domestic and industrial automation

«F&F»®

2014

PLC MAX programmable logic controllers

F&Home smart home system

F&Home RADIO radio smart home system

elFF video intercom sets



F&F Filipowski sp. j.

ul. Konstantynowska 79/81, 95-200 Pabianice

POLAND

The F&F company was established in 1992 based on a commercial and service company active in the electronic sector.The previous marketing and technical experience (mainly in terms of electronics and electrical engineering) enabled its owners to established a manufacturing company offers a wide range of electronic appliances for both domestic and industrial applications. The work of F&F's Research and Development department in cooperation with the scientific society and customers leads to expand and offer and allows to create devices on higher technological advancement level, exemplified by the series of programmable controllers and PLC MAX intelligent home system F & Home.

Nowadays, the F&F brand has been widely known in Poland. The company delivers its products to customers in Russia, Ukraine, Belarus, Lithuania, Latvia, Slovakia, Romania, Czech Republic, Hungary, Germany, Portugal, Spain, France, Ireland, Sweden, Norway, Finland, Chile, and the United States.

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DEKLARACJA ZGODNOŚCI WE
Declaration of EC-Conformity

Nr 044/14

F&F Filipowski s. j. ul. Konstantynowska 79/81 95-200 Pabianice Poland NIP: 731-000-53-14 REGON 47062581 3

Niżej podpisany, reprezentujący producenta wymienionego powyżej niniejszym deklaruję, że wyrób
The undersigned, representing the manufacturer listed above hereby declare that the goods

Przetwornik sygnału
Signal transmitter
Typ: AT-1I, AT-1U, AT-2I, AT-2U, AT-3I, AV-1I, AC-1I, AH-1I, MB-1U-1, MB-3U-1, MB-1I-1, MB-3I-1, MB-PT-1, MR-DIO-1, MR-AI-1, MR-AO-1.

jest zgodny z postanowieniami następujących dyrektyw WE:
are compatible with the following directive EC:

LVD 2006/95/EEC
Dyrektywa niskonapięciowa
Rozporządzenie Ministra Gospodarki z dnia 20 grudnia 2005 r. w sprawie zasadniczych wymagań dla sprzętu elektrycznego (Dz.U. Nr 259, poz.2172)
Low Voltage Directive
Regulation of the Minister of Economy of 20 December 2005 on essential requirements for electrical equipment (OJ No. 259, poz.2172)

EMC 2004/108/EEC
Dyrektywa Kompatybilności elektromagnetycznej
Ustawa o kompatybilności elektromagnetycznej z dnia 13 kwietnia 2007 r. (Dz.U. nr 82, poz. 556)
Electromagnetic Compatibility Directive
The EMC Act of 13 April 2007 (OJ No 82, item. 556)

Normy i/lub dokumentacje techniczne, lub ich części, zastosowane do wyrobu, którego dotyczy niniejsza deklaracja zgodności
Standards and / or technical documentation, or portions thereof, applied to the product covered by this declaration of conformity

-normy zharmonizowane:
- harmonized standards:

PN-EN 61010-1: 2004

PN-EN 61000-4-2:06.2011
PN-EN 61000-4-6:08.2009
PN-EN 61000-4-3:12.2007
PN-EN 61000-4-4:06.2013
PN-EN 61000-4-5:05.2010
PN-EN 61000-4-11:07.2007
PN-EN 55022: 2011

Ostatnie dwie cyfry roku, w którym naniesiono oznaczenie CE: **14**
The last two digits of the year in which the CE marking was affixed: **14**

Pabianice 2

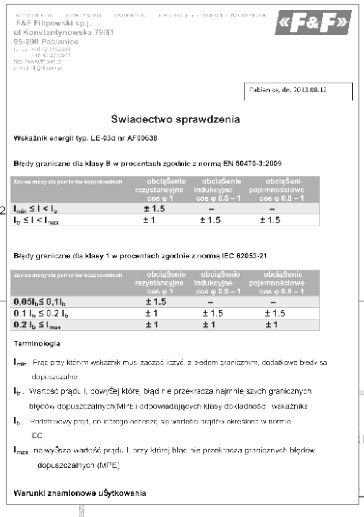
Sław

Dy

nazwisk
name ar

All concerned parties may receive the copies of conformity certificates CE and others concerning our products via mail or fax.
Printable versions of these documents may also be found in our internet site

www.fif.com.pl



«F&F»

F&F Filipowski sp.j.
ul.Konstantynowska 79/81
95-200 Pabianice

Pabianice, dn. 2013.08.13

Świadectwo sprawdzenia

Wskaźnik energii typ: LE-03d nr AF00638

Błędy graniczne dla klasy B w procentach zgodnie z normą EN 50470-3:2009

Zakres wartości prądów w/względem	obciążenie rezystancyjne cos φ 1	obciążenie indukcyjne cos φ 0.5 – 1	obciążenie pojemnościowe cos φ 0.8 – 1
$I_{min} \leq I < I_t$	± 1.5	–	–
$I_t \leq I < I_{max}$	± 1	± 1.5	± 1.5

Błędy graniczne dla klasy 1 w procentach zgodnie z normą IEC 62053-21

Zakres wartości prądów w/względem	obciążenie rezystancyjne cos φ 1	obciążenie indukcyjne cos φ 0.5 – 1	obciążenie pojemnościowe cos φ 0.8 – 1
$0.05I_b \leq 0.1I_b$	± 1.5	–	–
$0.1 I_b \leq 0.2 I_b$	± 1	± 1.5	± 1.5
$0.2 I_b \leq I_{max}$	± 1	± 1	± 1

Terminologia

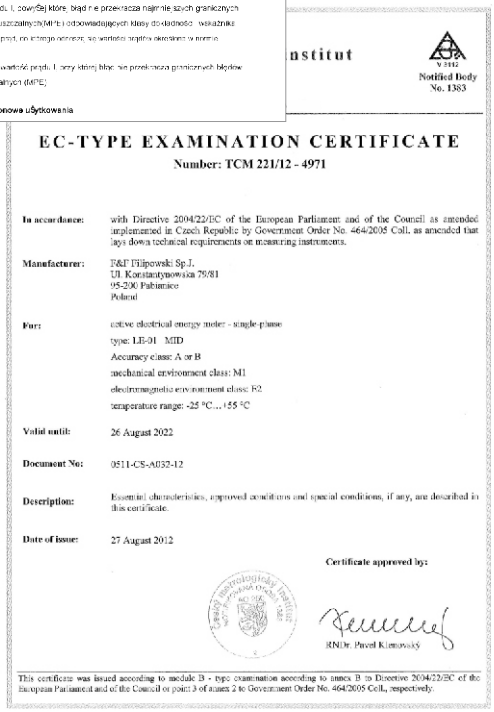
I_{min} - Prąd przy którym wskaźnik musi zacząć liczyć, z błędem granicznym, dodatkowo brany do dopuszczalnego

I_t - Wartość prądu I_t powyżej którego, błąd nie przekracza najmniejszych granicznych błędów dopuszczalnych(MPE) odpowiadających klasy dokładności wskaźnika

I_b - Podstawowy prąd, na którego cześć są wartości błędów określone w normie EC

I_{max} - największa wartość prądu I_t przy której błąd nie przekracza granicznych błędów dopuszczalnych (MPE)

Warunki znamionowe użytkowania



nstitut

Notified Body No. 1383

EC-TYPE EXAMINATION CERTIFICATE
Number: TCM 221/12 - 4971

In accordance: with Directive 2004/22/EC of the European Parliament and of the Council as amended implemented in Czech Republic by Government Order No. 464/2005 Coll. as amended that lays down technical requirements on measuring instruments.

Manufacturer: F&F Filipowski Sp.J.
Ul. Konstantynowska 79/81
95-200 Pabianice
Poland

Part: active electrical energy meter - single-phase
type: LE-01 MID
Accuracy class: A or B
mechanical environment class: M1
electromagnetic environment class: E2
temperature range: -25 °C ... +55 °C

Valid until: 26 August 2022

Document No: 0511-CS-A032-12

Description: Essential characteristics, approved conditions and special conditions, if any, are described in this certificate.

Date of issue: 27 August 2012

Certificate approved by:

RNDr. Pavel Klemovský

This certificate was issued according to module B - type examination according to annex B to Directive 2004/22/EC of the European Parliament and of the Council or point 3 of annex 2 to Government Order No. 464/2005 Coll., respectively.



SGS

EC Type Examination Certificate Number: **0120/ SGS0119**

F&F Filipowski sp.j.
ul. Konstantynowska 79/81
pabainice
Poland
95-200

Instrument identification:
LE-03 MID
Poly Phase, Active Import/Export, Electricity Meter

Instrument Traceable Number
0120/ SGS0119
has been assessed and certified as meeting the requirements of

EC Directive 2004/22/EC
on Measuring Instruments Annex B

It is certified that the manufacturer's technical design and specimen for the above instrument has been examined and, based on the evidence submitted, it is considered that the instrument conforms to the requirements of MI-003 of EC Directive 2004/22/EC

This certificate must be used in conjunction with a certificate covering the product verification as required in Annex D or Annex F.

This certificate is valid from 27th November 2012 until 26th November 2022
Issue 1

Certification is based on report number(s)
SHES1207001819MI issued 27th November 2012

Authorised Signature

Jan Saunders

SGS United Kingdom Limited, Notified Body 0120
Unit 202B Worle Parkway, Weston-super-Mare, BS22 6WA, UK
t +44 (0)1934 522917 f +44 (0)1934 522137 www.sgs.com

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t +44 (0)191 377 2000 f +44 (0)191 377 2020 www.sgs.com

MID-BCE Rev 5

EC Type Examination Cert
SGSPAPER
11999733

PRODUCTION OFFER

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1. LIGHT DEPENDENT RELAYS

PURPOSE

Light dependent relay serves to switch-ON the lighting of streets, squares, shop windows, neon lamps etc, at twilight and to switch-OFF afore mentioned lighting at dawn.

FUNCTIONING

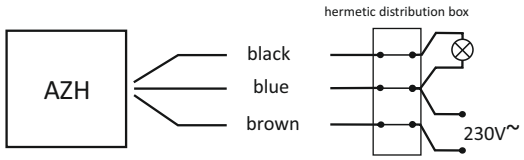
The relay should be situated at place with permanent access to day light, which, due to its changes of intensity, will cause switching ON and OFF the lighting.The exact time of switching the lighting can be set by potentiometer by the user . Turn in the direction of “half moon“ will delay switching-ON, turning in the direction of “sun " will advance switching-ON. The relay is equipped with a delay system, which delays switching ON and OFF the lighting, thus eliminating the influence of accidental disturbances like thunder lightings on the relay functioning.

WITH INTERNAL LIGHT DEPENDENT SENSOR

AZH

10A. Hermetic.



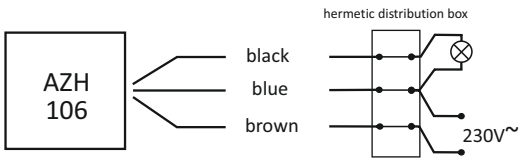


supply	230V AC
current	load<10A
switching threshold (setting range)	2÷1000Lx
switching threshold (factory setting)	7Lx
histeresis	15Lx
switching ON delay	1÷15sec
switching OFF delay	10÷30sec
power consumption	0,56W
connectioncable	3×0,75mm²; l=0,8m
working temperature	-25÷50°C
dimensions	50×67×26mm
fixing	2 screws to substrate
protection level	IP65

AZH-106

16A. Hermetic.



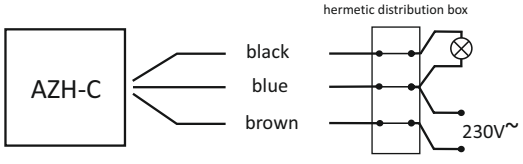


supply	230V AC
current load	<16A
switching threshold (setting range)	2÷1000Lx
switching threshold (factory setting)	ok. 7Lx
histeresis	ok. 15Lx
switching ON delay	1÷15sec
switching OFF delay	10÷30sec
power consumption	0,56W
connection cable	cable 3×1mm²; l=0,8m
working temperature	-25÷50°C
dimensions	50×67×26mm
fixing	two screws to substrate
protection level	IP65

AZH-C

10A. Miniature. Hermetic.



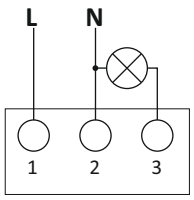


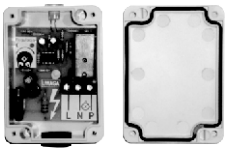
supply	230V AC
current load	<16A
switching threshold (setting range)	2÷1000Lx
switching threshold (factory setting)	ok. 7Lx
histeresis	ok. 15Lx
switching ON delay	1÷15sec
switching OFF delay	10÷30sec
power consumption	0,56W
connection	cable cable 3×0,75mm²; l=0,5m
working temperature	-25÷50°C
dimensions	81×33×25mm
fixing	two screws to substrate
protection level	IP65

AWZ 16A. Hermetic. With internal connection.
AWZ-30 30A. Hermetic. With internal connection.









Llight dependent relay in box with special sealing flange, fastened to the substrate by two screws, closed by a cover with silicongasket and tightened by 4 screws.

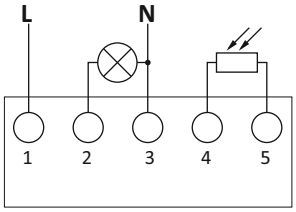
supply	230V AC
current load	<16A
switching threshold (setting range)	2÷1000Lx
switching threshold (factory setting)	ok. 7Lx
histeresis	ok. 15Lx
switching ON delay	1÷15sec
switching OFF delay	10÷30sec
power consumption	0,8W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	60×85×35mm
fixing	two screws to substrate
protection level	IP65

WITH EXTERNAL HERMETIC PROBE

AZH-S / AZH-S PLUS







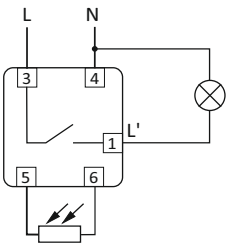
supply	230V AC
current load	<16A
switching threshold (setting range)	2÷1000Lx
switching threshold (factory setting)	ok. 7Lx
histeresis	ok. 15Lx
switching ON delay	1÷15sec
switching OFF delay	10÷30sec
power consumption	0,56W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	50×67×26mm
fixing	two screws to substrate

External hermetic probe Ø10 or PLUS (see item 1/9) including with automatic twilight sensor.

AZ-B / AZ-B PLUS
AZ-B UNI / AZ-B PLUS UNI







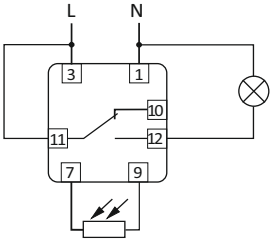
supply AZ-B / AZ-B PLUS	230V AC
AZ-B UNI / AZ-B PLUS UNI	12÷264V AC/DC
current load	<16A
switching threshold (setting range)	2÷1000Lx
switching threshold (factory setting)	ok. 7Lx
histeresis	ok. 15Lx
switching ON delay	1÷15sec
switching OFF delay	10÷30sec
power consumption	0,56W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

External hermetic probe Ø10 or PLUS (see item 1/9) including with automatic twilight sensor.

AZ-112 / AZ-112 PLUS







supply	230V AC
contact	1N/O
current load	<16A
switching threshold (setting range)	2÷1000Lx
switching threshold (factory setting)	ok. 7Lx
histeresis	ok. 15Lx
switching ON delay	1÷15sec
switching OFF delay	10÷30sec
power consumption	0,8W
connection	screw terminals 2,5mm²
	-25÷50°C
working temperature	1 module (18mm)
dimensions	on rail TH-35

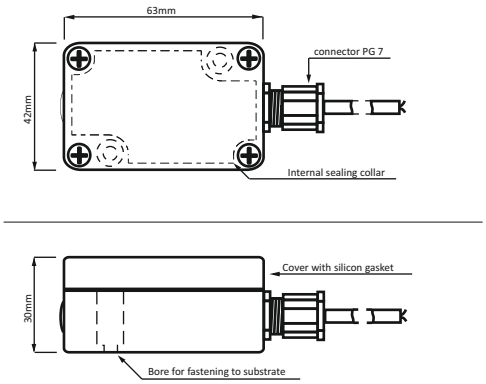
External hermetic probe Ø10 or PLUS (see item 1/9) including with automatic twilight sensor.

Hermetic external probe

PLUS

Applied in sets: AZH-S PLUS, AZ-B PLUS, AZ-112 PLUS.
Available separately.



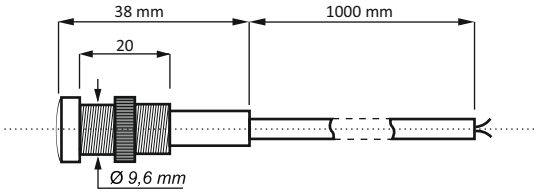


Optical sensor in convenient low dimensioned casing, to be connected by connector PG7 with round cable Ømax7 mm, (for ex. 2x0,5mm²) of length acc to necessity, Box with special sealing flange , fastened to the substrate by two screws, closed by a cover with silicon gasket and tightened by 4 screws.

Ø10

Applied in sets: AZH-S, AZ-B, AZ-112.
Available separately.



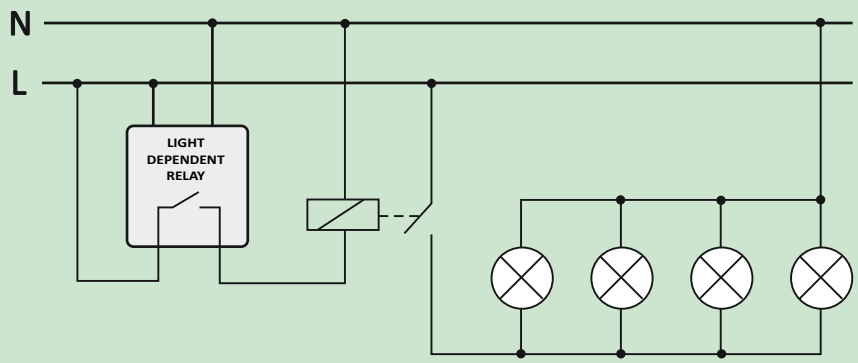


Little, easy to mount light dependent sensor with 1 meter cable with posibility to extend (connection of leads should be made in hermetic distribution box or at a place free from atmospheric influence.

ATTENTION!

The external probe should be situated at place with permanent access to day light, which, due to its changes of intensity, will cause switching ON and OFF the lighting.
When length of connecting cable of external probe exceeds 10m it should not be laid in vicinity of a parallel conductor under mains voltage, or conducting great currents. In any case always connect correctly phase and neutral leads to the light dependent relay.

PRACTICAL SOLUTIONS



Control system for contactor-actuating receivers of total power consumption exceeding the maximum allowable load of a photo-sensitive switch.

ATTENTION!

Automatic twilight sensors for other voltages than specified in the technical data table are also available on special request (24V, 48V, and 110V AC/DC and other).

2. STAIRCASE TIMERS

PURPOSE

Staircase timer serves to keep switched-ON lighting of staircase, corridor, or any other object for the set time and to switch-OFF this lighting automatically, upon elapse of this set time.

FUNCTIONING

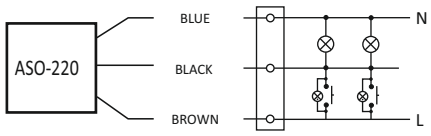
Turned ON staircase timer supports the lighting during set time by potentiometer (from 0,5min. to 10min.). After passage of set time timer will switch OFF the lighting automatically. After switching OFF the lighting there is possibility to switch it ON again.

STANDART TYPE

ASO-220 / ASO-24

10A. With cable connection.





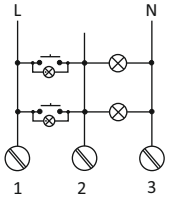
supply ASO-220	230V AC
ASO-24	24V AC/DC
current load	<10A
switching OFF delay (to set)	0,5÷10m
switching ON delay	<1sec
power consumption	0,56W
connection	cable 3×0,75mm²; l=0,45m
working temperature	-25÷50°C
dimensions	50×67×26mm
fixing	two screws to substrate

ASO-220 is adapted to co-operate with pushbuttons equipped with neon lamp.

ASO-201 / ASO-204

16A. With screw terminals.





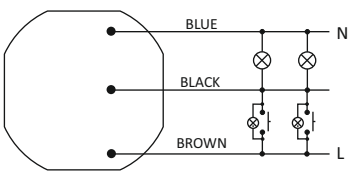
supply ASO-201	230V AC
ASO-204	24V AC/DC
current load	<16A
switching OFF delay (to set)	0,5÷10m
switching ON delay	<1sec
power consumption	0,56W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	50×67×26mm
fixing	two screws to substrate

ASO-201 is adapted to co-operate with pushbuttons equipped with neon lamp.

ASO-205

10A. To under plaster box.



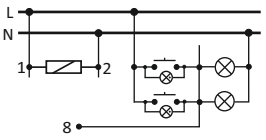


supply	230V AC
current load	<10A
switching OFF delay (to set)	0,5÷10m
switching ON delay	<1sec
power consumption	0,4W
connection	wires 3×1mm²; l=10cm
working temperature	-25÷50°C
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60

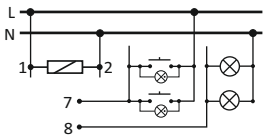
ASO-205 is adapted to co-operate with pushbuttons equipped with neon lamp.

AS-B220 / AS-B24





4 wires connection



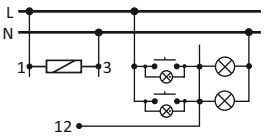
3 wires connection

supply AS-B 220	230V AC
AS-B24	24V AC/DC
current load	<16A
switching OFF delay (to set)	0,5÷10m
switching ON delay	<1sec
power consumption	1,2W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

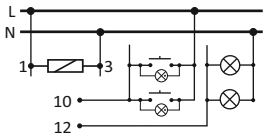
AS-B 220 is adapted to co-operate with pushbuttons equipped with neon lamp.

AS-212 / AS-214





4 wires connection



3 wires connection

supply AS-212	230V AC
AS-214	24V AC/DC
current load	<16A
switching OFF delay (to set)	0,5÷10m
switching ON delay	<1sec
power consumption	0,56W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	1 module (18mm)
fixing	on rail TH-35

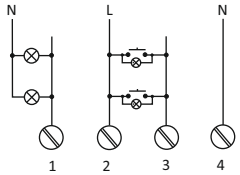
AS-212 is adapted to co-operate with pushbuttons equipped with neon lamp.

WITH ADDITIONAL FUNCTION OF COUNTER-BLOCKADE

Function of counter blockade does not allow to keep the light-ON in case of staircase switch blocking (after blocking the pushbutton, for example by match, the timer will count the set time and switch OFF the lighting). Next switching ON can be after removing the blockade.

ASO-202 / ASO-203



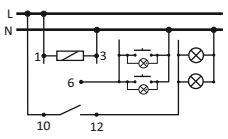


supply ASO-202	230V AC
ASO-203	24V AC/DC
current load	<16A
switching OFF delay (to set)	0,5÷10m
switching ON delay	<1sec
power consumption	0,56W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	50×67×26mm
fixing	two screws to substrate

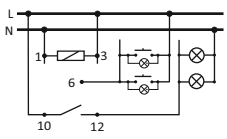
ASO-202 is adapted to co-operate with pushbuttons equipped with neon lamp.

AS-223 / AS-224





starting impuls: N



starting impuls: L

supply AS-223	230V AC
AS-224	24V AC/DC
current load	<16A
switching OFF delay (to set)	0,5÷10m
switching ON delay	<1sec
power consumption	0,56W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	1 module (18mm)
fixing	on rail TH-35

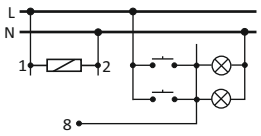
AS-223 is adapted to co-operate with pushbuttons equipped with neon lamp.

WITH FUNCTION OF SIGNALISATION OF LIGHTING SWITCHING-OFF

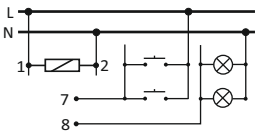
AS-221T

Turned ON staircase timer supports the lighting during set time by potentiometr (from 0,5min. to 10min.) and upon elapse of this set time a reduction by half of lighting brightness follows for about 30 seconds, after that OFF follows (thus an occurrence of a sudden darkness is avoided, enabling safe approach to the switch). After switching OFF the lighting there is possibility to switch it ON again.





4 wires connection



3 wires connection

supply	230V AC
current load	<10A
switching OFF delay (to set)	0,5÷10m
switching ON delay	<1sec
time of reduced brightness	~30sec
power consumption	0,8W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

ATTENTION!

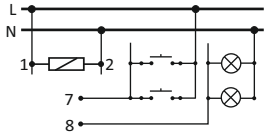
The AS-221T is not compatible with LED lamps, glow-discharge tubes, compact fluorescent lamps and other lighting devices including electric starters.

AS-222T

WITH COUNTER BLOCKADE

Turned ON staircase timer supports the lighting during set time by potentiometer (from 0,5min. to 10min.) and upon elapse of this set time a reduction by half of lighting brightness follows for about 30 seconds, after that OFF follows (thus an occurrence of a sudden darkness is avoided, enabling safe approach to the switch). After switching OFF the lighting there is possibility to switch it ON again. Function of counter blockade does not allow to keep the light-ON in case of staircase switch blocking (after blocking the pushbutton, for example by match, the timer will count the set time and switch OFF the lighting). Next switching ON can be after removing the blockade.





supply	230V AC
current load	<10A
switching OFF delay (to set)	0,5÷10m
switching ON delay	<1sec
time of reduced brightness	~30sec
power consumption	0,8W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

ATTENTION!

The AS-222T is not compatible with LED lamps, glow-discharge tubes, compact fluorescent lamps and other lighting devices including electric starters.

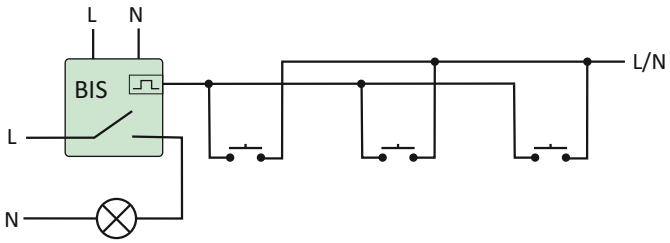
ATTENTION!

Automatic staircase switches for other voltages than specified in the technical data table are also available on special request (12V, 48V, and 110V AC/DC and other). The offer does not include the AS-221T and AS-222T models.

3. ELECTRONIC BI-STABLE PULSE RELAYS

PURPOSE

Electronic bi-stable pulse relays enables the user to actuate lighting or other devices from various locations by means of control buttons in parallel connection.



SWITCH ON - SWITCH OFF TYPE

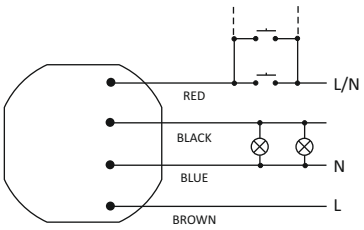
FUNCTIONING

The receiver is actuated by means of a current pulse triggered by pushing any bell push connected to the relay. The receiver is deactivated by another pulse or after a preset time.

The relay does not "memorize" the position of the relay contact, i.e. in case of supply voltage decay and the subsequent return of supply voltage, the relay contact will be set in the off position. Such a solution prevents the automatic actuation of the receivers controlled that might occur without proper supervision after a long-lasting decay of supply voltage.

BIS-402





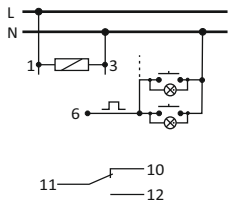
supply	230V AC
current load	<10A
controling current	0,5÷1mA
activation delay	0,1÷0,2sec
power consumption	0,4W
connection	wires 4×1mm²; l=10cm
working temperature	-25÷50°C
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60

ATTENTION!

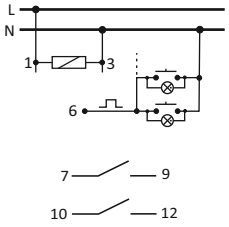
The BIS-402 is not compatible with bell pushes equipped with fluorescent lamps.

BIS-411 / BIS-411 2Z





BIS-411



BIS-411 2Z

supply	
BIS-411 (2Z) 230V	230V AC
BIS-411 (2Z) 24V	24V AC/DC
current load	
BIS-411	<16A
BIS-411 2Z	2×[<8A]
contact	
BIS-411	separated 1CO
BIS-411 2Z	sparated 2NO
controling current	0,5÷1mA
activation delay	0,1÷0,2sec
sygnalling of supplay	green LED
sygnalling of activation	red LED
power consumption	0,8W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	1 module (18mm)
fixing	on rail TH-35

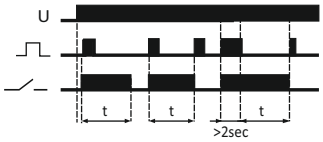
ATTENTION!

The BIS-411 230V is compatible with bell pushes equipped with fluorescent lamps.

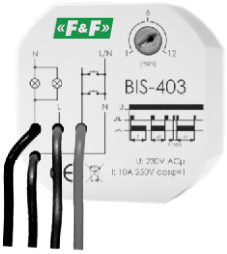
WITH TIMING SWITCH

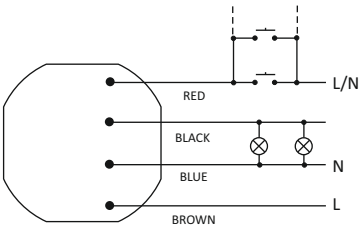
FUNCTIONING

The receiver is actuated by means of a current pulse triggered by pushing any bell push connected to the relay.
The receiver is deactivated by another pulse or after a preset time.
Press and hold the control button longer then 2 sec, that will effect the activate lighting permanently until the next pulse which will turn off the relay.
The relay does not “memorize” the position of the relay contact, i.e. in case of supply voltage decay and the subsequent return of supply voltage, the relay contact will be set in the off position. Such a solution prevents the automatic actuation of the receivers controlled that might occur without proper supervision after a long-lasting decay of supply voltage.



BIS-403





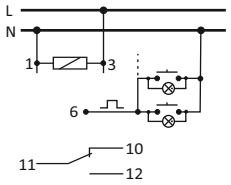
supply	230V AC
current load	<10A
controling current	<1mA
activation delay	0,1÷0,2sec
switching OFF delay (to set)	1÷12min
power consumption	0,4W
connection	wires 4×1mm²; l=10cm
working temperature	-25÷50°C
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60

ATTENTION!

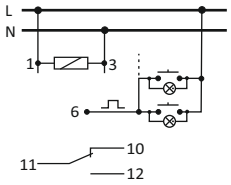
The BIS-403 is not compatible with bell pushes equipped with fluorescent lamps.

BIS-413





starting impuls: N



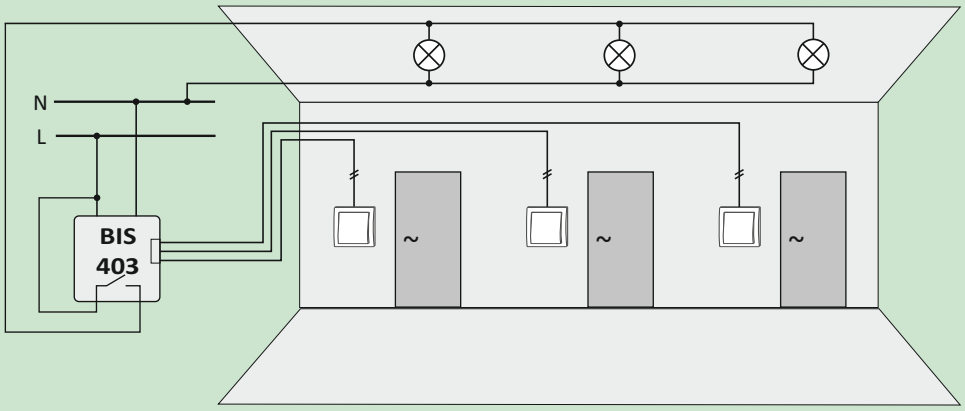
starting impuls: L

supply	BIS-413 230V	230V AC
	BIS-413 230V	24V AC/DC
current load		<10A
controling current		0,5÷1mA
activation delay		0,1÷0,2sec
switching OFF delay (to set)		1÷12min
sygnalling of supplay		green LED
sygnalling of activation		red LED
power consumption		0,8W
connection		screw terminals 2,5mm²
working temperature		-25÷50°C
dimensions		1 module (18mm)
fixing		on rail TH-35

ATTENTION!

The BIS-413 230V is not compatible with bell pushes equipped with fluorescent lamps.

PRACTICAL SOLUTIONS



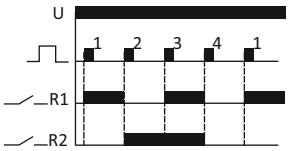
Example of control system for three-point hall lighting.

SEQUENCE-TYPE

FUNCTIONING

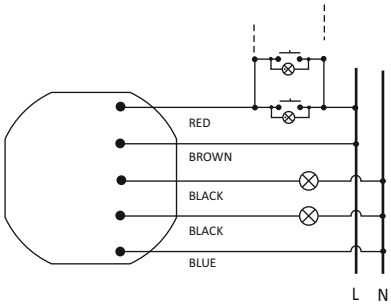
Switching the relay into another cycle phase is made by another current pulse triggered by pressing any bell push connected to the relay.
The relay does not “memorize” the position of the relay contact, i.e. in case of supply voltage decay and the subsequent return of supply voltage, the relay contact will be set in the off position. Such a solution prevents the automatic actuation of the receivers controlled that might occur without proper supervision after a long-lasting decay of supply voltage.

PULSE	STATE OF FUNCTIONING
1	ACTIVATED ONLY SECTION R1
2	ACTIVATED ONLY SECTON R2
3	ACTIVATED SECTION R1 AND R2
4	DEACTIVATED SECTION R1 AND R2



BIS-404





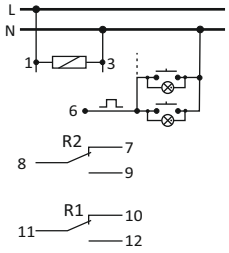
supply	230V AC
contacts	2×1N/O
current load	2×(<5A)
controling current	0,5÷1mA
activation delay	0,1÷0,2sec
power consumption	0,56W
connection	wires 5×1mm²; l=10cm
working temperature	-25÷50°C
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60

ATTENTION!

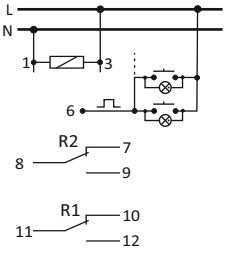
The BIS-404 is not compatible with bell pushes equipped with fluorescent lamps.

BIS-414





starting impuls: N



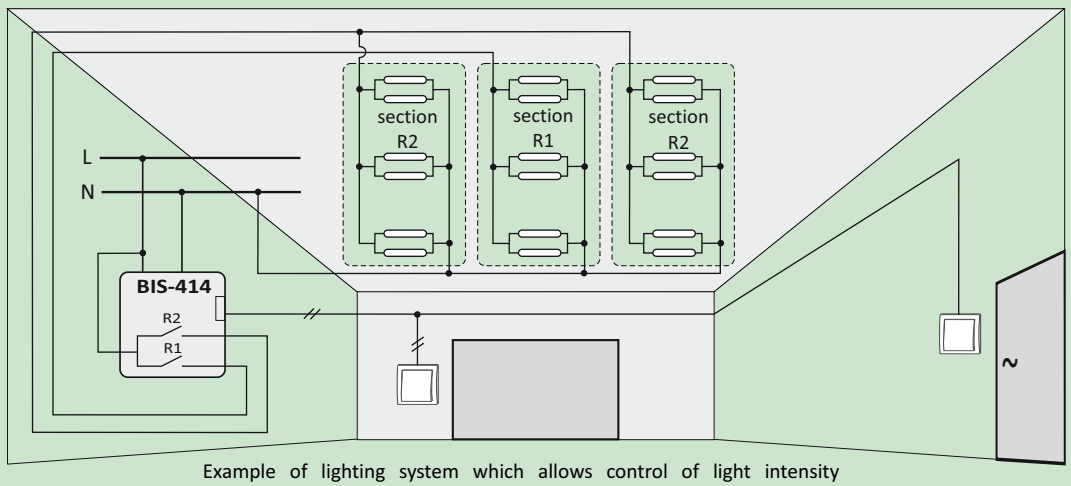
starting impuls: L

supply	BIS-414 230V	230V AC
	BIS-414 24V	24V AC/DC
contacts		2×1N/O
current load		2×(<10A)
controling current		0,5÷1mA
activation delay		0,1÷0,2sec
switching OFF delay (to set)		1÷12min
sygnalling of supplay		green LED
sygnalling of activation		2×yellow LED
power consumption		0,8W
connection		screw terminals 2,5mm²
working temperature		-25÷50°C
dimensions		1 module (18mm)
fixing		on rail TH-35

ATTENTION!

The BIS-414 is not compatible with bell pushes equipped with fluorescent lamps.

PRACTICAL SOLUTIONS



Example of lighting system which allows control of light intensity by actuating one of the sections R1 and R2 from any location in the room.

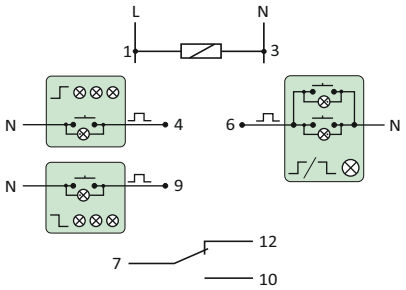
GROUP-TYPE (HOTEL-TYPE)

BIS-412 WITH CONTROLING INPUTS 'ACTIVATE ALL' AND 'DEACTIVATE ALL'

FUNCTIONING

BIS- 412 electronic bi-stable pulse relay is designed for operation in a group configuration. A single relay enables the activation and deactivation of the receiver controlled after each current pulse triggered by pushing a local control momentary push-button (bell-push). The group configuration enables the deactivation or activation of all receivers connected to individual relays by means of the central control push-buttons.





supply	BIS-412 230V	230V AC
	BIS-412 24V	24V AC/DC
current load		<16A
controling current		0,5÷1mA
activation delay		0,1÷0,2sec
sygnalling of supplay		green LED
sygnalling of activation		red LED
power consumption		0,8W
connection		screw terminals 2,5mm²
working temperature		-25÷50°C
dimensions		1 module (18mm)
fixing		on rail TH-35

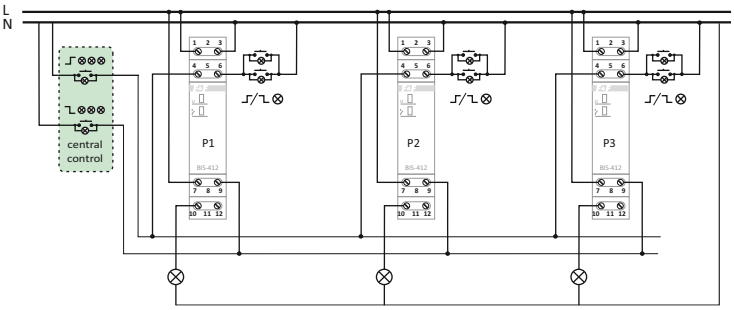
Local control

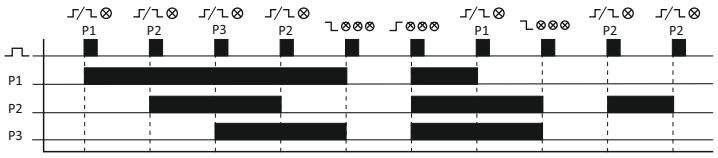
The receiver is activated after a current pulse that is triggered by pushing one optional momentary push-button ⎍/⎾⊗ belonging to the local control group. The contact of the relay is switched to the 7-10 position. After a next current pulse, the receiver will be deactivated (the contact of the relay returns to the 7-12 position).

Central control

DEACTIVATE ALL - after a current pulse triggered by pushing the momentary push-button ⎾⊗⊗⊗, all receivers will be deactivated (regardless of their status, i.e. deactivation or activation) that are controlled separately by individual relays. The contact in each relay will be switched to the 7-12 position.

ACTIVATE ALL - after a current pulse triggered by pushing the momentary push-button ⎍⊗⊗⊗, all receivers will be activated (regardless of their status, i.e. deactivation or activation) that are controlled separately by individual relays. The contact in each relay will be switched to the 7-10 position.



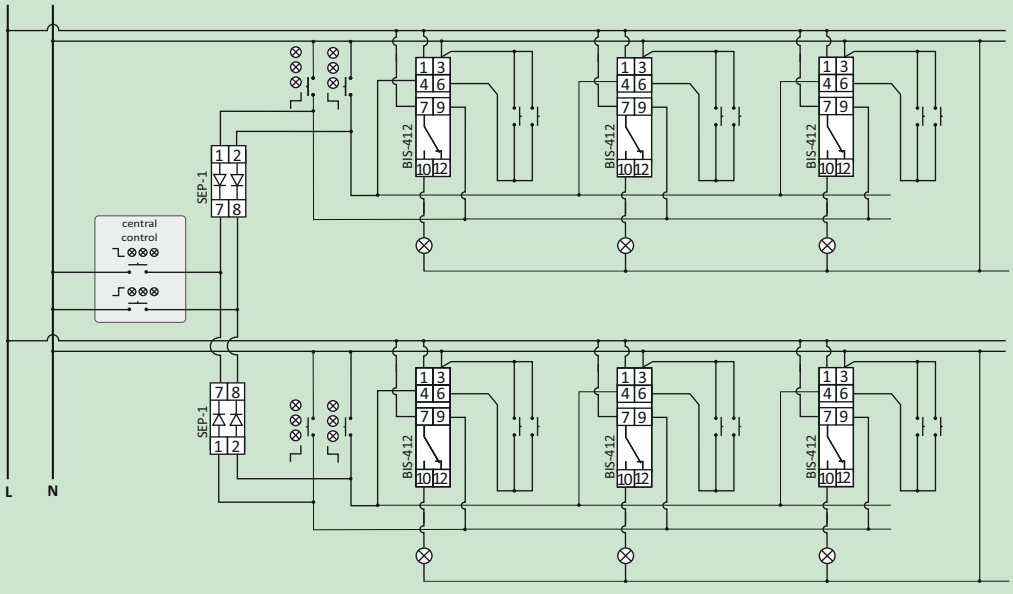


Diagram

ATTENTION!

The BIS-412 230V is compatible with bell pushes equipped with fluorescent lamps.

PRACTICAL SOLUTIONS



Example of division into subgroups using SEP-01 incoming signal separators (see chepter 23)

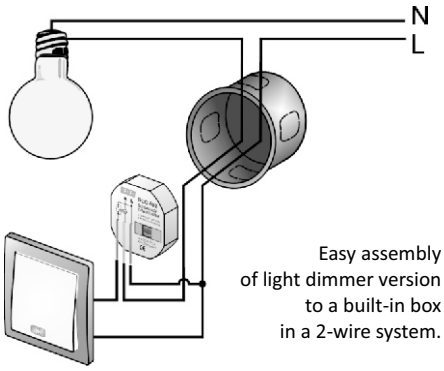
4. LIGHT DIMMERS

PURPOSE

the dimmer is used for switching on and off lighting and offers the option of light intensity adjustment by means of any impulse switch (buzzer).

FUNCTIONING

Lighting is turned on by a current pulse sent after pressing an impulse switch (buzzer) connected to a relay. Another mpulse switches the lighting off. Pressing and holding the switch for more than 1 second allows the user to adjust light intensity (continuous loop adjustments in the following sequence: BRIGHTER→DARKER→BRIGHTER).
Light intensity may be controlled by means of numerous switches in a parallel connection, distributed in several locations within a room.
SCO are adapted to co-operate with pushbuttons equipped with neon lamp.



Easy assembly
of light dimmer version
to a built-in box
in a 2-wire system.

SUITABLE FOR INCANDESCENT AND HALOGEN LAMPS

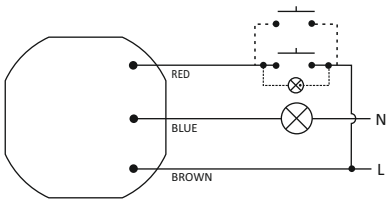
(including those powered with electronic or transformer-based feeders adapted to dimmers).

NO “STORAGE” OF LIGHT INTENSITY SETTINGS ENABLED.

The lighting returns to its maximum intensity after each activation.

SCO-801 350W

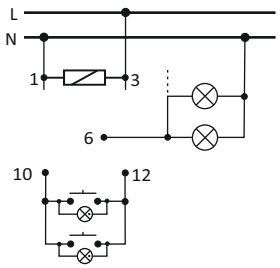




supply	230V AC
current load	<1,5A
maximum power of light bulbs connected	350 W
current pulse duration	<1sec
power consumption	0,1W
working temperature	-25÷50°C
connection	wires 3×1mm², l=10cm
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60mm
overcurrent protection	WTA 5×20 fuse link 2A

SCO-811 350W

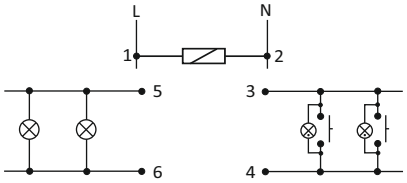




supply	230V AC
current load	<1,5A
maximum power of light bulbs connected	350 W
current pulse duration	<1sec
power consumption	0,1W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35
overcurrent protection	WTA 5×20 fuse link 2A

SCO-813 1000W





supply	230V AC
current load	<4,5A
maximum power of light bulbs connected	1000 W
current pulse duration	<1sec
power consumption	0,3W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	3 modules (52,5mm)
fixing	on rail TH-35
overcurrent protection	WTA 5×20 fuse link 6,3A

ATTENTION!

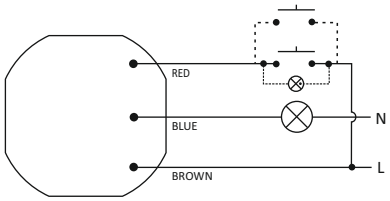
“SOFT START” - pressing and holding the switch for more than 1 second on switch-on allows gradual increase of the intensity from “zero level” (in a DARKER→BRIGHTER sequence).

A FUNCTION OF LIGHT INTENSITY SETTING “STORAGE” ALLOWED.

The lighting returns to the preset intensity after each activation.

SCO-802 350W

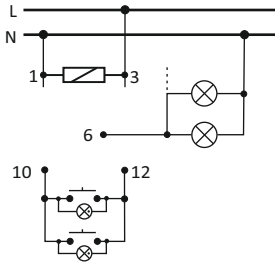




supply	230V AC
current load	<1,5A
maximum power of light bulbs connected	350 W
current pulse duration	<1sec
power consumption	0,1W
working temperature	-25÷50°C
connection	wires 3×1mm², l=10cm
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60mm
overcurrent protection	WTA 5×20 fuse link 2A

SCO-812 350W

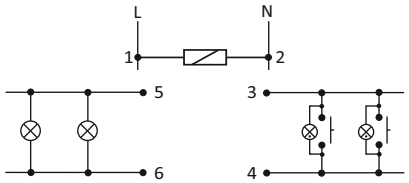




supply	230V AC
current load	<1,5A
maximum power of light bulbs connected	350 W
current pulse duration	<1sec
power consumption	0,1W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35
overcurrent protection	WTA 5×20 fuse link 2A

SCO-814 1000W





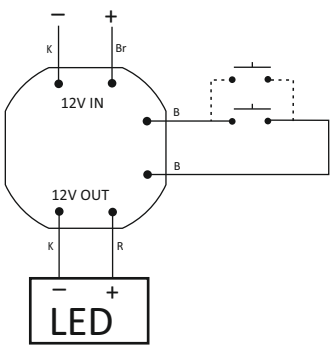
supply	230V AC
current load	<4,5A
maximum power of light bulbs connected	1000 W
current pulse duration	<1sec
power consumption	0,3W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	3 modules (52,5mm)
fixing	on rail TH-35
overcurrent protection	WTA 5×20 fuse link 6,3A

LIGHTING DIMMERS LED 12V

with “storage”of light intensity settings enabled

SCO-803 36W





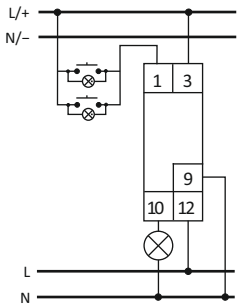
supply	12V DC
maximum power of connected LED	<36W
current pulse duration	<1sec
power consumption	0,1W
working temperature	-25÷50°C
connection	6×LY 0,75mm, l=10cm
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60

LIGHT DIMMER

Used for incandescent lamps, halogen lamps, LED lamps. compact fluorescent lamps with the dimming possibility

SCO-815





supply		230V AC
maximum power of light bulbs connected		
	(R)	500W
	(L)	500W
	(C)	500W
	(ESL)	100W
	(LED)	100W
control voltage		8÷230V AC/DC
current pulse duration		<1sek
power consumption		0,1W
tworking temperature		-20÷50°C
connection		screw terminals 2,5mm²
dimensions		1 moduł (18mm)
fixing		on rail TH-35

PURPOSE

Universal lighting dimmer enables you to adjusts the brightness of light the following light sources:
- Incandescent lamps and halogen main series (resistive load R)
- Lamps powered by a toroidal supplier (inductive load L)
- Lamps powered by electronic transformer (capacitive load C)
- Energy-saving compact fluorescent lamps (ESL) with dimming function
- LED lamps powered 230V with dimmable function

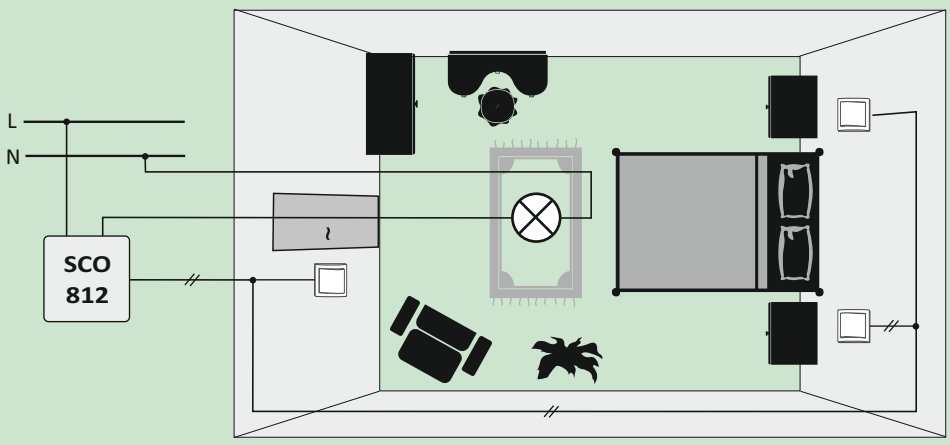
FUNCTIONING

The inclusion of light followed by a current pulse caused by a momentary push button (bell) connected to the relay. Lighting can be controlled through a number of buttons arranged in parallel at different points in the building. Disabling lighting will be after the next impulse. Holding down the button,> 1sec. enables you to set the desired light intensity (continuously adjustable lighting in the loop, Lighter / Darker / Lighter).

FUNCTIONS

- Automatic detection of the nature of the load L+R and R+C. The use of ESL lamps requires manual settings for nature of the load with dimmer knob on the forehead.
- Speed setting for brightness adjustment.
- "Memory" light intensity settings - after each inclusion lighting returns to the desired brightness.
- Function "SOFT START" - holding the button> 1sec. at switch on lights causes the smoothly illumination from "zero" (dark ž bright).
- Setting a minimum level of light-controlled lamps (particularly important for ESL lamps, requiring a minimum current of ignition and sustain).
- ON mode - switching to the maximum brightness of lighting without dimming.
- Control input galvanically isolated from the network with a wide range of input voltage 8 ÷ 230V AC / DC.
- Continuously adjustable lighting up and down in order to prolong the life of controlled lamp.

PRACTICAL SOLUTIONS



Example of lighting control system from three locations within a room.

5. LIGHTING CONTROLLERS

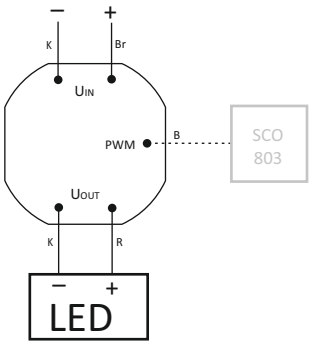
POWER LED DRIVER

PLD-01 1W / 3W

PURPOSE

LED power supply requires a suitable source of supply. In the case of current exceeding a specified value followed by a deterioration of work performance LED. PLD-01 is used to stabilize the output current of power diodes.





input voltage IN	5÷40V DC
power of connected LED	
LED 1W	15W
LED 3W	30W
maks. prąd stabilizowany wyjściowy	
LED 1W	350mA
LED 3W	750mA
power consumption	0,1W
working temperature	-20÷50°C
connections	5×LY 0,75mm², l=10cm
dimensions	Ø55, h=13mm
fixing	in under plaster box Ø60

ATTENTION!

PLD-01 cooperate with dimmer LED SCO-803 (part. 4).

"SOFT START" FOR HALOGEN LAMP

PURPOSE

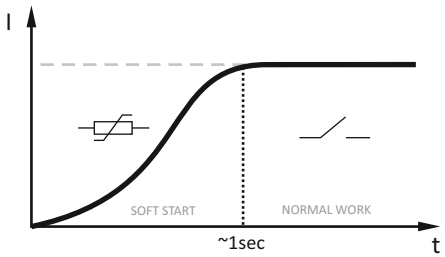
MST is used to reduce the starting current of halogen lamps. This prevents over-connected lamps, in effect extending their service life.

FUNCTIONING

At the time of switching on the controller does not allow for immediate switch ON of light to full power. Initially the lamp system is powered by internal thermistor which limiting current circuit. After a time of 1sec. system switches to permanent contact, through which passes a full load of receivers. ATTENTION! No effect gradually illuminating of lamps.

MST-01

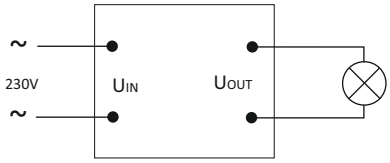




input Voltage	230V AC
output Voltage	230V AC
contact	1Z
current load	8A
rise time	1sec
power consumption of detection sensor	0,1W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on the rail TH-35

MST-02



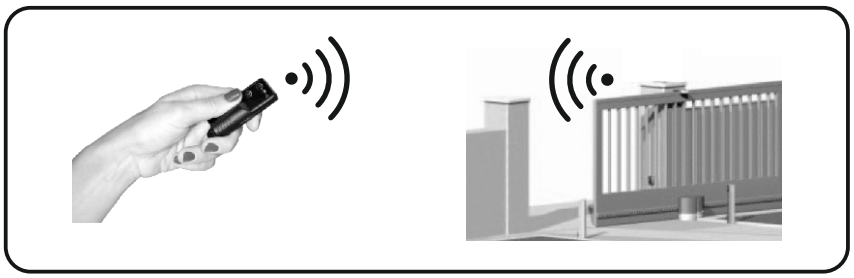


input Voltage	230V AC
output Voltage	230V AC
joint	1Z
current load	8A
rise time	1sec
power consumption of detection sensor	0,1W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	50×67×26mm
fixing	two screws to substrate

6. RADIO CONTROL RELAYS

PURPOSE

Electronic relays are used for radio remote control of gates, shutters, lighting, arming alarm systems, etc. The remote control system consisting of a transmitter (remote) and receiver (relay). There is a possibility of cooperation between many transmitters to one receiver and one transmitter to multiple receivers.



FUNCTIONING

The impulse caused by the push of a button on the remote control to send a coded signal to the receiver. Remote control is protected against break transmission after releasing the button. Thanks to this, even the shortest activation function is the full frame of data transmissions. Data transmission from the remote control is indicated by flashing of red LED on the remote. The range of the system is up to 100m (Range depends on many factors, among others, on: the weather (humidity), terrain characteristics (reflection), placement of the receiver and transmitter, and all kinds of obstacles such as walls).

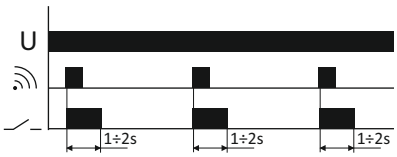
RECEIVERS

Receivers are designed for under plaster box montage. In receiver's non-volatile memory can be store up to 32 transmitters.
Radio receivers RS-407B i RS-407M cooperate with dedicated production units F & F: transmitter RS-N and RS-P.

RS-407 M MONOSTABLE TYPE

The push transmiter's button will effect of closes the receiver's contact of X1-X2 at time 1 ~ 2 sec (pulse).



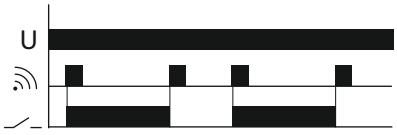


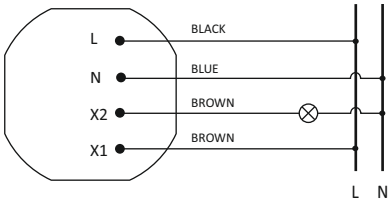
supply	230V AC
current load	<5A
joint	separate 1Z
signaling of recieving/programming	red LED
state of joint	green LED
power consumption	0,8W
connection	4×LY 1mm²; l=10cm
working temperature	-25÷50°C
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60

RS-407 B BISTABLE TYPE

The push transmiter's button will effect of closes the receiver's contactr on the opposite interface (ON/OFF).



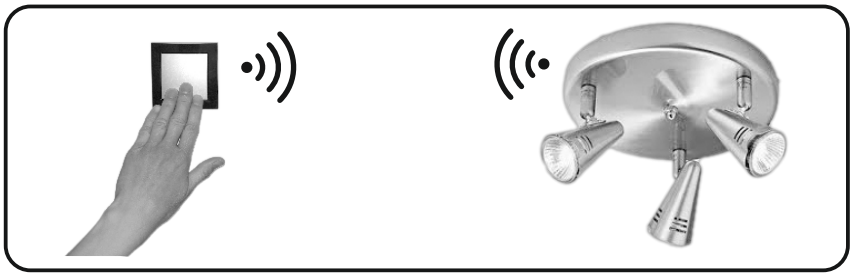




TRANSMITERS

The impulse caused by the push of a button on the remote control to send a coded signal to the receiver. Remote control is protected against break transmission after releasing the button.Thanks to this, even the shortest activation function is the full frame of data transmissions. Data transmission from the remote control is indicated by flashing of red LED on the remote.
Radio Transmitters cooperate with dedicated production units F & F: monostable receiver RS-407M monostable and bistable receiver RS-407B.

RS-N... TO UNDER PLASTER BOX TRANSMITER

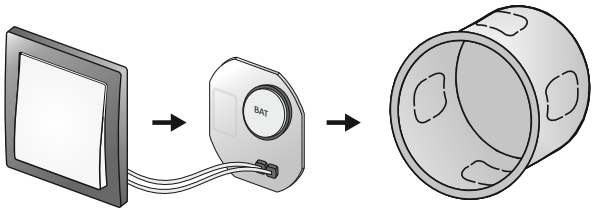


The transmitter for installation in inder plaster box. It has a stand-alone battery powered, which eliminates the need for a power cable at the mounting location of buttons. For the control we can use the monostable (instantaneous) buttons of any series wiring accessories.

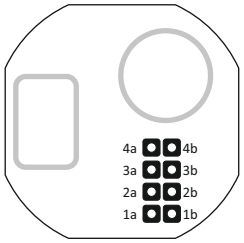


type	no of channels
RS-N1	1
RS-N2	2
RS-N3	3
RS-N4	4

supply	3V
battery type	CR2032
transmision	dynamic, variable code
frequency	868Mhz
coding	Keelog®
working temperature	-25÷50°C
connections	LGY 0,5mm²
dimensions	Ø52, h=11mm
fixing	to under plaster box Ø60



fixing to under plaster box



channels conections

RS-P... REMOTE CONTROL

The small remote as a pendant.



type	no of button
RS-P1	one-button
RS-P2	two-button
RS-P3	three-button
RS-P4	four-button

supply	12V
battery type	A23
transmision	dynamic, variable code
frequency	868Mhz
coding	Keelog®
working temperature	-25÷50°C
color	black
dimensions	30×68×14

7. MOTION SENSOR SWITCH

PURPOSE

Motion sensors are used for automatic attached temporary lighting in the event of a person or other object in such areas as hallways, courtyards, approach and access roads, garages, etc. The use of motion sensors to automatically accompany the lighting makes use of the lighting is more convenient and cheaper in operation.

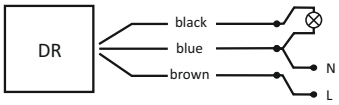
INFRARED

FUNCTIONING

The sensor detects infrared radiation source. It's analysing parameters as the size of the object, the amount of heat emitted, and the speed of movement between the various sectors of detection. Detector head is moving in two dimensions, which allows for precise setting of the matched field detection to the individual requirements of the user. Movement detection in the box will automatically attach to the lighting time set by the user. After that time, the lighting is switched off automatically. Motion sensor is equipped with an automatic control include preventing crepuscular lighting during the day. The state detector and a willingness to attach lighting is activated only after dusk. The timing of activation of the sensor can be adjusted by the user potencjometrem.

DR-05 W WHITE
DR-05 B BLACK

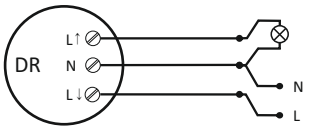




supply	230V AC
current load	<5A
ambient light	3÷2000Lx
detection motion speed	0,6÷1,5m/sek
time-delay	8sek±3sek ÷ 10min±2min
detection range - horizontal	140°÷180°
detection range - vertical	0°÷45°
detection distance (for <24°C)	12m
instalation height	0,5÷3,5m
power consumption	0,45W
connection	screw terminals 1,5mm²
working temperature	-20÷40°C
dimensions	75×87×185mm
fixing	two screws to substrate
protection level	IP40

DR-06 W WHITE
DR-06 B BLACK





supply	230V AC
current load	<7A
ambient light	3÷2000Lx
detection motion speed	0,6÷1,5m/sek
time-delay	10sek±5sek ÷ 4min±1min
detection range - horizontal	360°
detection distance (for h=3m, T<24°C)	r=5m
instalation height	h=2,5÷3m
power consumption	0,45W
connection	screw terminals 1,5mm²
working temperature	-20÷40°C
dimensions	Ø=110mm, h=35mm
fixing	two screws to substrate
protection level	IP20

MICROWAVE

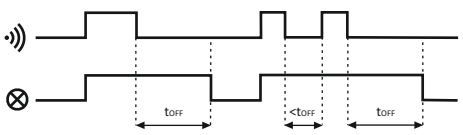
PURPOSE

Microwave sensor allows for motion detection by wooden boards, plasterboard panels, glass and plastics.

FUNCTIONING

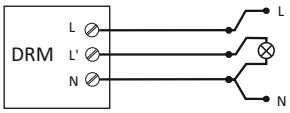
DRM sensor emits and bounces high-frequency 5.8GHz electromagnetic waves . The sensor detects changes in the reflected waves caused by movement of the object in the area of detection. The sensor detects movement of an object to and from the sensor. Movement in the range of detection will automatically attach the lighting for time set by the user. After this time the lights will be turned off automatically. The motion sensor is equipped with Light dependant relay able to attaching lighting during the day. Detection status and stand-by to attach lights are activated only after dusk. Sensor activation time might be adjust by the user. In addition, there is a possibility of adjustment of the detection area in range and the receiver actuation time. The sensor allows for motion detection by wooden boards, plasterboard panels, glass and plastics. Temperature changes do not affect on motion detection.

The power of microwave radiation is relatively low and is completely safe for humans and animals. Its value is less than 10mW. By comparison, microwaves and cell phones radiate about 1000mW of power (100 times harder).



DRM-01 / DRM-01 24V BUILD-IN

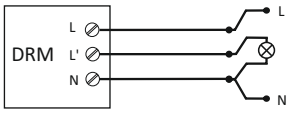




supply DRM-01	230V AC
DRM-01 24V	24V AC
current load	<5A
frequency of the microwaves radiation	5,8GHz
power radiation	<10mW
detection range	360°
detection ray - adjustable (for h=2,5m)	1÷10m
activation treshold - adjustable	2÷2000Lx
receiver's activation time - adjustable	8sec÷12min
activation delay	1sec
power consumption	0,9W
connection	screw terminals 1mm²
working temperature	-25÷50°C
dimensions	46×93×42mm
fixed	two screws to the substrate
protection level	IP20

DRM-02 CEILING





supply	230V AC
current load	<5A
frequency of the microwaves radiation	5,8GHz
power radiation	<10mW
detection range	360°
detection ray - adjustable (for h=2,5m)	1÷10m
activation treshold - adjustable	2÷2000Lx
receiver's activation time - adjustable	8sec÷12min
activation delay	1sec
power consumption	0,9W
connection	screw terminals 1mm²
working temperature	-25÷50°C
dimensions	Ø103 h=42mm
fixed	two screws to the substrate
protection level	IP40

PLAFOND WITH HIDDEN SENSOR

DRM-03 E27 60W / DRM-05 E27 25W
DRM-L WITHOUT SENSOR





supply	230V AC
type of light bulb	E27 max. 60W (DRM-03) / 25W (DRM-05)
frequency of the microwaves radiation	5,8GHz
power radiation	<10mW
detection range	360°
detection - adjustable	1÷8m
activation treshold - adjustable	2÷2000Lx
receiver's activation time - adjustable	5sec÷15min
activation delay	1sec
power consumption of sensor	0,9W
connection	screw terminals 1,5mm²
working temperature	-25÷50°C
dimensions	Ø285 h=110mm
fixed	three screws to the substrate
lampshade	milk-white glass
protection level	IP40

DRM-04 LED (×96) 15W





supply	230V AC 50Hz
light source	96xLED
light color	6000K
flux	1030Lm
electric power of LED	15W
frequency of the microwaves radiation	5,8GHz
power radiation	<0,2mW
detection range	360°
detection ray-adjustable	2÷10m
activation treshold-adjustable	2÷2000Lx
receiver's activation time - adjustable	5sec÷20min
activation delay	1sec
power consumption of detection sensor	0,9W
working temperature	-25÷50°C
connection	6×LY 0,75mm, l=10cm
dimensions	Ø295, h=100mm
fixing	4 srews to the substrate
shade	jointed, milk-white

DRM-06 LED (×160) 10W



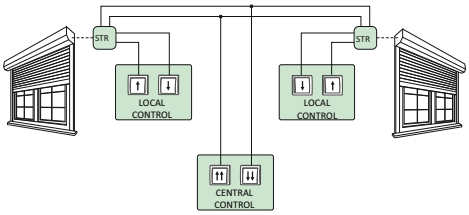


supply	230V AC 50Hz
light source	160xLED
light color	6000K
flux	970Lm
electric power of LED	10W
frequency of the microwaves radiation	5,8GHz
power radiation	<0,2mW
detection range	360°
detection ray-adjustable	1÷8m
activation treshold-adjustable	2÷2000Lx
receiver's activation time - adjustable	5sec÷15min
activation delay	1sec
power consumption of detection sensor	0,9W
working temperature	-25÷50°C
connection	6×LY 0,75mm, l=10cm
dimensions	Ø260, h=90mm
fixing	3 srews to the substrate
shade	HDPE material, milk-white
protection level	IP40

8. ROLLER BLIND CONTROLLER

PURPOSE

The roller blind controllers are designed for controlling roller blinds (up and down movement) or other devices (for example, gates) that are driven by a single-phase AC electric motor and operated by means of momentary switches (for example, bell-pushes). The controller can operate as an independent unit (designated for opening/closing one roller blind) as well as the controllers can be combined into groups that enable the central controlling of many roller blinds



FUNCTIONING

The roller blind motor is activated by the momentary switching of a current pulse (L or N) to one of the control inputs. The motor is activated at a time programmed previously by the user. The activation time programmed enables the complete lifting or lowering of the roller blind. Also, there is a possibility of stopping the rolled blind activated at a level selected by the user (non-complete opening or closing of the roller blind).

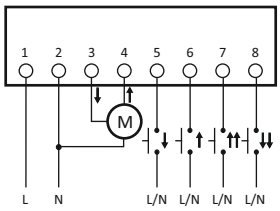
DOUBLE-BUTTON TYPE

Local control - a group of push-buttons that controls one roller blind. ↑-upwards (opening); ↓- downwards (closing). Pressing the local control push-button activates the movement of the roller blind in a selected direction. If the roller blind is already moving, pressing the local control push-button will stop the roller blind.

Central control - a common group of push-buttons for many controllers (minimum two controllers) that controls all roller blinds included in the central control system. ↑↑ - all upwards; ↓↓ - all downwards.Pressing the central control push-button activates the movement of the roller blinds in a selected direction. If one of the roller blinds is already moving in the same direction, its movement will be continued. If one of the roller blinds is moving in the opposite direction, this roller blind will be first stopped and then its movement will be activated in the direction in accordance with the command sent to the central input. The central control enables only activating the movement of the roller blinds in a selected direction. The roller blind will be stopped after the programmed movement time or when any of the local control push-buttons is pressed.

STR-1

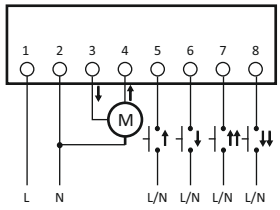




supply	230V AC
current load AC-3	<1,5A
Control pulse current for L/N	<1mA
actuation time - programmable	0sec÷10min
indication of power suppl/programming	LED green
power consumption	1W
working termperature	-25÷50°C
connection	signal 4×DY 1mm², l=10cm
	suppling 4×DY 1,5mm², l=10cm
dimensions	Ø55, h=13mm
fixed	to under plaster box Ø60

STR-21

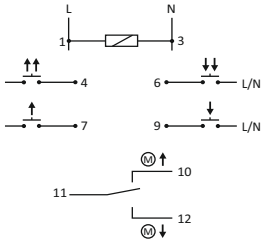




supply	230V AC
current load AC-3	<1,5A
control pulse current for L/N	<1mA
power supply indicator	LED green
power consumption	0,8W
working temperature	-25 ÷50°C
connection	screw terminals 2,5mm²
dimensions	50×67×26mm
fixing	two screws to the base

STR-421





supply	STR-421 230V	230V AC
	STR-421 24V	24V AC
current load AC-3		<1,5A
control pulse current for L/N		<1mA
power supply indicator		LED green
operating mode indictor		2×LED red
power consumption		0,8W
working temperature		-25 ÷50°C
connection		screw terminals 2,5mm²
dimensions		1 module (18mm)
fixing		on rail TH-35

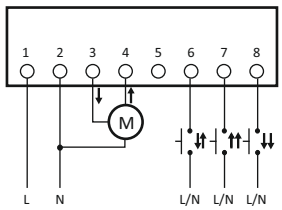
ONE-BUTTONS

Local control - a group of push-buttons that controls one roller blind. -upwards (opening) / downwards (closing). Pressing the local control push-button activates the movement of the roller blind in a direction opposite to the direction of a previously performed movement (after connecting the controller to the power supply, the first movement closes the roller blind). If the roller blind is already moving, pressing the local control push-button will stop the roller blind movement. When the local control push-button is pressed again, the movement of the roller blind in the opposite direction is activated.

Central control - a common group of push-buttons for many controllers (minimum two controllers) that controls all roller blinds included in the central control system. ↑↑ - all upwards; ↓↓ - all downwards. Pressing the central control push-button activates the movement of the roller blinds in a selected direction. If one of the roller blinds is already moving in the same direction, its movement will be continued. If one of the roller blinds is moving in the opposite direction, this roller blind will be first stopped and then its movement will be activated in the direction in accordance with the command sent to the central input. The central control enables only activating the movement of the roller blinds in a selected direction. The roller blind will be stopped after the programmed movement time or when any of the local control push-buttons is pressed.

STR-2

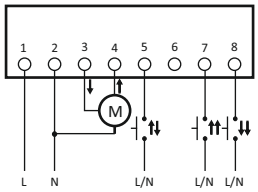




supply	230V AC
current load AC-3	<1,5A
Control pulse current for L/N	<1mA
actuation time - programmable	0sec÷10min
indication of power suppl/programming	LED green
power consumption	1W
working termperature	-25÷50°C
connection	signal 4×DY 1mm², l=10cm
	suppling 4×DY 1,5mm², l=10cm
dimensions	Ø55, h=13mm
fixed	to under plaster box Ø60

STR-22

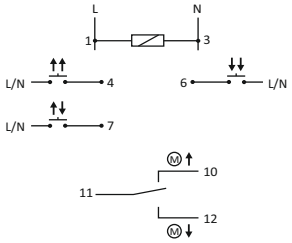




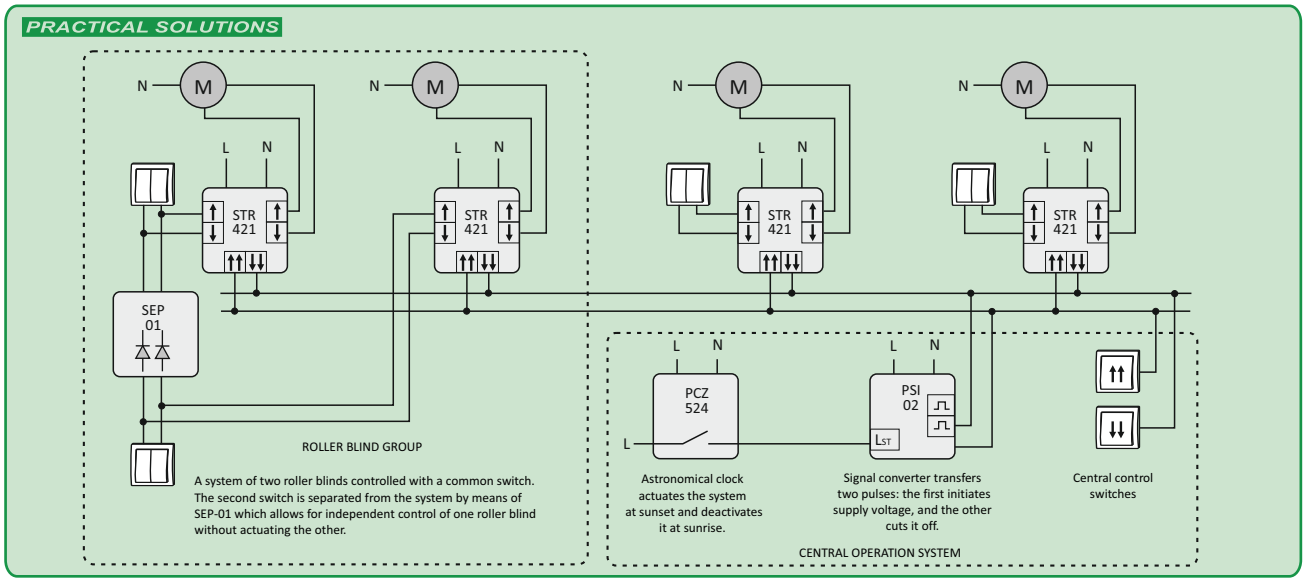
supply	230V AC
current load AC-3	<1,5A
control pulse current for L/N	<1mA
power supply indicator	LED green
power consumption	0,8W
working temperature	-25 ÷50°C
connection	screw terminals 2,5mm²
dimensions	50×67×26mm
fixing	two screws to the base

STR-422



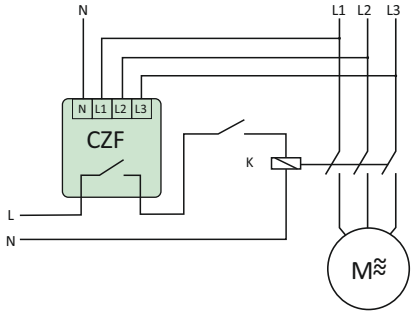


supply	STR-422 230V	230V AC
	STR-422 24V	24V AC
current load AC-3		<1,5A
control pulse current for L/N		<1mA
power supply indicator		LED green
operating mode indictor		2×LED red
power consumption		0,8W
working temperature		-25 ÷50°C
connection		screw terminals 2,5mm²
dimensions		1 module (18mm)
fixing		on rail TH-35



9. PHASE CONTROL RELAYS

9.1 THREE-PHASE MONITORS



PURPOSE

Three phase monitors serve to protect the three-phase electric motors supplied from three-phase mains, against phase collapse in at least one phase or against phase-to-phase voltage asymmetry, threatening to damage the motor.

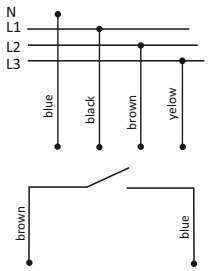
WITH FIXED ACTUATION THRESHHOLD VOLTAGE ASYMMETRY

FUNCTIONING

Phase collapse in at least one phase or voltage unbalance between phases above fixed actuation threshhold causes switching-OFF the motor. The motor switching-OFF occurs with delay, which prevents any accidental motor disconnecting at temporary voltage drop. The re-connection will occur automatically at voltage increase of 5V above activation voltage (i.e. of value of voltage hysteresis). At occurrence of these disturbances, it is not possible to set a motor in motion.

CZF

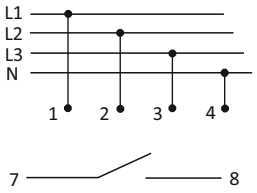




supply	3x400/230V+N
contact	1N/O
current load	<10A
sygnalling of supplay	LED in each phase circuit
activation voltage asymmetry	45V ~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	4×1mm^2, 2×0,75mm^2; l=0,5m
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	50x67x26 mm
fixing	two screws to the base

CZF-B

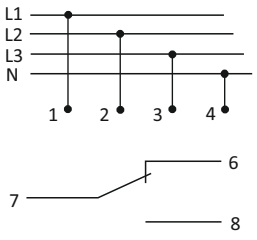




supply	3x400/230V+N
contact	1N/O
current load	<10A
sygnalling of supplay	LED in each phase circuit
activation voltage asymmetry	45V ~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

CZF-BS

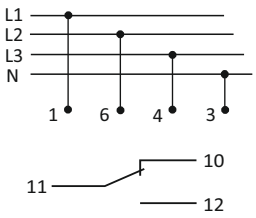




supply	3x400/230V+N
contact	1C/O
current load	<10A
sygnalling of supplay	LED in each phase circuit
activation voltage asymmetry	45V ~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

CZF-310





supply	3x400/230V+N
contact	1C/O
current load	<10A
sygnalling of supplay	LED in each phase circuit
activation voltage asymmetry	45V ~
activation voltage	185V~
histeresis	5V~
switching-OFF delay	4sec
power consumption	0,56W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	1 modules (18mm)
fixing	on ail TH-35

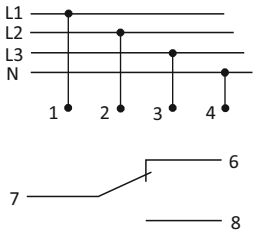
AND ADJUSTABLE ACTUATION THRESHHOLD AT VOLTAGE ASYMMETRY

FUNCTIONING

Phase collapse in at least one phase or voltage unbalance between phases above set value causes switching-OFF the motor. The motor switching-OFF occurs with 4 sec delay, which prevents any accidental motor disconnecting at temporary voltage drop. The re-connection will occur automatically at voltage increase of 5V above activation voltage (i.e. of value of voltage hysteresis). At occurrence of these disturbances, it is not possible to set a motor in motion.

CZF-BR

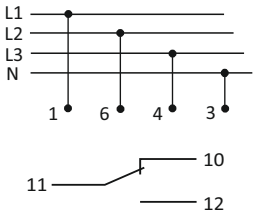




supply	3x400/230V+N
contact	1C/O
current load	<10A
sygnalling of supplay	LED in each phase circuit
activation voltage asymmetry	40÷80V~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

CZF-311



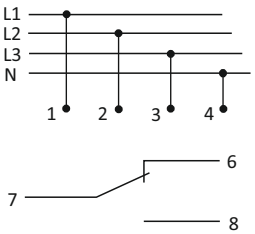


supply	3x400/230V+N
contact	1C/O
current load	<10A
sygnalling of supplay	LED in each phase circuit
activation voltage asymmetry	40÷80V~
activation voltage	175÷190V~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	1 module (18mm)
fixing	on rail TH-35

CZF-BT

WITH ADJUSTABLE ACTUATION TIME 0,5÷15sek



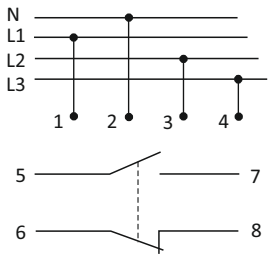


supply	3x400/230V+N
contact	1C/O
current load	<10A
sygnalling of supplay	LED in each phase circuit
activation voltage asymmetry	40÷80V~
histeresis	5V~
switching-OFF delay	0,5÷15sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

CZF-312 MONITOR

WITHOUT ACTION DELAY 0,3SEC.



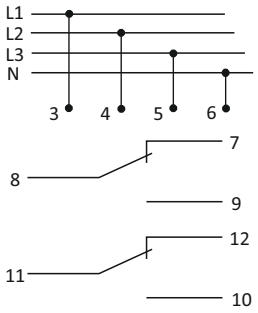


supply	3x400/230V+N
contact	1N/O, 1N/C
current load	2×(<5A)
sygnalling of supplay	LED in each phase circuit
activation voltage asymmetry	40÷55V~
activation voltage	175÷190V~
histeresis	5V~
switching-OFF delay	0,2sec
power consumption	1,2W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	1 module (18mm)
fixing	on rail TH-35

CZF-331

WITH TWO SEPARATED CONTACTS 2C/O.





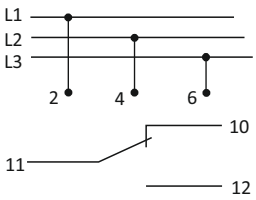
supply	3x230/400V+N
contact	2C/O
current load	2×[<8A]
sygnalling of supplay	LED in each phase circuit
activation voltage asymmetry	40÷80V~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,2W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

CZF-333

WITHOUT NEUTRAL LEAD.
PREVENTS AGAINST SYMMETRICAL AND ASYMETRICAL VOLTAGE DROP.

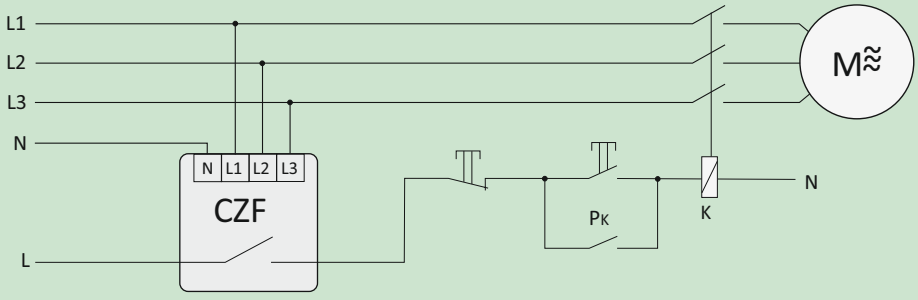
In case the voltage asymmetry above set value between phases causes the switching-OFF the motor. The switching-OFF the motor also occurs in case of phase-to-phase voltage drop below 320V. The motor switching-OFF occurs with 4 sec delay, which prevents any accidental motor disconnecting at temporary voltage drop. The re-connection will occur automatically at voltage increase of 5V above activation voltage (i.e. of value of voltage hysteresis). At occurrence of these disturbances, it is not possible to set a motor in motion.





supply	3x400V
contact	1C/O
current load	<10A
sygnalling of supplay	3×LED
activation voltage asymmetry	20÷50V~
activation voltage	<320V~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

PRACTICAL SOLUTIONS



Example of

Connection example of control that prevents automatic return of the power of the motor.

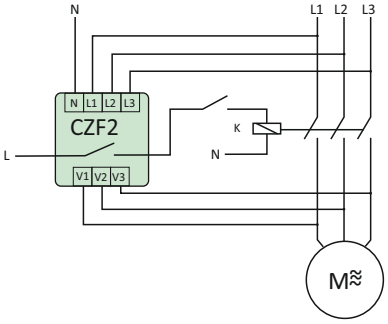
9.2 THREE-PHASE MONITORS
WITH CHECKING STATE OF CONTACTOR CONTACTS

PURPOSE

Three phase monitor serves to protect the three-phase electric motors supplied from three-phase mains, against phase collapse in at least one phase or against phase-to-phase voltage asymmetry or against damage of contacts threatening to damage the motor.

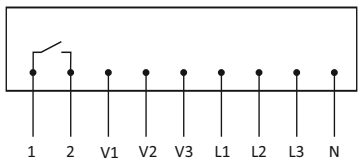
FUNCTIONING

Phase collapse in at least one, optional phase or voltage unbalance between phase fixed actuation threshhold causes switching-OFF the motor. The motor switching-OFF occurs with 4 sec delay, which prevents any accidental motor disconnecting at temporary voltage drop. The re-connection will occur automatically at voltage increase of 5V above activation voltage (i.e. of value of voltage hysteresis). At occurrence of these disturbances, it is not possible to set a motor in motion. Shining of red diode LED along with simultaneous disconnecting the apparatus permanently, indicates contactor contacts damage. Reactivation of the apparatus is possible (after contact repair), after disconnecting from supply all three phases (fuses) and then, after switching-ON anew.



CZF2



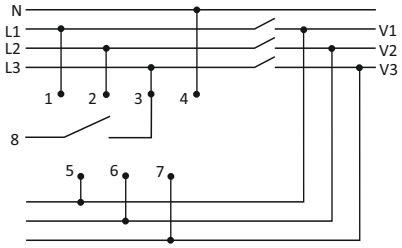


supply	3x400/230V+N
contact	1N/O
current load	<10A
sygnalling of supplay	2×LED
activation voltage asymmetry	45V ~
activation voltage	185V~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	95x60x25 mm
fixing	two screws to the base

CZF2-B

CONTACT CONNECTED TO POWER SUPPLY VOLTAGE.



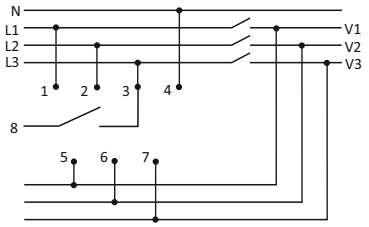


supply	3x400/230V+N
contact	1N/O
current load	<10A
sygnalling of supplay	2×LED
activation voltage asymmetry	55V ~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

CZF2-BR

CONTACT CONNECTED TO POWER SUPPLY VOLTAGE.



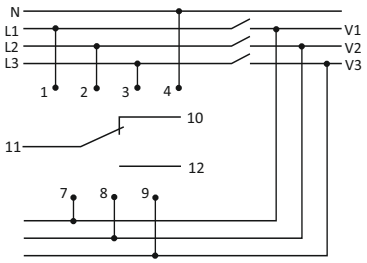


supply	3x400/230V+N
contact	1N/O
current load	<10A
sygnalling of supplay	2×LED
activation voltage asymmetry	40÷55V~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

CZF-332

WITH SEPARATED CONTACT.



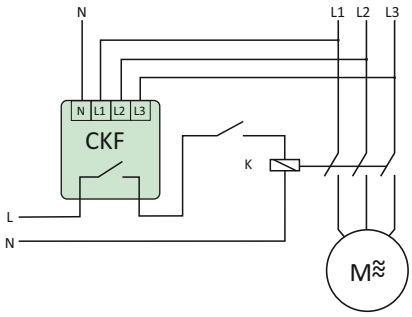


supply	3x400/230V+N
contact	1C/O
current load	<10A
sygnalling of supplay	2×LED
activation voltage asymmetry	40÷80V~
histeresis	5V~
switching-OFF delay	3÷5sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

9.3 THREE-PHASE ASYMMETRY AND SEQUENCE MONITORS

PURPOSE

Three phase and sequence monitor is designed to protect tree phase electric motors against voltage drop in at least one phase or voltage asymmetry between phases, which could damage the motor, with additional protection of motor rotation direction in case of phase change before the monitor.



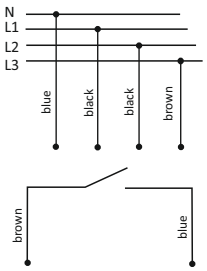
WITH FIXED ACTUATION THRESHHOLD VOLTAGE ASYMMETRY

FUNCTIONING

Voltage collapse in any phase or voltage asymmetry between phases above fixed actuation threshhold causes switching-OFF the motor. The motor switching-OFF occurs after delay of 4 sec, which prevents accidental motor switching-OFF caused by instantaneous voltage drop. Switching the motor ON anew occurs automatically when the voltage increases of 5V~ above activation voltage (i.e. about value of voltage hysteresis). At occurrence of these disturbances, it is not possible to set motor in motion. In case of change of phase sequence, before the monitor, which causes change of motor rotation direction (in relation to that primarily set) is signaled by shining red diode LED along with impossibility of switching-on the motor. The re-connection is possible after the return to correct phase sequence.

CKF

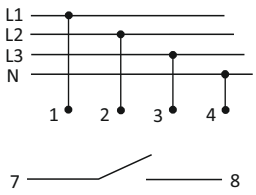




supply	3x400/230V+N
current load	<10A
sygnalling of supplay	2×LED
activation voltage asymmetry	45V ~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	4×1mm^2, 2×0,75mm^2; l=0,5m
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	50x67x26 mm
fixing	two screws to the base

CKF-B

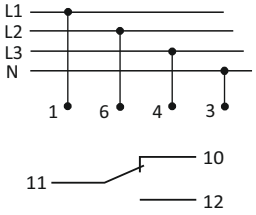




supply	3x400/230V+N
current load	<10A
sygnalling of supplay	2×LED
activation voltage asymmetry	55V ~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

CKF-316





supply	3x400/230V+N
current load	<10A
sygnalling of supplay	2×LED
activation voltage asymmetry	55V ~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	1 module (18mm)
fixing	on rail TH-35

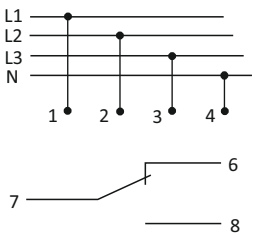
AND ADJUSTABLE ACTUATION THRESHHOLD VOLTAGE ASYMMETRY

FUNCTIONING

Voltage collapse in any phase or voltage asymmetry between phases above set value causes switching-OFF the motor. The motor switching-OFF occurs after delay of 4 sec, which prevents accidental motor switching-OFF caused by instantaneous voltage drop. Switching the motor ON anew occurs automatically when the voltage increases about 5V~ above activation voltage. At occurrence of these disturbances, it is not possible to set a motor in motion. In case of change of phase sequence, before the monitor, which causes change of motor rotation direction (in relation to that primarily set) along with impossibility of switching-ON the motor. The rswitching-ON is possible after the return to correct phase sequence.

CKF-BR

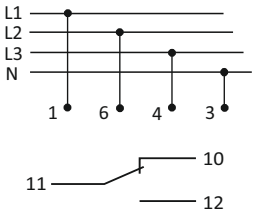




supply	3x400/230V+N
current load	<10A
contact	1 C/O
sygnalling of supplay	2×LED
activation voltage asymmetry	40÷80V~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	terminal screws 2,5mm^2
durability	10^5 of switching
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

CKF-317



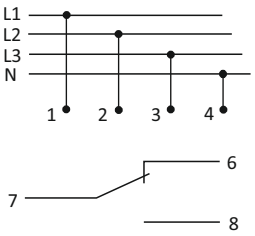


supply	3x400/230V+N
current load	<10A
contact	1 C/O
sygnalling of supplay	2×LED
activation voltage asymmetry	40÷80V~
histeresis	5V~
switching-OFF delay	4sec
power consumption	0,56W
connection	terminal screws 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	1 module (18mm)
fixing	on rail TH-35

CKF-BT

WITH ADJUSTABLE ACTUATION TIME 0,5÷15sek





supply	3x400/230V+N
contact	1C/O
current load	<10A
sygnalling of supplay	LED in each phase circuit
activation voltage asymmetry	40÷80V~
histeresis	5V~
switching-OFF delay	0,5÷15sec
power consumption	1,6W
connection	screw terminals 2,5mm^2
durability	10^5 of switching
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on rail TH-35

CKF-337

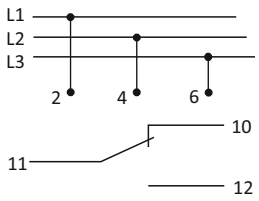
WITHOUT NEUTRAL LEAD.

PREVENTS AGAINST SYMMETRICAL AND ASYMETRICAL VOLTAGE DROP.

In case of voltage asymmetry above set value between phases causes the switching-OFF the motor. The switching-OFF the motor also occurs in case of phase-to-phase voltage drop below 320V. The motor switching-OFF occurs with 4 sec delay, which prevents any accidental motor disconnecting at temporary voltage drop. The re-connection will occur automatically at voltage increase of 5V above activation voltage (i.e. of value of voltage hysteresis). At occurrence of these disturbances, it is not possible to put a motor to motion.

Change of phase sequence, before the monitor, which causes change of motor rotation direction (in relation to that primarily set) along with impossibility of switching-ON the motor.



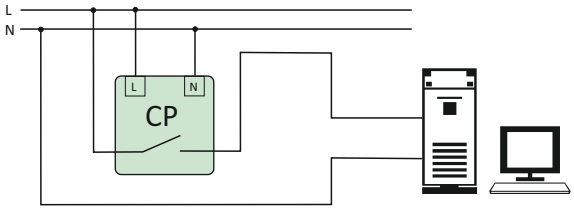


supply	3x400V
contact	1 C/O
current load	<10A
sygnalling of supplay	4×LED
activation voltage asymmetry	20÷50V~
activation voltage	<320V~
histeresis	5V~
switching-OFF delay	4sec
power consumption	1,6W
connection	terminal screws 2,5mm^2
durability	10^5 of switching
working temperature	-25÷40°C
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

10. VOLTAGE RELAYS

PURPOSE

Voltage relays serves to voltage control in single or three phase mains and to protect receiver against the effects of voltage collapse or increase beyond set values.

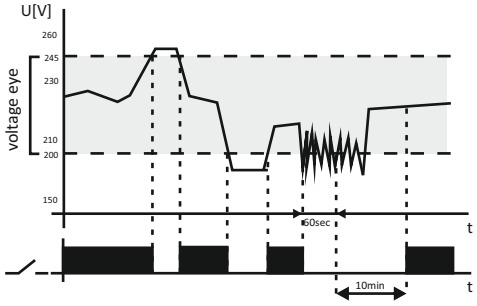


ATTENTION!

All types of CP can be supplied with a voltage up to 450V~. This ensures the effective protection of the receiver even in case of a voltage increase beyond allowable standards. Also, in case of supply polarity exchange or when "zero" is switched off (for three-phase types) the relay will not be destroyed ("burned").

FUNCTIONING

Lower voltage value (U1) and upper voltage value (U2) iare set by means of potentiometers. It is so-called eye of voltage, in limits of which can occur changes of phases voltages that do not cause activation of relay. Change of phase voltage on one of phases above or below set voltage tresholds will cause activation of relay. Reactivation follows automatically return of correct voltagevalue.

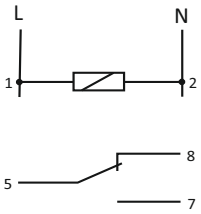


ONE-PHASE TYPE

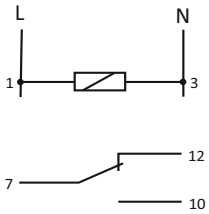
CP-709 WITHOUT TIME-BLOCKADE

CP-710 WITH TIME-BLOCKADE





CP-709



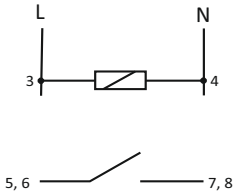
CP-710

supply	50÷450V AC
current load	<16A
contacts	1 C/O
sygnalling of supplay	4×LED
voltage Value	
lower U1	150÷210V
upper U2	230÷260V
hysteresis	
for U1	5V
for U2	5V
activation lag delay functions	
for U1	1,5sec
For U2	0,1sec
recovery time	
for U1	1,5sec
for U2	1,5sec
power consumption	0,8W
connection	screw terminals 2,5mm^2
working temperature	-25÷50°C
dimension	1 module (18mm)
fixing	on rail TH-35

CP-710: Because of unstable voltage in mains and frequent changes of supply voltage beyond the set thresholds of “eye of voltage” (at leat 10 times per 1minute), relay blocks itself for 10 minutes . This prevents against too frequent, cyclic switching-ON and OFF of the connected receiver.

CP-721 PROGRAMMABLE





supply	150÷450V AC
current load AC1	2×[<8A]
joint	separate 1P (1CO)
voltage activation threshold / skip	
down UL	150÷210V / 1V
up UH	230÷260V / 1V
hysteresis voltage return to UL/UH	5V
activation time / skip	
to threshold UL	2÷10sec / 1sec
to threshold UH	0,1÷1sec / 0,1sec
return time to UL/UH	2sec÷9,5min
setting precission	1V
measure precission	±1V
display	3×segment LED 5×9mm
indication of contact closure	LED red
power consumption	0,8W
connections	screw terminals 2,5mm^2
working temperature	-25÷50°C
dimensions	2 modules (35mm)
fixing	on the rail TH-35

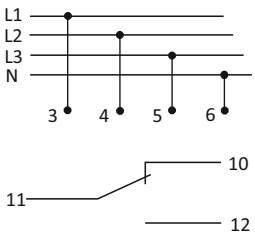
FUNCTIONS:

- setting voltage window (thresholds U1 and U2)
- separate setting response times for exceeding the limits U1 and U2
- setting the time to return
- continuous indication of the voltage
- indication of the correct voltage and contact closure

THREE-PHASES TYPE

CP-730 WITH TIME-BLOCKADE





supply	3×(50÷450V)+N
current load	<10A
contacts	1 C/O
sygnalling of supplay	4×LED
voltage Value	
lower U1	150÷210V
upper U2	230÷260V
hysteresis	
for U1	5V
for U2	5V
activation lag delay functions	
for U1 - adjustable	0,5÷10sec
For U2	0,1sec
recovery time	
for U1	1,5sec
for U2	1,5sec
power consumption	0,8W
connection	screw terminals 2,5mm^2
working temperature	-25÷50°C
dimension	3 modules (52,5mm)
fixing	on rail TH-35

Because of unstable voltage in mains and frequent changes of supply voltage beyond the set thresholds of “eye of voltage” (at leat 10 times per 1minute), relay blocks itself for 10 minutes . This prevents against too frequent, cyclic switching-ON and OFF of the connected receiver.

UNDER VOLTAGE

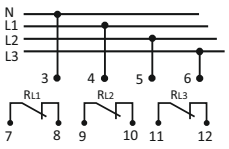
CP-733 Contatas3×1N/C

CP-734 Contacts 3×1N/O

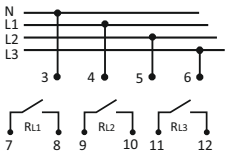
CP-733: A voltage relay is used to control voltage in a 3-phase network and secure a receiver against voltage drops below a preset value. Voltage decay in a phase or its drop below a preset activation threshold results in the shortage of the relay contact for this phase. The contact will be automatically released after the voltage in the phase is reinstated or its increase is 5V over the preset threshold (i.e. the voltage hysteresis value).

CP-734: A voltage relay is used to control voltage in a 3-phase network and secure a receiver against voltage drops below a preset value. Voltage decay in a phase or its drop below a preset activation threshold results in the opened of the relay contact for this phase. The contact will be automatically released after the voltage in the phase is reinstated or its increase is 5V over the preset threshold (i.e. the voltage hysteresis value).





CP-733



CP-734

supply	3×(50÷4 50V)+N
current load	3×(<8A)
contact CP-733	separated 3×1NC
CP-734	separated 3×1NO
sygnalling of supplay	3×LED
switching delay	170÷210V
histeresis	5V
operation time	0,5sek
power supply return	1,5sek
power consumption	0,8W
terminal	screw terminals 2,5mm2
working temperature	-25÷50°C
durability	10^5 of switching
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

CP-500 POWER SUPPLY 3×500V. WITHOUT NEUTRAL

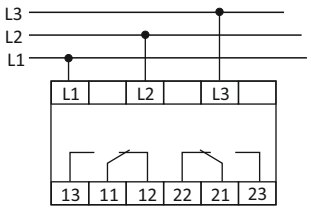
PROTECTING FEATURES

PROTECTION AGAINST PHASE COLLAPSE
PROTECTION AGAINST OF PHASE CHANGE ORDER
PROTECTION AGAINST PHASE ASYMMETRY
PROTECTION AGAINST CROSSING OVER VOLTAGE 580V
PROTECTION AGAINST DECLINE BELOW VOLTAGE 420V

FUNCTIONING

With the correct network voltage contacts remain closed. Operation of any security opens the sensor‘s contacts. Closure of the contacts will automatically after return the correct network parameters.





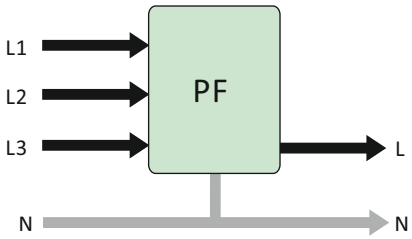
supply	3×500V
current load	2×[<8A]
contact	separated 2P
status indication	6×LED
activation asymmetry - adjustable	5÷80V
activation time- radjustable	1÷10sec
time to return	1,5sec
threshold voltage activation	
upper	580V
lower	420V
return voltage histeresis	5V
power consumption	0,7W
protection level	IP20
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	4 modules (70mm)
weigh	250g
fixing	on rail TH-35

11. AUTOMATIC PHASE SWITCHES

PURPOSE

Automatic phase switches serve to maintain continuity of power supply to single-phase receivers in the event of power phase decay or a drop in its parameters below standard values.

They are exemplify one-phase automatic switching system. They are especially suitable where is required the continuity of correct power supply parameters, for example, refrigeration, airconditioning, computer networks and telecommunications, cable television, alarm systems, etc.

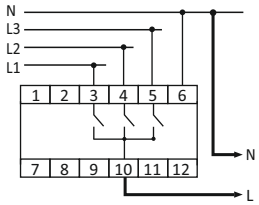


PF-431 WITH "PRIORITY" PHASE

FUNCTIONING

Three-phase voltage (3x230V+N) is supplied to the input of the switch. Single-phase voltage (230V AC), i.e. the phase voltage of one of the phases, is supplied to the output of the switch. The electronic system of the switch controls voltage values of the phases supplied in such a way as to ensure that output voltage is not lower than 195V. The phase that has correct parameters is directed to the output of the switch. The L1 phase is the priority phase, i.e. if its parameters are correct, this phase will be always switched to the output. If the voltage parameters of the L1 phase are not correct or if voltage decay occurs in this phase, the electronic system will switch the L2 phase to the output (provided that its parameters are correct). In case of a simultaneous lack of correct voltages in the L1 and L2 phases, the L3 phase will be switched to the output. When the correct supply voltage returns to the L1 phase, the electronic system will switch this phase to the output.





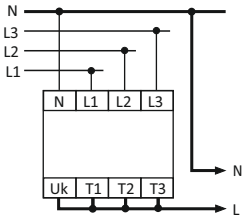
supply	3×400+N
output	230V AC
current load	<16A
activation threshold	
for L1 and L2 (lower / upper)	<195V / >250V
for L3 (lower / upper)	<190V / >250V
hysteresis	5V
working temperature	-25÷50°C
switching time	0,5÷0,8sec
power supply indicator	3×green LED
connection	terminal screws 2,5mm²
dimensions	3 modules (52,5mm)
terminal	on rail TH-35

PF-441 WITH "PRIORITY" PHASE. FOR CO-OPERATING WITH CONTACTORS

FUNCTIONING

The directly connected switch is used for supplying the single-phase circuit whose current-load does not exceed 16A. For the circuits that have a current-load higher that 16A, a configuration is used that consists of a switch and three contactors that have a properly selected current-carrying capacity. Three-phase voltage (3x230V+N) is supplied to the input of the switch (L1, L2, L3, N). Single-phase voltage (230V AC), i.e. the phase voltage of one of the phases, is directed to the output of the switch (T1, T2, T3). The electronic system of the switch controls voltage values of the phases supplied. The phase that has correct parameters is switched to the output of the switch. The L1 phase is the priority phase, i.e. if its parameters are correct, this phase will be always switched to the output. If the voltage parameters of the L1 phase are not correct or if voltage decay occurs in this phase, the electronic system will switch the L2 phase to the output (provided that its parameters are correct). In case of a simultaneous lack of correct voltages in the L1 and L2 phases, the L3 phase will be switched to the output. When the correct supply voltage returns to the L1 phase, the electronic system will switch this phase to the output. The switch-over time (required for voltage to occur at the output) after the decay of a currently activated phase is from 0.5 to 0.8 sec. (during this time the receivers are not supplied). Uk input is used for controlling the voltages activated. The system enables the activation of only one phase. In this way the simultaneous switching of voltages of two phases to the output is prevented. Such simultaneous switching of voltages might lead to a phase-to-phase fault. Also, the defect of the contactor (for example, a break in the coil circuit, suspending or burning out of the working contactor) will cause the switching of the receiver to another phase despite the fact that the voltage in a given phase is correct. If the contacts of the contactor are permanently closed, the system will not switch to another contactor despite the fact that the voltage in this phase is incorrect. After the activation of supply voltage (at least one phase), the system examines the correctness of voltages supplied for 2 seconds and only after that time the system switches the phase to the output.

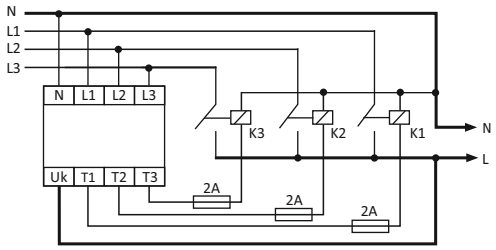




without contactors

supply	3×400+N
output	230V AC
current load	
without contactors	<16A
with contactors	up to max. capacity of the contacts
activation threshold	
lower	<195V
upper	>250V
hysteresis	5V
working temperature	-25÷50°C
switching time	0,5÷0,8sec
power supply indicator	green LED
signalization of phase selection	3 x yellow LED
connection	
for L1, L2, L3, N pin	terminal screws 2,5mm²
for T1, T2, T3, Uk pin	terminal screws 1,5mm²
dimensions	4 modules (70mm)
fixing	on rail TH-35

System with connectors is applied with receiver current exceeding 16A.



with contactors

PF-451 WITH "PRIORITY" PHASE

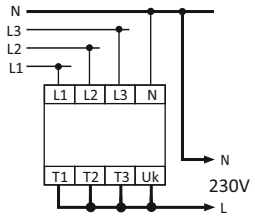
FOR CO-OPERATING WITH CONTACTORS.

WITH ADJUSTABLE LOWER (170÷210V) AND UPPER (230÷260V) ACTUATION THRESHOLD

FUNCTIONING

The directly connected switch is used for supplying the single-phase circuit whose current-load does not exceed 16A. For the circuits that have a current-load higher that 16A, a configuration is used that consists of a switch and three contactors that have a properly selected current-carrying capacity. Three-phase voltage (3x230V+N) is supplied to the input of the switch (L1, L2, L3, N). Single-phase voltage (230V AC), i.e. the phase voltage of one of the phases, is directed to the output of the switch (T1, T2, T3). The electronic system of the switch controls voltage values of the phases supplied. The phase that has correct parameters is switched to the output of the switch. Phase switching sequence is not specified the phase that has the best parameters is always switched to the output. Switching to another phase that has correct parameters occurs only after a drop in values of parameters of the currently used phase. The switch-over time (required for voltage to occur at the output) after the decay of a currently activated phase is from 0.5 to 0.8 sec. (during this time the receivers are not supplied). Uk input is used for controlling the voltages activated. The system enables the activation of only one phase. In this way the simultaneous switching of voltages of two phases to the output is prevented. Such simultaneous switching of voltages might lead to a phase-to-phase fault. Also, the defect of the contactor (for example, a break in the coil circuit, suspending or burning out of the working contactor) will cause the switching of the receiver to another phase despite the fact that the voltage in a given phase is correct. If the contacts of the contactor are permanently closed, the system will not switch to another contactor despite the fact that the voltage in this phase is incorrect. After the activation of supply voltage (at least one phase), the system examines the correctness of voltages supplied for 2 seconds and only after that time the system switches the phase to the output. The switch provides the option of adjusting a lower voltage threshold (150V to 210V) and an upper voltage threshold (230V to 260V) at which switching-over occurs.

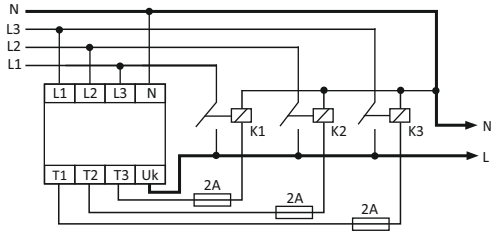




without contactors

supply	3×400+N
output	230V AC
current load	
without contactors	<16A
with contactors	up to max. capacity of the contacts
activation threshold	
lower	170÷210V
upper	230÷260V
hysteresis	5V
working temperature	-25÷50°C
switching time	0,5÷0,8sec
power supply indicator	green LED
signalization of phase selection	3 x yellow LED
connection	terminal screws 2,5mm²
dimensions	5 modules (88mm)
fixing	on rail TH-35

System with connectors is applied with receiver current exceeding 16A.



with contactors

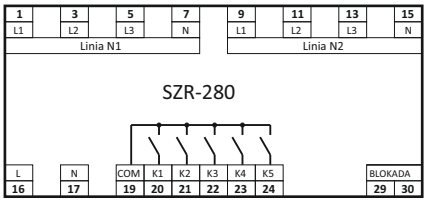
12. AUTOMATIC TRANSFER SWITCHING EQUIPMENT

PURPOSE

Automatic transfer switching equipment is used to control the work performance and accuracy of power lines and automatic switching power supply facility sources in the event of power line parameters decrease or total loss of voltage on the line.

SZR-280 SZR-280/12



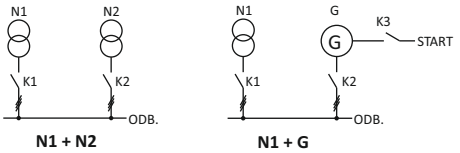


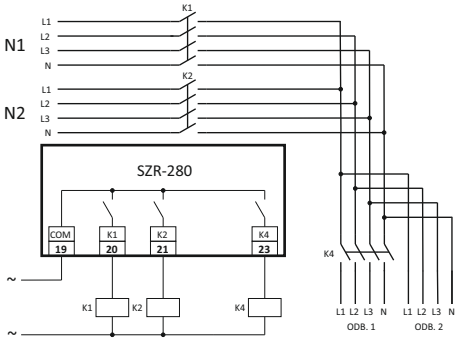
network	3-f 4-wired
controller power supply	
voltage	
SZR-280	85÷264V AC
SZR-280/12	12V AC/DC
power consumption	<5VA
measured input voltage	
rated voltage	230V
measuring range	80÷300V
frequency	45÷50Hz
accuracy	1% full scale + 1 digit
relay outputs	
contacts	5×1Z
load	<8A
states indication	7×LED
working temperature	10÷50°C
connection	terminal screws 2,5mm²
dimensions [mm]	width 100 height 75 depth110
fixing	on rail TH-35

FUNCTIONS

* Simultaneous control of two power lines
* Measured values TrueRMS
* Galvanic separation of measuring inputs supply lines
* Contactors control
* Support for an emergency generator exhaust
* Working in automatic mode, with the possibility of determining the priority line
* Power Dump is achieved through separation of the receiving line into two parts, with possibility to freely define of the power dump cases
* An independent determination of voltage range for each of the line for which line qualified as good, and the voltage hysteresis determination of the line qualifications
* The definition of eligibility as a good line, and the time of qualification as a bad line.
* Accelerated classification as a bad line in case of total loss of voltage on the line
* The definition of time-controlled switching on and off contactors
* Ability to connect to an external safety circuit lock the controller work
* Configure the driver through a PC using a dedicated application

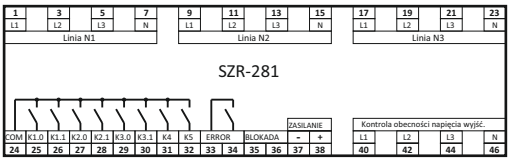
WORK MODES





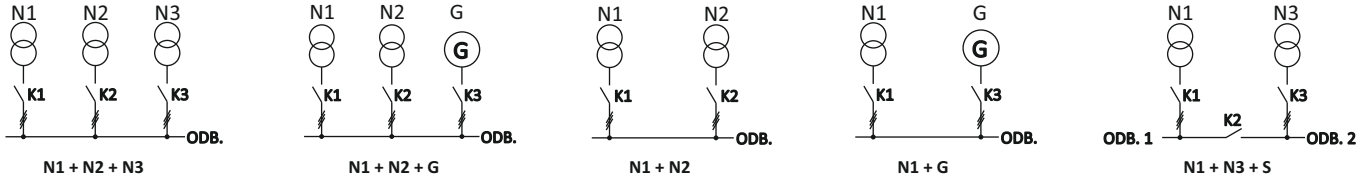
SZR-281



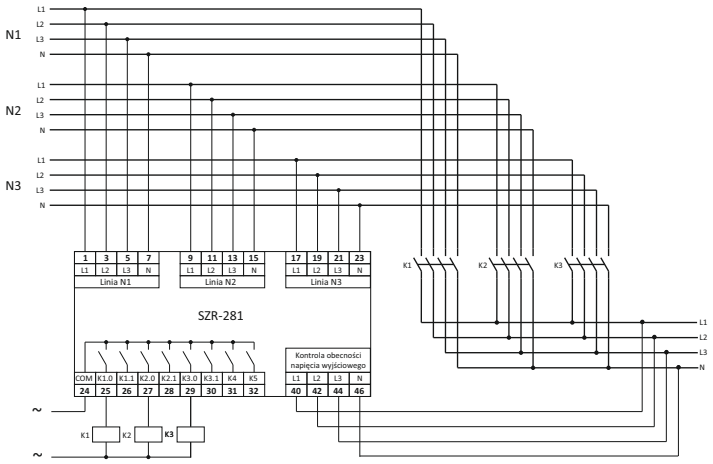


network	3-f 4-wired
Controller power supply	
voltage	85÷264V AC
reserve voltage	16÷27V DC
power consumption (main/reserve)	<5VA / <10W
measured input voltage	
rated voltage	230V
measuring range	80÷300V
frequency	45÷50Hz
accuracy	1% full scale + 1 digit
relay outputs	
contacts	8×1Z + 1×1Z(ALARM)
load	<8A / <2A(ALARM)
States indication	4×LED
Working temperature	10÷50°C
connection	terminal screws 2,5mm²
dimensions [mm]	width 150 height 75 depth110
fixing	on rail TH-35

WORK MODES



FUNCTIONS

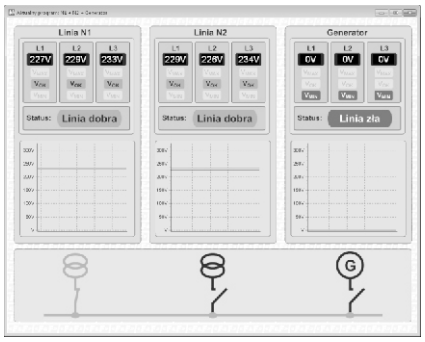


* Simultaneous control of three power lines
* Measured TrueRMS value
* Galvanic separation of measuring inputs lines supply
* Control voltage presence on the receiving line
* Controlling contactors or motorized connectors
* Support for an emergency exhaust generator
* Working in automatic mode, with the possibility of determining the priority line
* Power Dump is achieved through separation of the receiving line into two parts,
  with possibility to freely define of the power dump cases
* An independent determination of voltage range for each of the line for which line
  qualified as good, and the voltage hysteresis determination of the line qualifications
* The definition of eligibility as a good line, and the time of qualification as a bad line.
* Accelerated classification as a bad line in case of total loss of voltage on the line
* The definition of time-controlled switching on and off contactors / motor connector
* Ability to connect to an external safety circuit lock the controller work
* Setting and monitoring of the driver through the front panel controller with LCD display and keypad
* Setting and monitoring of the controller through a PC using a dedicated application
* Event registration with the possibility of export of the registration file to your PC
* Signaling errors achieved through contact and buzzer alarm
* Ability to controller supplying by reserve voltage 24V DC
*Settings controller access lock by a PIN code

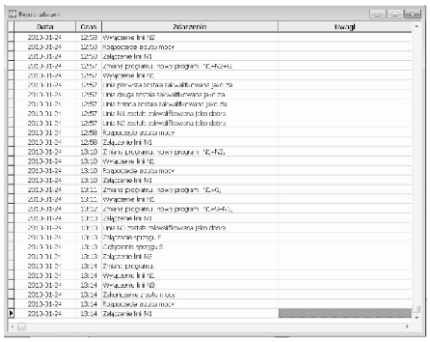
APPLICATION

Application support controller ATSE works in Windows 2000/XP/Vista/7 system and meets the minimum hardware requirements for these systems + monitor resolution min. 1024x768 points.

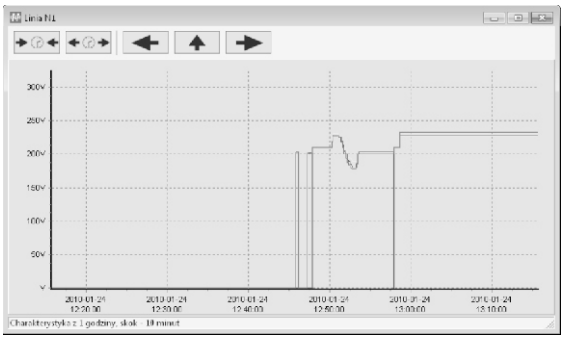
MAIN PROGRAM FUNCTION



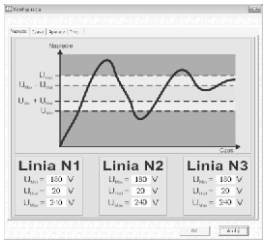
Program. Display information window with the currently executed program.



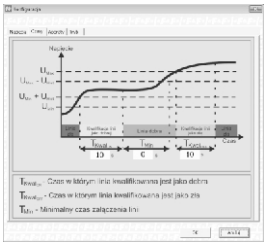
Register. Display windos registry events.



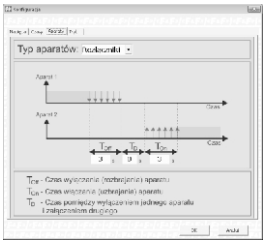
Monitor. Current voltage values on the inputs lines of the controller and browsing history.



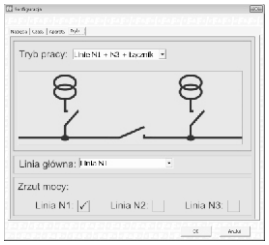
Configuration: Voltage
Setting of the parameters defining the limits of voltage minimum and maximum on each power supply lines, and the width of the hysteresis zone.



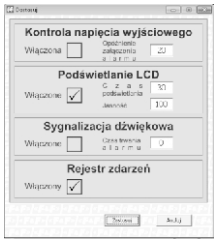
Configuration: Time
Setting of the duration of the qualification as a line of good and bad, and the minimum time for which the power line is attached.



Configuration: Devices
Setting the parameters associated with the types and characteristics of the devices connected to the controller (motor contactors or switches), sometimes switching on and off the devices, and the time interval between one except the device and attaching a second one.



Configuration: Working mode
Working mode program controller selection, choice of main line, and the line selection, which is implemented power dump.



System configuration:
- output voltage control
- the LCD backlight
- the sound of the siren
-activation of the log registration

13. TIMING RELAYS

PURPOSE

Timing relays are devised to time the control of industrial and domestic automatic control engineering systems (e.g. ventilation, heating, lighting, signalling, etc.).

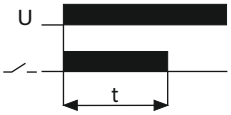
Operation mode: LAGGED DEACTIVATION

PCA-512

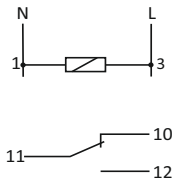
PCA-514

FUNCTIONING

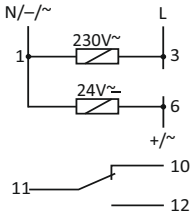
Until the relay is activated, the contact remains in the 11-10 position. After the power voltage is supplied, contact is shifted to position 11-12 and the countdown of the preset value t is commenced. After the preset time t has been counted down, contact returns to position 11-10. The working sequence of the relay may be repeated after turning the power supply off and on.







PCA-512



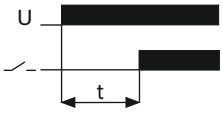
PCA-514

supply PCA-512 230V	230V AC
PCA-512 24V	24V AC/DC
PCA-512 UNI	12÷264V AC/DC
PCA-514 DUO	230V AC / 24V AC/DC
current load	<10A
contacts	1 C/O
operation time	0,1sec÷576day
activation lag	<50msec
power supply indicator	green LED
operation mode indicator	red LED
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm^2
dimensions	1 module (18mm)
fixing	on rail TH-35

Operation mode: LAGGED ACTIVATION

FUNCTIONING

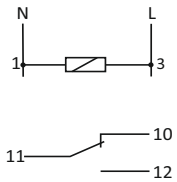
After the power voltage is supplied, the contact remains in position 11-10 and the timing of the preset value t is commenced. After the preset time t has been counted down, the contact is shifted to position 11-12. The working sequence of the relay may be repeated after turning the power supply off and on.



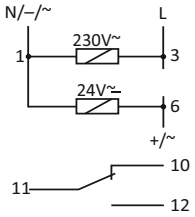
PCR-513

PCR-515





PCR-513

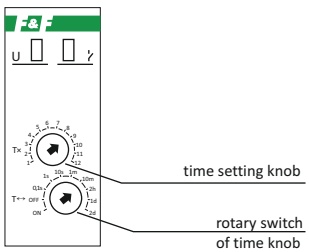


PCR-515

supply PCR-513 230V	230V AC
PCR-513 24V	24V AC/DC
PCR-513 UNI	12÷264V AC/DC
PCR-515 DUO	230V AC / 24V AC/DC
current load	<10A
contacts	1 C/O
operation time	0,1sec÷576day
power supply indicator	green LED
operation mode indicator	red LED
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm^2
dimensions	1 module (18mm)
fixing	on rail TH-35

ATTENTION!

*Setting the time range knob regulator in the:
ON - position with power supply activated results in the permanent closure of the contact .
OFF - position (power supply activated) causes the contact to be permanently closed.
*With the power supply on, the system does not respond to time range setting modifications.
*The newly set time range is active after the power supply has been turned off and on.
*With the power supply on, it is possible to regulate the preset time freely within the selected time range.



MULTI-FUNCTION; MULTI-RANGE

FUNCTIONING

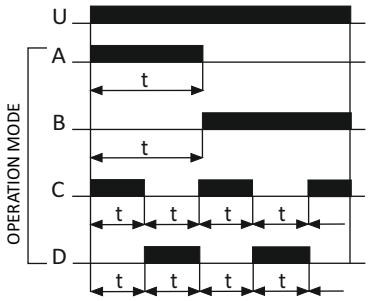
Operation mode:

***LAGGED ACTIVATION (IR)**

After the power voltage is supplied, the contact remains in position 11-10 (and 8-7 for PCU-510) and the timing of the preset value t is commenced. After the preset time t has been counted down, the contact is shifted to position 11-12 (and 8-9 for PCU-510). The working sequence of the relay may be repeated after turning the power supply off and on.

***LAGGED DEACTIVATION (IA)**

Until the relay is activated, the contact remains in the 11-10 (and 8-7 for PCU-510) position. After the power voltage is supplied, contact is shifted to position 11-12 (and 8-9 for PCU-510) and the countdown of the preset value t is commenced. After the preset time t has been counted down, contact returns to position 11-10 (and 8-7 for PCU-510). The working sequence of the relay may be repeated after turning the power supply off and on.



***LAGGED ACTIVATION - CYCLIC (CR)**

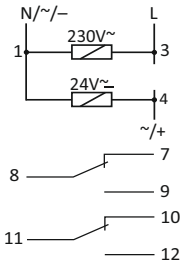
The LA operational mode is triggered in equal interruption/work cycles according to the preset time values.

***LAGGED DEACTIVATION - CYCLIC (CA)**

The LD operational mode is triggered in equal interruption/work cycles according to the preset time values.

PCU-510

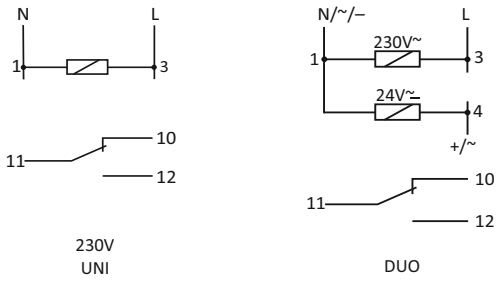




supply PCU-510 DUO	230V AC / 24V AC/DC
current load	2×(<5A)
contacts	2 C/O
operation time	0,1sec÷576day
activation lag delay functions	<50msec
power supply indicator	green LED
operation mode indicator	red LED
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35

PCU-511





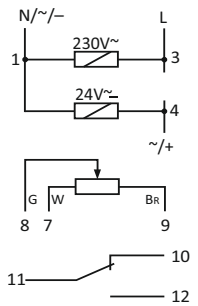
supply PCU-511 230V	230V AC
PCU-511 DUO	230V AC / 24V AC/DC
PCU-511 UNI	12÷264V AC/DC
current load	<10A
contacts	2 C/O
operation time	0,1sec÷576day
activation lag delay functions	<50msec
power supply indicator	green LED
operation mode indicator	red LED
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35

PCU-518

WITH EXTERNAL TIME SETTING KNOB



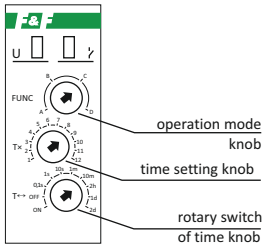




supply PCU-510 DUO	230V AC / 24V AC/DC
current load	<8A
contacts	1 C/O
operation time	0,1sec÷576day
activation lag delay functions	<50msec
power supply indicator	green LED
operation mode indicator	red LED
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35
dimensions of knob	63×42×30mm
connection	cable 3×0,34mm²; l=70cm
fixing hole	Ø10

ATTENTION!

*Setting the time range knob regulator in the:
ON - position with power supply activated results in the permanent closure of the contact.
OFF - position (power supply activated) causes the contact to be permanently closed.
*With the power supply on, the system does not respond to time range setting modifications.
*The newly set time range is active after the power supply has been turned off and on.
*With the power supply on, it is possible to regulate the preset time freely within the selected time range.

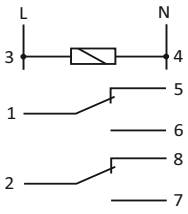


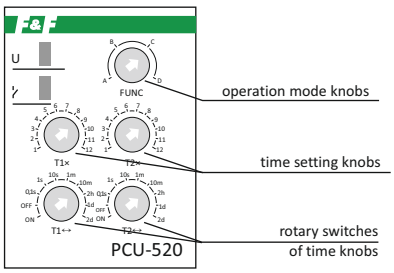
TWO-TIME TYPE

SETTING OF TWO INDEPENDENT TIME VALUES T1 AND T2 (work time and interruption time).
Made for 230V AC or 24V AC/DC (special order for 12V, 48V, 110V AC/DC)

PCU-520 4-FUNCTION







supply	230V AC 24V AC/DC
current load	2×(<8A)
contacts	2 C/O
operation time	0,1sec÷576day
activation lag delay functions	<50msec
power supply indicator	green LED
operation mode indicator	red LED
power consumption	1,2W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35

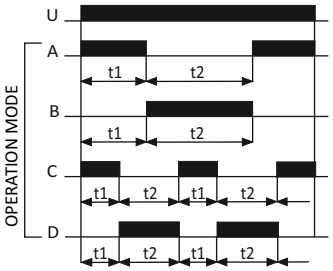
Operation mode:

***LAGGED ACTIVATION (IR)**

Until the relay is activated, the contact remains in the 1-5 and 2-8 position. After the power voltage is supplied (the green "U" LED lights up), the contact is shifted to 1-6 and 2-7 position and the countdown of the preset value t is commenced (the red LED lights up). After the preset time t has been counted down, the contact returns to position 1-5 and 2-8. The working sequence of the relay may be repeated after turning the power supply off and on.

***LAGGED DEACTIVATION (IA)**

Until the relay is activated, the contact remains in the 1-5 and 2-8 position. After the power voltage is supplied (the green "U" LED lights up), the contact is shifted to position 1-6 and 2-7 and the countdown of the preset value t is commenced (the red LED lights up). The working sequence of the relay may be repeated after turning the power voltage off and on.



***LAGGED ACTIVATION - CYCLIC (CR)**

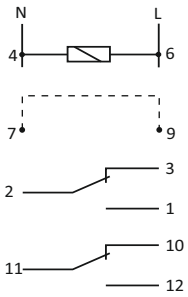
The LA operational mode is triggered in equal interruption/work cycles according to preset time values.

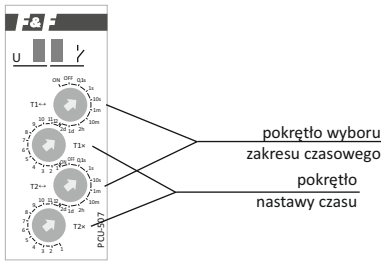
***LAGGED DEACTIVATION - CYCLIC (CA)**

The LD operational mode is triggered in equal interruption/work cycles according to preset time values.

PCU-507 2-FUNCTION







supply PCU-507 230V	230V AC
PCU-507 24V	24V AC/DC
current load	2×[<8A]
joint	separate 2P
work time - adjustable	0,1sec÷576h
interval time - adjustable	0,1sec÷576h
delay activation to aversive function	<50msec
power supply indicator	green LED
operation mode indicator	red LED
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm2
dimensions	1 module (18mm)
fixing	on rail TH-35

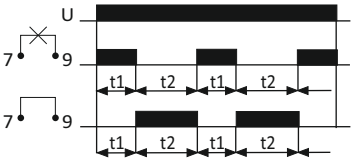
Functions:

- DELAYED ON - CYCLIC:

When the power supply is given then joints remain in the positions 2-3 and 11-10 for the time t1. After the preset time t1 switches the joints in position 2-1 and 11-12 at the time t2. After time t2 the relay joints return to the positions 2-3 and 11-10. The sequence of these switches is carried out periodically.

- DELAYED OFF - CYCLIC:

To time of switching the relay, the joints remain in the positions 2-3 and 11-10. After the power supply is given then joints are switched to position 2-1 and 11-12 at the time t1. After the preset time t1 joints return to the positions 2-3 and 11-10 for the time t2. The sequence of these switches is carried out periodically.



Selection of a particular function is make by jumper on terminals 7-9.

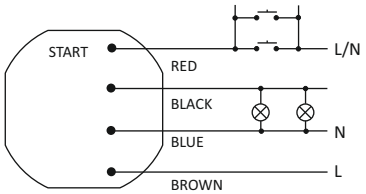
*Setting the time range knob regulator in the:
ON - position with power supply activated results in the permanent closure of the contact in position 1-6 and 2-7.
OFF - position (power supply activated) causes the contact to be permanently closed in the 1-5 and 2-7 position.
*With the power supply on, the system does not respond to time range setting modifications.
*The newly set time range is active after the power supply has been turned off and on.
*With the power supply on, it is possible to regulate the preset time freely within the selected time range.

MULTI-FUNCTION; MULTI-RANGE

PCS-506 8 FUNCTION

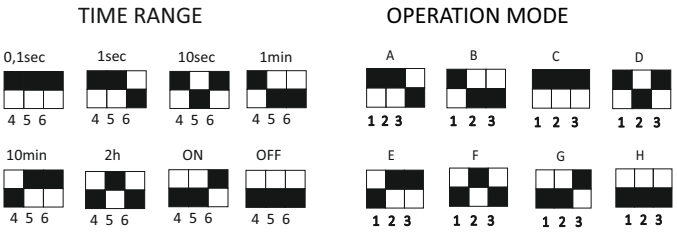
with START control input





Setting of operation mode and time range

The required time range and the operation mode of the relay is selected by choosing the proper combination of the switches (black field in the diagram stands for the switch position).



Setting the wheel regulator in the:
***ON** position with power supply activated causes the contact to be permanently closed.
***OFF** position with power supply activated causes the contact to be permanently opened.

*With the power supply on, the system does not respond to time range setting modifications.
*The newly set time range is active after the power supply has been turned off and on.
*With the power supply on, it is possible to regulate the preset time freely within the selected time range.

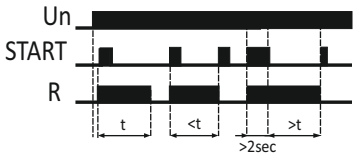
supply	230V AC
current load	<10A
contacts	1 N/O
operation time	0,1sec÷24h
activation lag delay function	<50msec
power supply indicator	green LED
operation mode indicator	red LED
power consumption	0,8W
working temperature	-25÷50°C
connection	4×1mm^2; l=10cm
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60

A



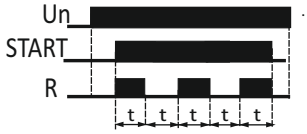
Presence simulator. When the START signal is being applied, the system turns the relay on and off at random for a period of 20sec. up to 20 min. The sequence in question is initiated by activation of the relay. After the START signal is discontinued, the system turns the relay off. The device does not respond to time range settings.

B



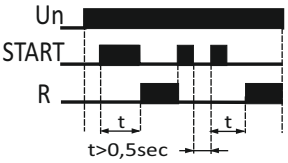
Bistable relay with step automatic module. A single pressing of the START button results in activating the relay for the preset time. A further START impulse generated during the countdown will deactivate the relay. Pressing and holding the button START for longer than 2sec. will result in the permanent activation of the relay. The following impulse turns the relay off.

C



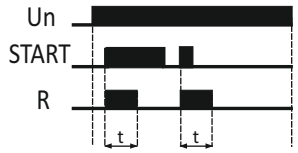
Generator with a pulse duty factor of 50% which initiates its working sequence from the moment of activation. It is active as long as START voltage is applied. Once the START signal is disconnected, the connection is broken and the device is deactivated.

D



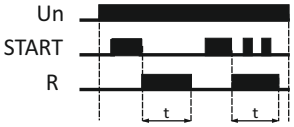
Lagged activation of the relay with the START signal. When the relay is active, another START impulse will turn it off. The following START impulse causes a repetition of the time countdown sequence and activation of the relay. The interval between the trailing edge of the reset signal and the leading edge of the START signal, which re-initiates the countdown sequence, should be at least 0,5 sec.

E



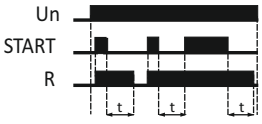
Generation of a single impulse of t time by the START signal trailing edge. During preset time countdown, the system does not respond to START impulses.

F



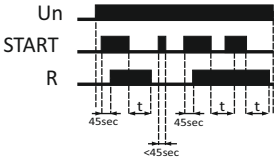
Generation of a single impulse of t time by the START signal trailing edge. During preset time countdown, the system does not respond to START impulses.

G



Lag in deactivation with support function enabled. The leading edge of the START signal results in relay activation, whereas the trailing edge of the same signal triggers the time countdown. The supply of the START signal during countdown results in an extension of the cycle by another t time value along the trailing edge.

H



Deactivation and activation lags with support function enabled. If the START voltage is supplied for less than 45sec., it is ignored by the system, however if it is longer, the relay is activated after the 45sec. and the preset time value is counted down with the trailing edge of the START signal. If another START impulse is applied during the countdown, then the trailing edge of this signal will result in the repeated countdown sequence (e.g. for ventilation purposes: short activation of the lighting does not turn the fan on, but if the lilting lighting is activated for longer than the 45sec., the fan will start).

PCU-516
PCU-519 10-FUNCTION

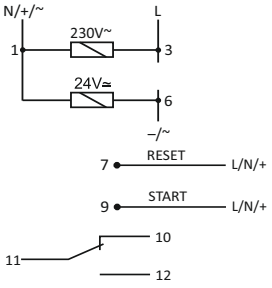
with START i RESET control inputs



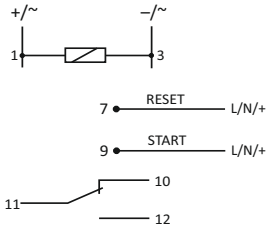
Using operation mode knob set the one of the functions.

If the RESET voltage is applied during the execution of:
*A, B, C, D, F functions the 'selected operation' mode is restarted
*F, G, H, I functions the relay returns to the initial condition and awaits the START signal;
*K function the relay's contact is closed permanently in the 3-7 position.

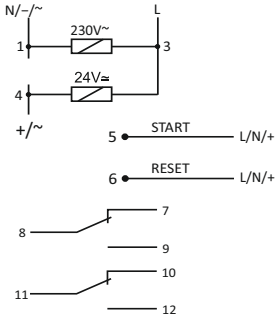
*Setting the time range knob regulator in the:
ON - causes pernament activation of contacts
OFF - causes pernament deactivation of contacts



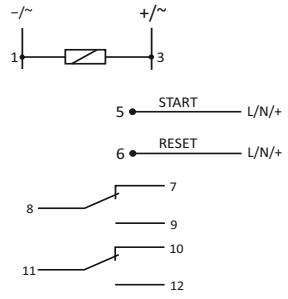
PCS-516 DUO



PCS-516 UNI



PCS-519 DUO



PCS-519 12V

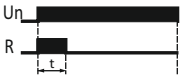
power supply PCS-516 DUO	230V AC / 24V AC/DC
PCS-516 UNI	12÷264V AC/DC
PCS-519 DUO	230V AC / 24V AC/DC
PCS-519 12V	12V AC/DC
current load PCS-516	<8A
PCS-519	2×[<8A]
contact PCS-516	1C/O
PCS-519	2C/O
working time	0,1s ÷576h
activation delay	< 50ms
signaling power	green LED
signaling contact status	red LED
power consumption	0,8W
work temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (17,5 mm)
fixed	on rail TH-35

A



LAGGED ACTIVATION
After the power voltage is supplied, the contact remains in position 3-5 and the timing of the preset value t is commenced. After the preset time t has been counted down, the contact is shifted to position 3-7. The working sequence of the relay may be repeated after turning the power supply off and on.

B



LAGGED DEACTIVATION
Until the relay is activated, the contact remains in the 3-5 position. After the power voltage is supplied, the contact is shifted to position 3-7 and the countdown of the preset value t is commenced . The working sequence of the relay may be repeated after turning the power voltage off and on.

C



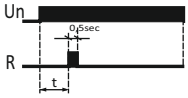
LAGGED ACTIVATION - CYCLIC
The LA operational mode is triggered in equal interruption/work cycles according to preset time values.

D



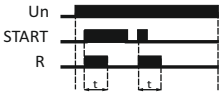
LAGGED DEACTIVATION - CYCLIC
The LD operational mode is triggered in equal interruption/work cycles according to preset time values.

E



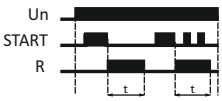
0,5sec. impulse generation after preset time t

F



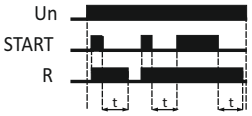
Generation of a single impulse of t time by the START signal eading edge. During preset time countdown, the system does not respond to START impulses.

G



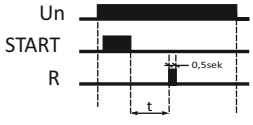
Generation of a single impulse of t time by the START signal trailing edge. During preset time countdown, the system does not respond to START impulses.

H



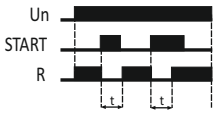
Lag in deactivation with support function enabled. The leading edge of the START signal results in relay activation, whereas the trailing edge of the same signal triggers the time countdown. The supply of the START signal during countdown results in an extension of the cycle by another t time value along the trailing edge.

I



The generate a single pulse 0.5 sec after time t activated by the trailing edge of the signal START

K

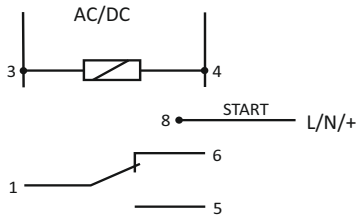


The brake on t time in activation of the contact is activating of the rising edge of the START signal.

PCS-517 18-FUNCTION

with START control input





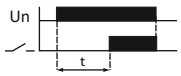
ATTENTION!

Wide range of time adjustment positions (0.25 sec. - 99 hrs 59mins 59secs) enables the user to preset an extremely accurate contact actuation time, e.g. 2hrs - 13mins - 27secs.

supply	24÷264V AC/DC
current load	<16A
contats	seprated 1C/O
control pulse current	<1mA
operation time	0,25sec÷99h59min59sec
activation lag delay function	500msec
power consumption	1,5W
working temperature	-20÷50°C
terminal	screw terminals 2,5mm^2
dimensions	2 modules (35mm)
fixing	on rail TH-35

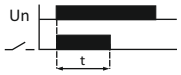
P00 IDLE MODE

P01



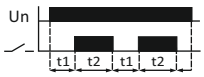
After supply voltage has been applied, the contact remains in 1-6 position and countdown of the preset delay time t is commenced. After this time is counted down, the contact is switched to position 1-5 (actuation). The next run of the relay's working sequence is operable when the supply voltage is reinstated after cut-off.

P02



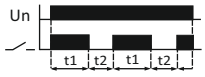
Until the supply voltage is applied, the contact remains in 1-6 position. Once the voltage is applied, the contact is switched to position 1-5 (actuation) and countdown of the preset delay time t is commenced. The next run of the relay's working sequence is operable when the supply voltage is reinstated after cut-off.

P03



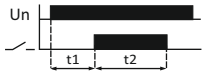
Delayed actuation work mode is realised in cycles with the following preset time interruptions: t1 interruption and t2 work (actuation).

P04



Delayed deactivation work mode is realised in cycles with the following preset time interruptions: t1 actuation and t2 interruption.

P05



After supply voltage has been applied, the contact remains in position 1-6 and countdown of the preset delay time t is commenced. After this time is counted down, the contact is switched to position 1-5 (actuation) for time t2. The next run of the relay's working sequence is operable when the supply voltage is reinstated after cut-off.

P06



Once the START signal is applied, the contact is switched to position 1-5 (actuation). After the signal's decay, the contact is held in the position for the preset t time. When time t is counted down, the contact does not respond to the next pulses of the START signal.

P07



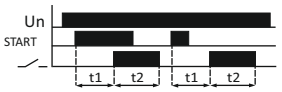
Once the START signal is applied, the contact is switched to position 1-5 (actuation). After the signal's decay, the contact is held in the position for the preset time t. Another application of the START signal during countdown time t results in the countdown interruption, with the contact still actuated (pos. 1-5). Another decay of the START signal triggers off time t countdown and the contact support in that position.

P08



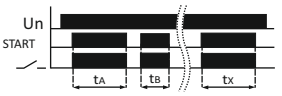
Contact actuation (pos. 1-5) for time t by the leading edge of the START signal.

P09



Delay time t1 (pos. 1-6) is triggered off by the leading edge of the START signal. After the t1 time has been counted down, the contact is actuated (pos. 1-6) for the t2 time.

P10



tA+tB+...+tX=t

Contact actuation (pos. 1-5) during the countdown of time t from value set as "zero" only during the application of the START signal. The signal's decay stops the countdown. Another application of the START signal results in the continuation of the countdown for the remaining time t. The decay of the supply voltage results in the remaining time t being reset. After the supply voltage and START signal are reinstated, the countdown of time t from the preset value will be restarted.

P11



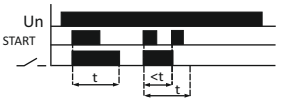
Contact actuation (pos. 1-5) for time t with the trailing edge of the START signal. When time t is counted down, the contact does not respond to the next pulses of the START signal.

P12



Contact actuation (pos. 1-5) for time t with the trailing edge of the START signal. Another application of the START signal, as well as its decay during time t countdown triggers off the countdown from the beginning.

P13



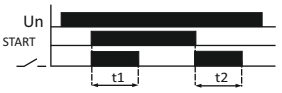
Contact actuation (pos. 1-5) for time t by the leading edge of the START signal. Another application of the START signal during time t countdown results in the countdown's interruption and the contact's deactivation (pos. 1-6)

P14



Contact actuation (pos. 1-5) for time t by the leading edge of the START signal. Another application of the START signal during time t countdown triggers off the countdown from the beginning.

P15



Contact actuation (pos. 1-5) for t1 time by the leading edge of the START signal and another actuation for time t2 with the trailing edge of the START signal.

P16



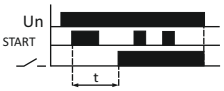
Contact actuation (pos. 1-5) for time t1by the leading edge of the START signal. When time t is counted down, the contact does not respond to the next pulses of the START signal.

P17



Delayed contact actuation after the lapse of time t, with the countdown triggered off by the leading edge of the START signal. Another application of the signal deactivates the contact (pos. 1-6) for time t. A further application of the START signal during time t countdown triggers off the countdown from the beginning.

P18



Delayed contact actuation after the lapse of time t, with the countdown triggered off by the leading edge of the START signal. When time t is counted down, the contact does not respond to the next pulses of the START signal. The contact is deactivated (pos. 1-6) on the decay of the supply voltage. The next run of the relay's working sequence is operable after the supply voltage is cut off and reinstated.

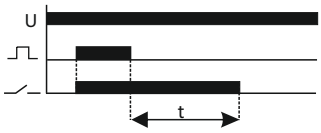
LAGGED-PULSE TIME RELAYS

PURPOSE

Lagged-pulse time relays are devised to support the power supply of the controlled receiver for a specified period of time after decay of the control voltage, e.g. in bathroom ventilation systems in which the upkeep of the fan operation (activated along with the lighting) is required for a specified period of time after turning off the accompanying lighting.

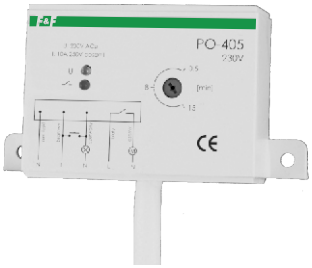
FUNCTIONING

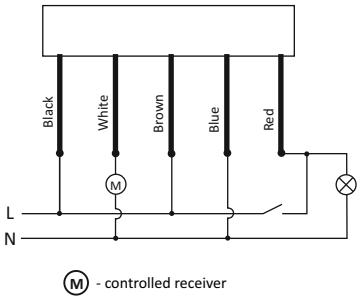
The application of control voltage S to the relay causes its activation and the resulting supply of voltage R to the controlled receiver. After decay of the control voltage, the operation of the receiving device is kept for the support time t (preset with the potentiometer). After the t time has been counted down, the controlled receiver is turned off automatically. If control voltage S is re-supplied before the lapse of the preset time, the relay will repeat its operational sequence.



PO-405

With cable connection.





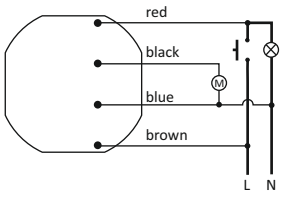
M - controlled receiver

supply PO-405 230V	230V AC
PO-405 24V	24V AC/DC
current load	<10A
contacts	1 N/O
operation time	1÷15min
power supply indicator	green LED
operation mode indicator	red LED
power consumption	0,56W
working temperature	-25÷50°C
connection	5×0,5mm²; l=0,5m
dimensions	70×50×25mm
fixing	two screws to substrate

PO-406

To under plaster box.





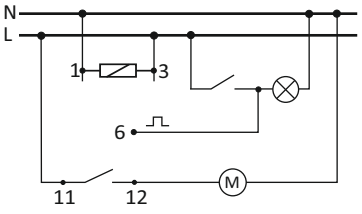
M - controlled receiver

supply	230V AC
current load	<10A
contacts	1 N/O
operation time	1÷15min
power consumption	0,56W
working temperature	-25÷50°C
connection	wires 4×1mm²; l=10cm
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60

PO-415

On rail TH-35





M - controlled receiver

supply PO-415 230V	230V AC
PO-415 24V	24V AC/DC
current load	<10A
contacts	1 C/O
operation time	1÷15min
power supply indicator	green LED
operation mode indicator	red LED
power consumption	0,56W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (17,5mm)
fixing	on rail TH-35

14. TIME CONTROLLERS

STP-541 PROGRAMMABLE CONTROLLER (LEFT/RIGHT activation mode)

With four time settings available and a programmable number of repetitions or infinite work sequence in the "loop mode"

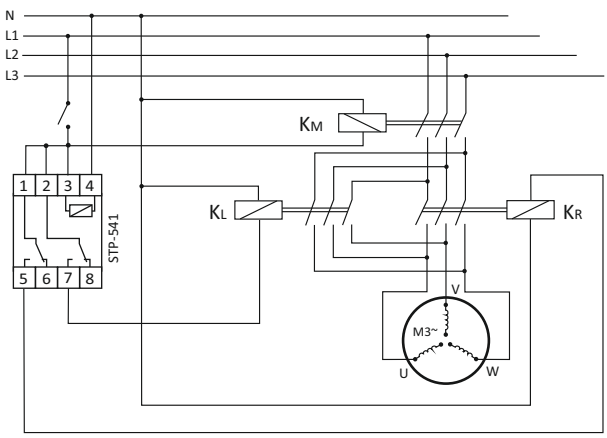
PURPOSE

The controller is used for technological process control in industrial automatic-control device systems which require temporal, cyclic and alternate activation of receivers with appropriate intervals between successive switchings.

FUNCTIONING

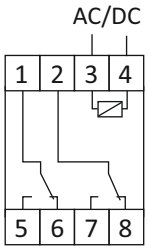
The controller works in compliance with a four-time sequence program and a preset number of cycles. A cycle is a sequence of four successive contact states.

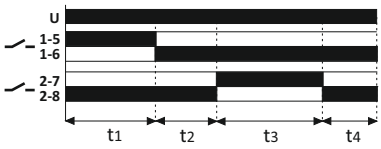
Diagram of the LEFT-RIGHT contactor-based switching system



KM - main contactor
KR - "RIGHT" contactor
KL - "LEFT" contactor







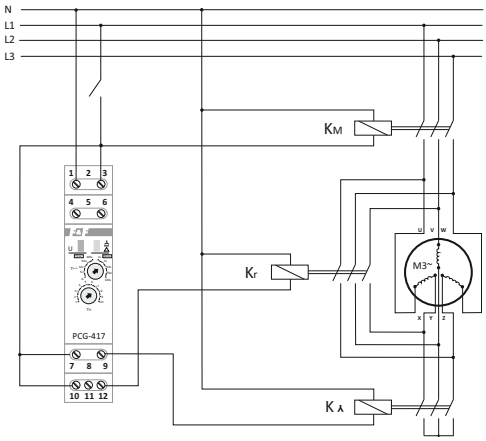
supply	24÷264V AC/DC
current load	2×(<16A)
contacts	2×1N/C
time settings t1, t2, t3, t4	1sec÷ 99h 59min 59sec
time setting accuracy	1 sec
number of cycle repetitions	1 ÷ 999999 or infinite in the "loop mode"
power consumption	1,5W
working temperature	-20÷50°C
connection	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35

PCG-417 STAR-DELTA SWITCH

To control the STAR-DELTA contactor connection system.

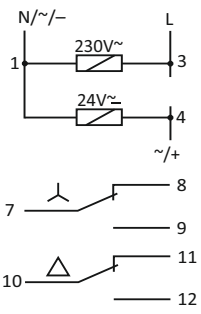
FUNCTIONING

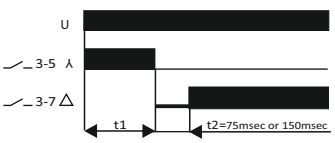
The PCG-417 relay is equipped with a special system of two electromagnetic relays which removes the risk of activating two connectors simultaneously, with each relay controlling a given connector. Once the system is switched from STAR to DELTA, one relay disconnects the "star" connector (a forced interval takes place). The other then activates the "delta" connector.
After the power supply is turned on, the contact 7-9 is closed and remains in this position for the preset start-up time t1. After the lapse of t1, contakt 7-9 opens and both contacts remain open for the time t2. After the lapse of t2, the contact 10-12 is closed and remains in this position until the power voltage is disconnected.



KM - main contactor
Kr - contactor "DELTA"
K Λ - contactor "STAR"





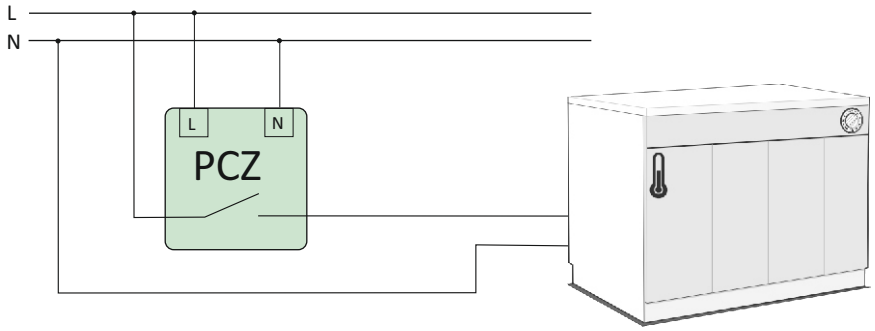


supply	230V AC / 24V AC/DC
current load	2×(<8A)
contact	2×1C/O
start-up time Λ	1÷1000sec
switching time Δ	75msec / 150msec
power consumption	0,8W
power supply indicator	green LED
action indicator	red LED
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35

15. PROGRAMMABLE CONTROL TIMERS

PURPOSE

Programmable control timers are used to control the work time of devices included into industrial or household automatic systems in compliance with individual time schedule planned by the user.



ATTENTION!

Daylight Saving Time - automatic change function! (Concerns all types)

Time change from winter to summer occurs automatically at 2 a.m. On the last sunday of March by adding one hour to the current time.
Time change from summer to winter occurs automatically at 3 a.m. on the last sunday of October by taking away one hour from the current time.
ATTENTION! It is possibilities to switch-OFF of automatic change function.

WEEKLY CYCLES TYPE

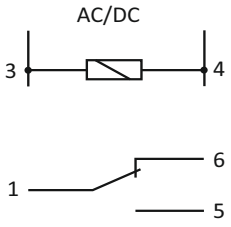
FUNCTIONING

The timer activates and deactivates a given device at preset hours in the following cycles: 24-hour, weekly, working day (Mon-Fri) or weekend (Sat, Sun).

PCZ-521

One-way type. 250 of program memory sectors.



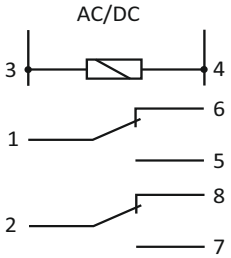


supply	24÷264V AC/DC
current load	<16A
contacts	1C/O
display maintenance time	non
timer maintenance time	6 years
indication accuracy item	1sec
time deviation	±1sec/24h
schedule time accuracy item	1min
no. of program memory sectors	250 (125 entry pairs: ON/OFF)
power consumption	1,5W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35

PCZ-522

Two-way type. 2×250 of program memory sectors.
With two independent separately programmable ways.





supply	24÷264V AC/DC
current load	2×(<16A)
contacts	2×1C/O
display maintenance time	non
timer maintenance time	6 years
indication accuracy item	1sec
time deviation	±1sec/24h
schedule time accuracy item	1min
no. of program memory sectors	2×250 (2×125 entry pairs: ON/OFF)
power consumption	1,5W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35

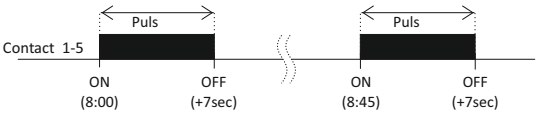
PULSE-TYPE

PCZ-523

One-way type with two programme lines.

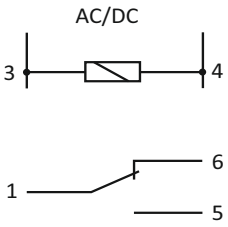
FUNCTIONING

The PCZ-523 activates a given device at a preset time and deactivates it after preset time (by pulse) in the following cycles: 24-hour, weekly, working day (Mon-Fri) or weekend (Sat, Sun). Pulse range: 1 sec. ÷ 99 min. 59 sec. The relay has been equipped with two independent switch able programme lines to control an connected receiver.



supply	24÷264V AC/DC
current load	<16A
contacts	1C/O
display maintenance time	non
timer maintenance time	6 years
indication accuracy item	1sec
time deviation	±1sec/24h
time accuracy item	1s÷99min59sec
schedule time accuracy item (pulse)	1sec
no. of program memory sectors	2×(125/per programme line)
power consumption	1,5W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35





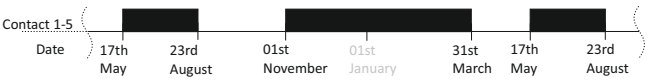
ANNUAL TYPE

PCZ-529

One-way type

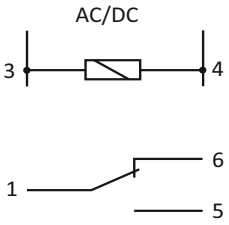
FUNCTIONING

Time control of devices in domestic or industrial automatic-control device systems according to internal time management program preset by the user. It allows a selection of the superordinate device responsible for seasonal cycles of an automatically controlled system. The timer activates and deactivates a given device to prescheduled dates in the annual cycle. Activation sequence available for a single, selected day of the year.

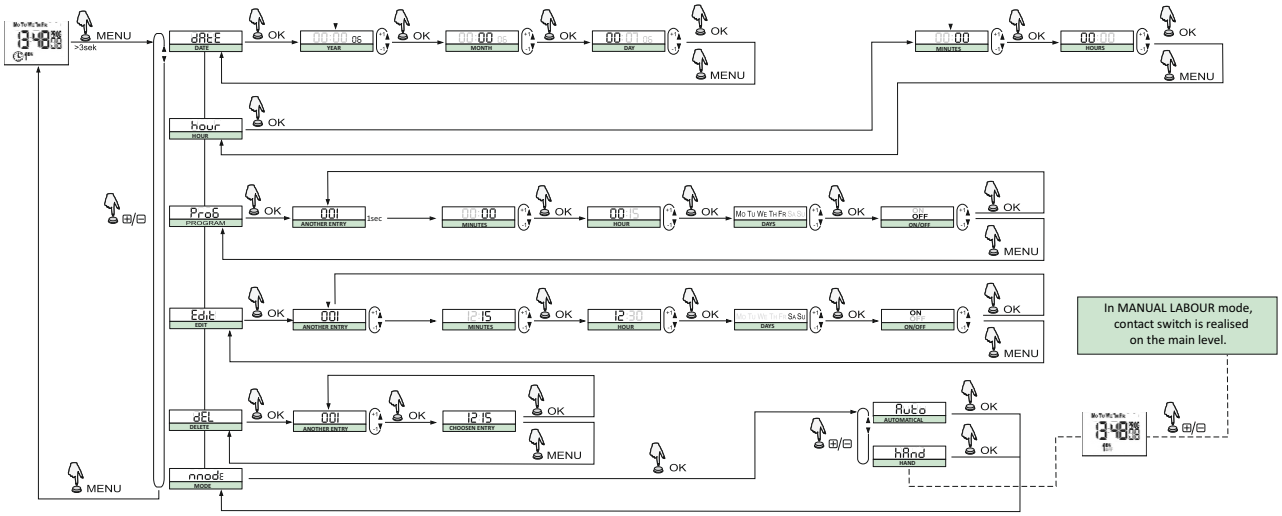


supply	24÷264V AC/DC
current load	<16A
contacts	1C/O
display maintenance time	1÷2h
timer maintenance time	5÷6 weeks
schedule maintenance time	10 years
battery recharge time	30h
Indication accuracy item	1sec
time deviation	±1s/24h
schedule time accuracy item	24h
no. of program memory sectors	198 storage
cells	(99 entry pairs: ON/OFF)
power consumption	1,5W
working temperature	-20÷50°C
connection	screw terminals 2,5mm²
dimenions	2 modules (35mm)
fixing	on rail TH-35





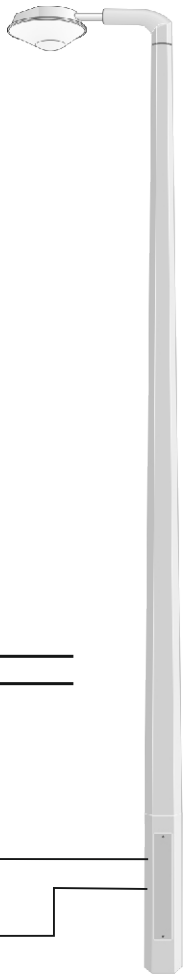
Easily programmable! Menu diagram and operational sequence for timer programming.



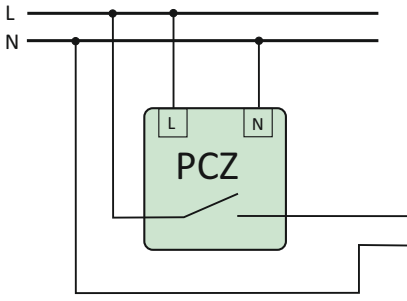
ASTRONOMICAL TYPE

FUNCTIONING

The astronomical timer activates and deactivates a device at certain hour, i.e. at sunrise and sunset. Should more settings that are precise be required for locations of different geographical co-ordinates, there is an option to set a given longitude and latitude or select a special code which entails automatic setting of these co-ordinates for a given place in Europe (list of locations and their codes may be found in the manual). Furthermore, there is an option to shift the preset activation/deactivation time for ±99 min. for sunrise and sunset times separately.



CITY CODE	°N	°E
1. Albania Tiranë	41:20:00 °N	019:49:00 °E
2. Austria Salzburg	47:54:00 °N	013:03:00 °E
3. Austria Vienna	48:13:00 °N	016:22:00 °E
4. Belgium Brussels	50:50:00 °N	004:21:00 °E
• • •		
21.France Brest	48:23:00 °N	004:30:00 °W
22.France Lyon	45:46:00 °N	004:50:00 °E
23.France Marseille	43:18:00 °N	005:22:00 °E
24.France Nantes	47:14:00 °N	001:35:00 °W
25.France Paris	48:52:00 °N	002:20:00 °E
26.France Strasbourg	48:35:00 °N	007:45:00 °E
27.Germany Berlin	52:30:00 °N	013:26:00 °E
28.Germany Frankfurt	50:06:00 °N	008:41:00 °E
29.Germany Hamburg	53:33:00 °N	010:00:00 °E
30.Germany Köln	50:53:00 °N	007:00:00 °E
31.Germany München	48:08:00 °N	011:35:00 °E
32.Germany Osnabruck	52:16:00 °N	008:02:00 °E
33.Greece Athens	38:00:00 °N	023:44:00 °E
34.Greece Iraklion	35:20:00 °N	25:09:00 °E
35.Greece Patra	38:14:40 °N	21:44:4 °E
• • •		



ATTENTION!

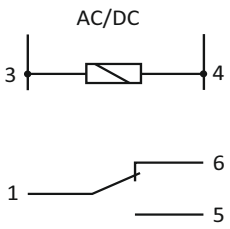
Daylight Saving Time - automatic change function! (Concerns all types)

Time change from winter to summer occurs automatically at 2 a.m. On the last sunday of March by adding one hour to the current time.
Time change from summer to winter occurs automatically at 3 a.m. on the last sunday of October by taking away one hour from the current time.
ATTENTION! It is possibilities to switch-OFF of automatic change function.

PCZ-524

One-way type.



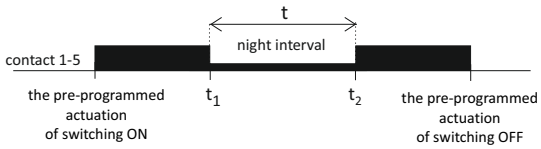


supply	24÷264V AC/DC
current load	<16A
contacts	1C/O
display maintenance time	non
timer maintenance time	6 years
indication accuracy item	1sec
time deviation	±1sec/24h
schedule time accuracy item	1min
activation/deactivation time correction	±0÷99min
schedule correction accuracy item	1min
power consumption	1,5W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35

WITH PROGRAMMEABLE NIGHT INTERVAL (PCZ-525.2, PCZ-526.2)

FUNCTIONING

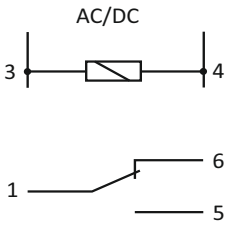
Like PCZ-524.2. Another feature enables the user to set the so-called night interval between the pre-programmed actuation times, i.e. turning off the controlled receiver for a given period t (e.g. from 11 p.m. (t1) to 04.00 a.m. (t2)).



PCZ-525

One-way type.



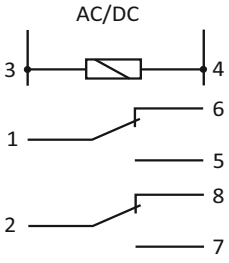


supply	24÷264V AC/DC
current load	<16A
contacts	1C/O
display maintenance time	non
timer maintenance time	6 years
indication accuracy item	1sec
time deviation	±1sec/24h
schedule time accuracy item	1min
activation/deactivation time correction	±0÷99min
schedule correction accuracy item	1min
interval time setting range	00:00÷24:00
power consumption	1,5W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35

PCZ-526

Two-way type





supply	24÷264V AC/DC
current load	<16A
contacts	2x1C/O
display maintenance time	non
timer maintenance time	6 years
indication accuracy item	1sec
time deviation	±1sec/24h
schedule time accuracy item	1min
activation/deactivation time correction	±0÷99min
schedule correction accuracy item	1min
interval time setting range	00:00÷24:00
power consumption	1,5W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35

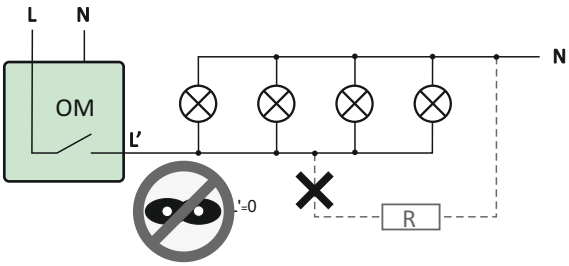
16. POWER CONSUMPTION LIMITERS

PURPOSE

Power consumption limiters are devised for the automatic disconnection of power from the circuit of single-phase wiring systems once the rated power consumption of the receivers incorporated into the system is exceeded.

FUNCTIONING

The limiter enables the user to supply power to the circuit if the total consumed power applied to the receivers constituting the system is lower than the preset value on the limiter's scale. Once the rated power consumption threshold in the controlled circuit is exceeded, the element is automatically disconnected from the power source. The supply is reinstated automatically once the preset time lapses. If the value of power consumption remains over the rated input, the power supply to the circuit is cut off again.

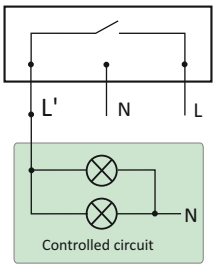


OM-1
OM-2

POWER SUPPLY RETURN: 30SEC.

ADJUSTABLE POWER SUPPLY RETURN: 4÷150SEC.

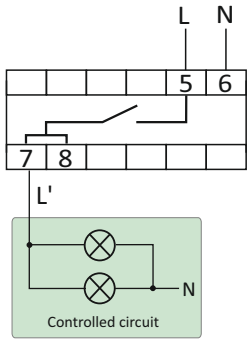




supply	180÷240V AC
current load	<16A
power limit	200÷2000 VA
activation lag	1,5÷2sec
power supply return	
OM-1 (factory setting)	30sec
OM-2 (to set)	4÷150sec
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	26×50×67mm
fixing	two screws to substrate

OM-631





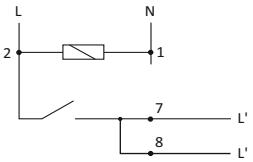
supply	180÷240V AC
current load	<16A
power limit	200÷2000 VA
activation lag	1,5÷2sec
power supply return	30sec
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

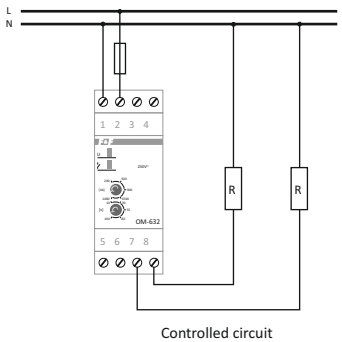
FOR CIRCUITS WITH CONVERTERS

OM-632

Limiter adapted for the protection of circuits with converters, e.g. fluorescent lamps, transformers.







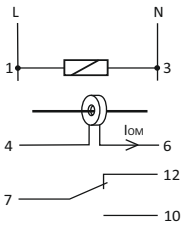
supply	180÷240V AC
contact	1O
current load for cosϕ=1	<16A
for cosϕ≠1	<4A
power limit	200÷1000 VA
activation lag	1,5÷2sec
power supply return	10÷100sec
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35

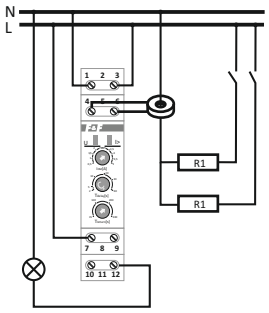
TO WORK WITH A CURRENT TRANSFORMER

OM-611

The relay is adapted to cooperate with current transformer whose primary circuit is connected to the circuit to be measured, and output terminals for measuring the OM, which allows for control circuits of any load and the actual setting of the relay activation threshold higher than 5A (I_{OM}). Range of measured current dependence on the transmission transformer for example, from 5A to 50A with the transmission ratio of 10:1 for the transformer 50/5A.







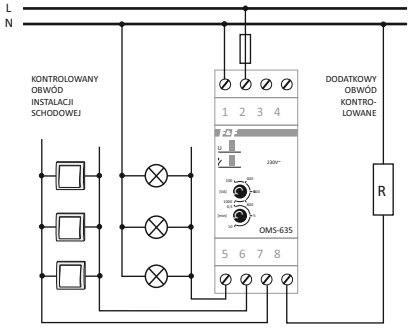
supply	180÷240V AC
contact	1C/O
current load	<10A
actuation threshold adjustable	0,5÷5 A
actuation delay adjustable	2÷40sec
power supply recovery hysteresis	2%
power supply recovery time adjustable	15÷300sec
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35

WITH STAIRCASE TIMER

OMS-635

The OMS-635 power consumption limiter allows the user to maintain lighting in halls, staircases or other places active for a specified time when it will then turn off automatically. The user may also preset the automatic disconnection of power supply to a single-phase wiring system if the rated power input to the receivers in a given circuit is exceeded.





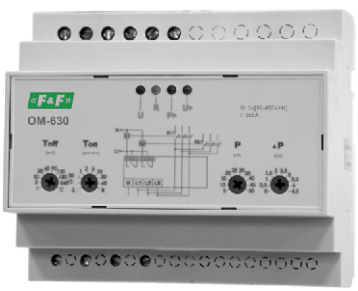
supply	180÷240V AC
current load	<10A
power limit	200÷1000VA
switching off delay (to set)	0,5÷10min
activation lag	1,5÷2sec
power supply return	30sec
work time setting range	0,5÷10min
power consumption	0,8W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

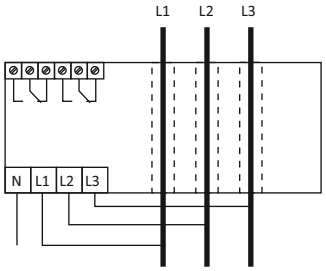
THREE-PHASES

OM-630 the direct measurement of the 50kW

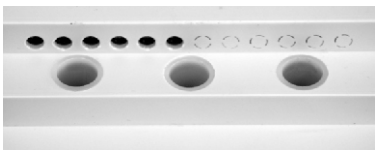
LIMITER FEATURES (depending on program version)

- measurement of three-phase active power
- three variants of calculation power (for different types of load)
- control of asymmetry, phase sequence and the presence of
- circuit protection
- function relay priority
- a function of three-phase voltage relay
- time lock limiter due to frequent exceedances of the threshold set
- alarm limit value is exceeded capacity
- regulation of activation and return time





power supply	3×[50÷450V+N
joint	separate 2×1P
load	2×8A
POWER	
activation threshold-regulated	5÷50kW
setting precission	0,5kW
activation time Toff -regulated	1÷240sec
return time Ton - regulated	2÷3600sec
VOLTAGE	
activation threshold	
up	<160V
down	>260V
activation time	
up	5sek
down	0,1sek
measurement precission	
voltage 50÷300V	<2%
current 3÷100	<3%
hole diameter transformer	10mm
power consumtion	
working tempearure	-25÷50ºC
dimensions	6 modules (105mm)
fixing	on the rail TH-35



internal circuits of current transformers

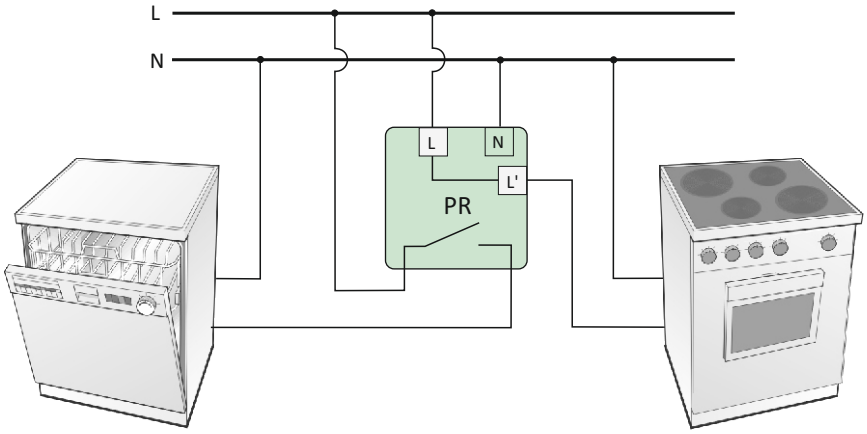
17. PRIORITY RELAYS

PURPOSE

Priority relays are designed to control the value of current drawn by electric receivers and their control units in cases where their simultaneous work could result in circuit overload or current overload protection activation.

FUNCTIONING

The potentiometer sets the value of drawn current (from 2A to 15A; for PR-615: from 4A to 30A) in the priority circuit, above which the receiver cuts off the non-primary circuit. A drop in current consumption in the priority circuit below the set threshold value will result in an automatic activation of the non-priority circuit. In cases where the priority receiver is already activated, the priority relay will prevent the activation of the non-priority receiver.

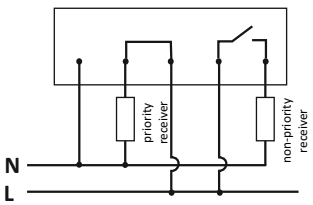


ATTENTION!

Circuits equipped with master relays require over-current security devices with increased actuation time, in order to prevent them operating before actuation of the relay.

PR-602 SETTING RANGE: 2÷15A

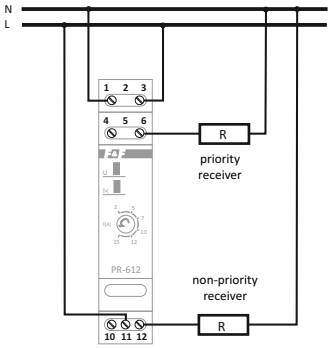




supply	230V AC
non-priority receivers current	<16A
	or higher with the use of a contactor
priority receivers current	<15A
contact	1 N/O
activation threshold	2÷15 A (priority circuit)
recovery hysteresis	10%
cut off delay	0,1sec
plug in delay	0,1sec
power consumption	0,4 W
dimensions	50×67×26 mm
terminal	screws terminal 2,5mm²
fixing	2 screws to substrate

PR-612 SETTING RANGE: 2÷15A





supply	230V AC
non-priority receivers current	<16A
	or higher with the use of a contactor
priority receivers current	<15A
contact	1 C/O
activation threshold	2÷15 A (priority circuit)
recovery hysteresis	10%
cut off delay	0,1sec
plug in delay	0,1sec
power consumption	0,4 W
terminal	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35

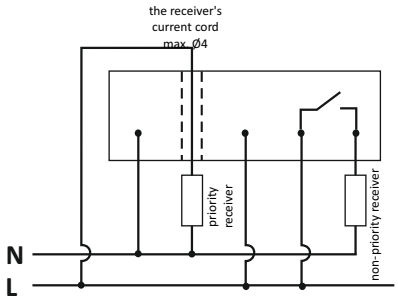
WITH THE RECEIVER'S CURRENT CORD SECTION

(GALVANIC SEPARATED FROM THE MEASUREMENT SYSTEM)

PR-603

SETTING RANGE: 2÷15A





supply	230V AC
non-priority receivers current	<16A
	or higher with use of contactor
priority receiver current	limited by the cross-section
	of the reciver cable
	(max Ø=4 mm)
contact	1 N/O
activation treshold	2÷15A (priority circuit)
recovery hysteresis	10%
cut off delay	0,1sec
plug In delay	0,1sec
working temperature	-25÷50°C
power consumption	0,4W
connection	screw terminals 2,5mm²
dimensions	26×50×67mm
fixing	two screws to substrate

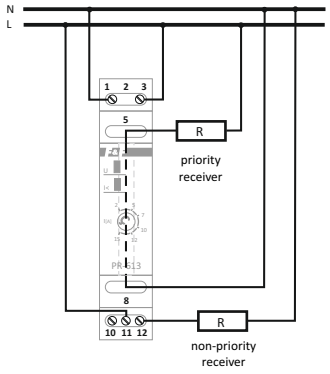
PR-613

SETTING RANGE: 2÷15A

PR-615

SETTING RANGE: 4÷30A





supply	230V AC
non-priority receivers current	<16A
	or higher with use of contactor
priority receiver current	limited by the cross-section
	of the reciver cable
	(max Ø=4 mm)
contact	1 C/O
activation treshold PR-613	2÷15A (priority circuit)
PR-614	4÷30A (priority circuit)
recovery hysteresis	10%
cut off delay	0,1sec
plug in delay	0,1sec
working temperature	-25÷50°C
power consumption	0,4W
connection	screw terminals 2,5mm²
dimensions	1 modules (18mm)
fixing	on rail TH-35

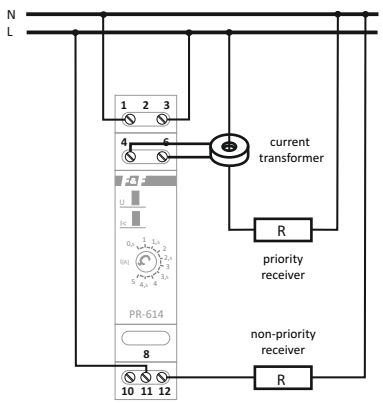
Priority receiver current can be higher than 15A. It is only restricted by the receiver's current cord section (galvanic separated from the measurement system) revved through the relay's throughway channel.

TO CO-OPERATION WITH A CURRENT TRANSFORMER

PR-614

The relay is designed to work with the current transformer with secondary current 5A. Transformer primary circuit is included in the priority receiver circuit, and secondary to the measurement relay terminals.
Example: For the receiver a priority for a maximum load of 140A we use the parameters of current transformer 150/5A. Torque is 30 at setting values on a scale equal to 2A relay will work with the actual value of current equal to 60A (2A×30=60A).





supply	230V AC
non-priority receivers current	<16A
	or higher with use of contactor
priority receiver current	<16A
	or increased with the use
	of current transformer
contact	1 C/O
activation treshold	2÷15A (priority circuit)
recovery hysteresis	10%
cut off delay	0,1sec
plug in delay	0,1sec
working temperature	-25÷50°C
power consumption	0,4W
connection	screw terminals 2,5mm²
dimensions	1 modules (18mm)
fixing	on rail TH-35

18. CURRENT RELAYS

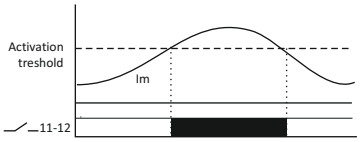
PURPOSE

Current relays are used to control the flow of current in the circuit measured with the function switch contact in case of exceeding the value of current intensity above set thresholds.

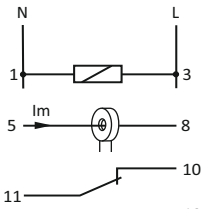
EPP-619 WITH RECEIVER'S CURRENT CORD SECTION.

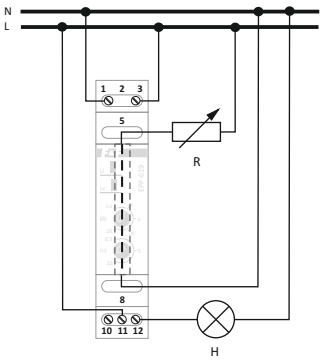
(GALVANIC SEPARATED FROM THE MEASUREMENT SYSTEM)

Adjustable potentiometer value is the measured intensity of the current circuit, above which the contact is closed (pos. 11-12). Intensity of the current decline in value below the set threshold will automatically open contact (item 11-10).









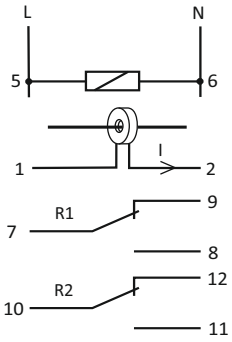
supply	230V AC
contact	separated 1P
current load	<16A
circuit current measured limited cross-section of the	cable (max. Ø=4mm)
current switch - adjustable	0,6÷16A
return histeresis	10%
actuation time - adjustable	0,5÷10sec
return time	0,5sec
power consumption	0,4Wworking
temperature	-25÷50°C
connection	screw terminal 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35

EPP-620 FOUR FUNCTIONS. WITH ADJUSTABLE LOWER AND UPPER ACTUATION THRESHOLD.

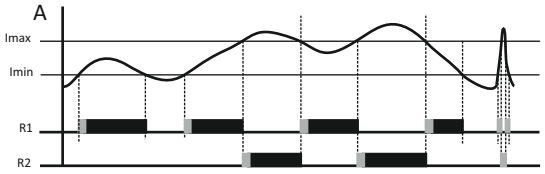
FUNCTIONING

The relay is designed to work with the current transformer with secondary current 5A. Transformer's primary circuit is included in the circuit being measured, and secondary to the terminals of the measuring relay. Potentiometers are set thresholds for current - the lower Imin and upper Imax. Excess over the measured intensity of the current closes the appropriate contacts in accordance with the desired work function. Contact closure is delayed setting potentiometers T1 (for contact R1) and T2 (for contact R2).

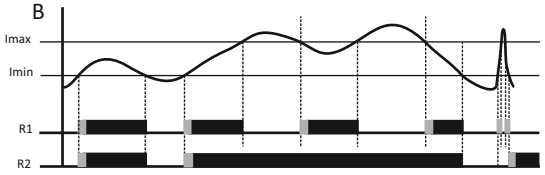




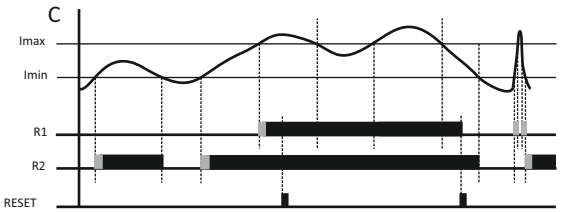
supply		230V AC
contact		2× separowany 1P
current load R1 i R2		2×[<16A]
input current measurement 1-2		<5A
current switch - adjustable	Imin	0,02÷1A
	Imax	0,5÷5A return
histeresis		10%
actuation time T1 i T2 - adjustable		0÷20sec
return time		0,5sec
power consumption		0,4W
working temperature		-25÷50°C
connection		screw terminals 2,5mm²
dimensions		3 modules (52,5mm)
fixing		on rail TH-35



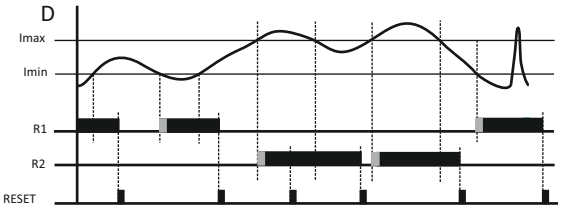
After crossing the Imin, contact R1 will close. After crossing the threshold of Imax contact R2 will close and R1 contact will be opened.



After crossing the Imin contacts R1 and R2 will close. After crossing the threshold of Imax R1 contact will open and R2 contact is closed.



After crossing the Imin the R2 contact will be closed. After crossing the threshold of Imax the R1 contact will be closed. Contact R1 is locked until you press the RESET button. If value exceeding Imax, the R1 contact doesn't react to the RESET button.



After crossing the Imin the R1 contact will be closed. After crossing the threshold of Imax the R2 contact will be and R1 contact is opened. Contact R1 and R2 are locked until you press the RESET button. If a value exceeding Imax, the contact R2 dosen't react to RESET.

19. FUSE MODULES

PURPOSE

Fuse modules serve as a security device for electric receivers against current increase over the nominal current value for the secured receiver.

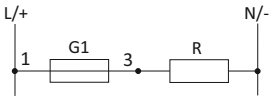
FUNCTIONING

Fuse actuation (blowing of fuse link) is signalled by a red LED.

BZ-1

One-socket.





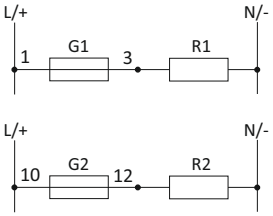


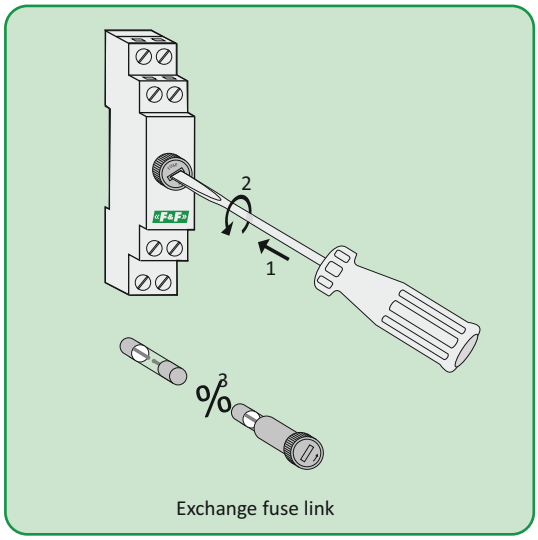
fuse link Ø5×20mm

BZ-2

Two-socket.





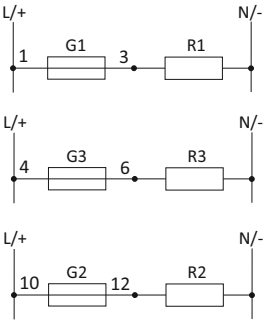


Exchange fuse link

BZ-3

Three-socket.

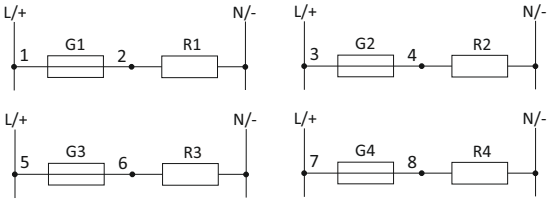




BZ-4

Four-socket.





fuse	fuse link Ø5×20mm
voltage	250V AC
current	<6,3A
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions BZ-1, BZ-2, BZ-3	1 module (18mm)
BZ-4	2 modules (35mm)
fixing	on rail TH-35

ATTENTION!

With DC power supply, proper polarity of the connection is of importance since otherwise the LED shall not signal the fuse actuation.

20. MICROPROCESSOR-BASED RELAY FOR ELECTRIC ENGINES

EPS

APPLICATION

The EPS is intended as a safety device for 3-phase electric motors. It is extremely efficient for expensive applications where reliability is essential, like for elevators, transporters, hoists, fans, centrifuges, compressors, etc.

FUNCTIONING

The relay controls loads for all phases. Based on the values preset by the user, as well as the actual current consumed by the motor, the operation of the motor is analysed by the relay's CPU. By comparing the operation of the motor in question with model characteristics stored in the CPU, the device detects all defects very quickly and accurately, and immediately switches off the motor.

SECURITY FEATURES

THERMAL PROTECTION
PROTECTION AGAINST MECHANICAL OVERLOAD
PROTECTION AGAINST FAN STALL
PROTECTION AGAINST FREQUENT RESTARTS
PROTECTION AGAINST PHASE COLLAPSE
PROTECTION AGAINST LOAD UNBALANCE
PROTECTION AGAINST EARTH FAULT

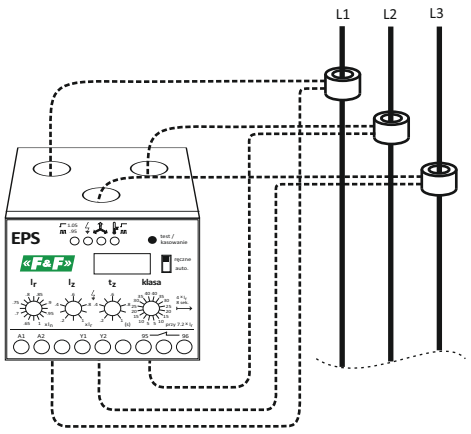
ADDITIONAL FEATURES

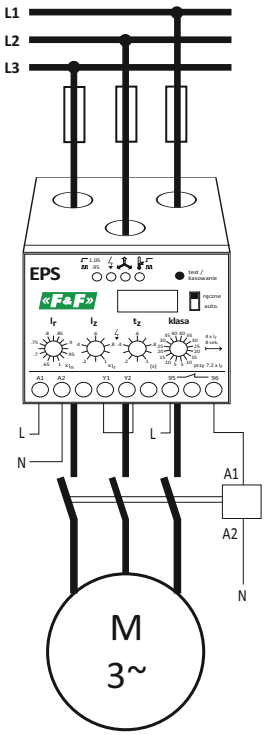
NITIAL LIGHT SIGNALLING OF ENGINE OVERLOAD
SELECTIVE SIGNALLING OF TRIP CAUSE
REMOTE RELAY MOTOR CONTROL DIRECTLY FROM INDUSTRIAL CONTROLLERS
MOTOR'S THERMAL MEMORY



The EPS is available in seven current versions: 5 A, 10 A, 16 A, 25 A, 45 A, 63 A, and 100 A. The actual working current set value range for each version is from 62 to 100% of the relay's rated current (0.625÷1×In). Therefore, the selection of a proper relay depends on the power of the engine to be protected and its rated current. For engines with power between several hundred watts and 55 kW, the EPS with a proper set current range can be used, whereas more powerful units require the 5A EPS version with additional external current transformers.

EPS VERSION	SETTING RANGE	
5A	3,125÷5A	to cooperatin with current transformer
10A	6,25÷10A	
16A	10÷16A	
25A	15,625÷25A	
40A	25÷40A	
63A	39,375÷63A	
100A	62,5÷100A	





power supply	230V AC
main circuits' insulation voltage	690V~
rated current (In)	see label on EPS case
current load of contact	2A AC-15
effective current unbalance	>30%
delay at phase decay and unbalance	4sec.
max. cable diameter	Ø14
terminal	screw terminals 2,5 mm
measurements	72×59×88 mm
weight	385g
fixing	on rail TH-35

EPS-D

APPLICATION

The EPS-D is intended as a safety device for 3-phase electric motors. It is extremely efficient for expensive applications where reliability is essential, like for pumps, hydrophores, elevators, transporters, hoists, fans, centrifuges, compressors, etc.

FUNCTIONING

The relay controls loads for all phases. Based on the values preset by the user, as well as the actual current consumed by the motor, the operation of the motor is analysed by the relay's CPU. By comparing the operation of the motor in question with model characteristics stored in the CPU, the device detects all defects very quickly and accurately, and immediately switches off the motor.

SECURITY FEATURES

THERMAL PROTECTION
PROTECTION AGAINST IDLE OPERATION AND DRY RUN (undercurrent protection)
PROTECTION AGAINST MECHANICAL OVERLOAD
PROTECTION AGAINST FAN STALL
PROTECTION AGAINST FREQUENT RESTARTS
PROTECTION AGAINST PHASE COLLAPSE
PROTECTION AGAINST PHASE SEQUENCE SWITCH
PROTECTION AGAINST LOAD UNBALANCE
PROTECTION AGAINST EARTH FAULT



OPTIONAL SECURITY FEATURES

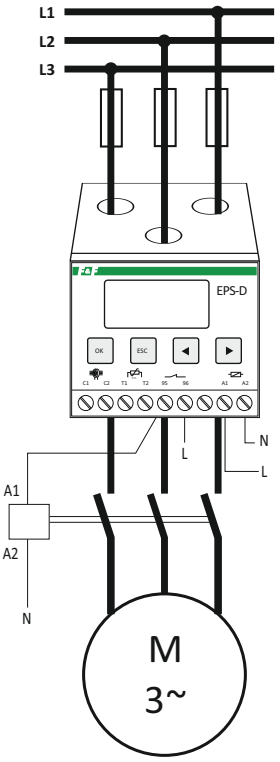
AGAINST SHOCK (an additional Ferranti transformer enables efficient protection within the range of 30 mA 500 mA. Response time: approx. 100 ms).

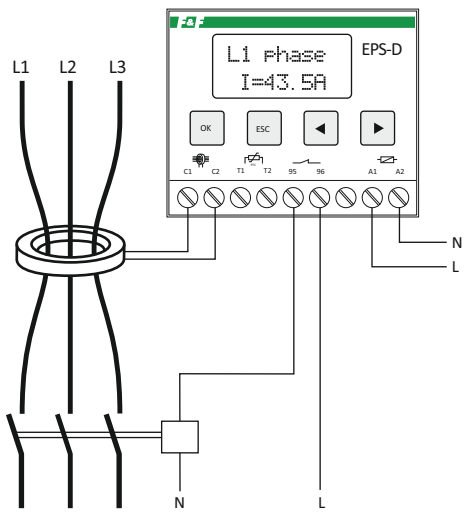
ADDITIONAL FEATURES

MOTOR LOAD PREVIEW
MESSAGE CONCERNING THE CAUSE OF PROTECTION ACTIVATION
MOTOR'S THERMAL MEMORY

The relay's LCD screen shows an actual current value for a single, selected phase. This is available in absolute (A) or relative (%) values in relation to the set current value In. additionally, the device displays the scope of the measured current by means of characters (I > 105% In), (I < 95% In), (95% In I 105% In). The relay measures the real current value up to and including the 7th harmonic. The measurement accuracy is 1%.

VERSION	SETTING RANGE	
20A	1÷5A	to cooperatin with current transformer
20A	5÷25A	
100A	20÷100A	

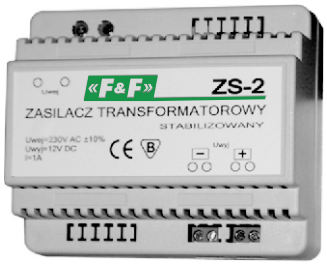




power supply	230V AC
main circuits' insulation voltage	690V~
rated current (In)	see label on EPS case
current load of contact	2A AC-15
effective current unbalance	>30%
delay at phase decay and unbalance	4sec.
max. cable diameter	Ø14
terminal	screw terminals 2,5 mm
measurements	72×59×88 mm
weight	385g
fixing	on rail TH-35

21. ELECTRIC SUPPLIERS AND TRANSFORMERS

ZS 1÷6 TRANSFORMER-BASED 12W



TYPE	OUTPUT VOLTAGE	OUTPUT CURRENT
ZS-1	5V DC	2A
ZS-2	12V DC	1A
ZS-3	18V DC	0,66A
ZS-4	24V DC	0,5A
ZS-5	15V DC	0,8A
ZS-6	48V DC	0,25A

input voltage	230 V ± 10% AC
output power	12W
current limitation	I max = 110% of output current
working temperature	-10÷60°C
current ripple	<3mV RMS
connection	screw terminals 2,5mm²
dimensions	6 modules (105mm)
weight	550g
fixing	on the TH-35 rail

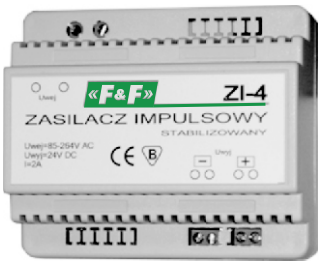
ZI-20-21 IMPULSOWY 12W



TYPE	OUTPUT VOLTAGE	OUTPUT CURRENT
ZI-20	12V DC	1,0A
ZI-21	24V DC	0,5A

input voltage	85÷264V AC
output power	12W
current limitation	I max = 110% of output current
working temperature	-10÷60°C
minimum load	0%
keying frequency	70 kHz
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
weight	80g
fixing	on the TH-35 rail

ZI 1÷6 PULSE 50W



TYPE	OUTPUT VOLTAGE	OUTPUT CURRENT
ZI-1	5V DC	10A
ZI-2	12V DC	4A
ZI-3	18V DC	3A
ZI-4	24V DC	2A
ZI-5	15V DC	3,3A
ZI-6	48V DC	1A

input voltage	85÷264V AC
output power	50W
current limitation	I max = 110% of output current
working temperature	-10÷60°C
minimum load	0%
keying frequency	70 kHz
connection	screw terminals 2,5mm²
dimensions	6 modules (105mm)
weight	550g
fixing	on the TH-35 rail

ZI-22-24 PULSE 30W



TYPE	OUTPUT VOLTAGE	OUTPUT CURRENT
ZI-22	12V DC	2,5A
ZI-24	24V DC	1,25A

input voltage	100÷264V AC
output power	30W
current limitation	I max = 110% of output current
working temperature	-10÷40°C
minimum load	0%
keying frequency	70 kHz
connection	screw terminals 2,5mm²
dimensions	3 modules (52,5mm)
weight	190g
fixing	on the TH-35 rail

ZT 1÷6 TRANSFORMER-BASED WITH PULSE STABILIZER



TYPE	OUTPUT VOLTAGE	OUTPUT CURRENT
ZT-1	5V DC	3A
ZT-2	12V DC	2A
ZT-4	24V DC	1A

input voltage	180÷264V AC
output power	25W
current limitation	I max = 110% of output current
working temperature	-10÷40°C
minimum load	0%
keying frequency	52 kHz
connection	screw terminals 2,5mm²
dimensions	6 modules (105mm)
weight	742g
fixing	on the TH-35 rail

ZI 11÷14 PULSE STABILIZER



TYPE	INTPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT
ZI-11	8÷28V AC / 12÷37V DC	5V DC	3A
ZI-12	12÷28V AC / 16÷37V DC	12V DC	3A
ZI-13	18÷28V AC / 22÷37V DC	18V DC	3A
ZI-14	24÷28V AC / 38÷27V DC	24V DC	3A

input voltage	10÷28V AC
output currentr	3A
current limitation	I max = 110% of output current
minimum load	0%
working temperature	-10÷60°C
connection	screw terminals 2,5mm²
dimensions	3 modules (52,5mm)
weight	150g
fixing	on the TH-35 rail

ZI-60-24 / ZI-120-24 / ZI-240-24 PULSE POWER INDUSTRY

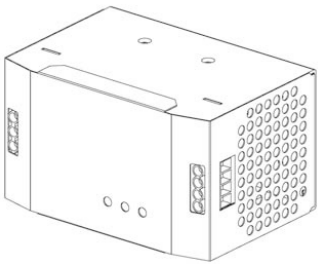






supply	90÷264VAC/120÷370VDC
output voltage	24V DC
frequency	47÷63Hz
min. load	0%
switching frequency	
breakdown voltage IN->OUT	3kV
overload	105%I/3min
cooling	air gravity
protection	Short circuit / overload
	overvoltage / temperature
supply indiction	green LED
overload/surge indication	red LED

type	power [W]	current [A]	output regul. [V]	efficiency [%]	dimensions [mm]	weight [g]
ZI-60-24	60	2,5	22÷27V	84	130×50×90	485
ZI-120-24	120	5,0	22÷28V	87	130×75×90	630
ZI-240-24	240	10,0	22÷28V	86	130×110×90	1040



TR-08 / TR-12 / TR-24 MAINS TRANSFORMER

PURPOSE

Application: power supply of electrical and electronic devices which do not require a stable and properly filtered supply voltage, regardless of mains voltage fluctuations.





supply		230V AC
efficiency		85%
working temperature		-10÷45°C
dimensions	TR-08	2 modules (35mm)
	TR-12	3 modules (52,5mm)
	TR-24	3 modules (52,5mm)
weight	TR-08	271g
	TR-12	325g
	TR-24	433g
connection		screw terminals 2,5mm²
fixing		on rail TH-35

TYP	OUT SUPPLY.	CURRENT	POWER
TR-08	8V	1A	8VA
TR-12	12V	0,66A	8VA
TR-24	24V	0,5A	12VA

The transformer system has an incorporated PTC posistor which offers overcurrent protection.

22. POWER SUPPLY INDICATORS

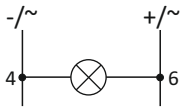
SIGNAL LAMPS

LK-712 One phase.

PURPOSE

Designed to optically signal the presence of voltage in a electrical circuit.





TYPE	COLOURS OF LED
LK-712 G	1×GREEN
LK-712 Y	1×YELLOW
LK-712 R	1×RED
LK-712 B	1×BLUE

supply (made in one range only)	5÷10V AC/DC
	10÷30V AC/DC
	30÷130V AC/DC
	130÷260V AC/DC
voltage indicator	1×LED
power consumption	0,8W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	1 module(18mm)
fixing	on rail TH-35

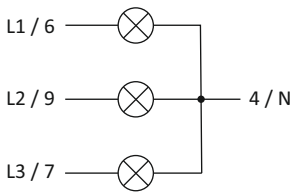
Order labelling method: LK-712 B 30÷130V — supply voltage — colour of LED

LK-713 Three phases.

PURPOSE

Designed to optically signal the presence of voltage in the three-phase electrical network.
The presence of voltage in a phase is signalled by the green LED in the circuit of each phase.





TYPE	COLOURS OF LED
LK-713 G	3×green LED
LK-713 Y	3×yellow LED
LK-713 R	3×red LED
LK-713 K	yellow-red-green LEDs

supply	3×230V+N
voltage indicator	3×LED
power consumption	1,1W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	1 module (18mm)
fixing	on rail TH-35

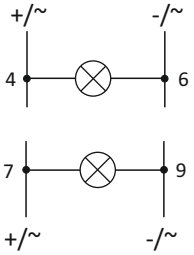
Order labelling method: LK-713 K — colour of LEDs

LK-714 Two ability type.

PURPOSE

Designed to optically signal the ability of recivers, for example: work - break, opened - closed, ect. It has two separated signal circuit: green LED and red LED.





supply (made in one range only)	5÷10V AC/DC
	10÷30V AC/DC
	300÷130V AC/DC
	13÷260V AC/DC
indicator	1×LED green
	1×LED red
power consumption	1,6W
connection	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	1 module(18mm)
fixing	on rail TH-35

Order labelling method: LK-712 30÷130V — supply voltage

VOLTAGE INDICATORS

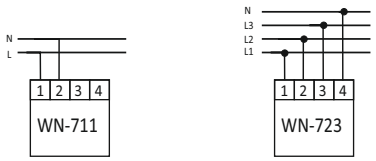
PURPOSE

Voltage indicators are devised to continually measure the value of the voltage in a single-phase or thrre-phase network.

LED LINE TYPE

WN-711 One phase indicator.
WN-723 Three phase indicator.



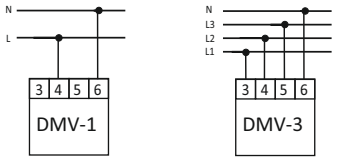


supply	WN-711	230V AC
	WN-723	3×400V+N
voltage indicator	WN-711	11×LED
	WN-723	3×(11xLED)
indication range		205÷245V
scale		5V
indication precision		2,5V
power consumption		0,8W
connection		screw terminals 2,5mm²
working temperature		-25÷50°C
dimensions	WN-711	1 moduł (17,5mm)
	WN-723	2 moduły (35mm)
fixing		on rail TH-35

DIGITAL

DMV-1 **DMV-1 TrueRMS** One phase indicator.
DMV-3 **DMV-3 TrueRMS** Three phase indicator.





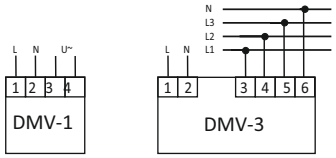
supply	100÷300V AC
frequency	45÷55Hz
indication range	100÷300V
indication precision	
DMV-1; DMV-3	1%
DMV-1 True RMS; DMV-3 True RMS	0,5%
display for one phase	3×segment LED 10×6mm
power consumption	4W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	3 moduły (52,5mm)
fixing	on rail TH-35

* phase voltage measurement
* measuring circuit is also a device supplying circuit
* indicators with True RMS marking, equipped with RMS value converter, give proper voltage value for deflected runs

DIGITAL

DMV-1T One phase indicator.
DMV-3T Three phase indicator.





supply		230V AC
indication range	DMV-1T	12÷600V
	DMV-3T	3×0÷400V
indication precision		1%
display		
	DMV-1T	4×segment LED 14×8mm
	DMV-3T	3×(4×segment LED 14×8mm)
power consumption		3VA
working temperature		-5÷50°C
connection		screw terminals 2,5mm²
dimensions		
	DMV-1T	72×72×92mm
	DMV-3T	96×96×92mm
fixing hole		
	DMV-1T	66×66mm
	DMV-3T	92×92mm

CURRENT INTENSITY INDICATORS

PURPOSE

Current intensity indicators are devised to continually measure the value of the current in a circuits of single-phase or thrre-phase network.

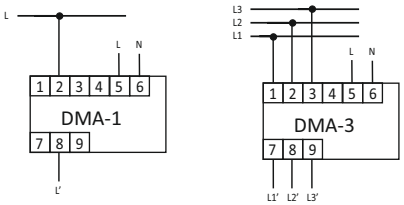
DIGITAL

DMA-1 **DMA-1 True RMS** One phase indicator.

DMA-3 **DMA-3 True RMS** Three phase indicator.

* independent current measurement for each phase
* indicators with True RMS marking, equipped with RMS value converter, give proper voltage value for deflected runs





supply	100÷300V AC
frequency	45÷55Hz
max. measured current	20A
max. temporary overloading of current	40A (<1sec)
indication precision	
DMV-1; DMV-3	1%
DMV-1 True RMS; DMV-3 True RMS	0,5%
display for one phase	3×segment LED 10×6mm
power consumption	4W
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	3 moduły (52,5mm)
fixing	on rail TH-35

DMA indicators are intended for current transformers with a rated secondary current of 5A. The current range for these transformers is from 25 to 1000/5 A. The primary value of the transformer's current specifies the maximum measured current and the actual current value displayed by the indicator.
The DMA-20A and DMA-3 20A are intended for direct measurements (without transformers applied) within the range of 0÷20 A.

Order labelling method:

INDIRECT MEASUREMENT (with transformers applied)

DMA- X Y /5A Z

- Z: True RMS
- Y: primary value of the transformer's current : 25, 30, 40, 50, 70, 75, 80, 100, 120, 125, 150, 160, 200, 250, 300, 400, 500, 600, 700, 750, 800, 900, 1000.
- X: onephase: 1; threephase: 3

Example:
* DMA-150/5A a one-phase device for 50/5A transformer, measurement range at 0÷50A, no TrueRMS;
*DMA-3150/5 A TrueRMS a three-phase for 3×150/5A transformers, measurement range at 3 ×0÷150 A, incl. TrueRMS.

DIRECT MEASUREMENT (without transformers)

DMA- X 20A Z

- Z: True RMS
- X: onephase: 1; threephase: 3

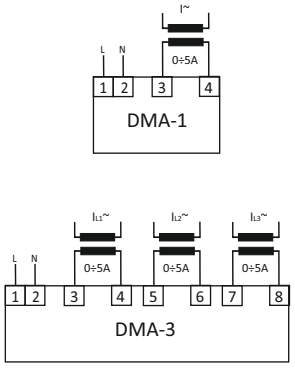
Przykład:
* DMA-1 20A - jednofazowy do 20A, zakres mierzony 0÷20A, bez TrueRMS
* DMA-3 20A TrueRMS - trójfazowy do 20A, zakres mierzony 3x0÷20A, z TrueRMS

DMA-1T One phase indicator.

DMA-3T Three phase indicator.

* direct measurement 0÷5A
* indirect measurement using current transformers
* setting indicator to proper current transformer values using three buttons on the indicator's front





supply	230V AC
max. current of direct measure for single phase	5A
max. current of indirect measure	depended on applyed current transformer
possible type of current transformer to conect	1÷9000/5A
indication precision	1%
display	
DMA-1T	4×segment LED 14×8mm
DMA-3T	3×(4×segment LED 14×8mm)
power consumption	3VA
working temperature	-5÷50°C
connection	screw terminals 2,5mm²
dimensions	
DMA-1T	72×72×92mm
DMA-3T	96×96×92mm
fixing hole	
DMV-1T	66×66mm
DMV-3T	92×92mm

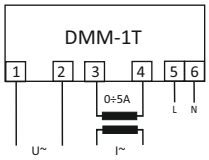
MULTIMETERS

PURPOSE

Multimeters are intended for monitoring parameters of three-phase electrical network.

DMM-1T ONE-PHASE TYPE



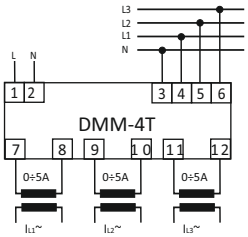


supply	230V AC
max. current of direct measure for single phase	5A
max. current of indirect measure	depended on applyed current transformer
possible type of current transformer to conect	1÷9000/5A
measured frequency range	10÷100Hz
measured voltage range	0÷400V
indication precision	1%±1 digit
display	4×segment LED 5×9mm
power consumption	3VA
working temperature	-5÷50°C
connection	screw terminals 2,5mm²
dimensions	96×96×92mm
fixing hole	92×92mm

* independent current measurement for each phase
* direct measurement 0÷5A
* indirect measurement using current transformers in standard current work with 1÷9000/5A range
* setting indicator to proper current transformer values using three buttons on the indicator's front
* phase voltage and phase to phase voltage measurement
* phase frequency measurement

DMM-4T THREE-PHASE TYPE



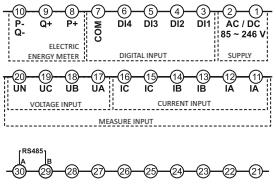


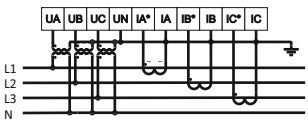
supply	230V AC
max. current of direct measure for single phase	5A
max. current of indirect measure	depended on applyed current transformer
possible type of current transformer to conect	1÷9000/5A
measured frequency range	10÷100Hz
measured voltage range	0÷400V
indication precision	1%±1 digit
display	4×segment LED 5×9mm
power consumption	3VA
working temperature	-5÷50°C
connection	screw terminals 2,5mm²
dimensions	96×96×92mm
fixing hole	92×92mm

* independent current measurement for each phase
* direct measurement 0÷5A
* indirect measurement using current transformers in standard current work with 1÷9000/5A range
* setting indicator to proper current transformer values using three buttons on the indicator's front
* phase voltage and phase to phase voltage measurement
* phase frequency measurement
* selection of indicated voltage and frequency values for a single phase using button on indicator's front

DMM-3T THREE-PHASE TYPE







* direct or indirect (using current transformer) measurement of phase currents.
* direct or indirect (using current transformer) measurement of phase voltage and phase to phase voltage.
* frequency measurement
* active, wattless and apparent power measurement
* power factor measurement
* four-quadrant measurement of input and output energy
* constant or periodical display of one of eight measured values, automatic switching between the displayed values
* digital inputs
* OC type pulse output (open collector)
* communication with peripheral devices using RS485 interface and MODBUS RTU protocol (up to 32 devices)

supply	85÷264V AC/DC
power consumption	<5VA
frequency	45÷65Hz
operation temperature	-10÷50°C
humidity (free of wet and gascorruption)	≤85%
elevation	≤3000m n.p.m.
dimansion	96×96×105mm
fix hole	92×92mm
network	three phase three-wire or four-wire
measuringaccuracy	
voltage/current	±(0,5%FS + 1 digit)
power	±(0,5%FS + 1 digit)
frequency	±0,1Hz
power factor	±0,01
active electric energy	±0,5%
reactive electric energy	±2%
digital output	
ways	4
signal	non current type
electric energy meter	
output mode	two-channel open collector optical pulse output
puls constant - active	10000imp/kWh
- reactive	10000imp/kVARh
communication	
output mode	RS 485
protocol	MODBUS RTU
baud rate	4880bps
working temperature	-5÷50°C
connection	screw terminals 2,5mm²
dimensions	96×96×92mm
fixing hole	92×92mm

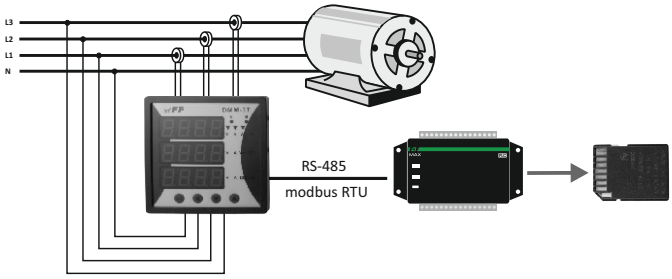
NETWORK PARAMETERS REGISTRATION SYSTEM

LogDMM2 with PC configurator

LogDMM-D with LCD monitor

PURPOSE

The system is dedicated to registration of 3-phase network.



PARTS OF THE SYSTEM:

LogDMM2: controller MAX S02, multimeter DMM-3T, termination modulese LT-04 (2 pcs.), memory card SD 2GB], cable USB, soft + manuals.

LogDMM-D: controller MAX H01, multimeter DMM-3T, gel battery ACCU-Hp1,3Ah-12V, termination modulese LT-04 (2 pcs.), memory card SD 2GB], soft + manuals.


DMM-3T


MAX S02


MAX H03


LT-04


ACU 12V 1,3Ah


cable USB


CD soft


SD 2G

Circuit devices DMM-3T and MAX used for reading and recording parameters of three-phase system. Controller and multimeter to communicate through the port RS485 using the communication protocol MOTBUS RTU. The controller periodically records retrieved network parameters and stores them in internal memory. Writing in the internal memory is periodically transferred to a text file on the SD card.

Recorded parameters:

- Date [YYYY-MM-DD]
- time [hh: mm: ss]
- three phase voltages (U1, U2, U3)
- three phase currents (I1, I2, I3)
- network frequency (F)
- active Power (P)
- reactive Power (Q)
- apparent power (S)
- power factor (cosϕ)
- positiv activ energy (+Wh) [kWh]
- negativ activ energy (-Wh) [kWh]
- positiv reactiv energy (+varh) [kvarh]
- negativ activ energy (-varh) [kvarh]

Simultaneously are recorded parameters of the correctness of read registers (status). Start reading registers is indicated by a single low beep. Backup registry is stored on an SD card to a file LogDMM.txt. Minimum registers cycle reading time is 1.0 sec.

LogDMM-D:

All settings of cycle times, dates, time, and backup is done by using main menu on controller's LCD screen. Additionally using front panel and buttons we may start and stop registration process also get the message about controller - multimeter communication.

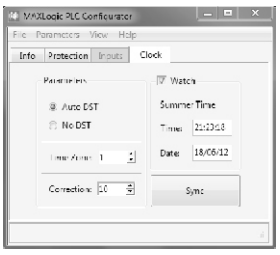


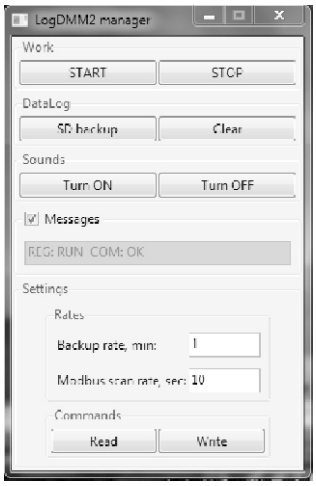


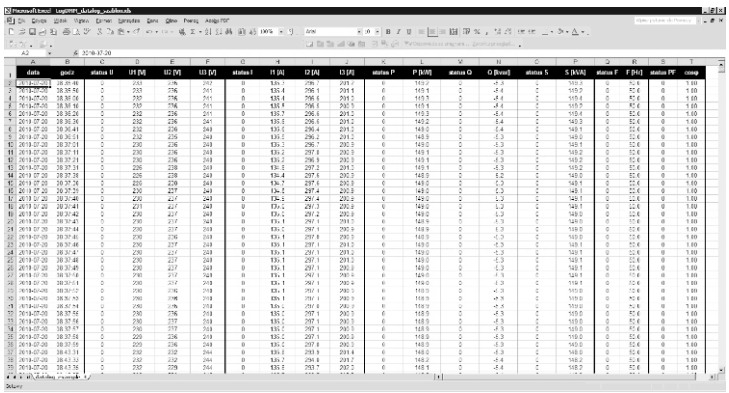
LogDMM-D's program menu

LogDMM2:

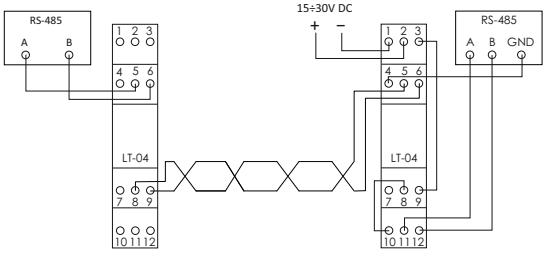
All settings of cycle times, dates, time, and backup is done by using special configurate program for PC. Additionally using front panel and buttons we may start and stop registration process also get the message about controller - multimeter communication.







Look of registered data imported into Excel spreadsheet.

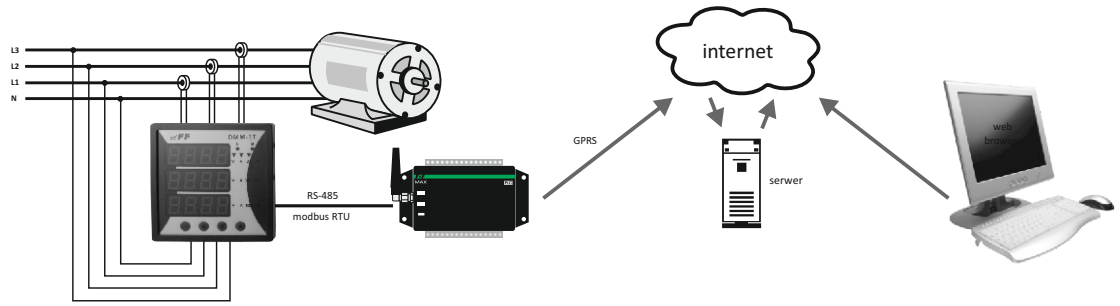


Optional connection of termination modules in order to RS-485 network polarization.

LogDMM-G

PURPOSE

Pack is used to read and registration phase network parameters and remotely send data to MySQL base via GPRS communication.



COMPONENT

MAX H02 controller, multimeter DMM-3T, gel battery ACCU-HP1,-12V 3Ah, termination modules LT-04 (2 pcs), mini USB cable> USB, software + manual. 24V power adapter available separately (eg, ZI-24).


DMM-3T


MAX H02


LT-04


ACU 12V 1,3Ah


CD soft


USB wire

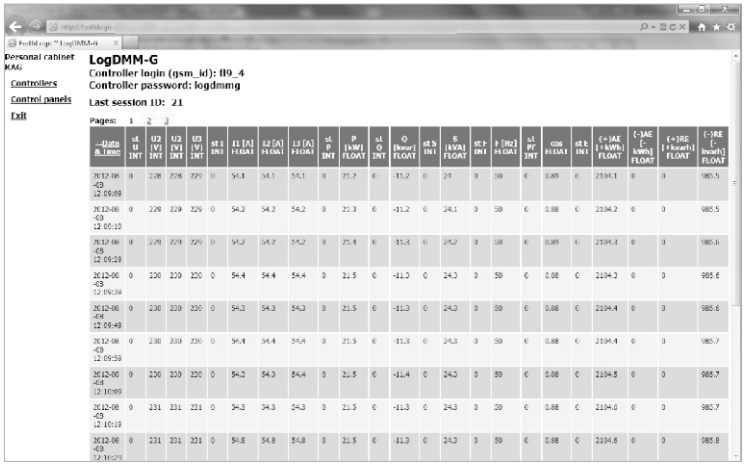
FUNCTIONING

MAX controller and multimeter DMM-3T communicate with the RS485 port using Modbas RTU communication protocol. The controller cycle records the read network parameters and stores them in the internal memory. Recording from the internal memory is periodically sent to the MySQL database installed on a special base server. User access to data in a table is available through any web browser. Data can be deleted or imported to your computer as a text file. There is also the ability to directly read data from a MySQL database from other systems or programs (this requires the construction of a separate program).

Recorded parameters:

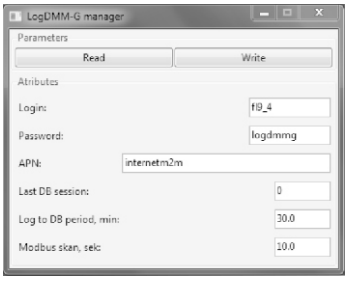
- date [YYYY-MM-DD]
- time [hh: mm : ss]
- voltage of three phases (U1, U2, U3) [1V]
- current of three phases(I1, I2, I3) [1A]
- network frequency (FREQ) [1Hz]
- active power (P) [1kW]
- reactive power (Q) [1kVar]
- apparent power(S) [1kVA]
- power factor (cosϕ)
- Positive active energy(+Wh) [kWh]
- Negative active energy (-Wh) [kWh]
- Positive reactive energy((+varh) [kvarh]
- negative reactive energy(-varh) [kvarh]

Simultaneously recorded parameters are correct reading registers (status):
0 - read correctly, 16 - no answer, for example, the multimeter off, broken communication cable, etc., 17 - checksum incorrect response (incorrect result), for example, an error resulting from disturbances on the communication line.
Cycle registers read and write to the internal memory and the transmission cycle [backup] to the database are set by the user. The minimum read cycle time is 1.0 sec records.
The system requires a SIM card with tariff telemetry from any operator and buy a hosting service, or maintain a database on external server F&F



Display data in a web browser

Any adjustments cycle times, dates, times, and perform backup is done by using a special program menu on your computer.



Menu program LogDMM-G on PC

23. ELECTRIC ENERGY METERS

ELECTRIC ENERGY METERS

According to directive

MID

PURPOSE

LE are a static (electronic) rated electric energy meters which are to serves as an auxiliary meters to measure the energy consumption in a direct system.

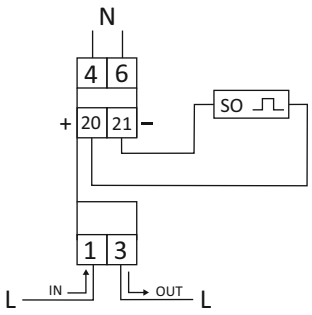
FUNCTIONING

The meter is equipped with a special electronic circuit which generates pulses proportionally to electric energy consumption in a given phase by means of the current flow and voltage applied. The sum of the pulses from t is signalled by blinking of an LED , calculated in phase into the electric energy consumed in the system, and finally its total value is indicated by a counter.

DIRECT MEASUREMENT TYPE

LE-01 / LE-01d SINGLE-PHASE

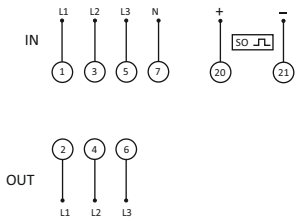




reference voltage		230V AC ±30%
basic current		5A
maximum current		45A
minimum current		0,02A
measurement accuracy per IEC61036		class 1
counter's own power consumption		<8VA; <0,4W
drum counter indication range		
LE-01		0÷99999.9 kWh
LE-01d		0÷99999.99 kWh
constant of a meter	(1Wh/pulse)	1000 pulses/kWh
current consumption signal		1×red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		< 27V DC
connection current SO+ SO-		< 27mA
constant SO+ SO-	(1Wh/pulse)	1000 pulses/kWh
czas impulsu SO+ SO-		70msec
working temperature LE-01		-20÷65°C
LE-01d		-20÷50°C
protection level		IP20
connection		6mm² screw terminals
measurements		1 modules (18 mm)
fixing		on rail TH-35

LE-02d THREE-PHASE



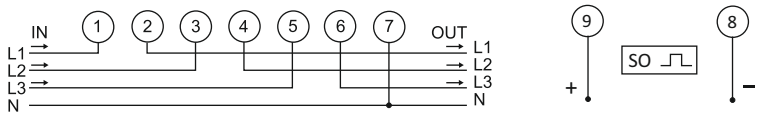


reference voltage		3×230/400V+N
basic current		5 A
maximum current		63A
minimum current		0,04A
measurement accuracy per IEC61036		class 1
counter's own power consumption		<10VA; <2W
drum counter indication range		0÷999999,99 kWh
constant of a meter	(1,25 Wh/pulse)	800 pulses/kWh
current consumption signal		3×red LEDs
read-out status signal		red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		< 30V DC
connection current SO+ SO-		< 27mA
constant SO+ SO-	(1.25 Wh/pulse)	800 pulses/kWh
working temperature		-20÷50°C
protection level		IP20
connection		16mm² screw terminals
measurements		4,5 modules (75 mm)
fixing		on rail TH-35

LE-03 / LE-03d THREE-PHASE TYPE

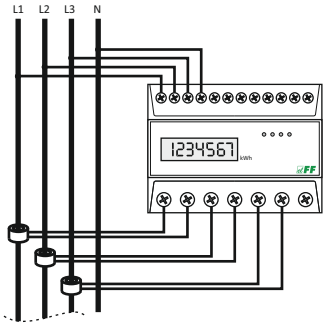






reference voltage		3×230/400V+N
basic current		10 A
maximum current		100A
minimum current		0,04A
measurement accuracy per IEC61036		class 1
counter's own power consumption		<10VA; <2W
drum counter indication range		0÷999999,9 kWh
constant of a meter	(1,25 Wh/pulse)	800 pulses/kWh
current consumption signal		3×red LEDs
read-out status signal		red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		< 30V DC
connection current SO+ SO-		< 27mA
constant SO+ SO-	(1.25 Wh/pulse)	800 pulses/kWh
working temperature LE-03		-20÷65°C
LE-03d		-20÷50°C
protection level		IP20
connection		25mm² screw terminals
measurements		7 modules (122 mm)
fixing		on rail TH-35

TO CO-OPERATION WITH A CURRENT TRANSFORMERS



PURPOSE

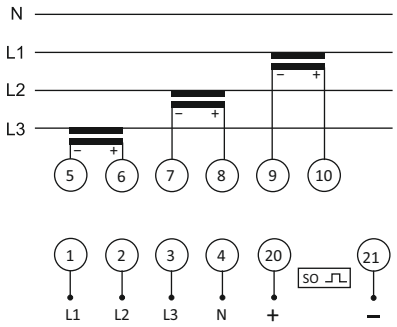
These meters are intended for current transformers with a secondary current of 5A. Maximum measured current of the system is specified by the value of the primary current while using the current transformer.

Current transformers - see the chapter 32.

LE-02d CT THREE-PHASE TYPE

WITH PROGRAMMABLE CURRRENT TRANSDUCER RATIO

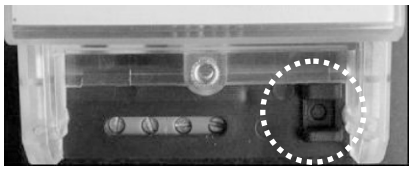




reference voltage	3×230/400V+N
basic current	3×1,5A
max current	3×6A
secondary current	5A
min current	0,04A
measure precision with IEC61036	class 1
meter's own power consumption	<10VA; <2W
number of LCD signs	8
range of display reports	dependent on transmission
constatnt of the meter	12000imp/kWh
current consumption signal	3×LED red
meter signal	LED red
impulse output SO+ SO-	open colector
connection voltage SO+ SO-	<30V DC
connection current SO+ SO-	<27mA
constant SO+ SO-	dependent on transmission
working temperature	-20÷55°C
protection level	IP20
connection	screw terminals 25mm^2
dimensions	4,5 modules (75mm)
fixing	on the rail TH-35

FUNCTIONING

The user has the ability to set the index value used gear ratio, which allows you to indicate the actual value taken by the electricity system.
In the memory of indicator are preserved values of primary currents Ip transformers feasible. Choosing the appropriate value in accordance to the values of the connected transformers automatically sets the appropriate factor, according to which computes the actual value of the electricity taken. The LCD displays the actual value of the energy collected in a format depending on the selected gear.
CT currents Ip inscribed in memory of the indicator:
5, 20, 30, 40, 50, 60, 75, 80, 100, 120, 150, 200, 250, 300, 400, 500, 600, 750, 800, 1000, 1200, 1250, 1500, 2000, 2500, 3000, 4000, 5000, 6000.

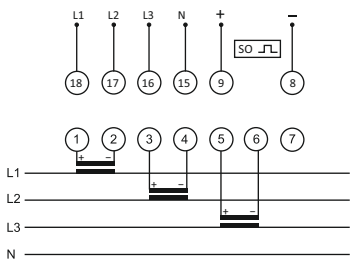


programming button

LE-03d CT200 / LE-03d CT400

TO CO-OPERATION WITH A DEDICATED CURRENT TRANSFORMERS



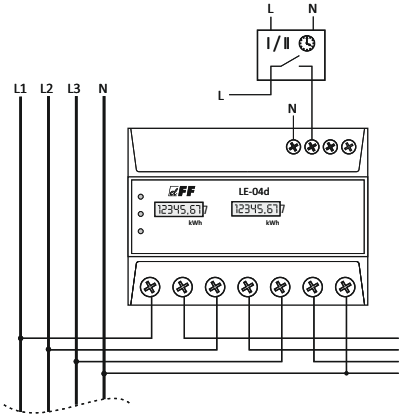


In the case of transformers with dedicated operating parameters, the meters display the actual value of the power consumed by the system.

type of transformer	LE-03d CT200	200/5A
	LE-03d CT400	400/5A
reference voltage		3×230/400V+N
basic current		3×1,5 A
maximum current		3×5A
minimum current		0,04A
measurement accuracy per IEC61036		class 1
counter's own power consumption		<10VA; <2W
drum counter indication range		0÷999999,9 kWh
constant of a meter	(0,083Wh/imp)	12000imp/kWh
current consumption signal		3×red LEDs
read-out status signal		red LED
pulse output SO+ SO-		open collector
connection voltage SO+ SO-		< 30V DC
connection current SO+ SO-		< 27mA
constant SO+ SO-	(0,083Wh/imp)	12000imp/kWh
working temperature		-20÷55°C
protection level		IP20
connection		25mm² screw terminals
measurements		7 modules (122 mm)
fixing		on rail TH-35

TWO-TARIFFS TYPE
LE-04d

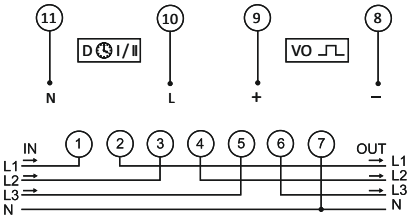




reference voltage		3×230/400V+N
basic curre		10A
max current		100A
min current		0,04A
measure precision with IEC61036		class 1
meter's own power consumption		<10VA; <2W
range of display reportsT0 i T1		0÷99999,99kWh
constatnt of the meter	(1,25Wh/imp)	800imp/kWh
current consumption signal		4×LED red
meter signal T0 i T1		2×LED red
impulse output VO		open colector
connection voltageVO		<24V DC
connection current SO+ SO-		<30mA
constant VO	(1,25Wh/imp)	800imp/kWh
working temperature		-20÷55°C
protection level		IP20
connection		screw terminals 25mm2
dimensions		7 modules (122mm)

FUNCTIONING

The counter is equipped to measure the electricity in two tarif system. The values indicated in the power tariffs are separate displays T0 and T1. Switching between the tariffs is fed to the input control voltage meter D (joints 10-11). This can be used for controlling the external clock. Counter T0 read energy input in the absence of voltage control at the entry to the T1 D. Meter read energy input from the control voltage appears at the entrance to the D decay. Operation of the meter is indicated by shine the corresponding LED.



WITHOUT NEUTRAL CABLE

LE-05d THREEPHASE 3×400V

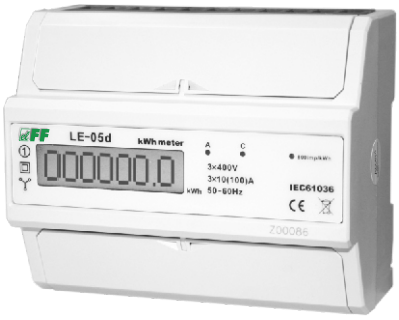
Measurement in the Aron system.

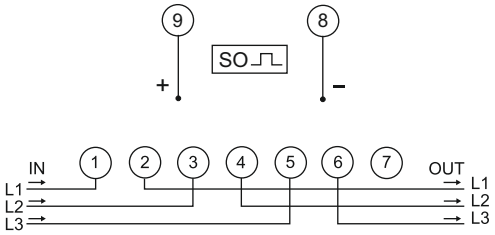
PURPOSE

LE is static calibrated electricity consumption meter is used as the display sub meters to report of the active power of three-phase AC .

FUNCTIONING

The electronic system by the influence of the flowing current and the applied voltage generates pulses in proportion to the electricity consumed. Energy measurement system takes place in Aron system. Indicators have pulse output SO + - SO-. Indicators are sealable terminal covers input and output bypass to prevent making the index.

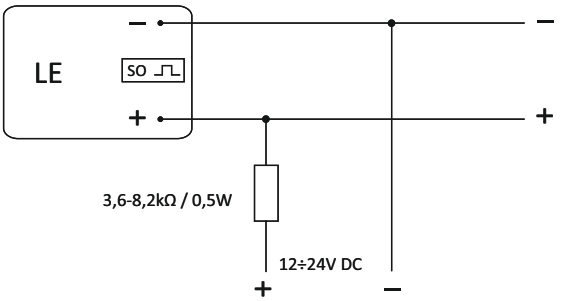




reference voltage		3×400V
basic current		3×10A
max current		3×100A
min current		0,04A
accuracy in accordance with the IEC61036		class 1
own power meter		<10VA; <2W
meter display range		999999,9kWh
meter constant	(1,25Wh/imp)	800imp/kWh
indication of the current consumption		2×LED red
signal read-out		LED red
pulse output SO+ SO-		open collector
voltage connection SO+ SO-		<30V DC
current connection SO+ SO-		<27mA
constant SO+ SO-	(1,25Wh/imp)	800imp/kWh
working temperature		-20÷50°C
protection level		IP20
connections		screw terminals 25mm²
dimensions		7 modules(122mm)
fixinng		on the rail TH-35

Pulse output supply system with connected external counting machine

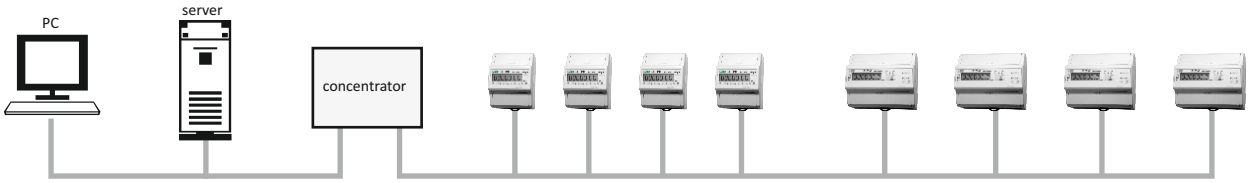
In order to connect to electricity energy meter counting device has to be connected in parallel to the system power supply 12÷24V DC through resistor 3.6 ÷ 8.2 kOhm / 0,5 W current limiting. Maximum load counting circuit is 27mA .
Changing the polarization of power can damage the meter pulse output.
In the absence of connecting an external counting device is not allowed to connected to the output pulse power system.



WITH RS-485 PORT AND MODBUS RTU COMMUNICATION PROTOCOL

PURPOSE

Energy meters M. series are used for reading and recording taken of electricity with possibility of remote readings of energy meters registers group via wired network in RS-485 standard.

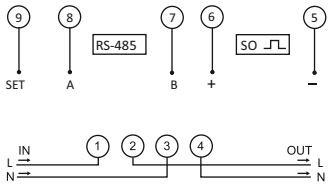


FUNCTIONING

Communication with energy meters as a slave device is in compliance with the standard Modbus RTU via RS-485.
The indication is written in the form of consecutive bytes of hex. When converted to decimal form we obtain the result in kWh consistent with the indications on the display counter.

LE-01M SINGLE-PHASE TYPE

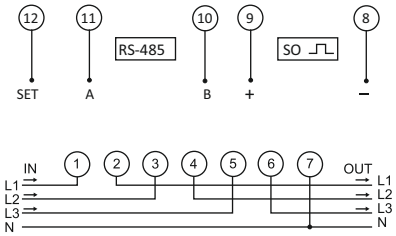




reference voltage	230V AC ±30%
basic current	10 A
maximum current	100A
minimum current	0,04A
measurement accuracy per IEC61036	class 1
counter's own power consumption	<10VA; <2W
drum counter indication range	0÷99999,99 kWh
constant of a meter (0,625Wh/pulse)	1600 pulses/kWh
read-out status signal	red LED
pulse output SO+ SO-	open collector
connection voltage SO+ SO-	< 30V DC
connection current SO+ SO-	< 27mA
constant SO+ SO- (0,625 Wh/pulse)	1600 pulses/kWh
port	RS-485comunic
ation protokol	MODBUS RTU
working temperature	-20÷50°C
protection level	IP20
connection	25mm² screw terminals
measurements	4,5 modules (75 mm)
fixing	on rail TH-35

LE-03M THREE-PHASE TYPE

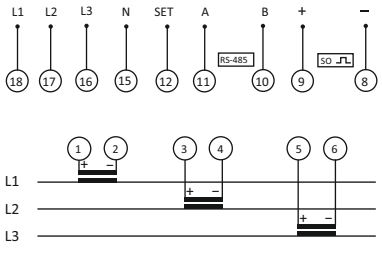




reference voltage	3×230/400V+N
basic current	3×10A
maximum current	3×100A
minimum current	0,04A
measurement accuracy per IEC61036	class 1
counter's own power consumption	<10VA; <2W
drum counter indication range	0÷999999,9 kWh
constant of a meter (1,25Wh/pulse)	800 pulses/kWh
read-out status signal	red LED
pulse output SO+ SO-	open collector
connection voltage SO+ SO-	< 30V DC
connection current SO+ SO-	< 27mA
constant SO+ SO- (1,25Wh/pulse)	800 pulses/kWh
port	RS-485comunic
ation protokol	MODBUS RTU
working temperature	-20÷50°C
protection level	IP20
connection	25mm² screw terminals
measurements	7 modules (122mm)
fixing	on rail TH-35

LE-03M CT WITH PROGRAMMABLE CURRRENT TRANSDUCER RATIO





reference voltage	3×230/400V+N
basic current	3×1,5A
max current	3×5A
second current	5A
min current	0,04A
measure precision with IEC61036	class 1
meter's own power consumption	<10VA; <2W
range of display reports	dependent on transform
constatnt of the meter (for 5/5A)	1200pulses/kWh
current consumption signaling	3×red LED
reading signaling	red LED
pulse output SO+ SO-	open colector
connection voltage SO+ SO-	<30V DC
connection current SO+ SO-	<27mA
constant SO+ SO-	dependent on transform
port	RS-485
comunnication protocol	MODBUS RTU
working temperature	-20÷55°C
protection level	IP20
connection	25mm² screw terminals
dimensions	7 modules (122mm)
fixing	on the rail TH-35

In the memory index values are preserved primary currents Ip transformers feasible. Choosing the appropriate value in accordance with the values of the connected transformers automatically sets the appropriate factor, according to which computes the actual value of the electricity taken. This value is projected on the LCD display format depending on the selected gear.

CT ratio as a suitable value of registry is programmable using the Modbus RTU protocol command. CT currents Ip inscribed in memory of the indicator: 5, 20, 30, 40, 50, 60, 75, 80, 100, 120, 150, 200, 250, 300, 400, 500, 600, 750, 800, 1000, 1200, 1250, 1500, 2000, 2500, 3000, 4000, 5000, 6000.

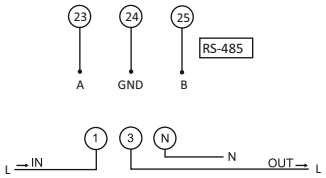
WITH RS-485 PORT AND MODBUS RTU COMMUNICATION PROTOCOL WITH NETWORK PARAMETERS ANALYSIS

PURPOSE

They are used for indications and recordings taken of electricity and mains parameters. Measured by the meter network's parameters are indicated cyclically on the LCD display. Remote reading all indications is possible via a wired RS-485 communication network standard.

LE-01MP SINGLE-PHASE TYPE





reference voltage	230V AC ±20%
basic current	5 A
maximum current	100A
minimum current	0,02A
measurement accuracy per IEC61036	class 1
counter's own power consumption	<8VA; <0,4W
counter indication range	0÷99999,99 kWh
constant of a meter (1,0Wh/imp)	1000 imp/kWh
read-out status signal	red LED
port	RS-485
comunication protokol	MODBUS RTU
working temperature	-20÷65°C
protection level	IP20
connection	25mm² screw terminals
measurements	1 module (19,5 mm)
fixing	on rail TH-35

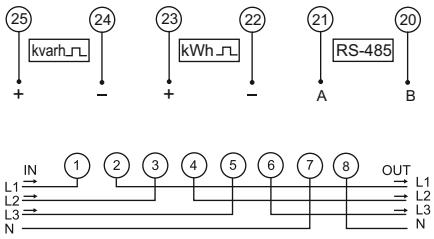
MEASURED VALUE

Active energy AE+ [kWh]
Voltage [V]
Current [A]
Frequency - F [Hz]
Temperature of meter - T [°C]

LE-03MP THREE-PHASE TYPE

with PREPAID function and overcurrent protection





reference voltage	3×230/400V+N
basic current	3×5A
maximum current	3×60A
minimum current	0,04A
measurement accuracy per IEC61036	class 1
counter's own power consumption	<10VA; <1,5W
drum counter indication range	0÷999999,99 kWh
kWh constant of a meter (1,25Wh/imp)	800 imp/kWh
kvarh constant of a meter (1,25varh/imp)	800 imp/kvarh
read-out status signal	2 × red LED
pulse output kWh/kvarh	open collector
connection voltage kWh/kvarh	< 30V DC
connection current kWh/kvarh	< 27mA
constant kWh/kvarh (1,25W/varh/imp)	800 imp/kWh/kvarh
port	RS-485comunic
ation protokol	MODBUS RTU
working temperature	-20÷55°C
protection level	IP20
connection	16mm² screw terminals
measurements	7 modules (122mm)
fixing	on rail TH-35

MEASURED VALUE

Active energy AE+ [kWh]
Reactive energy RE+ [kvarh]
Voltage of three phases - U1, U2, U3 [V]
Current of three phases - I1, I2, I3 [A]
Frequency - F [Hz]
Active power L1 - P1 [W]
Active power L2 - P2 [W]
Active power L3 - P3 [W]
Active power L1+L2+L3 - P [W]
Power factor L1 - cosφ1
Power factor L2 - cosφ2
Power factor L3 - cosφ3

FUNCTIONS

* The internal relay switching circuits L1, L2, L3
* Manual relay control
* Over-current protection - setting the limit load
* Prepaid energy (prepayment) - the value of active energy at which meter disconnects the internal relay.
* Automatic mode - automatic relay auto-off after overcurrent treshold increased and when the set overcurrent and set ON prepaid functions.
* Status - current status of the relay [on/off]

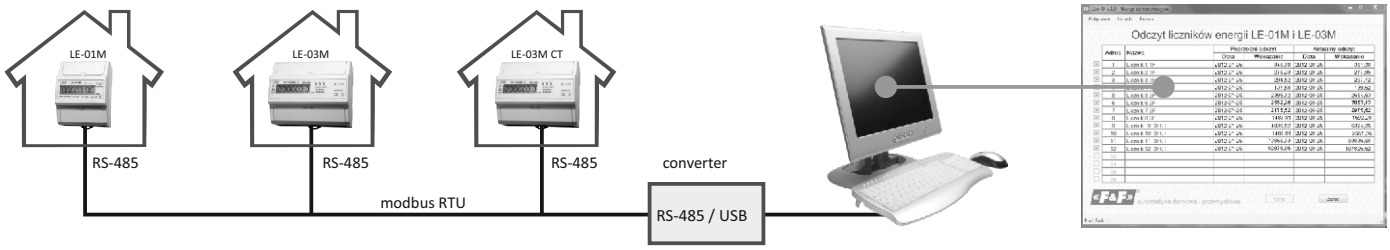
Reading of all measured values and set function parameters is done by using the Modbus RTU protocol .

ELECTRICITY CONSUMPTION READING SYSTEMS

LExx-M READING UP TO 16 METERS

PURPOSE

Lexx-M program enables remote reading display up to 16 pieces of energy meters of type LE01-M , LE-03M and LE03-M CT produced by F & F. Meters communicates via RS-485 network in accordance with the standard Modbus RTU protocol. The exchange of data between meters and the application is carried out through a standard RS485 converter <-> USB seen by the operating system what COM port. RS network is made using twisted-pair cable (shielded) signal cable type "twisted pair" (UTP, FTP).



FUNCTIONING

The central part of the program is a sheet with a list of active energy meters and their current and previous indications of energy. Configuration of meters and compilation connection with them is done through the command placed in the menu. The buttons at the bottom part of the screen allow you to make the current reading of the counter, reading and writing results to a text file (*.txt) or Excel worksheet (*.xls). Configuration Table allows you to easily (check box) to set up the system, ie to select counters, set their parameters, give a name and a description of the utility. The program is available in demo mode, which displays only the last two digits of the result of the energy meter reading. The rest of the functionality of the program remains unchanged

To get the full functionality of the program must purchase a license for each post, which will run the program.

The demo version of the program allows for addressing meters and setting values of transmission for meters measuring half intermediate CT.



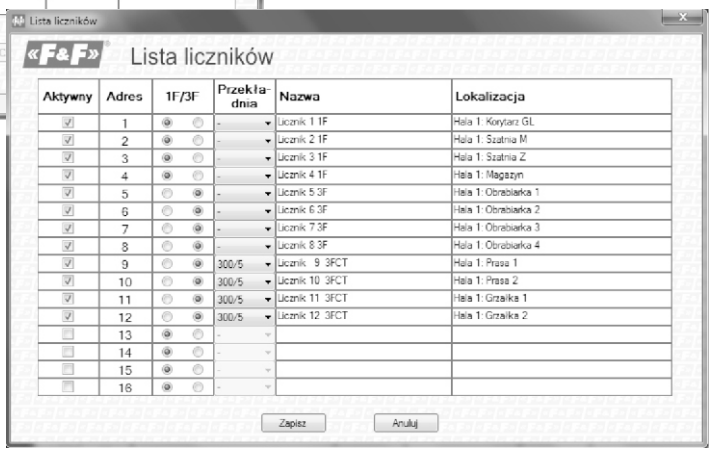
WORK MODE AND LICENCES

The program is available in demo mode, which displays only the last two digits of the result of the energy meter reading. The rest of the functionality of the program remains unchanged. To get the full functionality of the program must purchase a license (licence file).

The demo version of the program allows for addressing meters and setting values of transmission for half-indirect measurement meter CT.

Licenses:

LIC01 - a one-time license fee for the full program version (per one computer).







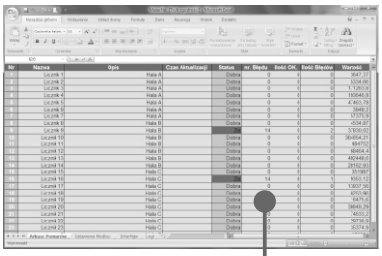
HARDWARE REQUIREMENTS

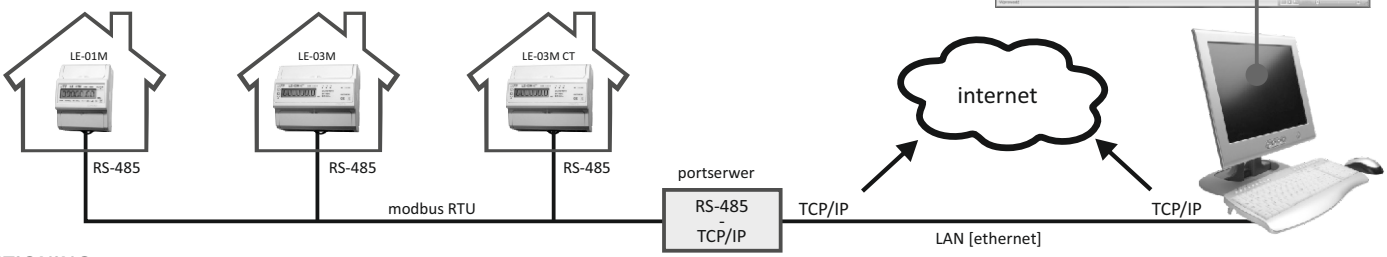
Operating System: Windows 7, Windows 7 Service Pack 1, Windows Server 2003 Service Pack 2, Windows Server 2008, Windows Server 2008 R2, Windows Server 2008 R2 SP1, Windows Vista Service Pack 1, Windows XP Service Pack 3

METERNET READING UP TO 1000 METERS

PURPOSE

METERNET program enables to remote reading of indicators up to 1000 energy meters type LE01-M, LE-03M and LE03-M CT produced by F&F. Meters communicates via RS-485 network in accordance with the standard Modbus RTU protocol. The exchange of data between meters and the application is done via a standard RS485 converter <-> USB port or server on the LAN (Ethernet). In the case of a LAN to the router with a static IP address, you can read data via the Internet.
RS network is made using twisted-pair cable (shielded) signal cable type "twisted pair" (UTP, FTP).

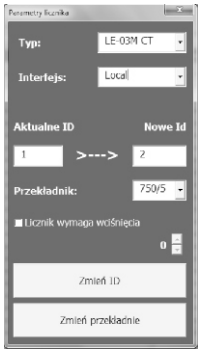




FUNCTIONING

The application is an integral part of Excel. Read the data program presents in the table of the program. Data can be any shape as functions of spreadsheet software. Program as part of their workbook consists of four sheets;
1) Sheet Measurements - table with a list of active counters and their current indications energy.
2) Set the Modbus - select types of meters, their name and a description of the type of connection and setting
3) Interfaces - setting the communication parameters (IP address, COM, name)
4) Logs - registration and description of communication errors
5) CSV - Configure logging to CSV file (spreadsheet activated, if licensed)
and panel setting program options and parameter meters



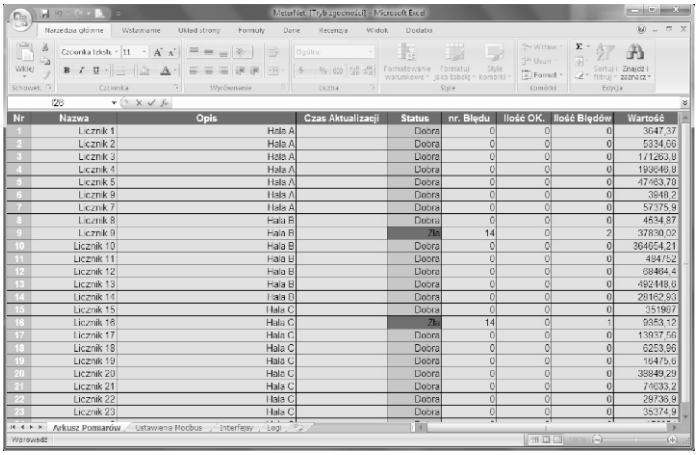


WORK MODE AND LICENCES

The program is available in demo mode, which displays only the last two digits of the result of the energy meter reading. The rest of the functionality of the program remains unchanged. To get the full functionality of the program must purchase a license (electronic dongle USB) and a license for each meter are part of the system.
The demo version of the program allows for addressing meters and setting values of transmission for half-indirect measurement meter CT.
Licenses:
LIC02 - functionality includes four sheets of the program: a list of active meters with readings, settings of Modbus, parameterisation communication in network and recording of communication.
LIC03 - a one-time license fee for each meter running on the program
LIC04 - auto login function (record) reading results to a designated file in CSV format. When you purchase license, an electronic dongl with an activation code the table for a specific license number of counters will be sent to user.



Electronic
USB dongle



Nr	Nazwa	Opis	Czas Aktualizacji	Status	nr. Błędu	Ilość OK.	Ilość Błędów	Wartość
1	Licznik 1	Hala A		Dobra	0	0	0	3647,37
2	Licznik 2	Hala A		Dobra	0	0	0	5334,66
3	Licznik 3	Hala A		Dobra	0	0	0	171263,8
4	Licznik 4	Hala A		Dobra	0	0	0	193648,9
5	Licznik 5	Hala A		Dobra	0	0	0	47483,76
6	Licznik 6	Hala A		Dobra	0	0	0	3848,2
7	Licznik 7	Hala A		Dobra	0	0	0	57375,9
8	Licznik 8	Hala B		Dobra	0	0	0	4634,87
9	Licznik 9	Hala B		Zła	14	0	2	37890,02
10	Licznik 10	Hala B		Dobra	0	0	0	364654,21
11	Licznik 11	Hala B		Dobra	0	0	0	484752
12	Licznik 12	Hala B		Dobra	0	0	0	684894,4
13	Licznik 13	Hala B		Dobra	0	0	0	492948,9
14	Licznik 14	Hala B		Dobra	0	0	0	28162,93
15	Licznik 15	Hala C		Dobra	0	0	0	351987
16	Licznik 16	Hala C		Zła	14	0	1	9853,12
17	Licznik 17	Hala C		Dobra	0	0	0	13937,56
18	Licznik 18	Hala C		Dobra	0	0	0	6253,96
19	Licznik 19	Hala C		Dobra	0	0	0	19475,6
20	Licznik 20	Hala C		Dobra	0	0	0	38849,29
21	Licznik 21	Hala C		Dobra	0	0	0	74633,2
22	Licznik 22	Hala C		Dobra	0	0	0	29736,9
23	Licznik 23	Hala C		Dobra	0	0	0	35374,9

SOFTWARE REQUIREMENTS

MS Office 2003, MS Office 2007, MS Office 2010.

CONVERTERS

ATC-2000 RS485>TCP/IP



supply	9÷24V DC
connector RS	1,0mm²
connector TCP	RJ45 socket
dimensions	86×100×26
fixing	two screw to the ground

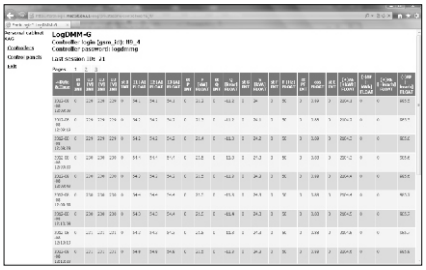
9VDC power adapter included

WE1800BT RS485>USB



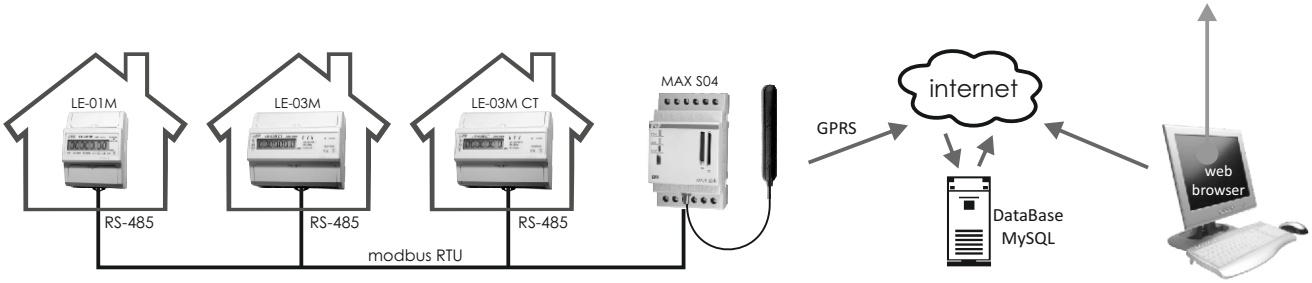
length of cable	1,8m
connector RS485	2×0,34mm2

LEMAX
DATA TRANSFER via GPRS.
LEMAX-SD
RECORDING ON SD CARD.
READING UP TO 128 METERS



PURPOSE

Program enables to remote reading of indicators up to 128 energy meters type LE01-M, LE-03M and LE03-M CT produced by F&F. Meters communicates via RS-485 network in accordance with the standard Modbus RTU protocol.



FUNCTIONING

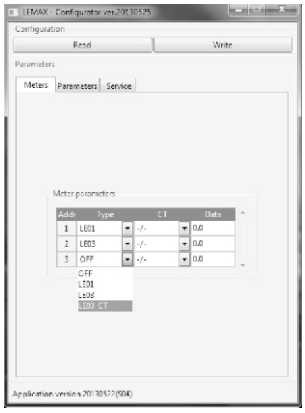
MAX controller and meters communicate with the RS485 port using Modbas RTU communication protocol. The controller cycle records the read network parameters and stores them in the internal memory. Recording from the internal memory is periodically sent to the MySQL database installed on a special base server. User access to data in a table is available through any web browser. Data can be deleted or imported to your computer as a text file. There is also the ability to directly read data from a MySQL database from other systems or programs (this requires the construction of a separate program).

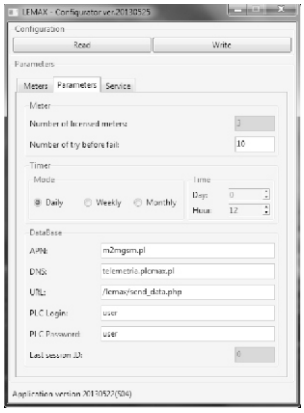
In the LEMAX-SD software version data recording is held locally on the SD memory card.

LEMAX Configurator - PC software program is used to set the general parameters of the controller (registration cycle and backup, GPRS communication parameters, the table of results).



Controller MAX S04
with GPRS communicator







WORK MODE AND LICENCES

The program in demo version has activated 3 reading positions (for 3 meters of any type), which displays only the last two digits of the result of the energy meter reading. The rest of the functionality of the program remains unchanged. To get the full functionality of the program must purchase a license for each meter are part of the system.
Licenses:
LIC05 - a one-time license fee for each meter running on the program

INFRASTRUKTURE

Controller MAX S04 operates on the network of mobile GSM 900/1800 in any of mobile operators (no simlock). One of the basic conditions for the use of GSM communicator driver is the existence of adequate infrastructure.

The system requires a SIM card with tariff telemetry from any operator and maintain a database on your own or an external server [hosting].

24. PULSE AND WORKING TIME METERS

PULSE METER

PURPOSE

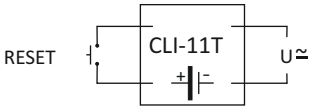
Pulse meters are intended for counting AC/DC voltage signals, generated by additional peripheral devices in order to determine the number of carried out working cycles in automatics systems, e.g. in order to control the number of press strokes, the number of revolutions of a rotating device, the number of components leaving the production line, etc.

CLI-11T

FUNCTIONING

CLI-11T meter is a one-way meter, enabling the counting of pulses from 0 to 99999999 range (eight digits). It is equipped with RESET input for the connection of an external button, enabling the resetting of the meter state for any value.





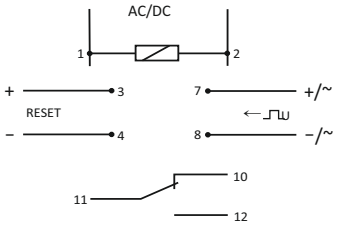
supply	(non-voltage type) internal battery
battery life	10 years
input voltage	
CLI-11T 230V	110÷240V AC/DC
CLI-11T 24V	4÷30V DC
maximum counting frequency	200Hz
RESET input	non-voltage type
display	8 characters / h 6.7mm
precision	1%±1digit
connection	screw terminals 1,5mm²
working temperature	-5÷50°C
dimensions	96×96×92mm
fixing hole	92×92mm

CLI-01 PROGRAMMABLE
CLI-02

FUNCTIONING

CLI-01 is a programmable, one-way type electronic meter enabling the counting of external pulses in 0 to 99 999 999 range. Pulses are counted from 0 to value set by the user. After reaching the limiting value, the meter will stop to count. Meter will count from 0 again after reset.





supply	24÷264V AC/DC
input voltage low state	0÷4V
input voltage high state	5÷264V
RESET input voltage	24÷264V
maximum frequency for DC signal	5kHz
maximum frequency for AC signal	50Hz
maximum relay load current	8A
power input	1,5W
operating temperature	-20÷50°C
terminal	screw terminal 2,5mm2
dimensions	3 modules (52,5mm)
assembly	TH-35 bus

FUNCTIONS

* control panel, enabling programming and the monitoring of device operation
* T input, adapted for operation with AC/DC signal, 5 to 264V amplitude and 50 Hz frequency for AC and 5kHz for DC signals
* possibility to set THRESHOLD parameter (1÷99 999 999 range), specifying the limiting number of pulses counted in a single operation cycle
* external RESET input
* relay output signaling the preset meter state (contact1C/O 8A)
* local counter, reset using the external reset input or using RESET button
* total counter for all impulses (loop mode 0 →99 999 999 →0 →... or reset using the meter configuration menu)
* digital filter, enabling the limiting of maximum frequency of the counted pulses (in order to reduce interferences on meter input)
* local and total meter state memory after supply failure
* program menu in three languages: Polish, English or Russian

ADDITIONAL FUNCTIONS OF CLI-02:

* 'downward' counting mode to the selected value with zero value signaling (e.g. 9999→0)
* selection of input pulse edge (leading or trailing) the counter will react to
* possibility of automatic local counter reset (loop mode) with possibility to set selected relay action
* relay action selection: pulse with set time length; ON OFF or OFF ON state change
* scaling pulse values according to set multiplier or divider

WORKING TIME METERS

PURPOSE

Working time meters are intended for counting the number of working hours in automatic production processes or the number of device working hours, which, due to safety requirements and operation efficiency have limited overhaul life, i.e operational capacity that may not be exceeded (e.g. advanced power units, special radioactive lamps, etc.).

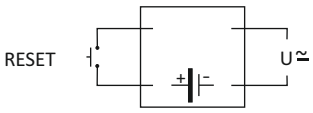
CLG-13T with button RESET
CLG-14T without button RESET

FUNCTIONING

CLG-13T meter is an electronic, one-way meter, enabling the counting of working hours in 0 to 99999,9 range (five digits + one decimal). It is equipped with RESET input for the connection of external button and RESET button in front (with locking), enabling counter state reset for any value.







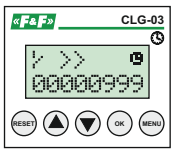
supply	(non-voltage type) internal battery
battery life	10 years
input voltage	
CLI-11T 230V	110÷240V AC/DC
CLI-11T 24V	4÷30V DC
CLG-14T 230V	110÷240V AC/DC
maximum counting frequency	200Hz
RESET input	non-voltage type
display	6 characters / h 6.7mm
precision	1%±1digit
connection	screw terminals 1,5mm²
working temperature	-5÷50°C
dimensions	96×96×92mm
fixing hole	92×92mm

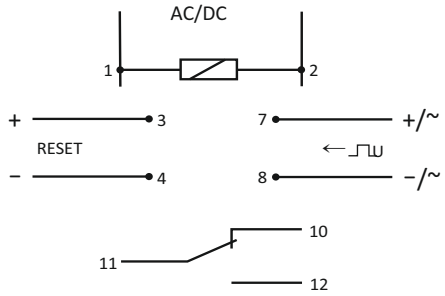
CLG-03

FUNCTIONING

CLG-03 is a programmable, multi-function electronic meter, enabling the counting of working hours of the connected devices or systems in 1 to 999 999 range, corresponding to 114 years of operation. Working time is counted according to an individual program, set by the user. After reaching the limiting value, the meter will configure itself according to individual user's needs.







supply	24÷264V AC/DC
input voltage	4÷264V
maximum relay load current	8A
power input	1,5W
operating temperature	-20÷50°C
terminal	screw terminal 2,5mm2
dimensions	3 modules (52,5mm)
assembly	TH-35 bus

FUNCTIONS

* control panel, enabling programming and the monitoring of device operation
* T input for DC signal and AC signal 50 Hz
* counting time upwards without threshold value
* 'downward' counting mode to the selected value with zero value signaling (e.g. 9999 →0)
* counting working time with high state (constant voltage) at the T input
* counting working time between two pulses given at the T input
* counting time upwards to the selected threshold value
* external RESET input
* relay output signaling the preset meter state (contact1C/O 8A)
* relay action selection: pulse with set time length; ON→OFF or OFF→ON state change
* local and total meter state memory after supply failure
* limiting access to program menu using PIN code
* setting display illumination mode
* program menu in three languages: Polish, English or Russian

25. FLUID LEVEL CONTROL RELAYS

PURPOSE

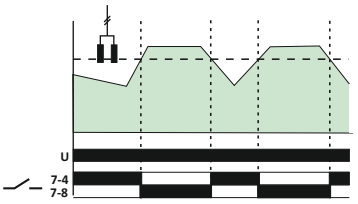
Fluid level control relays are used to detect the presence of fluid conductive the current on the level of mounted flooding sensors

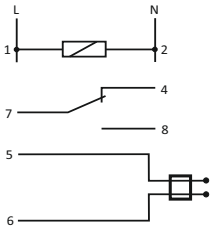
ONE-POSITION

PZ-828 / PZ-828 RC

ADJUSTABLE SENSITIVITY







supply	230V AC
current load	<16A
contact	1 C/O
sensiviti PZ-828 (factory setting)	50KΩ
PZ-828 RC (adjustable)	4,5÷220KΩ
power supply indicator	green LED
working mode indicator	red LED
power consumption	1,1 W
terminal	screw terminals 2,5mm²
dimensions	2 modules (35 mm)
fixing	on rail TH-35

output 5-6 galvanic separated

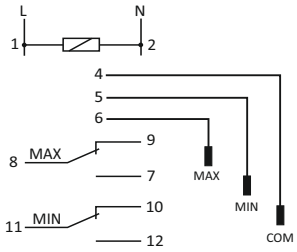
In dry conditions, the relay's contact remains in the 7-4 position. Once the sensor becomes flooded with liquid, the red LED indicator lights up, and the contact is shifted to the 7-8 position. After the level of the conductive liquid decreases (and the electrodes of the flooding sensor depart), the contact returns to position 7-4.

TWO-POSITION

PZ-829 / PZ-829 RC

ADJUSTABLE SENSITIVITY

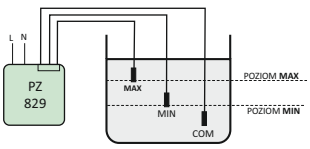


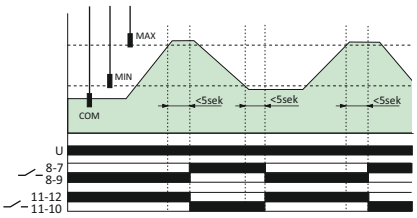


supply	230V AC
current load	2×(<16A)
contact	2×1C/O
sensiviti PZ-828 (factory setting)	50KΩ
PZ-828 RC (adjustable)	4,5÷220KΩ
contact switching delay	
for level MIN	1÷2sec
for level MAX	1÷2sec
power supply indicator	green LED
working mode indicator	2×red LED
power consumption	1,1 W
terminal	screw terminals 2,5mm²
dimensions	3 modules (52,5 mm)
fixing	on rail TH-35

output 4-5-6 galvanic separated

After the liquid level decreases to MIN (i.e. electrodes MIN and COM spaced), the MIN joint is switched to position 11-12, whereas the MAX joint remains in position 8-9. On the other hand, when the MAX liquid level is reached (MAX and COM electrodes shorted), the relay's MIN joint will be switched to position 11-10, whereas the MAX into position 8-7.

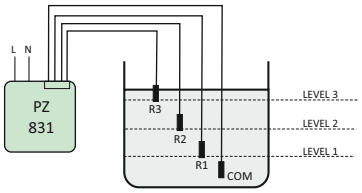


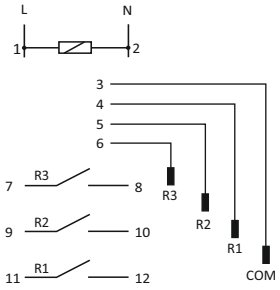


THREE-POSITION

PZ-831 RC



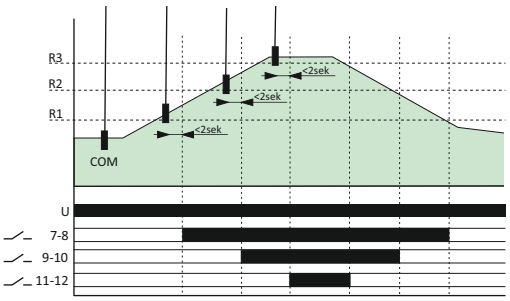




supply	230V AC
current load	3×(<8A)
contact	3×1NO
sensitivity	1÷180KΩ
contact switching delay	<2sec
power supply indicator	green LED
working mode indicator	3×red LED
power consumption	1,1 W
terminal	screw terminals 2,5mm²
dimensions	3 modules (52,5 mm)
fixing	on rail TH-35

output 3-4-5-6 galvanic separated

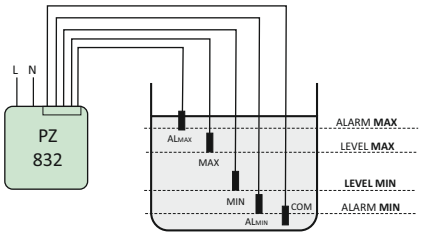
In dry condition (all probes open), all the transformer's contacts are also open. If the base probe COM and the next level probe are closed due to a liquid presence, the contact for a given probe will close, e.g. once the first R1 level probe (the COM base probe and the R1 level probe closed) is submerged, the 11-12 contact will close. The same procedure applies to the R2 and R3 level probes. On the other hand, once the liquid level drops below the probe level (the COM probe and the level probe open), the contact for a given probe will open as well.



TWO-POSITION WITH EMERGENCY STATES MIN I MAX

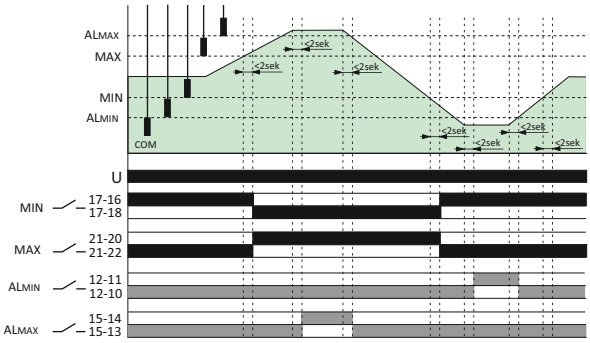
PZ-832 RC

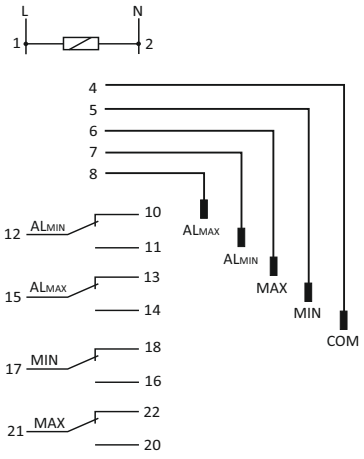




supply	230V AC
joint	separate 4×(1P)
current load MIN and MAX	2×(<16A)
current load ALmin and ALmax	2×(<8A)
sensiviti - to set	1÷100KΩ
switching joints delay	1÷2sec
Voltaof measured outputs	<6V
power supply	green LED
working mode	yellow LED
state MIN and MAX	2×green LED
state ALmin and ALmax	2×red LED
power consumption	1,1W
connection	screw terminals 2,5mm²
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

joints 4-5-6 -7-8 galvanic separated





Relay control MAX and MIN statues set by user of controlled fluid. After the liquid level decreases to MIN (i.e. electrodes MIN and COM spaced), the MIN joint is switched to position 17-16 (FILLING), whereas the MAX joint remains in position 21-22. On the other hand, when the MAX liquid level is reached (MAX and COM electrodes shorted), the relay's MIN joint will be switched to position 17-18 (EMPTYING), whereas the MAX into position 21-20. Emergency state: **ALmin** (dry running) - after the liquid level decreases to **ALmin** (i.e. electrodes MIN and COM spaced), the ALmin joint is switched to position 12-11; **ALmax** (overflow) after level is reached **Almax** (ALmax and COM electrodes shorted), the relay's **Almax** joint will be switched to position 15-14.

PROBE PZ



flooding probe	electrode
dimension of probe/lengthof cable	30×20×5mm/1,5m
length/pitch of electrodes	30mm / 5mm
probe voltage	<6V~
probe current	<0,13mA
lenght of conection wire	<100m
dedicated	PZ-828, PZ-828 RC

PROBE PZ2

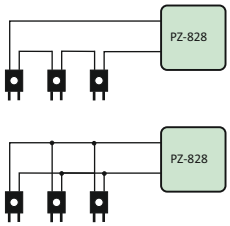


flooding probe	acid-resistant steel electrode in + plastic box for electrode + gland PG9
dimension of probe	Ř15, l=9,5cm
probe voltage	<6V~
probe current	<0,13mA
connection cable	e.g. <1mm2
lenght of conection wire	<100m
dedicated	PZ-829, PZ-829 RC
	PZ-831 RC, PZ-832 RC

How to connect the probe

The design of the probe makes it possible to install the probe on a flat horizontal base, for example on the floor in a room where hydro-valves and flow pipes are installed or in a laundry room. Thanks to such a design of the probe, any failure or flooding of a room with a liquid can be quickly detected as well as electric circuits can be simultaneously switched off or the sound or light signalling system (alarm system) can be actuated. The probe cable can be extended to 100m.

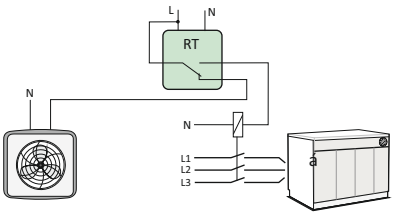
A maximum of 10 probes can be connected in parallel connection or in series connection to 5-6 output:
series connection - for a dependant system that controls the level of liquid in many points a simultaneous short-circuit of all sensors connected must occur in order to activate the relay.
parallel connection - for an alternative system that controls the level of liquid in many points - a short-circuit of at least one of the sensors connected must occur.
In case of a series connection, the sensitivity of the sensors is reduced (conductivity is reduced).



26. TEMPERATURE REGULATORS

PURPOSE

Temperature regulators may be used for equipment control in anti-freeze systems which prevent the freezing of gutters, the accumulation of ice on stairs, vehicles, etc.



RT-820 temperature setting range: 4÷30°C

RT-821 temperature setting range: -4÷5°C

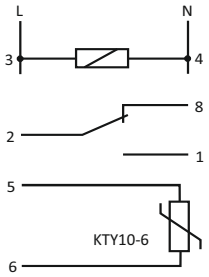
RT-822 temperature setting range: 30÷60°C

RT-823 temperature setting range: 60÷95°C

FUNCTIONING

The power supply to the generator is indicated by the green LED. Until the required ambient temperature is achieved, the contact of the regulator remains in position 2-1 and the heating device is active. Once the set value is achieved, the contact shifts into position 2-8 and the heating or ventilation device is turned off. Any drop in temperature by the hysteresis value will activate the heating device again (contacts 2-1 closed) until the set temperature value is achieved.

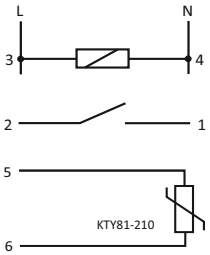




supply	230V AC
current load	<16A
contact	1 C/O
temperature setting range	
RT-820	4÷30°C
RT-821	-4÷5°C
RT-822	30÷60°C
RT-823	60÷95°C
hysteresis setting range	0,5÷3°C
temperature probe	RTR / RT2
power supply indicator	green LED
operation mode indicator	yellow LED
power consumption	1,1W
terminal	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35

RT-826 DIGITAL temperature setting range: -25÷130°C





supply	230V AC
current load	<16A
contact	1 C/O
temperature setting range	-25÷130°C
hysteresis setting range	1÷30°C
adjusting precision	1°C
measure precision	±1°C
display	3×segment LED 5×9mm
temperature probe	RT / RT2
power supply indicator	green LED
operation mode indicator	yellow LED
power consumption	1,1W
terminal	screw terminals 2,5mm²
dimensions	2 modules (35mm)
fixing	on rail TH-35

- working mode: HEATING / COOLING
- indication correction ±5°C
- audible indication of alarm status when the temperature exceeded ± 5 º C Oriented (internal piezoelectric hooter)
- error indication

PROBE RT



temperature sensor	KTY 81-210
measurement range	-50÷130°C
working temperature	-50÷65°C
dimansion	Ø5; h=20mm
isolation of sensor	PC
cable	PC 2×0,34mm²; l=2,5m

PROBE RT2

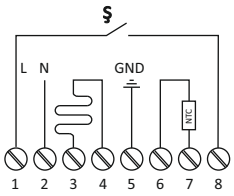


temperature sensor	KTY 81-210
measurement range	-50÷130°C
working temperature	-50÷65°C
dimansion	Ø8; h=40mm
isolation of sensor	brass muff
cable	heatresist SIHF 2×0,5mm²; l=2,5m

FOR HOME APPLICATIONS

RT-824 temperature range: 5÷35°C





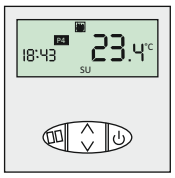
supply	230V AC
current load	<16A
contact	1 NO
temperature setting range	5÷35°C
hysteresis setting range	3°C
set value accuracy	±1°C
temperature sensor	NTC
length of probe with sensor	3m cable
power consumption	0,8W
terminal	screw terminals 1,5mm²
dimensions	
front	83,5×83,5mm; gł.22mm
back	Ø50; gł.27,5mm
fixing	to under plaster box Ø60mm

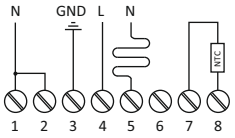
FUNCTIONS

* possibility of programming 1 required temperature
* the knob located on the front panel enables setting a required temperature
* the breaker switch located on the front panel enables switching off the power supply of the whole heating system
* the input for connecting a control clock
* signalling of the heating system activation
* 2 temperature sensors: an internal one and an external one
* 3 operation modes of the regulator: operation with the internal temperature sensor; operation with the external temperature sensor; operation with two temperature sensors
* in the mode of operation with the internal temperature sensor: in case of the failure of the temperature sensor the regulator will shift to the so-called safe automatic model and will try to maintain the temperature set
* automatic switching over to the mode of operation with the internal temperature sensor in case of a failure of the external sensor
* in the mode of operation with two temperature sensors, the external sensor is the limiting one and it does not permit the temperature of 27°C to be exceeded regardless of the temperature set by means of the temperature adjusting knob
* in the mode of operation with two temperature sensors: if both temperature sensors fail, the regulator will shift to the so-called safe automatic model. Working with interruptions, the regulator will try to maintain the temperature at the level of 80% of the set temperature.

RT-825 temperature range: 5÷60°C







supply	230V AC
current load	<16A
contact	1 NO
temperature setting range	15÷50°C
antifrost temperature range	0÷10°C
set value accuracy	±1°C
temperature sensor	NTC
length of probe with sensor	3m cable
RTC clock	<1h
power consumption	0,8W
terminal	screw terminals 1,5mm²
dimensions	
front	83,5×83,5mm; gł.22mm
back	Ø50; gł.27,5mm
fixing	to under plaster box Ø60mm

FUNCTIONS

* the control panel enables programming and monitoring the device operation
* the breaker switch located on the front panel enables switching off the power supply of the whole heating system
* maintaining a preset temperature in accordance with programmed hours and days of the week
* possibility of programming 4 intervals of a required temperature per 24 hours
* 12 program entries: 4 entries concerning the required temperature for working days (Pn-Pt: Monday through Friday); 4 entries concerning the required temperature for Saturday (So: Saturday) and 4 entries concerning the required temperature for Sunday (Nd: Sunday)
* possibility of a quick, manual correction of the currently maintained temperature
* adjustable hysteresis
* 2 temperature sensors: an internal one and an external one
* 3 operation modes of the regulator: operation with the internal temperature sensor; operation with the external temperature sensor; operation with two temperature sensors
* in the mode of operation with two temperature sensors, the external sensor is the limiting one with an adjustable temperature within the range of 15÷50°C

PROBE RT-45



temperature sensor	NTC
working temperature	-50÷65°C
dimansion	Ø7; h=25mm
isolation of sensor	PC muff
cable	PC 2×0,34mm²; l=3m
dedicated	RT-824, RT-825

PROGRAMMABLE

PURPOSE

The CRT controllers are multi-function, programmable electronic devices which enable control of heating or cooling devices in order to maintain a stable room temperature, as well as to control ambient and substance temperatures in industrial conditions, with the option of supervising technological processes.

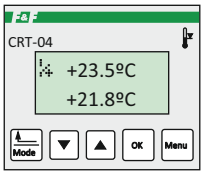
FOR HOME APPLICATIONS

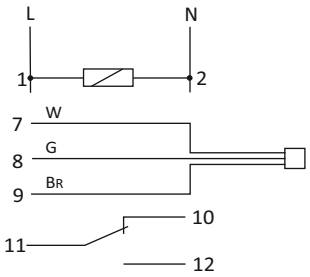
CRT-04 temperature range: 0÷60°C

FUNCTIONING

The operation time and required temperature are achieved according to the individual program set by the user. The CRT controllers are equipped with a calendar and a real time clock which enable switching the controlled device on and off at preset hours within the following cycles: 24-hour, weekly, business-day (Mon. Fri.) or weekend (Sat., Sun.).





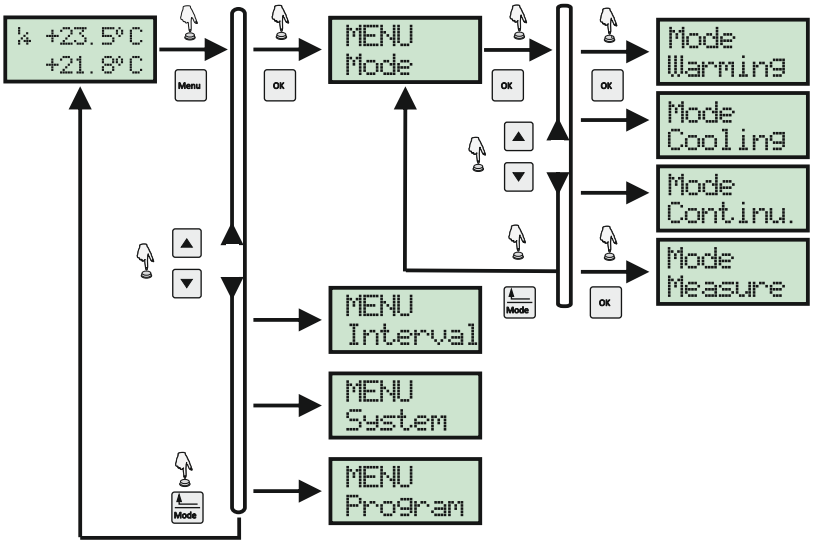


supply	230V AC
current load	<16A
contact	1 C/O
temperature setting range	0÷60°C
hysteresis setting range	0÷10°C
set value accuracy	0,1°C
model correction	±5°C
lagged switching - regulated	1÷15min
type of temperature sensor	RT4
length of probe with sensor	2,5m cable
power consumption	1,5W
terminal	screw terminals 2,5mm²
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

CONTROLLER'S FEATURES:

*control panel for programming and monitoring;
*operation modes: HEATING and COOLING to maintain a preset temperature according to programmed hours and days;
*CONTINUOUS operating mode to maintain a single preset temperature value while ignoring other program entries;
*MEASUREMENT operating mode display of an actual temperature value without controlling a connected machine;
*50 program entries;
INTERVAL this feature enables the user to program up to 8 required temperature values (3 in the MY1, MY2 and MY3 modes, and an additional 5 in modes called MORNING, WORK, DINNER, DAY, and NIGHT for everyday time windows related to the users' lifestyle;
*DELAY programmable time of response delay while exceeding limit temperature values;
*CORRECTION related to the temperature read-out error against the model thermometer;
*SENSORS visual signalisation of the temperature sensor failure;
*DST automatic DST time implementation with programmable shift to manual mode;
*LIGHT selection of display illumination mode.
*LANGUAGE program menu in three languages: Polish, English or Russian

Menu (example)



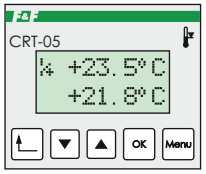
INDUSTRIAL

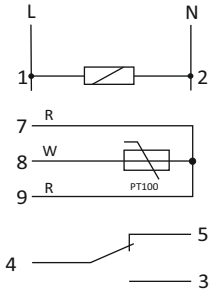
FUNCTIONING

The controller responds to a selected function on the basis of individual entries concerning parameters like temperature, hysteresis, response delay, and other values preset by the user.

CRT-05 2-FUNCTION temperature range: -100÷400°C





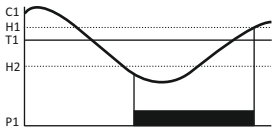


supply	230V AC
current load	<16A
contact	1 C/O
temperature setting range	-100÷400°C
hysteresis setting range	0÷100°C
set value accuracy	1°C
model correction	±20°C
lagged switching - regulated	0÷45min
gradient - regulated	4°C/1sec
type of temperature sensor	PT100
power consumption	1,5W
terminal	screw terminals 2,5mm²
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

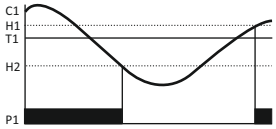
CONTROLLER'S FEATURES:

*control panel for programming and monitoring;
*2 operations modes: HEATING and COOLING
*2 regulated HYSTERESIS values lower and upper limits;
*AUTOMATIC mode operation with one selected function;
*MANUAL mode permanent closing or opening of the contact without a temperature measurement.
*CORRECTION related to the temperature read-out error against the model thermometer;
*WARNING - visual signalisation of the temperature sensor failure, range exceed and speed riasing or falling temperature exceed
* limiting access to program menu using PIN code
*LIGHT selection of display illumination mode.
*LANGUAGE program menu in three languages: Polish, English or Russian

HEATING

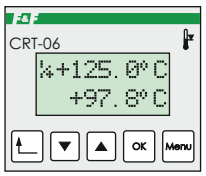


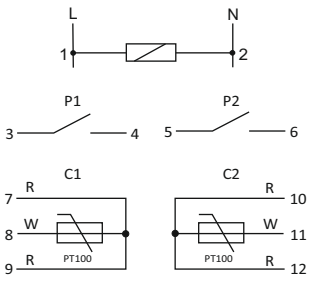
COOLING



CRT-06 10-FUNCTION temperature range: -100÷400°C







supply	230V AC
current load	2×(<16A)
contact	1 C/O
temperature setting range	-100÷400°C
hysteresis setting range	0÷100°C
set value accuracy	1°C
model correction	±20°C
lagged switching - adjustable	0÷45min
gradient - regulated	4°C/1sek÷6°C/1min
sampling frequency - regulated	1÷120probek/1min
type of temperature sensor	PT100
power consumption	1,5W
terminal	screw terminals 2,5mm²
dimensions	3 modules (52,5mm)
fixing	on rail TH-35

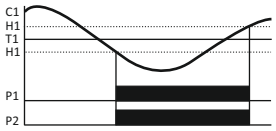
CONTROLLER'S FEATURES:

*control panel for programming and monitoring;
*10 operation functions;
*2 independent temperature sensors;
*two independent temperature values may be set;
*2 x 1P contacts applied to the temperature sensors;
*2 hysteresis set values, one for each sensor;
*AUTOMATIC mode - operation with one selected function;
*MANUAL mode permanent closing or opening of the contact without a temperature measurement. Separate temperature drops for the P1 and P2 contacts.
*memory feature for maximum and minimum temperature values registered, independent for the C1 and C2 sensors;
*CORRECTION related to the temperature read-out error against the model thermometer;
*WARNING - visual signalisation of the temperature sensor failure, range exceed and speed riasing or falling temperature exceed
* limiting access to program menu using PIN code
*LIGHT selection of display illumination mode.
*LANGUAGE program menu in three languages: Polish, English or Russian

OPERATIONAL FUNCTIONS OF THE CRT-06

PROG 1

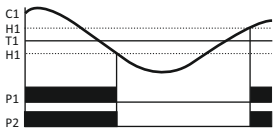
HEATING mode. The P1 and P2 contacts depend on the C1 sensor.



-1 sensor: C1
- P1 and P2 work in parallel
-1 temperature set value: T1
- 1 hysteresis set value: H1 (upper and lower limit)

PROG 2

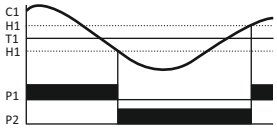
COOLING mode. The P1 and P2 contacts depend on the C1 sensor.



-1 sensor: C1
- P1 and P2 work in parallel
-1 temperature set value: T1
- 1 hysteresis set value: H1 (upper and lower limit)

PROG 3

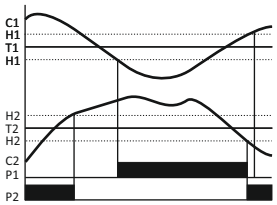
HEATING / COOLING modes. The P1 and P2 contacts depend on the C1 sensor.



-1 sensor: C1
- contacts work in alternate manner:
P1 - cooling
P2 - heating
- 1 temperature set value: T1
- 1 hysteresis set value: H1 (upper and lower limit)

PROG 4

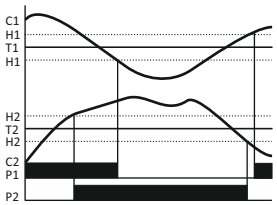
For contacts P1 and P2. The P1 contact dependent on the C1 sensor; the P2 on the C2 sensor.



-2 sensors: C1 and C2
-contacts work independently:
P1 - heating
P2 - heating
-2 temperature set values: T1 and T2
-2 hysteresis values:
H1 upper and lower limit for T1
H2 upper and lower limit for T2

PROG 5

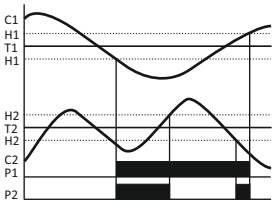
COOLING mode for the P1 and P2 contacts. The P1 contact depends on the C1 sensor; the P2 on the C2 sensor.



-2 sensors: C1 and C2
- contacts work independently:
P1 - cooling
P2 - cooling
-2 temperature set values: T1 and T2
-2 hysteresis set values:
H1 - upper and lower limit for T1
H2 - upper and lower limit for T2

PROG 6

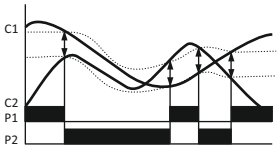
HEATING mode for the contacts P1 and P2. The P1 contact depends on the C1 sensor, and the P2 on the C2 and C1 (activated only with the P1 contact closed).



-2 sensors: C1 and C2
- the contacts interdependent:
P1 - heating
P2 heating with the P1 closed
-2 temperature set values: T1 and T2
-2 hysteresis set values:
H1 upper and lower limit for T1
H2 upper and lower limit for T2

PROG 7

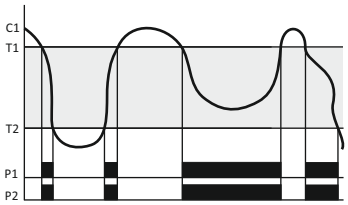
DIFFERENTIAL mode. The P1 contact closed with the temperature difference exceeding the set value. The P2 contact activated in the reversed conditions in comparison to the P1 , i.e. with the temperature difference lower than the set value.



- 2 sensors: C1 and C2;
- contacts work in alternate manner:
P1 heating
P2 heating with the P1 closed
- 2 temperature set values: T1 and T2
- no hysteresis set values H1 and H2

PROG 8

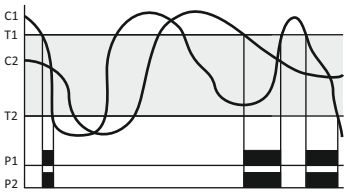
WINDOW mode. The P1 and P2 contacts closed when the C1 sensor temperature is between the preset temperature values of T1 and T2.



-1 sensor: C1
-contacts work in alternate manner:
P1 and P2
-2 temperature set values: T1 and T2
-no hysteresis set value H1 and H2

PROG 9

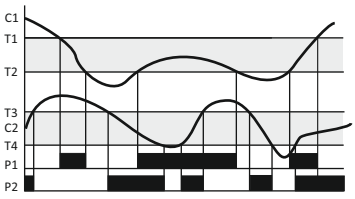
WINDOW mode. The P1 and P2 contacts closed when the C1 and C2 sensors temperature is between the preset temperature values of T1 and T2.



-2 sensors: C1 and C2
-contacts work in alternate manner:
P1 and P2
-2 temperature set values: T1 and T2
-no hysteresis set value H1 and H2

PROG 10

WINDOW mode independent for the P1 and P2 contacts. The P1 contact closed when the C1 sensor temperature is between the preset temperature values of T1 and T2. The P2 contact closed when the C2 sensor temperature is between the preset temperature values of T3 and T4.



- two sensors: C1 and C2
-contacts work independently: P1 and P2
-4 temperature set values:
T1 and T2 for the P1 and
T3 and T4 for the P2 contact
-no hysteresis set value H1 and H2

PROBE RT4



temperature sensor	DS18S20
measurement range	-55÷125°C
working temperature	-30÷65°C
dimansion	Ø5; h=30mm
isolation of sensor	PC
cable	LiYY 3×0,34mm² l=2,5m
dedicated	CRT-04

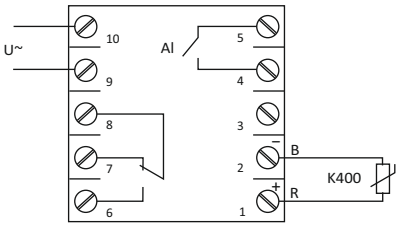
PROBE RT-56



temperature sensor	PT100
measurement range	-100÷400°C
dimansion	Ø4; h=85mm
isolation of sensor	steel muff
cable	PC 3×0,34mm²; l=1,5m in metal braid sheath
dedicated	CRT-05, CRT-06

CRT-15T temperature range: 0÷400°C





supply	100÷240V
current load	<3A
contact	1 C/O
load current for alarm output	<1A
alarm output contact	1 NO
temperature setting range	0÷400°C
PID set value	
proportional section P	0÷100
integrating section I	0÷255
differentiating section D	0÷255
set value accuracy	0,5°C
model correction	±15°C
lagged switching - regulated	0÷45min
gradient - regulated	4°C/1sec
type of temperature sensor	K400
power consumption	1W
terminal	screw terminals 2,5mm²
dimensions	48×48×86

CONTROLLER'S FEATURES:

*control panel for programming and monitoring of device operation;
*PID controller (a proportional-integral-derivative controller);
*automatic tuning of the PID regulator;
*ALARM programmable temperature limit to trigger off the alarm feature;
*preset temperature indications;
*current temperature indications;
*1P output contact;
*additional ALARM output: 1Z contact
*CORRECTION related to the temperature read-out error against the model thermometer;
*LOCK settings block.

PROBE K400



temperature sensor	K400
dimansion	thread M6; h=15mm
isolation of sensor	steel
cable	2×0,34mm² l=1,0m in steel weave

RESISTANCE (THERMAL) RELAY

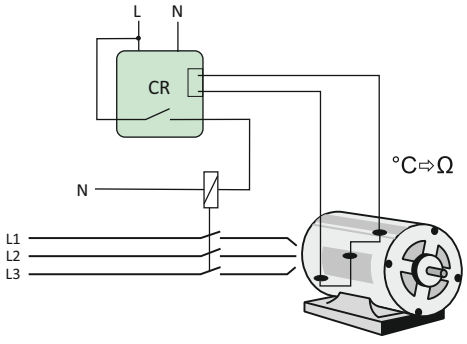
CR-810 TO CO-OPERATION WITH THE PTC THERMISTOR-EQUIPPED TEMPERATURE SENSORS.

PURPOSE

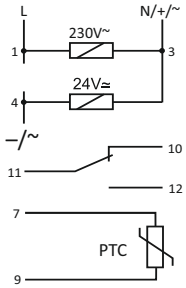
The resistance relay protects electrical equipment against any undesirable temperature increases by means of PTC resistors in serial connection (1-6 pieces).

FUNCTIONING

Correct operation (closed contacts 3-7) is indicated by the green LED (correct power voltage, temperature of the controlled device, working circuit of connected PTC sensors). The increase in temperature of at least one sensor over the rated value results in an increase in its resistance over 3000W. The relay is then activated (contacts 3-7 open). The system is activated automatically if the resistance of the PTC sensor loop decreases below the threshold of 1800W (drop in temperature of the controlled device). The contact of the executive relay also opens in the event of the resistance dropping to 15W (e.g. during a short circuit between cables) or with the power voltage turned off .







supply	230V AC / 24V AC/DC
current load	<16A
contact opening resistance	R>3000W, R<70W
contact closure resistance	110W<R<1800W
max resistance of sensor loop when cold	R=1500W
power supply / correct condictions indicator	green LED
damage condictions indicator	2×red LED
working temperature	-25÷50°C
terminals	screw terminals 2,5 mm²
dimensions	1 module (18 mm)
fixing	on rail TH-35

27. CONTROL SYSTEM COMPONENTS

ELECTROMAGNETIC RELAYS

PURPOSE

Electromagnetic relay in single-module casing intended for direct assembly on the TH-35 bus bar.

FUNCTIONING

Application of the power supply voltage to the relay's coil results in a shift of the contact. After the decay of the voltage in question, the contact returns to the initial position.

PK-1P Contact 1C/O (16A).

PK-2P Contacts 2C/O (2×8A).

PK-3P Contacts 3C/O (3×8A).

PK-4PZ Contacts 2C/O (2×8A) + 2NO (2×8A).

PK-4PR Contacts 2C/O (2×8A) + 2NC (2×8A).

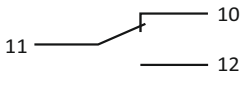


Order labelling method:

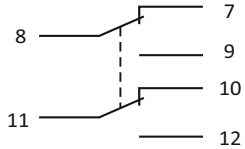
PK-2P 48V — supply voltage

appl. standard no.	IEC 61095
power supply	
PK-xP 230V	230V AC
PK-xP 110V	110V AC/DC
PK-xP 48V	48V AC/DC
PK-xP 24V	24V AC/DC
PK-xP 12V	12V AC/DC
connection current	
PK-1P	Ie=16A
PK-2P	Ie=2×8A
PK-3P	Ie=3×8A
PK-4PZ	Ie=4×8A
PK-4PR	Ie=4×8A
connection voltage	Ue=250V
usage category	AC-7a
insulation voltage	400V
voltage surge resistor	contact pair coil, 6 kV
separate current circuits	3.6 kV
contact gap	1.2 kV
pollution level	3
overvoltage capacity	6 kV
safety label	B
protection level	IP20
operating time	max. 40 msec
turn-off time	max. 20 msec
mechanical life	5 x 10^6 cycles
current consumption	25mA
voltage indicator	LED
terminal	screw terminals 2.5 mm^2
working temperature	-25÷50°C
dimensions	1 module (18 mm)
fixing	on rail TH-35

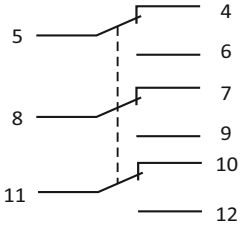
PK-1P



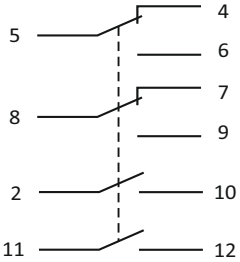
PK-2P



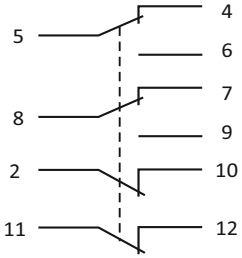
PK-3P



PK-4PZ



PK-4PR



Loadability for contats of relays

						ALTERNATING CURRENT			DIRECT CURRENT
						AC-1	**AC-3**	**AC-15**	**DC-1** 24V/230V
	BULBS HALOGEN LIGHTS	INCOMPENSATED FLUORESCENT LIGHTS	COMPENSATED OF FLUORESCENT LIGHTS	FLUORESCENT LIGHTS COMPENSATED IN PARALLEL	ECONOMIC FLUORESCENT LIGHT	non-inductive or low-inductive loads resistive furnance	squirerel-cage motor, switching motors in operation	controlling of alternative electro-magnetic loads	non-inductive or low-inductive, resistive furnances
5A	600W	300W	300W	200W	240W	1800VA	0,30KW	280VA	5A/012A
8A	1100W	550W	550W	350W	300W	2200VA	0,45KW	325VA	8A/0,18A
10A	1500W	650W	650W	500W	350W	2500VA	0,6KW	500VA	10A/0,25A
16A	2300W	1000W	1000W	800W	550W	4200VA	1KW	750VA	16A/0,35A
30A	4000W	1900W	1900W	1500W	1000W	7500VA	1,7KW	1400VA	30A/0,7A

MODULAR CONTACTORS

PURPOSE

Electromagnetic contactors in modular case for direct mounting on rail 35mm.

FUNCTIONING

Connect the voltage on the contactor's coil will switch the contact. Contactor's status is indicated by blinking red marker in the box. After a loss of power the contacts return to their original position.



ST-25

Type	Contacts	Power Cat. AC1	Coil supply voltage	Power consumption	Module	Weight	Screw terminals
ST25-20	2NO	25A	230V AC	2,2W	1	106g	4mm²
ST25-20/24	2NO	25A	24V AC	2,2W	1	106g	4mm²
ST25-11	1NO+1NC	25A	230V AC	2,2W	1	106g	4mm²
ST25-30	3NO	25A	230V AC	4,0W	2	168g	4mm²
ST25-31	3NO+1NC	25A	230V AC	4,0W	2	168g	4mm²
ST25-31/24	3NO+1NC	25A	24V AC	4,0W	2	168g	4mm²
ST25-40	4NO	25A	230V AC	4,0W	2	168g	4mm²
ST25-22	2NO+2NC	25A	230V AC	4,0W	2	168g	4mm²
ST25-04	4NC	25A	230V AC	4,0W	2	168g	4mm²
ST25-40/24	4NO	25A	24V AC	4,0W	2	168g	4mm²
ST40-40	4NO	40A	230V AC	6,4W	3	241g	10mm²
ST40-40/24	4NO	40A	24V AC	6,4W	3	241g	10mm²
ST40-31	3NO+1NC	40A	230V AC	6,4W	3	241g	10mm²
ST63-40	4NO	63A	230V AC	6,4W	3	241g	10mm²
ST63-40/24	4NO	63A	24V AC	6,4W	3	241g	10mm²
ST63-31	3NO+1NC	63A	230V AC	6,4W	3	241g	10mm²



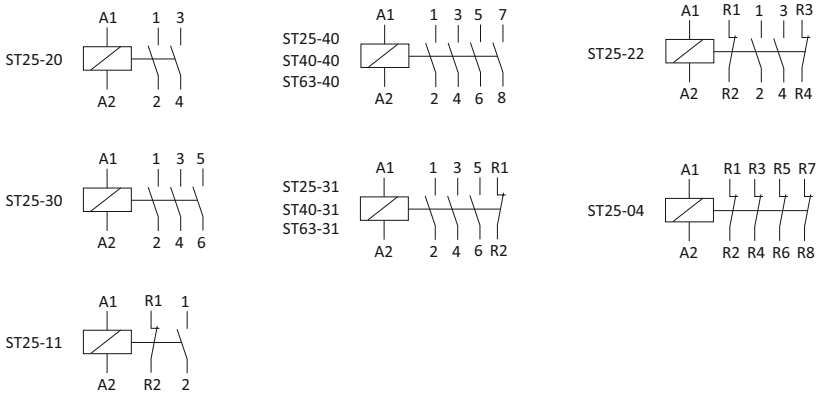
ST-40

Standard number	IEC 61095
Number of a cycles	3×10^6
Protection level	IP20
Working temperature	-25÷50°C

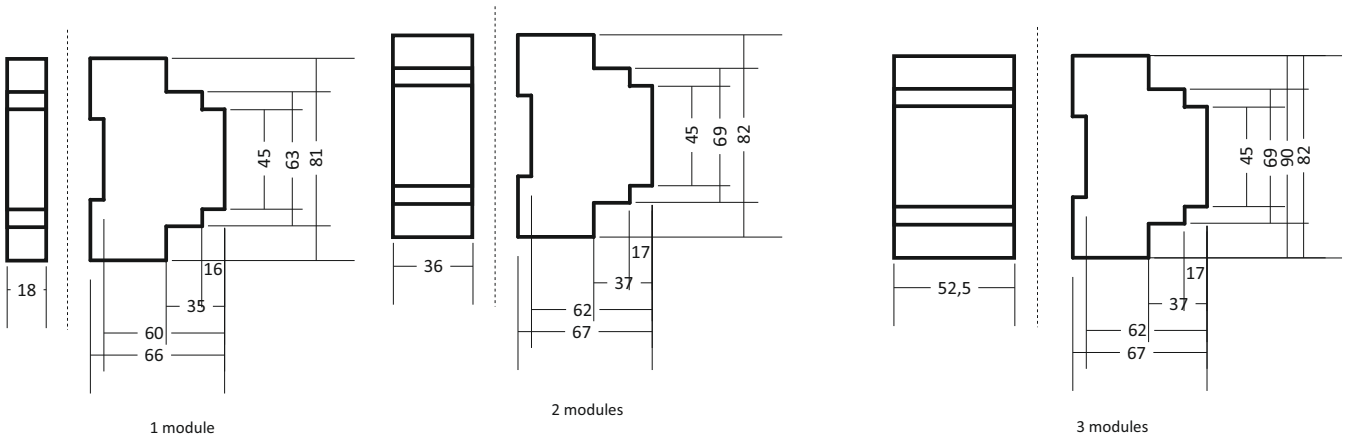


ST-63

Contacts description



Dimensions

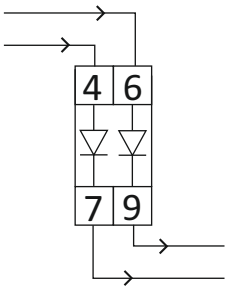


SEP-01 SEPARATOR OF INPUT SIGNAL

FUNCTIONING

The SEP-01 serve to separating of input signal in automatic arrangement with separated control groups and central control. Input signal goes in "one way". Example of use: see chapter 3 and 8.





current load	<1A 1000V
working temperature	-25÷50°C
terminal	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35

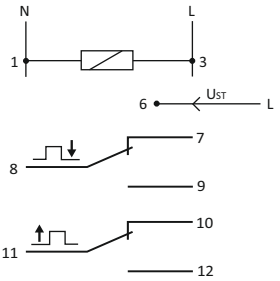
PSI-02 CONTINUOUS - PULSE SIGNAL CONVERTER

FUNCTIONING

The PSI-02 converter serves to break up a control signal into single pulses required in automatic control systems.
After the application of the control signal to the UST input (leading edge), the converter generates a pulse on output 6 (contact 5-6 closed for 1 second). After the decay of the control signal (trailing edge), the converter sends another pulse on output 8 (contact 7-8 closed for 1 second).
Example of use: Roller blinds group control system (see chapter 8).







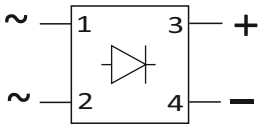
supply	PSI-02 230V	230V AC
	PSI-02 24V	24V AC/DC
current load		<2×8A
contact		separated 2×1N/O
input signal		230V AC
time of input signals		1sec
working temperature		-25÷50°C
terminal		screw terminals 2,5mm²
dimensions		1 module (18mm)
fixing		on rail TH-35

MPG-03 FULL-WAVE BRIDGE RECTIFIER (in GREATZ circuit)

PURPOSE

The MPG-02 changes alternating current into unidirectional direct current.





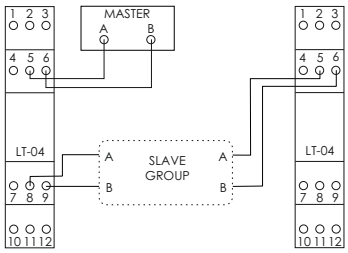
supply	110÷264V AC
	12÷48V AC
current load	<2A
signalization of supply	LED green
working temeperature	-25÷50°C
terminal	screw terminal 2,5mm²
dimensions	1 module(17,5mm)
fixing	on rail TH-35

LT-04 TERMINATION / POLARISATION / ENHANCEMENT MODULE NETWORK RS-485

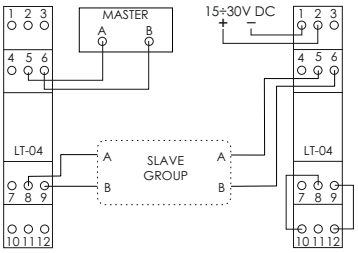
PURPOSE

LT module is used to termination of signal line (UTP cable) between devices exchange data according to the standard MODBUS protocol on the network RS-485.





Termination Line



Signal enhancement
(with termination)

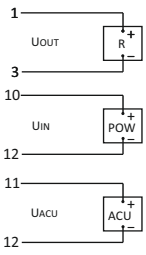
supply	15÷30V DC
current	<10mA
working temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on rail TH-35

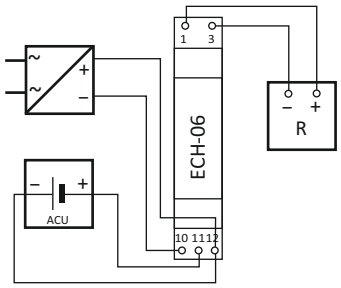
ECH-06 RESERVE POWER MODULE (with battery charger 1.3 ÷ 7.2 Ah)

FUNCTIONING

Power module and charging battery of ECH allows you to implement flexible power scheme to ensure continuity of the device after the main power failure. With the external acid battery (gel) of a nominal voltage 12V is battery reserve system.
The module performs the continuous surveillance of the battery and recharges it automatically when the presence of the main supply voltage. In the case of main power failure or a decline in its value below the battery voltage of the receiver is powered from the battery.







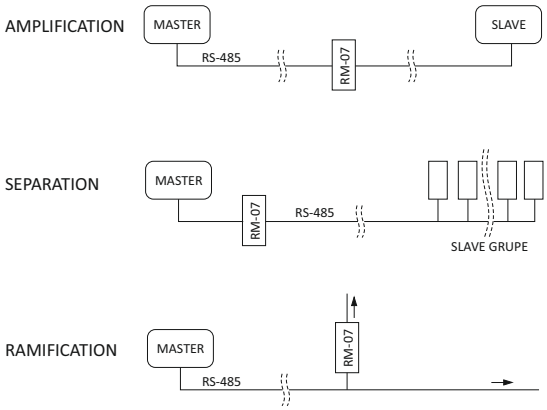
supply/charging Uin	15÷30V DC
out voltage Uout	9÷30V DC
	(Uin-0,5V DC / Uacu-0,5V DC)
current load out Uout	<3A
supported battery capacity	1,3÷7,2Ah
max battery voltage	13,8V DC
charging current	<3A
power consumption	<1W
connection	screw terminals
dimensions	1 module (18mm)
fixing	on the rail TH-35

RM-07 RS-485 ISOLATED REPEATER / AMPLYFIER

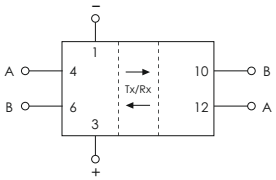
PURPOSE

Device allow to extend the range of RS-485 bus and to connect more devices to the one line. Furthermore RM-07 allows to create separated branch which can be used when RS-485 star topology network is needed. Due to fact that device is using optical separation it can be used to protect sensitive and expensive devices against electrostatic discharges.





supply	9÷30V DC
baudrate	1200÷115200bps
current consumption	<25mA
galvanic separation	1kV
work temperature	-25÷50°C
connection	screw terminals 2,5mm²
dimensions	1 module (18mm)
fixing	on the rail TH-35



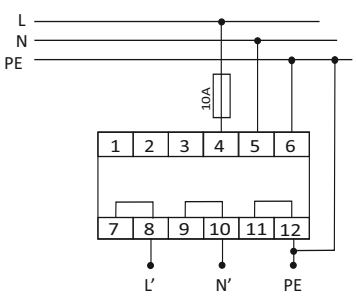
OP-230 OVERVOLTAGE PROTECTOR

type 3 (early D-class) with a triple interference filter

PURPOSE

Protection of electronic devices, i.e. computers, PLCs, microprocessor systems, etc. against electromagnetic disturbance and overvoltage in the electrical system.





standard no	IEC 61643-1:2001
protection class	D
rated voltage	230V
rated current	10A
rated frequency	50Hz
maximum stable working voltage	255V
overvoltage protection level L¶Novervoltage	<1,25kV
protection level L(N)¶PE	<1,5kV
operating time	<25ns
additional protection	10A gL/gG lub C10A
inductans	1mH na tor
leakage current	0,5mA
capacitance L¶N	880nF
capacitance L(N)¶PE	2,2nF
electromagnetic interference damping capacity	>85dB
terminal	screw terminals 2,5mm²
working temperature	-25÷50°C
dimensions	3 modules (52,5mm)
weight	170g
fixing	on rail TH-35

28. SIGNAL TRANSMITTERS

ANALOG TRANSMITTERS [4-20MA]

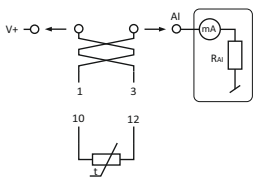
The analog transducers dedicated for measuring physical values with an external or internal sensor and converting the measured features to the standard analog current signal output 4-20mA or voltage 0 to 10V.

TEMPERATURE TRANSMITTERS

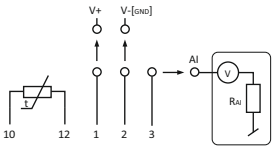
AT-1I / AT-1U

to cooperate with temperature sensor KTY





AT-1I



AT-1U

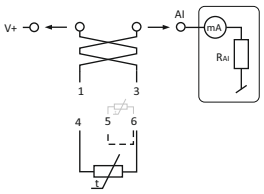
supply	9÷30V DC
measure range	-50°C÷+100°C
mistake precision	±1,5°C
output signal	4÷20mA / 0÷10V
lenght of signal wire I / U	300m / 20m
temperature probe	RT / RT2
power consumption	0,8W
working temperature	-40°C÷+85°C
relative humidity	85% to +30°C
connection	screw terminals 2,5mm2
dimensions	1 module (18mm)
fixing	on the rail TH-35
protection level	IP20

The module works with resistance-type temperature sensor KTY81-210 (or similar).
A dedicated temperature probe of F&F production : RT probe or RT2 probe (Chapter 25).

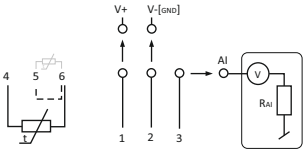
AT-2I / AT-2U

with internal temperature sensor KTY





AT-1I



AT-1U

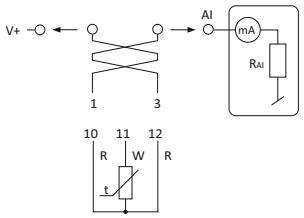
supply	9÷30V DC
measure range	-50°C÷+100°C
mistake precision	±1,5°C
output signal	4÷20mA / 0÷10V
lenght of signal wire I / U	300m / 20m
temperature probe	RT / RT2
power consumption	0,8W
working temperature	-40°C÷+85°C
relative humidity	85% to +30°C
connection	screw terminals 2,5mm2
dimensions	Ø55, h=13mm
fixing	to under plaster box Ø60mm
protection level	IP20

The module works in one of two options - with the internal sensor or external probe.
The module works with resistance-type temperature sensor KTY81-210 (or similar).
A dedicated temperature probe of F&F production : RT probe or RT2 probe (Chapter 25).

AT-3I

to cooperate with temperature sensor PT-100





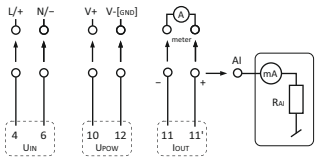
supply	9÷30V DC
measure range	-100°C÷+400°C
mistake precision	±1°C
max. current load	4÷20mA
temperature sensor	PT-100
processing error	±0,5%
lenght of signaling cable	<300m
working temperature	-40°C÷+85°C
power consumption	0,8W
relative humidity	85% to +30°C
connection	screw terminals 2,5mm2
dimensions	1 module (18mm)
assembly	on the rail TH-35
protection level	IP20

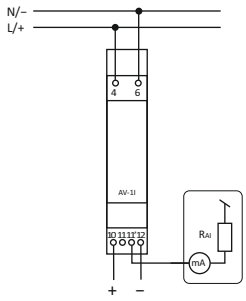
The module works with resistance-type temperature sensor PT100 (or similar).
A dedicated temperature probe of F&F production : RT -56 (chapter 25).

TRANSMITTERS OF MEASUREMENT VOLTAGE

AV-1I one-phase 230V AC / 400V DC







supply	9÷30V DC
measure range TrueRMS	
AC	0÷282,8V
DC	0÷400V
max. instantaneous voltage	320V AC / 450V DC
max. measurement mistake	±0,5V
max. current load	4÷20mA
lenght of signal cable	300m
breakdown voltage IN->OU	3KV
power consumption	0,8W
working temperature	-20°C÷50°C
relative humidity	85% to +30°C
connection	screw terminals 2,5mm2
dimensions	1 module (18mm)
protection level	IP20

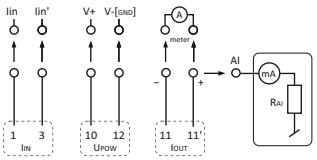
The transmitter measures the rms value voltage TrueRMS, which ensures high measurement accuracy even with distorted waveforms.

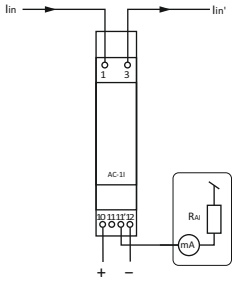
CURRENT TRANSMITTER

AC-1I 5A one-phase 5A AC

AC-1I 15A one-phase 15A AC / 20A DC







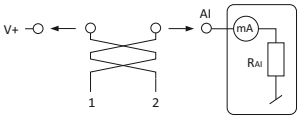
supply	9÷30V DC
range of measuer TrueRMS / max.voltage	
AC-1I 5A	0÷5A/285V
AC-1I 15A	0÷15A/285VAC
	0÷20A/400VDC
max. current load Iin	<10A AC
permissible overload	100A/100msek
output signal	4÷20mA
lenght of signal cable	300m
breakdown voltage IN->OUT	2,1KV
max measure mistake	±0,2A
processing mistake	±0,5%
power consumption	0,8W
working temperature	-20°C÷+50°C
relative humidity	85% to +30°C
connection	screw terminals 2,5mm2
dimensions	1 module (18mm)
fixing	on the rail TH-35
protection level	IP20

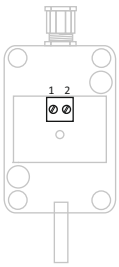
The transmitter measures the rms current TrueRMS, which ensures high measurement accuracy even with distorted waveforms.

HUMIDITY TRANSMITTER

AH-1I hermetic IP65







supply	9÷30V DC
range of measuer	0÷100%RH
accurasy (dla 25ºC)	±3,5RH
inertia	5sec
output signal	4÷20mA
lenght of signal cable	300m
breakdown voltage IN->OUT	2,1KV
max measure mistake	±0,2A
processing mistake	±0,5%
power consumption	0,8W
working temperature	-20°C÷+50°C
relative humidity	85% to +30°C
connection	screw terminals 1,5mm2
dimensions	42×98×30mm
fixing	on the rail TH-35
protection level	IP65

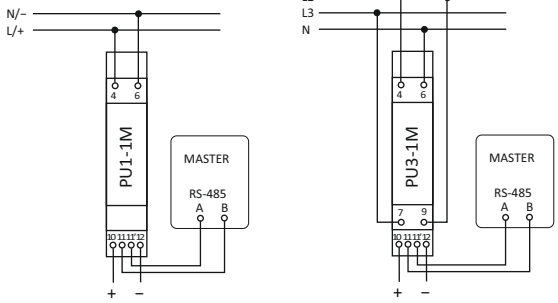
TRANSMITTERS WITH MODBUS RTU OUTPUT

Transducers for measuring physical values with an external or internal sensor with the possibility of reading data from the internal registers using Modbus RTU protocol.

TRANSMITTERS OF MEASUREMENT VOLTAGE

MB-1U-1 one-phase / MB-3U-1 three-phase





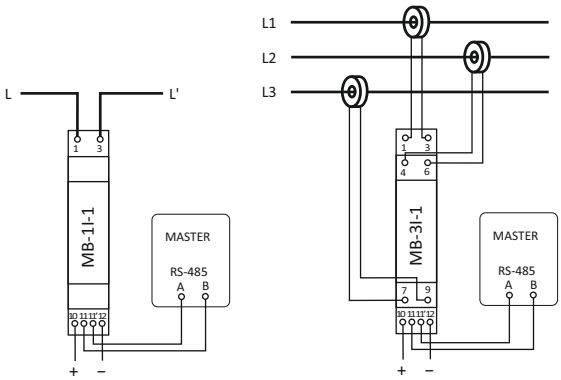
supply	9÷30V DC
max. current load	50mA
measure TrueRMS range	
AC	0÷285V
DC	0÷400V
measure mistake	0,5%
reading registry precision	1V
breakdown voltage IN->OUT	3kV
mistake precision	±0,5%
samplaed frequency	10Hz
port	RS-485
communication protocol	Modbus RTU
work mode	SLAVE
communication parameters	speed;9600bit/sec
	data bits; 8, stop bits:2, parity bits:no
adress	10÷19
working temperature	-20°C÷50°C
relative humidity	85% for +30°C
connection	screw terminals 2,5mm2
dimensions	1 module (18mm)
protection level	IP20

The transmitter measures the rms value voltage TrueRMS, which ensures high measurement accuracy even with distorted waveforms.

CURRENT TRANSMITTER

MB-1I-1 5A / MB-1I-1 15A one-phase
MB-3I-1 5A / MB-3I-1 15A three-phase





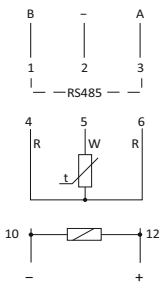
supply	9÷30V DC
max. current load	50mA
measure TrueRMS range / max. voltage	
AC-1I 5A	0÷5A/285V
AC-1I 15A	0÷15A/285VAC
	0÷20A/400VDC
measure mistake	±0,5%
reading registry precision	0,1A
breakdown voltage IN->OUT	2,1kV
samplaed frequency	10Hz
port	RS-485
communication protocol	Modbus RTU
work mode	SLAVE
communication parameters	speed;9600bit/sec
	data bits; 8, stop bits:2, parity bits:no
adress	20÷29
working temperature	-20°C÷50°C
relative humidity	85% for +30°C
connection	screw terminals 2,5mm2
dimensions	1 module (18mm)
protection level	IP20

The transmitter measures the rms current TrueRMS, which ensures high measurement accuracy even with distorted waveforms.

TEMPERATURE TRANSMITTERS

MB-PT-1 to cooperate with temperature sensor PT-100





supply	9÷30V DC
measure range	-100°C÷+400°C
mistake precision	±1°C
reading registry precision	1°C
temperature sensor	PT-100
processing error	±0,5%
samplaed frequency	10Hz
port	RS-485
communication protocol	Modbus RTU
work mode	SLAVE
communication parameters	speed;9600bit/sec
	data bits; 8, stop bits:2, parity bits:no
adress	20÷29
working temperature	-20°C÷50°C
relative humidity	85% for +30°C
connection	screw terminals 2,5mm2
dimensions	1 module (18mm)
protection level	IP20

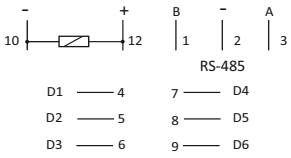
The module works with resistance-type temperature sensor PT100 (or similar).
A dedicated temperature probe of F&F production : RT -56 (chapter 25).

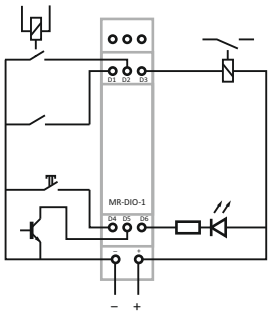
EXTENSION MODULES

MR module is dedicated as an external I/O expansion device for PLC controllers or other devices where data exchange is via the RS485 port in accordance with MODBUS RTU.

MR-DIO-1 DIGITAL I/O EXTENSION MODULE (DI/DO)





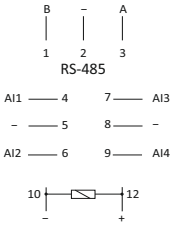


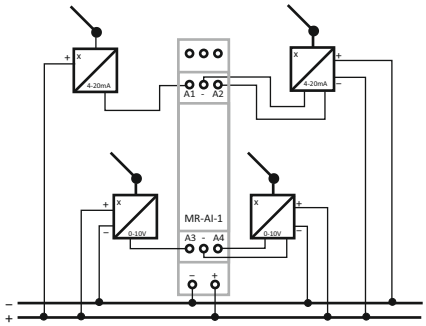
power supply	9÷30V DC
max current load	25mA
contact number DI/DO	6
voltage contact	<50V
work current contact: constant/pulse(20%)	100mA/200mA
port	RS485
communication protocol	MODBUS RTU
work mode	SLAVE
comunication param.	No of bits per second: 9600
	Data bits: 8, Parity: no, Start bits: 1, Stop bits: 2
base adress range	70÷79
working temerature	40°C÷+50°C
storage temperature	-40°C÷+70°C
Relative humidity	85% dla +30°C
fixing	screw terminals 1,5mm2
dimensions	1 moduł (18 mm)
IP protection	IP20

Module MR-DIO-1 has six universal contacts. Each of the contacts depending on how the connection can be a digital input or output.
The module has a recording of output function in non-volatile local memory. After each power-output module will revert to a saved state.

MR-AI-1 ANALOG INPUT EXTENSION MODULE (AI)





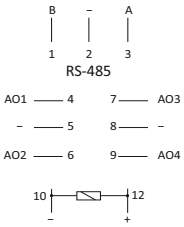


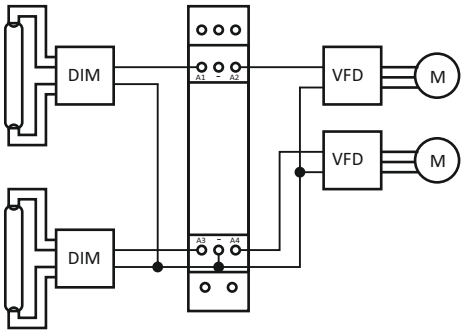
supply	9÷30V DC
max. current consumption	30mA
number inputs	4
type of inputs/range	
current	0÷20mA
voltage	0÷10V
input resistance	
current	110kΩ
voltage	47kΩ
mistake precision	0,5%
port	RS485
communication protocol	MODBUS RTU
work mode	SLAVE
comunication param.	No of bits per second: 9600
	Data bits: 8, Parity: no, Start bits: 1, Stop bits: 2
base adress range	90÷99
working temperature	-40°C÷+50°C
storage temperature	-40°C÷+70°C
relative humidity	85% to +30°C
connection	screw terminals 2,5mm2
dimensions	1 module (18mm)
protection level	IP20

The module has 4 universal analog inputs. Input type compatible 0-10V (voltage U) or 4-20mA (current I) is determined using internal jumpers. The module measures the value of input current and voltage on all inputs regardless of the hardware configurations of input types (location of jumpers). However, they will be properly measured input values for which this entry is configured.

MR-AO-1 ANALOG OUTPUT EXTANSION MODULE (AO)







supply	9÷30V DC
max. current consumption	40mA
output signal	0÷10V
output signal precision	0,1V
mistake precision	±0,02V
min.output resistance	2kΩ
short-circuit current	40mA
port	RS485
communication protocol	MODBUS RTU
work mode	SLAVE
comunication param.	No of bits per second: 9600
	Data bits: 8, Parity: no, Start bits: 1, Stop bits: 2
base adress range	100÷109
working temperature	-40°C÷+50°C
storage temperature	-40°C÷+70°C
relative humidity	85% for +30°C
connection	screw terminals 1,5mm2
dimensions	1 module (18mm)
protection level	IP20

The module has 4 analog voltage outputs 0-10V. The values of the outputs volages can be set or read via RS485, using MODBUS RTU protocol. The module has the function of recording the output voltage non-volatile memory in the local area. Each time you power up the module output value will be restored to the saved state.

29. INVERTERS

PURPOSE

Inverters are electronic group of frequency converters are designed for smooth speed control of asynchronous three-phase motors.

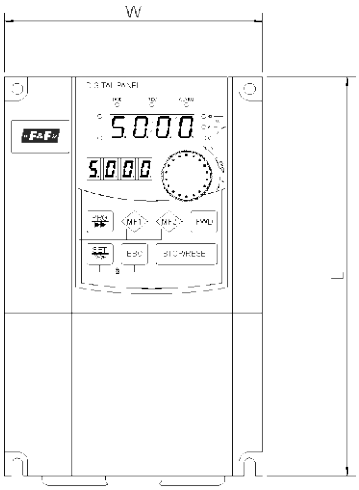


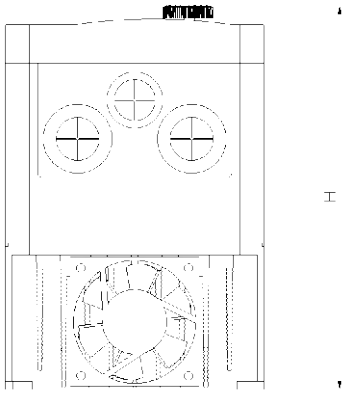
KEY FUNCTIONS

* The design of efficient inverter-based 32-bit DSP processor ensures fast and effective implementation of advanced control algorithms, asynchronous three-phase motor
* Ability to work in speed control mode or torque control mode
* Motor control based on vector control (both sensorless and with speed-feedback loop), and control based on the freely programmable V / F.
* Automatic slip compensation, and a large starting torque (up to 180% at a frequency of 0.25Hz).
* Multi-function control panel connected to the inverter on a "hot-plug" with the possibility of simultaneous storage of up to four sets of parameter settings and feature an easy transfer settings from one inverter to another
* Mode PLC - programmable up to seven steps performed once or periodically by the inverter. For each step, you can determine the speed, acceleration and duration.
* Large programming freedom inverter inputs and outputs, both analog and digital.
* Built-in RS485 Modbus RTU protocol support allows plugging the inverter to fieldbus and remote control, monitoring and configuration of the inverter

TYPES

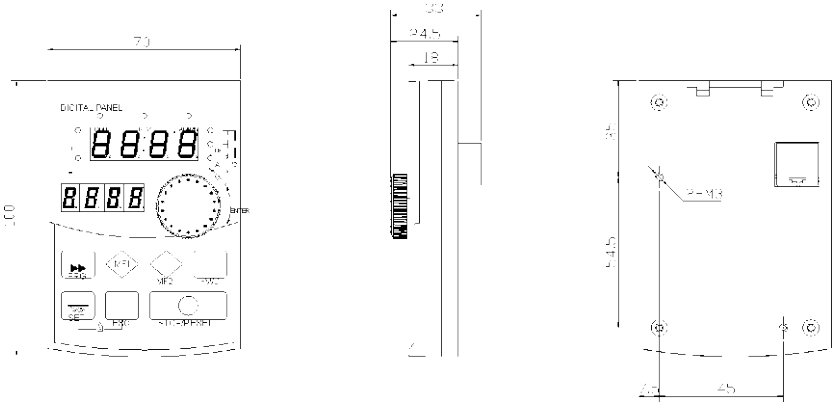
Inverter type	Input voltage	Input current	Output volatge	Output current	Max motor power	Lenght L	Width W	Heightht H
	V	A	V	A	kW	mm	mm	mm
FA-1L007	1x230V	9A	3x230V	4A	0.75kW	185	120	168,5
FA-1L015	1x230V	17.5A	3x230V	7A	1.5kW	185	120	168,5
FA-1L022	1x230V	24A	3x230V	10A	2.2kW	220	150	185,5
FA-1L040	1x230V	36A	3x230V	16A	4.0kW	220	150	185,5
FA-3H007	3x400V	3.3A	3x400V	2.5A	0.75kW	185	120	168,5
FA-3H015	3x400V	5A	3x400V	3.7A	1.5kW	185	120	168,5
FA-3H022	3x400V	7A	3x400V	5A	2.2kW	185	120	168,5
FA-3H040	3x400V	11A	3x400V	8.5A	4.0kW	220	150	185,5
FA-3H055	3x400V	16.5A	3x400V	13A	5.5kW	220	150	185,5
FA-3H075	3x400V	20A	3x400V	16A	7.5kW	285	180	200
FA-3H110	3x400V	28A	3x400V	25A	11kW	285	180	200





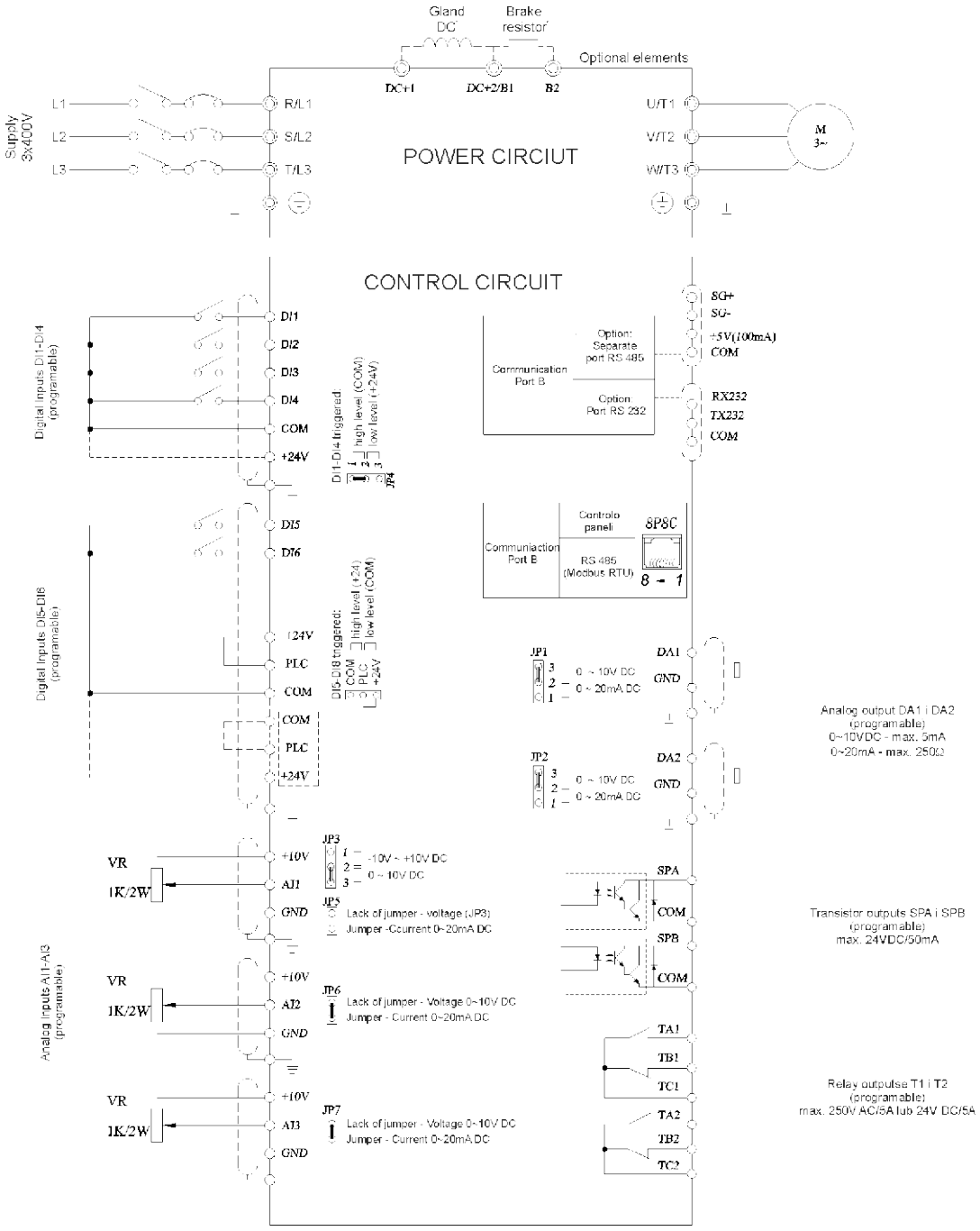
CONTROL PANEL





Control panel is detachable from the main body of the inverter. This allows for external mounting on the cabinet door for quick access to settings and adjust the parameters of the inverter.

INPUTS/OUTPUTS DESCRIPTION



SPECIFICATIONS

Items		Specifications		
Supply	Supply and frequency	1x230V 3 x 380~415V (±15%), 50/60Hz (±5%)		
	Output voltage	3x230V (to supply 230V) 3x380~400V (to supply 400V)		
	Output frequency	0.00~320.0Hz		
	Control Characteristics V/F	1) FÖÖCEMÖPPÖØØPÑÑÓNMØMNÑØØEÖÖCE 2) FOMIacteristics of the reduced torque (3 types) 3) FOMØMNÑØØEÖÖCEÖÑPOÑPÖØØPÑset by the user (8 points) 4) IJÑÑPÖØÑÓÖÖPØÖÖÄÄÖÖÖEØØÖÖCEEÖØÑÓÖÖCEÑÑ-loop)		
		Control V/F	Sensorless vector control	Vector control with feedbac
	Starting torque	180% dla 0.50Hz	180% dla 0.50Hz	180% dla 0.0Hz
	The dynamics of speed control	1: 100	1: 200	1: 2000
	The stability of the output speed	±0.5%	±0.2%	±0.02%
	Torque boost	In this mode V/F control - automatic or user-defined		
	Acceleration / deceleration	Linear or by programmed curve S. Maximum acceleration and braking - 3200S		
	Frequency Accuracy	Digital frequency reference: 0.01Hz(f <= 100Hz), 0.1Hz (>100Hz); Analog frequency reference: 1% of maximum frequency		
	Overload	1) ÔDÓÃ the rated current for 1 minute, 2) ÕÓÓÃ rated current for 0.1s.		
	Motor slip compensation	In this mode V/F control can automatically compensate for the slip		
Security	Security of inverter	1) Ę ÑÐØÃÑPÖÖOÒÐOÖØPÖÖÕÕRÖÐPÖÖÕRÖÐÕMÑÑ 2) ÏØØPÖÑRÑÑÑÑÑÕÑÐOÑÖMÑÕÐÞÖÑÞØÑÖP 3) Ę ÑÐØÃÑPOÑÕÕMÑÖÐÐPÖÖOÒÐO 4) Ę ÑÐØÃÑÕÕÖÖÐÒÐÖÖÑÑMÐÑÖÐEMÕÐ 5) J ÒÐÖÕÐPOÑÑÞØØÑÖPPÖÑÐØÞÖÑ 6) ÏØØPÖÑRÑÑÖÐÐÐÒÑÖÖÑØÑMÐÒÐÐÖÖÑÑØ 7) HÕMÑÑÒÐÖÖÐÞPOÑÐÖÖÑØÑØÖÐÐEØØÞHÑÑPÑÑMÑMÒÖÐÐÞÑÖÖÖÞÖÖÑMÐÖÖÑØØØÐÐEØØÖÖÑÖØØÑÑP feedback signal.		
	Safety switch	Can be programmed as input or button on the safety switch causing immediate image voltage of the inverter output.		
	Security settings	Possibility to secure the set the inverter to use a PIN		
	Deleting mistakes	You can set both automatic and manual reset errors		
Braking	DC braking, and using an external braking resistor.			
IO	6 digital inputs	1) ìØÑÑÑØÖÖÞPÐÐÑÖØÑÖPOÖÐR -level (COM) and high (+24 V) 2) È ÖÑÑÑ ÑÑÑÑÑÖÖ ÖÑ ØØÑÑÑÖÖ ÖÖÑ ÑÞÖÑÐÖÖÖÐ - it is possible to assign to the terminals 68 different functions. Among other things, running back and forth, trying to run back and forth, safety switch, reset, multi-speed control, motor potentiometer, change of acceleration and deceleration, pulse input, and more.		
	3 analog inputs	1) ìOÑRÑMÐRÖØØÑÖÑPOMÐÖÖÞPÐÖÐEMÑÑÄ10V ~ +10 V or 0 ~ 10V) and input current 0 ~ 20mA (software, you can set the range of 4 ~ 20mA). 2) ìOÑMÐalog inputs can be used to ask frequency and time, and to cooperate with PID controller.		
	2 analog outputs	1) ÇÅìOÑRÑMÐRØØÑÖPOMÐEMÐÖÖMÑÑÖÞPØÞPĆŠ ÇĆIJÅMÐÑÖÞPØÞPÑÞØØÑÖPĆŠ 20mA. 2) ÇÄMÐMÐÑÖÞPØÞPÐÐÑMÐÑÑØØÑÖÑÖÖÑÖÐÐÑMÑÑE a Setpoint and actual frequency b Voltage and output current c DC voltage on the track d Temperatures IGBT power amplifier e Power output f Engine speeds g Torque Drive		
	2 transistor outputs	1) Fast pulse outputs (max. frequency 50kH). Possible signaling: a desired frequency b Actual frequency c The current values d Output Voltages e DC voltage on the track f Temperatures of power amplifier g Output power 2) ÎÑÑØÐMÑÖÑPØÐÖÐEÐØÖ– max. 20mA/27V		

	Two relays outputs	1) Î ÇÑÝØÐÑÑÏÖÑÇÑÒÐÒÞ DÉ CČDCIJ È F ÇØ5A/30VDC 2) ĜŔĤÑÖĞĐÑ ÇØĐÑÝØÁVÖ ÖĐÑÇÞPŐÞPÑÞÖÑŔĐĐÖ ÄĐĐÖMĐĐÑÇ ÑĐÑÑÁÑÇÞ CĐVĤÑCĐÑŔOÑ inverter)
Communication	Built-in RS485 communication port running Modbus RTU standard (constant speed of 19200 bps). Optional with additional interface RS 485.	
Control panel	Multi-function operator panel: 1)Cconnected to the inverter via a standard RJ45 socket (according to EIA T568A standard) - easy to connect the inverter such as outside the control cabinet. 2) Two displays and eight LEDs provide simultaneous transmission of multiple diagnostic information, and facilitate the programming of the inverter. 3) Built-in potentiometer for min. easily change the speed of the motor. 4) The standard buttons for start, stop and change the direction of motor rotation. 5) Two freely programmable buttonsr MF1 and MF2 which can be assigned to one of 18 functions. 6) Extended error diagnostics - with information about the type of error, the time of its occurrence and the inverter parameters when an error occurs. 7) Can be stored in the operator panel set four sets of inverters with the ability to easily transfer settings from one inverter to another.	
Speed control	1) Wide range speed reference, including taking into account different combinations of digital inputs, analog inputs, potentiometer and buttons on the control panel, pulse inputs and motor potentiometer. 2) Ì ulti-speed - the possibility of 16 different speed and eight times the acceleration / deceleration. 3) ÎI F Ö ÇÑÑ- can define a sequence of seven steps that will be performed by the inverter. For each step, you can determine the motor speed, acceleration / deceleration and duration step. You can also specify whether the sequence is executed only once, or will be repeated in a loop.	
PID	Built-in PID increases the ability of the drive to match process requirements. Both the reference and the feedback signal may be placed in one of the following sources ﷺ Control Panel (buttons or potentiometer) ﷺ Ï ÎÇĐD ÖĐĤÑØÁVÑÑ ﷺ É ÖÑÁĐÑ HÖĐÞPŒ ﷺ GÖÑØÑÁĐHÖĐÞPŒ ﷺ HÖĐÞPÎÞÖĐÑ	
Motor	1) É NŒĐĤR PÖ ÑÑÑÑĐÑ ÖVØÁVĐ ÑPÑØÆÑÖØĤR Ö ÖĐÑÑÇÑÖÑÑÇÞ Ö ÖPÖØÆ 2) The motor parameters defined by the user: a Frequency b voltage and rated current c Number of poles d Rated speed 3) ì OØÑÑ Ö ÑPOÖÑÇÑÑÖÑÑÖPÖØÑÖÑÖPÖØÁVĐ ÖÑÖ ÖPÖØÖÁVĐ ÑPÑØÆ	
Environmental conditions	Working temperature	-10 ~ 50 Blf the temperature exceeds 40 °C, the maximum output current is reduced by 1% with each additional °C
	Storage	-40 ŠĄĐĆ
	Humidity	5~ 95 %, Without moisture condensation
	Height	0 ~ 2000m,
	Assembly	Installation in a vertical position inside the cabinet with good ventilation to the mounting plate made of non-combustible material. Mounting must also protect the inverter from direct sunlight, dust, moisture, and corrosive or explosive gases.
	Assembly	Cooling by natural and forced air.



FA-1L...P

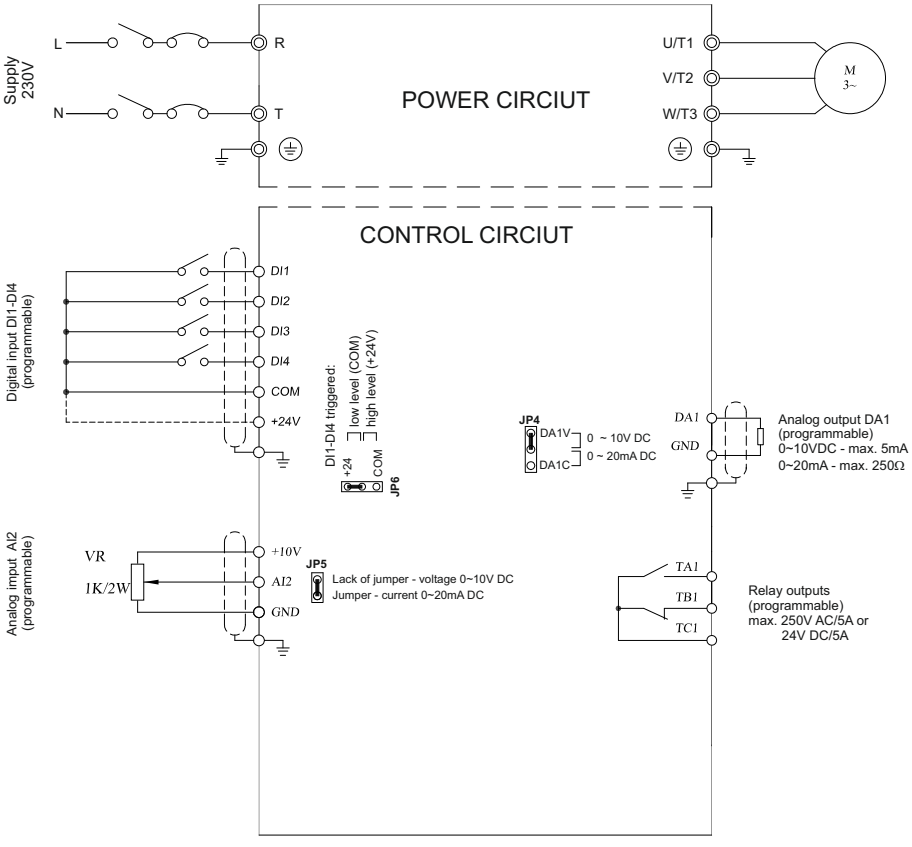


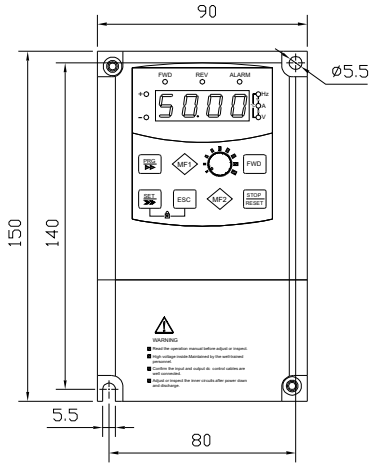
KEY FUNCTIONS

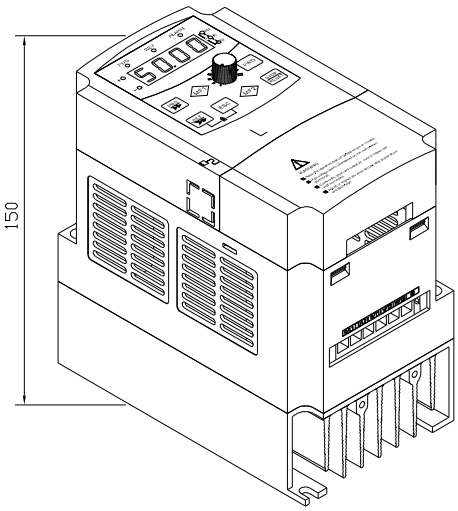
* The design of efficient inverter-based 32-bit DSP processor ensures fast and effective implementation of advanced control algorithms, asynchronous three-phase motor
* Ability to work in speed control mode or torque control mode
* Motor control based on vector control (both sensorless and with speed-feedback loop), and control based on the freely programmable V / F.
* Automatic slip compensation, and a large starting torque (up to 180% at a frequency of 0.25Hz).
* Multi-function control panel
* Mode PLC - programmable up to seven steps performed once or periodically by the inverter. For each step, you can determine the speed, acceleration and duration.
* Large programming freedom inverter inputs and outputs, both analog and digital.

TYPES

TYPE	Input voltage	Input current	Output voltage	Output current	Max. motor power
	V	A	V	A	kW
FA-1L007P	1x230V	9A	3x230V	4A	0.75kW
FA-1L015P	1x230V	17.5A	3x230V	7A	1.5kW







SPECIFICATIONS

Items		Specifications	
Supply	Supply and frequency	1x230V, 50/60 Hz	
	Output voltage	3x230V (to supply 230V)	
	Output frequency	0.00~320.0Hz	
	Control Characteristics V/F	1) FCCOEMPPÖØÞÑNOMMNÑØDEXCE 2) FOMacteristics of the reduced torque (3 types) 3) FOMMNÑØDEXCEÑPOÑPÖØÞÑset by the user (8 points) 4) IJÑNPÖØNCOPØÖÖÄBÖGEØÑCEEÖØNÖDBÑ-loop)	
		Control V/F	Sensorless vector control
	Starting torque	180% dla 0.50Hz	180% dla 0.50Hz
	The dynamics of speed control	1: 100	1: 200
	The stability of the output speed	±0.5%	±0.2%
	Torque boost	In this mode V/F control - automatic or user-defined	
	Acceleration / deceleration	Linear or by programmed curve S. Maximum acceleration and braking - 3200S	
	Frequency Accuracy	Digital frequency reference: 0.01Hz(f <= 100Hz), 0.1Hz (>100Hz); Analog frequency reference: 1% of maximum frequency	
	Overload	1) ÊDCÃ the rated current for 1 minute, 2) ÊCCÃ rated current for 0.1s.	
	Motor slip compensation	In this mode V/F control can automatically compensate for the slip	
Security	Security of inverter	1) EÑNDØÑPÖÖOOÐDÖØPÖÖÕÕR CEÖÖÕRQDÕMNÑ 2) ÎØØØPÖ ÑRNÑÑÑÑÑÕÑPOÑÖ NRÖÐ ÞÖ ÑÞØØÑÕP 3) EÑNDØÑPOÑÕÕMÑÕDEPÖÖOOÐD 4) EÑNDØÑÕÕDEÐÑCEÑÑÑNMÐÑCEMÕ 5) J ÒÞOÕÐPOÑ ÑÞØØÑÕPPÖ NØÐÞÕÑ 6) ÎØØØPÖ ÑRNÑCEEÐÑ ÕÕÑØÑNRÐÐÑÐDCÑØÑÓ 7) HÕaddition, the inverter is protected against communication errors or incorrect feedback signal.	
	Safety switch	Can be programmed as input or button on the safety switch causing immediate image voltage of the inverter output.	
	Security settings	Possibility to secure the set the inverter to use a PIN	
	Deleting mistakes	You can set both automatic and manual reset errors	
Braking	DC braking.		
IO	4 digital inputs	1) ìØÐÑÑØÕÕÖÞPCEÑÐØÑÕPOÕÕR -level (COM) and high (+24 V) 2) Ë ÕMØÑ ÑØÑÑÑÕÕ ÖÑ ÕØÕÑØMÖ ÖÕÑ functions - it is possible to assign to the terminals 68 different functions. Among other things, running back and forth, trying to run back and forth, safety switch, reset, multi-speed control, motor potentiometer, change of acceleration and deceleration, pulse input, and more.	
	1 analog inputs	1) ìOÑR ÑMÐ RÖØÓNÖPOMCEÐÖÞPQÕEMÑÑÄ10V ~ +10 V or 0 ~ 10V) and input current 0 ~ 20mA (software, you can set the range of 4 ~ 20mA). 2) ìOÑMÐMÐÑÕÐÖÞPCEÑMÐNÑÞCEÑÑ PÖMCÉÑØÞÑÕÑR MÐÑPÖÑÄEMÕÑ PÖÑÖÖÕÑØÑÑwith PID controller.	
	1 analog outputs	1) ìOÑR ÑMÐ RÖØÓNÖPOMCEMCÐÕMÑÑÖÞPÖÞPÓŠ ÊÓIJÅMÐÑÖÞPÖÞÞÑØØÑÕPÓ ŠÓÓÖËB 2) Analog outputs can be programmed to indicate: a Setpoint and actual frequency b Voltage and output current c DC voltage on the track d Temperatures IGBT power amplifier e Power output f Engine speeds g Torque Drive	
	2 relay outputs	1) Î QÑØload of joint 5A/250V AC or 5A/30VDC 2) GÊHÑÖCEÐÑÖØÐÑØMÖ ÕÑÞÖPÖÞÞÑÞÖÑRÐÐ ÄEÐÑMÐÕÑÐÇÇ ÑÐÑÑØÑÕPCEMÑCEÑPOÑ inverter)	

30. TELEMETRY AND GSM REMOTE CONTROL

GSM REMOTE CONTROL RELAYS

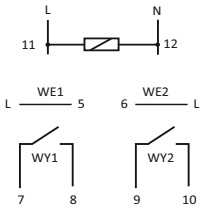
PLC MAX

SIMply MAX P01 ON / OFF / INFORM

PURPOSE

P01 relay with built-in GSM communicator is used to remote control using a mobile phone. Enables you to easily manage and control the state of the outputs of devices connected to the controller inputs.

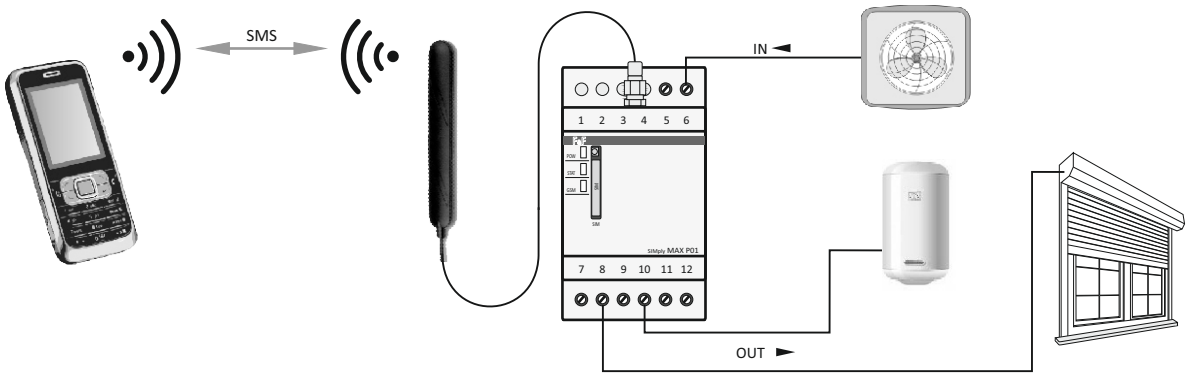




supply	230V AC
inputs	
number	2
voltage tolerance	160÷260V AC
relay outputs	
number	2
type	1NO
nominal voltage	230V AC
current load	<8A
ports	SIM
power consumption	
standby mode	1,3W
with GSM comunnication	<3W
working temperature	-10÷50°C
connection	screw terminals 2,5mm²
dimensions	3 modules (52mm)
fixing	on the rail TH-35

FUNCTIONING

The relay operates in the mobile communications network GSM 900/1800 any local GSM operator (no simlock). To be able to make calls and perform the desired function must have a valid SIM card. The relay has two relay outputs which are implemented by functions start and stop controlled receivers and two high voltage inputs, which are implemented through notification of activation functions controlled devices. Commands and notification specified SMS texts exchanged between the controller and user phone.



FUNCTIONS

* Switching on and off outputs
* Temporary output switch (Interval 1sec ÷ 600min)
* SMS to the phone user to input activation
* Request input or output state
* Redefinition of the names of inputs and outputs
* Password: 4 to 8 digits (when working with password command option must be preceded by a password)
* Configuration of inputs: we give your phone number for which you want to send the message and at what state: ON, OFF or both
* Request about the status of inputs and outputs
* Automatic answer as an option (word RIP major orders)
* Automatic recovery of output after power (out of memory)

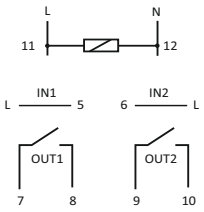
SIMply MAX P02 WITH CLIP FUNCTION

NO-COST GSM CONTROL GATE, WICKET, BARRIER

PURPOSE

MAX P02 relay with built-in GSM communicator is used to remotely open the automatic gates, garage doors, barriers and gates with your mobile phone. It is used for objects with protected access and a large number of users with permission to enter, such as housing, garages, car parks and public company, etc. It eliminates the traditional control of the radio transmitters and the cost associated with the purchase of a large number of users.



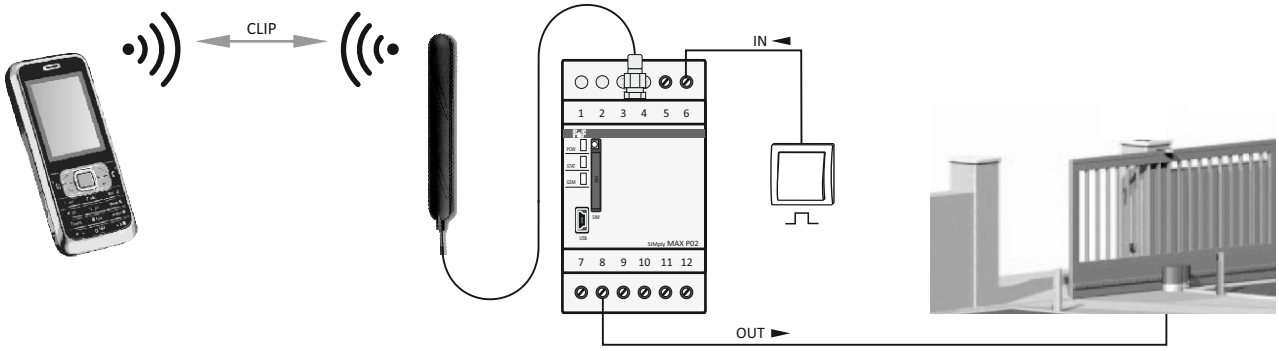


supply	230V AC
inputs	
number	2
voltage tolerance	160÷260V AC
relay outputs	
number	2
type	1NO
nominal voltage	230V AC
current load	<8A
ports	SIM
power consumption	
standby mode	1,3W
with GSM comunnication	<3W
working temperature	-10÷50°C
connection	screw terminals 2,5mm²
dimensions	3 modules (52mm)
fixing	on the rail TH-35

FUNCTIONING

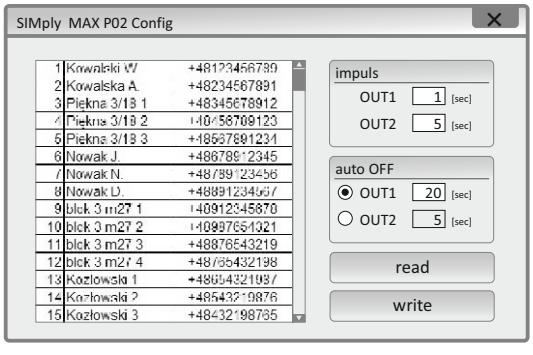
The relay operates in the mobile communications network GSM 900/1800 any local GSM operator (no simlock). To be able to make calls and perform the desired function must have a valid SIM card. The relay has two control pins, which are actuated by the driver pulse gate or lock the gate. Both outputs are run in parallel, but with any fixed contact closure times (pulse). Self control is done no cost. The user initiates a connection to the number of standard controller. The controller automatically identifies the number and refuses to connect at the same time activating the output (dialup CLIP function). In addition, it is possible to drive the output using the control buttons are connected to the inputs of the relay. The relay has a working range of options: manual or automatic closing. In automatic mode, the relay output is activated by the user activates itself again after a certain time in order to close the gate.

The phone numbers of users and pulse times and automatic shutdown are determined by the configuration program on your PC. The connection to the relay via USB cable.



FUNCTIONS

* Costless control for users (dialup function CLIP)
* Two parallel relay outputs
* Ability to set different output activation time for each output separately (eg simultaneous control gate and gate)
* Two pulse inputs allowing for manual activation outputs connected via external buttons
* Auto shutdown after a certain time
* User authentication 500 numbers
* PC configuration program



Configuration program

COSTS

Given the current rate of GSM operators for pre-paid tariff type of SIM cards cost of the controller can reach up to 5EUR per year.

PROGRAMMABLE CONTROLLERS WITH GSM COMMUNICATOR

PLC MAX

PURPOSE

PLC MAX is one of the few controllers to enable the connection and use the elements without programming. Through CONFIGURATOR can use it, anyone who does not want to learn languages and complicated procedures PLC programming.

FUNCTIONING

The task notification alert you to implement one of the six members whose phones number are stored in the relevant sections of the configuration menus, when there is a logical tripped on one of the inputs. The analog input is a fixed threshold value is exceeded for a given input. Notification shall be implemented as a text message. The job output control allows you to:
- Remotely control the digital output driver by commands sent as plain text SMS;
- To perform a simple controller based on the physical value of any of the analog input and digital output.

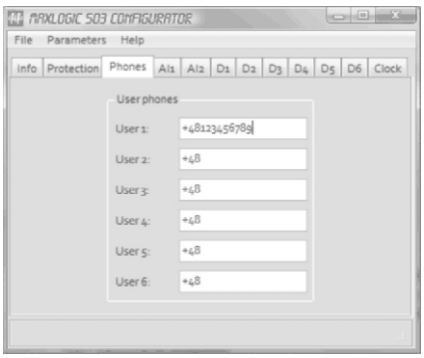
Automatic control of one of the digital outputs in the ordinary course of physical values of the control lies in the fact that the measured value exceeds the threshold set for the digital output is switched active.

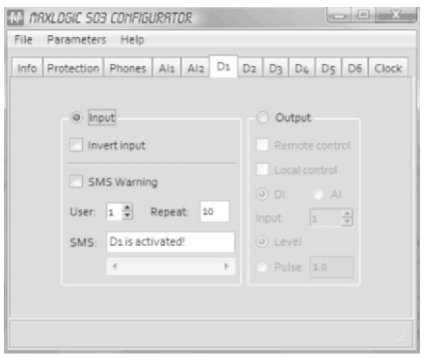
Controllers with SMS functions

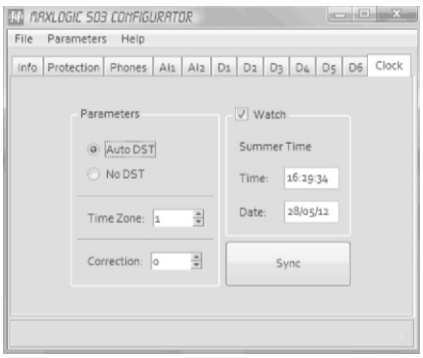
FUNCTIONS

- Record numbers of users that will be implemented notification and remote control
- Authorization of phone numbers of incoming calls
- Setting password. Password precedes the content of SMS commands
- Output control by SMS commands
- Ask about the status of inputs and outputs SMS commands
- SMS messages to the mobile user for actuation of digital inputs
- SMS messages to the mobile user to the pre-determined threshold on the analog input
- The definition of the content of the SMS message output (up to 160 characters)
- Optional set number of minutes, after which the SMS message will be repeated in the case of the continuous maintenance of the entrance
- Control output depending on the assigned input: LEVEL option - mapping of (EC 1 -> O 1, EC 0 -> O 0); PULSE - time, output set time after activation of the input.
- Function digital controller based on the definitions of scale analog input, and assigned him to the threshold of the output
- Scaling the actual values measured by the analog input range
- Setting the PIN code for the SIM card (if required)
- Selecting signal (high state 1 or low state 0) at the input trigger an SMS message
- DST (Daylight Saving Time) - synchronize the system time of the controller with a time of a connected computer, set the time zone and daylight saving time automatic summer-winter

PC Configurator

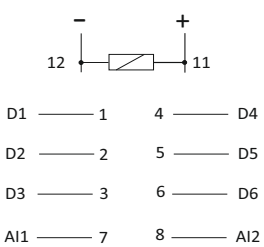






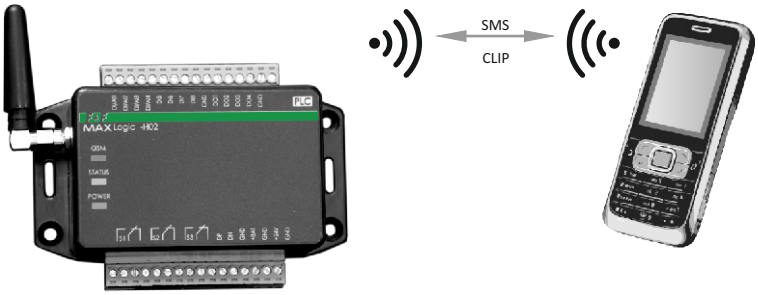
MAX S03 ON / OFF / INFORM





supply	9÷30V DC
IN/OUT digital DIO (30V; 0,2A)	6
analog inputs 0/4÷20mA / 10 bitów	2
working temperature	-20÷50°C
power consumption	8W
connections	screw terminals 1,5mm²
dimensions	3 modułes (52mm)
fixing	on the rail TH-35

MAX H02



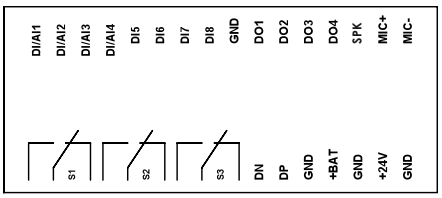
MAX H02 / MAX H04

program system cycle	10msec
supply	9÷30V DC
digital inputs	4 (30V; 0,2A)
analog/digital inputs	4 (0/4÷20mA/0÷10V)
digital outputs	4 (50V; 0,2A)
relay outputs N/C	3×[<5A]
ports	SD, microUSB, SIM, RS485
communication port	MODBUS RTU
register internal memory	1,3MB
working temperature	-10÷50°C
power consumption	<7W
connection	screw terminals 1,5mm²
dimensions	110×79×40mm
fixing	to the base or on the rail TH-35

MAX H04 with HMI (LCD + buttons) + grafic MENU



MAX H02 / MAX H04







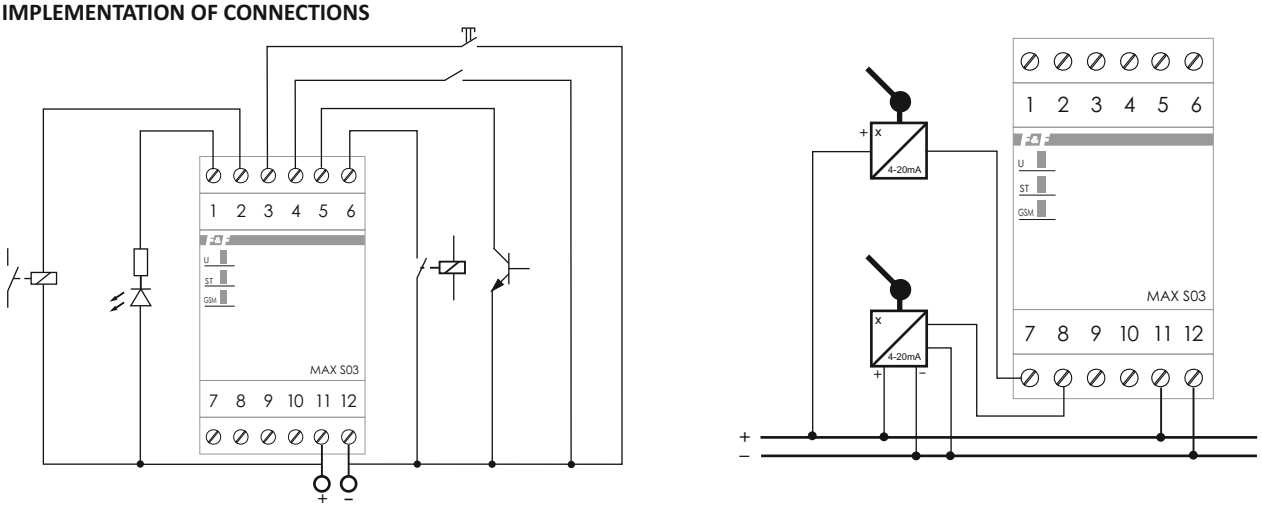


CONFIGURATION MENU
GUI menu allows to configure controller functions, set inputs type and define functions of outputs. Additionally controller allows to enter phone number of SMS notification receivers, set up access lock and configure parameters of specific tasks.

IVR - VOICE MENU (playing sound files of type. wav)
Allows to remote control using voice connation with DTMF functions. (Sellection is available by pressing buttons on user phone).

DATALOGGER
The built-in datalogger controller algorithm works independently of the controller and the whole set through the configuration menu. Datalogger allows you to save your data in one of 3 modes:
- interval - the data are equally reading fixed intervals;
- event - the data are recorded only when the existence of any change in the logical inputs / outputs
- user - data are recorded in accordance with the format specified in the application's language ForthLogic
During the registration data are stored in internal memory or on SD card (selection on the menu configuration).
The data is stored as text:
13:04:39|19/03|18.4 13.8|353 0000 0000 0000 | 01010100|0100|110

IMPLEMENTATION OF CONNECTIONS



DIGITAL INPUTS AND OUTPUTS
Wiring diagram depending on the selected function digital D.Digital outputs (DO): D1 digital D2.Digital inputs (DI): D3, D4, D5, D6. The tripping logic of digital input is closed the circuit between this input and ground (GND) [boolean 1].

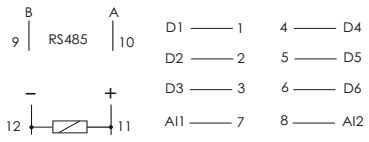
ANALOG INPUTS
A schematic diagram of connecting analog sensors of different types.

REMOTE READING TECHNOLOGIES, OF REGISTRATION, MONITORING AND CONTROL

based on the work of the PLC MAX S04 with the GPRS communication function





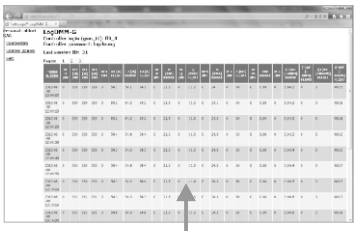


FUNCTION

data packet transmission GPRS
integer math operations
floating-point math operations
bit logical operations
register data formatting
input and output SMS
definition of the content of SMS messages
Modbus RTU master

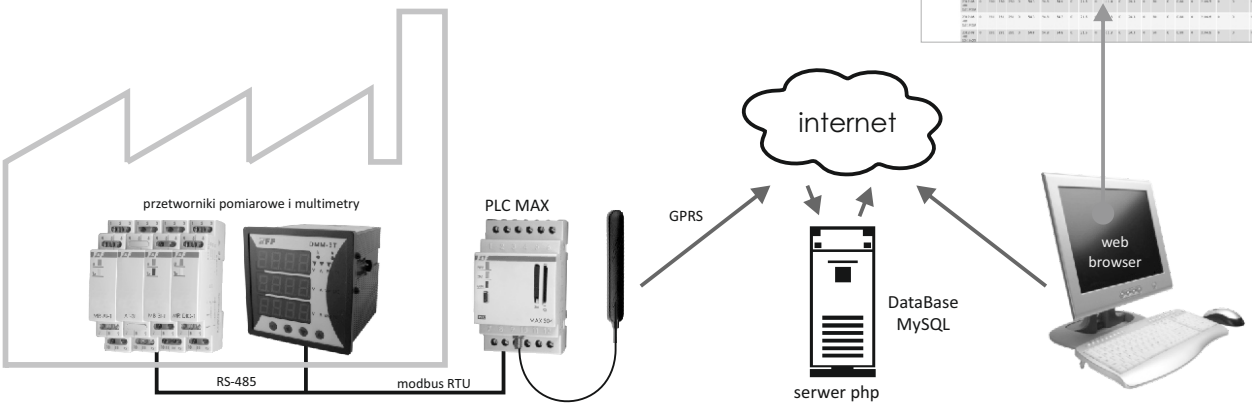
Technical data -> see chapter 31

DataBase [MySQL]



PURPOSE

DataBase technology allows obtain data process of controller and storage them in the universal database format for the MySQL.

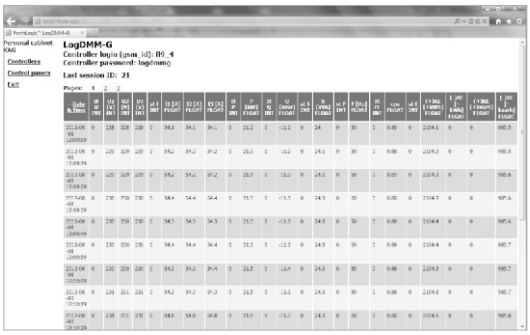


FUNCTIONING

Controller cyclical records variable data process and stores them in the internal memory. Recording from the internal memory is periodically sent to the MySQL database installed on a special base server . User access to data in a table is available through any web browser, or you can directly read data from a MySQL database from other systems or programs (this requires a suitable mechanism to build the program).

Company F&F has a special set of files MAX_php_MySQL_set allow to communicate MAX controller with the built, own database. The software is free and is available for download on the website www.plcmax.pl.

The system requires a SIM card with tariff telemetry from any operator and maintain a database on your own or an external server [hosting].

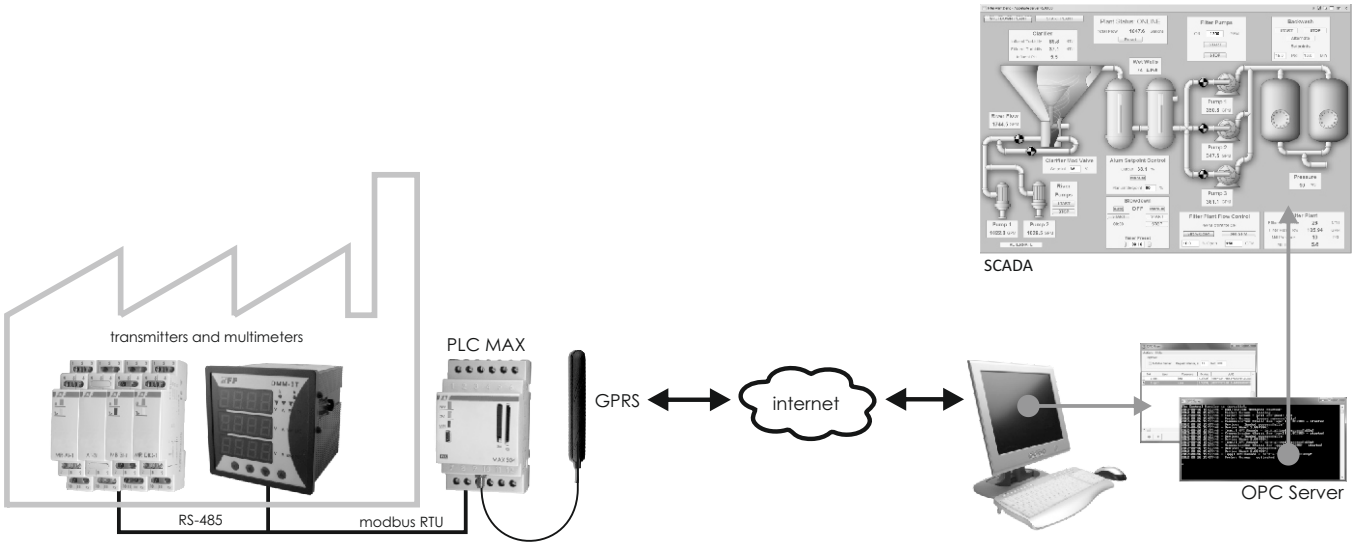


Example of data in the Internet browser

OPC Server

PURPOSE

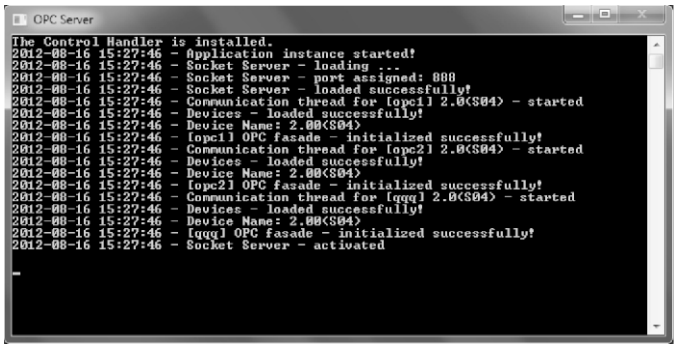
Technology OPC Server is a software tool for the PC, allowing the controller to obtain process data and make them available for other programs, data logging, visualization and monitoring of work conditions and controlled automation system (SCADA). OPC Server for S04 MAX controller allows you to communicated with him and exchange data with other universal applications running on the PC.



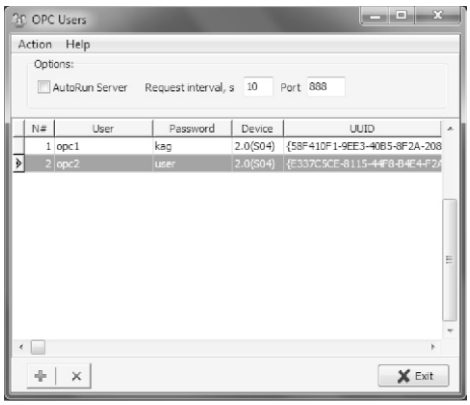
FUNCTIONING

OPC Server of F&F is compliant with the OPC / DA v1 and v2. The computer on which the software is installed must have access to the Internet. A computer or router that is the connection must be assigned a static IP address. The controller connects to the OPC Server for GPRS communication channel and acts as a "client". For safety communication system for compliance is established names and passwords. These parameters and a series of questions, ie the exchange of data are set by the user via the OPC interface Users forming part of OPC development environment. One OPC server can be connected to multiple drivers, creating a multilocation, distributed monitoring and control system.
OPC Server works with 32I64 - bit operating systems Windows 2000, Windows NT, Windows XP, Windows Vista, Windows 7.

OPC Server software is free and is available for download on the website www.plcmax.pl.
The system requires a SIM card with telemetry tariff from any operator .



WIndow of OPC Server



Interface OPC Users

31. PLC - PROGRAMMABLE LOGIC CONTROLLER

www.plcmax.pl

PLC MAX

PURPOSE

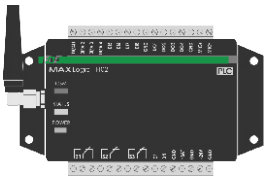
PLCMAX controllers are designed to solve a wide range of tasks of management and technological processes and data exchange. It is used in home and industrial automation on low and medium level of technological advancement. Group of controllers with GSM communicator is designed for management of technological processes and data exchange via the mobile network GSM 900/1800 in SMS, GPRS mode and voice call (using a DTMF and CLIP).



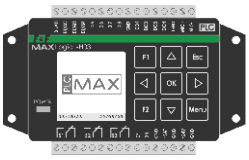
H series

PURPOSE

Are used in home automation and industrial low and medium level of technological advancement. Made in a compact case designed for mounting directly on a flat surface (wall, table) as well as switchboards (35mm rail).



H02



H03



H04

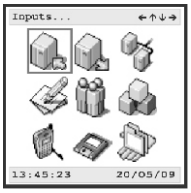
H02 **With GSM communicator**

H03 **with front panel (LCD screen + keyboard)**

H04 **With GSM communicator, front panel (LCD screen + keyboard), GUI**

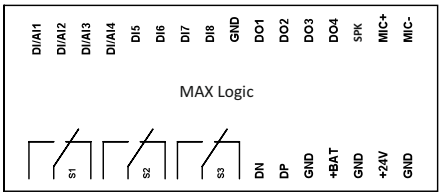
MAX Logic H02 and H04 is one of the few drivers to enable connection and use it without the elements of programming. Using menu configurator, anyone can utilize who does not want to know the language and the complicated procedures of PLC programming.

program system cycle	10msec
supply	9÷30V DC
digital inputs	4 (30V; 0,2A)
analog/digital inputs	4 (0/4÷20mA/0÷10V)
digital outputs	4 (50V; 0,2A)
relay outputs N/C	3×[<5A]
ports	SD, microUSB, SIM, RS485
communication port	MODBUS RTU
register internal memory	1,3MB
working temperature	-10÷50°C
power consumption	1W
connection	screw terminals 1,5mm²
dimensions	110×79×40mm
fixing	to the base or on the rail TH-35









series S



S01



S02



S03

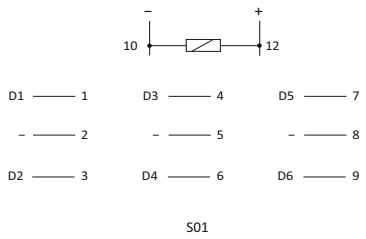


S04

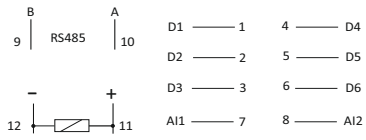


antenna GSM

type	S01	S02	S03	S04
program system cycle	10msec	1msec	1msec	1msec
supply	9÷30V DC			
digital input/output DIO (30V; 0,2A)	6	6	6	6
fast counting inputs 100kHz	–	1	–	1
output PWM	–	1	–	1
analog inputs 0/4÷20mA / 10 bits	–	2	2	2
port SD	–	ˇ	–	ˇ
port microUSB	ˇ	ˇ	ˇ	ˇ
port SIM	–	–	ˇ	ˇ
port RS485 + MODBUS RTU	–	ˇ	–	ˇ
work modeMODBUS	–	MASTER	–	MASTER
module GSM	–	–	ˇ	ˇ
funkctions GSM	–	–	SMS/CLIP	SMS/GPRS/CLIP
register	–	ˇ	–	ˇ
internal memory		2MB		2MB
clock RTC	–	ˇ	–	ˇ
event sound idication	–	ˇ	ˇ	ˇ
working temperature	-20÷50°C			
power consumption	0,5W	0,8W	8W	8W
connections	screw terminals 1,5mm²			
dimensions	1 mod.(18mm)	3mod.(52mm)	3mod.(52mm)	3mod.(52mm)
fixing	on the rail TH-35			



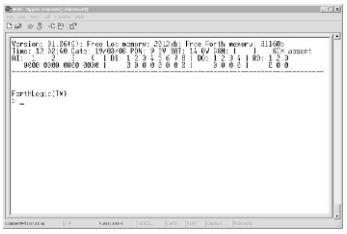
S01



S02, S03, S04

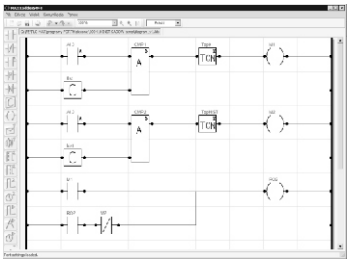
SOFTWARE TOOLS

For carrying out and interpreting program in **ForthLogic** responsible programming and hardware system called the forth-system. Computational model underlying the language ForthLogic consists of stacks, global variables, the dictionary, the input and output buffer. ForthLogic language allows to describe the processes running in parallel and operates in a multitasking environment.



HyperTerminal

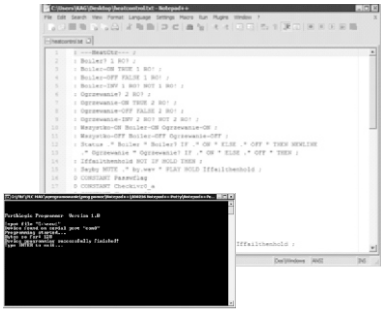
Interactive programming environment and creating applications for controllers MAX in ForthLogic consists of a text editor **Notpade + +**, terminal program **PuTTY a**nd the program **ForthLogic Programmer** providing two-way communication between PC and controller MAX. Your environment, you can create scripts ForthLogic, program MAX controllers and communicate with the controller in terminal mode.



MAX-LadderSOFT

MAXLadderSOFT program provides an easy way to convert schema "relay" at programming language of controller. The program allows creating and editing applications using ladder diagram language [LAD], checking the correctness of the construction schedule, the directly communication controller with a computer, upload the application to the PLC.

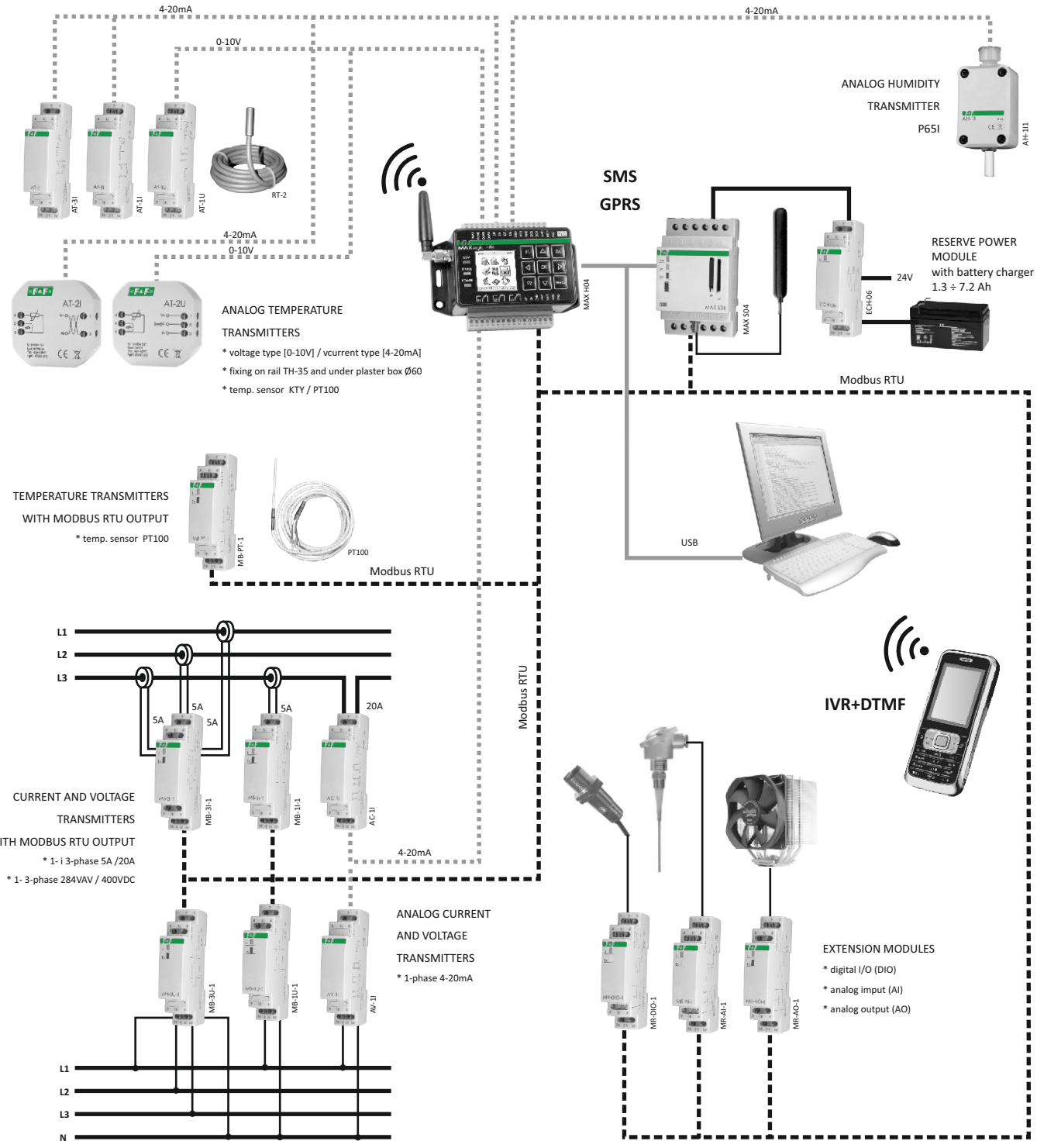
Direct work with the system controller called a **box mode**. There are two types of work box: terminal and remote. **Terminal Mode** is working with a program like **HIPERTERMINAL** (MAX-PC connection USB cable). Terminal Mode primarily use for learning programming, solving programming tasks or solving existing problems in the operation of the controller. **Remote mode** - only for controllers with GSM module - this controller work with the phone via SMS. In this mode the phone screen fulfills a similar function as a terminal window on your computer monitor. Remote mode is clearly to use remote control devices connected to the controller.



Notepad++PuTTY
ForthLogic Programer

AN IDEOLOGICAL DIAGRAM OF COMMUNICATION BETWEEN PLCMAX controllers with external measurement devices and expansion modules

PLC MAX



SIGNAL TRANSMITTERS (chepter 28):
- analog transmiters
- transmitters with MODBUS RTU output
- extension modules

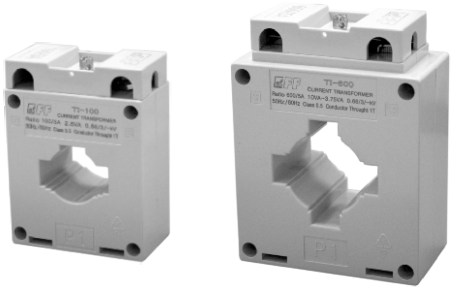
CURRENT TRANSFORMER (chepter 32)
RESERVE POWER MODULE DC (chepter 26)
TEMPERATURE PROBE (chepter 22)

32. CURRENT TRANSFORMERS

PURPOSE

Current transformer is used for the proportional changes of large currents to lower values, adapted to ranges of control and measuring devices.

TI-...





assembling accessories

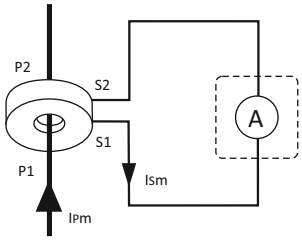
no. of norm	IEC 60044-1
nominal second current Is	5A
rated voltage	0,66kV AC
insulation breakdown voltage	3kV/1min
frequency	50/60Hz
IP protection	IP20
working temperature	-5÷40°C
fixing S1/S2	screw terminals 4mm²
assembly	board / busbar
position	vertical / horizontal

FUNCTIONING

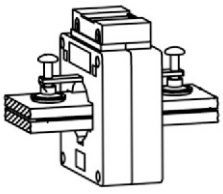
The cable with the measured current passes through the main hole of transformer (P1/P2), which is equivalent to one coil of primary winding. Terminals of secondary winding S1 and S2 are connected to the terminals of the circuit of the measuring control device or measuring.
Ratio of intensities of currents in both windings is constant and is called the current gear: IPn/ISn = N, where IPn - rated primary current; ISn - rated secondary current, N - the value of the transmission. With the current flowing through the secondary winding can be determined the value of current flowing through the primary winding: ISm * N = IPm, where the ISm - measured primary current; IPm - measured secondary current.

ATTENTION!

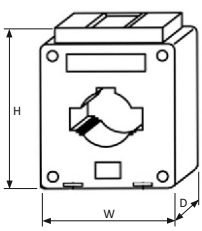
Recommended connection of the secondary system by wire with a diameter of not less than 2,5 mm ².
Recommended grounding terminal S2.
Prohibition of disconnection of the secondary system during operation of the transformer (the possibility of high voltage resulting electric shock to person or damage of equipment).



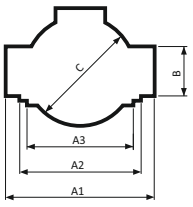
Type	transsision Ip/Is	class	power [VA]	hole dimensions P1/P2 A1/A2/A3×B; C [mm]	dimensions W×H×D [mm]	weight [kg]
TI-100	100/5	0,5	2,5	30/25/20×10; Ø10	61×81×34	0,235
TI-150	150/5	0,5	2,5	30/25/20×10; Ø10	61×81×34	0,235
TI-200	200/5	0,5	5,0	30/25/20×10; Ø10	61×81×34	0,235
TI-250	250/5	0,5	5,0	30/25/20×10; Ø10	61×81×34	0,235
TI-300	300/5	0,5	5,0	30/25/20×10; Ø10	61×81×34	0,235
TI-400	400/5	0,5	10,0	40/30/ - ×10; Ø30	75×99×40	0,305
TI-600	600/5	0,5	10,0	40/30/ - ×10; Ø30	75×99×40	0,305



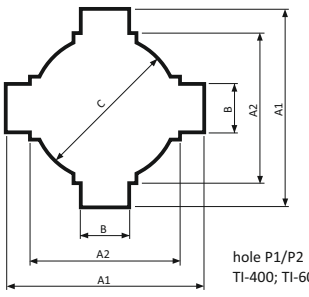
busbar assembly



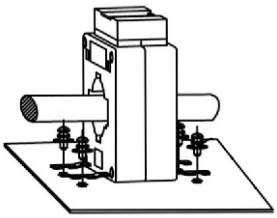
dimensions



hole P1/P2
TI-100; TI-150; TI-200; TI-250; TI-300



hole P1/P2
TI-400; TI-600



baseplate assembly

33. VIDEOINTERCOM SETS

MONITORS (PANELS)

MK-01



hands
Working with two cameras
volume control, brightness and color
plastic + aluminum panel
black
adapter on the rail 35mm included
wall mount
dimensions weight 245, height 160, depth 18

MK-02



hands
Working with two cameras
volume control, brightness and color
plastic + aluminum panel
white
adapter on the rail 35mm included
wall mount

MK-03

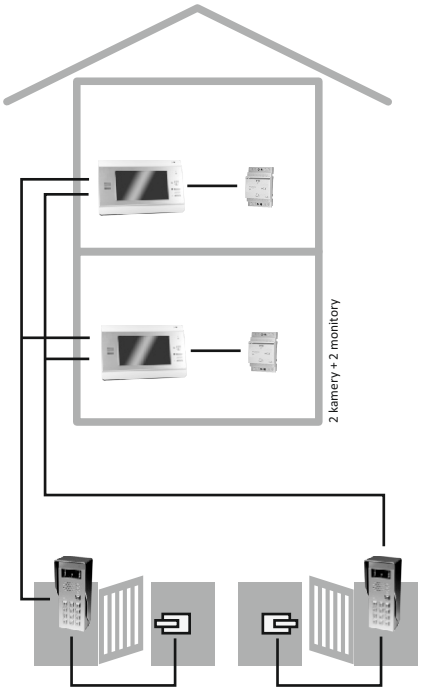


hands
Working with two cameras
Backlit touch keyboard
volume control, brightness and color
LEDs indication
glass panel
black
adapter on the rail 35mm included
wall mount
dimensions weight 241, height 161, depth 23

MK-04W



hands
additional control gate
Working with two cameras
volume control, brightness and color
plastic panel
white
adapter on the rail 35mm included
wall mount



Work configuration:
1 camera + 1 monitor
1 camera + 2 monitors
2 cameras + 1 monitor

INSTALLATION

Installation 4 wire + 2 wires to the electric opener. When using low-current electric lock 12V DC max. 300mA possible 4-wire installation (can use video intercom power supply). For installations use cables up to 30m with a minimum diameter of 0.5 mm ², 30m above the min. 0.7 mm ². For the best image quality in video and audio line is recommended to use 75 ohm coaxial cables.

supply	14,5V DC
power consumption	7W
display	7'' TFT LCD
working temperature	-10÷55°C
dimension	5 modules [85mm]

MK-05



abonent multiple, customizable system supporting up to 999 users,
hands (without headset)
color screen 7 "widescreen TFT LCD
adjust the monitor parameters (volume, brightness and color)
buttons: touch, backlit
glass panel
housing color: black
control of Electro-hook
sequential view of the cameras in a number of door stations,
preview of her head and PTZ control cursors,
direct communication with concierge,
elevator recall
receiving text messages
dimensions 305x145x23mm

MK-08F with foto function



speakerphone
memory of 100 photos
working with two cameras
backlit touch keyboard
volume control, brightness and color
LEDs indication
glass panel
white
adapter on the rail 35mm included
wall mount
dimensions weight 241, height 161, depth 23

GATE STATION

KK-01
surface



dimensions:
58×135×39 [mm]

KK-03
surface with keypad



dimensions:
78×185×60 [mm]

KK-04
flat webbed



dimensions:
150×203×43 [mm]

KK-05
flat webbed with keypad



dimensions:
120×250×43 [mm]

KK-07 dedicated to monitor MK-05
webbed, touch keyboard
individual access codes



dimensions:
150×350×48 [mm]

KK-08
2-abonents
webbed with keypad



dimensions:
150×335×55 [mm]

KK-08K
2-abonents
webbed



dimensions:
150×355×55 [mm]

KK-09
4-abonents
webbed



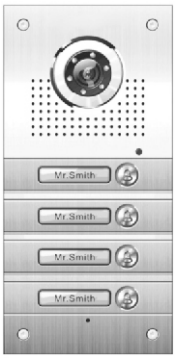
dimensions:
150×355×55 [mm]

KK-10
6-abonents
webbed



dimensions:
150×355×55 [mm]

KK-11
4-abonents
webbed



dimensions:
120×250×43 [mm]

APPLICATION

All gate stations can be used interchangeably with any monitor.

The exception is a set of monitor MK-05 and dedicated to them station KK-07

supply	12V DC
power consumption	1,5W
angle of view	70°
opening time - programs.	1÷99s
converter	1/3 CCD
working temperature	-25÷55°C
minimum illumination	0,05 Lux
backlight	LED
protection level	IP55

UNIPHONES

MU-01

headset



electromagnetic control
support two door stations
adjust the ringer volume
cooperation with monitors: all
supply: 14,5V DC
warranty: 24 months
dimensions: 100x200x45mm

MU-02

hands



hands without headset
electromagnetic control
4-wire installation
support two door stations
Adjusting intercom
(call volume, tone)
dimensions: 160x120x42
Power Supply: DC/14,5 V
(external power supply)

APPLICATION

Intercoms cooperate with all types of monitors.
The exception is the only monitor MK-05

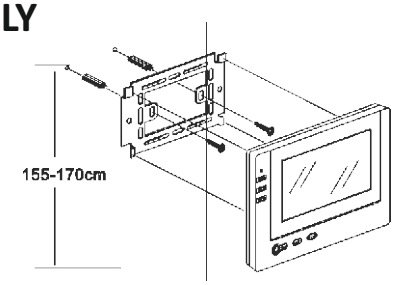
KEYPAD

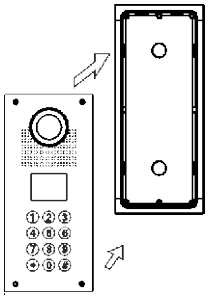
KS-01

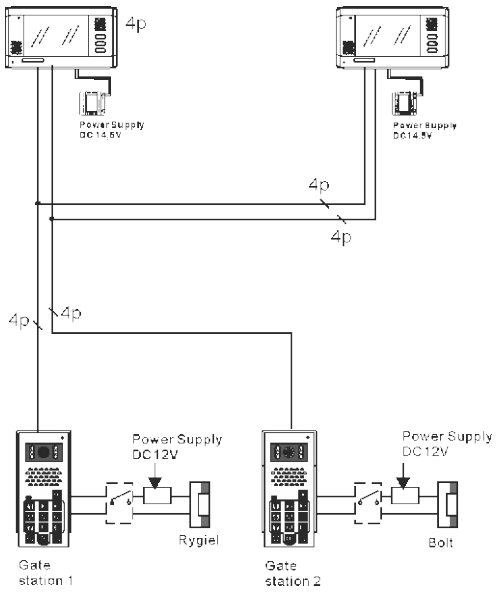


lock with proximity card reader
vandal-proof metal housing
built-in RFID proximity card reader
support for 2 zones (eg opening gates and doors)
bell function (alternatively instead of 2 zones)
Memory Capacity: Zone 1 - 1000 user codes and cards, Zone 2 - 10 user codes and cards
backlit keyboard
Power supply: 12 - 15V DC
relays set time: 0-99s
the ability to connect the output switches
open door sensor input
tamper sensor
current consumption stand by <40mA, during work <70mA
working temperature : -20 - +50 ˚C
protection level: IP65

ASSEMBLY







34. RADIO SMART HOME SYSTEM

www.fhome.pl

F&Home RADIO

STANDARD OF THE FUTURE IN OUR HOME



The F&Home Radio system is an innovative and comprehensive solution for the design and installation of network management and remote equipment or devices that are an integral part of the building. Through the use of universal radio actuators and sensory control the operation of each device, the system allows the integration of previously low communication wireless system components: lighting, heating, air conditioning, ventilation, access control, security, audio-video systems and automation garden system.

SYSTEM ARCHITECTURE

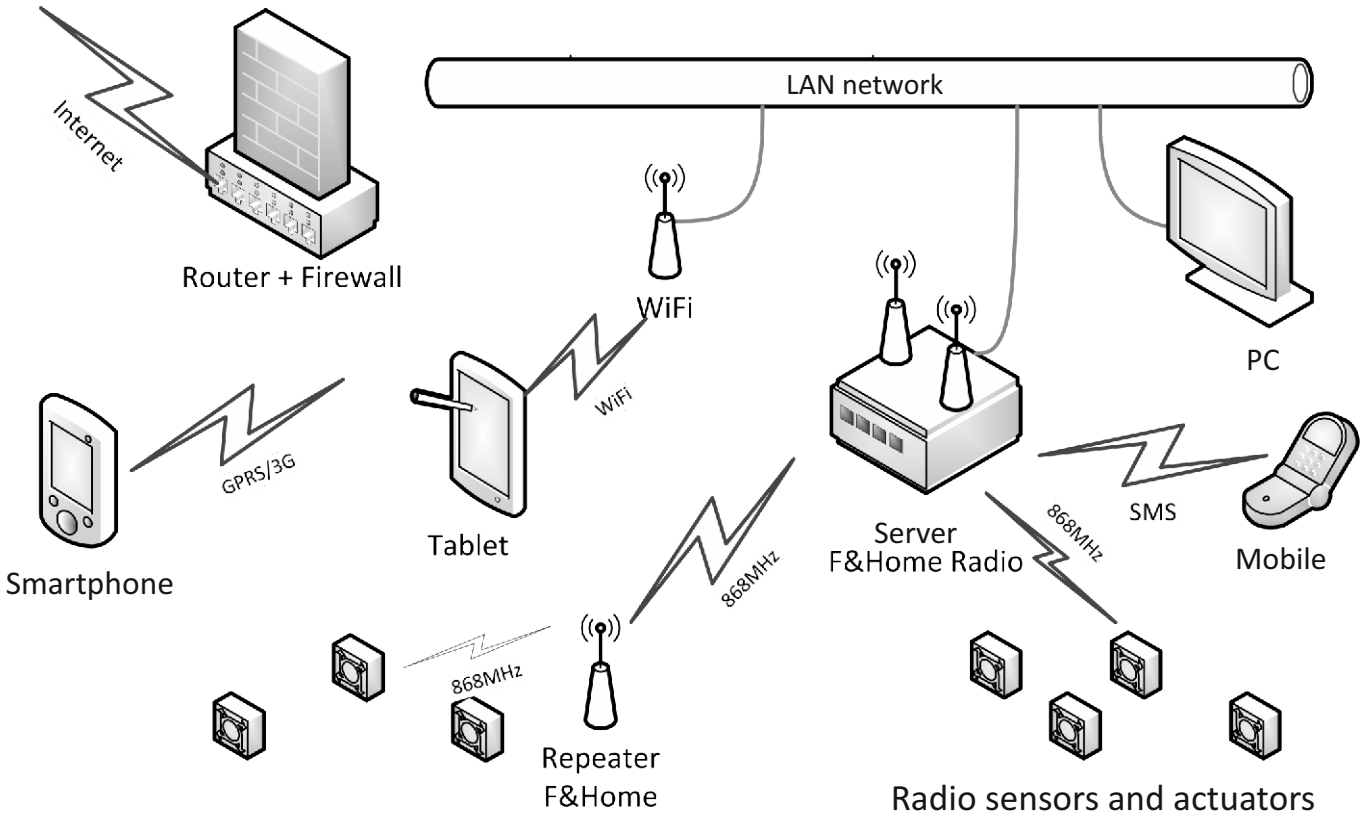
The F&Home Radio is built based on a central server controlling all its functions. The server, based on Embedded Linux operating system has a high performance and reliability at very low power (4W). The server communicates by radio in the 868 MHz band of the sensory elements - the so-called. sensors (i.e.switches, motion detectors, temperature probes, humidity and other sensors) and actuators - the so-called. actuators (relays, dimmers, control modules, LED, drivers of electric motors, pumps, valves and water heaters, and other actuators). By using two radio modules operate simultaneously in two independent channels, the system has a very high resistance to external interference. Radio range, typically amounting to tens of meters, can be extended by using repeaters (signal enhancing module).



Both sensors and actuators in the F&Home Radio are universal. For example, motion sensor in the absence of family members can act as an alarm sensor and the alarm disarmed can switch light, or ventilation system settings change depending on the activity of the household. Similarly, power regulator can control the intensity of light or the fan thrust bathroom. This approach means that the available range of sensory and regulatory elements in no way limits the functionality of the system and on the contrary - it significantly expands!.
Processing signals in the , F&Home Radio system done in real time (the guaranteed response time of the event and any combinations thereof is less than 30ms). F&Home Server works with a local radio network (LAN) that allows you to communicate with a wide range of mobile devices (phones, smart phones and tablets). This configuration allows you to manage, control and monitoring of the system from any device, without using external servers. The system also has direct support for communication based on SMS messages via a standard USB modem equipped with a SIM card

BENEFITS OF WIRELESS

* Reduction of wired connections
* Non-invasive radio system components through the use of: box modules, transmitters and controllers, alternative modules on a DIN rail mounted and battery powered sensors
* Warranty quick and easy installation of the new buildings and modernization of existing installations without the need for absorbing and costly repairs)
* Easy reconfiguration of system components for the development house, apartment or increased requirements or changes in household preferences
* The ability to connect and control the operation of already installed, and without the remote control device fitted to or an integral part of the building (eg, lighting components, automatic doors, windows, shutters / blinds, heaters, solenoid valves, circulation pumps, sprinkler systems, watering lawns and plants etc.)
* A much wider range of flexibility, performance and functionality of the wired solution with the possibility of adapting or full integration



DISTINCTIVE FEATURES OF THE SYSTEM

* architecture based on server that provides the unprecedented functionality by using a relatively narrow range of universal actuators and sensory
* Integration of working independently devices and installation
* Flexible expansion and scaling system
* Small size modules to facilitate and accelerate installation, designed to work with equipment from other manufacturers
* Use a wide range of mobile devices (phones, smart phones and tablets) as a universal remote or stationary or portable control panel
* Integration of systems using radio communication with wired solutions (only for selected solutions!)
* Limiting the number of system components by parallel use of their functionality (reduction of installation costs)
* Built-in algorithms to prolong the service life of components (eg preheating for incandescent lighting)
* The use of information from websites to manage the physical components of the system (eg the management of heating systems work with high inertia or plant watering systems based on the weather forecast)
* Built-in astronomical clock (in conjunction with weather prediction tools allows m.in a full break with dusk sensors, reducing installation costs)
* Unique design tools and system configuration

REMOTE CONTROL

One of the basic assumptions on which is based the systemF & Home Radio is the ability to remotely manage the work of an individual or group of individual appliances within the defined scenarios with the use of SMS text messages and designed specifically for that purpose applications. In these solutions equip a wide range of increasingly popular smartphones, tablets or handheld or desktop personal computers, ie, in particular;

* Device-based Apple iOS (iPhone, iPhone 3G, 3GS, iPhone 4, 4S, iPad, iPad 2, iPad 3 and subsequent versions)
* devices based on Google's Android system (including smartphones and tablets from Samsung, HTC, Sony, Motorola, Asus and others)
* devices with Internet browsers (laptops, notebooks, netbooks, laptops and desktops

different manufacturers)

Applications for mobile devices, as an integral component of the F & Home Radio, have been designed in such a way as to allow the user to remotely control access to the immediate and direct control of home appliances and control of their work in the intelligent scenarios, defined according to their personal preferences.

When working on the user interface focused primarily on providing simplicity and convenience comparable to the classical virtues TV remote control, without going through the maze of unnecessary windows and complicated settings. A clear presentation of the required information and clear indication of the state of each device provides users an easy and intuitive operation.



iPhone







iPad

INDEPENDENT WORK

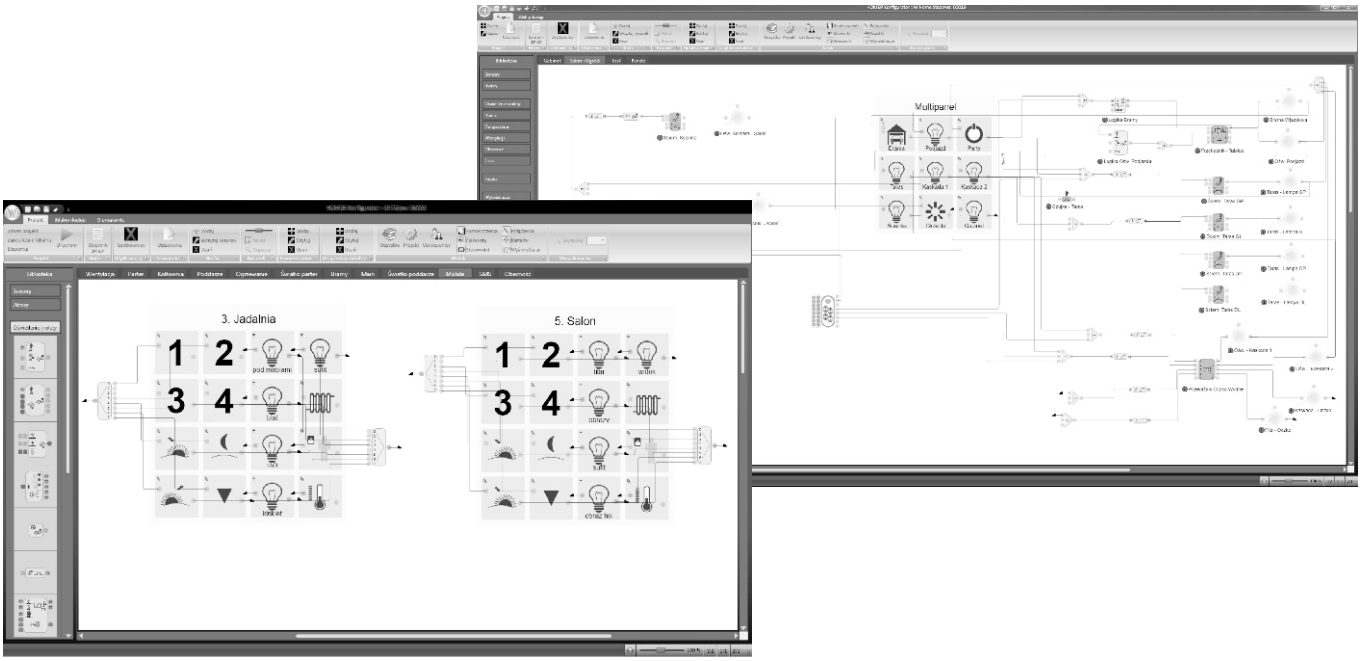
Architecture and various components of the system F & Home Radio has been designed to not only allow the user to remotely control the operation of individual components but also, where possible, relieve him from the necessity by autonomous intelligent management and control of devices. Depending on the type and configuration of the installed automated equipment of the building system can control his work after the diagnosis of specific household activities such as: user sleeps, wakes up, leaves the house, away from home, coming home, entering, staying in the house, put sleep - or other types of events such as the visit of guests, watch a movie, party, barbecue in the garden, etc. Here is an example implementation of an autonomous function for one of the examples of activities:

User moves closer to home - the system identifies the activity (such as GPS location, SMS message sent by the user) and automatically:
* adjusts the heat (or cool reheats selected room or zone) to the preferred,
* raises the blinds to the desired position (as preset by the user)
* turns on lights in selected areas or zones (eg, driveway, garden, garage) and adjusts the intensity of the external conditions (time of day, weather conditions, personal preferences)
* airs selected rooms (repealed a window or turn on the ventilation system), taking into account information from sensors (eg detection of rainfall, wind strength and direction)
* starts the circulation of hot water in advance of the expected time of return (turn the pump circulation)
* set the blinds, drapes, curtains in preferred positions, taking into account information from sensors (eg temperature control, angle to the sun)
* prepare audio-video systems for media playback in certain areas or rooms
* runs, controls work or prepare for work other desired device

CONFIGURATION TOOL FOR INSTALLERS

Integral part of the F&Home Radio is a support tool in the form of software configuration WiHome Configurator, dedicated mainly to installers, architects, developers, engineers, as well as industry and users - hobbyists. Software is a unique solution in the following areas: design and construction of the installation and configuration of intelligent home and building automation and management server based on the technology WiHome. With a virtual representation of the physical elements of sensory and regulations and the creation of an extensive library of software objects implementing the logic of the interaction between these elements - it is possible to easily create virtually any configuration scenarios work of individual devices, systems, and entire systems. Other advantages of this approach include

* Saves time and is easy installer
* Ability to perform most of the configuration work off-site installation
* Simplifying and minimizing installation work at customer
* Fast copying installation projects for more similar properties (multi-family housing, twin buildings, residential houses)
* Easy reconfiguration of installation for system expansion or change user preferences
* Remote configuration, management and maintenance



EXAMPLES FOR SOME FEATURES OF INSTALLATION

Lighting:

* Free configuration of points of light, space, and installation of the physical circuit design features and control panels mobile applications
* Remote control time and light intensity of individual points, separate sections and whole circuits
* Create any color compositions for RGB LED lighting
* The composition of different lighting scenarios defined by the user according to his preferences
* Sequential operation (eg control of different light scene using only one switch)
* Free-scenes combine with the work of other systems within the defined scenarios (eg integration of systems, Audio-Video))
* Intelligent operation depending on the time of day or night, presence detection, traffic, and other events (such as gradual light up the room in night mode)
* Setting up lights for the simulation of user presence in the house while their actual absence

Heating, Air Conditioning, Ventilation:

* The direct or indirect control the operation of the heating system components (drivers using ovens, electric valves, circulation pumps, ventilation systems, etc.)
* The use of temperature sensors embedded in the system components
* Local management of temperature and ventilation in each room or zone
* Remote control working temperature and ventilation equipment at selected locations
* Freedom to define scenarios modes for specific activities (eg summer operation, winter, holiday mode, short absence, return home, etc.)
* Configuration modes for each user preferences
* Intelligent operation depending on the time of day or night, household activities and other events (eg temperature adjustment the presence and volume of traffic in the room)

COMPONENTS

rH-D1S2	Box single channel dimmer module with dual channel transmitter
rH-D2S2	DIN dimmer module with dual channel transmitter
rH-PWM3	Three way box module low-voltage PWM controller
rH-PWM2S2	Boxmodule dual PWM controller with low voltage two-channel transmitter
rH-TSR1S2	Box module bi-directional relay channel with transmitter
rH-R1S1	Single channel relay module box channel with transmitter
rH-R2S2	DIN relay module with dual channel transmitter
rH-R5	DIN relay of five way module
rH-S2L2	Box module of two channel transmitter with two LEDs
rH-S4L2T1	Box module four channel transmitter unit and a temperature probe and two LEDs
rH-S6-	DIN six-way transmitter module
rH-P1	Low-current module, passive motion detector
rH-P1T1	Low-current module, passive motion detector with a temperature probe
rH-E2	Two-channel signal amplifier module
rH-IR1	Infrared remote control module (in preparation)
rH-AC16S4R4	Module co-operation with the control panel (in preparation)
rH-SERVER	Server control and management system work



Dimension: Ø50



Dimension: 245×58×138mm

SYSTEM INSTALLATION

Installation of F&Home Radio can only be done by a qualified installer, who received training in the installation, maintenance and configuration. In the case of self-assembly or by the unauthorized installation company F&F may refuse to free technical support and warranty express terms of the components and assembly of the system.
Authorized installer holds a personalized card with your name and authorization number.



F&Home RADIO

www.fhome.pl

35. SMART HOME SYSTEMS

www.fhome.pl

F&Home

STANDARD OF THE FUTURE IN OUR HOUSE

F&Home is a dedicated system for the automation of flats, houses and business premises. It provides all the basic functionality of the building automation, such as:
- management and control of heating, cooling and ventilation
- lighting (dimmers, lighting scenes, RGB)
- control of roller shutters, gates and other elements of the motor
- On / off various circuits and receivers (including outlets), external lighting, sprinklers, electrical appliances
- wireless control of Wi-Fi and a remote control and monitoring of GSM
- a complete alarm system with surveillance

Thanks to the "unfolding" of the system into separate subsystems (modules) performing specific functions individually, each can adjust the system to their individual needs and budget.

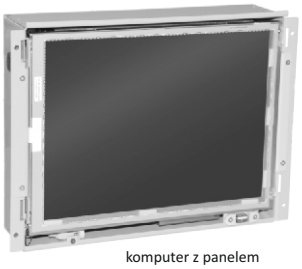


GENERAL

The smart homes system integrate F&Home operating systems regardless of the standard solutions. The integration offers new opportunities and simplifies the control of a vast installation. F& Home is a wired system, lighting, blinds, heating, air conditioning and other equipment powered from any voltage. Communication takes place UTP cables coming down to the main switching station (star system). Because of the distinctive way to control and position wiring system is dedicated to the newly constructed or extensively refurbished buildings. An important feature of the system is free to use equipment. It is permissible to use the buttons, switches and sockets from any manufacturer.,

CENTRAL UNIT

The central element of system is a computer with touch panel 12 "or 15". Is mounted outside the switchboard in wall using a steel mount casing. powered fro 230V and requires a separate connection to the main switchboard. Communicates with the system through a CAN line. You can self-screen menu, color settings and upload your own favorite images and photos as a screen saver.
Features:
- Introductory Programming (layout of the floor plan)
- Programmable dimmer settings (hysteresis)
- Set the device programmer (on an annual basis every 15 minutes)
- Setting up programmer for heating and cooling
- Setting the hysteresis motor devices (blinds, shutters)
- Defining the scenes (may include a light, blinds, temperature, switching on some receivers)
- Set the color of the interface (fit to your needs)
- Uploading images to the screen (electronic box)
- Setting up the GSM and Ethernet
- Update software (via USB stick)



komputer z panelem
w obudowie montażowej

Taking care of the aesthetics of the interior of the customer can choose a steel frame with masking patterns among the 12 available colors. Easy to install frame and color palette of colors is a guarantee of fit into any decor.

steel
frame





as digit
frame

AUXILIARY PANEL

Touch 5.7 inch unit is designed for mounting on floor or in the living room to control the advanced features of the system without going to the main panel. Scenes can contain settings for the lighting in the room, lowering or raising blinds, set a specific temperature and the activation or exclusion of specific receivers. For the scene buttons can be assigned to previously uploaded images through the main panel. Number of scenes is basically unlimited and depends on user needs. For the complete steel frame should be selected from among 12 camouflage color patterns available in line with the central panel frames.



GRAPHICAL INTERFACE - USER MENU

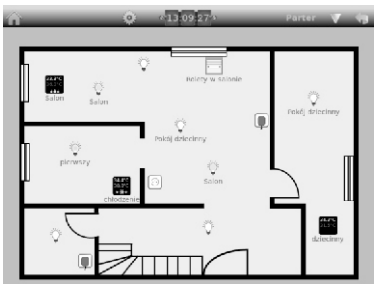
The clear and intuitive menu structure allows for central control of entire devices in the system. Attractive visualization are an additional decorative element. Additionally, you can self-screen menu, color settings and upload your own favorite images and photos as a screen saver. Visualization of a house or apartment rooms - based on plans supplied by the customer - is done free of charge by our programmers.













RoomManager
mH-DB4

REMOTE CONTROL GSM i WI-FI

Optionally, the system F&Home has the ability to connect wirelessly to a home Wi-Fi router and through our special website, you can remotely monitor the system from any computer in the world. GSM features to easily allow you to remotely control the system via SMS text messages. By sending a special SMS message can include / exclude any receiver in the building, check that the specified circuit is on, read the temperature of the room, or run a specific stage (eg raise the temperature, open the gate, illuminate the driveway, etc.).



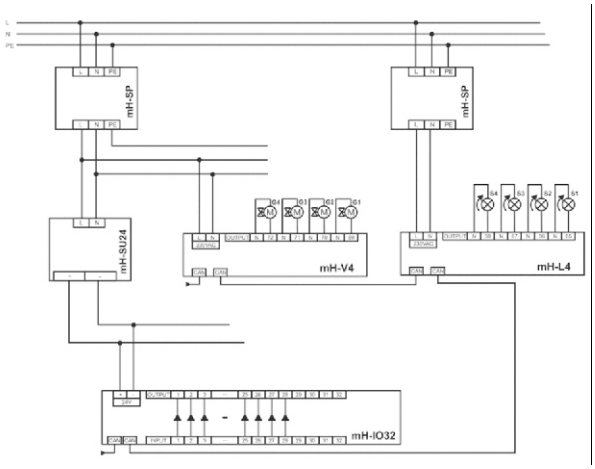


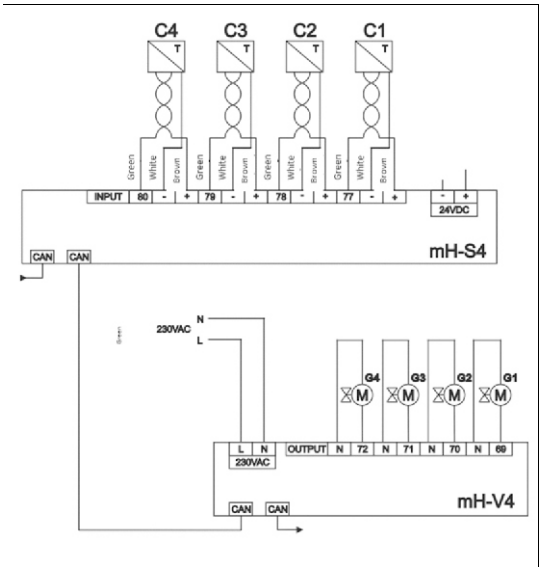
The function of an extended pilot house meets Tablet 7 "Samsung Galaxy TAB P1010 with the application F&Home Phones to control the system via WiFi. Application allows you to control the defined scenes and make changes to the settings of these scenes.

SWITCHBOARD, HARDWARE AND CABLES



The system operates in a star, it means that all control cables and power of individual receivers converge at a switchboard. Due to the large number of cables should be used with large switching (96 modules or more) or free-standing cabinet. It is also permissible to use two switching, for example on the ground floor and first floor. In this case, section switchboards should be placed between the CAN bus line. The position requires a large amount of wiring, so installation should be performed before applying the plaster. During installation, together with tynkarzami (fill switching computers and enclosures) and plumbers (control solenoid). The focal point of the system is switching and going off all the wires (star system). For switchboard to bring the signal from the UTP cable controls such devices as on-off (lights, sockets and other). For the control system can use any type of accessories (buttons, switches, sockets) available on the market.





INSTALLATION COST and SAVINGS

The cost of building an intelligent system is certainly a higher initial expense. But the economic effect is not determined by only one-time cost incurred in the investment, but also the subsequent maintenance and operation costs. By installing F&home must be aware that an investment in the future. With time, save on costs associated with heating and lighting and operation of facilities TV. High initial cost to purchase the system components. The cost of building a wired installation F & Home marginally above the cost of a standard cable (about 1000zł more with 150m ² floor space). Installers, electricians work is comparable with the location of a computer system or alarm. The whole system is the cost, and so 3-4-fold lower than that of other known systems of this type.

Integration with central heating with system, F&Home allows you to reduce heating costs by up to 40%. This effect is achieved thanks to the possibility of valve control circuit for central heating and individual temperature control program, depending on time of day, and the presence and activity of the household. There has also been savings - up to 15% - achieved by controlling the light as a function of time and place, such as the setting of illumination depending on time of day. Additional savings can be achieved with proper control of the other receivers, such as electronics devices, when leaving the house when using the feature disable Disable All these receivers from standby

Approximate cost of the system components (according to the rates in September 2010):
apartment of about 70m ² - price around 9.000zł *
house / apartment approximately 120m ² - price around 12.000zł *
house 150-200m ² - price around 15.000zł *

SYSTEM INSTALLATION

nstallation of F&Home can make a qualified installer, who received training in the field of installation, operation and configuration. In the case of self-assembly or by an unauthorized installer company F&F can refuse free technical support and to express terms of warranty on parts and installation of the system.
Authorized installer's business is personalized card with your name and authorization number.



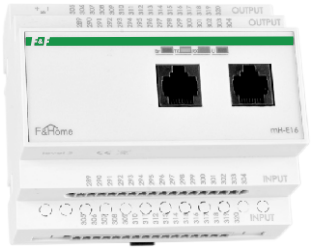
COMPONENTS

mH-IO32	input-output module control 28 devices on - off..
mH-IO12E6	mixed module IO12E6 control 12 devices on - off and six motor equipment.
mH-E16	engine control module 16 motor units of type blinds, awnings, doors, roof windows with the drive.
mH-L4	ecutive Module Four dimmers (4x350W)
mH-S4	four-channel sensor module (sensors included).
mH-S8	eight-channel sensor module (sensors included).
mH-V4	four-valve module executive (executive element - semiconductor).
mH-V8	eight-module executive (executive element - semiconductor).
mH-V7+	executive seven-valve module and pump control CO or furnace..
mH-R2x16	relay module (2 pcs 16A)
mH-R8x8	Relay Module (8 pcs 8A)
mH-SP	module with surge protectors surge module.
mH-SU24	power supply 30W
mH-SU50	power supply 50W
mH-Kh	Cables - house
mH-Kf	Cables - apartament
mH-ETH	Ethernet module (connection of internet by WIFI)
mH-Mrg	GSM module
mH-Mb	Master module(built-in computer)
mH-TS12	Computer 12" with touch panel
mH-TS12s	Ramka stalowa komputera 12"
mH-TS15	Computer 15" with touch panel
mH-TS15s	Steel frame of computer 15"
mH-TS5	Touch monitor 5,7" for scene functions
mH-RGB	control module LED RGB
mH-MS	module scenes (16 inputs). It allows you to trigger scenes using buttons..
mH-MK	light module (16 channels). It allows the visualization of states on the screen on / off, open / closed (max 16).
mH-RP	Tablet 7 "Samsung Galaxy TAB P1010 with the application F & Home Phones to control the system F & Home with WiFi.

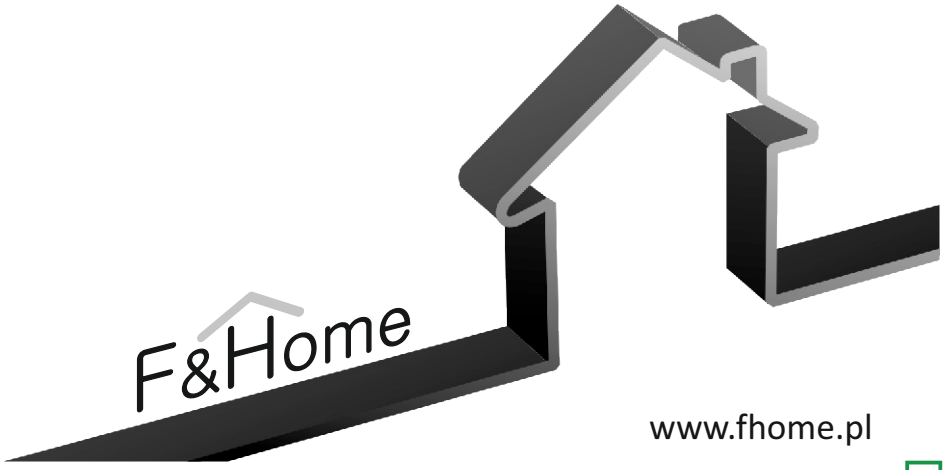








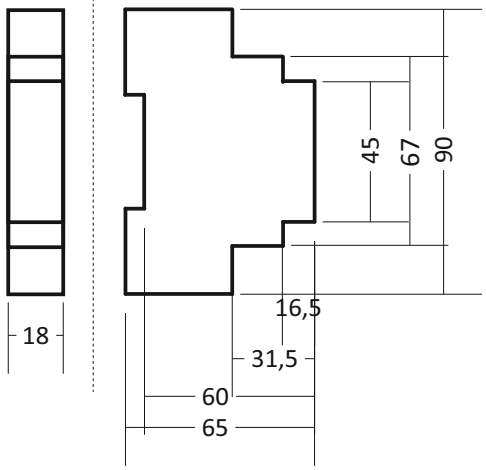




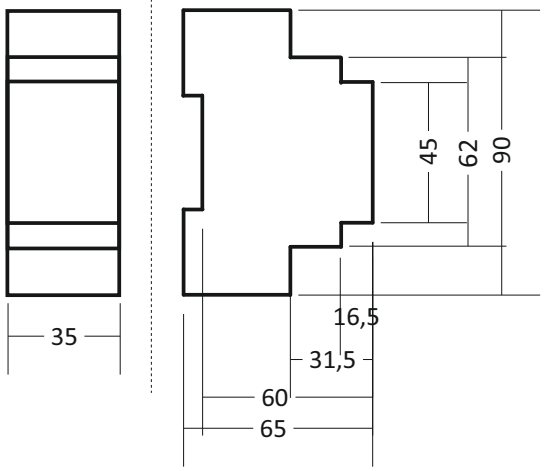
www.fhome.pl

36. ENCLOSURE DIMENSIONS

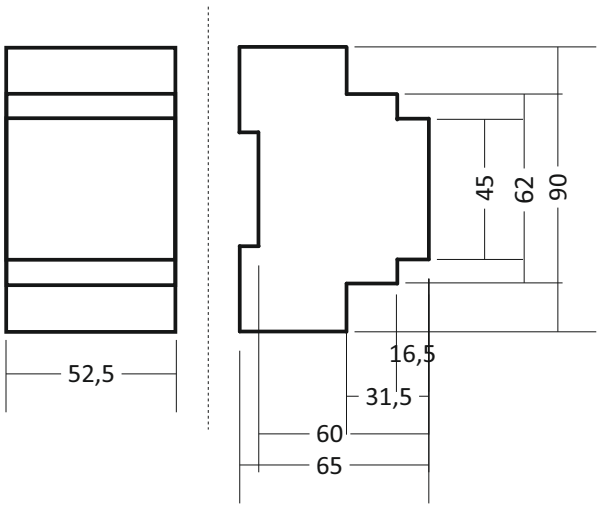
[mm]



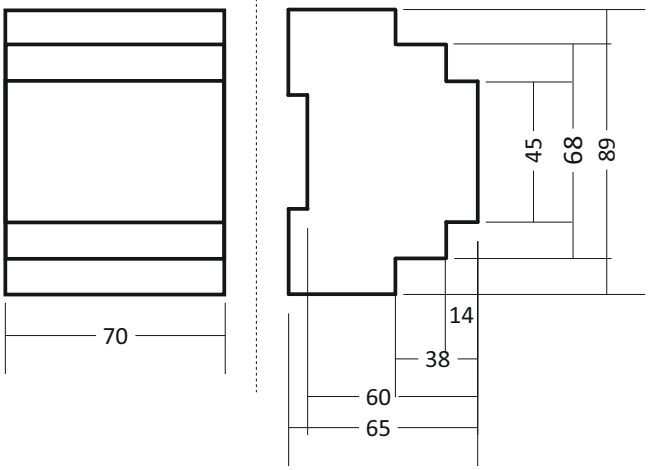
1 modul



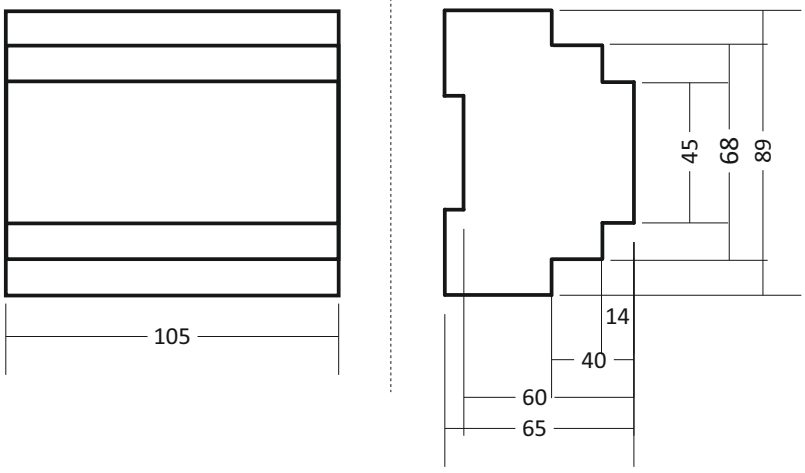
2 modules



3 modules

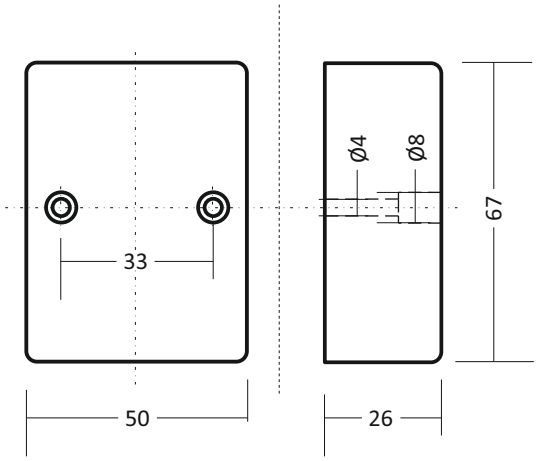


4 modules

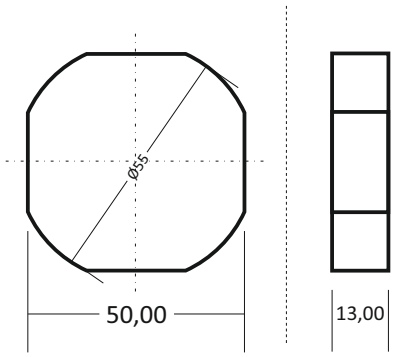


6 modules

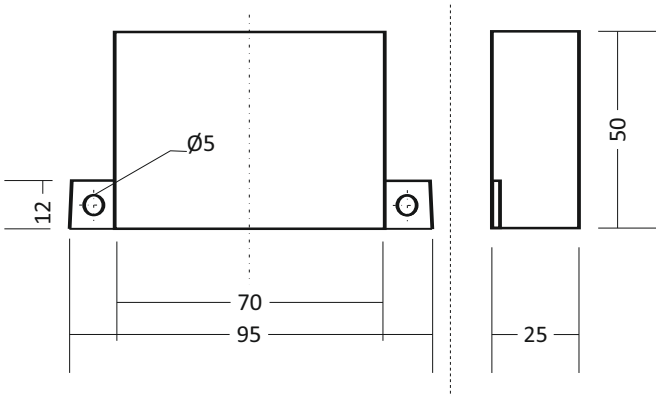
[mm]



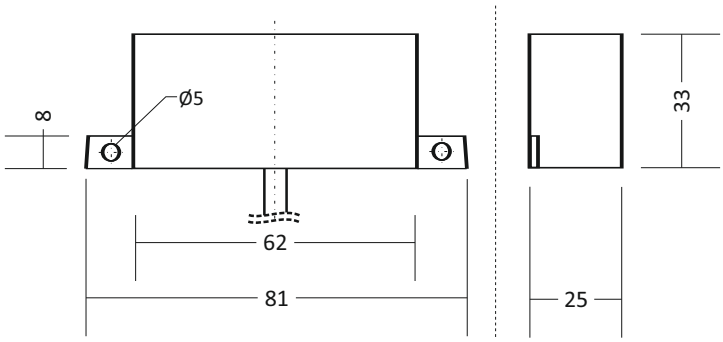
to plater box



to under plaster box



CZF2 PO-405



AZH-C

NOTES