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Subject: Adding simple functions to Ladder

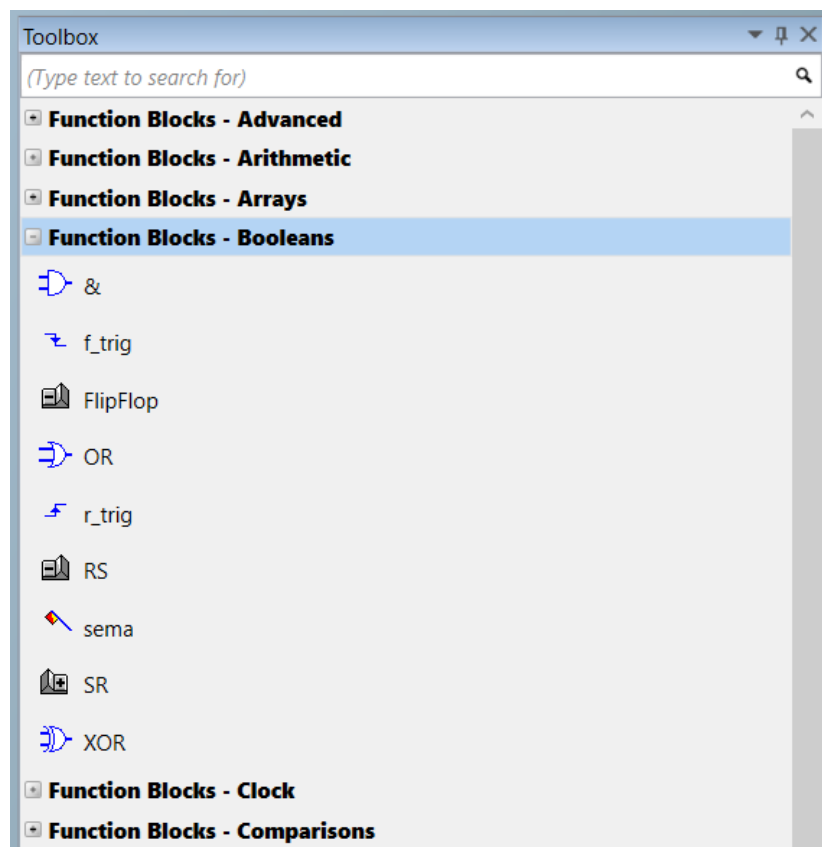
APPLICATION NOTE

1. Requirement

To add Rising Edge, Flip-Flop and Timer functions to a Ladder program.

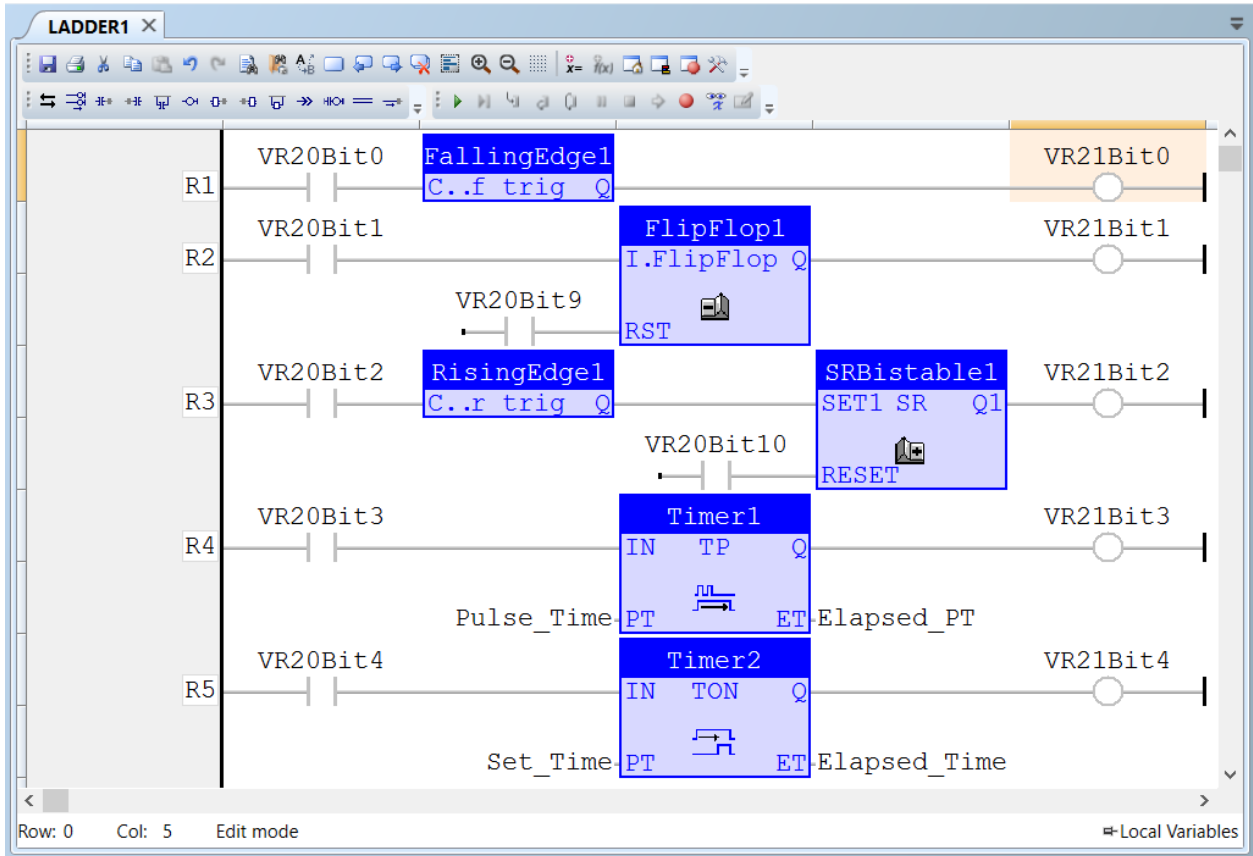
2. Toolbox

Open the toolbox, select the required function blocks and drag them to the required position on the Ladder.



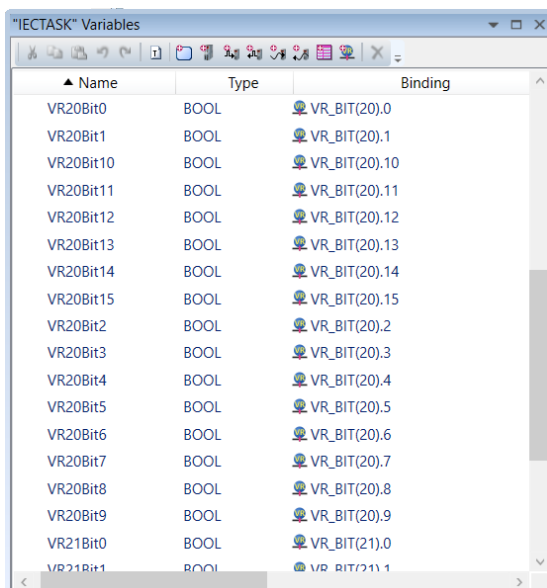
3. Assign instance names to the Function Blocks

As you put the functions into the Ladder, the editor will ask for names if they are needed. Names like RisingEdge1 were used in this example. More meaningful names can be used in the real application.



4. Bind contacts and coils as required

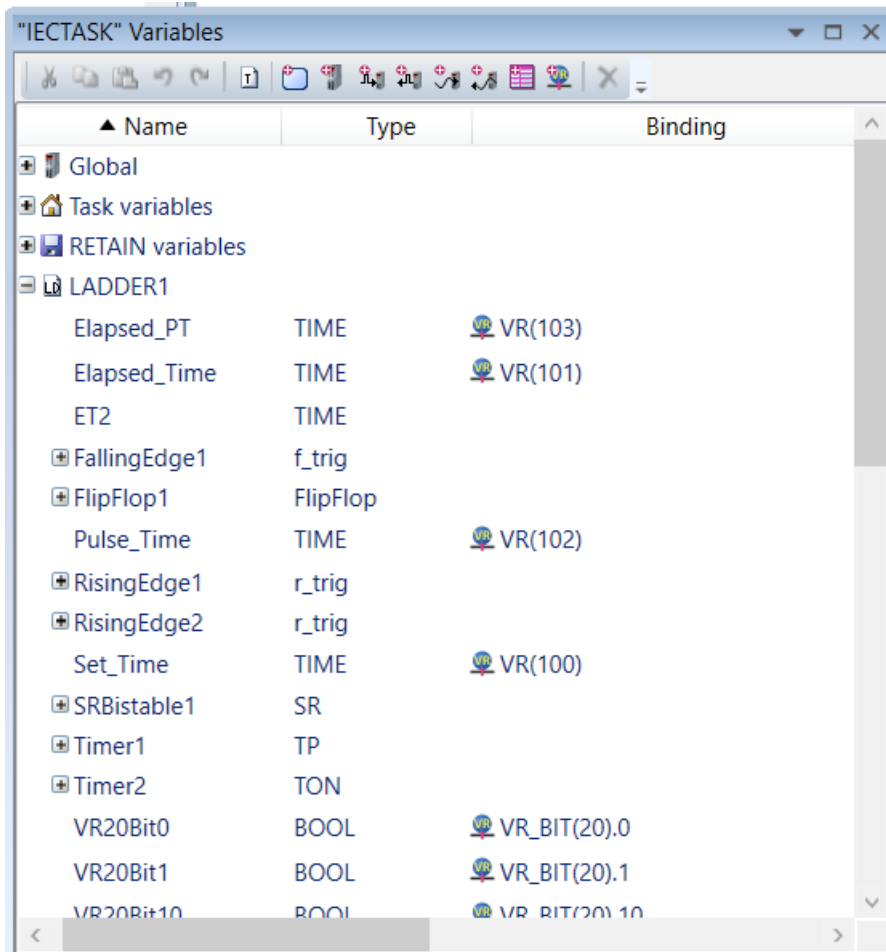
Usually the contacts will be inputs and the coils will be outputs. In this example they are bound to bits in global VR variables.



Name	Type	Binding
VR20Bit0	BOOL	VR_BIT(20).0
VR20Bit1	BOOL	VR_BIT(20).1
VR20Bit10	BOOL	VR_BIT(20).10
VR20Bit11	BOOL	VR_BIT(20).11
VR20Bit12	BOOL	VR_BIT(20).12
VR20Bit13	BOOL	VR_BIT(20).13
VR20Bit14	BOOL	VR_BIT(20).14
VR20Bit15	BOOL	VR_BIT(20).15
VR20Bit2	BOOL	VR_BIT(20).2
VR20Bit3	BOOL	VR_BIT(20).3
VR20Bit4	BOOL	VR_BIT(20).4
VR20Bit5	BOOL	VR_BIT(20).5
VR20Bit6	BOOL	VR_BIT(20).6
VR20Bit7	BOOL	VR_BIT(20).7
VR20Bit8	BOOL	VR_BIT(20).8
VR20Bit9	BOOL	VR_BIT(20).9
VR21Bit0	BOOL	VR_BIT(21).0
VR21Bit1	BOOL	VR_BIT(21).1

5. Set up TIME variables for the timers

Timers need times as input and output as type TIME. In this case the variables are bound to VRs. The VR value is always in milliseconds.



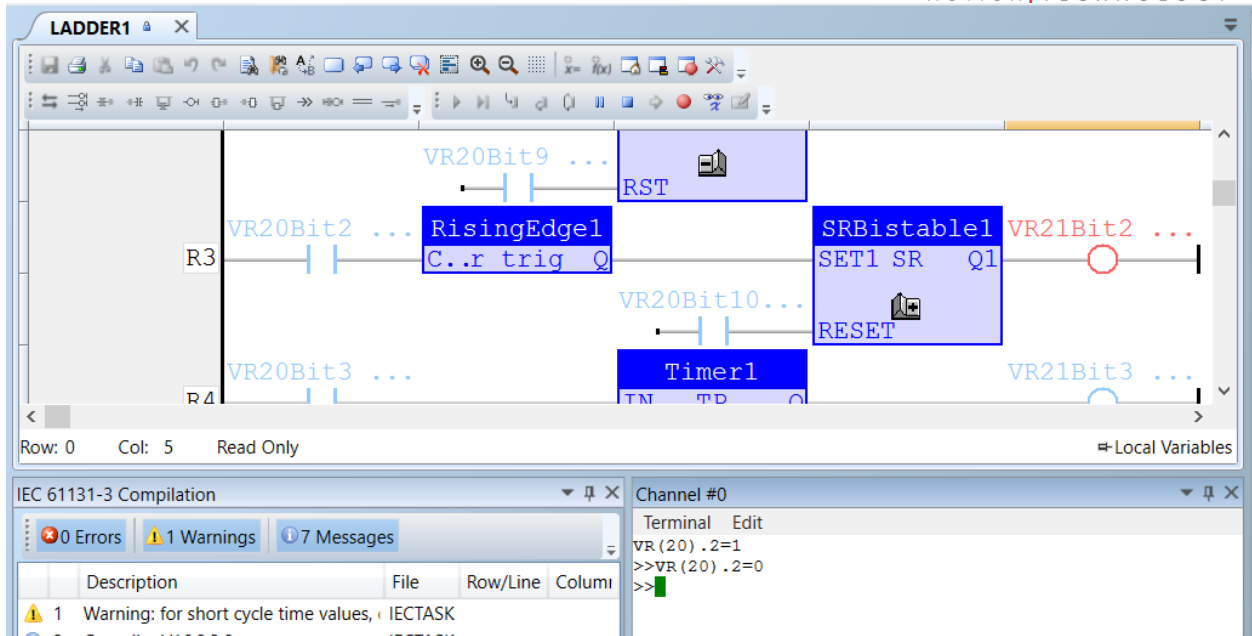
6. Set the time values and run the program

In Motion Perfect terminal 0, the time values are set in VR(100) and VR(102).

```
>>vr(100)=10000
>>vr(102)=5000
```

In this case 10 seconds and 5 seconds.

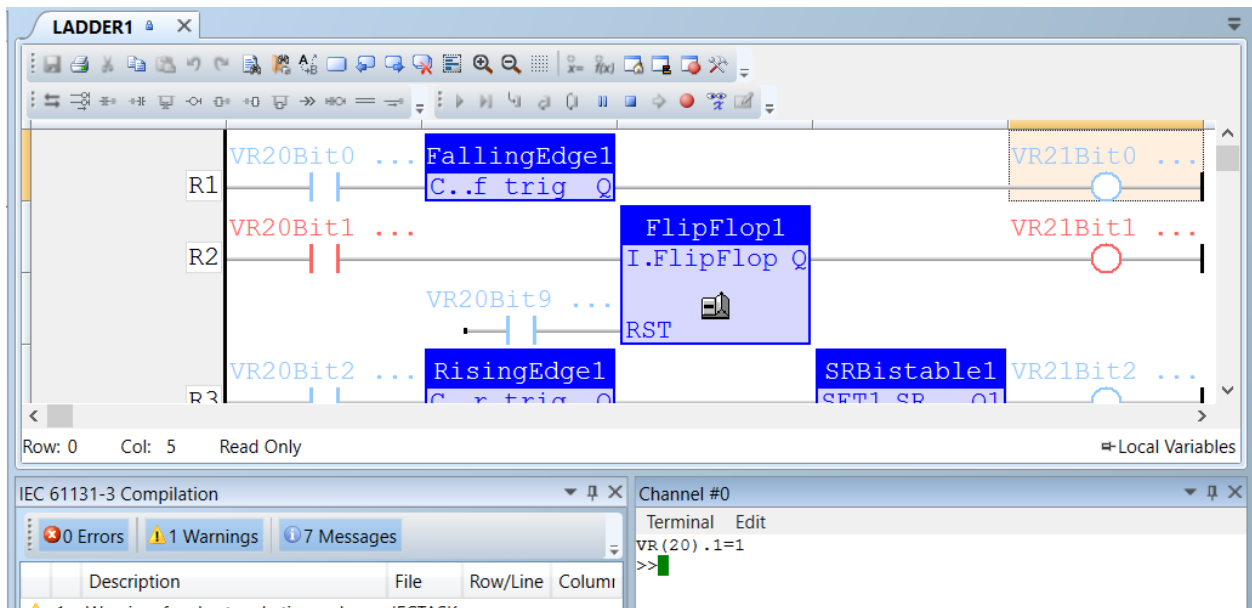
VR(20) bits are then set to trigger the different functions.



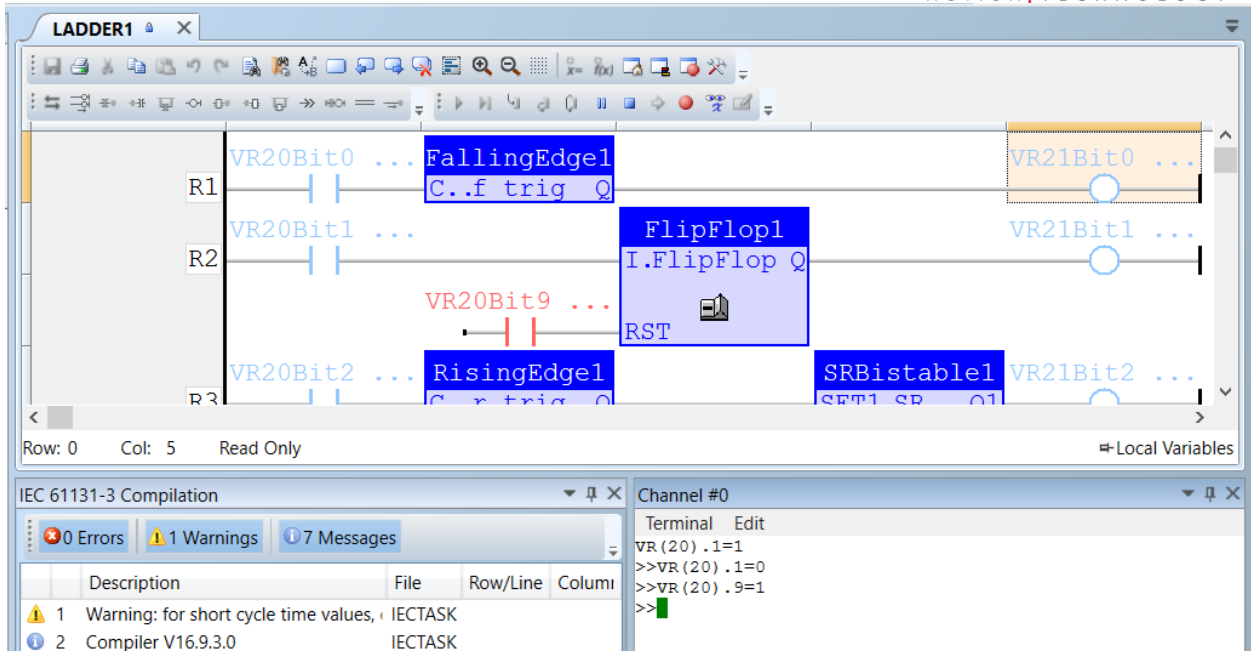
Setting the input low again.

6.3. Flip Flop

The flip flop Q goes high when the SET input is pulsed. It goes low when the RST input is pulsed.

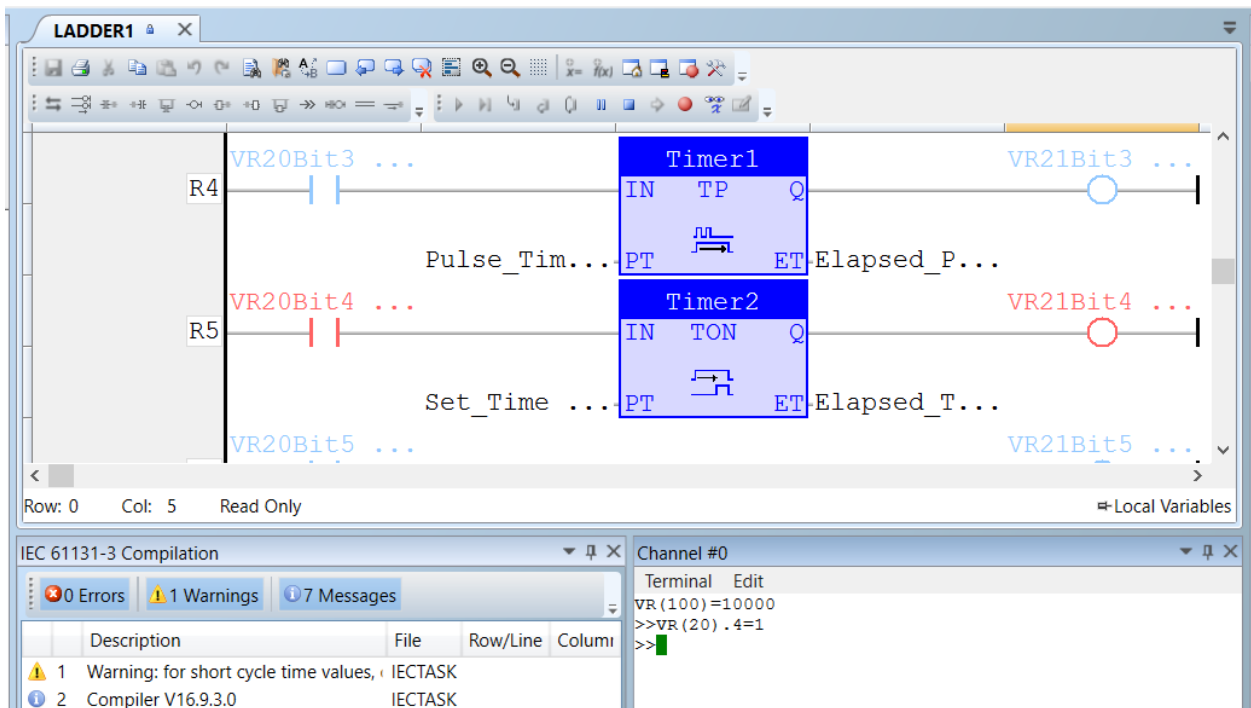


Q stays high until the RST input is set.



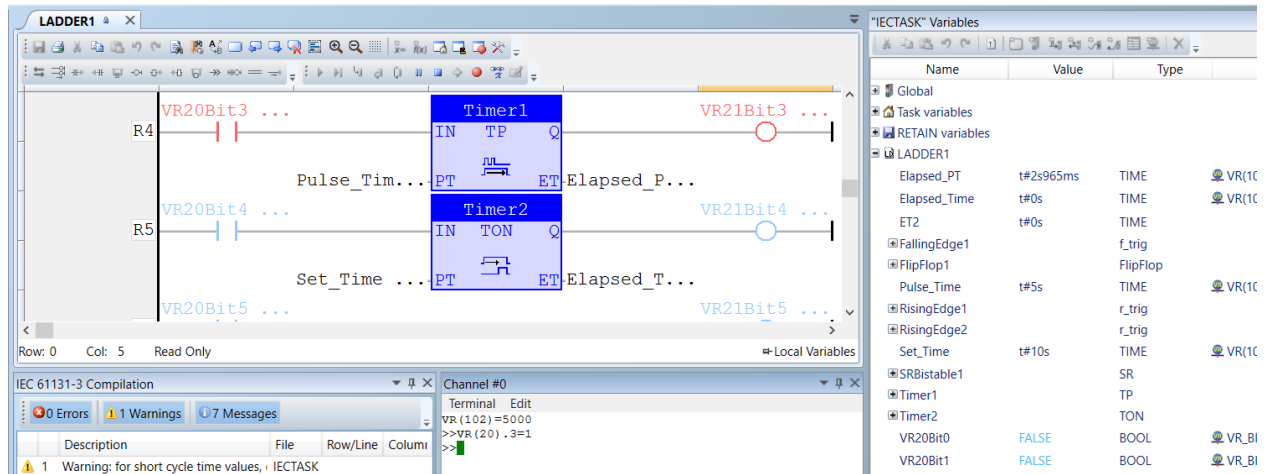
6.4. TON timer

The output goes ON after the elapsed time is finished. In this case 10 seconds.



6.5. TP timer

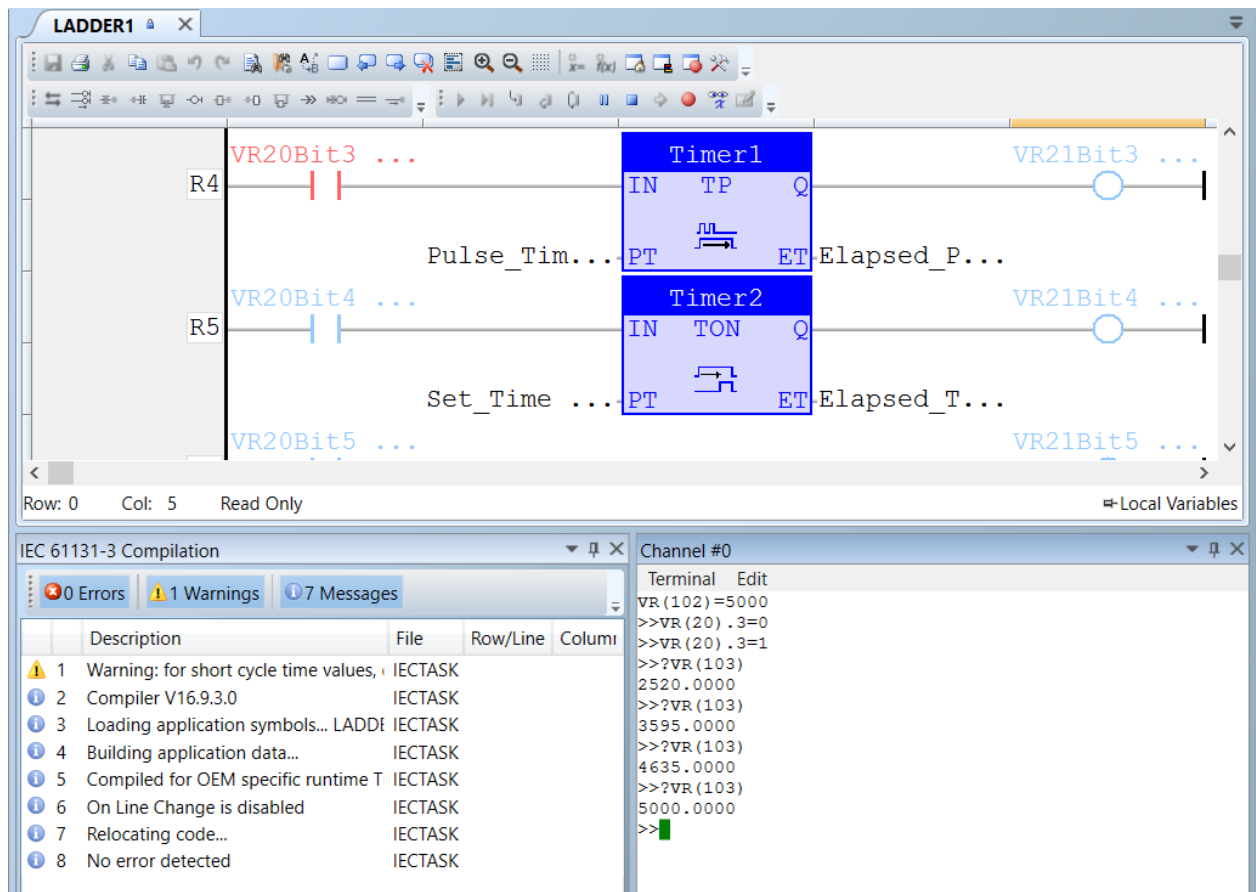
The output goes ON immediately the input is set TRUE. It remains ON for the elapsed time.



The screenshot shows the Ladder Logic editor for LADDER1. It contains two timer blocks: Timer1 (TP) and Timer2 (TON). Timer1 is triggered by VR20Bit3 and has an output VR21Bit3. Timer2 is triggered by VR20Bit4 and has an output VR21Bit4. The elapsed time for Timer1 is shown as VR21Bit3. The elapsed time for Timer2 is shown as VR21Bit4. The variables are listed in the 'IECTASK' Variables table on the right.

Name	Value	Type	
Global			
Task variables			
RETAIN variables			
LADDER1			
Elapsed_PT	t#2s965ms	TIME	VR(103)
Elapsed_Time	t#0s	TIME	VR(103)
ET2	t#0s	TIME	
FallingEdge1	f_trig	FlipFlop	
FlipFlop1		FlipFlop	
Pulse_Time	t#5s	TIME	VR(103)
RisingEdge1	r_trig	FlipFlop	
RisingEdge2	r_trig	FlipFlop	
Set_Time	t#10s	TIME	VR(103)
SRBistable1		SR	
Timer1		TP	
Timer2		TON	
VR20Bit0	FALSE	BOOL	VR_BI
VR20Bit1	FALSE	BOOL	VR_BI

You can also see the elapsed time in VR(103)



The screenshot shows the Ladder Logic editor for LADDER1. It contains two timer blocks: Timer1 (TP) and Timer2 (TON). Timer1 is triggered by VR20Bit3 and has an output VR21Bit3. Timer2 is triggered by VR20Bit4 and has an output VR21Bit4. The elapsed time for Timer1 is shown as VR21Bit3. The elapsed time for Timer2 is shown as VR21Bit4. The variables are listed in the 'IECTASK' Variables table on the right.

Name	Value	Type	
Global			
Task variables			
RETAIN variables			
LADDER1			
Elapsed_PT	t#2s965ms	TIME	VR(103)
Elapsed_Time	t#0s	TIME	VR(103)
ET2	t#0s	TIME	
FallingEdge1	f_trig	FlipFlop	
FlipFlop1		FlipFlop	
Pulse_Time	t#5s	TIME	VR(103)
RisingEdge1	r_trig	FlipFlop	
RisingEdge2	r_trig	FlipFlop	
Set_Time	t#10s	TIME	VR(103)
SRBistable1		SR	
Timer1		TP	
Timer2		TON	
VR20Bit0	FALSE	BOOL	VR_BI
VR20Bit1	FALSE	BOOL	VR_BI