

XCP (Basic and Professional)

Measurement and Calibration via CAN, LIN, FlexRay, Ethernet, etc.

Advantages

- > Easy configuration using PC-based tool
- > Low memory requirement and short execution times due to scaling of the component according to your requirements
- > XCP can be obtained for different transport layers (e.g. CAN, LIN, FlexRay, Ethernet, etc.)

Application Areas

Measurement and calibration of ECUs in motor vehicles are performed using the XCP protocol (Universal Calibration Protocol), which is the successor to CCP (CAN Calibration Protocol). XCP was standardized by ASAM (Association for Standardization of Automation and Measuring Systems) under the leadership of Vector as a working member. XCP supports a wide variety of bus systems, since it is partitioned into a Protocol Layer and a Transport Layer:

- > CAN, FlexRay, LIN
- > Ethernet
- > USB
- > Various serial buses

On the PC side, CANape is used as the XCP Master. Its counterpart in the ECU is the XCP Slave. This is implemented by the XCP software component, which in turn is available in two different variants:

- > XCP Basic
- > XCP Professional

XCP Basic has limited functionality and is available free-of-charge at the Vector website. XCP Professional contains a complete set of functional features. You can utilize both variants together with conventional communication stacks or in AUTOSAR systems.

Functions of XCP Basic

XCP Basic contains functions for fundamental communication with the XCP Master, such as:

- > Synchronous data acquisition based on DAQ lists
- > Read and write accesses
- > Initialization and switchover of memory area of the calibration data
- > Support of timestamps

XCP Basic is configured manually by compiler switches.

Functions of XCP Professional

In addition to the functionality of XCP Basic, XCP Professional also has additional functions:

- > Protection against unauthorized reading and writing to memory
- > Activation and deactivation XCP
- > Synchronous Data Stimulation (STIM)
- > Resume Mode
- > Flash and EEPROM programming
- > Communication mode: Block transfer
- > Transmission of Service Request packages
- > Supporting AUTOSAR CRC modules

CANape as XCP Master

CANape, the all-round tool for measurement, calibration and diagnostics of ECUs, is the XCP Master, while the ECU acts as the XCP Slave. The XCP Slave allows CANape to access the measurement signals and calibration parameters in the ECU with the help of an ECU description file. Values can be displayed or edited in physical units.

The key properties of CANape related to measurement and calibration are:

- > Time-synchronous real-time acquisition and visualization of internal ECU signals with XCP/CCP, of signals from CAN, LIN and FlexRay buses and external measurement equipment

- > Online calibration via XCP/CCP, real-time stimulation via XCP and offline calibration
- > Flash programming of the ECU via XCP/CCP or via the diagnostic protocol
- > Rapid prototyping for functional development by bypassing a MATLAB/Simulink model with the help of CANape

Additional information can be found in the "ECU Calibration" product catalog.

Contact

If you are interested in XCP or have further questions please feel free to contact Vector Sales.

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Training Events

We offer various courses and workshops on XCP conducted in our classrooms or at your company.

For further information on individual training events and schedules on the Internet go to: www.vector-academy.com

- > Bit modification
- > Short download times
- > Configuration by GENy

Synchronous Data Stimulation (STIM)

To optimize algorithms and parameters, you can read (STIM) a measurement signal from the ECU by XCP via the bus system and modify it with a simulation model (e.g. Matlab). The newly computed value is then written back to the ECU. Reading and writing are performed synchronously in predefined time cycles (Bypassing).

Resume Mode

The Resume Mode enables cold start measurements, e.g. to check the behavior of an ECU in the wake-up phase. Here, the XCP stored in the flash memory is activated directly after the cold start – even before the application starts. Sending of measured values is started automatically, and these values can be logged for later evaluation. A connection to the calibration tool CANape is unnecessary.

Flash and EEPROM Programming

Using the Vector XCP component, measured values do not have to be saved in RAM; they can also be saved in flash memory or EEPROM. To do this, XCP executes callback functions, in which the flash algorithms may be activated by the application, for example.

This gives you the option of customizing the algorithms to the specific flash memory or EEPROMs used.

Communication Mode: Block Transfer

The block transfer facilitates transmission of large quantities of data. This functionality is comparable to a transport protocol. The sender segments the data and the receiver reassembles the data in the correct order.

Transmission of Service Request Packets

The service request packets enable transmission of text lines. They are stored in the program code, sent to the XCP Master when the program section is executed, and are displayed there. This function is very useful, primarily for developing a system and for debugging.

Configuration with GENy

The PC-based configuration tool GENy easily configures the XCP Professional component. Compiler switches are used to deactivate unnecessary functions and thereby reduce memory requirements. At the start of XCP transmission, the list of supported functions is transmitted to the XCP Master by the XCP plug-and-play mechanism.

Special Functions of XCP Professional

- > The XCP component from Vector offers more functions than those defined in the ASAM2 standard, e.g. protection against unauthorized reading and writing to memory. A write or read access may be defined and activated for access to pre-defined memory areas via XCP.
- > Only one function call is needed to activate or deactivate the entire XCP component.