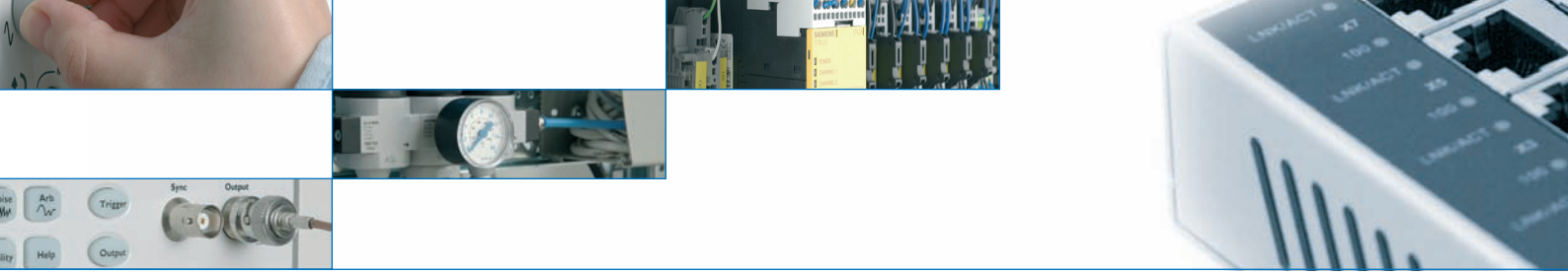
LXinstruments

Open Test Platform²

Functional test productivity at a new level



System Approach

OTP², the next generation of our modular **O**pen **T**est **P**latform, addresses key challenges that arise during the construction and operation of functional test systems, such as:

- Short development cycles and quick, schedulable introduction to production
- Fast development of test applications consisting of test adapter and test software
- Optimization of test throughput
- Minimization of downtime and unscheduled maintenance
- Support of operations at offshore locations
- Assurance of adaptability to future requirements and upgrading of the system on site
- Minimization of total costs over the lifetime of the system (Total Cost of Ownership)

Image 1: LXI-based Micro OTP

The Open Test Platform OTP² is based on a modular strategy that enables customer- and application-specific functional test systems despite standardized modules. Each module contains defined measurement functions, cable set, driver software and the corresponding test step libraries. The test sequences are configured from the test sequencer.

The system can be extended at any time to include customer-specific special functions and special hardware and software to completely cover special requirements.

Simple Configuration

On the basis of customer requirements, we work with you to create a suitable system configuration based on our interactive configurator and work out alternatives. We estimate the system costs together and identify possible cost drivers. Even with special requirements, you will receive a robust fixed price offer within a few days.

Basic Features

OTP² test systems have the following key attributes:

- Modular instruments based on PXI/LXI
- Single modular Virginia panel system interface
- Software architecture based on the test sequencers NI TestStand® or Keysight TestExec SL®
- Test step libraries based on IVI drivers
- Relational test database based on MySQL or Microsoft SQL Server
- Scalability from compact systems to comprehensive high-performance systems

The key attributes allow individual system components in hardware and software to be combined and reused as required. This significantly reduces the development and planning effort compared to a purely application-specific solution.

Image 2: PXI subsystem

OTP² Platform Variations and Markets

LXinstruments offers the OTP² architecture in an extremely powerful PXI version as well as in a flexible and cost-optimized LXI version.

PXI-based OTP² systems are mainly used in test applications where every millisecond of test time counts. This is particularly the case in automotive and smart sensor manufacturing, but also in other large-volume manufacturing.

For products that are manufactured in small and medium quantities in a large variety of variations, the time required to create the test application is often decisive. Furthermore, the investment costs must be allocated to a smaller number of test items. Here, the LXI (LAN Extensions for Instrumentation) system platform offers advantages.
Additional instruments can be integrated at any time for customer-specific special functions. Communication can be via PXI, LXI, GPIB or RS232/USB.

Hardware Architecture

Both OTP² platform versions have a similar architecture, whose central element is the analogue measurement and stimulus matrix. This connects measuring instruments and stimulus sources via an analogue bus to the analogue DUT channels, which can be expanded in groups of 32 channels.

PXI Analogue Matrix

- Analogue bus system with 8 single-wire buses
- 32 single ended instrument channels
- Up to 256 single ended DUT channels
- Reed relay with a switching capability of 1A/150V and a switching time of <500µs
- Switchable protective resistors between instrument matrix and test specimen matrices

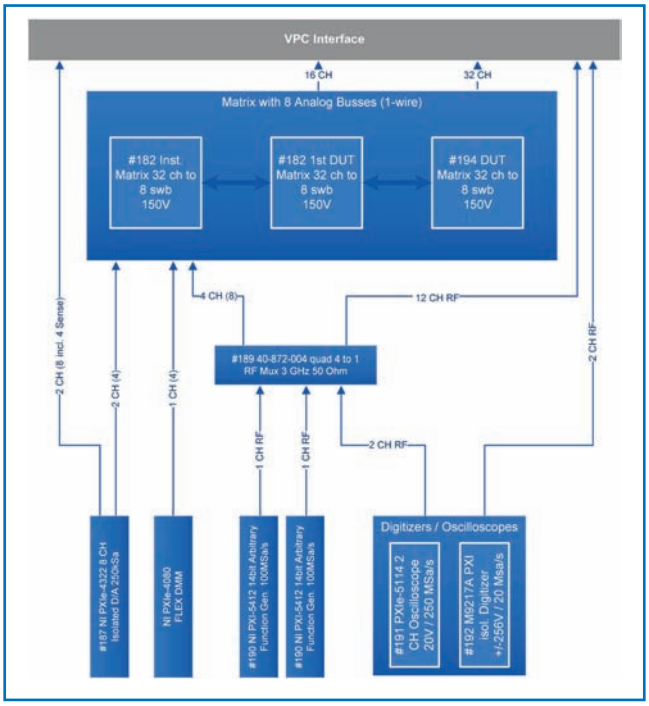


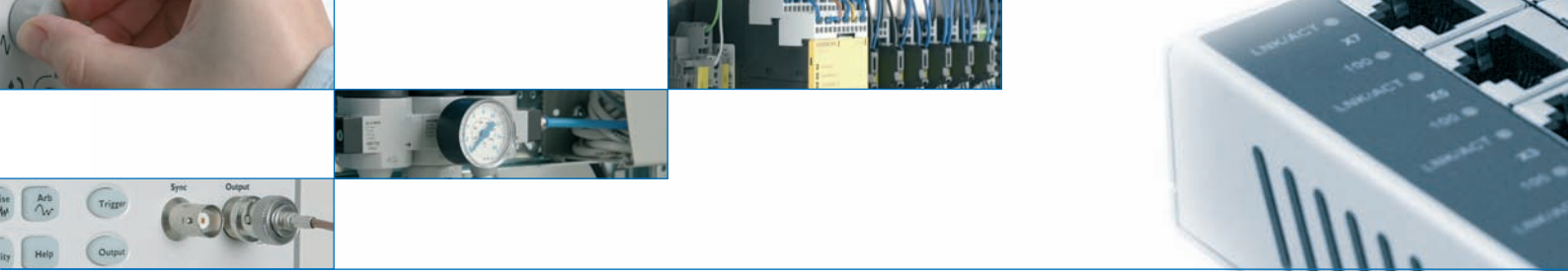
Image 3: PXI matrix

LX Analogue Matrix

In the LXI system version, the modular switching and measuring system Keysight 34980A is the core of the system. Instead of the 8 single-wire buses in the PXI version, 4 two-wire buses are used.

Image 4: 34980A switching system

Via the analogue buses each DUT channel can be switched to any instrument and the internal 6.5-digit DMM.



2 utility loops allow the transfer of a signal from the low to the high level of the matrix and thus offer maximum flexibility for floating measurements between different test points.
The first matrix card in the system offers connection options for 16 instruments and 16 DUT channels each. If required, the number of channels can be extended at any time by inserting additional matrix cards. 32 additional DUT channels are available per matrix card.

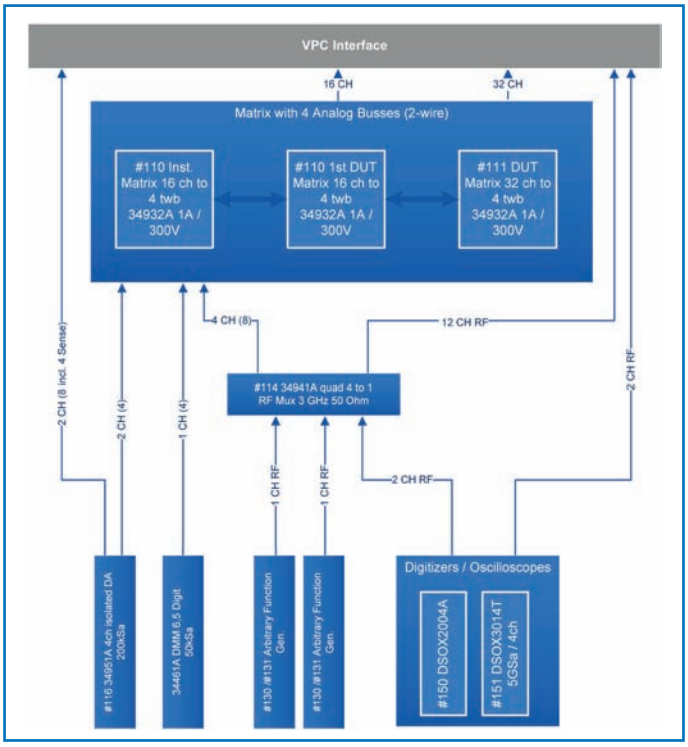


Image 5: LXI matrix

Further Switching Functions

In addition to the instrument and DUT matrices, an RF multiplexer card with 4 units 1 on 4 multiplexers is available for switching RF signals up to 3 GHz with high signal quality.
For the switching of loads and other superstructures in the test adapter, Form A switching cards up to 100V/1A are available on system level. If higher voltages or currents are required, the corresponding relays can be integrated into the test adapter and controlled via Form A relays.

Image 6: PXI cards

Instruments

For the OTP² platform, the following measurement and stimulus functions are available as complete system components with cabling and test step libraries:

- DC and AC power supplies, also with multi-channel switch-on sequences and other advanced functions, depending on the device used
- Digital I/O incl. pattern handling
- System multimeters - also with digitizing functions
- Oscilloscopes and digitizers
- Arbitrary function generators
- Relay drivers for special relays

Communication Interfaces

Communication with the DUTs plays an increasingly important role. Via appropriate interfaces, e.g. firmware is downloaded to the DUT or software functions are retrieved in the firmware which support the test of the DUTs.
The following interfaces are supported in the standard system:

- Ethernet
- USB
- CAN/LIN
- RS232
- I²C
- SPI
- JTAG

Mechanical Stimulus

A pneumatic valve terminal with eight 3/2-way valves is part of the concept for the mechanical stimulation of the DUTs and the automation of test adapters. Control of servo motors etc. can also be integrated as a customer-specific extension.

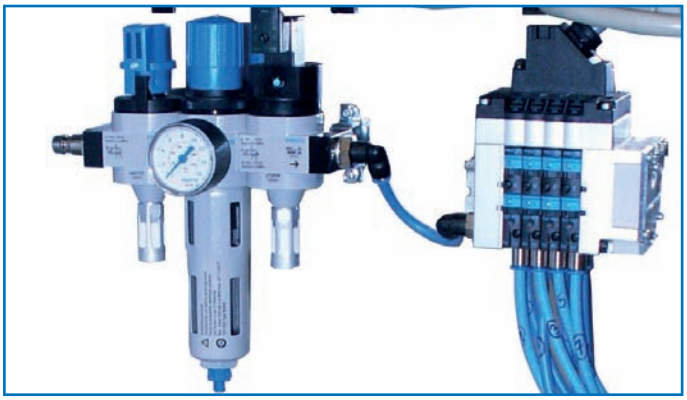


Image 6: Valve terminal with maintenance unit

Power Distribution Unit

The power distribution unit provides the supply voltages for the various system components and, if required, includes the safety technology required for the system. One- and three-phase versions are available with or without emergency stop control unit. Up to three auxiliary voltages are provided for the supply of adapter electronics and the like.
The power distribution unit can be easily replaced due to its 19" rack design.

Image 7: LXinstruments PDU

Image 8: VPC F12 adapter interface

The interfaces are available in different form factors and can be equipped modularly with different contact inserts. Where appropriate, LXinstruments has developed printed circuit boards for the contact modules which serve a direct conversion to the connector types and pin assignments of the standard cables used.

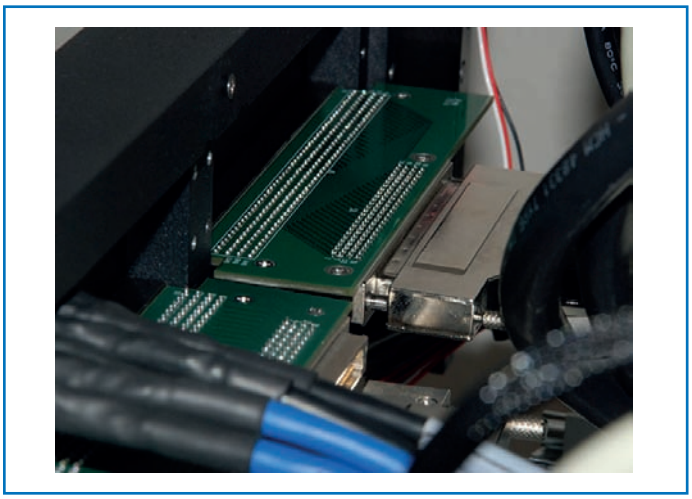
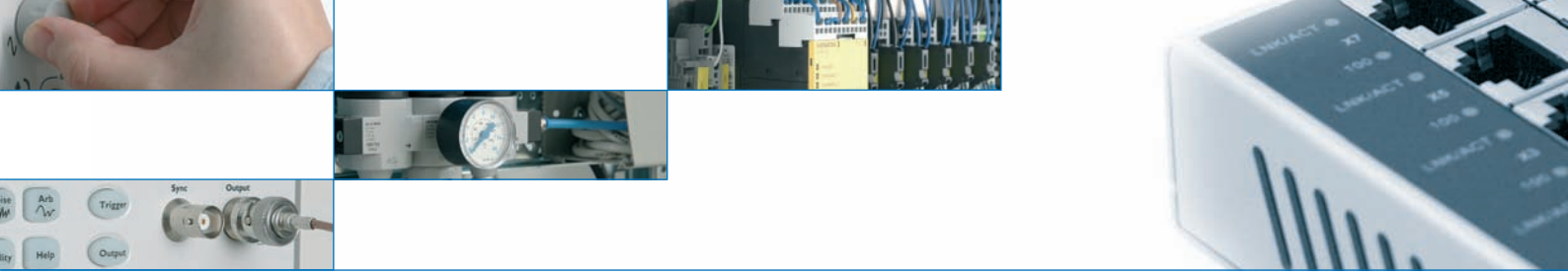


Image 9: Routing PCB for VPC contact block

The new Virginia Panel VTAC® contact modules are used for fast differential signals as they occur in modern communication interfaces (Ethernet, USB, CAN, etc.). This means that these data streams can also be easily routed from the test system to the DUT at data rates in the gigabit range.



Test Software Suite

The LXinstruments test software suite is an integral part of the OTP² system concept and consists of several scalable and optionally usable software tools. Together they form a powerful software environment for the development and operation of functional test applications.

The software has an open modular structure and covers the following functional areas:

Test Executive

The LXinstruments software suite is based on the commercially available test sequencers National Instruments TestStand® and Keysight Technologies TestExec SL®.

The graphical development environment (integraded development environment) of the sequencer is used to develop the product-specific test sequence. It allows a simple creation of the test sequence in the manner of an interpreter with comfortable debugging options. For the test engineer, the focus is on the knowledge of the test object but not on mastering a complex programming language.

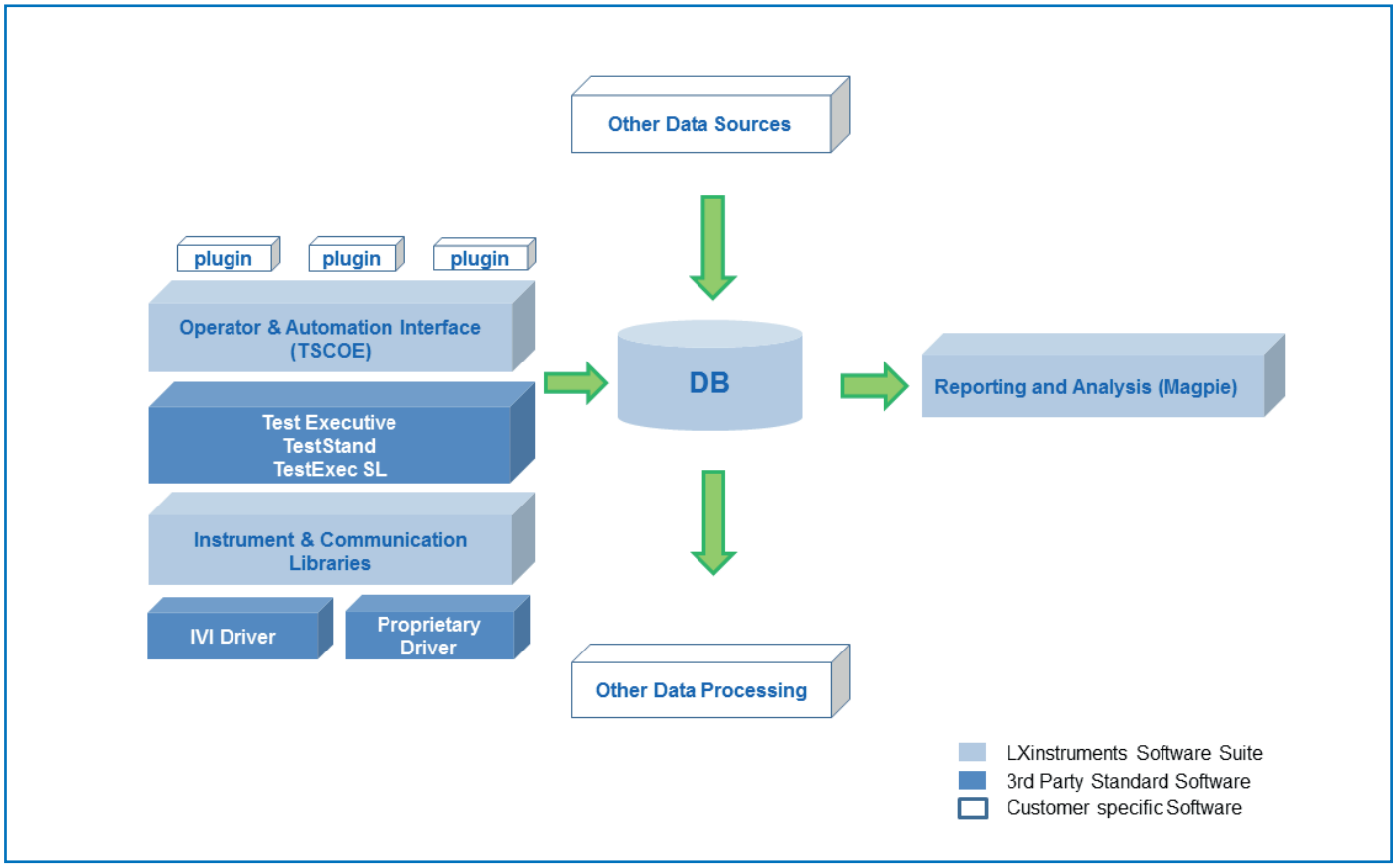


Image 10: Software architecture

- Creation of the test software in the development environment of NI TestStand® or Keysight Technologies TestExec SL®
- Operation of the software in the production environment with extensive and easily adaptable process interfaces
- One database-driven, centralized test data management locally or in the network - for all types of test systems
- Evaluation software for data mining, data analysis and traceability

Even without the test engineer's programming knowledge, simple parameterisation of the measurements is possible thanks to the convenient device libraries.

LXinstruments TSCOE Operator Interface

The Operator Interface is the interactive user interface for the test system during production. Based on the rights profile defined in TSCOE, the respective operator can access certain functions of the test system.

TSCOE displays the essential contents for the operator, such as test results, test sequence and test system status. The language of the user interface can be easily changed via corresponding language files.

Another important function of TSCOE is the connection of the test system to other process interfaces, such as the identification of the test item via barcode reader, communication with the automation technology and the identification of the test items.

Relational LXinstruments Test Database

The relational test database is the centre of the modular software structure. It is used to store comprehensive data.

- Modelling of the test systems used (data sources)
- Properties of the testable products (product master data, test applications and parameters)
- Data and rights of all authorised users
- Production or test orders and order-related data
- DUT-related data and test results with complete documentation of all tests performed for a DUT
- Repair data

LXinstruments Magpie Data Mining and Evaluation Software

The Magpie analysis software can be operated on any PC as long as it has access to the test database via the network (TCP-IP). In addition to extensive analysis functions, Magpie also allows, for example, the execution of an ad hoc analysis of the measuring equipment capability.

Customizing

Through application-specific extensions in hardware and software, our system can be adapted to your requirements with full functionality. The functionality of our systems can be adapted to your requirements by application-specific hardware and software extensions. Defined interfaces are available for this purpose, so that the advantages of standardization are retained.

For customer-specific solution elements, we work with you to develop the appropriate support concept.

Test Adapters and Application Creation

The OTP² system platform is fully documented and follows an open system approach. So you can have test adapters and test procedures created by yourself or by service providers at any time. Of course we also offer these services ourselves.

Maintenance and Repair

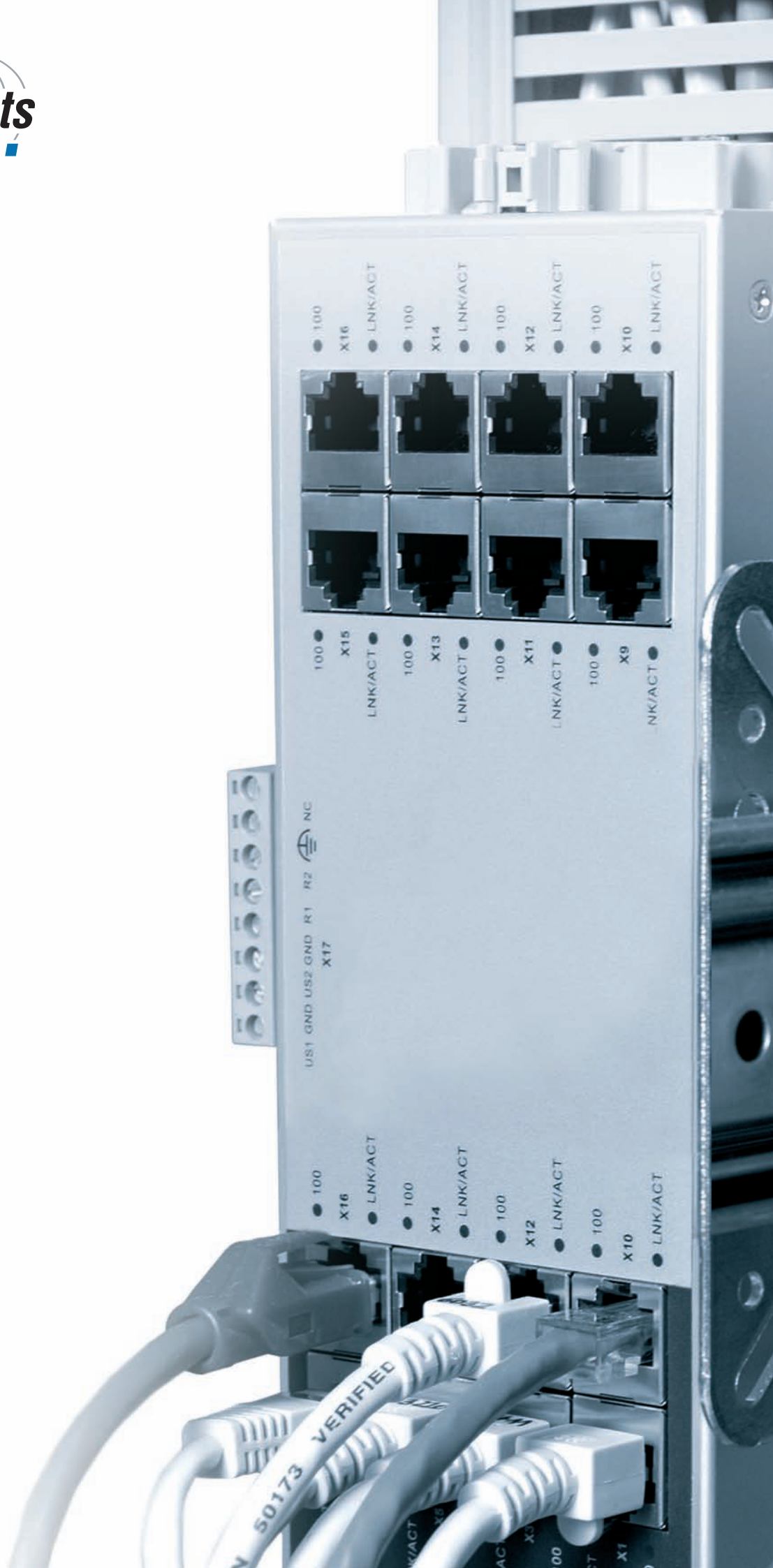
The enhanced OTP platform ensures such high reliability and availability that it easily meets the high demands of mass production, EMS service providers or remote locations.

- If problems arise, a tried and tested self-test allows simple and comprehensive diagnosis.
- Our experts will assist you with troubleshooting via remote access
- Minimal waiting times thanks to intelligent spare parts logistics
- Your employees can often replace components themselves or extend the system at a reasonable price

Additional Services

- General contractor for the entire system with test adapters, automation technology and integration into the company's infrastructure
- Technical consulting services such as feasibility studies, test and adaptation concepts and creation of requirement specifications
- Training and education for hardware and software products
- Calibration, maintenance, on-site repair & service

LXinstruments



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Art.-No.: LX-OTP-2018-english