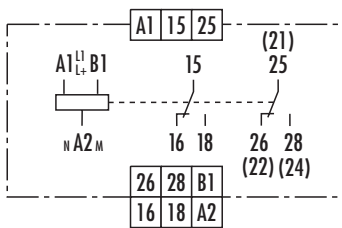# NGM 1600

Multi-function multi-range time relay

- Multi-voltage for AC/DC 24 to 240 V
- 16 function
- Setting range from 0.1 s to 300 h divided into 16 switchable time ranges
- 2 changeover contacts or 1 instantaneous changeover contact and one timed changeover contact (function-dependent)
- 3 LEDs for function display

Functions

Function code 11 = ON-delay

A1-A2	Energizing quantity
15-18	Delayed contact
15-16	LED green
25-28	Delayed contact
25-26	LED green
LED green	Energizing quantity

FD 250-3

t_A = Operating time
t_1 = Break time, must be > recovery time 1
t_2 = Break time, must be > recovery time 2

Function code 11-ON = ON-delay

A1-A2	Energizing quantity
15-18	Delayed contact
15-16	LED green
21-24	Instantaneous contact
21-22	LED green
LED green	Energizing quantity

FD 250-5

t_A = Operating time
t_1 = Break time, must be > recovery time 1
t_2 = Break time, must be > recovery time 2

Function code 11C-ON = ON-delay, accumulative y/n, with auxiliary supply

A1-A2	Auxiliary supply
B1-A2	Energizing quantity
15-18	Delayed contact
15-16	LED green
21-24	Instantaneous contact
21-22	LED green
LED green	Energizing quantity

FD 250-8

t_A = Operating time
t_1 = Break time, must be > recovery time 1
t_2 = Break time, must be > recovery time 2

$$t_A = \sum_{B1\text{-}A2}^{n} t_{AX}$$

Function code 12 = OFF-delay, with auxiliary supply

A1-A2	Auxiliary supply
B1-A2	Energizing quantity
15-18	Delayed contact
15-16	LED green
25-28	Delayed contact
25-26	LED green
LED green	Energizing quantity

FD 250-12

t_R = Returning time
t_1 = Make time, must be > minimum ON time 1
t_2 = Make time, must be > minimum ON time 2
t_3 = Time between switching on auxiliary supply and energizing quantity, must be > recovery time 1
t_4 = Break time, must be > recovery time 2

Function code 12-ON = OFF-delay, with auxiliary supply

A1-A2	Auxiliary supply
B1-A2	Energizing quantity
15-18	Delayed contact
15-16	LED green
21-24	Instantaneous contact
21-22	LED green
LED green	Energizing quantity

FD 250-13

t_R = Returning time
t_1 = Make time, must be > minimum ON time 1
t_2 = Make time, must be > minimum ON time 2
t_3 = Time between switching on auxiliary supply and energizing quantity, must be > recovery time 1
t_4 = Break time, must be > recovery time 2

Function code 11-12 = ON-delay, OFF-delay, with auxiliary supply

A1-A2	Auxiliary supply
B1-A2	Energizing quantity
15-18	Delayed contact
15-16	LED green
25-28	Delayed contact
25-26	LED green
LED green	Energizing quantity

FD 250-14

t_A = Operating time
t_R = Returning time
t_1 = Make time, must be > recovery time 1
t_2 = Make time, must be > minimum ON time 1
t_3 = Time between switching on auxiliary supply and energizing quantity, must be < recovery time 2

Time ranges

Setting range from 0.1 s to 300 h divided into:

< 0.1	to	1	s	1.5	to	30	min
0.15	to	3	s	3	to	60	min
0.5	to	10	s	5	to	100	min
1.5	to	30	s	0.15	to	3	h
5	to	100	s	0.5	to	10	h
15	to	300	s	1.5	to	30	h
0.5	to	10	min	5	to	100	h
50	to	1000	s	15	to	300	h

Connection diagram

KS 250-31

Dimensions

K 3-3

Ordering designation

NGM 1600

Price code: 20.1

Features

Setting the Function

The function is set with the MODE selector switch and displayed by the function code in the window next to it. The code designation for the function can be found in the "Functions" column.

Setting the time delay

The time range is set with the RANGE selector switch and displayed in the window next to it. The required delay time is set with a setting wheel.

LEDs show the state of the excitation input and the position of the contacts. You can monitor the countdown on a flashing LED.
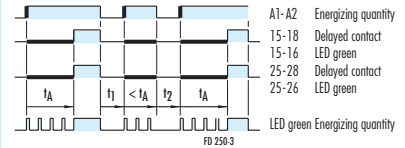
Note

The device is designed for multi-voltage. Connect phase L1 or L + to terminal A1 and B1 and neutral N and/or M to terminal A2.

You can change the function or the delay time during operation. The change is effective immediately.
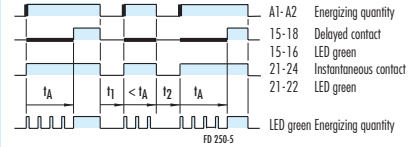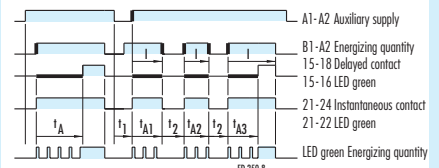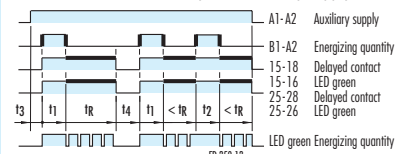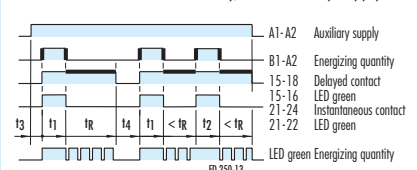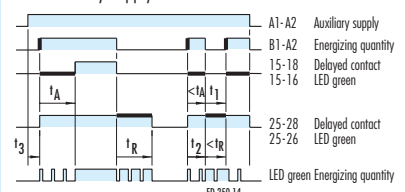
Functions

Technical data

Functions column

Function code 12-22 = OFF-delay and interval OFF, 0.5 s fixed interval time, with auxiliary supply

A1-A2 Auxiliary supply
B1-A2 Energizing quantity
15-18 Delayed contact
15-16 LED green
25-28 Delayed contact
25-26 LED green
LED green Energizing quantity
FD 250-15

t_R = Returning time
t_{WA} = Fixed interval OFF time
t_1 = Make time, must be > minimum ON time 1
t_2 = Time between switching on auxiliary supply and energizing quantity, must be > recovery time 1
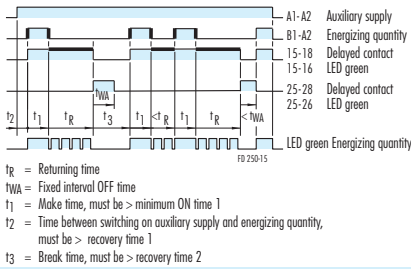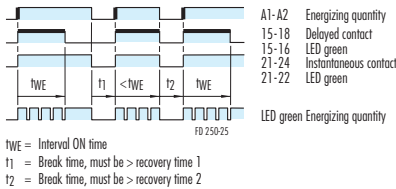t_3 = Break time, must be > recovery time 2

Function code 21 = interval ON

A1-A2 Energizing quantity
15-18 Delayed contact
15-16 LED green
25-28 Delayed contact
25-26 LED green
LED green Energizing quantity
FD 250-21

t_{WE} = Interval ON time
t_1 = Break time, must be > recovery time 1
t_2 = Break time, must be > recovery time 2
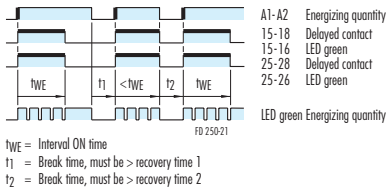
Function code 21-ON = interval ON

A1-A2 Energizing quantity
15-18 Delayed contact
15-16 LED green
21-24 Instantaneous contact
21-22 LED green
LED green Energizing quantity
FD 250-25

t_{WE} = Interval ON time
t_1 = Break time, must be > recovery time 1
t_2 = Break time, must be > recovery time 2

Function code 21-22 = interval ON, interval OFF, with auxiliary supply

A1-A2 Auxiliary supply
B1-A2 Energizing quantity
15-18 Delayed contact
15-16 LED green
25-28 Delayed contact
25-26 LED green
LED green Energizing quantity
FD 250-27

t_{WE} = Interval ON time
t_{WA} = Interval OFF time
t_1 = Break time, must be > recovery time 1
t_2 = Make time, must be > minimum ON time 1
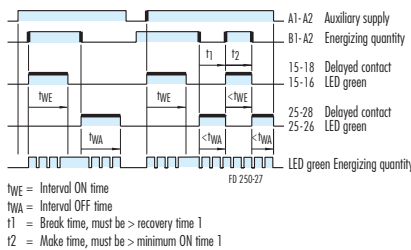
Function code 22-ON = interval OFF, with auxiliary supply

A1-A2 Auxiliary supply
B1-A2 Energizing quantity
15-18 Delayed contact
15-16 LED green
21-24 Instantaneous contact
21-22 LED green
LED green Energizing quantity
FD 250-29

t_{WA} = Interval OFF time
t_1 = Make time, must be > minimum ON time 1
t_2 = Make time, must be > minimum ON time 2
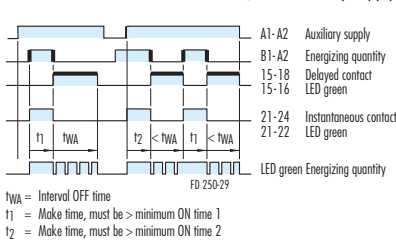
Function code 43-44 = clock-generating, 0.5 s fixed OFF and ON time, OFF/ON start, with cycle time setting

A1-A2 Energizing quantity
15-18 Delayed contact
15-16 LED green
25-28 Delayed contact
25-26 LED green
LED green Energizing quantity
FD 250-41

t_B = Cycle time
t_P = Fixed OFF time
t_1 = Fixed ON time
t_1 = t^P
t_1 = Break time, must be > recovery time 1
t_2 = Break time, must be > recovery time 2
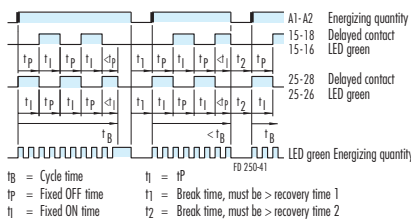
Function code 51 = star-delta switching, interval ON

A1-A2 Energizing quantity
15-18 Delayed contact
15-16 LED green Y
25-28 Delayed contact
25-26 LED green △
LED green Energizing quantity
FD 250-46

t_H = acceleration time
t_U = Transit time 100 ms
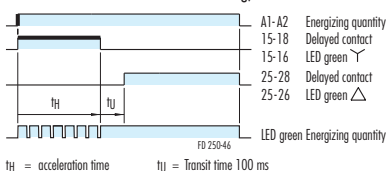
Technical data column

Device type	**NGM 1600**
Product norm (Time relays)	EN 61812-1:1999-08
Relay function according to IEC 60050 (445)	Multi-function relay with multi-time-range
Function diagram	See "Functions" column
Function display	3 LEDs green
Ambient operating temperature range	-25 to +60 °C

Input circuit

Rated voltage A1-A2, B1-A2	AC/DC 24 to 240 V
Rated power AC	3.5 VA/1.7 W
Rated power DC	1.6 W
Rated voltage limits	70 to 110 %
Rated frequency f_n	50 to 60 Hz ± 5 %
Release value of input voltage (line capacitance approx. 150 pF/m)	≥ AC/DC 10 V; permissible line capacitance 0.2 µF
Rated current on control connection (B1-A2)	1 mA
Rated power on control connection (B1-A2)	< 0.25 W
Parallel load permitted	A1-A2 yes/B1-A2 yes
Internal one-way rectifier	A1-A2 no/B1-A2 yes

Time circuit

Time setting / number of time ranges	analog/16
Setting ranges for time delay	from ≤ 0.1 s to 300 h divided into:

≤ 0.1 to 1 s		1.5 to 30 min	
0.15 to 3 s		3 to 60 min	
0.5 to 10 s		5 to 100 min	
1.5 to 30 s		0.15 to 3 h	
5 to 100 s		0.5 to 10 h	
15 to 300 s		1.5 to 30 h	
0.5 to 10 min		5 to 100 h	
50 to 1000 s		15 to 300 h	

Recovery time 1/2/3	See table 1
Minimum ON time 1/2	See table 1
Setting tolerance	≤ ± 5 %
Repeatability (to set value)	≤ ± 0.01 % + ± 10 ms
Influence of temperature (within range)	≤ ± 0.002 %
Influence of voltage (within range)	≤ ± 0.002 %

Output circuit

Contact equipment	2 changeover contacts
Contact material	AgNi 90/10
Rated operating voltage	AC/DC 24 to 240 V
Rated value for limiting continuous current I_{th}	5 A
Minimum contact load	≥ AC/DC 5 V/≥ 10 mA
Utilization category according to IEC 60947-5-1	AC–15 U_e AC 230 V, I_e 3 A DC–13 U_e DC 24 V, I_e 2 A
Permissible switching frequency	≤ 3600 switching cycles/h
Mechanical service life	30×10^6 switching cycles
Electrical service life 20/2 A, AC 250 V, cos φ = 0.3	0.12×10^6 switching cycles AC–15
Operate time / release time for excitation A1-A2	40 ms
Operate time / release time for excitation B1-A2	20 ms

Other data

Clearance/creepage distances to IEC 60664-1	
Contamination level	3 outside, 2 inside
Overvoltage category	III
Rated voltage	AC/DC 275 V
Protection class housing / terminals acc. to IEC 60529	IP 40/IP 20
Interference immunity acc. to IEC 61000-4	Test level 3
Dimensions (housing)	K 3-3
Terminal connection diagram	KS 250-31
Connection cross sections single or fine wire fine wire with connector sleeve	1 x 0,2 to 6 or 2 x 0,2 to 2,5 mm² 1 x 0,4 to 4 or 2 x 0,2 to 1,5 mm²
Weight	0.13 kg
General Technical Specification	NGG Catalogue

Functions

Function code 81-1 s-ON = ON-delay, pulse-generating, 1 s fixed ON time
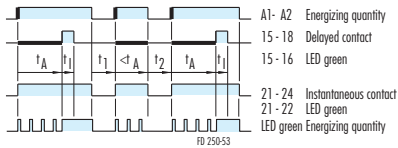
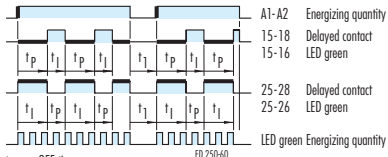|	
A1- A2	Energizing quantity
15 - 18	Delayed contact
15 - 16	LED green
21 - 24	Instantaneous contact
21 - 22	LED green
LED green	Energizing quantity

FD 250-53

t_A = Operating time
t_I = Fixed ON time
t_1 = Break time, must be > recovery time 1
t_2 = Break time, must be > recovery time 2

Function code 82-ON = pulse-shaping, with auxiliary supply

A1- A2	Auxiliary supply
B1- A2	Energizing quantity
15 - 18	Delayed contact
15 - 16	LED green
21 - 24	Instantaneous contact
21 - 22	LED green
LED green	Energizing quantity

FD 250-57
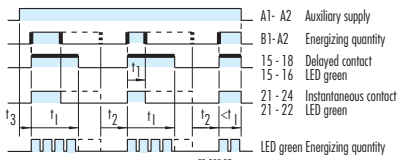
t_I = Fixed ON time
t_1 = Make time, must be > minimum ON time 1
t_2 = Break time, must be > recovery time 1
t_3 = Time between switching on auxiliary supply and energizing quantity, must be > recovery time 2

Function code 83-84-1 s = pulse-generating, 1 s fixed ON or OFF time

A1- A2	Energizing quantity
15-18	Delayed contact
15-16	LED green
25-28	Delayed contact
25-26	LED green
LED green	Energizing quantity

FD 250-60

t_P = OFF time
t_I = ON time
t_1 = Break time, must be > recovery time 1

Legend

Control signal for energizing quantity

Settable time

Fixed time

Settable cycletime

LED green excitation   5-fold function

Time not running
Energizing quantity ON

Time running
Delayed contact in operated condition

Time running
Delayed contact in normal condition

Time running
Delayed contact in normal or operated condition

Time not running
Energizing quantity OFF