

Data sheet

Electronic time relays

ATI, BTI, SDT and MTI



With their robust design and many built-in functions, electronic timers ATI, BTI, SDT and MTI are ideal for OEMs and panel builders.

Features

- Easy time setting
- Electrical noise immunity
- Mechanical shock and vibration resistance
- Time ranges 0.1 s to 30 min for single function Electronic timers
- Time ranges 0.05 s to 300 h for multi function Electronic timers
- Compact standard dimensions
- DIN rail or adaptor mounting
- Single function electronic timers featuring:
 - ON delay
 - OFF delay or
 - star-delta start
- Multi function timer with 10 timing functions
- Function selector

- = ON delay
- = OFF delay
- = pulse with ON delay
- = pulse with OFF delay
- = flasher relay with pause start
- = flasher relay with pulse start
- = star-delta starters with pulse function
- = ON-delay and OFF-delay, symmetrical
- = Pulse former
- = ON/OFF-Function
- Output relay R2 (On LED = yellow)
- Output relay R1 (On LED = yellow)
- U/T supply voltage (established LED = green)
- "Inst" switch (changes output relay R2 to instantaneous relay).

Approvals

CE EAC ENEC

cULus LLC CDC TYSK



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Ordering

ON-delay electronic timers

Type	Time range	Voltage range	Contact function	Code no.
ATI	0.1 – 10 s	220 – 240 V AC, 50 – 60 Hz	1 changeover	047H3092
		24 V AC, 50 – 60 Hz		
		24 V DC		
	0.3 – 30 s	220 – 240 V AC, 50 – 60 Hz		047H3104
		24 V AC, 50 – 60 Hz		
		24 V DC		
	3 – 300 s	220 – 240 V AC, 50 – 60 Hz		047H3093
		24 V AC, 50 – 60 Hz		
		24 V DC		
	0.3 – 30 min.	220 – 240 V AC, 50 – 60 Hz		047H3105
		24 V AC, 50 – 60 Hz		
		24 V DC		

OFF-delay electronic timers

Type	Time range	Voltage range	Contact function	Code no.
BTI	3 – 300 s	24 V AC, 50 – 60 Hz	1 changeover	047H3095
		24 V DC		
	0.3 – 30 s	220 – 240 V AC, 50 – 60 Hz		047H3107
	3 – 300 s	220 – 240 V AC, 50 – 60 Hz		047H3099

Star-delta electronic timers

Type	Time range	Voltage range	Contact function	Code no.
SDT	0.3 – 30 s	110 – 130 V AC, 50 – 60 Hz	1 changeover	047H3110
		220 – 240 V AC, 50 – 60 Hz		047H3111
		24 V AC, 50 – 60 Hz		
		24 V DC		
		380 – 415 V AC, 50 – 60 Hz		047H3112

Multi function electronic timers

Type	Time range	Voltage range	Contact function	Code no.
MTI	0.05 s – 300 h	24 – 240 V AC, 50 – 60 Hz	2 changeover	047H3077
		24 – 48 V DC		



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Technical data

Type designation	ATI	BTI	SDT	MTI
Output circuit				
Changeover switch	1	1	1	2
Max. A on 250 V	4	4	4	4
AC-15 on 230 V (A)	1.5	1.5	1.5	3
AC-15 on 415 V (A)			0.25	
DC-12 on 24 V (A)	4	4	4	4
DC-13 on 24 V (A)	2	2	2	2

		Input			
Supply voltage	AC/DC 24 V		•		
	DC 24 – 48 V AC 24 – 240 V				•
	AC/DC 24 V AC 220 – 240 V	•		•	
	AC 110 – 130 V	•		•	
	AC 220 – 240 V		•		
	AC 380 – 415 V			•	
Voltage tolerance		-10% – 10%		-15% – 10%	
Frequency		50 – 60 Hz			
Duty rating		Continuous			
Consumption	AC/DC 24 V	1.0 VA / W			
	AC 220 – 240 V	12.0 VA			
	AC 380 – 415 V			23.0 VA	

		Time circuit				
Time ranges		0.1 – 10 s	0.3 – 30s			
		0.3 – 30 s	0.15 – 3 s	0.05 – 1 s	1.5 – 30 s	1.5 – 30 min.
		3 – 300 s		5 – 100 s	5 – 100 s	1.5 – 300 min.
		0.3 – 30 min.		0.5 – 10 s	15 – 300 s	1.5 – 30 min.
10 time ranges in each unit		15 – 300 h				
Reset time (dwell time) <		100 ms	400 ms	80 ms		
Control pulse time >		20 ms				
Y/D changeover time			30 ms	50 ms		
Repeat accuracy <		1%		0.2%		
Time deviation within voltage tolerance <		0.5%		0.004% / V		
Time deviation within temperature range <		0.1% / °C		0.03% / °C		
Ambient temperature	operation	-20 °C – 60 °C		-25 °C – 60 °C		
	storage	-40 °C – 80 °C		-40 °C – 85 °C		

		Control contact Y1 – Z2	
No-load voltage		10 – 40 V DC	
Remote pot.meter connection Z ₁ Cable screen Z ₂ to screen		Potentiometer resistance 50 KΩ 2 x 25 m shielded with 100 pF/m	

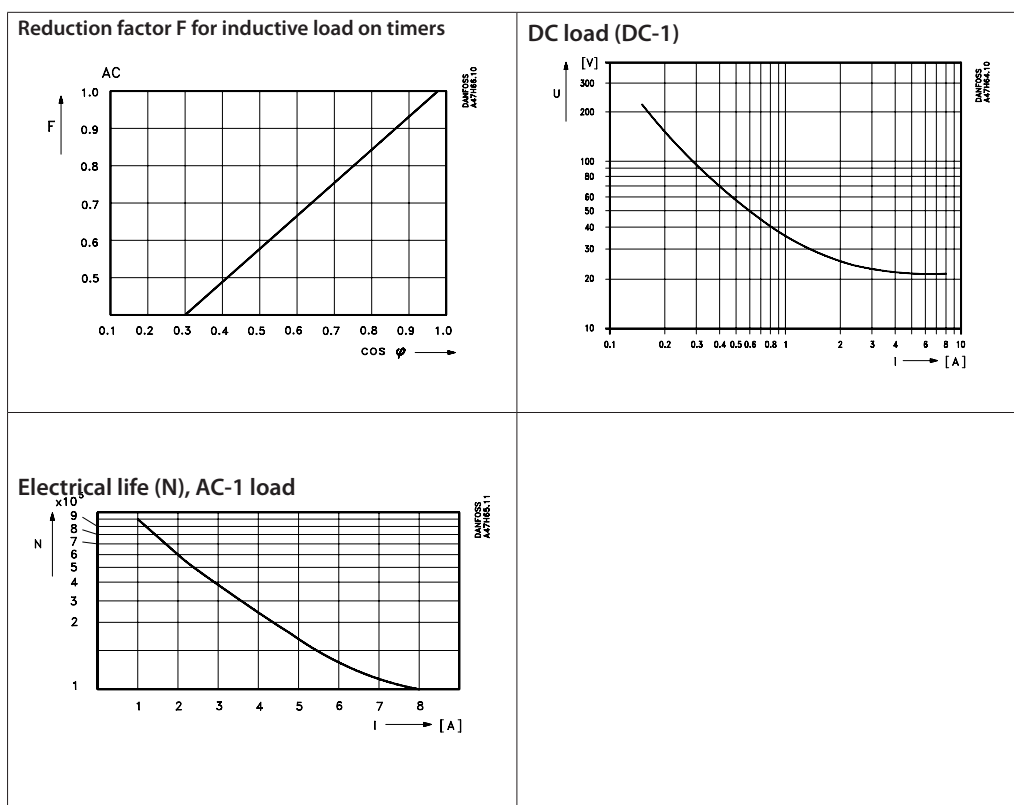
LED indication				
Supply voltage, green	•	•	•	•
Supply voltage, green/flashes when timng				•
Output relay R1, yellow				•
Outout relay R2, yellow				•

		Other data	
Installation		DIN rail	
Enclosure, housing/terminals		IP50 / IP20	
Installation orientation		Any	
Mechanical life		30 x 10 ⁶	
Electrical life, ohmic load		100,000 operations on 8 A, 230 V AC	100,000 operations on 4 A, 230 V AC
Max. fuse		2 A, gl	6 A, gl
Max. lead cross-section		2 x 1.5 mm ²	2 x 2.5 mm ²
Test voltage		2.5 kV, 50 Hz, 1 s	2.0 kV, 50 Hz, 1 s
EMC Directive		2004 / 108 / EC	



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Load graphs,
electronic time relays
ATI, BTI, SDT, MTI



Approvals

Approval authority	CE	EAC	UL LISTED	089
	EN 60947	EAC	UL-listed CANADA USA	LLC CDC TYSK
Product type				
ATI / BTI / SDT	•	•	•	•
MTI	•	•	•	•

• Approved

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Contact symbols and terminal markings

Electronic timers

<p>On- delay ATI</p>	<p>On-delay (terminal marking) ATI</p>
<p>Off-delay - BTI</p>	<p>Off-delay (Terminal marking) - BTI</p>
<p>Star-delta timer - SDT</p>	<p>Star-delta timer (Terminal marking)</p>
<p>Multi function timer - MTI (with 2 changeover contacts)</p>	<p>Multi function timer (Terminal marking) - MTI</p>

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Function overview,
electronic time relays

<p>■ supply on and contact made t set time</p>	<p>ON delay When voltage is applied to A1/A2 the time interval begins. When the time interval elapses, the output relay is energised and remains energised until the voltage supply is cut off. With 24 V supply, terminals A1 and B1 must be used.</p>
<p>■ supply on and contact made t set time</p>	<p>OFF delay The supply must be connected to A1/A2 and remain established. Time interval start is controlled by a contact on terminal Y1. When the contact is made, the output relay is energised. When the contact is broken, the time interval starts (control pulse length min. 20 ms). When the set time interval elapses, the output relay drops back to its dwell position. If the control contact for terminal Y1 makes during the time interval, the interval is stopped. If the contact is broken again, the time interval starts anew. Note! External load must not be connected so that it is supplied via control contact Y1.</p>
<p>■ supply on and contact made t1 set time (Y-operation) t2 changeover pause (approx. 30 ms)</p>	<p>Star-delta relay When voltage is applied to A1/A2 the time interval starts. When the time interval elapses, the output relay energises. The Y-contactor switch-off and after a dwell time of 30 – 35 ms the D contactor switch-in. With 24 V supply, terminals A1 and B1 must be used.</p>

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MTI multi functions with two contacts

<p style="text-align: right;">Danfoss 47H561.14</p> <p style="text-align: center;">$t = \text{adjusted time delay}$</p> <p style="text-align: center;">■ supply on and contact made</p>	<p>ON delay</p> <p>When supply voltage is applied to A1/A2, the set time interval begins. The green LED flashes for the duration of the interval. When the interval elapses, the output relay is energised and the green LED lights up constantly. The output relay remains activated until supply voltage is cut off.</p> <p>With permanent supply voltage, start and stop of the time interval can also be controlled by breaking or making control contact Y1/Z2.</p> <p>If control input Y1/Z2 closes before the time delay is complete, the time delay is reset and the output relay remains de-energized. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. When the red slide switch is brought to position „Inst.“ changeover switch R2 is immediately activated when supply voltage is applied and remains activated until the supply is cut off.</p> <p>Note! Control contacts Y1/Z2 must be potential-free.</p>
<p style="text-align: right;">Danfoss 47H561.13</p> <p style="text-align: center;">$t = \text{adjusted pulse time}$</p> <p style="text-align: center;">■ supply on and contact made</p>	<p>Pulse relay with ON delay</p> <p>When supply voltage is applied to A1/A2 the output relay is immediately energised and remains activated until the set time interval has elapsed. The green LED flashes for the duration of the interval. When the time interval elapses, the output relay drops back to its dwell position and the green LED lights up constantly.</p> <p>With permanent supply voltage, start and stop of the time interval can also be controlled by making or breaking control contact Y1/Z2.</p> <p>If control input Y1/Z2 closes before the time delay is complete, the time delay is reset and the output relay remains de-energized. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.</p> <p>When the red slide switch is brought to position „Inst.“ changeover switch R2 is immediately activated when supply voltage is applied and remains activated until the supply is cut off.</p> <p>Note! Control contacts Y1/Z2 must be potential-free.</p>
<p style="text-align: right;">Danfoss 47H54.13</p> <p style="text-align: center;">$t = \text{adjusted flashing time}$</p> <p style="text-align: center;">■ supply on and contact made t set time</p>	<p>Flasher relay with pulse begins</p> <p>When supply voltage is applied to A1/A2 the time relay flasher function begins, in accordance with the set symmetrical pause-pulse time. The green LED flashes for both pause and pulse, but with double flash frequency during pauses.</p> <p>With permanent supply voltage, start and stop of the flash sequence can also be controlled by breaking or making control contact Y1/Z2.</p> <p>When the red slide switch is brought to position „Inst.“ changeover switch R2 is immediately activated when supply voltage is applied and remains activated until the supply is cut off.</p> <p>Note! Control contacts Y1/Z2 must be potential-free.</p>

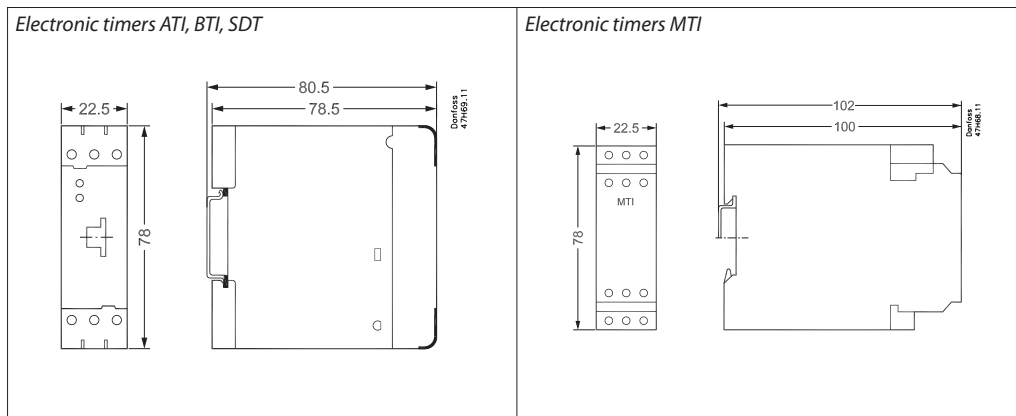
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<p style="text-align: right;">Danfoss 47H45.13</p> <p style="text-align: center;">t = adjusted flashing time</p> <p style="text-align: center;">■ supply on and contact made</p>	<div style="text-align: right;"> </div> <p>Flasher relay with pause begins</p> <p>When supply voltage is applied to A1/A2 the time relay flasher function begins, in accordance with the set symmetrical pause-pulse time. The green LED flashes for both pause and pulse, but with double flash frequency during pauses.</p> <p>With permanent supply voltage, start and stop of the flash sequence can also be controlled by breaking or making control contact Y1/Z2. When the red slide switch is brought to position „Inst.“ changeover switch R2 is immediately activated when supply voltage is applied and remains activated until the supply is cut off.</p> <p>Note! Control contacts Y1/Z2 must be potential-free.</p>
<p style="text-align: right;">Danfoss 47H60.13</p> <p style="text-align: center;">t = adjusted time delay</p> <p style="text-align: center;">■ supply on and contact made</p>	<div style="text-align: right;"> </div> <p>OFF delay</p> <p>The supply voltage must be connected to A1/A2 and remain established. The output relay is energised immediately. Time interval start is controlled by a contact on Y1/Z2.</p> <p>(Note: No foreign voltage permissible).</p> <p>When the contact is broken, the time interval begins. The green LED flashes for the duration of the interval. When the set time interval has elapsed, the output relay drops back to its dwell position and the green LED lights up constantly.</p> <p>If control input Y1/Z2 closes before the time delay is complete, the time delay is reset and the output relay remains de-energized. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.</p> <p>When the red slide switch is brought to position „Inst.“ changeover switch R2 is immediately energised when supply voltage is applied and remains activated until the supply is cut off.</p> <p>Note! Control contacts Y1/Z2 must be potential-free.</p>
<p style="text-align: right;">Danfoss 47H60.13</p> <p style="text-align: center;">t = adjusted time delay</p> <p style="text-align: center;">■ supply on and contact made</p>	<div style="text-align: right;"> </div> <p>Pulse relay with OFF delay</p> <p>The supply voltage must be connected to A1/A2 and remain established. Closing control input Y1/Z2 energizes the output relay immediately and starts timing. Operating the control contact switch Y1/Z2 during the time delay has no effect.</p> <p>The green LED flashes for the duration of the interval. 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 Y1/Z2.</p> <p>When the red slide switch is brought to position „Inst.“ changeover switch R2 is immediately energised when supply voltage is applied and remains activated until the supply is cut off.</p> <p>Note! Control contacts Y1/Z2 must be potential-free.</p>
<p style="text-align: right;">DANFOSS 47H53.12</p> <p style="text-align: center;">t₁ set time t₁ + t₂ t₂ changeover pause (approx. 50 ms)</p> <p style="text-align: center;">■ supply on and contact made</p>	<div style="text-align: right;"> </div> <p>Star-delta changeover with pulse function</p> <p>When supply voltage is applied to A1/A2, output relay R1 is energised immediately. When the set time interval elapses, output relay R1 drops back to its dwell position. After a further 50 ms, output relay R2 is energised and remains cut in as long as the supply is on. The green LED flashes for the duration of the time interval.</p>

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<p> t_1 = adjusted ON-delay t_2 = adjusted OFF-delay $t_1 = t_2$ </p> <p>■ supply on and contact made</p>	<div style="text-align: right;">☒</div> <p>Symmetrical ON and OFF-delay</p> <p>The supply voltage must be connected to A1/A2 and remain established. Time interval start is controlled by a contact on Y1/Z2.</p> <p>Closing control input Y1/Z2 starts the ON-delay t_1. When timing is complete, the output relay energizes. Opening control input Y1/Z2 starts the OFF-delay t_2. Both timing functions are displayed by the flashing green LED. When the OFF-delay t_2 is complete, the output relay de-energizes.</p> <p>If control input Y1/Z2 opens before the ON-delay t_1 is complete, the time delay is reset and the output relay remains de-energized. If control input Y1/Z2 closes before the OFF-delay t_2 is complete, the time delay is reset and the output relay remains energized.</p> <p>When the red slide switch is brought to position „Inst.“ changeover switch R2 is immediately energized when supply voltage is applied and remains activated until the supply is cut off.</p> <p>Note! Control contacts Y1/Z2 must be potential-free.</p>
<p>t = adjusted time delay</p> <p>■ supply on and contact made</p>	<div style="text-align: right;">☒</div> <p>Pulse former</p> <p>The supply voltage must be connected to A1/A2 and remain established. Closing control input Y1/Z2 energizes the output relay immediately and starts timing. Operating the control contact switch Y1/Z2 during the time delay has no effect.</p> <p>The green LED flashes for the duration of the interval. 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 Y1/Z2.</p> <p>When the red slide switch is brought to position „Inst.“ changeover switch R2 is immediately energized when supply voltage is applied and remains activated until the supply is cut off.</p> <p>Note! Control contacts Y1/Z2 must be potential-free.</p>
<p>Time sector # 300 h Time sector = 300 h</p> <p>■ supply on and contact made</p>	<div style="text-align: right;">☐</div> <p>ON/OFF-function</p> <p>This function is used for test purposes during commissioning and trouble-shooting.</p> <p>If the selected max. value of the time range is smaller than 300 h (front-face potentiometer “Time sector” not 300 h), applying control supply voltage energizes the output relay immediately and the green LED glows.</p> <p>Interrupting control supply voltage, de-energizes the output relay. If the selected max. value of the time range is 300 h (front-face potentiometer “Time sector” = 300 h) and control supply voltage is applied, the green LED glows, but the output relay does not energize.</p> <p>Time settings and operating of the control inputs have no effect on the operation.</p>

Dimensions [mm]



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