ifm electronic

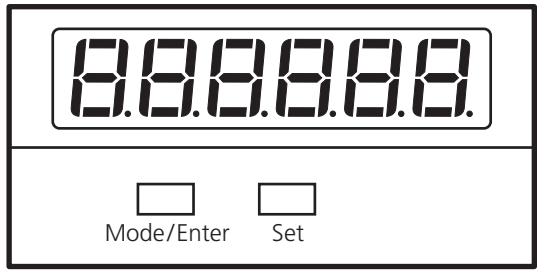
CE

Device manual
Multifunction display and evaluation system

UK

ecomat200®

FX 360



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Safety instructions

This manual is part of the unit. It contains texts and diagrams for the correct handling of the unit and must be read before installation or use.

Follow the operating instructions. Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or handling can result in damage to the unit or injury to the person using the equipment.

The unit must only be installed, connected and activated by a qualified electrician.

Disconnect the unit externally before handling it. Also disconnect any independently-supplied relay load circuits.

The external 24 V DC voltage has to be generated and supplied externally according to the requirements for safe extra-low voltage (SELV) as this voltage is supplied near the operating elements and at the terminals for the supply of connected pulse pick-ups without further safety measures.

The wiring of all signals concerning the SELV circuit of the unit must also meet the SELV criteria (safe extra-low voltage, safe galvanic separation from other circuits).

If 24 V DC is switched with the potential-free outputs, these only correspond to the ELV criteria.

In case of malfunctioning of the unit or uncertainties please contact the manufacturer. An unauthorised access of the unit can lead to considerable risks for the safety of persons and plant. It is not permitted and leads to an exclusion of liability and warranty.

Inhalt

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1 Function and features

The multifunction display FX 360 is a universal unit for the display and evaluation of physical parameters which can be derived from pulses.

The function of the unit is variable due to the setting of different parameters and can thus be adapted to the individual application.

The input pulses are processed according to the principle of period measurement. By means of the programmable scaling factor e.g. rotational speed, speeds, quantities or processing times can be calculated and displayed on the basis of the incoming pulse frequency.

2 Technical data

Order no.	DX2001	DX2002	DX2003
Operating voltage AC	115/230 V (± 12.5%)		
Operating voltage DC	24 V (16...35 V)		
Current consumption (without pulse pick-up)	120 mA (18 V); 95 mA (24 V); 80 mA (30 V)		
Power consumption	7,5 VA		
Sensor supply	24 V DC; ±15%; 150 mA		
Inputs current consumption input level HTL max input frequency max. input frequency Reset Accuracy of the frequency measuring	3 (pnp, npn/NAMUR); short-circuit protection 5.1 mA at 24V level (Ri = 4,7 kOhm) Low 0..3.5 V; High 9...35 V 25 kHz (= min. pulse length 0.02 ms) 1 kHz (= min. pulse length 1 ms) ±1 ppm; ±1 digit		
Analogue output Resolution Accuracy Response time Current (voltage output) Load (current output)	–	0/4...20 mA; ±10 V 14 bits (+ sign) 1% 300 ms max. 2 mA max. 300 Ω	–
Switching output Voltage range max. current rating per output	–	–	2 optocouplers; pnp 5...35 V DC max. 150 mA
Display	7-segment LEDs, high-efficiency orange; 15 mm; 6 positions		
Operating temperature	0 ... +45°C		
Storage temperature	-25 ... +75°C		
Protection housing/terminals	IP 65 (front) / IP 20		
EMC	Radiation of interference: EN 50081-1 Noise immunity: EN 50082-2		
Housing material	Noryl UL94-V-0		
Weight	410 g		
Connection	10 screw terminals ...1.5 mm² (DC supply and signals) 4 screw terminals ... 2.5 mm² (AC supply)		

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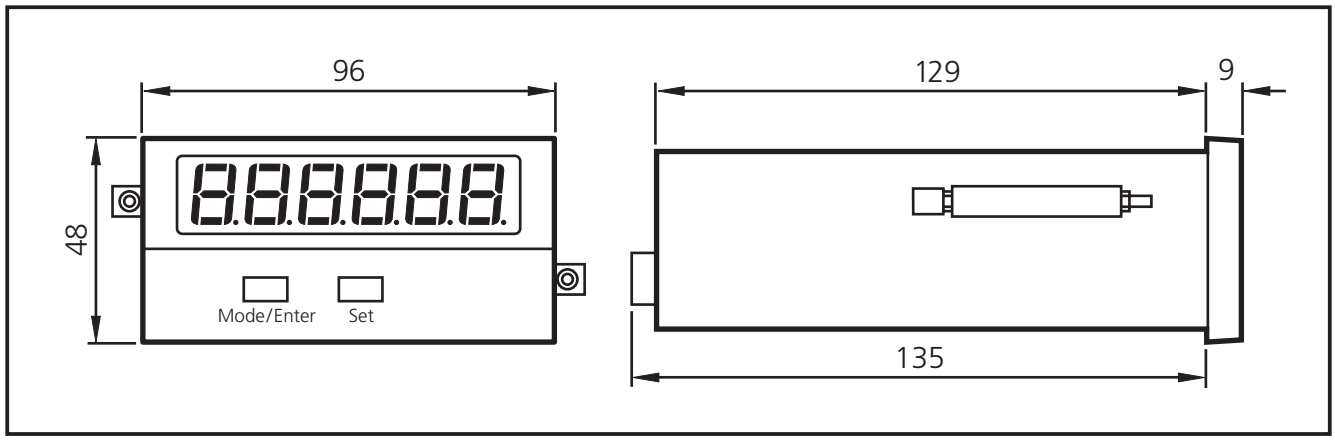
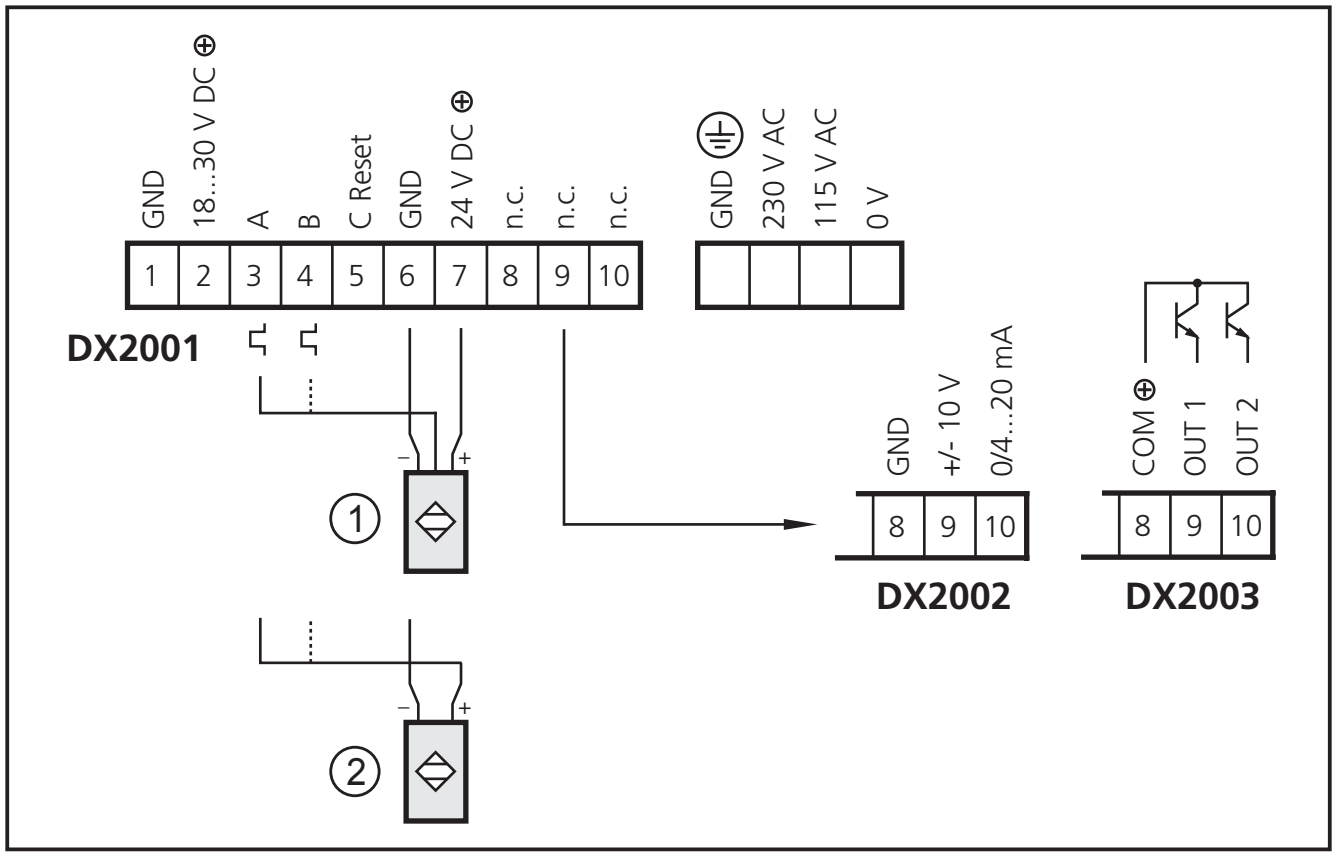
3 Dimensions and mounting



Mount the unit with two screws in the control panel, cutout 91 x 44 mm.

4 Electrical connection

4.1 Terminal connection



If NAMUR pulse pick-ups are used in Ex areas, a suitable separating amplifier must be connected between the NAMUR pulse pick-up and the FX360.

1: e.g. 3-wire DC
2: e.g. 2-wire NAMUR npn

Disconnect the installation.

Note when earthing GND:
In this case all digital and analogue reference potentials are earthed.
Double earthing in case of DC supply must be avoided (e.g. if the negative pole of the supply voltage has already been earthed externally).
The PE connection is internally connected to the ground of the unit. But it is not necessary for safety or EMC.

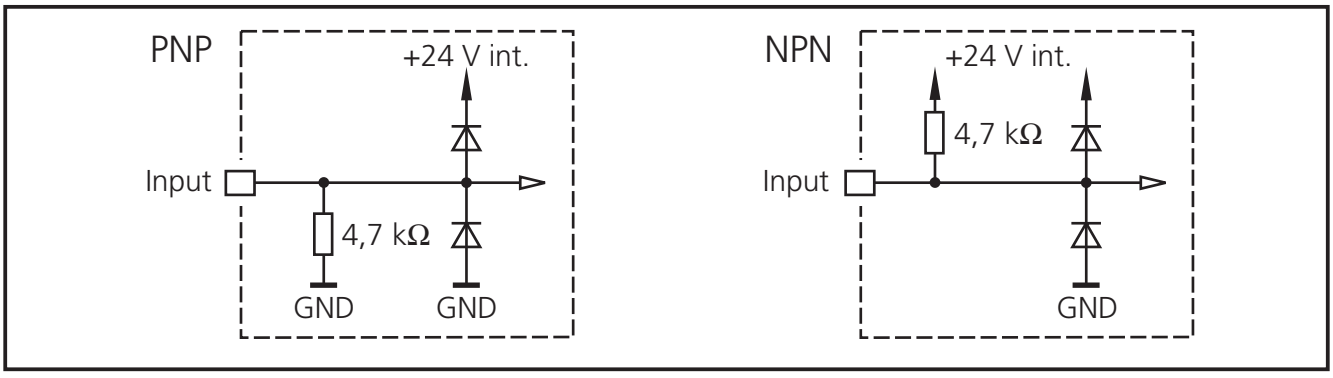
4.2 Inputs A, B and Reset

The basic setting (PNP or NPN) refers to all 3 inputs. If 2-wire NAMUR sensors are used, NPN must be selected.

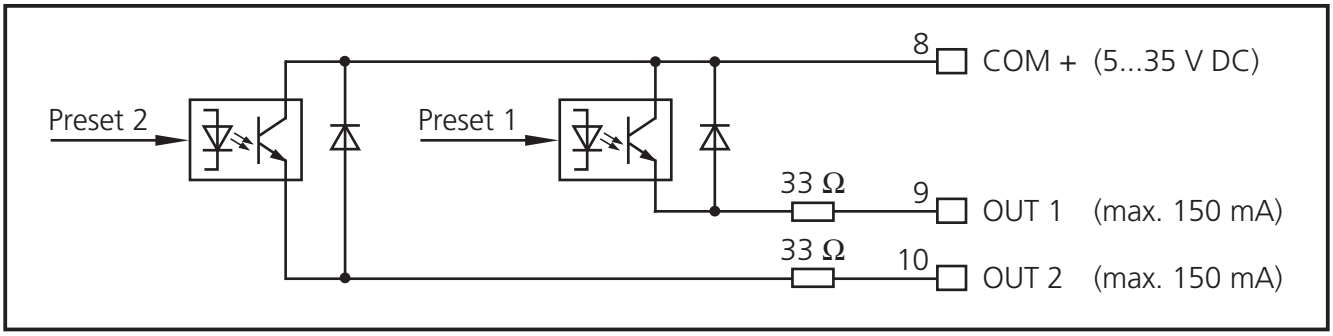
All functions are “active HIGH“ independent of the selected basic setting and the unit evaluates the positive edges.
As an open RESET input is on HIGH in case of NPN setting, it must always be externally connected to GND potential, otherwise the unit is permanently in the RESET state and not operational.

If mechanical contacts are used as pulse source a capacitor should be connected between GND (-) and the corresponding input (A/B) for debouncing (e.g. 10 µF limits the input frequency to 20 Hz).

4.3 Input circuit



4.4 Optocoupler transistor outputs (only DX2003)



When inductive loads are switched an additional, external damping of the coil by means of a diode is recommended.

5 Functions of the programming buttons

The unit is operated and parameterised by means of 2 buttons on the front.

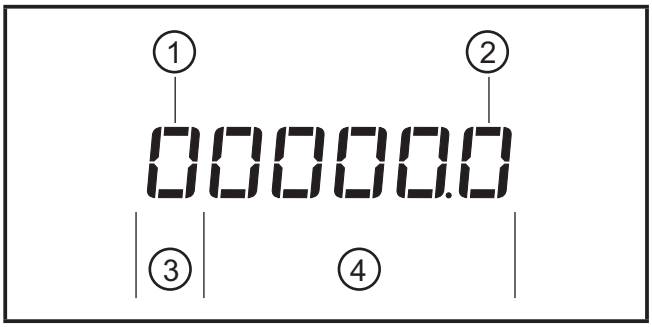
- The [Mode/Enter] button scrolls the individual menu points and stores a selection or a numerical value.
- With the [Set] button a menu point is selected, the respective selection is made or a numerical value is entered.

5.1 Numerical entries and signs

For numerical entries the lowest decade flashes first.

Press the [Set] button briefly to change to the next decade.

By continuously pressing the [Set] button the numerical value of the flashing decade changes (cyclical scrolling 0, 1, 2, ... 9, 0, 1, 2, etc.).
When the [Set] button is released the last displayed numerical value is maintained and the next higher decade flashes.



1. Highest decade
2. Lowest decade
3. Sign
   Display „0“ corresponds to positive (+).
4. Numerical values

When the highest decade has been set, the lowest decade flashes again.

The highest decade for the sign only changes between „0“ (positive) and „-“ (negative). „0“ for positive values is not displayed during operation.

5.2 Storing of entries

The [Mode/Enter] button is pressed to store a numerical value or a selection; at the same time the unit switches to the next menu point.

If the unit is to switch from the programming routine back to the operating mode, the [Mode/Enter] button has to be pressed for at least 3 seconds.

5.3 Display of the output status (only DX2003)

Press the [Mode/Enter] button during operation.

One of the following messages is displayed for about 2 seconds:

1_20FF	Switching outputs 1 and 2 blocked
1_2 On	Switching outputs 1 and 2 switched
1 On	Switching output 1 switched (switching output 2 blocked)
2 On	Switching output 2 switched (switching output 1 blocked)

Note: A set decimal point continues to be displayed and is not significant.

5.4 Returning to the factory preset

Press the [Mode/Enter] button and at the same time switch on the unit supply (see also chapter 9 “Factory preset”).

5.5 Time-out function

If during the programming no button is pressed for more than 10 seconds, the unit switches one menu level higher or back into the operating mode. Entries which have not been confirmed with [Mode/Enter] are not taken into account.

5.6 Locking of the buttons

Enabling or disabling of the programming buttons is carried out in the basic menu, menu point “Code”. If access has been denied, the display shows [- - - - - -] each time a button is pressed.

Inputs are possible if the button sequence [Mode/Enter]–[Set]–[Mode/Enter]–[Set]–[Mode/Enter]–[Set] is entered within 10 seconds. Otherwise the unit automatically switches back to the normal display.

6 Overview of the operating modes

6.1 RPM

Operating mode for the display of frequency, rotational speed and speed

The frequency is determined by means of period measurement on the basis of the input signals. By entering 2 reference values the frequency can be converted into a rotational speed [min^{-1}] or into a speed with any unit (km/h, m/h, m/s, etc.) and displayed.

In principle the conversion corresponds to a “simple” rule of three, i.e. a required quantity is derived from 2 known reference values.

Apart from unit-specific parameters (switching functions or characteristics of the analogue output) the following parameters support this operating mode:

- reference frequency [Hz, whole numbers]
- reference displayed value
- decimal point
- reset time (change of the display to “0” if no further pulses are provided)
- filter (averaging)

Example display of rotational speed [min^{-1}] for a shaft with 1 or 2 switching cams:

e.g. 1 cams x 60 min^{-1} = 60 pulses/min = reference frequency 1 Hz
→ = reference displayed value 60
e.g. 2 cams x 60 min^{-1} = 120 pulses/min = reference frequency 2 Hz
→ = reference displayed value 60

6.2 Time

Operating mode for displaying a processing time (reciprocal rotational speed)

Time corresponds to the operating mode RPM. Only the reciprocal value of the determined rotational speed [min^{-1}] is displayed. Processing times of objects which move for example an oven, a drying plant or a galvanic bath, can be displayed in this way.

Like in the operating mode RPM 2 known reference values are required.

Apart from the unit-specific information (switching functions or characteristics of the analogue output) the following parameters support this operating mode:

- selection of the time unit (seconds, minutes, etc.)
- reference frequency [Hz, whole numbers]
- reference displayed value
- reset time
- filter

For details and descriptions of the individual operating parameters as well as input possibilities see chapter 8 “Operating parameters ”.

6.3 Timer

Operating mode for time measurements and stop-watch function

By different use of the inputs A/B e.g. operating hours can be counted or the cycle times for periodic processes can be measured and displayed.

The following 3 display/evaluation variants are available:

- duration of a HIGH signal on input A
- HIGH signal on input A starts a time measurement,
  HIGH signal on input B stops the time measurement
- period, i.e. time between 2 HIGH signals on input A (rising edges)

6.4 Count

Operating mode for typical counting operations

Counting of quantities and events is enabled by means of adding or subtracting pulse inputs A and B. Measurements of distance or angles by means of shaft encoders are possible as well.

The operating mode offers 6 different counting modes (A+B, A-B, etc.).

6.5 Speed

Operating mode for calculating speed on the basis of elapsed time

The basis of this operating mode is the pulse train between inputs A/B.

The input pulses are generated by detecting passing objects with e.g. optical sensors. The measurement of the elapsed time is started with a HIGH signal on input A; it is stopped with a HIGH signal on input B.

Also for this operating mode 2 known reference values are required.

- Reference time = time interval between 2 passing objects [s]
- Reference displayed value = resulting speed to be displayed [any unit]

6.6 Note on the power failure protection

The operating modes **Timer** and **Count** include a power failure protection to store the values last determined.

6.7 Note on the automatic start-up delay (only DX2003)

If in the operating modes **RPM** or **Time** the preset value 1 (Preset 1) is used to monitor a minimum value (characteristics LE) an automatic start-up delay is active. This start-up delay remains active after the unit is switched on again, until the preset value 1 is exceeded for the first time.

7 Basic settings

The basic menu contains

- the selection of the operating mode,
- the characteristics of the pulse inputs (PNP or NPN),
- the setting of the display brightness,
- the locking of the programming buttons,

as well as depending on the unit

- the characteristics of the analogue output (only DX2002),
- the switching function and hysteresis of the switching outputs (only DX2003)

7.1 Activating the basic menu

Press [Mode/Enter] and [Set] at the same time for about 3 seconds.

7.2 Basic menu

Menu point	Selection	Description	
tYPE		Type	Operating mode
	rPn	RPM ◙	frequency, rotational speed, speed
	t inE	Time	display of processing time
	t inEr	Timer	stopwatch, industrial timer
	Count	Count	position counter, event counter
	SPEEd	Speed	display of speed measured from elapsed time
CHAr		Char	Characteristics of the pulse inputs
	PnP	PNP ◙	switch to +
	nPn	NPN	switch to - (NAMUR)
br iGht		Bright	Display brightness [%]
	100	100 ◙	20, 40, 60, 80 or 100
	80		

Menu point	Selection	Description	
CodE		Code	Locking of the buttons
	no	no ◙	buttons always enabled
	ALL	ALL	buttons disabled for all functions
	PFrEE	PFrEE	(only DX2003) buttons disabled for all functions with the exception of the preset values Pres1 and Pres2.
		Additional basic settings (see following pages)	
		Analogue input (DX2002)	
		Switching outputs (DX2003)	

◙ = factory preset

7.3 Additional basic settings for unit with analogue output (DX2002)

Menu point	Selection	Description	
A-CHAr		A-Char	Analogue mode
	- 10_ 10	-10_10 ◙	±10 Volts (bipolar)
	0 _ 10	0_10	0...10 Volt
	0_20	0_20	0...20 mA
	4_20	4_20	4...20 mA
OFFSEt		Offset	Zero point
	-9.999 ... 9.999		Determines the current value/voltage value which is provided for the AnaBeg-value (see also operating parameters). If e.g. Offset = 0 the analogue output provides 0 V or 0/4 mA for the AnaBeg value. If e.g. Offset = 5 000 the analogue output already provides 5 V or 10 mA for the displayed AnaBeg value. Default = 0.000

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Menu point	Selection	Description	
GAin		Gain	Deviation
	00.00 ... 99.99		Here the requested analogue range is set. If e.g. Gain = 10.00 this corresponds to a range of 10 V or 20 mA. If e.g. Gain = 2.00 this corresponds to a range of 2 V or 4 mA. Default = 10.00

■ = factory preset

7.4 Settings for unit with switching outputs (DX2003)

Menu point	Selection	Description	
CHAr 1		Char 1	Characteristics output 1
	_J¯ GE	GE ■	Greater/Equal Output 1 becomes statically HIGH, if displayed value ≥ preset value 1.
	_J¯ LE	LE	Lower/Equal Output 1 becomes statically HIGH, if displayed value ≤ preset value 1. ⚠ For min/max monitoring: Output 1 only becomes statically HIGH, if the previously displayed value > preset value 1
	_⊓_ GE	GE	Greater/Equal (fleeting pulse, 300 ms) Output 1 becomes dynamically HIGH, if displayed value ≥ preset value 1.
	_⊓_ LE	LE	Lower/Equal (fleeting pulse, 300 ms) Output 1 becomes dynamically HIGH, if displayed value ≤ preset value 1. ⚠ For min/max monitoring: Output 1 only becomes dynamically HIGH, if the previously displayed value > preset value 1.
	_J¯rES	Res	Fleeting pulse (300 ms) and automatic reset to zero if displayed value ≥ preset value 1.
	_⊓_SEt	Set	Fleeting pulse (300 ms) and automatic setting to preset value 1 if displayed value ≤ zero.

Menu point	Selection	Description	
CHAr 2		Char 2	Characteristics output 2
	_J- GE	GE ◙	Greater/Equal Output 2 becomes statically HIGH, if displayed value ≥ preset value 2.
	_J- LE	LE	Lower/Equal Output 2 immediately becomes statically HIGH, if displayed value ≤ preset value 2.
	_n_ GE	GE	Greater/Equal (fleeting pulse, 300 ms) Output 2 becomes dynamically HIGH, if displayed value ≥ preset value 2.
	_n_ LE	LE	Lower/Equal (fleeting pulse, 300 ms) Output 2 immediately becomes dynamically HIGH, if displayed value ≤ preset value 2.
	_J- 1-2	1–2	Output switches statically if displayed value ≥ preset value 1 - preset 2 *).
	_n_ 1-2	1–2	Output switches dynamically if displayed value ≥ preset value 1 - preset 2 *).
*) Serves to generate a “presignal“ at constant intervals to a main signal (e.g. creep speed-stop). The switch point of output 2 automatically changes each time preset 1 is changed.			

◙ = factory preset

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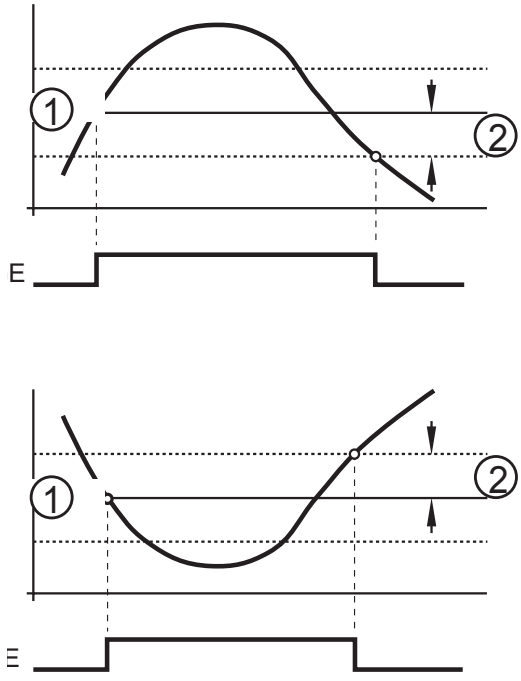
7.5 Hysteresis of unit with switching outputs (DX2003)

Menu point	Selection	Description	
HYSt 1		HYSt 1	Hysteresis output 1
	0 ... 99999		Determines the switching hysteresis to the set switch point output 1. The hysteresis is only effective for the operating modes **RPM** and **Time** in connection with the switching characteristics "⌐ GE" and "⌐ LE" (see left). The operating direction of the hysteresis depends on the switching characteristics. GE = preset – hysteresis LE = preset + hysteresis  1: Preset 2: Hysteresis
			The decimal point settings are maintained. Preset = 0
HYSt 2		HYSt 2	Hysteresis output 2
	0 ... 99999		like above, for output 2

8 Operating parameters

The operating parameters are selected by pressing the [Mode/Enter] button for 3 seconds. The display only shows parameters which are relevant to the previously selected operating mode (RPM, Time, Timer, Count, or Speed).

8.1 RPM: Operation as frequency meter, rpm counter, tachometer

Menu point	Selection	Description	
PrES 1		PreSelection	Preset value 1 (only DX2003)
	-99999...99999		Default output 1 = 10000
PrES 2		PreSelection	Preset value 2 (only DX2003)
	-99999...99999		Default output 2 = 5000
FrEqu		Frequency	Reference frequency [Hz]
	1...25000		Typical input frequency of the application as reference value. Default = 1000
diSPL		Display	Displayed reference value
	1...99999		Numerical value which is to be displayed at the above reference frequency (without taking into account the decimal point) Default = 1000
dPoint		Dpoint	Decimal point
	000000		Requested position of the decimal point of the displayed reference value. Default = 0.000
	00000.0		
	0000.00		
	000.000		
	00.0000		
	0.00000		
LJAit		Wait	Reset time [s]
	0.1...99.9		Waiting time until display switches to 0 if there are no input pulses. Default = 1.0

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Menu point	Selection	Description	
F iLtEr		Filter	Number of mean-value cycles
	OFF		In order to avoid display fluctuations in case of unstable input frequencies. Default = OFF (Filter OFF)
	2		
	4		
	8		
	16		
AnAbEG		AnaBeg/-End	Analogue beginning/end (only DX2002)
	-99999...99999		Here a defined part of the whole measuring range can be scaled to the selected analogue range. If e.g. AnaBeg = 1500 and AnaEnd = 2100, the analogue output generates the defined output value in case of displayed value 1500 and the defined final value in case of displayed value 2100. Default AnaBeg = 0; AnaEnd = 10000
AnAEnd			
	-99999...99999		

■ = factory preset

8.2 Time: Operation as processing time display (reciprocal rotational speed)

Menu point	Selection	Description	
PrES 1		PreSelection	Preset value 1 (only DX2003)
	-99999...99999		Default output 1 = 10000
PrES 2		PreSelection	Preset value 2 (only DX2003)
	-99999...99999		Default output 2 = 5000
diSFor		Display Format	Selection of the time unit
	SEC	SEC	integer seconds
	mi n	min	integer minutes
	mi-SE	mi-SE	minutes:seconds (9999:59)
	mi n.00	min.00	minutes with 2 decimal places The decimal point is automatically set when the format is selected.

Menu point	Selection	Description	
FrEQu		Frequency	Reference frequency [Hz]
	1...25000		Typical input frequency of the application as reference value. Default = 1000
diSPL		Display	Displayed reference value
	1...999999		Numerical value which is to be displayed at the above reference frequency (without taking into account the decimal point). Default = 1000
LJAit		Wait	Reset time [s]
	0.1...99.9		Waiting time until display switches to 0 if there are no input pulses. Default = 5.0
FiLtEr		Filter	Number of mean-value cycles
	OFF		In order to avoid display fluctuations in case of unstable input frequencies. Default = OFF (Filter OFF)
	2		
	4		
	8		
	16		
AnABEG		AnaBeg/-End	Analogue beginning/end (only DX2002)
	-99999...99999		Here a defined part of the whole measuring range can be scaled to the selected analogue range. If e.g. AnaBeg = 1500 and AnaEnd = 2100, the analogue output generates the defined output value in case of displayed value 1500 and the defined final value in case of displayed value 2100. Default AnaBeg = 0; AnaEnd = 10000
AnAEnd			
	-99999...99999		

◙ = factory preset

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8.3 Timer: Operation as stopwatch, industrial timer

In this operating mode open NPN inputs are always “HIGH” and open PNP inputs are always “LOW”.

Menu point	Selection	Description	
PrES 1		PreSelection	Preset value 1 (only DX2003)
	-99999...99999		Default output 1 = 10000
PrES 2		PreSelection	Preset value 2 (only DX2003)
	-99999...99999		Default output 2 = 5000
bASE		Base	Time basis/resolution
	SEC.000	SEC.000 ◙	1/1000 seconds
	SEC.00	SEC.00	1/100 seconds
	SEC.0	SEC.0	1/10 seconds
	SEC	SEC	integer seconds
	mn.00	min.00	minutes with 2 decimal points
	mn.0	min.0	minutes with 1 decimal point
	H-mn-S	H-m-S	hours:minutes:seconds
StArt		Start	
	H_Lo	High_Low	Time is counted as long as input A is “HIGH”.
	St_SP	Start_Stop ◙	Rising edge on input A initiates time count, rising edge on input B stops time count
	A_StSP	A_StSP	Period measurement Cyclical indication of the time between two rising edges on input A.
rESEt		Auto-Reset	
	no	NO ◙	Time count accumulates, no automatic reset during the next start. Reset to zero must be made via the reset input.
	YES	YES	With each start the new time count automatically starts at zero.
LAtcH		Latch	Storage display
	no	NO ◙	The elapsing time is displayed.

Menu point	Selection	Description	
	YES	YES	The display stores the end result of the last time count while the new time count runs in the background.
AnAbEG		AnaBeg/-End	Analogue beginning/end (only DX2002)
	-99999...99999		Here a defined part of the whole measuring range can be scaled to the selected analogue range. Default AnaBeg = 0; AnaEnd = 10000
AnAEnd			
	-99999...99999		

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■ = factory preset

8.4 Count: Operating mode as counter

Menu point	Selection	Description	
PrES 1		PreSelection	Preset value 1 (only DX2003)
	-99999...99999		Default output 1 = 10000
PrES 2		PreSelection	Preset value 2 (only DX2003)
	-99999...99999		Default output 2 = 5000
mode		Mode	Counter mode
	A_bdir	A_Bdir	Input A is the counter input. Input B determines the direction of counting: LOW = up HIGH = down
	A u b	AuB	Sum, counts pulses A + pulses B.
	A - b	A-B	Difference, counts pulses A - pulses B.
	A_b.1	A_B.1 ■	Up/down counter for pulses shifted by 90°, one-fold edge evaluation (x1).
	A_b.2	A_B.2	p/down counter for pulses shifted by 90°, two-fold edge evaluation (x2).
	A_b.4	A_B.4	Up/down counter for pulses shifted by 90°, four-fold edge evaluation (x4).
FActor		Factor	Pulse assessment fact
	0.0001...9.9999		If e.g. 1.2345 is set the unit displays the value 12 345 after 10 000 pulses. Default = 1.0000
SEt		Set	Set value

Menu point	Selection	Description	
	-99999...99999		In case of a reset command the counter is set to the basic value set here. Default = 0
rESEt		Reset	Execution of the reset command
	no	NO	No set/reset possible.
	Front	Front	Set/reset via [Set] button on the front.
	E_tErn	Extern	Set/reset via reset input.
	Fr u E	Fr u En	Set/reset via [Set] button on the front and via reset input.
dPo int		Dpoint	Decimal point
	000000		Sets the decimal point to the displayed position. Default = 000000 (no decimal point)
	00000.0		
	0000.00		
	000.000		
	00.0000		
	0.00000		
AnAbEG		AnaBeg/-End	Analogue beginning/end (only DX2002)
	-99999...99999		Here a defined part of the whole measuring range can be scaled to the selected analogue range. If e.g. AnaBeg = 1500 and AnaEnd = 2100, the analogue output generates the defined output value in case of displayed value 1500 and the defined final value in case of displayed value 2100. Default AnaBeg = 0; AnaEnd = 10000
AnAEnd			
	-99999...99999		

8.5 Speed: Display of speed measured from elapsed time

Input A serves as start input and input B as stop input for a speed measurement from elapsed time. On the basis of this the unit determines the speed of a passing object.

Menu point	Selection	Description	
PrES 1		PreSelection	Preset value 1 (only DX2003)
	-99999...99999		Default output 1 = 10000
PrES 2		PreSelection	Preset value 2 (only DX2003)
	-99999...99999		Default output 2 = 5000
t imE		Time	Measuring time (reference time) [s]
	1...999999		Typical run time of the application as reference value. Default = 1000
d iSPL		Display	Displayed value (speed reference)
	1...999999		Numerical value (speed) which is to be displayed at the above reference time (without taking into account the decimal point). Default = 1000 e is counted as long as input A is “HIGH”.
dPoint		Dpoint	Decimal point
	000000 00000.0 0000.00 000.000 00.0000 0.00000		Requested position of the decimal point at displayed reference value. Default = 00000 (no decimal point)
tWAit		Wait	Reset time [s]
	0.0...99.9		Waiting time until display switches to 0 if there are no input pulses. If “0” is entered the last value is displayed until a new speed is calculated on the basis of new input pulses. Default = 10.0

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Menu point	Selection	Description	
AnAbEG		AnaBeg/-End	Analogue beginning/end (only DX2002)
	-99999...99999		Here a defined part of the whole measuring range can be scaled to the selected analogue range. Default AnaBeg = 0; Default AnaEnd = 10000
AnAEnd			
	-99999...99999		

■ = factory preset

9 Factory preset

	Designation	Display text	Min value	Max value	Default
Basic menu plus...	operating mode	tYPE	0	4	RPM
	NPN/PNP	CHAr	0	1	PNP
	brightness	briGht	0	4	100%
	code	CodE	0	2	NO
DX2002	analogue mode	A-CHAr	0	3	±10 V
	offset	OFFSEt	-9.999	9.999	0.000
	gain	GAin	00.00	99.99	10.00
DX2003	characteristics 1	CHAr 1	0	5	⌐ GE
	characteristics 2	CHAr 2	0	5	⌐ GE
	hysteresis 1	HYSt 1	0	99999	0
	hysteresis 2	HYSt 2	0	99999	0
RPM	reference frequency	FrEqu	1	25000	1000
	reference display	diSPL	1	99999	1000
	decimal point	dPoint	0	5	0.000
	reset time	WAit	0.1	99.9	1.0
	filter (mean value)	FiLtEr	0	4	OFF
Time	display format	diSFor	0	3	SEC
	reference frequency	FrEqu	1	25000	100
	reference display	diSPL	1	999999	100
	reset time	WAit	0.1	99.9	5.0
	filter (mean value)	FiLtEr	0	4	OFF

	Designation	Display text	Min value	Max value	Default
Timer	resolution	bASE	0	6	SEC.000
	start/stop	StArt	0	2	Start_Stop
	auto reset	rESEt	0	1	NO
	storage display	LAtcH	0	1	NO
Count	counter mode	modE	0	5	A_B. 1
	factor	FActor	0.0001	9.9999	1.0000
	set value	SEt	-199999	199999	0
	reset/set	rESEt	0	3	Fr u E
	decimal point	dPoint	0	5	000000
Speed	measuring time (run time)	timE	1	999999	1000
	displayed value	diSPL	1	999999	1000
	decimal point	dPoint	0	5	000000
	reset time	WAit	0.0	99.9	10.0
additional unit-specific operating parameters	preset value 1	PrES 1	-199999	999999	10000
	preset value 2	PrES 2	-199999	999999	5000
	analogue begin	AnAbEG	-199999	999999	0
	analogue end value	AnAEnd	-199999	999999	10000

10 Maintenance, repair, disposal

As the unit does not contain any components to be maintained by the user, the housing must not be opened. Only the manufacturer is allowed to repair the unit.

The unit must be disposed of according to the valid national environmental regulations.

11 Declaration of conformity

The CE mark is applied on the basis of the EMC guideline EMC 89/336/EEC, stipulated in the standards EN 500 81-1 and EN 500 82-2 as well as the low voltage guideline LS73/23/EEC, stipulated in the standard EN 61010.