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COMECO
CONTROL & MEASUREMENT

COMECO Ltd., P.O.Box 378, Plovdiv 4000, BULGARIA, tel: +359 32 646523, 646524, fax: 634089
e-mail: info@comeco.org, WWW.COMECOGROUP.COM

DOUBLE PROGRAMMABLE CONTROLLER

RT218 / RT228

OPERATION MANUAL

Please read this Operation Manual before mounting and operating!
Save the Manual for future references!

Overview

RT218 / RT228 combine two fixed-input programmable controllers (respectively RT18 / RT28) in one case. RT218 has one relay output per channel providing ON/OFF or PI (auto-tuning) control, and RT228 is equipped with two relay outputs for each channel operating according to 3-point ON/OFF or PD control algorithm. The service behavior of each of the channels of either model is determined by a set of parameters. Controller operation requires the user to assign a value for each parameter and save it in the device non-volatile memory. All the parameters, along with their names, symbols, and value ranges, are given in Table 1.

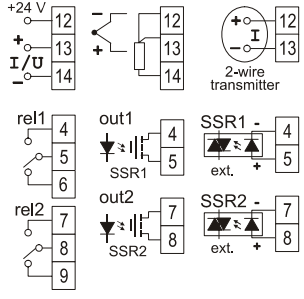
Electro-Magnetic Interference (EMI) Issues

- All signal wires must be shielded. They must not be packaged together with power cables!
- Never lay the signal wires close to inductive or capacitive noise sources, such as relays, contactors, motors, etc.!
- All shields have to be grounded ONLY at one end, as closer as possible to the controller terminals!
- Avoid sharing supply lines with powerful consumers, especially with inductive loads, switched on and off.
- To stop unwelcome interference signals entering through the power supply lines, use shielded 1:1 isolation transformer!
- Shunt all switched (not only those switched by the controller) inductive consumers with special suppression networks: RC group and varistor - for AC loads, or diode - for DC loads.
- If the controller operates in a very powerful EMI area, it has to be mounted inside a grounded metal shielding box!

Mounting

Place the device into a 90 x 90 mm panel cut-out and tighten into place using the enclosed mounting brackets.

Mounting and Wiring



- Connect the CH1 input with regard to its type (see '**Specifications**') through the respective terminals from row 'A', and the CH2 input — through these from row 'B'.
- Connect the CH1 and CH2 outputs with regard to their types (see '**Specifications**') through the corresponding terminals from row 'A' and row 'B' respectively.
- Connect the right power supply voltage for your device (see '**Specifications**') through terminals A1(+) and A3(-) for CH1 and B1(+) and B3(-) for CH2.
- In case of 90...250 VAC/DC power supply, ground the device via terminals A2 and B2.

Declaration of Conformity

CE

The undersigned hereby declares, on behalf of COMECO Ltd., that this device has been manufactured in compliance with standards EN 61000 and EN 61010, and meets the requirements of Directives 73/23/EEC and 89/336/EEC.

Vladimir Sakaliyski
General Manager

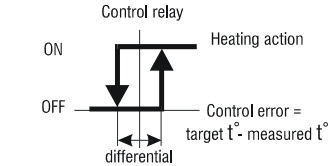
Waste Disposal

Do not dispose of electronic devices together with household waste material!

If disposed of within European Union, this product should be treated and recycled in accordance with the laws of your jurisdiction implementing the WEEE Directive 2002/96 on the Waste Electrical and Electronic Equipment.

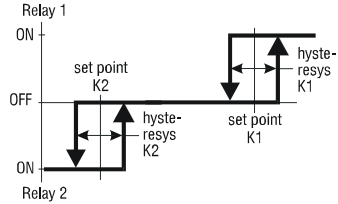
Table 1

#	Parameter	Description	Values	Selection	Adjustment
2-point ON/OFF control algorithm					
1	Set point	Controlled parameter set-point value	within the input range	press ◆ once from normal mode	▲▲ and ▼▼
2	Hysteresis	Relay switching differential	within the input range	press ◆ twice from normal mode or once from **Setpoint** adjustment mode	
3	Direction	Relay action direction	1 - direct (heating) 2 - reverse (cooling)	press ◆ 3 times from normal mode or once from **Hysteresis** adjustment mode	
3-point ON/OFF control algorithm					
1	Set point 1	Set-point value of output **K1**	within the input range	press ◆ once from normal mode	▲▲ and ▼▼
2	Set point 2	Set-point value of output **K2**	within the input range	press ◆ twice from normal mode or once from **Setpoint 1** adjustment mode	
3	Hysteresis 1	Switching differential of output **K1**	within the input range	press ◆ 3 times from normal mode or once from **Setpoint 2** adjustment mode	
4	Hysteresis 2	Switching differential of output **K2**	within the input range	press ◆ 4 times from normal mode or once from **Hysteresis 1** adjustment mode	
5	Direction 1	Control action direction of output **K1**	1 - direct (heating) 2 - reverse (cooling)	press ◆ 5 times from normal mode or once from **Hysteresis 2** adjustment mode	
6	Direction 2	Control action direction of output **K2**	1 - direct (heating) 2 - reverse (cooling)	press ◆ 6 times from normal mode or once from **Direction 1** adjustment mode	
PD control algorithm (for motor valves)					
1	Set point	Controlled parameter set-point value	within the input range	press ◆ once from normal mode	▲▲ and ▼▼
2	Td	Derivative Time	1...250 s	press ◆ twice from normal mode or once from **Setpoint** adjustment mode	
3	DB	Dead Band	within the input range	press ◆ 3 times from normal mode or once from **Td** adjustment mode	
4	Kp	Proportional Gain	1…250 %/%	press ◆ 4 times from normal mode or once from **DB** adjustment mode	
5	Tc	Cycle Time	1...250 s	press ◆ 5 times from normal mode or once from **Kp** adjustment mode	
PI control algorithm (with / without auto-tuning)				**If auto-tuning is desired, enter ONLY a set-point value and start auto-tuning!**	
1	Set point	Controlled parameter set-point value	within the input range	press ◆ once from normal mode	▲▲ and ▼▼
2	Ti	Integration Time	1...250 s	press ◆ twice from normal mode or once from **Setpoint** adjustment mode	
3	Kp	Proportional Gain	1…250 %/%	press ◆ 3 times from normal mode or once from **Ti** adjustment mode	
4	Tc	Cycle Time	1...250 s	press ◆ 4 times from normal mode or once from **Kp** adjustment mode	

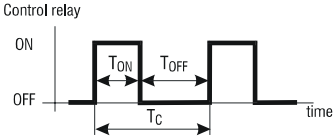


ON/OFF algorithm

- The static characteristic of a 2-point ON/OFF algorithm (RT218) is shown on the left. In case of reverse relay action (cooling), the characteristic is mirror.

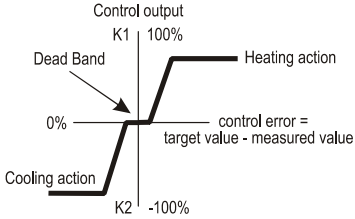


- The static characteristic of a 3-point ON/OFF algorithm using 2 relays (RT228) is illustrated on the left. The set-point and hysteresis values for each relay are independent!



PD algorithm

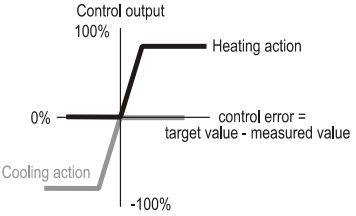
- PD control is achieved by periodically switching either relay K1 or relay K2 with period of cycle time (**Tc**).



- The static characteristic of a PD control is shown on the left.

PI algorithm w/ or w/o auto-tuning

- PI control is achieved by periodically switching the output relay with period of cycle time (**Tc**) according to the PD-algorithm diagram.



- The static characteristic of a PI control is illustrated on the left.

Control Algorithms

The auto-tuning procedure stops automatically after a power drop-out of more than 3 seconds.

- To start/stop the auto-tuning procedure, press key combination [⩓] + [⩔].
- The display reading starts blinking, indicating that auto-tuning is carried on.
- During the auto-tuning procedure, the device operates as an ON/OFF controller with vacillations dependent on the object inertia.
- When the auto-tuning is complete, the blinking stops, and the device starts operating as a PI-controller with new set of algorithm parameters.
- If the auto-tuning procedure has been stopped, the controller continues operating using the former set of PI-control parameters.

Warranty and Support

……
serial number

……
manufacturing date

QC check mark .....(passed)
(signature, stamp)

88 Slavyanska Str.
P.O.Box 378
Plovdiv 4000, BULGARIA
tel: +359 32 646523, 646524
fax: +359 32 634089, 622719
e-mail: support@comeco.org

Warranty

COMECO warrants this product to be free from defects in materials and workmanship for one year. If your unit is found to be defective within that time, we will promptly repair or replace it. This warranty does not cover accidental damage, wear or tear, or consequential or incidental loss. This warranty does not cover any defects caused by wrong transportation, storage, installation, or operating (see '**Specifications**').

Technical support

In the unlikely event that you encounter a problem with your COMECO device, please call your local dealer or contact directly our support team.

Specifications

CHANNEL CH1	
Control Algorithm	☐ ON/OFF, ☐ PD, ☐ PI with auto-tuning
Input	☐ Pt100, ☐ T/C J, ☐ T/C K, ☐ 4...20 mA, ☐ 0…20 mA, ☐ 0…10 V, ☐ ……; range: ……
Output K1	☐ relay, ☐ SSR, ☐ MOS, ☐ external SSR
Output K2	☐ relay, ☐ SSR, ☐ MOS, ☐ external SSR
Display Resolution	☐ 1, ☐ 0.1
CHANNEL CH2	
Control Algorithm	☐ ON/OFF, ☐ PD, ☐ PI with auto-tuning
Input	☐ Pt100, ☐ T/C J, ☐ T/C K, ☐ 4...20 mA, ☐ 0…20 mA, ☐ 0…10 V, ☐ ……; range: ……
Output K1	☐ relay, ☐ SSR, ☐ MOS, ☐ external SSR
Output K2	☐ relay, ☐ SSR, ☐ MOS, ☐ external SSR
Display Resolution	☐ 1, ☐ 0.1
COMMON SPECIFICATIONS	
Outputs:	
Electromechanical relay	5A/250VAC with NO/NC contact
SSR	1A/250VAC
MOS gate	0.1A/60V, isolated
Output for external SSR	5...24 VDC, 15 mA
Power Supply	☐ 230 VAC, ☐ 115 VAC, ☐ 90…250 VAC/DC, ☐ 24 VAC, ☐ 12…24 VAC/DC, ☐ 12…24 VAC/DC, isolated
Auxiliary Supply Output	24 VDC, 30 mA
Consumption	less than 3 VA
Measurement Error	$\leq \pm 0.4\%$ from span
Temperature Drift	$\leq \pm 0.005\%$ from span for 1 °C
RTD Line Compensation	☐ none, ☐ $\leq \pm 0.01\%/\Omega$ at $R_{lin.} \leq 50\ \Omega$
Cold-junction Error	$\leq \pm 1$ °C at air temperature -10…+80 °C
Operating Temperature / Humidity	-10…65 °C / 0…85% RH
Protection Class: front / terminals	IP54 / IP20