

# DX 345, DX 346, DX 347, DX 348

## Universal Display Units with Impulse Inputs



<u>DX 345:</u>	Display only
<u>DX 346:</u>	Display with analogue output
<u>DX 347:</u>	Display with two presets and switching outputs
<u>DX 348:</u>	Display with serial interface

### Operation modes:

- Tachometer, frequency meter
- Counter for positions and events
- Baking time, processing time (reciprocal speed)
- Timer, stopwatch
- Speed display from delay between a Start and a Stop input

## Operating Instructions



## Safety Instructions

- This manual is an essential part of the unit and contains important hints about function, correct handling and commissioning. Non-observance can result in damage to the unit or the machine or even in injury to persons using the equipment!
- The unit must only be installed, connected and activated by a qualified electrician
- It is a must to observe all general and also all country-specific and application-specific safety standards
- When this unit is used with applications where failure or maloperation could cause damage to a machine or hazard to the operating staff, it is indispensable to meet effective precautions in order to avoid such consequences
- Regarding installation, wiring, environmental conditions, screening of cables and earthing, you must follow the general standards of industrial automation industry
- - Errors and omissions excepted –

Version:	Description
01/hk/mb/April 02	
02/af/hk/July 03	Supplements for DX348 serial interface
03/af/hk/Jan. 04	Range extensions and supplements for serial code
04/hk/hk/Jan. 07	Version with 3 keys, A5 brochure, SV006, TTLIN, serial Reset
08c/hk/hk/Mar08	Small modifications only

# Table of Contents

<b>1. Electrical Connections.....</b>	<b>4</b>
1.1. Power supply .....	5
1.2. Aux. voltage output .....	5
1.3. Inputs A, B and Reset .....	5
1.4. Adjustable analogue output (DX 346 only).....	6
1.5. Optocoupler (transistor) outputs (DX 347 only) .....	6
1.6. Serial RS232 / RS485 interface (DX 348 only) .....	7
<b>2. How to Operate the Keys.....</b>	<b>8</b>
<b>3. Basic Settings .....</b>	<b>9</b>
<b>4. Operational registers .....</b>	<b>10</b>
4.1. RPM, operation as tachometer or frequency counter .....	10
4.2. Time, display of baking or processing time (reciprocal speed).....	11
4.3. Timer, stopwatch.....	12
4.4. Count, Counter mode.....	13
4.5. Speed from differential time between a Start and a Stop input .....	14
<b>5. Additional Settings for Units with Analogue Output (DX 346) .....</b>	<b>15</b>
<b>6. Additional settings for Units with Presets (DX 347) .....</b>	<b>16</b>
<b>7. Additional settings for Units with serial interface (DX 348).....</b>	<b>18</b>
<b>8. Set all register to "Default" .....</b>	<b>21</b>
<b>9. Dimensions .....</b>	<b>21</b>
<b>10. Technical Data .....</b>	<b>22</b>
<b>11. Parameter List.....</b>	<b>23</b>

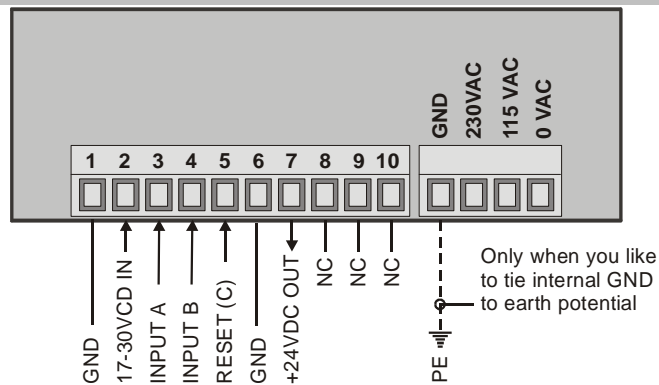
# 1. Electrical Connections

## DX345:

### Display unit only

Special versions with TTL inputs (option TTLIN1) provide a +5V aux. output on terminal 7, instead of +24V

Units with option SV006 provide 24 / 42 VAC power input instead of 115 / 230 VAC

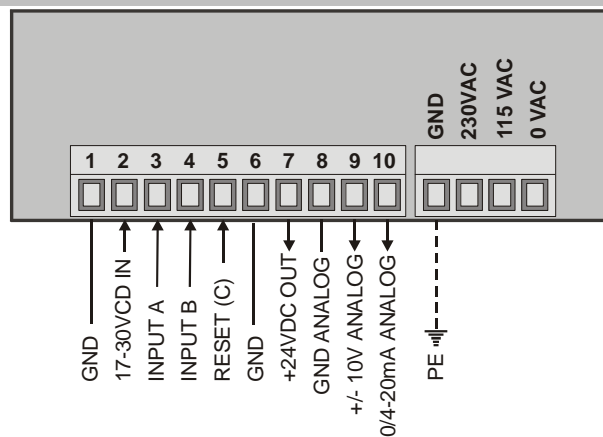


## DX 346:

### Display unit with analogue output

Special versions with TTL inputs (option TTLIN1) provide a +5V aux. output on terminal 7, instead of +24V

Units with option SV006 provide 24 / 42 VAC power input instead of 115 / 230 VAC

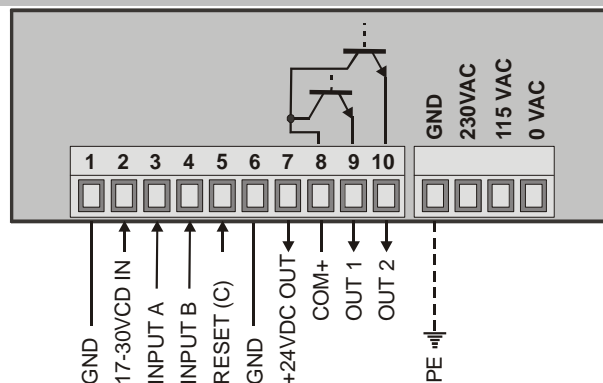


## DX347:

### Display unit with 2 presets and transistor outputs

Special versions with TTL inputs (option TTLIN1) provide a +5V aux. output on terminal 7, instead of +24V

Units with option SV006 provide 24 / 42 VAC power input instead of 115 / 230 VAC

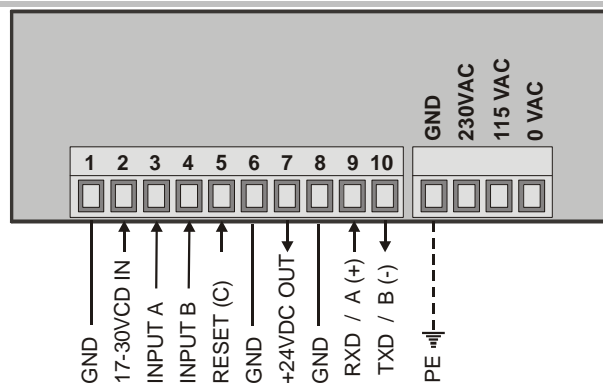


## DX348:

### Display unit with serial interface

Special versions with TTL inputs (option TTLIN1) provide a +5V aux. output on terminal 7, instead of +24V

Units with option SV006 provide 24 / 42 VAC power input instead of 115 / 230 VAC



## 1.1. Power supply

The unit accepts DC supply from 17 V to 35 V when using terminals 1 and 2, and the consumption depends on the level of the supply voltage (typical 80 mA at 35 V or 150 mA at 16 V, plus current taken from aux. output).

For AC supply, terminals 0 VAC, 115 VAC or 230 VAC can be used. The total AC power consumption is 7.5 VA.

The diagrams show a dotted line for grounding to PE. This connection is not really necessary, neither for safety nor for EMC. However, for some applications, it can be useful to ground the common potential of all signal lines.

Units with option SV006 are designed for 24 VAC and 42 VAC power supply, and the AC input terminals are marked correspondingly



### When using this earthing option, please observe:

- All terminals and potentials marked "GND" will be earthed.
- You should avoid multiple earthing, e.g. when you use a DC power supply where the Minus is already connected to earth etc. Especially where the quality of your earthing system should not meet the latest standards, multiple earth connections may cause problems.

## 1.2. Aux. voltage output

Terminal 7 provides an auxiliary output of 24 VDC / 150 mA max. for supply of sensors and encoders. Units with TTL inputs (option TTLIN1) provide a 5 VDC / 150 mA auxiliary output on terminal 7 instead.

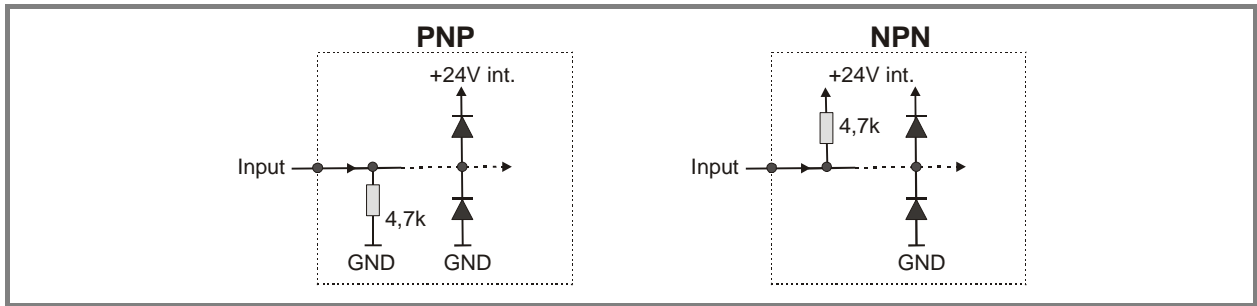
## 1.3. Inputs A, B and Reset

In the basic setup menu, these inputs can be configured to PNP (signal must switch to +) or to NPN (signal must switch to -). This configuration is valid for all three inputs at a time. The factory setting is always PNP.



- Independent of your setting, all functions of the unit are "active HIGH" and the unit triggers to positive transitions (rising edge).
- Because with NPN setting open or unused inputs are HIGH, you must tie the Reset line to GND for operation. Otherwise your unit would be in a continuous RESET state and could not work.
- Where you use 2-wire NAMUR type sensors, please select NPN, connect the negative wire of the sensor to GND and the positive wire to the corresponding input.

Typical input circuit (standard version with HTL inputs):



Counting inputs A and B are designed for input frequencies up to 100 KHz with all counter modes, and up to 25 kHz with all other operating modes.

The minimum pulse duration on the Reset input must be 500 µsec.

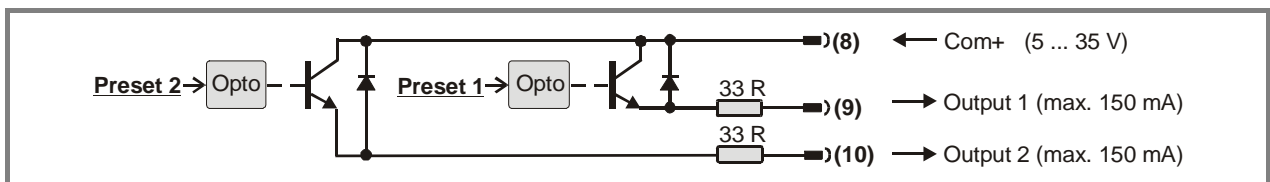
All inputs are designed to receive impulses from an electronic impulse source. Where exceptionally you need to **use mechanical contacts**, please connect an external capacitor between GND (-) and the corresponding input (+). With a capacity of 10 µF, the maximum input frequency will reduce to 20 Hz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

### 1.4. Adjustable analogue output (DX 346 only)

A voltage output is available, operating in a range of 0...+10 V or -10 V...+10 V according to setting. At the same time, a current output 0/4 – 20 mA is available. Both outputs refer to the GND potential and the polarity changes with the sign in the display. The outputs provide a 14 bits resolution and the response time to changes of the measuring value is approx. 7 msec. The maximum current of the voltage output is 2 mA, and the load on the current output can vary between 0 and max. 270 Ohms.

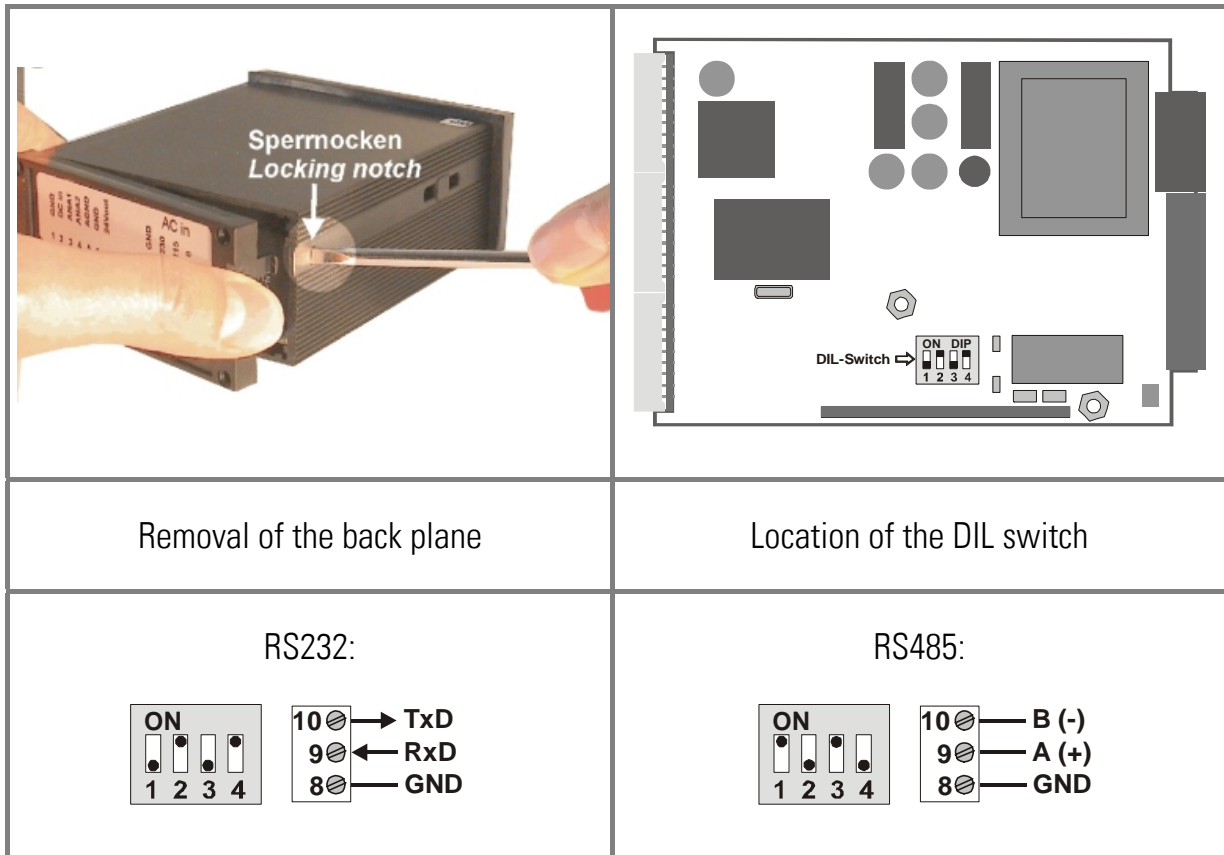
### 1.5. Optocoupler (transistor) outputs (DX 347 only)

The outputs provide programmable switching characteristics and are potential-free. Please connect terminal 8 (COM+) to the positive potential of the voltage you like to switch (range 5V...35V). You must not exceed the maximum output current of 150 mA. Where you switch inductive loads, please provide filtering of the coil by means of an external diode.



## 1.6. Serial RS232 / RS485 interface (DX 348 only)

Ex factory the unit is set to RS232 communication. This setting can be changed to RS485 (2-wire) by means of an internal DIL switch. To access the DIL switch, you must remove the screw terminal connectors and the backplane. Then pull the print to the rear to remove the PCB from the housing.



### Warning!

- Never set DIL switch positions 1 and 2 or DIL switch positions 3 and 4 to ON at the same time!
- After setting the switch, shift the print carefully back to the housing, in order not to damage the front pins for connection to the front keypad plate.

## 2. How to Operate the Keys

There are three keys on the front of the unit. The left key provides the “ENTER” function and the center key “SET” is used to scroll. The right key is reserved for special functions and not used with standard units.



**To start the menu, keep the ENTER key down for at least 3 seconds.**

Use the SET key to scroll from one menu text to the next. Select the menu text by ENTER. Scroll through the settings and confirm your choice by ENTER again.

Where you get to numeric entries, the low order digit will blink. Keep the SET key down to increment this digit to the figure desired. When you release the SET key, the next digit will blink for editing etc. After setting the high order digit, the low order digit will blink again and you are free to make corrections

With parameters using a sign, the most significant decade will scroll first from “0” to “9” (positive values) and the to “-1” and “-” (negative values).

As soon as you have set all digits to the desired value, press ENTER to store the setting. This will also change over to the next parameter text.

**To exit the menu, keep again down “ENTER” for at least 3 seconds.**

When you do not touch any key for about 10 seconds, the “time-out” routine will switch back to the previous menu level and finally to normal display operation. All changes that have not been confirmed by ENTER at this time will not be saved.



**All counting functions remain disabled while you are using the menu!**



### 3. Basic Settings

The subsequent settings are of unique nature and must only be made upon the very first setup. Sections 3. and 4. describe all parameters of the “display only” and supplementary settings for optional outputs and interfaces are explained later.

The basic setup selects the desired operation mode of the unit, the input characteristics PNP/NPN and the desired brightness of the LED display.



To access the basic setup, press **ENTER** and **SET** simultaneously for at least 3 seconds.

Menu	Selection	Text	Description
<b>TYPE</b>		Type	Operation Mode
	<b>rPn</b>	RPM	tachometer, frequency meter (4.1)
	<b>t. nE</b>	Time	baking/processing time (4.2)
	<b>t. nEr</b>	Timer	stopwatch
	<b>Count</b>	Count	position or event counter (4.4)
	<b>SPEED</b>	Speed	speed from differential time
<b>CHAR</b>		Char	Characteristics of input
	<b>nPn</b>	NPN	switch to “-”
	<b>PnP</b>	PNP	switch to “+”
<b>br. Ght</b>		Bright	brightness of display 20%, 40%, 60%, 80%, 100%
<b>Code</b>		Code	Code locking of the keypad
	<b>no</b>	No	keys enabled all the time
	<b>ALL</b>	ALL	keys disabled for all functions
	<b>P.FrEE</b>	P_FrEE	keys disabled, except for access to Preset values Pres 1 and Pres 2 (DX 347 only)

## 4. Operational registers

After the basic setup, you can access the operational parameters by pressing ENTER for at least 3 seconds. You will only find the parameters that are relevant for your mode of operation.

To exit the menu, keep again ENTER down for at least 3 seconds, or just wait for the time-out.

When the code locking of the keypad has been switched on, any key access first results in display of



To access the settings, within 10 seconds you must now press the key sequence



otherwise the unit automatically will return to the normal display mode.

### 4.1. RPM, operation as tachometer or frequency counter

(Input A = frequency input, Input B not in use)

Menu	Selection	Text	Description
<b>FrEq</b>		Frequency	Set a typical operating frequency for your application. Range 1 Hz to 25 000 Hz
<b>d.SPL</b>		Display	Set the value you would like to see on your display with above frequency at the input.
<b>dPo int</b>		Decimal point	Select the desired position like shown in the display
<b>LJA it</b>		Wait	Define a "waiting time", this is the time in seconds that the unit will wait from one input pulse to the next, before it sets the display to zero. When you enter "0", the unit will wait forever and show the last result until it receives the next input.
<b>F ILtEr</b>		Filter	Selectable average filter to suppress unstable display with unsteady input frequencies.
	<b>OFF</b>	OFF	No filtering
	<b>15</b>		2, 4, 8, 16 = number of floating average cycles.

Units of version DX346 allow displaying speed also with a sign for the direction of rotation. See section 5.

## 4.2. Time, display of baking or processing time (reciprocal speed)

(Input A = frequency input, Input B not in use)

Menu	Selection	Text	Description
d .SFor		Display- Format:	Select between seconds, minutes, minutes and seconds or minutes with two decimal positions. This will also automatically set your decimal point to the proper place.
	SEC		
	ח ד		
	ח ד ,SE		
	ח ד ,00		
FrEq		Frequency	Set a typical operating frequency for your application. Range 1 Hz to 25 000 Hz.
d .SPL		Display	Set the value you would like to see on your display with above frequency at the input.
LJA י		Wait	Define a "waiting time", this is the time in seconds that the unit will wait from one input pulse to the next, before it sets the display to zero. When you enter "0", the unit will wait forever and show the last result until it receives the next input.
F ILT Er		Filter	Selectable average filter to suppress unstable display with unsteady input frequencies. No filtering 2, 4, 8, 16 = number of floating average cycles.
	OFF		
	15		



With operating modes 4.1 und 4.2 the setting of parameter „Wait“ automatically limits the minimum input frequency correspondingly.

With "Wait" set to e.g. 0.1 sec. the unit will respond to frequencies > 10 Hz only and all lower frequencies will just display 0.

### 4.3. Timer, stopwatch

Please note that open NPN inputs are always "HIGH" and open PNP inputs are always "LOW".

Menu	Selection	Text	Description
<b>BASE</b>		Base	Select the time base (resolution) for your application.
	<b>SECO00</b>		Milliseconds
	<b>SECO0</b>		1/100 seconds
	<b>SECO</b>		1/10 seconds
	<b>SEC</b>		integer seconds
	<b>00.00</b>		minutes with two decimals
	<b>00.0</b>		minutes with one decimal
	<b>H-00-S</b>		minutes : seconds
	<b>Start</b>	<b>H_Low</b>	Start
<b>St_SP</b>		Start_Stop	Rising edge on input A starts count. Rising edge on input B stops count
<b>A_StSP</b>		A_StSP	Period time measurement. Repeating display of the time between two rising edges on input A
<b>RESET</b>	<b>no</b>	Reset: no	Time count cumulates with every new start. No automatic Reset. Use the Reset input to set zero.
	<b>YES</b>	YES	Every start initializes a new count starting from zero.
<b>LATCH</b>	<b>no</b>	Latch: no	Real time display, count visible.
	<b>YES</b>	YES	Display freezes final count result after every Stop. Timer counts in the background

## 4.4. Count, Counter mode

Menu	Selection	Text	Description
Mode	A_dir	Mode: A_Bdir	A_Bdir: Input A counts and input B selects the counting direction (LOW = increment, HIGH = decrement)
	A + B	A u B	Summing mode, count = A + B
	A - B	A - B	Differential count A – B
	A_B.1	A_B.1	Quadrature up/down counter A/B with single edge count (x1)
	A_B.2	A_B.2	Quadrature up/down counter A/B with double edge count (x2)
	A_B.4	A_B.4	Quadrature up/down counter A/B with (x4) edge count.
Factor		Factor	Impulse scaling factor 0.0001 – 9.9999. Example: setting 1.2345 results in display of 12 345 after 10 000 input pulses.
Set		Set	Every Reset input will set your display to the value entered here. Range –199 999....0....999 999.
rESEt	no	Reset NO	Select, how to set/reset the counter. no: No set/reset possible
	Front	Front	Set/reset by the front SET key
	ExtErn	Extern	Set reset by remote signal to the Reset input.
	Fr u E	Fr u E	Set/reset by front SET key and external input.
dPoi nt	000000	Dpoint	Sets your decimal point to the desired place.



- The counting range of the unit is limited from -199999 to 999999. In case of underflow or overflow the unit will display
- The counter stores all data also in power-down state (EEPROM data retention >10 years)
- With the summing mode (A+B) and the differential mode (A-B) please note that the impulse scaling factor will only scale the input A signals

## 4.5. Speed from differential time between a Start and a Stop input

Input A operates as a start input and input B operates as a Stop input. The differential time between start and stop will be converted into the speed of the passing object.

Menu	Selection	Text	Description
<b>Δ m-E</b>		Time	Enter a typical delay time you expect between start and stop. Range 0.001 sec to 999.999 sec.
<b>d.SPL</b>		Displ	Enter the speed you would like to see in the display when an object passes with above time.
<b>dPo int</b>	<b>000000</b>	Dpoint	Sets your decimal point to the desired place.
<b>LJA t</b>		Wait	How long should the last result remain in the display before it returns to zero? Set the desired waiting time. With setting "0" the display will freeze and wait until to the next measuring cycle.

## 5. Additional Settings for Units with Analogue Output (DX 346)

This version uses the following additional parameters in the basic setup:

Menu	Selection	Text	Description
A-CHAR	- 10. 10	A-Char	Analogue Characteristics. Select between +/- 10V (positive and negative output) 0...+10V (positive output only) 0 - 20mA 4 - 20mA.
	0 . 10		
	0.20		
	4.20		

Where you set the output to +/- 10 Volts, your input signals A/B must be of quadrature type with phase displacement. The polarity of the output follows the sign in the display (operation as a counter or as a speed display with detection of direction of rotation).

Menu	Selection	Text	Description
OFFSET		Offset	Set this register to "0" when your output range should begin at zero (or 4mA) If you desire another initial output value, set this register correspondingly. Setting 5.000 means your output will start at 5 Volts instead of zero.
GA in		Gain	Set the analogue stroke you desire: Setting 1000 means 10 Volts or 20mA. Setting 200 reduces the stroke to 2 Volts or 4mA. Full scale output = Offset + Gain.
	AnAbEG	Anabeg	In the operational menus you will find two additional parameters: <b>Anabeg</b> sets the display value where the analogue output should begin and <b>Anaend</b> sets the display value for full scale output. Where you set Anabeg to -1500 and Anaend to 2100, your output will generate the start value (like defined before) at a display of -1500 and the full scale value at a display value of 2100.
AnAEnd	Anaend		

## 6. Additional settings for Units with Presets (DX 347)

The basic setup menu provides the following additional parameters. Where you program impulse outputs, the impulse duration will always be 300msec (factory adjustable only).

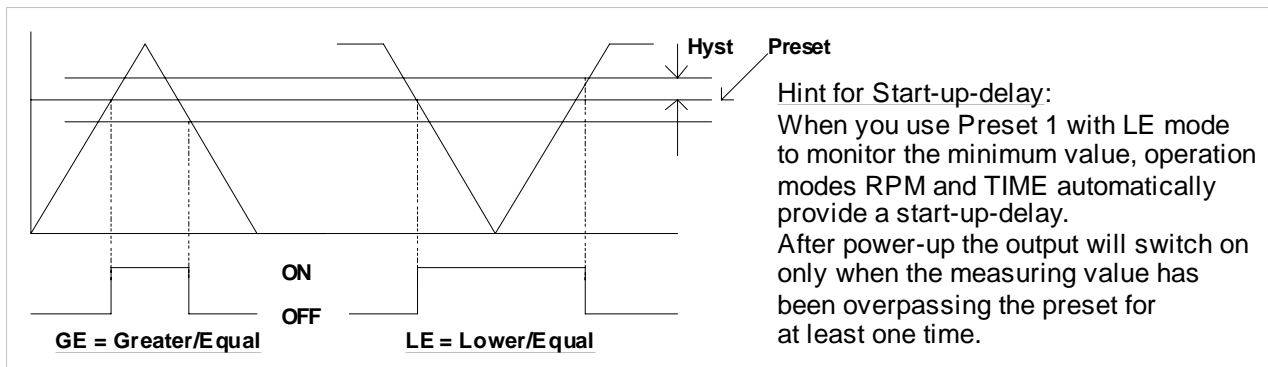
**CHAR 1**   **CHAR 2**   **HYST 1**   **HYST 2**

The settings "Char 1" and "Char2" select the switching characteristics of output 1 and output 2 according to the following table.

Parameters "Hyst1" and "Hyst2" allow assigning a switching hysteresis to each of the two outputs.

Hysteresis settings are only active with the operation modes RPM (tachometer) and Time (baking time)

The direction of operation of the hysteresis depends on the selected switching characteristics "GE" or "LE" as explained in the drawing below.



Menu	Selection	Text	Description
[CHAR 1]	[J] GE	GE	Greater/Equal: static "ON" signal when display value is greater or equal preset.
	[J] LE	LE	Lower/Equal: static "ON" signal when display value is lower or equal preset
	[N] GE	GE	Greater/Equal: Impulse output when display overpasses preset
	[N] LE	LE	Lower/Equal: Impulse output when display underpasses preset



Menu	Selection	Text	Description
		Res**)	Impulse output and automatic Reset to zero when display reaches preset 1.
		Set**)	Impulse output and automatic setting to preset 1 when display reaches zero
			See Char 1
			See Char 1
			See Char 1
			See Char 1
			Output switches ON when display reaches the value of Preset 1 – Preset 2 *).
			Impulse output when display reaches the value of Preset 1 – Preset 2 *)

\*) This feature serves for generation of an anticipation signal with a fixed distance to the preset 1 signal. The anticipation automatically follows the setting of preset 1 (trailing preset).

\*\*) Auto-Set and Auto-Reset operation will limit the counting frequency to 1 kHz

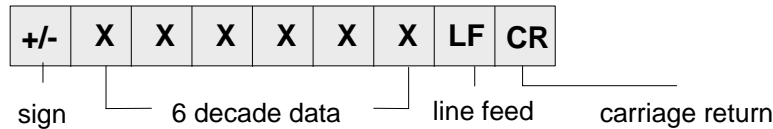
Menu	Selection	Text	Description
		Pres_1	Setting of the preset values uses the texts Pres1 and Pres2 which appear first of all parameters when accessing the menu.
		Pres_2	
<b>Indication of the switching states of the outputs</b>			
		1_2off	During normal operation, it is possible to check for the actual states of the outputs. To do this, press shortly the ENTER key. For about 2 seconds, the display will then show one of the adjoining messages.
		1_2on	
		1 on	
		2on	

## 7. Additional settings for Units with serial interface (DX 348)

The basic setup menu contains the main parameters of the serial interface configuration, like Baud Rate, Data Format and Unit Number. The factory settings are shown in parenthesis

Menu	Selection	Text	Description
S-Form	7 E 1		<b>Serial data format (7 E 1):</b> The first character indicates the number of data bits. The second character specifies Parity "Even" or "Odd" or "none" and the third character indicates the number of Stop bits.
	7 E 2		
	7 O 1		
	7 O 2		
	7 no 1		
	7 no 2		
	8 O 1		
	8 E 1		
	8 no 1		
	8 no 2		
S-bAUD	9600		<b>Baud rate (9600):</b> The following Baud rates shown beside can be selected:
	4800		
	2400		
	1200		
	600		
	19200		
	38400		
S-Unit		S-Unit	<b>Serial Unit Number (11):</b> You can assign any address number between 11 and 99 to your unit.  The address must <u>not</u> contain a "0" because these numbers are reserved for collective addressing.

Menu	Selection	Text	Description
S-tim		S-tim	<b>Serial Timer (0.100):</b> When the subsequent parameter is set to "Print" mode, this timer generates automatic transmission cycles every x.xxx seconds. The string consists of the following sequence of ASCII characters:



Menu	Selection	Text	Description
S-mode	PC	PC	<b>Serial mode: PC:</b> Communication according to the Drivecom standard protocol ISO 1745*
	Print	Print	Print: see above
S-Code		S-Code	<b>Serial register code (101):</b> Specifies the code number of the register that should appear in the data string. For readout of the actual measuring value the code number is 101, which with PC mode is represented by the ASCII characters ":" and "1"

\* The protocol uses the following string to request for data. The example shows how to request unit number 11 for the content of the register with register code 101 (actual display value)

EOT	...	AD1	AD2	C1	C2	ENQ		
(04)		(31)	(31)	(3A)	(31)	(05)	Hex-Code	<b>EOT: Control character</b>
(EOT)		(1)	(1)	(:)	(1)	(ENQ)	ASCII-Code	<b>AD1: Unit address, high byte</b>
<u>0000 0100</u>		<u>0011 0001</u>	<u>0011 0001</u>	<u>0011 1010</u>	<u>0011 0001</u>	<u>0000 0101</u>	Binary	<b>AD2: Unit address, low byte</b>
								<b>C1: Register code, high byte</b>
								<b>C2: Register code, low byte</b>
								<b>ENQ: Control character</b>

When in our example the measuring data xxxx would have a value of „-180“, the unit would respond with the following string:

STX	C1	C2	x	x	x	x	ETX	BCC	
(02)	(3A)	(31)	(2D)	(31)	(38)	(30)	(03)	(1C)	Hex-Code
(STX)	(:)	(1)	(-)	(1)	(8)	(0)	(ETX)		ASCII-Code
<u>0000 0010</u>	<u>0011 1010</u>	<u>0011 0001</u>	<u>0010 1101</u>	<u>0011 0001</u>	<u>0011 1000</u>	<u>0011 0000</u>	<u>0000 0011</u>	<u>0001 1100</u>	Binary

Leading zeros will not be transmitted.

BCC represents a „Block Check Character“ which results from the Exclusive-OR of all characters between C1 and ETX (inclusively).

With incorrect request strings, the unit only responds STX C1 C2 EOT or just NAK.

Units with serial link also allow setting or resetting the counter by serial command (similar to the external input or front key function). To use the Reset command, you must write the data "1" to the register code "60" to activate Reset, and "0" to release the Reset command again.

The following strings show how to reset a unit with unit No. 11:

Reset ON :

<u>EOT...</u>	<u>AD1</u>	<u>AD2</u>	<u>STX</u>	<u>C1</u>	<u>C2</u>	<u>Dat</u>	<u>ETX</u>	<u>BCC</u>	
(04)	(31)	(31)	(02)	(36)	(30)	(31)	(03)	(34)	<u>HEX</u>
(EOT)	(1)	(1)	(STX)	(6)	(0)	(1)	ETX	(4)	<u>ASCII</u>
0000 0100	0011 0001	0011 0001	0000 0010	0011 0110	0011 0000	0011 0001	0000 0011	0011 0100	<u>BIN</u>

Reset OFF :

<u>EOT...</u>	<u>AD1</u>	<u>AD2</u>	<u>STX</u>	<u>C1</u>	<u>C2</u>	<u>Dat</u>	<u>ETX</u>	<u>BCC</u>	
(04)	(31)	(31)	(02)	(36)	(30)	(30)	(03)	(35)	<u>HEX</u>
(EOT)	(1)	(1)	(STX)	(6)	(0)	(0)	ETX	(5)	<u>ASCII</u>
0000 0100	0011 0001	0011 0001	0000 0010	0011 0110	0011 0000	0011 0000	0000 0011	0011 0101	<u>BIN</u>

## 8. Set all register to “Default”

At any time you can return all settings to the factory default values.

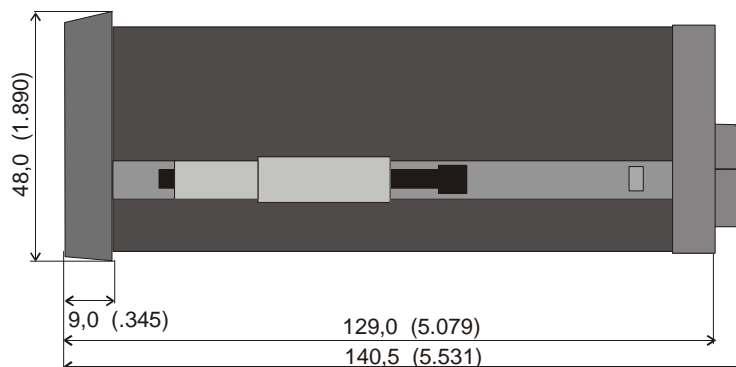
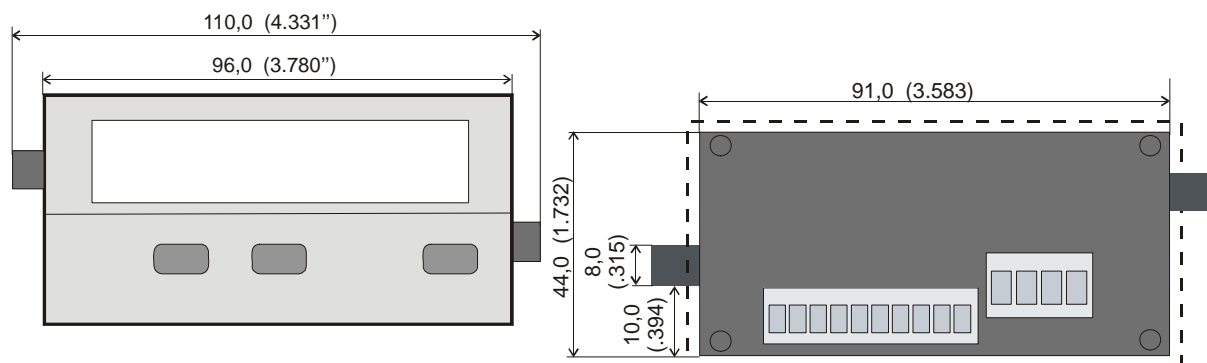
To do this:

- switch power off
- press the ENTER key on the front
- keep ENTER down while you power up again.



This action will reset all parameters to factory default values and your own settings will be lost. You will have to repeat your individual setup procedure. Factory default values are shown in the subsequent parameter tables.

## 9. Dimensions



**Panel cut out: 91 x 44 mm (3.583 x 1.732")**

# 10. Technical Data

Supply voltage AC	:	115/230 V (+/- 12,5 %)
Supply voltage DC	:	24V (16 – 35V)
Consumption (without sensor)	:	18 V : 120mA, 24V : 95 mA, 30V : 80mA
AC Power	:	7,5 VA
Aux. output for sensors	:	24V DC, +/- 15%, 150mA ( AC + DC supply)
Inputs	:	3 (PNP/NPN/Namur), A/B = Impulse, C = Reset
Input currents	:	5,1 mA / 24V (Ri = 4,7 kOhms)
Input level HTL	:	Low: 0...3,5V, High: 9...35V
Max. input frequency	:	Counter modes: 100 kHz All other operating modes: 25 kHz Reset input C: 1kHz (minimum pulse duration 500 µsec)
Display update rate	:	approx. 7 msec (330 msec with tachometer operation)
Accuracy	:	+/- 1 ppm +/- 1 Digit
Analogue output (DX 346)	:	Current: 0/4...20mA (load 0 – 270 ohms) Voltage: 0...+/- 10V (max. 2 mA)
Resolution analogue	:	14 Bits + Sign
Accuracy analogue	:	0.1%
Analogue response time	:	approx. 7 msec.
Ambient temperature	:	Operation: 0° - 45°C ( 32 – 113°F) Storage: -25° - +70°C (-13 – 158°F)
Housing	:	Norly UL94 – V-0
Display	:	6 Digit, LED, high- efficiency orange, 15mm
Protection class	:	Front IP65, Rear IP20
Terminals	:	Signals max. 1.5 mm <sup>2</sup> , AC power max. 2.5 mm <sup>2</sup>
Switching outputs (DX 347)	:	PNP, max. 35 volts, max. 150 mA
Conformity and Standards	:	EMC 89/336/EEC: EN 61000-6-2 EN 61000-6-3 LV73/23/EEC: EN 61010-1

# 11. Parameter List

Description	Text	Min - Value	Max - Value	Settings bold = default	Pos.	Char	Ser. Code	Selection
<b>Basic settings</b>								
Operating mode	tYPE	0	4	<b>0</b>	1	0	00	rpm
				1				time
				2				timer
				3				count
				4				speed
NPN / PNP	CHAr	0	1	0	1	0	01	npn
				<b>1</b>				pnp
Brightness	brIGht	0	4	<b>0</b>	1	0	02	100
				1				80
				2				60
				3				40
				4				20
Keypad locking	Code	0	2	<b>0</b>	1	0	03	no
				1				all
				2				Preset free
<b>RPM, operation as Tachometer or frequency meter</b>								
Frequency	FrEqu	1	25000	<b>1000</b>	5	0	04	
Display value	diSPL	1	99999	<b>1000</b>	5	0	05	
Decimal point	dPoint	0	5	<b>3</b>	1	0	06	0.000
Wait time to zero	WAit	0,1	99,9	<b>1,0</b>	3	1	07	
Average filter	FiLtEr	0	4	<b>0</b>	1	0	08	off
				1				2
				2				4
				3				8
				4				16
<b>Time, display of backing and processing time</b>								
Display format	diSFor	0	3	<b>0</b>	1	0	09	sec
				1				min
				2				min-sec
				3				min-h
Frequency	FrEqu	1	25000	<b>100</b>	5	0	10	
Display value	diSPL	1	999999	<b>100</b>	6	0	11	
Wait time to zero	WAit	0,1	99,9	<b>5,0</b>	3	1	12	
Average filter	FiLtEr	0	4	<b>0</b>	1	0	13	off
				1				2
				2				4
				3				8
				4				16

Description	Text	Min - Value	Max - Value	Settings bold = default	Pos.	Char	Ser. Code	Selection
<b>Timer, stopwatch</b>								
Resolution	bASE	0	6	<b>0</b>	1	0	14	sec - 000
				1				sec - 00
				2				sec - 0
				3				sec
				4				min - 00
				5				min - 0
				6				hr.min.s
Start / Stop	StArt	0	2	<b>0</b>	1	0	15	hi - lo
				1				st - sp
				2				ast - sp
Auto-Reset	rESEt	0	1	<b>0</b>	1	0	16	no
				1				yes
Display latch	LAtcH	0	1	<b>0</b>	1	0	17	no
				1				yes
<b>Count, counter operation</b>								
Counter mode	modE	0	5	0	1	0	18	A-B div
				1				A+B
				2				A-B
				<b>3</b>				A_B-1
				4				A_B-2
				5				A_B-4
Scaling factor	FActor	0,0001	9,9999	<b>1,0000</b>	5	4	19	
Set value	SEt	-199999	+999999	<b>0</b>	+/- 6	0	20	
Reset / Set	rESEt	0	3	0	1	0	21	no
				1				Front
				2				Ester
				<b>3</b>				FruE
Decimal point	dPoint	0	5	<b>0</b>	1	0	22	
<b>Speed from differential time</b>								
Delay time	timE	1	999999	<b>1000</b>	6	0	23	
Display with delay time	diSPL	1	999999	<b>1000</b>	6	0	24	
Decimal point	dPoint	0	5	<b>0</b>	1	0	25	
Wait time to zero	WAit	0,0	99,9	<b>10,0</b>	3	1	26	



Description	Text	Min - Value	Max - Value	Settings bold = default	Pos.	Char	Ser. Code	Selection
<b>Presets (DX 347)</b>								
Preset 1	PrES 1	-199999	+999999	<b>10000</b>	+/- 6	0	27	
Preset 2	PrES 2	-199999	+999999	<b>5000</b>	+/- 6	0	28	
Mode Preset 1	CHAr 1	0	0	<b>0</b>	1	0	29	┘ GE
				1				┘ LE
				2				┘ GE
				3				┘ LE
				4				┘ RES
				5				┘ SET
Mode Preset 2	CHAr 2	0	5	<b>0</b>	1	0	30	┘ GE
				1				┘ LE
				2				┘ GE
				3				┘ LE
				4				┘ 1-2
				5				┘ 1-2
Hysteresis 1	HYSt1	0	99999	<b>0</b>	5	0	31	
Hysteresis 2	HYSt2	0	99999	<b>0</b>	5	0	32	
<b>Analogue output (DX 346)</b>								
Analogue begin	An-bEG"	-199999	999999	<b>0</b>	+/-6	0	33	
Analogue end	An-End	-199999	999999	<b>10000</b>	+/-6	0	34	
Analogue mode	A-CHAr	0	3	<b>0</b>	1	0	35	±10 V
				1				0 ... 10V
				2				0 ... 20 mA
				3				4 ... 20 mA
Offset	OFFSEt	-9,999	9,999	<b>0,000</b>	+/- 4	3	36	
Gain	GAin	00,00	99,99	<b>10,00</b>	4	2	37	

Description	Text	Min - Value	Max - Value	Settings bold = default	Pos.	Char	Ser. Code	Selection
<b>Serial interface (DX 348)</b>								
Serial format	S-Form	0	9	<b>0</b>	1	0	92	<b>0 = 7E1</b>
				1				1 = 7E2
				2				2 = 701
				3				3 = 702
				4				4 = 7N01
				5				5 = 7N02
				6				6 = 8E1
				7				7 = 801
				8				8 = 8N01
				9				9 = 8N02
Baud rate	S-bAUd	0	6	<b>0</b>	1	0	91	<b>0 = 9600</b>
				1				1 = 4850
				2				2 = 2400
				3				3 = 1200
				4				4 = 600
				5				5 = 19200
				6				6 = 38400
Unit address	S-Unit	0	99	<b>11</b>	2	0	90	—
Serial timer	S-tim	10	9999	<b>100</b>	4	3	38	—
Serial mode	S-mod	0	1	<b>0</b>	1	0	39	<b>0 = PC</b>
				1				1 = print
Code for print	S-CodE	100	120	<b>101</b>	3	0	40	—