



TraNET® EPC

Data Acquisition Instrument

Datasheet



The most complete Data Acquisition solution from Elsys available.
Features high channel density in a robust housing!

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The Elsys Data Acquisition Instrument TraNET EPC with its high channel density and robust housing is designed for high precision measurements in industrial environments. It is a scalable system that may grow to a total number of 64 SE channels in one device. Several devices can be synchronized with the Elsys SynLink box.

TraNET EPC is used to acquire simultaneously many traces to address various measurement tasks in applications such as test and verification of train systems, power conversion systems, automotive and power plant maintenance.

In the Continuous Data Recorder mode, a continuous data stream can be captured and stored to disk over a long time. Even in burst mode applications TraNET EPC is capable to capture thousands of blocks of data without any loss thanks to the unique Event Controlled Recording (ECR) mode.

The powerful application software TranAX not only helps to quickly configure many acquisition channels, but also provides the right post-processing tools to analyse complex waveforms.

General Specification

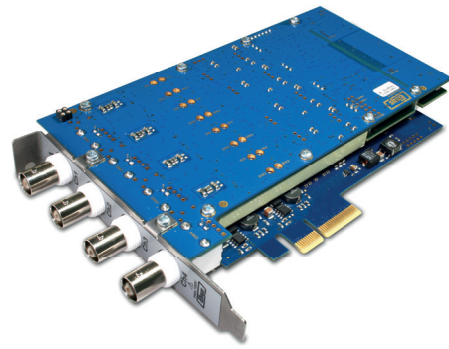
- 19 inch, 4 HE Industrial Rack (6 HE for 64 channel)
- Up to 64 channel Single Ended (TPCE, TPCE-LE or TPCE-I PCIe boards)
- Intel i5 CPU or better
- 250 GB SSD System drive
- 1 TB SSD Data drive (RAID 0)
- 4 bay HD exchange drive (1 free slot)
- Windows 10, 64 Bit Professional
- USB-3, DP, GBIT, VGA, Audio
- Rear or front connectors
- Power Supply: 100 V - 250 V, 50/60 Hz
- Operating Temperature: 0 .. 45 °C
- Storage Temperature: -20 .. 60 °C
- Rel. Humidity: Up to 31°C: < 80%
- 31°C ..45°C: decreasing to < 50%
- Max. Operating Elevation: 2'000m
- Recording Modes: Scope, Multi-Block, Continuous, ECR
- Dual sample rate recording (with ECR only)
- Digital inputs (Markers)
(synchronized with analog signals)
- I/O-Driver with sample programs for C++/C#, VB and LabVIEW
- LabVIEW Instrument Driver
- C++/C#, Python API

Rear View



Data Acquisition Cards

The TraNET EPC can be equipped with different types of PCIe data acquisition cards. It is also possible to mix-up different types of cards and different types of sampling rates. The following table shows a summary of all available boards with its specific characteristics and application fields.



Parameter	TPCE	TPCE-LE	TPCE-I
Interface	PCIe x4	PCIe x1	PCIe x1
Available Sample Rates	2 - 240 MHz	2 - 240 MHz	1 MHz
Resolution	14/16 Bit	14 Bit (16 Bit optional)	16 Bit
# of Channels	4 or 8	4 or 8	4 or 8
Input Ranges	100 mV, 200 mV, 500 mV, 1 V, 2 V, 5 V, 10 V, 20 V, 50 V, 100V	200 mV, 500 mV, 1 V, 2 V, 5 V, 10 V, 20 V, 50 V	200 mV, 400 mV, 1 V, 2 V, 5 V, 10 V, 25 V, 50 V
Input Offset	0 - 100 %	0 - 100 %	fix at 50%
Isolation	-	-	400V RMS (560V Peak)
Differential Mode	yes	yes	no
Differential Variant	yes	yes	no
CMRR	> 74 dB (DC – 1 kHz); > 60 dB (1 kHz – 100 kHz) > 40 dB (100 kHz – 5 MHz)	> 60 dB (DC – 1 kHz); > 54 dB (1 kHz – 100 kHz) > 40 dB (100 kHz – 5 MHz)	-
Memory (4 channel modules)	32 MS/channel (128 MS/channel optional)	32 MS/channel (128 MS/channel optional)	32 MS/channel (128 MS/channel optional)
Application	Fast Streaming, precise differential measurement, large or small input signals.	General application	Isolated application

TPCE Module Specification

Module Type	TPCE-24016-4	TPCE-12016-4	TPCE-8016-4	TPCE-4016-4	
Number of Input Channels SE Module	4 single ended or 2 differential software switchable		4 single ended or 2 differential software switchable		
Number of Input Channels DIF Module	4 single ended or 4 differential software switchable		4 single ended or 4 differential software switchable		
Max. Sample Rate (all channels are sampled simultaneously)	240 MHz	120 MHz	80 MHz	40 MHz	
Amplitude Resolution	16 Bit up to 60 MHz 14 Bit up to 240 MHz	16 Bit up to 60 MHz 14 Bit up to 120 MHz	16 Bit up to 20 MHz 14 Bit up to 80 MHz	16 Bit up to 10 MHz 14 Bit up to 40 MHz	
Memory (per Module)	Standard: 4 x 32 MWords (= 256 MByte) Optional: 4 x 128 MWords (= 1 GByte)				
Input Amplifier					
Measurement Ranges	±50 mV – ±50 V rsp. 0.1 V – 100 V (100 V limited to 70 V) in 1, 2, 5 Steps				
Offset	0 – 100 % in steps of 0.1% (Resolution 0.01 %)				
Input Impedance	1 MΩ (± 0.2 %) or 50 Ω (± 0.5 %) // 26 pF (± 5 %)		1 MΩ (± 0.2 %) // 35 pF (± 5 %)		
Coupling	AC / DC software switchable (AC: -3 dB at < 5 Hz), Inputs invertible				
Bandwidth at Range ≥ 1 V	120 MHz	60 MHz	30 MHz	18 MHz	
Bandwidth at Range < 1 V	80 MHz	50 MHz	8 MHz	7 MHz	
Slew Rate (10 – 90 %) @ Range ≥ 1 V	4 ns	6 ns	13 ns	25 ns	
Slew Rate (10 – 90 %) @ Range < 1 V	6 ns	9 ns	50 ns	60 ns	
Settling Time to 1%	< 200 ns	< 200 ns	< 200ns	< 200 ns	
Low Pass Filter (RC-Filter)	2 Steps (1 MHz and 100 kHz) software switchable				
Antialiasing-Filter (optional)	200 Hz – 5 MHz, min. 4. order Butterworth, software setable				
Common Mode Range	Differential-Mode: ±8 V or +/-80 V at ranges. > 5 V				
Common Mode Rejection	> 74 dB (DC – 1 kHz); > 60 dB (– 100 kHz); > 40 dB (– 5 MHz)				
Range Error (±)	max. 0.1 % typ. 0.07 % (after autocalibration)		max. 0.1 % typ. 0.03 % (after autocalibration)		
Offset Error (±)	max. 0.1 % typ. 0.07 % (after autocalibration)		max. 0.1 % typ. 0.02 % (after autocalibration)		
Offset Drift (±)	max. (0.0100 % + 0.1 mV) per °C, typ. (0.0050 % + 0.03 mV) per °C (will be compensated by autocalibration)				
Input Noise:					
@ max. Sample Rate	< 0.250 mVrms	< 0.200 mVrms	< 0.200 mVrms	< 0.180 mVrms	*2
@ 5 MHz Sample Rate	< 0.120 mVrms	< 0.120 mVrms	< 0.120 mVrms	< 0.110 mVrms	
@ 1 MHz Sample Rate	< 0.070 mVrms	< 0.070 mVrms	< 0.070 mVrms	< 0.060 mVrms	
@ 100 kHz Sample Rate	< 0.040 mVrms	< 0.040 mVrms	< 0.040 mVrms	< 0.040 mVrms	
@ 10 kHz Sample Rate	< 0.025 mVrms	< 0.025 mVrms	< 0.020 mVrms	< 0.015 mVrms	
Signal to Noise Ratio SNR:					
@ max. Sample Rate	59 dB	62 dB	67 dB	70 dB	*3
@ 10 MHz Sample Rate	62 dB	68 dB	70 dB	70 dB	
@ 5 MHz Sample Rate	66 dB	70 dB	72 dB	72 dB	
@ 1 MHz Sample Rate	69 dB	74 dB	76 dB	76 dB	
@ 100 kHz Sample Rate	79 dB	82 dB	84 dB	84 dB	
@ 10 kHz Sample Rate	89 dB	90 dB	92 dB	92 dB	
Channel Isolation (Crosstalk) @ 10 kHz Ranges < 1V	> 80 dB > 60 dB				
Special : Autocalibration	Auto adjustment of gain and offset in all measurement ranges. (Initiated by software)				
Trigger					
Number of Trigger Channels	4 coupled to analog inputs, pos./neg.Edge, with or without hysteresis, Window IN, Window OUT				
Advanced Trigger (Option)	On all analog inputs: Slew Rate, Pulse Width, Pulse Pause or Period (too short or too long = Missing Event), State (above / below), AND link, Product (trigger signal is calculated from 2 channels)				
External Trigger input	1 per System (TTL), pos. or neg. Edge				
Trigger Delay	-100 % (Pretrigger) to +200 % (Posttrigger) in 1 % steps				
Miscellaneous					
Digital Inputs (Marker)	8 (2 per analog channel) (TTL) Optocoupler Connection Box (5 to 48 V) as additional option				
Ext. Control Inputs (TTL))	Trigger, Arm/Disarm, Ext. Sampling (fmax = 10 MHz), external command to start recording				
Status Outputs (TTL)	Trigger Output, Armed (=True during recording)				
ICP® Sensor Supply (Option)	4mA Integrated Current Power for piezo sensors				

Module Type	TPCE-2016-4/8	TPCE-1016-4/8	TPCE-0516-4/8	TPCE-0216-4/8	
Number of Input Channels SE Module	4-Channel Modules: 4 single ended or 2 differential 8-Channel Modules: 8 single ended or 4 differential				
Number of Input Channels DIF Module	4-Channel Modules: 4 single ended or 4 differential 8-Channel Modules: 8 single ended or 8 differential				
Max. Sample Rate (all channels are sampled simultaneously)	20 MHz	10 MHz	5 MHz	2 MHz	
Amplitude Resolution	16 Bit up to 5 MHz 14 Bit up to 20 MHz	16 Bit up to 5 MHz 14 Bit up to 10 MHz	16 Bit up to 5 MHz	16 Bit up to 2 MHz	
Memory 4 Channel Module	Standard: 4 x 32 MWords (= 256 MByte) Optional: 4 x 128 MWords (= 1 GByte)				
Memory 8 Channel Module	Standard: 8 x 16 MWords (= 256 MByte) Optional: 8 x 64 MWords (= 1 GByte)				
Input Amplifier					
Measurement Ranges	±50 mV – ±50 V rsp. 0.1 V – 100 V (100 V limited to 70 V) in 1, 2, 5 Steps				
Offset	0 – 100 % in steps of 0.1% (Resolution 0.01 %)				
Input Impedance	1 MΩ (± 0.2 %) // 35 pF (± 5 %)				
Coupling	AC / DC software switchable (AC: -3 dB at < 5 Hz), Inputs invertible				
Bandwidth at Range ≥ 1 V	10 MHz	5 MHz	2.5 MHz	1 MHz	
Bandwidth at Range < 1 V	6 MHz	4 MHz	2.5 MHz	1 MHz	
Slew Rate (10 – 90 %) @ Range ≥ 1 V	40 ns	70 ns	80 ns	180 ns	
Slew Rate (10 – 90 %) @ Range < 1 V	70 ns	80 ns	80 ns	180 ns	
Settling Time to 1%	< 200ns	< 200 ns	< 300 ns	< 500 ns	
Low Pass Filter (RC-Filter)	2 Steps (1 MHz and 100 kHz) software switchable				
Antialiasing-Filter (optional)	200 Hz – 5 MHz, min. 4. order Butterworth, software setable				
Common Mode Range	Differential-Mode: ±8 V or +/-80 V at ranges. > 5 V				
Common Mode Rejection	> 74 dB (DC – 1 kHz); > 60 dB (– 100 kHz); > 40 dB (– 20 MHz)				
Range Error (±)	max. 0.1 % typ. 0.03 % (after autocalibration)				
Offset Error (±)	max. 0.1 % typ. 0.03 % (after autocalibration)				
Offset Drift (±)	max. (0.0100 % + 0.1 mV) per °C, typ. (0.0050 % + 0.03 mV) per °C (will be compensated by autocalibration)				
Input Noise: @ max. Sample Rate @ 5 MHz Sample Rate @ 1 MHz Sample Rate @ 100 kHz Sample Rate @ 10 kHz Sample Rate	< 0.080 mVrms < 0.060 mVrms < 0.030 mVrms < 0.020 mVrms < 0.010 mVrms	< 0.080 mVrms < 0.060 mVrms < 0.030 mVrms < 0.020 mVrms < 0.010 mVrms	< 0.060 mVrms < 0.060 mVrms < 0.030 mVrms < 0.020 mVrms < 0.010 mVrms	< 0.060 mVrms - < 0.030 mVrms < 0.020 mVrms < 0.010 mVrms	*2
Signal to Noise Ratio SNR: @ max. Sample Rate @ 10 MHz Sample Rate @ 5 MHz Sample Rate @ 1 MHz Sample Rate @ 100 kHz Sample Rate @ 10 kHz Sample Rate	67 dB 70 dB 72 dB 79 dB 84 dB 90 dB	70 dB 70 dB 72 dB 79 dB 84 dB 90 dB	72dB - 72 dB 79 dB 84 dB 90 dB	72 dB - - 79 dB 84 dB 90 dB	*3 *4
Channel Isolation (Crosstalk) @ 10 kHz Ranges < 1V	> 80 dB > 60 dB				
Special : Autocalibration	Auto adjustment of gain and offset in all measurement ranges. (Initiated by software)				
Trigger					
Number of Trigger Channels	4 or 8, coupled to analog inputs, pos./neg.Edge, with or without hysteresis, Window IN, Window OUT				
Advanced Trigger (Option)	On all analog inputs: Slew Rate, Pulse Width, Pulse Pause or Period (too short or too long = Missing Event), State (above / below), AND link, Product (trigger signal is calculated from 2 channels)				
External Trigger input	1 per System (TTL), pos. or neg. Edge				
Trigger Delay	-100 % (Pretrigger) to +200 % (Posttrigger) in 1 % steps				
Miscellaneous					
Digital Inputs (Marker)	8 rsp. 16 (2 per analog channel) (TTL) Optocoupler Connection Box (5 to 48 V) as additional option				
Ext. Control Inputs (TTL))	Trigger, Arm/Disarm, Ext. Sampling (fmax = ¼ of the max sample rate), external command to start recording				
Status Outputs (TTL)	Trigger Output, Armed (=True during recording)				
ICP® Sensor Supply (Option)	4mA Integrated Current Power for piezo sensors				

*2) The input noise depends on the sample rate.

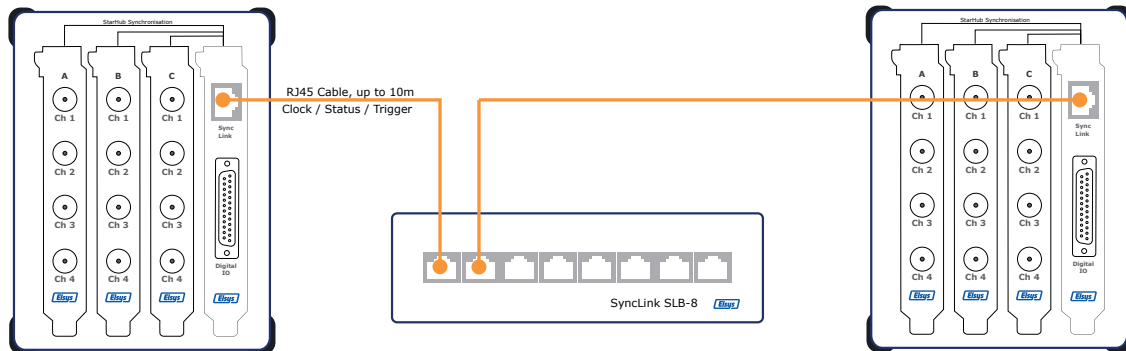
*3) At 14 bit modules the SNR will be reduced by 2 dB

*4) At 8-channel modules the SNR will be reduced by 3 dB

Multi-Device Synchronization

The SyncLink SLB-8 allows to expand the measurement setup up to 8 (optional up to 16) devices. The maximum cable length is limited to 10 meters between the DAQ device and the SyncLink which is sufficient in most indoor and lab applications.

The synchronization precision is 12.5 ns and is much better than normally achieved with other synchronization methods like GPS or PTP.

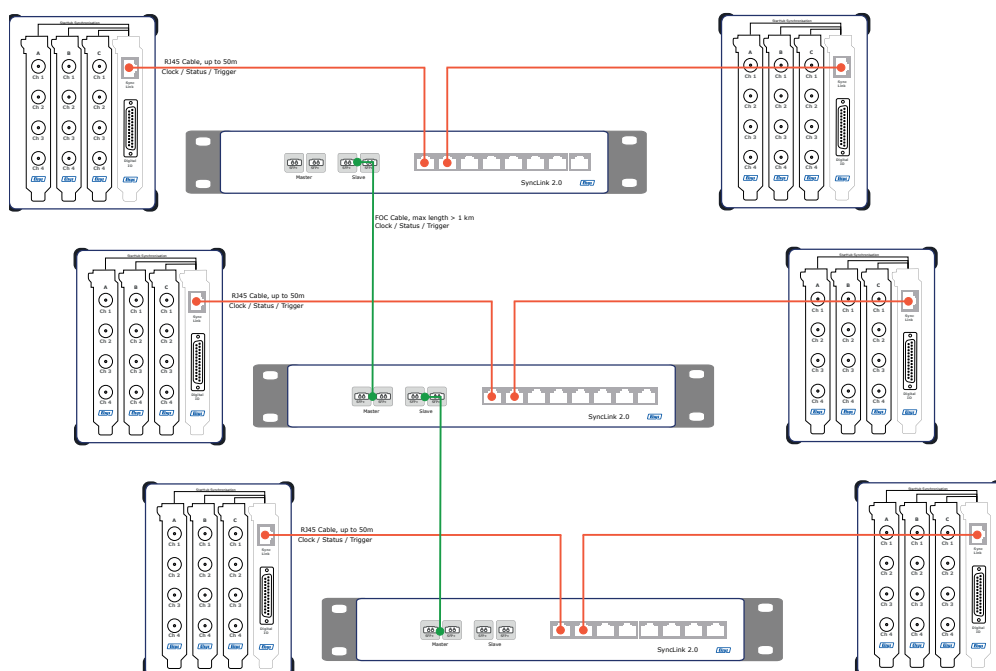


Distributed Multi-Device Synchronization

The SyncLink 2.0 is the highest level of synchronization and allows to daisy-chain several SyncLink units together. The connection between them is established over fiber optical cables (FOC) allowing much larger distances between the DAQs than possible with the SyncLink SLB-8. The connection between the DAQ and the SyncLink 2.0 is still based on RJ45

CAT. 6 cables but its maximum length is expanded to 50 m while it is only 10 m for the SLB-8.

A main advantage beside the high synchronization precision of 12.5 ns is the possibility to transmit also trigger message to all connected devices in sub-microsecond delays. This makes this solution most suitable for measurement where a trigger condition is not available on all location.

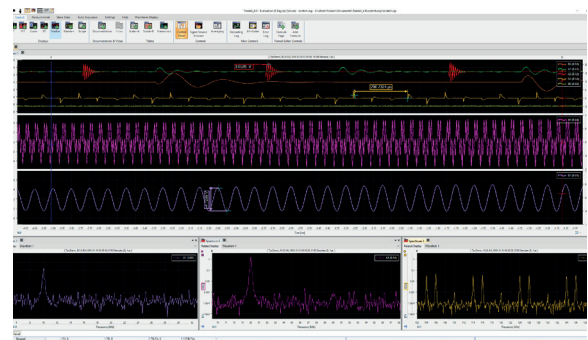


TranAX

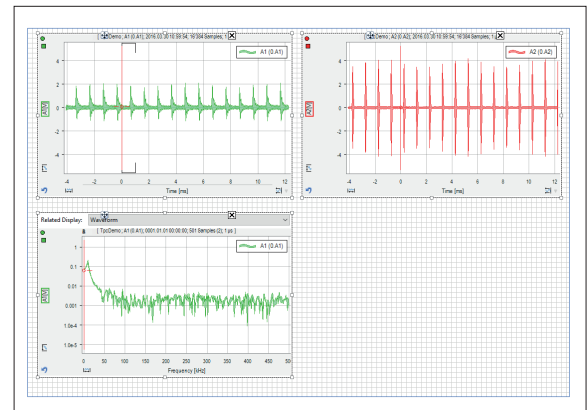
TranAX is the universal data acquisition software from Elsys designed for TPCX/TPCE data acquisition cards and the turnkey TraNET data acquisition instruments.

Key Features:

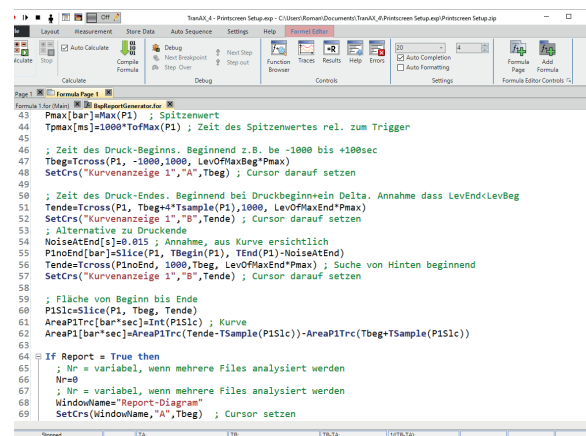
- Configures quick and easy many analog input channels, no programming required
- Data visualization in Multi-Waveform displays
- Several cursor for easy data readout and reporting
- X-Y data display
- FFT Analysis with different scaling and windows function
- Measurement data - video synchronization
- More than 40 scalar functions to measure any significant waveform parameter on time or FFT curves
- Powerful formula editor for more than 60 mathematics functions, syntax highlighting, for-loops, array calculations, string manipulations, etc.
- Curve fitting (Polynomial regression)
- Autosequence-macro's for easy to set up, fast automated measurements
- English and German version



TranAX Waveform Display



Documentation Page



Formula Editor for Post-Processing

LabVIEW Instrument Driver

Elsys provides a LabVIEW instrument driver which is fully compliant with the NI driver design guidelines. The instrument drivers provides the following features:

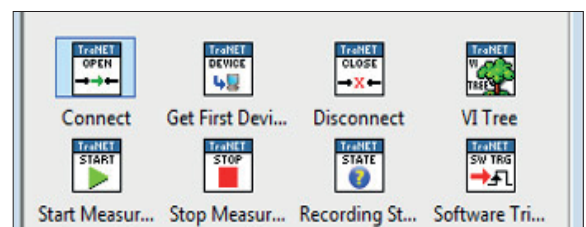
Key Features:

- Ready-made measurement flow-control VI's for scope, multiblock, continuous and ECR measurement modes
- Express VI's for amplifier and trigger settings
- VI's for data readout
- Express VI's for setup the connection to the modules and instruments

C++ / C# / Python TpcAccess API

TpcAccess API is based on a client/server architecture and can be integrated in any custom specific software. It handles all network traffic and synchronisation task when several clients are connected to the same device.

TpcAccess API is compatible with all Elsys Data Acquisition devices and cards like TraNET FE/PPC/EPC and TPCX/TPCE modules.



Elsys Tool Box in LabVIEW

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