control – motion – interface

Electronic Preset Counters
ZX122, ZX123

- 6 decade counter with two presets and relay outputs
- Bright LED display at 8 mm size
- Counting and preset range -199 999 to 999 999
- Operates as impulse counter, frequency counter, tachometer or timer
- Easy to set up via front keys and menu support
- Power supply: ZX122: 0 – 30 VDC   ZX123: 90 – 250 VAC

Operating Instructions

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:

Table of Contents

1. Inputs

1.1. INP A, INP B,

Counting inputs. Function according to operating mode. Maximum input frequency up to 20 kHz (depending on mode, can be reduced to 30Hz by selectable filter).

1.2. GATE

Static gate input, function depending on operating mode.

1.2.1. Counter mode:

Disables counter when High

1.2.2. Timer mode:

Enables Timer when input HIGH (gate.lo) or when input LOW (gate.hi.). Low order decimal point blinks when timer is active.

1.3. Reset

Dynamic Reset input. Resets to zero in count-up mode and presets to preset 2 in count-down mode. Input can be disabled by menu.

1.4. Key

Locks the front keys when HIGH.
The display select function remains active.

2. Outputs

2 potential free relay contacts

Active Outputs

Active outputs are indicated by status LED. For safety control applications the output function can be inverted (coil powerless when preset is reached)

Please note:
When you use automatic repeat functions, it is a must to define the pulse width of output 2, otherwise this output will not provide a defined signal.

3. Setting of Operational Parameters

a.   Keep key P down while you power up the unit.

b.   The display will show

$$\boxed{P\ r\ o\ L}$$

c.   When you release the key, the display shows the menu title and the actual value, in an alternating sequence of 1 sec. The "⬅"- key interrupts this sequence and the display shows only the actual value.

d.   Use the "⬆"- key to scroll the value up

e.   Use the "P"- key to store the actual value and continue with the next title

f.   The last title "EndPro" allows to select "Yes" (store all data and conclude setup) or "no" (run setup again to verify settings)

g.   For numeric entries like factors: see section 5. (Presets)

4. Programming Routine

Menu	Selection	Text	Description
`ModE`		Mode	The first step selects the basic function of the unit.
	`Count`	Count	Counter mode. Go to 4.1
	`timEr`	Timer	Timer mode. Go to 4.2
	`tAcho`	Tacho	Tachometer mode. Go to 4.3

4.1. Counter setup

4.1.1. Sub mode

Menu	Selection	Text	Description
`SModE`			
	`Add`	Add	<u>Incrementing.</u> Outputs active when counter $\geq$ preset. Reset to zero.
	`Sub`	Sub	<u>Decrementing.</u> Output 1 active when counter $\leq$ Preset 1. Output 2 active when counter $\leq$ 0. Reset to "Preset 2".
	`AddAr`	AddAr	<u>Adding/Auto Reset.</u> Outputs active when counter $\geq$ Preset. Automatic Reset upon counter = Preset 2. Reset to zero.
	`SubAr`	SubAr	<u>Subtracting/Auto Reset.</u> Output 1 active when counter $\leq$ Preset 1. Output 2 active when counter = 0. Automatic setting to Preset 2 when count = 0. Reset to Preset 2.

4.1.2. Input polarity

Menu	Selection	Text	Description
`InPoL`		InPol	
	`nPn`	nPn	NPN characteristics: switch input to 0
	`PnP`	PnP	PNP characteristics: switch input to +24V

4.1.3. 30 Hz bouncing filter

Menu	Selection	Text	Description
`FiLtEr`		Filter	
	`oFF`	oFF	Max. count frequency 20 kHz *)
	`on`	on	Max. count frequency 30 Hz

*) The maximum counting frequency depends on the counting mode, see „Specifications"

4.1.4. Input mode

Menu	Selection	Text	Description
`InPut`		Input	
	`Cntdir`	Cntdir	Input A: Count input Input B: Direction select up/down
	`uP .dn`	uP .dn	Differential Input A: increments Input B: decrements
	`quAd`	quAd	Quadrature up/down for A/B Signals with 2 x 90° of phase displacement
	`quAd 2`	quAd 2	Similar to "quad", but with impulse doubling. Counts every edge on input A.

4.1.5. Impulse scaling factor

Menu	Selection	Text	Description
`FActor`		FActor	
	`00.0001`	00.0001	Scales the input pulse with the factor set. Setting range 00.0001 to 99.9999.
	`99.9999`	99.9999	Setting "0" will not be accepted

4.1.6. Decimal point

Menu	Selection	Text	Description
`dP`		dP	Sets the decimal point of the display (Max. 3 decimal places) This setting does not affect the counter no decimal place
	`0`	0	one decimal place
	`0.000`	0000	0.00 two decimal places 0.000 three decimal places

4.1.7. Set / Reset mode

Menu	Selection	Text	Description
rESEt		rESEt	
	MAnEl	MAnEl	Manual Set/ Reset function by the red front key and electrical Set/ Reset by the rear input.
	no rES	No rES	All Set/ Reset functions disabled
	ELEctr	ELEctr	Electrical Set/ Reset only by input "Reset".
	MAnu	MAnu	Manual Set/ Reset only by the red front key.

4.1.8. Preset 1

Menu	Selection	Text	Description
PrES 1		PrES 1	
	oFF	oFF	Preset 1 unused and blanked out
	on	on	Preset 1 in use

4.1.9. Shape of output 1 signal

Menu	Selection	Text	Description
Out 1		Out 1	
	__⌐__		Static ON when count ≥ Preset 1 (incrementing) or count ≤ Preset 1 (decrementing)
	¯¯L__		Static OFF when count ≥ Preset 1 (incrementing) or count ≤ Preset 1 (decrementing)
	¯¯U¯¯		OFF Impulse when count ≥ Preset 1 (incrementing) or count ≤ Preset 1 (decrementing)
	__Π__		ON Impulse when count ≥ Preset 1 (incrementing) or count ≤ Preset 1 (decrementing)
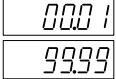
4.1.10. Output 1 impulse duration

Menu	Selection	Text	Description
Out 1		Out 1	
	00.01	00.01	Time adjustable from 0.01 sec to 99.99 sec.
	99.99	99.99	Setting 0.00 will not be accepted.

4.1.11. Shape of output 2 signal

Menu	Selection	Text	Description
`Out  2`			
	`__r__`		Fully similar to output 1, but with respect to preset 2.
	`__L__`		
	`__U__`		With decrementing modes, output 2 switches always at ≤ 0.
	`__U__`		

4.1.12. Output 2 impulse duration

Menu	Selection	Text	Description
`Out  2`			
	`00.01`		Similar to output 1
	`99.99`		

4.1.13. End of program

Menu	Selection	Text	Description
`EndPro`			
	`no`	no	Select "No" to return to the beginning of the menu for verification of settings
	`YES`	YES	Select "Yes" to store data and exit the menu

4.2. Timer setup

4.2.1. Timer Sub mode

Menu	Selection	Text	Description
`SΠodE`			
	`Add`	Add	<u>Incrementing timer</u>.
			Outputs active when time ≥ preset. Reset zero
	`Sub`	Sub	<u>Decrementing timer</u>.
			Output 1 active when time ≤ preset 1.
			Output 2 active when time ≤ 0. Reset to preset 2.
	`AddAr`	AddAr	<u>Incrementing timer</u> with auto Reset.
			Outputs active when time ≥ preset.
			Automatic Reset to zero when time = preset 2.
	`SubAr`	SubAr	<u>Decrementing timer</u> with auto Preset.
			Output 1 active when time ≤ Preset 1.
			Output 2 active when time ≤ 0.
			Automatic Reset to Preset2 when time =0.

4.2.2. Input polarity

Menu	Selection	Text	Description
`InPoL`		InPoL	
	`nPn`	nPn	NPN characteristics, switch input to 0
	`PnP`	PnP	PNP characteristics, switch input to 24V

4.2.3. Bouncing filter

Menu	Selection	Text	Description
`FiLtEr`		Filter	
	`oFF`	oFF	Electronic start/ stop inputs
	`on`	on	Mechanical start/ stop inputs

4.2.4. Timer Start and Stop

Menu	Selection	Text	Description
`StArt`		Start	
	`Inb.Inb`	Inb.Inb	Impulse on input B starts timer. Next impulse on input B stops timer. (Rising edge with PNP, Falling edge with NPN)
	`InA.Inb`	InA.Inb	Impulse on input A starts timer. Impulse on input B stops timer. (Rising edge with PNP, falling edge with NPN)
	`FrErun`	FrErun	Timer under static control of the Gate input. Inputs A and B are out of function.
	`Auto`	Auto	Timer sets resp. Resets by Reset input. With incrementing operation, it stops and waits upon Preset 2. With decrementing operation, it stops and waits upon zero. Any Reset signals while the timer counts will result in a stop. Inputs A and B have no function.

4.2.5. Operation of the GATE input

Menu	Selection	Text	Description
`GAtE`		GAtE	
	`LoActi`	LoActi	Timer counts when GATE Low
	`hiActi`	hiActi	Timer counts when GATE High

4.2.6. Timer Resolution

Menu	Selection	Text	Description
`tModE`		tModE	
	`SEC`	SEC	Timer counts in "seconds" and the setting of the decimal point determines the resolution.
	`Min`	Min	Timer counts in "minutes" and the setting of the decimal point determines the resolution.
	`hour`	Hour	Timer counts in "hours" and the decimal point setting determines the resolution.
	`hMinS`	hMinS	Timer counts hours : minutes : seconds and the decimal point setting will be skipped.

4.2.7. Decimal point

Menu	Selection	Text	Description
`dP`			
	`0`		0 Counts sec. or min, or h
	`0.000`		0.0 Counts 0.1 sec. or min. or h
			0.00 Counts 0.01 sec. – etc -

4.2.8. Reset Mode

Menu	Selection	Text	Description
`rESEt`		rESEt	
	`MAnEL`	MAnEL	Manual Set/ Reset function by the red front key and electrical Set/ Reset by the rear input.
	`no rES`	No rES	All Set/ Reset functions disabled
	`MAnu`	Manu	Manual Set/ Reset only by the red front key.
	`ELEctr`	ELEctr	Electrical Set/ Reset only by input "Reset".

4.2.9. Preset 1

Menu	Selection	Text	Description
`PrES  1`		PrES 1	
	`on`	On	Preset 1 in use
	`oFF`	oFF	Preset 1 unused and blanked out

4.2.10. Shape of output 1 signal

Menu	Selection	Text	Description
`Out   1`		Out 1	
	`__Γ__`		Static ON when count ≥ Preset 1 (incrementing) or count ≤ Preset 1 (decrementing)
	`‾‾L__`		Static OFF when count ≥ Preset 1 (incrementing) or count ≤ Preset 1 (decrementing)
	`‾‾U‾‾`		OFF Impulse when Count ≥ Preset 1 (Incrementing) or count ≤ Preset 1 (decrementing)
	`__Π__`		ON Impulse when Count ≥ Preset 1 (Incrementing) or count ≤ Preset 1 (decrementing)

4.2.11. Output 1 impulse duration

Menu	Selection	Text	Description
`Out  1`		Out 1	
	`00.01`	00.01	Time adjustable from 0.01 sec to 99.99 sec.
	`99.99`	99.99	Setting 0.00 will not be accepted.

4.2.12. Shape of output 2 signal

Menu	Selection	Text	Description
`Out  2`		Out 2	
	`__⌐__`		Fully similar to output 1, but with respect to preset 2. With decrementing operation, output 2 switches always at ≤ 0.
	`__L__`		
	`__∩__`		
	`__u__`		

4.2.13. Output 2 impulse duration

Menu	Selection	Text	Description
`Out  2`		Out 2	
	`00.01`	00.01	Similar to output 1
	`99.99`	99.99	

4.2.14. End of program

Menu	Selection	Text	Description
`EndPro`		EndPro	
	`no`	No	Select "No" to return to the beginning of the menu for verification of settings.
	`YES`	YES	Select "Yes" to store data and exit the menu

4.3.   Setup for tachometer or frequency counter

With this operation mode, Inputs B, Reset and Gate are out of function

4.3.1.   Input polarity

Menu	Selection	Text	Description
InPoL		InPoL	
	nPn	nPn	The count input must switch to "0"
	PnP	PnP	The count input must switch to "+".

4.3.2.   Input filter

Menu	Selection	Text	Description
FiLtEr		FiLter	
	oFF	oFF	Maximum input frequency 20 kHz
	on	on	Maximum input frequency 30 Hz

4.3.3.   Scaling factor

Menu	Selection	Text	Description
FActor		FActor	
	00.0001	00.0001	Scales the input frequency with the factor setting
	99.9999	99.9999	Range 0.0001 to 99.9999.
			Setting "0" will not be accepted.

4.3.4.   Decimal point

Menu	Selection	Text	Description
dP		dP	Adjustable between no decimal position and max. 3 decimal positions. This setting does not affect the numeric value of the frequency display.
			0 no decimal place
	0		0.0 one decimal place
	0.000		0.00 two decimal places
			0.000 three decimal places

4.3.5.   Display mode

Menu	Selection	Text	Description
diSPm		diSPm	
	SEC - 1	SEC - 1	The unit displays the frequency as number of impulses per second (Hz). (With factor setting 1.000)
	Min - 1	Min - 1	The unit displays the frequency as number of impulses per minute. (With factor setting 1.000)
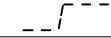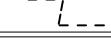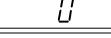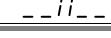
4.3.6. Maximum waiting time

Menu	Selection	Text	Description
`WAit0`		WAit0	This setting specifies the maximum waiting time from one input impulse to next, before the display sets to zero
	`01.1`	01.1	Range 1.1 sec. to 99.9sec.
	`99.9`	99.9	
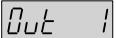
4.3.7. Preset 1

Menu	Selection	Text	Description
`PrES 1`		PrES 1	
	`on`	On	Preset 1 in use
	`oFF`	oFF	Preset 1 unused and blanked out
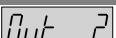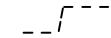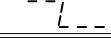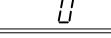
4.3.8. Shape of output 1 signal

Menu	Selection	Text	Description
`Out 1`		Out 1	
	`⌐`		Static ON when display ≥ Preset 1.
	`L`		Static OFF when display ≥ Preset 1.
	`U`		OFF Impulse when display ≥ Preset 1.
	`Π`		ON Impulse when display ≥ Preset 1.

4.3.9. Output 1 impulse duration

Menu	Selection	Text	Description
`Out 1`			
	`00.01`		Time adjustable from 0.01 sec to 99.99 sec.
	`99.99`		Setting 0.00 will not be accepted.

4.3.10. Shape of output 2 signal

Menu	Selection	Text	Description
`Out 2`		Out 2	
	`⌐`		Fully similar to output 1, but with respect to preset 2
	`L`		
	`U`		
	`U`		

4.3.11. Output 2 impulse duration

Menu	Selection	Text	Description
`Out 2`		Out 2	
	`00.01`	00.01	Similar to output 1
	`99.99`	99.99	

4.3.12. End of program

Menu	Selection	Text	Description
`EndPro`		EndPro	
	`no`	no	Select "No" to return to the beginning of the menu for verification of settings.
	`YES`	YES	Select "Yes" to store data and exit the menu

5. Preset setting

Press key P to change the display from normal to Preset 1. Press P again to see Preset 2. About 4 seconds after the last key action, the display automatically returns to the operation state and changes of the preset values are stored.

Exception: In the timer mode the unit accepts the new setting immediately.

When you see the preset value, choose the decade by the" ← " key. The selected decade always blinks in a seconds cycle.
Key " ↑ " increments the decade selected.
The high order decade increments from "9" to "-" and to   "-1"and then to "0" again.
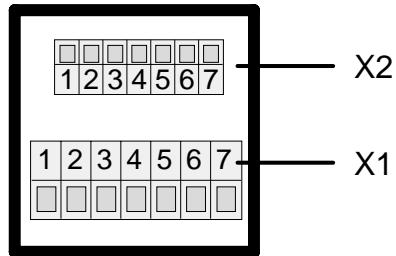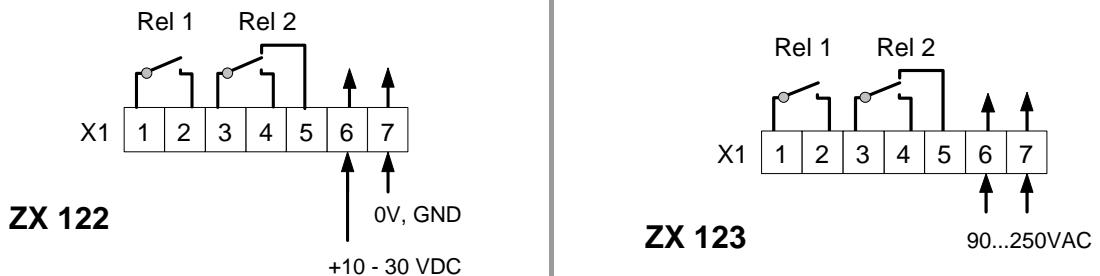
For automatic repeat operation you must never set negative values to preset 2
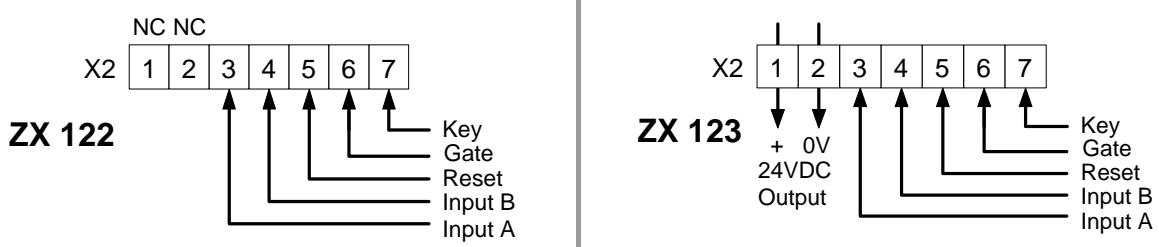
6.   Terminal Assignment

```
        ┌─────────────────────┐
        │   ┌──────────────┐   │
        │   │□□□□□□□│      ─── X2
        │   │1 2 3 4 5 6 7│   │
        │   └──────────────┘   │
        │                      │
        │  ┌──────────────────┐│
        │  │1 2 3 4 5 6 7│    ─── X1
        │  ├──────────────────┤│
        │  │□ □ □ □ □ □ □│     │
        │  └──────────────────┘│
        └─────────────────────┘
```

X1: Power Supply and Relay Outputs

Rel 1 Rel 2		Rel 1 Rel 2
X1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |		X1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
ZX 122 0V, GND		**ZX 123**
+10 - 30 VDC		90...250VAC

X2 : Inputs

NC NC

X2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

ZX 122

- Key
- Gate
- Reset
- Input B
- Input A

X2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

ZX 123

+   0V
24VDC
Output

- Key
- Gate
- Reset
- Input B
- Input A
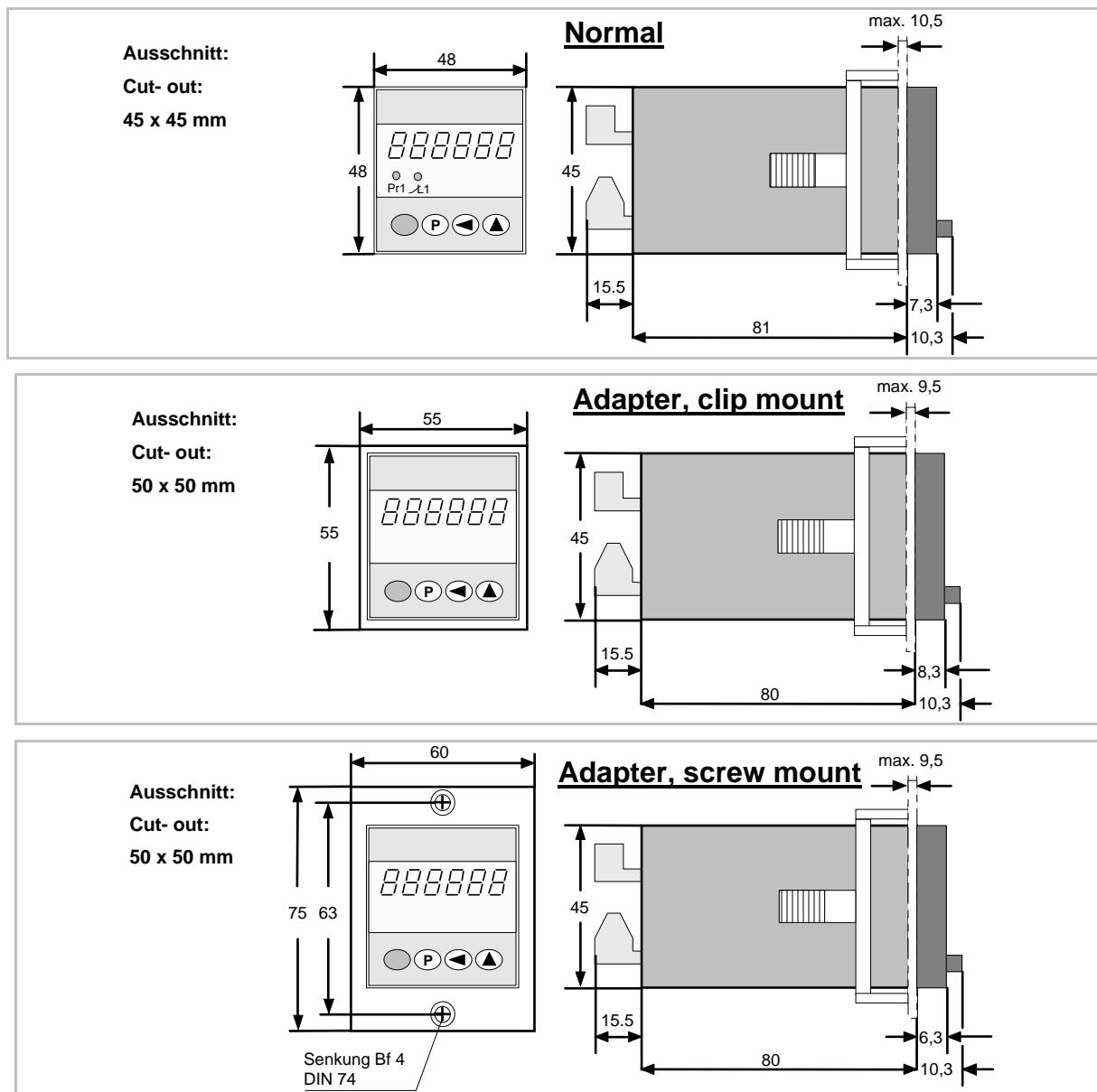
7. Specifications

Power supply	:	ZX 122: 10 - 30 VDC, max 1,2 W ZX 123: 90 - 250VAC, max 7 VA
Display	:	LED 8 mm, 6 decades
Inputs	:	PNP / NPN, Ri = 10 kOhms
Counting frequency	:	20 kHz (A only) 10 kHz (quadrature A/ B, 90°) 1.2 kHz (Auto- Repeat) 700 Hz (Auto- Repeat x 2)
Minimum pulse width	:	Inputs Reset, Gate, Key: 5 msec.

Trigger thresholds	:	ZX 122: Low = 0....0.2xUB
		             High = 0.6 UB....30 VDC
		ZX123: Low = 0....4 VDC
		             High = 12....30VDC

Pulse shape	:	not important (Trigger inputs)
Accuracy (Tachometer)	:	better than 0.1%
Accuracy (Timer)	:	± 50ppm
Output Relays	:	AC: Max 250 V / 750 VA DC: Max 125 V / 50 W, Min. 30 mA / Max. 3 A
Response time relays	:	Typ. 7 msec.
Power down memory	:	10 years or one million of storage cycles
Aux. voltage output	:	24 VDC +/- 15%, max 100 mA (ZX 123 only!)
Ambient temperature	:	-10°C ... +50 °C (14°F ... 122°F)
Storage temperature	:	-25°C ... +70°C (-13°F ... 158°F)
Weight	:	Approx. 200 g
Protection class (front)	:	IP 65
Conformity and standards	:	EMC 89/336/EEC: EN 61000-6-2 EN 61000-6-3 LV73/23/EEC: EN 61010-1

8.   Dimensions

Normal

Ausschnitt:
Cut- out:
45 x 45 mm

48 / 48 / Pr1 ⟂1 / P

max. 10,5 / 45 / 15.5 / 81 / 7,3 / 10,3

Adapter, clip mount

Ausschnitt:
Cut- out:
50 x 50 mm

55 / 55 / P

max. 9,5 / 45 / 15.5 / 80 / 8,3 / 10,3

Adapter, screw mount

Ausschnitt:
Cut- out:
50 x 50 mm

60 / 75 63 / P / Senkung Bf 4 DIN 74

max. 9,5 / 45 / 15.5 / 80 / 6,3 / 10,3

9.   Delivery includes

- Counter ZX122 or ZX123
- Screw terminal (7 pos.) Pitch 5,8 mm
- Screw terminal (7 pos.) Pitch 3,81 m
- Frame for screw mounting Cut-out 50 x 50mm
- Frame for clamp mounting Cut-out 50 x 50mm
- Clamping clip
- Seal
- Template for cut- out