



# Application Note AN2020

### **D-Series / C-Series**

### Positioning with Dimetix distance sensor and SEW inverter

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#### Abstract

This application describes how to use the D-Series and C-Series laser sensor in a positioning application in conjunction with a SEW servo drive. The necessary configuration of the D-Series and C-Series laser sensor and the SEW inverter are described in this document. Further the wiring is also documented.

This application note is provided as is without any warranty for any problems this sample may cause.

⋇

File: AN2020 Positioning with SEW V106.odt



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# **1** Introduction

The laser distance sensor measures absolute distances. It is suitable for positioning applications to measure the actual feedback position. Figure 1 shows a general setup for such an application.



Fig. 1: Positioning application

In this application note a SEW Eurodrive inverter is used to control the motor. The position is measured by a D-Series or C-Series sensor of Dimetix. The setup of the sensor, the cable connection and the configuration of two product series (MOVIDRIVE® B, MOVIAXIS®) are described.

# **1.1 SEW-System requirements**

Hardware:	MOVIDRIVE® B with encoder card or MOVIAXIS® with encoder card XG	DEU 21B	
Firmware versions:	MOVIDRIVE® B: MOVIAXIS® DEU21B: XGS	>= >= >= >=	18220916.15 .28 .11 .12
	MOVITOOLS® MOTION STUDIO	>=	5.80 SP2 (Service-Pack2)



# 2 Configuration

This chapter is a step by step configuration example. Just do each single step described later in this to configure the sensor for the positioning application. For the C-Series sensor please change to chapter 2.2.

# 2.1 Setup of the D-Series sensor

### 2.1.1 Reset of D-Series sensor

Before proceeding, it is recommended to reset the sensor to its factory defaults. But keep in mind that all previously done settings will be lost when performing a factory reset.

Steps	Description
1	Switch off the power supply used for the device
2	Press the reset push button and keep it pressed
3	Switch on the power supply used for the device
4	Keep the reset push button pressed until all status LED's (POWER, ERROR, DO1, DO2) flash for a short time (about 0.5 seconds)
5	Release the reset push button
6	Switch off the power supply and wait 5 seconds
7	Switch on the power supply and wait until the green status LED (POWER) is on
8	Reset procedure executed successfully



Fig. 2: Reset push button



### 2.1.2 Connection of Laser Sensor Utility with D-Series sensor

Steps	Description
1	Connect the laser sensor over USB or RS-232 to the PC, start the Laser Sensor Utility software and check the connection. Download and install the latest "Laser Sensor Utility" software ( <u>www.dimetix.com/UtilitySW</u> ).
2	Download the special interface board firmware for the SEW-System:
	a) Menu Tools => Firmware download => Download interface board firmware file
	b) Select the following firmware file:
	"DSERIES_IF_FW_V99_11_PAR_V2_SSI_RevisedStartSequence.dls"
	c) Wait until download is finished and sensor is reconnected
	d) Close the download window
3	Download the configuration file "Dserie_10_SEW_24012023.cfg" with the "Laser Sensor Utility". Therefore click on Menu File => Download configuration file to device.
4	Select the configuration file: "Dserie_10_SEW_24012023.cfg"
5	Test the sensor with the SEW-System. If the measurements are not accurate enough for your control unit, a special filter can be activated: see steps 6-8.
6 optional	Connect the sensor again with the laser sensor utility. If needed, set the special moving target filter length. Therefore click on Menu Tools => Manual command input
	Easer Sensor Utility         File       Tools         Info         Error stack         General commands         Service procedure
7 ontional	Activate the special filter with the command:
optional	Send: <b>s0c</b>
	Answer: g0?
	Send: s0afi+2+100
	Description: 100 is the filter length, min. value: 1 and max. value: 400
	Answer: g0afi+2?
	Send: s0A+0
	User commands COM Trace
	COM trace Using CUM port 5 with 15200 boud, / bits, party even, 1 stop bits. Command history
	s0afi+2+100 g0afi+2?
	Temp
	Single measurement
	Clear COM trace Clear command history
8	Close manual command window and try again.
optional	If needed, adjust the filter length s0afi+2+xxx with an other value (see steps 6-8)



### 2.1.3 Cable connection D-Series

The D-Series sensor must be connected to the DEU21B/XGS of the MOVIDRIVE® B or the MOVIAXIS®. Connect the D-Series sensor with the internal screw terminal.

### 2.1.4 Connection of D-Series



Fig. 3: Connection from D-Sub to screw terminal

### 2.1.5 Error handling D-Series

In the configuration for the D-Series Sensor the error behavior "Latest valid measurement value" is selected. In an error case (e.g. distance out or range E234) the last valid measurement is frozen until the sensor can measure again (without an error).

Tools Info								V2.4.2
Connection	Controlled Mode	Stand-alone Mode	Configuration			COM trace	DIMI	εтіх
Measurement characteristics Filter Analog output Digital output	-4-pole serial port ⊂ RS422 ເ SSI	usage sNSSI		C Attach error bit Data coding C binary Measurement data va C 24 bit C	gray Jlue 23 bit	<pre>(&lt; g070m+1 &gt; g070m+1 &gt; g070m+0000 &gt; g070m+0000000+00100000 &gt; g070m+0000000+0010000 &gt; g08ds+1 &lt; g08dds+1+000+000+00000 &gt; g01400+2000+000000 &gt; g01400000000+000000</pre>	0 1000 1000	
SSI	Error behavior sl	NSSIe (distance	output while error)	<ul> <li>Attach error code</li> </ul>		-> s02 <- g02+0000000+0000000 -> s0DI1	D	
User output protocol	C Replaceme	nt value		0 16777015)		<- g0DI1+00000000 -> s0mc <- g0mc+00000004		
Device ID	<ul> <li>Latest valid</li> <li>Error code</li> </ul>	measurement v	alue	(0 10777215)		-> s0fi <- g0fi+00+00+00 -> s0uof		
Additional Features				DOWNL	OAD TO DEVICE	<pre>&lt; guuct+0000000 &gt; sluga &lt; gluga+0000010+00000 &gt; sluu &lt; gluu+0000000 &gt; sluu &lt; gluu+0000000 &gt; slssi &lt; gluu+0000000 &gt; slssi &lt; gluu+1000 &gt; slssi &lt; gluu+10000000 &gt; slssi+1 &lt; gluu+10000000 </pre>	010	
atus: OK					RESET	Clear trace		

Fig. 4: Latest valid measurement value is selected



# 2.2 Setup of the FLS-C

### 2.2.1 Preparation FLS-C

**1.** The following items are needed to do the configuration of the FLS-C.

- RS-232 Configuration cable FLS / DLS (Part no. 500200)
  - 24V DC Power supply
- **2.** Download the UtilitySW from the website <u>www.dimetix.com/lnk/sew</u> and install it on a PC.

**3.** Download the configuration file and safe it on the PC.

To setup the FLS-C sensor, connect the sensor to a serial interface of a PC and power the sensor with 24VDC. Start the UtilitySW and follow the steps below.

Check the connection to the sensor

DLS / FLS Utility			Unconnect	ted			
le Tools Info							
Connection	Controlled Sta Mode	nd-alone Mode Co	nfiguration			COM trace	DIMET
[	Software version and	l serial number					
	Serial number sNsr	1		???			
	Interface software v	version sNsv		???			
	Module software ve	ersion sNsv		??? Unconnected			
	Device ID:		0	-			
r	-Communication para	meters	1				
	Port:		COM1	•			
	Settings:		7: 19200	Baud, 7 Data bits, Parity Even 💌			
l		6					
	CHEC	ONNECTION		Read configuration from	device		
	DIS	CONNECT					
tatus: CONNEC	TION NOT CHECKED				RESET	Clear t	Tace

#### The UtilitySW shows information about the sensor

Connection	Controlled Stand-alone Mode Configuration	COM trace DIME
	Software version and serial number         Serial number sNsn         Interface software version sNsv         Module software version sNsv         4.1         FLS-C         Device ID:         0         Communication parameters         Port:         Settings:         7: 19200 Baud, 7 Data bits, Parity Even	Open COM1 @ 19200-7-even-1           ->           -> dg           -> g0dg+083+47           -> s0sv           -> g0sv+00410522           -> s0sn           <- g0sn+1110326           -> s0uc+0000000+00000000           -> s0uc+2+0           -> s0uc+0+0           <- g0uc+0000000+00000000
	CHECK CONNECTION Read configuration from device DISCONNECT	



#### Select File/Download configuration file to device

Load configuration		
Save configuration as	Configuration	
Set default configuration		Open COM1 & 19200-7-even-1
Load configuration from device	mber	->
Download configuration file to device Exit	11110326	-> dg <- g0dg+083+47 -> s0sv
Interface software	version sNsv 5.22	<- g0sv+00410522
Module software	ersion sNsv 4.1 FLS-C	-> s0sn <- g0sn+11110326 -> s0uc
Device ID:	0 -	<- g0uc+00000000+0000000 -> s0uc+2+0 -> s0uc+0+0
Communication pa	ameters	<- g0uc+0000000+00000000
Port:	COM1 -	
Settings:	7: 19200 Baud, 7 Data bits, Parity Even 💌	
CHEC	CONNECTION Read configuration from	i device
D	SCONNECT	
Status: OK		RESET Clear trace

### Select the file FLS\_C\_10\_SEW\_25072012.cfg. This is the file you downloaded in 2.2.1 Preparation FLS-C on page 7

Compu	ter 🕨 Local Disk (C:) 🕨 Üsers 🕨 admin 🕨	My Documents	▼   * <u>†</u>	Search My L	)ocument.	s	-
Organize 👻 New fol	der				•		?
<ul> <li>★ Favorites</li> <li>➡ Desktop</li> <li>➡ Downloads</li> <li>⊞ Recent Places</li> <li>➡ Libraries</li> <li>➡ Documents</li> <li>➡ Music</li> <li>➡ Pictures</li> <li>➡ Videos</li> <li>♥ Computer</li> <li>♦ Network</li> </ul>	Name	Date modified 7/26/2012 8:56 AM	Type CFG-Datei	Size 1 Ki	В		
File	<u>n</u> ame:		•	Configuratio	n files (*.c	fg)	•



An OK in the status line of the UtilitySW indicates a successful transfer of the configuration. The FLS-C 10 is now ready to be connected to the SEW inverter.

e Tools Info						
Connection	Controlled Mode	Stand-alone Mode	onfiguration		COM trace	DIME
	Serial number Interface softw Module softwa Device ID: Communication Port: Settings:	n and serial number sNsn vare version sNsv ire version sNsv	11110320 5.22 4. 0 COM1 7: 19200 Baue	6 2 1 FLS-C • d, 7 Data bits, Parity Even •	<pre>-&gt; s0v+0000000 &lt;- g0v? -&gt; s01+00000000 &lt;- g01? -&gt; s02+00000000 &lt;- g02? -&gt; s0DI1+0000000 &lt;- g0DI1? -&gt; s0uc+2+0 &lt;- g0uc+0000000 -&gt; s0fi+0+0+0 &lt;- g0fi? -&gt; s0uc+1+0 &lt;- g0ucf? -&gt; s0uga+1+1 &lt;- g0uga? -&gt; s0uga+0</pre>	0+00100000 0+0000000 0+00000000 000 02+00000000
	CH	ECK CONNECTIO	N	Read configuration from device	-> s0SSIe+-1 <- g0SSIe? -> s0SSI+9 <- g0SSI? -> s0s <- g0s? -> s0A+00000000	)
					   <- g0A?	

### 2.2.2 Cable connection FLS-C

The FLS-C sensor must be connected to the DEU21B/XGS of the MOVIDRIVE® B or the MOVIAXIS®. Following different possibilities are documented. Connect the FLS-C sensor with a 15 pin D-sub connector or an internal screw terminal.

#### **Connection of FLS-C (without heating)**



Fig 1: Connection from D-Sub to D-Sub

Fig 2: Connection from D-Sub to screw terminal



#### Connection of the FLS-CH (with heating)

If using a FLS-CH device with integrated heater, an external power supply must be used. Please do the wiring as shown in the following diagram.





Fig 3: Connection from D-Sub to D-Sub

Fig 4: Connection from D-Sub to screw terminal



Install a proper ground connection between the ground of the FLS-C and the MOVIDRIVE  $^{\circ}$  B / MOVIAXIS  $^{\circ}.$ 

### 2.2.3 Error Handling FLS-C

In the configuration for the FLS-C "With error freezing" is selected. Therefore an error (e.g. a position jump) will be detected. The sensor will be in the error state for about 5s before it automatically does a reset.

Connection	Controlled Mode	Stand-alone Mode	Configuration		COM trace	DIMET
Measurement characteristics	C Standard	characteristics sN	de		-> s0ve <- g0ve+000 -> s0v <- g0v+00000000+0	00100000
Filter			က Normal က Fast		-> s01 <- g01+00000000+0 -> s02	0000000
Analog output			C Precise C Natural target		<- g02+000000040 -> s0DI1 <- g0DI1+00000000 -> s0uc	)
Digital output	C Timed (eff	ect in user measu	rements only)		<pre>&lt;- g0uc+00000002+ -&gt; s0fi &lt;- g0fi+00+00+00</pre>	0000000
User output	<ul> <li>Moving tar</li> </ul>	rget Erro	r behavior		-> s0uof <- g0uof+00000000 -> s0uga <- g0uga+00000001	) L+00000001
User offset / gain			C Without error freezing		-> s0uo <- g0uo+00000000 -> s0SSI	
			DOWNLOAD TO DEVIC	E	-> s0SSIe <- g0SSIe-0000000 -> s0uc <- g0uc+00000002	01
-				DEALT		



### 2.3 Error Handling MOVITOOLS® MOTION STUDIO

The MOVIDRIVE® B-inverter registers errors of the FLS-C Distance Sensor. Examine them in the Fault History of the inverter.

To display the error with the MOVITOOLS® MOTION STUDIO, change the settings of the MOVITOOLS® MOTION STUDIO to 'Internal mode'.

Activate this mode under Settings / Authorization level: Password = \*\*\*\*1) -> OK.





The encoder diagnostics via MOVITOOLS® MOTION STUDIO or PLC is only available with MOVIDRIVE® B. MOVIAXIS® does not support this function.

<sup>1)</sup> To get the code, you may ask Dimetix (<u>sales@dimetix.com</u>).

The field 080 Developer code shows the error code. Add  $200_{dec}$  to the displayed value to get the error code corresponding to the FLS-C Distance Sensor reference Manual.

In this example, the fault memory 0 (last fault) is shown in the picture.

080 Fault t-0		Description
Fault code	122	Fault "Absolute encoder option" / SSI encoder X14: Encoder signals
Suberror code	16644	programmable error

The field 080 Developer code is 130. Add 200 to it to get error 330, which corresponds to the Dimetix Error 330 Distance jump.

## 2.4 Error Handling PLC

Read out the error code with the parameter service of the PLC:

Read the index 8883.0 of the MOVIDRIVE® B for remote diagnosis. Add  $200_{dec}$  to get the error code corresponding to the Dimetix error list.



# 3 MOVIDRIVE® B Setup for D-Series and C-Series

GUI: encoder start-up Select distance measurement device Encoderectti

LIICU	del settings		
ľ	Motor encoder (X15)		
		AV1H	DEU 21
	Distance encoder (X14)		
l		AS1H 2 P Edit manually Detect automatically Select Position detection ON	

Select 'FLS-C 10 Dimetix' as your encoder

Encoder selection	P Mounting				
Select the relevant e	ncoder grouping				
SEW encoder	SEW. App	roved encoder	Non-SEW encode	r ?	
FLS-C	: 10	Electrical type	Nochanical type	Population	
TName	Manuacturer	Electrical type	Retation	Resolution	
EQ11329	Heidenhain	EnDat2.1	Rotatory	52IIICI.	-
EQN1125	Heidenhain	EnDat2.1	Rotatory	2048Ipcr	-
EQN1325	Heidenhain	EnDat2.1	Rotatory	512Incr	-
ELS-C 10	Dimetix	SSI	Linear	100um (10.0 I/mm)	
GM 401	IVO	SSI	Rotatory	4096Incr.	
HMG161 S24 H2048	Hübner	SSI	Rotatory	4096Incr.	
Kueb 9081xxxx2003	Kuebler	SSI	Rotatory	4096Incr.	
Kueb 9081xxxx2004	Kuebler	SSI	Rotatory	8192Incr.	
_A41K	TR Electronic	SSI	Linear	10µm (100,0 I/mm)	
_C183	Heidenhain	EnDat2.1	Linear	20µm (50,0 I/mm)	
E100 0,1mm	TR Electronic	SSI	Linear	100µm (10,0 I/mm)	
LE100 1mm	TR Electronic	SSI	Linear	1000µm (1,0 I/mm)	
_E200 0,1mm	TR Electronic	SSI	Linear	100µm (10,0 I/mm)	
LE200 CAN 0,1mm	TR Electronic	CANopen	Linear	100µm (10,0 I/mm)	
LE200 CAN 1mm	TR Electronic	CANopen	Linear	1000µm (1,0 I/mm)	
TR44.VO	-I	601		10F (0 0 T/)	



Select the 'Mounting' tab, enter the traveling distance per motor revolution in µm (adjustment to the mechanic)

Encoder selection	lounting	
Encoder mounting		
<b></b>	Counting direction of the encoder in sense of rotation of motor	
Ratio encoder / motor		
	Travel distance on encoder per motor revolution           Operation w           409600         µm	vithout motor encoder gear ratio

### Start-up the motor-encoder

### Switch on the position detection

Enc	oder settings		
ľ	Motor encoder (X15)		
		AV1H	DEU 21
L	Distance encoder (X14)		
l		FLS-C 10 <sup>TH</sup> Position of Position of Posit	letection



# 4 MOVIAXIS® Setup for D-Series and C-Series

In GUI: drag XGS Card on slot 3 and drop it to distance encoder 1

ncoder	Option cards	(
	3	Encoder care Slot 3
Motor encoder	Distance encoder 1	Distance encoder 2
1. Parameter set		
AV1H		
Position		
detection		
2. Parameter set		
		a a a a a a a a a a a a a a a a a a a
3. Parameter set		
3. Parameter set		
3. Parameter set		

#### Edit the encoder

are configuration		
Encoder pool	Option cards	Encoder card Slot 3
Motor encoder 1. Parameter set	Distance encoder 1	Distance encoder 2
AV1H Bedit Position detection	AK1H Bedit Position detection 3	
2. Parameter set		
3. Parameter set		



Select 'FLS-C 10 Dimetix' as your encoder

Select the relevant enco	der grouping				
SEW encoder	SEW App	roved encoder	Non-SEW encode	er ?	
Select the encoder from	the SEW database				
FLS-C 1	0				
Name	Manufacturer	Electrical type	Mechanical type	Resolution	
EH1R EH1T ESxR ESxT	SEW	TTL	Rotatory	1024Incr.	
EH1S ES1S ES2S EV1S	SEW	SIN/COS	Rotatory	1024Incr.	
EQI1329	Heidenhain	EnDat2.1	Rotatory	32Incr.	
EQN1125	Heidenhain	EnDat2.1	Rotatory	512Incr.	
EQN1325	Heidenhain	EnDat2.1	Rotatory	2048Incr.	
EQN425	Heidenhain	EnDat2.1	Rotatory	512Incr.	
ES1H ES2H EV1H	SEW	Hiperface	Rotatory	1024Incr.	
FLS-C 10	Dimetix	SSI	Linear	100µm (10,0 I/mm)	
GM 401	IVO	SSI	Rotatory	4096Incr.	
HMG161 S24 H2048	Hübner	SSI	Rotatory	4096Incr.	
Kueb 9081xxxx2003	Kuebler	SSI	Rotatory	4096Incr.	
Kueb 9081xxxx2004	Kuebler	SSI	Rotatory	8192Incr.	
LA41K	TR Electronic	SSI	Linear	10µm (100,0 I/mm)	
LC183	Heidenhain	EnDat2.1	Linear	20µm (50,0 I/mm)	
LE100 0,1mm	TR Electronic	SSI	Linear	100µm (10,0 I/mm)	
_E100 1mm	TR Electronic	SSI	Linear	1000µm (1,0 I/mm)	
F200 0 1	TD []	CCT	· :	100 (10 0 T/)	

Select the 'Mounting' tab, enter the traveling distance per motor revolution in µm (adjustment to the mechanic)



Switch the position measurement system to external.

ire configuration		
Encoder pool	Option cards	Encoder card Slot 3
Motor encoder 1. Parameter set	Distance encoder 1	Distance encoder 2
AV1H B Edit Position detection	FLS-C 10 <b><i>B</i> Edit</b> <b>P</b> osition detection <b>3</b>	
2. Parameter cot		
		3
3. Parameter set		

Start-up the motor encoder.