HYDAC | INTERNATIONAL

TTControl | MATCH Hardware and Software Packages

For the development of
mobile machines ready for the future

It's a MATCH:
Intelligent Hardware and
Innovative Software in One Package

HYDAC Software and TTControl have extended the product range for the development of mobile machines with combined hardware and software packages.

Save up to 50 % development time

Our hardware and software packages allow you to develop extremely reliable and functionally safe electronic control systems, quickly and cost-effectively. The packages fit perfectly to each other. This enables efficient implementation of safety-relevant applications for complex vehicle and machine control systems – in line with the V-model and in up to 50 % less time.

Your advantage: the combined expertise of two strong partners

TTControl
HYDAC INTERNATIONAL

In a joint venture since 2008, TTControl has been complementing the HYDAC Group's portfolio with a pioneering range of mobile control systems and HMIs.

MATCH
BY HYDAC

HYDAC has been developing innovative software solutions for mobile machines since 2010. Our core product is MATCH, a holistic software platform for mobile automation. Founded in 2017, HYDAC Software GmbH is continuously expanding its range of software solutions.

MATCH Software Tools

The versatile and perfectly coordinated tools in the MATCH tool chain supply tailor-made solutions throughout the machine's entire life cycle. The software tools are an integral part of the packages and can be used individually or as a complete package, depending on requirements.

PDT

The Project Definition Tool (PDT) supports the development, documentation, testing and production of embedded software applications for controllers and displays in complex vehicles and machines. Tested and certified toolboxes significantly simplify and accelerate application development.

MST

The Machine Service Tool (MST) supports the machine configuration and maintenance of the software applications developed using MATCH. The software tool can be used over the machine's entire life cycle.

TSE

The Test and Simulation Environment (TSE) supports all test levels based on the V-model. It enables module tests, integration tests, system tests and application tests.

MATCH Hardware
All in one

MATCH Hardware provides you with the optimum system electronics solution for your specific machine project: the perfectly matched embedded software is supplied with every piece of hardware.

There are six modular software packages that build upon each other. Each software package covers different levels of complexity and work tasks.

The main highlight: each software package can be extended with additional software tools and/or further add-ons for the tools – allowing you to cover all your machine control's specific requirements with pinpoint accuracy.

Our tip for getting started: the MATCH Explorer package. When you purchase the controller hardware, we supply the basic licence for functional safe software development with MATCH free of charge.

MATCH Hardware + Software packages	Controllers	I/O modules	Connectivity	Displays
🔗 MATCH **Explorer**	✓	or ✓	or	✓
🔗 MATCH **Standard**	✓ ✓			
🔗 MATCH **Advanced**	✓ ✓ +	✓ ✓		
🔗 MATCH **Ultimate**	✓ ✓ +	✓ ✓ +	✓ ✓ +	✓ ✓
🔗 MATCH **Display & Connectivity**			✓ ✓ +	✓ ✓
🔗 MATCH **Testing**	✓ ✓ +	✓ ✓		

✓ Only one of these components can be integrated into a project

✓ ✓ Two or more components can be integrated into a project

MATCH Hardware Components at a Glance
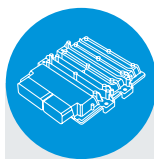
Controllers
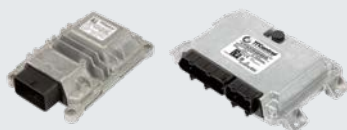
TTC 30 family | TTC 50 family
Freely programmable family of controllers for cost-optimised applications

TTC 500 family
High-performance safety control systems for high-end applications

TTC 2000 series
High-performance safety control systems which use the latest multi-core processor technology

I/O modules (IOM)

TTC 30XSH
CANopen-based and safety-certified, robust I/O module with flexible configuration of inputs and outputs
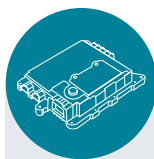
HSW J1939 IOM
J1939-based safety-certified I/O module with integrated error handling and flexible configuration of inputs and outputs

TTC 48XS
CANopen-based and safety-certified, robust I/O module with flexible configuration of inputs and outputs

Connectivity

TTConnect Wave
Connectivity solution for accessing your machines remotely

Fusion
State-of-the-art multi-interface edge computing platform with high computing power and multi-monitor control, equipped with an AI accelerator

TTConnect Cloud
Plug-and-play solution for monitoring and managing fleets and vehicles

Displays

Vision 305
Robust and compact 5" display with an excellent price-performance ratio

Vision 307
Robust 7" touchscreen display with an integrated high-end Vision 3 display controller and solid protection for use in off-highway vehicles

Vision 312
Versatile 12" display, extremely robust, with high CPU performance and intuitive user interface
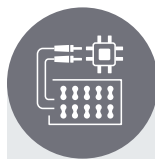
Camera

HVT 1000
High-performance Ethernet camera equipped with a latest generation image sensor and processor

Testing

Breakout box(es)
Breakout solutions for simple commissioning and rapid field diagnostics, for use with all controller families and all I/O modules

HYDAC

MATCH Software Packages
Precisely Tailored to the Hardware
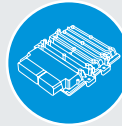
MATCH Explorer

All of MATCH's advantages for programming individual hardware components on your machine

Do you plan on programming a controller, display or remote device and having it customised to your specific machine requirements? If so, **MATCH Explorer** allows you to enjoy all the benefits of the holistic MATCH software platform: from robust, TÜV-certified middleware and extensive library modules to integrated functional safety. The package is available for C, CODESYS® and Qt, depending on the hardware. Not to mention: **MATCH Explorer** is integrated free of charge when you purchase a MATCH hardware component.

Controller   **Display**   **Connectivity**

or   **or**

...each as a single project

At a glance

- Definition and configuration of the software project per hardware component
- Efficient programming at a high level of abstraction using MATCH middleware
- Simulating and debugging the embedded controller software on a PC
- Perfect application portability to other MATCH hardware components
- Configure CAN messages instead of programming them
- Controlling and reading out standard components such as directional valves and proportional valves, joysticks, sensors, switches etc.
- Servicing the controller: adjusting parameters, configurations, reading out error codes, vehicle states and diagnostic values
- Extensively configurable error management with numerous interfaces for achieving the requirements in the event of an error
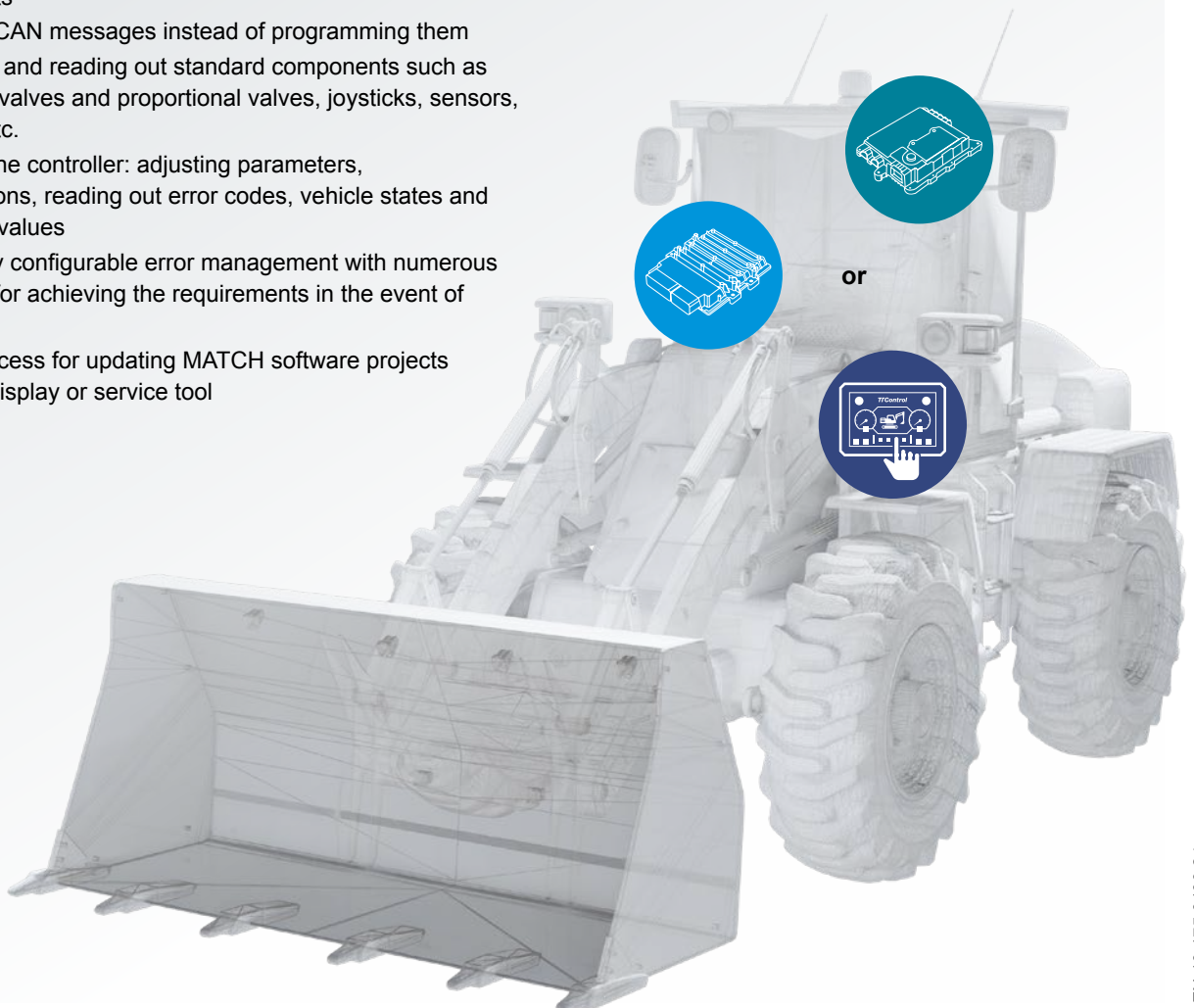- Simple process for updating MATCH software projects using the display or service tool

or

MATCH Standard

For programming all controllers connected in the machine network as part of a joint project

The **MATCH Standard** package builds on MATCH Explorer. This means that you have all the functionalities of the basic package at your disposal. Plus: **MATCH Standard** allows you to define your software project at a machine level and easily program all controllers connected to the machine's network, including the diagnostic connection. The package is available for C and CODESYS®, depending on the hardware. The Code Builder for MATLAB/Simulink® is available separately.

The MATCH Standard add-ons

- Manage several controllers in just one machine project
- Generate embedded code for all controllers in the machine network at the touch of a button
- Automated generation of documentation for projects and development
- Development service tool with comprehensive services from optimisation of prototypes up to commissioning at the end of production line
- Service interface with up to eight customisable access levels and user authentication
- Machine-specific fleet management

Controllers
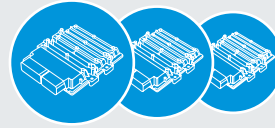
...individually or in a network

MATCH Advanced

For the development of connected controller architectures with I/O module extensions within a complex machine network

MATCH Advanced extends the standard package. As well as giving you the opportunity to benefit from all the functionalities of MATCH Explorer and MATCH Standard.
It also enables you to set up complex applications with a large number of inputs and outputs and precisely configure all desired machine requirements within the network. The package is available for C and CODESYS®, depending on the hardware. The Code Builder for MATLAB/Simulink® is available separately.
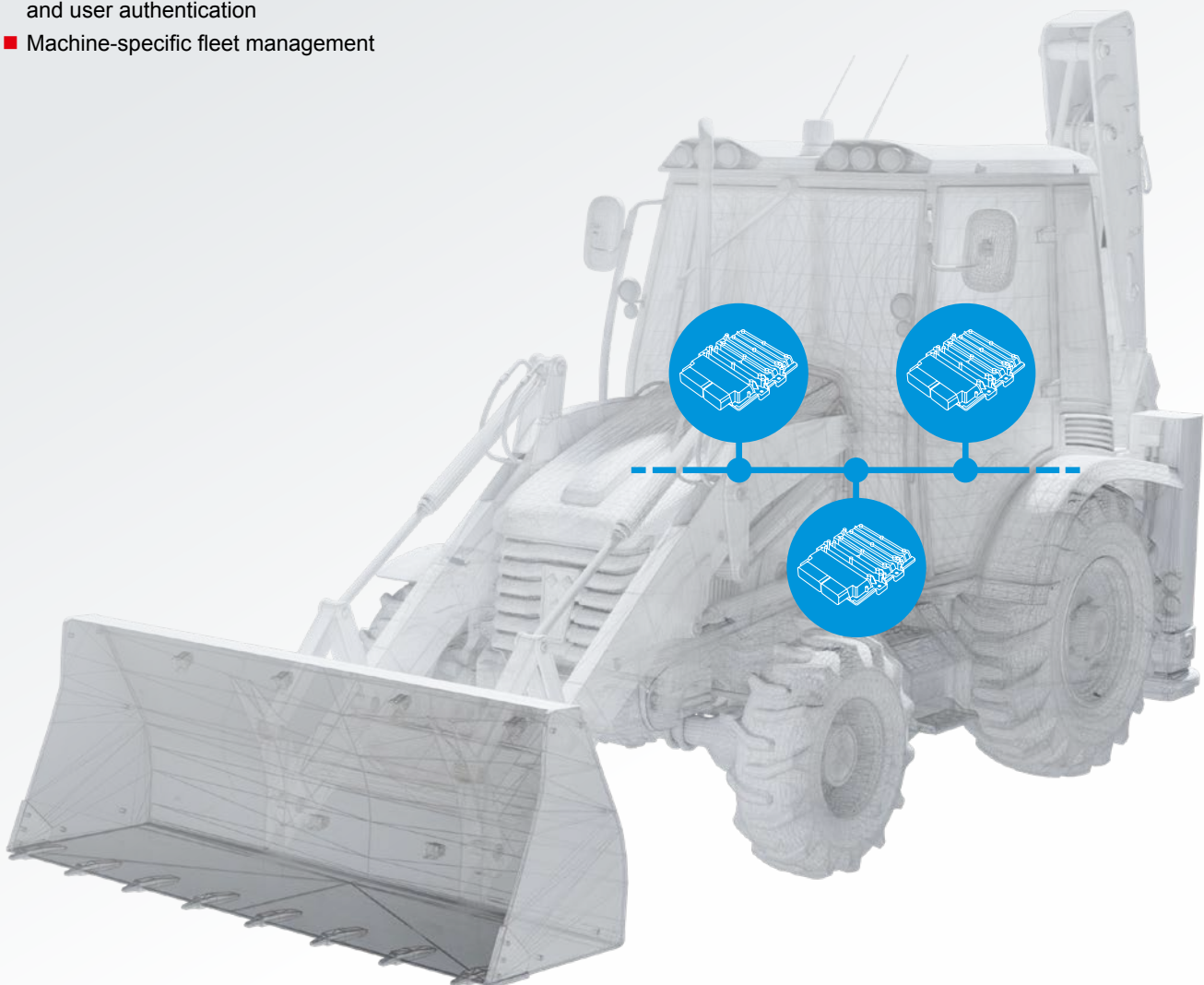
Controllers

&

I/O modules

...individually or in a network

...CANopen & J1939 interfaces

The MATCH Advanced add-ons

- CANopen Safety Protocol Stack for functional safe connection of safety I/O modules
- J1939 Safety Protocol Stack for functional safe communication with the J1939 HYDAC Software I/O module
- Advanced Output & Signal Control toolboxes for extended functionality
- DMX Selected Services
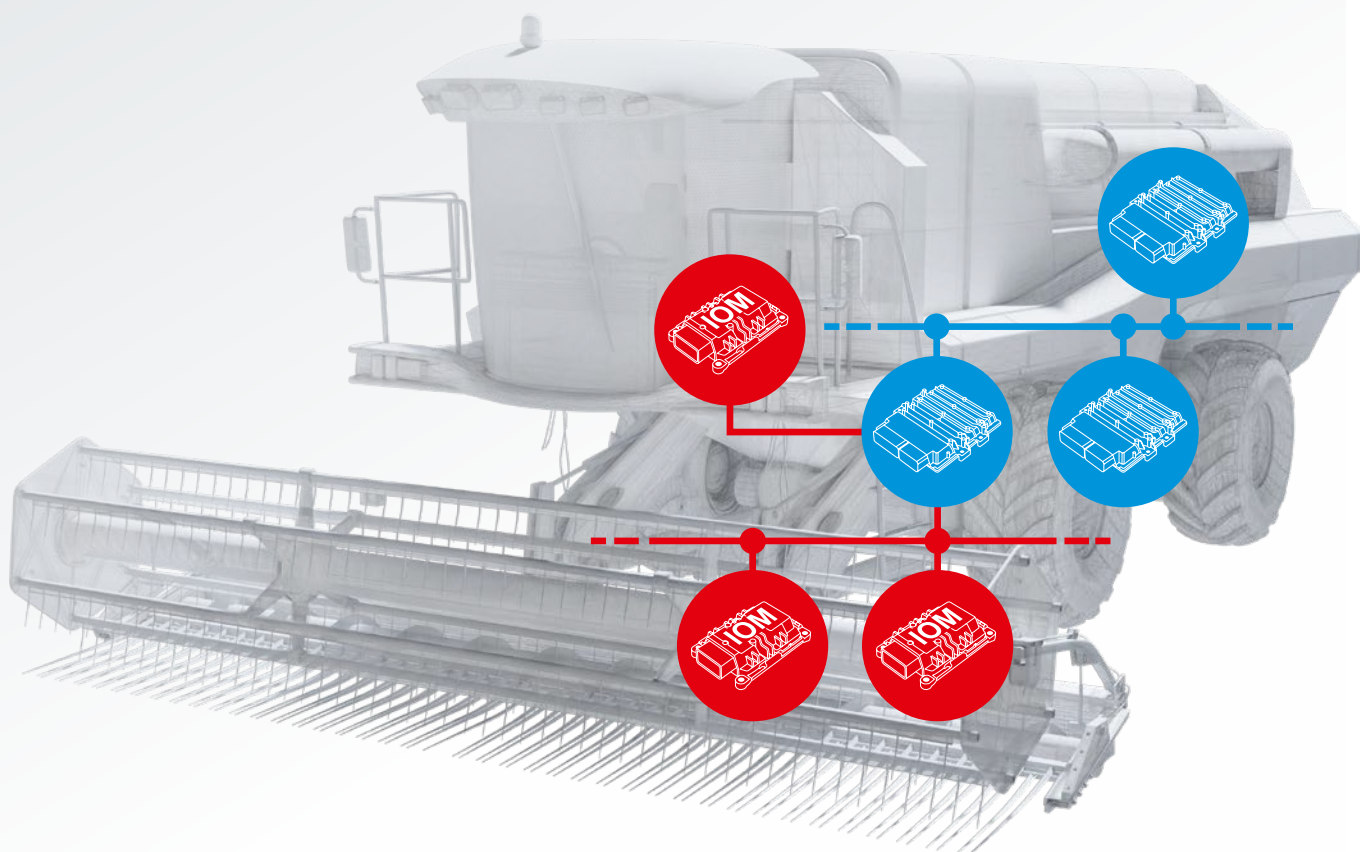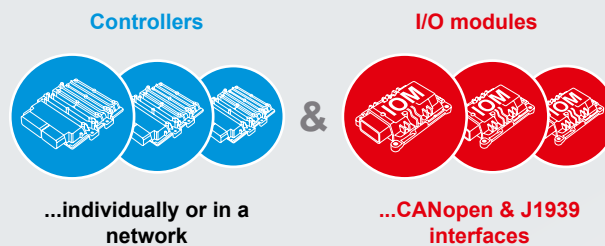
MATCH Ultimate

For the implementation of networked vehicle architectures with controllers, displays, connectivity and I/O modules

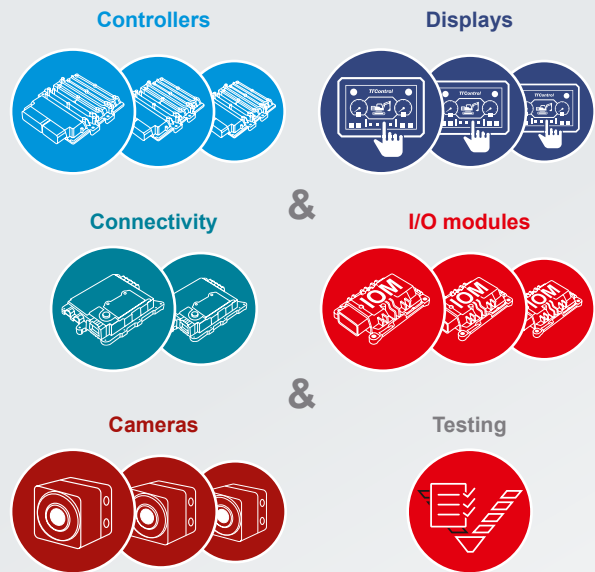**MATCH Ultimate** is an extension to MATCH Advanced, offering you all the options you need to create complex hardware architectures on your machine whilst complying with demanding safety and quality standards. Developers and testers benefit in several respects: **MATCH Ultimate** provides the necessary tools for all phases of development. All the steps build on each other perfectly. Users in the development process have access to the same database. The main highlight: the TSE is a dedicated tool for testing, allowing you to automatically test your machine project at all levels of the V-model.

The MATCH Ultimate add-ons

- One tool for the whole machine software
- Testing during development according to the V-model saves valuable time: unit-, module-, integration- and system-testing on machine level
- Extensive Qt libraries for displays and connectivity solutions in the machine network with controllers and I/O modules
- Service tool designer for customisable service pages
- Additional service tool for a second developer

Controllers

Displays

&

Connectivity

I/O modules

&

Cameras

Testing

...individually or as a complete networked system

MATCH Display & Connectivity

For display and connectivity architectures combined on vehicle level

Display and telematics programming made easy:
MATCH Display & Connectivity is an extension to the MATCH Explorer package that enables fast and, above all, platform-independent development while also supporting camera and cloud connectivity. A plug-and-play solution is also available with the TTConnect Cloud.
MATCH Display & Connectivity enables you to write software once and then use it without modification: you program your display with the advantages of MATCH and then benefit from these advantages with all Linux devices with Qt.

The advantages of MATCH Display & Connectivity

- Efficient programming at a high level of abstraction using MATCH Qt middleware
- Qt middleware offers extensive functions and many solutions to problems (e.g. mathematical and logical operations, time and date functions, etc.)
- Specialised widgets for your own UIs
- Perfect software portability between the MATCH Qt hardware components
- Diagnostic functions, error and parameter management
- Software download to MATCH controllers
- User authentication, data logging etc.
- Generation of service pages and diagnostic pages
- Multiple languages

Displays   **Connectivity**

Cameras   **&**   **Cloud connectivity**

...individually or as a complete networked system

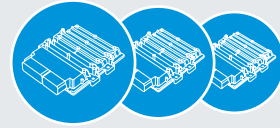# MATCH Testing & Validation

For efficient controller software testing, including functional safety and documentation

MATCH Testing & Validation is geared towards testers' specific requirements. The software package allows quick plug-and-play implementation of all the test levels based on the V-model with integrated safety standards and consistent data. The test levels can easily be automated using scripts. In addition, the requirements, use cases and test cases are available directly in the scripts and are linked in a transparent way (traceable).

The advantages of MATCH Testing & Validation

- Simple creation, management and documentation of test projects, from individual controllers to large tests with multiple controllers
- Plug-and-play testing for all test levels based on the V-model: unit tests, module tests, integration tests and system tests
- Simple implementation of software tests on the virtual test bench
- Hybrid test approach: combination of virtual and physical controllers in a network
- Automated testing thanks to a test script interface
- Definition of test sequences according to the "Arrange – Act – Assert" principle
- Creation and use of custom diagnostic pages
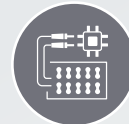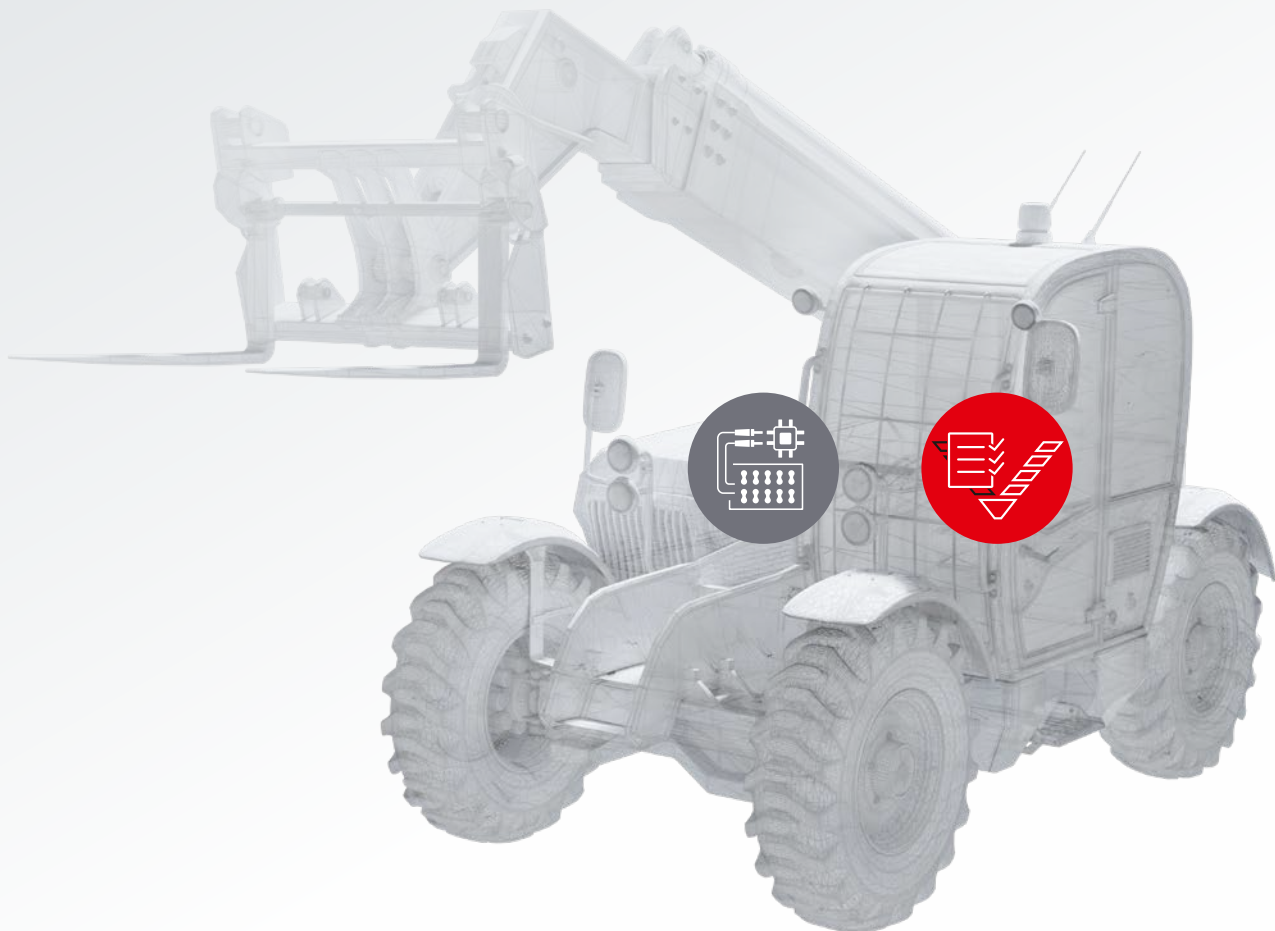- Additional service tool for a second tester

Controller testing

...individually or in a network

&

BoB   **Testing**

Key Functions at a Glance

Package / Hardware	Explorer	Standard	Advanced	Ultimate	Display & Telematics	Testing & Validation
	Single Controller, Single Display, Single Connectivity Device	Multi Controller	Multi Controller, Multi I/O Modules	Multi Controller, Multi Display, Multi Connectivity Device, Multi I/O Modules	Multi Display, Multi Connectivity Device	Multi Controller Testing
Tools						
Development with the Project Definition Tool PDT	X	X	X	X	X	
Testing with the Test & Simulation Environment TSE				X		X
Servicing with the Machine Service Tool MST	Lite	Developer	Developer	Developer & Ultimate (Service Page Designer)	Service	Developer & Ultimate (Service Page Designer)
Protocols						
CANopen Safety			X	X		
J1939 I/O-Module Safety Stack			X	X		
DMX Selected Services J1939			X	X		
UDS Selected Services			X	X		
Toolboxes						
Standard	X	X	X	X		
Float Mathematics	X	X	X	X		
Advanced Outputs			X	X		
Signal Control			X	X		

Each package can be extended with additional software tools and add-ons – allowing you to cover all of your machine controller's specific requirements with pinpoint accuracy.

Contact us today

Would you like to receive more information on our packages, prices and functionalities? Then visit our website or get in touch with our experts.
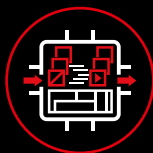
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⚭ MATCH

YOUR BENEFITS

READY TO USE FUNCTIONS

CLICK & USE

TESTING WITH EASE

ONE DATA SOURCE

MINIMISED EFFORT

ALL IN ONE

SAVE TIME & MONEY

SAFETY INCLUDED

CERTIFIED SAFETY

YOUR SOFTWARE-TOOLS

P D T
PROJECT DEFINITION TOOL

M S T
MACHINE SERVICE TOOL

T S E
TEST & SIMULATION ENVIRONMENT

Note

The information in this brochure relates to the operating conditions and applications described. For applications and / or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.