caemax
imc group

CAEMAX D^x telemetry

digital • modular • convenient

Modular, multi-channel telemetry system for a variety of applications

productive testing

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Your benefits at a glance

- Multi-channel system for capturing up to 6 analog signals per transmitter module
- For universal applications such as: strain gauges, temperature transducers, etc.
- Synchronous data acquisition of up to 4 transmitters with a single receiver unit
- Noise-free digital radio link, especially reliable due to diversity mode operation with up to 4 independent receiver antennas
- Robust transmitter with wide temperature range from -40 °C to +85 °C (standard) and from -40 °C to +125 °C (D^{x}-HT)
- Seamless integration into your measurement hardware via standard interfaces: CAN, analog, Ethernet
- Easy configuration and operation via user panel at receiver unit, or web browser

CAEMAX Dˣ telemetry

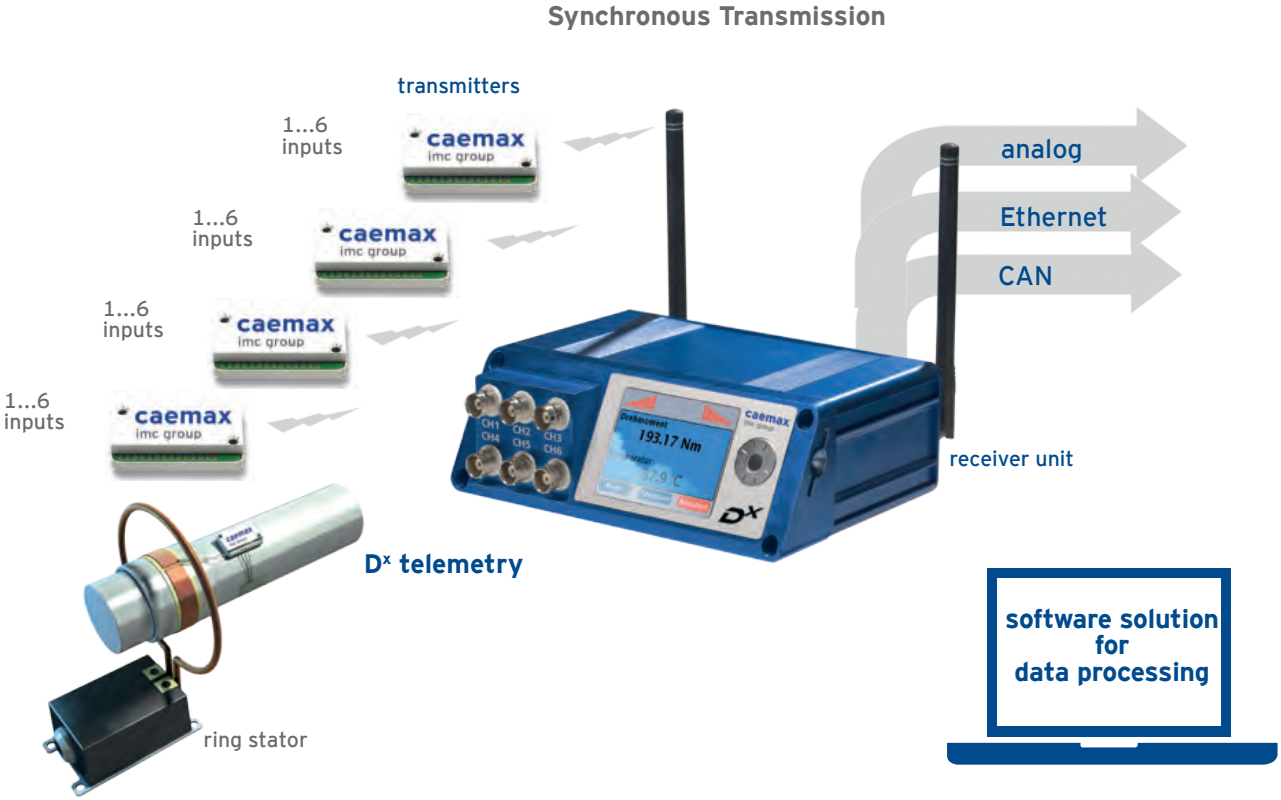
Digital, multi-channel telemetry system

Whether simple, single-channel acquisition, or testing with a complex, multi-component system, one thing remains clear: today's telemetry requirements have become more diverse and demanding. Dˣ telemetry addresses this challenge through universal transmission modules that enable measurements with different channel counts and sensor assignments.

A distinction is the synchronous operation of multiple transmitter modules via a central receiver unit. This guarantees simultaneous data acquisition from multiple rotating components.

Providing the most robust radio link possible is a prerequisite for reliable measurement data. Thus, the Dˣ digitizes the analog sensor signals as early as possible directly in the transmitter unit. Error detection redundancies ensure that the Dˣ only outputs correctly transmitted data. Two independent radio systems operating in diversity mode additionally increase transmission reliability.

Instead of having a large number of special modules, CAEMAX relies on the universal approach: one fits all. The same transmitter can be used for different types of sensors (strain gauges, thermocouples, accelerometers) and for multiple channel counts.



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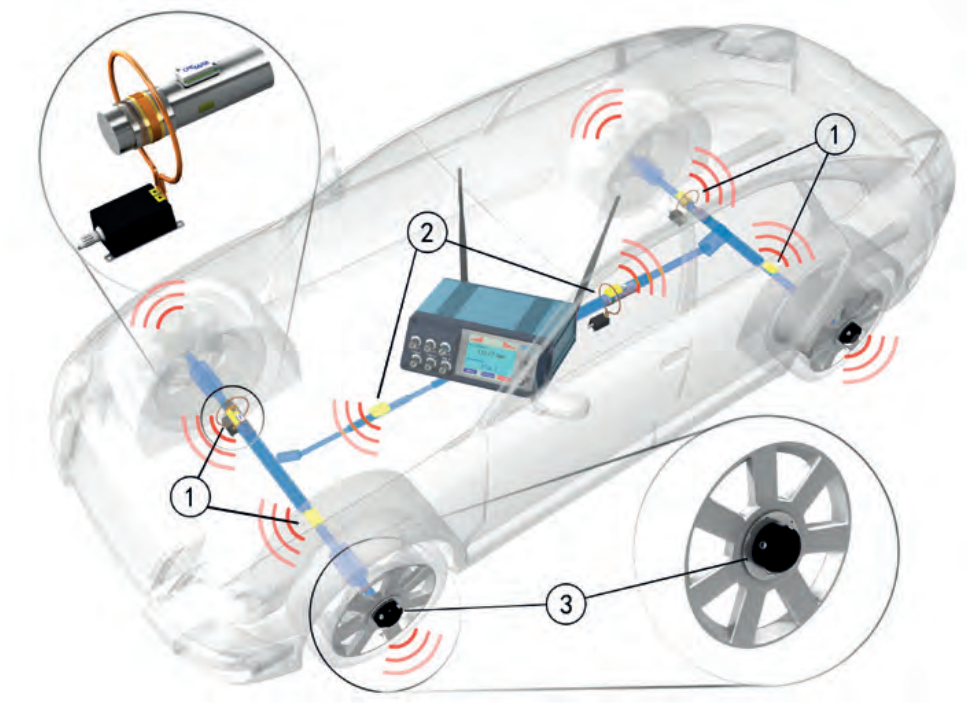
Increase productivity with the Dˣ telemetry

Solve challenging tasks easily

- Compact, lightweight (14 g) Dˣ transmitter unit with full signal conditioning and digitization of up to 6 channels and integrated antenna
- Additional channels (transmitter temperature, power supply, signal strength) already integrated for monitoring the test location and radio link
- Digital data transmission including error detection, receiver unit with up to 4 antennas in diver sity mode operation for maximum noise immunity
- Up to 4 Dˣ transmitter units can be synchronized to a single Dˣ receiver unit
- Configurable transmitter frequency within frequency band allowing parallel operation of multiple systems
- Transmitter unit with extended temperature range of -40 °C to +125 °C available when testing in engine compartments, climate chambers, etc.

Independent and flexible

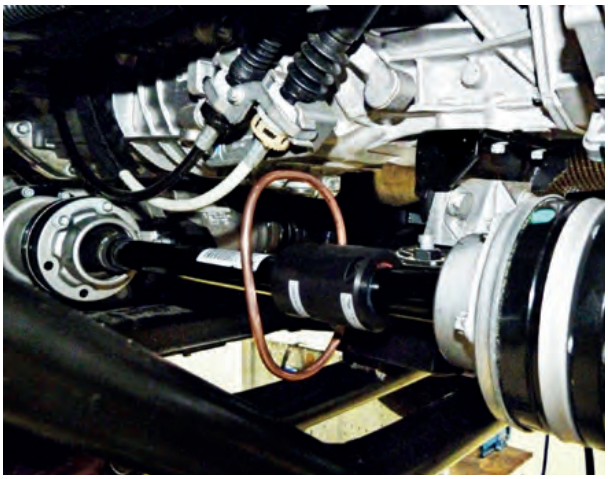
- Universal transmitter module to measure strain gauge, temperature or voltage signals, incl. strain gauge bridge supply incl. adjustable gain and bridge supply
- Flexible transmitter power supply: transmitter unit can be powered both inductively or by battery
- Measurement data output via 6 freely-programmable analog outputs and CAN interface
- Different receiver antenna types for best reception even in difficult installation situations
- System parameterization directly on the receiver unit or with web browser via integrated Ethernet interface



In Practice

Quick setups in automotive testing

When on the test track, quick setup times are valued. Using a D^x transmitter unit installed in a housing with an integrated power supply, the system can be ready for testing in very little time. The selected housing serves to reliably protect the transmitter and sensors against stone chipping and water. Whether measurements are taken from the wheels, engine compartment or powertrain, a variety of receiver antennas enables interference-free data transfer - even in inaccessible places. Through centrally-controlled sampling of up to four transmitter modules, D^x telemetry signals can be simultaneously acquired from multiple drive axles or wheels.



Versatile and temperature-resistant on the test stand

On the test stand, telemetry systems must be capable of being seamlessly embedded into the existing hardware. Thanks to CAN interfaces and analog outputs, the D^x is easy to integrate. The standard D^x transmitter module covers a variety of applications for torque and temperature measurements, for example, when testing torsion and tension. When it comes to online-calculation of torque and angular rotation, there is a special system available, that can output the resulting power directly in physical units via the standard interfaces. High-temperature transmitter modules allow for climate chamber temperature measurements from -40 °C to +125 °C.

Flexible operations on wind turbines

Measurement equipment used in conjunction with wind turbine rotors has to be low-maintenance and remote controllable. Thanks to the embedded web server of the Dx receiver unit, the system can be configured remotely over a network connection and the measurement can be restarted. The D^x receiver unit will recover from any power failure or supply interruption by automatically rebooting when powered on. The transmitter modules allow strain gauge-based measurements of bending moment and torsion, and the connection of special sensors suited for detection of blade angle and rotor position. Optionally, the system can also be used as an autarkic data logger.

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The complete solution: with imc

In comprehensive testing of vehicles, wind turbines or machinery, it is necessary to detect many different physical quantities. This includes sensor signals such as strain gauge, acceleration, force, frequency and digital information from ECUs. To complete the system, the CAEMAX D^x telemetry can be directly integrated into imc measurement devices. Furthermore, imc software allows for a multitude of options when it comes to data analysis, visualization and processing.

Modular, distributable test & measurement system

imc CRONOS*flex*

- Flexible modularity through frameless expansion
- Ideal for frequently changing test, measurement and control tasks
- Aggregate sampling rate of 2 MHz
- Practically unlimited channel count

Adaptable measurement & control system for mixed signal testing

imc CRONOS*compact*

- Measure, control and simulate with a single system
- For test stand, laboratory or mobile applications
- Integration of MATLAB/Simulink models for HiL
- Ideal for medium to high channel counts

Measurement system for extreme environmental conditions

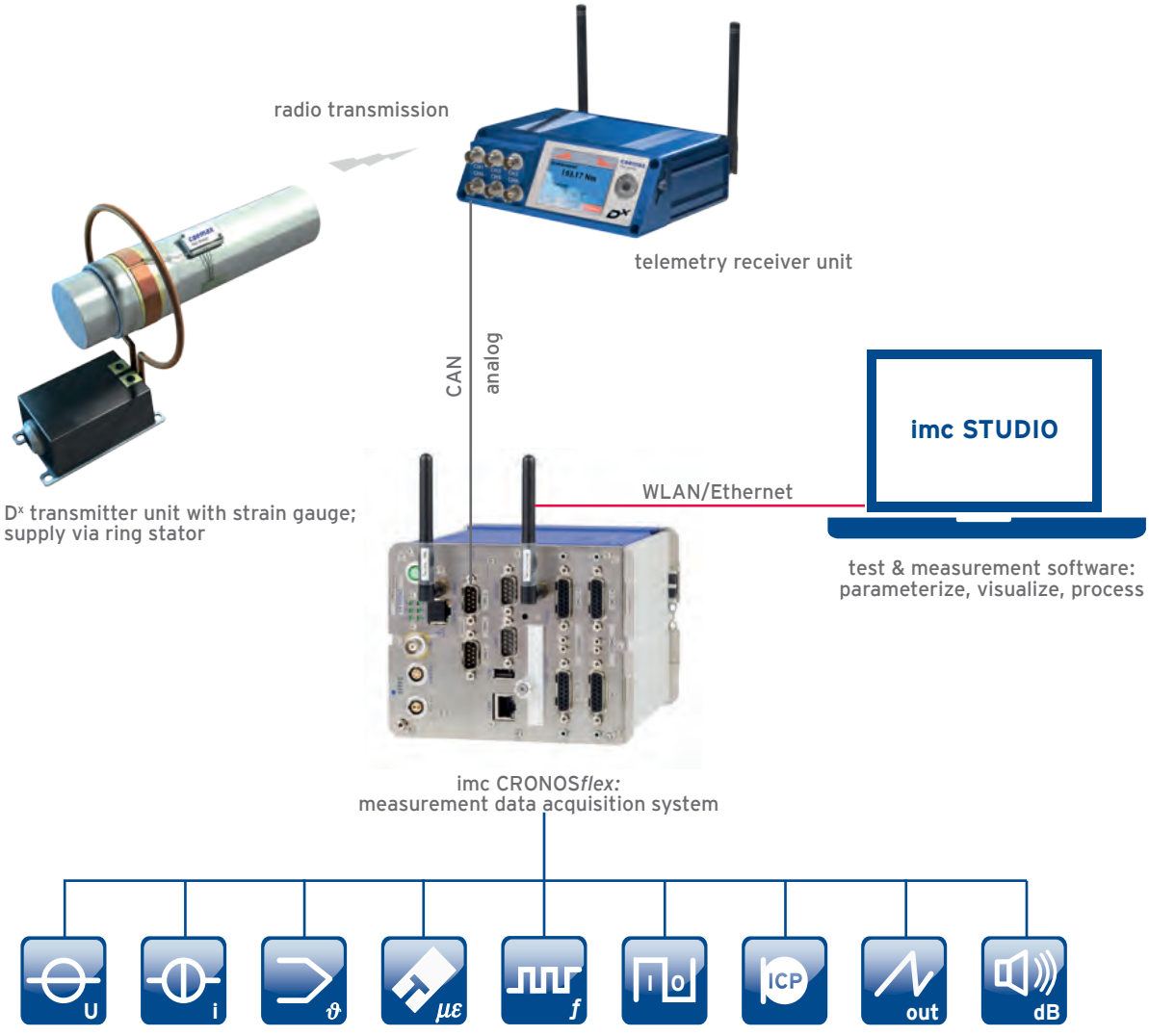
imc CRONOS-SL

- Extremely rugged
- Shock resistant: MIL STD810F
- Protection rating: IP65
- Extended temperature range from -40 °C to +85 °C
- Condensation allowed

All-in-one data acquisition & control

imc C-SERIES

- Ideal for varying test stand set-ups and mobile applications
- Affordable solution for measurement tasks with 8 to 24 channels



Facts & Features

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Technical Data

D^x transmitter unit (SCT)

Voltage input in millivolt range: two differential or four single-ended inputs		
Parameter	**Value**	**Comments**
Full-bridge	2 inputs	
Half-bridge	4 inputs	Internal half-bridge completion
Bridge supply	4.096 V (max. 40 mA short-circuit proof)	short-circuit proof max. 2 full-bridges or 4 half-bridges each 350 Ω max. 1 full-bridges or 2 half-bridges each 120 Ω
Input range	±0.244 mV/V to ±1000 mV/V	13 measurement ranges can be set
Thermocouple	2 differential or 4 single-ended inputs	type J, K
Electrical voltage	2 differential or 4 single-ended inputs	
Input voltage	±1 mV to ±4096 mV	13 measurement ranges can be set
Resolution	16 bit	
Accuracy	0.01% up to 0.025% full scale	
Sampling rate	D^x: max. 4.6 kHz per channel D^x-HT: max. 5.0 kHz per channel	
Anti-aliasing filter	6 pole Butterworth-characteristics	cutoff frequency 1/5 of sample rate

Voltage input in volt range: one differential and one single-ended input		
Parameter	**Value**	**Comments**
Electrical voltage	1 differential and 1 single-ended input	
Measurement range	±0.011 V to ±45.056 V	13 measurement ranges can be set
Sampling rate	max. 4.6 kHz per channel	D^x HT: max. 5.0 kHz per channel
Anti-aliasing filter cutoff frequency	6 pole Butterworth-characteristics 1/5 of sample rate	

Additional channels for monitoring: signal strength, voltage supply and temperature		
Parameter	**Value**	**Comments**
Voltage supply of SCTs (Signal Conditioning & Transmitter)	Measurement range: 6 V up to 41.5 V	Resolution 10 mV
Temperature of SCTs	Measurement range for D^x: -30 °C up to +100 °C for D^x HT: -30 °C up to +150 °C	Resolution 0.034 °C
Signal strength measure-ment range	-99 dBm up to -10 dBm	Resolution 1 dBm

General data		
Parameter	**Value**	**Comments**
Voltage supply	Inductive supply with stator head or stator ring or DC-supply 8 V up to 39 V	
Temperature range	D^x: -40 °C up to +85 °C D^x HT: -40 °C up to +125 °C	
Data transmission	Data packets with error detection	
Transmission frequency	D^x: 13 frequencies in 868 MHz band D^x HT: 17 frequencies in 2.4 GHz band	Freely adjustable via remote control - allows parallel operation of multiple systems
Transmission power	max. 10 dBm	
max. aggregate sampling rate of entire system	Standard D^x: 1 SCT: 4.6 kHz 2 SCTs: 7.2 kHz 3 SCTs: 3.0 kHz 4 SCTs: 4.0 kHz	D^x HT: 1 SCT: 5.0 kHz 2 SCTs: 8.0 kHz 3 SCTs: 3.6 kHz 4 SCTs: 4.8 kHz
Housing material	PEEK	Highly temperature-resistant polymer
Dimensions	ca. 45 x 25 x 10 mm	
Weight	ca. 14 g	

D^x receiver unit (RCI)

Parameter	Value	Comments
Voltage supply	9 up to 36 V DC	
Power comsumption	< 0,5 W	
CAN interface	CAN 2.0b, Standard- & Extended-Identifier, freely programmable up to max. 1 MBaud	Connection according to ISO 11898, galvanically-isolated
Analog output	6 BNC jacks	Channels freely assignable. output max. ±10 V
Autozero	Remote-controlled	
Antennas	2 independent receiver systems operating in diversity mode	
Storage	SD card (SDHC)	
Synchronization	synchronized sampling of up to 4 transmitters	
Temperature range	-20 °C to +65 °C	
Display	2.83 inch color display, 320 x 240 px	
Dimensions	ca. 170 x 130 x 53 mm	
Weight	ca. 0.8 kg	
Option: speed recording	input for yaw rate sensor	Online calculation of power from the torsional moment and speed
Option: data logger	storage of measured data on integrated SD card	in preparation
max. aggregate sampling of RCI unit	Dx 868 MHz = 7.2 kHz	Dx 2.4 GHz = 8 kHz

"With the development of D^x telemetry, we focused from the beginning on the needs of the user. Our goal was to create a practical system to serve a variety of operations whether on the test bench or on the test track.
By creating a modular system with universal transmitters, the D^x covers a wide range of applications – a distinct economic advantage even in times of declining budgets."

Frank Ketelhut, Head of Product Development at CAEMAX

Accessories

The right equipment for every application

Housings for Dˣ transmitter units

Dˣ housing with integrated battery, attaches to the wheel with a Peiseler plate

Dˣ half-shell housing with integrated power supply (battery or secondary coil for inductive supply)

Dˣ half-shell housing in XXL for shaft diameters up to 1200 mm, with integrated inductive power supply

Dˣ housing with breakout cable, universal mounting options, splash-proof

Power supply for Dˣ transmitter units

Ring stator for inductive supply

Dˣ fixed stator for inductive power supply with secondary-side power conditioning

Dˣ housing with integrated special battery pack

Dˣ receiver antennas

Dˣ flat antenna with universal mounting option, cable length 5m

Dˣ satellite antennas with outsourced receiving unit

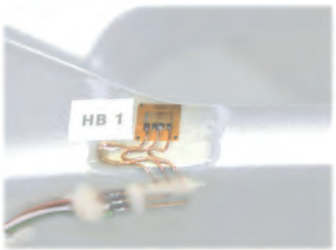
Dˣ mirror antenna for unobtrusive placement during road tests

Additional accessories, options & service

Dˣ test panel for quick configuration and testing without having to solder

Mounting frame for Dˣ receiver

Data logger function: storing measurement values on the integrated SD card



Strain gauge applications & calibration, e.g., according to VDI/VDE 2646

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