ES930
Multi-I/O Module

The ES930 Multi-I/O Module is a powerful, flexible I/O all-rounder with an excellent price/performance ratio.

The ES930 Multi-I/O Module is a compact, rugged, versatile and powerful module with several digital and analog input and output channels for signal recording and output. It can be used for rapid prototyping, testing and calibration.

The module also extends the functionality of the ES910 Prototyping and Interface Module, which makes it suitable for controlling and analyzing sensors and actuators directly from within a given function model, including ASCET, Simulink®, and C code models. Interconnecting the Prototyping and Interface Modules ES910/ES920 with the ES930 Multi-I/O Module opens up a broad spectrum of options for systems requiring access to ETK, FETK,

XETK, FlexRay, CAN, and LIN, along with simultaneous access to all current analog and digital I/O-signals.
The ETAS INTECRIO and ETAS ASCET-RP rapid prototyping software and the widely used ETAS INCA calibration tool support all functions of the ES930 Multi-I/O Module.

Altogether, the ES930 Multi-I/O Module features four thermal inputs, eight analog and four digital inputs. On the output side, the module provides four analog and six digital outputs, six half-bridge-switches with current measurement, as well as four sensor power supplies. All channel settings can be configured for each channel. The number of channels can be extended by connecting several ES930 Multi-I/O Modules in an ETAS Ethernet daisy chain configuration. Additional signal types, such as lambda measurements, can be added effortlessly by means of the ETAS

ES4xx/ES63x measurement modules. The Ethernet interface allows a performance connection to the function model which is created on the ES910 Prototyping and Interface Module.

The frequently required half-bridges, e.g., for valve or electric motor applications, are integrated in the module, which dispenses with external signal conditioning. A full-bridge (H-bridge) to control electric motors can be realized with two synchronized half-bridges of the module. To drive brushless direct-current motors (BLDC) it is possible to operate three half-bridges with a three-phase center aligned PWM* signal.
A current sense in the output path of the half-bridge sends the current back to the function model as a direct result of the control variable.

The inputs can be operated either in a predefined, equidistant time raster or in an event triggered mode. In the latter case, a measured value is transmitted only when a specific event has occurred on a digital input. Such an event, e.g., a falling signal edge, triggers the synchronous measurement of all inputs coupled to this event. In the rapid prototyping module, these event-triggered input signals facilitate the synchronization of the model sequencing to external events.

Technical Data

Items	Characteristics	Features
Thermo channels (TH)	Number of channels	4, thermocouples type K
	Measuring range	-200 °C to +1372 °C / 73 °F to 2501 °F
Analog input channels (AI)	Number of channels	8
	Measuring range, resolution	±1 V, ±10 V, ±60 V for differential input voltages, 16 bit
	Anti-aliasing filter (hardware filter)	Low-pass, 2nd order (Bessel), 3 dB limit frequency 10 kHz
	Digital low-pass filter	Digital FIR low-pass 8th order (Butterworth) with adjustable limit frequency, switched
Digital input channels (DI)	Number of channels	4
	Input voltage	0 V to 5 V, TTL-compatible
	Counter width, resolution	32 bit, 15 ns
	Functionality	Active time, inactive time, counter, state; event raster generation
	Glitch filter	120 ns to 3000 ns or "Off", resolution 15 ns
	Timeout	Configurable per channel: 0.1 s to 64.4 s or "Off"
	Events	4 event sources per module can be configured differently
	Event functionality	Triggering a synchronous data acquisition on the ES930 module; triggering the model trigger in the ES910 Prototyping and Interface Module
Analog output channels (AO)	Number of channels	4
	Output voltage, resolution	0 V to +10 V, 14 bit
	Output current	± 4 mA (max.)
Digital output channels (DO)	Number of channels	6
	Output voltage	TTL-compatible
	Counter width, resolution	32 bit, 15 ns
	Function	PWM Out, Pulse Out, Digital Out; simultaneously control of the half-bridges (PS); configurable synchronous channel groups

Technical Data

| Items	Characteristics	Features
Digital output channels (DO)	Pulse width	150 ns to 64.4 s f_{max} = 30 kHz at 95% duty cycle
	Control of half-bridges	2.5 µs to 64.4 s f_{max} = 20 kHz at 95% duty cycle
Power stages/half-bridges (PS)	Number of channels	6, one digital output controls both switches of one half-bridge
	Power supply	Separate: 7 V to 32 V DC
	Switching current	± 5 A rated current (max., per channel) ±7 A short-term voltage peaks (max., per channel) 20 A (max., rated current at power supply plus or minus)
	Frequency	20 kHz (max.)
	Pulse width	2.5 µs to 64.4 s
Current input of the half-bridges	Number of channels	6, current measurement with shunt in output path of half-bridge switch
	Input measuring range	-5 A to 5 A (clipping)
	Anti-aliasing filter (hardware filter)	Low pass 1st order, 3 dB limit frequency 15 kHz
	Digital filter (software)	Configurable per module: Off, CIC filter (sic filter), IIR filter 2nd order (Bessel)
Sensor supply	Number of channels	4, assigned to sensors or input channels
	Output voltage	+5 V to +15 V DC or "Off", configurable per channel, resolution < 10 mV
	Output current	50 mA (max. per channel at 5 V) 30 mA (max. per channel at 15 V, all channels loaded simultaneously)
Host interface	Ethernet interface and protocols	100Base-T, Full-Duplex required, XCP-on-UDP/IP
	IP-Address	Dynamic via INCA or ES93x Configuration Tool
Power supply	Operating voltage	6 V to 32 V DC at „IN" connection"
Environment	Operating temperature range	-40 °F to +158 °F / -40 °C to +70 °C
	Protection class	IP30
Mechanical data	Dimensions (H x W x D)	73 mm x 128 mm x 174 mm / 2.9 in x 5.0 in x 6.8 in
	Weight	approx. 1.1 kg / 2.4 lbs
Supported by ETAS software for configuration, control, or data recording	General	V1.3.0 and higher 9.5.0 and higher
	Measurement and Calibration (MC)	V1.3.0 and higher
	Rapid Protoyping (RP)	INTECRIO V4.0, ASCET-RP V6.1.3 and higher
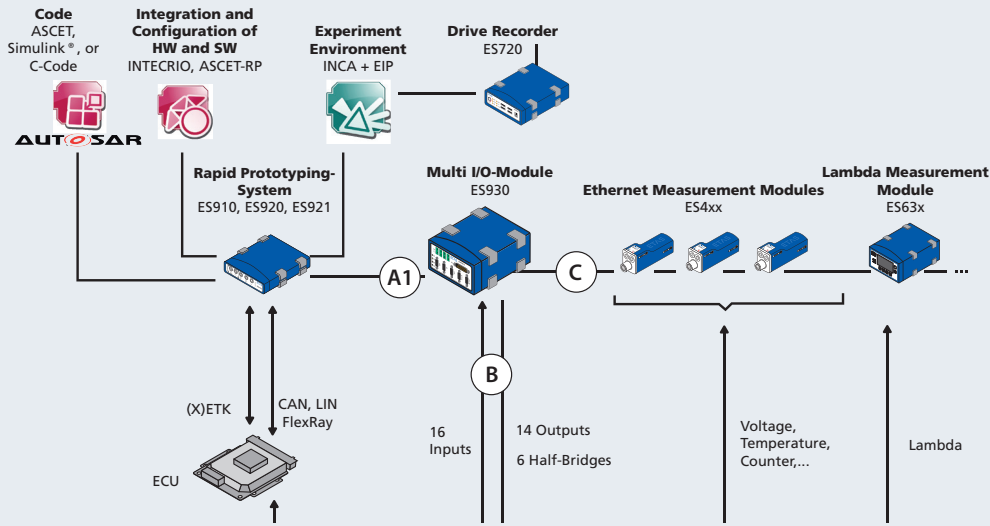
Figure 1: The ES930 Multi-I/O Module in connection with the other ETAS tools for efficient prototyping.
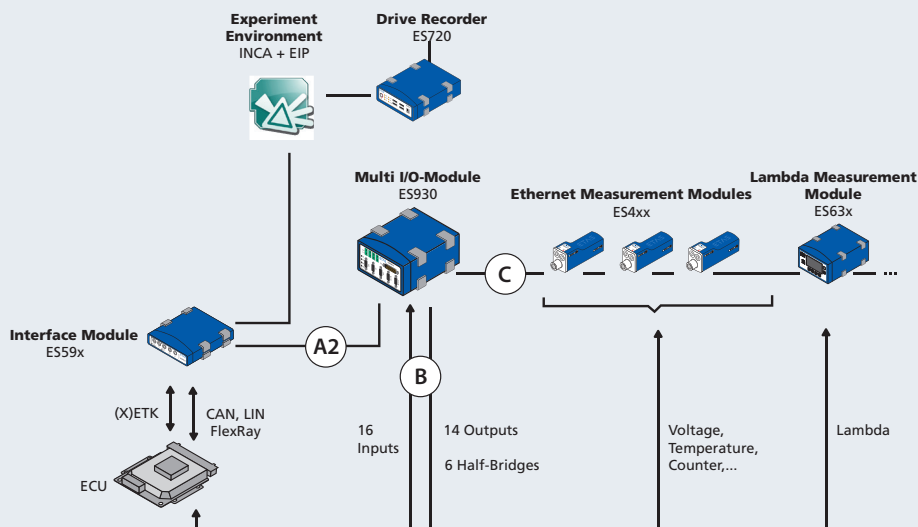

Figure 2: The ES930 Multi-I/O Module works with other ETAS tools for measurement and calibration.

[1] PWM = Puls width modulation

More information is available at www.etas.com/ES930.