Series NMV Multivoltage timers 22.5mm module

- Timers: 22,5mm multivoltage 24-240V AC/DC relay
- Functions: delayed ON, OFF, star-delta, intermittence and multifunction
- 2 LED indication:
  Green flashing during timer function and stable after relay energized.
  Red when output contact is ON

Standards

VDE 0106	CSA C 22.2 Nr.14	UNE 20-119
VDE 0110	UL 94	IEC/EN 60947-5-1
EN 50002	UL 508	IEC/EN 61812-1
EN 50042	IEC 255.5	CE
		cUL

Multivoltage electronic timers - 22.5mm module

	Supply voltage	Time range	Available contacts		Cat. no.	Ref. no.	Pack.
Delayed ON relay	Direct						
	24-240V AC/DC	0.06 sec - 100 h	2 changeover		NMTCV 2	**124901**	1
	Technical data: see G.6						

Star-delta starter relay	Direct	1 - 10 sec.	1 changeover		NMETV	**124908**	1
	24-240V AC/DC	6 - 60 sec					
	With transformer[2]	1 - 10 sec.	1 changeover		NMETV t AU[1]	**124911**	1
		6 - 60 sec					
	Technical data: see G.7						

Delayed OFF timer	Direct	0.5 - 6 sec	2 changeover		NMRDV 2-6	**124915**	1
	24-240V AC/DC	5 - 60 sec.	2 changeover		NMRDV 2-60	**124916**	1
	24-240V AC/DC	50 - 600 sec.	2 changeover		NMRDV 2-600	**124917**	1
	Technical data: see G.7						

Asymmetric intermittence, started by connection or pause (choice)	Direct	0.06 sec - 100 h	1 changeover		NMIVV	**124929**	1
	24-240V AC/DC						
	Technical data: see G.8						

Multifunction	- Delayed ON timer			- Impulse ON timer			
	- Delayed ON through contact timer			- Impulse ON through contact timer			
	- Delayed OFF thro ugh contact timer			- Impulse OFF through contact timer			
	- Delayed ON and OFF through contact timer			- Impulse ON and OFF through contact timer			
	Module 22,5mm						
	Direct	0.6 sec - 100 h	1 changeover		NMMFV	**124930**	1
	24-240V AC/DC						
	Technical data: see G.9						

Dimensions ● pg. G.20

(1) AU = coil 380V 50/60 Hz
(2)Transformator inside the timerhousing

Series D *Single voltage relays 45mm module*

- Line protection and detection relays.
- Detection functions: motor re-start, thermistor, earth-leakage, voltage, current, frequency ...
- Line protection: unbalance, maximum and minimum voltage, phase sequence ...

Standards

VDE 0106	CSA C 22.2 Nr.14	UNE 20-119
VDE 0110	UL 94	IEC/EN 60947-5-1
EN 50002	UL 508	IEC/EN 61812-1
EN 50042	IEC 255.5	CE
		cUL

Single voltage electronic relays - 45mm module

Motor re-start control relay (plug in)

Supply voltage	Voltage	Available contacts	Time range	Cat. no.	Ref. no.	Pack
Direct[1]	220-230V 50/60Hz	RCRT 1 changeover	0.2 - 6 sec. (memory time)	RCRT 6 - 60AN	**123624**	1
	110-125V 50/60Hz		0.2 - 60 sec. (delayed time)	RCRT 6 - 60AJ	**123623**	1
11 pins socket for RCRT for panel fixing. Front terminals				PRCZ11	**220647**	1

Technical data: see G.10

Earth leakage relays - 45 mm module

					Differential transformers			Earth leakage relays		
	Voltage (V)	Contacts	Sensiv. (A)	Ø (mm)	Cat. no.	Ref. no.	Pack	Cat. no.	Ref. no.	Pack
Differential earth leakage relay with hand reset (with test)	220-230V 50/60Hz	RDHT **1**-... **With test** 1 changeover	0.2 - 1.2	35	**WKAT 35-1,2A/2V**	204165	1	RDHT 1-1,2AEN	**123744**	1
				70	**WKAT 70-1,2A/2V**	204166	1			
	220-230V 50/60Hz		1 - 10	35	**WKAT 35-10A/2V**	204169	1	RDHT 1-10AEN	**123754**	1
				70	**WKAT 70-10A/2V**	204170	1			

Technical data: see G.12

Differential earth leakage relay with automatic reset (with test)	380-400V 50/60Hz Direct and with transformer[2]	RDHA **1**-... **With test** 1 changeover	0.2 - 1.2	35	**WKAT 35-1,2A/2V**	204165	1	RDHA 1-1,2AEU	**123965**	1
				70	**WKAT 70-1,2A/2V**	204166	1			
	220-230V 50/60Hz		1 - 10	35	**WKAT 35-10A/2V**	204169	1	RDHA 1-10AEN	**123964**	1
				70	**WKAT 70-10A/2V**	204170	1			

Technical data: see G.12

(1) Possibility of fitting a remote potentiometer.
(2) Transformer inside the relay

Dimensions ● pg. G.20

Liquid level detector relay

Voltage (V)	Contacts	No. of circuits	Cat. no.	Ref. no.	Pack
220-230V 50/60Hz	DINIL ...E 1 changeover	2	DINIL 02E ENU	**123656**	1
11 pins socket for DINIL-02E, -03E. for panel fixing. Front terminals			PRCZ11	**220647**	1

Technical data: G.11

Probes

Without cable. Waterproof and protected with a thermoplastic housing. Stainless steel probe.	SON-3	**123700**	1

Detection relays

Voltage detector relay

Supply voltage	Contacts	Operating range	Voltage drop	Input impedance	Max. input voltage	Cat. no.	Ref. no.	Pack
Direct and with transformer	RDT **2-...** 2 changeover	40 - 400V	-	800 kΩ	600V	RDT2400VEN[1]	**124184**	1

Technical data: see G.17

Current detector with delay (0.5 - 15 sec.)

Direct and with transformer	RDIT **2-...** 2 changeover	0.5 - 5A	0.25V	0.05Ω	10A	RDIT2-5AEN[1]	**124754**	1
		20 - 200mV		1 kΩ	15V	RDIT2-02VEN[1]	**124354**	1

Technical data: see G.17

Control and protection relays

Thermistor relay

Supply voltage	Contacts	Thermal probe [5] When cold - When hot		Cat. no.	Ref. no.	Pack
Direct and with transformer[4]	RS01N 1 changeover	1.5 kΩ	2.5 kΩ	RS01NEN[1]	**212759**	1
				RS01NAJ[2]	**124373**	1

Technical data: see G.18

Frequency control relay

Supply voltage	Contacts	Jumper terminals	Setting range	Cat. no.	Ref. no.	Pack
With transformer[4]	RCF **1-...** 1 changeover	Without	5 - 15Hz	RCF-1 AJ[2]	**124433**	1
		Y1 - Y2	15 - 45Hz	RCF-1 EN[1]	**124434**	1
		Y1 - Y3	45 - 135Hz	RCF-1 AU[3]	**124435**	1

Technical data: see G.19

(1) EN = coil 220/230V 50/60Hz
(2) AJ = coil 110V 50/60Hz
(3) AU = coil 380/400V 50/60Hz
(4) Transformator inside the timerhousing
(5) Thermal probe resistance not included
(6) ENU = coil 220-230V 380-400V 50/60Hz

Dimensions ● pg. G.20

Protection relays

	Supply voltage contact	Contacts	Operating range Umin.	Operating range Umax.	Unbalance	Mains frequency	Cat. no.	Ref. no.	Pack
Integral protection relay for three-phase lines 	400V 50Hz With transformer(1)	RDFF **1-...** 1 changeover	5 - 20%	5 - 15%	2.5 - 10%	50 Hz	RDFF1-50AU	**123985**	1
Technical data: see G.13									
Unbalance and phase failure protection relay for three-phase lines 	400V 50Hz Direct and with transformer(1)	RPDF **2-...** 2 changeover	-	-	2.5 - 10%	50 Hz	RPDF2-50AU	**124025**	1
Technical data: see G.14									
Phase sequence and phase failure protection relay for three-phase lines 	400V 50Hz With transformer(1)	RSFF **1-...** 1 changeover	-	-	-	50 Hz	RSFF1-50AU	**124622**	1
Technical data: see G.15									
Phase sequence protection relay for three-phase lines 	220-230V 380-400V 50/60Hz With transformer(1)	RSF **1-...** 1 changeover	-	-	-	50 Hz	RSF1-50ENU(6)	**124051**	1
Technical data: see G.15									
Maximum and minimum voltage protection relay for three-phase lines 	380/400V 220/230V 50/60Hz With transformer(1)	RTMM **2-...** 2 changeover	5 - 20%	5 - 15%	-		RTMM 2 AU RTMM 2 EN	**124085** **124084**	1 1
Technical data: see G.16									
Maximum and minimum voltage protection relay for a single-phase lines 	220/230V 50/60Hz With transformer(1)	RMM **2-...** 2 changeover	5 - 20%	5 - 15%	-		RMM 2 EN	**124104**	1
Technical data: see G.16									

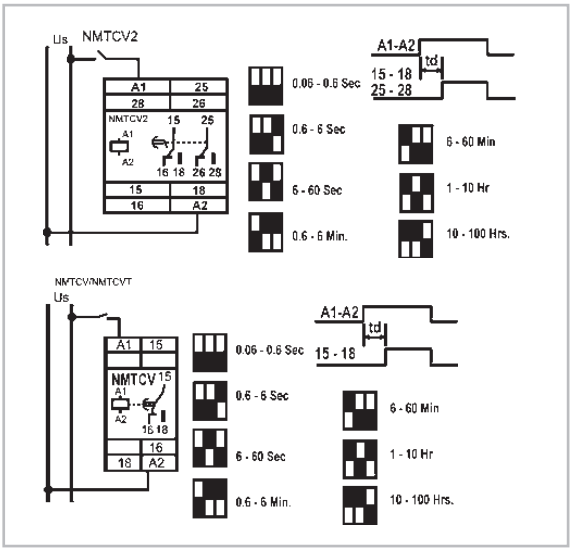
(1) Transformer inside the relay

Dimensions ● pg. G.19

NMTCV2 Delayed ON timer

Function

Electronic relay whose output contact connects with a certain adjustable delay from the moment voltage is applied to supply terminals **A1-A2.**
It has seven timing ranges : see drawing.
Range selection is made by dipswitches located on the front of the relay. Times are set by front potentiometer controlling an Application Specific Integrated Circuit (ASIC) specially designed for this group of relays. This allows for excellent precision and repeatability features.



0.06 - 0.6s, 0.6 - 6s, 6 - 60s, 0.6 - 6 min, 6 - 60 min, 1 - 10h, 10 - 100h

Technical characteristics

			NMTCV2
Nr. of changeover contacts			2
Output contacts:			
Rated insulation voltage Ui	AC	(V)	250
	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/230
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/230
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC/DC (direct)		(V)	24-240
AC(with transformer)		(V)	-
Frequency		(Hz)	50/60
Supply voltagetolerance		(%)	+10 / -20
Consumption		(mA)	60 (24V)
		(mA)	15 (240V)
		(VA)	-
Input circuit test voltage (between input, output and group circuits)		(kV)	4
Switch ON response time			0.06s - 100 h.
Switch OFF response time		(ms)	150
Reset time between 2 cycles [1]		(ms)	100
Repeat accuracy with 0.85 - 1.1 Un		(%)	1

Ambient conditions

Storage temperature	-40°C to +80°C
Operating temperature	-25°C to +60°C
Relative humidity	95% (without condensation)
Max. operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any position

Conformity to standards

VDE 0106	CSA C 22.2 No 14
VDE 0110	IEC/EN 60255-5
EN 50002	UL 94
EN 50042	UL 508
IEC/EN 60947-5-1	UNE 20-119
CE	

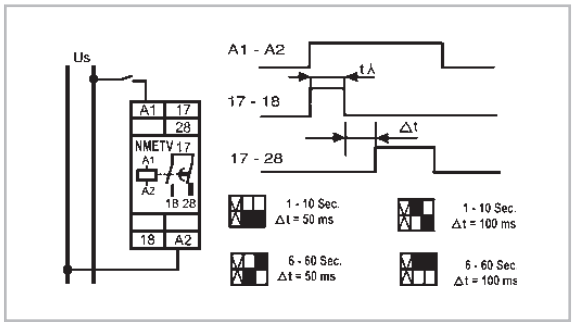
(1) Reset time: Time that must go by from the relay ends an operation until it is able to initiate the next one without error.

Remark
The relay has a green LED that lights when the relay is energised (flashing during the timing) and a red LED that lights when output contact is made.

NMETV... Star-delta starter timer

Function

Electronic relay timed in steps whose purpose is to control star-delta starting. When supply voltage is applied to the **A1-A2** terminals, the star contact (17-18) closes for an adjustable time between up to 100 h (selectable)
When this time is up, it opens, there is a pause and then the delta contact connects (17-18). The standard pause time is about 100ms.
Times are set by front potentiometer controlling an ASIC specially designed for this group of relays. This allows for excellent precision and repeatability features.



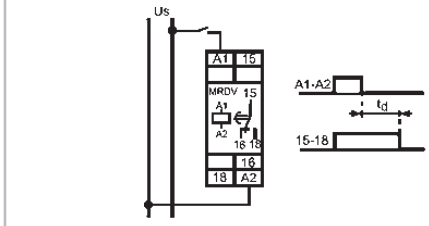
Technical characteristics

			NMETV	NMETV t
Nr. of changeover contacts			2	
Output contacts:				
Rated insulation	AC	(V)	250	
voltage Ui	DC	(V)	250	
Thermal current Ith		(A)	6	
Utilisation AC-15				
Rated voltage Ue		(V)	125/230	
Rated current Ie		(A)	2.5/1.3	
Utilisation DC-13				
Rated voltage Ue		(V)	110/230	
Rated current Ie		(A)	0.2/0.1	
Supply voltages (Un)				
AC/DC (direct)		(V)	24-240	-
AC(with transformer)		(V)	-	110-125
				200-240
				380-440
Frequency		(Hz)	50/60	
Supply voltage tolerance		(%)	+10 / -20	+10 / -15
Consumption		(mA)	50 (at 24V)	-
		(mA)	12 (at 240V)	-
		(VA)	-	3.5
Test voltage (between input, output and ground)		(kV)	4	
Switch ON response time		(ms)	100	
Reset time between 2 cycles [1]		(ms)	100	
Repeat accuracy with 0.85 - 1.1 Un		(%)	2	

NMRDV... Delayed OFF timer

Function

Electronic relay whose output contact instantly connects when supply voltage is applied to terminals **A1-A2.** It disconnects with an adjsutable delay as from the moment the relay loses supply voltage. There are several types depending on the range of timers.



Technical characteristics

			NMRDV2
Nr. of changeover contacts			2
Output contacts:			
Rated insulation	AC	(V)	250
voltage Ui	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	125/230
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/230
Rated current Ie		(A)	0.2/0.1
Supply voltages (Un)			
AC/DC (direct)		(V)	24-240
AC(with transformer)		(V)	-
			200-240
			380-440
Frequency		(Hz)	50/60
Supply voltage tolerance		(%)	+10 / -20
Consumption		(mA)	1,5 (at 24V)
		(mA)	5 (at 240V)
		(VA)	-
Test voltage		(kV)	4
(between input, output and ground)			
Switch ON response time		(ms)	250 [2]
Switch OFF response time			0.5 - 600
Reset time between 2 cycles [1]		(ms)	250
Repeat accuracy with 0.85 - 1.1 Un		(%)	5

Ambient conditions

Storage temperature	-40°C to +80°C
Operating temperature	-25°C to +60°C
Relative humidity	95% (without condensation)
Max. operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any position

Conformity to standards

VDE 0106	CSA C 22.2 No 14
VDE 0110	IEC/EN 60255-5
EN 50001 (NMETV)	UL 94
EN 50002	UL 508
EN 50042 (NMRDV)	UNE 20-119 (NMRDV)
IEC/EN 60947-5-1 (NMRDV)	CE

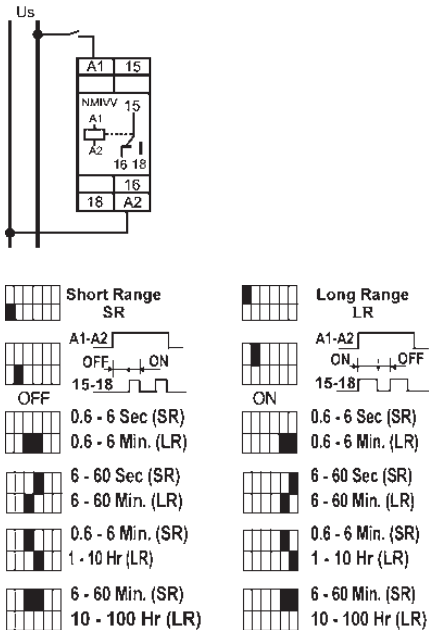
(1) Reset time: Time that must go by from the relay ends an operation until it is able to initiate the next one without error.
(2) For 24V c.c. = 300ms

Remark
NMETV relays have a green LED that lights up when the relays is energised (flashing during the timing) and a red LED that lights up when the star contact 17-18 is closed.

NMIVV Asymmetric intermittence, started by connection or pause (choice)

Function

Electronic relay whose output contact connects and disconnects intermittently. Connection and pause times may be separately. The intermittency cycle begins a connection or disconnection selected by a dip-switches and start the instant connection is made from supply voltage to the **A1-A2** terminals. A new step is begun if voltage supply is interrumped during operation.
It has seven timing ranges ;
NMIVV : 0,6 sec - 100 h
Range selection is made by dip-switches located on the front of the relay. Times are set by front potentiometer an ASIC specially designed for this group of relays. This allows for excellent precision and repeatability features.



Technical characteristics

			NMIVV
Nr. of changeover contacts			1
Output contacts:			
Rated insulation	AC	(V)	250
voltage Ui	DC	(V)	50
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	125/230
Rated current Ie		(A)	2,5/1,3
Utilisation DC-13			
Rated voltage Ue		(V)	110/230
Rated current Ie		(A)	0,2/0,1
Supply voltages		(Un)	
AC/DC (direct)		(V)	24-240
Frequency		(Hz)	50/60
Supply voltage tolerance		(%)	+10 / -20
Consumption		(mA)	60 (at 24V)
		(mA)	15 (at 240V)
		(VA)	-
Test voltage (between input, output and ground circuits)		(kV)	2
Switch ON response time		(ms)	150
Intermittent switch ON times [2]			0,6 s - 100 h.
Reset time between 2 cycles [1]		(ms)	150
Repeat accuracy with 0.85 - 1.1 Un		(%)	1

Ambient conditions

Storage temperature	-40°C to +80°C
Operating temperature	-25°C to +60°C
Relative humidity	95% (without condensation)
Max. operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any position

Conformity to standards

VDE 0106	CSA C 22.2 No 14
VDE 0110	IEC/EN 60255-5
EN 50002	UL 94
EN 50005	UL 508
EN 50042	UNE 20-119
IEC/EN 60947-5-1	CE

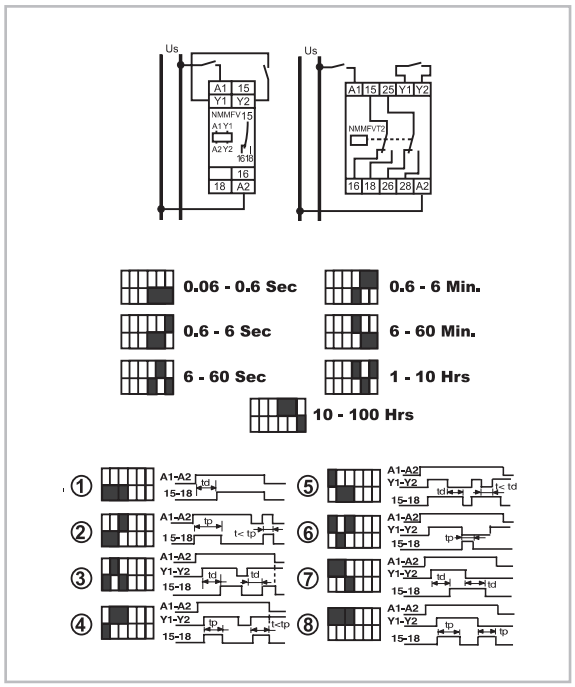
(1) Reset time: Time that must go by from the relay ends an operation until it is able to initiate the next one without error.
(2) Connection and pause times be set within different ranges.

Remark
These relays has a green LED that lights up when the relays is energised (flashing during the timing) and a red LED that lights up when output contact is made.

NMMFV Multifunction relay

Function

The functions of this multifunction and multirange electronic relay are selected by 3 dip-switches located on the front of the relay. It has eight functions: delayed ON timer, delayed ON through contact timer, delayed OFF through contact timer, delayed ON and OFF through contact timer, impulse ON timer, impulse ON through contact timer, impulse OFF through contact timer, impulse ON and OFF through contact timer. If the relay loses current during timing, it disconnects and is ready for a new cycle.
It has seven timing ranges: see drawing.
Range selection is made by dip-switches located on front of the relay.
Times are set by front potentiometer controlling an ASIC specially designed for this group of relays. This allows for excellent precision and repeatability features.



Technical characteristics

			NMMFV
Nr. of changeover contacts			1
Output contacts:			
Rated insulation voltage Ui	AC	(V)	250
	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	110/230
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/230
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC/DC (direct)		(V)	24-240
Frequency		(Hz)	50/60
Supply voltage tolerance		(%)	+10 / -20
Consumption		(mA)	60 (at 24V)
		(mA)	15 (at 240V)
		(VA)	-
Test voltage (between input, output and ground circuit)		(kV)	2
Switch ON response time			0.065 s - 100 h.
Switch OFF response time			0.065 s - 100 h.
Reset time between 2 cycles [1]		(ms)	150
Repeat accuracy with 0.85 - 1.1 Un		(%)	1
Voltage open Y1-Y2 control contact terminals		(V DC)	5
Current through control contact			
Initial		(mA)	15
Permanent		(mA)	1

Ambient conditions

Storage temperature	-40°C to +80°C
Operating temperature	-25°C to +60°C
Relative humidity	95% (without condensation)
Max. operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any position

Conformity to standards

VDE 0106
VDE 0110
EN 50002
EN 50042
IEC/EN 60947-5-1
CE
CSA C 22.2 No 14
IEC/EN 60255-5
UL 94
UL 508
UNE 20-119

(1) Reset time: Time that must go by from the relay ends an operation until it is able to initiate the next one without error.

Remark
The relays have a green LED that lights up when the relays is energised (flashing during the timing) and a red LED that lights up when output contact is made.

RCRT... Motor re-start control relay

(plug-in)

Function

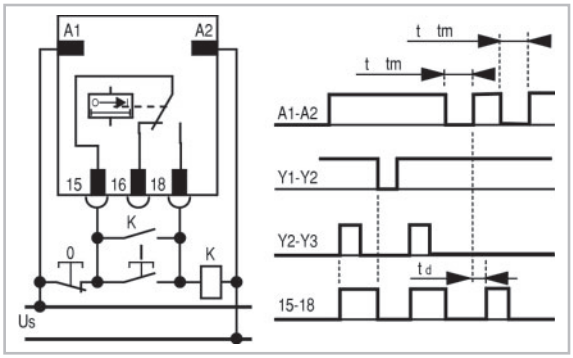
RCRT...

Correlation table between relay and 11pins socket.

RCRT	Socket
A1	8
A2	2
15	5
16	11
18	6

RCRT...

The relay is used for instantaneous or delayed motor startup after a short-time power failure (max. 6 sec). The start ocurrs immediately if power supply is disrupted for less than 0.2 sec. If the power failure lasts longer, the relay activates its memory for a time that can be set to 0.2 to 6 sec, after which no automatic restart is possible. If power supply is restored while the memory period is elapsing, the relay commands a motor restart with a delay time from power supply restoration that can be set to 0.2 to 60 sec. A system stop cancels the memory function after 50 ms, and therefore the stop signal should be on for at least this time. The relay is non-sensitive to any control voltage fluctuation or disruption during or after the motor stop.



Technical characteristics

			RCRT 6-60
Nr. of changeover contacts			1
Output contacts:			
Rated insulation voltage Ui	AC	(V)	400
	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC		(V)	110, 220-230, 125
Frequency		(Hz)	50/60
Permissible supply voltage variation		(%)	+10 / -15
Repeat accuracy with 0.85 - 1.1 Un		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Switch ON response time		(ms)	100
Power failure detection level			0.8 Us
Reset time (stop)		(ms)	50 - 75
Memory reset time		(ms)	100
Max. restart delay time		(s)	0.2 - 60
Max. memory time		(s)	0.2 - 6

Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Max. operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any position

Conformity to standards

VDE 0106
EN 50001
EN 50005
EN 50011
DIN 46199
IEC/EN 60947-5-1
UNE 20-119
CE

Remark

The relay has one LED that lights up when the contact is made.

DINIL 02E Liquid level detector relay for simultaneous control of well and tank

Functions

Plug-in devices for control of level of conductive liquids which can perform the following functions:
Filling control: The contact between **1** and **3** sloses when the tank to be cheked drops below a minimum, fixed by the position of probe **6,** which starts up the pumping system. When the maximum filling level is reached, fixed by the position of probe **7**, the contact between **1** and **3**, opens and the pumping system stops. For the filling control the two well probes must be connected externally to the common one (condition of full well).
Draining control: The contact **1-3** closes if the level liquid goes above a maximum, fixed by the position of probe **9**, which starts up the drain pumping system. When the level drops below a minimum, fixed by the position of probe **8** the contact **1-3** opens and stop the pumping system, which prevents the pumpo from losing its prime.
Simultaneous filling and draining control: The system starts up whenever the tank requires liquid and the well has sufficient level to supply it, and it stops when the liquid reaches its maximum level in the tank or, as the case may be, the well reaches its minimum level.

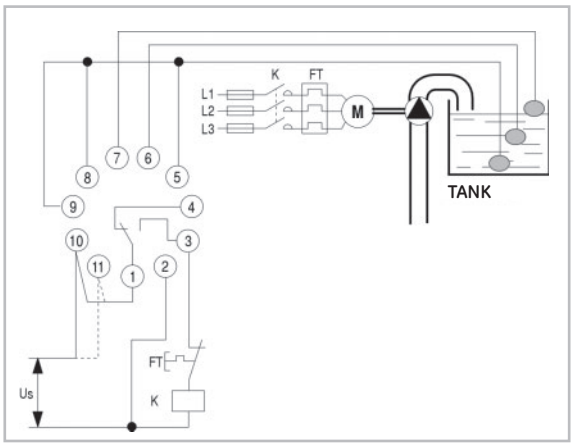
Remark: In all the above applications, the contact between **1-3** is used as a permanent contact for starting and stopping the pump starter, whether this is DOL, star-delta or any other type of starter.

Control voltage: **Two voltages:**
terminals 2-10 (220 VAC)
terminals 2-11 (380 VAC)

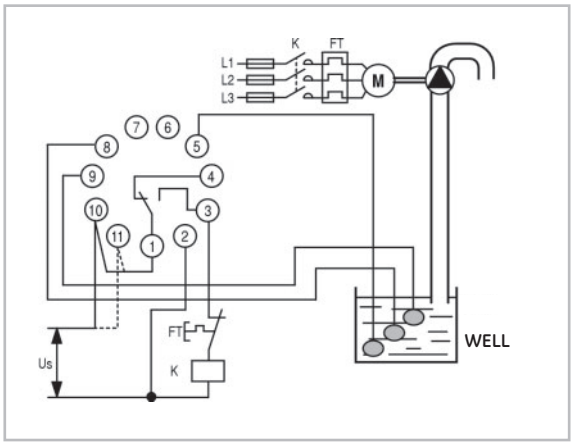
Technical characteristics

			DINIL-02E
Nr. of changeover contacts			1
Output contacts:			
Rated insulation voltage Ui	AC	(V)	400
	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC (with transformer)		(V)	380-400/220-230 (two voltages)
Frequency		(Hz)	50/60
Permissible supply voltage variation		(%)	+10 / -15
Repeat accuracy with 0.85-1.1 Un		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Voltage between probes and common		(V ef.)	6 - 18
Max. consumption of probes		(mA ef.)	0.18
Max.resistance between probes (resistance of controlled liquid)		(kOhms)	200
Switch ON response time		(s)	1
Switch OFF response time		(s)	1

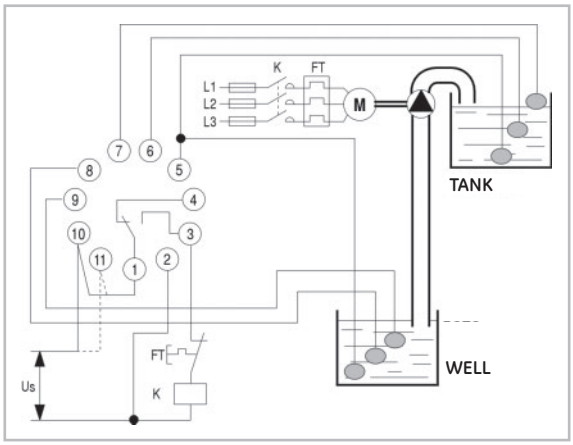
DINIL-02E - Filling control



DINIL-02E - Draining control



DINIL-02E - Simultaneous filling and draining control



Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Maximum operating altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

Conformity to standards

VDE 0106 IEC/EN 60947-5-1 CE UNE 20119

Remark
The relays has one LED that lights up when the output contact is made.

RDHT... RDHA...
Earth leakage relays

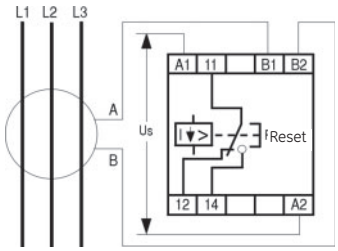
RDHT... *Earth leakage relay with manual reset, with test*
RDHA... *Earth leakage relay with automatic reset, with test*

Function

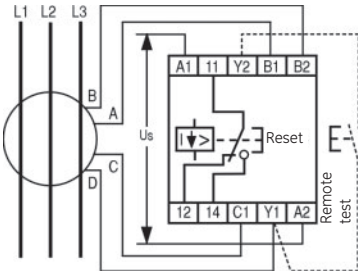
RDH, RDHT and RDHA are earth leakage detectors for industrial networks with neutral connected to earth, used with WKA (without test) and WKAT (with test) differential transformers. Tripping is produced when leakage current exceeds a threshold which is adjustable by means of a front mounted potentiometer. Tripping ranges are shown in the table below.
RDH and RDHT keep memory of tripping even in the absence of voltage in **A1** and **A2** and resetting is obtained from a push-button. RDHA is self resetting in the absence of control voltage in **A1** and **A2** or when leakage dissappears. RDHT and RDHA have in addition a test push-button for control from cubicle door, and therefore those relays should always be use with WKAT transformers with test winding. All types have included a timer, with external adjustement in RDHA and internal ajustement in RDH and RDHT that allows to delay the trip to achieve trip selectivity.

RDHT1-... RDHA1-...	Sensitivity	Transformers		Ø
... 1,2	0.2 - 1.2A	**WKAT-35**	1.2A/2V	35
		WKAT-70	1.2A/2V	70
... 10	1 - 10A	**WKAT-35**	10A/2V	35
		WKAT-70	10A/2V	70

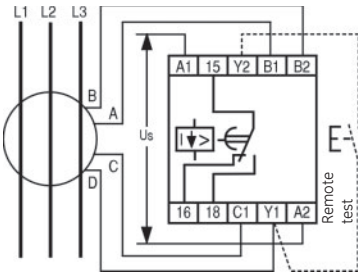
RDH



RDHT



RDHA



Ambient conditions

Storage temperature	-10°C to+85°C
Operating temperature	0°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

Conformity to standards

VDE 0106	IEC/EN 60947-5-1
EN 50001	UNE 20-119
EN 50005	CE
EN 50011	
DIN 46199	

Technical characteristics

			RDHT1-...	RDHA1-...
Nr. of changeover contacts			1	
Output contacts:				
Rated insulation voltage Ui	AC	(V)	400	
	DC	(V)	250	
Thermal current Ith		(A)	6	
Utilisation AC-15				
Rated voltage Ue		(V)	120/240	
Rated current Ie		(A)	2.5/1.3	
Utilisation DC-13				
Rated voltage Ue		(V)	110/220	
Rated current Ie		(A)	0.2/0.1	
Supply voltages		(Un)		
AC (with transformer)		(V)		380-400
			220-230	220-230
DC/AC (direct)		(V)		-
Frequency		(Hz)	50/60	
Permissible supply voltage variation		(%)	+10 / -15	
Repeat accuracy with 0.85-1.1 Un		(%)	2	
Consumption		(VA)	3	
Input circuit test voltage (between input, output circuit and earth)		(kV)	4	
Switch ON response time (can be delayed up to 5 sec)		(s)	150-200	100

RDFF1... Integral protection relay for three-phase lines

Function

Protection against:
a) Phase failure
b) Phase sequence
c) Phase unbalance
d) Low line voltage
e) High line voltage

Relay operates by phase angle detection between voltages and not by voltage levels and therefore will drive satisfactorly even with feedback from other motors.

Relays will connect only when all conditions are normal (contact **15-18** closes) and disconnects on any fault including supply, protecting network even with supply failure. It will not connect if phase sequence is incorrect, preventing motors starting in wrong direction.

Unbalance adjustement
Phase, unbalance, and therefore single phase is very dangerous for the life of a motor. The graph belows shows temperature rise in a three-phase motor with a phase unbalance (NEMA MG 1-1433 and 34). The per cent unbalance is obtained as follow:

$$\% \text{ unbalance} = \frac{\text{Max. voltage deviation from average voltage}}{\text{average voltage}} \times 100$$

Tripping is adjustable between 2.5 and 10 %.
Consequently protection is provided for motors working closely adjusted to rated power, to others more generously sized, and even power lines.
In any case adjustements should be made so that on failure of one phase realy will disconnect.

Voltage adjustement
Voltage tripping is adjustable form -5 to - 20 % and +5 to +15 % maximum by which it is possible to adjust to values recommended by IEC 34.1 (1969) and IEC 158 respectively. Tripping for these causes is delayed 1 second approximately.

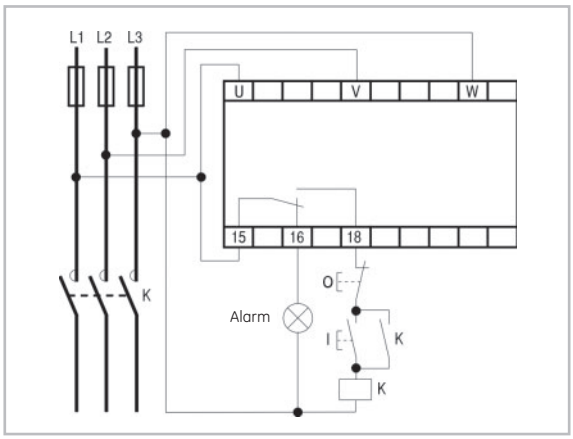
Tripping indication
Relays incorporate LED diode tripping indication. When phase sequence is incorrect, both phase sequence and unbalance light up. When unbalance lights up only indicates unbalance or single phasing with feedback.

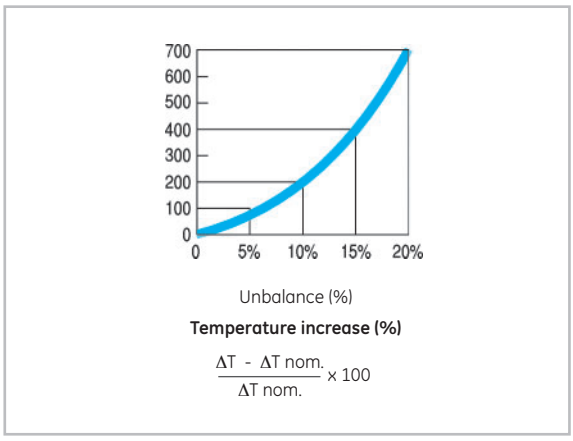
Ambient conditions

Storage temperature	-10°C to+85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

Conformity to standards

VDE 0106	EN 50011	IEC/EN 60947-5-1
EN 50001	DIN 46199	CE
EN 50005	UNE 20-119	





Technical characteristics

			RDFF1-5
Nr. of changeover contacts			1
Output contacts:			
Rated insulation voltage Ui	AC	(V)	400
	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0,2/0,1
Supply voltages		(Un)	
AC (with transformer)		(V)	380
Frequency		(Hz)	50
Permissible supply voltage variation		(%)	+15 / -20
Repeat accuracy with 0.85 - 1.1 Un		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Unbalance tripping (adjustable)		(%)	2.5 to 10
Low voltage tripping (adjustable)		(%)	5 to 20
Overvoltage tripping (adjustable)		(%)	5 to 15
Switch ON response time		(ms)	200
Reset hysteresis		(%)	5 approx.

RPDF... Unbalance and phase failure protection relay for three-phase lines

Function

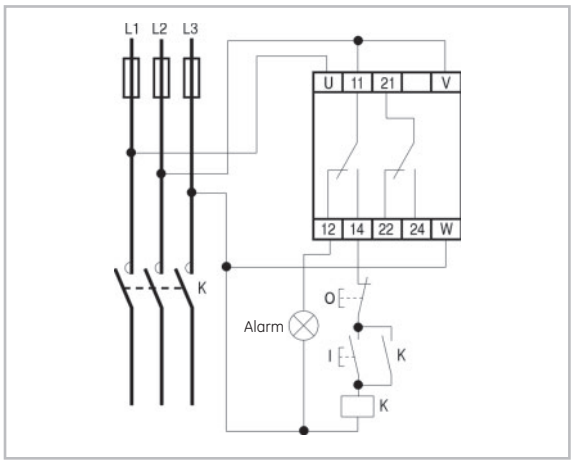
The RPDF-electronic relay is intended for the protection of lines or electronic motors against unbalance between phases or failure of one or more phases. Detection of unbalance or phase failure is done by measuring phase change and not by voltage levels. This guarantees correct working even when there are return paths due to motors running which are connected to the mains networks to be protected.The relay is made when all conditions are normal (contact **11-14** closed); the contacts open in the event of a failure. In this way, any failure, including that of the relay supply, will cause disconnection and so avoid the supply being left unprotected.

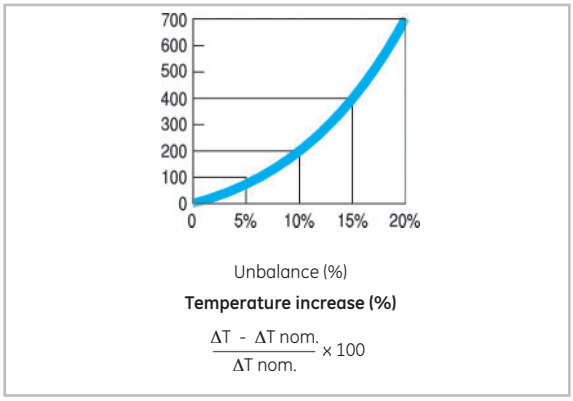
Setting unbalance

The unbalance in phases and, consequently, the failure of one of these, is a limiting factor in the life of an electric motor. The graph below shows the percentage temperature increase in a three-phase motor as a function of the degree of unbalance (see standards NEMA MG 1-1433 and 34). The per cent unbalance is calculated as follows :

$$\% \text{ unbalance} = \frac{\text{Max. voltage deviation from average voltage}}{\text{average voltage}} \times 100$$

The trip is adjustable between about 2.5% and 10%. Consequently protection is provided for motors working closely adjusted to rated power, to others more generously sized, and even power lines. In any case, the adjustement must be such that the loss of a phase produces the opening of the relay.





Technical characteristics

			RPDF 2-50
Nr. of changeover contacts			2
Output contacts:			
Rated insulation voltage Ui	AC	(V)	400
	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0,2/0,1
Supply voltages		(Un)	
AC (with transformer)		(V)	380
Frequency		(Hz)	50
Permissible supply voltage variation		(%)	+10 / -20
Repeat accuracy		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Unbalance tripping (adjustable)		(%)	2.5 to 10
Switch ON response time		(ms)	100
Reset hysteresis		(%)	2

Ambient conditions

Storage temperature	-10°C to+85°C
Operating temperature	-5°C to +50°C
Relative humidity	95%(without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

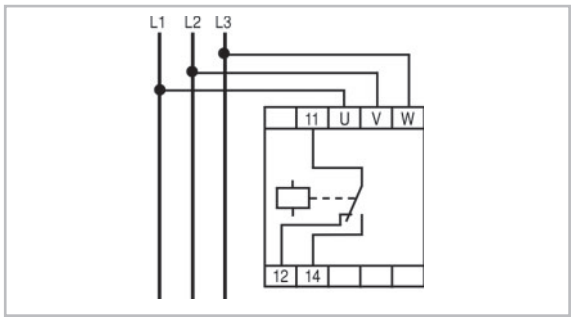
Conformity to standards

VDE 0106
EN 50001
EN 50005
EN 50011
DIN 46199
IEC/EN 60947-5-1
UNE 20-119
CE

RSFF... Phase sequence and phase failure protection relay for three-phase lines

Function

The RSFF relay is designed to detect phase sequence errors and/or phase failures in three phase lines. Three terminals **U, V, W** are connected to each of the three phases of the mains. Controlling vectors of voltage between lines (amplitude and phase) is detected the direct sequence (phase **V** with 120° in respect of **U** and phase **W** with 240° lag in respect and phase **U**) as well as balance of voltages and angles of phases, for detecting a phase failure even with returns (motor working).
By means of an external potentiometer can be adjusted the network unbalance, level, between 2,5 % and 105 % to adapt the relays sensibility for phase failure function. This unbalance is measured according to NEMA MG1-1433 and 34, and corresponds to a fall of simple tension of phase in amplitude of 7.3 and 28%, respectively. The relay precives either increases or drops of voltage and angle, then it detect the failures even in motors working as breaking devices (loads going down in lifting devices). When relay is powered, it connects instantaneously (max. 200ms) if the power system is correct. Once the switched on relay is switch-on, it switches-off with 1 sec. delay in case of a failure, to avoid false disconnections due to transient unbalances. (Start of other motors, transformers, etc.).



Technical characteristics

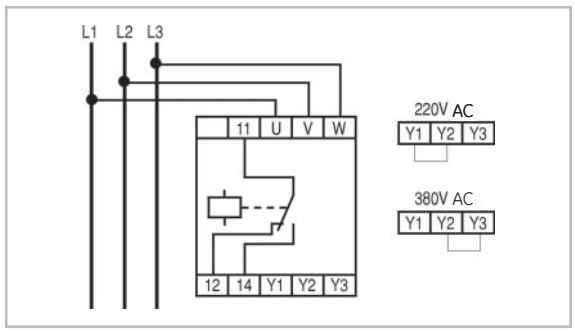
			RSFF1-50
Nr. of changeover contacts			1
Output contacts:			
Rated insulation	AC	(V)	400
voltage Ui	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC (with transformer)		(V)	380-400
Frequency		(Hz)	50/60
Permissible supply voltage variation		(%)	+15 / -20
Repeat accuracy		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Switch ON response time		(ms)	200
Switch OFF response time		(s)	1

$$\% \text{ unbalance} = \frac{\text{max. voltage derivation from average voltage}}{\text{average voltage}} \times 100$$

RSF... Phase sequence relay for three-phase lines

Function

The RSF1 is designed to detect phase sequence in three phase power system. Three supplies **U, V, W**, take voltage from each of the phases of the network. When phase sequence supplying relay is direct (Phase **V** with 120° lag in respect of **U** and phase **W** with 120° lag in respect of **V**) the relays connects with supply (closes contact between **11**-**14**) and if no it remains OFF. For correct operation, relay must have supplying each of the three phases.
A phase failure, when there is a return current (the motor is rotating), is not detected by the relay and may lead to a relay malfunction.



Technical characteristics

			RSF1-50
Nr. of changeover contacts			1
Output contacts:			
Rated insulation	AC	(V)	400
voltage Ui	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC (with transformer)		(V)	380-400 / 220-230 (two voltages)
Frequency		(Hz)	50/60
Permissible supply voltage variation		(%)	+10 / -15
Repeat accuracy		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Switch ON response time		(ms)	500
Switch OFF response time		(ms)	200

Ambient conditions

Storage temperature	-10°C to+85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

Conformity to standards

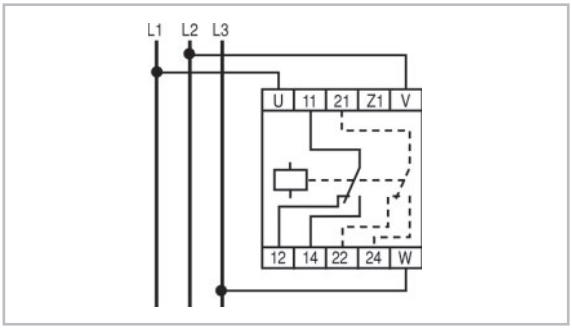
VDE 0106	IEC/EN 60947-5-1	EN 50001	UNE 20-119
EN 50005	EN 50011	DIN 46199	CE

Remark
The relay has one LED that lights when the output contact is made.

RTMM2 Maximum and minimum voltage protection relay for three-phase lines

Function

The RTMM electronic relay is voltage sensitive and has one or two changeover output contacts. The relay mantains operated (contact between **11-14** or between **21-24** closed) while the voltage is within the tolerance limits and opens when these limits are surpassed in plus or minus. The relay can be used for low voltage or over-voltage detection in three-phase lines.
The trip value, for maximum and minimum voltage, are set by means of two independent potentiometer mounted on the relay front cover. The limits for the trip are adjustable between +5 and +15% for maximum voltage and between -5 and -20% for minimum voltage.



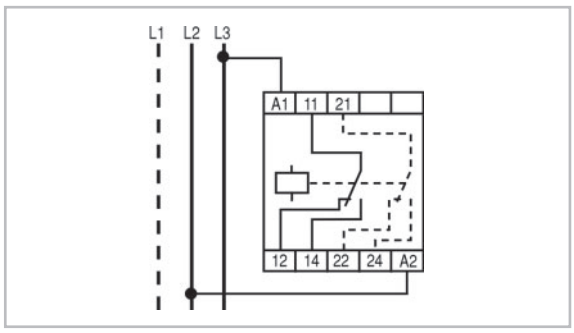
Technical characteristics

			RTMM2
Nr. of changeover contacts			2
Output contacts:			
Rated insulation	AC	(V)	400
voltage Ui	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC (with transformer)		(V)	400,380,240,220
Frequency		(Hz)	50/60
Permissible supply voltage variation		(%)	+20 / -20
Repeat accuracy		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Low voltage tripping (adjustable)		(%)	-5 to -20
Over voltage tripping (adjustable)		(%)	+5 to +15
Switch ON response time		(ms)	100
Reset hysteresis		(%)	2

RMM2 Maximum and minimum voltage relay for single-phase lines

Function

These voltage-sensitive relays with one or two changeover output contacts remain connected (contact between 11-14 or between 21-24 closed) when voltage is within tolerance limits, and opens when voltage surpasses these limits in plus or minus. Relays can be used to detect low or lover voltage in balanced single or three-phase systems, and maximum and minimum tripping values are adjsutable by means of two frontal potentiometers. The limits for the trip are adjustable between 5 and 15% for maximum voltage and between 5 and 20% for minimum voltage.



Technical characteristics

			RMM 2
Nr. of changeover contacts			2
Output contacts:			
Rated insulation	AC	(V)	400
voltage Ui	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC		(V)	240,220
Frequency		(Hz)	50/60
Permissible supply voltage variation		(%)	+15 / -20
Repeat accuracy		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Low voltage tripping (adjustable)		(%)	-5 to -20
Over voltage tripping (adjustable)		(%)	+5 to +15
Reset hysteresis		(%)	5 approx.
Switch ON response time		(ms)	100

Ambient conditions

Storage temperature	-10°C to+85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

Conformity to standard

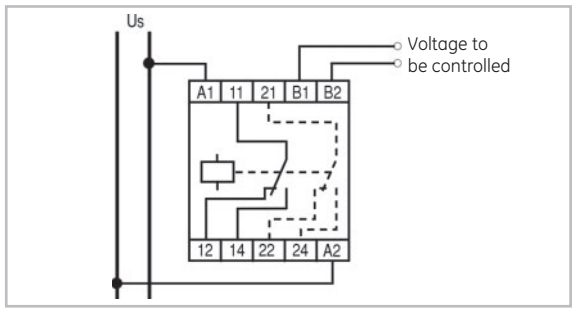
VDE 0106
EN 50001
EN 50005
EN 50011
DIN 46199
IEC/EN 60947-5-1
UNE 20-119
CE

Remark
The relay has one LED that lights when the output contact is made.

RDT2 Voltage detector relay (1)

Function

The output contact in this voltage detector will connect when controlled voltage between terminals B1-B2 exceeds a certain adjustable threshold by means of the front potentiometer and will disconnect with a voltage 10% below the setting value.
The relay requires voltages supply between A1-A2. Controlled voltage can be either direct (DC) or alternating (AC). The output contact function can be set to NO by means of an internal jumper (contact 11-14 is normally closed and opens when control power supply or removal is detected at A1-A2).
When the distance between the measurement point and the relay is greater than 1m, in order to avoid any noise problems, connection to the B1-B2 terminals should be made by using a shielded cable, with its screen joined to the B2 terminal and isolated at the other cable end or by using a twisted-pair cable.



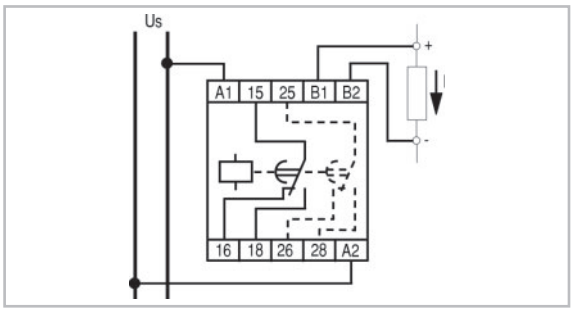
Technical characteristics

			RDT2-...
Nr. of changeover contacts			2
Output contacts:			
Rated insulation voltage Ui	AC	(V)	400
	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC		(V)	220-230
Frequency		(Hz)	50/60
Permissible supply voltage variation		(%)	+10 / -15
Consumption		(VA)	3,7
Input circuit test voltage (between input, output circuit and earth)		(kV)	2,5
Reset hysteresis		(%)	10
Switch ON response time		(ms)	100

RDIT2 Current detector relay (2) with delay (0.5-15 seconds)

Function

This relay is similar to the RDI except that it will connect with a certain adjustable delay of **0.5 to 15 secs**. If current falls below threshold before timeout, relay will reset inmediately to recount delay from zero. For higher currents, current transformers or shunts of suitable ratios can be used. The realy requires voltages supply between A1-A2. Controlled voltage can be either direct (DC) or alternating (AC). The output contact function can be set to NO (the **15-18** contact closes when the delay time has elapsed) or to NC (the 15-18 contact is normally closed and opens when the delay time has elapsed or when the control power supply is removed from **A1-A2**) by means of an internal jumper. The **0.2 V** version has been designed to be used with an external shunt and if the distance between the shunt and the relay is greater than 1 m, a connection to the **B1-B2** terminals should be made by using a shielded cable, with its screen joined to the **B2** terminal and isolated on the shunt side or by using a twisted-pair cable.



Technical characteristics

			RDIT2-...
Nr. of changeover contacts			2
Output contacts:			
Rated insulation voltage Ui	AC	(V)	400
	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC (with transformer)		(V)	220-230
Frequency		(Hz)	50/60
Permissible supply voltage variation		(%)	+10 / -15
Repeat accuracy with 0.8 -1.1 Un		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Switch OFF response time		(s)	0.5 to 15
Reset time between 2 cycles(3)		(ms)	100

Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

Conformity to standards

VDE 0106
EN 50001
EN 50005
EN 50011
DIN 46199
IEC/EN 60947-5-1
UNE 20-119
CE

(1) **Remark**
The relay has a green LED which lights up when the supply is between A1 and A2, and a red LED when the contact is made (11-14).

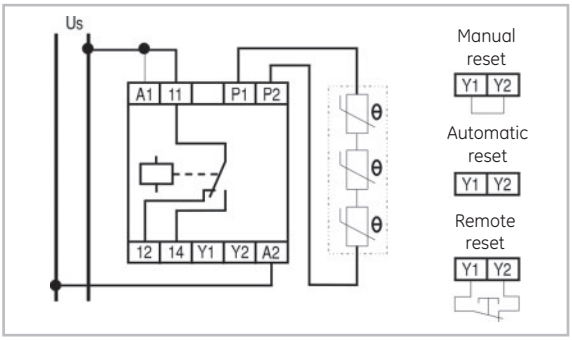
(2) **Remark**
The relay has a yelow LED which lights up when the supply is between A1 and A2, and a red LED when the contact is made **15-18**.

(3) Reset time: Time that must go by from the relay ends an operation until it is able to initiate the next one without error.

RS01N Thermistor relay

Function

This thermal probe relay is sensitive to resistance of several thermal probes (thermistors, PTC) connected to **P1** and **P2** and detect overheating in motor windings transformers, etc. where these PTC are connected.
The relays disconnects when probe resistance exceeds 2500 ohms and cannot reset until resistance is lower than 1500 ohms. Control voltage should be applied to **A1** and **A2**, the absence of this will cause relay to trip and prevent any possibility remaining without protection. In this case resetting is automatic, but if the relay trips through probe heating, resetting may be automatic, hand or remote (distance NC contact).
RS01N detect those cases of probe cables short-circuited (resistance lower than 20 Ohms) or probe cables cut (resistance higher than 2.5k Ohms). The resistance at 25 °C of the probe circuit must be within 40 to 600 ohms range.



Technical characteristics

			RS01N
Nr. of changeover contacts			1
Output contacts:			
Rated insulation voltage Ui	AC	(V)	400
	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC (with transformer)		(V)	220-230,125,110
Frequency		(Hz)	50/60
Permissible supply voltage variation		(%)	+10 / -15
Repeat accuracy with 0.85-1.1 Un		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Switch OFF response time		(s)	100
Hysteresis		(kOhms)	1
Probe resistance min. (at 25°C)		(Ohms)	40
Probe resistancemax. (at 25°C)		(Ohms)	600
Max. voltage in terminals P1-P2 (R=2.5kV)		(V)	< 1,6

Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

Conformity to standards

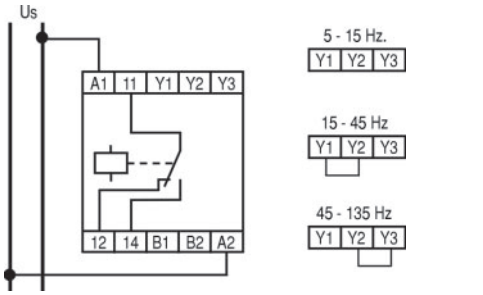
VDE 0106
EN 50001
EN 50005
EN 50011
DIN VDE 0660-303 (RS01N)
DIN 46199 (RSR)
IEC/EN 60947-5-1
IEC 34-11-2 (RS01N)
UNE 20-119
CE

Remark
The relay has one LED that lights when the output contact is made.

RCF 1 Frequency control relay

Function

This frequency control relay is sensitive to frequency of the signal applied to terminals **B1** and **B2** and output contact connects when frequency fails below a threshold adjsutable by the front potentiometer. Supply voltage should also be applied to relay between terminals **A1** and **A2** to produce connection. Possibility of three settings ranges (by cross-connection): 5-15Hz, 15-45Hz, 45-135Hz.
Switching is independent of input signal level at **B1-B2**, whitin a wide range of values, and response is not changed by the input signal wave form (sinusoidal, square, triangular, etc).
Relay is suitable for suppression of rotor resistance in slipring asynchronous motors starters, speed reversal detector in motor wound motors and frequency control in generating sets.



Technical characteristics

			RCF-1
Nr. of changeover contacts			1
Output contacts:			
Rated insulation voltage Ui	AC	(V)	400
	DC	(V)	250
Thermal current Ith		(A)	6
Utilisation AC-15			
Rated voltage Ue		(V)	120/240
Rated current Ie		(A)	2.5/1.3
Utilisation DC-13			
Rated voltage Ue		(V)	110/220
Rated current Ie		(A)	0.2/0.1
Supply voltages		(Un)	
AC (with transformer)		(V)	380-400,220,230,110
Frequency		(Hz)	50/60
Permissible supply voltage variation		(%)	+10 / -15
Voltage between B1-B2 terminals		(V c.a.)	15 to 500
Repeat accuracy with 0.85-1.1 Un		(%)	2
Consumption		(VA)	3
Input circuit test voltage (between input, output circuit and earth)		(kV)	4
Switch ON response time		(ms)	100
Switch OFF response time		(ms)	800
Reset hysteresis		(Hz)	1.5 approx.

Ambient conditions

Storage temperature	-10°C to +85°C
Operating temperature	-5°C to +50°C
Relative humidity	95% (without condensation)
Altitude	2.000 m
Degree of protection	IP40; terminals IP20
Operating positions	Any

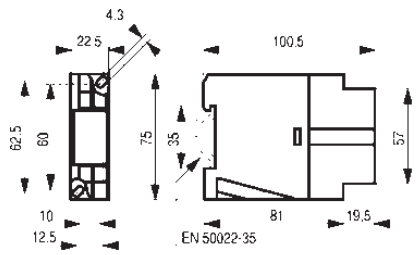
Conformity to standards

VDE 0106	EN 50042 (MRI)
VDE 0110 (MRI)	DIN 46199 (RCF)
EN 50001 (RCF)	IEC/EN 60947-5-1
EN 50002 (MRI)	UNE 20-119 (RCF)
EN 50005	UL 94 (MRI)
EN 50011	UL 508 (MRI)
CE	

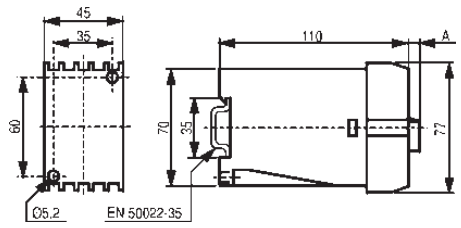
Remark
The relay has one LED that lights when the output contact is closed.

Dimensional drawings

Series NMV

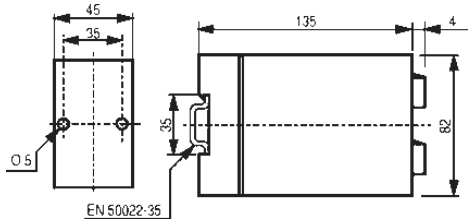


Series D

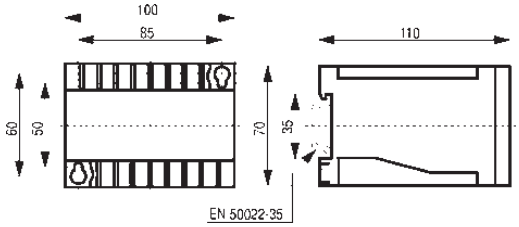


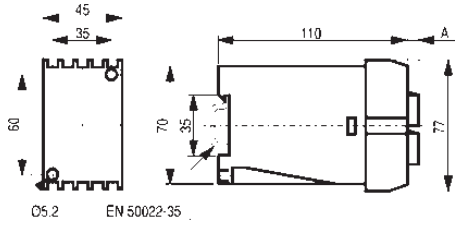
	A
RET, RTC, RTCI, RRD, RTD, RIC, RCR, DINIL-02, DINIL-03, RTMM, RDI, RDIA RSR, RCF	4
RS01N	8

RCRT 6 - 60



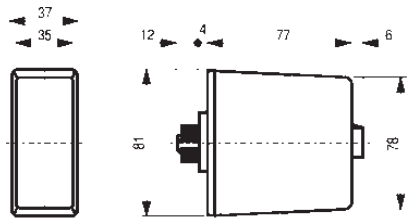
RDFF



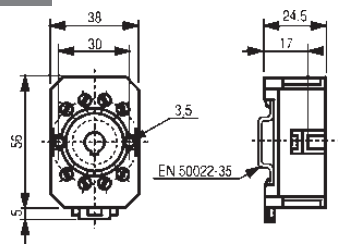


	A
RDMT, RPDF, RMM, RDT,RDTA, RDIT, RDITA	4
RDH, RDHT, RDHA	12

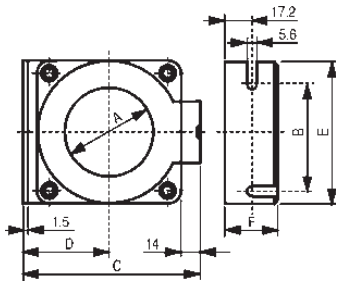
DINIL-02E, -03E



PRCZ11

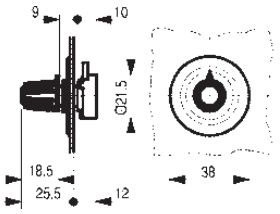


Differential transformers



TYPE	A	B	C	D	E	F
WKA-35	35	75	99	42	92	33.5
WKA-70	70	98	132	60.5	115	33.5
WKA-105	105	141	175	82	158	33.5
WKA-140	140	183	218	103.5	200	33.5
WKA-210	210	270	309	150	290	43
WKAT-35	35	75	99	42	92	33.5
WKAT-70	70	98	132	60.5	115	33.5
WKAT-105	105	141	175	82	158	33.5
WKAT-140	140	183	218	103.5	200	33.5
WKAT-210	210	270	309	150	290	43

Remote potentiometer



Metal and thermoplastic limit switches. Positive opening. Conformity with EN 50041.

- Fixing center lines and operation points in accordance with EN 50041
- NC contacts with positive opening to IEC/EN 60947-5-1
- IP65 protection
- Terminal numbering according to IEC/EN 50013
- Cable entry M20 x 1.5
- Safety switches according to cat. 1 of IEC/EN 60947-5-1 (depends on actuating system)
- CSA and UL certified

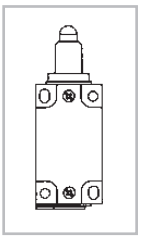
Standards

IEC/EN 60947-5-1
IEC/EN 60204-1

Approvals

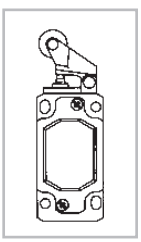
Mounted versions

Series IS...



- Double-insulated bodies, in **thermoplastic material, according to UL-94 VO**
- Clip-fixing and opening of terminal acces cover, no screws.

Series IM...



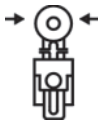
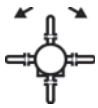
- Metal bodies constructed from injected **aluminium**.
- Cover fastening by screws.

Specifications

Degree of protection		IP65
Ambient conditions		
Storage temperature	°C	-40 to +80
Operating temperature	°C	-25 to +80
Resistance to shocks (10 ms)	G	30
Resistance to vibrations (10-55 Hz)	G	25
Mechanical endurance	ops.	10×10^6
Cable entry		M20 x 1.5
Fixing screws		4 x M5

Order codes ● pg. G.3
Technical data ● pg. G.10
Dimensions ● pg. G.11

Limit switches according to EN 50041

	Heads Standard position	Head position	Form to EN 50041	Slow break Cat.no	Ref. no.	Snap action Cat.no	Ref. no.	Pack
	Plunger	I I I	B	**ISGA-B211**	130000	**ISGA-B411**	130018	5
		I I I	B			**IMGA-B411**	130019	5
	Roller plunger	I I I	C			**ISGR-B411**	130020	5
		I I I	C			**IMGR-B411**	130021	5
	Roller level	I I I	(1)			**ISGH-B411**	130022	5
		I I I	(1)			**IMGH-B411**	130023	5
	Roller crank	I I I	A			**ISGL-B411**	130028	5
		I I I	A			**IMGL-B411**(4)	130029	5
	Adjustable roller crank[2]	I I	(1)			**ISGT-B311**	130030	5
		I I	(1)			**IMGT-B311**	130031	5
	Rod lever[2]	I I	D			**IMGP-B311**	130035	5
	Cross rod	I I	(1)			**IMGC-B411**	130037	5
	Spring rod lever[2]	I I I	(1)			**IMGQ-B311**	130039	5
	Omnidirectional spring rod[2]	I I I	(1)			**ISGM-B311**	130040	5
		I I I	(1)			**IMGM-B311**	130041	5

Positive break

(1) Fixing center lines and operation points in accordance with EN 50041.
(2) Heads for these limit switches have no positive opening, as they are adjustable or flexible.
(3) Supplied in standard mounting position. Positions II and III must be set by user.
(4) Available with metal roller lever: IMGL-B411M (130107).

Thermoplastic limit switches. Positive opening. Conformity with EN 50047.

- Fixing center and operation points in accordance with EN 50047
- NC contacts with positive opening according to IEC/EN 60947-5-1
- IP65 protection
- Terminal numbering according to EN 50013
- Thermoplastic material according to UL-94 V0
- One bottom cable entry M20x1.5 on Series IUG
- Two fixing possibilities for series IUGA...
- Clip fixing and opening of terminals access cover, no screws.
- CSA and UL certified

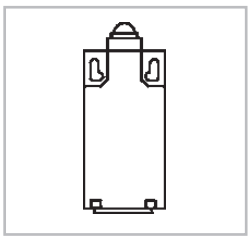
Standards

IEC/EN 60947-5-1
IEC/EN 60204-1

Approvals

Mounted versions

Series IUG...



Specifications

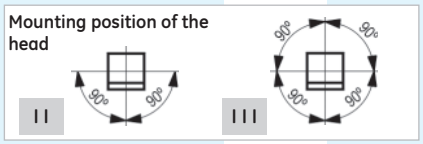
Degree of protection		IP 65
Ambient conditions		
Storage temperature	°C	-40 to +80
Operating temperature	°C	-25 to +80
Resistance to shocks (10 ms)	G	30
Resistance to vibrations (10-55 Hz)	G	25
Mechanical endurance	ops.	10×10^6
Cable entry	IUG...	1 x (M20x1.5)
Fixing screws		2 of M5

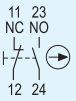
Switch function

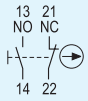
Contact type		Switch function	Switch contacts	Voltage	Current
IUG	Slow make & break	Changeover	1NC/1NO	250V	10A
	Snap action	Changeover	1NC/1NO	250V	10A

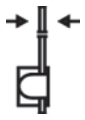
Order codes ● pg. G.5
Technical data ● pg. G.10
Dimensions ● pg. G.13

Limit switches according to EN 50047

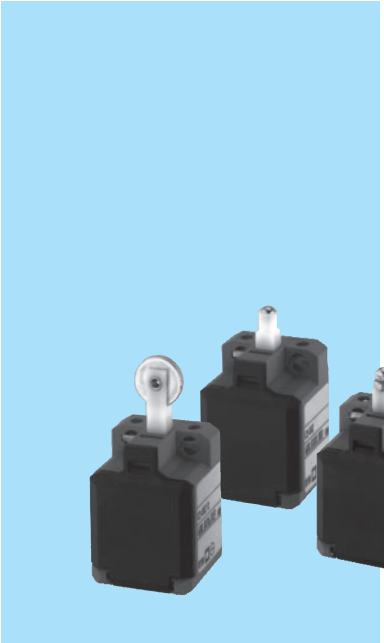






	Heads Standard position	Head position	Form to EN 50047	Slow break Cat. no.	Slow break Ref. no.	Snap action Cat. no.	Snap action Ref. no.	Pack
	Plunger	I I I	B	**IUGA-B211**[3]	130060	**IUGA-B411**	130082	5
		I I I	B	**IUGA-B211 S**[3]	209140			5
	Low roller plunger	I I I	[2]			**IUGU-B411**	130084	5
		I I I	[2]	**IUGU-B211 S**[3]	130057			5
	Low roller plunger [1]	I I I	[2]			**IUGR-B411**	130086	5
	Roller lever	I I I	E			**IUGH-B411**	130088	5
	Adjustable roller lever	I I I	[2]			**IUGI-B411**	130090	5
	Retractable returning roller lever	I I I	[2]			**IUGE-B411**	130094	5
	Roller crank (28mm between centres)	I I I	A			**IUGL-B411**	130096	5
	Adjustable roller crank [1]	I I	[2]			**IUGT-B311**	130098	5
	Rod lever [1]	I I	[2]			**IUGP-B311**	130100	5
	Spring rod lever [1]	I I I	[2]			**IUGQ-B311**	130102	5
	Omnidirectional spring rod [1]	I I I	[2]			**IUGM-B311**	130104	5

(1) Heads for these limit switches have no positive opening.
(2) Fixing centre lines and operating points according to EN 50047.
(3) with latch
⊖ Positive break



Miniature thermoplastic limit switches

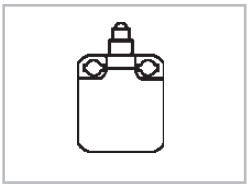
- The small sizes makes these ideal for use in reduced spaces
- With slow break, NC contacts with positive opening according to IEC/EN 60947-5-1
- 2 mm contact opening of slow-action system according to EN 81-1 for lift application
- IP30 protection
- Terminal numbering according to EN 50013
- Thermoplastic material in accordance with UL-94 V0
- Clip fixing and opening of the contact access cover, no screws
- Two fixing possibilities: 2 x M3 from the top
  2 x M4 for mounting from the front

Approvals

Switch function

Contact type	Switch function	Switch contacts	Voltage	Current
Slow make & break	Changeover	1NC/1NO	250V	10A
Snap action	Changeover	1NC/1NO	250V	10A

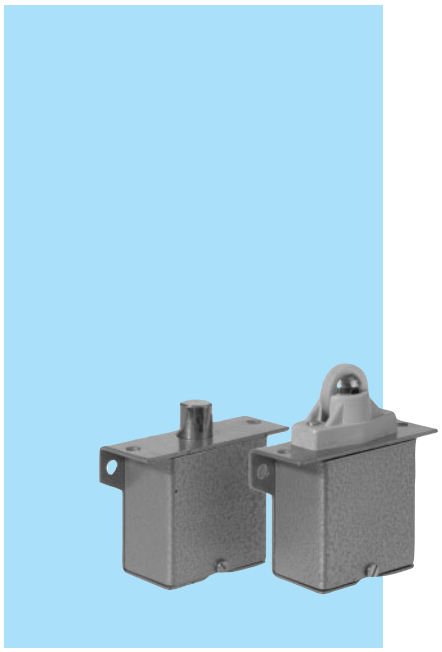
Mounted versions



Order codes ● pg. G.6
Technical data ● pg. G.10
Dimensions ● pg. G.15

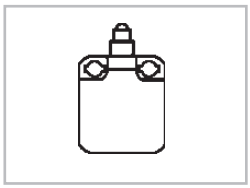
Miniature limit switches

	Heads	Slow break Cat. no.	Slow break Ref. no.	Snap - action Cat. no.	Snap - action Ref. no.	Pack
	Plunger			**IZMA-B311**	130144	10
	Push-button (adjustable)	**IZMS-B211**	130141	**IZMS-B311**	130145	10
	Roller plunger			**IZMR-B311**	130146	10



Stainless steel limit switches - Heavy duty - IP40

Mounted versions



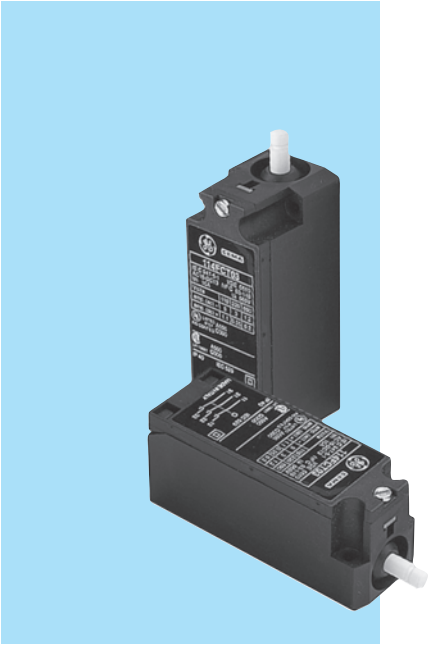
Dimensions ● pg. G.35

Approvals

CE

Stainless steel limit switches

	Heads	Slow break 13 21 NO NC 14 22 Cat. no.	Ref. no.
	Plunger	IP	201942
	Ball	IB	201943
	Roller plunger	IR	201944



Three pole limit switches

- Switch-box, cover and operation plunger by thermoplastic resin.
- Silver contacts.
- Lockable cover with one screw only.
- Two basic versions:
  Without seal Protection IP40 according to IEC 529
  With seal Protection IP65 according to IEC 529
  (Types NEMA 1, 12 and 13 according to UL, ENCL. 3 according to CSA)
- Four electrical functions for both versions.
- Slow operation contacts, double-break and positive break of NC contacts.
- With screws, retractable and captive clamp type. Protection against accidental contact with live parts, degree of protection IP2x according to IEC 529.

Standards

IEC/EN 60947-5-1
VDE 0660
BSI 4794
NFC 63140

Approvals

Actuating force

Minimum actuating force		
	114FCT03, ...03T	7.5N
	114FCT12, ...12T	10N
	114FCT21, ...21T	12N
	114FCT30, ...30T	13N
Positive opening force		
	114FCT03, ...03T	8.5N
	114FCT12, ...12T	8.5N
	114FCT21, ...21T	8.5N
	114FCT30, ...30T	-
Maximum force		
	114FCT03, ...03T	12N
	114FCT12, ...12T	13.5N
	114FCT21, ...21T	15.5N
	114FCT30, ...30T	17N

Specifications

Mechanical performances										
Climatic protections										
Temperate climate (DIN 50014)						23 / 50				
Wet climate (DIN 50015)						23 / 83				
Hot wet climate (DIN 50015)						40 / 92				
Variable wet climate (DIN 50016)						FW 24				
Temperature ranges										
Operation						-25°C to +70°C				
Storage						-40°C to +70°C				
Vibrations resistance						10G				
(according to IEC 68-2-6)						with frequency range from 1 to 100Hz				
Mechanical endurance						10×10^6 operations				
Operation speed										
Min.						0.25 m/sec.				
Max.						1 m/sec.				
Electrical performances										
Rated insulation voltage (Ui) EN 60947.1						690V				
Impulse withstand voltage (Uimp) EN 60947.1						4kV				
Insulation class according to VDE 0660						Group C				
Electrical shocks protection IEC 536						Class II (double insulation)				
Short-circuit protection according to IEC 269.1 and 269.3						10A				
Rated thermal current: Ith						10A				
Performances according to IEC 947.5.1										
Cat. AC15	Voltage Ue	(V)	24	48	60	110	220	380	500	600
	Current Ie	(A)	10	10	10	6	3	2	1.5	1.2
Cat. DC13	Voltage Ue	(V)	24	48	60	110	220	300		
	Current Ie	(A)	2.5	1.4	1	0.55	0.27	0.2		
Performances according to UL and CSA						AC / Heavy duty (A600)				
						DC / Standard duty (Q300)				
Terminals										
Capacity					min.	22 AWG (0.32mm²)				
Rigid and/or flexible conductors					max.	12 AWG (3.3mm²)				
Cable entry						1 x PG11				

Order codes ● pg. G.9
Dimensions ● pg. G.15

Three pole limit switches

	Contacts	Diagrams	Protection		Cat. no.	Ref. no.	Pack.
	11 NC 21 NC 31 NC 12 22 32	0 2 6,5mm 11-12 21-22 31-32 3,3 Positive opening travel	IP40 IP65		**114FCT03** **114FCT03T**	130320 130321	1 1
	13 NO 21 NC 31 NC 14 22 32	0 2 3,5 6,5mm 11-12 21-22 31-32 3,3 Positive opening travel	IP40		**114FCT12**	200909	1
	13 NO 23 NO 31 NC 14 24 32	0 2 3,5 6,5mm 11-12 21-22 31-32 3,3 Positive opening travel	IP40		**114FCT21**	200910	1
Three pole insulated jumper 					**105PT**	132234	1

Technical data

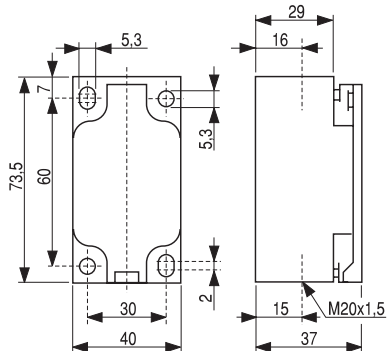
Limit switches

				ISG..-B211 IMG..-B211	ISG..-B311 IMG..-B311 ISG..-B411 IMG..-411	IUG..-B111 IUG..-B211	IUG..-B311 IUG..-B411	IZM..-B211	IZM..-B311
Type of break				Slow break	Snap action	Slow break	Snap action	Slow break	Snap action
Number of contacts				2	2	2	2	2	2
Function				1NO-1NC	1NO-1NC	1NO-1NC	1NO-1NC	1NO-1NC	1NO-1NC
Polarity				Same	Same	Same	Same	Same	Same
Rated thermal current (Ithe)			(A)	10	10	10	10	10	10
Auxiliary contacts									
Rated insulation voltage (Ui)V				400	400	250	250	380	250
Protection against electrical shocks				Class II (ISG) CLASS I (IMG)	Class II (ISG) CLASS I (IMG)	Class II	Class II	-	-
Protection against electrical shocks (fuse)			(A)	10	2	10	2	6	6
Rated current (DIN EN60947-5-1)									
A300	AC-15	12/24V	(A)	-	-	-	-	-	-
		48/60V	(A)	-	-	-	-	-	-
		(110V) 120V	(A)	6	6	6	6	6	6
		127V	(A)	-	-	-	-	-	-
		(220V) 240V	(A)	3	3	3	3	3	3
		380V	(A)	-	-	-	-	-	-
Q300	DC-13	24V	(A)	-	-	-	-	-	-
		48V	(A)	-	-	-	-	-	-
		(110V) 125V	(A)	0.55	0.55	-	-	0.55	0.55
		(220V) 250V	(A)	0.27	0.27	-	-	0.27	0.27
		300V	(A)	-	-	-	-	-	-
Operating rate			ops./h	6000	6000	6000	6000	6000	6000
Switching time			(ms)	-	10	-	10	-	10
Repetition assurance			(mm)	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1
Clamping capacity			(mm^2)	0.5 - 1.5	1.5	1.5	1.5	1.5	1.5
Terminal screw				M3.5	M3.5	M3.5	M3.5	M3.5	M3.5
Protection				IP65	IP65	IP65	IP65	IP30	IP30

Dimensional drawings

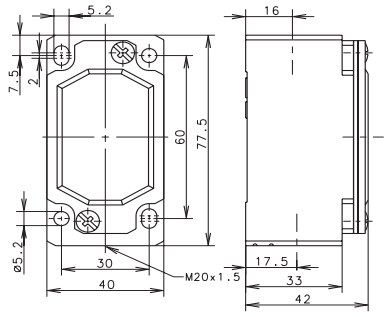
Contact block Series IS

Common for all limit switches Series IS



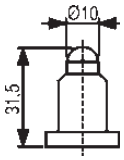
Contact block Series IM

Common for all limit switches Series IM

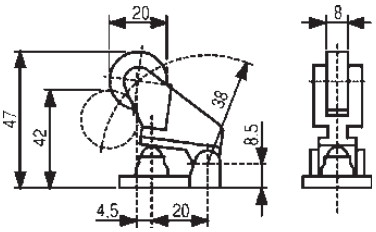


Operating heads

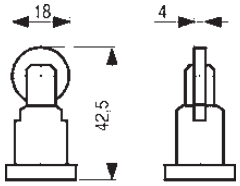
ISGA B..., IMGA B...



ISGH B..., IMGH B...



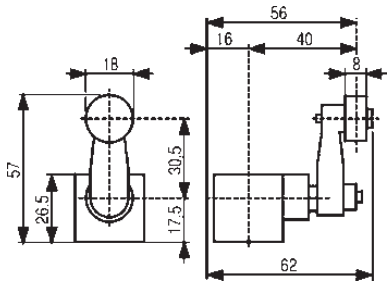
ISGR B..., IMGR B...



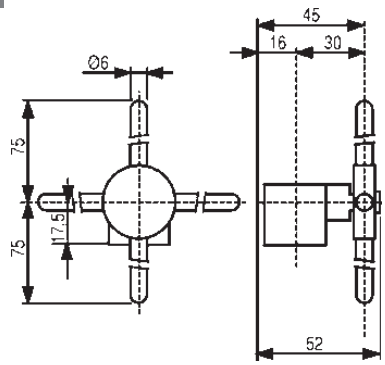
Dimensional drawings

Operating heads *(continued)*

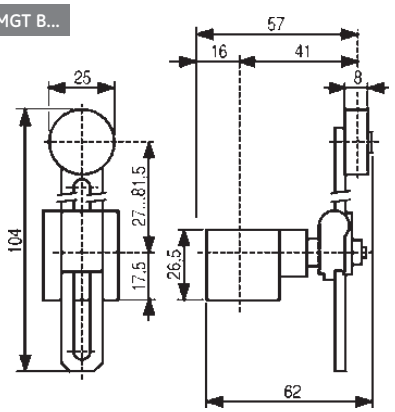
ISGL B..., IMGL B...



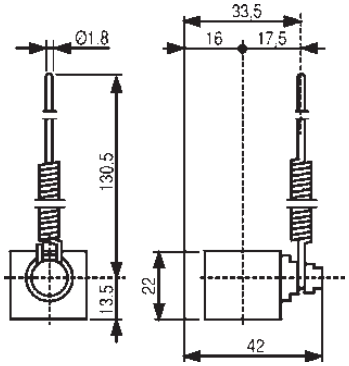
IMGC B...



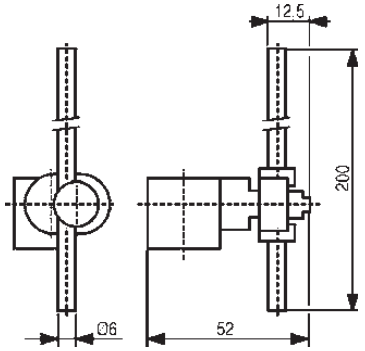
ISGT B..., IMGT B...



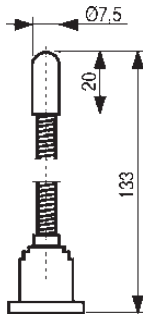
IMGQ B...



IMGP B...

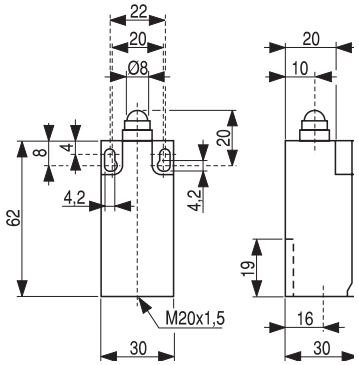


ISGM B..., IMGM B...

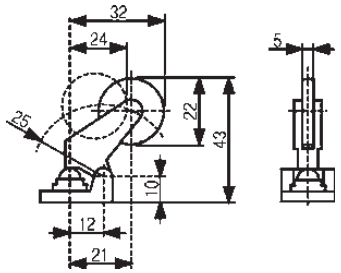


Contact block Series IUG

Common for all limit switches Series IUGA B...

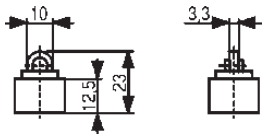


IUGK B...

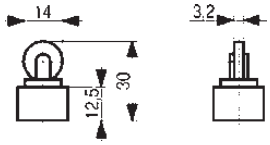


Operating heads

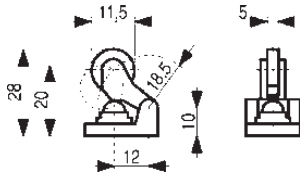
IUGU B...



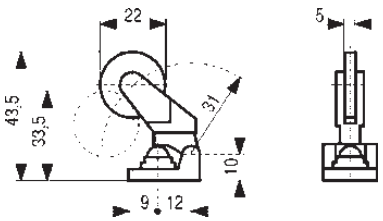
IUGR B...



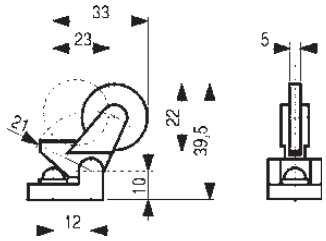
IUGH B...



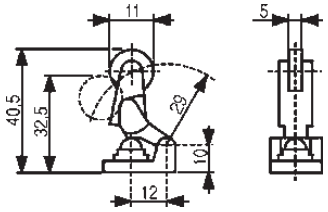
IUGI B...



IUGJ B...



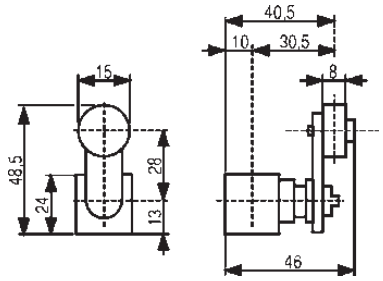
IUGE B...



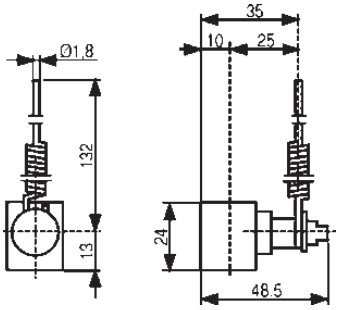
Dimensional drawings

Operating heads (continued)

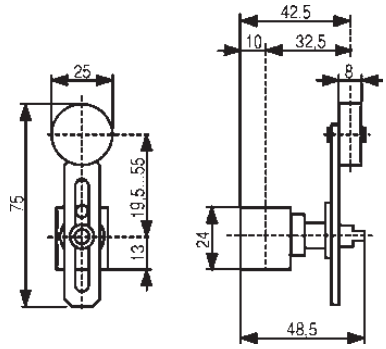
IUGL B...



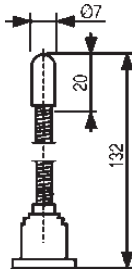
IUGQ B...



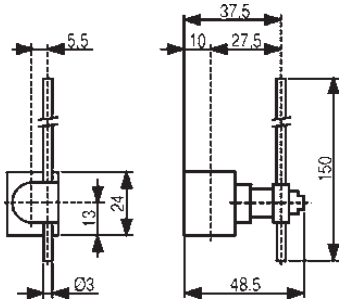
IUGT B...



IUGM B...

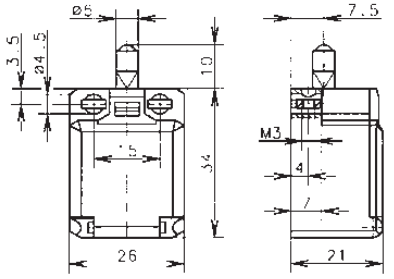


IUGP B...

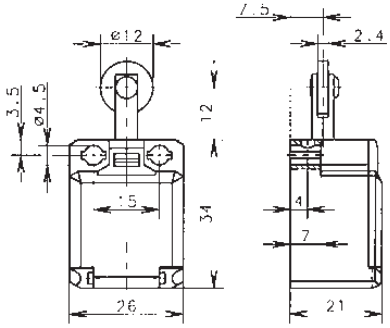


Series IZ

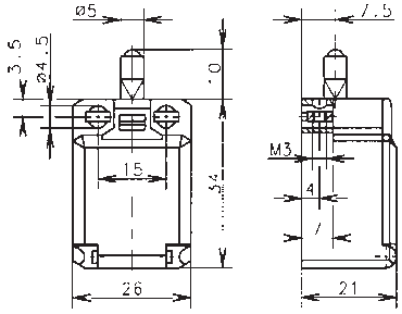
IZMA



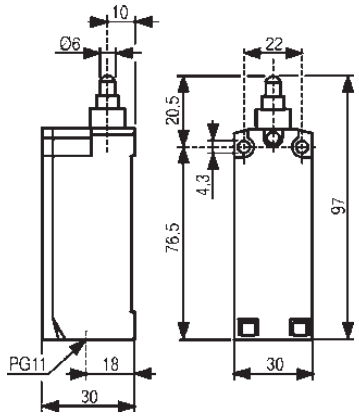
IZMR



IZMS

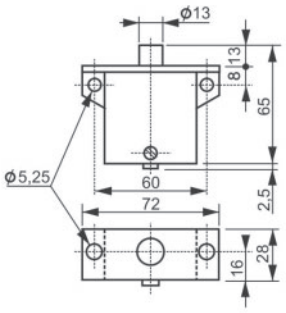


Three pole limit-switches Series 114FCT

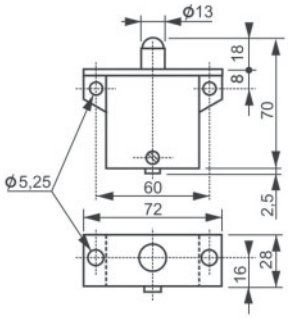


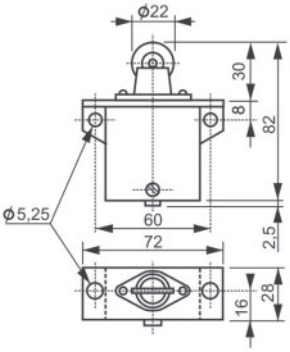
Serie IP

IP

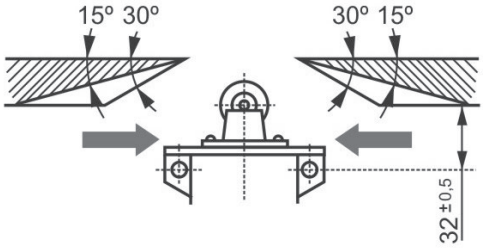


IB

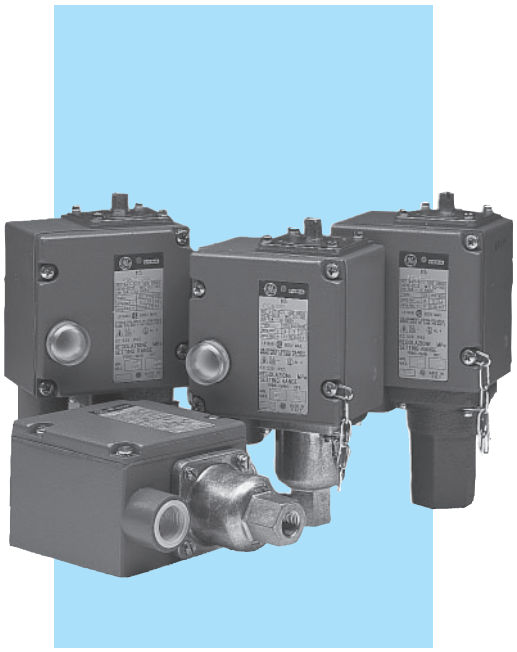




Angle



15° for 1m/s
30° for 0,5m/s



Standards

IEC/EN 60947-5-1 BSI
CEI UTE
VDE 0660

Approvals

(Canada)

ASE/SEV (Switzerland)

Pressure switches

- Controlled fluid temperature: 120°C
- Fluids that can be controlled by bellows pressure switches: air and rare gases, freon, water (sea-water not included), fuel oils, mineral oils, hydraulic oils and other kinds of fluids that do not corrode steel, tin and other kinds of fluids that do not corrode steel, tin and copper alloys. To avoid absolutely and solvents and acids.
- Fluids that can be controlled by piston pressure switches: mineral oils and hydraulic oils that do not corrode steel and cast iron.
- Synthetic oils with base of phosphates, gas and all the other fluids have to be excluded.

Setting range choice

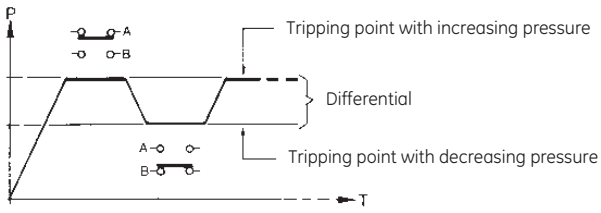
On the following pages are shown the values within which it is possible to make setting of our pressures switches.
For a correct interpretation, consider that:

- The main setting range defines the values within which it is possible to set the tripping of the pressure switch, when the pressure is decreasing.
- The differential setting range defines the values that, added to those ones of the main range, determine the tripping when pressure is increasing.
- The maximum admissible pressure defines the limit that the devices can stand without consequences. Indicated values have never to exceed also in the case of occasional overpressure of temporary type.

When choosing the most suitable type, consider that the device reaches its excellent efficiency when the tripping point, with decreasing pressure, is set between 25% and 75% of the main setting range.

Setting

- To completely loose the external screw of the main range and the internal pawl of the differential range.
- By a manometer, to set pressure at the value on which the tripping is wanted, when pressure is decreasing. To screw the external screw of the main range until the tripping of the microswitch (A contact shall result open and B closed).
- To completely screw the pawl of the differential range, until its maximum value.
- To set pressure at the value on which the tripping is wanted, when pressure is increasing.
- To loosen the pawl of the differential range until the tripping of the microswitch (A contact shall result closed and B open).

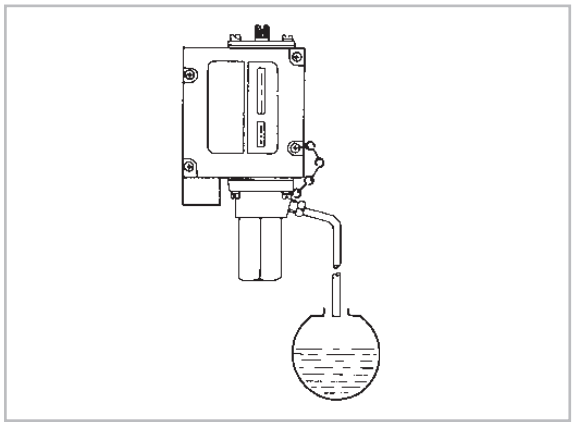


Order codes ● pg. G.18
Dimensional drawings ● pg.G.15

Location

Generally the location of our pressure switches can be effected as wanted.
Nevertheless, as to the piston types whitout seal ring, location have to be made in such a way as to allow the discharge, through the drainage hole, of the blow-by oil between cylinder and piston (a few drops per hour).
The going-out oil can be collected by a proper drainage pipe that conveys it, free falling, into the tank of the hydraulic central, as shown in the below figure.

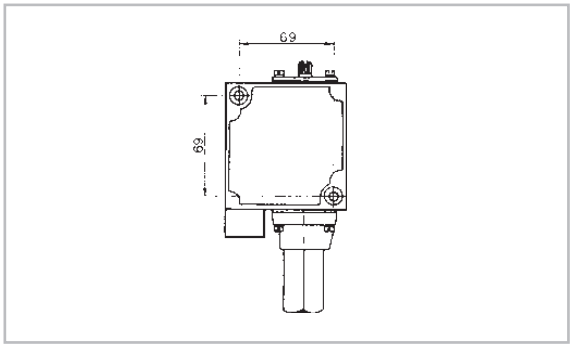
Caution



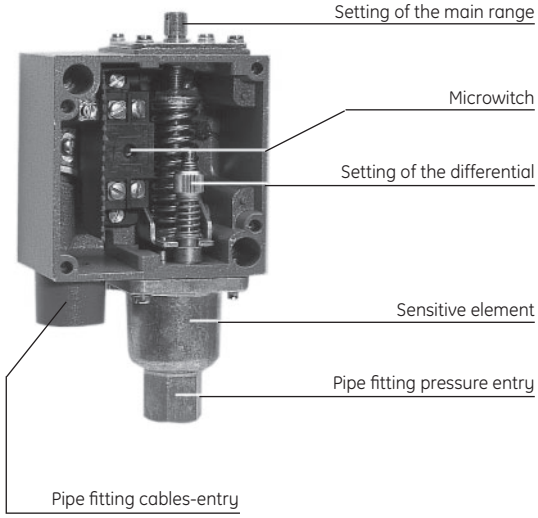
- Do not connect the drainage hole to a return pipe of the line...
- The drainage pipe must not cover a way different from that one indicated (e.g. towards the top).
- Do not plug the drainage holes.

If the above cautions are not met, inside the sensitive group there will be a counter pressure that could damage the sealing washer between actuator and frame of the pressure switch.

Fixing



To fix the pressure switch on a proper support, use the two pierceable holes Ø 6.8 mm. located under the cover.
To absolutely avoid to fix it directly on the pipe containing the fluid to be controlled, use the threaded pipe fitting for pressure entry.



Pressure switches - Bellows type

Without lighting signalisation

Setting Range		Maximum admissible pressure	Weight (kg)	1NO - 1NC		2NO - 2NC		Pack
Main	Differential			Cat. no.	Ref. no.	Cat. no.	Ref. no.	
Mpa Bar	Mpa Bar	Mpa Bar						
0.002 - 0.15	0.02 - 0.1	0.4	0.950	**115PC002**	132500			1
0.02 - 1.5	0.2 - 1	4		**115PC002A**	215253			1
0.01 - 0.5	0.04 - 0.1	0.6	0.950	**115PC015**	132501	**115PC2015**	132505	1
0.1 - 5	0.4 - 1	6		**115PC015A**	215252	**115PC2015A**	132517	1
0.01 - 0.8	0.07 - 0.2	1.55	0.950	**115PC018**	132502	**115PC2018**	132515	1
0.1 - 8	0.7 - 2	15.5		**115PC018A**	241311	**115PC2018A**	247788	1
0.1 - 1.9	0.12 - 0.2	2.45	0.950	**115PC119**	132503			1
1 - 19	1.2 - 2	24.5		115PC119A	215329			1

Accessories

Microswitch

Contacts	Weight	Cat. no.	Ref. no.	Pack
1NO - 1NF	0.060	090MI1	130310	25
2NO - 2NF	0.100	090MI2	130311	25

Bellows type

Sensitive group

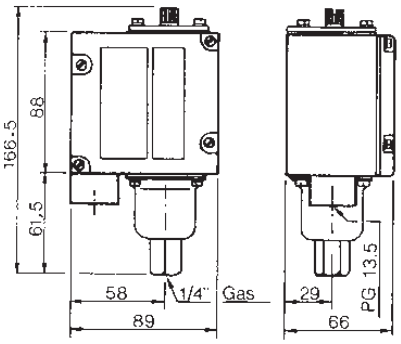
Basic pressure switch	Weight	Bellow type				Piston type				Pack
		Standard		Stainless steel		Without seal ring		With seal ring		
		Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	Cat. no.	Ref. no.	
115PC002	0.045	**115807SP**	132562	**1158065SPA**	215320	-	-	-	-	1
115PC015	0.045	**115803SP**	132563	**1158067SPA**	215321	-	-	-	-	1
115PC018	0.045	**115805SP**	132564	**1158067SPA**	215321	-	-	-	-	1
115PC119	0.045	**115804SP**	132565	**1158067SPA**	215321	-	-	-	-	1

Protective cap of main range screws

Weight	Cat. no.	Ref. no.	Pack
0.078	**115CA**	132571	100

Dimensions

Pressure switches - Bellows type



Technical data

General

The pressure switches Series 115 are designed for transforming a pressure variation into an electrical signal when a pre-arranged pressure value is reached.
Pressure switches are utilized in the field of the industry machines, installations and transports.

Climatic protections

Temperature climate	cat. 23/50 (DIN 50014)
Wet climate	cat. 23/83 (DIN 50015)
Hot wet climate	cat. 40/92 (DIN 50015)
Variable wet climate	cat. FW24 (DIN 50016)

Temperature ranges

Operation	–25°C to +70° C
Storage	–40°C to +70°C

Insulation class

IP65	IEC/EN 60529
ENCL. 4, 5	CSA

Vibration resistance

5g at a sinusoidal frequency ranging from to 100 Hz according to IEC 68-2-6	IEC 68-2-6

Mechanical endurance

Bellows type

1 million operations. It can be considerably reduced when the pressure jump reachs the maximum value foreseen for every type of device and the operations number is high. The bellows endurance can be also negatively influenced by the temperature and the kind of controlled fluid.

Rated insulation voltage

600V AC/DC

Insulation class

Group C according to VDE 0110

Short-circuit protection

10 A gL fuses according to IEC 947-5-1

Electrical performances

090MI1 (1NO + 1NC)
090MI2 (2NO + 2NC)
Rated thermal current: Ith = 10 A

Performances according IEC 947.5.1

Category AC15 (A600)									
Voltage Ue	V	24	48	60	110	220	380	500	600
Current Ie	A	10	10	10	6	3	2	1.5	1.2
Category DC 13 (P600)									
Voltage Ue	V	24	48	60	110	220	300		
Current Ie	A	2.5	1.4	1	0.55	0.27	0.2		

Performances according to CSA

AC/Heavy Duty (A/600)
DC/Standard Duty (Q300)
Connections at same polarity

Connection terminals

Screw type without clamping screw.
Suitable for eye, fork and hook terminals.

Cable entry

One PG 13.5 threaded cable entry.

Range

The pressure switches series 115 are available in two basic versions:
- With bellows sensitive element for pressures ranging between 0.002 Mpa (0.02 bar) minimum and 2.1 Mpa (21 bar) maximum.
- With piston sensitive element for pressures ranging between 0.95 Mpa (9.5 bar) minimum and 37.25 Mpa (372.5 bar) maximum.

Both versions can be supplied:
- Without lighting signaling
- With lighting signaling

Construction

Snap-action 1NO-1NC or 2NO+2NC microswitches with double-break contacts without positive-break of the NC contact.
Bellows sensitive element, hermetic sealing, made by Tombacco (or stainless steel) material enclosed into a die-cast zamac case complete with a 1 mm. damper.
Piston sensitive element, with or without seal ring, with steel piston enclosed into a cast-iron cylinder complete with 1 mm. damper.
Enclosure and cover are made of die-cast aluminium and painted with anaphoresis process grey RAL 7012..