Specifications

Input (programmable)	Pt100, 10 T/C types, mA, mV, V, kΩ
Outputs:	up to 3
- OUT1	☐ alarm AL1, ☐ control OUT1
- OUT2	☐ none, ☐ alarm AL2, ☐ control OUT2
- OUT3	☐ none, ☐ alarm AL3
Electromechanical relay	5A/250VAC with NO contact
SSR	1A/250VAC
MOS gate	0.1A/60V, optically isolated
Output for external SSR	5...24 VDC, 30 mA
- OUT1	☐ relay, ☐ SSR, ☐ MOS gate, ☐ for ext. SSR, ☐ 0÷20 mA, ☐ 4÷20 mA, ☐ 0÷5 V, ☐ 0÷10 V
- OUT2	☐ relay, ☐ SSR, ☐ MOS gate, ☐ for ext. SSR
- OUT3	☐ relay, ☐ SSR, ☐ MOS gate, ☐ for ext. SSR
Serial Interface	☐ RS485 with MODBUS RTU/ASCII protocol
USB Interface	mini-A connector for parameter Read/Write
Control Algorithm	PID-fuzzy or ON/OFF
Alarms	11 alarm types plus 2 system alarms
Power Supply	85…265 VAC
Consumption	less than 4 VA
Measurement Error	≤ ± 0.3% from span
Temperature Drift	≤ ± 0.01% from span for 1 °C
Ambient Temperature / Humidity	0…50 °C / 20…85% RH,
Protection / Insulation	IP10 / >10 MΩ at 500 VDC

Warranty and Support

……
serial number

……
manufacturing date

QC check mark ……(passed)
(stamp)

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QD-8.2.4-WC

Warranty

COMECO warrants this product to be free from defects in materials and workmanship for 2 years. 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.

Communication

Serial network interface

If serial interface is installed, follow the additional requirements given in RT1800 Communication Manual available from www.comeco.org/downloads (Software->Communication Prots->Rt1800).

Read/Write parameters

Regardless of installed serial interface, RT1900-R is equipped with an independent parameter copy system via USB interface and IA400 converter.
All parameters can be copied, saved and transferred to other units using 'Parameter Copy' free software.

Error Messaging

Message	Error type
inIE	sensor error
AdCF	ADC failure *
CJCE	Input measurement or CJC failure *
UUU1	measured value above high SV limit (parameter USPL)
ooo1	measured value below low SV limit (parameter LSPL)
rAHF	RAM (memory) failure *
inEF	interface problem
AUtF	unsuccessful auto-tuning

⚠ ***WARNING!***

When a message marked with (*) appears and stays, return the unit for repair!

v1-09.12

COMECO
CONTROL & MEASUREMENT

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UNIVERSAL PID CONTROLLER

RT1900-R

OPERATION MANUAL

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

Overview

RT1900-R is a DIN-rail mounting controller with universal input accepting Pt100, 10 T/C types and various linear signals. It can have up to 3 relays (control or alarm) and analog output that may be controlled through ON/OFF and self-tuning PID-fuzzy algorithms as well as optional RAMP/SOAK pattern control. A bumpless auto-manual change-over is also built in the PID algorithm. RT1900-R is equipped with 4-digit LED display and 4-button keyboard for programming. A triple input/output/supply isolation protects the controller from electro-magnetic disturbances. Communication features include RS485 MODEBUS interface and USB port for program parameter storage. RT1900-R is well equipped for trouble-free operation in harsh industrial conditions.

Mounting

- RT1900-R can be mounted on every 33-mm rail confirming EN 50022.
- Install RT1900-R following the steps 1-2 as shown on the left.
- Always observe device dimensions (W40xH107xD43) before installation!

- Uninstall Rt1900-R using a suitable screwdriver and following the steps 1-2 as shown on the left picture.

- If install 2 or more units on the same rail, use the enclosed plastic spacer to provide adequate air cooling distance following the marks on the left.

⚠ *Never place units without a gap (min. 5mm) between them or other rail-mounted devices!*
It may result in overheating and device failure!

Table of Contents

Overview	3
Mounting	3
Wiring	4
Indication and Controls	5
Program Levels	6
Level 1 (User Level)	7
Program Level 2	8
Program Level 3 (I)	9
Program Level 3 (II)	10
Program Level 3 (III)	11
Output Control	12
Alarm modes	13
Communication	14
Error Messaging	14
EMI Issues	15
Declaration of Conformity	15
Waste Disposal	15
Specifications	16
Warranty and Support	16

Electro-Magnetic Interference (EMI) Issues

Important note:

RT1900 may content a RC noise suppression circuit is connected in parallel with relay contacts.
Full AC voltage isolation is NOT provided when relay contacts are open.
Small AC current (≈ 1.5 mA at 230 VAC) still flows through the RC circuit!

- 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 device 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 indicator) inductive consumers with special suppression networks: RC group and varistor - for AC loads, or diode - for DC loads.
- If the indicator operates in a very powerful EMI area, it has to be mounted inside a grounded metal shielding box!

Declaration of Conformity

We hereby declare that this device has been manufactured in compliance with standards EN 61000, EN 61010 and EN 61326, and meets the requirements of Directives 2004/108/EC, 2006/95/EC and 2011/65/EC.

Vladimir Sakaliyski, CEO
COMECO Inc.

Waste Disposal

Do not dispose of electronic devices together with household waste!

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.

Wiring

Gently remove transparent plastic protectors from terminal blocks prior wiring! Install the protectors again when finish!

Input signal wiring

- Connect Pt100 sensors to terminals 9, 10 and 11, or T/C sensors to terminals 9(-) and 10(+).

- Connect linear mV/V signal to terminals 9(-) and 10(+).
- Connect linear mA signal to terminals 9(-) and 10(+) paralleled with enclosed 2.5 Ω external resistor.
- Transmitters must be powered from external sources!

Serial interface wiring

Connect RT1900-R to RS485 interface line via terminals 12(Dx-) and 13(Dx+).

Output wiring

- Connect relay, SSR and MOS gate outputs to the respective terminals 3...8 as shown on the left figure.

- Connect analog outputs and external SSRs to the respective terminals 3...8 as shown on the left.

Power supply wiring

Connect the power supply voltage to terminals 1(L) and 2(N).

Alarm modes

Table 2 (Alarm modes)

Alarm function
Alarm action is suppressed at start-up until PV enters non-alarm range!
Alarm action is suppressed at start-up until PV enters non-alarm range!
Alarm action is suppressed at start-up until PV enters non-alarm range!
Alarm action is suppressed at start-up until PV enters non-alarm range!
Alarm action is suppressed at start-up until PV enters non-alarm range!
Alarm action is suppressed at start-up until PV enters non-alarm range!

Alarm modes with their type and codes (referenced to AL d 1, AL d2, AL d3):

Code	Description
00/10	No alarm
11	Relative HIGH alarm Deviation from SV high alarm
01	same as code 11, but with suppression
12	Relative LOW alarm Deviation from SV low alarm
02	same as code 12, but with suppression
13	Window alarm Deviation from SV high/low alarm
03	same as code 13, but with suppression
04/14	Band alarm Deviation from SV
15	Process HIGH alarm Exceeding absolute value
05	same as code 15, but with suppression
16	Process LOW alarm Falling below absolute value
06	same as code 16, but with suppression
08	System alarm ON Activating at errors UUU 1, nnn 1 or CJCE
18	System alarm OFF Not activating at above errors

Output Control

ON/OFF control

The static characteristic of a relay controlled by an ON/OFF algorithm is shown on the left.

PID control

The relationship between PID input and output when both integration and differentiation are switched off is illustrated on the left.

PID-control internal structure is shown on the left figure.

Alarm output control

The static characteristic of an alarm relay is the same as for ON/OFF control.

Alarm time characteristics (referenced to ALt1, ALt2, ALt3) are illustrated on the left.

Indication and Controls

1. Brawn-transparent plastic cover to protect display and keyboard (pull the upper edge to open)
2. Keyboard of 4 push switches
3. 4-digit 8mm red LED display
4. Status LED indicators
   - Lamp 1: OUT1 or AL1
   - Lamp 2: OUT2 or AL2
   - Lamp 3: AL3
   - Lamp 4: running program (for pattern control only)
5. Front protection plastic cover. Should be opened ONLY for hardware input selection (see **'Program Level 3'**)
6. Communication status LED
7. USB terminal for parameter save and restore
8. Upper terminal block (5-pin) for input and interface wiring
9. Lower terminal block (8-pin) for output and power wiring
10. DIN-rail fixing slide

⚠ *Both display and front protection cover must be well closed during operation! Working with covers open may lead to human injury caused by electric current!*

Program Level 3 (Input Level) - II

Input hardware selection

⚠ *To be completed BEFORE installation!*

- Insert 2 flat-tip screwdrivers in the slots located on both sides of the front protection cover (1).
- Gently press the side plastic walls outwards in order to remove 2 fixing pins (2) from their slots (3) and then open the cover (1) rotating it up.
- Find the input jumper located on the right side of the terminal.
- Place the jumper bridge in UP position for T/C or in DOWN position for Pt100 input.

Programming procedure

- First go to Level 2 and set LCY to 0000.
- From Level 1 (User level) press SET+ ◀ keys for ~5s to enter Level 3.

INP1	Y2
↓ SET	
ANL1	0
↓ SET	
ANH1	5000
↓ SET	
dP	0000
↓ SET	
LSPL	00
↓ SET	
USPL	4000
↓ SET	
ALd1	11
↓ SET	
ALt1	99.59
↓ SET	

- Set input type by selecting it from Table 1.
- For analog linear input, set display value for LOW input range (-1999 to 9999).
- For analog linear input, set display value for HIGH input range (-1999 to 9999).
- For analog linear input, set decimal point position (0000, 000.0, 00.00 or 0.000)
- Set LOW set-point limit (within PV range, resolution and units).
- Set HIGH set-point limit (within PV range, resolution and units).
- Select AL1 alarm mode (2-digit code from Table 2, **'Alarm modes'**).
- Set AL1 alarm ON delay time [mm.ss] (99.59: continued action, 00.00: flicker alarm).

Level 1 (User Level)

main indication	alternative indication
Power ON	
↓	
8888	
↓	
INP1	C Y6
↓	
1200	0
↓	
25	
⋮	
25	
↓ ◀	
0000	
adjust SV	
↓ SET	
25	
⋮	
25	
↓ SET	
At	no
↓ SET	
AL1	0
↓ SET	
AL2	0
↓ SET	
AL3	0
↓ SET	
25	

Power ON sequence

After turning power on, RT1900-R automatically makes some system tests:

- Checks indication integrity (display and all LEDs)
- Shows input type.
- Shows input HIGH and LOW range limits (Table 1).
- Automatically returns to basic state showing PV.

Set-point (SV) adjustment

- Press ◀ to enter SV adjustment mode.
- Adjust the set-point from LSPL to USPL (with PV resolution and units). Select a blinking digit with ◀, adjust digit value with ▲ and ▼,confirm with SET.
- Return to basic state showing PV.

Other user-level adjustments

- Turn ON auto-tuning by selecting YES (returns to no after finishing).
- Set AL1 set value (if used, with PV resolution and units).
- Set AL2 set value (if used, with PV resolution and units).
- Set AL3 set value (if used, with PV resolution and units).
- Return to basic state showing PV.

Program Levels

Basic state

After power-on RT1900-R performs a system check and enters its Basic state showing PV with a resolution, according to the dP parameter.

SV adjustment

Form Basic state press ◀ key and adjust the SV. Press SET key to return. If press no key, RT1900-R will return to Basic state automatically within 60 s.

LEVEL 1 (User Level)

Form Basic state press SET key to enter and the same key to return. If press no key, RT1900-R will return to Basic state automatically within 60 s.

LEVEL 2 (PID Level)

Form Basic state press and hold SET key for ~5 s to enter. Return the same way. If press no key, RT1900-R will return to Basic state automatically within 60 s.

LEVEL 3 (Input Level)

Form Basic state press and hold SET+ ◀ keys for ~5 s to enter. Return by using the same keys. If press no key, RT1900-R will return to Basic state automatically within 60 s.

Program Level 2 (PID Level)

P1	30
↓ SET	
I1	240
↓ SET	
d1	60
↓ SET	
db1	0
↓ SET	
AtUL	0
↓ SET	
CYt1	10
↓ SET	
HYS1	1
↓ SET	
P2	30
↓ SET	
I2	240
↓ SET	
d2	60
↓ SET	
CYt2	10
↓ SET	
HYS2	1
↓ SET	
GAP1	0
↓ SET	
GAP2	0
↓ SET	
LCK	0000
↓ SET	

Return to P1

Programming procedure

- From Level 1 (User level) press SET key for ~5s to enter Level 2.
- Set PID proportional band for OUT1 (0.0 to 200.0 %, 0.0 converts PID to ON/OFF).
- Set PID integral time for OUT1 (0 to 3600 s, 0 converts PID to PD).
- Set PID derivative time for OUT1 (0 to 900 s, 0 converts PID to PI).
- Set dead-band time for OUT1 (do not care - let stay 0).
- Set auto-tuning offset value (0 to USPL).
- Set circle time for OUT1 (0 to 150 s) Recommended: 10 for relay and 0 - for mA.
- Set hysteresis for OUT1 if ON/OFF control is set with P1=0 (0 to 1000, with PV units).
- Set PID proportional band for OUT2 (0.0 to 200.0 %, 0.0 converts PID to ON/OFF).
- Set PID integral time for OUT2 (0 to 3600 s, 0 converts PID to PD).
- Set PID derivative time for OUT2 (0 to 900 s, 0 converts PID to PI).
- Set circle time for OUT2 (0 to 150 s) Recommended: 10 for relay and 0 - for mA.
- Set hysteresis for OUT2 if ON/OFF control is set with P2=0 (0 to 1000, with PV units).
- Set dead-band gap for OUT1 (heating): set-point= SV-GAP1 (if in doubt, set to 0)
- Set dead-band gap for OUT2 (cooling): set-point= SV+GAP2 (if in doubt, set to 0)
- Parameter change lock:
  0000 - ALL parameters can be changed
  0100 - change Level 1(2) parameters only
  0110 - change Level 1 parameters only
  0001 - change SV and LCK only
  0101 - change LCK only

Program Level 3 (Input Level) - III

↓	
ALd2	0
↓ SET	
ALt2	99.59
↓ SET	
ALd3	0
↓ SET	
ALt3	99.59
↓ SET	
HYSA	0
↓ SET	
CLO1	230
↓ SET	
CHO1	3600
↓ SET	
PSL	rtU
↓ SET	
bitS	o_81
↓ SET	
IdNO	1
↓ SET	
bAUd	384
↓ SET	
PVOS	00
↓ SET	
UNIt	C
↓ SET	
PVFt	200
↓ SET	
OUd	HEAt
↓ SET	
Hz	50Hz
↓ SET	

Return to INP1

- Select AL2 alarm mode (2-digit code from Table 2, '**Alarm modes**').
- Set AL2 alarm ON delay time [mm.ss] (99.59: continued action, 00.00: flicker alarm).
- Select AL3 alarm mode (2-digit code from Table 2, '**Alarm modes**').
- Set AL3 alarm ON delay time [mm.ss] (99.59: continued action, 00.00: flicker alarm).
- Set hysteresis of all alarms (0 to 1000, with PV resolution and units).
- For analog control output, set LOW-point calibration value (0 to 9999).
- For analog control output, set HIGH-point calibration value (0 to 9999).
- For RS485 interface, select communication protocol (MODBUS-RTU or MODBUS-ASCII).
- For RS485 interface, select bit format (0_81: 1 stop/no, 0_82: 2 stop/no), (E_81: 1 stop/even, E_82: 2 stop/even).
- For RS485 interface, select unit ID (0 to 255).
- For RS485 interface, select baud-rate (2400, 4800, 9600, 19200 or 38400 bps).
- PV correction [offset] (-1000 to 1000).
- PV/SV engineering units (°C, °F or A -for analog linear input).
- PV filter (smaller values - for faster response, bigger values - for better filtration).
- Control action mode [direction of action] (Heat or Cool).
- Mains power supply frequency (50 or 60 Hz)

⚠ *Select the proper frequency for your country!*

Program Level 3 (Input Level) - I

T/C type (1)		Code	Range [°C]
'K'	K1	01	0.0 ÷ 200.0
	K2	02	0.0 ÷ 400.0
	K3	03	0 ÷ 600
	K4	04	0 ÷ 800
	K5	05	0 ÷ 1000
	K6 (2)	06	0 ÷ 1200
'J'	J1	07	0.0 ÷ 200.0
	J2	08	0.0 ÷ 400.0
	J3	09	0 ÷ 600
	J4	10	0 ÷ 800
	J5	11	0 ÷ 1000
	J6	12	0 ÷ 1200
'R'	R1	13	0 ÷ 1600
	R2	14	0 ÷ 1769
'S'	SS1	15	0 ÷ 1600
	S2	16	0 ÷ 1769
'B'	B1	17	0 ÷ 1820
'E'	E1	18	0 ÷ 800
	E2	19	0 ÷ 900
'N'	N1	20	0 ÷ 1200
	N2	21	0 ÷ 1300
'T'	T1	22	-199.0 ÷ 400.0
	T2	23	-199.0 ÷ 200.0
	T3	24	0.0 ÷ 350.0
'W'	W1	25	0 ÷ 2000
	W2	26	0 ÷ 2320
'PLII'	PL1	27	0 ÷ 1300
	PL2	28	0 ÷ 1390
'U'	U1	29	-199.0 ÷ 600.0
	U2	30	-199.0 ÷ 200.0
	U3	31	0.0 ÷ 400.0
'L'	L1	32	0 ÷ 400
	L2	33	0 ÷ 800

Table 1 (Input types and codes)

RTD type (1)		Code	Range [°C]
Pt100 1.381	JP1	41	-199.0 ÷ 600.0
	JP2	42	-199.0 ÷ 400.0
	JP3	43	-199.0 ÷ 200.0
	JP4	44	0 ÷ 200
	JP5	45	0 ÷ 400
	JP6	46	0 ÷ 600
Pt100 1.385	DP1	47	-199.0 ÷ 600.0
	DP2	48	-199.0 ÷ 400.0
	DP3	49	-199.0 ÷ 200.0
	DP4	50	0 ÷ 200
	DP5	51	0 ÷ 400
	DP6	52	0 ÷ 600
Analog Linear		Code	Range (3)
AN1		61	-10 ÷ 10 mV
		62	-2 ÷ 2 V
		63	-5 ÷ 5 V
		64	-10 ÷ 10 V
AN2		71	0 ÷ 10 mV
AN3		76	0 ÷ 20 mV
AN4		81	0 ÷ 50 mV
		82	(4) 0 ÷ 20 mA
		83	0 ÷ 1 V
		84	0 ÷ 5 V
		85	0 ÷ 10 V
		86	0 ÷ 5 kΩ
		87	0 ÷ 2 V
AN5		91	10 ÷ 50 mV
		92	(4) 4 ÷ 20 mA
		93	1 ÷ 5 V
		94	2 ÷ 10 V

(1) Changing from T/C to Pt100 and vice-versa requires hardware adjustment
(2) Default input configuration setting
(3) Display ranges for all linear choices can be: -1999÷9999 with 0, 0.0 0.00 or 0.000 DP
(4) Requires 2R5 external resistor in parallel