

Index	Designation	Acc.	Type	Meaning										
2010h	Current state of work areas 1–16	ro	U16	GEL 235 only										
2011h	Current state of work areas 17–32			The status of the first 16 activated work area signals can be obtained with this object: Bit 0: work area signal 1/17 Bit 1: work area signal 2/18 : Bit 15: work area signal 16/32										
2015h	Current encoder configuration			GEL 235 only The configuration of the absolute encoder can be queried and modified with this object; see the explanatory notes further below.										
2020h	Fault recorder	ro	U8	The last 20 stored faults can be obtained with this object. The fault storage is reset by writing subindex 0. The faults are not saved power failure-proof. <table border="1" data-bbox="778 936 1369 1480"> <thead> <tr> <th>Sub</th> <th>Content</th> </tr> </thead> <tbody> <tr> <td>00h</td> <td>number of entries = 21 (15h)</td> </tr> <tr> <td>01h</td> <td>number of occurred faults</td> </tr> <tr> <td>02h</td> <td>fault no. 1: 0: no fault message existing 1: supply voltage too low 2: watchdog has triggered 3: internal encoder fault 4: data transmission faulty 5: no data on fieldbus</td> </tr> <tr> <td>03h – 15h</td> <td>faults no. 2 – 20: like no. 1</td> </tr> </tbody> </table>	Sub	Content	00h	number of entries = 21 (15h)	01h	number of occurred faults	02h	fault no. 1: 0: no fault message existing 1: supply voltage too low 2: watchdog has triggered 3: internal encoder fault 4: data transmission faulty 5: no data on fieldbus	03h – 15h	faults no. 2 – 20: like no. 1
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2021h	Warning recorder	ro	U8	No function at the moment										

Index	Designation	Acc.	Type	Meaning								
2025h	Gate time	rw	U16	<p>GEL 235 only</p> <p>This object can be used to set the gate time for the speed and acceleration measurement as a concrete value, and to configure the gate time for the revolution measurement from a table.</p> <table border="1"> <thead> <tr> <th>Sub</th> <th>Content</th> </tr> </thead> <tbody> <tr> <td>00h</td> <td>number of entries = 2</td> </tr> <tr> <td>01h</td> <td>gate time for speed measurement: 1 to 1000 ms, 0 = function inactive</td> </tr> <tr> <td>02h</td> <td> gate time for speed measurement from table: 0: function inactive 1: 1 ms 2: 5 ms 3: 10 ms 4: 50 ms 5: 100 ms 6: 250 ms 7: 500 ms 8: 1000 ms 9: 6000 ms (calculated) </td> </tr> </tbody> </table>	Sub	Content	00h	number of entries = 2	01h	gate time for speed measurement: 1 to 1000 ms, 0 = function inactive	02h	gate time for speed measurement from table: 0: function inactive 1: 1 ms 2: 5 ms 3: 10 ms 4: 50 ms 5: 100 ms 6: 250 ms 7: 500 ms 8: 1000 ms 9: 6000 ms (calculated)
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2030h 2031h 2032h	Function of data outputs 1, 2, 3	rw	U8	GEL 235 only, see explanatory notes further below								
2035h 2036h 2037h	Data outputs 1, 2, 3	ro	U32	<p>GEL 235 only</p> <p>These objects can be used to obtain the current data assigned to the corresponding data output via objects 2030h to 2032h. Reference is taken to the objects in the PDO mapping (objects 1A00h to 1A02h).</p>								

Index	Designation	Acc.	Type	Meaning	
2060h	Business card	ro	STR	GEL 235 only	
				Sub	Content
				00h	number of entries = 6
				01h	Lenord, Bauer & Co. GmbH
				02h	Dohlenstrasse 32
				03h	46145 Oberhausen
				04h	Germany
				05h	sensors@lenord.de
06h	www.lenord.de				
2101h	Measuring parameters	rw	U16	GEL 2352 only	
				Sub	Content
				00h	number of entries = 4 (Data: ro)
				01h	speed unit 1: increments per second 2: increments per minute 3: revolutions per second 4: revolutions per minute
				02h	number of readings for speed average (50 to 500)
				03h	number of readings for acceleration average (50 to 500)
				04h	gate time for speed and acceleration measurement (0 to 1000 ms)
2130h	Speed value 32 bits	ro	S32	GEL 2352 only	
2140h	Acceleration value 32 bits			Sub	Content
				00h	number of entries = 2
				01h	current value
02h	moving average over the number of readings defined via object 2101h				

Current encoder configuration (object 2015h)

Sub	Function/content	Acc.	Type
00h	number of entries = 14 (0Eh)	ro	U8
01h	number of measuring steps per revolution	ro	U32
02h	number of MT revolutions	ro	U32
03h	calculated preset value	ro	U32
04h	current ST operating range	rw	U32
05h	current MT operating range	rw	U32
06h	preset value	rw	U32
07h	zero shift, see explanation further below	rw	S32
08h	count direction of the encoder: cw (0), ccw (1)	rw	U32
09h	MT count overflow (→ object 200Dh)	rw	S32
0Ah	reset preset value (1)	rw	U32
0Bh	enable actual value multiplier function (1), see explanation further below	rw	U32
0Ch	actual value multiplier numerator	rw	U32
0Dh	actual value multiplier denominator	rw	U32
0Eh	validation of actual value multiplier and activation if it is correct (1)	rw	U32

Function of data output 1, 2, 3 (objects 2030h, 2031h, 2032h)**PDO structure**

COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Type 0	Position value 32 bits				—	—	—	—
Type 1	Position value 32 bits				Data output 32 bits			
Type 2	Position value 32 bits				Data output 16 bits		Data output 16 bits	
Type 3	Position value 64 bits							

Function assignment

Sub	Function/content
00h	number of entries = 4
01h	selection of PDO type: 0: type 0 = sole output of the position as a 32-bit value * 1: type 1 = output of the position and one 32-bit data value (default) ** 2: type 2 = output of the position and two 16-bit data values ** 3: type 3 = sole output of the position as a 64-bit value ** * GEL 2035 and GEL 2352 ST: 16 bits ** GEL 235 only

Sub	Function/content
02h	function of the 32-bit data value (bytes 5–8): 0: no output, function inactive 1: absolute position value (hardware reading) 2: relative position value (with multiplier, but without preset and offset) 4: speed value 5: acceleration value 6: rotational speed value 7: MT count overflow 8: work area signals 1–32 9: ST position 10: MT count
03h, 04h	function of the 16-bit data values (bytes 5+6 and 7+8): 0: no output, function inactive 1: absolute position value (hardware reading), low word 2: absolute position value (hardware reading), high word 3: relative position value (with multiplier, but without preset and offset), low word 4: relative position value (with multiplier, but without preset and offset), high word 7: speed value, low word 8: speed value, high word 9: acceleration value, low word 10: acceleration value, high word 11: rotational speed value, low word 12: rotational speed value, high word 13: MT count overflow, low word 14: MT count overflow, high word 15: work area signals 1–16 16: work area signals 17–32 17: ST position 18: MT count

4 SDO communication

The service data objects (SDO) represent the communication channel for the transmission of device parameters (e.g., programming of the encoder resolution). Since these parameters are transferred acyclically (e.g., once only during start-up of the network), the SDOs have a low priority (high COB identifier).

Structure of the SDO telegram

COB-ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
SDO identifier	Data length	Command	Index L	Index H	Subindex	Data 0	Data 1	Data 2	Data 3

The SDO identifier is defined as follows:

Client (control) → Server (absolute encoder): **600h** + node ID

Server (absolute encoder) → Client (control): **580h** + node ID

The data length (DLC) is always 8: 1 command byte + 2 index bytes (object) + 1 sub-index byte + 4 data bytes

The command defines whether data is to be written (download) or read (upload), and how many bytes of payload there are:

Command	Description	Payload	Function
22h	SDO(rx), download request	undefined	Send parameters to the absolute encoder
23h		4 bytes	
2Bh		2 bytes	
2Fh		1 byte	
60h	SDO(tx), download response	—	Confirm acceptance of parameters to the control
40h	SDO(rx), upload request	—	Request parameters from the absolute encoder
42h	SDO(tx), upload response	undefined	Send parameters to the control
43h		4 bytes	
4Bh		2 bytes	
4Fh		1 byte	
80h	SDO(tx), abort domain transfer (because of a fault)	4 bytes	Encoder reports error code to the control

In the case of an error, an error message with the 80h command (SDO abort message) replaces the normal response. The index and subindex belong to the previously specified object. The output error code is contained in the bytes 5 to 8 as follows:

Structure of the error telegram

COB-ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
580h + node ID	8	80h	Index L	Index H	Subindex	ErrByte 0	ErrByte 1	ErrByte 2	ErrByte 3

Possible error messages

ErrByte 3	ErrByte 2	ErrByte 1	ErrByte 0	Error
05h	04h	00h	01h	command byte not supported
06h	01h	00h	00h	illegal access to an object
06h	01h	00h	01h	read access to a write-only object
06h	01h	00h	02h	write access to a read-only object
06h	02h	00h	00h	object not supported
06h	09h	00h	11h	subindex not supported
06h	09h	00h	30h	parameter value beyond the limits
06h	09h	00h	31h	parameter value too large
06h	09h	00h	32h	parameter value too small
08h	00h	00h	00h	general error
08h	00h	00h	20h	false saving signature ("save")
08h	00h	00h	21h	parameters cannot be saved