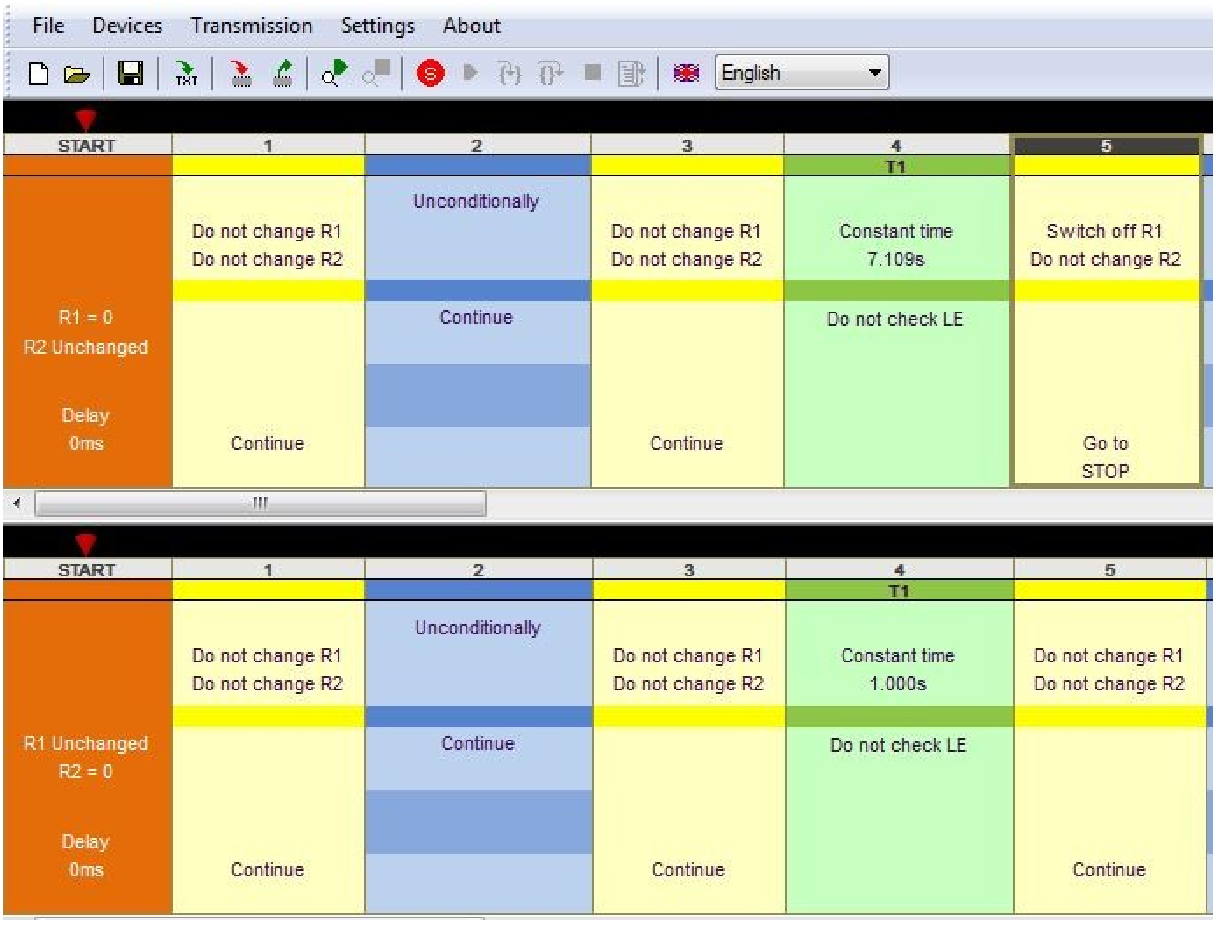
TPA	TPD	
 START R = 1 Delay 0ms	 START R1 = 0 R2 Unchanged Delay 0ms START R1 Unchanged R2 = 0 Delay 0ms	In the first step, let's START field. As you can see from the graph of a function, the relay R Executive is attached immediately after administration of supply voltage. This means that you must select the START configuration parameter to Enable R. In the case of version TPD we will use only the top program and relay R1, where it is set. At the bottom we leave Do not change the R1. Due to the fact that we do not use the control S input, we can skip the initial delay setting the delay to 0ms.
 1 Do not change R Continue	 1 Do not change R1 Do not change R2 Continue III 1 Do not change R1 Do not change R2 Continue	After the analysis of the field START relay program proceeds to step number 1 which is a Control field of R. Relay R have already been set and there is no need to change its status, so this step should be skipped by setting the parameters do not change R (Rx) and Continue. For version TPD end up unused bottom program performing a jump to the STOP.

 2 Unconditionally Continue	 2 Unconditionally Continue	Subsequently, the program proceeds to the *Conditional Block* number 2. No condition is not needed, because the block also omit setting Unconditionally and Continue. The Program will be continued work by going to the stage 3. Further examples of the settings fields for TPD will be focussed on the relay of the upper, the lower is unused.
 3 Do not change R Continue	 3 Do not change R1 Do not change R2 Continue	The next step is *Status Control* field R. As before, there is no need to make any changes, because we skip stage going to the temporary Block number 4.
 4 T1 Constant time 7.109s Do not check S	 4 T1 Constant time 7.109s Do not check LE	In the end, we went to the place where our program will stop at the time of 5s. In truth, an analysis of previous phases also takes CPU time, but it is negligibly small. We remember that in the START we set R relay (R1) on the attached and this State will now all 7,109 s. After dough trough time program goes to the next step immediately behind him (general rule for Time Blocks).
 5 Switch off R Go to STOP	 5 Switch off R1 Do not change R2 Go to STOP	We have measured the 7,109 s and it's time to turn off the relay R (R1). We found ourselves in Status Control field R, which set off the R (R1). The function came to an end, so we stop the relay function doing the jump to the field STOP
 STOP	 STOP	The Program has completed its operation.To start it again requires disco nnecting and reconnecting the power supply.

A window containing the ready-to-use programs for TPA relays and TPD are as follows:



START	1	2	3	4 T1	5
R = 1 Delay 0ms	Do not change R	Unconditionally	Do not change R	Constant time 7.109s	Switch off R
		Continue		Do not check S	
	Continue		Continue		Go to STOP

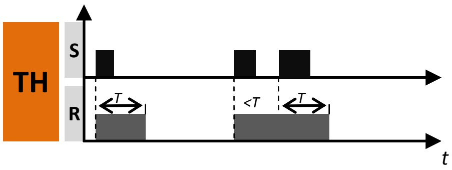


START	1	2	3	4 T1	5
R1 = 0 R2 Unchanged Delay 0ms	Do not change R1 Do not change R2	Unconditionally	Do not change R1 Do not change R2	Constant time 7.109s	Switch off R1 Do not change R2
		Continue		Do not check LE	
	Continue		Continue		Go to STOP

START	1	2	3	4 T1	5
R1 Unchanged R2 = 0 Delay 0ms	Do not change R1 Do not change R2	Unconditionally	Do not change R1 Do not change R2	Constant time 1.000s	Do not change R1 Do not change R2
		Continue		Do not check LE	
	Continue		Continue		Continue

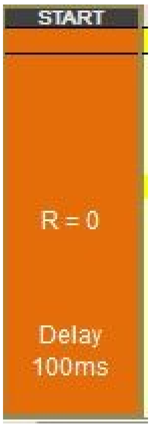
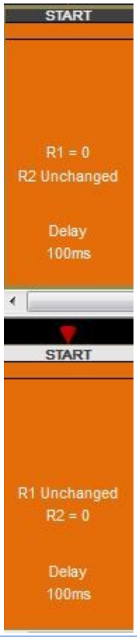
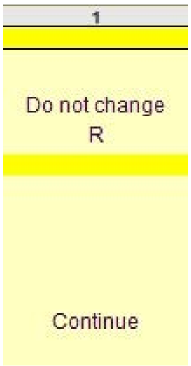
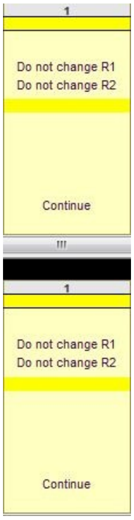
ON for the set interval by closing the control contact S, with extension of the interval T - extension of the time of switching on the output relay R.

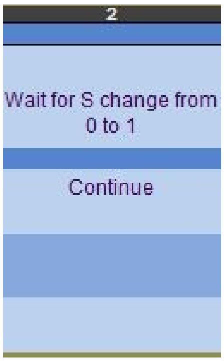
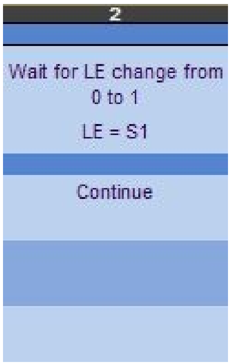
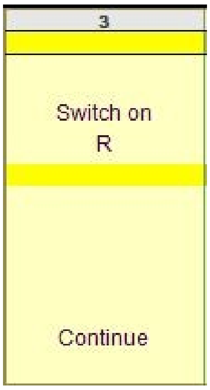
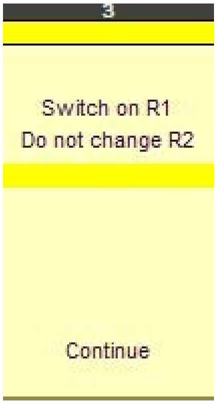
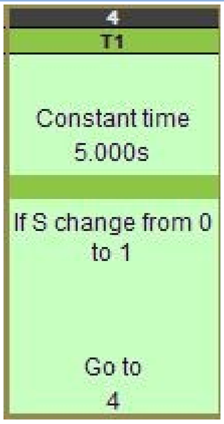
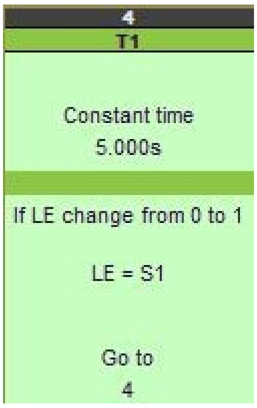
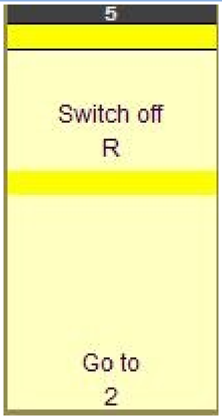
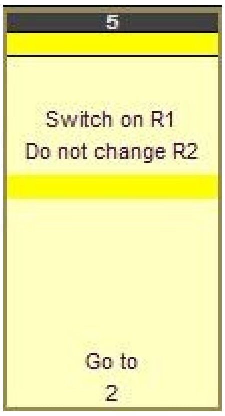
We have gone through the first generator single impulse. Let's modify it so that the relay start up only at the time of application the control input voltage S, and in the course of the timing, it was possible to its extension. Graph of a function is as follows:



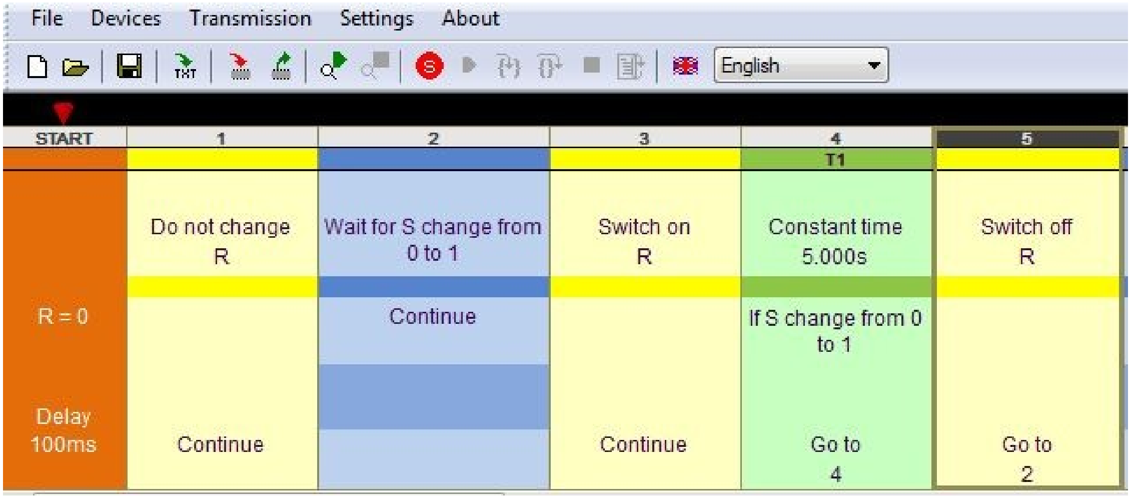
ON for the set interval by closing the control contact S, with extension of the interval T - extension of the time of switching on the output relay R (TH)
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R is switched off. The next closing of the control contact S immediately
switches on the output relay R for the interval T. In case the control contact S is closed within the interval T, the measured time is cancelled, and the interval T starts again.

A description of the next steps of the program:

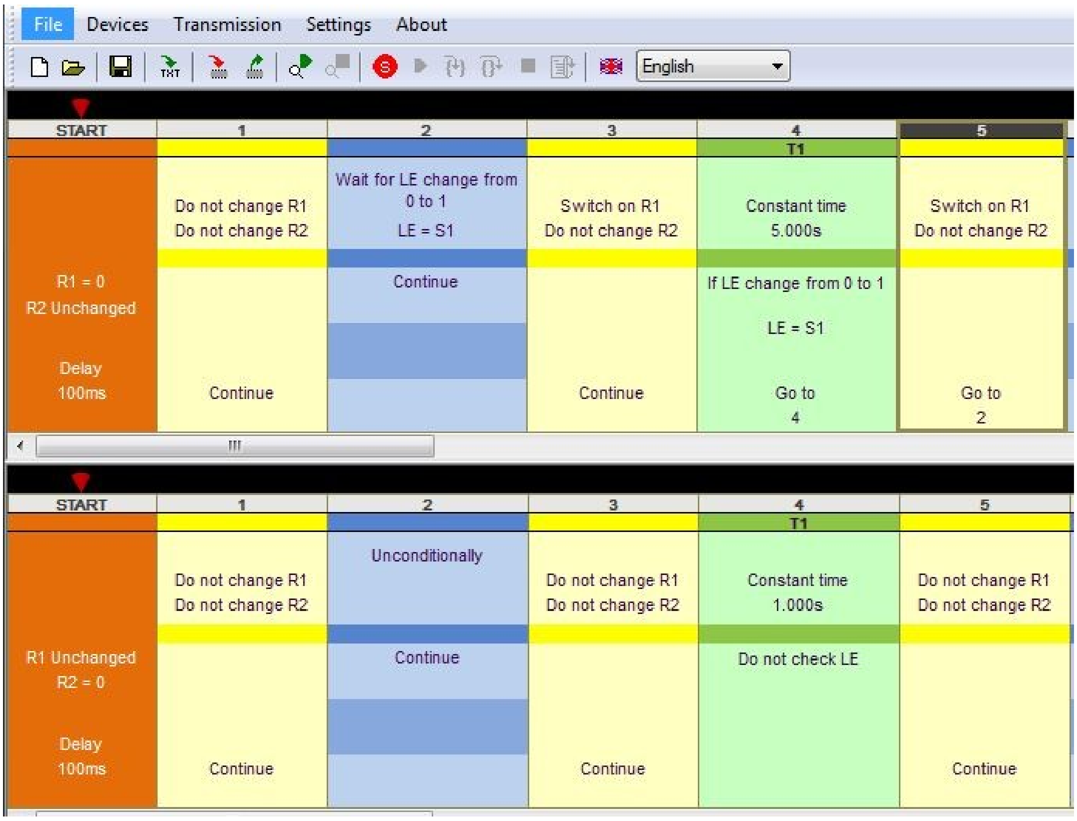
TPA	TPD	
 START R = 0 Delay 100ms	 START R1 = 0 R2 Unchanged Delay 100ms START R1 Unchanged R2 = 0 Delay 100ms	Relay R Executive remains switched off after the supply voltage, although it is not marked on the chart. Select the Disable parameter R for TPA. For TPD set Off R1 in the top and do not change the R1 in the bottom. In the program we use to input S (S1). Because directly after power is attached the actual status S is not known, which is why we are 100ms delay to give the CPU time to measurement.
 1 Do not change R Continue	 1 Do not change R1 Do not change R2 Continue 1 Do not change R1 Do not change R2 Continue	After the analysis of the START relay program goes to number 1 which is the Status Control field R. Relay R (R1) have already been set and there is no need to change its status, so this step should be skipped by setting the parameters do not change R (R1) and Continue. For version TPD end up unused bottom program performing a jump to STOP.

 2 Wait for S change from 0 to 1 Continue	 2 Wait for LE change from 0 to 1 LE = S1 Continue	Continuing the program moved to the conditional Block. Because we want the timing began after activation S(S1), which is why we stop at this point until, as the State S (S1) will change from 0 to 1. TPA version set Wait for the change (S) from 0 to 1, if you go to the next step. In operation spring we therefore *Continue.* For TPD, we now only from the top, where we look forward to changing the expression LE from 0 to 1, wherein LE = S1.
 3 Switch on R Continue	 3 Switch on R1 Do not change R2 Continue	Change the entry into S (S1) has been detected, so turn on the Executive relay R (R1), and Continue going to the *Time Block.*
 4 T1 Constant time 5.000s If S change from 0 to 1 Go to 4	 4 T1 Constant time 5.000s If LE change from 0 to 1 LE = S1 Go to 4	Here you direct relay stop for 5s, but introducing additional control. If we detect a change in timing for entry into S (S1) from 0 to 1, we jump to step 4, which is actually the current. Thanks to the time will begin to count up from scratch and get the required extension. However, if the change does not occur, the program goes to the next stage after 5s..
 5 Switch off R Go to 2	 5 Switch on R1 Do not change R2 Go to 2	Relay measured a set time and contacts R (R1) should be switched off. We therefore Turn R (R1) and we jump to step 2, where we expect the re-arming input S (S1).

The appearance of the finished program for TPA relays and TPD looks as follows:



START	1	2	3	4 T1	5
R = 0 Delay 100ms	Do not change R	Wait for S change from 0 to 1	Switch on R	Constant time 5.000s	Switch off R
		Continue		If S change from 0 to 1	
	Continue		Continue	Go to 4	Go to 2



START	1	2	3	4 T1	5
R1 = 0 R2 Unchanged Delay 100ms	Do not change R1 Do not change R2	Wait for LE change from 0 to 1 LE = S1	Switch on R1 Do not change R2	Constant time 5.000s	Switch on R1 Do not change R2
		Continue		If LE change from 0 to 1 LE = S1	
	Continue		Continue	Go to 4	Go to 2

START	1	2	3	4 T1	5
R1 Unchanged R2 = 0 Delay 100ms	Do not change R1 Do not change R2	Unconditionally	Do not change R1 Do not change R2	Constant time 1.000s	Do not change R1 Do not change R2
		Continue		Do not check LE	
	Continue		Continue		Continue

The following instruction shows only brief examples of defining time functions. If you omit Time Blocks and use Conditional Blocks respectively, may arise sequence relay, e.g. alternately switching on and off when it detects a pulse output to control input S. The amount of resources and the diversity of settings give a very large configuration options, allowing you to implement control schemes not found in typical time relays.