



Training Guide

EASY 412-DC-...

EASY 412-AC-...

Control Relay

EASY 618-AC-RC

EASY 620-DC-TC

06/99 AWB 2528-1316 GB

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see list of revisions on page II

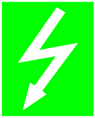
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Translator: Terence Osborn

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Caution!

Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that the device cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (AWA) of the device concerned.
- Only suitably qualified personnel may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 volt supply. Only use power supply units complying with IEC 60 364-4-41 or HD 384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60 204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause uncontrolled operation or restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.

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List of revisions for the manual AWB 2528-1316 GB

Edition	Page	Title	New	Modified	Omitted
06/99	gen.	EASY 620-DC-TC EASY 618-AC-RC	×		
	4	Functions	×		
	5	"easy" at a glance		×	
	6	Mounting	×		
	6 ff.	Connecting "easy"	×		
	12	EASY 6... status display	×		
	14, 23 ff.	Circuit diagram elements		×	
	16	System menu	×		
	20	Menu languages	×		
	22	Startup behaviour	×		
	36	Text display (markers)	×		
	44	Available memory cards	×		
	44	EASY-SOFT		×	
	45	Technical data		×	
	47	Dimensions of EASY 6...		×	

Contents

1	“easy” Control Relay	3
	Simply “easy”	3
	Mounting “easy”	6
	Connecting “easy”	6
	“easy” operating principle	11
2	Drawing a Circuit with “easy”	19
	Operation of “easy”	19
	Setting the menu language	20
	Setting the time	21
	Choose “easy” operating mode	22
	“easy”-Circuit diagram elements	23
	Example: creating a circuit diagram	26
	Function relay types	30
	Example: using a function relay	37
	Basic circuits	41
3	“easy” Interface Socket	43
4	Technical Data	45
	Technical data	45
	“easy” models	45
	Index	49

1 “easy” Control Relay

Safety information



Danger of injury due to electric shock!

The electrical installation and commissioning work must only be carried out by suitably qualified personnel.

Do not work on the device when the power is switched on.

Observe the relevant safety regulations:

- Switch off the power

- Make sure that the device cannot be switched on again inadvertently

- Check to make sure that no dangerous voltages are present before working on the device

- Cover up any neighbouring equipment which carries dangerous voltages

Simply “easy”

Clever switching and controlling

“easy” is a compact, user-friendly and low-cost control relay for simple control applications. Applications range from building and domestic automation to machine and plant control. “easy” has built-in user-friendly operating elements and an LCD display.

Just connect up “easy” and draw your circuit diagram on the display by pressing the buttons on the device. “easy” works with make contacts, break contacts, and relays.

Enter your circuit diagram in “easy” just like you sketched it on paper. “easy” has basic and advanced functions for relays, time switches and contactors, and lots more, too. You can make changes to your circuit just by pressing the buttons on the device. Time consuming rewiring is not necessary.

Applications everywhere

Building and domestic automation, controllers for lighting, doors, window shutters...

Control ventilators, rotating doors, greenhouses, exterior lighting, window controllers, shop display lighting control...

Create controllers for temperature, ventilation and brightness levels...

Control machines and plant, presses, conveyor belts, oscillating conveyors, sorters, pumps...

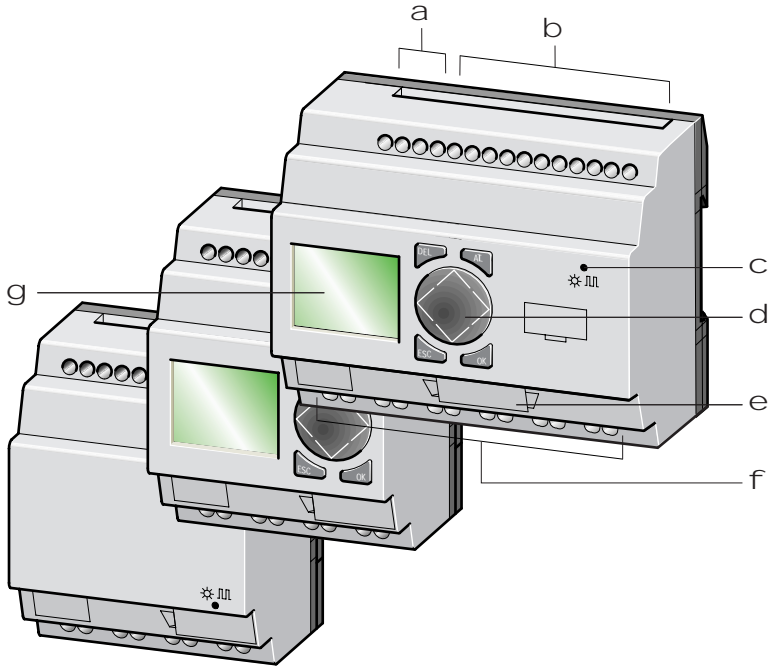
Additional functions

With the help of the additional 600 units - EASY 620-DC-TC, EASY 618-AC-RC - as well as the expansion of the 400 range with EASY 412-DC-TC, EASY 412-DC-TCX and EASY 412-AC-RCX, additional I/O and functions are now available, such as retentive counters, timing relays, markers and eight user-definable display texts.

The individual features of each control relay are described below.

Simply "easy"

Overview of "easy"



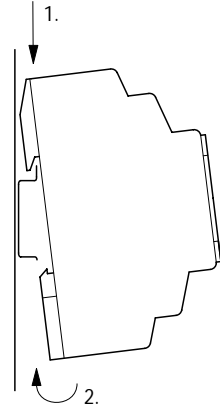
- a Power supply
- b Inputs
- c Buttons
- d Socket for memory card or PC interface cable
- e Output terminals
- f LCD display

Mounting “easy”

Mounting on top-hat rail

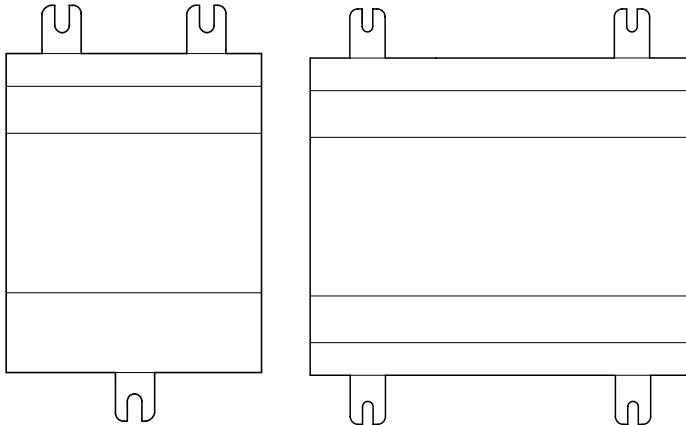
Hook “easy” to the top edge of the top-hat rail and hinge into place while pressing down slightly as shown by the arrows.

“easy” will clip into place and will be secured by the built-in spring mechanism without needing screws.



Mounting on a mounting plate

“easy” can be screwed to a mounting plate with the three device feet (available as an optional accessory).

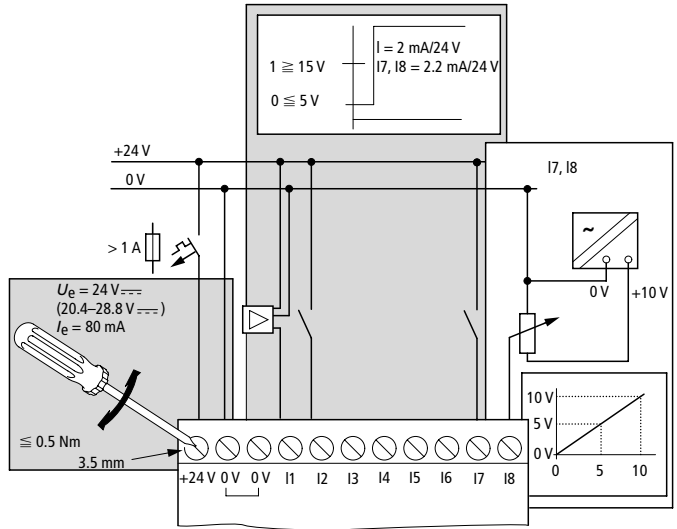


Connecting “easy”

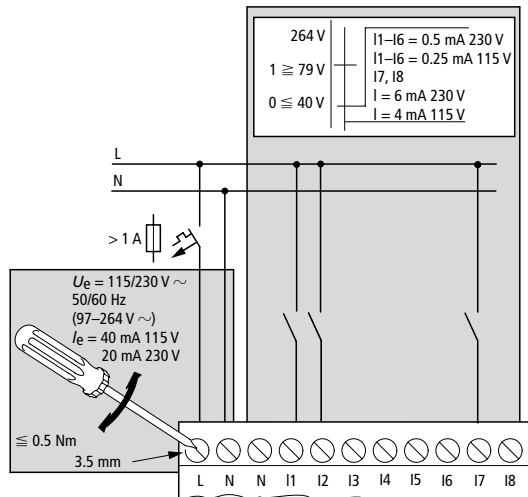
Overview

EASY...	412-DC-R...	412-DC-TC	412 AC-R...	618-AC-RC	620-DC-TC
Connecting inputs	Page 7	Page 7	Page 7	Page 9	Page 9
Connecting outputs	Page 8	Page 8	Page 8	Page 10	Page 10

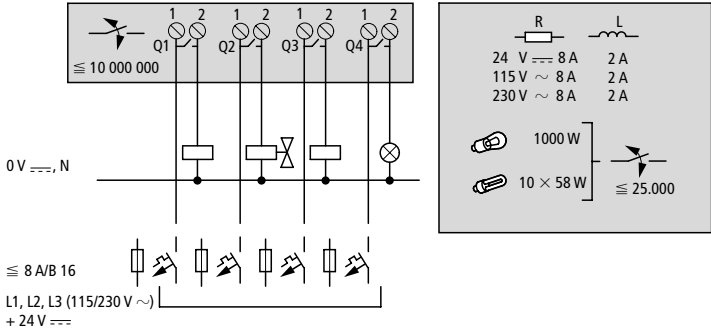
Inputs EASY 412-DC-...



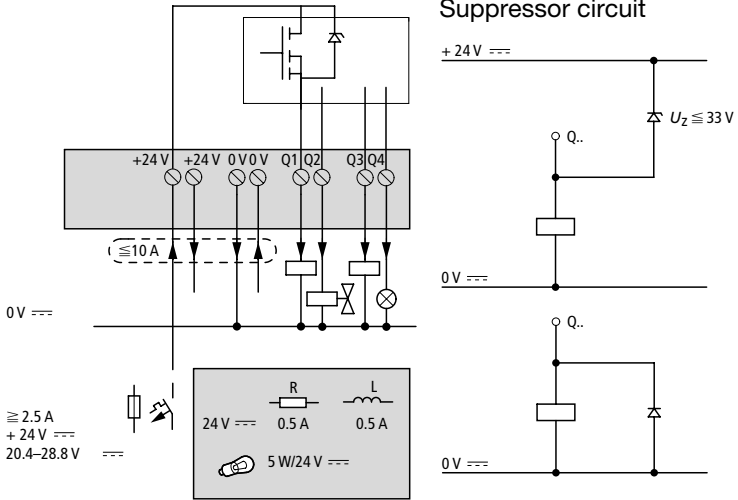
Inputs EASY 412-AC-...



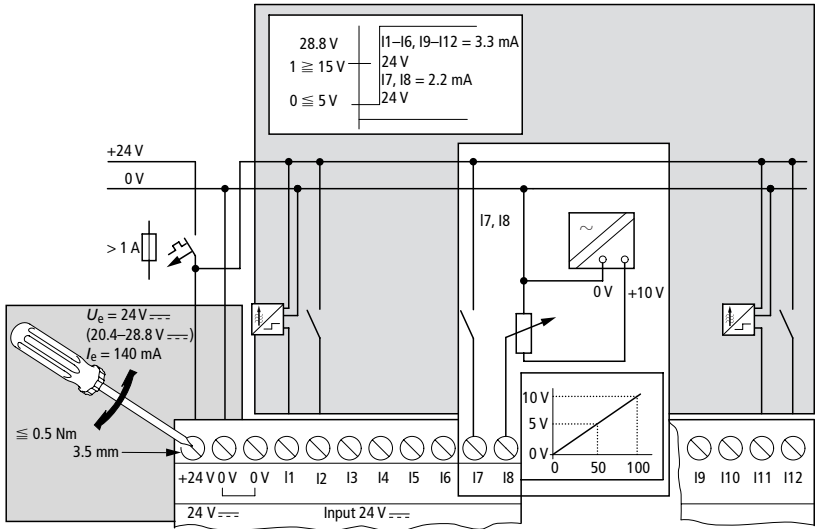
Outputs EASY 412-AC-..., EASY 412-DC-R...



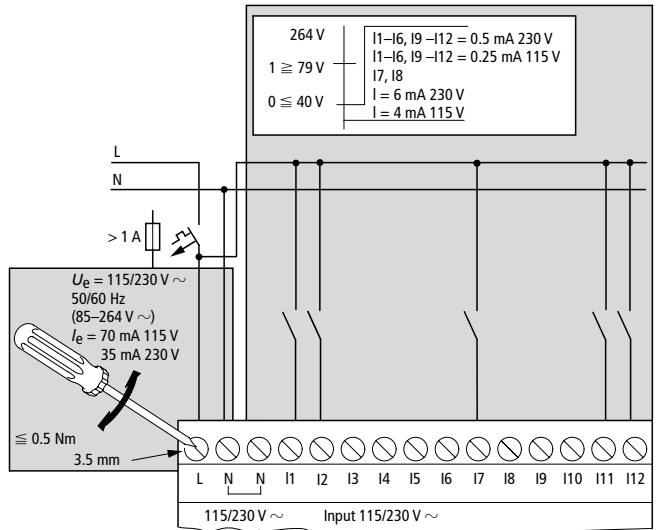
Outputs EASY 412-DC-T...



Inputs EASY 620-DC-TC

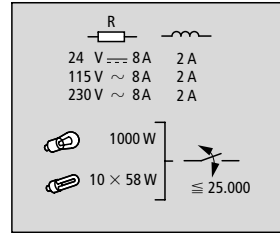
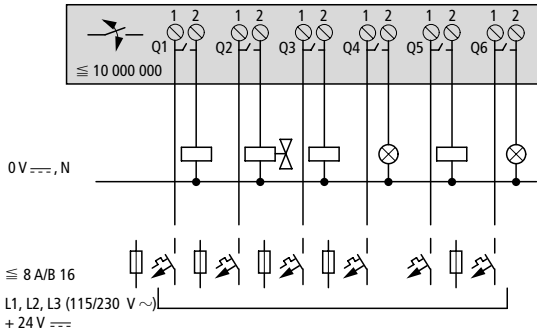


Inputs EASY 618-AC-RC

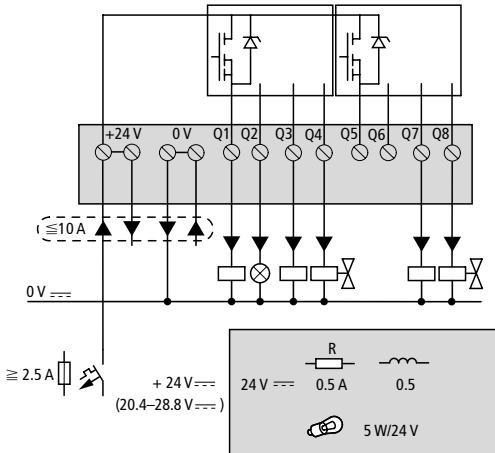


“easy” Control Relay

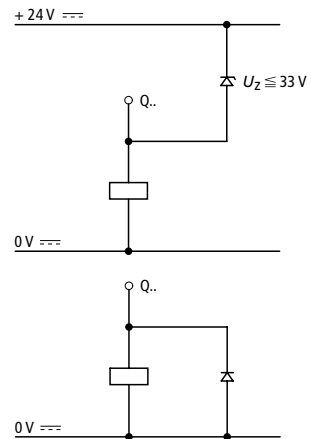
Outputs EASY 618-AC-RC



Outputs EASY 620-DC-TC



Suppressor circuit



“easy” operating principle

“easy” operating buttons



DEL: Delete object in the circuit diagram

ALT: Special functions in the circuit diagram

Cursor buttons < > ^ ∨:

Move cursor,

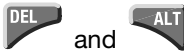
Select menu item,

Choose contact numbers, values, time etc.

OK: Next menu level, store your entry

ESC: Last menu level, cancel your entry

Moving through menus and choosing values



Show system menu



Go to next menu level

Select menu item

Store your entry



Return to last menu level

Cancel your entry since the last **OK**

^ ∨ Change menu item

Change value

< > Change position

P button function (if enabled):

< Input P1,

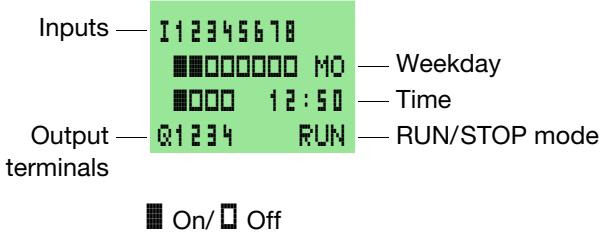
^ Input P2

> Input P3,

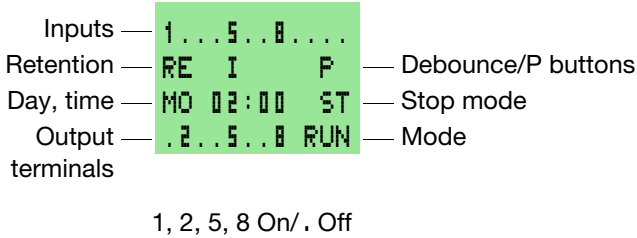
∨ Input P4



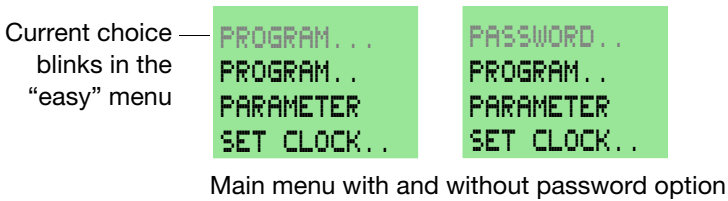
EASY 412-...status display



Status display EASY 618-..., EASY 620-...



Menu display



“easy” operating principle

Cursor display

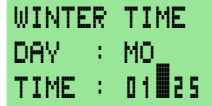
The cursor blinks alternately:

Full blinking cursor █/█:

Move cursor with < > ,

In circuit diagram also with

^ v

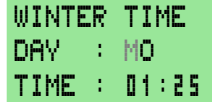


```
WINTER TIME
DAY : MO
TIME : 01:25
```

Value M/M

Change position with < >

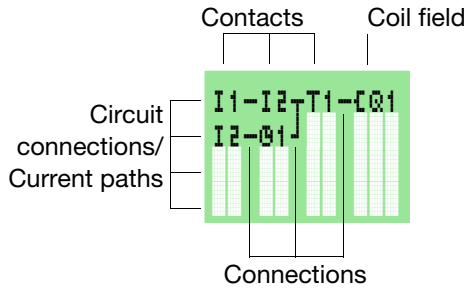
Change values with ^ v



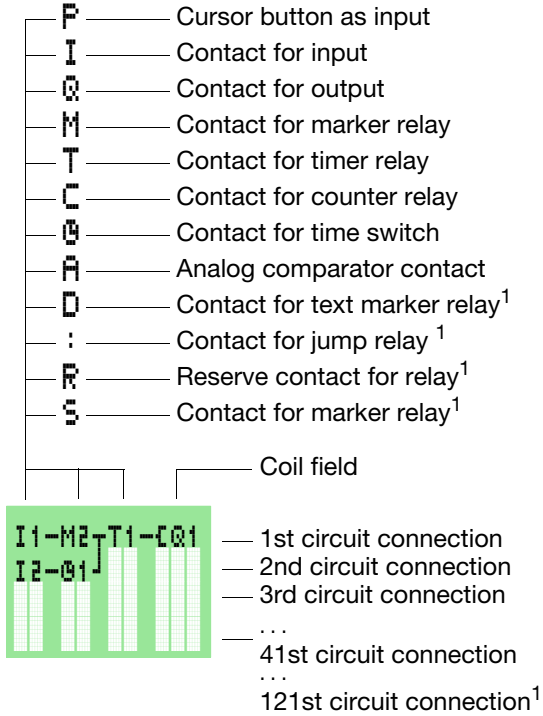
```
WINTER TIME
DAY : MO
TIME : 01:25
```

Blinking values/menus are shown grey in this manual.

Circuit diagram menu



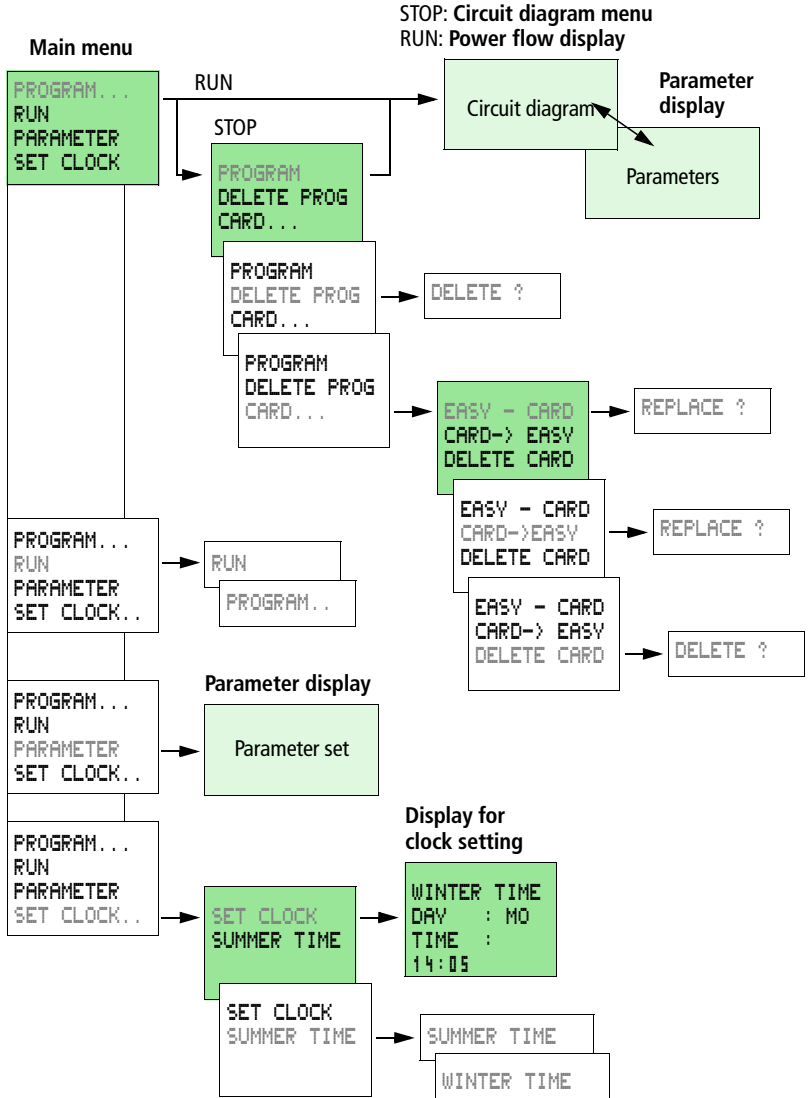
Circuit diagram symbols



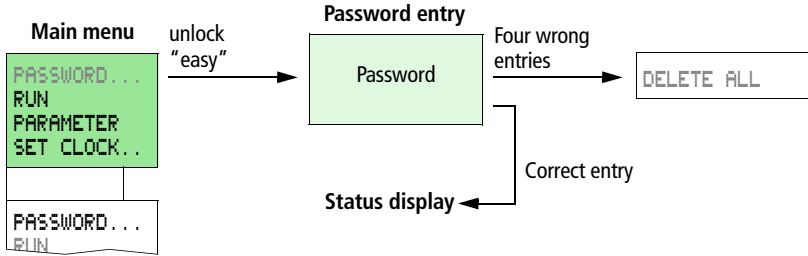
1 Only EASY 618/620

Menu structure

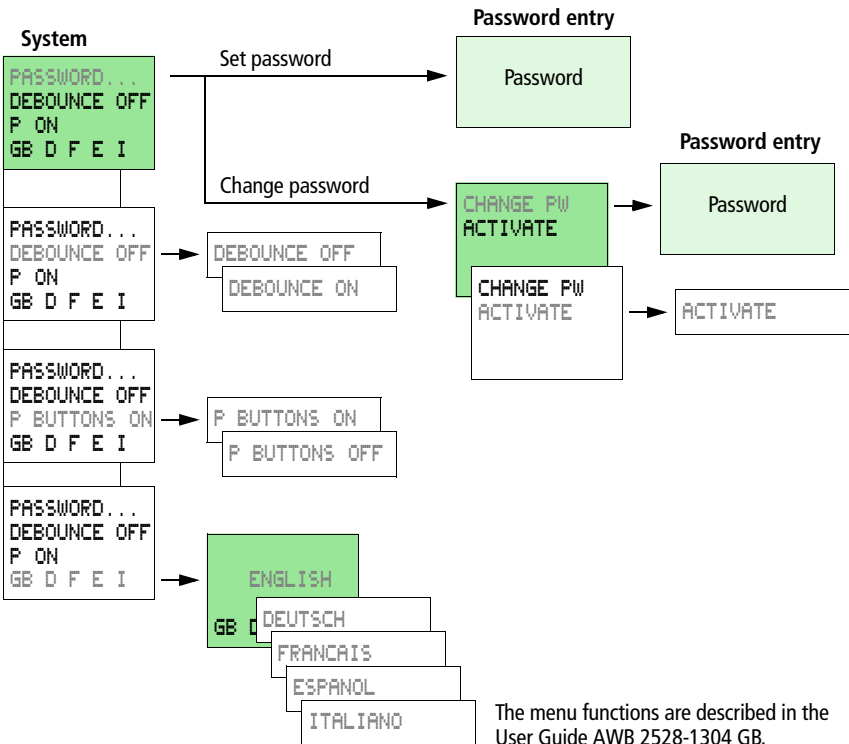
Main menu without optional password protection



Main menu with password protection

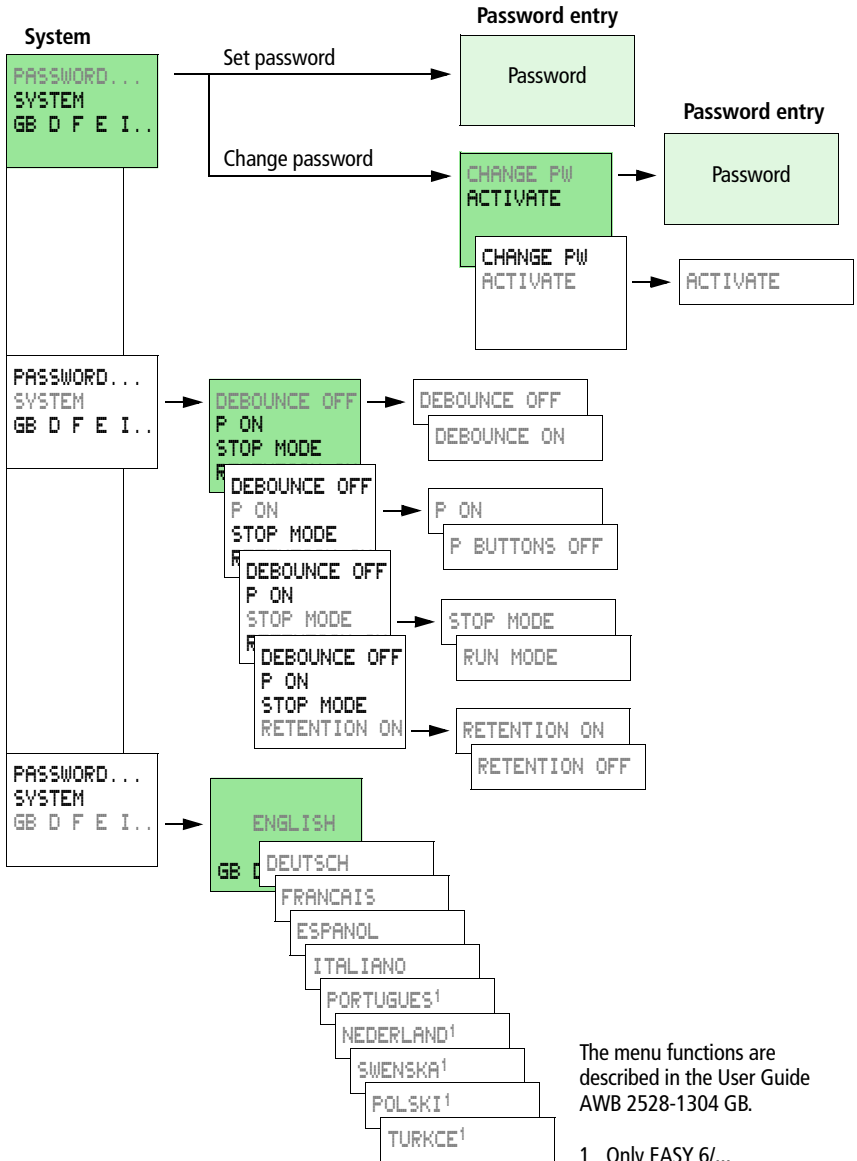


System menu EASY 412-..., operating system V 1.0



The menu functions are described in the User Guide AWB 2528-1304 GB.

System menu EASY 412-..., operating system from V 1.2, EASY 618-AC-RC, EASY 620-DC-TC



The menu functions are described in the User Guide AWB 2528-1304 GB.

1 Only EASY 6/...

2 Drawing a Circuit with “easy”

Operation of “easy”

Buttons for drawing circuit diagrams



Delete circuit connection, contact, relay or empty line in the circuit diagram



Toggle between break and make contact
Connect contacts and relays
Add circuit connections



^v Change value
Move cursor up and down
<> Change position
Move cursor to left and right

Assign P buttons:

< Input P1, ^ Input P2
> Input P3, v Input P4



Undo settings from previous **OK**
Exit current display



Change, add contact/relay
Save setting

Setting the menu language

Switching on “easy” for the first time

Choose menu language

- ▶ Choose language with the cursor keys ^∨

GB English
D German
F French
E Spanish
I Italian

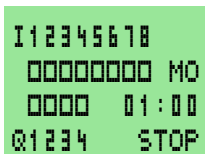


EASY 600 also supports the following languages:

Portuguese
Dutch
Swedish
Polish
Turkish

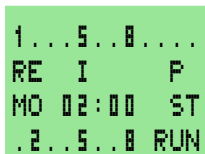
- ▶ Confirm with **OK**.

“easy” then shows the status display



EASY 412-...

or

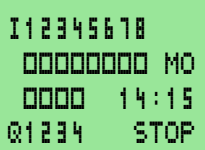
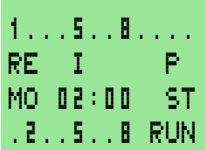





EASY 6...




Setting the time

A clock is only provided in “easy” models with the type designation “...-C”.

Switch to the Set Clock menu


 or
 




EASY 412-... EASY 6...

Setting week days and time





- <> Move cursor
- ^> Change value

-  Save setting
- or
-  Keep previous value
-  Exit menu

Winter/summer time (DST)



Display: SUMMER TIME
Winter time is set
Display: WINTER TIME
Summer time is set



Toggle settings



Exit menu

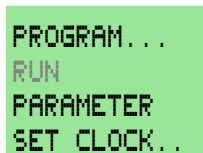
Choose “easy” operating mode

The two “easy” operating modes are RUN or STOP.

RUN: “easy” processes the circuit diagram.

STOP: Draw the circuit diagram.

The alternating RUN/STOP menu shows either RUN or STOP as follows:



STOP mode active: RUN is shown

RUN mode active: STOP is shown

Selectable startup behaviour

With EASY 412-... units using operating system V 1.2, EASY 618-... and EASY 620-... it is possible to select the operating mode to be activated when the power supply is switched:

Startup in “RUN” mode

or

Startup in “STOP” mode

Retentive actual values

With EASY 412-DC-... using operating system V 1.2, EASY 620-DC-TC and EASY 618-AC-RC it is possible to save the actual values of markers and counters, also in the event of a power failure.

EASY 412-DC-...

- 4 marker relays (markers)
- 1 timing relay
- 1 counter

EASY 620-DC-TC, EASY 618-AC-RC

- 12 marker relays (markers), text display
- 2 timing relays
- 4 counters

For further information see AWB 2528-1304 GB.

“easy” circuit diagram elements Contacts

Contact type	Make contact	Break contact	EASY 412	EASY 6...
“easy” input terminal	I	\bar{I}	I1...I8	I1...I12
P button contact (cursor keys)	P	\bar{P}	P1...P4	P1...P4
“easy” output relay contact	Q	\bar{Q}	Q1...Q4	Q1...Q8
Marker relay contact	M	\bar{M}	M1...M16	M1...M16
Counter relay contact	C	\bar{C}	C1...C8	C1...C8
Timing relay contact	T	\bar{T}	T1...T8	T1...T8
Time switch contact	Q	\bar{Q}	Q1...Q4	Q1...Q4
Analog comparator contact	A	\bar{A}	A1...A8	A1...A8
Text display contact	D	\bar{D}	—	D1...D8
Jump contact	:	—	—	:1...:8
Marker relay contact	S	\bar{S}	—	S1...S8
Reserve	R	\bar{R}	—	R1...R16
Short-circuit detection EASY...-DC-T..	I	\bar{I}	I16	I15, I16

Relays

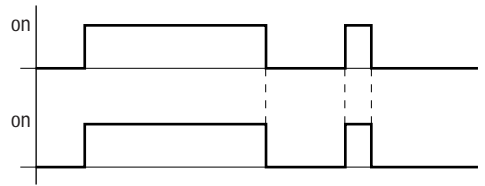
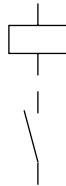
Relay type	"easy" symbol	EASY 412	EASY 6...	Coil function	Parameter
"easy" input terminal	I	I1...I8	I1...I12	—	—
P button contact (cursor keys)	P	P1...P4	P1...P4	—	—
"easy" output relay contact	Q	Q1...Q4	Q1...Q8	X	—
Marker relay contact	M	M1...M16	M1...M16	X	—
Counter relay contact	C	C1...C8	C1...C8	X	X
Timing relay contact	T	T1...T8	T1...T8	X	X
Time switch contact	Q	Q1...Q4	Q1...Q4	—	X
Analog comparator relay	A	A1...A8	A1...A8	—	X
Text display contact	D	—	D1...D8	X	X
Jump contact	:	—	:1...:8	X	—
Marker relay contact	S	—	S1...S8	X	—
Reserve	R	—	R1...16	—	—
Short-circuit detection EASY...DC-T...	I	I16	I15, I16	—	—

Retentive relays

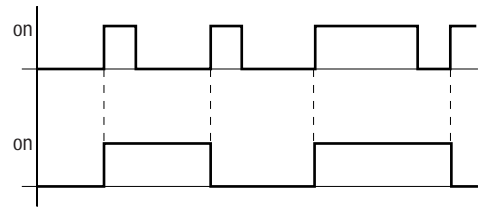
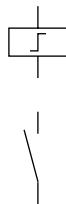
Relay type	"easy" symbol	EASY 412	EASY 6...
Marker relay contact	M	M13...M16	M13...M16
Counter relay contact	C	C8	C5, C6, C7, C8
Timing relay contact	T	T8	T1, T8
Text display contact	D	—	D1...D8



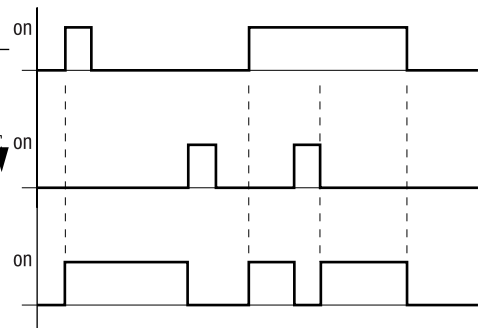
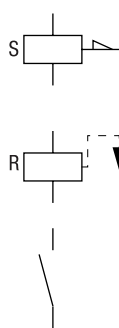
Basic relays with contactor function



Impulse relay



Latching relay

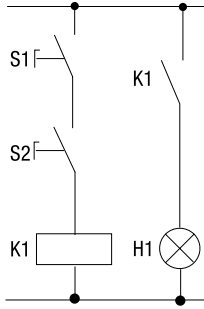


Drawing a Circuit with "easy"

Example: creating a circuit diagram

Interconnecting contacts and relays

Conventional circuit



"easy" circuit diagram

Connecting up "easy"

- Connect S1 to "easy" input terminal I1
- Connect S2 to "easy" input I2
- Connect load H1 to "easy" output Q1

"easy" circuit diagram

I1-I2-----[Q1]

Draw circuit in circuit diagram menu...

Start Status display

```

I12345678
00000000 MO
0000 13:15
01234 STOP
    
```

or

```

1...5..8...
RE I   P
MO 02:00 ST
.2..5..8 RUN
    
```



```

PROGRAM...
RUN
    
```



```

P
S PROGRAM
DELETE PROG
    
```

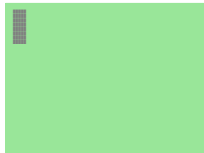


EASY 412-...

EASY 6...

Insert contact "I1"

Circuit diagram display



```

I1
    
```



```

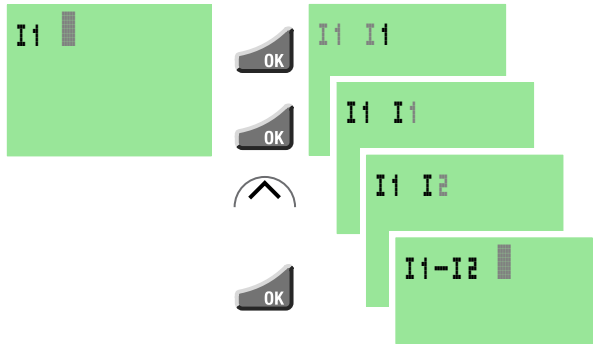
I1
    
```



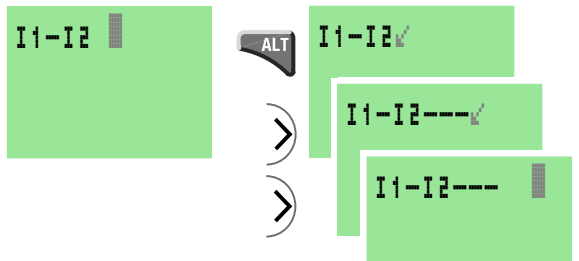
```

I1
    
```

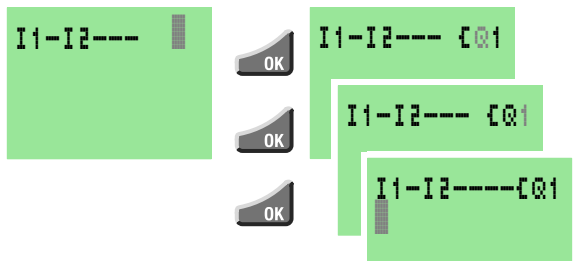
Insert contact "I2"



Draw connection between contact and relay coil

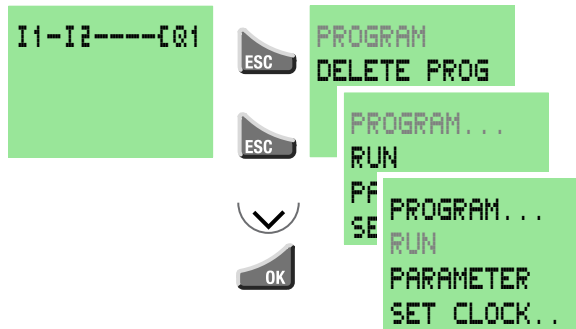


Choose relay coil "Q1"



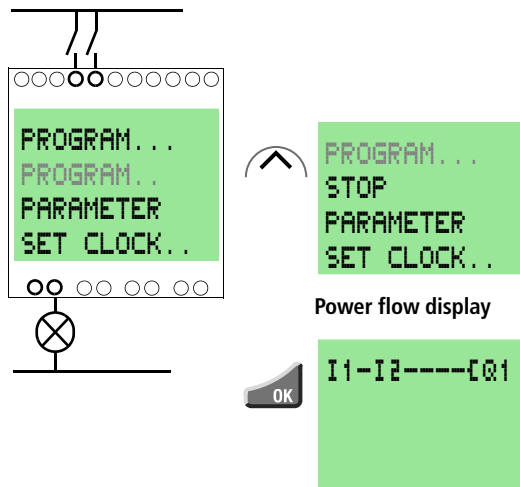
Change operating mode

"easy" circuit diagram



"easy" now in RUN mode

Test circuit diagram



Power flow display

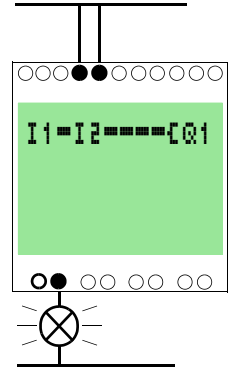
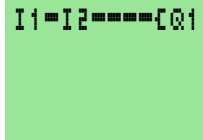
Example: creating a circuit diagram

Operate switch "S1" and "S2"

"S1" on

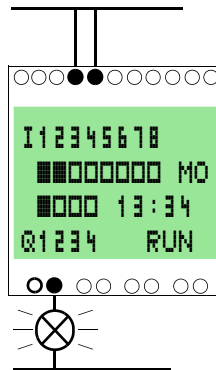
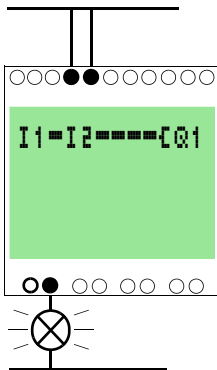


"S2" on

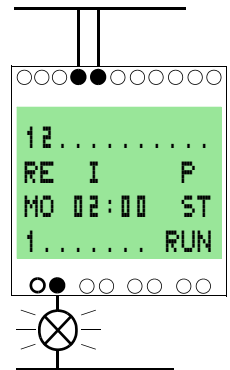


Relay "Q1" picks up

Return to status display with ESC



or



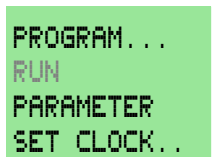
EASY 412-...

EASY 6...

In the next example, a timing relay will be added to the circuit.

Status display is activated.

Choose STOP mode:

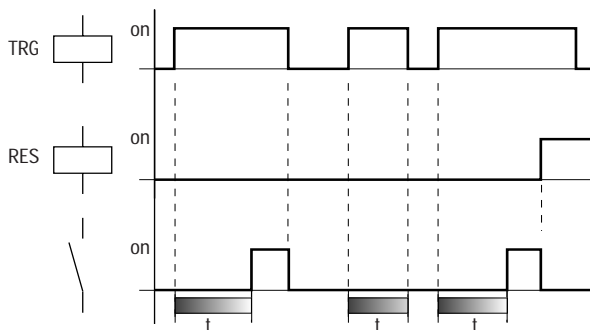


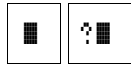
Function relay types

Circuit diagram symbol	Function relay type
	Timing relay with on delay with and without random switching
	Timing relay, off-delayed with and without random switching
	Timing relay, single pulse Timing relay, flashing
	Counter relay, up/down counter
	Time switch, weekday/time (only in “easy” models with clock)
	Analog comparator relay (only in “easy” models for 24 V DC)

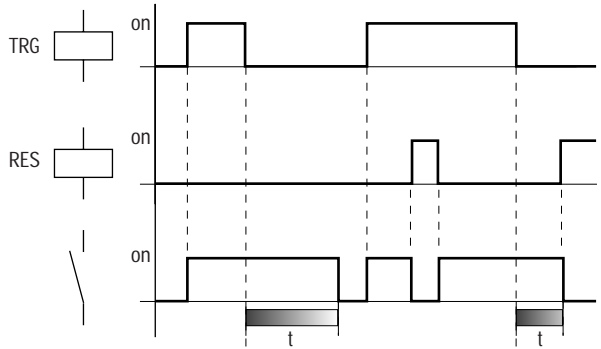
Timing relay

Timing relay with on delay, with and without random switching





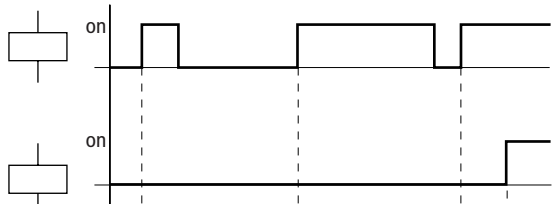
Timing relay, off-delayed, with and without random switching



With random switching, the relay contact switches randomly at any time up to the specified time value (shown shaded in figure).



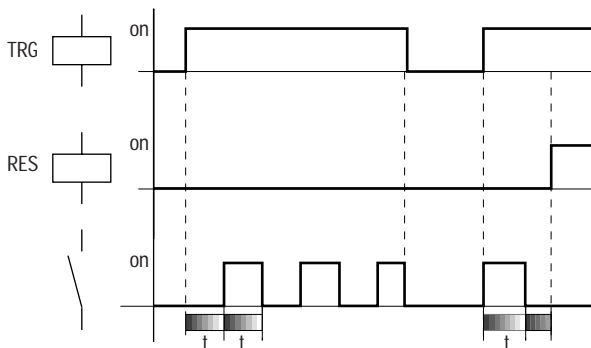
Timing relay, single pulse



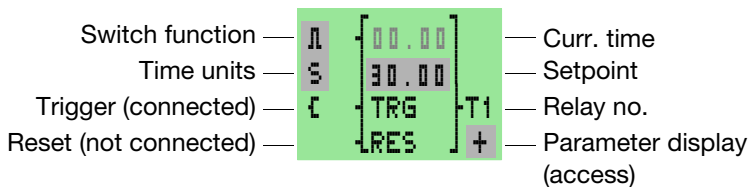


Timing relay, flashing

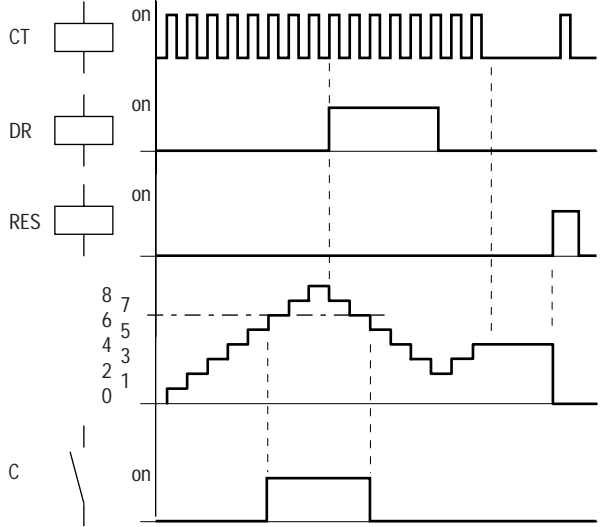
$$\text{Flash frequency} = \frac{1}{2 \times \text{Setpoint}}$$



Parameter display for timing relays



Counter relay



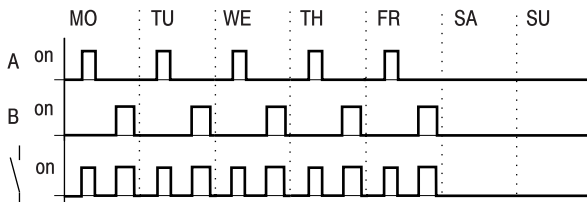
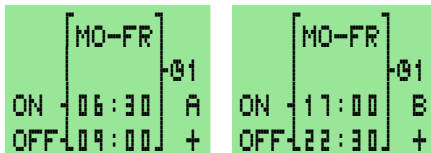
Setpoint = 6

Parameter display for counter relays

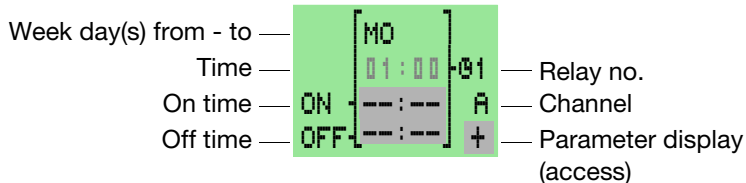
Setpoint	—	[0230]	0000	—	Curr. value
Opt. direction (connected)	—	[DIR]		—	Setpoint
Opt. counter (connected)	—	[CNT]	C1	—	Relay no.
Reset (not connected)	—	[RES]	+	—	Parameter display (access)

Time switch

Example: Time switch "01" switches on Mondays to Fridays between 6:30 and 9:00 and between 17:00 and 22:30.



Parameter display for time switches



Analog comparator

Available functions:

$I7 \geq I8, I7 \leq I8$

$I7 \geq \text{Setpoint}, I7 \leq \text{Setpoint}$

$I8 \geq \text{Setpoint}, I8 \leq \text{Setpoint}$

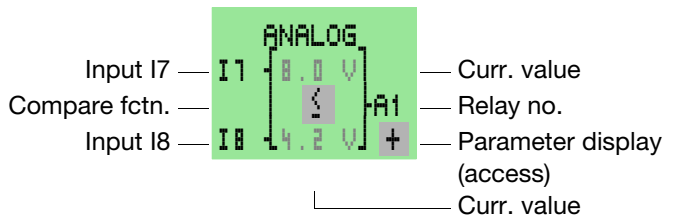
The analog comparator can compare voltages from 0 V to 10 V (setpoints “0.0” to “10.0”).



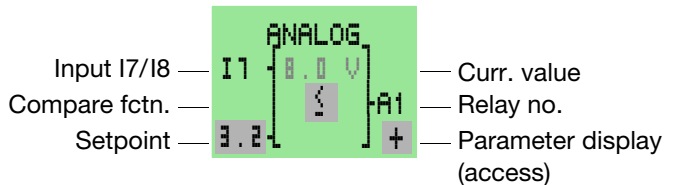
Analog signals of sensors typically fluctuate by several millivolts. For stable set and reset switching the setpoints should differ by at least 0.2 V (switching hysteresis). Do not use any relay with contactor or impulse relay coil functions.

Parameter displays for analog comparators

Compare inputs “I7” and “I8”



Compare input “I7” or “I8” with program setpoint



Text display (Marker)

The markers can be used to display eight freely definable texts. Each text block can display up to 48 characters from the easy display character set (ASCII + easy special characters). If the coil of a marker is "1", the text entered via EASY-SOFT V 2.0 will be displayed. If several text markers are "1", the next text is displayed every 4 seconds. When text marker D1 is "1" it stays displayed (fault indication).

Press OK to switch to the menus at any time.

Current values or parameters of function relays can be displayed in lines 2 and 3.

Examples:

Fault signals

```
CAUTION !  
PUMP 1  
MOTOR  
MALFUNCTION
```

Time with text display

```
THE TIME  
IS  
14:42
```

Showing scaled analog values

```
EXTERNAL  
TEMPERATURE  
020 0 C  
HEAT !
```

Display current value and parameter of timing relay

```
TIMING RELAY  
1  
SETP49.00 S  
ACTV 42.00 S
```

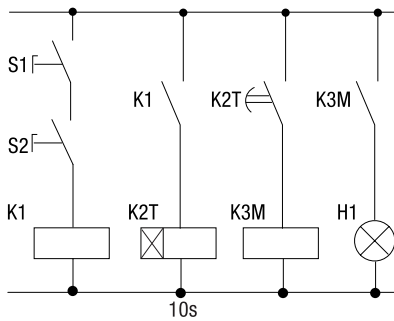
Display counter value

```
QUANTITY  
ACTV 0042  
PCS  
SETP0100
```

Example: using a function relay

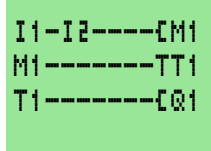
Example: using a function relay

Conventional circuit



"easy" circuit diagram
 "easy" switches H1 with 10 seconds delay.

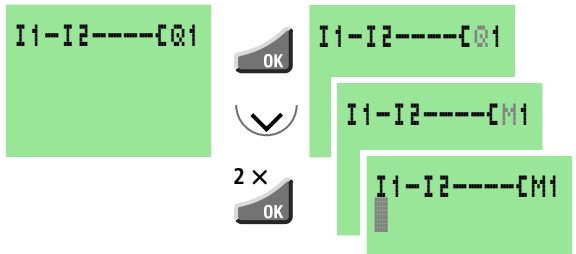
"easy" circuit diagram



Select marker relay

Start Circuit from first example

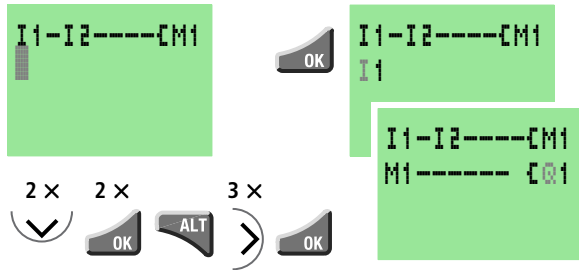
Position cursor on "Q"



Select marker relay contact and connect to new

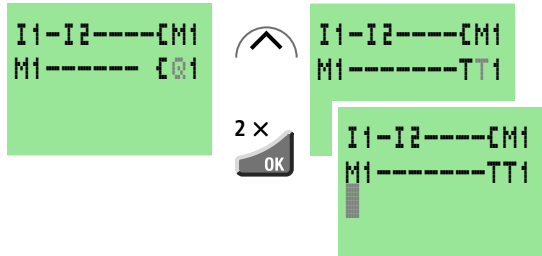
Drawing a Circuit with
"easy"

output relay

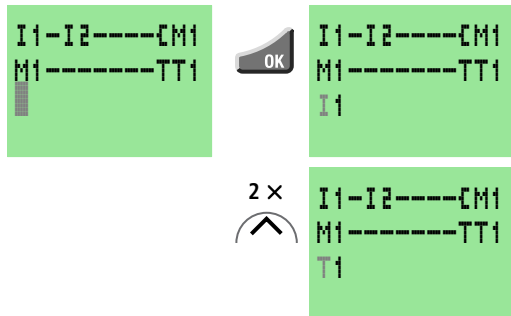


Example: using a function relay

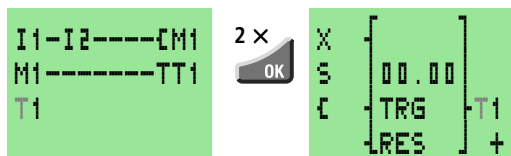
Select Trigger relay for time



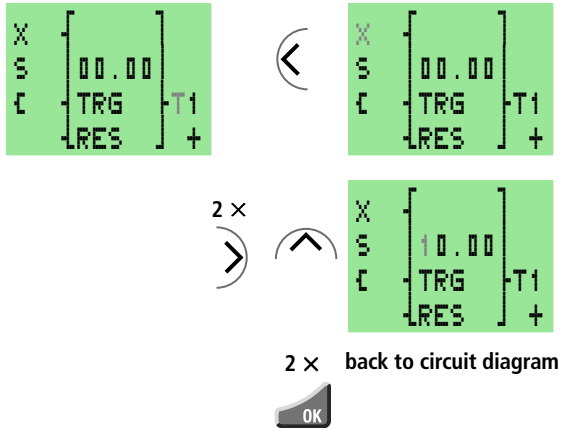
Insert timing relay contact



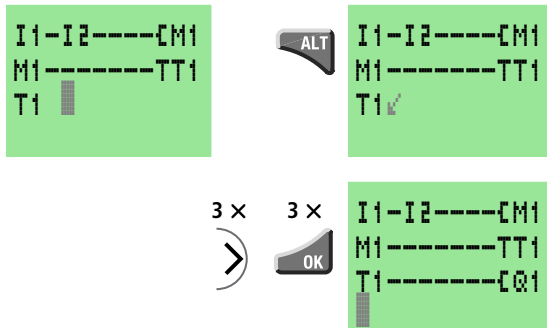
Select parameter access



Set “10 seconds”



Connect timing relay contact to new output relay



Switch “easy” to RUN to test circuit diagram.

- ▶ Test the circuit as shown for the first example.

To display and access the parameters for the timing relay and change the time value:

- ▶ In RUN mode, position the cursor in the circuit diagram on the “T” of “T1” and press **OK**.

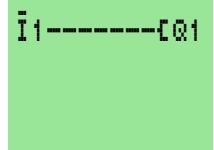
Basic circuits

Significance of logic values

- “0” Make contact open, break contact closed, relay coil not energised
- “1” Make contact closed, break contact open, relay coil energised

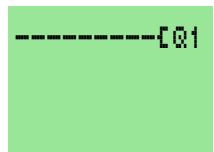
Negation (NOR)

I1	Q1
1	0
0	1



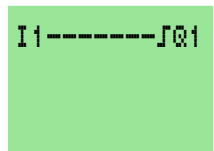
Permanent contact

---	Q1
1	1



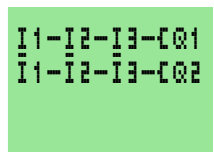
Impulse relay

I1	State Q1	Q1
0	0	0
1	0	1
0	1	1
1	1	0



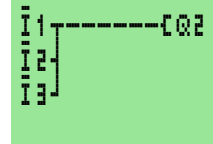
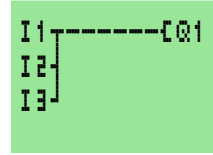
Series connection (AND)

I1	I2	I3	Q1	Q2
0	0	0	0	1
1	0	0	0	0
0	1	0	0	0
1	1	0	0	0
0	0	1	0	0
1	0	1	0	0
0	1	1	0	0
1	1	1	1	0



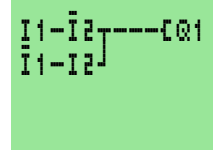
Parallel connection (OR)

I1	I2	I3	Q1	Q2
0	0	0	0	1
1	0	0	1	1
0	1	0	1	1
1	1	0	1	1
0	0	1	1	1
1	0	1	1	1
0	1	1	1	1
1	1	1	1	0



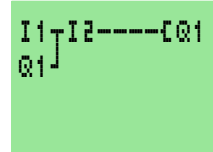
Changeover circuit (XOR)

I1	I2	Q1
0	0	0
1	0	1
0	1	1
1	1	0

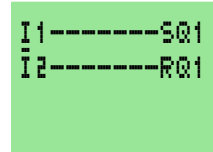


Latching circuit

I1	I2	Contact Q1	Coil Q1
0	0	0	0
1	0	0	0
0	1	0	0
1	1	0	1
1	0	1	0
0	1	1	1
1	1	1	1



alternatively:



3 “easy” Interface Socket

The “easy” interface socket, which is hidden beneath a protective cap, lets you plug in the optional “easy” memory card or connect “easy” to a PC using the optional PC interface cable and the EASY-SOFT software. You can then copy your circuit diagrams to and from the PC and/or memory card. In addition you can draw and test your circuit diagrams on the PC before transferring them to “easy”.

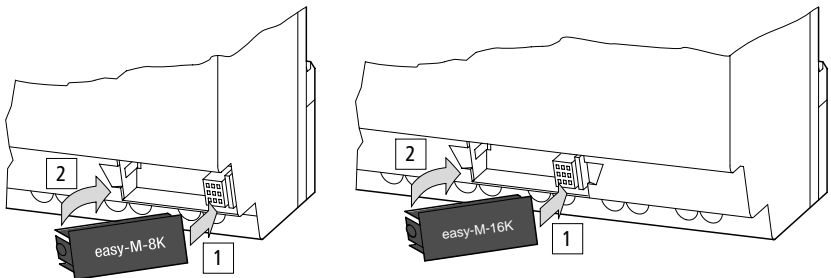
Memory card

Memory cards are available as the optional accessory “easy-M-..K”. Each memory card can store a single “easy” circuit diagram.

Information stored on the memory card is “non-volatile” (the information is not lost when the power is switched off), and thus you can use the card to make a backup copy of your circuit diagram and/or to transfer it to another “easy” device.

Each memory card stores:

- the circuit diagram
- all parameter settings of the circuit diagram
- system settings



Loading or storing the circuit diagram

You can only transfer the circuit diagram from “easy” to the card or vice versa in STOP mode.

“EASY->CARD”: Transfer circuit diagram and parameter settings from “easy” memory to the card,



“CARD->EASY”: Transfer circuit diagram and parameter settings from the card to “easy” memory,

“DELETE CARD”: Delete the contents of the card.

Available memory cards

EASY-M-8K memory card for EASY 412-...

EASY-M-16K memory card for EASY 618/620-...

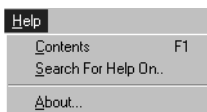
EASY-SOFT

EASY-SOFT is an optional PC program with which you can create, store, test (simulate) and manage “easy” circuit diagrams. You can then transfer the circuit diagrams from the PC to “easy” or vice versa using a special PC interface cable.

You should only transfer the circuit diagrams using the special PC interface cable, which is available as the optional accessory “easy-PC-CAB”.

To test your circuit diagram in the “easy” device itself, transfer it from the PC to “easy” and choose RUN mode by pressing the appropriate buttons.

The EASY-SOFT software also includes extensive online Help.



To use the online Help, start EASY-SOFT and choose Contents in the Help menu.

Context sensitive help is also available choose a menu item with the mouse and press F1 while keeping the mouse button pressed.

4 Technical Data

Technical data

Weight	200 g, 300 g (EASY 600)
Ambient temperature, (operation)	-25 to 55 °C
Protection class	IP 20
Emitted interference, interference immunity	EN 55 011, EN 55 022, Class B
Standards and regulations Approvals	EN 50 178 UL, CSA

“easy” models

	EASY 412-DC-...				EASY 412-AC-...			EASY 618-...	EASY 620-...
	...R	...RC	...TC	...TCX	...R	...RC	...RCX	...AC-RC	...DC-TC
Power supply	24 V DC power feed				115, 230, 240 V AC			100, 115, 120, 230, 240 V AC	24 V DC power feed
Digital inputs	8 digital inputs, 2 of them also usable for analog signals				8	8	8	12	12 digital inputs, 2 of them also usable for analog signals
Relay outputs	4	4	–	–	4	4	4	6	–
Transistor outputs	–	–	4	4	–	–	–	–	8
LCD display	✓	✓	✓	–	✓	✓	–	✓	✓
Operating buttons	✓	✓	✓	–	✓	✓	–	✓	✓
Time switch	–	✓	✓	✓	–	✓	✓	✓	✓
Text display	–	–	–	–	–	–	–	✓	✓
Retentive actual values	From version V 1.2				–	–	–	✓	✓

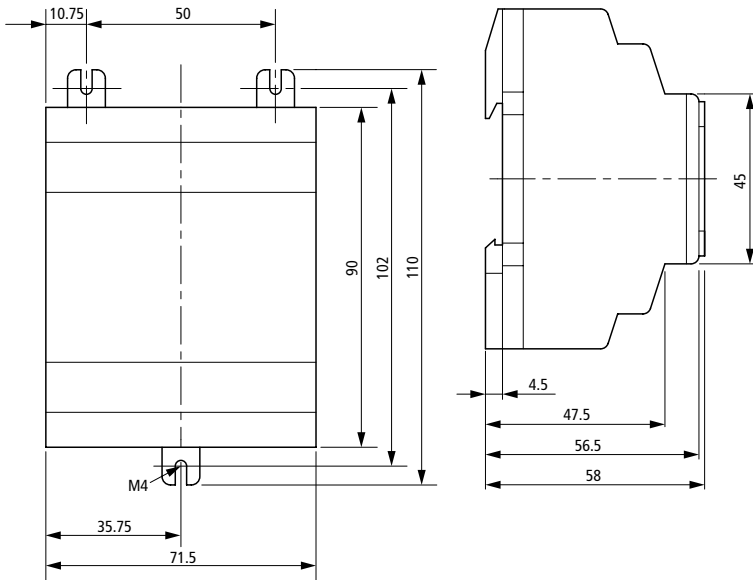
Accessories

Software	EASY-SOFT, Version 2.0, for Windows 95/98, Windows NT	
PC – “easy” interface cable	EASY-PC-CAB with interface electronic circuit	
Memory card	EASY-M-8K	EASY-M-16K

Technical Data

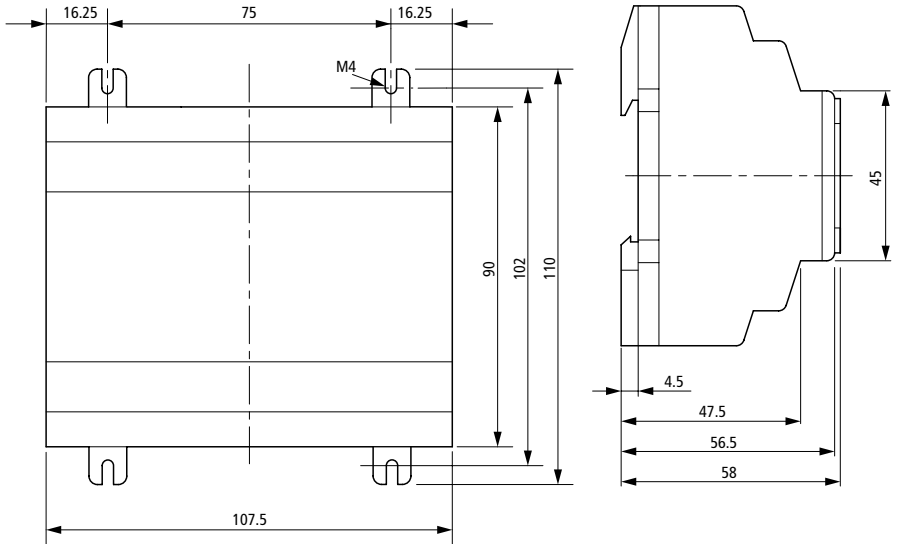
	EASY 412-DC-...				EASY 412-AC-...			EASY 618-...	EASY 620-...
	...R	...RC	...TC	...TCX	...R	...RC	...RCX	...AC-RC	...DC-TC
Input/output simulator	EASY 412-DC-SIM				-	-	-	-	-
Mounting feet	ZB 4-101-GF1: For EASY 412-... 3 feet							min. 3	
Documentation	Training Guide (AWB 2528-1316 GB), User Guide (AWB 2528-1304 GB), Application Guide (TB 2528-025 GB)								

Dimensions EASY 412-...



“easy” models

Dimensions EASY 618-..., EASY 620



Index

A

Accessories	45
Accuracy	
Analog comparator	35
Analog comparator	35
Hysteresis	35
AND circuit	41

B

Basic circuit	
Impulse relay	41
Parallel connection	42
Permanent contact	41
Basic circuits	
Example	41
Break contact	23
Buttons	11
Use in circuit diagrams	19

C

Change operating mode	22
Changeover circuit	42
Circuit diagram	
Access relay parameters	39
Choosing relay type	27
Displaying	26
Example	26, 37
Inserting contacts	26
Loading	44
Select marker relay	37
Storing	44
Symbols	14
Testing	28
Using a function relay	37
Using buttons in	19
Circuit diagram elements	23
Coil function	25
Connecting inputs	6
Connecting outputs	6

Contactor function	25
Contacts	
Overview	23
Counter relay	33
Parameter display	33
Cursor display	13
D	
Dimensions, “easy”	46
E	
Overview of “easy”	5
Example	
Basic circuits	41
Circuit diagram	26
Contacts and relays	26
Example of function relay	37
F	
Function relay	
Analog comparator	35
Function relays	
Counter relay	33
Overview	30
Time switch	34
Timing relay	30
H	
Hysteresis	
Analog comparator	35
I	
Impulse relay	25
L	
Language for menus	
Changing	20
Latching circuit	42
Latching relay	25
Logic tables	41–42

M	
Make contact	23
Marker	36
Memory card (optional)	43
Menu guidance	11
Menu language	
Changing	20
Menu structure	15
Models	45
Mounting	6
N	
Negation	41
NOT	41
O	
Operating buttons	11
OR circuit	42
P	
Parameter display	
Analog comparator	35
Counter relay	33
For timing relays	32
Time switch	34
R	
Relay	
Impulse	25
Latching	25
Relay types	
Overview	24
Reset input	25
S	
Series connection	41
Set input	25
Setting the time	21
Setting week days	21
Startup behaviour	22
Status display	12
Summer time	22

Symbols in circuit diagram 14
System menu 16

T
Terminals, inputs/outputs 6
Text display 36
Time switch 34
 Parameter display 34
Timing relays 30–32
 Parameter display 32
Transfer cable 43

W
Winter time 22

X
XOR circuit 42