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Preliminary

ZD 340

High Speed Position Counter and Differential Counter with two Encoder Inputs

- Electronic counter for high-end applications
- Two independent encoder inputs, each with channels A, /A, B, /B , 500 kHz of counting capability and individual impulse scaling facility
- Choice of 6-decade display (15 mm size) or 8-decade display (10 mm size)
- Selectable operating modes like fast position or event counter, summing counte differential counter, cutting length indicator, diameter calculator and more
- 4 preset levels with very fast power transistor outputs
- RS232 interface included in standard, fast analogue output available as option

Operating Instructions

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Safety Instructions

- This manual is an essential part of the unit and contains important hints about function, correct handling and commissioning. Non-observance can result in damage to the unit or the machine or even in injury to persons using the equipment!
- The unit must only be installed, connected and activated by a qualified electrician
- It is a must to observe all general and also all country-specific and application-specific safety standards
- When this unit is used with applications where failure or maloperation could cause damage to a machine or hazard to the operating staff, it is indispensable to meet effective precautions in order to avoid such consequences
- Regarding installation, wiring, environmental conditions, screening of cables and earthing, you must follow the general standards of industrial automation industry
- - Errors and omissions excepted –

Version:	Description:
ZD34001a/Feb06/hk/kk/af	First preliminary edition

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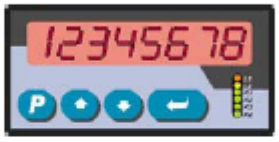
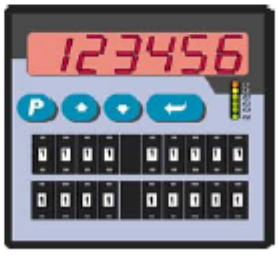
1. Available Models

ZD 340 represents the basic model of the new ZD series of counters, which includes all the models shown in the list below, all with similar properties with operation and performance.

Model	Figure and dimensions	Display	Presets	Outputs
ZD 330 96 x 48 mm 3.780x1.890''		8 decades 10 mm .394''	4 presets via keypad	4 high-speed power transistor outputs
ZD 340 96 x 48 mm 3.780x1.890''		6 decades 15 mm .591''	4 presets via keypad	4 high-speed power transistor outputs
ZD 632 96 x 96 mm 3.780x3.780''		8 decades 10 mm .394''	2 presets via keypad, 2 presets via thumbwheel switches	4 high-speed power transistor + 4 relay outputs
ZD 642 96 x 96 mm 3.780x3.780''		6 decades 15 mm .591''	2 presets via keypad, 2 presets via thumbwheel switches	4 high-speed power transistor + 4 relay outputs
ZD 634 96 x 96 mm 3.780x3.780''		8 decades 10 mm .394''	4 presets via thumbwheel switches	4 high-speed power transistor + 4 relay outputs
ZD 644 96 x 96 mm 3.780x3.780''		6 decades 15 mm .591''	4 presets via thumbwheel switches	4 high-speed power transistor + 4 relay outputs
AO 600	Available as an option for all models: Fast analogue output +/-10V, 0 – 20 mA, 4 – 20 mA (500 µsec)			

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2. Introduction

The counters of series ZD have been designed to close a gap with multiple counting applications, which cannot be accomplished by the normal industrial electronic counters available on the market.

A continual demand for increasing production speeds and higher precision at the same time results in counting frequencies exceeding the conventional frequency range.

Particularly with fast running procedures it is most important to also have fast responding outputs on the preset or analogue output.

Many applications require to evaluate the signals of two incremental measuring systems, and to compare the results with respect to the sum, the difference or the ratio of the two positions. This is e.g. necessary for calculation of diameters of winding rolls etc.

And still there exist applications where the use of traditional thumbwheel switches offers real advantages compared to keypad and menu operations.

These are some of the reasons why the new counter series ZD 330 to ZD644 have been designed.

This manual is valid for model ZD 340 only.

Separate instructions are available for the other models shown in the table.

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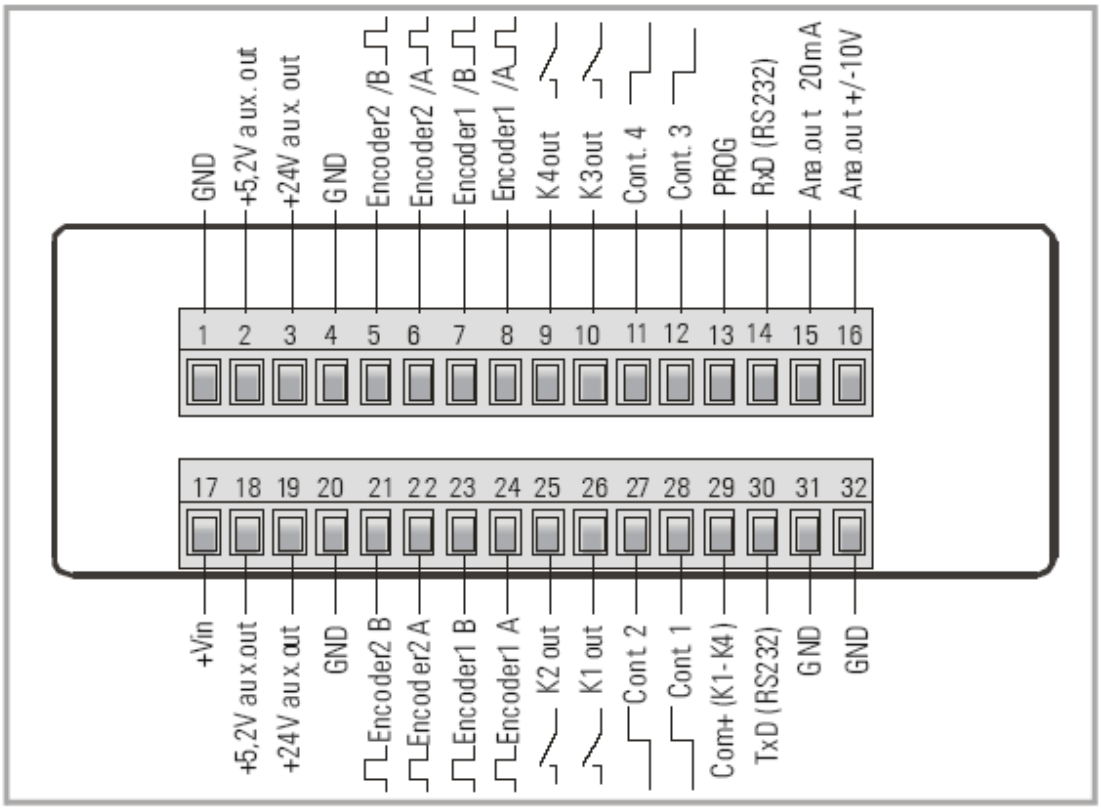
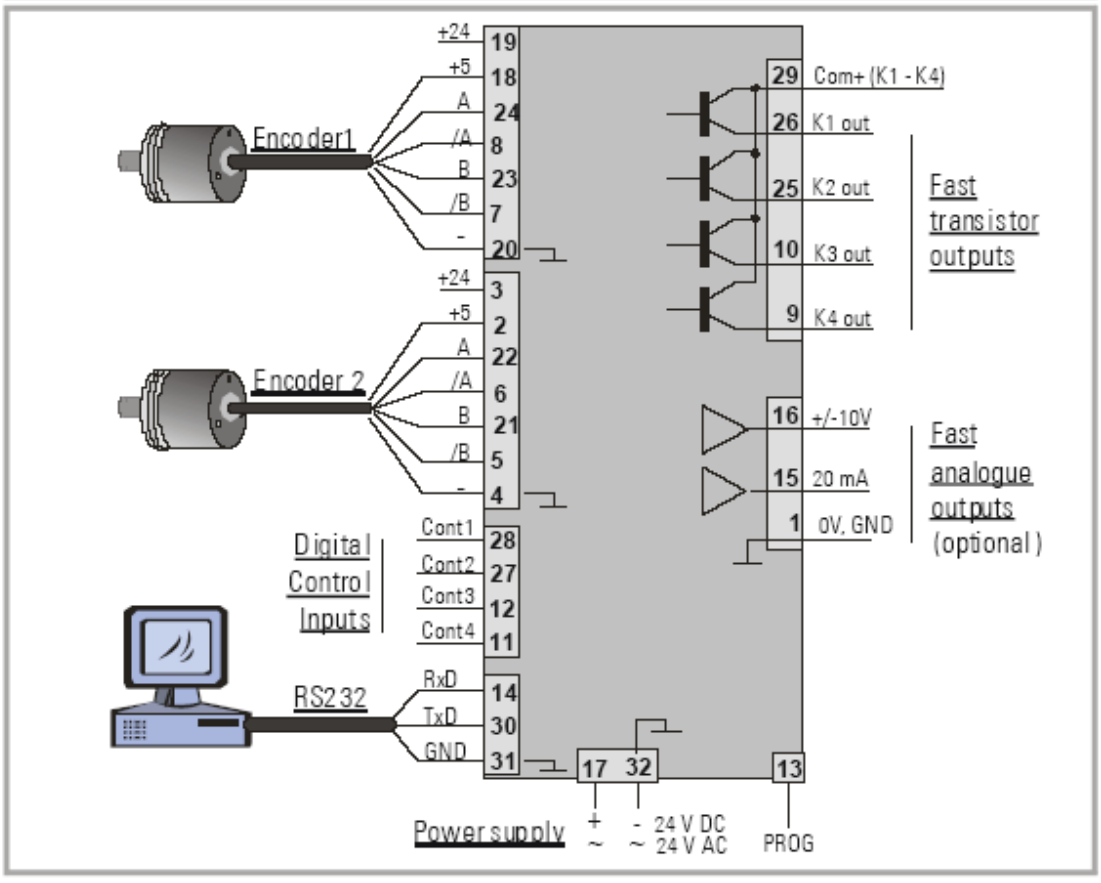
3. Electrical Connections





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Terminal	Name	Function
01	GND	Common Ground Potential (0V)
02	+5,2V out	Aux. output 5,2V/150 mA for supply of encoder 2*
03	+24V out	Aux. output 24V/120 mA for supply of encoder 2*
04	GND	Common Ground Potential (0V)
05	Geber2, /B	Encoder 2, channel /B (B inverted)
06	Geber2, /A	Encoder 2, channel /A (A inverted)
07	Geber1, /B	Encoder 1, channel /B (B inverted)
08	Geber1, /A	Encoder 1, channel /A (A inverted)
09	K4 out	Output K4, transistor PNP 30 volts, 350 mA
10	K3 out	Output K3, transistor PNP 30 volts, 350 mA
11	Cont.4	Digital control input
12	Cont.3	Digital control input
13	(PROG)	(for download of new firmware only, not for general use)
14	RxD	Serial RS232 interface, „Receive Data"
15	Ana.out 20 mA	Analogue current output 0 – 20 mA or 4 – 20 mA (optional)
16	Ana.out +/-10V	Analogue voltage output -10V … 0 … +10V (optional)
17	+Vin	Power supply input, +16 – 40 VDC or 24 VAC
18	+5,2V out	Aux. output 5,2V/150 mA for supply of encoder 2*
19	+24V out	Aux. output 24V/120 mA for supply of encoder 2*
20	GND	Common Ground Potential (0V)
21	Geber2, B	Encoder 2, channel B (non-inverted)
22	Geber2, A	Encoder 2, channel A (non-inverted)
23	Geber1, B	Encoder 1, channel B (non-inverted)
24	Geber1, A	Encoder 1, channel A (non-inverted)
25	K2 out	Output K2, transistor PNP 30 volts, 350 mA
26	K1 out	Output K1, transistor PNP 30 volts, 350 mA
27	Cont.2	Digital control input
28	Cont.1	Digital control input
29	Com+ (K1-K4)	Common positive input for transistor outputs K1-K4
30	TxD	Serial RS232 interface, „Transmit Data"
31	GND	Common Ground Potential (0V)
32	GND	Common Ground Potential (0V) for DC or AC power supply

*) Indications 120 mA and 150 mA are maximum currents available for each of the encoders.

Devices of the first production series provide the +5,2 V auxiliary output on terminals 2 and 18 only.

The +24V outputs on terminals 3 and 19 will be available with the succeeding series.

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3.1. Power Supply

The ZD340 counter accepts both, a 16 – 40 volts DC power or a 24 volts AC power for supply via terminals 17 and 32. The current consumption depends on the level of the input voltage and some internal conditions; therefore it can vary in a range from 100 – 200 mA (aux. currents taken from the unit for encoder supply not included).

3.2. Auxiliary Outputs for Encoder Supply

Terminals 15 and 18 provide an auxiliary output with +5.2 volts DC (300 mA totally).
Terminals 14 and 19 provide an auxiliary output with +24 volts DC (240 mA totally)
Please observe limitations valid for the first production lot of units.
Where you supply the unit with 24 VDC anyway, it is advisable to also supply the encoders from the same remote source and not to use the auxiliary outputs.

3.3. Impulse Inputs for Incremental Encoders

All input characteristics of the impulse inputs can be set by the parameter menu, for each of the encoders separately. Depending on the application the unit can accept single channel information (input A only) or quadrature information (A / B, 90°). The following settings are possible:

- Symmetric input (differential) according to RS422 standard
- TTL inputs at a level of 2.4 to 5 volts
  (provided the inverted signals of every channel is available, too)
- HTL signals at a 10 – 30 volts level
  (alternatively differential with inverted signals A, /A, B, /B, or single-ended A, B only)
- Impulses from photocells or proximity switches etc. providing a HTL level (10 – 30 volts) or Namur standard (2-wire)

3.4. Control Inputs Cont.1 – Cont.4

These inputs can be configured for various remote functions like Reset, Set, Latch, Inhibit or switch-over purpose.
All control inputs require HTL level. They can be individually set to either NPN (switch to -) or PNP (switch to +) characteristics. For applications where edge-triggered action is needed, the menu allows to set the active edge (rising or falling). Control inputs also accept signals with Namur (2-wire) standard. For reliable operation the minimum pulse width on the control inputs should be 50 µsec.

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3.5. Switching Outputs K1 – K4

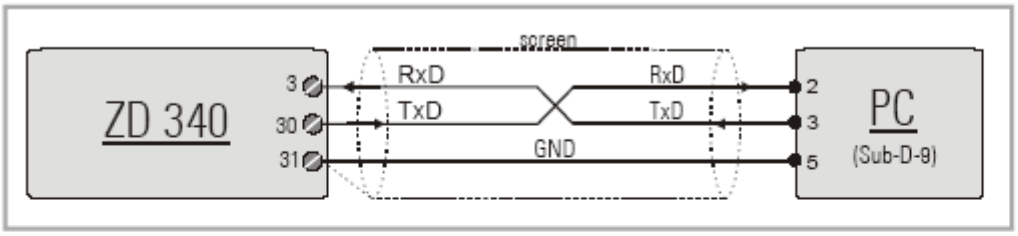
ZD340 provides four presets and outputs with programmable switching characteristics. K1 – K4 are fast-switching and short-circuit-proof transistor outputs with a switching capability of 5 – 30 volts / 350 mA each. The switching voltage of the outputs must be applied remotely to the Com+ input (terminal 29)

3.6. Serial Interface

The serial RS232 interface can be used for the following purposes:

- Set-up of the unit by PC (if desirable)
- Change of parameters during operation
- Readout of actual counter or other values by PLC or PC

The figure below explains the connection between the ZD340 counter and a PC using the standard Sub-D-9 serial connector



3.7. Fast Analogue Output

An analogue output is available as an option, providing a voltage output of +/- 10 volts (load = 3 mA), and a current output of 0 – 20 mA or 4 – 20 mA (load = 0 – 270 Ohms). All output characteristics like beginning of conversion range, output swing etc. are freely programmable via menu. The response time is only 500 µsec at a resolution of 14 bits.

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4. Operating Modes of the Counter

For best survey, all parameters of the unit are arranged in 13 expedient groups, named "F01" - "F13". Depending on the application, only some of these groups may be important, while other groups are irrelevant and must not be considered.

This section describes possible applications and operating modes of the counter. The operation mode can be set under parameter group F07.

All details about parameter arrangement and function can be found under section 6.

4.1. "Single Mode" (Encoder 1 only): F07.062 = 0

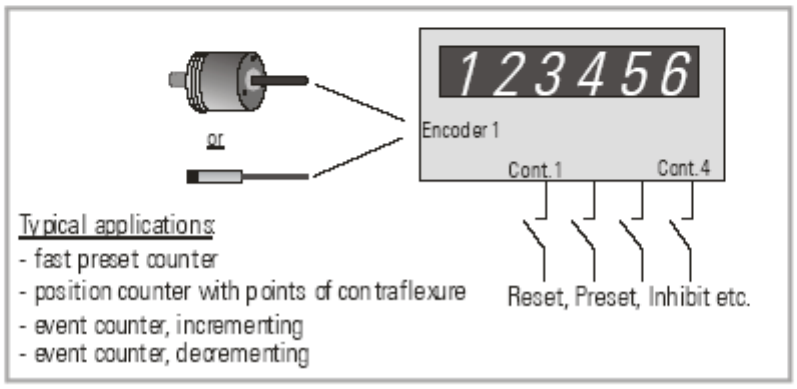
Only the inputs of encoder 1 are active, signals on the encoder 2 inputs will not be evaluated. Besides the actual counter value, the unit also records minimum and maximum values as well as the last points of contraflexure.

All 4 presets are related to the actual counter value.

It is possible to cycle the display between the readings shown below by pressing one of the front keys (provided you have assigned the display scroll function to one of the keys under key definition menu F06). LEDs L1 and L2 indicate which of the values is actually displayed.

	Display	L1 (red)	L2 (yellow)
1	Actual counter value	--	--
2	Minimum value (since last reset)	blinking fast	--
3	Maximum value (since last reset)	--	blinking fast
4	Point of contraflexure (last change of direction)	blinking slow	--
5	Either upper or lower point of contraflexure (setting)	--	blinking slow

Scrolling of the display from one reading to another will not affect the preset outputs K1 – K4 nor the analogue output.



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4.2. "Sum Mode" (Encoder 1 + Encoder 2): F07.062 = 1

Both inputs encoder 1 and encoder 2 are active. From both values the unit forms the sum, with consideration of the individual encoder scaling factors. Where the encoder signal also provides direction information, this information will be considered by a corresponding sign of the count. Without direction information (channel A only) both encoder values will be added up. The final result can once more be scaled into user-friendly engineering units by means of special scaling parameters.

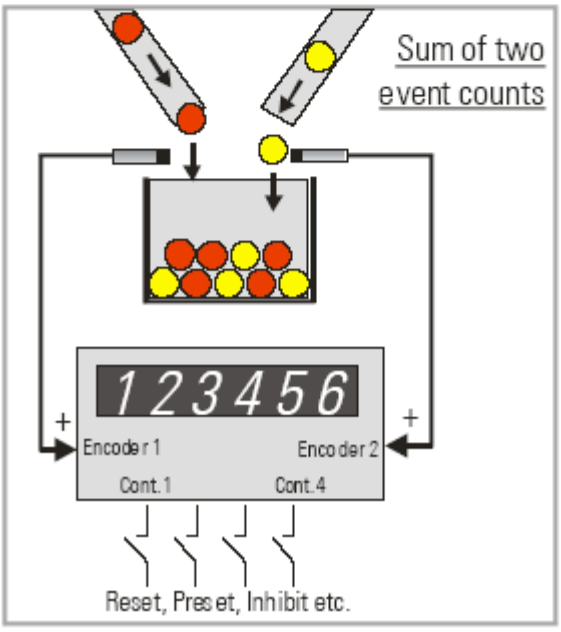
Besides the actual counter value and the sum, the unit also records minimum and maximum values of the sum.

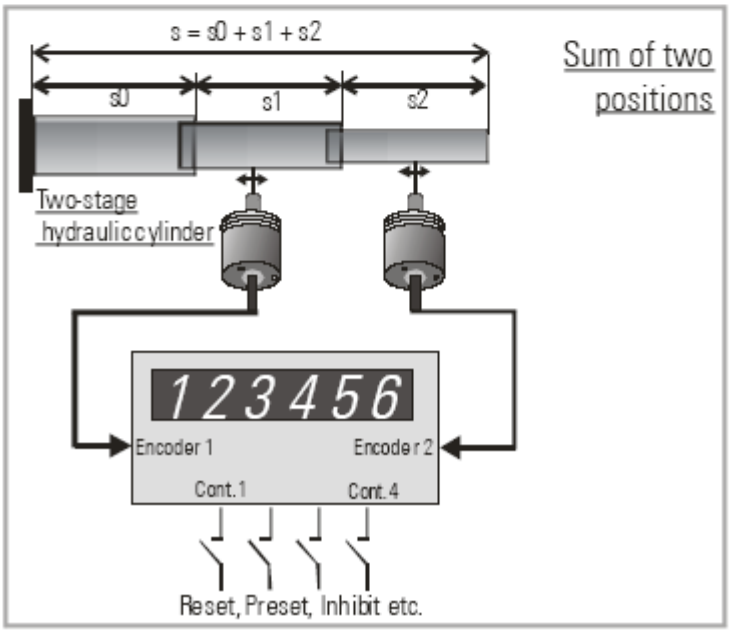
Presets K1 and K2 are related to the actual counter value of encoder 1 only.
Presets K3 and K4 are related to the actual sum result (encoder 1 + encoder 2)

It is possible to cycle the display between the readings shown below by pressing one of the front keys (provided you have assigned the display scroll function to one of the keys under key definition menu F06). LEDs L1 and L2 indicate which of the values is actually displayed.

	Display	L1 (red)	L2 (yellow)
1	Actual sum encoder 1 + encoder 2	--	--
2	Minimum value of the sum (since last reset)	blinking fast	--
3	Maximum value of the sum (since last reset)	--	blinking fast
4	Actual counter value of encoder 1 alone	blinking slow	--
5	Actual counter value of encoder 2 alone	--	blinking slow

Scrolling of the display from one reading to another will not affect the preset outputs K1 – K4 nor the analogue output.





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4.3. Differential Mode (Encoder 1 – Encoder 2): F07.062 = 2

Both inputs encoder 1 and encoder 2 are active. From both values the unit forms the difference, with consideration of the individual encoder scaling factors.
Where the encoder signal also provides direction information, this information will be considered by a corresponding sign of the count. Without direction information (channel A only) both encoder values will be added up. The final result can once more be scaled into user-friendly engineering units by means of special scaling parameters.

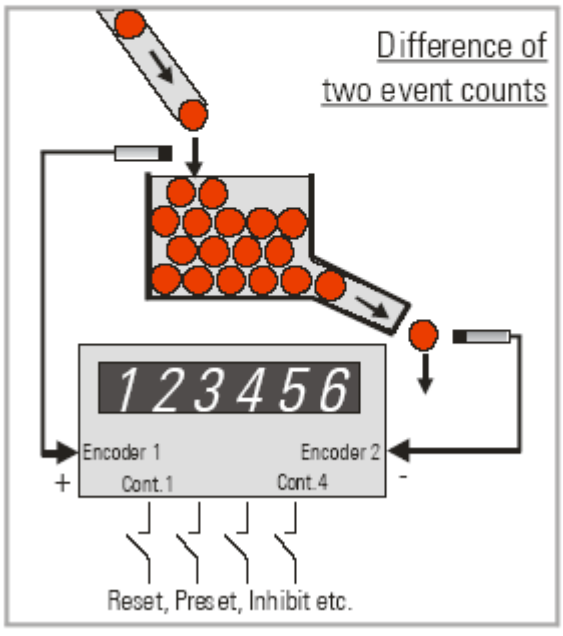
Besides the actual counter value and the difference, the unit also records minimum and maximum values of the difference.

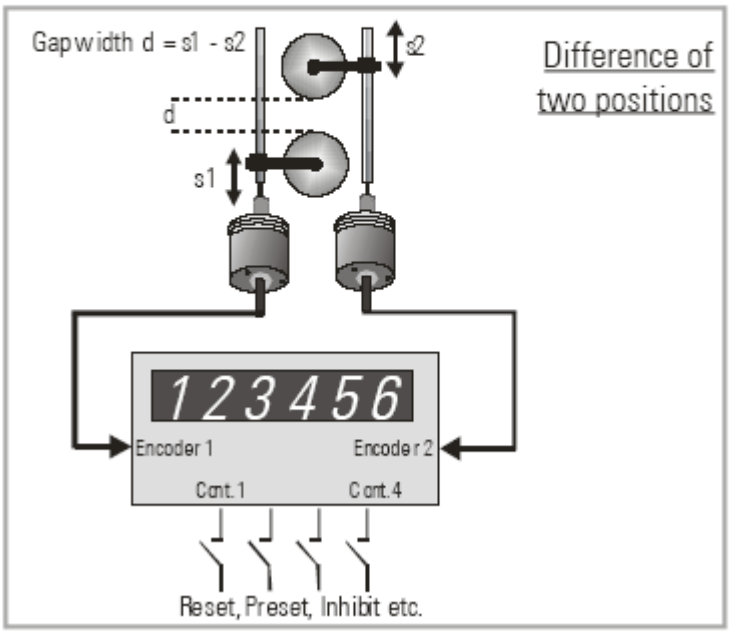
Presets K1 and K2 are related to the actual counter value of encoder 1 only.
Presets K3 and K4 are related to the actual differential result (encoder 1 - encoder 2)

It is possible to cycle the display between the readings shown below by pressing one of the front keys (provided you have assigned the display scroll function to one of the keys under key definition menu F06). LEDs L1 and L2 indicate which of the values is actually displayed.

	Display	L1 (red)	L2 (yellow)
1	Actual difference encoder 1 - encoder 2	--	--
2	Minimum value of the difference (since last reset)	blinking fast	--
3	Maximum value of the difference (since last reset)	--	blinking fast
4	Actual counter value of encoder 1 alone	blinking slow	--
5	Actual counter value of encoder 2 alone	--	blinking slow

Scrolling of the display from one reading to another will not affect the preset outputs K1 – K4 nor the analogue output.





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4.4. Master Counter and Integrated Batch Counter: F07.062 = 3

This counter mode can be used for cut-to lengths applications, cyclic production flows, packing procedures etc. While the master counter takes care of the correct number of impulses per product, the background batch counter detects the number of products produced.

This mode assumes that the automatic reset function has been activated for the master counter, providing restart from zero every time the preset value has been reached.

Only the inputs of encoder 1 are active. Every time the master counter reaches it's preset value, it restarts from zero and the batch counter increments by 1.

Besides the master counter and the batch counter, the unit also records minimum and maximum values of the master count.

Presets K1 and K2 are related to the actual counter value of encoder 1.
Presets K3 and K4 are related to the actual value of the batch counter.

It is possible to cycle the display between the readings shown below by pressing one of the front keys (provided you have assigned the display scroll function to one of the keys under key definition menu F06). LEDs L1 and L2 indicate which of the values is actually displayed.

	Display	L1 (red)	L2 (yellow)
1	Actual counter value of batch counter	--	--
2	Minimum value of master counter (since last reset)	blinking fast	--
3	Maximum value of master counter (since last reset)	--	blinking fast
4	Actual counter value of master counter (encoder 1)	blinking slow	--
5	Actual counter value of batch counter	--	blinking slow

Scrolling of the display from one reading to another will not affect the preset outputs K1 – K4 nor the analogue output.

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4.5. Evaluation of the Real Cutting Length: F07.062 = 4

This mode uses encoder 1 as a length counter and encoder 2 is not active. All counting occurs in the background and is not visible in the display. The counter gets started and stopped by remote control signals, and the final counting result appears in the display (frozen) whilst the counter already executes the next cycle in the background.

For remote start and stop signals the inputs Cont.1 and Cont.2 are used. All assignments of the signals and the active edges (rising or falling) can individually be set to match with most of the possible measuring situations.

This mode is useful to get information about the actual cutting length with applications like Rotary Cutters, Flying Shears and similar procedures. The automatic reset function is automatically on in order to ensure that the next measuring cycle will restart at zero.

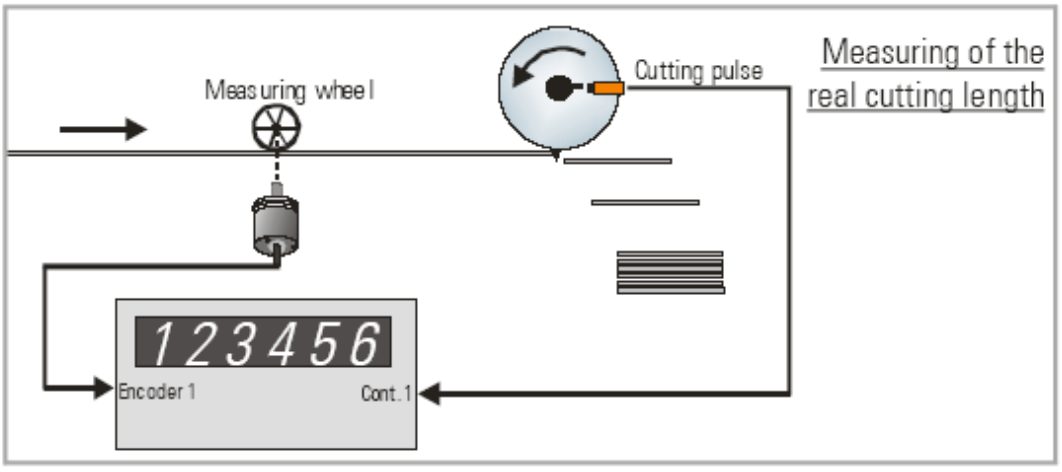
Besides the actual cutting length the unit also records the extreme length values (minimum and maximum) of all cuts.

Presets K1 and K2 are related to the actual counter value of encoder 1 (live background counter). Presets K3 and K4 are related to the real cutting lengths shown in the frozen display. Therefore K3 and K4 can be used for quality sorting purpose (e.g. too short – good – too long)

It is possible to cycle the display between the readings shown below by pressing one of the front keys (provided you have assigned the display scroll function to one of the keys under key definition menu F06). LEDs L1 and L2 indicate which of the values is actually displayed.

	Display	L1 (red)	L2 (yellow)
1	Last actual cutting length (frozen)	--	--
2	Minimum length (since last reset)	blinking fast	--
3	Maximum length (since last reset)	--	blinking fast
4	Actual background counter (live)	blinking slow	--
5	Last actual cutting length (frozen)	--	blinking slow

Scrolling of the display from one reading to another will not affect the preset outputs K1 – K4 nor the analogue output.



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4.6. Diameter Calculation with Winding Rolls: F07.062 = 5

With this mode encoder 1 receives line impulses from a measuring wheel or a feed roll of a winder or unwinder application. Furthermore the counter needs an impulse signal from the rotation of the winding roll. From both signals the counter can calculate and display the actual roll diameter. All counting occurs in the background and only updated diameter readings appear in the display. Encoder 2 is not in use with this application.

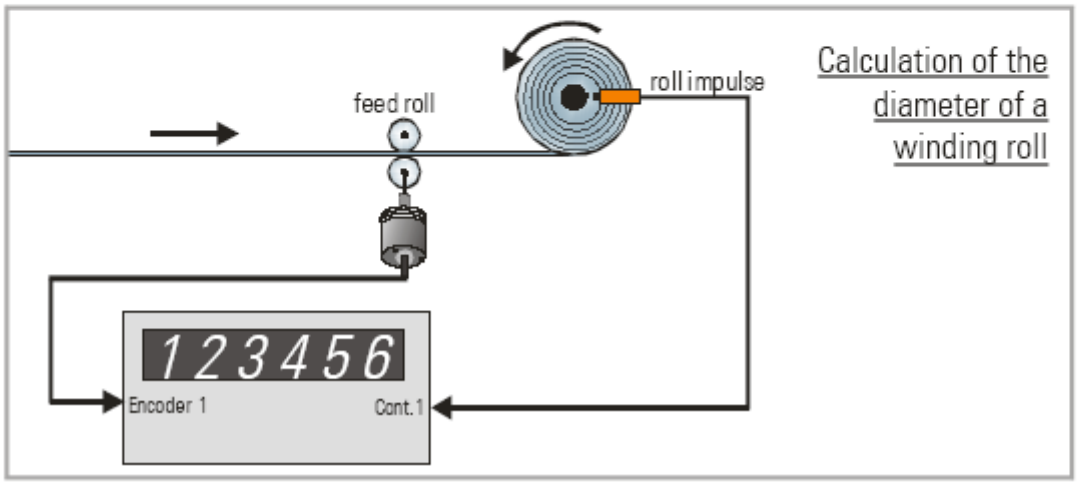
Besides the total material length and the actual diameter the unit also records the extreme diameter values (minimum and maximum) coming up during the process.

Presets K1 and K2 are related to the actual line counter of encoder 1 (total material length under the measuring roll).
Presets K3 and K4 are related to the actual diameter value of the winding roll.

It is possible to cycle the display between the readings shown below by pressing one of the front keys (provided you have assigned the display scroll function to one of the keys under key definition menu F06). LEDs L1 and L2 indicate which of the values is actually displayed.

	Display	L1 (red)	L2 (yellow)
1	Actual roll diameter	--	--
2	Minimum diameter (since last reset)	blinking fast	--
3	Maximum diameter (since last reset)	--	blinking fast
4	Actual value of the line counter	blinking slow	--
5	Actual roll diameter	--	blinking slow

Scrolling of the display from one reading to another will not affect the preset outputs K1 – K4 nor the analogue output.



Calculation of the diameter of a winding roll

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5. Keypad Operation

An overview of all parameters and explanations can be found under section 6.

The menu of the unit uses four keys, hereinafter named as follows:

			
PROG	UP	DOWN	ENTER

Key functions depend on the actual operating state of the unit. Essentially we have to describe three basic states:

- Normal operation
- General setup procedure
- Direct fast access to presets and set values

5.1. Normal Operation

In this mode the unit operates as a counter according to the settings defined upon setup. All front keys may have customer-defined functions according to the specifications met in the keypad definition menu F06 (e.g. scrolling of the display, Reset, Inhibit etc.)

5.2. General Setup Procedure

The unit changes over from normal operation to setup level when keeping the  key down for at least 2 seconds. Thereafter you can select one of the parameter groups F01 to F13.

Inside the group you can now select the desired parameter and set the value according to need. After this you can either set more parameters or return to the normal operation.

The adjoining sequence of key operations explains how to change
Parameter number 052 of group F06 from the original value of 0 to 8

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Step	State	Key action	Display	Comment
00	Normal operation		Counting	
01		P > 2 sec.	F01	Display of the Parameter group
02	Level: Parameter group	▲ 5 x	F02 … F06	Select group # F06
03		↵	F06.050	Confirmation of F06. The first parameter of this group is F06.050
04	Level: Parameter numbers	▲ 2 x	F06.051… F06.052	Select parameter 052
05		↵	0	Parameter 052 appears in display, actual setting is 0
06	Level: Parameter values	▲ 8 x	1 …. 8	Setting has been modified from 0 to 8
07		↵	F06.052	Save the new setting (8)
08	Level: Parameter numbers	P	F06	Return to level parameter groups
09	Level: Parameter groups	P	Counting	Return to normal operation
10	Normal operation			

During the general setup procedure all counter activities remain disabled. New parameter settings become active after return to normal operation only.

5.3. Direct Fast Access to Presets

To get to the fast access routine, please press for at least 2 seconds both

P and ↵ at the same time

This will access the parameter group F01 right away. To change of the settings follow the same procedure as already described above. Besides the advantage of direct access, the fundamental difference to general setup is the following:

During the fast access procedure all counter functions remain fully active.
Changes of preset values will become effective immedeately.
Access is limited to presets, no other parameters can be changed.

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5.4. Change of Parameter Values on the Numeric Level

The numeric range of the parameters is up to 6 digits and may include a sign. For fast and easy setting or these values the menu uses an algorithm as shown subsequently. During this operation the front keys have the following functions:

			
PROG	UP	DOWN	ENTER
Saves the actual value shown in the display and returns to the parameter selection level	Increments the highlighted (blinking) digit	Decrements the highlighted (blinking) digit	Shifts the cursor (blinking digit) one position to the left, or from utmost left to right

With signed parameters the left digit scrolls from **0 to 9** and then shows "–„ (negative) and "-1" (minus one). The example below shows how to change a parameter from the setting 1024 to the new setting 250 000.
This example assumes that you have already selected the parameter group and the parameter number, and that you actually read the parameter value in the display. Highlighted digits appear on colored background.

Step	Display	Key action	Comment
00	001024		Display of actual parameter setting, last digit is highlighted
01		 4 x	Scroll last digit down to 0
02	001020		Shift cursor to left
03	001020	 2 x	Scroll highlighted digit down to 0
04	001000	 2 x	Shift curser 2 positions left
05	001000		Scroll highlighted digit down to 0
06	000000		Shift cursor left
07	000000	 5 x	Scroll highlighted digit up to 5
08	050000		Shift cursor left
09	050000	 2 x	Scroll highlighted digit up to 2
10	250000		Save new setting and return to the parameter number level

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5.5. Code Protection against Unauthorized Keypad Access

Parameter group F05 allows to define an own locking code for each of the parameter menus. This permits to limit access to certain parameter groups to specific persons only.

When accessing a protected parameter group, the display will first show "CODE" and wait for your entry. To continue keypad operations you must now enter the code which you have stored before, otherwise the unit will return to normal operation again.

5.6. Return from the Programming Levels and Time-Out Function

At any time the PROG key sets the menu one level up and finally returns to normal operation. The same thing happens automatically via the time-out function, when during a period of 10 seconds no key has been touched.

5.7. Reset all Parameters to Factory Default Values

Upon special need it may be desirable to set all parameters back to their original factory settings (e.g. because you have forgotten your access code, or by too many change of settings you have achieved a complex parameter state). Default values are indicated in the parameter tables shown later.
To reset the unit to default, please take the following steps:

•	Switch power off
•	Press ↓ and ↑ simultaneously
•	Switch power on while you keep down both keys
	Where you decide to take this action, please note that all parameters and settings will be lost, and that you will need to run a new setup procedure again.

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6. Menu Structure and Description of Parameters

All parameters are arranged in a reasonable order of functional groups (F01 to F13)
You must only set those parameters which are really relevant for your specific application.
Unused parameters can remain as they actually are.

6.1. Summary of the Menu

This section shows a summary of the parameter groups, with an assignment to the functional parts of the unit.

Group	Function
F01	Preset values
000	Preset level K1
001	Preset level K2
002	Preset level K3
003	Preset level K4
004	Set value encoder 1
005	Set value encoder 2

Group	Function
F02	Definitions for encoder 1
010	Encoder properties
011	Edge count select x1, x2, x4
012	Counting direction up/down
013	Impulse scaling Factor
014	Multiple count factor
015	Round-loop cycle definition

Group	Function
F03	Definitions for encoder 2
018	Encoder properties
019	Edge count select x1, x2, x4
020	Counting direction up/down
021	Impulse scaling Factor
022	Multiple count factor
023	Round-loop cycle definition

Group	Function
F04	Special functions
026	Digital input filters
027	Dimensions mm / inch / others
028	Power down memory
029	Input threshold 1
030	Input threshold 2
031	Selection of contraflexure point

Group	Function
F05	Code protection for keys
033	F01
034	F02
035	F03
036	F04
037	F05
038	F06
039	F07
040	F08
041	F09
042	F10
043	F11
044	F12
045	F13

Group	Function
F06	Key commands and control inputs
050	Key UP
051	Key DOWN
052	Key ENTER
053	Input Cont.1, switching characteristics
054	Input Cont.1, assignment of function
055	Input Cont.2, switching characteristics
056	Input Cont.2, assignment of function
057	Input Cont.3, switching characteristics
058	Input Cont.3, assignment of function
059	Input Cont.4, switching characteristics
060	Input Cont.4, assignment of function

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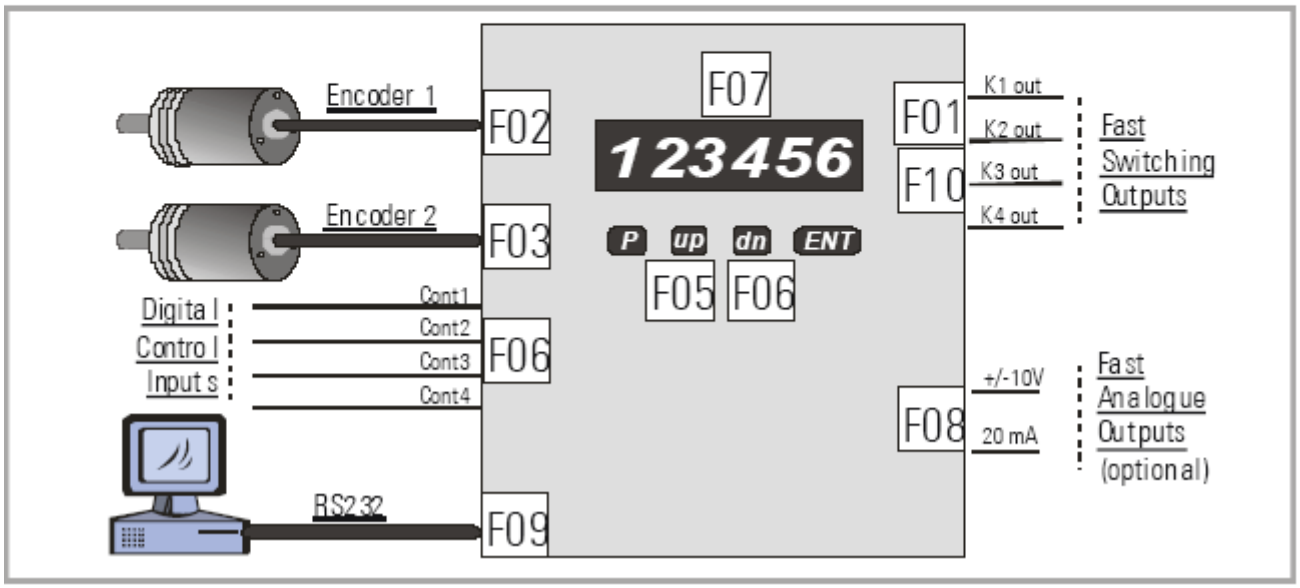
Group	Function
F07	Basic settings
062	Mode of operation
063	Decimal point encoder 1
064	Decimal point encoder 2
065	Decimal point combined <1,2>
066	Multiplication factor <1,2>
067	Division factor <1,2>
068	Display offset <1,2>
069	Brightness of LED display %

Group	Function
F08	Analogue output definitions
074	Output current or voltage
075	Start value of conversion
076	End value of conversion
077	Output swing
078	Zero offset

F09	Serial communication
081	Serial device address
082	Baud rate
083	Data format
084	Serial protocol selection
085	Timer for auto-transmission

F10	Switching characteristics and presets
089	K1 (static or pulse)
090	K2 (static or pulse)
091	K3 (static or pulse)
092	K4 (static or pulse)
093	Hysteresis K1
094	Hysteresis K2
095	Hysteresis K3
096	Hysteresis K4
097	Preselection mode K1
098	Preselection mode K2
099	Preselection mode K3
100	Preselection mode K4
101	Preset mode



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6.2. Description of the Parameters

6.2.1. Preselections and presets

F01		Range	Default
F01.000	Preselection K1	-199 999 ... 999 999	1 000
F01.001	Preselection K2	-199 999 ... 999 999	2 000
F01.002	Preselection K3	-199 999 ... 999 999	3 000
F01.003	Preselection K4	-199 999 ... 999 999	4 000
F01.004	Preset value encoder 1	-199 999 ... 999 999	000 000
	Upon internal or external command the encoder 1 counter will set to this value		
F01.005	Preset value encoder 2	-199 999 ... 999 999	000 000
	Upon internal or external command the encoder 2 counter will set to this value		

6.2.2. Definitions for encoder 1

F02		Range	Default
F02.010	Encoder properties	0 ... 3	0
	0= Impulses A, /A, B, /B (2 x 90°) incl. inv. 1= Impulses A, B (2 x 90°) without inv. 2= Impulses A, /A for count Signals B, /B can indicate static direction (if available) 3= Impulses A for count Signals B can indicate static direction (if available)		
F02.011	Edge counting	0 ... 2	0
	0= Simple (x1) 1= Double (x2) 2= Full quadrature (x4)		
F02.012	Counting direction	0 ... 1	0
	0= Up when A leads B 1= Down when A leads B		
F02.013	Impulse scaling factor	0.00001 ... 9.99999	1.00000
	Multiplier for input impulses		
F02.014	Impulse multiplier	001 ... 999	001
	Multiple count of every impulse		
F02.015	Round-loop cycle	0 ... 999 999	0
	0= Unlimited counting range xxx Round-loop operation in a range 0 - xxx		

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6.2.3. Definitions for encoder 2

F02		Range	Default
F03.018	Encoder properties	0 … 3	0
	0= Impulses A, /A, B, /B (2 x 90°) incl. inv. 1= Impulses A, B (2 x 90°) without inv. 2= Impulses A, /A for count Signals B, /B can indicate static direction (if available) 3= Impulses A for count Signals B can indicate static direction (if available)		
F03.019	Edge counting	0 … 2	0
	0= Simple (x1) 1= Double (x2) 2= Full quadrature (x4)		
F03.020	Counting direction	0 … 1	0
	0= Up when A leads B 1= Down when A leads B		
F03.021	Impulse scaling factor	0.00001 … 9.99999	1.00000
	Multiplier for input impulses		
F03.022	Impulse multiplier	001 … 999	001
	Multiple count of every impulse		
F03.023	Round-loop cycle	0 … 999 999	0
	0= Unlimited counting range xxx Round-loop operation in a range 0 - xxx		

6.2.4. Special functions

F04		Range	Default
F04.026	Digital input filter	0 … 3	0
F04.027	Dimensions metric / inch / others	0 … 2	0
F04.028	Power-down memory	0 - 1	1
	0= Off. Counter resets to zero after power down 1= On. Counter stores last counting result		
F04.029	Trigger threshold for HTL input		
F04.030	Trigger threshold for HTL input		

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6.2.5. Keypad protection codes

F05		Range	Default
F05.033	Protected group F01	0 = no protection 1 – 999 999 = Protection code for the actual group	0
F05.034	Protected group F02		
F05.035	Protected group F03		
F05.036	Protected group F04		
F05.037	Protected group F05		
F05.038	Protected group F06		
F05.039	Protected group F07		
F05.040	Protected group F08		
F05.041	Protected group F09		
F05.042	Protected group F10		
F05.043	Protected group F11		
F05.044	Protected group F12		
F05.045	Protected group F13		

6.2.6. Key commands and control input definitions

F06		Range	Default
F06.050	Function assignment to key „UP" 0= No function 1= Reset counter 1 (encoder 1) 2= Reset counter 2 (encoder 2) 3= Reset counter 1 and counter 2 4= Set counter 1 to Preset 1 5= Set counter 2 to Preset 2 6= Set both counters to Preset 7= Inhibit counter 1 8= Inhibit counter 2 9= No function 10= Start serial transmission 11= Reset minimum/maximum records 12= Scroll actual display	0 … 12	0
F06.051	Function assignment to key „DOWN" See key „UP"	0 … 12	0
F06.052	Function assignment to key „ENTER" See key „UP"	0 … 12	0

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F06	(continued)	Range	Default
F06.053	Switching characteristics of input „Cont.1" 0= NPN (switch to -) function active LOW 1= NPN (switch to -) function active HIGH 2= NPN (switch to -) rising edge 3= NPN (switch to -) falling edge 4= PNP (switch to +), function active LOW 5= PNP (switch to +), function active HIGH 6= PNP (switch to +), rising edge 7= PNP (switch to +), falling edge	0 ... 7	0
F06.054	Function assignment to input „Cont.1" 0= No function 1= Reset counter 1 (encoder 1) 2= Reset counter 2 (encoder 2) 3= Reset counter 1 and counter 2 4= Set counter 1 to Preset 1 5= Set counter 2 to Preset 2 6= Set both counters to Preset 7= Inhibit counter 1 8= Inhibit counter 2 9= No function 10= Start serial transmission 11= Reset minimum/maximum records 12= Scroll actual display	0 ... 12	0
F06.055	Switching characteristics of input „Cont.2" See „Cont.1" (F06.053)	0 ... 7	0
F06.056	Function assignment to input „Cont.2" See „Cont.1" (F06.054)	0 ... 12	0
F06.057	Switching characteristics of input „Cont.3" See „Cont.1" (F06.053)	0 ... 7	0
F06.058	Function assignment to input „Cont.3" See „Cont.1" (F06.054)	0 ... 12	0
F06.059	Switching characteristics of input „Cont.4" See „Cont.1" (F06.053), however this input does not support edge-triggered function	0 ... 5	0
F06.060	Function assignment to input „Cont.4" See „Cont.1" (F06.054)	0 ... 12	0

Unconnected NPN inputs are always HIGH (internal pull-up resistor)

Unconnected PNP inputs are always LOW (internal pull-down resistor)

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6.2.7. Basic settings

F07		Range	Default
F07.062	Operation mode of the counter 0= „Single", encoder 1 only 1= „Sum", encoder 1 + encoder 2 2= „Differential", encoder 1 – encoder 2 3= Master counter and batch counter 4= Measuring of real cutting length 5= Calculation of roll diameters 6= Reserve 7= Reserve 8= Reserve	0 … 8	0
F07.063	Decimal point position of encoder 1	0 … 5	0
F07.064	Decimal point position of encoder 2	0 … 5	0
F07.065	Decimal point position combined <1&2>	0 … 5	0
F07.066	Scaling factor for combined values <1&2>	0.0001 – 9.9999	1.0000
F07.067	Divider for combined values*	0.0000 – 9.9999	1.0000
F07.068	Offset value for combined values	-199 999 … 999 999	0
F07.069	Brightness of the 7-segment LED display 0= 20% of maximum brightness 1= 40% of maximum brightness 2= 60% of maximum brightness 3= 80% of maximum brightness 4= 100% of maximum brightness	0 … 4	4

*Setting 0,0000 will skip the whole recalculation and speed up the cycle time

6.2.8. Analogue output definitions (optional)

F08		Range	Default
F08.074	Output format 0= Voltage 0 – 10 V 1= Voltage -10 V … 0 … +10 V 2= Current 0 – 20 mA 3= Current 4 – 20 mA	0 … 3	0
F08.075	Beginning of the conversion range With a display as entered here the analogue output will generate 0 volts or 0/4 mA	-199 999 … 999 999	0
F08.076	End of the conversion range With a display as entered here the analogue output will generate 10 volts or 20 mA	-199 999 … 999 999	10 000
F08.077	Analogue output swing (1000 = 10 V or 20 mA)	0 … 1000	1000
F08.078	Analogue zero offset (mV, zero displacement)	-10 000 … 10 000	0

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6.2.9. Serial communication parameters

F09		Range	Default
F09.081	Serial device address (unit number)	11 … 99	11
F09.082	Serial baud rate	0 … 6	0
	0= 9600 Baud 1= 4800 Baud 2= 2400 Baud 3= 1200 Baud 4= 600 Baud 5= 19200 Baud 6= 38400 Baud		
F09.083	Serial data format	0 … 6	0
	0= 7 Data, Parity even, 1 Stop 1= 7 Data, Parity even, 2 Stop 2= 7 Data, Parity odd, 1 Stop 3= 7 Data, Parity odd, 2 Stop 4= 7 Data, no Parity, 1 Stop 5= 7 Data, no Parity, 2 Stop 6= 8 Data, Parity even, 1 Stop 7= 8 Data, Parity odd, 1 Stop 8= 8 Data, no Parity, 1 Stop 9= 8 Data, no Parity, 2 Stop		
F09.084	Serial protocol select	0 … 1	0
	0= Transmission = Unit Nr. – Data, LF, CR 1= Transmission = Data, LF, CR		
F09.085	Serial timer (sec.) for timer transmissions	0.000 … 99.999	0
F09.086	Serial register code of the transmit parameter	0 … 19	0

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6.2.10. Switching characteristics and presets

F10		Range	Default
F10.089	Pulse time (sec.) output K1 (0 = static output)	0.00 … 9.99	0.00
F10.090	Pulse time (sec.) output K2 (0 = static output)		
F10.091	Pulse time (sec.) output K3 (0 = static output)		
F10.092	Pulse time (sec.) output K4 (0 = static output)		
F10.093	Switching hysteresis K1 (display units)	0 … 9999	0
F10.094	Switching hysteresis K1 (display units)		
F10.095	Switching hysteresis K1 (display units)		
F10.096	Switching hysteresis K1 (display units)		
F10.097	Switching characteristics K1	0 … 5	0
	0= active with display ≥ preselection 1= active with display ≤ preselection 2= active with display ≥ preselection, 0⟶counter. Remaining errors are cancelled 3= active with display ≤ preselection, Set⟶counter. Remaining errors are cancelled 4= active with display ≥ preselection, 0⟶counter Remaining errors added to following cycle 5= active with display ≤ preselection, Set⟶counter Remaining errors added to following cycle		
F10.098	Switching characteristics K2 (see K1, F10.097)	0 … 5	0
F10.099	Switching characteristics K3 (see K1, F10.097)		
F10.100	Switching characteristics K4 (see K1, F10.097)		
F10.101	Set value of the counter	0 … 1	
	0= Set value = Preset (1 or. 2) 1= Set value = Preselection K1 or K2		
F10.102	K1 – K4 outputs N.C or N.O	0 … 15	
	K1= binary value 1 K2= binary value 2 K3= binary value 4 K4= binary value 8		
	Bit = 0: Output switches ON when active (N.O.) Bit = 1: Output switches OFF when active (N.C.)		
	Example: Setting 9 means that K1 and K4 operate N.O. and K2 and K3 operate N.C		

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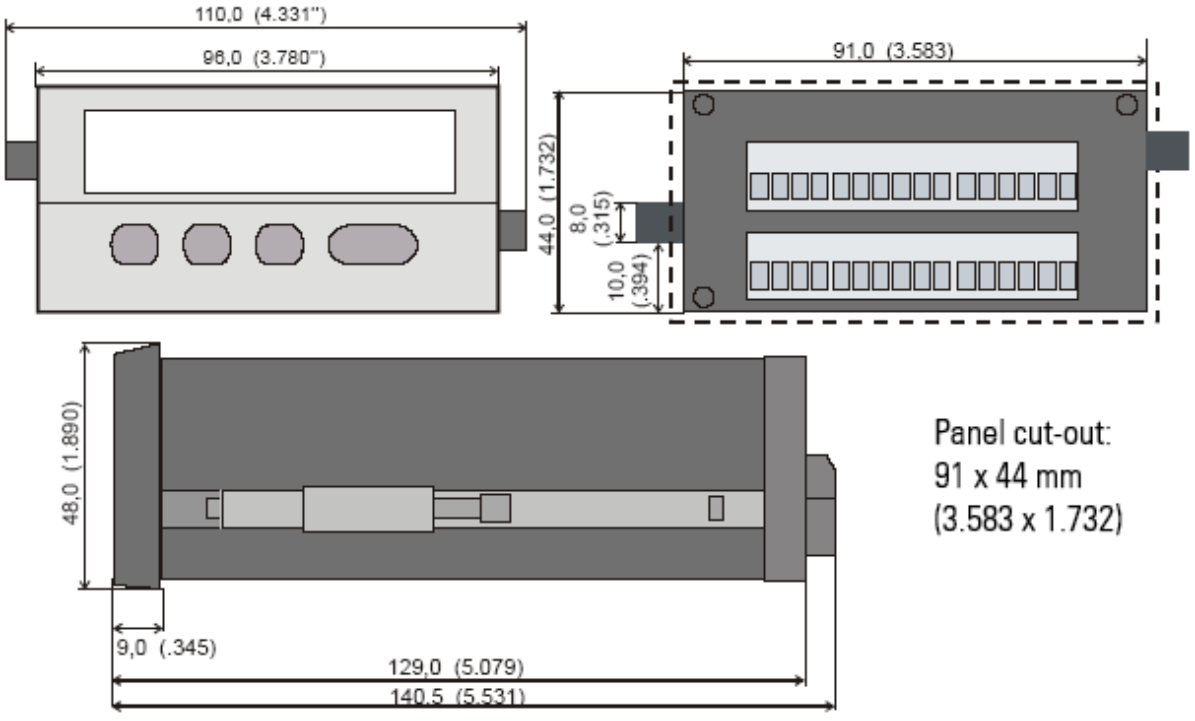
7. Specifications and Dimensions

AC power supply	:	24 V~ +/-10%, 15 VA
DC power supply	:	24V- (17 – 40V), approx. 100 mA (+ encoders)
Aux. encoder supply outputs:		2 x 5,2 VDC, 150 mA each 2 x 24V DC, 120 mA each (not with 1st series)
Inputs	:	2 universal encoder inputs 4 digital Control inputs HTL (Ri = 4,7 kΩ)
Outputs	:	4 fast power transistors 5 - 30V, 350 mA
Counting frequency	:	max. 500 kHz for each encoder
Serial link	:	RS232, 2400 – 38400 Bauds
Analogue outputs (optional)	:	0/4...20mA (load max.270 Ohm) 0…+/- 10V (load max. 2 mA)
Ambient temperature	:	Operation: 0 - 45°C (32 – 113°F) Storage: -25 - +70°C (-13 – 158°F)
Housing	:	Norly UL94 – V-0
Display	:	6 Digit, LED, high- efficiency red, 15mm
Protection class	:	Front IP65, rear IP20
Screw terminals	:	Cross section max. 1.5 mm²,
Conformity and standards:		EMC 89/336/EEC: EN 61000-6-2 EN 61000-6-3 LV73/23/EEC: EN 61010-1



Panel cut-out:
91 x 44 mm
(3.583 x 1.732)