Multifunction Time relays C50 Series

1 Features

- **Time range from 10 ms to 60 days, quartz precision**
- **Power supply UC 24 – 60 V, AC 230 V, UC 110 – 240 V**
- **Control inputs start, stop and reset**
- **Up to 15 time functions and test function (Button)**
- **Function selector, button, turning button, LCD**
- **Either standard relay or solid-state output UC 240 V, DC 24 V**
- **Remaining time display on LCD, relay state display with LED**
- **11-pole plug-in**
- **Mounting with retaining clip or front mounting set**

2 General description

The C52, C53, C55 and C56 are multifunctional timer relays with up to 15 functions and time ranges from 10 ms to 60 Days. They are developed for a voltage range of UC 24-240V and are able to switch nominal current up to 8 A at a nominal voltage of 240 V. Solid-state outputs for 0.5 A, 10 - 250 V AC and 2 A, 24 V DC are available.

**Technical specification is subject to change without previous notice**

3 Order designation

Type	Functions and Specifications
C52/UC24V C52/AC110-120V C52/AC 230V	Functions E und A Output 1 x U
C53/UC24-60 C53/UC110-240V C53**.3**/UC24-60V C53**.3**/UC110-240V C53**.4**/DC24V	Functions T, A, F, E, H, W, Q, N, I, B, K Output 1 x U Solid-State Output, 0,5A Solid-State Output, 2A
C55/UC24-60 C55/UC110-240V C55**.3**/UC24-60V C55**.3**/UC110-240V C55**.4**/DC24V	Functions T, A, F, E, H, W, Q, N, I, P, V, U, G, B, K, M Output 2 x U Solid-State Output, 0,5A Solid-State Output, 2A
C56/UC24 –60 C56/UC110-240V	Functions T, A, F, E, H, W, Q, N, I, P, V, U, G, B, K, M Output 1 x U, 1 x S for potential-free excitation

Options:

C5*L/ **V: Time lapse begins from 0 to the adjusted time.

Accessories:

Socket	CS-11, C11A
Retaining clip	HF-50
Front mounting set	FZ-50L
Marking label	PL-50/10
Front cover	FA-50

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
1/13

4 Connection diagram

S = Start, St = Stop, R = Reset

C52, C53
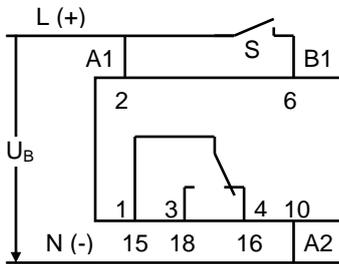
C53.3/UC...
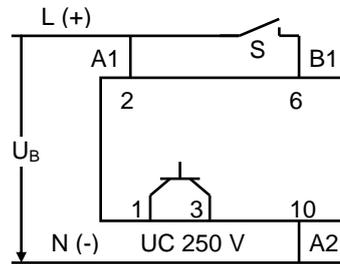
C53.4/DC24V
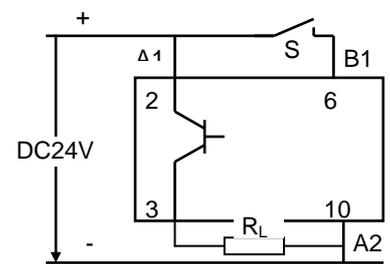
C55
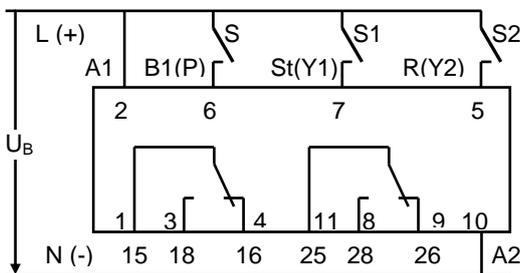
C55.3/UC...
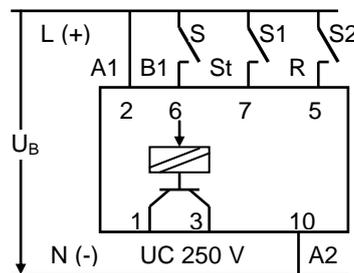
C55.4/DC24V
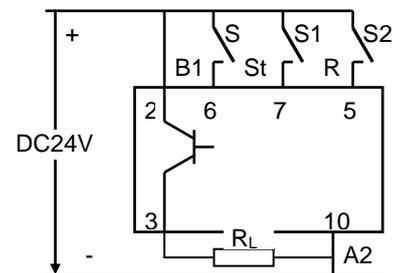
C52, C53, C55
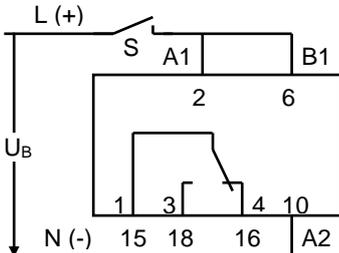
For the functions E, W, H, I, P, and B the terminal B1 can be connected with A1 and the device will start with the power supply.

Considering of precision reasons it is only recommended by using longer times.

C56
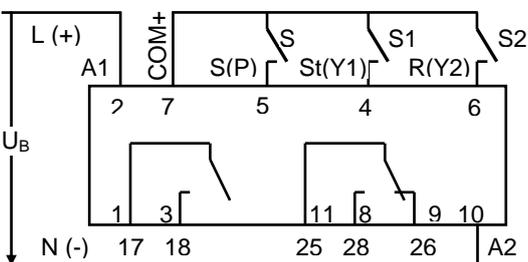
C56
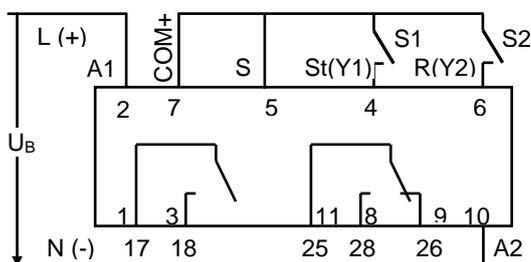
Start up with bridge between 5 and 7. Considering of precision reasons it is only recommended by using longer times.

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
2/13

5 Block diagram C55
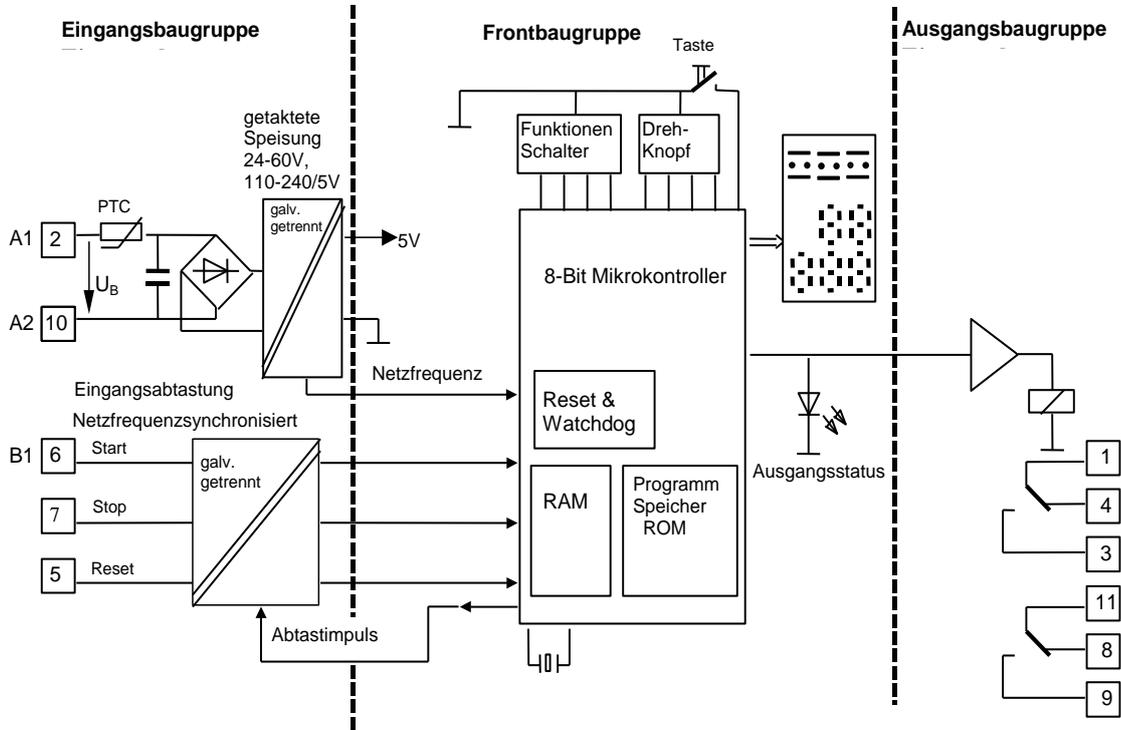
6 Specifications

If not specially mentioned, the specifications are for all types.

6.1 General data

6.1.1 Mechanical data

Case / Dimensions   11-pole plug-in case with retaining clip (Option), with front mounting set (Option).
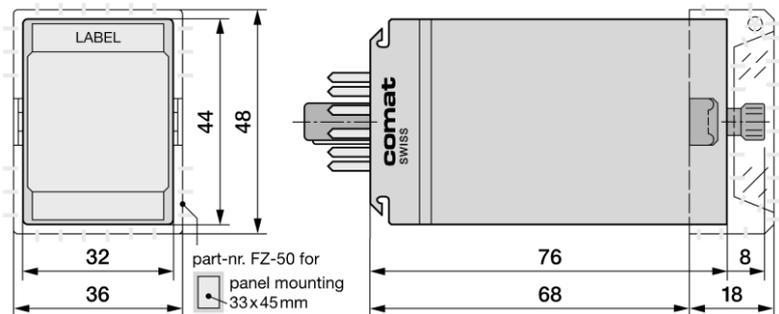
Case material	Noryl SE1, Lexan EXL 9330 (UL 94V-1)
Protection class	IP40
Weight	80 g
Fastening and connection	Socket 11-pole (IEC 67-1-18a), (retaining clip or front mounting set)
Shake consistency	IEC571
Shock	>> 20g

6.1.2 Ambient conditions

Storage temperature   -40 - +85°C

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
3/13

Operating temperature	-25 - +60°C
Life cycle (MTBF) type.	>150 000 h /40°C; Life cycle for contacts, see chapt. 6.3.
Relative humidity	10 - 95% (non-condensing).

6.2 Supply and excitation

6.2.1 Supply

Type / U_{Bnom}	C52			C53			C55 und C56			Unit
	UC24V	AC110 - 120V	AC230V	.4/DC24V	UC24 - 60V	UC110 - 240V	.4/DC24 V	UC24 - 60V	UC110- 240V	
Operating voltage U_B	19 - 30	97 - 133	196 - 265	19 - 30	19 - 75	88 - 265	19 - 30	19 - 75	88 - 265	V
Current consumption (type)	35	35	35	25	80 - 60	25 -15	20	80 - 55	15 - 8	mA
Inrush current	3/100 µs	=	=	=	=	=	=	=	=	A
Power failure safety: -Supply -Control	≥ 4 ≥ 10	≥ 25 ≥ 10	≥ 25 ≥ 10	≥ 10 ≥ 10	≥ 30 ≥ 70	≥ 30 ≥ 10	≥ 8 ≥ 10	≥ 20 ≥ 10	≥ 20 ≥ 10	ms ms
Net frequency	48 - 400	48 - 62	50	-	48 - 400	48 - 400	-	48 - 400	48 - 400	Hz

Max. energy of parallel charge (all types): 2,5 kV/50 mWs/2,5 Hz

6.2.2 Excitation, Stop und Reset

The Stop-Input (Y1) S1 is static, which means; active as long excitation.
The Reset-Input (Y2) S2 is dynamic, which means; react only on a rising flank (↑)

At the functions U - and V: S1 (Y1) and S2(Y2) is static, P(B1) is dynamic (↑).

Type / U_{Bnom}	C52			C53			C55			Unit
	UC24V	AC110 - 120V	AC230V	.4/DC24V	UC24 - 60V	UC110 - 240V	.4/DC24V	UC24- 60V	UC110 - 240V	
Input voltage range	19 - 30	97 - 133	196 - 265	19 - 30	19 - 75	88 - 265	19 - 30	19 - 75	88 - 265	V
Input current (type)	3.5	2.5	2.5 mA	5	2,5 - 6	1.5 - 5	5.5	1.5 - 6.3	1 - 4.2	mA
Input voltage -off -on-	≤ 5 ≥ 14	≤ 25 ≥ 65	≤ 175 ≥ 160	≤ 5 ≥ 10	≤ 6 ≥ 11	≤ 40 ≥ 50	≤ 5 ≥ 10	≤ 6 ≥ 11	≤ 40 ≥ 50	V V
Rest current	≤1.25	≤ 1	≤ 1	≤ 1	-	-	≤ 1	≤ 1.5	≤ 1	mA

C56 (Potential free excitation)	
Control voltage	ca. 10 V
Current in the control circuit	≤ 4 mA
Input resistance	2.2 kΩ
Tolerated voltage drop in control circuit	≤ 3 V
Rest current	≤ 1.8 mA
Overlayed alternating voltage	≤ 4 V 50 Hz
Over voltage	DC 500 V für 1 ms
Transient protection	1 kV 50 µs
Couple capacity to the power line 230V 50 Hz	≤ 10 nF

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
4/13

6.3 Outputs

6.3.1 Relay outputs

Type	C52, C53	C55, C56
Contact output	1 x U AgNi	C55: 2 x U AgNi C56: 1 x U + 1 x S AgNi
Switching voltage	(12) – 250 V	(12) – 250 V
Switching current	$\leq$ 8 A	$\leq$ 5 A
Sum current	--	$\leq$ 10 A
Switching power	2000 VA / $\leq$ 200 W	1250 VA / $\leq$ 200 W
Recommended minimal charge	24 V 10 mA	12 V 10 mA
Life cycle electrical AC1	1×10^5 cycles	1×10^5 cycles
mechanical	3×10^7 cycles	5×10^6 cycles

6.3.2 Short-circuit proof solid-state outputs

Option	.3/...	.4/...
Switching voltage	UC 10 – 265 V	DC 19 – 30 V
Switching current	0.5 A	2 A
Short-circuit current (Imax)	6 A / 2 μs	40 A / 150 μs
Galv. separation / Test voltage	2 kV	no galvanic separation
Voltage drop	$\leq$ 3 V	$\leq$ 100 mV
Rest current	$\leq$ 100 μA	$\leq$ 150 μA

The option .3/... is equipped with a short-circuit feedback. If the solid-state is over charged, on the display of C53 or C55, "SC" will appear for **S**hort **C**ircuit.

6.4 Time response

6.4.1 Time ranges

Type	Time range	Adjustable time	Resolution
C52	Minutes	0.1 s - 59 min 59.9 s	0.1 s
C53	Minutes	0.1 s - 59 min 59.9 s	0.1 s
	Hours	0.1 min – 59 h 59.9 min	0.1 min
C55	Seconds	0.01 s - 59.999 s	0.001 s
	Minutes	0.1 s - 59 min 59.9 s	0.1 s
	Hours	0.1 min 59 h 59.9 min	0.1 min
	Days	0.1 h - 59 day 23.9 h	0.1 h

At Double-Time functions, it's possible to adjust them independently.

6.4.2 Reaction times und accuracy
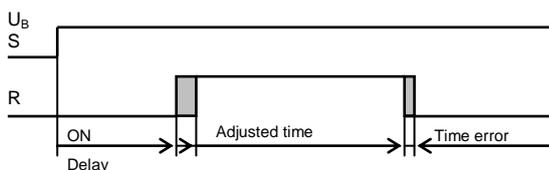
Time accuracy	$\pm$0.05%
Repeating accuracy	$\pm$ 0.05% or $\pm$ 10 ms
On-Delay	DC: 40 - 50 ms, AC: 50 - 60 ms
Temperature stability	$\pm$ 0.01% over the whole temperature range
Minimal excitation time	DC: 30 ms, AC: 40 ms
Reset time	$\leq$ 200 ms

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
5/13

6.5 Functions
Reset and Stop

The C55 has additionally a Stop and Reset input.

Reset: Only effective when time process is running. Dynamic input: triggered with a rising flank while process, the time is resetting and will restart

Stop: Only effective when time process is running. Static input: the time process will be stopped.

A: OFF Delayed

C52/ C53/C55
By triggering (S) , the output R is switched ON. With falling edge (S) the output R is switched OFF after the set time t.
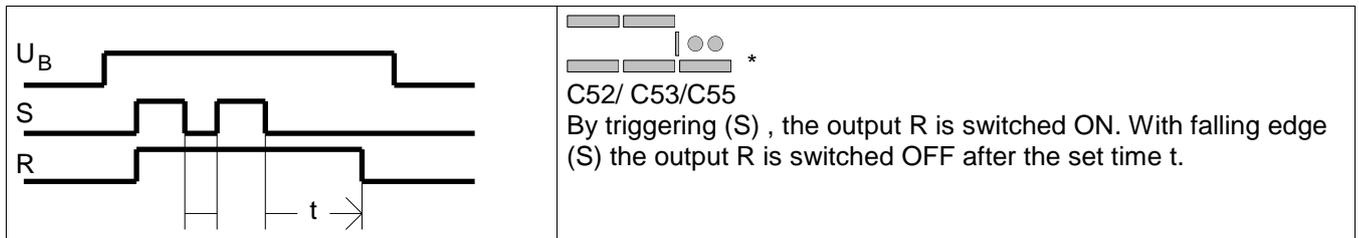
* Darstellung der Funktion auf dem Gerätedisplay (Bei Zeitablauf blinken entsprechende Punkte).

B: Blinker

C53, C55
By triggering (S) , the output R is switched ON/OFF according to the set time t.
The output will be stopped at the same time as (S).

E: ON Delayed

C52, C53, C55
By triggering(S) , the output R is switched ON according to the set time t.

F: ON and OFF delayed

C53, C55
By triggering (S) , the output R is switched ON after the set time t_1. After falling edge
(S) , the output R is switched OFF after the set time t_2.

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
6/13

G, H: On delay single shot

H

C55

By triggering (S), the output R is switched on for a pulse length of t_2 after expiry of set time t_1.
The output impulse stops with the falling edge (S) .

G

C55

By triggering (S) , the output R is switched on for a pulse length of t_2 after expiry of set time t_1.
The output impulse is independent of the duration of the trigger.

K, W: Pulse shaping

W

C53, C55

By triggering (S) , the output R is switched ON for the set time t.
In case of a premature triggering (S) , the output impulse stops immediately.

K

C53, C55

By triggering (S), the output R is switched ON for the set time t.
The output impulse is independent of the duration of the trigger.

M, N: One shot falling edge

N

C55

With falling edge (S) of the triggering, the output R is switched ON for the set time t. If during the timing the trigger (S) is activated, R will be OFF.

M

C53, C55

By triggering (S), the output R is switched ON for the set time t.
During the timing, (S) has no more influence on R.

Q: One shot leading and trailing edge

C53, C55

By triggering (S) , the output R is switched ON for the set pulse length t_1. After falling edge (S) , the output R is again switched ON for the set pulse length t_2.

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
7/13

I: Impulse generator, pulse start

C53, C55
By triggering(S) , the output R is switched ON and OFF alternatively according to the set times t_1 (ON-time) and t_2 (OFF-time).
The output pulse will be stopped at the same time as (S).

P: Impulse generator, interval start

C55
By triggering(S), the output R is switched OFF and ON alternatively according to the set times t_1 (OFF-time) and t_2 (ON-time).
The output pulse will be stopped at the same time as (S).

U, V: Monitoring functions

Only for C55 and C56.
Both functions are monitoring the sequence of impulses on its temporal distance. With the help of these functions, motor speeds or motion sequences can be supervised on its minimal speed.

U: Pulse sequence monitoring (Cycle)

Cycle: The output becomes active with a first as a properly recognized period duration.

The supervision clearance without approach bridging and without alarm delay occurs over S1 (Y1, terminal 7)

The supervision clearance with approach bridging and alarm delay occurs over S2 (Y2, terminal 5)

With approach bridging t_A (t1), the output remains active during the time regardless of the impulse result. If an error is recognized, the output becomes inactive after the time t1.

After the monitoring clearance the period duration of an impulse result is supervised in P (B1, terminal 6): If period duration of signal P > t_P (t2) then the output becomes inactive. The output remains inactive for $t_{amin} \geq 50$ ms. With a next as properly recognized impulse result (cycle) the output is activated again.

If both start inputs S1, S2 (Y1, Y2) are activated at the same time, it corresponds on a function reset and the output is switched inactive. If necessary the approach bridging is restarted afterwards.

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
8/13

V: Pulse sequence monitoring (Event)
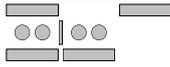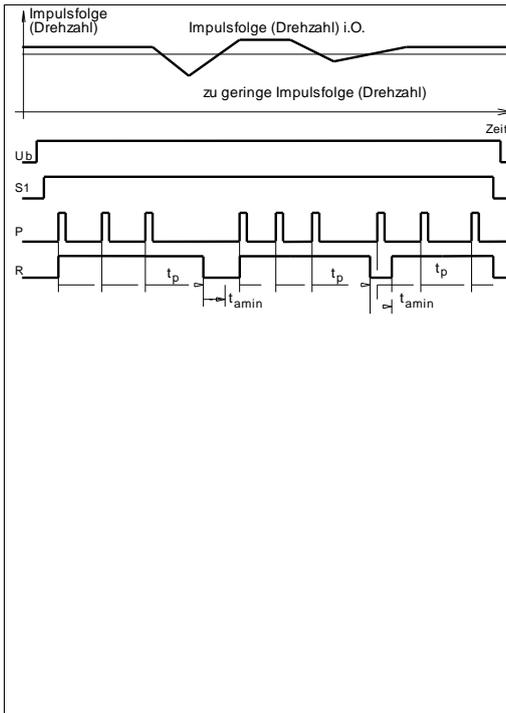
Event: The output becomes active with the first pulse.

The supervision clearance without approach bridging and without alarm delay occurs over S1 (Y1, terminal 7)

The supervision clearance with approach bridging and alarm delay occurs over S2 (Y2, terminal 5)

With approach bridging t_A (t1), the output remains active during the time regardless of the impulse result. If an error is recognized, the output becomes inactive after the time t1.

After the monitoring clearance the period duration of an impulse result is supervised in P (B1, terminal 6): If period duration of signal P > t_P (t2) then the output becomes inactive. The output remains inactive for $t_{amin} \geq 50$ ms. With a next as properly recognized impulse result (cycle) the output is activated again.

If both start inputs S1, S2 (Y1, Y2) are activated at the same time, it corresponds on a function reset and the output is switched inactive. If necessary the approach bridging is restarted afterwards.

Adjusting the approach bridging:

U-Function
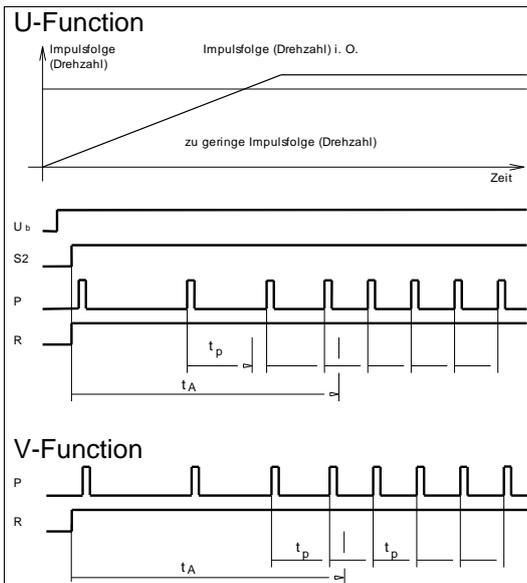
With the approach bridging the run-up time of a power unit will be bridged, i.e. that the supervision output is switched active for the time t_A regardless of the impulse sequence.

The approach bridging time must be longer than the time, the right impulse sequence has been build up.

V-Function

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
9/13

T: Test

|	
U_B — Test — Button T — R (timing diagram)	⬜ Input (S) ⬜ Output (R) C52, C53, C55 With this button the output state can be changed. After turning on the operating voltage the output is inactive first. If switched from any function to the test function, the device state is frozen. I.e. an actual time lapse will be stopped. If a new function is selected from the test function, the device will be reset. If the previous function is selected again, the previous functional status is continued.

7 Handling

C52

C53, C55
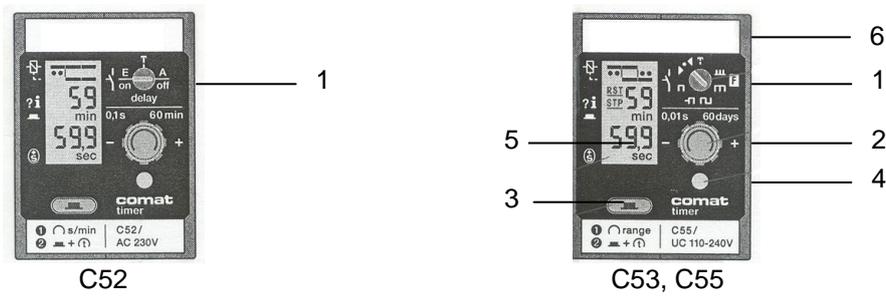
1 Rotary switch for adjusting the function. The corresponding letter for the function will appear in the right window beside the button, the functions on the C52 are printed around the turning button on the front plate.

2 Rotary switch for time adjustment

3 Button for Info and time adjustment

4 Yellow LED for output state

5 LCD advertising for the time, functions, state of the device and system information's

6 Marking label

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
10/13

7.1 Description of LCD Display

Time advertising (t, t1, t2, tA, und tP) depends on state of operating

S (Start)

R (Output)

Points are blinking
when time running
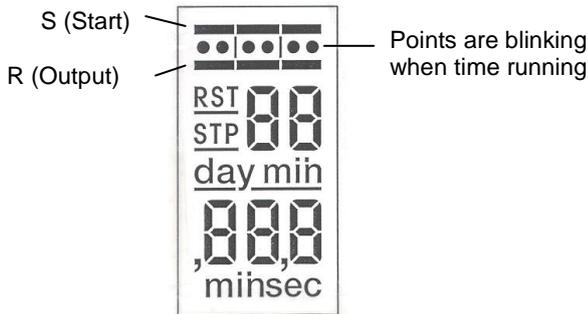
Times			Functions
t	-	-	E W K
-	-	t	A N M
t	t	-	B
t_1	-	t_2	F Q
t_1	t_2	-	H G I P
t_A	t_P	t_A	U V

In <u>Resting state</u> the target time t / t_1 / t_A is advertised. The time double-points do not blink.

In <u>Active state</u>, excitation with or without "Time stop" (Y1), the Rest time (optional run time) of the running process will be shown. The belonging time double-points are blinking.

In <u>Info state</u> the adjusted time will be indicated after the choice of t1, or t1 / t2. The belonging time double-points are blinking. With every other button stroke the time indication switch from t_1 (t_A) to t_2 (t_P) and back again, provided that a 2-times function is adjusted.

In <u>Adjustment state</u> the chosen time is indicated. The figure group, which can be adjusted, and the belonging double-points are blinking.

7.2 Function setting

The function setting occurs over a 16-figure rotary switch.

On the devices C52 and C53, not all positions are occupied.

If the counter is set on a not occupied position, the announcement "noF" (no function) appears. The output remains switched off in any case.

A new function is taken over with an internal device reset, 1 second after the last rotation of the rotary function switch.

7.2.1 Time and monitoring function

If a new function is selected during the time setting, the new time will be stored first, before the device will reset. If no time was changed in the set state, the set state will leave after 1 second with the takeover of the new function.

7.2.2 Correspondence between function symbol and function diagram

S —— Function diagram (Start)

t —— Function symbol

R —— Function diagram (Output)

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
11/13
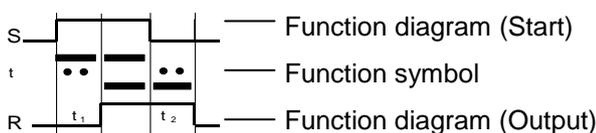
7.3 Time adjustment

7.3.1 Composition of the time structure of the C50 series

Time	t_1, t_2, t_A or t_P										
Time range	Days			Hours			Minutes			Seconds	
Figure groups	day	h	1/10 h	h	min	1/10 min	min	s	1/10 s	s	10 ms	1 ms

Every time (t, t_1, t_2, t_A und t_P) is divided into maximum 4 time areas: Days, hours, minutes and seconds. Only the time constellation which is visible on the display is valid.
E.G., is not possible: 3 days 5sec.
Every time area is divided into 3 figure groups:
Over the rotary switch the time areas and their figure groups can be selected after which then the values can be adjusted.
At double-time functions both times can be adjusted absolutely independent of each other.

7.3.2 Adjustment of the time

Betrieb
Fonction
Run

Einstellungen anzeigen
Réglages
Display parameters

Info

For Functions P, U, V

Time 1   Time 2

Zeit t1 oder t2 auswählen
Definir temps t1 ou t2
Select time t1 or t2

Wert anzeigen
Affichage de la valeur
Display value

Zeit einstellen
Réglages de l'heure
Adjust time

Settings

Bereich und Ziffern wählen (blinkend)
Definir du champ d'applications (clignotent)
Select range and digits (blinking)

gedrückt halten
maintenir
hold down

Zeit einstellen
Réglages de l'heure
Adjust time

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
12/13

7.4 Error messages

The devices dispose of an own supervision.
In case of an error the following error messages are indicated:

Indication	Error	Cause	Output	To do
SC	Short circuit	The output is overloaded (only C5x.3 with solid-state output).	Off	Reduce charge or remove failure
noF	No function	The rotary switch for the function choice is not in a proper position (only C52, C53).	Off	Turning the rotary switch to the right position
02 Err	EEPROM Warning	The saved adjustments are not consistent.	Function as adjusted	Re-adjust the device. If error occurs again, replacing of the device
03 Err	EEPROM Error	The saved adjustments can't be read.	Off	Re-adjust the device. If error occurs again, replacing of the device
04 Err	RAM Error	The data's in the RAM are not consistent.	Off	Re-adjust the device. If error occurs again, replacing of the device
08 Err	Type decoding Error	The internal type coding is defect	Off	Replacing of the device
09 Err	Watchdog error	The device was reset by the internal watchdog.	Off	Re-start the device. If error occurs again, replacing of the device

C50_DB_e.docx
09.01.2014 CP

Multifunction Time relay C50 Series
Datasheet

36000-019-41-008
13/13