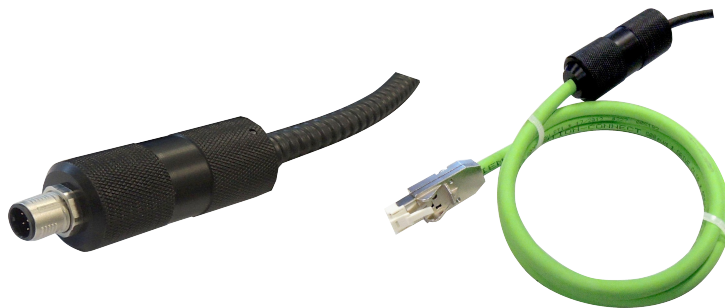


**Immediate  
Absolutely  
Real  
Position  
DRIVE-CLiQ interface**



**The EC-PA-DQ adaptor connects Fagor linear and angular absolute encoders with Feedat Fast protocol to Siemens systems through DRIVE-CLiQ digital interface.**

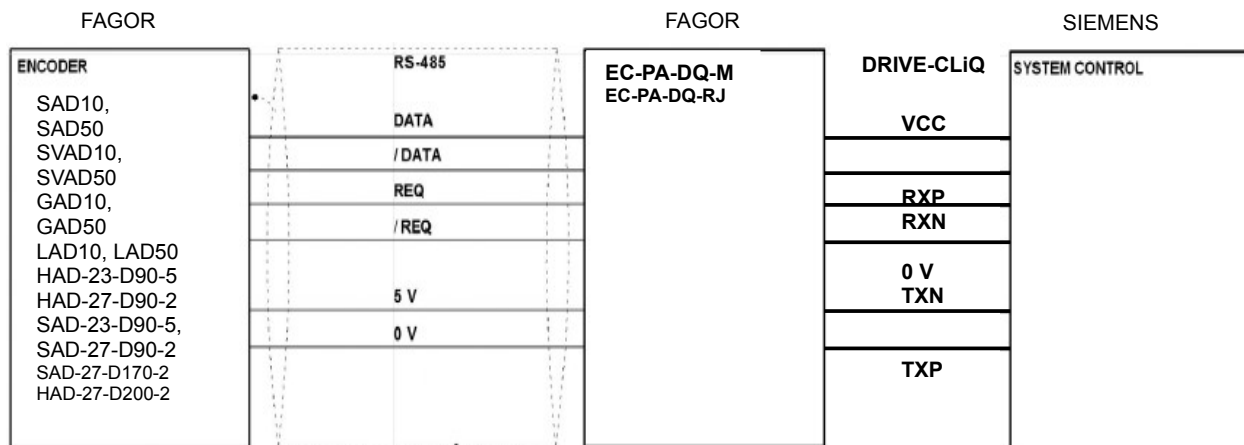
The EC-PA-DQ adaptor input connects to Fagor encoders with **Feedat Fast** protocol and the output connects to Siemens systems through DRIVE-CLiQ interface. The standalone (external) cable adaptor provides a universal solution for both, linear and angular encoders.

- One unique solution for linear and angular encoders
- Complete offer: Linear encoders series S, SV, G and L; angular encoders
- Easy installation
- Up to 10 nanometer resolution or 27 bit angular
- Higher velocity up to 180 m/min
- Up to 50 meters measuring length
- IP 67 and slim dimensions ensures installation anywhere in the machine

The logo for DRIVE-CLiQ, consisting of the text "DRIVE-CLiQ" in a white, bold, sans-serif font on a blue rectangular background.

## DRIVE-CLiQ adaptor connection

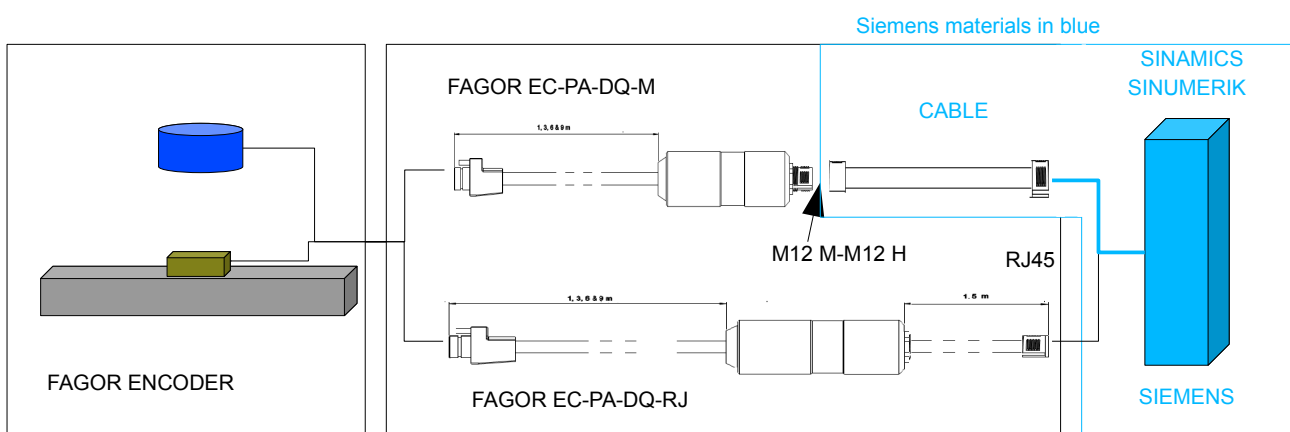
The input of the DRIVE-CLiQ adaptor EC-PA-DQ is connected to the linear and angular encoders with FeeDat Fast protocol (10 MHz communication speed). For connecting Fagor encoders with Siemens systems through DRIVE-CLiQ 1 encoder (linear or angular) and 1 adaptor EC-PA-DQ are needed.




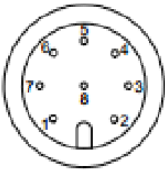
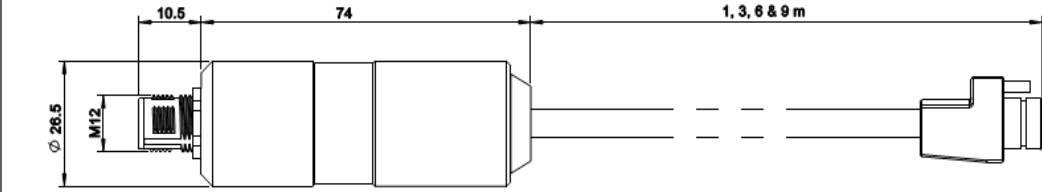
Fagor offers two terminating connectors for the EC-PA-DQ adaptor:

- i) M12 male 8 pin connector
- ii) RJ 45 connector


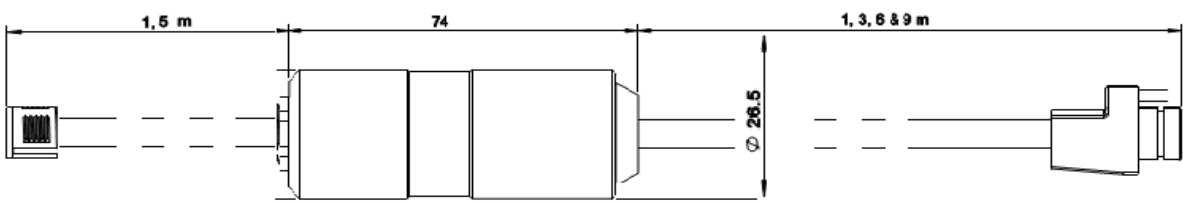
Next figure depicts the elements needed to connect the encoders to Siemens systems



MODEL EC-PA-DQ-M: needs Siemens extension cable for connecting to Sinamics/Sinumerik systems from M12 female (8 pins) to terminating RJ45  
 MODEL EC-PA-DQ-RJ: it is not needed a Siemens cable for direct connection to Sinamics/Sinumerik systems because the adaptor terminates in a RJ45 connector.

<b>EC-PA-DQ-M DRIVE-CLiQ Adaptor</b>											
<ul style="list-style-type: none"> <li>• DRIVE-CLiQ protocol communication</li> <li>• Alternative solution for connecting to Siemens systems</li> <li>• For connecting linear and angular encoders with FeeDat Fast protocol to Siemens systems</li> <li>• Resolution 10 and 50 nanometers for linear encoders; 23 and 27 bit for angular encoders</li> <li>• High IP against contamination, can be installed in the cabinet or externally</li> <li>• Connection to PC via USB port for software upload (PD-U-ENC adaptor necessary)</li> </ul>											
<b>Characteristics</b>											
System resolution						Linear: 10 and 50 nanometer Angular: 23 and 27 bits					
Operating temperature						0°C to 60°C					
Storage temperature						-30°C to 70°C					
Maximum vibration (55 - 2000Hz)						10g (IEC 60068-2-6)					
Impact (11 ms)						20g (IEC-60068-2-27)					
IP rating						67					
<b>Dimensions</b>											
											
<b>PIN / SIGNAL</b>											
1	VCC (24 VDC)	3	RXP	4	RXN	5	GND (0V)	6	TXN	7	TXP
<b>General Specification</b>											
Input						Output					
Interface			FeeDat Fast			Interface			DRIVE-CLiQ		
Communication speed			10 MHz			Communication speed			100 MHz		
Cable length			1, 3, 6 & 9 meters			Connector			M12 male 8 pins		
Cable bending radius			With armour: ≥ 75 mm Without armour: ≥ 40 mm			Power supply			24 V DC		
Power supply			5 VDC ± 0.5 V			Maximum Siemens cable			30 meter		
<b>Order information</b>											
Cable	Input cable length (m)		DRIVE-CLiQ		Output connector		Armour				
EC	1, 3, 6, 9 PA		DQ		M: M12 male 8 pin connector		Blank (yes) or N (no)				
<b>Examples</b>											
Order code		Description									
EC-3PA-DQ-M		DRIVE CLiQ adaptor, 3 meter input cable with armour, M12 male 8 pin outputconnector									
EC-6PA-DQ-M-N		DRIVE-CLiQ adaptor 6 meter input cable without armour, m12 male 8 pin output connector									

Notes: Each field in the order code is separated by a hyphen. For a full list of available models see price list.

EC-PA-DQ-RJ DRIVE-CLiQ Adaptor				
<ul style="list-style-type: none"> <li>DRIVE-CLiQ protocol communication</li> <li>Alternative solution for connecting to Siemens systems</li> <li>Direct connection to Siemens systems without additional extension cable</li> <li>For connecting linear and angular encoders with FeeDat Fast protocol to Siemens systems</li> <li>Resolution 10 and 50 nanometers for linear encoders; 23 and 27 bit for angular encoders</li> <li>High IP against contamination, can be installed in the cabinet or externally</li> <li>Connection to PC via USB port for software upload (PD-U-ENC adapter necessary)</li> </ul>				
Characteristics				
System resolution		Linear: 10 and 50 nanometer Angular: 23 and 27 bits		
Operating temperature		0°C to 60°C		
Storage temperature		-30°C to 70°C		
Maximum vibration (55 - 2000Hz)		10g (IEC 60068-2-6)		
Impact (11 ms)		20g (IEC-60068-2-27)		
IP rating		67		
Dimensions				
				
General Specification				
Input			Output	
Interface	FeeDat Fast		Interface	DRIVE-CLiQ
Communication speed	10 MHz		Communication speed	100 MHz
Cable length	1, 3, 6 & 9 meters		Cable length	1 & 5 meters
Cable bending radius	With armour: ≥ 75 mm Without armour: ≥ 40 mm		Power supply	24 V DC
Power supply	5 VDC ± 0.5 V			
Order information				
Cable	Input cable length (m)	DRIVE-CLiQ	Output cable length (m)	Armour
EC	1, 3, 6, 9 PA	DQ	1, 5 RJ	Blank (yes) or N (no)
Examples				
Order code	Description			
EC-3PA-DQ-1RJ	DRIVE-CLiQ adaptor, 3 meter input cable with armour, 1 meter output cable with terminating connector RJ45			
EC-6PA-DQ-5RJ-N	DRIVE-CLiQ adaptor 6 meter input cable without armour, 5 meter output cable with terminating connector RJ45			

Notes: Each field in the order code is separated by a hyphen. For a full list of available models see price list.

## **Software compatibility and additional information**

The EC-PA-DQ adaptor is compatible with the following software version of the Sinamics/Sinumerik systems from Siemens:

### **SINAMICS S120 and SINUMERIK series:**

SINAMICS S120 - V4.4 HF4 (04.40.23.15) or above for angular and linear encoders without "functional safety".

SINUMERIK 840D sl - V4.4 SP1 HF3 (04.04.01.03.005) or above for angular and linear encoders without "functional safety".

Additional information can be found in the following URL addresses:

- **S120 Commissioning Manual**

[http://support.automation.siemens.com/WW/llisapi.dll/csfetch/68043633/IH1\\_012013\\_eng\\_en-US.pdf?func=cslib.csFetch&nodeid=68043641&forcedownload=true](http://support.automation.siemens.com/WW/llisapi.dll/csfetch/68043633/IH1_012013_eng_en-US.pdf?func=cslib.csFetch&nodeid=68043641&forcedownload=true)

- **MOTION-CONNECT DRIVE-CLiQ cables with M12 connector for direct measuring systems**

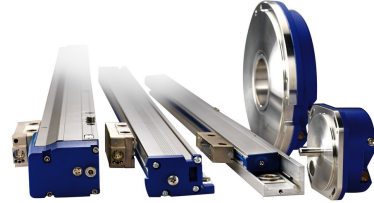
<http://support.automation.siemens.com/WW/view/en/60179485>

- **Encoders certified with DRIVE-CLiQ:**

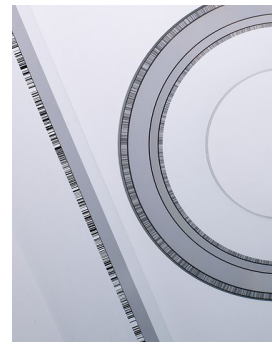
<http://support.automation.siemens.com/WW/view/en/65402168>

## **Fagor FeeDat Fast absolute encoders**

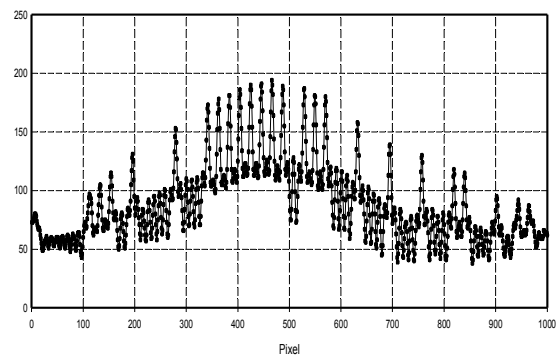
Full range of optical absolute encoders, the widest in the market with 3 solutions: steel tape linear encoders up to 40 meters; glass linear encoders with nanometric resolution; angular encoders up to 27 bit resolution. Communication at 10 MHz.



Pseudo-random absolute code developed and patented by Fagor. The design of the code and the optimised processing algorithm makes Fagor Absolute encoders the leader for long measuring lengths.

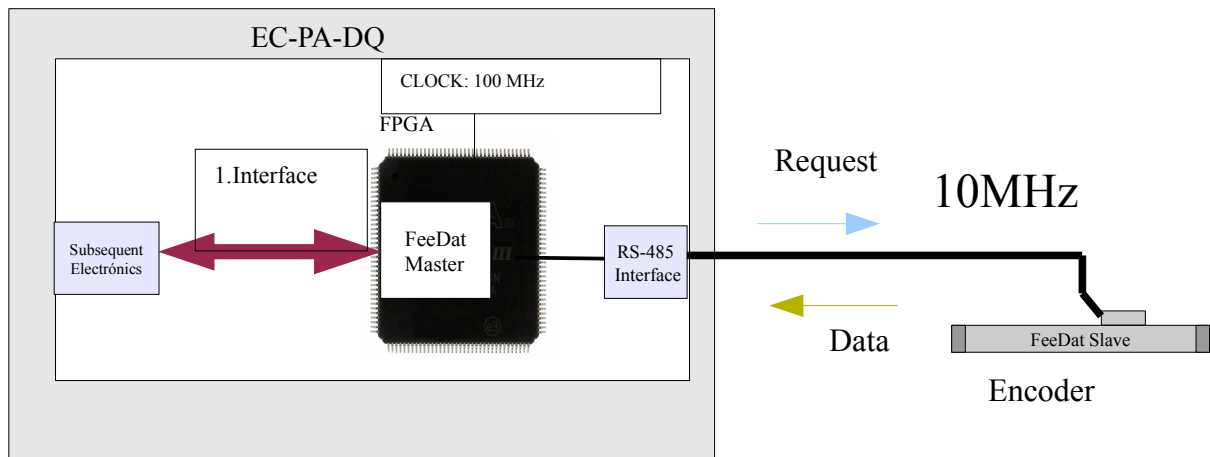


Own developed optical technology was designed taking into account the harsh endurance conditions needed. The technology provides higher contamination tolerance as the system can “distinguish” between the engraved code and the presence of contamination.



## FeeDat Fast protocol interface for DRIVE-CLiQ interface

The FeeDat Fast protocol comprises two modules (slave and master) which communicate via RS 485.

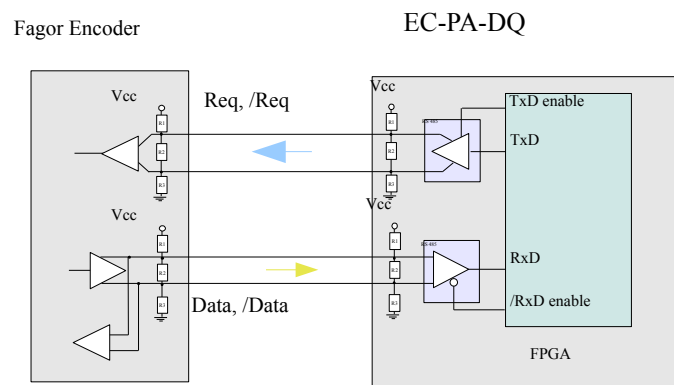



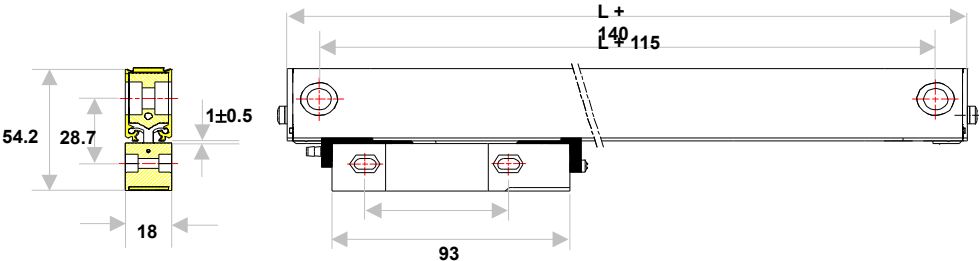
Characteristic	Description
Interface frequency	10 MHz
Loop cycle	10 $\mu$ s
Communication Mode	Full duplex
Clock FPGA	100 MHz

## Communication mode

The modules of the FeeDat Fast protocol communicate via RS 485 at 10 MHz. The communication lines of the FeeDat Fast with the EC-PA-DQ adaptors are full duplex.


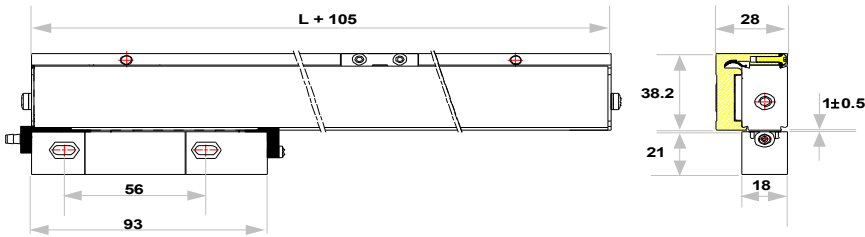
## Full-Duplex



Linear encoder: SAD10/SAD50 (absolute scale)				
<ul style="list-style-type: none"> <li>Accuracy grades of <math>\pm 5</math> and <math>\pm 3 \mu\text{m/m}</math></li> <li>Resolution 10 or 50 nanometers</li> <li>Mounting with 2 x (M8x20) bolts (scale) and 2 x (M4x20) bolts (reader head).</li> <li>FeeDat Fast protocol communication via RS 485</li> <li>Connection to PC via USB port for analysis (PD-U-ENC or PSED adaptor necessary)</li> <li>Incremental three phase scanning for high signal stability.</li> </ul>				
Characteristics				
Accuracy	$\pm 5 \mu\text{m/m}$ or $\pm 3 \mu\text{m/m}$			
System resolution	10 or 50 nanometer			
Signals	Absolute: Protocolo FeeDat Fast via RS 485			
Incremental signal period	20 $\mu\text{m}$			
Measuring standard	Optical scale with one 20 $\mu\text{m}$ incremental track and one pseudo random absolute track.			
Measuring lengths (mm)	70, 120, 170, 220, 270, 320, 370, 420, 470, 520, 570, 620, 670, 720, 770, 820, 870, 920, 1020, 1140 & 1240			
Dimensions				
 <p style="text-align: center;">When L &gt; 620mm centre supports are supplied. For further details see manual.</p>				
General Specification				
Maximum speed	180 m/min	Maximum cable length	100 m	
Maximum vibration	10g (55 - 2000Hz)	Maximum shock	30g (11ms)	
IP rating standard	53	IP rating with air supply	64	
Moving force	< 5 N	Operating temperature	0°C to 50°C	
Weight	0.20 kg + 0.5 kg/metre	Storage temperature	-20°C to 70°C	
Air inlet on end caps	Standard on all models	Air inlet on reader head	Optional (state in order)	
Order information				
Linear encoder	Resolution	Measuring length (mm)	Accuracy	Air inlet in reader head
SAD	10 or 50	70.....1240	5 or 3	Blank (no) or A (yes)
Examples				
Order code	Description			
SAD10-720-5-A	SAD linear encoder, 720mm measuring length, $\pm 5 \mu\text{m/m}$ accuracy, air inlet in reader head. FeeDat Fast protocol with 10 nanometer resolution			
SAD50-1240-3	SAD linear encoder, 1240mm measuring length, $\pm 3 \mu\text{m/m}$ accuracy, no air inlet in reader head. FeeDat Fast protocol with 50 nanometer resolution			

Notes: Each field in the order code is separated by a hyphen. For a full list of available models see price list. Other measuring lengths may be available on request.

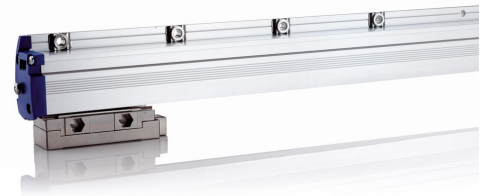


<b>Linear encoder: SVAD10/SVAD50 (absolute scale)</b>				
<ul style="list-style-type: none"> <li>• Accuracy grades of <math>\pm 5</math> and <math>\pm 3</math> <math>\mu\text{m}/\text{m}</math></li> <li>• Resolution 10 or 50 nanometers</li> <li>• Mounting bar with TDMS® for better performance and protection.</li> <li>• FeeDat Fast protocol communication via RS 485</li> <li>• Connection to PC via USB port for analysis (PD-U-ENC or PSED adaptor necessary)</li> <li>• Incremental three phase scanning for high signal stability.</li> </ul>				
<b>Characteristics</b>				
Accuracy	$\pm 5$ $\mu\text{m}/\text{m}$ or $\pm 3$ $\mu\text{m}/\text{m}$			
System resolution	10 or 50 nanometers			
Signals	Absolute: FeeDat Fast protocol via RS 485			
Incremental signal period	20 $\mu\text{m}$			
Measuring standard	Optical scale with one 20 $\mu\text{m}$ incremental track and one pseudo random absolute track.			
Measuring lengths (mm)	70, 120, 170, 220, 270, 320, 370, 420, 470, 520, 570, 620, 670, 720, 770, 820, 870, 920, 1020, 1140, 1240, 1340, 1440, 1540, 1640, 1740, 1840 & 2040			
<b>Dimensions</b>				
				
For further details see manual.				
<b>General Specification</b>				
Maximum speed	180 m/min	Maximum cable length	100 m	
Maximum vibration	20g (55 - 2000Hz)	Maximum shock	30g (11ms)	
IP rating standard	53	IP rating with air supply	64	
Moving force	< 5 N	Operating temperature	0°C to 50°C	
Weight	0.20 kg + 0.5 kg/metre	Storage temperature	-20°C to 70°C	
Air inlet on end caps	Standard on all models	Air inlet on reader head	Optional (state in order)	
<b>Order information</b>				
Linear encoder	Resolution	Measuring length (mm)	Accuracy	Air inlet in reader head
SVAD	10 or 50	70.....2040	5 or 3	Blank (no) or A (yes)
<b>Examples</b>				
Order code	Description			
SVAD10-720-5-A	SVAD linear encoder, 720mm measuring length, $\pm 5$ $\mu\text{m}/\text{m}$ accuracy, air inlet in reader head. FeeDat Fast protocol with 10 nanometer resolution			
SVAD50-1240-3	SVAD linear encoder, 1240mm measuring length, $\pm 3$ $\mu\text{m}/\text{m}$ accuracy, no air inlet in reader head. FeeDat Fast protocol with 50 nanometer resolution			

Notes: Each field in the order code is separated by a hyphen. For a full list of available models see price list. Other measuring lengths may be available on request

### Linear encoder: GAD10/GAD50 (absolute scale)

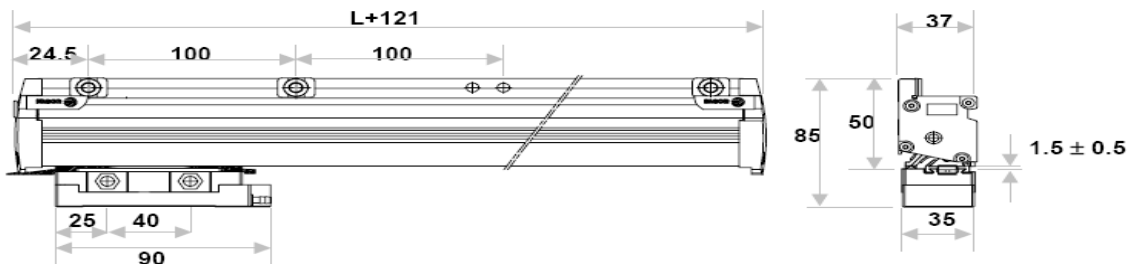
- Accuracy grades of  $\pm 5$  and  $\pm 3\mu\text{m/m}$
- Resolution 10 or 50 nanometers
- Mounting with TDMS® for better performance and thermal predictability.
- FeeDat Fastprotocol communication via RS 485
- Connection to PC via USB port for analysis (PD-U-ENC or PSED adapter necessary)
- Incremental three phase scanning for high signal stability.



### Characteristics

Accuracy	$\pm 5 \mu\text{m/m}$ or $\pm 3 \mu\text{m/m}$
Resolution	10 or 50 nanometers
Signals	Absolute: FeeDat Fast protocol via RS 485
Incremental signal period	20 $\mu\text{m}$
Measuring standard	Optical scale with one 20 $\mu\text{m}$ incremental track and one pseudo random absolute track.
Measuring lengths (mm)	140, 240, 340, 440, 540, 640, 740, 840, 940, 1040, 1140, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 2040, 2240, 2440, 2640, 2840, 3040.

### Dimensions



All dimensions in mm. For further details see manual.

### General Specification

Maximum speed	180 m/min	Maximum cable length	100 m
Maximum vibration	20g (55 - 2000Hz)	Maximum shock	30g (11ms)
IP rating standard	53	IP rating with air supply	64
Moving force	< 5 N	Operating temperature	0°C to 50°C
Weight	0.20 kg + 0.5 kg/metre	Storage temperature	-20°C to 70°C
Air inlet on end caps	Standard on all models	Air inlet on reader head	Optional (state in order)

### Order information

Linear encoder	Resolution	Measuring length (mm)	Accuracy	Air inlet in reader head
GAD	10 or 50	140.....3040	5 or 3	Blank (no) or A (yes)

### Examples

Order code	Description
GAD10-720-5-A	GAD linear encoder, 720mm measuring length, +5mm/m accuracy, air inlet in reader head. FeeDat Fast protocol with 10 nanometer resolution
GAD50-1240-3	GAD linear encoder, 1240mm measuring length, $\pm 3\mu\text{m/m}$ accuracy, no air inlet in reader head. FeeDat Fast protocol with 50 nanometer resolution

Notes: Each field in the order code is separated by a hyphen. For a full list of available models see price list. Other measuring lengths may be available on request.

### Linear encoder: LAD10/LAD50 (absolute scale)

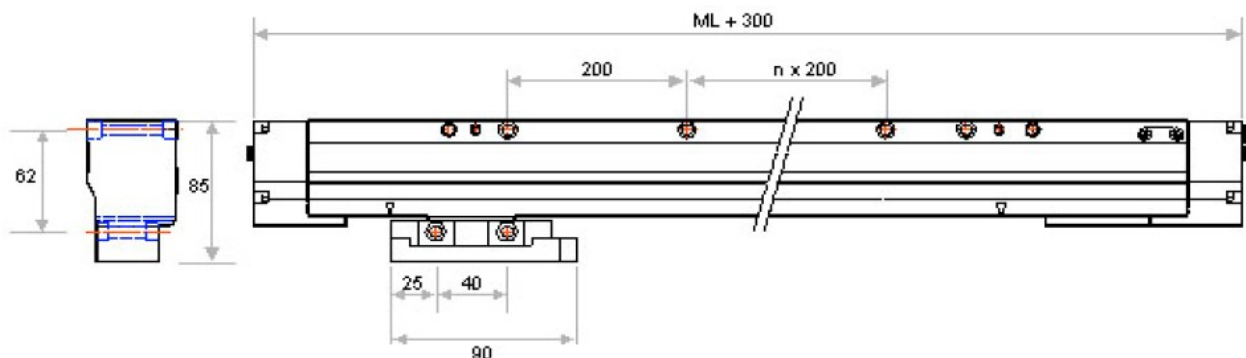
- Accuracy grade of  $\pm 5 \mu\text{m/m}$
- Resolution 10 or 50 nanometres
- FeeDat Fast protocol communication via RS 485
- Connection to PC via USB port for analysis (PD-U-ENC or PSED adapter necessary)
- Incremental three phase scanning for high signal stability.



### Characteristics

Accuracy	$\pm 5 \mu\text{m/m}$
Resolution	10 or 50 nanometers
Signals	Absolute: FeeDat Fast protocol via RS 485
Incremental signal period	40 $\mu\text{m}$
Measuring standard	Steel tape with pseudo random code and incremental track
Measuring lengths (mm)	440 mm to 50 m in 200 mm increments

### Dimensions



All dimensions in mm. For further details see manual.

### General Specification

Maximum speed	180 m/min	Maximum cable length	100 m
Maximum vibration	10g (55 - 2000Hz)	Maximum shock	30g (11ms)
IP rating standard	53	IP rating with air supply	64
Moving force	< 5 N	Operating temperature	0°C to 50°C
Weight	1.5 kg + 4 kg/metre	Storage temperature	-20°C to 70°C
Air inlet on end caps	Standard on all models	Air inlet on reader head	Optional (state in order)

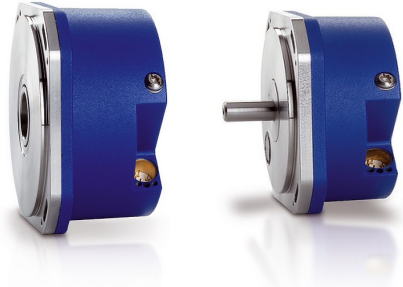
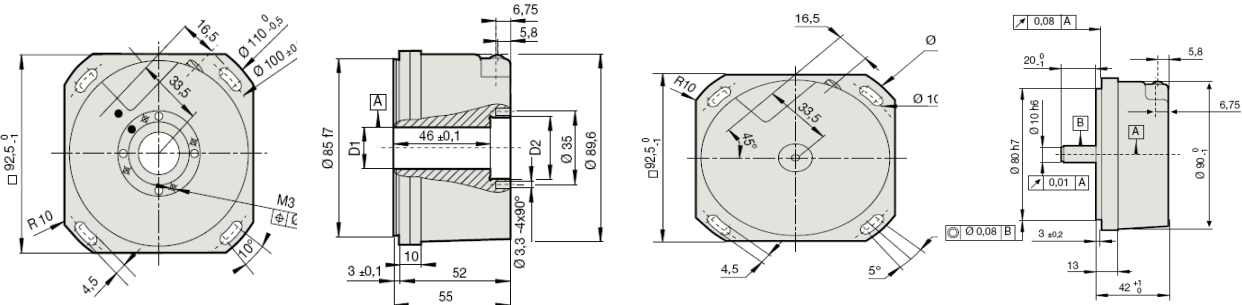
### Order information

Linear encoder	Resolution	Measuring length (mm)	Air inlet in reader head
LAD	10 or 50	4.....500	Blank (no) or A (yes)

### Examples

Order code	Description
LAD10-32-A	LAD linear encoder, 3240mm measuring length, air inlet in reader head. FeeDat Fast protocol with 10 nanometer resolution
LAD50-400	LAD linear encoder, 40.040 mm measuring length, no air inlet in reader head. FeeDat Fast protocol with 50 nanometer resolution

Notes: Each field in the order code is separated by a hyphen. For a full list of available models see price list. Other measuring lengths may be available on request.

<b>Angular encoder: SAD-D90; HAD-D90</b>			
<ul style="list-style-type: none"> <li>• Accuracy up to <math>\pm 2,5</math> arcsecs</li> <li>• Pulses per revolution up to 134 217 728</li> <li>• Solid (S) or Hollow (H) shaft</li> <li>• IP 64 rating (IP 67 with air supply)</li> <li>• FeeDat Fast protocol communication via RS 485</li> <li>• Connection to PC via USB port for analysis (PD-U-ENC or PSED adapter necessary)</li> <li>• High accuracy optical technology</li> </ul>			
<b>Characteristics</b>			
Resolution	23 bit or 27 bit		
Accuracy	$\pm 2.5$ arcsec or $\pm 5$ arcsec		
Signals	Absolute: FeeDat Fast protocol via RS 485		
Measuring standard	Optical scale with one incremental track and one pseudo random absolute track.		
<b>Dimensions</b>			
			
All dimensions in mm. For further details see manual.			
<b>General Specification</b>			
Maximum speed	H model: 3000 rpm S model: 10 000 rpm	Maximum cable length	100 m
Maximum vibration	10g (55 - 2000Hz)	Maximum shock	100g (6 ms)
IP rating standard	64	IP rating with air supply	>64
Moment of inertia	H model: 650 g.cm <sup>2</sup> S model: 240 g.cm <sup>2</sup>	Operating temperature	0°C to 50°C
Air inlet	Standard on all models	Storage temperature	-30°C to 80°C
<b>Order information</b>			
Angular encoder	Resolution	Accuracy	Diameter
HAD; SAD	23 bit or 27 bit	2.5 or 5	90 mm
<b>Examples</b>			
Order code	Description		
HAD-27-D90-2	HAD angular encoder, resolution 27 bit, accuracy $\pm 2,5$ arcsecs, external diameter 90 mm. FeeDat Fast protocol.		
SAD-23-D90	SAD angular encoder, resolution 23 bit, accuracy $\pm 5$ arcsecs, external diameter 90 mm. FeeDat Fast protocol.		

Notes: Each field in the order code is separated by a hyphen. For a full list of available models see price list

### Angular encoder: HAD-D200

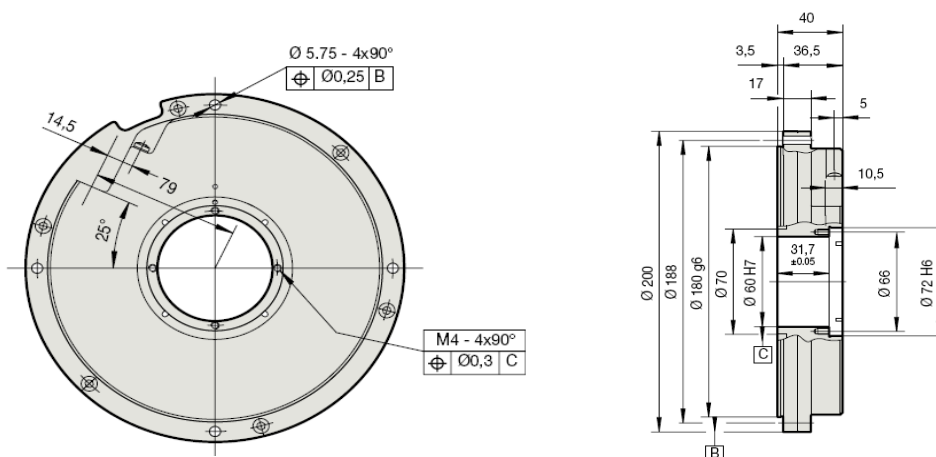
- Accuracy  $\pm 2$  arcsecs
- Pulses per revolution 134 217 728
- IP 64 rating (IP 67 with air supply)
- FeeDat Fast protocol communication via RS 485
- Connection to PC via USB port for analysis (PD-U-ENC or PSED adapter necessary)
- High accuracy optical technology



### Characteristics

Resolution	27 bit
Accuracy	$\pm 2$ arcsec
Signals	Absolute: FeeDat Fast protocol via RS 485
Measuring standard	Optical scale with one incremental track and one pseudo random absolute track.

### Dimensions



All dimensions in mm. For further details see manual.

### General Specification

Maximum speed	1000 rpm	Maximum cable length	100 m
Maximum vibration	10g (55 - 2000Hz)	Maximum shock	100g (6 ms)
IP rating standard	64	IP rating with air supply	>64
Moment of inertia	10 000 g.cm <sup>2</sup>	Operating temperature	0°C to 50°C
Air inlet	Standard on all models	Storage temperature	-30°C to 80°C

### Order information

Angular encoder	Resolution	Accuracy	Diameter
HAD	27 bit	2	200 mm

### Examples

Order code	Description
HAD-27-D200-2	HAD angular encoder, resolution 27 bit, accuracy $\pm 2$ arcsecs, external diameter 200 mm. FeeDat Fast protocol.

Notes: Each field in the order code is separated by a hyphen. For a full list of available models see price list.

**RELATED PRODUCTS****COUPLINGS**

AA 10/10	High precision coupling for coupling 10mm shafts
AP 10	High precision coupling for coupling 10mm shafts
AA 10/14	High precision coupling for coupling 10mm shaft to 14mm shaft
AA 14/14	High precision coupling for coupling 14mm shafts
AP 14	High precision coupling for coupling 14mm shafts



FAGOR AUTOMATION

**Fagor Automation, S. Coop.**  
Bº San Andrés, 19  
E-20500 Arrasate - Mondragón  
SPAIN  
Tél.: +34 943 719 200  
Fax.: +34 943 791 712  
E-mail: info@fagorautomation.es



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