CTI-TI™ Contactors and Motor Starters Timers ATI, BTI, MTI

Features

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

- Easy time setting
- Electrical noise immunity
- Mechanical shock and vibration resistance
- Time ranges 0.1 s to 30 min for single function Electronic timers and 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 electronic timers featuring:
  - ON delay
  - OFF delay
  - single pulse pause or pause pulse
  - flasher pulse pause or pause pulse
  and
  - star-delta start

- Function selector

AV	⊠	= ON delay
RV	■	= OFF delay
EW	1⌐ ⊠	= pulse with ON delay
AW	1⌐ ■	= pulse with OFF delay
BI	⌐ ■	= flasher relay with pulse start
BP	⌐ ⊠	= flasher relay with pause start
YDAV	△ ⊠	= star-delta starters with ON delay
YDEW	△ 1⌐	= star-delta starters with pulse function

- output relay R2 (On LED = red)
- output relay R1 (On LED = red)
- U/T supply voltage (established LED = green)
- „Inst" switch (changes output relay R2 to instantaneous relay).

Ordering

ON-delay electronic timers

Time range	Voltage range	Contact function	Code no.	Type
0.1 - 10 s	110-130 V a.c., 50-60 Hz		**047H3090**	
3 - 300 s	110-130 V a.c., 50-60 Hz		**047H3091**	
0.1 - 10 s	220-240 V a.c., 50-60 Hz		**047H3092**	
	24 V a.c., 50-60 Hz			
	24 V d.c.			
0.3 - 30 s	220-240 V a.c., 50-60 Hz	1 changeover	**047H3104**	ATI
	24 V a.c., 50-60 Hz			
	24 V d.c.			
3 - 300 s	220-240 V a.c., 50-60 Hz		**047H3093**	
	24 V a.c., 50-60 Hz			
	24 V d.c.			
0.3 - 30 min.	220-240 V a.c., 50-60 Hz		**047H3105**	
	24 V a.c., 50-60 Hz			
	24 V d.c.			

Data sheet   Timers ATI, BTI and MTI

Ordering (continued)

OFF-delay electronic timers

Time range	Voltage range	Contact function	Code no.	Type
0.1 - 10 s	24 V a.c., 50-60 Hz		047H3094	
	24 V d.c.			
0.3 - 30 s	24 V a.c., 50-60 Hz		047H3106	
	24 V d.c.			
3 - 300 s	24 V a.c., 50-60 Hz	1 changeover	047H3095	BTI
	24 V d.c.			
0.1 - 10 s	110-130 V a.c., 50-60 Hz		047H3096	
3 - 300 s	110-130 V a.c., 50-60 Hz		047H3097	
0.1 10 s	220-240 V a.c., 50-60 Hz		047H3098	
0.3 - 30 s	220-240 V a.c., 50-60 Hz		047H3107	
3 - 300 s	220-240 V a.c., 50-60 Hz		047H3099	

Star-delta electronic timers for SDU 12-25

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

Multi function electronic timers

Time range	Voltage range	Contact fuction	Code no.	Type
0.05 s - 300 h	24-240 V a.c., 50-60 Hz	2 changeover	047H3075	MTI
	24-240 V d.c.			
	24 V a.c., 50-60 Hz		047H3076	
	24 V d.c.	1 changeover		
	42-48 V a.c., 50-60 Hz			
	42-48 V d.c.			
	110-240 V a.c., 50-60 Hz			

Timers ATI, BTI, SDT, MTI

Type designation		ATI	BTI	SDT	MTI	
Output circuit						
Changeover switch		1	1	1	2	1
Max. A on 250 V		4	4	4	4	
AC-15 on 230 V (A)		1.5	1.5	1.5	1.5	
AC-15 on 415 V (A)				0.25		
DC - 12 on 24 V d.c. (A)		4	4	4	4	
DC - 13 on 24 V d.c. (A)		2	2	2	2	
Input						
Supply voltage*)	UC 24 V		•			
	UC 24-240V				•	
	UC 24 V, UC 42-48 V AC 110-240 V					•
	UC 24 V AC 220-240 V	•		•		
	AC 110-130 V	•	•	•		
	AC 220-240 V		•			
	AC 380-415 V			•		
Voltage tolerance		-10% to +10%			-15% to +10%	
Frequency		50-60 Hz				
Duty rating		Continuous				
Consumption*)	UC 24 V	1.0 VA/W				
	AC 110-130 V	6.0 VA				
	AC 220-240 V	12.0 VA				
	AC 380-415 V			23.0 VA		
	UC 42-48 V				Typically 1.8 VA/W	
	AC 110-240 V				Typically 2.5 VA	
	UC 24-240 V			Typically 2.5 VA/W		
Time circuit						
Time ranges		0.1-10 s		0.3-30 s	0.05-1 s 1.5-30 s 1.5-30 min.	
		0.3-30 s			0.15-3 s 5-100 s 15-300 min.	
		3-300 s			0.5-10 s 15-300 s 1.5-30 h	
		0.3-30 min				
10 time ranges in each unit					15-300 h	
Reset time (dwell time) <		100 ms		400 ms	50 ms	
Control pulse time >		20 ms				
Y/D changeover time				30 ms		
Repeat accuracy <		1%			0.2%	
Time deviation within voltage tolerance <		0.5%			0.008% / %ΔU	
Time deviation within temperature range		0.1%/ °C			0.07%/ °C	
Ambient temperature	operation	-20 °C to +60 °C			-20 °C to +60 °C	
	storage	-40 °C to +80 °C			-40 °C to +85 °C	
Control contact Y1-Z2/X1-Z2 [1]						
No-load voltage					10 - 50 V d.c.	
Min. current					1-5 mA	
Remote pot.meter connection Z1-Z2 [1] Cable screen Z₂ to screen					Potentiometer resistance 50 KΩ max. 25 m	
LED indication						
Supply voltage, green		•	•	•		
Supply voltage, green/flashes when time interval expires					•	•
Output relay , red					•	•
Output relay I, red					•	
Outout relay II, red					•	
Other data						
Installation		DIN rail/screw fixing with adapter				
Enclosure, housing/terminals		IP 50/IP 20				
Installation orientation		Any				
Mechanical life		30 mio. operations				
Electrical life, ohmic load		100 000 operations on 8 A, 230 V a.c.				
Vibration (mechanical)		10 g, 55 Hz/a = ±0.95 mm				
Vibration (operation)		6 g			4 g	
Max. fuse		2 A, gl				
Max. lead cross-section		2 × 1.5 mm²			2 × 2.5 mm²	
Test voltage		2.5 kV				
EMC		IEC 801.1 - 4. class III				

Approvals

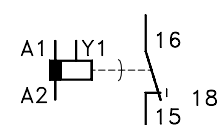| Approval authority / Product type	EN 60947	CSA Canada	UL-listed USA	Germanischer Lloyd, Germany
ATI/ BTI/ SDT	●	●	●	●
MTI	●	●	●	●
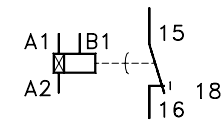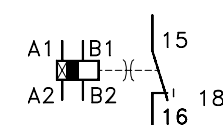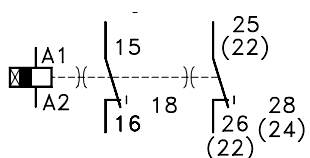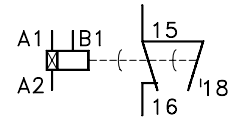
● Approval

Load graphs, timers ATI, BTI, SDT, MTI

AC

DANFOSS A47H66.10

Reduction factor F for inductive load on timers

DANFOSS A47H64.10

d.c. load (DC-1)

DANFOSS A47H65.11

Electrical life (N), AC-1 load
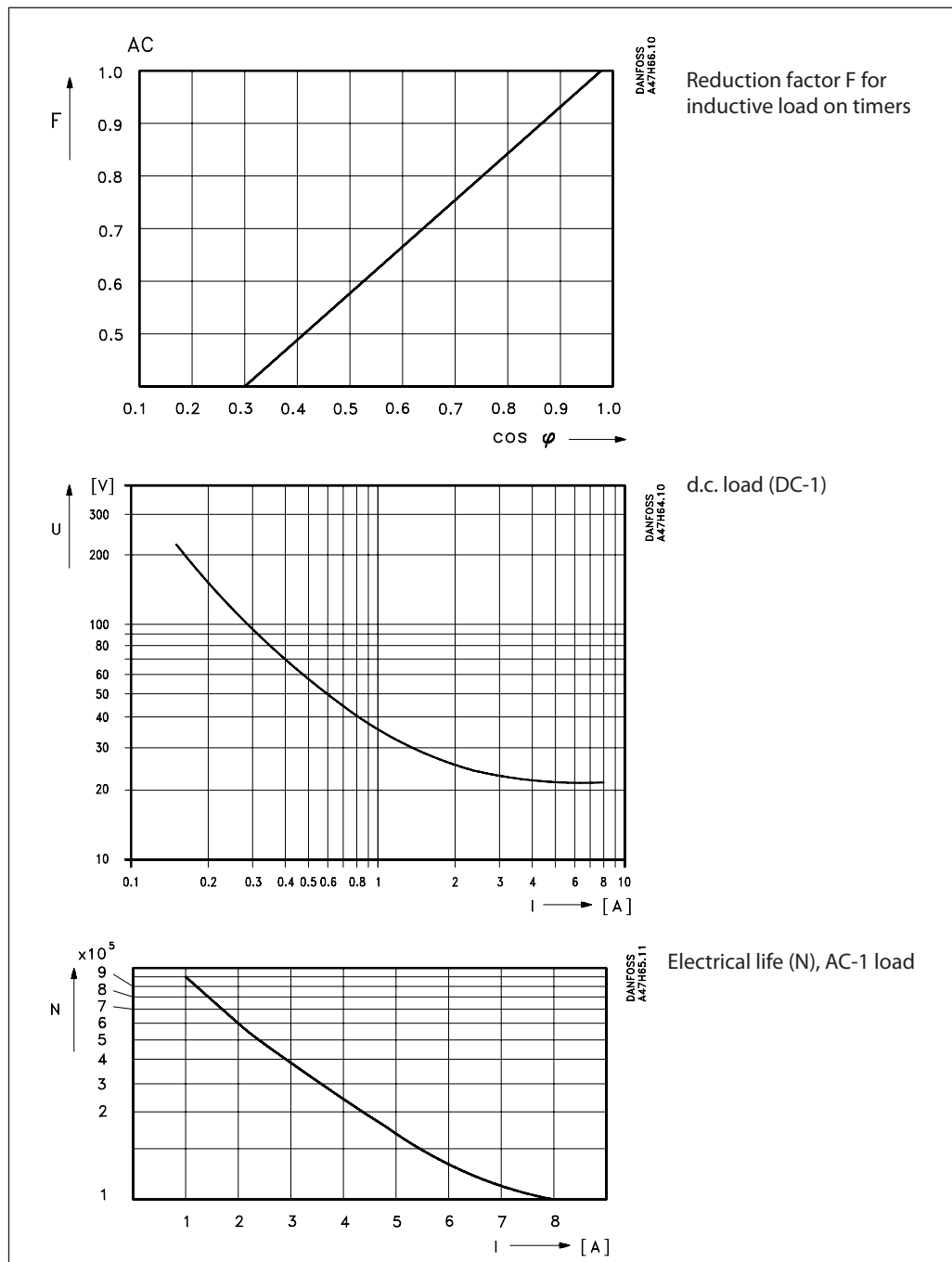
Contact symbols and terminal markings

Electronic timers

|	
On- delay ATI	On-delay (terminal marking) ATI
Off-delay BTI	Off-delay (Terminal marking) BTI
Multi function timer MTI (with 1 changeover contact)	Multi function timer (Terminal marking) MTI
Multi function timer MTI (with 2 changeover contacts)	Multi function timer (Terminal marking) MTI
Star-delta timer SDT	Star-delta timer (Terminal marking) SDT

Function overview, timers

- supply on and contact made
- t set time

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.

- supply on and contact made
- t set time

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.

- supply on and contact made
- t1 set time (Y-operation)
- t2 changeover pause (approx. 30 ms)

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.

MTI multi functions with one switch

A1 — A2
A2 — B1
A2 — B2
Y1 — Z2
15 — 18
   16
LED
X1 — Z2

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A47H80.10

■ supply on and contact made
t set time t1 + t2
ts time interval stopped

AV
ON delay

When voltage is applied to A1/A2*) the set time interval starts. The green LED flashes for the duration of the interval. When the time interval elapses, the output relay is energised and the green LED lights up constantly. The output relay remains energised until supply voltage is cut off.

With permanent supply voltage, start and stop of the time interval can also be controlled by making or breaking control contact Y1/Z2.

The time interval can be stopped by making control contact X1/Z2. The time elapsed until then is stored and the time interval is stopped. The time interval starts again when control contact X1/Z2 is broken. This function can be repeated any number of times.

Note! Control contacts Y1-Z2 and X1-Z2 must be potential-free.

*)On 24 V use terminals A2/B1 and on 48 V terminals A2/B2.

A1 — A2
A2 — B1
A2 — B2
Y1 — Z2
15 — 18
   16
LED
X1 — Z2

DANFOSS
A47H81.10

■ supply on and contact made
t set time t1 + t2
ts time interval stopped

EW
pulse relay with ON delay

When supply voltage is applied to A1/A2*) the output relay is immediately energised and remains energised 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.

With permanent supply voltage, start and stop of the time interval can also be controlled by making or breaking control contact Y1/Z2.

The time interval can be stopped by making control contact X1/Z2. The time elapsed until then is stored and the time interval is stopped. The time interval starts again when control contact X1/Z2 is broken. This function can be repeated any number of times.

Note! Control contacts Y1-Z2 and X1-Z2 must be potential-free.

*)On 24 V use terminals A2/B1 and on 48 V terminals A2/B2.

A1 — A2
A2 — B1
A2 — B2
Y1 — Z2
15 — 18
   16
LED

DANFOSS
A47H82.10

■ supply on and contact made
t set time

BI
flasher relay with pulse begins

When supply voltage is applied to A1/A2*) the time relay flasher function begins, in accordance with the set symmetrical pulse-pause time.

The green LED flashes for both pulse and pause, but with double flash frequency during pauses.

With permanent supply voltage, start and stop of the flash sequence can also be controlled by breaking or making control contact Y1/Z2.

Note! Control contacts Y1-Z2 must be potential-free.

*)On 24 V use terminals A2/B1 and on 48 V terminals A2/B2.

A1 — A2
A2 — B1
A2 — B2
Y1 — Z2
15 — 18
   16
LED

DANFOSS
A47H83.10

■ supply on and contact made
t set time

BP
flasher relay with pause begins

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.

With permanent supply voltage, start and stop of the flash sequence can also be controlled by breaking or making control contact Y1/Z2.

Note! Control contacts Y1-Z2 must be potential-free.

*)On 24 V use terminals A2/B1 and on 48 V terminals A2/B2.

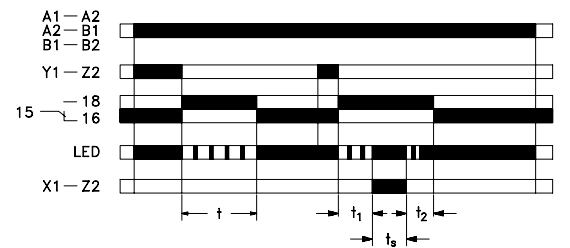## MTI multifunction with one switch, continued
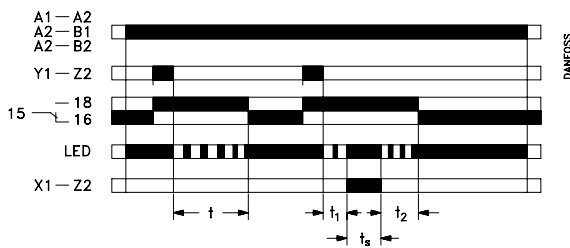
RV
OFF delay
The supply voltage must be connected to A1/A2*)
and remain established. The output relay is
immediately energised. Time interval start is
controlled by a contact on Y1/Z2.
(Note: No foreign voltage permissible).
When the contact breaks, the time interval begins.
The green LED flashes for 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. The time interval
can be stopped by making control contact X1/Z2.
The time elapsed until then is stored and the time
interval is stopped. The time interval starts again
when control contact X1/Z2 is broken. This function
can be repeated any number of times.
Note! Control contacts Y1-Z2 and X1-Z2 must be
potential-free.
*) On 24 V use terminals A2/B1 and on 48 V terminals A2/B2.

■ supply on and contact made
t set time t1 + t2
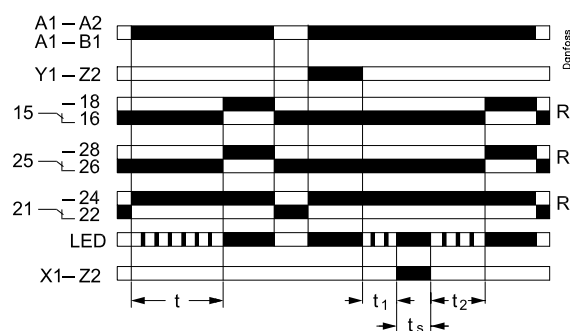ts time interval stopped

AW
pulse relay with OFF delay
The supply voltage must be connected to A1/A2*) and
remain established.
Time interval start is controlled by a contact on
Y1/Z2. When the contact is broken, the output relay
is energised and the time interval started. 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. The time interval can be stopped by making
control contact X1/Z2.
The time elapsed until then is stored and the time
interval is stopped. The time interval starts again when
control contact X1/Z2 is broken. This function can be
repeated any number of times.
Note! Control contacts Y1-Z2 and X1-Z2 must be
potential-free.
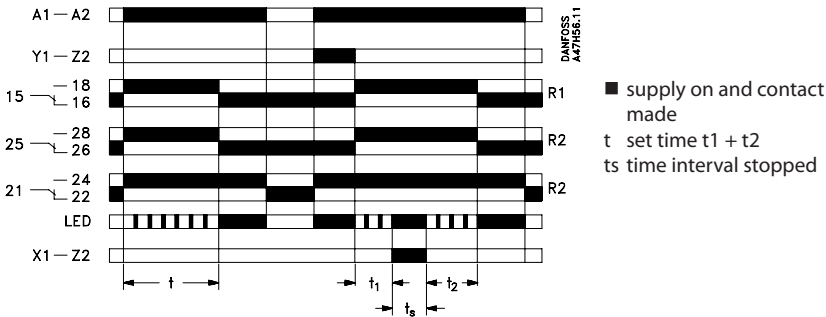*) On 24 V use terminals A2/B1 and on 48 V terminals A2/B2.

AV
ON delay
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.
With permanent supply voltage, start and stop of the
time interval can also be controlled by breaking or
making control contact Y1/Z2.
The time interval can be stopped by making control
contact X1/Z2. The time elapsed until then is stored
and the time interval is stopped. The time interval
starts again when control contact X1/Z2 is broken.
This function can be repeated any number of times.
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.
**Note! Control contacts Y1-Z2 and X1-Z2 must be
potential-free.**

■ supply on and contact made
t set time t1 + t2
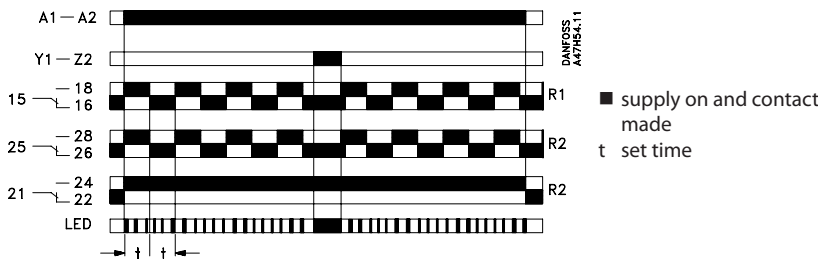ts time interval stopped

EW
pulse relay with ON delay
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. With permanent supply voltage, start and stop of the time interval can also be controlled by making or breaking control contact Y1/Z2.
The time interval can be stopped by making control contact X1/Z2. The time elapsed until then is stored and the time interval is stopped. The time interval starts again when control contact X1/Z2 is broken. This function can be repeated any number of times.
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.
Note! Control contacts Y1-Z2 and X1-Z2 must be potential-free.
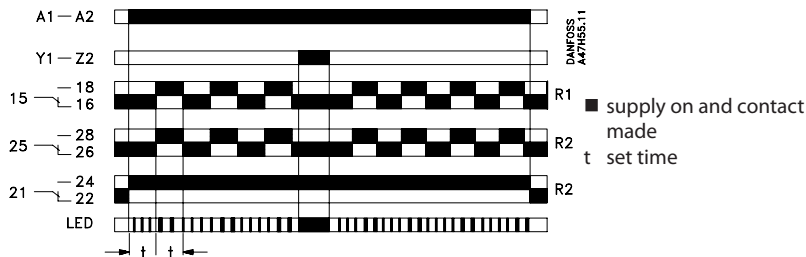

■ supply on and contact made
t set time

BI
flasher relay with pulse begins
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.
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.
Note! Control contacts Y1-Z2 must be potential-free.

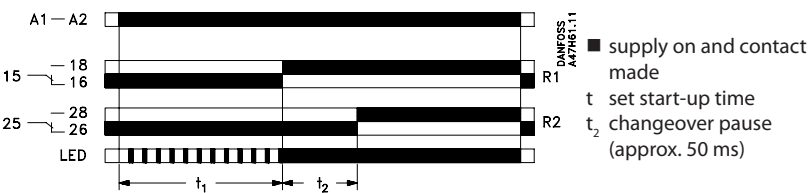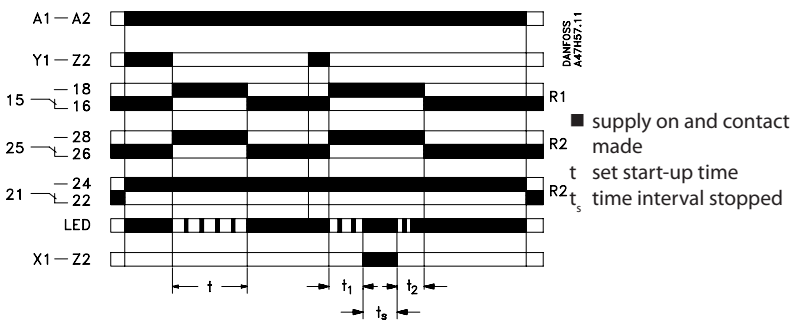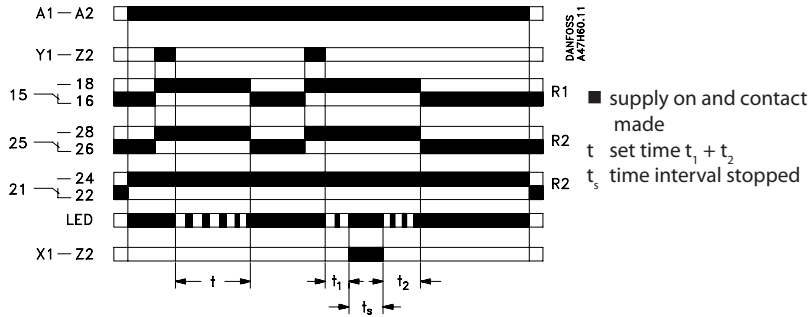■ supply on and contact made
t set time

BP
flasher relay with pause begins
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.
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.
Note! Control contacts Y1-Z2 must be potential-free.

Danfoss

- ■ supply on and contact made
- t   set time $t_1 + t_2$
- t_s time interval stopped

RV
OFF delay
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.
(Note: No foreign voltage permissible).
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.
The time interval can be stopped by making control contact X1/Z2. The time elapsed until then is stored and the time interval is stopped. The time interval starts again when control contact X1/Z2 is broken. This function can be repeated any number of times.
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.
Note! Control contacts Y1-Z2 and X1-Z2 must be potential-free.

- ■ supply on and contact made
- t   set start-up time
- t_s time interval stopped

AW
pulse relay with OFF delay
The supply voltage must be connected to A1/A2 and remain established.
Time interval start is controlled by a contact on Y1/Z2. When the contact is broken, the output relay is activated and 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.
The time interval can be stopped by making control contact X1/Z2.
The time elapsed until then is stored and the time interval is stopped. The time interval starts again when control contact X1/Z2 is broken. This function can be repeated any number of times.
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.
Note! Control contacts Y1-Z2 and X1-Z2 must be potential-free.

- ■ supply on and contact made
- t   set start-up time
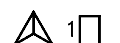- t_2 changeover pause (approx. 50 ms)

YDAV
star-delta changeover
When supply voltage is applied to A1/A2, the time interval begins. When the interval elapses, output relay R1 is energised immediately, R2 after a further 50 ms. The green LED flashes for the duration of the time interval.

- ■ supply on and contact made
- t   set time $t_1 + t_2$
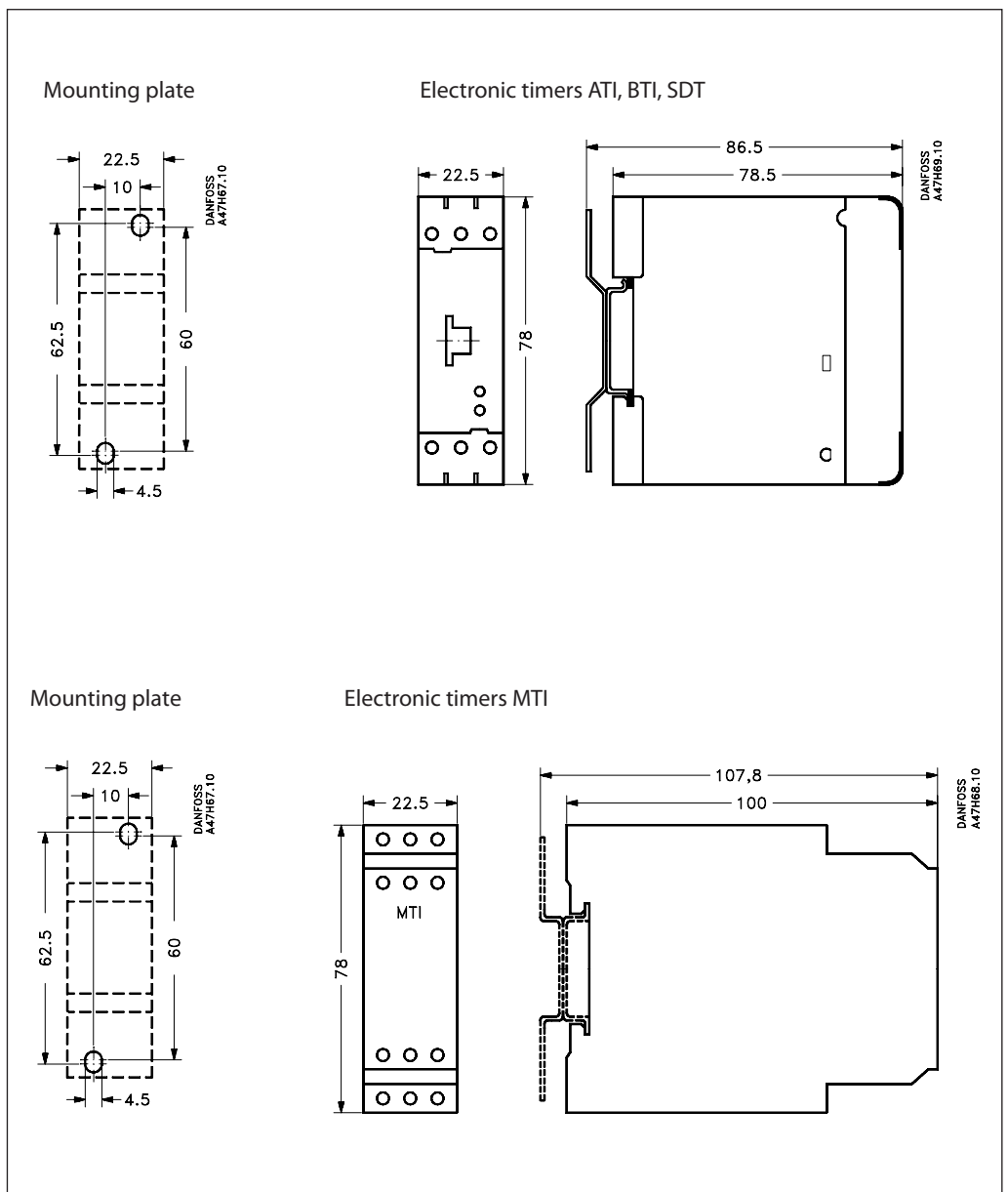- t_2 changeover pause (approx. 50 ms)

YDEW
star-delta changeover with pulse function
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.

Data sheet   Timers, ATI, BTI and MTI

Dimensions

Mounting plate   Electronic timers ATI, BTI, SDT

Mounting plate   Electronic timers MTI