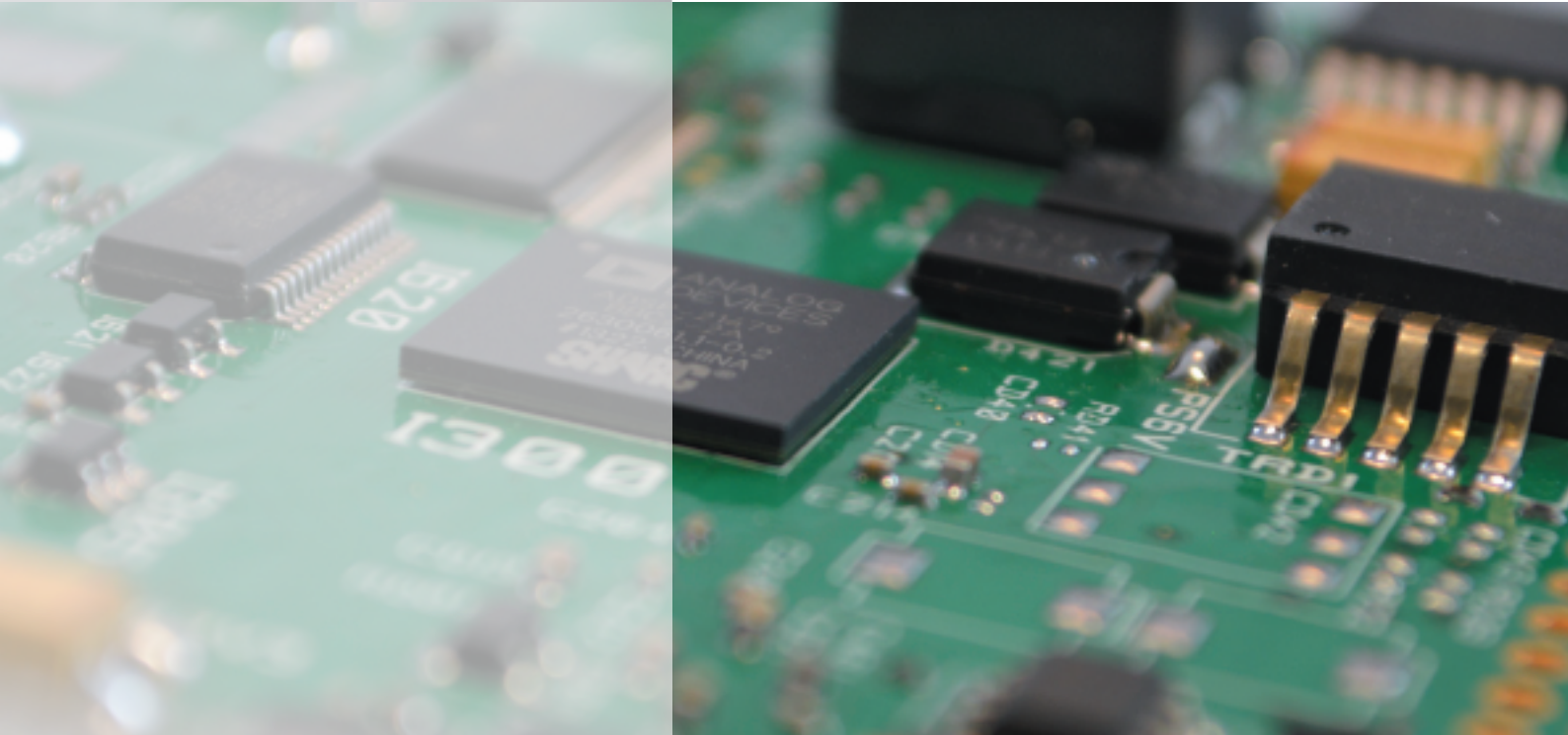


## Special function specifications



2000 & 4000 - EnDat 2.1 Feedback

Function	Feedback EnDat
Hardware	Option EnDat
Firmware	IRT4002 compatible with mini, mini3 and AT drives
Windows user	2.30 and up
Edition	21.09.2005

## 1. Introduction

This option works with an absolute encoder feedback system EnDat ROC, ROQ and EQI from Heidenhain.

This option offers a programmable SSI-interface to read the absolute position and to set the speed command.

## 2. EnDat feedback

The EnDat feedback is an absolute position encoder with two sinusoidal incremental signals and one digital canal.

The digital canal allows to read specific data from the encoder. At power on or after a reset, the 48 first parameters are read and stored in the scope data (drive parameters 112..159). A special user function permits to edit, to save in a file or to print these parameters (Button feedback, feedback info).

If a feedback alarm is detected (alarm 5), parameter 78 gives information on the cause of this alarm. A click on the traffic light icon will open the status window, the alarm window and parameter 78 window (a right click on this icon will close these windows).

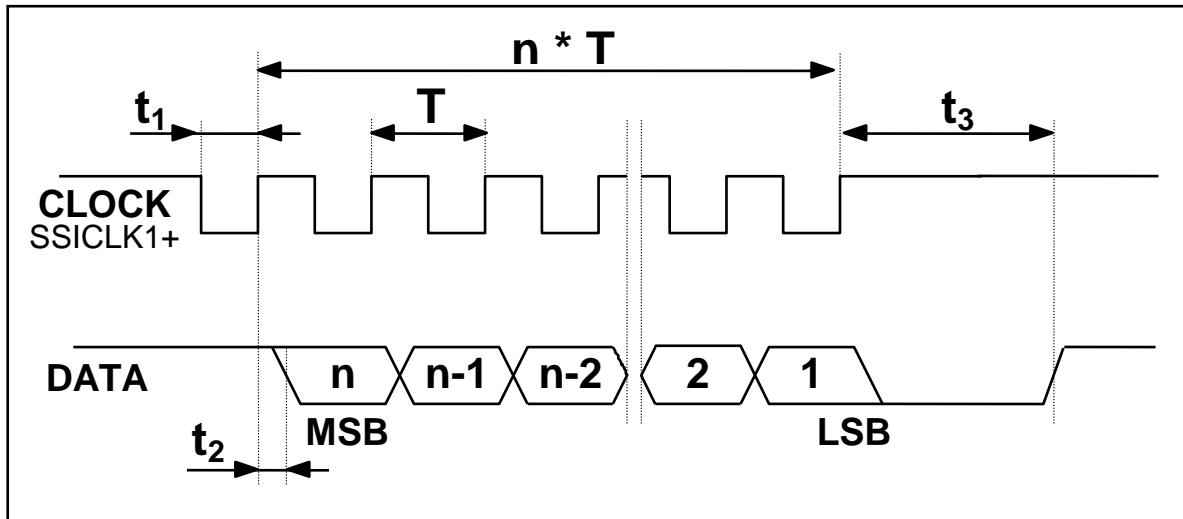
P78 Type of EnDat alarm	
Type of encoder unknown	0
Initialisation error	0
SIN + COS out of range	0
Timeout EnDat SSI	0
Position error	0
EnDat SSI CRC error	0
EnDat alarm register or bit	0
bit 7	0
bit 8	0
bit 9	0
bit 10	0
bit 11	0
bit 12	0
bit 13	0
bit 14	0
Initialisation	0

### 3. SSI output description

The SSI position output is full programmable 1 to 32 bits, with max 20 bits resolution inside one turn and max 12 bits of turns, and is transmitted MSB first.

Parameter 38 sets the total number of bits

Parameter 39 sets the number of bits per turn



$$t_{1\min} = 1 \mu\text{s}$$

$$t_2 = 150..250 \text{ ns}$$

$$t_3 = 24..25 \mu\text{s}$$

$$T_{\min} = 2 \mu\text{s} (f_{\max} = 500 \text{ kHz})$$

Note : 1 more clock than the number of transmitted bit is needed

#### 4. SSI input description

To work with the SSI command, the parameter P27 must be set to 2.

The SSI command input is a 16 bits signed word, transmitted with the MSB first. The unit is \$7FFF for the maximum value programmed in parameter P23 (Maximum speed for 10V input)

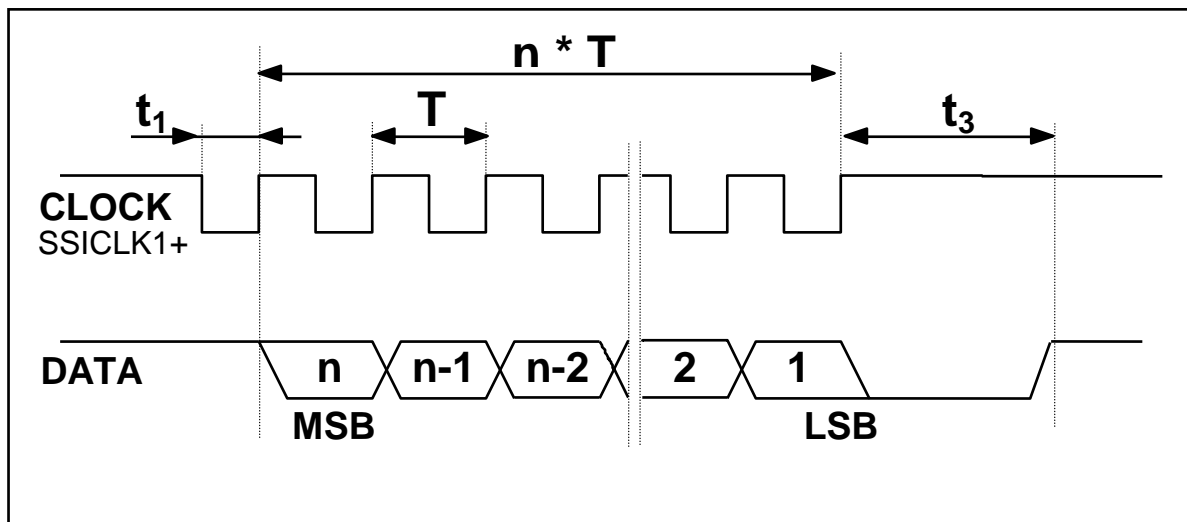
The transmission clock is the same as for the SSI output SSICLK1.

Note :

P38 must be at least 16, to assume the full transmission of the 16 bits of the command input.

If P38 is larger then 16 bits, the 16 bits of the command input must be located in the last 16 clocks of the transmission.

The end of transmission is given after N+1 raising edges or after the timeout t3.



$$t_{1min} = 1 \mu s$$

$$t_3 = 18..25 \mu s$$

$$T_{min} = 2 \mu s (f_{max} = 500 \text{ kHz})$$

Note : - 1 more clock than the number of transmitted bits is needed

- acquisition is made on the falling edge (150..200ns after it).

#### 5. Incremental output signals

A and B signals are the image of the saturated sine and cosine signals :

A\ signal is in phase with SIN

B\ signal is in phase with COS

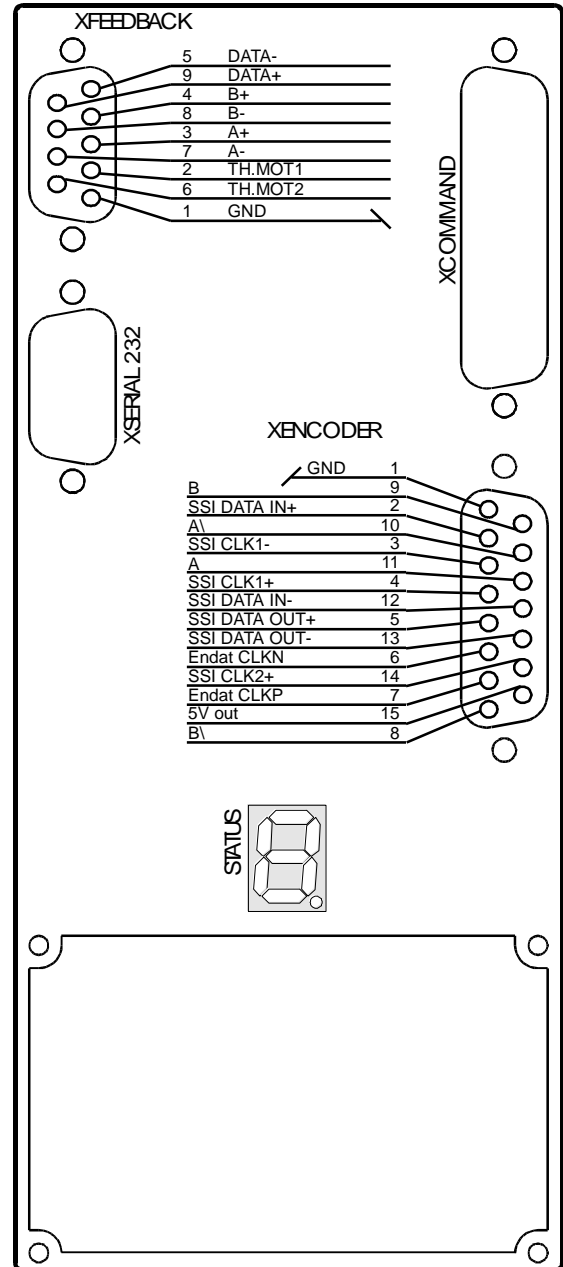
## 6. PIN allocation

### XFEEDBACK:

EnDat Signal	Drive PIN
A+	3
A -	7
B+	4
B -	8
DATA+	9
DATA -	5
THMOT1	2
THMOT2	6

### XENCODER :

Signal	Drive PIN
GND	1
A	11
A\	10
B	9
B\	8
Endat CLK+	7
Endat CLK -	6
SSI CLK1 -	3
SSI CLK1+	4
SSI DATA OUT+	5
SSI DATA OUT-	13
SSI CLK2+*	14
5V out	15
SSI DATA IN+	2
SSI DATA IN -	12



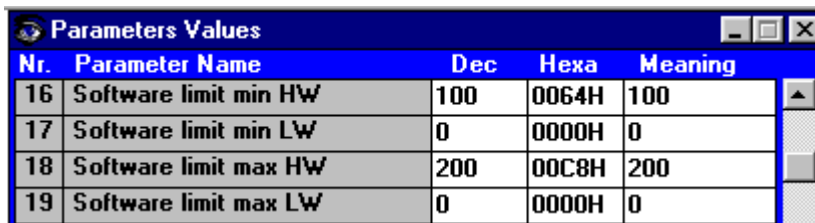
## 7. Technical data

SSI CLK input maximum frequency	500 kHz
SSI DATA IN, CLK1	Line receiver inputs (type LS32, no internal load)
A, B, Z, SSI DATA OUT	Line transmitter outputs (type LS31)
EnDat Power supply (output !)	5.25 VDC, 150 mA, short circuit protected
EnDat Parameter channel clock	615 kHz
EnDat maximal sinus/turn	2048

## 8. Additional functions

### 8.1 Software limits

The parameters 16 to 19 define the software limits. Each limit is defined with a number of revolution (HW) and a position within the revolution (LW).



Nr.	Parameter Name	Dec	Hexa	Meaning
16	Software limit min HW	100	0064H	100
17	Software limit min LW	0	0000H	0
18	Software limit max HW	200	00C8H	200
19	Software limit max LW	0	0000H	0

These limits have the same as the end switches :

- SW2 for the upper limit (= stop of the negative command )
- SW1 for the lower limit (= stop of the positive command )

If one of these limits is reached, the bit 7 « Limit stop » in the status is set, and the display will show the which limit is active :

- |- for the negative limit or SW2
- | for the positive limit or SW1.

### 8.2 Setup tool

This is the first step of setup tool for zero finding. This function can be called with the button Setup tool in the Feedback and Motor window.

This will generate a current to a fix electric zero position. Once the position is stable, it can be stored in the feedback shift angle.

Irtsa/21.09.2005/pau