

Description Angular encoder according to standard SAE J1939. Customer configuration of operating parameters by Peer-to-Peer. Process data exchange by Broadcast message.

Interface J1939 	CAN specification	ISO 11898, Basic and Full CAN 2.0 B
	Transceiver	24V-compliant, not isolated
	Communication profile	SAE J1939
	Baud rate	250 kBit/s
	Internal termination resistor	120 Ω
	Address	Default 247d, configurable

NAME Fields	Arbitrary address capable	1	Yes
	Industry group	0	Global
	Vehicle system	7Fh (127d)	Non specific
	Vehicle system instance	0	
	Function	FFh (255d)	Non specific
	Function instance	0	
	ECU instance	0	
	Manufacturer	145h (325d)	Manufacturer ID
	Identity number	0nnn	Serial number 21 bit

Parameter Group Numbers (PGN)	Configuration data	PGN EFddh	Proprietary-A (PDU1 peer-to-peer) dd Sensor Node ID
	Process data	PGN FFnnh	Proprietary-B (PDU2 broadcast); nn Group Extension (PS) configurable

Specifications	Excitation voltage	8 ... 36 V DC
	Excitation current	Typ. 15/30 mA for 24/12 V, 100 mA max.
	Resolution	0.05° max.
	Linearity	1° (0.25° as option)
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	±50 x 10 ⁻⁶ / °C f.s.
	Repeatability	1 LSB
	Operating temperature	-40 ... +105 °C
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMC Automation	EN 61326:2004, table A1

Setup

Node-ID

The default Node-ID the sensor will claim on power up is user or factory configurable. The user can configure by "Commanded Address" service according to the J1939 standard or by Peer-to-Peer message as described below.

User configuration

User accessible parameters including node-id may be configured by peer-to-peer proprietary A message PGN 0EF00h. The parameters are accessed by byte-index and read/write operations coded in the data frame. The slave will return the data frame including the acknowledge code. Parameter values will be effective immediately. On execution of "Store Parameters" the configuration is saved nonvolatile.

Peer-to-peer message (PGN 0x00EF00), send/receive format

PGN		8 Byte data frame							
PGN _{HIGH}	PGN _{LOW} (Node-ID)	Index	Rd/Wr	0	Ack	4-Byte Data			

Request: Control Unit → Sensor

→	0EFh	dd	i	0/1	0	0	LSB	MSB
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Response: Control Unit ← Sensor

←	0EFh	cc	i	0/1	0	a	LSB	MSB
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- a: Acknowledge codes:
 0: Acknowledge, 81: Read only parameter, 82: Range overflow,
 83: Range underflow, 84: Parameter does not exist
- dd: Sensor Node-ID (Default 0F7h, 247d)
- cc: Control-Unit Node-ID



Warning notice

- Changing the parameters can cause a sudden step of the instantaneous value and can result in unexpected machine (re)actions!
- Precautions to prevent danger for man or machine are necessary!
- Execute parametrizing at standstill of the machine only!

Configuration examples

Example: Set Transmit Cycle to 10ms, Index 31, Node-ID 247d (F7h)

	PGN _{HIGH}	PGN _{LOW}	8 Byte data frame							
→	0EFh	F7h	1Fh	01h	00	00	0Ah	00	00	00
←	0EFh	cc	1Fh	01h	00	00	0Ah	00	00	00

Example: Read Transmit Cycle value, Index 31

→	0EFh	F7h	1Fh	00	00	00	00	00	00	00
←	0EFh	cc	1Fh	00	00	00	0Ah	00	00	00

Example: Store Parameters permanently, Index 28

→	0EFh	F7h	1Ch	01h	00	00	65h	76h	61h	73h
←	0EFh	cc	1Ch	01h	00	00	65h	76h	61h	73h

Example: Reload factory defaults, Index 29

→	0EFh	F7h	1Dh	01h	00	00	64h	61h	6Fh	6Ch
←	0EFh	cc	1Dh	01h	00	00	64h	61h	6Fh	6Ch

Encoder - Parameters

Configuration No. PRDS-CANJ1939-CFG0010 (= default configuration)

Parameter	Index [dec]	Default	Range / Selection	Unit	Read / Write
Control					
Node ID	20	247	128 ... 247		rd/wr ¹⁾
Baude rate	21	3 (250kB)	-		rd ¹⁾
Termination resistor	22	0	-		rd ¹⁾
Store parameters	28	-	"save" ²⁾		wr
Reload factory defaults	29	-	"load" ²⁾		wr
Communication					
Transmit mode	30	0	0 timer 1 request 2 event		rd/wr
Transmit cycle	31	100	10..65535	ms	rd/wr
PGN Group Extension	32	0	0..255		rd/wr
Event mode hysteresis	38	0	0..16383	steps	rd/wr
Process data byte order	39	0	0 little / 1 big endian		rd/wr
Measurement					
Code sequence	70	0	0 CW 1 CCW		rd/wr
Measuring steps per turn	73	2 ¹⁴	1.. 2 ¹⁴	steps	rd/wr
Preset	74	0	0.. 2 ¹⁴ - 1	steps	rd/wr
Averaging filter	77	1	1...255		rd/wr
Identification					
SW Version	198	-	4 bytes	number	rd
Serial number	199	-	4 bytes	number	rd
Identity number	200	-	21 bit	number	rd

¹⁾ Effective on next power-up

²⁾ „save“ MSB...LSB: 73h, 61h, 76h, 65h
 „load“ MSB...LSB: 6Ch, 6Fh, 61h, 64h

Depending on configuration ordered default settings may be different, refer to ASM homepage.

Process data

Process data are transmitted by broadcast proprietary-B-Message PGN 0x00FFxx where the low byte is configurable.

Data field of process data

B7	B6	B5	B4	B3	B2	B1	B0
Error				Position value			
Byte ^{*)}				MSB			LSB

^{*)} Error codes: 0 = no error, 1 = error

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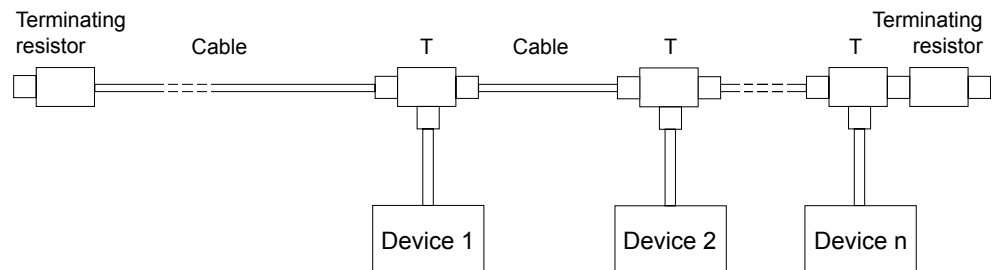
Output CAN-SAE J1939



Signal wiring / connection	Signal name	Connector pin	Wire color	View to sensor connector
	Shield	1	Braid	
	Excitation +	2	White	
	GND	3	Brown	
	CAN-H	4	Blue	
	CAN-L	5	Black	

CAN bus wiring

Connect the device by a T-connector to the CAN trunk line. Total length of stubs should be minimized. Do not use single stub lines longer than 0.5 m. Connect terminating resistors 120 Ohm at both ends of the trunk line.



Accessories

Accessory cable M12, 8 pin	Connector pin / cable color							
	1	2	3	4	5	6	7	8
	White	Brown	Green	Yellow	Grey	Pink	Blue	Red