K23-SSI/R2/IU-C

Converter from SSI-to-Analogue and SSI-to-Serial

- Suitable for operation with all sensors and encoders using SSI interface
- Scalable analogue outputs +/- 10 V, 0-20 mA and 4-20 mA proportional to the sensor signal
- Serial RS232 and RS485 interface for serial readout of the sensor data
- Easy to set up by Teach function or by PC
- Linearisation facilities by freely programmable input-output curves
- Additional facilities like bit-blanking, round-loop-operation etc.
- 18–30 volts DC power supply, auxiliary voltage output 5 VDC for sensor supply

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 –

Table of Contents

1. Introduction

K23-SSI/R2/IU-C represents a small and low-cost, but highly performing converter for industrial applications, where the information of a sensor or encoder with SSI interface needs to be converted to an analogue signal or to a serial RS232/485 data format.
The unit has been designed as a compact module with 12 screw terminals and a 9-position SUB-D connector (female). The housing is suitable for standard DIN rail mounting.

1.1. Applicable Encoders and Sensors:

Single-turn or multi-turn absolute encoders and all similar sensors using a standard SSI interface (6 to 25 bits of resolution with binary or Gray code). The unit can operate in either master mode (clock signal generated by the unit itself), or in slave mode (clock signal generated by a remote device)

1.2. Remark to the Encoder Resolution:

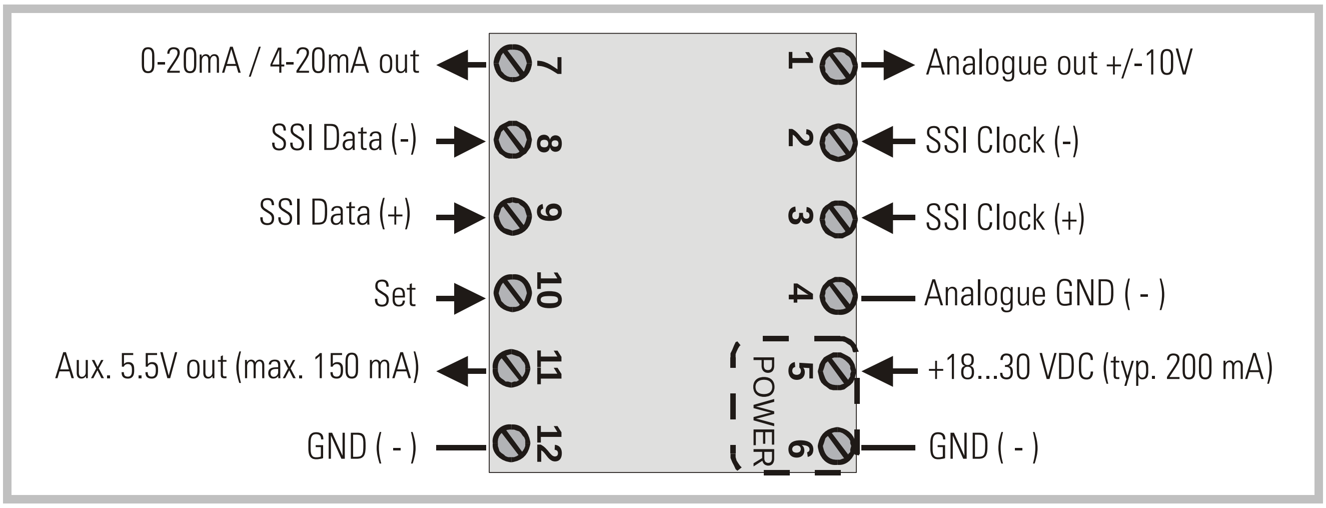
The unit provides settings for the standard resolutions of 13 bits, 21 bits and 25 bits. In general, for sensors with other resolutions you can use the next higher setting (i.e. set the unit to 21 bits with a sensor of 16 bits).
Depending on brand and specification of the encoder, in some cases it may be necessary to blank out the surplus bits by using the bit blanking function described later. In general however, the unit should work perfectly with any number of bits between 6 and 25, also without special bit blanking.

2. Terminal Assignment

The subsequent diagram shows the assignment of the screw terminals.
We recommend connecting the Minus wire of the power supply to earth potential.

GND terminals 4, 6 and 12 are connected internally.

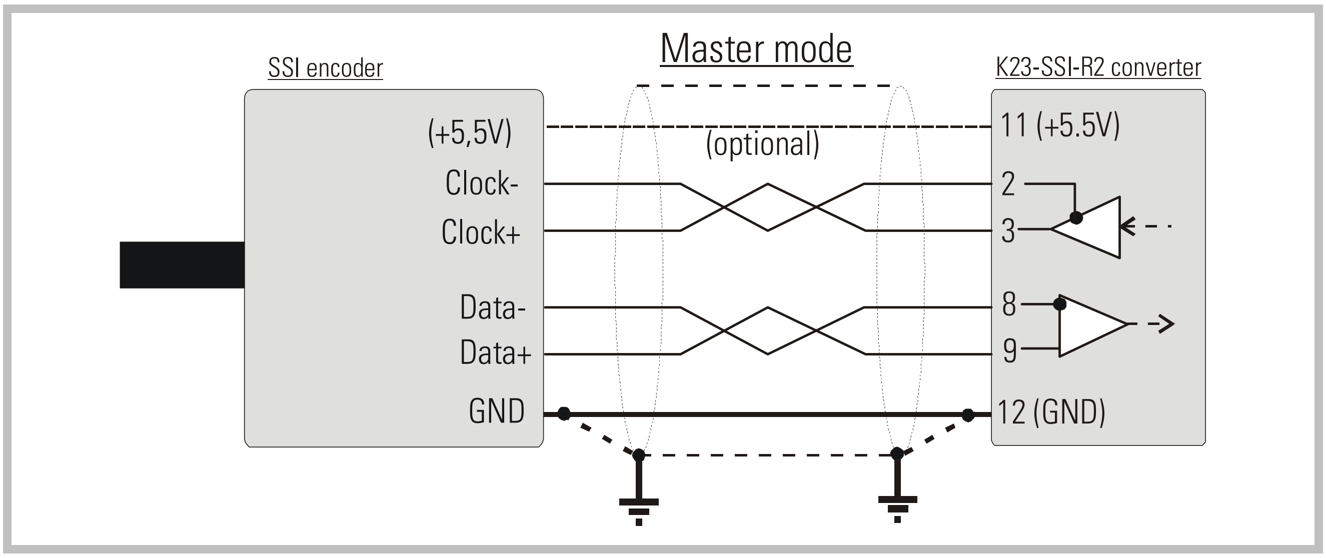
Depending on input voltage and load of the auxiliary voltage output, the total power consumption of the unit is approximately 200 mA.



3. Encoder Connections

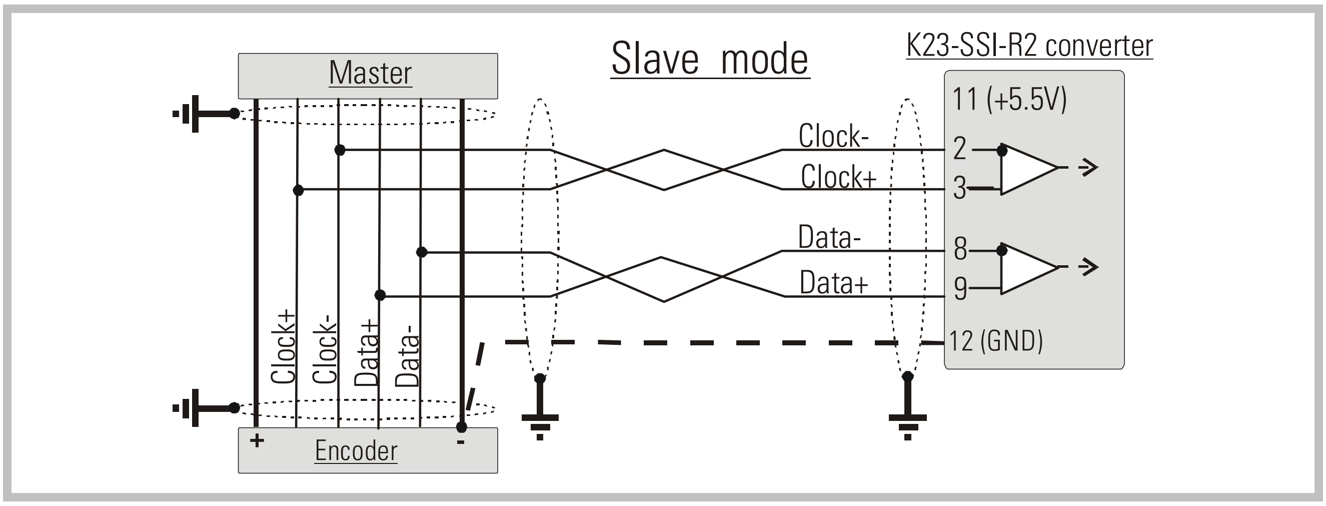
3.1. Master Operation

We recommend connecting the screen to the <u>Minus</u> wire of the encoder supply voltage <u>on both sides</u>.



3.2. Slave Operation

With this mode, the converter operates in parallel to another unit, acting as a „listener“ to the existing data communication.
Quite according to need, the common potential of the master can be connected to terminal 12 (GND), or remain open for fully differential operation.

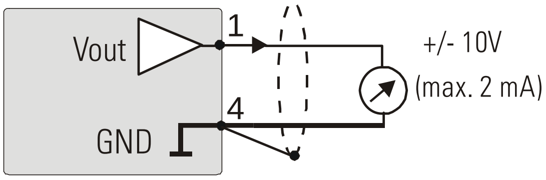


4. Analogue Outputs

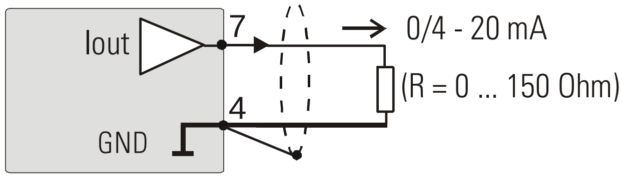
The unit provides a +/- 10V voltage output and a 0-20 mA / 4-20 mA current output at a resolution of 14 Bits (i.e. the voltage output operates in steps of 1.25 mV).

The nominal load of the voltage output is 2 mA.
The current output can accept loads between 0 Ohms and 150 Ohms.

There is a separate analogue ground terminal, which however internally is connected to the GND potential of the power supply



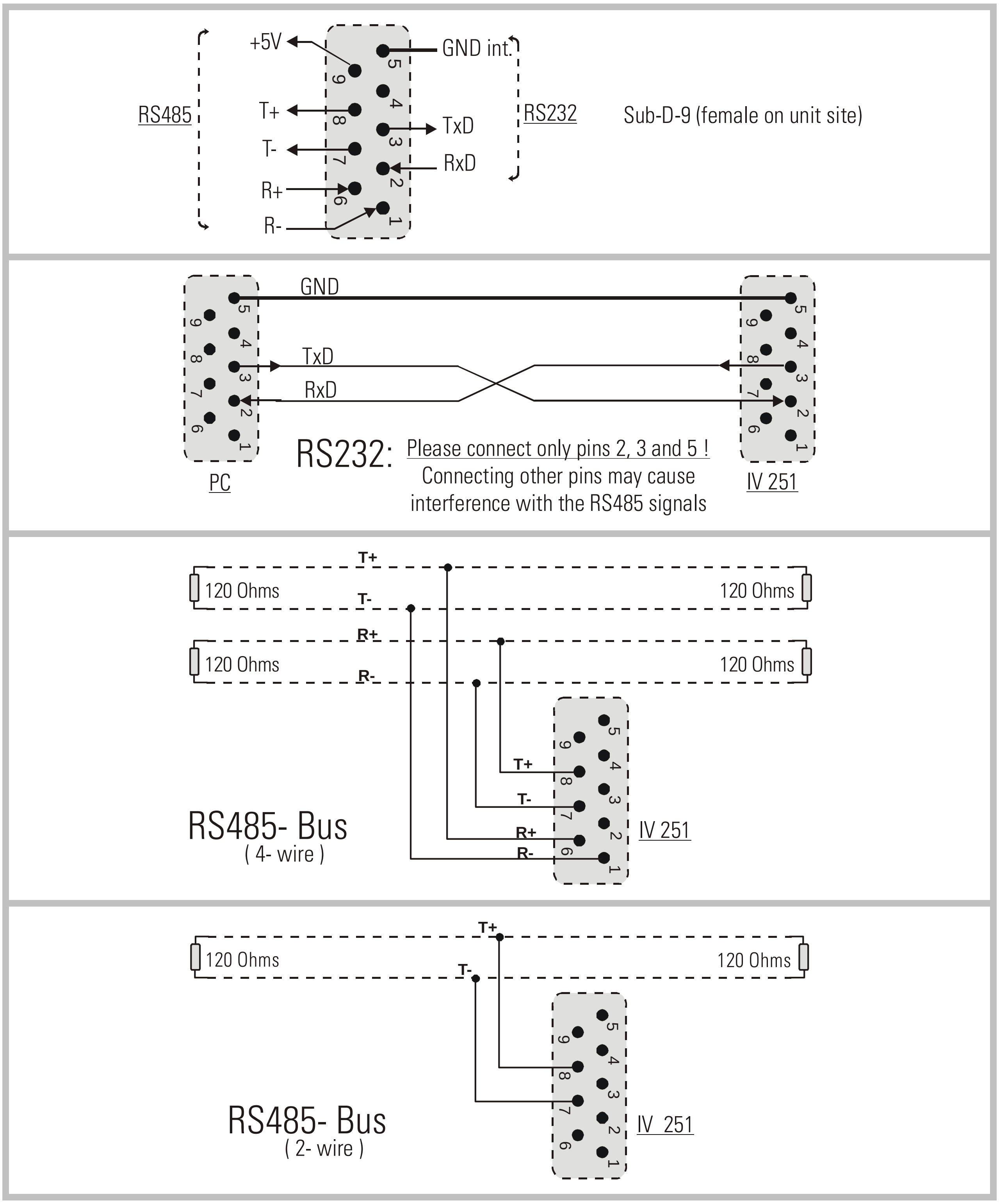
Voltage output



Current output

5. Serial Interface

The unit provides a RS232 interface and a RS485 interface, however only one of the two can be used at a time. Serial communication allows to read out the encoder position and to set parameters and variables by PC, according to need.



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6. DIL Switch Settings

The DIL switch located on the top side of the unit provides customer- specific settings of desired operation modes.

Set Default:
OFF:Unit loads default settings (p.22) with every power-up cycle
ON : No loading of default settings upon power-up.

Analogue Update Mode
OFF: Update of analogue output after every SSI telegram
ON: Update of analogue output in a fixed preset time pattern

SSI- Test:
OFF:Normal LED operation, teach function active
ON: Verifies correct status of SSI clock and data lines

SSI Code
OFF: Gray Code
ON: Binary Code

SSI Resolution:
3 OFF, 4 OFF : not valid
3 ON, 4 OFF : 25 Bit
3 OFF, 4 ON : 21 Bit
3 ON, 4 ON : 13 Bit

SSI Mode:
OFF: Slave Mode
ON : Master Mode

Serial Port:
OFF: RS 232- Format
ON : RS 485- Format

The switch settings shown in the example are suitable for Master operation of a 25 bit SSI encoder with Gray coded output.
The analogue output operates with continuous update and the serial link is set to RS232 communication.

Any changes of the switch settings will become active only after the next power-up cycle!

After setup and commissioning, please set DIL switch position 6 to ON. If set to OFF, any inadvertently touch of the „Teach“ button would overwrite your previous scaling input !

7. Commissioning

With basic applications you can use the Teach procedure for commissioning of the unit. Extended functions need a PC for setup and are described later.

7.1. Self Test

Set all DIL switches according to your application and connect encoder and power supply to the unit. Set switch position No. 6 to ON first (test mode) and power the unit up. The green LED (power) and the yellow LED (status) must light both. After a successful self-test, the yellow LED must switch off again (approx. 1 sec.)

7.2. SSI Signal Test

Push the Teach button one time now. This will verify the SSI Data lines. The yellow LED must switch on now. Where it remains off, you need to cross the input lines Data+ (9) and Data- (8).

The second actuation of the Teach button will test the SSI Clock lines in the same manner. Again, the LED must be lit, otherwise you need to cross the lines Clock+ (3) and Clock- (2).*)

The third actuation of the Teach button will switch off the LED again and restart the test cycle.

Where you find your status LED lit after the first and the second actuation of the button, your wiring of the encoder is o.k. Now, power the unit down and set DIL position 6 to OFF (Teach operation).

With use of a PC and our operator software, you can check the status also from the indicator boxes „Status SSI clock" and „Status SSI data" (red = status o.k.)

*) Testing the clock lines is primarily useful with Slave operation. Though the test works also in Master mode, the result says only that the internal generation of the clock works fine. However, in Master mode, this test cannot indicate faulty clock drivers or bad wiring of the clock lines.

7.3. Scaling of the Analogue Output With Use of the Teach Function:

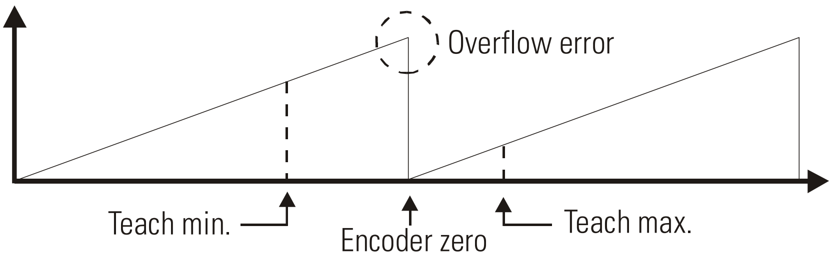
Power the unit up again, with DIL position 6 set to OFF. Press the Teach button one time. The status LED will blink in a slow sequence now while the unit waits for the zero position.

Move your encoder to where you like zero output and press the button again. This stores your zero definition and the LED will blink in a fast sequence now while the unit waits for the full scale position.

Move your encoder to where you desire full scale output and press the button once more. This stores your full scale definition and the LED will switch off.

Your analogue output is now set to the extreme values, as defined by the output mode setting.

- Your full scale position is allowed to be higher or lower than the zero position
- More scaling facilities and linearisation functions are available with PC setup. The PC allows also to execute the TEACH procedure, by using the soft keys „Teach min" and „Teach max" on the screen.
- „Teach min" always refers to the initial output value defined by „Output mode", e.g. 0 V or 0 mA or 4 mA
- When, after setting of the full scale position, the status LED does not switch off, this indicates an overflow error where the mechanical zero position of your encoder lies between your two teach settings. You need to change the zero position of the encoder then (mechanically or by corresponding programming of the encoder). With PC setup, the converter itself provides also an electronic suppression of the overflow jump.
- The only way to reset an overflow error state is to cycle the power supply This LED overflow check may fail with encoders of a resolution lower than 13 bits



7.4. Set Input

With a HIGH signal on the Set input (terminal 10), the unit temporary substitutes the SSI encoder data by a set value as entered to the "SSI Set Value" register, and analogue output as well as serial readout will follow correspondingly.

This means, independent of the actual mechanical position of the encoder, the unit internally uses the register data instead of the encoder data. It turns back to normal encoder reading as soon as the Set signal goes LOW again.

This function may be very useful for testing and commissioning purpose.
The Set input uses PNP–HTL characteristics (LOW = open or 0 – 3V, HIGH = 10 – 30V)

8. Encoder Readout by Serial Communication

You can read out the actual SSI position of the encoder at any time from the serial link. For setting of communication parameters (unit address, baud rate etc.) you need a PC.
More details about serial settings can be found in section 10.

The K23-SSI/R2/IU-C converter uses the DRIVECOM communication standard according to DIN ISO 1745.

To read out the actual position of your SSI encoder, your PLC or PC must send the following request string to the K23-SSI/R2/IU-C unit:

EOT	AD1	AD2	C1	C2	ENQ
Control character Ctrl D (Hex 04)	Unit address (High byte)	Unit address (Low byte)	Register code (High Byte)	Register code (Low byte)	Control character Ctrl E (Hex 05)

Since the default unit address is always " 11 ", and since the register code of the actual encoder position is always " :8 ", the normal string to request data is

EOT	1	1	:	8	ENQ
Ctrl D Hex code: 04 0000 0100	ASCII code: 1 Hex code: 31 0011 0001	ASCII code: 1 Hex code: 31 0011 001	ASCII code: colon Hex code: 3A 0011 1010	ASCII code: 8 Hex code: 38 0011 1000	Ctrl E Hex code: 05 0000 0101

When the request string has been sent correctly, the unit will respond with the following string:

STX	C1	C2	x x x x x x x x	ETX	BCC
Ctrl B Hex code: 02 0000 0010	ASCII code: colon Hex code: 3A 0011 1010	ASCII code: 8 Hex code: 38 0011 1000	Encoder position, 1 – 8 digits ASCII 30 to 39 Hex 0011 0000 to 0011 1001	Ctrl C Hex code: 03 0000 0011	Block check character: EOR from underlined characters

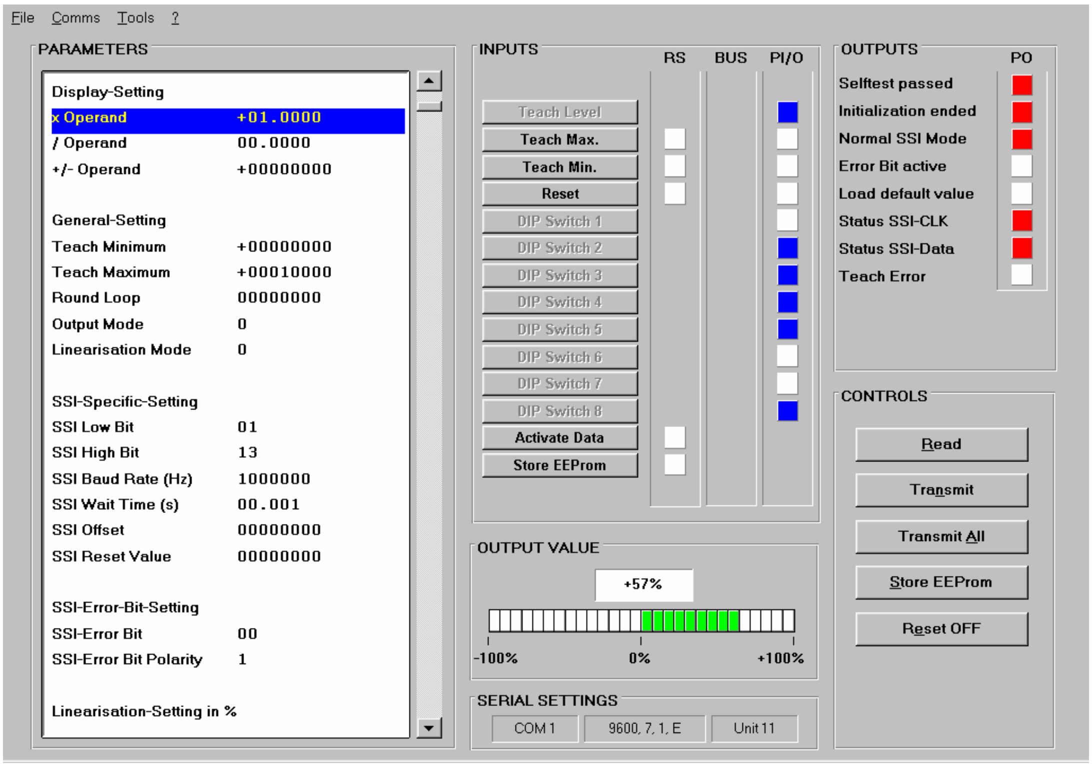
x x x x x x x are the requested encoder data (high digit first).
Leading zeros will automatically be blanked.
The block check character is calculated from the Exclusive-OR of all characters from C1 to ETX.

9. PC Setup with Use of the OS32 Software

The OS32 PC software is a freeware, available for download from the P+F homepage.
Please visit www.pepperl-fuchs.com , go to the "Product Selector" and select "Downloads".

Once you have installed the OS32 software on your PC, please follow the subsequent steps:

- Connect your PC to the converter, using a serial RS232 cable like shown in section 5. of this manual. Make sure the cable only uses pins 2, 3 and 5 and no other pins are connected.
- Run the OS32 software and you will see the following screen:



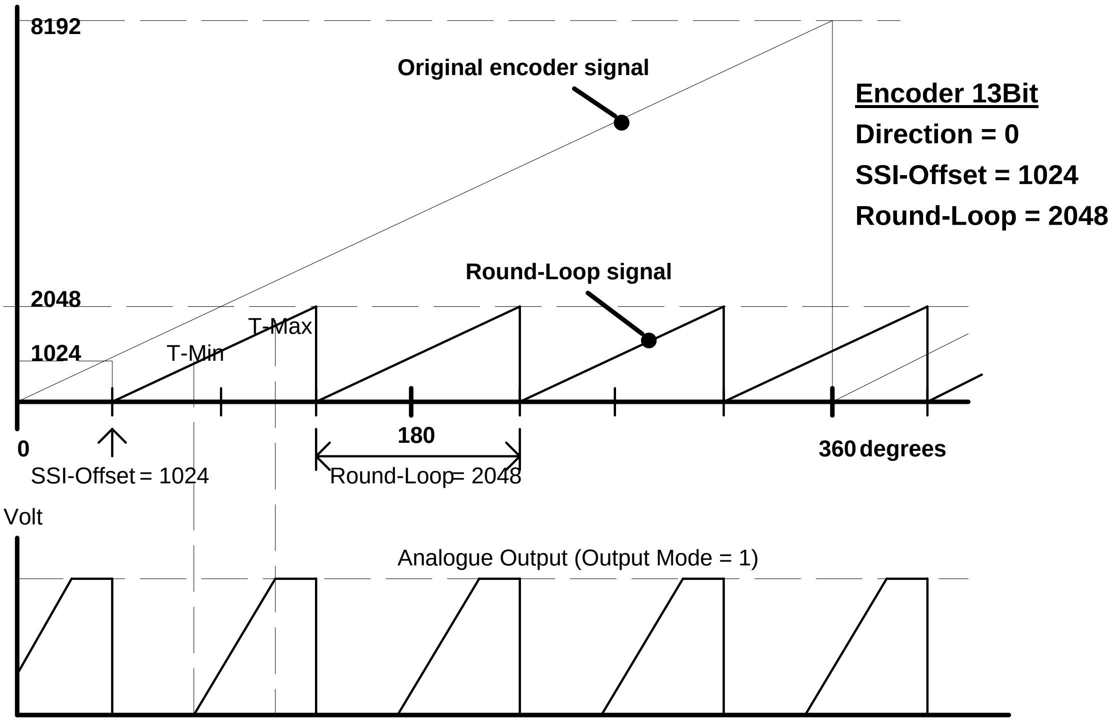
- In case your text and color fields remain empty and the headline says „OFFLINE", you must verify your serial settings. To do this, select „Comms" from the menu bar. Ex factory, all units use the following serial standard settings:

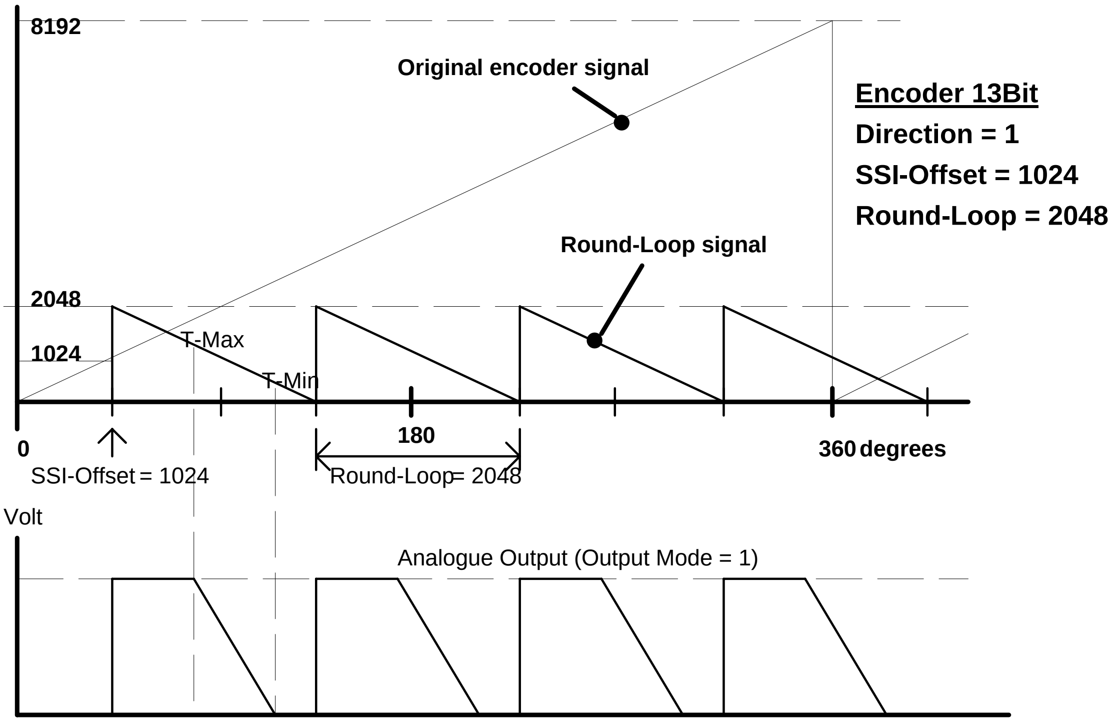
Unit No. 11, Baud rate 9600,
1 start/ 7 data/ parity even/ 1 stop bit

- If the serial settings of the unit should be unknown, you can run the „SCAN" function from the „TOOLS" menu to find out.

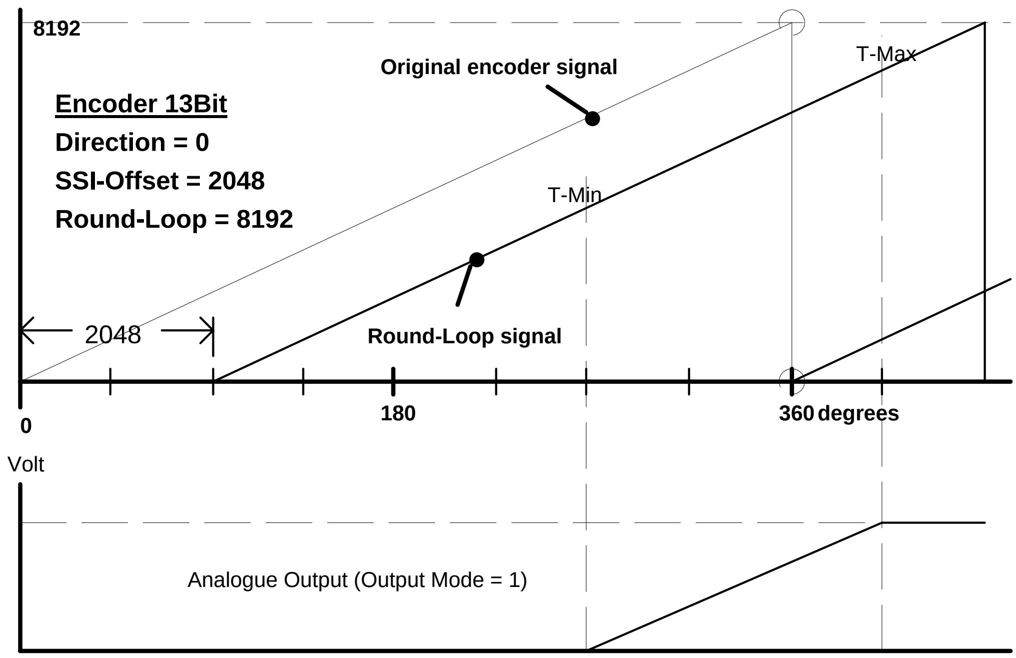
10. Parameter Settings

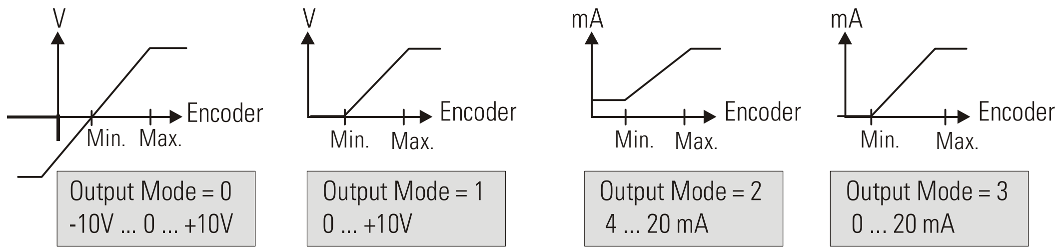
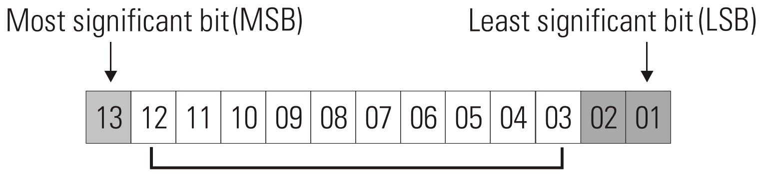
Parameter	Description
xOperand /Operand +/-Operand	Parameters for scaling of the serial read-out value from SSI encoder information into practical engineering units. These settings do not affect the analogue output. The serial information results from the conversion $\text{Readout} = \left[\text{encoder data} \times \frac{\text{xOperand}}{\text{/Operand}} \right] + \text{+/-Operand}$
Teach Minimum Teach Maximum	These two settings define the range of the encoder where the analogue output should operate between minimum and maximum output. At any time you can use the Teach button on the unit or the soft keys on the screen to set these parameters *) But you are also free to enter your settings directly by keyboard, without using the Teach function. *) Click to Teach-Min (on) and again (off), then click to Teach-Max (on) and again (off) Click to “Activate Data” to make your Teach results active. Click to “Read” to read out and see your Teach results on the screen. Click to “Store EEProm” to finally save your Teach parameters to the unit.
Round Loop	In general, this setting should be 00000. Any other setting will substitute the real encoder position by a repeating cycle count. Example: when we set this register to 2048, the internal position register will only move in a range between 0 and 2047. When we underpass zero with reverse direction, again 2047 will appear. When we exceed 2047 with forward direction, we restart at 0 again The zero position of the round-loop counter can be set by register “SSI-Offset” which allows settings between 0 and the Round-Loop value. Register “Direction” allows to set the counting direction of the round loop counter (0 = up, 1 = down). Within this new range of round-loop positions you are free to set the zero and full scale thresholds of your analogue output again, by means of the Teach-Min. and Teach-Max. Parameters. The following drawings explain clearly the coherence between original encoder data, Round-Loop setting, SSI-Offset and Direction register:





- The Round-Loop function is also suitable to suppress the encoder overflow, when the mechanical zero position of your encoder lies between your Teach-Min and Teach-Max values and you do not like to change the mechanical situation. As shown in the subsequent picture, you need to set the Round-Loop register to the full encoder resolution and then shift the zero transition by setting the SSI Offset correspondingly.
- Every change of the Round-Loop setting requires new entry of Teach-Min, Teach-Max and Offset values
- With use of the Round-Loop function it is also possible to change the counting direction of the encoder by setting the Direction bit. After doing this, again new entry of Teach-Min, Teach-Max and Offset is necessary.



Parameter	Description
Output Mode	Selects the output format of the analogue outputs like shown
	
Linearisation Mode	Sets the mode of linearisation. 0: Linearisation off, registers P1 to P16 are out of function 1: Linearisation in a range of 0 – 100% 2: Linearisation over full range –100% to +100% See example under section „Linearisation
SSI Low Bit	Defines the lowest bit (LSB) for evaluation when the bit blanking function is used. Must be set to "01" for full evaluation of the encoder range
SSI High Bit	Defines the highest bit (MSB) for evaluation when the bit blanking function is used. Must be set to the total number of encoder bits for full evaluation of the encoder range  With setting "SSI high bit" = 12 and "SSI low bit" = 03, only bits 03 to 12 will be evaluated, (bits 01, 02 and 13 to be blanked)

Bit blanking results in a different evaluation of the encoder information, and you should be fully aware of what happens with the resolution and the number of executed turns when you use this function.
The subsequent example uses a 13-bit single-turn encoder to explain various result of bit blanking:

- Without blanking, a 13 bit encoder would provide a 0 – 8191 information with a 0 - 360° turn of the encoder shaft.
  This assumes setting of "High Bit = 13" and "Low Bit = 01".

It is easy to understand that there are two different ways how to use only 12 of the 13 bits available:

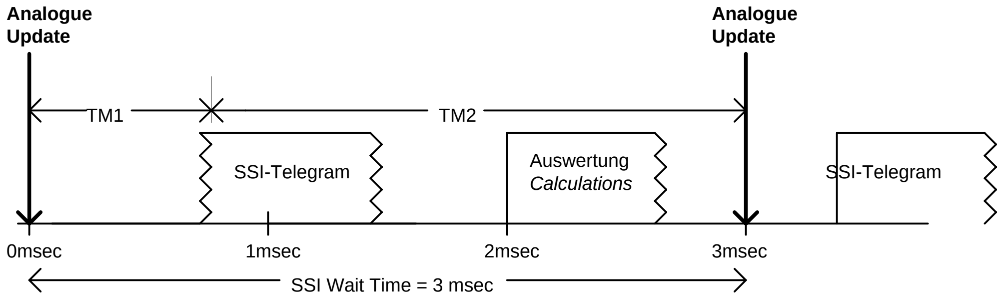
- When we set High Bit to 12 while Low Bit remains 01, we have blanked the high order bit. The result corresponds to an encoder providing informations 0 – 4095 while we turn from 0 - 180°, and again the same 0 – 4095 information while we turn from 180° to 360°. The resolution remains unchanged with respect to the number of steps per revolution.
- We can also leave High Bit to 13 and set Low Bit to 02 instead. This means we blank the low order bit now. As a result, within one turn of 0 - 360°, we receive the encoder information 0 – 4095 one time only, but the total number of steps per revolution has been halved.

Parameter	Description
SSI Baud Rate	Sets the communication speed of the SSI interface with SSI encoders. Setting range: 100 Hz to 1MHz. You are free to set any desired frequency between 0.1 kHz and 1000.0 kHz. For technical reasons however, with settings higher than 250 kHz, the unit will use one of the baud rates shown in the list, next to your set baud rate

1 000,0 kHz	888,0 kHz	800,0 kHz	727,0 kHz	666,0 kHz
615,0 kHz	571,0 kHz	533,0 kHz	500,0 kHz	470,0 kHz
444,0 kHz	421,0 kHz	400,0 kHz	380,0 kHz	363,0 kHz
347,0 kHz	333,0 kHz	320,0 kHz	307,0 kHz	296,0 kHz
285,0 kHz	275,0 kHz	266,0 kHz	258,0 kHz	250,0 kHz

Parameter	Description
SSI Baud Rate (continued)	It is mandatory to set the Baud rate even with Slave operation. In this case, the setting is needed to determine the pause time for correct synchronization (pause is detected after 4 clock cycles). The unit automatically synchronizes with every remote clock signal within the specified Baud rate range.
SSI Wait Time	This register sets the waiting time between two SSI telegrams in a range from 0.001 to 99.999 sec. In normal operation, due to processor cycle times, the real time may vary by 512 µsec. with respect to the preset time. The fastest sequence possible is 1.3 µsec at a setting of 0.000

- With Slave operation mode, the distance of the SSI protocols depends on the remote Master and the SSI Wait Time specifies the distance of evaluation data strings. Setting to 100 msec results in evaluation of one telegram only every 100 msec, even though the Master may have transmitted many telegrams more.
- Especially with applications of closed-loop control loops, it may be of advantage to have equidistant updating of the analogue output (DIL switch 7 = ON). This is possible with Master mode only and the Wait Time setting (must be >0) directly corresponds to the time pattern of updates.
- The subsequent drawing explains the timing with use of equidistant update mode with a SSI Wait Time setting of 3 msec.



- The shortest possible time for equidistant updating is 1.3 msec, due to internal processing times (SSI Wait Time set to 0.001 and parameter "/Operand" set to 00000 which skips the conversion calculations for serial readout)
- The time marks TM1 and TM2 shown in above diagram can be displayed with the Monitor function of the PC operator software. It is easy to understand that the sum of both times must be equal to the Wait Time setting, other-wise you must increase the Baud rate or choose a longer update cycle. (The serial access codes are :3 for TM1 and :5 for TM2)

Parameter	Description
SSI Offset	Defines the electrical zero position of the encoder with respect to the mechanical zero position. When the Round-Loop function is not active (Round-Loop = 0), the SSI Offset is subtracted from the SSI position reading, which can also cause negative results. When the Round-Loop is active, SSI Offset displaces the mechanical zero position, but always with only positive results.
SSI Reset Value	Applying a remote Set signal to the Set input (terminal 10) results in a temporary substitution of the SSI position value by the SSI Set Value entered here. This function allows easy testing and simulation of fixed analogue output values while commissioning
SSI Error Bit	Defines the position of the error bit (if available with the encoder in use). 00: no error bit available 13: bit 13 represents the error bit 25: bit 25 represents the error bit etc Errors indicated by the encoder can be read out via serial code " ;9 " (ASCII characters for semicolon and nine). In case of an encoder error, the indication is 2000 (hex). On your PC screen, the "Error Bit active" box is lit and the front LED will blink at a 1:4 On/Off ratio
SSI Error Bit Polarity	Defines the polarity of the Error Bit 0: Bit is LOW in case of error, 1: Bit is HIGH in case of error

<table>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td>P01 (x),
P01 (y) etc</td><td>Linearisation registers as shown under 13</td></tr>
<tr><td>Analogue Offset</td><td>This register can adjust the analogue zero output in a range of approx.
+/- 100mV (respectively+/- 200 µA), if necessary</td></tr>
<tr><td>Analogue Gain</td><td>Sets the maximum output swing of the analogue output.
Setting of 1000 results in a 10 volts respectively 20 milliamps output swing.</td></tr>
<tr><td>Direction</td><td>This parameter changes the internal direction of counting (0 or 1), provided the unit operates in Round Loop mode.
Any changes of the Round Loop or Direction registers require a new Teach procedure</td></tr>
<tr><td>Unit Number

Factory setting: 11</td><td>Especially with RS 485 applications it is necessary to attach a specific address to each unit, since up to 32 units can be connected to the same bus.
You can choose any address number between 11 and 99.
The address must not contain a “0“ because these numbers are reserved for collective addressing</td></tr>
<tr><td>Serial Baud Rate

Factory setting: 0</td><td><table><tr><th>Setting</th><th>Baud</th></tr><tr><td>0</td><td>9600</td></tr><tr><td>1</td><td>4800</td></tr><tr><td>2</td><td>2800</td></tr><tr><td>3</td><td>1200</td></tr><tr><td>4</td><td>600</td></tr><tr><td>5</td><td>19 200</td></tr><tr><td>6</td><td>38 400</td></tr></table></td></tr>
<tr><td>Serial Format

Factory setting: 0</td><td><table><tr><th>Setting</th><th>Data bits</th><th>Parity</th><th>Stop bits</th></tr><tr><td>0</td><td>7</td><td>even</td><td>1</td></tr><tr><td>1</td><td>7</td><td>even</td><td>2</td></tr><tr><td>2</td><td>7</td><td>odd</td><td>1</td></tr><tr><td>3</td><td>7</td><td>odd</td><td>2</td></tr><tr><td>4</td><td>7</td><td>none</td><td>1</td></tr><tr><td>5</td><td>7</td><td>none</td><td>2</td></tr><tr><td>6</td><td>8</td><td>even</td><td>1</td></tr><tr><td>7</td><td>8</td><td>odd</td><td>1</td></tr><tr><td>8</td><td>8</td><td>none</td><td>1</td></tr><tr><td>9</td><td>8</td><td>none</td><td>2</td></tr></table></td></tr>
</table>

11. Programmable Linearisation

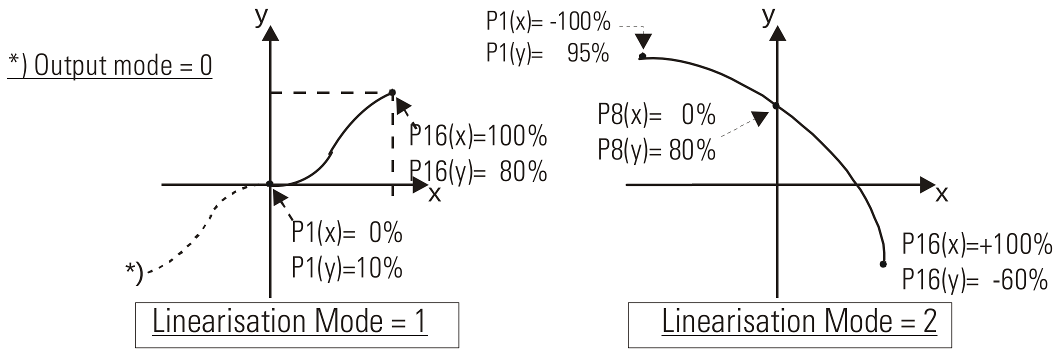
This programmable feature allows the user to convert a linear motion to a non- linear analogue output. There are 16 programmable x/y coordinates available, which can be set in any desired distance over the full conversion range. Between two coordinates, the unit uses linear interpolation. Therefore it is advisable to use more coordinates in a range with strong curves and only a few coordinates where the curvature is less.

To activate linearisation and to specify your desired linearisation curve, you must set the „Linearisation Mode" register from 0 to either 1 or 2.

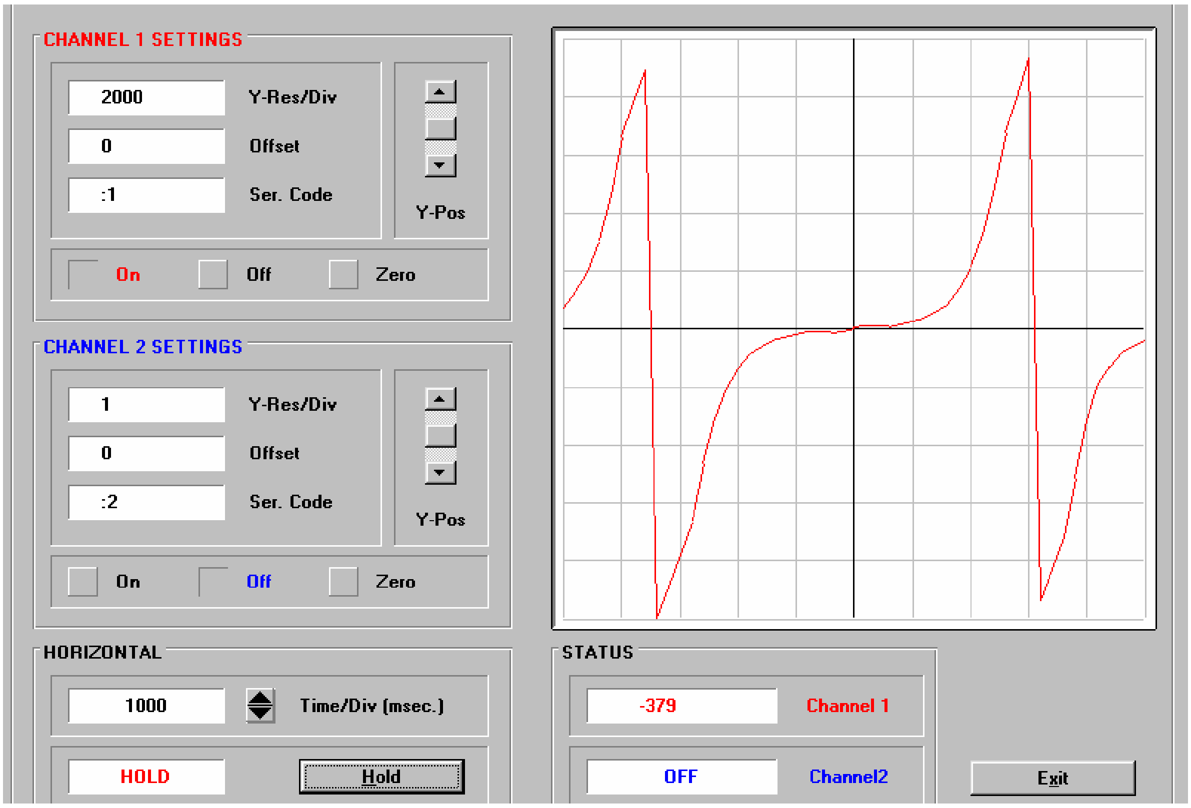
Use registers **P1(x) to P16(x)** to specify the coordinates on the x-axis. These are the analogue output values that the unit normally would generate according to the actual encoder position. These settings are in % of full scale.

Now enter the attached values to registers **P1(y)** to **P16(y)**. These are the values that the analogue output will generate <u>instead</u> of the x- values, i.e. P2(y) will substitute P2(x) etc.

- x-register must use continuously increasing settings, i.e. P1(x) must have the lowest setting and P16(x) must have the highest setting
- All entries use a percentage format (xx.xxx% of full scale output). Setting 0.000% means zero output and setting 100.000% means full scale output
- With Linearisation Mode set to 1, it is a must to set P1(x) to 0% and P16(x) to 100%. Linearisation is defined in the positive range only and the negative range will be a mirror image of the positive range with reference to zero
- With Linearisation Mode set to 2, it is a must to set P1(x) to –100% and P16(x) to +100%. This enables the user to set curves which are not symmetric to the zero position.



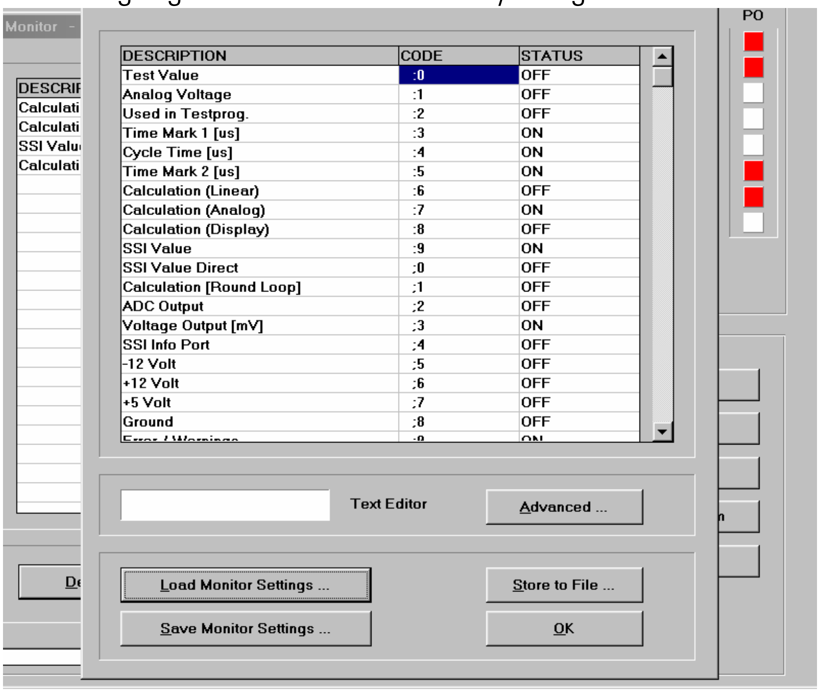
You can visualize your curve on the PC screen or by means of the internal PC scope or any external oscilloscope. For this, select TOOLS, then TEST and there „Analogue Voltage Function“. The unit will now simulate a repeating motion of the encoder over the full range and generate the analogue signal accordingly. When you use the Scope function of the operator software, you must set the serial code “ :1 “ to record the analogue output.



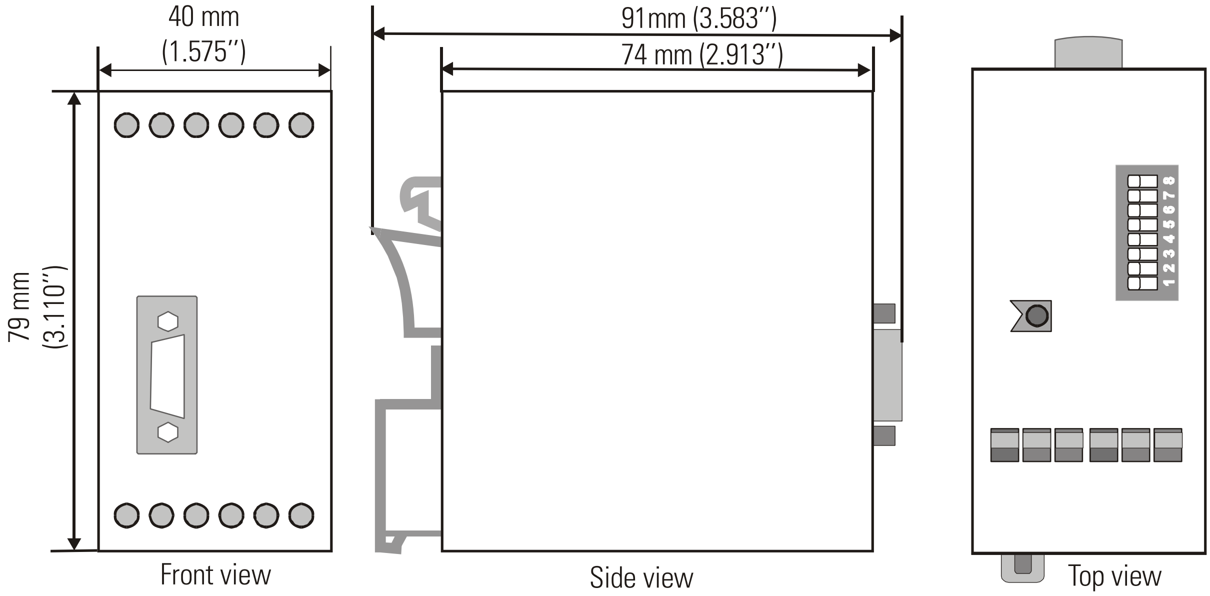
12. Test Functions

When you select TEST from the TOOLS menu, you are able to verify the following data, by clicking to the corresponding field: Actual encoder position, DIL switch settings, Internal supply voltages, Analogue output state.

Furthermore, the following registers can be recorded by using the monitor function:



13. Specifications und Dimensions



Power Supply	:	18...30 VDC
Power consumption	:	approx. 170 mA at 18V (+5.5V not connected) approx. 120 mA at 30V
Inputs (SSI, TTL)	:	TTL differential, RS-422 standard (1.0 MHz)
SSI Format	:	13, 21 or 25 Bit (Master / Slave / Gray / Bin)
SSI break time	:	min. 4 x clock
Reset Input spec.	: :	High > 10V , Low < 3V (Ri = 5k) Static, active high, minimum duration approx. 10msec
Encoder supply	:	+5.5V +/- 5% (max. Load: 150mA)
Analogue outputs	:	+/- 10V (> 5 kOhms): 0-20mA / 4-20mA (<150 Ohms)
Resolution	:	14 bits
Stabilization time	:	2 msec
Accuracy	:	+/- 0.1%
Temperature-Range	:	0 ... 45°C (32 … 113°F)
Weight	:	ca. 190 g
Conformity and Standards	:	EMC 89/336/EEC: EN 61000-6-2 EN 61000-6-3 LV73/23/EEC: EN 61010-1

14. Parameter List

Text assignment	Min. setting	Max. setting	Default	# Digits	Serial register code
X Operand	-10.0000	+10.0000	1.0000	+/- 6	00
/ Operand	0	10.0000	1.0000	6	01
+/- Operand	-99999999	99999999	0	+/- 8	02
Teach Minimum	-99999999	+99999999	0	+/- 8	03
Teach Maximum	-99999999	+99999999	10000	+/- 8	04
Round Loop	0	99999999	0	8	05
Output Mode	0	3	0	1	06
Linearisation Mode	0	2	0	1	07
SSI Low Bit	0	25	1	2	08
SSI High Bit	1	25	25	2	09
SSI Baud rate	100	1000000	100000	7	10
SSI Wait Time	0	10.000	0	5	11
SSI Offset	0	99999999	0	8	12
SSI Reset Value	0	99999999	0	8	13
SSI Error Bit	0	25	0	2	14
SSI Error Bit Polarity	0	1	0	1	15
P1(x)	-100.000	+100.000	100000	+/- 6	A0
P1(y)…..	-100.000	+100.000	100000	+/- 6	A1
P16(x)	-100.000	+100.000	100000	+/- 6	D0
P16(y)	-100.000	+100.000	100000	+/- 6	D1
Direction	0	1	0	1	46
Analog Offset	-99	+99	0	+/-2	47
Analog Gain	0	10000	1000	5	48
Unit Number	0	99	11	2	90
Serial Baud Rate	0	6	0	1	91
Serial Format	0	9	0	1	92