



Multifunctional Indicator DX350

Frequency counter, tachometer and speed indicator (HTL) with touchscreen and graphic display

Product Features:

- Multifunctional unit with several operating modes, e. g. speed or position indicator, process meter, counter, timer or stopwatch
- Universal HTL inputs for encoders / sensors with NPN / PNP / NAMUR characteristic
- Bright and high-contrast display with event-dependent color variations
- Emulation of a 7-segment display inclusively icons and units
- Intuitive and easy parameterization by plain text and touchscreen
- 24 V auxiliary output for encoder supply
- Input frequencies up to 250 kHz
- Linearization with 24 control points
- Numerous features, e. g. scaling, filtering, start-up suppression
- 3.78 x 1.89 inch norm panel housing and IP65 protection

Available Options:

- **DX350:** Basic unit with HTL inputs (A, B), 3 control inputs
- **Option AC350:** Power supply 115 ... 250 VAC
- **Option AO350:** 16 bit analog output, 4 control outputs, serial RS232 interface
- **Option CO350:** 4 control outputs, serial RS232 interface
- **Option RL350:** 2 relay outputs

All options can be combined

Version:	Description
DX350_01a_oi/sn- tg /Oct-16	First Version
DX350_01d_oi/cn/Okt-16	Revised first Version

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1. Safety Instructions and Responsibility

1.1. General Safety Instructions

This operation manual is a significant component of the unit and includes important rules and hints about the installation, function and usage. Non-observance can result in damage and/or impairment of the functions to the unit or the machine or even in injury to persons using the equipment!

Please read the following instructions carefully before operating the device and observe all safety and warning instructions! Keep the manual for later use.

A pertinent qualification of the respective staff is a fundamental requirement in order to use these manual. The unit must be installed, connected and put into operation by a qualified electrician.

Liability exclusion: The manufacturer is not liable for personal injury and/or damage to property and for consequential damage, due to incorrect handling, installation and operation. Further claims, due to errors in the operation manual as well as misinterpretations are excluded from liability.

In addition the manufacturer reserve the right to modify the hardware, software or operation manual at any time and without prior notice. Therefore, there might be minor differences between the unit and the descriptions in operation manual.

The raiser respectively positioner is exclusively responsible for the safety of the system and equipment where the unit will be integrated.

During installation or maintenance all general and also all country- and application-specific safety rules and standards must be observed.

If the device is used in processes, where a failure or faulty operation could damage the system or injure persons, appropriate precautions to avoid such consequences must be taken.

1.2. Use according to the intended purpose

The unit is intended exclusively for use in industrial machines, constructions and systems. Non-conforming usage does not correspond to the provisions and lies within the sole responsibility of the user. The manufacturer is not liable for damages which has arisen through unsuitable and improper use.

Please note that device may only be installed in proper form and used in a technically perfect condition (in accordance to the Technical Specifications). The device is not suitable for operation in explosion-proof areas or areas which are excluded by the EN 61010-1 standard.

1.3. Installation

The device is only allowed to be installed and operated within the permissible temperature range. Please ensure an adequate ventilation and avoid all direct contact between the device and hot or aggressive gases and liquids.

Before installation or maintenance, the unit must be disconnected from all voltage-sources. Further it must be ensured that no danger can arise by touching the disconnected voltage-sources.

Devices which are supplied by AC-voltages, must be connected exclusively by switches, respectively circuit-breakers with the low voltage network. The switch or circuit-breaker must be placed as near as possible to the device and further indicated as separator.

Incoming as well as outgoing wires and wires for extra low voltages (ELV) must be separated from dangerous electrical cables (SELV circuits) by using a double resp. increased isolation.

All selected wires and isolations must be conform to the provided voltage- and temperature-ranges. Further all country- and application-specific standards, which are relevant for structure, form and quality of the wires, must be ensured. Indications about the permissible wire cross-sections for wiring are described in the Technical Specifications.

Before first start-up it must be ensured that all connections and wires are firmly seated and secured in the screw terminals. All (inclusively unused) terminals must be fastened by turning the relevant screws clockwise up to the stop.

Overvoltages at the connections must be limited to values in accordance to the overvoltage category II.

For placement, wiring, environmental conditions as well as shielding and earthing/grounding of the supply lines the general standards of industrial automation industry and the specific shielding instructions of the manufacturer are valid. Please find all respective hints and rules on www.motrona.com/download.html --> "[General EMC Rules for Wiring, Screening and Earthing]".

1.4. Cleaning, Maintenance and Service Notes

To clean the front of the unit please use only a slightly damp (not wet!), soft cloth. For the rear no cleaning is necessary. For an unscheduled, individual cleaning of the rear the maintenance staff or assembler is self-responsible.

During normal operation no maintenance is necessary. In case of unexpected problems, failures or malfunctions the device must be shipped for back to the manufacturer for checking, adjustment and reparation (if necessary). Unauthorized opening and repairing can have negative effects or failures to the protection-measures of the unit.

2. Introduction

This series of display unit is suitable for HTL impulse signals and panel mounting. It is very versatile in use, due to the intuitive operation and the extensive range of functions and options.

2.1. Function

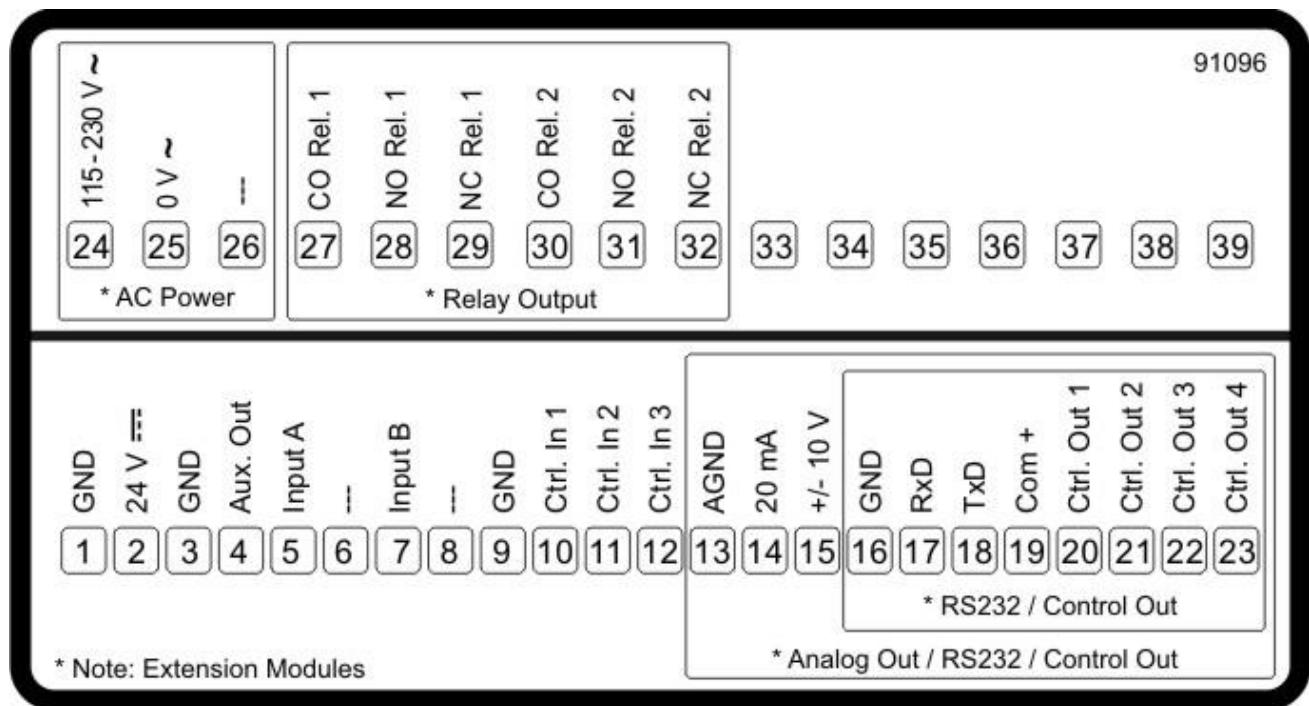
Functions are set in the parameter menu.

The device can be operated in one of the following operation modes:

- Speed:
Speed indicator (RPM), operation as tachometer or frequency counter.
Only input A is used. Input B is unused.
- Process Time:
Operation as baking time or processing time indicator (reciprocal speed)
Only input A is used. Input B is unused.
- Timer:
Operation as stopwatch. Start- / Stop function can be freely parameterized.
Depending on the parameter setting, only Input A or Input B are used.
- Counter:
Operation as position indicator, impulse, summing, difference, up-down counter.
Input A and B are used.
- Velocity:
Runtime measurement as speed indicator.
Input A operates as a start input and input B operates as a Stop input.

Devices with option CO350 / AO350 / RL350, serial interface, control outputs, analog outputs or relay outputs can be used in addition as feedback for e.g. motion controllers. Monitoring of preset values such as maximum speed, minimum speed, standstill or window functions is also feasible.

3. Electrical Connections



3.1. DC Power Supply

The unit accepts DC supply from 18V to 30 V when using terminals 1 and 2, and the consumption depends on the level of the supply voltage (typically between 50 mA and 100 mA plus current taken from aux. output).

All GND terminals are internally interconnected.

3.2. Auxiliary Voltage Output

Terminal 3 and 4 provide an auxiliary output for supply of sensors and encoders.

The output voltage is dependent on the power supply.

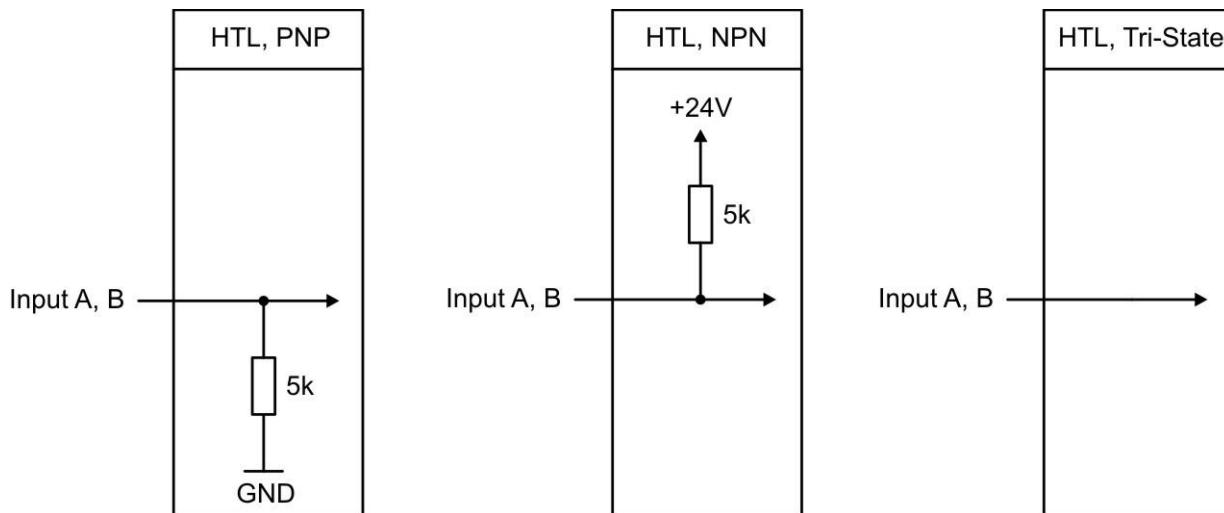
- For DC Version, the encoder voltage is approx. 1 V lower than the power supply voltage and should be loaded with max. 250 mA.
- For AC Version, the encoder voltage is 24 VDC ($\pm 15\%$) and should be loaded with max. 150 mA.
- The maximum output current is temperature-dependent.

3.3. Incremental Input A, B

The unit provides two TTL inputs at terminal 5 and 7 for HTL signals.

The characteristics of the Incremental Input (PNP, NPN, Tri-State) are set by the Parameter Menu.

Internal wiring of the Incremental Inputs:



By using two-wire-NAMUR-sensor select NPN. Connect the negative pole of the sensor with GND and the positive pole with the corresponding input.

Unconnected PNP inputs are always "LOW" and unconnected NPN inputs are always "HIGH".

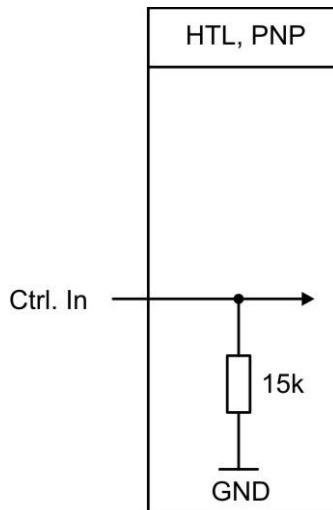
All inputs are designed to receive impulses from an electronic impulse source. When exceptionally you need to use mechanical contacts, please connect an external capacitor between GND (-) and the corresponding input (+). With a capacity of 10 μF , the maximum input frequency will reduce to 20 Hz and miscounting due to contact bouncing will be eliminated.

3.4. Control Inputs

The three control inputs at terminal 10, 11 and 12 have HTL PNP characteristics.

The parameter menu provide assignment of programmable functions for the control inputs like reset the display value, display switching, locking the touchscreen controls or reset latched control or relay outputs.

Internal wiring of the Control Inputs:



Unconnected control inputs are always "LOW".

All inputs are designed to receive impulses from an electronic impulse source. When exceptionally you need to use mechanical contacts, please connect an external capacitor between GND (-) and the corresponding input (+). With a capacity of 10 μF , the maximum input frequency will reduce to 20 Hz and miscounting due to contact bouncing will be eliminated.

3.5. Analog Output (Option A0350)

A 16 Bit Output is available at terminal 13 and 14 / 15

This output is configurable with the parameter menu.

The following configuration is possible:

- Voltage output: -10 ... +10 V
- Current output: 0 ... 20 mA
- Current output: 4 ... 20 mA

The display value is proportional to the analog output and is referenced to potential AGND.

AGND and GND are internally interconnected.

The scaling of the analog output is configurable with the parameter menu.



Important: A parallel operation with voltage output and current output at the analog output is not possible.
It can be taken either in Volt or mA.

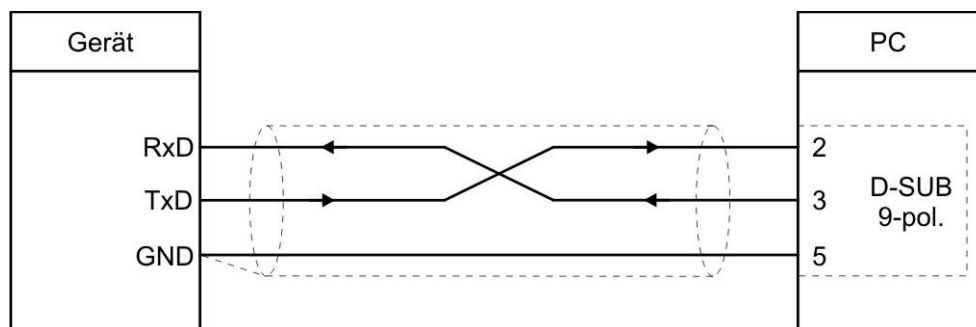
3.6. Serial interface (Option A0350 / C0350)

A serial interface is available at terminal 16, 17 und 18.
This interface is configurable with the parameter menu.

The serial interface can be used as follows:

- for easy setup and commissioning of the units
- for modify settings and parameters during operation
- to read out internal states and actual measuring values by PC or SPS

Die picture bellow shows the connection to a PC using the standard Sub-D-9 connector:



3.7. Control-Output (Option A0350 / C0350)

Four control outputs are available at terminal 19, 20, 21, 22 and 23.

The setpoints and the switching conditions can be parameterized by the parameter menu.

The units provide four threshold settings with programmable switching characteristics.

The output Ctrl. Out1 – Ctrl. Out 4 are fast PNP outputs with a switching capability of 5 – 30 Volt / 200 mA per channel.

The switching voltage of the outputs must be applied remotely to the COM+ input (terminal 19).

In case of switching inductive loads it is advisable to use external filtering of the coils.

3.8. AC Power supply (Option AC350)

The units require an AC supply which must be applied to terminals 24 and 25.

N.A. Available at the beginning of 2017.

3.9. Relay-Output (Option RL350)

Two relay outputs with potential-free changeover contacts are available at terminal 27, 28, 29, 30, 31, 32.

The setpoints and the switching conditions can be parameterized by the parameter menu.

The units provide four threshold settings with programmable switching characteristics.

N.A. Available at the beginning of 2017.

4. Operation / Touchscreen

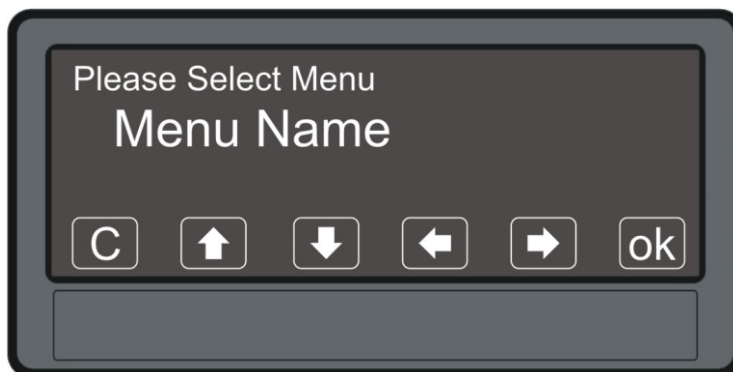
4.1. Setup Procedure

The parameter menus and the parameters are described in chapter 5.



Setup Procedure:

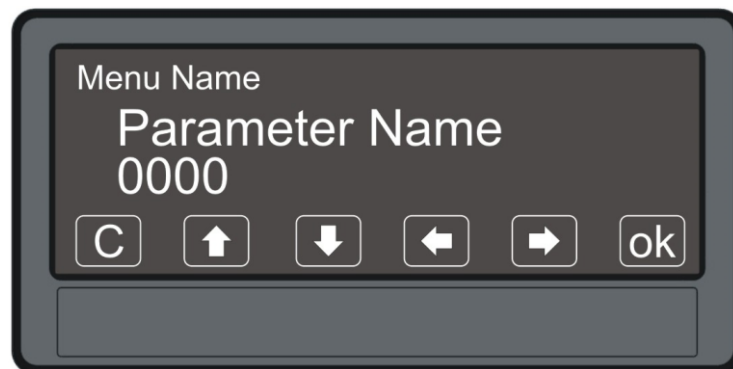
For setting the device parameters, press the touchscreen for 3 seconds.



Menu selection:

Select the parameter menu via arrow button and conform to "OK".

The menu selection is terminated with „C“.



Parameter selection:

Select the parameter via arrow button and conform to „OK“.

The parameter selection is terminated with „C“.



Parameter editing:

Edit the parameter via arrow button and save with „OK“.

The parameter editing is terminated with „C“.

Parameter changes become active only after closing the menu selection

4.2. The display possibilities

The following displays are available.



Display with the status of the control- and relay outputs

For switching over to the next display, press the touchscreen.



Display with command keys

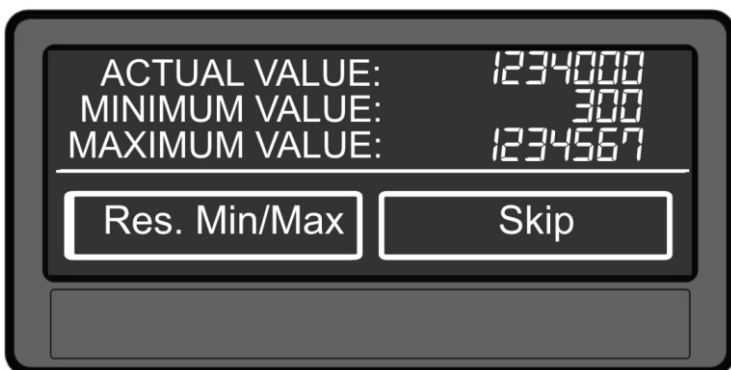
Function: N.A.

For switching over to the next display, press the touchscreen at the top of the screen or the "Skip" button.



Display for quick start with Preselection Values

For switching over to the next display, press the touchscreen at the top of the screen or the "Skip" button.



Display with minimum and maximum value

For switching over to the next display, press the touchscreen at the top of the screen or the "Skip" button

5. Parameter / Overview-Menu Structure

5.1. Overview

This section provides an overview of the menus and their assignments to the different functions of the units. The menu names are printed hold, and associated parameters are arrayed directly under the menu names.

Menu / Parameter
GENERAL MENU
OPERATIONAL MODE
ENCODER PROPERTIES
COUNTING DIRECTION
PIN PRESELECTION
PIN PARAMETER
FACTORY SETTINGS
DISPLAY-MENU
UP-DATE-TIME
BRIGHTNESS
SCALE UNITS
SCREEN SAVER
COLOUR
FONT
CONTRAST
COMMAND-MENU
INPUT 1 ACTION
INPUT 1 CONFIG
INPUT 2 ACTION
INPUT 2 CONFIG
INPUT 3 ACTION
INPUT 3 CONFIG
LINEARISATION-MENU
P1(X)
P1(Y)
P2(X)
P2(Y)
P3(X)
P3(Y)
P4(X)
P4(Y)
P5(X)
P5(Y)
P6(X)
P6(Y)

Menu / Parameter
LINEARISATION-MENU
P7(X)
P7(Y)
P8(X)
P8(Y)
P9(X)
P9(Y)
P10(X)
P10(Y)
P11(X)
P11(Y)
P12(X)
P12(Y)
P13(X)
P13(Y)
P14(X)
P14(Y)
P15(X)
P15(Y)
P16(X)
P22(Y)
P23(X)
P23(Y)
P24(X)
P24(Y)
MODE SPEED
INPUT FREQUENCY (HZ)
DISPLAY VALUE
DECIMAL POINT
SAMPLING TIME (S)
WAIT TIME (S)
STANDSTILL TIME (S)
AVERAGE FILTER

Continuation „Parameter / Overview-Menu Structure“:

Menu / Parameter
MODE PROCESS TIME
DISPLAY FORMAT
INPUT FREQUENCY (HZ)
DISPLAY VALUE
SAMPLING TIME (S)
WAIT TIME (S)
STANDSTILL TIME (S)
AVERAGE FILTER
MODE TIMER
TIME BASE
START / STOP
AUTO RESET
LATCH FUNCTION
MODE COUNTER
COUNT MODE
FACTOR
SET VALUE
DECIMALPOINT
MODE VELOCITY
MEASURING TIME (S)
DISPLAY VALUE
DECIMALPOINT
WAIT TIME (S)
STANDSTILL TIME (S)
PRESELECTION VALUES
PRESELECTION 1
PRESELECTION 2
PRESELECTION 3
PRESELECTION 4
PRESELECTION 1 MENU
MODE 1
HYSTERESIS 1
PULSE TIME 1
OUTPUT TARGET 1
OUTPUT POLARITY 1
OUTPUT LOCK 1
START UP DELAY 1

Menu / Parameter
PRESELECTION 2 MENU
MODE 2
HYSTERESIS 2
PULSE TIME 2
OUTPUT TARGET 2
OUTPUT POLARITY 2
OUTPUT LOCK 2
START UP DELAY 2
PRESELECTION 3 MENU
MODE 3
HYSTERESIS 3
PULSE TIME 3
OUTPUT TARGET 3
OUTPUT POLARITY 3
OUTPUT LOCK 3
START UP DELAY 3
PRESELECTION 4 MENU
MODE 4
HYSTERESIS 4
PULSE TIME 4
OUTPUT TARGET 4
OUTPUT POLARITY 4
OUTPUT LOCK 4
START UP DELAY 4
SERIAL MENU
UNIT NUMBER
SERIAL BAUD RATE
SERIAL FORMAT
SERIAL INIT
SERIAL PROTOCOL
SERIAL TIMER
ANALOG-MENU
ANALOG FORMAT
ANALOG START
ANALOG END
ANALOG GAIN
ANALOG OFFSET

Menu MODE SPEED, PROCESS TIME, TIMER, COUNTER, VELOCITY are only displayed when the appropriate OPERATIONAL MODE in the GENERAL MENU is selected.

5.2. General Menu

OPERATIONAL MODE

This parameter specifies the selected measuring function.

	SPEED	Indicator (RPM), operation as tachometer or frequency counter
	PROCESS TIME	Operation as baking time or processing time indicator (reciprocal speed)
	TIMER	Operation as stopwatch
	COUNTER	Operation as position indicator, impulse, summing, difference, up-down counter
	VELOCITY	Runtime measurement as speed indicator
	SPEED	Indicator (RPM), operation as tachometer or frequency counter

ENCODER PROPERTIES

This parameter determine the characteristics of the pulse input.

	PNP	signal must switch to +
	NPN	signal must switch to -
	TRI-STATE	Tri-State

COUNTING DIRECTION

This parameter determine the direction of rotation of the pulse input

	FORWARD	The direction of rotation of the pulse input is forward.
	REVERSE	The direction of rotation of the pulse input is reverse.

PIN PRESELECTION

This parameter defines the PIN-Code for interlock quick start „Preselection Values“). Interlock for the quick start Menu „Preselection Values“ is only useful in conjunction with the interlock for all parameters “PIN Parameter”.

.	0000	No interlock
	...	
	9999	Access after entering PIN-Code 9999

PIN PARAMETER

This parameter defines the PIN-Code for interlock all parameters (Emergency PIN - DIN6079)

	0000	No interlock
	...	
	9999	Parameterization of the unit after entering PIN-Code 9999

FACTORY SETTINGS

	No	No default values are loaded
	Yes	Load default values (the grey deposited values)

5.3. Display Menu

UP-DATE-TIME

This parameter defines the update time of the display in sec.

	0,005	Shortest update time
	...	
	9,999	Largest update time

BRIGHTNESS

This parameter defines the brightness of the display in percent

	0,005	Shortest brightness in percent
	...	
	9,999	Largest brightness in percent

SCALE UNITS

This parameter defines the setting of the display brightness.

	HZ	
	KHZ	
	M/S	
	M/MIN	
	KM/H	
	MPH	
	MIN-1	
	RPM	
	SEK-1	
	RPS	
	STK/H	
	PCS/H	
	MM	
	M	
	INCH	
	FEET	
	SCK	
	PCS	
	SEC	
	MIN	
	MIN:SEC	
	H:M:S	
	%	
	DEFAULT	

Continuation „Display Menu“:

SCREEN SAVWER

This parameter defines the automatic dimming time of the display in sec.

	0	Shortest time for automatic dimming
	...	
	99,99	Largest time for automatic dimming

COLOUR

This parameter defines the emitting color of the display.

	ROT	Red lighted display
	GRÜN	Green lighted display
	GELB	Yellow lighted display

FONT

This parameter defines the setting of the font style.

	0	Standard
	1	Font 1

CONTRAST

This parameter defines the angle of view to the display

	0	Angle of view from above
	1	Angle of view from half above
	2	Angle of view from half below
	3	Angle of view from below

5.4. Command Menu

INPUT 1 ACTION

This parameter defines the function and wiring of ext Ctrl. In 1.

	NO	No function
	RESET VALUE	Reset to zero
	SCROLL DISPLAY	Display switching
	FREEZE	Freeze display value
	RESET MIN/MAX	Reset of the min. / max. value
	KEY LOCK	Key lock of the touchscreen
	LOCK RELEASE	All outputs are latched / open relay

INPUT 1 CONFIG

This parameter defines the switching characteristics of Ctrl. In 1.

	ACTIVE LOW	Activation by „LOW“ (static)
	ACTIVE HIGH	Activation by „HIGH“ (static)
	RISING EDGE	Activation by rising edges
	FALLING EDGE	Activation by falling edges

INPUT 2 ACTION

This parameter defines the function and wiring of ext Ctrl. In 2.

See parameter INPUT 1 ACTION.

INPUT 2 CONFIG

This parameter defines the switching characteristics of Ctrl. In 2.

See parameter INPUT 1 CONFIG.

INPUT 3 ACTION

This parameter defines the function and wiring of ext Ctrl. In 3.

See parameter INPUT 1 ACTION.

INPUT 3 CONFIG

This parameter defines the switching characteristics of Ctrl. In 3.

See parameter INPUT 1 CONFIG.

5.5. Linearization Menu

The linearization points are defined in this menu. The linearization points are only used during the operation mode "Mode Speed" and "Mode Counter".

P1(X) - P24(X)		
x-coordinate of the linearization point		
	-99999999	Smallest x-coordinate
	...	
	+99999999	Largest x-coordinate

P1(Y) - P24(Y)		
y-coordinate of the linearization point		
	-99999999	Smallest y-coordinate
	...	
	+99999999	Largest y-coordinate

5.6. Mode Speed

This menu defines the operation as indicator (RPM), tachometer or frequency counter.

The frequency must be connected to Input A, Input B is unused. This menu is only displayed when the appropriate OPERATIONAL MODE in the GENERAL MENU is selected.

INPUT FREQUENCY (HZ)

This value defines a typical application frequency.

1	Smallest frequency
100	Default value
500000	Highest frequency

DISPLAY VALUE

This value defines the displayed speed value assigned to the set frequency using the parameter INPUT FREQUENCY.

1	Smallest displayed speed
1000	Default Value
99999999	Greatest displayed speed

DECIMAL POINT

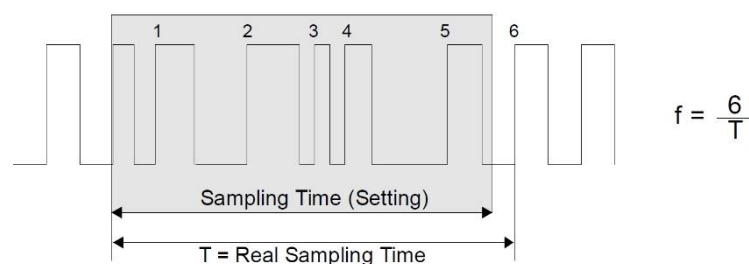
This value defines the number of decimal places.

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

The adjusted value corresponds to the minimal measurement time. The Sampling Time is used as a filter for smoothing unstable frequencies. This parameter affects the reaction time of the unit. The valid settings are for both input channels.

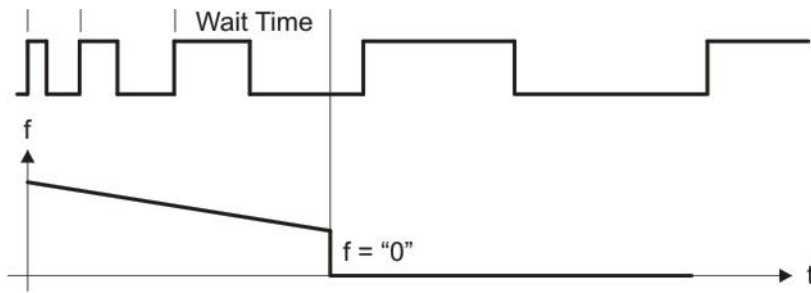
0,001	Shortest Sampling time
0,1	Default value
9,999	Largest Sampling time



Continuation „Mode Speed“:

WAIT TIME

This parameter defines the period time of the lowest frequency, accordingly the time between two rising signal edges detecting frequency 0 Hz. Frequencies with a period time higher than the set "WAIT TIME" will be detected as frequency = 0 Hz.

	0,01	Frequency = 0 Hz, for frequencies below 100 Hz
	1,00	Default Value
	99,99	Frequency = 0 Hz, for frequencies below 0,1 Hz
		

STANDSTILL TIME

This parameter defines the time setting for standstill definition.

A time of xx.xx seconds after detection "zero input frequency" the unit signals "standstill" and reactivates the start-up-delays.

	0,00	Shortest delay time in sec.
	...	
	99,99	Largest delay time in sec.

AVERAGE FILTER

Switchable averaging to avoid display fluctuations by unstable frequencies.

	0	No average value will be created
	1	2 numbers of floating average cycles
	2	4 numbers of floating average cycles
	3	8 numbers of floating average cycles
	4	16 numbers of floating average cycles

5.7. Mode Process Time

In this menu the operation is defined as baking time or processing time indicator (reciprocal speed)
Only input A is used. Input B is unused. This menu is only displayed when the appropriate
OPERATIONAL MODE in the GENERAL MENU is selected.

DISPLAY FORMAT

This parameter selects the Display Format.

This will also automatically set your decimal point to the proper place.

	SECONDS	Display in seconds
	MINUTES	Display in minutes
	MIN:SEC	Display in minutes : seconds
	MIN.00	Display in minutes and 1/100 minutes

INPUT FREQUENCY (HZ)

This value defines a typical application frequency.

	1	Smallest frequency
	100	Default value
	500000	Highest frequency

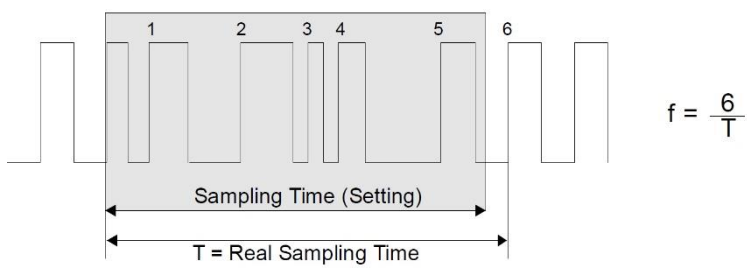
DISPLAY VALUE

This value defines the displayed processing time value assigned to the set frequency using the parameter
INPUT FREQUENCY.

	1	Smallest displayed processing time
	1000	Default Value
	99999999	Greatest displayed processing time

SAMPLING TIME

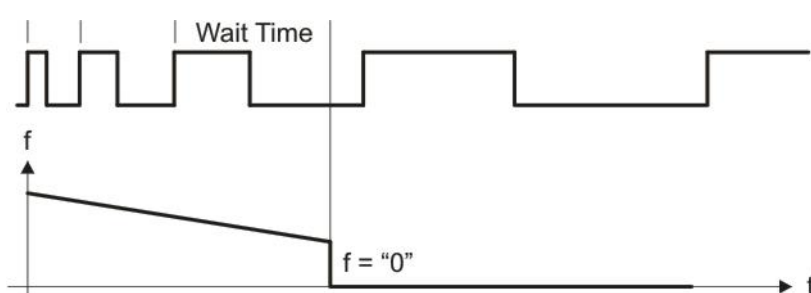
The adjusted value corresponds to the minimal measurement time. The Sampling Time is used as a filter for
smoothing unstable frequencies. This parameter affects the reaction time of the unit. The valid settings are for
both input channels.

	0,001	Shortest Sampling time
	0,1	Default value
	9,999	Largest Sampling time
		

Continuation „Mode Process Time“:

WAIT TIME

This parameter defines the period time of the lowest frequency, accordingly the time between two rising signal edges detecting frequency 0 Hz. Frequencies with a period time higher than the set "WAIT TIME" will be detected as frequency = 0 Hz.

0,01	Frequency = 0 Hz, for frequencies below 100 Hz
1,00	Default Value
99,99	Frequency = 0 Hz, for frequencies below 0,1 Hz
	

STANDSTILL TIME

This parameter defines the time setting for standstill definition.

A time of xx.xx seconds after detection "zero input frequency" the unit signals "standstill" and reactivates the start-up-delays.

0,00	Shortest delay time in sec.
...	
99,99	Largest delay time in sec.

AVERAGE FILTER

Switchable averaging to avoid display fluctuations by unstable frequencies

0	No average value will be created
1	2 numbers of floating average cycles
2	4 numbers of floating average cycles
3	8 numbers of floating average cycles
4	16 numbers of floating average cycles

5.8. Mode Timer

In this menu the operation is defined as timer or stopwatch.

Depending on the parameterization only input A or Input B are used. This menu is only displayed when the appropriate OPERATIONAL MODE in the GENERAL MENU is selected.

TIME BASE		
This parameter defines the time basis or resolution of the measurement.		
	1/1000 SEC	Milliseconds
	1/100 SEC	1/100 seconds
	1/10 SEC	1/10 seconds
	SECONDS	Full seconds
	MIN.00	Minutes and 1/100 minutes
	MIN.0	Minutes and 1/10 minutes
	H:M:S	Hour : Minutes : Seconds (9999:59:59)

START / STOP		
This parameter defines the starting/stopping methods of the time measurement.		
	COUNT AT A HIGH	High_Low: time counter, when Input A is „HIGH“
	COUNT AT A LOW	Low_High: time counter, when Input A is „LOW“
	START A / STOP B	A rising edge at Input A starts the time measurement, a rising edge at Input B stops the time measurement.
	PERIODE AT A	The period time measurement: cyclically displays the time between two rising signal edges

AUTO RESET		
	NO	Time count cumulates with every new start. Zero setting will be done by reset.
	YES	Every start initializes a new count starting from zero.

LATCH-FUNCTION		
	NO	The course of time is .shown in the display.
	YES	The final result is displayed, while the new measurement is running in the background.

5.9. Mode Counter

In this menu the operation is defined as position indicator, an impulse, a summering, a difference or an up-down counter. Input A and Input B are used. This menu is only displayed when the appropriate OPERATIONAL MODE in the GENERAL MENU is selected.

COUNT MODE		
This parameter defines the time basis or resolution of the measurement.		
	A SINGLE	Input A is a counting input. Input B defines the counting direction: „LOW“ = forward „HIGH“ = reverse
	A+B	Summering: counts Impulse at A + Impulse at B
	A-B	Difference counts the impulses at A – impulses at B
	A/B 90 x1	Up-down counter for impulses with the offset of 2x90° (simple edge evaluation x1)
	A/B 90 x2	Up-down counter for impulses with the offset of 2x90° (double edge evaluation x2)
	A/B 90 x4	Up-down counter for impulses with the offset of 2x90° (fourfold edge evaluation x4)

FACTOR		
Impulse evaluation factor: Setting the factor to 1,2345 signifies the value 12345 will be showed at the display after 10 0000 input pulses.		
	0,00001	Smallest factor
	1	Default value
	9,99999	Largest factor

SET VALUE		
Upon a Reset command, the counter sets to the value entered here (Reset Setting vaule).		
	-99999999	Smallest Reset-Setting value
	0	Default value
	+99999999	Largest Reset-Setting value

DECIMAL POINT		
This value defines the number of decimal places		
	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

5.10. Mode Velocity

In this menu the operation is defined as a runtime measurement as speed indicator. Input A is the start input and Input B is the stop input. This menu is only displayed when the appropriate OPERATIONAL MODE in the GENERAL MENU is selected.

MEASURING TIME (SEC)		
This value defines a typical application runtime in seconds.		
	000,001	Shortest runtime in seconds
	1	Default value
	999,999	Longest runtime in seconds

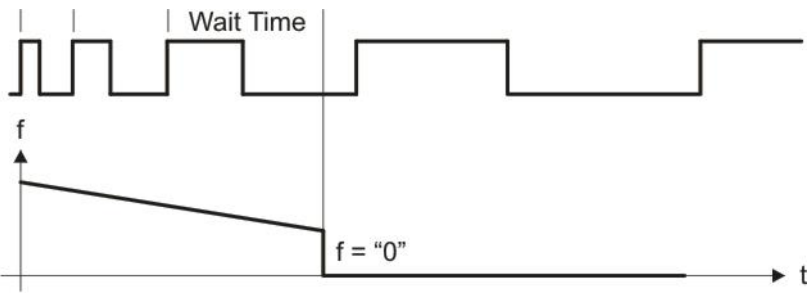
DISPLAY VALUE		
This value defines the displayed time value assigned to the set runtime using the parameter MEASUREMENT TIME.		
	000,001	Smallest display value
	1	Default value
	999,999	Largest display value

DECIMAL POINT		
This value defines the number of decimal places.		
	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

Continuation „Mode Velocity“:

WAIT TIME

This parameter defines the period time of the lowest frequency, accordingly the time between two rising signal edges detecting frequency 0 Hz. Frequencies with a period time higher than the set "WAIT TIME" will be detected as frequency = 0 Hz.

0	The display value is retained until a new value is determined.
0,001	Frequency = 0 Hz, for frequencies below 100 Hz
1	Default Value
9,999	Frequency = 0 Hz, for frequencies below 100 Hz
	

STANDSTILL TIME

This parameter defines the time setting for standstill definition.

A time of xx.xx seconds after detection "zero input frequency" the unit signals "standstill" and reactivates the start-up-delays.

0,00	Shortest delay time in sec.
...	
99,99	Largest delay time in sec.

5.11. Preselection Values

This menu is used to set the preselection values or the switching points. The preselection value and the switching points are always referred to the display value.

PRESELECTION 1		
Preselection / Switching point 1		
	-99999999	Smallest preselection value
	10000	Default value
	+99999999	Largest preselection value

PRESELECTION 2		
Preselection / Switching point 2		
	-99999999	Smallest preselection value
	20000	Default value
	+99999999	Largest preselection value

PRESELECTION 3		
Preselection / Switching point 3		
	-99999999	Smallest preselection value
	30000	Default value
	+99999999	Largest preselection value

PRESELECTION 4		
Preselection / Switching point 4		
	-99999999	Smallest preselection value
	40000	Default value
	+99999999	Largest preselection value

5.12. Preselection 1 Menu

MODE 1

Switching conditions for preselection 1. Output switches under the following conditions :

 RESULT >= PRES 	Absolute value of the display value is greater than or equal to absolute value of PRESELECTION 1
 RESULT <= PRES 	Absolute value of the display value is less than or equal to absolute value of PRESELECTION 1 (start-up suppression (START UP DELAY) is advisable)
 RESULT = PRES 	Absolute value of the display value is equal to absolute value of PRESELECTION 1
RESULT>=PRES	Display value is greater than or equal to PRESELECTION 1
RESULT<=PRES	Display value is less than or equal to PRESELECTION 1 (start-up suppression (START UP DELAY) is advisable)
RESULT=PRES	Display value is equal to PRESELECTION 1
RESULT=0	Display value is zero (Stillstand after STANDSTILL TIME)
RESULT>= PRES->0	Display value is greater than or equal to PRESELECTION 1, the display value is set to zero (only in Mode TIMER or COUNTER)
RESULT<= 0->SET	Display value is less or equal to zero, the display value is set to PRESELECTION 1 (only in Mode TIMER or COUNTER) (start-up suppression (START UP DELAY) is advisable)
RES>=PRES-TRAIL	Trailing preselection 1: Display value is greater or equal to PRESELECTION 2 – PRESELECTION 1 PRESELECTION 1 is the trailing preselection from PRESELECTION 2

HYSTERESIS 1

Switching hysteresis for preselection 1

0	No switching hysteresis
...	
9999	Switching hysteresis of 99999

PULSE TIME 1 (SEC)

Period of switching hysteresis of preselection 1

0	No wipe pulse (static signal)
...	
9,999	Puls length of 9,999 seconds

Continuation „PRESELECTION 1 MENU“:

OUTPUT TARGET 1		
Assignment of an input to preselection 1		
	NO	No assignment
	CTRL OUT 1	Ctrl. Out 1
	CTRL OUT 2	Ctrl. Out 2
	CTRL OUT 3	Ctrl. Out 3
	CTRL OUT 4	Ctrl. Out 4

OUTPUT POLARITY 1		
Switching state of preselection 1		
	ACTIVE HIGH	Active „HIGH“
	ACTIVE LOW	Active „LOW“

OUTPUT LOCK 1		
Latched preselection 1		
	NO	No latched preselection
	YES	Latched preselection

START UP DELAY 1		
Start-up suppression (upon power up or Stillstand) for preselection 1		
	00.000	No start-up suppression
	...	
	60.000	Start-up suppression in seconds

5.13. Preselection 2 Menu

MODE 2 Switching conditions for preselection 2, see chapter "Preselection 1 Menu"(except trailing preselection).		
		See chapter "Preselection 1 Menu"
	RES$\geq$PRES-TRAIL	Trailing preselection 2: Display value is greater or equal to PRESELECTION 1 – PRESELECTION 2 PRESELECTION 2 is the trailing preselection from PRESELECTION 1
HYSTERESIS 2 Switching hysteresis for preselection 2, see chapter "Preselection 1 Menu".		
PULSE TIME 2 (SEC) Period of switching hysteresis of preselection 2, see chapter "Preselection 1 Menu"		
OUTPUT TARGET 2 Assignment of an input to preselection 2, see chapter "Preselection 1 Menu".		
OUTPUT POLARITY 2 Switching state of preselection 2, see chapter "Preselection 1 Menu".		
OUTPUT LOCK 2 Latches preselection 2, see chapter "Preselection 1 Menu"		
START UP DELAY 2 Start-up suppression for preselection 2, see chapter "Preselection 1 Menu".		

5.14. Preselection 3 Menu

MODE 3 Switching conditions for preselection 3, see chapter "Preselection 1 Menu" (except trailing preselection).		
		See chapter "Preselection 1 Menu"
	RES>=PRES-TRAIL	Trailing preselection 3: Display value is greater or equal to PRESELECTION 4 – PRESELECTION 3 PRESELECTION 3 is the trailing preselection from PRESELECTION 4
HYSTERESIS 3 Switching hysteresis for preselection 3, see chapter "Preselection 1 Menu"		
PULSE TIME 3 (SEC) Period of switching hysteresis of preselection 3, see chapter "Preselection 1 Menu"		
OUTPUT TARGET 3 Assignment of an input to preselection 3, see chapter "Preselection 1 Menu"		
OUTPUT POLARITY 3 Switching state of preselection 3, see chapter "Preselection 1 Menu".		
OUTPUT LOCK 3 Latches preselection 3, see chapter "Preselection 1 Menu"		
START UP DELAY 3 Start-up suppression for preselection 3, see chapter "Preselection 1 Menu".		

5.15. Preselection 4 Menu

MODE 4 Switching conditions for preselection 4, see chapter "Preselection 1 Menu" (except trailing preselection).		
		See chapter "Preselection 1 Menu"..
	RES>=PRES-TRAIL	Trailing preselection 4: Display value is greater or equal to PRESELECTION 3 – PRESELECTION 4 PRESELECTION 4 is the trailing preselection from PRESELECTION 3
HYSTERESIS 4 Switching hysteresis for preselection 4, see chapter "Preselection 1 Menu"..		
PULSE TIME 4 (SEC) Period of switching hysteresis of preselection 4, see chapter "Preselection 1 Menu"..		
OUTPUT TARGET 4 Assignment of an input to preselection 4, see chapter "Preselection 1 Menu".		
OUTPUT POLARITY 4 Switching state of preselection 4, see chapter "Preselection 1 Menu".		
OUTPUT LOCK 4 Latches preselection 4, see chapter "Preselection 1 Menu"..		
START UP DELAY 4 Start-up suppression for preselection 4, see chapter "Preselection 1 Menu".		

5.16. Serial Menu

UNIT NUMMER		
This parameter defines serial device addresses. The addresses between 11 and 99 can be assigned to the devices. Addresses with zero are not allowed, there are used as group addresses.		
	11	Smallest address without zero
	...	
	99	Greatest address without zero

SERIAL BAUD RATE		
This parameter defines the serial baud rate		
	9600	9600 Baud
	19200	19200 Baud
	38400	38400 Baud

SERIAL FORMAT				
This parameter defines the data format.				
	7-EVEN-1	7 data	Parity even	1 Stop
	7-EVEN-2	7 data	Parity even	2 Stops
	7-ODD-1	7 data	Parity odd	1 Stop
	7-ODD-2	7 data	Parity odd	2 Stops
	7-NONE-1	7 data	no Parity	1 Stop
	7-NONE-2	7 data	no Parity	2 Stops
	8-EVEN-1	8 data	Parity even	1 Stop
	8-ODD-1	8 data	Parity odd	1 Stop
	8-NONE-1	8 data	no Parity	1 Stop
	8-NONE-2	8 data	no Parity	2 Stops

SERIAL INIT		
This parameter defines the baud rate for sending the initialization value to the user interface of the OS6.0 or a safety devices. The initialization time are reduced with more than 9600 Baud.		
	0	Initialization value are send with 9600 baud. Then the device use the set baud rate.
	1	Initialization value are send with the set baud rate and the device uses the equal baud rate.

SERIAL PROTOCOL (N.A.)	
SERIAL TIMER (SEC) (N.A.)	

5.17. Analog Menu

ANALOG FORMAT

This parameter defines the output characteristics. The polarity of the analogue output depends on the displayed sign at ANALOG FORMAT (-10 ... +10 V) during MODE COUNTER is selected.

The analogue output is proportional to the display value.

	-10...10V	-10 ... +10 V
	0...20M	0 ... 20 mA
	4...20MA	4 ... 20 mA

ANALOG START

This parameter defines the start value of the analogue modulation. This start value specifies the display value for triggering the analogue output to zero V or 0/4 mA.

	-99999999	Smallest start value
	...	
	+99999999	Greatest start value

ANALOG END

This parameter defines the final value of the analogue modulation. This final value specifies the display value for triggering the analogue output to the maximum value (+/-) 10 V or 20mA.

	-99999999	Smallest final value
	...	
	+99999999	Greatest final value

ANALOG GAIN (%)

This parameter defines the maximum modulation. The ANALOG GAIN specifies the maximum modulation of the analogue output as percentage of (+/-) 10 V or 20mA.

e. g. 102.00 corresponds to a modulation of (+/-) 10.20 V, when the „ANALOG END“ value is reached.

e. g. 80.00 corresponds to a modulation of 16 mA, when the „ANALOG END“ value is reached..

	0	Smallest modulation
	100	Default value
	110	Greatest modulation

ANALOG OFFSETT (%)

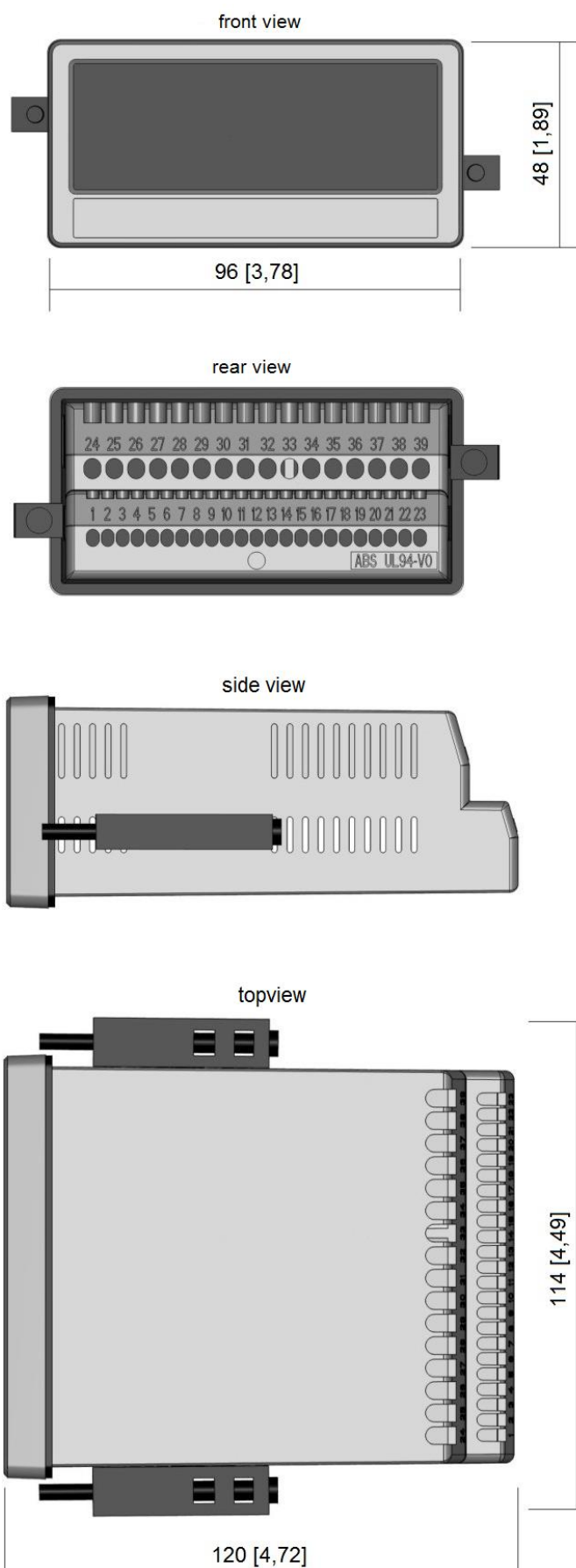
This parameter defines the zero offset of the output.

z. B. 50,00 corresponds to a modulation of 5,00 V, when the „ANALOG START“ value is reached..

	-99,99	Smallest zero offset
	...0	Default value
	+99,00	Greatest zero offset

6. Technical appendix

6.1. Dimensions



6.2. Technical specifications

Technical Specifications:		
Power supply (DC):	Input voltage: Protection circuit: Consumption:	18 ... 30 VDC reverse polarity protection approx. 150 mA (unloaded)
Power supply (AC): (Option AC350)	Input voltage: Power consumption:	90 ... 260 VAC (50 ... 60 Hz) approx. 5 VA (unloaded)
Connections:	Connector type:	screw terminal, 1.5 mm ² / AWG 16
Encoder supply:	DC version: Output current: AC version: Output current:	approx. 1 V lower than the power supply voltage max. 250 mA approx. 24 VDC (± 15%) 150 mA @ 45°C / 80 mA @ 60°C
Incremental inputs:	Number of inputs: Usage: Channels: Format: Frequency: Load:	2 Tri-State, PNP-, NPN-, Namur encoders / sensors A, B HTL (Low 0 ... 3 V, High 9 ... 30 V) max. 250 kHz max. 6 mA / Ri > 5 kOhm / 470 pF
Control inputs:	Number of inputs: Format: Frequency: Load:	3 HTL, PNP (Low 0 ... 3 V, High 9 ... 30 V) max. 10 kHz max. 2 mA / Ri > 15 kOhm / 470 pF
Analog output: (Option AO350)	Configuration: Voltage output: Current output: Resolution: Accuracy:	current or voltage operation ±10 V (max. 2 mA) 0/4 ... 20 mA (burden: max. 270 Ohm) 16 Bit ± 0,1 %
Control outputs: (Option CO350)	Number of outputs: Format / level: Output current: Reaction time:	4 5 ... 30 V (depends on the COM+ voltage), PNP max. 200 mA < 1 ms
Relay outputs: (Option RL350)	Number of outputs: Configuration: AC-Switching capacity: DC-Switching capacity Reaction time:	2 potential free changeovers max. 250 VAC / 3 A / 750 W max. 150 VDC / 2 A / 50 W < 5 ms
Serial interface: (Option CO350)	Format: Baud rate: Configuration:	RS232 2400 ... 38400 baud PC or Printer mode
Display:	Type: Display range: Color: Operation:	LCD (backlight) 8 digits plus sign with 12 mm height (-99999999 ... 99999999) red / green / yellow (switchable) resistive touchscreen
Housing:	Material: Mounting: Dimensions (w x h x d): Cut out (w x h): Protection class: Weight:	ABS, UL 94 V-0 panel cut out 96 x 48 x 120 mm / 3.78 x 1.89 x 0.47 inch 91 x 43 mm / 3.58 x 1.69 inch IP65 (front), IP20 (rear) approx. 200 g
Ambient temperature:	Operation: Storage:	-20°C ... +60°C resp. -4 ... 140°F -25°C ... +70°C resp. -13 ... 158°F
Conformity and standards:	EMC 2004/108/EC: LV 2006/95/EC: RoHS 2011/65/EU:	EN 61000-6-2, EN 61000-6-3, EN 61000-6-4 EN 61010-1 EN 50581

