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### MTS (MODULAR TEST SYSTEM) OVERVIEW

The Baumann MTS is a modular test system designed for versatile use in laboratories, prototype development, and high-volume production environments:

- Cell, module and battery test benches (End-of-Line, End-of-Repair, Second-Life testing)
- Test recipe modifications without the need for advanced programming skills
- Testing of power electronics and converters
- Intuitive and user-friendly operation

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- Compact system design
- Testing of control units
- Flexible expandability

#### ightarrow HIGHLIGHTS OF THE MTS

- Modular design with scalable architecture; modules can be reused across different projects
- Rapid and flexible installation into a complete system with minimal footprint
- Easy integration of third-party systems
- Measurement access points for calibration and fault diagnostics
- Stand-alone functionality
- Short delivery times thanks to module stock and pre-configuration
- Mobile version available for laboratory use
- Wide range of communication interfaces for DUT (Device Under Test) connections

In addition to our MTS modules, Baumann offers flexible solutions for both manual and automated contacting via low- and highvoltage connectors. With our in-house adapter manufacturing, we provide a broad spectrum of contacting solutions – fast, safe, and precisely tailored to your requirements.



#### **SELECTION OF FUNCTIONAL AND COMPONENT TESTS**

- Verification software version of Device under Test (DUT)
- Evaluation of fault memory entries
- Measurement of insulation resistance
- Dielectric strength test
- Measurement of Y-capacitance
- Plausibility check of internal voltage measurement
- Current consumption measurement
- Interlock function test
- Internal temperature measurement
- Current pulse test
- State-of-charge monitoring
- Flashing function
- Impedance measurement
- Voltage and current of terminal power supply





### SOFTWARE AND **INTERFACES**

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Baumann provides a tailored test framework designed to complement the modular hardware. Based on predefined test functions, individual test sequences can be created and configured using our standalone editor. Execution is then performed by a high-performing test engine.

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stlauf												
stlauf					> Test > Test Übersicht							
				10	30 %					En	gebnis i. O.	
stfall	Fortschritt Statu: Dauer Akti Testschritt Fortschri Statu: Dauer Halt											
nit	100 %	i. O.	14.729 s	$\checkmark$	1. Check HV Test needed (If Go To)	100 %	Fertig	0 s		Information		
Flash ECU	100 %	i. O.	1.120 s	$\checkmark$	2. Connect HV Contactor (Connect DUT/Power Supply (HCDU))	100 %	Fertig	0 s		Station	B305203-003-CCU	
Read Fault Memory of ECU	100 %	i. O.	1.120 s	$\checkmark$	3. HV Test 2200V (Stahl GH-200 Execute Test)	100 %	Fertig	8.210 s		Auftragsnummer	B-305193.001	
Measurement of DUT Power Consumption	100 %	i. O.	1.020 s	$\checkmark$	4. Disconnect HV Contactor (Connect DUT/Power Supply (HCDU))	100 %	Fertig	0 s		Rezept Beschreibung (ESPV-SNR_ZGS)	Test_Recipe	
Withstand Voltage Test	100 %	i. O.	8.290 s							Rezept Version	1.1.22	
										Startzeit	2025-05-07T13:39:53.434	
solation Resistance Measurment	100 %	i. O.	1.020 s	$\checkmark$						Endzeit	2025-05-07T13:40:30.253	
DCIR test	100 %	i. O.	1.120 s	$\checkmark$						Abbruchgrund	36.819 s	
Read Fault Memory at Test End	100 %	i. O.	1.120 s	$\checkmark$						Abbruchposition		
mpedance Measurement	100 %	i. 0.	1.120 s							HCDU U source	-0.691	
mpedance weasurement	100 %	1. 0.	1.120 S							HCDU U sense	-0.008	
Check Temperatures	100 %	i. O.	1.100 s	$\checkmark$						High Current HCDU	0.000	
Voltage-free measurement	100 %	i. O.	1.080 s	$\checkmark$						KL30 Voltage-Source	0.000	
										KL30c Voltage-Source	0.000	
Shutdown	100 %	i. O.	3.550 s	$\checkmark$						KL30 Current KL30c Current	-0.000	

The core component of the architecture is the test engine, which is responsible for controlling the test hardware. Test sequence configuration is carried out using the test recipe editor, while the head system manages data exchange between the customer system and the tester.

	V	alue	Unit T	/pe	Description	Assignment		ID	Testfunction		Description
¬ recipe (version: 1.0.7)					n.a.			1	Configure Test Parame	ters	Configures test parameter.
▷ 1. Init					n. a.				If Go To		Jumps to a relative sequence step if input is TRUE
2. Residual Voltage Measurement				n. a.			3 Wait			Waits for a specified time.	
→ 3. HV Measurement					n. a.				Basic Calculation		Executes basic calculations.
1. Control Relays (id: 20)					n. a.				Complex Calculation		Executes complex calculations.
					n. a.				Concat String		Concats two strings to one string.
▷ Inputs									Simulate Tester		Can be used for Tester Simulator
→ Outputs									Execute Program		Executes external Program
1. Measurement range (IBER)				RING	n. a.				Extract UUT Data		Extractes a String from UUT Information sent by superior PLC.
2. 200 uA measurement range active (I-Ber)				OOL	n. a.				Clear UUT Data		Clears UUT Data information from HMI table.
<ol><li>Current measurement overrange (I-Ueberlau</li></ol>				OOL	n. a.				User Interaction		Opens a user dialogue window. (Pic. example: C:\STC\TestEngine\Images\
<ol> <li>Voltage measurement overrange (U-Ueberlag)</li> </ol>	f)			OOL	n. a.				Eval Result To Error Bit		Evaluates result and sets specified error bit in line interface
5. Electric flashover (I Interrupt)				DOL	n. a.				Control Relays		Controls relays.
<ol><li>Measurement result voltage (U_RES)</li></ol>	r	i. a.		EAL	n. a.	HV_Test_Voltag			Configure RBS		Configuration of residual bus simulation (CAN)
<ol><li>Measurement result current (I_RES)</li></ol>	r	n. a.		EAL	n. a.	HV_Test_Curren			Control RBS		Starts/Stops residual bus simulation
8. Measurement result resistance (R_RES)	r	n. a.		EAL	n. a.	HV_Test_Resistan	ce		Start CAN Application		HW configuration and application startup for one can network
<ol> <li>Measurement result test time (T_RES)</li> </ol>				EAL	n. a.				Read CAN signals		Reads the specified CAN signals and writes them to separate outputs
<ol> <li>Generated electric charge until voltage setp</li> </ol>	pint (Q_RES)		C LR	EAL	n. a.				Read CAN signal group		Reads the specified CAN signals and writes them to a grouped output
3. Control Relays (id: 20)					n. a.			50	Read Digital Input (MD	U-IOB)	Reads Digital Input from IO-Board
4. Insulation Resistance Measurement					n. a.						
5. CAN Communication Test					n. a.			_			1
6. DCIR Test					n. a.				Subsequence		Description
2 7. Shutdown					n. š.		×				
Result-Name	DB-Name		Fail Behaviour	Lower Limit	Assigned Variable	Upper Limit	Target-V	alue	Unit		Description
HV_Test_Voltage HV_Test	Voltage		n. a.		HV_Test_Voltage				v	n. a.	
HV_Test_Current HV_Test	Current		continue	0.001	HV_Test_Current	0.4			mA	n. a.	
HV_Test_Resistance HV_Test	Resistance		n. a.		HV_Test_Resistance				MOhm	n. a.	

The core feature of the test recipe editor is the simple creation and modification of test recipes without the need for advanced programming skills. Individual steps are assembled into a sequence using drag-and-drop and can be parametrised with a high degree of flexibility. Results can be freely defined, and the type of evaluation can be customised. It is also possible to specify whether the results should be sent to the MES. The test recipe editor is the tool of choice for implementing any type of test specification with maximum flexibility.

#### **ADVANTAGES OF THE TEST FRAMEWORK**

- Customisable test recipes and test sequences tailored to the customer's requirements
- Seamless implementation of test recipes with a large number of individual steps and result types
- Intuitive graphical user interface with extensive graphical diagnostic and analysis tools
- Integration of special functionalities (e.g. flashing, authentication, etc.)
- The execution of the test engine in a real-time environment ensures robust and highly consistent test sequences.
- Standardised data interfaces to production and customer systems (e.g. MES systems such as MQTT, • SQL, OPC UA, TCP/IP, ModBUS, PROFINET – depending on customer needs)
- Process monitoring of both the DUT and the test system during execution, including emergency case • detection
- Communication with the DUT via all common automotive bus systems • (CAN, LIN, isoSPI, Automotive Ethernet)
- Open data structure using JSON or XML file formats •
- Connection to automation lines via standardised PROFINET interface

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## MTS | CCU CONTROL & COMMUNICATION UNIT

The MTS is composed of flexible units - each unit is precisely configured to match your testing requirements.

# TEST CASES APPLICATION EXAMPLES



MDU - Measurement Distribution Unit

Central measurement unit for capturing voltage and current readings



HVDU – High Voltage Distribution Unit

For management of measurement circuits up to 3 kV, connection monitoring (sensing), return measurement for validation, and integrated insulation and dielectric strength testing device.



HCDU – High Current Distribution Unit

For control and protection of high-current circuits.



PDU – Power Distribution Unit

For the supply and protection of individual measurement units as well as an optional DC system. Connection to the individual units via pre-assembled connection cables.

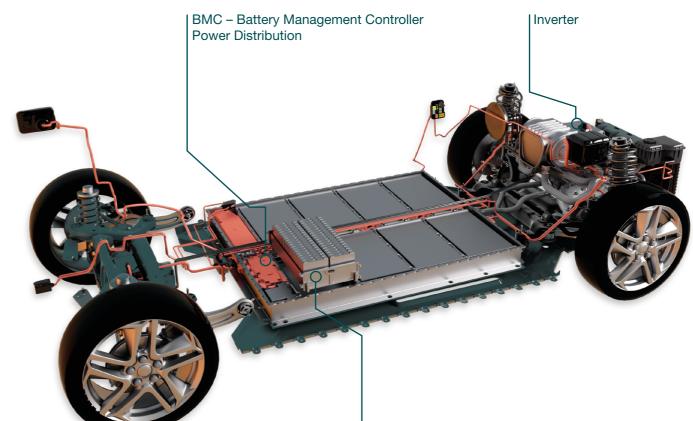




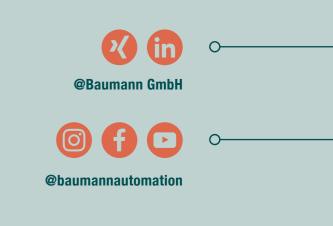
**Baumann MTS** 



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CMC – Cell Management Controller Cell, Module and Battery



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