

ENGINEERING  
TOMORROW

*Danfoss*

Danfoss Power Solutions presents

# Electronic Controls Portfolio

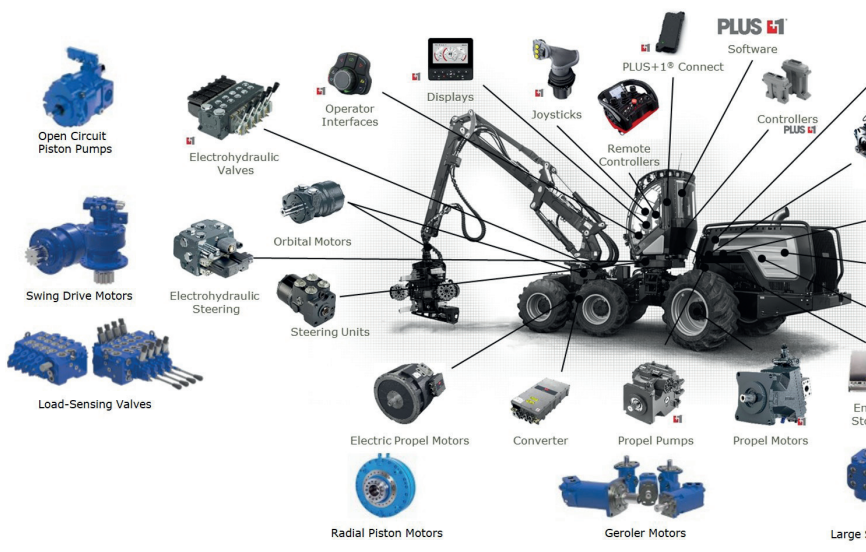
**SAUER BIBUS**  
////// SUPPORTING YOUR SUCCESS



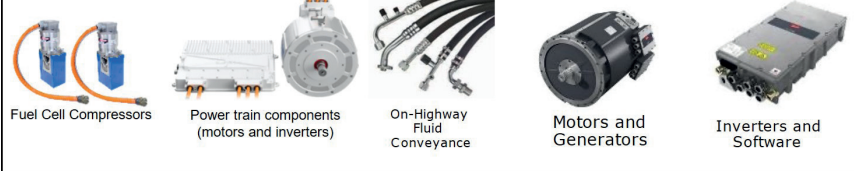
# PLUS+1<sup>®</sup> Eco System

## The evolution from hardware-only

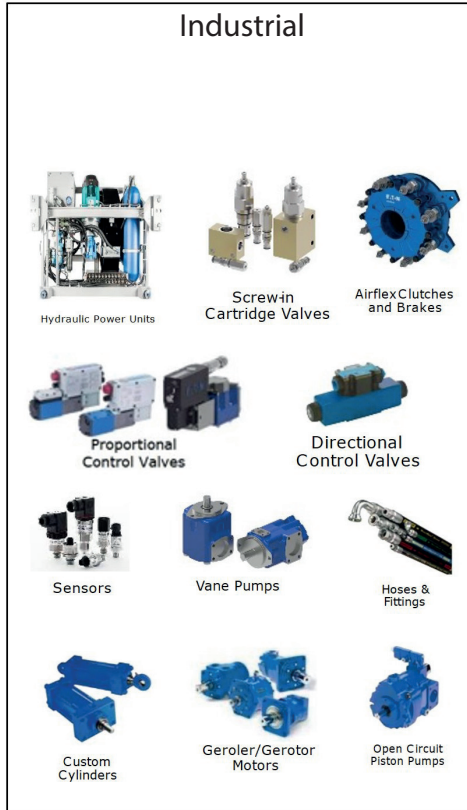
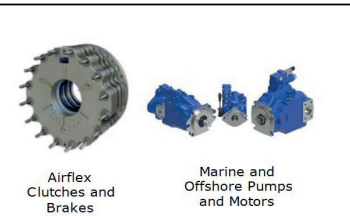
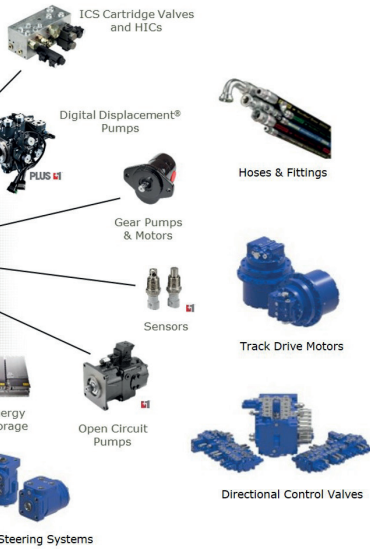
### Mobile off-highway



### On-highway & Marine



# to software systems and services



# PLUS+1<sup>®</sup> Software



**PLUS+1**

## Fast. Easy. Open.

PLUS+1 GUIDE and PLUS+1 Service Tool are the foundation of the PLUS+1 Platform. Engineered to accelerate your development process and bring higher quality machines to market faster.

Build your application with drag-and-drop logical components or software blocks in the PLUS+1 GUIDE graphical interface.

Get started today with a free Express license or 90-day Professional trial of PLUS+1 GUIDE and Service Tool.

- ☒ The PLUS+1 Platform is specifically designed for mobile control, giving you tools to bring your machine applications to market faster
- ☒ The simple and intuitive interface makes PLUS+1 GUIDE and Service Tool easy to learn
- ☒ Import any existing IEC 61131-3 language, or C-code programs with the openness of the PLUS+1 Platform
- ☒ PLUS+1 Compliance - Choose from hundreds of function blocks/libraries specifically designed for mobile control
- ☒ Go to market faster with a variety of PLUS+1 off-the-shelf sub-system applications
- ☒ Functional Safety ready – Fulfils requirements for IEC 61508:2010 support tool certification
- ☒ Service your machines wired or wirelessly with the very powerful PLUS+1 Service Tool or PLUS+1 Mobile solution



PLUS+1 GUIDE



PLUS+1 Learning and Support



PLUS+1 Service Tool



PLUS+1 Mobile Service Tool



**PLUS+1**

# PLUS+1<sup>®</sup> Controllers

## Intelligent vehicle control

Our PLUS+1 controllers are the brains behind intelligent vehicle control. Swiftly programmable to your specific requirements. Our powerful PLUS+1 microcontrollers bring intelligence to every node of a distributed control system. Thanks to their rugged design, they'll withstand the toughest conditions your vehicle comes up against. Programming our controllers requires minimum effort with our easy-to-learn PLUS+1 GUIDE software.

- ❑ Hardware specifically designed for mobile use
- ❑ High speed technology to process even the most complex applications
- ❑ Software-configurable universal I/O for multiple control options
- ❑ Simpler system design and faster development cycles with PLUS+1 toolchain
- ❑ SC/XL controllers are SIL 2 capable (Safety Integrity Level 2 according to IEC 61508)
- ❑ C-open capability and high current driver options on some controllers



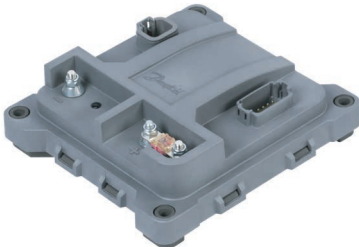
PLUS+1 safety SC microcontrollers



PLUS+1 MC microcontrollers



PLUS+1 input/output expansion modules



PLUS+1 high current controllers



PLUS+1 XL controllers



**PLUS+1**

# PLUS+1<sup>®</sup> Displays

## Monitoring, control and diagnostics

Monitoring vehicle performance has never been easier. Our displays give a customized all-in-one overview of your vehicle's CAN-based network. Just what operators need for continuous monitoring, control and diagnostics.

Many options are available with our PLUS+1 programmable displays – from plug and play to customized operator interfaces with optional external video.

All our displays have one thing in common: they provide an integrated operating network that brings the entire hydraulic system on your vehicle together. Whatever your needs, our displays can monitor every hydraulically-controlled detail, from oil pressure to machine angles.

- ❑ Supreme viewability with high brightness and optical bonding
- ❑ Touch technology and/or multiple button configuration options
- ❑ Multiple connectivity options
- ❑ Simpler screen design with PLUS+1 toolchain and widget libraries
- ❑ Certification for Marine application use with our DM430M
- ❑ CAN Rotary device for external screen navigation and machine control – The next level in operator comfort and machine modernization





DM700



DM1000 & DM1200 series



HMR CAN Rotary device



DM430E series



DM430M series



**PLUS+1**

# PLUS+1<sup>®</sup> Joysticks & Footpedals

## Endless configuration possibilities

Operators get a real feel for control with our wide range of joysticks. Endless configuration possibilities and ergonomic designs enable smooth and comfortable operation of your light or heavy-duty vehicles. With single- and dual-axis configurations and multiple mechanical and electrical interface options. Our joysticks are as versatile as they come. A complete range of modular PLUS+1 Compliant joysticks to support our intelligent mobile control solutions.

- ❑ Customizable solutions: Build your own joystick. Choose from four bases and five ergonomic grip types, with flexible button and switch placement
- ❑ PLUS+1 GUIDE Programmability – Remove the need for an additional controller in the system.
- ❑ Multiple electrical interfaces available for ease of configuration - including CAN+ (input module capability - allow up to 11 Digital/Analogue inputs)
- ❑ Superior performance: PLUS+1 Compliance enables simple and seamless future-oriented integration in the machine control system
- ❑ Faster, more flexible fulfilment times: The JS1-H standard portfolio is readily available, enabling you to reduce your warehouse stocks, including globally situated Build Centres.
- ❑ Bi-directional and uni-directional footpedals: Rugged design, high operating life, SIL 2 (Safety Integrity Level 2 according to IEC 61508)



JS1-H



JS1000



Bi-directional  
foot pedal



Uni-directional  
foot pedal



**PLUS+1**

# PLUS+1<sup>®</sup> Operator Interfaces

## Operator ergonomics and machine modernization possibilities

We are constantly striving to provide our operators with the most ergonomic and modernized human-machine interfaces. Our Human Machine Interface (HMI) CAN-based devices combine an ergonomic, modern and rugged design, into compact solutions for both open and enclosed cabs.

- ❑ CAN Rotary device for external screen navigation and machine control. The next level in operator comfort and machine modernization
- ❑ Online configurator with almost 5,000 different icons as per ISO 7000, or fully customized for a truly unique appearance
- ❑ Intuitive five-finger control, allowing for “blind” operation of the device
- ❑ CAN controlled RGB LEDs provide give the flexibility to easily customize each button for colour and frequency
- ❑ Simpler system design and faster development cycles with PLUS+1<sup>®</sup> toolchain
- ❑ PLUS+1 Partner Program for fast integration of CAN Keypads



HMR CAN rotary devices



HMK powered by PLUS+1 Partner Program

# PLUS+1<sup>®</sup> Connect



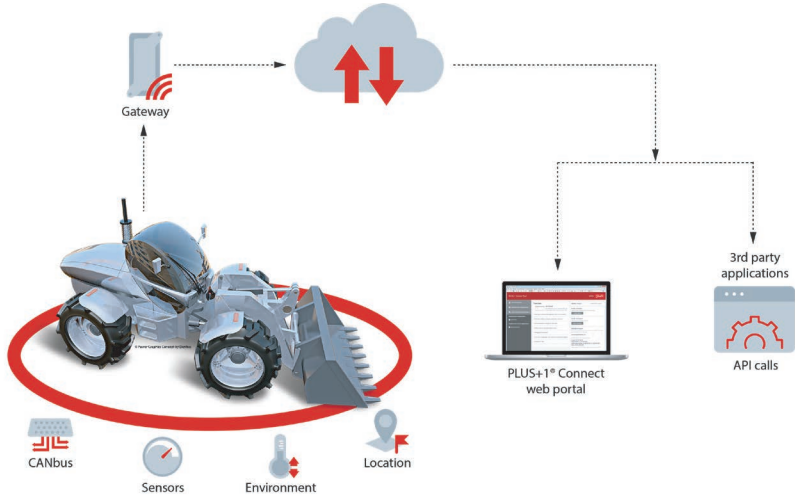
**PLUS+1**

## Leveraging your data for optimal performance

PLUS+1 Connect combines telematics hardware, software infrastructure and a user-friendly interface, on a single cloud platform; to provide one cohesive, connected experience. The platform opens the door to numerous value-adding services, from fleet management to remote diagnostics and over-the-air programming. Built-in alerts and alarms will keep you informed about the machine condition, or if a preset geo-fence is crossed.

Our hardware portfolio meets a wide range of connectivity needs, via cellular services, Wi-Fi networks and/or Bluetooth connections. The PLUS+1 Connect machine monitoring platform then provides insights to optimize machine efficiency, improve productivity and facilitate servicing through data generated on site.

- ☒ Machine monitoring, diagnostics and remote updates
- ☒ Entire hardware portfolio on a single platform to meet mixed-fleet needs
- ☒ Customizable, widget-based interface with multiple dashboard levels
- ☒ Fully encrypted to ensure data security
- ☒ Easy to order digital service plans via PLUS+1 MarketPlace
- ☒ Compatible with multiple satellite navigation systems for global operability



CS10 wireless gateway



CS100 cellular gateway



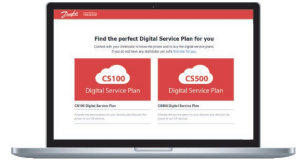
CS500 IoT gateway



PLUS+1® Mobile



PLUS+1 Connect Portal



PLUS+1 MarketPlace

# PLUS+1<sup>®</sup> Remote Controls



**PLUS+1**

## Intelligent vehicle control

Our PLUS+1 remote controls incorporate the latest human-machine interface technologies. Through radio technology, the operator is kept at a safe distance while also improving productivity. The user-friendly programming tools and plug-and-play systems, ensure a fast customization and commissioning. Our remote controls are robust, ergonomic and safe.

- ☒ Flexible and freely configurable. The Console Boxes frontplate is 100% customizable and all the devices are equipped with an external configurable SIM EEPROM.
- ☒ Ergonomic design. Operator comfort is crucial for a human machine interface, which is why we have ergonomics at our core when designing the products.
- ☒ Knowledge and Tool sharing. We have developed support and service solutions to enable an autonomous approach, thus enhancing the customer experience. Such as:
  - ☒ PLUS+1 Compliance Block
  - ☒ Remote Control and display configurator
  - ☒ EEPROM programmer
  - ☒ Remote Controls Customer Service Center
- ☒ Safety comes first. The most recent software platform, working in 2.4GHz band has been certified with Category 3-PLe by TÜV on the E-Stop.





iKontrol family transmitters



Ikompact transmitters



Ikore transmitters



Ikargo transmitters



R Explosion-proof portfolio



R family receivers



MP family receivers



**PLUS+1**

# PLUS+1<sup>®</sup> Autonomy

## Fast-track to autonomous machine functions

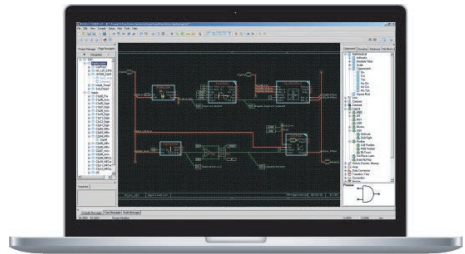
The PLUS+1 Autonomy platform increases operator and worker safety by removing the operator from dangerous test environments and minimizing safety risks, through features such as collision avoidance. It also improves machine and operator productivity by automating navigation and work functions.

The XM100 autonomous controller, Danfoss' first autonomous hardware solution, supports customers in enabling Level-3 Autonomy and delivers the central processing power for the future of mobile machinery and development. The XM100 Controller meets the needs of autonomous machines by interfacing with GNSS systems, LiDAR, Radar and inertial sensors while carrying out autonomous navigation tasks.

With the integrated PLUS+1 Autonomous Control Library (ACL), machine manufacturers are able to add autonomous functionality to their machines without writing a single line of code, by using the pre-programmed and pre-tested function blocks, each covering key areas like perception, positioning, and navigation.



XM100 controller



PLUS+1 Autonomous Control Library

### Software features:

- ❑ Obstacle detection
- ❑ Obstacle detection and avoidance
- ❑ Feature localization
- ❑ Path following

### Hardware features:

- ❑ Powerful i.MX 6 QuadPlus processor
- ❑ 8 GB of flash and 2GB of DDR3RAM
- ❑ 4 CAN ports
- ❑ Interfaces for LiDAR & Radar over Ethernet (10/100)
- ❑ Integrated 6-Axis Inertial Measurement Unit
- ❑ GNSS Receiver with 1.5M CEP50 position accuracy
- ❑ Simpler system design and faster development cycles with PLUS+1 toolchain



# PLUS+1<sup>®</sup> Sensors

## Compliance support

Our temperature or pressure-detecting sensors link your machine functions directly into the control system. PLUS+1 Compliance further supports easy device integration, and contributes to precision control in all types of mobile control application.

Many of the sensors in our broad range are PLUS+1 Compliant. Contributing to precision control systems on all kinds of mobile application.

- ☒ Hall-effect and MEMS technology
- ☒ Single or redundant options
- ☒ Multiple output options, i.e. SAE J1939, Current or Ratiometric
- ☒ High burst and over pressure capabilities due to fully welded design
- ☒ SIL 2 (Safety Integrity Level 2 according to IEC 61508) pressure sensors
- ☒ Simpler system design and faster development cycles with PLUS+1 toolchain



Position sensors



Heavy-duty  
pressure transmitter



Temperature  
sensors



KPP speed sensors



# Product Support

## Technical Support

If you need technical support for your products (controllers or other hardware), simply contact us

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