# **TECH NOTE:** QuantumX Integration in ZwickRoell Testing Machines

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## Abstract

This Tech Note describes the Integration of QuantumX in ZwickRoell Testing Machines.

## Intro

Any QuantumX module can be integrated in a ZwickRoell tensile/compression testing machine, depending on the application. In this example, the QuantumX MX1615B strain gauge amplifier is used to determine the strains of a material or coupon.

HBM strain gauges are attached on the sample and connected to the QuantumX MX1615B. In addition, other sensors, such as a Pt100 sensor for temperature measurement, can be **connected and used without much additional effort**. To enable access from a PC, the QuantumX MX1615B module is connected to the **Ethernet switch**. This is also used to establish a connection to the testing machine in order to synchronize the measurement results.



Figure 1: Integration of QuantumX in ZwickRoell Testing Machines

The enabled use of strain gauges in this application example allows for a **more precise and simplified measurement**. The extensometers installed in the testing machine for measuring length changes and strain can mainly only measure standardized samples. However, by integrating the QuantumX MX1615B module, compact strain gauges can be **applied to almost any surface of the sample** and are protected against a large number of external influences by means of appropriate accessories. In addition, strain gauges have the **least influence on a sample** and there is no need for calibration.

## Advantages

These are the main advantages of integration QuantumX in ZwickRoell testing machines:

- The use of strain gauges is possible
- Versatile application even in places that are difficult to access
- High flexibility, by simply adding different sensors (for example, Pt100) to the test setup



• High precision, through bridge circuit

## Workflow

The workflow for integrating catman into testXpert®<sup>1</sup> III is shown below exemplarily.

- 1. catman Easy: Channel Configuration
  - To configure a channel, a template from the sensor database is selected. Here, there are templates for all common strain gauge circuits.

Update Rev Soft CAN Constraint Co	Find Apply			
iensor database				
EN Language 4.2 Version				
Search	💙 Ple	ase specify type and name of new sensor		83
P			Nama	Description
Sensor database				Description.
a Sensor groups	s	rain gage based transducers		۱
B BM transducers				
G Strain gage bridges	~	oplied strain gages with gage factor		۲
Inductive transducers		0	$\bigcirc$	
Gamma Contraction Contraction Contraction     Gamma Contraction Contraction		Single SG Single SG 3-wire	Single SG 3-wire	8
G Frequency		120 Ohms	350 Ohms	
			A 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10	
B 🙆 Counters		Single SG 3-wire Single SG 3-wire	Single strain gage 4	
My sensors     A Pulse width modulation		700 Ohms 1000 Ohms	wire 120 ohms	
e 🚯 IEPE			<ul> <li>A</li> </ul>	
	Si	ngle strain gage 4 Single strain gage	4 Single SG 4-wire	
Optical sensors		wire 300 ohms wire 700 ohms	1000 Ohms	
		< <	<	
		SG half bridge SG half bridge 12	0 SG half bridge 350	
		Ohms	Contris	

• After the new strain gauge sensor has been created, the k-factor, the type of excitation and the excitation voltage must be adjusted.

File DAQ channels DAQ jobs Visualization DataViewer Sensor database		
Set in the set of the set		
Sensor database	Current sensor settings	
10 Language [42] Version Search P	Sensor-ID Name/Description Comment Serial number	423526859490741 My strain gage
(1) Gensor database ⊜ dessor groups ⊕ dessor groups ⊕ destrain gege transducers ⊕ destrain gege transducers ⊕ destrain gege bridges ⊕ destrain gege transducers ⊕ destrain ter transducers ⊕ destrain ter transducers	Type/Model  More  Transducer settings  Single SG 3-1	Transducer characteristic     wire 350 Ohms
Bit Wolf age/current         Bit Courters         Bit Not	2,5 DC 3-wire 350 Leave this field empty	Excitation in V Carrier frequency Sensor wiring Bridge resistance (Ohms) if the resistance is unknown. It is only res

• The strain gauge sensor can then be dragged and dropped onto the desired channel to parameterize it.

Arte Constants	isplay Her	Cogure TE	S Sensor Banyo	tur	f(x) ∫ Create ↓ Delete ↓ Austian	(thannel	Configure	LV1 OFF LV2 OFF LV3 OFF	s and events		Speci	-
gure DAQ channels Devices: 1 handwar	e channels: 16 (Live updats	e active]						Current	t sensor datab	ase: HBM, S	ensorData	dbs.e.adb
Channel name	HEADING	-	Sample rate Hitter	5404	Sensor Function	2.01	to vasue	Survey	a land			
D - MK16158								8			OW	and the second
D - MX16158_CH 1	🗃 -236,0 µm/m	H 300	Hz / BE S0 Hz (Auto)	1	My strain gage	-697	,22 umim		No. 141		-	
D - MX18158_CH 2	😑 No signal	300	Hz/BE 50 Hz (Auto)	2	DC Voltage	0,00	V 800		ray sensors			
D - MX16158_CH 3	No signal	• 300	Hz / BE 50 Hz (Auto)	3	C Vottage	0.00	V 000					
D - MX16158_CH 4	😑 No signal	H 300	Hz / BE 50 Hz (Auto)	4	C Votage	0,00	V 000					
D - MX18158_CH 5	😑 No signal	300	Hz/BE 50 Hz (Auto)	5	E DC Votage	0,00	V 000					
D - MX16158_CH 6	😑 No signal	H 300	Hz/BE 50 Hz (Auto)	6	E DC Votage	0,01	000 V 000					
D - MX1615B_CH 7	No signal	H 300	Hz / BE 50 Hz (Auto)	7	C Voltage	8,00	000 V 000					
D - MX18159_CH 8	😑 No signal	➡ 300	Hz/BE 50 Hz (Auto)	8	C Voltage	0,00	000 V					
D - Miterse_CH 9	No signal	P 300	Hz / BE 50 Hz (Auto)	9	E DC Voltage	0,00	V poor					
D - MX18158_CH 10	No signal	300 (4)	Hz / BE 50 Hz (Auto)	10	E DC Voltage	0,00	y 900					
D - M016158_CH 11	No signal	H 300	Hz/BE 50 Hz (Auto)	11	C Voltage	0,00	V 000					
D - MX18158_CH 12	No signal	H 300	Hz / BE 50 Hz (Auto)	12	C Votage	0,00	000 V					
D - MR16158_CH 13	😑 No signal	H 300	Hz/BE 50 Hz (Auto)	13	C Voltage	0,00	V 990					
D - MX16158_CH 14	No signal	H 300	Hz / BE 50 Hz (Auto)	14	C Vottage	0,00	000 V	Mysen	6843			
D - MX16158_CH 15	No signal	H 300	Hz/BE 50 Hz (Auto)	15	E DC Voltage	0,00	V 990	-Searc	ah			
D - MX18150_CH 16	No signal	H 300	Hz / BE 50 Hz (Auto)	16	E DC Votage	0,00	000 V	P.				Advance
Computation channels								No No	sensor atrain gage			

- 2. catman Easy: Assign Sample Rate
  - In testXpert, all channels that are set to the default sample rate will later be visible. The maximum sample rate in conjunction with testXpert is 1200 Hz.



🟠 Configure sample ra	te groups and filters X
-Sample rate groups- Useful sample rates	
Slow sample rate	100 Hz
Default sample rate	1200 Hz 💽
Fast sample rate	9600 Hz
Filter	
Help regarding filter s	ettings
Channel: D - MX1615	B_CH 1
Use current device Filter is set via TEE	settings DS or Setup Assistant.
🖲 Use automatic Ant	-Alias filters
The frequency will sample rate. Usual	be determined before DAQ start based upon the ly a Bessel characteristic will be selected.

## 3. catman Easy: Optimal Test Run

• To test the configuration, we suggest to perform a test in catman:



## 4. catman Easy: Save DAQ Project as .mep File

To use the created measurement configuration of the QuantumX module in testXpert III, it must be saved as a .mep file.

Dpen	•	Save file as	Edit	Exec	ute	$f(x) \stackrel{!}{}{{}{{}{{}{{}{{}{{}}{}}$	hannel	Configure
Save	>	Project Saves the current DAQ or Analysis project		Zero b	alance	Computation chan	inels	
Save as	-	Save last DAQ job	lillor	Slot		Sone or Euroption	70	ro valuo
Print		Saves the measurement data of the last DAQ job permanently to disk	inci	SIUC		Jensor Function	20	o value
Clipboard		Complete visualization Saves the entire visualization (all panels and panels) under a new pame	iz (Auto)	1	1 M	r strain gage	-697	,22 µm/m
Import		Current panel/page Saves the objects of the current panel or page	iz (Auto) iz (Auto)	2 3		C Voltage C Voltage	0,00	000 V 000 V
🦳 Repair		under a new name	Iz (Auto) Iz (Auto)	4		C Voltage C Voltage	0,00	000 V 000 V
Analyze measurement data		Saves the selected object of the current panel under a new name (applies to tables and graphs only).	iz (Auto) iz (Auto)	6 7		C Voltage C Voltage	0,00	000 V 000 V
Special functions		AutoSequence Save the current AutoSequence workbook	iz (Auto)	8		C Voltage C Voltage	0,00	000 V 000 V
		EasyScript	iz (Auto)	10		C Voltage	0,00	000 V
		Saves the current EasyScript project under a new name	Iz (Auto)	12	Di Di	C Voltage	0,00	000 V
			iz (Auto) iz (Auto)	13 14		C Voltage C Voltage	0,00	000 V 000 V
			z (Auto)	15	De De	C Voltage	0.00	nnn v

- 5. testXpert<sup>™</sup> III: Go to the Periperhals Menu
  - If the QuantumX module is connected to the PC via Ethernet, it can be added from the peripheral device menu.



	Installierte Geräte: testControl (COM1)			Schließen Hilfe Hingufügen Bearbeiten Entfernen Einsteljungen Mehrfachstat
	Standard <u>a</u> ntrieb:	testControl	×	
	Bearbeiten der <u>K</u> onfig.	uration:		
	(K:\TXR\BIN\CFG\W	ACHINE.CFG)	~	
Coritouur	wabi			

Geräteart:	
Datenerfassungssystem (HBM) externe Aufnehmer	^
externe Messverstärker	
Fallwerke	
Härteprüfgeräte	=
HDT/Vicat-Geräte	
Pendelschlagwerke	
Probenmessgeräte (RS-Geräte) Prijifmaschinenelektronik	

Gerät:	OK
HBM MGCPlus HBM Spider8 NII device QuantumX	Abbrecher <u>H</u> ife
Zu verwendende Konfiguration:	
Konfig	guration
Name: LEM MCCOL	

6. testXpert<sup>™</sup> III: Load DAQ Project File
Next, the catman Easy project is loaded as a configuration file.

Messwerte:		ОК
		Abbrecher
		Hife
Einstellungen:		
Konfigurationsdatei:		
	Öffnen	
21, 11, 2012 14:08: 19 - Catman Runtime initialisiert		
	Messwerterfassung:	
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Öffnen			×
Suchen in:	길 Data 💌	G 🗊 📂 🛄 -	
C.	Name	Änderungsdatum	Тур
Zuletzt besucht	Export Catman-QuantumX.MEP Catman-QuantumX_16kanalig.MEP Catman-QuantumX_Kaskade.MEP manfred.MEP	18.09.2012 10:29 14.11.2012 15:41 19.11.2012 13:04 15.11.2012 09:38 08.11.2012 16:25	Dateiordn catmanEa catmanEa catmanEa catmanEa
Bibliotheken	MGC.MEP	21.11.2012 14:07	catmanEa

## 7. testXpert<sup>™</sup> III: Integrate Strain Gauge Sensors

• The sensors of the QuantumX module are now listed under 'Machine'. If the channels were also created under 'Test specification', they are linked to the corresponding sensor and are ready for use.

	Marchine:	Prúfvorachrift	QK
		Geräte	Abbrecher
	DMS A 1	Musschine Traverse	(117-
	DMS A 2	Gtandard-Wessufnehmer	( Due
testXpert <sup>*</sup> II	DMS A 3	Bretenanderungsaufnehmer	Putplatz.
	DMS A 4	Standard-Kraftaufnehmer	
	DMS B 1	Probenhalter	Verbinden
	DMS B 2	Sparinung	Trennen
	DMS B 3 0	DMS	
	DMS B 4	En-/Ausgänge 1	Gerate
	MGCplus_1 CH 6-1	En- / Ausgänge 2	Kanale
Prüfart	MGCplus_1 CH 6-2	Ausgange 3	
🧟 Zug	MGCplus_1 CH 6-3	4Solwert	Synchronität
🗇 Druck	MGCplus_1 CH 6-4	#stwert	
	MGCplus_1 CH 6-5	Stellwert	
highraum	MGCplus_1 CH 6-5		
🗇 Oben	MGCplus_1 CH 6-7		
Unten	MGCplus_1 CH 6-8		Standard

- 8. testXpert<sup>™</sup> III: Adjust the Time Synchronicity
  - To ensure that the strain gauge measures synchronously with the other sensors, a 5V signal is sent to an input channel of the QuantumX module and the returning signal is read in.

uswahl des Master Geräts:		OK	Verfügbare Hilfethemen:
testControl II		Abbrechen	Anleitung zur NI-Anbindung
Ausgang zur Ausgabe des Sy	nchronisierungssignals:	Hilfe	Incoduction assund (21m) (1)
1.2			
Eingang zum Einlesen des Sy	nchronisierungssignals:		
MGCplus_1 CH 6-1	-	1	
Schwelle zu Auto 2,4931	r Erkennung des Signals:		
Synchronisationskanäle:			
Name:	Schwelle		
MGCplus_1 CH 6-1 : HBM N	IGCPlus 2.4931		
MGCplus_1 CH 6-1 : HBM N	IGCPlus 2.4931		

#### -- end

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