



Operating instructions  
Multifunction displays  
for analogue standard signals

UK

**AX460**

80257643 / 00 03 / 2017



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## 1 Preliminary note



This document applies to devices of the type "AX460".  
These instructions are part of the device.

This document is intended for specialists. These specialists are people who are qualified by their appropriate training and their experience to see risks and to avoid possible hazards that may be caused during operation or maintenance of the device. The document contains information about the correct handling of the device.

Read this document before use to familiarise yourself with operating conditions, installation and operation. Keep this document during the entire duration of use of the device.

Adhere to the safety instructions.

### 1.1 Symbols 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

### 1.2 Warnings used

#### 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

### 2.1 General safety instructions

This description is an essential part of the device and contains important information concerning installation, function and operation. Non-compliance may result in damage or can affect the safety of operators and installations!

Using this device description requires appropriately qualified staff. The device may only be installed, configured, set up and maintained by a qualified and trained electrician.

Exclusion of liability: The manufacturer is not liable for any personal injuries or damage to property that may be caused by improper installation, set-up, operation and maintenance or by human misinterpretation or mistakes in this device description. Moreover, the manufacturer reserves the right to change technical aspects of the device or the description at any time; also without prior notice. Therefore, possible deviations between the device and the descriptions cannot be excluded.

The builder of the installation or the entire system is responsible for the safety of the installation or the entire system in which the system is to be integrated.

During installation, operation and maintenance works, all general and country-specific as well as application-specific safety regulations and standards must be observed and respected.

If the device is used in processes where human error or operating errors may cause damage to the installation or injuries to persons, corresponding measures must be taken to ensure reliable prevention of such consequences.

## 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 for display of input 1 and input 2 and for linking of input 1 + input 2, input 1 - input 2, input 1 x input 2, input 1 : input 2
- 2 universal 16-bit analogue inputs for -10 ... 10 V / 0 ... 20 mA / 4 ... 20 mA
- Reference output 10 V for potentiometer  $1 \geq \text{kohms}$
- 7-segment display with symbols and units
- Parameter setting via clear text and touch screen
- Auxiliary voltage output 24 VDC for sensor supply
- Totaliser for each input
- Linearisation with 24 data points per input
- Functions such as tare, averaging, sampling intervals per input
- 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 fluids.

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 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 analogue signals (-10 ... 10 V / 0 ... 20 mA / 4 ... 20 mA).

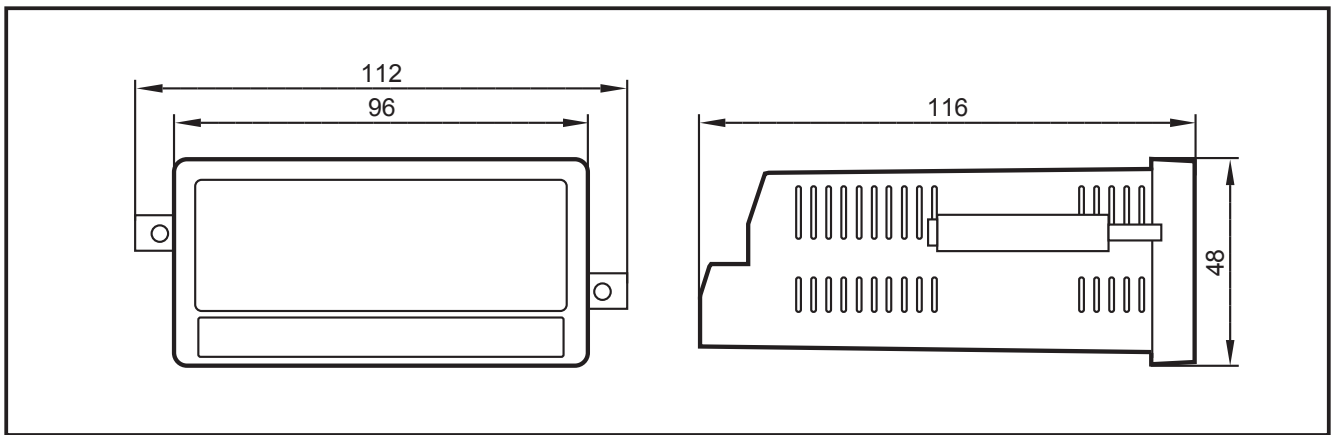
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### 5.1 Operating mode

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

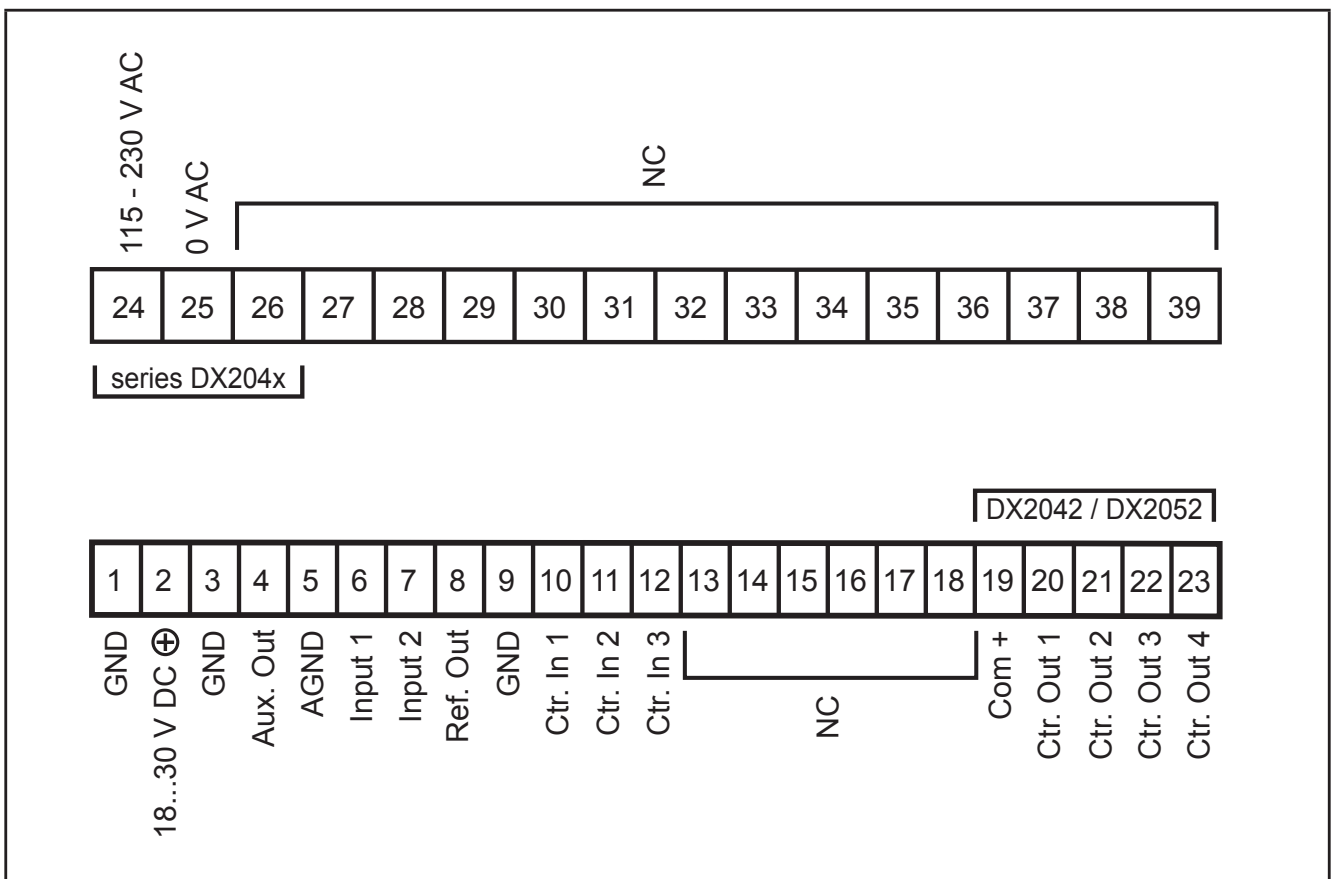
- **SINGLE:**  
One-channel operation of input 1.
- **DUAL:**  
Two-channel operation of inputs 1 and 2.
- **IN 1 + IN 2:**  
Two-channel operation of inputs 1 and 2, type of linking: addition.
- **IN 1 - IN 2:**  
Two-channel operation of inputs 1 and 2, type of linking: subtraction.
- **IN 1 x IN 2:**  
Two-channel operation of inputs 1 and 2, type of linking: multiplication.
- **IN 1 / IN 2:**  
Two-channel operation of inputs 1 and 2, type of linking: division.

## 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

### NOTE

Important: 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 V DC 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 approx. 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 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 ( $\pm 15\%$ ) 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.

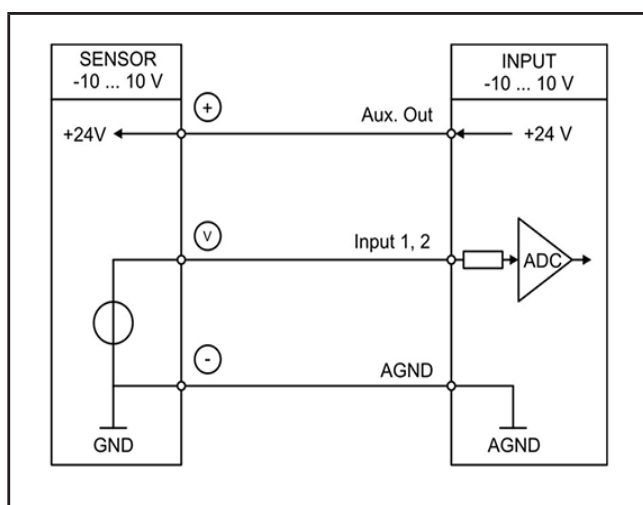
## 7.3 Analogue inputs

On terminal 5, the reference potential (AGND) for the analogue inputs is connected. On terminals 6 and 7, two 16 bit analogue outputs are available. The configuration (voltage input or current input) is set in the IN 1 / IN 2 Properties menus.

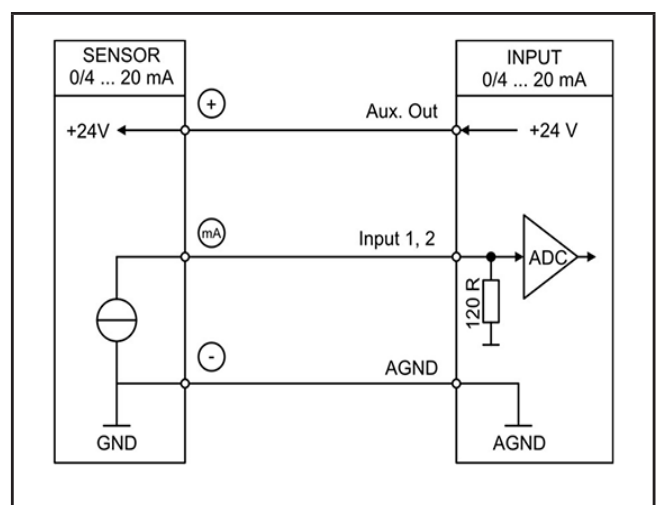
### NOTE

Important: The configuration (voltage input or current input) has to be set before connecting the sensor.

Connection of the analogue inputs:



Voltage input

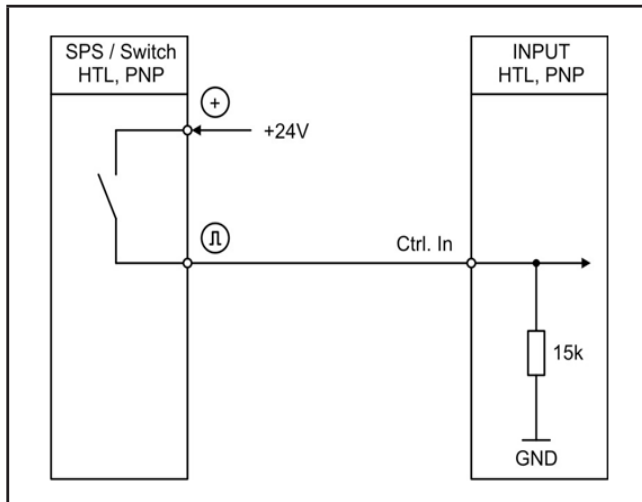


Current input

## 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".

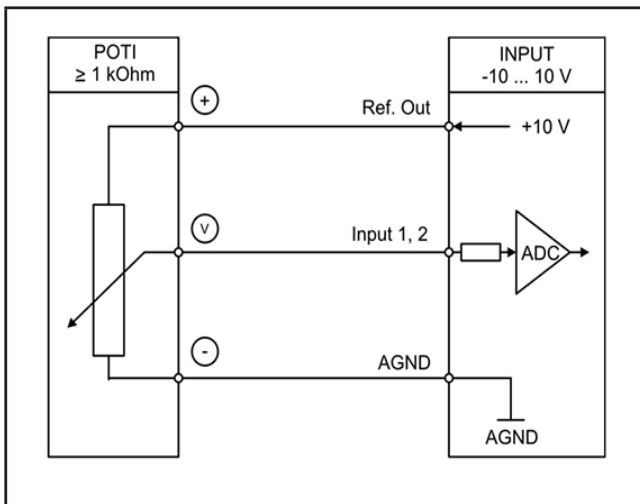
The input stages are designed for electronic control signals.

Remark on mechanical switching contacts:

If mechanical contacts are to be used as pulse source, a standard, external capacitor of about 10  $\mu\text{F}$  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 Reference output

On terminal 8, a 10 V reference output is available. The max. load of this output must not exceed 10 mA. This reference output can, for example, be used to connect a potentiometer.



Reference output with potentiometer

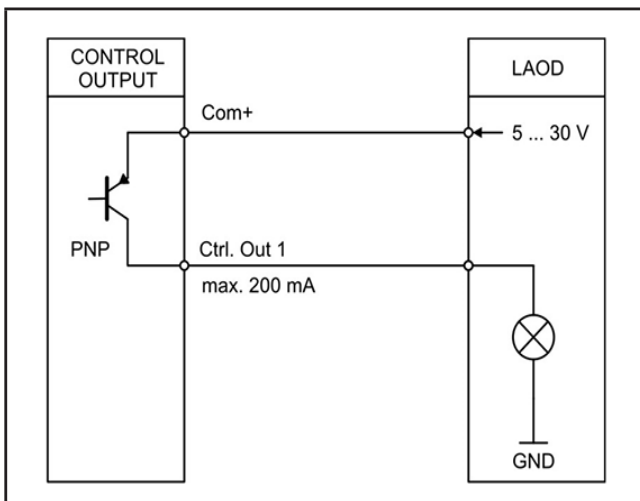
## 7.6 Control outputs (DX2042, DX2052)

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. The switching status is indicated in the display as C1 – C4 (display with unit and status line).



Connection of the control outputs

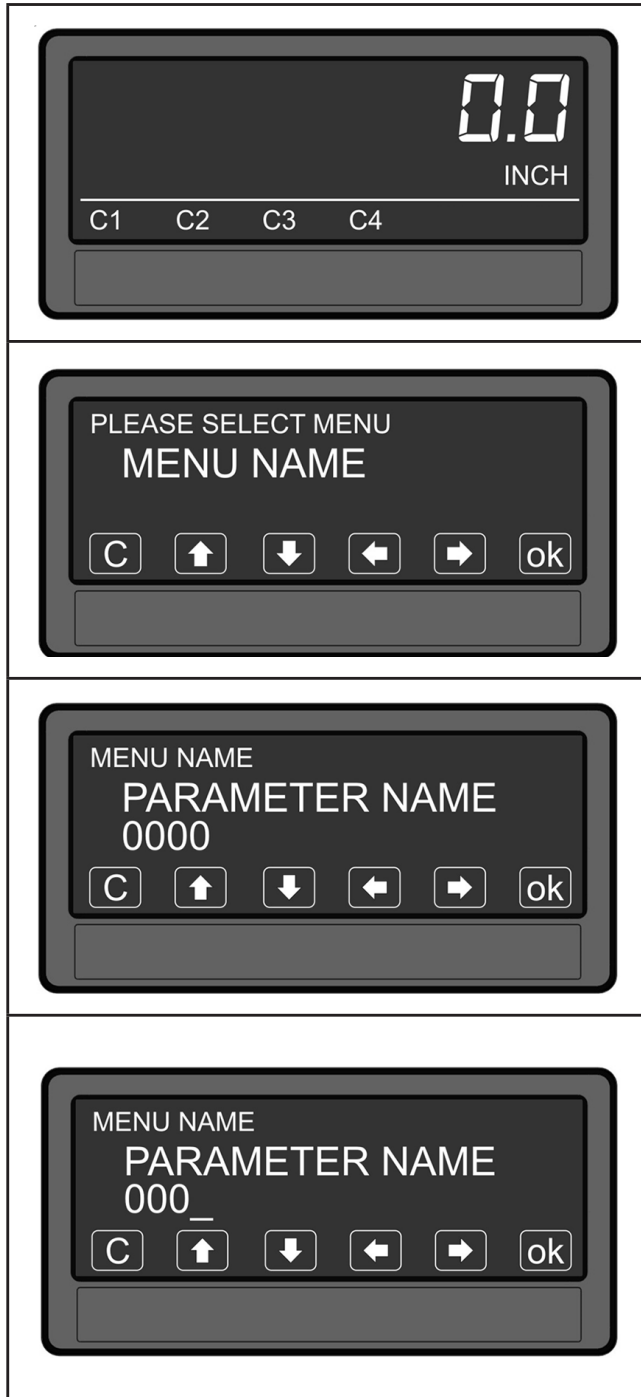
## 7.7 AC voltage supply (DX2041, DX2042)

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 mA 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 pushed 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 displays are possible.

The source (input 1, input 2, ...) for one-channel and two-channel display is defined in the DISPLAY MENU.



One-channel display with unit and status line:

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

Only for DX2042 and DX2052.

Two-channel display:

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

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 tap SKIP.

Only for DX2042 and DX2052.

Display of the actual / min / max values of input 1 and input 2:

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

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## 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 parameters belonging to the menu 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.

Menu / parameter	Menu / parameter
<b>GENERAL MENU</b>	<b>IN 1 TOTALIZATION</b>
OPERATIONAL MODE	TIME BASE
PIN PRESELECTION	DIVIDER
PIN PARAMETER	DECIMAL POINT
BACK UP MEMORY	SCALE UNITS
FACTORY SETTINGS	
	<b>IN 2 PROPERTIES</b>
<b>IN 1 PROPERTIES</b>	CONFIGURATION
CONFIGURATION	START VALUE
START VALUE	END VALUE
END VALUE	DECIMAL POINT
DECIMAL POINT	SCALE UNITS
SCALE UNITS	SAMPLING TIME (S)
SAMPLING TIME (S)	AVERAGE FILTER
AVERAGE FILTER	OFFSET
OFFSET	LINEARIZATION
LINEARIZATION	TOTALIZATION
TOTALIZATION	
	<b>IN 2 LINEARIZATION</b>
<b>IN 1 LINEARIZATION</b>	P1(X)
P1(X)	P1(Y)
P1(Y)	P2(X)
P2(X)	P2(Y)
P2(Y)	...
...	P24(X)
P24(X)	P24(Y)
P24(Y)	

Menu / parameter	Menu / parameter
<b>IN 2 TOTALIZATION</b>	<b>PRESELECTION 2 MENU</b>
TIME BASE	SOURCE 2
DIVIDER	MODE 2
DECIMAL POINT	HYSTERESIS 2
SCALE UNITS	PULSE TIME 2 (S)
	OUTPUT TARGET 2
<b>LINKAGE PROPERTIES</b>	OUTPUT POLARITY 2
FACTOR	OUTPUT LOCK 2
DIVIDER	START UP DELAY 2 (S)
ADDITIVE VALUE	EVENT COLOR 2
DECIMAL POINT	
SCALE UNITS	<b>PRESELECTION 3 MENU</b>
	SOURCE 3
<b>PRESELECTION VALUES</b>	MODE 3
PRESELECTION 1	HYSTERESIS 3
PRESELECTION 2	PULSE TIME 3 (S)
PRESELECTION 3	OUTPUT TARGET 3
PRESELECTION 4	OUTPUT POLARITY 3
	OUTPUT LOCK 3
<b>PRESELECTION 1 MENU</b>	START UP DELAY 3 (S)
SOURCE 1	EVENT COLOR 3
MODE 1	
HYSTERESIS 1	<b>PRESELECTION 4 MENU</b>
PULSE TIME 1 (S)	SOURCE 4
OUTPUT TARGET 1	MODE 4
OUTPUT POLARITY 1	HYSTERESIS 4
OUTPUT LOCK 1	PULSE TIME 4 (S)
START UP DELAY 1 (S)	OUTPUT TARGET 4
EVENT COLOR 1	OUTPUT POLARITY 4
	OUTPUT LOCK 4
	START UP DELAY 4 (S)
	EVENT COLOR 4

Menu / parameter	Menu / parameter
<b>COMMAND MENU</b>	<b>DISPLAY MENU</b>
INPUT 1 ACTION	START DISPLAY
INPUT 1 CONFIG	SOURCE SINGLE
INPUT 2 ACTION	SOURCE DUAL TOP
INPUT 2 CONFIG	SOURCE DUAL DOWN
INPUT 3 ACTION	COLOR
INPUT 3 CONFIG	BRIGHTNESS (%)
	CONTRAST
	SCREEN SAVER (S)
	UP-DATE-TIME (S)
	FONT

## 9.2 General Menu

<b>OPERATIONAL MODE</b>	
This parameter defines which measuring function (operating mode) the device is supposed to fulfil.	
SINGLE	One-channel operation (only input 1)
DUAL	Two-channel operation (input 1 and 2 separately)
IN 1 + IN 2	Two-channel operation of inputs 1 and 2, type of linking: addition.
IN 1 – IN 2	Two-channel operation of inputs 1 and 2, type of linking: subtraction.
IN 1 x IN 2	Two-channel operation of inputs 1 and 2, type of linking: multiplication.
IN 1 / IN 2	Two-channel operation of inputs 1 and 2, type of linking: division.
<b>PIN PRESELECTION</b>	
This parameter defines the PIN code for locking the quick-start function to enter the preset 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
<b>PIN PARAMETER</b>	
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.



<b>BACK UP MEMORY</b>	
NO	No backup in case of a power failure.
YES	In case of a power failure the device stores the actual value. Only for totaliser.
<b>FACTORY SETTINGS</b>	
NO	The factory settings are not loaded.
YES	The factory settings are loaded (default values highlighted in grey).

### 9.3 IN 1 Properties

In this menu the parameters for input 1 are defined.

<b>CONFIGURATION</b>	
This parameter defines the configuration of input 1.	
-10 ... +10 V	Voltage input -10...10 V
0 ... 20 mA	Current input 0...20 mA
4 ... 20 mA	Current input 4...20 mA
<b>START VALUE</b>	
This parameter defines the display value for an input signal of 0 V, 0 mA or 4 mA. Signals between START VALUE and END VALUE behave proportionally.	
-64999	Lowest value
0	Default value
64999	Highest value
<b>END VALUE</b>	
This parameter defines the display value for an input signal of 10 V or 20 mA. Signals between START VALUE and END VALUE behave proportionally.	
-64999	Lowest value
10000	Default value
64999	Highest value
<b>DECIMAL POINT</b>	
This setting defines the position of the decimal point.	
NO	No decimal point
0000000.0	Decimal point at the specified spot
000000.00	Decimal point at the specified spot
00000.000	Decimal point at the specified spot
0000.0000	Decimal point at the specified spot
000.00000	Decimal point at the specified spot
00.000000	Decimal point at the specified spot
0.0000000	Decimal point at the specified spot

**SCALE UNITS**

This parameter defines which unit is indicated in the display. It does not influence the display value. The decimal point for decimal places is set with the DECIMAL POINT parameter.

V	Default
mV	
A	
mA	
km/h	
mph	
feet/min	
inch/min	
g	
kg	
oz	
W	
kW	
VA	
mm	
cm	
m	
inch	
feet	
C	
F	
K	
1/sec	
1/min	
1/h	
gal/min	
Pa	
kPa	
%	
	No unit

**SAMPLING TIME (S)**

The set value corresponds to the sampling interval. This interval defines the interval in seconds between the samples of the analogue signal. This parameter has a direct influence on the reaction time of the device.

0.001	Lowest value
-------	--------------

0.01	Default value
60.000	Highest value
<b>AVERAGE FILTER</b>	
Optional averaging to prevent display fluctuations.	
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
<b>OFFSET</b>	
With this parameter, the zero point shift / tare of the input is set.	
-64.999	Lowest value
0	Default value
+64.999	Highest value
<b>LINEARIZATION</b>	
This parameter defines the linearisation function(→ 10 Linearisierung). The linearisation points are set in the IN 1 / IN 2 LINEARIZATION menu.	
OFF	No linearisation
1 QUADRANT	Linearisation in the 1st quadrant
4 QUADRANT	Linearisation in all 4 quadrants
<b>TOTALIZATION</b>	
This parameter activates the totalisation function. Settings are made in the IN 1 / IN 2 TOTALIZATION menu. The totalisation depends on the selected operating mode (→ 9.5 IN 1 Totalization).	
OFF	No totalisation
ON	Totalisation active

## 9.4 IN 1 Linearization

In this menu the linearisation points for input 1 are defined. This menu is only displayed if the corresponding linearisation is selected in the IN 1 PROPERTIES menu (→ 10 linearisation).

<b>P1(X) ... P24(X)</b>	
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

**9.5 IN 1 Totalization**

In this menu the parameters for the totalisation are defined. This menu is only displayed if the totalisation has been activated in the IN 1 PROPERTIES menu. The totaliser depends on the selected operating mode (see table below).

Operating mode	Totaliser		
	INPUT 1 TOTAL	INPUT 2 TOTAL	LINKAGE TOTAL
SINGLE	active	→ 0	→ 0
DUAL	active	active	→ 0
IN 1 + IN 2	active	active	Total 1 + Total 2
IN 1 - IN 2	active	active	Total 1 - Total 2
IN 1 x IN 2	active	active	→ 0
IN 1 / IN 2	active	active	→ 0

**TIME BASE**

This parameter defines the time base for the totalisation. It indicates the time interval for the detection of the measured values.

SECONDS	The current value is added to INPUT 1 TOTAL every second
MINUTES	The current value is added to INPUT 1 TOTAL every minute
HOURS	The current value is added to INPUT 1 TOTAL every hour
COMMAND	The current value of input 1 is added to INPUT 1 TOTAL by means of the command (ADD TO TOTAL 1) via the operation function of a control input (→ 9.15 Command menu).

**DIVIDER**

This parameter defines the divisor for the totalisation.

1	No division
10	Result of the totalisation is divided by 10.
100	Result of the totalisation is divided by 100.
1000	Result of the totalisation is divided by 1000.

<b>DECIMAL POINT</b>	
This setting defines the position of the decimal point.	
NO	No decimal point
0000000.0	Decimal point at the specified spot
000000.00	Decimal point at the specified spot
00000.000	Decimal point at the specified spot
0000.0000	Decimal point at the specified spot
000.00000	Decimal point at the specified spot
00.000000	Decimal point at the specified spot
0.0000000	Decimal point at the specified spot
<b>SCALE UNITS</b>	
Configuration of the indicated unit (→ 9.3 IN 1 Properties)	

## 9.6 IN 2 Properties

In this menu the parameters for input 2 are defined.

<b>CONFIGURATION</b>
Configuration of input 2 (→ 9.3 IN 1 Properties)
<b>START VALUE</b>
Display value of input 2 for an input signal of 0 V, 0 mA or 4 mA (→ 9.3 IN 1 Properties)
<b>END VALUE</b>
Display value of input 2 for an input signal of 10 V or 20 mA (→ 9.3 IN 1 Properties)
<b>DECIMAL POINT</b>
Setting of the decimal point (→ 9.3 IN 1 Properties)
<b>SCALE UNITS</b>
Unit indicated on the display (→ 9.3 IN 1 Properties)
<b>SAMPLING TIME (S)</b>
Sampling interval of input 2 (→ 9.3 IN 1 Properties)
<b>AVERAGE FILTER</b>
Optional averaging (→ 9.3 IN 1 Properties)
<b>OFFSET</b>
Zero point shift / tare (→ 9.3 IN 1 Properties)
<b>LINEARIZATION</b>
Linearisation function (→ 9.3 IN 1 Properties)
<b>TOTALIZATION</b>
Totalisation function (→ 9.3 IN 1 Properties)

## 9.7 IN 2 Linearization

In this menu the linearisation points for input 2 are defined.

<b>P1(X) ... P24(X)</b> X coordinate of the linearisation point (→ 9.4 IN 1 Linearization)
<b>P1(Y) ... P24(Y)</b> Y coordinate of the linearisation point (→ 9.4 IN 1 Linearization)

## 9.8 IN 2 Totalization

In this menu the parameters for the totalisation of input 2 are defined.

<b>TIME BASE</b> Time base for the totalisation (→ 9.5 IN 1 Totalization)
<b>DIVIDER</b> Divisor for the totalisation (→ 9.5 IN 1 Totalization)
<b>DECIMAL POINT</b> Position of the decimal point (→ 9.5 IN 1 Totalization)
<b>SCALE UNITS</b> Unit indicated on the display (→ 9.5 IN 1 Totalization)

## 9.9 Linkage Properties

In this menu the parameters for the linked operating mode are defined. This menu is only displayed if an operating mode with linking (e.g. IN 1 – IN 2) has been selected in the GENERAL MENU. For use of a linked operating mode the parameters in the IN 1 PROPERTIES and IN 2 PROPERTIES menus have to be set first. The result of the linking can be scaled with the following parameters.

<b>FACTOR</b> This parameter defines the factor with which the result of the linking is offset.	
-99999999	Lowest value
1	Default value
99999999	Highest value
<b>DIVIDER</b> This parameter defines the divisor with which the result of the linking is offset.	
-99999999	Lowest value
1	Default value
99999999	Highest value
<b>ADDITIVE VALUE</b> This parameter defines a constant that is added to the result of the linking.	
-99999999	Lowest value

0	Default value
99999999	Highest value
<b>DECIMAL POINT</b>	
This setting defines the position of the decimal point (→ 9.5 IN 1 Totalization).	
<b>SCALE UNITS</b>	
Configuration of the indicated unit (→ 9.3 IN 1 Properties)	

## 9.10 Preselection values

In this menu the preselection values and switching values are set. The preselection values / switch points always refer to the parameter SOURCE selected in the PRESELECTION MENU.

This function is only available for the devices DX2042 and DX2052.

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

## 9.11 Preselection 1 Menu

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

This function is only available for the devices DX2042 and DX2052.

<b>SOURCE 1</b>	
This parameter defines the source for preselection 1. The totalisation depends on the selected operating mode (→ 9.5 IN 1 Totalization).	
INPUT 1	Source is input 1
INPUT 2	Source is input 2
LINKAGE 1 – 2	The source is the result of the linking of input 1 and input 2
INPUT 1 TOTAL	Source is input 1 with totalisation
INPUT 2 TOTAL	Source is input 2 with totalisation
LINKAGE TOTAL	The source is the result of the linking of input 1 and input 2 with totalisation
<b>MODE 1</b>	
Switching condition for preselection 1. Output / display switch according to the following conditions:	
$ \text{RESULT}  \geq  \text{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 $\geq$ preselection 1 → ON Display value $<$ preselection 1 - hysteresis 1 → OFF
$ \text{RESULT}  \leq  \text{PRES} $	The result of display value is smaller 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 $\leq$ preselection 1 → ON Display value $>$ preselection 1 + hysteresis 1 → OFF
$ \text{RESULT}  =  \text{PRES} $	The result of the display value is equal to the result of preselection 1. In combination with hysteresis a frequency band (preselection $\pm \frac{1}{2}$ hysteresis) can be defined and monitored. With hysteresis 1 not equal to 0 the following switching condition results: Display value $>$ preselection 1 + $\frac{1}{2}$ hysteresis 1 → OFF Display value $<$ preselection 1 - $\frac{1}{2}$ hysteresis 1 → OFF
$\text{RESULT} \geq \text{PRES}$	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 $\geq$ preselection 1 → ON Display value $<$ preselection 1 - hysteresis 1 → OFF



RESULT≤PRES	<p>Display value smaller than or equal to preselection 1, e.g. underspeed (start-up delay recommended)</p> <p>With hysteresis 1 not equal to 0 the following switching condition results:            Display value ≤ preselection 1 → ON            Display value &gt; preselection 1 + hysteresis 1 → OFF</p>
RESULT=PRES	<p>Display value equal to preselection 1. In combination with hysteresis 1 a frequency band (preselection +/- ½ hysteresis) can be defined and monitored.</p> <p>With hysteresis 1 not equal to 0 the following switching condition results:            Display value &gt; preselection 1 + ½ hysteresis 1 → OFF            Display value &lt; preselection 1 - ½ hysteresis 1 → OFF</p>
RES≥PRES-TRAIL	<p>Tracking preset 1:            Display value greater than or equal to preselection 2 – preselection 1            Preselection 1 is the tracking preset of preselection 2.</p>
<b>HYSTERESIS 1</b>	
Hysteresis to define the switch-off point for the switching condition of preselection 1	
0	No switching hysteresis
...	
99999	Switching hysteresis of 99999
<b>PULSE TIME 1 (S)</b>	
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
<b>OUTPUT TARGET 1</b>	
Assignment of an output for the switching condition of preselection 1. If several switching conditions have been assigned to one single output, this output is active as soon as one of the switching conditions has been met.	
NO	No attribution
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

<b>OUTPUT POLARITY 1</b>	
Switching status for the switching condition of preselection 1	
ACTIVE HIGH	Active "HIGH"
ACTIVE LOW	Active "LOW"
<b>OUTPUT LOCK 1</b>	
Latching for the switching condition of preselection 1	
NO	No latching
YES	Latching
<b>START UP DELAY 1 (S)</b>	
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 $!RESULT \leq !PRES$ und $RESULT \leq PRES$ . (Start-up delays 3 and 4 have an automatic start-up delay.)	
0.000	No start-up delay
...	
60.000	Start-up delay in seconds
<b>EVENT COLOR 1</b>	
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

## 9.12 Preselection 2 Menu

<b>SOURCE 2</b>	
Source for preselection 2 (→ 9.11 Preselection 1 Menu)	
<b>MODE 2</b>	
Switching condition for preselection 2, (→ 9.11 Preselection 1 Menu) (except tracking preset)	
	see Preselection 1 Menu
RES $\geq$ PRES-TRAIL	Tracking preset 2: Display value greater or equal to preselection 1 – preselection 2 Preselection 2 is the tracking preset of preselection 1.
<b>HYSTERESIS 2</b>	
Switching hysteresis for the switching condition of preselection 2, (→ 9.11 Preselection 1 Menu)	
<b>PULSE TIME 2 (S)</b>	
Duration of the fleeting pulse for the switching condition of preselection 2 (→ 9.11 Preselection 1 Menu)	

<b>OUTPUT TARGET 2</b>	
Assignment of an output for the switching condition of preselection 2 (→ 9.11 Preselection 1 Menu) (except default value)	
	see Preselection 1 Menu
<b>CTRL OUT 2</b>	Assignment of the switching condition to Ctrl. Out 2
<b>OUTPUT POLARITY 2</b>	
Switching status for the switching condition of preselection 2, (→ 9.11 Preselection 1 Menu)	
<b>OUTPUT LOCK 2</b>	
Latching for the switching condition of preselection 2 (→ 9.11 Preselection 1 Menu)	
<b>START UP DELAY 2 (S)</b>	
Start-up delay for the switching condition of preselection 2 (→ 9.11 Preselection 1 Menu) (Start-up delays 3 and 4 have an automatic start-up delay.)	
<b>EVENT COLOR 2</b>	
Event-dependent colour change of the display for switching condition of preselection 2, see Preselection 1 Menu	

### 9.13 Preselection 3 Menu

<b>SOURCE 3</b>	
Source for preselection 3 (→ 9.11 Preselection 1 Menu)	
<b>MODE 3</b>	
Switching condition for preselection 3, (→ 9.11 Preselection 1 Menu) (except tracking preset)	
	see Preselection 1 Menu
<b>RES≥PRES-TRAIL</b>	Tracking preset 3: Display value greater or equal to preselection 4 – preselection 3 Preselection 3 is the tracking preset of preselection 4.
<b>HYSTERESIS 3</b>	
Switching hysteresis for the switching condition of preselection 3, (→ 9.11 Preselection 1 Menu)	
<b>PULSE TIME 3 (S)</b>	
Duration of the fleeting pulse for the switching condition of preselection 3 (→ 9.11 Preselection 1 Menu)	

<b>OUTPUT TARGET 3</b>	
Assignment of an output for the switching condition of preselection 3 (→ 9.11 Preselection 1 Menu) (except default value)	
	see Preselection 1 Menu
<b>CTRL OUT 3</b>	Assignment of the switching condition to Ctrl. Out 3
<b>OUTPUT POLARITY 3</b>	
Switching status for the switching condition of preselection 3, (→ 9.11 Preselection 1 Menu)	
<b>OUTPUT LOCK 3</b>	
Latching for the switching condition of preselection 3 (→ 9.11 Preselection 1 Menu)	
<b>START UP DELAY 3 (S)</b>	
Start-up delay for the switching condition of preselection 3. This setting only applies for the switching conditions $ \text{RESULT}  \leq  \text{PRES} $ und $\text{RESULT} \leq \text{PRES}$ . (Start-up delays 1 and 2 have a time-dependent start-up delay.)	
OFF	No start-up delay
AUTO	Automatic start-up delay until the preselection value / switch point has been exceeded for the first time.
<b>EVENT COLOR 3</b>	
Event-dependent colour change of the display for the switching condition of preselection 3, see Preselection 1 Menu	

## 9.14 Preselection 4 Menu

<b>SOURCE 4</b>	
Source for preselection 4 (→ 9.11 Preselection 1 Menu)	
<b>MODE 4</b>	
Switching condition for preselection 4, (→ 9.11 Preselection 1 Menu) (except tracking preset)	
	see Preselection 1 Menu
<b>RES≥PRES-TRAIL</b>	Tracking preset 4: Display value greater or equal to preselection 3 – preselection 4 Preselection 4 is the tracking preset of preselection 3.
<b>HYSTERESIS 4</b>	
Switching hysteresis for the switching condition of preselection 4, (→ 9.11 Preselection 1 Menu)	
<b>PULSE TIME 4 (S)</b>	
Duration of the fleeting pulse for the switching condition of preselection 4 (→ 9.11 Preselection 1 Menu)	

<b>OUTPUT TARGET 4</b>	
Assignment of an output for the switching condition of preselection 4 (→ 9.11 Preselection 1 Menu) (except default value)	
	see Preselection 1 Menu
<b>CTRL OUT 4</b>	Assignment of the switching condition to Ctrl. Out 4
<b>OUTPUT POLARITY 4</b>	
Switching status for the switching condition of preselection 4, (→ 9.11 Preselection 1 Menu)	
<b>OUTPUT LOCK 4</b>	
Latching for the switching condition of preselection 4 (→ 9.11 Preselection 1 Menu)	
<b>START UP DELAY 4 (S)</b>	
Start-up delay for the switching condition of preselection 4 (→ 9.13 Preselection 3 Menu) (Start-up delays 1 and 2 have a time-dependent start-up delay.)	
OFF	No start-up delay
AUTO	Automatic start-up delay until the preselection value / switch point has been exceeded for the first time.
<b>EVENT COLOR 4</b>	
Event-dependent colour change of the display for the switching condition of preselection 4, see Preselection 1 Menu	

## 9.15 Command menu

<b>INPUT 1 ACTION</b>		
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.	
TARA INPUT 1	The value of input 1 is saved as OFFSET of input 1.	d
TARA INPUT 2	The value of input 2 is saved as OFFSET of input 2.	d
TARA INPUT 1+2	The value of input 1 is saved as OFFSET of input 1, The value of input 2 is saved as OFFSET of input 2.	d
RESET TOTAL 1	The value of totaliser 1 is reset to 0.	d, s
RESET TOTAL 2	The value of totaliser 2 is reset to 0.	d, s
RESET TOTAL 1+2	The values of totaliser 1 and 2 are reset to 0.	d, s
TEACH PRESEL. 1	Value of SOURCE 1 is saved as PRESELECTION 1.	d
TEACH PRESEL. 2	Value of SOURCE 2 is saved as PRESELECTION 2.	d
TEACH PRESEL. 3	Value of SOURCE 3 is saved as PRESELECTION 3.	d
TEACH PRESEL. 4	Value of SOURCE 4 is saved as PRESELECTION 4.	d
SCROLL DISPLAY	Display change (→ 8.2 Display during operation).	d

RESET MIN/MAX	Reset of the min. / max. values.	d, s
CLEAR LOOP TIME	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
FREEZE	Freezes the display value.	s
KEY LOCK	Locks the keys of the touch screen.	s
LOCK RELEASE	Releases latching of all outputs.	d
START PRESELECT	N.A.	
ADD TO TOTAL 1	Adds the current value of input 1 to INPUT 1 TOTAL.	d
ADD TO TOTAL 2	Adds the current value of input 2 to INPUT 2 TOTAL	d
<b>INPUT 1 CONFIG</b>		
This parameter defines the switching characteristics for Ctrl. In 1.		
ACTIVE LOW	Activation in case of "LOW" (static)	
ACTIVE HIGH	Activation in case of "HIGH" (static)	
RISING EDGE	Activation in case of rising edge (dynamic)	
FALLING EDGE	Activation in case of falling edge (dynamic)	
<b>INPUT 2 ACTION</b>		
This parameter defines the control function of the Ctrl. In 2 input. See function assignment parameter INPUT 1 ACTION.		
<b>INPUT 2 CONFIG</b>		
This parameter defines the switching characteristics for Ctrl. In 2. See activation assignment parameter INPUT 1 CONFIG.		
<b>INPUT 3 ACTION</b>		
This parameter defines the control function of the Ctrl. In 3 input . See function assignment parameter INPUT 1 ACTION.		
<b>INPUT 3 CONFIG</b>		
This parameter defines the switching characteristics for Ctrl. In 3. See activation assignment parameter INPUT 1 CONFIG.		

## 9.16 Display menu

Parameter changes are only active after quitting the menu selection.

The totalisation depends on the selected operating mode (→ 9.5 IN 1 Totalization).

<b>START DISPLAY</b>	
This parameter defines the start display after power-on of the device.	
SINGLE	One-channel display. The source has to be defined in SOURCE SINGLE.
DUAL	Two-channel display. The sources have to be defined in SOURCE DUAL TOP / DOWN.
<b>SOURCE SINGLE</b>	
INPUT 1	Source is input 1
INPUT 2	Source is input 2
LINKAGE 1 – 2	The source is the result of the linking of input 1 and input 2
INPUT 1 TOTAL	Source is input 1 with totalisation
INPUT 2 TOTAL	Source is input 2 with totalisation
LINKAGE TOTAL	The source is the result of the linking of input 1 and input 2 with totalisation
<b>SOURCE DUAL TOP</b>	
INPUT 1	Source is input 1
INPUT 2	Source is input 2
LINKAGE 1 – 2	The source is the result of the linking of input 1 and input 2
INPUT 1 TOTAL	Source is input 1 with totalisation
INPUT 2 TOTAL	Source is input 2 with totalisation
LINKAGE TOTAL	The source is the result of the linking of input 1 and input 2 with totalisation
<b>SOURCE DUAL DOWN</b>	
INPUT 1	Source is input 1
INPUT 2	Source is input 2
LINKAGE 1 – 2	The source is the result of the linking of input 1 and input 2
INPUT 1 TOTAL	Source is input 1 with totalisation
INPUT 2 TOTAL	Source is input 2 with totalisation
LINKAGE TOTAL	The source is the result of the linking of input 1 and input 2 with totalisation
<b>COLOR</b>	
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 DX2042 and DX2052.	
RED	The display is red.

GREEN	The display is green.
YELLOW	The display is yellow.
10	Minimum display brightness
90	Default value
100	Maximum display brightness
<b>BRIGHTNESS (%)</b>	
This parameter defines the display brightness in %.	
10	Minimum display brightness
80	Default value
100	Maximum display brightness
<b>CONTRAST</b>	
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
<b>SCREEN SAVER (S)</b>	
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
<b>UP-DATE-TIME (S)</b>	
This parameter defines the display refreshing time in seconds.	
0.005	Minimum update time
0.1	Default value
9.999	Maximum update time
<b>FONT</b>	
With this parameter, the font of the clear text can be selected.	
0	Standard
1	Font 1

## 10 linearisation

By means of this function a linear input signal can be converted into a non-linear display (or vice versa). Up to 24 linearisation points are available for input 1 and input 2. They can be distributed across the whole conversion area at any distances. There is automatic linear interpolation between 2 predefined coordinates.



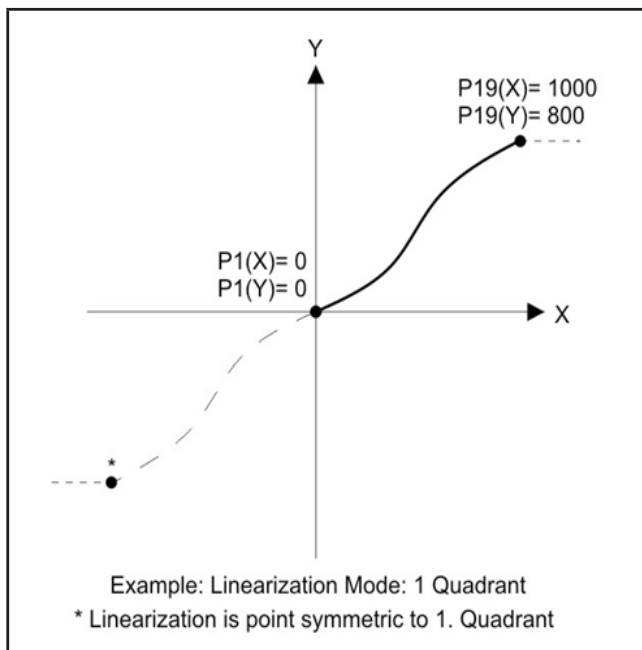
It is recommended to set many points in places with considerable curve bending; in places with little bending, however, few points are sufficient. To predefine a linearisation curve the LINEARIZATION MODE parameter has to be set to 1 QUADRANT or 4 QUADRANT in the IN1 Properties and IN 2 Properties menus (see diagram below).

Up to 24 X coordinates can be defined via the parameters P1(X) to P24(X) in the IN 1 Linearization and IN 2 Linearization menus. They correspond to the display values without linearisation.

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

UK

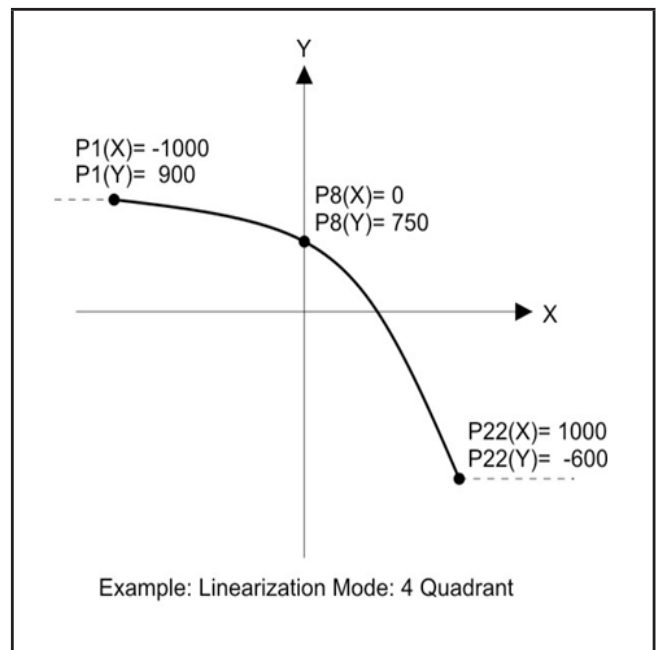
The X coordinates have to be assigned with continuously increasing values. That means P1(X) is the smallest value; every following value must be greater. With measured values greater than the X value defined last the corresponding Y value is constantly displayed.



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.

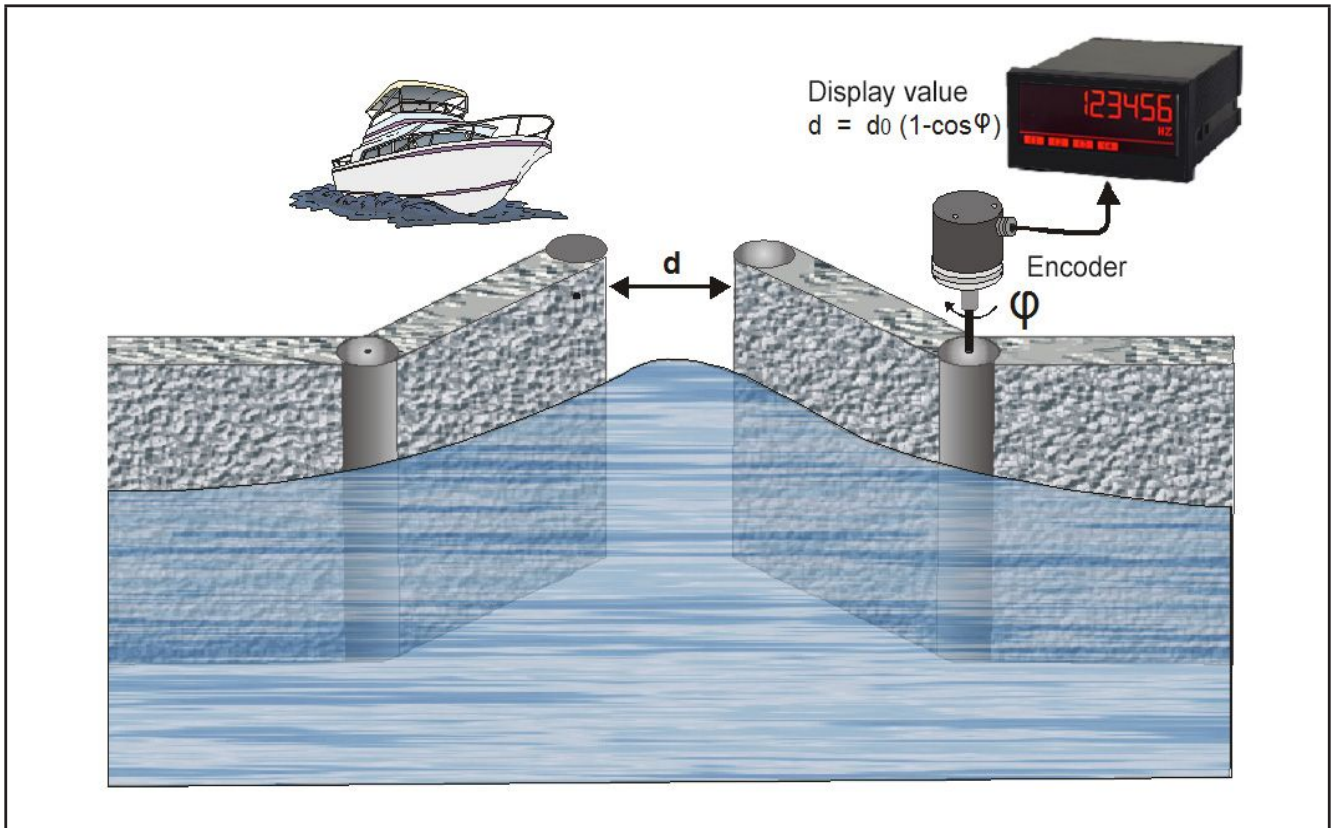


Mode 4 Quadrant:

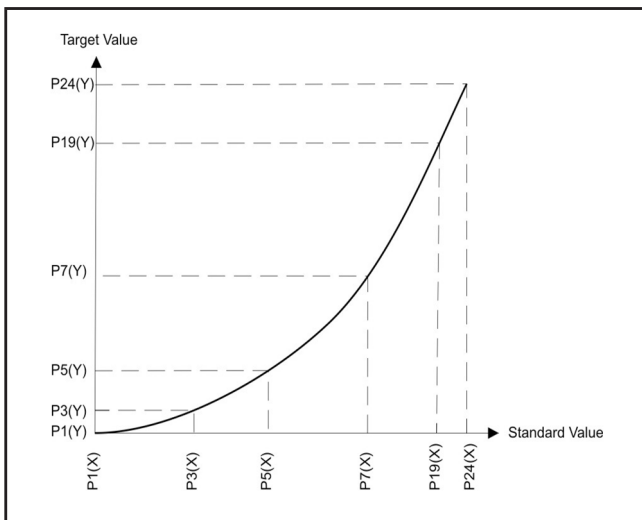
P1(X) can also be set to negative values. With measured values smaller than P1(X) the value P1(Y) is constantly displayed.

Application example linearisation:

The image below shows a water lock the opening width of which is detected by an incremental encoder and displayed. In this constellation the encoder generates a signal proportionally to the angle of rotation  $\varphi$ ; required is, however, the direct display of the opening width "d".



Application example water lock



Linearisation curve

## 11 Technical data

Voltage supply (DC):	Input voltage:	18 ... 30 VDC
	Protection circuit:	reverse polarity protection
	Current consumption:	approx. 100 mA (without load)
Voltage supply (AC): (DX2041, DX2042)	Input voltage:	115 ... 230 VAC (50 ... 60 Hz)
	Power consumption:	approx. 3 VA (without load)
Connections:	Connection type:	screw terminals, 1.5 mm <sup>2</sup> / 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)
Reference output:	Output voltage:	10 V
	Accuracy:	± 0.1 %
	Load:	max. 10 mA / ≥ 1 kohms
Analogue inputs:	Number	2
	Configuration	Voltage input or current input
	Voltage input	-10 ... 10 V (R <sub>i</sub> ≈ 50 kohms)
	Current input	0 ... 20 mA / 4 ... 20 mA (R <sub>i</sub> ≈ 120 ohms)
	Resolution	16 bits
	Accuracy:	± 0.1 %
Control inputs:	Number:	3
	Format:	HTL, PNP (LOW 0 ... 3 V, HIGH 9 ... 30 V)
	Frequency:	max. 10 kHz
	Load:	max. 2 mA / R <sub>i</sub> > 15 kohms / 470 pF
Control outputs: (DX2042, DX2052)	Number:	4
	Format / level:	5 ... 30 V (depending on the voltage on Com+), PNP
	Output current:	max. 200 mA
	Response time:	< 1 ms
Display:	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)

UK

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:	IP65 front, IP20 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 Maintenance

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 and dry 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](http://www.ifm.com).