

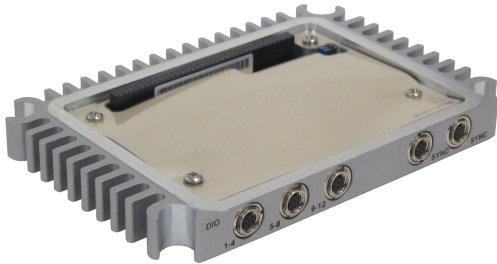
## ELDIO/EXRL-DIO

eDAQ-lite or eDAQXR-lite  
Digital Input/Output Layer

### Special Features

- 8 digital inputs/outputs, 4 wide-range inputs and 6 configurable pulse counters

1-ELDIO-B-2



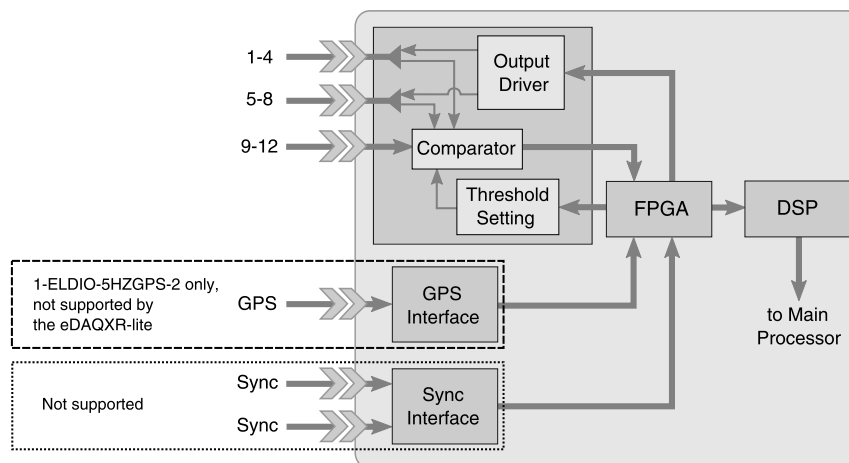
- eDAQ-lite supports an optional GPS communications port designed to work with Somat GPS devices
- eDAQ-lite supports up to two independent vehicle bus module (CAN or J1708) interfaces

1-EXRL-DIO-B-2



- GPS is on the eDAQXR-lite EXRLCPU
- CAN is on the eDAQXR-lite EXRLCPU

### Block diagram



#### NOTE

A double-arrowhead symbol in the diagram represents male and female connectors only, not power polarity or input/output direction.

## Detailed Description

The Digital Input/Output Layer is a versatile layer that supports digital input/output (I/O) and a pulse counter. The layer offers eight channels that can be used as digital inputs and outputs, four channels dedicated to wide-range inputs, six integrated configurable pulse counters. The legacy layer (1-ELDIO-5HZGPS-2) supports an optional GPS channel on the eDAQ-lite. Only the legacy layers (1-ELDIO-5HZGPS-2 and 1-ELDIO-2) support up to two independent vehicle bus modules (VBM). The eDAQ-lite and TCE support the GPS port and two vehicle bus modules (CAN or J1708). These are not supported on the eDAQXR-lite, but are superseded by a GPS port, 2 CAN ports and Ethernet ports with PTP on the eDAQXR-lite CPU.

The digital I/O channels are grouped into three Somat M8 female bulkhead connectors of four digital I/O channels (i.e., bits). The eight channels on connectors |1-4| and |5-8| are individually configurable to be either inputs or outputs. The four channels on connector |9-12| are dedicated wide-range input channels. Each connector also provides two pulse counter channels for a total of six pulse counter channels.

Vehicle bus modules are compatible with the first two connectors (|1-4| and |5-8|) for the eDAQ-lite only.

The pulse counters support pulse time period, pulse on period, pulse rate counting and quadrature decoder. The pulse rate and quadrature decoder functions count range spans four billion counts for signals of frequencies up to 1 MHz. Pulse width period and pulse on period functions use a 5 MHz (200 nanosecond resolution) clock. The layer measures frequency inputs as low as 0.0012 Hz.

The New-design ring (1-EXRL-DIO-B-2) and captive screws provide an improved seal with the eDAQXR-lite CPU. If legacy and New-design layer rings are in an eDAQXR-lite stack, the IP rating for the devices may be impacted. Always install standoffs when using legacy layers (1-ELDIO-B-2 and 1-ELDIO-5HZGPS-2).

## Ordering Options

Order No.	Description
1-ELDIO-B-2	Digital Input/Output Layer - Base Layer Includes: (3) 1-SAC-TRAN-MP-2-2 Transducer Cables and (4) standoffs.
1-ELDIO-5HZGPS-2	Digital Input/Output Layer - 5 Hz GPS Installed Option: GPS Communications Port Includes: (3) 1-SAC-TRAN-MP-2-2 Transducer Cables, (1) 1-EGPS-5HZ-2 GPS Receiver and (4) standoffs.
1-EXRL-DIO-B-2	Digital Input/Output Layer Includes: (3) 1-SAC-TRAN-MP-2-2 Transducer Cables, (4) captive layer screws and (4) standoffs for legacy system compatibility. The New-design ring and captive screws provide an improved seal with the eDAQXR-lite CPU.

## Cables and Accessories (Order Separately)

Order No.	Description	Order No.	Description
1-HDW-0034-00-2	M8 Hex Nut Wrench	1-SAC-EXT-MF-2-2	Extension Cable - Male/Female Connectors - 2 Meters Length
1-SAC-TRAN-MP-2-2	Transducer Cable - Male/Pigtail - 2 Meters Length	1-SAC-EXT-MF-5-2	Extension Cable - Male/Female Connectors - 5 Meters Length
1-SAC-TRAN-MP-10-2	Transducer Cable - Male/Pigtail - 10 Meters Length	1-SAC-EXT-MF-10-2	Extension Cable - Male/Female Connectors - 10 Meters Length
1-EPCM-2	Pulse Conditioning Module Requires: (1) Extension Cable (not included, 1-SAC-EXT-MF-X-2)	1-SAC-EXT-MF-15-2	Extension Cable - Male/Female Connectors - 15 Meters Length
1-EVBM-CAN-2	Vehicle Bus Module - CAN Requires: (1) Extension Cable (not included, 1-SAC-EXT-MF-X-2)	1-EVBM-J1708-2	Vehicle Bus Module - J1708 Requires: (1) Extension Cable (not included, 1-SAC-EXT-MF-X-2)
1-EGPS-5HZ-2	GPS receiver, updates at 5Hz		

## Specifications

Parameter	Unit	Value
Dimensions: width x length x height	mm	176 x 1117.6 x 17.6; new-design 152.25 x 107.5 x 18.6
Weight	kg	0.42; new-design 0.29
Temperature range	°C [°F]	-20 ... +65 [-4 ... +149]
Relative humidity range, non-condensing	%	0 ... 90
Power consumption, no load <sup>(1)</sup>	W	1.55
Digital Inputs		
Steady-state input voltage ( $V_{in}$ ) limits	-	-
minimum (channels 1-8)	V	-0.2
minimum (channels 9-12)	V	-45
maximum (channels 1-8 and 9-12)	V	+45
Transient input voltage ( $V_{in}$ ) limits	-	-
minimum (channels 1-8)	V	-0.4
minimum (channels 9-12)	V	-100
maximum (channels 1-8 and 9-12)	V	+100
Input current	-	-
$V_{in} < 5.5$ V (channels 1-8)	μA	110
$V_{in} < 5.5$ V (channels 9-12)	μA	10
$V_{in} < 5.5$ V (channels 1-8)	mA	$(V_{in}-5.5)/10+0.110$
$V_{in} < 5.5$ V (channels 9-12)	mA	$(V_{in}-5.5)/10+0.010$
Threshold voltage	-	-
upper threshold ( $V_{th,upper}$ ) range (channels 1-8)	V	0.8 ... 4.8
upper threshold ( $V_{th,upper}$ ) range (channels 9-12)	V	0.001 ... 4.8
lower threshold ( $V_{th,lower}$ ) (channels 1-12)	V	$V_{th,upper}-1$
accuracy (channels 1-12)	V	±0.02
Hysteresis voltage	V	1
Pulse Counters		
Pulse rate mode	-	-
maximum input frequency	MHz	1
maximum counts per sample period	counts	$2^{32} = 4.295E^{+09}$ (Bi-direction counting, $2^{32}/2$ )
Quadrature decoder mode	-	-
maximum input frequency	MHz	1
Pulse time period mode	-	-
resolution	nanoseconds	200
accuracy	%	±0.01
minimum input frequency	Hz	0.0012
Pulse on period mode	-	-
resolution	nanoseconds	200
accuracy	%	±0.01
minimum input frequency	Hz	0.0012
Digital Outputs		
Logic 0 provided current sink to ground (at 100 mA)	-	-
maximum	V	1.1
typical	V	0.9

Parameter	Unit	Value
Maximum allowable output current sink (single output) <sup>(2)</sup>	mA	400
Logic 1 voltage output ( $V_{out}$ ) (with no pull-up)	V	5
Maximum allowable output pull-up voltage (channels 1-8)	V	45
Output power <sup>(3)</sup>	-	-
5-V output	A	1
12-V output	A	1
voltage tolerance	%	±10

<sup>(1)</sup> Power consumption measurements include the efficiency of the power supply.

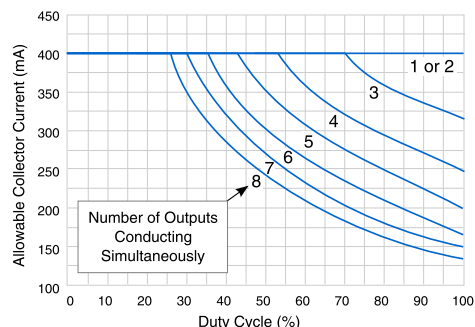
<sup>(2)</sup> For multiple outputs, see Allowable Output Sink Current plot below.

<sup>(3)</sup> On MSDIO.02 (or earlier) board models, the 12 volt option worked correctly only if the input power to the eDAQ was about 14 to 15 volts (or more); otherwise, the DIO output would be something less than 12 volts.

## Standards

Category	Standard	Description
Shock	MIL-STD-810F	Method 516.5, Section 2.2.2 Functional Shock - ground vehicle
Vibration	MIL-STD-202G	Method 204D, Test condition C (10 g swept sine tested from 5 Hz to 2000 Hz)
EMC requirements	EN 61326-1:2006	Before July 2018, CE conformity test per EN 61326-1:2006
-	EN 61326-1:2012	After June 2018, CE conformity test per EN 61326-1:2012

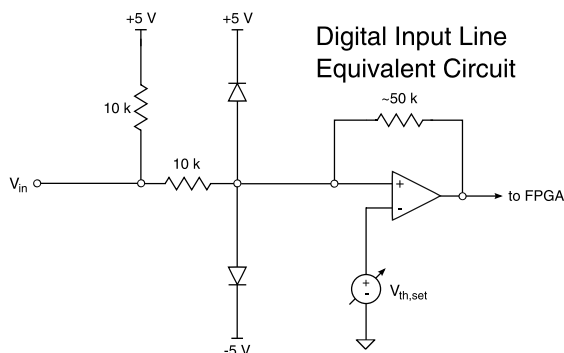
## Allowable Output Sink Current



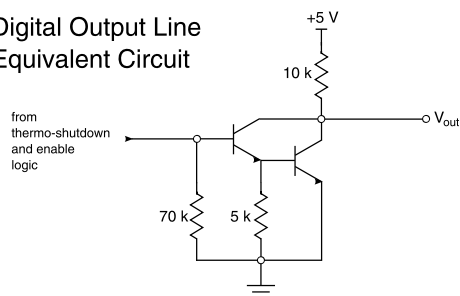
The graph shows the allowable collector current at 50 °C depending on the number of simultaneous outputs. The data applies to the eight output channels on one DIO bank.

## Digital Circuits

The digital input circuitry sets the threshold voltages and determines the input as a logic 1 or 0. The input equivalent circuit is the same for all input channels.



## Digital Output Line Equivalent Circuit



The output circuitry is applicable to the first two connectors (channels 1-8). Note that since the outputs share common I/O lines with the digital inputs, the lines are not allowed a DC voltage level lower than -0.3 volts.

## Connectors



The diagram shows the M8 connectors on an ELDIO or EXRL-DIO layer. The optional GPS connector (only on the 1-ELDIO-5HZGPS-2) is not shown. The Sync ports are not supported. The following table lists the pin assignments for the SAC-TRAN-MP cable when used for DIO inputs (i.e., |1-4|, |5-8| or |9-12|). The I/O pin depends on the bank connector (i.e., |1-4|, |5-8| or |9-12|).

Connector	Pin	Function	Wire color	Quad encoder use
	1	I/O 4, 8 or 12	Brown	Encoder 2, output B
	2	I/O 3, 7 or 11	White	Encoder 2, output A
	3	GND/Shield	Bare wire	Return
	4	I/O 1, 5 or 9	Black	Encoder 1, output A
	5	Power	Red	Power
	6	I/O 2, 6 or 10	Green	Encoder 1, output B



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