

# ESX-310S

ESX I/O modules

## KEY FEATURES

- Control specially designed for use in harsh mobile applications
- Suitable for safety related applications up to SIL2 according to IEC 61508:2000 or PLd according to EN ISO 13849-1:2015
- Flexible I/O module for programming via different CAN protocols (CANopen, CANopen safety, opt. ESX CAN efficient safety (ECeS), J1939)

## TECHNICAL DATA

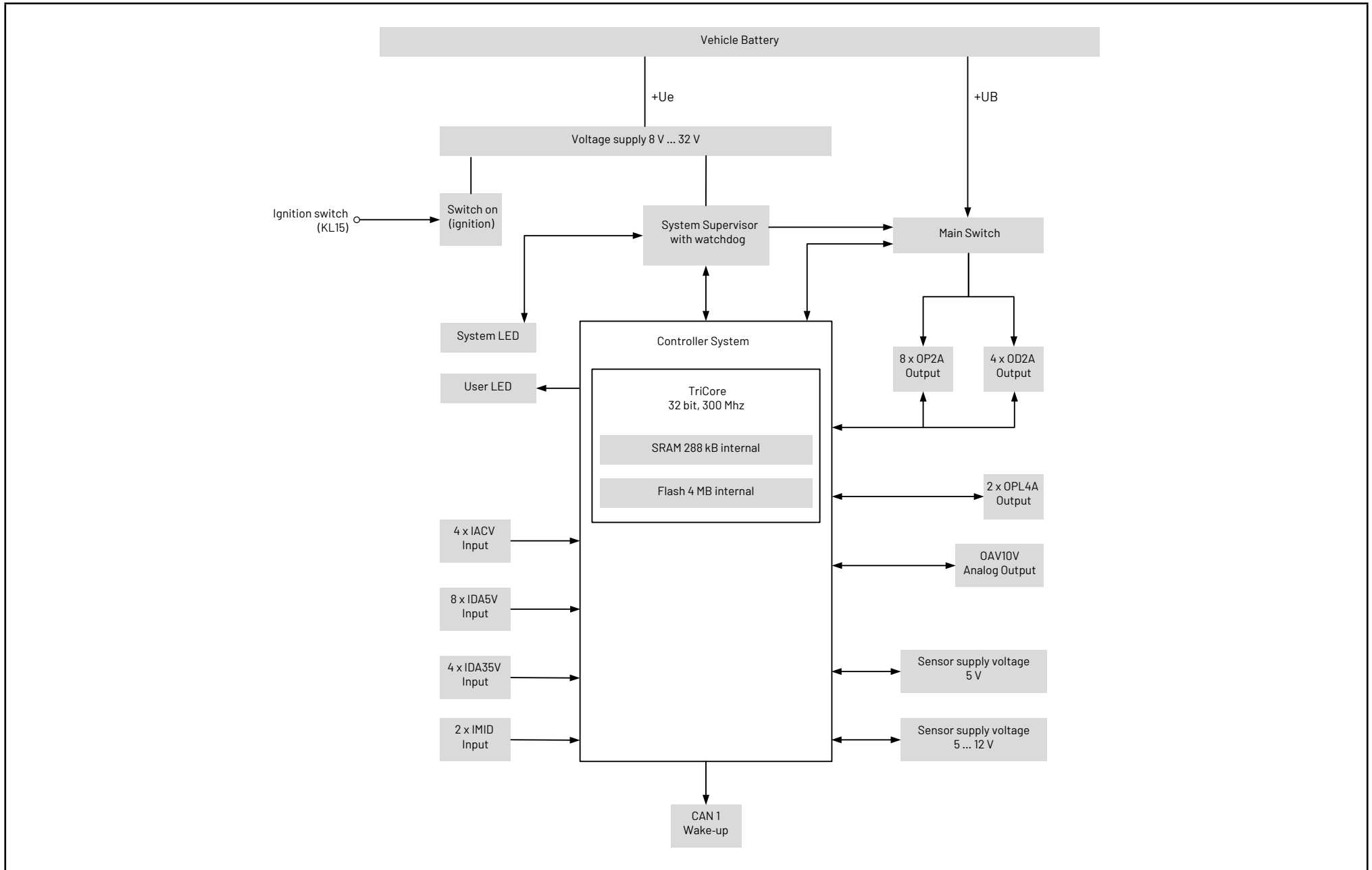
- TriCore TC 1798 32 bit, 300 MHz
- 2 CAN interfaces (CAN 1 with wake up function, CAN 2\*)
- ESX CAN efficient safety (ECeS)
- 16 inputs (SENT support)
- 15 outputs

## ACCESSORIES

- Mating plug

\* Under development, available in future releases

# BLOCK DIAGRAM



# TECHNICAL DATA

## Processor and memory

Type	Properties	Features
TriCore TC 1798	32 bit, Multicore	@ 300 MHz

## Communication Interfaces

Type	Max. Quantity	Configuration
CAN	2	CAN 1: Wake-up functionality CAN 2: CAN 2.0 B, Low-/High-Speed max. 1Mbit/s*

## Inputs

Type	Max. Quantity	Configuration	Measurement	Options / Dependencies
Analog Input IACV	4	Voltage	0 ... 12 V	
		Current	4 ... 20 mA	
		Digital	Voltage	Cutoff frequency: 100 Hz
		Edge Evaluation	Events, rising/falling edges	
Multi Function Input IDA5V	8	Analog Voltage	0 ... 5 V	e.g. PT1000, KTY
		Digital	Low-Active	Programmable pull-up resistor 1kOhm to 5 V
			High-Active	External pull-down resistor required
		Frequency	0.6 Hz ... 20 kHz	
		Edge Evaluation	Events, rising/falling edges	
		SENT Interface		

## Inputs

Type	Max. Quantity	Configuration	Measurement	Options / Dependencies
Multi Function Input IDA35V	4	Analog Voltage	0 ... 35 V	
		NAMUR Sensors		
		Digital	Low-Active	Programmable pull-up (1kOhm to 8.5V) or pull-down resistors
			High-Active	
		Frequency	0.6 Hz ... 20 kHz	A maximum of 8 Inputs can be used for the function "Average Frequency Measurement"
		Edge Evaluation	Events, rising/falling edges	
		Incremental Input	Position or angle change	Pairs of 2 inputs can be connected to a maximum of 2 incremental encoder inputs
Ident Input IMID	2	Identifier Input	8 Conditions	

\* Under development, available in future releases

## TECHNICAL DATA

**Outputs** (All outputs are short circuit protected)

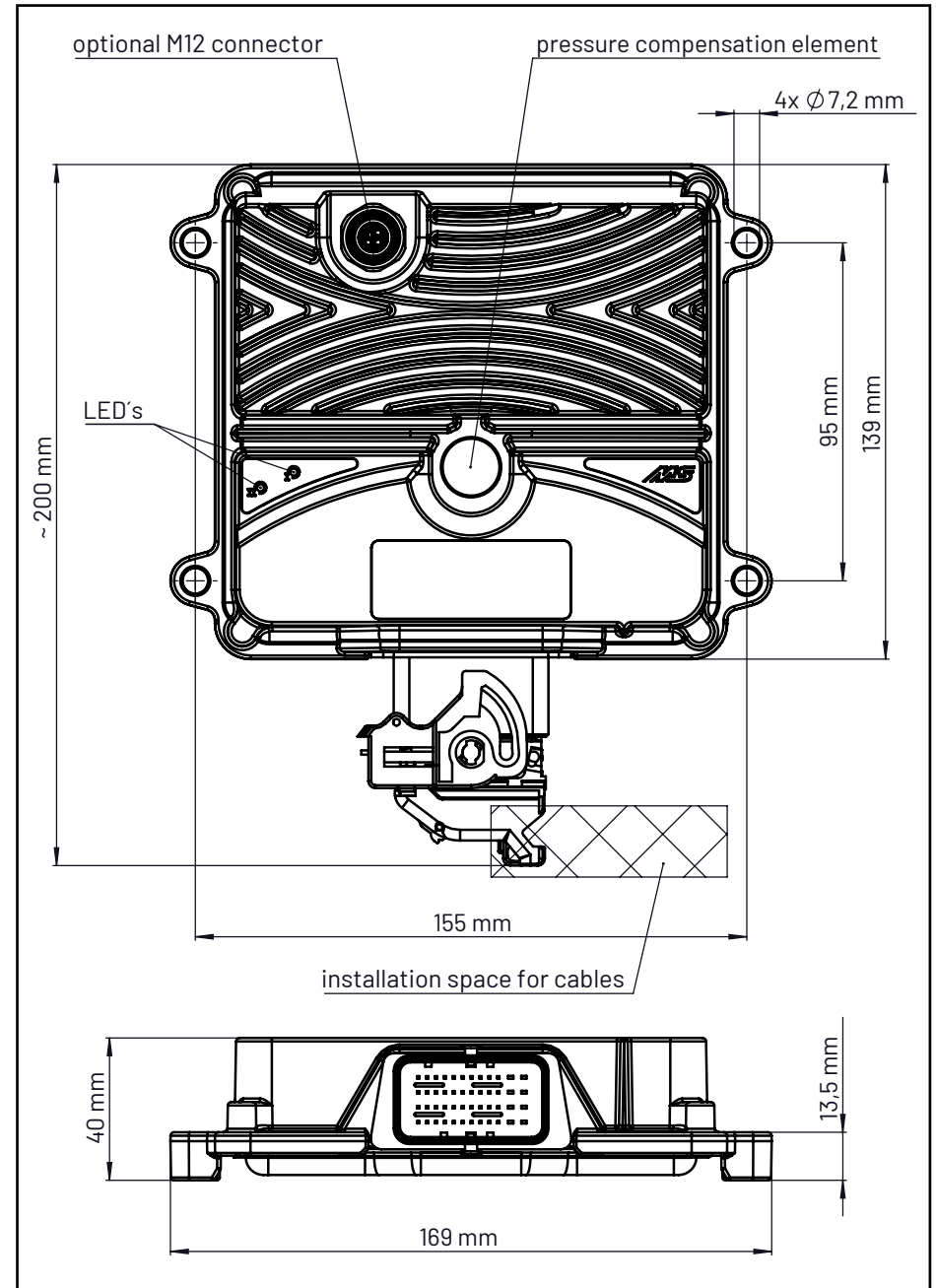
Type	Max. Quantity	Configuration	Range	Property	Features
Digital-/ PWM-Output OP2A	8	Digital  PWM	0 ... 2.5 A  0 ... 100 % max. 1000 Hz	Current On/ Off	High side switch Current control with 2 % accuracy Digital feedback Cut-off at overcurrent (>4.6 A ±20 %) Several outputs in parallel circuit for up to 12 A
Digital-/ PWM-Output OD2A	4	Digital  PWM	0 ... 2.5 A  0 ... 100 % max. 1000 Hz	Current On/ Off	High side switch Voltage measurement with ±3 % accuracy Current detection
Digital-/ PWM-Output OPL4A	2	Digital  PWM	0 ... 4 A  0 ... 100 % max. 1000 Hz	Current On/ Off	Low side switch Current control with 3 % accuracy Voltage measurement with ±3.5 % accuracy Cut-off at overcurrent (> 7.5 A ±20 %)
Analog Output OAV10V	1	Analog	0 ... 10 V	Voltage On/ Off	Load impedance min. 500 Ohm Resolution 10 mV
Sensor Supply UExt	2	Programmable  Fixed Voltage	5 ... 12 V  5 V	up to 250 mA  max. 250 mA	

# TECHNICAL DATA

## System Data

Type	Property	Values
Supply Voltage	Direct Current (DC)	8...32 V
Power Consumption	Without external load	< 400 mA at 12 V supply Voltage < 240 mA at 24 V supply Voltage
	Standby (ignition off)	< 1 mA
	Maximum load current	60 A
Temperature	Chassis Temperature	-40 °C ... +85 °C (-40 °F ... +185 °F) variant without Ethernet connector
		-25 °C ... +85 °C (-13 °F ... +185 °F) variant with Ethernet connector
Connector	XS1	Automotive 48 pins, matching plug: molex 64320-1311 and molex 64320-3311
	ETH1*	4 pins, M12 connector, D-coded*
Indicators	2 LED (dual color)	1x for system status and 1x firmware status
Housing	Die-cast aluminum	GORE-TEX® Membrane for pressure equalization
Dimensions	Standard Variant	169 mm x 139 mm x 40 mm
Weight		about 0.565 kg (1.25 lbs)
Degree of Protection	Variant without M12 connector	IP6k9k
	Variant with M12 Connector	IP6k7

# TECHNICAL DRAWING



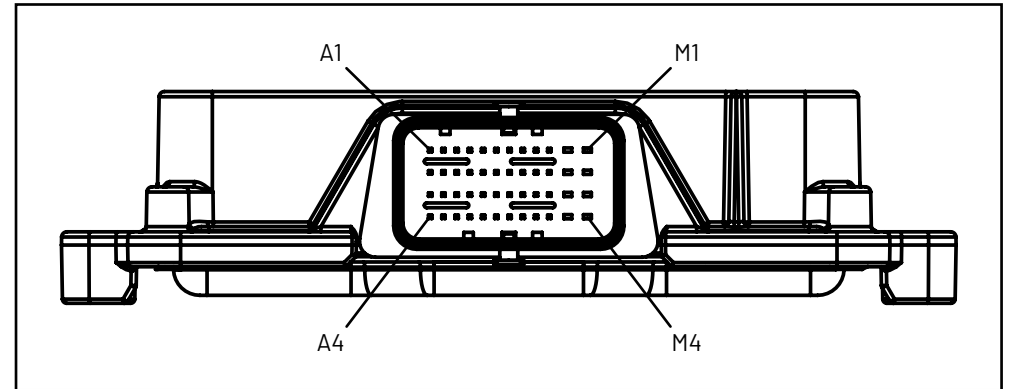
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# PIN ASSIGNMENT

Pin assignment sorted by pin numbers:

Pin	Description
A1	CAN bus 1 (low)
B1	CAN bus 1 (high)
C1	RS232 interface (TxD line) or Opt. LIN 12V power supply
D1	RS232 interface (RxD line) or Opt. LIN Bus
E1	Input digital, pull-up, SENT, frequency analog input voltage 0 ... 5 V
F1	Input digital, pull-up, SENT, frequency analog input voltage 0 ... 5 V
G1	Input digital, pull-up and pull-down, NAMUR, frequency, incremental 1-B analog input voltage 0 ... 35 V
H1	Output high-side digital 2.5 A
J1	Output high-side PWM 2.5A
K1	Output high-side PWM 2.5A
L1	Output analog voltage 10V
M1	Power supply for the outputs of type OP2A and OD2A
A2	CAN bus 2 (low) or Opt. 2nd pin for CAN bus 1 (low)
B2	CAN bus 2 (high) or Opt. 2nd pin for CAN bus 1 (high)
C2	Analog input current 0 ... 25 mA / volt- age 0 ... 12 V, digital functionality with limited bandwidth
D2	Analog input current 0 ... 25 mA / volt- age 0 ... 12 V, digital functionality with limited bandwidth

Pin	Description
E2	Input digital, pull-up, SENT, frequency analog input voltage 0 ... 5 V
F2	Input digital, pull-up, SENT, frequency analog input voltage 0 ... 5 V
G2	Input digital, pull-up and pull-down, NAMUR, frequency, incremental 2-A analog input voltage 0 ... 35 V
H2	Output high-side digital 2.5 A
J2	Output high-side PWM 2.5A
K2	Output high-side PWM 2.5A
L2	Output low-side PWM 4 A
M2	Output low-side PWM 4 A
A3	Identification input
B3	Identification input
C3	Sensor supply voltage 5 V
D3	Programmable sensor supply voltage 5 ... 12 V
E3	Input digital, pull-up, SENT, frequency analog input voltage 0 ... 5 V
F3	Input digital, pull-up, SENT, frequency analog input voltage 0 ... 5 V
G3	Input digital, pull-up and pull-down, NAMUR, frequency, incremental 2-B analog input voltage 0 ... 35 V
H3	Output high-side digital 2.5 A
J3	Output high-side PWM 2.5A
K3	Output high-side PWM 2.5A
L3	Output high-side PWM 2.5A
M3	Output high-side PWM 2.5A



Pin	Description	Pin	Description
A4	Analog ground for IMID2 (pin A3)	K4	Ignition (KL15)
B4	Analog ground for IMID1 (pin B3)	L4	Ground of the ECU
C4	Analog ground for 5Vext and 5-12Vext (pins C3 and D3)	M4	Power supply of the ECU
D4	Analog input current 0 ... 25 mA / volt- age 0 ... 12 V, digital functionality with limited bandwidth		
E4	Analog input current 0 ... 25 mA / volt- age 0 ... 12 V, digital functionality with limited bandwidth		
F4	Input digital, pull-up, SENT, frequency analog input voltage 0 ... 5 V		
G4	Input digital, pull-up, SENT, frequency analog input voltage 0 ... 5 V		
H4	Input digital, pull-up and pull-down, NAMUR, frequency, incremental 1-A analog input voltage 0 ... 35 V		
J4	Output high-side digital 2.5 A		

## QUALIFICATION



The ESX-3IOS is particularly designed to operate under rough environmental conditions like vibration, temperature, etc., as they are common in the industry of off-highway working machinery. The ESX-3IOS complies with all well established standards of the industries. This chapter is not fully available at this state of the ESX-3IOS development.