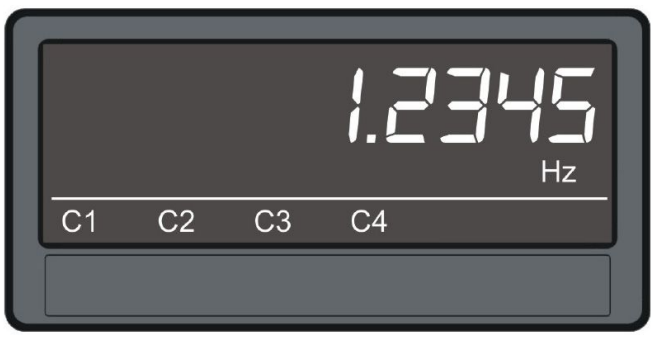
Operating instructions
Multifunction displays for digital signals

UK

FX460



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Contents

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1 Preliminary note

Technical data, approvals, accessories and further information at www.ifm.com.

1.1 Symbols and warnings used

► Instructions
> Reaction, result
[…] Designation of keys, buttons or indications
→ Cross-reference

Important note
Non-compliance may result in malfunction or interference.

Information
Supplementary note.

WARNING!

Warning of serious personal injury. Death or serious irreversible injuries may result.

CAUTION!

Warning of personal injury.
Slight reversible injuries may result.

NOTE!

Warning of damage to property

2 Safety instructions

- The described unit is a subcomponent to be integrated into a system. The builder of the system is responsible for the safety of the system. It is the system builder’s responsibility to perform a risk assessment and to draft a documentation, in accordance with legislation and standard requirements, to be provided to the system operator and the system user. The documentation must contain all information and safety instructions required by the operator, the user and, if applicable, by any service personnel authorised by the builder of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ 3 Functions and features).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- In case of malfunctions of the unit, please contact the manufacturer. Tampering with the unit is not allowed.
- Installation, electrical connection, set-up, programming, configuration, operation and maintenance of the product must be carried out by personnel qualified and authorised for the respective activity.
- Protect units and cables against damage.
- Replace damaged units, since otherwise the technical data and safety will be impaired.

3 Functions and features

This device must only be used in industrial machines and installations. Other uses do not comply with the regulations and are the sole responsibility of the user. The manufacturer is not liable for damage caused by improper use. The device must only be installed in compliance with the instructions and only be used and operated in a perfect technical condition that is in accordance with the technical data. The device is neither suited for explosion-protected areas nor for areas that are excluded in DIN EN 61010-1.

3.1 Product characteristics:

- Multifunction device with operating modes such as speed sensor, counter, processing time display, position display, timer for operating times, stop watch or process display
- HTL pulse pick-up / sensor inputs with PNP, NPN or NAMUR inputs
- 7-segment display with symbols and units
- Parameter setting via clear text and touch screen
- 24 VDC auxiliary voltage output for sensor supply (DX202x devices)
- Input frequency up to 250 kHz
- Functions such as scaling, filters, start-up delay
- Standardised 96 x 48 mm housing for panel mounting and protection rating IP65 (front)

4 Installation

The device may only be installed and operated in an environment that is in accordance with the permissible temperature range. Provide sufficient ventilation and avoid direct contact of the unit with hot or aggressive gases or liquids.

Before installation and maintenance works, the unit must be disconnected from all voltage sources. Also ensure that contact with disconnected voltage supply wires is prevented.

Devices that are supplied via AC may only be connected via switches or circuit breakers to the low voltage supply system. This switch must be positioned close to the device and clearly marked as disconnecting device.

Ingoing and outgoing cables for extra-low voltage must be separated from dangerous live cables (SELV circuits) by double and/or reinforced insulation.

The choice of all cables and their insulation must guarantee that they comply with the permissible voltage and temperature range. Moreover, both device and country-specific standards are to be observed that apply to the cables with regard to their structure, shape and quality. Please view the technical data for specifications concerning permissible wire cross-sections for the screw terminal connections.

Before set-up, all connections and cables must be checked if they are tightly fitted in the screw terminals. All (even unused) screw terminals must be turned to the right up to the end stop and thereby reliably attached, so that they cannot get loose due to shocks and vibration.

Voltage spikes on the connections of the device are to be limited to the values of overvoltage category II.

With regard to installation conditions, wiring, environmental conditions as well as screening and grounding of connected cables, the general standards for control cabinet construction in the machine industry as well as the manufacturer's specific screening instructions apply.

5 General

The device is designed as panel-mounting display unit for HTL pulses.

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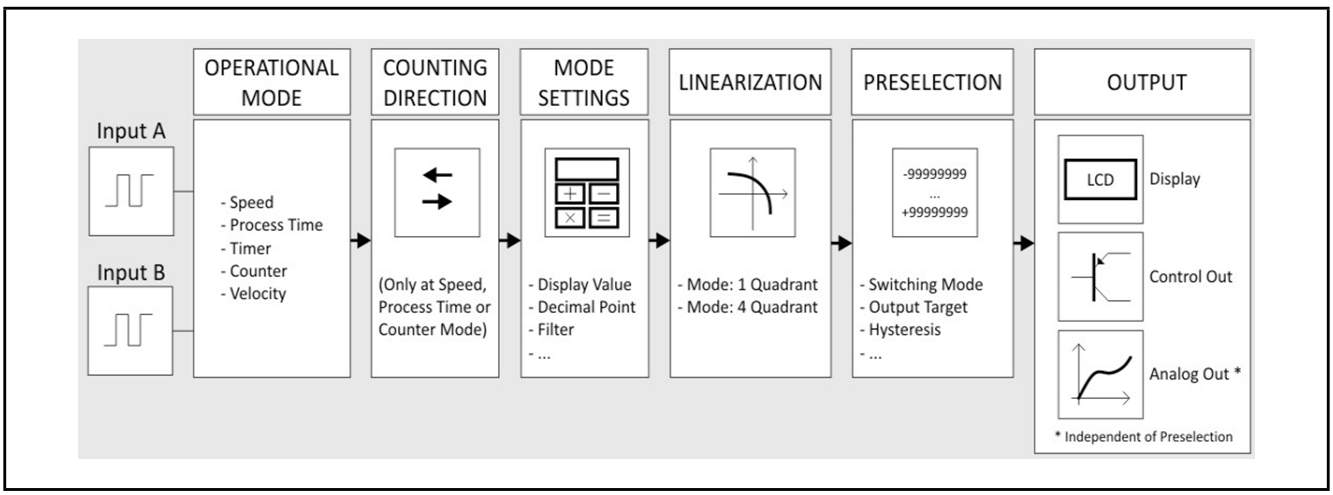
5.1 Operating mode

In general, all functions can be configured in the parameter menu. The device can be operated in the following display modes:

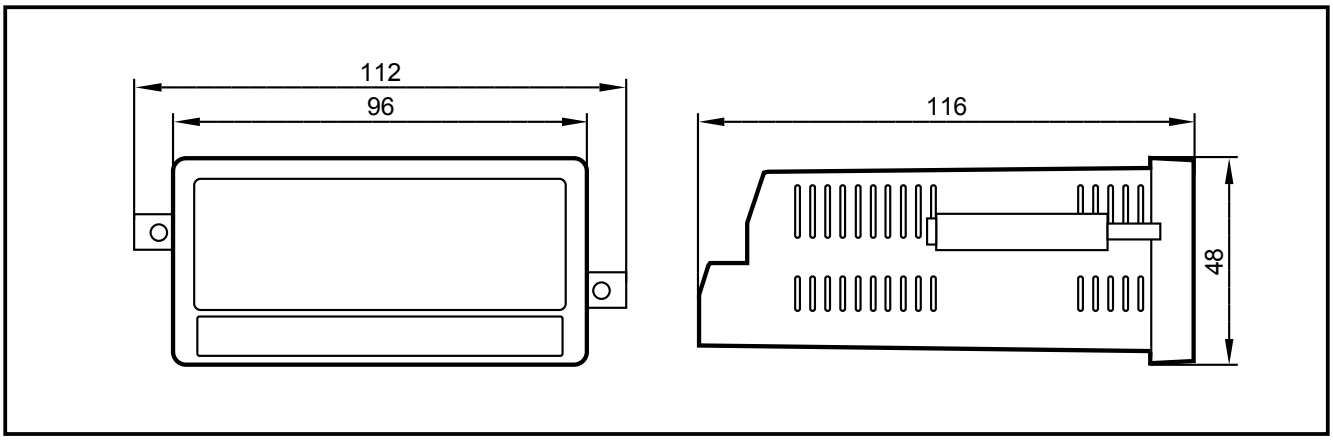
- Speed:
  Indication of rotational speed (RPM), operation as tachometer or for frequency measurement. Only input A is active. Input B is unused.
- Process time:
  Operation as baking time or processing time display (reciprocal rotational speed). Only input A is active. Input B is unused.
- Timer:
  Operation as stop watch. Start and stop functions are freely configurable. Depending on the parameter setting, only input A or inputs A and B are active.
- Counter:
  Operation as position display, pulse, totalisator, differential, up or down counter. Inputs A and B are active.
- Velocity:
  Speed indication from operating time measurement. Input A serves as start input and input B as stop input.

In addition, the devices can be used for control and regulating purposes. Monitoring limits such as maximum speed, minimum speed, standstill or a window function is also possible.



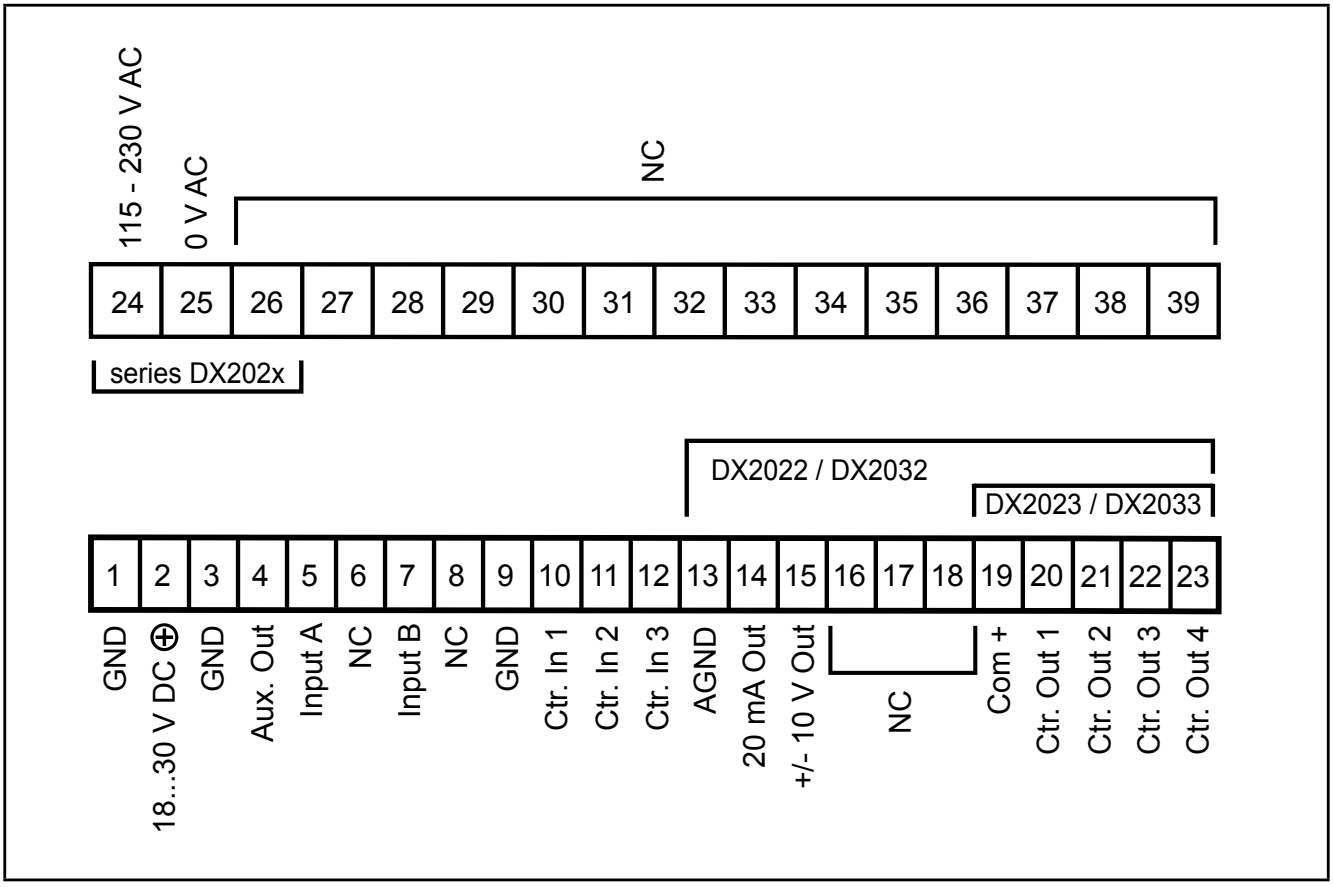
Function diagram

6 Dimensions and mounting



► Make a panel cut-out (91 x 43 mm) and fix the device into the panel with the 2 screws.

7 Electrical connection



Connections on the rear of the housing

The terminals 16, 17 and 18 must not be used.

7.1 DC voltage supply

The device can be supplied with direct voltage between 18 and 30 VDC via the terminals 1 and 2. The current consumption depends, among other things, on the level of the supply voltage and the setting and is typically at appr. 100 mA plus the sensor current consumed at the auxiliary voltage output.

All GND connections are internally connected with each other.

7.2 Auxiliary voltage output

Auxiliary voltage for pulse pick-up /sensor supply is provided at terminals 3 and 4.

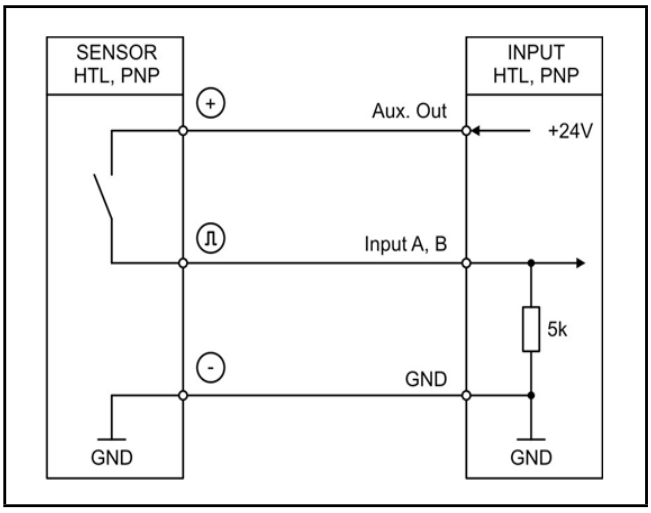
The output voltage depends on the device supply:

- In case of DC device supply, the output voltage is approx. 1 V less than the supply voltage applied at terminals 1 and 2 and the max. load must not exceed 250 mA.
- In case of AC device supply, the output voltage is 24 VDC (± 15%) and the max. load must not exceed 150 mA at temperatures up to 45 °C. At higher temperatures the max. output current is reduced to 80 mA.

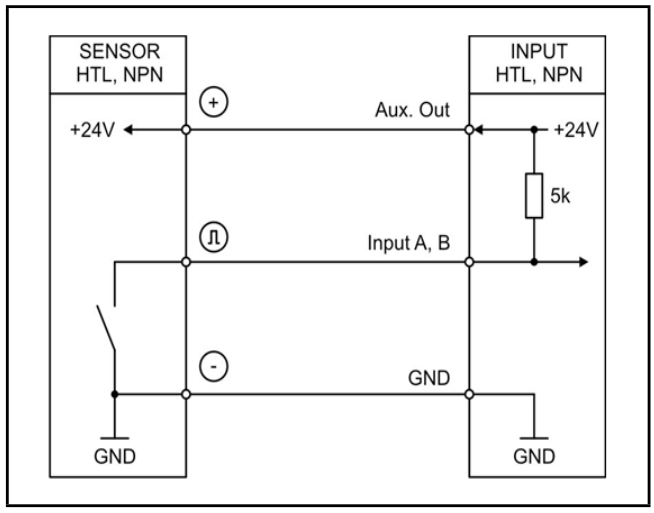
7.3 Incremental inputs A, B

On terminals 5 and 7, two pulse inputs for HTL signals are available. The characteristic (PNP, NPN, Namur or Tri-State) of the incremental inputs can be set in the GENERAL MENU.

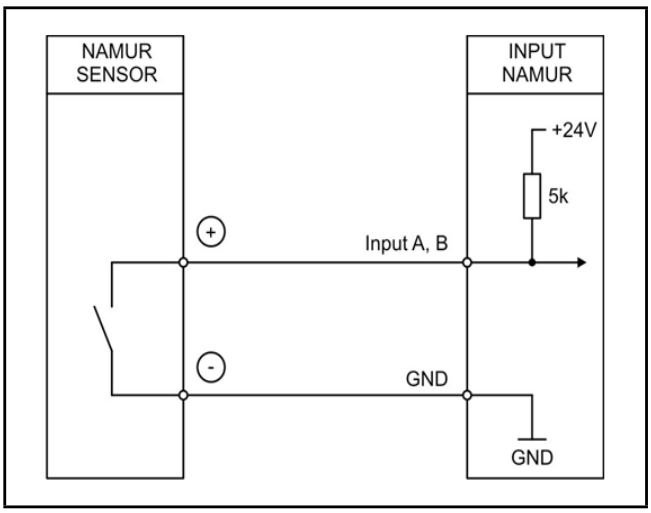
Connection of the incremental inputs:



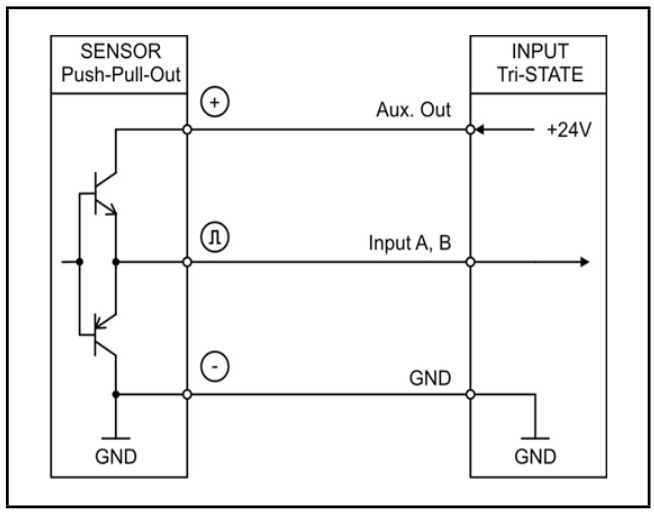
PNP



NPN



Namur



Tri-State

Open PNP inputs are generally "LOW" and open NPN inputs "HIGH".

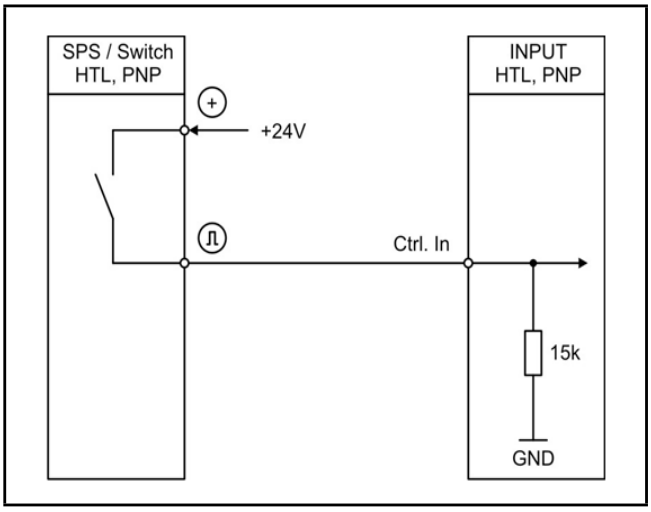
The input stages are designed for electronic pulse pick-ups.

Remark on mechanical switching contacts:
If mechanical contacts are to be used as pulse source, a standard, external capacitor of about 10 µF must be connected to the terminals between GND (-) and the corresponding input (+). This damps the maximum input frequency to approx. 20 Hz and contact bouncing is suppressed.

7.4 Control inputs

On terminals 10, 11 and 12, three control inputs with HTL-PNP characteristic are available.

These inputs can be configured in the COMMAND MENU and are used for functions that can be triggered externally such as resetting the display value, changing the display, locking buttons of the touch screen or releasing the latching of control outputs.



Connection of the control inputs

Open control inputs are generally "LOW".

The input stages are designed for electronic control signals.

Remark on mechanical switching contacts:
If mechanical contacts are to be used as pulse source, a standard, external capacitor of about 10 µF must be connected to the terminals between GND (-) and the corresponding input (+). This damps the maximum input frequency to approx. 20 Hz and contact bouncing is suppressed.

7.5 Analogue output (DX2022, DX2032)

On terminals 13 and 14 / 15, a 16 bit analogue output is available.

This output can be configured and scaled in the ANALOG MENU. The following configuration is possible:

- Voltage output: -10 … +10 V
- Voltage output: 0 … 20 mA
- Voltage output: 4 … 20 mA

The analogue output is proportional to the source and refers to the AGND potential.

AGND and device GND are internally connected.

Parallel operation of voltage and current output is not permitted.

7.6 Control outputs (DX2022, DX2023, DX2032, DX2033)

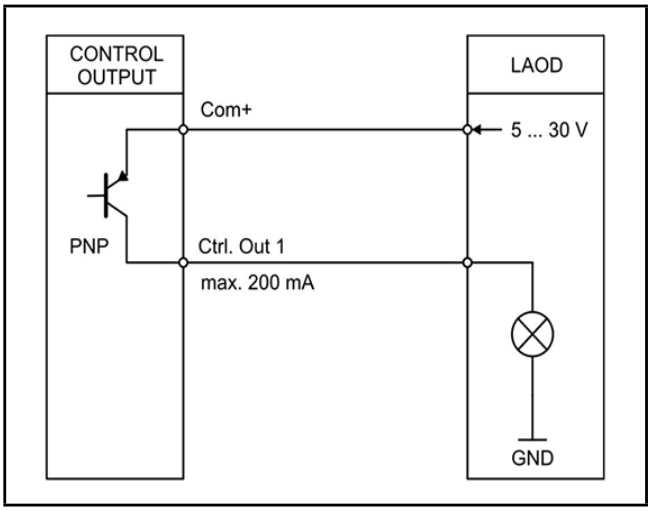
On terminals 20, 21, 22 and 23, four control outputs are available.

The switching conditions can be set in the PRESELECTION MENU.

The outputs Ctrl. Out 1 – Ctrl. Out 4 are fast PNP outputs with a switching capacity of 5 – 30 V / 200 mA per channel.

The switching voltage is determined by the voltage at terminal 19 (Com+).

To switch inductive loads, external damping measures are recommended.



Connection of the control outputs

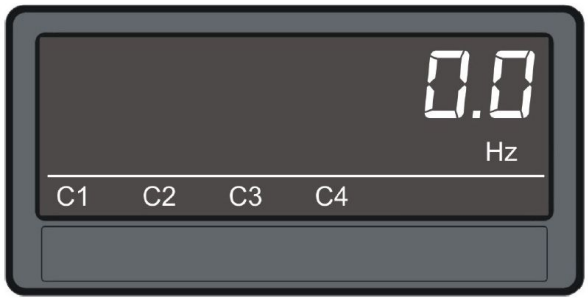
7.7 AC voltage supply (DX2021, DX2022, DX2023)

On terminals 24 and 25, the device can be supplied with an alternating voltage between 115 and 230 V AC. The power consumption depends, among other things, on the level of the supply voltage and the setting and is at approx. 3 VA plus the sensor current consumed at the auxiliary voltage output.

8 Operation / touch screen

8.1 Display for parameter setting

The individual parameter menus and their parameters are described in a separate chapter (→ 9 Parameter / menu overview).

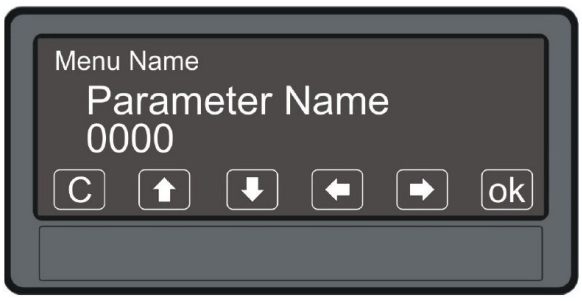


Device parameter setting:

In order to be able to set device parameters, the touch screen must be pressed for 3 seconds.

Select menu:

The required parameter menu can be selected via the arrow keys and confirmed with ok.
To close the menu selection, press C.



Select parameter:

The required parameter can be selected via the arrow keys and confirmed with ok.
To close the parameter selection, press C.

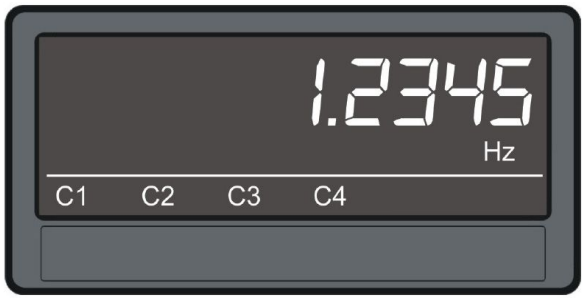
Edit parameters:

When the parameter value is flashing, it can be edited via the arrow keys and stored with ok.
To close the editing mode, press C.

Parameter changes are only active after quitting the menu selection.

8.2 Display during operation

The following displays are available. Depending on the device version and the selected operating mode, only certain visualisations are possible.



Display with unit and status line:

In order to access the next display, you need to tap the touch screen.

Only for DX2022, DX2023, DX2032 and DX2033.

Display in counter and batch counter / total counter mode or in timer and total counter mode:

In order to access the next display, you need to tap the top of the touch screen.

Only for COUNT MODE A+B / A-B or TOTAL TIME MODE.

Two-line display with units:

In order to access the next display, you need to tap the touch screen.

Only for COUNT MODE A+B / A-B or TOTAL TIME MODE.

Large display (4-digit):

In order to access the next display, you need to tap the touch screen.

Only if LARGE DISPLAY parameter is activated

Display of the keyboard commands:

In order to access the next display, you need to tap the top of the touch screen.

Only in the operating modes TIMER and COUNTER

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Display with quick-start function to enter the preselection values:

In order to access the next display, you need to tap the top of the touch screen or "Skip".

Only for DX2022, DX2023, DX2032 and DX2033.

Display with min / max value indication:

In order to access the next display, you need to tap the top of the touch screen or "SKIP".

8.3 Error messages

Error message in the display	Description
ERROR: MAXIMUM DISPLAY VALUE	Display value of the one-line display is greater than + 99 999 999.
ERROR: MINIMUM DISPLAY VALUE	Display value of the one-line display is smaller than - 99 999 999.
ERROR: MAX. TOP DISPLAY VALUE	Upper display value of the two-line display is greater than + 99 999 999.
ERROR: MIN. TOP DISPLAY VALUE	Upper display value of the two-line display is smaller than - 99 999 999.
ERROR: MAX. DOWN DISPLAY VALUE	Lower display value of the two-line display is greater than + 99 999 999.

Error message in the display	Description
ERROR: MIN. DOWN DISPLAY VALUE	Lower display value of the two-line display is smaller than - 99 999 999.
ERROR: MAX. LARGE DISPLAY VALUE	Display value of the large display is greater than + 9999.
ERROR: MIN. LARGE DISPLAY VALUE	Display value of the large display is smaller than - 9999.

The described error messages are automatically reset as soon as the corresponding display value is again in the range that can be displayed.

9 Parameter / menu overview

9.1 Overview

This section gives an overview of the individual menus and their parameters. The menu name is always in bold characters. The respective parameters are arranged directly under the menu name. Default values are greyed out. Depending on the device version and the selected operating mode only certain menus are displayed.

The following menu structure is valid for software version 06B or higher.

Menü / Parameter	Menü / Parameter
GENERAL MENU	WAIT TIME (S)
OPERATIONAL MODE	STANDSTILL TIME (S)
ENCODER PROPERTIES	AVERAGE FILTER
COUNTING DIRECTION	
SCALE UNITS	**MODE TIMER**
SCALE UNITS (BATCH)	TIME BASE
LINEARIZATION MODE	START / STOP
PIN PRESELECTION	AUTO SET / RESET
PIN PARAMETER	LATCH FUNCTION
BACK UP MEMORY	SET VALUE
FACTORY SETTINGS	INC / DEC MODE
	TOTAL TIME MODE
MODE SPEED	TOTAL TIME SET VALUE
DISPLAY VALUE	
BASE FREQUENCY (HZ)	**MODE COUNTER**
DECIMAL POINT	COUNT MODE
SAMPLING TIME (S)	FACTOR
WAIT TIME (S)	SET VALUE
STANDSTILL TIME (S)	DECIMAL POINT
AVERAGE FILTER	BATCH / TOTAL MODE
FOR/REV DETECTION	BATCH / TOTAL SET VALUE
	ROUND LOOP VALUE
MODE PROCESS TIME	
DISPLAY FORMAT	
DISPLAY VALUE	
BASE FREQUENCY (HZ)	
SAMPLING TIME (S)	

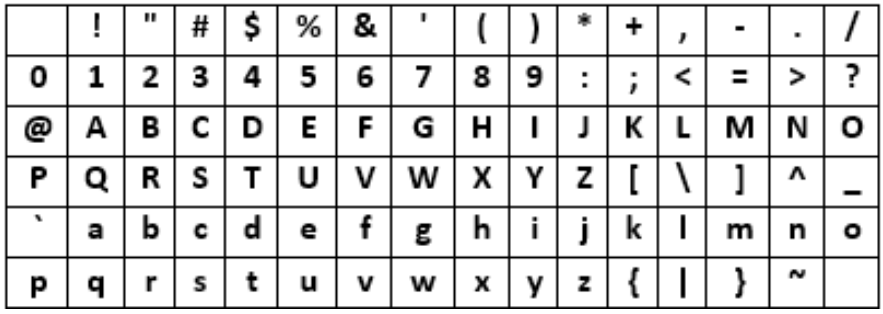
Menü / Parameter	Menü / Parameter
MODE VELOCITY	**PRESELECTION 3 MENU**
START / STOP	SOURCE 3
DISPLAY VALUE	MODE 3
BASE TIME (S)	HYSTERESIS 3
DECIMAL POINT	PULSE TIME 3
WAIT TIME (S)	OUTPUT TARGET 3
STANDSTILL TIME (S)	OUTPUT POLARITY 3
	OUTPUT LOCK 3
PRESELECTION VALUES	START UP DELAY 3 (S)
PRESELECTION 1	EVENT COLOR 3
PRESELECTION 2	
PRESELECTION 3	**PRESELECTION 4 MENU**
PRESELECTION 4	SOURCE 4
	MODE 4
PRESELECTION 1 MENU	HYSTERESIS 4
SOURCE 1	PULSE TIME 4
MODE 1	OUTPUT TARGET 4
HYSTERESIS 1	OUTPUT POLARITY 4
PULSE TIME 1	OUTPUT LOCK 4
OUTPUT TARGET 1	START UP DELAY 4 (S)
OUTPUT POLARITY 1	EVENT COLOR 4
OUTPUT LOCK 1	
START UP DELAY 1 (S)	**ANALOG MENU**
EVENT COLOR 1	ANALOG SOURCE
	ANALOG FORMAT
PRESELECTION 2 MENU	ANALOG START
SOURCE 2	ANALOG END
MODE 2	ANALOG GAIN (%)
HYSTERESIS 2	ANALOG OFFSET (%)
PULSE TIME 2	
OUTPUT TARGET 2	
OUTPUT POLARITY 2	
OUTPUT LOCK 2	
START UP DELAY 2 (S)	
EVENT COLOR 2	

Menü / Parameter	Menü / Parameter
COMMAND MENU	**LINEARIZATION MENU**
INPUT 1 ACTION	P1(X)
INPUT 1 CONFIG.	P1(Y)
INPUT 2 ACTION	P2(X)
INPUT 2 CONFIG.	P2(Y)
INPUT 3 ACTION	...
INPUT 3 CONFIG.	P23(X)
	P23(Y)
DISPLAY MENU	P24(X)
SOURCE DUAL TOP	P24(Y)
SOURCE DUAL DOWN	
COLOR	
BRIGHTNESS	
CONTRAST	
SCREEN SAVER (S)	
UP-DATE-TIME (S)	
FONT	
START DISPLAY	
LARGE DISPLAY	

9.2 General menu

OPERATIONAL MODE This parameter defines which measuring function (operating mode) the device is supposed to fulfil.	
SPEED	Indication of rotational speed (RPM), operation as tachometer or for frequency measurement
PROCESS TIME	Operation as baking time or processing time display (reciprocal rotational speed)
TIMER	Stop watch / timer
COUNTER	Operation as position display, pulse, totalisator, differential, up or down counter
VELOCITY	Speed indication from operating time measurement
ENCODER PROPERTIES This parameter defines the characteristic of the pulse inputs.	
PNP	PNP (switching towards +)
NPN	NPN (switching towards –)
NAMUR	Connect sensor (-) to GND and sensor (+) to input (A, B)

TRI-STATE	Tri-State
COUNTING DIRECTION With this parameter, it is possible to invert the rotational direction of the pulse input (only in the COUNTER A, B 90° operating mode).	
FORWARD	Up
REVERSE	Down
SCALE UNITS This parameter defines which unit is indicated on the display. It does not influence the display value. The decimal point for decimal places is set with the DECIMAL POINT parameter. With the two-line display, the set unit and the display value's decimal point are automatically adopted for the total counter / total timer as well. The batch counter unit can be set separately via the SCALE UNITS (BATCH) parameter.	
Hz	Default
kHz	
m/s	
m/min	
km/h	
mph	
1/min	
RPM	
1/sec	
RPS	
Stk/h	
pcs/h	
mm	
m	
inch	
feet	
Stueck	
pcs	
sec	
min	
Min:Sec	
H:M:S	
Min:Sec:00	
l/min.	
gal/min	
ml/min	
gr/min	

inch/min	
H:M	
Edit Unit	With this parameter, a customer-specific unit with max. 16 digits can be edited. Open the "Edit Unit" menu with the [OK] button. Use the arrow keys to change the unit. Keep the arrow key pressed for fast scrolling. Save with [OK]. Quit the "Edit Unit" menu with [C]. 

	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	

SCALE UNITS (BATCH)

This parameter defines which unit is indicated for the batch counter on the two-line display. Available units: see SCALE UNITS parameters.

LINEARIZATION MODE

This parameter defines the linearisation function(→ 10 Linearisation).

OFF	No linearisation
1 QUADRANT	Linearisation in the 1st quadrant
4 QUADRANT	Linearisation in all 4 quadrants

PIN PRESELECTION

This parameter defines the PIN code for locking the quick-start function to enter the preselection values in the PRESELECTION VALUES menu (emergency PIN: 6079). Locking the quick start is only useful if all parameters are locked.

0000	Access not locked
…	
9999	Access after entering the PIN code 9999

PIN PARAMETER

This parameter defines the PIN code for the locked access for all parameters (emergency PIN: 6079).

0000	Access not locked
…	
9999	Parameter setting of the device is only possible after entering the PIN code.

BACK UP MEMORY

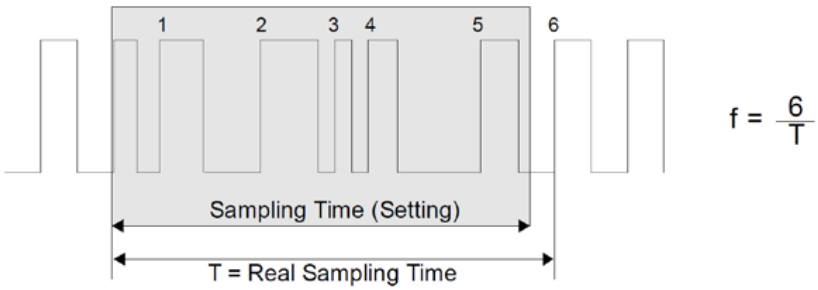
NO	No backup memory in the event of power failure
YES	Backup memory in the event of power failure active. Saves actual value in case of a power failure.

FACTORY SETTINGS	
NO	The factory settings are not loaded
YES	The factory settings are loaded (default values shown in grey)

9.3 Speed mode

In this menu, you can define the operation as rotational speed display (RPM), tachometer or frequency measurement. In this operating mode, only input A is active or input A and input B with a phase shift of 90 ° for detection of the direction of rotation. This menu is only displayed if the corresponding OPERATIONAL MODE is selected in the GENERAL MENU.

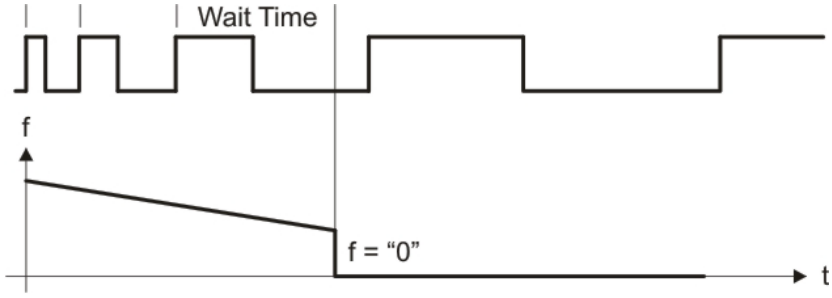
DISPLAY VALUE Setting of the required value that is to be displayed with the following reference frequency.	
1	Lowest value
1000	Default value
99999999	Highest value
BASE FREQUENCY (HZ) Setting of the reference frequency in Hz for the above display value.	
1	Lowest value
100	Default value
500000	Highest value
DECIMAL POINT This setting defines the position of the decimal point.	
NO	No decimal point
0000000.0	Decimal point at the specified position
000000.00	Decimal point at the specified position
00000.000	Decimal point at the specified position
0000.0000	Decimal point at the specified position
000.00000	Decimal point at the specified position
00.000000	Decimal point at the specified position
0.0000000	Decimal point at the specified position
SAMPLING TIME (S) The set value corresponds to the minimum measured time in seconds. The sampling time serves as a filter in case of irregular frequencies. This parameter has a direct influence on the response time of the device.	
0.005	Minimum measurement time in seconds
0.1	Default value
9.999	Maximum measurement time in seconds



WAIT TIME (S)

This parameter defines the period duration of the lowest frequency i.e. the waiting time between two rising edges at which the device detects the frequency 0 Hz. Frequencies with a period duration that is longer than the set Wait Time are evaluated as frequency = 0 Hz.

0.01	Frequency = 0 Hz in case of frequencies below 100 Hz
1.00	Default value
80.00	Frequency = 0 Hz in case of frequencies below 0.1 Hz



STANDSTILL TIME (S)

This parameter defines the time for the standstill definition. When the frequency is found to be 0 Hz, standstill is signalled after the time set here (in seconds) has elapsed and the start-up delay is activated again. Standstill monitoring can be set in the PRESELECTION MENU.

0.00	Shortest possible delay time in seconds
…	
99.99	Longest possible delay time in seconds

AVERAGE FILTER Optional averaging or filter function to avoid display fluctuations with unstable frequencies. With the EXPONENTIAL FILTER setting the device uses an exponential function. The time constant T (63 %) corresponds to the number of the sampling cycles. Example: With SAMPLING TIME = 0.1 s and EXPONENTIAL FILTER 2 (exponential filter, T (63 %) = 2 x sampling time) 63 % of the jump height are reached after 0.2 s.	
OFF	No averaging
CYCLE FILTER 2	Free-flowing averaging with 2 cycles
CYCLE FILTER 4	Free-flowing averaging with 4 cycles
CYCLE FILTER 8	Free-flowing averaging with 8 cycles
CYCLE FILTER 16	Free-flowing averaging with 16 cycles
EXPONENTIAL FILTER 2	Exponential filter, T (63 %) = 2 x sampling time
EXPONENTIAL FILTER 4	Exponential filter, T (63 %) = 4 x sampling time
EXPONENTIAL FILTER 8	Exponential filter, T (63 %) = 8 x sampling time
EXPONENTIAL FILTER 16	Exponential filter, T (63 %) = 16 x sampling time
FOR/REV DETECTION With this parameter the detection of the direction of rotation is activated (input A, input B with a phase shift of 90 °).	
NO	Detection of the direction of rotation off.
YES	Detection of the direction of rotation on.

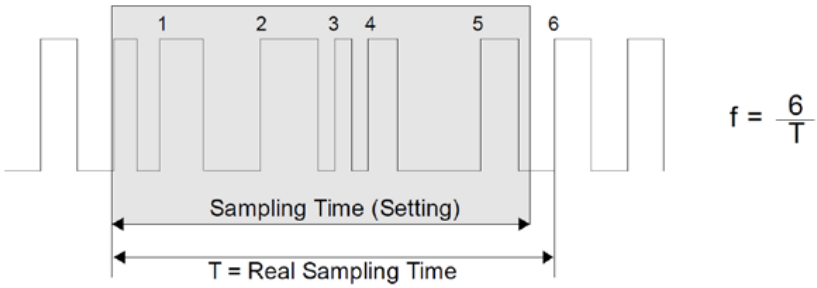
9.4 Process Time mode

In this menu, operation can be defined as baking and processing time display (reciprocal rotational speed). Only input A is active. This menu is only displayed if the corresponding OPERATIONAL MODE is selected in the GENERAL MENU.

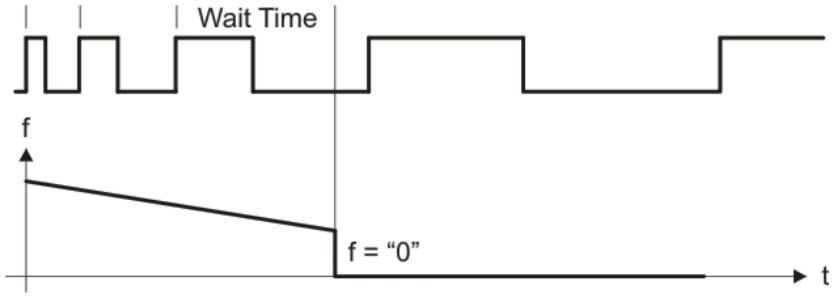
DISPLAY FORMAT With this parameter, the required display format can be selected. The decimal point is set automatically by selecting the format.	
SECONDS	Indication in seconds (max. 99999999)
MINUTES	Indication in minutes (max. 99999999)
MIN:SEC	Indication in minutes: seconds (max. 999999:59)
MIN.00	Indication in minutes and 1/100 minutes (max. 999999.99)
H:M:S	Indication in hours: minutes : seconds (max. 9999:59:59)
DISPLAY VALUE Setting of the required value that is to be displayed with the following reference frequency.	
1	Lowest value
1000	Default value
99999999	Highest value

BASE FREQUENCY (HZ) Setting of the reference frequency in Hz for the above display value.	
1	Lowest value
100	Default value
500000	Highest value

SAMPLING TIME (S) The set value corresponds to the minimum measured time in seconds. The sampling time serves as a filter in case of irregular frequencies. This parameter has a direct influence on the response time of the device.	
0.005	Minimum measurement time in seconds
0.1	Default value
9.999	Maximum measurement time in seconds



WAIT TIME (S) This parameter defines the period duration of the lowest frequency i.e. the waiting time between two rising edges at which the device detects the frequency 0 Hz. Frequencies with a period duration that is longer than the set Wait Time are evaluated as frequency = 0 Hz.	
0.01	Frequency = 0 Hz in case of frequencies below 100 Hz
1.00	Default value
80.00	Frequency = 0 Hz in case of frequencies below 0.1 Hz



STANDSTILL TIME (S) This parameter defines the time for the standstill definition. When the frequency is found to be 0 Hz, standstill is signalled after the time set here (in seconds) has elapsed and the start-up delay is activated again. Standstill monitoring can be set in the PRESELECTION MENU.	
0.00	Shortest possible delay time in seconds
…	
99.99	Longest possible delay time in seconds

AVERAGE FILTER Optional averaging or filter function to avoid display fluctuations with unstable frequencies. With the EXPONENTIAL FILTER setting the device uses an exponential function. The time constant T (63 %) corresponds to the number of the sampling cycles. Example: With SAMPLING TIME = 0.1 s and EXPONENTIAL FILTER 2 (exponential filter, T (63 %) = 2 x sampling time) 63 % of the jump height are reached after 0.2 s.	
OFF	No averaging
CYCLE FILTER 2	Free-flowing averaging with 2 cycles
CYCLE FILTER 4	Free-flowing averaging with 4 cycles
CYCLE FILTER 8	Free-flowing averaging with 8 cycles
CYCLE FILTER 16	Free-flowing averaging with 16 cycles
EXPONENTIAL FILTER 2	Exponential filter, T (63 %) = 2 x sampling time
EXPONENTIAL FILTER 4	Exponential filter, T (63 %) = 4 x sampling time
EXPONENTIAL FILTER 8	Exponential filter, T (63 %) = 8 x sampling time
EXPONENTIAL FILTER 16	Exponential filter, T (63 %) = 16 x sampling time

9.5 Timer mode

In this menu, operation can be defined as timer / stop watch. Depending on the parameter setting, only input A or input A and B are active. This menu is only displayed if the corresponding OPERATIONAL MODE is selected in the GENERAL MENU.

TIME BASE Selection of the time base / resolution required for the measurement	
1/1000 SEC	Milliseconds
1/100 SEC	1/100 seconds
1/10 SEC	1/10 seconds
SECONDS	Seconds
MIN.00	Minutes and 1/100 minutes
MIN.0	Minutes and 1/10 minutes
MIN:SEC	minutes : seconds (max. 999999:59)
MIN:SEC:00	minutes : seconds : 1/100 seconds (max. 9999:59:99)
H:M:S	Hours: minutes : seconds (max. 9999:59:59)
H:M	Hours: minutes (max. 9999:59)

START / STOP Definition of the start / stop type of the time measurement	
COUNT AT A HIGH	Time measurement is active as long as input A is "HIGH"
COUNT AT A LOW	Time measurement is active as long as input A is "LOW"
START A / STOP B	Rising edge on input A starts the time measurement, rising edge on input B stops the time measurement.
PERIOD AT A	Period measurement: indicates the duration cyclically between two rising edges at input A.
AUTO SET / RESET	
NO	Time measurement adds values up, no automatic reset during the next start. Zero must be set via set/reset.
YES	With each start, the new time measurement starts automatically at the set value of the SET VALUE parameter
LATCH FUNCTION	
NO	The lapse of time can be seen in the display.
YES	The final result of the last time measurement is displayed while the new measurement is running in the background.
SET VALUE A set/reset command sets the timer to the value set here.	
0	Lowest value (reset)
…	
99999999	Highest value
INC / DEC MODE With the setting period measurement as START / STOP the time measurement is always incrementing.	
INCREMENT MODE	Time measurement is incrementing.
DECREMENT MODE	Time measurement is decrementing.
TOTAL TIME MODE Activation of the total timer. If TOTAL TIME MODE is activated, the total timer can be assigned to each PRESELECTION value via the source. Example: For total time measurement, TOTAL TIME MODE must be set to YES. Total time measurement and normal time measurement then run in parallel. If total time is to be automatically reset to 0 when reaching 1:30 (H:M), the source has to be set to TOTAL TIMER, the respective preselection value to 1:30 and the respective switching condition to RESULT>=PRES->0. For example: SOURCE 1 of PRESELECTION 1 MENU to TOTAL TIMER, the respective preselection value (in this example: PRESELECTION 1) to 1:30 and the respective switching condition (in this example: MODE 1) to RESULT>=PRES->0.	
NO	Total time measurement deactivated
YES	Total time measurement activated

TOTAL TIME SET VALUE A set/reset command (SET TOTAL TIME command, via control input) sets the total timer to the value set here. Parameter only visible if TOTAL TIME MODE parameter is activated.	
000000:00	Lowest value (reset)
…	
999999:59	Highest value

9.6 Counter mode

In this menu, operation can be defined as position indication, pulse, totaliser, differential, up or down counter. Inputs A and B are active. This menu is only displayed if the corresponding OPERATIONAL MODE is selected in the GENERAL MENU.

COUNT MODE Selection of the timer configuration	
A SINGLE	Input A is the counting input. Input B determines the counting direction: "LOW" = up "HIGH" = down
A + B	Total: counts pulses on input A + pulses on input B
A - B	Difference: counts pulses on input A – pulses on input B
A/B 90 x1	Up/down counter for pulses with 2x90° displacement (simple edge evaluation)
A/B 90 x2	Up/down counter for pulses with 2x90° displacement (double edge evaluation)
A/B 90 x4	Up/down counter for pulses with 2x90° displacement (quadruple edge evaluation)
FACTOR Pulse evaluation factor. Example: With a setting of 1.23456, the unit displays the value 123456 after 100000 input pulses.	
0.00001	Lowest value
1	Default value
9.99999	Highest value
SET VALUE With a reset command (e.g. via keyboard or control input) the counter is set to the value set here.	
-99999999	Lowest value
0	Default value
+99999999	Highest value

DECIMAL POINT

This setting defines the position of the decimal point.

NO	No decimal point
0000000.0	Decimal point at the specified position
000000.00	Decimal point at the specified position
00000.000	Decimal point at the specified position
0000.0000	Decimal point at the specified position
000.00000	Decimal point at the specified position
00.000000	Decimal point at the specified position
0.0000000	Decimal point at the specified position

BATCH / TOTAL MODE

Setting of the batch counter / total counter.

The function of batch counting in dependence on the preselection value (PRESELECTION 1...3) is only possible in connection with the switch condition automatic setting to zero (RESULT>=PRES->0) or setting to counter value (RESULT<=0->SET).

If BATCH / TOTAL MODE is activated, the batch counter or the total counter can be assigned to the respective preselection value (PRESELECTION 1...4) via the source (SOURCE 1...4).

Example: batch counter
If the batch counter is to be increased by 1 every 1000 pulses, the following parameters have to be set:

– a preselection value (e.g. PRESELECTION 1) to 1000
– the respective source (SOURCE 1) to MEASUREM. RESULT
– the respective switching condition (MODE 1) to RESULT>=PRES->0
– BATCH MODE to INCREMENT BATCH

If after a batch of 33 an output is to be switched, the following parameters have to be set:

– a preselection value (e.g. PRESELECTION 2) to the value 33
– the respective source (SOURCE 2) to BATCH COUNTER
– the switching condition (MODE 2) to display value greater than or equal to (RESULT >=PRES).

Example: total counter
For total counter, BATCH / TOTAL MODE has to be set to TOTAL COUNTER. Total counter and main counter run in parallel.If the total counter, on reaching 4000, is to be automatically reset to 0, the following parameters have to be set:

– a preselection value (e.g. PRESELECTION 3) to 4000
– the respective source (SOURCE 3) to TOTAL COUNTER
– the respective switching condition (MODE 3) to RESULT>=PRES->0

OFF	Neither batch counter nor total counter
INCREMENT BATCH	Batch counter is incrementing.
DECREMENT BATCH	Batch counter is decrementing.
USE INPUTS ONLY	Batch counter only operates via external control commands (see COMMAND menu).
TOTAL COUNTER	Total counter activated

BATCH / TOTAL SET VALUE A set/reset command (SET BATCH / TOTAL command, via control input) sets the batch counter / total counter to the value set here. Parameter only visible if BATCH / TOTAL MODE parameter is activated.	
0	Lowest value (reset)
…	
99999999	Highest value
ROUND LOOP VALUE This parameter defines the number of steps regarding a round loop function request. Only for counter configuration A SINGLE or A/B 90 xX	
0	Normal display, round loop deactivated
…	
99999999	Number of steps for round loop function

9.7 Velocity mode

In this menu, the speed indication from an operating time measurement is defined. Input A serves as start input and input B as stop input. This menu is only displayed if the corresponding OPERATIONAL MODE is selected in the GENERAL MENU.

START / STOP Set the start/stop function.	
RISE TO RISE	Start: rising edge on input A Stop: rising edge on input B
FALL TO FALL	Start: falling edge on input A Stop: falling edge on input B
RISE TO FALL	Start: rising edge on input A Stop: falling edge on input B
FALL TO RISE	Start: falling edge on input A Stop: rising edge on input B
DISPLAY VALUE Setting of the required value that is to be displayed with the following reference runtime.	
1	Lowest value
1000	Default value
99999999	Highest value
BASE TIME (S) Setting of the time base (in seconds) for the above display value.	
0.001	Lowest value
1	Default value
999.999	Highest value

DECIMAL POINT

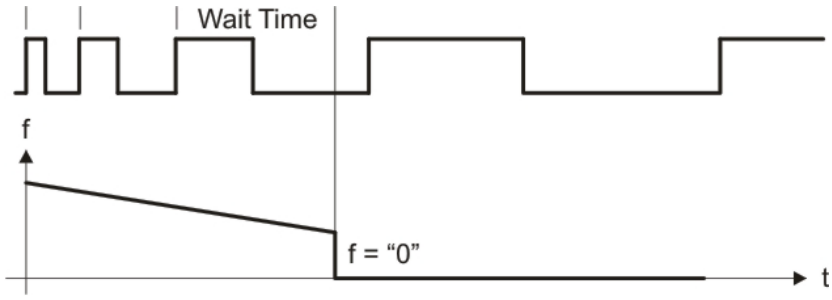
This setting defines the position of the decimal point.

NO	No decimal point
0000000.0	Decimal point at the specified position
000000.00	Decimal point at the specified position
00000.000	Decimal point at the specified position
0000.0000	Decimal point at the specified position
000.00000	Decimal point at the specified position
00.000000	Decimal point at the specified position
0.0000000	Decimal point at the specified position

WAIT TIME (S)

This parameter defines the period duration of the lowest frequency i.e. the waiting time between two rising edges at which the device detects the frequency 0 Hz. Frequencies with a period duration that is longer than the set Wait Time are evaluated as frequency = 0 Hz.

0.00	Display value is retained until a new display value has been determined
0.01	Frequency = 0 Hz in case of frequencies below 100 Hz
...	
99.99	Frequency = 0 Hz in case of frequencies below 0.1 Hz



STANDSTILL TIME (S)

This parameter defines the time for the standstill definition. When the frequency is found to be 0 Hz, standstill is signalled after the time set here (in seconds) has elapsed and the start-up delay is activated again. Standstill monitoring can be set in the PRESELECTION MENU. STANDSTILL TIME is only useful if WAIT TIME not equal to 0.00

0.00	Shortest delay time
…	
99.99	Longest delay time

9.8 Preselection Values

In this menu, the preselection values / switch points can be set. The preselection values always refer to the source (SOURCE 1...4) selected in the PRESELECTION MENU.

This function is only available for the devices DX2022, DX2023, DX2032, DX2033.

PRESELECTION 1 Preselection / switch point 1	
-99999999	Lowest preselection value
1000	Default value
+99999999	Highest preselection value
PRESELECTION 2 Preselection / switch point 2	
-99999999	Lowest preselection value
2000	Default value
+99999999	Highest preselection value
PRESELECTION 3 Preselection / switch point 3	
-99999999	Lowest preselection value
3000	Default value
+99999999	Highest preselection value
PRESELECTION 4 Preselection / switch point 4	
-99999999	Lowest preselection value
4000	Default value
+99999999	Highest preselection value

9.9 Preselection 1 Menu

In this menu, the parameters for the source, the switching conditions and further definitions for the preselection value / switch point 1 are set.

This function is only available for the devices DX2022, DX2023, DX2032, DX2033.

SOURCE 1 Source for preselection 1.	
MEASUREM. RESULT	The measurement result of the selected operating mode is the source.
COUNTER A	The counter reading of channel A is the source. (Only visible in counter configuration A+B or A-B).
COUNTER B	The counter reading of channel B is the source. (Only visible in counter configuration A+B or A-B).

BATCH COUNTER	The batch counter is the source. (Only visible in BATCH / TOTAL MODE with INCREMENT BATCH, DECREMENT BATCH or USE INPUTS ONLY being set).
TOTAL COUNTER	The total counter is the source. (Only visible in BATCH / TOTAL MODE with TOTAL COUNTER being set).
TOTAL TIMER	The total timer is the source. (Only visible in TOTAL TIME MODE with YES being set).
MODE 1 Switching condition for preselection 1. Output / display switch according to the following conditions:	
¦RESULT¦≥¦PRES¦	The result of the display value is greater than or equal to the result of preselection 1 With hysteresis 1 not equal to 0 the following switching condition results: Display value ≥ preselection 1 → ON Display value < preselection 1 - hysteresis 1 → OFF
¦RESULT¦≤¦PRES¦	The result of the display value is smaller than or equal to the result of preselection 1 (start-up delay recommended) With hysteresis 1 not equal to 0 the following switching condition results: Display value ≤ preselection 1 → ON Display value > preselection 1 + hysteresis 1 → OFF
¦RESULT|=|PRES¦	The result of the display value is equal to the result of preselection 1. In combination with hysteresis a frequency band (preselection +/- ½ hysteresis) can be defined and monitored. With hysteresis 1 not equal to 0 the following switching condition results: Display value > preselection 1 + ½ hysteresis 1 → OFF Display value < preselection 1 - ½ hysteresis 1 → OFF
RESULT≥PRES	If the display value is greater than or equal to preselection 1, e.g. overspeed With hysteresis 1 not equal to 0 the following switching condition results: Display value ≥ preselection 1 → ON Display value < preselection 1 - hysteresis 1 → OFF
RESULT≤PRES	If the display value is smaller than or equal to preselection 1, e.g. underspeed (start-up delay recommended) With hysteresis 1 not equal to 0 the following switching condition results: Display value ≤ preselection 1 → ON Display value > preselection 1 + hysteresis 1 → OFF
RESULT=PRES	Display value equal to preselection 1. In combination with hysteresis 1 a frequency band (preselection +/- ½ hysteresis) can be defined and monitored. With hysteresis 1 not equal to 0 the following switching condition results: Display value > preselection 1 + ½ hysteresis 1 → OFF Display value < preselection 1 - ½ hysteresis 1 → OFF

RESULT=0	Display value equal to 0 (standstill after standstill time), e.g. standstill monitoring. (Only in SPEED and PROCESS TIME operating modes.)
RESULT≥ PRES->0	Set display to 0. (Only in the TIMER or COUNTER operating modes). If the display value is greater than or equal to preselection 1, the display value is set to zero. If BATCH MODE is activated and the selected source is MEASUREM. RESULT, COUNTER A or COUNTER B, the batch counter is incremented / decremented each time it is reset to 0.
RESULT≤ 0->SET	Set display to preselection 1. (Only in the TIMER or COUNTER operating modes). If the display value is smaller than or equal to 0, the display value is set to preselection 1. If BATCH MODE is activated and the selected source is MEASUREM. RESULT, COUNTER A or COUNTER B, the batch counter is incremented / decremented each time it is set to preselection 1.
RES≥PRES-TRAIL	Tracking preset 1: Display value greater or equal to preselection 2 – preselection 1 Preselection 1 is the tracking preset of preselection 2.
HYSTERESIS 1 Hysteresis to define the switch-off point for the switching condition of preselection 1	
0	No switching hysteresis
…	
99999	Switching hysteresis of 99999
PULSE TIME 1 (S) Duration of the fleeting pulse (in seconds) for the switching condition of preselection 1	
0.000	No fleeting pulse (static signal)
…	
60.000	Pulse duration of 60 seconds
OUTPUT TARGET 1 Assignment of an output for the switching condition of preselection 1. If several switching conditions are assigned to one single output, this output is active as soon as one of the switching conditions is met.	
NO	No assignment
CTRL OUT 1	Assignment of the switching condition to Ctrl. Out 1
CTRL OUT 2	Assignment of the switching condition to Ctrl. Out 2
CTRL OUT 3	Assignment of the switching condition to Ctrl. Out 3
CTRL OUT 4	Assignment of the switching condition to Ctrl. Out 4

OUTPUT POLARITY 1 Switching status for the switching condition of preselection 1	
ACTIVE HIGH	Active "HIGH"
ACTIVE LOW	Active "LOW"
OUTPUT LOCK 1 Latching for the switching condition of preselection 1	
NO	No latching
YES	Latching
START UP DELAY 1 (S) Start-up delay for the switching condition of preselection 1. Time window until the monitoring function has been activated. This setting only applies for the switching conditions ¦RESULT¦≤¦PRES¦ and RESULT≤PRES as well as in the SPEED and PROCESS TIME operating modes. (Start-up delays 3 and 4 are set automatically.)	
0.000	No start-up delay
…	
60.000	Start-up delay in seconds
EVENT COLOR 1 Event-dependent colour change of the display for the switching condition of preselection 1. Event Color 1 is of lowest priority. Event Color 2 ... 4 can overwrite this colour change.	
NO CHANGE	No colour change
CHANGE TO RED	Colour changes to red
CHANGE TO GREEN	Colour changes to green
CHANGE TO YELLOW	Colour changes to yellow

9.10 Preselection 2 Menu

SOURCE 2 Source for preselection 2 (→ 9.9 Preselection 1 Menu)	
MODE 2 Switching condition for preselection 2, see Preselection 1 Menu (except tracking preset)	
See Preselection 1 Menu	
RES≥PRES-TRAIL	Tracking preset 2: Display value greater than or equal to preselection 1 – preselection 2 Preselection 2 is the tracking preset of preselection 1.
HYSTERESIS 2 Switching hysteresis for the switching condition of preselection 1, see Preselection 1 Menu	
PULSE TIME 2 (S) Duration of the fleeting pulse for the switching condition of preselection 2, see Preselection 1 Menu	
OUTPUT TARGET 2 Assignment of an output for the switching condition of preselection 2, see Preselection 1 Menu	
OUTPUT POLARITY 2 Switching status for the switching condition of preselection 2, see Preselection 1 Menu	
OUTPUT LOCK 2 Latching for the switching condition of preselection 2, see Preselection 1 Menu	
START UP DELAY 2 (S) Start-up delay for the switching condition of preselection 2, see Preselection 1 Menu (Start-up delays 3 and 4 are set automatically.)	
EVENT COLOR 2 Event-dependent colour change of the display for the switching condition of preselection 2, see Preselection 1 Menu	

9.11 Preselection 3 Menu

SOURCE 3 Source for preselection 3 (→ 9.9 Preselection 1 Menu)	
MODE 3 Switching condition for preselection 3, see Preselection 1 Menu (except tracking preset)	
See Preselection 1 Menu	
RES≥PRES-TRAIL	Tracking preset 3: Display value greater or equal to preselection 4 – preselection 3 Preselection 3 is the tracking preset of preselection 4.
HYSTERESIS 3 Switching hysteresis for the switching condition of preselection 3, see Preselection 1 Menu	
PULSE TIME 3 (S) Duration of the fleeting pulse for the switching condition of preselection 3, see Preselection 1 Menu	

OUTPUT TARGET 3 Assignment of an output for the switching condition of preselection 3, see Preselection 1 Menu	
OUTPUT POLARITY 3 Switching status for the switching condition of preselection 3, see Preselection 1 Menu	
OUTPUT LOCK 3 Latching for the switching condition of preselection 3, see Preselection 1 Menu	
START UP DELAY 3 Start-up delay for the switching condition of preselection 3. Time window until the monitoring function has been activated. This setting only applies for the switching conditions ¦RESULT¦≤¦PRES¦ and RESULT≤PRES as well as in the SPEED and PROCESS TIME operating modes.	
OFF	No start-up delay
AUTO	Automatic start-up delay until the preselection value / switch point has been exceeded for the first time
EVENT COLOR 3 Event-dependent colour change of the display for the switching condition of preselection 3, see Preselection 1 Menu	

9.12 Preselection 4 Menu

SOURCE 4 Source for preselection 4 (→ 9.9 Preselection 1 Menu)	
MODE 4 Switching condition for preselection 4, see Preselection 1 Menu (except tracking preset)	
See Preselection 1 Menu	
RES≥PRES-TRAIL	Tracking preset 4: Display value greater or equal to preselection 3 – preselection 4 Preselection 4 is the tracking preset of preselection 3.
HYSTERESIS 4 Switching hysteresis for the switching condition of preselection 4, see Preselection 1 Menu	
PULSE TIME 4 (S) Duration of the fleeting pulse for the switching condition of preselection 4, see Preselection 1 Menu	
OUTPUT TARGET 4 Assignment of an output for the switching condition of preselection 4, see Preselection 1 Menu	
OUTPUT POLARITY 4 Switching status for the switching condition of preselection 4, see Preselection 1 Menu	
OUTPUT LOCK 4 Latching for the switching condition of preselection 4, see Preselection 1 Menu	
START UP DELAY 4 Start-up delay for the switching condition of preselection 4, see Preselection 3 Menu	

EVENT COLOR 4
Event-dependent colour change of the display for the switching condition of preselection 4, see Preselection 1 Menu

9.13 Analogue menu

In this menu the basic settings for the analogue output are defined. This function is only available for the devices DX2022 and DX2032.

ANALOG SOURCE Source for the analogue output	
MEASUREM. RESULT	The measurement result of the selected operating mode is the source.
COUNTER A	The counter reading of channel A is the source. (Only visible in counter configuration A+B or A-B).
COUNTER B	The counter reading of channel B is the source. (Only visible in counter configuration A+B or A-B).
BATCH COUNTER	The batch counter is the source. (Only visible in BATCH / TOTAL MODE with INCREMENT BATCH, DECREMENT BATCH or USE INPUTS ONLY being set).
TOTAL COUNTER	The total counter is the source. (Only visible in BATCH / TOTAL MODE with TOTAL COUNTER being set).
TOTAL TIMER	The total timer is the source. (Only visible in TOTAL TIME MODE with YES being set).
ANALOG FORMAT This parameter defines the output characteristic. With the output format (-10 … +10 V), the polarity of the output follows the algebraic sign in the display (only in the COUNTER operating mode). The analogue output is proportional to the display value.	
-10…10V	-10 … +10 V
0…20MA	0 … 20 mA
4…20MA	4 ... 20 mA
ANALOG START With this parameter, the start value of the analogue gain can be set. The start value determines at which display value the analogue output has a gain of 0 V or 0 / 4 mA.	
-99999999	Lowest possible start value
0	Default value
+99999999	Highest possible start value
ANALOG END With this parameter, the end value of the analogue gain can be set. The end value determines at which display value the analogue output has a maximum value of +/- 10 V or 20 mA.	
-99999999	Lowest possible final value

10000	Default value
+99999999	Highest possible final value
ANALOG GAIN (%) With this parameter, the maximum gain can be set. The analogue gain indicates the maximum gain of the analogue output in % referred to +/- 10 V or 20 mA. Examples: ● 101.00 corresponds to a gain of 10.2 V / 20 mA after reaching the "Analog End“ value. ● 95.00 corresponds to a gain of 9.5 V / 18 mA after reaching the "Analog End“ value.	
0.00	Lowest possible gain
100.00	Default value
110.00	Highest possible gain
ANALOG OFFSET (%) With this parameter, the zero point shift of the output can be set. Example: 0.20 corresponds to a gain of 0.2 V / 0.4 mA after reaching the "Analog Start“ value.	
-99.99	Lowest possible zero point shift
0	Default value
+99.00	Highest possible zero point shift

9.14 Command menu

INPUT 1 ACTION This parameter defines the control function of the Ctrl. In 1 input. d = dynamic switching characteristics (edge evaluation), INPUT CONFIG must be set to RISING/ FALLING EDGE s = static switching characteristics (level evaluation), INPUT CONFIG must be set to ACTIVE LOW/ HIGH		
NO	No function	
SET / RESET VALUE	TIMER operating mode: set / reset to the value of SET VALUE COUNTER operating mode: set / reset of the value of channel A and B to the value of SET VALUE VELOCITY operating mode: reset to 0	d, s
FREEZE	Freezes the display value	s
KEY LOCK	Locks the keys of the touch screen	s
LOCK RELEASE	Release latching of all outputs	d
RESET MIN/MAX	Reset of the min. / max. values	d, s
SERIAL PRINT	N.A.	d
TEACH PRESEL 1	Current display value is stored as PRESELECTION 1.	d
TEACH PRESEL 2	Current display value is stored as PRESELECTION 2.	d
TEACH PRESEL 3	Current display value is stored as PRESELECTION 3.	d
TEACH PRESEL 4	Current display value is stored as PRESELECTION 4.	d

SCROLL DISPLAY	Display change	d
CLEAR LOOP TIME	All defined switching conditions enabled	
START PRESELECTION	N.A.	
ACTIVATE	N.A.	
STORE DATA	N.A.	
TESTPROGRAM	N.A.	
SET RED COLOR	Display is red. The colour can be changed by means of the event-dependent colour change in the PRESELECTION 1 ... 4 MENU.	d
SET GREEN COLOR	Display is green. The colour can be changed by means of the event-dependent colour change in the PRESELECTION 1 ... 4 MENU.	d
SET YELLOW COLOR	Display is yellow. The colour can be changed by means of the event-dependent colour change in the PRESELECTION 1 ... 4 MENU.	d
INCREMENT BATCH	Increment the batch counter (see COUNTER mode)	d
DECREMENT BATCH	Decrement the batch counter (see COUNTER mode)	d
SET BATCH / TOTAL	Set / reset of the batch counter / total counter (see COUNTER mode)	d, s
INC. BRIGHTNESS	Increase display brightness	d, s
DEC. BRIGHTNESS	Decrease display brightness	d, s
SET TOTAL TIME	Set / reset of the total timer (see COUNTER mode)	d, s
SET COUNTER A	Set / reset of the value of channel A to the value of SET VALUE (only in COUNTER mode)	d, s
SET COUNTER B	Set / reset of the value of channel B to the value of SET VALUE (only in COUNTER mode)	d, s

INPUT 1 CONFIG

This parameter defines the switching characteristics for the Ctrl. In 1 input.

ACTIVE LOW	Activation in case of "LOW" (static)
ACTIVE HIGH	Activation in case of "HIGH" (static)
RISING EDGE	Activation in case of rising edge
FALLING EDGE	Activation in case of falling edge

INPUT 2 ACTION

This parameter defines the control function of the Ctrl. In 2 input.

See function assignment parameter INPUT 1 ACTION.

INPUT 2 CONFIG

This parameter defines the switching characteristics for the Ctrl. In 2 input.

See activation assignment parameter INPUT 1 CONFIG.

INPUT 3 ACTION

This parameter defines the control function of the Ctrl. In 3 input.

See function assignment parameter INPUT 1 ACTION.

INPUT 3 CONFIG This parameter defines the switching characteristics for the Ctrl. In 3 input. See activation assignment parameter INPUT 1 CONFIG.

9.15 Display menu

Parameter changes are only active after quitting the menu selection.

SOURCE DUAL TOP Source for the two-line display, 1st line	
MEASUREM. RESULT	The measurement result of the selected operating mode is the source.
COUNTER A	The counter reading of channel A is the source. (Only visible in counter configuration A+B or A-B).
COUNTER B	The counter reading of channel B is the source. (Only visible in counter configuration A+B or A-B).
BATCH COUNTER	The batch counter is the source. (Only visible in BATCH / TOTAL MODE with INCREMENT BATCH, DECREMENT BATCH or USE INPUTS ONLY being set).
TOTAL COUNTER	The total counter is the source. (Only visible in BATCH / TOTAL MODE with TOTAL COUNTER being set).
TOTAL TIMER	The total timer is the source. (Only visible in TOTAL TIME MODE with YES being set).
SOURCE DUAL DOWN Source for the two-line display, 2nd line	
MEASUREM. RESULT	The measurement result of the selected operating mode is the source.
COUNTER A	The counter reading of channel A is the source. (Only visible in counter configuration A+B or A-B).
COUNTER B	The counter reading of channel B is the source. (Only visible in counter configuration A+B or A-B).
BATCH COUNTER	The batch counter is the source. (Only visible in BATCH / TOTAL MODE with INCREMENT BATCH, DECREMENT BATCH or USE INPUTS ONLY being set).
TOTAL COUNTER	The total counter is the source. (Only visible in BATCH / TOTAL MODE with TOTAL COUNTER being set).
TOTAL TIMER	The total timer is the source. (Only visible in TOTAL TIME MODE with YES being set).

COLOR This parameter defines the display colour. The colour can be changed by means of an event-dependent colour change in the Preselection 1 ... 4 Menu. This event-dependent colour change is only available for the devices DX2022, DX2023, DX2032, DX2033.	
RED	The display is red
GREEN	The display is green
YELLOW	The display is yellow
BRIGHTNESS (%) This parameter defines the display brightness in %.	
10	Minimum display brightness
90	Default value
100	Maximum display brightness
CONTRAST This parameter defines the display's angle of view.	
0	Angle of view from above
1	Angle of view from the front
2	Angle of view from below
SCREEN SAVER (S) This parameter defines the time in seconds after which the display goes off.	
0	Display stays on
...	
9999	Longest time until the display goes off
UP-DATE-TIME (S) This parameter defines the display refreshing time in seconds.	
0,005	Minimum update time
0,1	Default value
9.999	Maximum update time
FONT With this parameter, the font of the clear text can be selected.	
0	Standard
1	Font 1
START DISPLAY This parameter defines the start display after power-on of the device.	
STANDARD	Display with unit and status line
DOUBLE	Two-line display without units (Only visible in counter configuration A+B or A-B and with batch counter, total counter or total timer being activated).

DOUBLE WITH UNITS	Two-line display with units (Only visible in counter configuration A+B or A-B and with batch counter, total counter or total timer being activated).
LARGE	Large display (only if LARGE DISPLAY parameter is activated)
COMMAND	Display of the keyboard commands (Only visible in TIMER and COUNTER operating modes).
QUICKSTART	Display with quick-start function. Only for DX2022, DX2023, DX2032, DX2033.
MINIMUM / MAXIMUM	Display of the minimum / maximum values

LARGE DISPLAY

This parameter switches the large display on and off. Via the divider ratio, the display value for large display can be divided according to the available options.

NO	Large display switched off
1:1	Large display with divider ratio 1:1
1:10	Large display with divider ratio 1:10
1:100	Large display with divider ratio 1:100
1:1000	Large display with divider ratio 1:1000
1:10000	Large display with divider ratio 1:10000

9.16 Linearisation menu

In this menu the linearisation points are defined. Linearisation is only possible in the SPEED, PROCESS TIME and COUNTER operating modes. This menu is only displayed if the corresponding LINEARIZATION MODE is selected in the GENERAL MENU.

Description and examples of the linearisation function: (→ 10 Linearisation).

P1(X) ... P24(X) X coordinate of the linearisation point This is the display value which the device generates without linearisation depending on the input signal.	
-99999999	Lowest value
0	Default value
+99999999	Highest value
P1(Y) ... P24(Y) Y coordinate of the linearisation point This is the display value which the device is to generate instead of the X coordinate. For example, P2(X) is replaced by P2(Y).	
-99999999	Lowest value
0	Default value
+99999999	Highest value

10 Linearisation

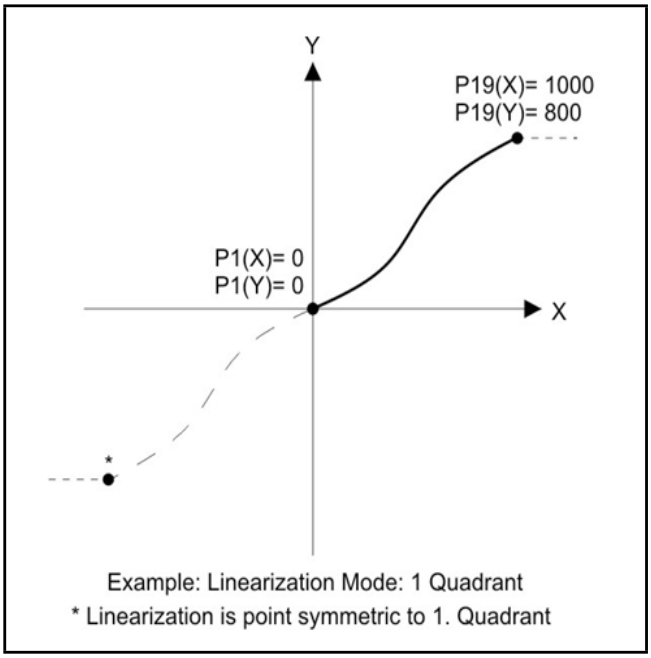
With this function, a linear input signal can be converted into a non-linear visualisation (or the other way round). 24 linearisation points are available. They can be distributed across the whole conversion area at any distances. There is automatic linear interpolation between 2 predefined coordinates.

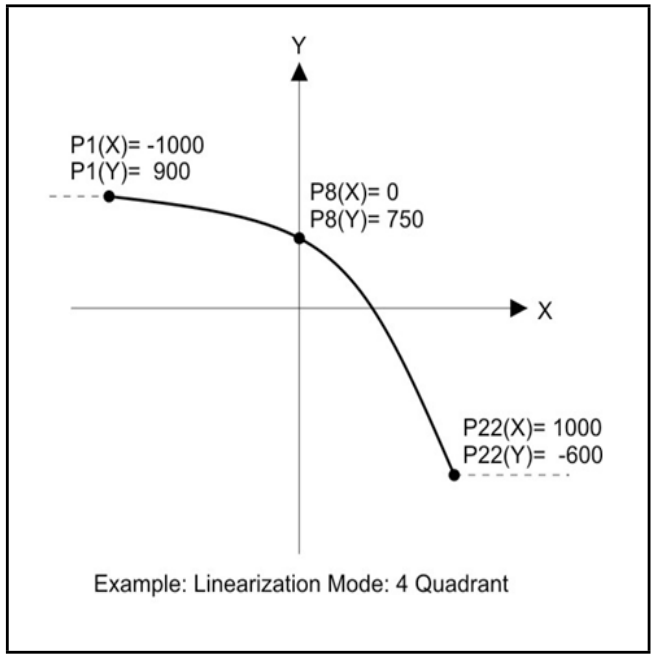
It is recommended to set as many points as possible in sections where curves are strongly bent. In sections with slight curve bending, only a few points are sufficient. To predefine a linearisation curve the LINEARIZATION MODE parameter has to be set to 1 QUADRANT or 4 QUADRANT (see diagram below).

With the parameters P1(X) to P24(X) up to 24 X coordinates can be defined. They correspond to the display values without linearisation.

With the parameters P1(Y) to P24(Y), you can enter the values which the display should indicate instead of the X values. Value P5(X) is replaced by value P5(Y), for example.

The X coordinates have to be assigned with continuously increasing values. That means P1(X) is the lowest value; every following value must be higher. In case of measured values that are higher than the X value that was defined last, the corresponding Y value is constantly displayed.





Mode 1 Quadrant:

P1(X) must be set to 0. Linearisation is only defined in the positive value range.

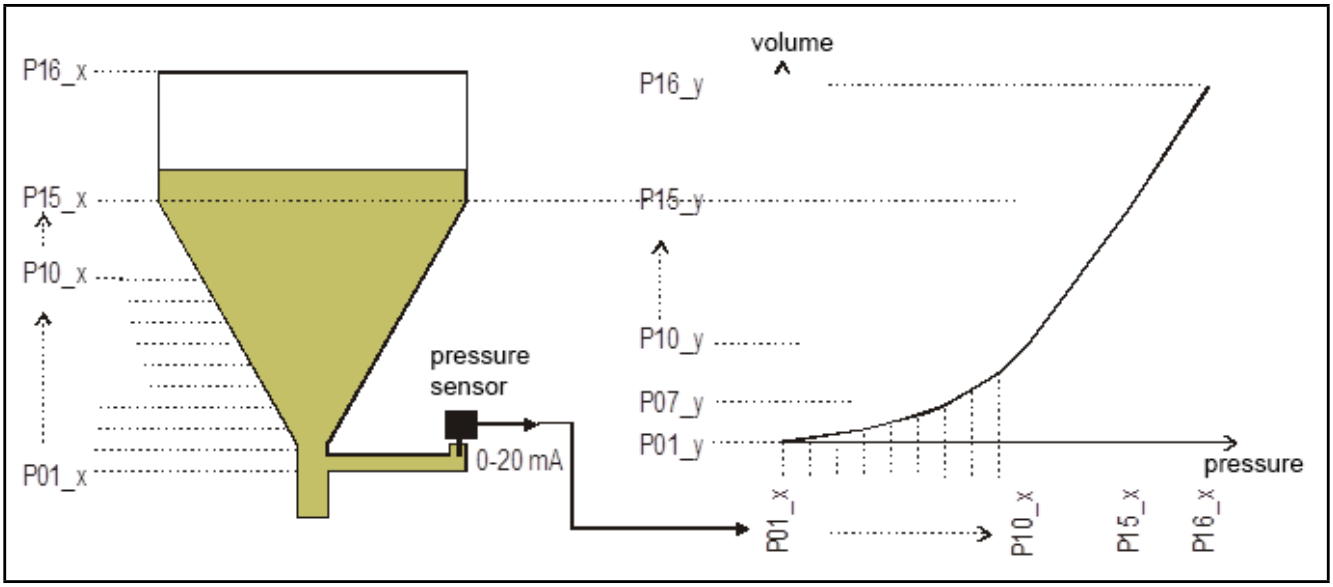
With negative measured values the curve is mirrored point-symmetrically.

Mode 4 Quadrant:

P1(X) can also be set to negative values. With measured values lower than P1(X) the value P1(Y) is constantly displayed.

Application example: linearisation

Using a pressure sensor, the level (volume) of a tank is to be determined and displayed. The analogue signal of the sensor is proportional to the level, but due to the shape of the tank, it is not proportional to the volume.



Application example volume calculation

11 Technical data

Voltage supply (DC):	Input voltage:	18 … 30 VDC
	Protection circuit:	reverse polarity protection
	Current consumption:	approx. 100 mA (without load)
	Protection:	external: T 0.5 A
Voltage supply (AC): (DX2021, DX2022, DX2023)	Input voltage:	115 … 230 VAC (50 … 60 Hz)
	Power consumption:	approx. 3 VA (without load)
	Protection:	external: T 0.1 A
Connections:	Connection type:	screw terminals, 1.5 mm² / AWG 16
Sensor supply:	In case of DC supply:	approx. 1 V lower than the input voltage
	Output current:	max. 250 mA
	in case of AC supply:	approx. 24 V (± 15%)
	Output current:	150 mA (at max. 45 °C) / 80 mA (at > 45 °C)
Incremental inputs:	Number:	2
	Configuration:	PNP, NPN, Namur or Tri-State
	Tracks:	A, B
	Format:	HTL (LOW 0 … 3 V, HIGH 9 … 30 V)
	Frequency:	max. 250 kHz
	Load:	max. 6 mA / Ri > 5 kohms / 470 pF
Control inputs:	Number:	3
	Format:	HTL, PNP (LOW 0 ... 3 V, HIGH 9 ... 30 V)
	Frequency:	max. 10 kHz
	Load:	max. 2 mA / Ri > 15 kohms / 470 pF
Analogue output: (DX2022, DX2032)	Configuration:	current or voltage output
	Voltage output:	-10 ... +10 V (max. 2 mA)
	Current output:	0 … 20 mA / 4 … 20 mA (load max. 270 ohms)
	Resolution:	16 bits
	Accuracy:	± 0.1 %
	Response time:	< 150 ms
Control outputs: (DX2022, DX2023, DX2032, DX2033)	Number:	4
	Format / level:	5 … 30 V (depending on the voltage on Com+), PNP
	Output current:	max. 200 mA
	Response time:	< 1 ms

Indication:	Type:	graphic LCD with backlight
	Display range	8 decades plus sign (-99999999 ... +99999999)
	Character height	13 mm
	Colour:	red / green / yellow (selectable)
	Operation:	touch screen (resistive)
Housing:	Material:	ABS, UL 94 V-0
	Installation:	panel mounting
	Dimensions (W x H x D):	96 x 48 x 116 mm
	Section (W x H):	91 x 43 mm
	Protection rating:	IP 65 front, IP 20 back
	Weight:	approx. 200 g
Ambient temperature:	Operation:	-20 °C ... 60 °C
	Storage:	-25 °C ... 70 °C
Conformity and standards:	EMC 2004/108/EC:	EN 61000-6-2, EN 61000-6-3, EN 61000-6-4
	NS 2006/95/EC:	EN 61010-1
	RoHS 2011/65/EU:	EN 50581

12 Maintenance, repair and disposal

12.1 Servicing

In case of regular operation, no maintenance measures are necessary for the unit. In case of unexpected problems, errors or functional failures, the unit must be sent to the manufacturer to be examined and, if necessary, repaired. Unauthorised opening and set-up may impair the functioning of the unit or cause failure of the protective measures supported by the unit.

12.2 Cleaning the housing surface

- ► Clean the device from dirt using a soft, chemically untreated cloth.
- ► The competent maintenance staff or the corresponding installer is responsible for unscheduled cleaning.

12.3 Repair

- ► The device must only be repaired by the manufacturer.
  Observe the safety instructions (→ 2 Safety instructions).

12.4 Disposal

- ► Dispose of the device in accordance with the national environmental regulations.

13 Approvals/standards

Test standards and regulations (→ 11 Technical data)

EC Declaration of Conformity and approvals are available at www.ifm.com.