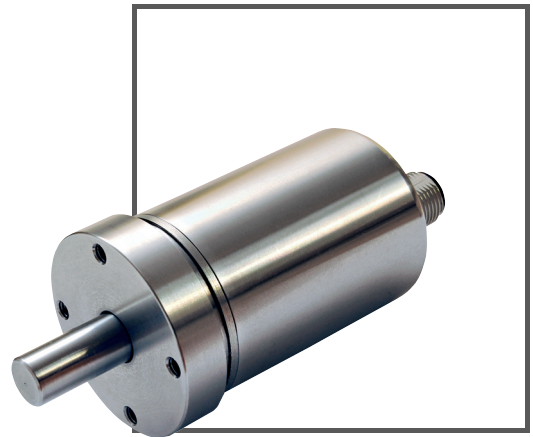


MANUAL

**Encoders with J1939
Interface
Communication Manual**



CE

With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

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1 Introduction

Congratulations

You have chosen a device manufactured by Pepperl+Fuchs. Pepperl+Fuchs develops, produces and distributes electronic sensors and interface modules for the market of automation technology on a worldwide scale.

Before installing this equipment and put into operation, read this manual carefully. This manual contains instructions and notes to help you through the installation and commissioning step by step. This makes sure bring such a trouble-free use of this product. This is for your benefit, since this:

- ensures the safe operation of the device
- helps you to exploit the full functionality of the device
- avoids errors and related malfunctions
- avoids costs by disruptions and any repairs
- increases the effectiveness and efficiency of your plant

Keep this manual at hand for subsequent operations on the device.

After opening the packaging please check the integrity of the device and the number of pieces of supplied.

Symbols used

The following symbols are used in this manual:



Note!

This symbol draws your attention to important information.



Handling instructions

You will find handling instructions beside this symbol

Contact

If you have any questions about the device, its functions, or accessories, please contact us at:

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2 Declaration of conformity

This product was developed and manufactured under observance of the applicable European standards and guidelines.



Note!

A Declaration of Conformity can be requested from the manufacturer.

The product manufacturer, Pepperl+Fuchs GmbH, D-68307 Mannheim, has a certified quality assurance system that conforms to ISO 9001.



3 J1939 Interface description

3.1 J1939 Message format

In comparison to CANopen, which is using the 11 bit identifier (CAN-ID) J1939 is using the 29 bit CAN-ID. The CAN-ID in J1939 consists of a parameter group number (PGN) and a source address.

A parameter group (PG) is assembled of various parameters defined in the J1939 series, such as rotation speed, direction of rotation, etc. Thus, a PGN identifies the content of the data field.

The priority field indicates the priority of the message, where "0" is the highest priority and "7" the lowest. If the value of the field "PDU format" is between 00_{hex} and F0_{hex}, the field "PDU specific" has to be interpreted as destination address. This is used for peer-to-peer communication between two devices. If the value of the field "PDU Format" is greater than F0_{hex}, "PDU specific" is interpreted as a so-called "group extension". The PGNs are sent according to the producer/consumer model (broadcast). The source address has to be unique for every device in the network and may be achieved by participating the address claiming procedure.

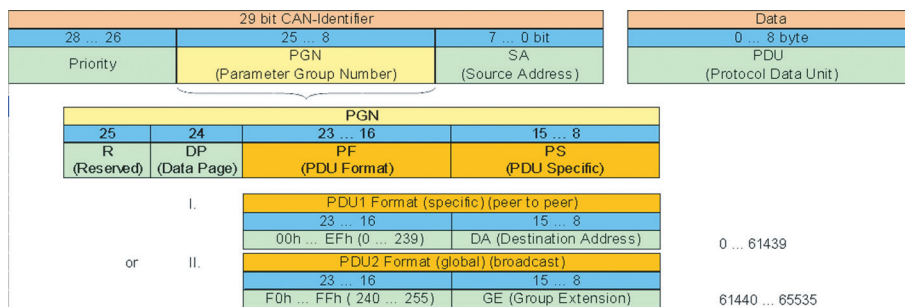
3.2 Interpretation of the CAN Identifier

The CAN identifier of a J1939 message contains Parameter Group Number (PGN), source address, priority, data page bit, extended data page bit and a target address (only for a peer-to-peer PG).

The identifier is composed as follows:

Priority	Extended Data Page	Data Page	PDU Format	PDU Specific	Source Address
3 bit	1 bit	1 bit	8 bit	8 bit	8 bit

The entire telegram contains the identifier and the data section. The following graphic shows the identifier structure more detailed.



3.3 PGN Default Definitions

PGN description	Value
Repetition rate	50 ms
Baudrate	250 kbaud (default)
Node ID	32
Counting direction for increasing position values	clockwise (view onto shaft)
Speed filter	on
Termination resistor	off

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3.4 Position Data, PGN 61184

Parameter	Value
Data page	0
PDU format	255 (0xFF)
PDU specific	170 (0xAA)
Data length	8 bytes

3.5 Encoder Message

Byte	Description
Byte 1	Encoder absolute position – byte 1 (LSB)
Byte 2	Encoder absolute position – byte 2
Byte 3	Encoder absolute position – byte 3
Byte 4	Encoder absolute position – byte 4 (MSB)
Byte 5	Encoder speed - byte 1 (LSB) in rpm.
Byte 6	Encoder speed - byte 2 (MSB) in rpm.
Byte 7	Byte container 1 - const.
Byte 8	Byte container 2 - const.

3.6 Encoder Cyclic Message

Identifier	CAN data	Description
18FFAA20	4E B8 64 0A 0F 02 00 00 (as an example)	bytes 1 ... 4: absolute encoder position 0x0A64B84E = 174,372,942 bytes 5 ... 6: encoder speed 0x020F = 527 rpm bytes 7 ... 8: constant

4 Read and Write Definitions

4.1 Read Definitions

Identifier	CAN data	Description
18EA2000	01 EF 00 00 00 00 00 00	Read request, direction of rotation
18EA2000	01 00 00 00 00 00 00 00	Encoder response Index 01, direction of rotation 0x0000 = cw
18EA2000	02 EF 00 00 00 00 00 00	Read request, singleturn resolution
18EA2000	02 00 10 00 0000 00 00	Encoder response Index 02, singleturn resolution 0x00001000 = 4,096 steps/revolution
18EA2000	03 EF 00 00 00 00 00 00	Read request, total resolution
18EA2000	03 00 00 00 8000 00 00	Encoder response Index 03, total resolution 0x80000000 = 2,147,483,648 steps
18EA2000	05 EF 00 00 00 00 00 00	Read request, cycle time
18EA2000	05 32 00 00 0000 00 00	Encoder response Index 05, PGN 65450 cycle time (position, speed, diagnosis) 0x0032 = cyclic communication 50 ms
18EA2000	07 EF 00 00 00 00 00 00	Read request, baudrate
18EA2000	07 04 00 00 00FF FF FF	Encoder response Index 07, baudrate 0x04 = 250 kbaud
18EA2000	08 EF 00 00 00 00 00 00	Read request, encoder node ID
18EA2000	08 20 00 00 00FF FF FF	Encoder response Index 08, node ID 0x20 = 32
18EA2000	09 EF 00 00 00 00 00 00	Read request, termination resistor
18EA2000	09 00 00 00 00FF FF FF	Encoder response Index 09, termination resistor 0x00 = termination resistor off

4.2 Write Definitions

Identifier	CAN data	Description
00EF2000	01 00 00 00 00 00 00 00	Index 01, direction of rotation 0x0000 = cw
00EF2000	02 00 10 00 00 00 00 00	Index 02, singleturn resolution 0x00001000 = 4,096 steps/revolution
00EF2000	03 00 00 00 20 00 00 00	Index 03, total resolution 0x20000000 = 536,870,912
00EF2000	04 00 00 00 00 00 00 00	Index 04, preset 0x04A8610000FFFFFF = 25,000
00EF2000	05 00 00 00 00 00 00 00	Index 05, PGN 65450 cycle time (position, speed, diagnosis) 0x0000 = cyclic communication stopped
00EF2000	07 03 00 00 00 00 00 00	Index 07, baudrate 0x03 = 125 kbaud
00EF2000	08 20 00 00 00 00 00 00	Index 08, node ID 0x20 = 32
00EF2000	09 00 00 00 00 00 00 00	Index 09, termination resistor 0x00 = off
00EF2000	FA 73 61 76 65 FF FF FF	save parameter and reset
00EF2000	FC 6C 6F 61 64 FF FF FF	restore factory settings and save and reset

5 Parameter Index Definitions

5.1 Parameter Index 01, Counting Direction

Type	Description
data type	unsigned 16
access	r/w
default	0
function	counting direction
values	Bit 0, direction of rotation 0: cw (clockwise) 1: ccw (counter-clockwise)

5.2 Parameter Index 02, Singleturn Resolution

Type	Description
data type	unsigned 32
access	r/w
default	0x00001000 = 4,096 steps/revolution
function	singleturn resolution
values	> 4,096 and must be equal to 2^n

5.3 Parameter Index 03, Total Resolution

Type	Description
data type	unsigned 32
access	r/w
default	0x80000000 = 2,147,483,648 steps
function	total resolution
values	singleturn resolution * number of revolutions (must be equal to 2^n)

5.4 Parameter Index 04, Preset

Type	Description
data type	unsigned 32
access	r/w
default	0
function	allows to set the zero point at the current position
values	value within total resolution

5.5 Parameter Index 05, Cyclic Timer

Type	Description
data type	unsigned 16
access	r/w
default	0x32 = 50 (50 ms)
function	cyclic timer
values	0: stop cyclic data transmission n: transmits data every n milliseconds

5.6 Parameter Index 07, Baudrate

Type	Description
data type	unsigned 16
access	r/w
default	0x04
function	baudrate setting
values	00h: 20 kbit/s 01h: 50 kbit/s 02h: 100 kbit/s 03h: 125 kbit/s 04h: 250 kbit/s 05h: 500 kbit/s 06h: 800 kbit/s 07h: 1000kbit/s

5.7 Parameter Index 08, Node ID

Type	Description
data type	unsigned 8
access	r/w
default	32
function	Node ID setting
values	1 ... 253

5.8 Parameter Index 09, Termination Resistor

Type	Description
data type	unsigned 8
access	r/w
default	0
function	termination resistor activation/de-activation
values	1: on 0: off

5.9 Parameter Index FA, Save

Type	Description
data type	unsigned 32
access	w
default	FA 73 61 76 65 FF FF FF
function	save current settings and reset encoder
values	FA 73 61 76 65 FF FF FF

5.10 Parameter Index FC, Restore

Type	Description
data type	unsigned 32
access	w
default	FC 6C 6F 61 64 FF FF FF
function	restore factory settings, save and reset encoder
values	FC 6C 6F 61 64 FF FF FF

FACTORY AUTOMATION – SENSING YOUR NEEDS



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