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6-DIGIT MULTIFUNCTIONAL COUNTER

CT34

OPERATION MANUAL

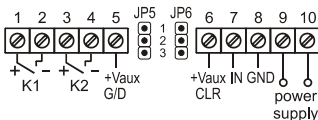
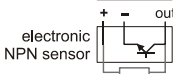
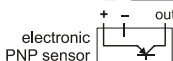
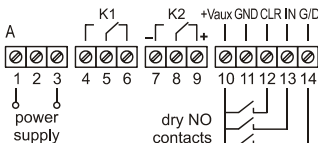
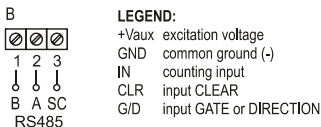


Please read this Operation Manual before mounting and operating!
Save the Manual for future references!

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CT34 is a versatile fully programmable totalizing counter / RPM meter that can be adapted to a wide variety of counting, measuring, and controlling applications. It is equipped with one or two 6-digit LED displays and has 4 control inputs allowing 7 different operating modes. Up to 2 relay or analog outputs may be installed, enhancing device application.

Mounting and Wiring



terminal 5 function

	+Vaux	G/D
JP5	2-3 *	1-2

terminal 6 function

	+Vaux	CLR
JP6	2-3	1-2 *

(*) factory set

Mounting

Place CT34 into a 71x29 mm (for case 'L') or 90x42 mm (for case 'H') panel cut-out and tighten using the enclosed mounting bracket(s).

Wiring

- ◆ Connect CT34-H in accordance with the upper wiring diagram and CT34-L – with the lower one.
- ◆ If analog output is installed instead of relay output K2 (see **Specifications**), wire it via terminals 7(-) and 9(+).
- ◆ Note that for CT34-L terminals 5 and 6 may be used for sensor supply or as control inputs. To swap their function, remove the PCB and set jumpers JP5 and JP6.



Important notes:

- ◆ Power supply polarity does not matter!
- ◆ Each input may be either dry contact or electronic.
- ◆ Sensor voltage may be taken from inside or from an external source.
- ◆ If the NPN sensor does not have a resistor, add an appropriate one (1...30 kΩ)!

Display	Counter	RPM meter	Both
upper	counts	RPM/ frequency	counts
lower	---	RPM/ frequency (2)	RPM/ frequency

(2) - applying prescale with second set of coefficients



Important note:

CT34-L has only one display!

CT34-H has an additional (second) display!

- ◆ The types of readings of a 2-display CT34 operating at Basic level depend on its function.
- ◆ During programming, the upper display shows the parameter symbol and the lower – its value.
- ◆ When the counter overflows (value > 999 999), CT34 displays alternatively the leftmost and the rightmost value part at a 2-second interval.
- ◆ To read both values on the CT34-L display, use + (the alternative value differs in the point next to the least significant digit).

Parameter Programming



Note:

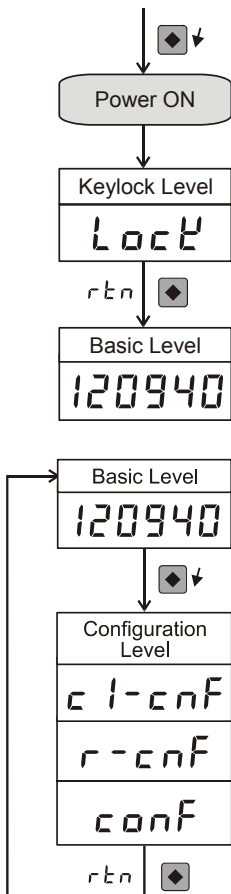
If the new value has not been confirmed and no key has been pressed for a certain period of time, value adjustment automatically ceases, and the parameter retains its initial value.

Setting numerical parameter value

- ◆ Enter parameter value adjustment mode (see 'Program Levels').
- ◆ The whole part of the value appears on the display, and the rightmost digit blinks.
- ◆ To select another digit, press .
- ◆ To increase or decrease the blinking digit value, use respectively or .
- ◆ Confirm the adjusted value with + .
- ◆ If the new value is within the limits, CT34 accepts it and goes on to the next parameter. Otherwise, the device displays the same parameter and waits for a correct value to be set.

Setting symbolic parameter value

- ◆ Enter parameter value adjustment mode.
- ◆ Read the blinking parameter value.
- ◆ To change the value, use or , and to confirm, press + .



STEP 1: Keyboard unlock

- ◆ Hold the key pressed at power-on, and release it after **Lock** appears on the display.
- ◆ Using or , select **EEEE** and set with + .
- ◆ To return to Basic level, select **rtn** and press .

Basic level

At Basic level, CT34 indicates the measured input value with a resolution, according to the **Point Position** parameter.

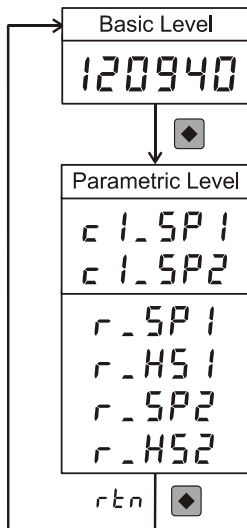
STEP 2: Configuration level

This level contains the configuration parameters of the device.

- ◆ From Basic level, press and hold .
- ◆ To enter Counter configuration, release the key while **c1-cnF** is displayed, to enter RPM-meter configuration release it while **r-cnF** is displayed, and to enter other configurations – while **conf** is displayed (serial interface, etc.).
- ◆ Use or to choose a parameter (see Table 1) and press to enter the parameter value adjustment mode.
- ◆ To return to Basic level, select **rtn** and press .



The shaded rows of the parameter table refer to the RPM-meter function, and the clear ones – to the counter function!



STEP 3: Parametric level

This level contains the control algorithm parameters. If no relay output is installed, this level does not show up.

- ◆ Enter from Basic level by pressing briefly.
- ◆ Use and to browse the respective group of parameters (see Table 1).
- ◆ To enter the displayed parameter value adjustment mode, press .
- ◆ To return to Basic level, select *r.tn* and press .



The shaded rows of the parameter table refer to the RPM-meter function, and the clear ones – to the counter function!

STEP 4: Keyboard lock (if necessary)

- ◆ Hold the key pressed at power-on, and release it after *L ock* appears on the display.
- ◆ Using or , select *ESP* or *dPEY* (see Table 1) and set with + .
- ◆ To return to Basic level, select *r.tn* and press .

functions

both CLEAR key and input are enabled to clear the counter

only CLEAR input is enabled to clear the counter

CLEAR input enables CLEAR key to clear the counter

both CLEAR key and input are disabled

Parameter 'Clear Algorithm'

$c1_crg = 0$

$c1_crg = 1$

$c1_crg = 2$

$c1_crg = 3$

Prescale Calculations

Counts = Input * MUL / DIV

MUL = 1; DIV = 10

Display = Input * MUL / DIV

MUL = 6; DIV = 1; Decimal point = x 0.1

Display = Input * MUL / DIV

MUL = 5; DIV = 6; Decimal point = x 0.1

(MUL, DIV - see Table 1)

Example 1 (counter)

- sensor gives 10 pulses per turn
- need to count turns

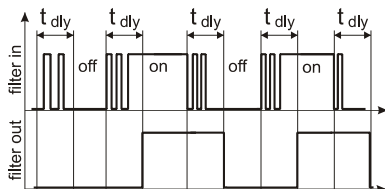
Example 2 (frequency meter)

- sensor gives pulses with 25 Hz
- need to indicate 15.0 [m/s]

Example 3 (flow meter)

- sensor gives 1 pulse per 5 liters
- the flow is 600 [l/h]
- need to indicate 10.0 [l/min]

Input Filtration



Delay filter

This filtration removes dry contact parasite vibrations as shown on the left. The delay time t_{dly} is defined by $c1_dl$ or r_dl . For electronic sensors, the delay time must be zeroed!

Low-pass filter

This filter is available only for the RPM-meter variant. It is defined by the parameters r_flt and r_fb .

















Parameter	Symbol	Description
Configuration Parameters (These parameters are part of Configuration level)		
Mode	$c1_mod$	Operating mode selection
Save	$c1_SA$	Saving values at power-off
Clear Algorithm	$c1_cAR$	Function of CLEAR input and key
Gate or Dir	$c1_GDS$	Function of GATE/DIRECTION input
Point Position ⁽¹⁾	$c1_Pnt$	Display decimal point position
Prescale Multiplier	$c1_mul$	Prescale multiplying coefficient MUL
Prescale Divider	$c1_div$	Prescale dividing coefficient DIV
Filter Delay	$c1_dt$	Input filter delay time
Active Edge	$c1_EDG$	Active edge of the counting input
One-shot Time	$c1_ost$	Duration of the one-shot output
Display Direction	$c1_ddr$	Display counting direction
Relay 2 Link ⁽²⁾	$c1_r2L$	Links the 2 nd output relay to the parameter chosen
Relay 2 Direction ⁽²⁾	$c1_r2d$	Control action direction of the 2 nd output relay
Mode	r_mod	Operating mode selection
Filter Delay	r_dt	Input filter delay time
Filter Time	r_ft	Relative time constant of the input low-pass filter
Filter Band	r_fb	Zone around measured value, with active filter
Point Position ^(1,3)	$r_Pnt (r_Pnt2)$	Display decimal point position
Maximum Wait Time	r_tOW	Maximum waiting time to receive input signal
Prescale Multiplier ⁽³⁾	$r_mul (r_mul2)$	Prescale multiplying coefficient MUL
Prescale Divider ⁽³⁾	$r_div (r_div2)$	Prescale dividing coefficient DIV
Analog Output Low ⁽²⁾	r_oLo	Input value corresponding to Low output limit
Analog Output High ⁽²⁾	r_oHi	Input value corresponding to High output limit
Output Calibration ⁽²⁾	r_CAL	Enables analog output calibration
Relay 1 Direction	r_r1d	Control action direction of the 1 st output relay
Relay 2 Direction ⁽²⁾	r_r2d	Control action direction of the 2 nd output relay
Baud Rate ⁽²⁾	$bAud$	Serial interface RS485 baud rate
Device Address ⁽²⁾	$AdDr$	Serial interface RS485 device address
Parameters of the control algorithm (These parameters are part of Parametric level)		
Set Point 1	$c1_SP1$	Set-point value of relay output K1
Set Point 2	$c1_SP2$	Set-point value of relay output K2
Set Point 1	r_SP1	Set-point value of relay output K1
Hysteresis 1	r_HS1	Hysteresis of relay output K1
Set Point 2	r_SP2	Set-point value of relay output K2
Hysteresis 2	r_HS2	Hysteresis of relay output K2
Keyboard locking Parameter		
Keyboard Lock Mode	$L o c k$	Keyboard locking mode

⁽¹⁾ Changing decimal point position reflects all parameters linked to the control value! E.g.: changing **Point**

⁽²⁾ These parameters do not appear if the respective option is not installed!

⁽³⁾ The second set of prescale parameters is available **ONLY** in the 2-display variant!

Table 1

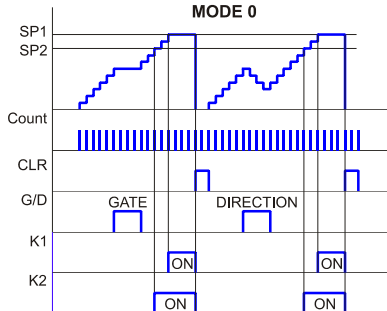
Value	Unit	Notes
0 ... 6	-	defines counter operating mode (see 'Modes of Operation')
no, YES	-	YES saves current values in non-volatile memory
0 ... 3	-	defines CLEAR input and key (see 'CLEAR Functions')
CARE, d, r	-	CARE - enables/disables counting; d, r - accumulator counting direction
x1, x0.1, x0.01, x0.001	-	affects all parameters linked with the input and marked with (!)
1 ... 9999	-	affects Cnt and Rcc
1 ... 9999	-	affects Cnt and Rcc
0 ... 9.999	sec.	removes dry contact parasite vibrations (set to '0' for electronic sensor)
 	-	 - rising edge;  - falling edge
0.1 ... 999.9	sec.	for modes 2, 3, and 5
uP, dn	-	uP displays from 0 to SP1; dn displays from SP1 to 0
cnt, total, batch	-	cnt - counter current value; total - total accumulated; batch - total batches
 	-	 - relay ON over set point;  - relay ON under set point
0 ... 6	-	defines RPM operating mode (see 'Modes of Operation – part III')
0 ... 9.999	sec.	removes dry contact parasite vibrations (set to '0' for electronic sensor)
0 ... 255	-	Higher value gives better filtration.
0 ... 1000	-	The filter is active only around the measured value.
x1, x0.1, x0.01, x0.001	-	affects all parameters linked with the input and marked with (!)
1 ... 120	sec.	If no input signal is sensed during this time, CT34 will display '0'.
1 ... 9999 (0 ... 9999)	-	a number, the measured value will be multiplied by
1 ... 9999	-	a number, the measured value will be divided by
-1999 ... 9999	(!)	only with retransmission analog output installed
-1999 ... 9999	(!)	only with retransmission analog output installed
no, YES	-	This parameter is reserved for authorized personnel only!
 	-	 - relay ON over set point;  - relay ON under set point
 	-	 - relay ON over set point;  - relay ON under set point
1200, 2400, 4800,	bps	communication speed
1...254	-	defines the unique address of CT34 connected to a RS485 network

-199999 ... 999999	(!)	
-199999 ... 999999	(!)	
0 ... 30000	(!)	
0 ... 9999	(!)	
0 ... 30000	(!)	
0 ... 9999	(!)	

EEY, ESP, dEEY	-	ESP - enables set point; EEY - enables all; dEEY - all locked
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Position value from (x1) to (x0.1) would change a Set-point value of 100 to 10.0!!

MODE 0

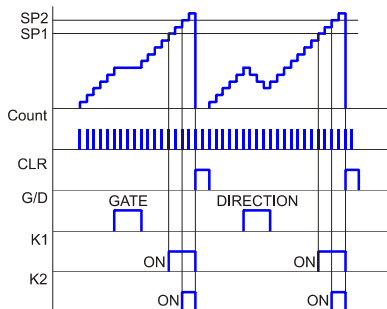


Operation Mode 0

$c1.mod = 0$

- ◆ CT34 counts up to SP1, stops, and initializes at receiving CLEAR command.
- ◆ Output K1 activates when counter reaches SP1 and stays ON until initialization.
- ◆ Output K2 is ON when SP2 is reached and OFF – depending on parameters $c1.r2l$ and $c1.r2d$.

MODE 1

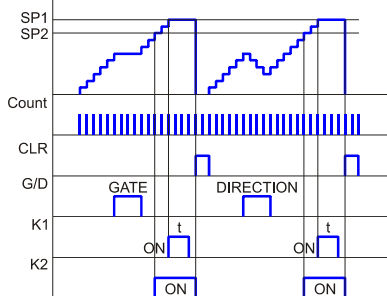


Operation Mode 1

$c1.mod = 1$

- ◆ CT34 counts up and initializes at receiving CLEAR command.
- ◆ Output K1 activates when counter reaches SP1 and stays ON until initialization.
- ◆ Output K2 is ON when SP2 is reached and OFF – depending on parameters $c1.r2l$ and $c1.r2d$.

MODE 2

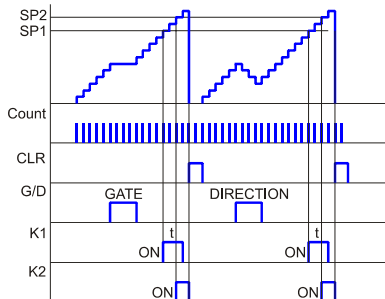


Operation Mode 2

$c1.mod = 2$

- ◆ CT34 counts up to SP1, stops, and initializes at receiving CLEAR command.
- ◆ Output K1 activates at SP1 and stays ON for a period set with $c1.o5t$ or until initialization (1-shot).
- ◆ Output K2 is ON when SP2 is reached and OFF – depending on parameters $c1.r2l$ and $c1.r2d$.

MODE 3

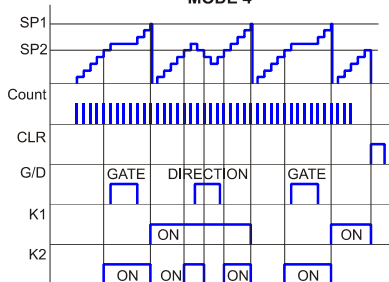


Operation Mode 3

$c1_mod = 3$

- CT34 counts up and initializes at receiving CLEAR command.
- K1 activates at SP1 and stays ON for a period set with $c1_ost$ or until initialization.
- Output K2 is ON when SP2 is reached and OFF – depending on parameters $c1_r2l$ and $c1_r2d$.

MODE 4

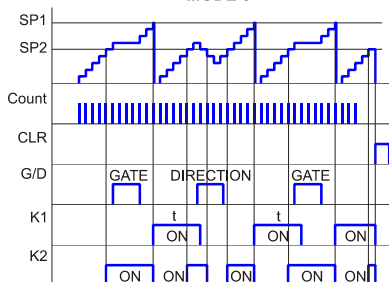


Operation Mode 4

$c1_mod = 4$

- CT34 counts up to SP1, automatically initializes, and starts a new cycle.
- K1 switches ON/OFF alternatively when counter reaches SP1.
- Output K2 is ON when SP2 is reached and OFF – depending on parameters $c1_r2l$ and $c1_r2d$.

MODE 5

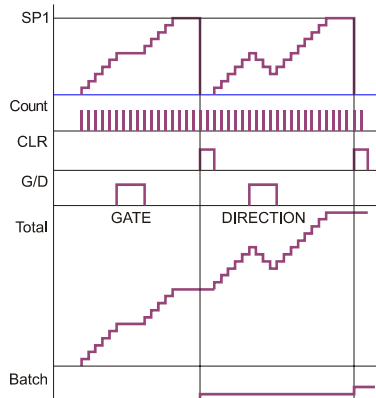
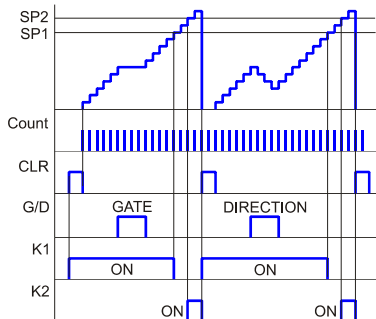


Operation Mode 5

$c1_mod = 5$

- CT34 counts up to SP1, automatically initializes, and starts a new cycle.
- K1 activates at SP1 and stays ON for a period set with $c1_ost$.
- Output K2 is ON when SP2 is reached and OFF – depending on parameters $c1_r2l$ and $c1_r2d$.

MODE 6



- 0 - indicates period in xxx.xx [s]
 - 1 - indicates frequency in xxx.x [Hz] or [tr/s]
 - 2 - indicates RPM in xxxxx [tr/min]
 - 3 - indicates RPM in xxxxxx [tr/h]
 - 4 - indicates frequency applying prescale
 - 5 - indicates flow in [l/h] applying prescale
 - 6 - indicates frequency using time-base defined by **Maximum Wait Time**
- (see 'Prescale Calculations').

Operation Mode 6 (Dosing Mode)

c1.mod = 6

- ◆ CT34 counts up and initializes at receiving CLEAR command.
- ◆ Output K1 activates with CLEAR command and stays ON until counter reaches SP1.
- ◆ Output K2 is ON when SP2 is reached and OFF – depending on parameters *c1.r2l* and *c1.r2d*.

Totalizing Accumulators

As a totalizer, CT34 accumulates total input pulses (TOTAL) or total batches (BATCHES), counted from 0 to SP1.

- ◆ To see value in TOTAL accumulator, press and hold from Basic Level.
- ◆ To clear TOTAL, press while holding .
- ◆ To see value in BATCHES accumulator, press and hold from Basic Level.
- ◆ To clear BATCHES, press while holding .

RPM-meter Modes

- ◆ As a RPM meter, CT34 can operate in 7 different modes depending on the *r.mod* parameter value.
- ◆ For the second (lower) display, another set of prescale coefficients will be applied.

Table 2

Parameter	Symbol	Value
Read/Write Parameters (Counter)		
Mode	c-mode	0...6
Save	c-save	no, yes
Clear Algorithm	c-c.a	0...3
Gate/Direction	c-g.d	gate, dir
Point Position	c-pnt	0...3
Prescale Multiplier	c-mul	1...9999
Prescale Divider	c-div	1...9999
Filter Delay	c-delay	0.000...9.999
Active Edge	c-edge	raise, fall
One-shot Time	c-time	0.1...999.9
Display Direction	c-d.dir	up, down
Relay 2 Link	c-r2.lnk	cnt, total, batch
Relay 2 Direction	c-r2.dir	over, under
Set Point 1	c-s.p.1	-199999...999999
Set Point 2	c-s.p.2	-199999...999999
Baud Rate	baud	1200...9600
Address	addr	1...254
Access Level	access	no, allow-1, full
Read/Write Parameters (RPM)		
Mode	r-mode	0...6
Filter Delay	r-f.d	0.000...9.999
Filter Time	r-f.t	0...255
Filter Band	r-f.b	0...1000
Point Position	r-pnt(2)	0...3
Max. Wait Time	r-wait	1...120
Prescale Multiplier	r-mul(2)	1(0)...9999
Prescale Divider	r-div(2)	1...9999
Analog Out. Low	r-o.low	0...9999
Analog Out. High	r-o.high	0...9999
Relay 1 Direction	r-r1.dir	over, under
Relay 2 Direction	r-r2.dir	over, under
Set point 1	r-s.p.1	0...30000
Hysteresis 1	r-hys.1	0...9999
Set point 2	r-s.p.2	0...30000
Hysteresis 2	r-hys.2	0...9999
Error Info	error	0 (read): no errors 0 (write): initializes memory at Fail error -1: Fail error

Protocol architecture

- ◆ The protocol is based on UART protocol with:
 - Baud Rate - as defined by parameter **Baud Rate**;
 - Data bits - 8;
 - Parity Control - Even;
 - Stop bit - 1.
- ◆ ASCII protocol is used for communicating, and the information is exchanged in frames.
- ◆ Each frame consists of 1, or 2 words separated by byte 32 (SPACE), and ends with bytes 13 (CR) and 10 (LF). The first word in the frame denotes the parameter 'Symbol' as taken from Table 2 and the second word (if needed) is the parameter 'Value', both spelled with only small Latin letters, digits, dots, and/or the '-' sign.

Device activating

- ◆ To respond to commands, the device should be active.
- ◆ For a device to be activated, it must receive a Ux command, where 'x' is the value of the parameter **Address** or the value '255' (if device address is unknown), and respond to it with oK...
- ◆ If a device does not respond even to U255, check the UART protocol settings, chiefly **Baud Rate** value.

Table 2 cont'd

Parameter	Symbol	Value
Read Only Values		
Counter Total	total	-2147483648 ... 2147483647
Counter Count	cnt	
Counter Batch	batch	
RPM Rate	rate	
Commands		
Clear Register	clear	total, cnt, batch

**Notes:**

- ◆ #13 (CR) is byte 0x0D;
#10 (LF) is byte 0x0A.
- ◆ The U255 command should be used only in case just 1 slave is presented.

**Protocol examples:**

PC or other device: CT34 response:

activating device number 10

U10#13#10 ok.#13#10

reading TOTAL

total#13#10 total 9999#13#10

clearing TOTAL

clear total#13#10 clear ok.#13#10

writing counting mode 6

c-mode 6#13#10 c-mode 6#13#10

invalid command.	command not recognized
parity error.	parity error detected
not a number.	attempt to write symbols for numerical parameter
point error.	value resolution greater than parameter's one
out of range.	value out of range
read only.	parameter is read-only

- ◆ The device remains active until it receives another Ux command, but with different device address, a FR, L error, or with reset.
- ◆ Any Baud Rate value change through the communication interface also deactivates the device.

Reading from a device

- ◆ If the frame consists of only 1 word, it is recognized as a command for reading.
- ◆ The device responds to it by returning the same word and its value, according to Table 2.

Writing in a device

- ◆ If the frame consists of 2 words, it is recognized as a command for writing.
- ◆ With writing, transferred are the same 2 words that would have been received at the respective command for reading from the device.
- ◆ After successful writing, the device responds with the respective command for reading, except for the baud command.

Other device responses

- ◆ When Error Info value is -1, the device substitutes any command for error reading.
- ◆ CT34 responses in case of incorrect protocol use are given on the left.



The undersigned hereby declares, on behalf of COMECO Inc., 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/EU.

A handwritten signature in black ink, appearing to read 'K. Darakchiev'.

Krasimir Darakchiev, CEO
COMECO Inc.

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.

Case

Function Included (Variant)

Input Type

Input Isolation

Maximum Input Frequency

Outputs:

Electromechanical relay

MOS gate

Transistor gate

Output for external SSR

- K1

- K2

Analog Output (K2)

Serial Interface

Counter Linked Output

RPM Linked Output

Power Supply

Excitation Voltage (Vaux)

Consumption

Ambient Temperature / Humidity

Protection Class: front / terminals

☐ 'H', ☐ 'L'

☐ counter, ☐ RPM meter, ☐ combined dry NO contact or from NPN/PNP sensor

☐ 1500 VAC

500 Hz or 5 kHz (only counter function incl.) up to 2

5A/250VAC with NO/NC or NO contact

0.1A/60V, optically isolated

open collector NPN 40mA/40V

5...24 VDC, 30 mA

☐ relay, ☐ MOS, ☐ open collector, ☐ ext. SSR

☐ relay, ☐ MOS, ☐ open collector, ☐ ext. SSR

☐ 0...20 mA, ☐ 4...20 mA, ☐ 0...10 V

☐ RS485, isolated

☐ K1, ☐ K2

☐ K1, ☐ K2

☐ 230 VAC, ☐ 115 VAC, ☐ 24 VAC,

☐ 90...250 V, ☐ 12...24 V

☐ 10...30 V, 60 mA, ☐ less than 6 VA

-10...65 °C / 0...85% RH, non-condensing

☐ IP65, ☐ IP54 / IP20

Warranty and Support

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.

.....
article number

.....
serial number

.....
manufacturing date

QC check mark(passed)
(stamp)

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QD-8.2.4-WC