KIBES® Body and Chassis Control

Multiplex system for commercial vehicles

www.continental-automotive.com/kibes
KIBES® – Key to integrated onboard electronic system.

Increasing requirements for efficiency, comfort and functionality affect the development of modern vehicles. The KIBES® hardware and software package from Continental can meet the challenge to fulfill them.

The KIBES® system will help to optimize the OEM application – by reducing wirings, connectors, relays, and fuses the vehicle will become more reliable. The costs for wiring up the vehicle, as well as the expenses for documentation service and maintenance, will significantly drop.

With our KIBES® product portfolio, we provide an efficient development tool chain that offers a scalable and flexible network system at a reasonable price, making buses, trucks and special vehicles more powerful, efficient and reliable.

Thanks to the KIBES®-32 / KIBES®-5 software the integration and testing of application software is easy to handle and it supports flexible business models.

Advantages and base systems

The flexible network system of KIBES® allows an easy addition or removal of several components and it also simplifies the maintenance and troubleshooting of the vehicle. Vehicles can be operated more safely and reliably due to built-in diagnostic features like short-circuit protection, open-load, and over-temperature detection.

The minimized amount of wirings, connectors, relays and fuses allow for the vehicle weight and installation time to be significantly reduced, as well as the fuel consumption, documentation service and maintenance costs. At the same time, the vehicle reliability can be improved though high quality components that are carefully tested and validated not only on a component basis, but also on system level.

The system with central computer ZR5-A provides a solution to almost every possible requirement. Up to 18 nodes can be connected to ZR5-A for all types of in- and output signals. It offers a complex CAN network connectivity with powertrain CAN, customer generic CANs, instrument CAN, body CAN and three multiplex CANs. It is also possible to connect different instrument clusters and driver’s workplace solutions with a ZR5-A.

Systems with a control unit of the CBCU3 family provide powerful solutions that are optimized to meet any customer requirement. Up to four nodes can be connected to CBCU3-E via multiplex CAN. Beyond that, control units of the CBCU3 family offer a network of powertrain CAN and instrument CAN, with the latter providing a direct connection to several possible instrument cluster solutions.

The family of MUX5 provides a water protected system with the multiplex node MUX4-Pn for general purposes controlled by the master unit MUX5-Pcu. Up to four MUX4-Pn nodes per multiplex CAN can be connected to MUX5-Pcu. The system also provides four generic CANs, as well as the installation outside of the cabin. LIN as interfaces for intelligent switches, as well as separate intelligent sensor interfaces, round up the connectivity features for inside the vehicle.

Safety relevant functions compliant to ISO 26262 can be supported up to ASIL B. The customer enjoys high flexibility and will be able to program these functions on his own by using the KIBES tool chain and the KIBES®-5 safety manual.
# KIBES®: Advantages and base systems

## Base systems
- **ZR5-A** - central computer
- **MUX5-B**
- **MUX4-Pn**

## Cluster combinations
- **MVP12**
- **BusIC**
- **CIMOT**
- **mDWP**

## Nodes overview
- **MUX5-B**
- **MUX2-B+**
- **MUX2-M+**
- **MUX4-Pn**

## Control units overview
### Installation
- **ZR5-A** - cabin
- **CBCU3** - cabin
- **CBCU3-E** - cabin
- **CBCU3-EL** - cabin
- **MUX5-Pcu** - outside cabin
- **MUX3-E** - cabin

### Operation mode
- **ZR5-A** - master
- **CBCU3** - master
- **CBCU3-E** - master
- **CBCU3-EL** - master
- **MUX5-Pcu** - master
- **MUX3-E** - master

### Possible mix with nodes on M CAN
- **ZR5-A** - up to 12 (1B)
- **CBCU3** - up to 4
- **CBCU3-E** - up to 4
- **CBCU3-EL** - up to 4
- **MUX5-Pcu** - up to 4
- **MUX3-E** - up to 4

### Possible configuration with cluster with driver's workplace
- **ZR5-A** - yes
- **CBCU3** - yes
- **CBCU3-E** - yes
- **CBCU3-EL** - yes
- **MUX5-Pcu** - yes
- **MUX3-E** - yes

### LIN interface
- **ZR5-A** - 2
- **CBCU3** - 2
- **CBCU3-E** - 1 (12 V / 24 V)
- **CBCU3-EL** - 6
- **MUX5-Pcu** - 3
- **MUX3-E** - 1 (optional)

### CAN interface
- **ZR5-A** - 8
- **CBCU3** - 2
- **CBCU3-E** - 3
- **CBCU3-EL** - 3
- **MUX5-Pcu** - 6
- **MUX3-E** - 3

### MCU interface
- **ZR5-A** - –
- **CBCU3** - 1
- **CBCU3-E** - 1
- **CBCU3-EL** - 1
- **MUX5-Pcu** - –
- **MUX3-E** - –

### CVSG interface
- **ZR5-A** - –
- **CBCU3** - –
- **CBCU3-E** - –
- **CBCU3-EL** - –
- **MUX5-Pcu** - 1 (optional)
- **MUX3-E** - –

### Water protection
- **ZR5-A** - cover optional
- **CBCU3** - cover optional
- **CBCU3-E** - cover optional
- **CBCU3-EL** - cover optional
- **MUX5-Pcu** - yes
- **MUX3-E** - –

## Nodes overview
- **MUX5-B**
- **MUX2-B+**
- **MUX2-M+**
- **MUX4-Pn**

### Installation
- **MUX5-B** - cabin
- **MUX2-B+** - body controller
- **MUX2-M+** - body controller
- **MUX4-Pn** - body controller

### Operation mode
- **MUX5-B** - master
- **MUX2-B+** - master
- **MUX2-M+** - master
- **MUX4-Pn** - master

### Possible mix with nodes on M CAN
- **MUX5-B** - MUX2-B+ MUX2-M+ MUX4-Pn

### Corresponding central computer
- **ZR5-A**
- **CBCU3-A**
- **CBCU3-E family**
- **MVP12**

### CAN interface
- **MUX5-B** - M CAN
- **MUX2-B+** - M CAN
- **MUX2-M+** - M CAN
- **MUX4-Pn** - M CAN

### Input digital analog
- **MUX5-B** - 20 (also usable as digital inputs)
- **MUX2-B+** - 24
- **MUX2-M+** - 12
- **MUX4-Pn** - 8 (also usable as digital inputs)

### Output high side (PWM) low side
- **MUX5-B** - 24 (8)
- **MUX2-B+** - 24 (8)
- **MUX2-M+** - 14
- **MUX4-Pn** - 22

### Water protection
- **MUX5-B** - –
- **MUX2-B+** - –
- **MUX2-M+** - –
- **MUX4-Pn** - yes

### Half bridges for motor control
- **MUX5-B** - 4
- **MUX2-B+** - –
- **MUX2-M+** - –
- **MUX4-Pn** - 2

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1. For detailed information see "Modular instrument cluster platforms" brochure, 2016
2. J 1939 Instrument Cluster
3. Concept
4. Not in combination with MUX2-B+ / MUX2-M+
The central controller ZR5-A is an intelligent and powerful gateway controller used together with a variable number of multiplex nodes (max. 18) in high-end multiplex systems.

It is compatible with the node MUX5-B and optional with MUX4-Pn. It can be connected to up to three powerful multiplex CANs. It also provides an efficient CAN structure to connect various instrument clusters: MOKI3, FlexCluster, MultiViu®Professional12, LoaderIC and CB500 are possible choices as well as the driver’s workplaces DWP, DWP+ and mDWP. To achieve a maximum of flexibility, all the CAN communication is based on generic objects and support flexible data rate (FD). ZR5-A also provides a central gateway for EOL programming and diagnosis and is controlled by the model based application programming tool KIBES®-5. The device is designed according to ISO 26262 and supports application level up to ASIL B.

Advantages at a glance
- Generic central computer for general purpose
- Complex gateway functionality
- Up to 18 nodes
- CAN FD (flexible datarate)
- ISO 26262 up to ASIL B

### Technical specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>162 x 165 x 30 mm</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>12 V and 24 V</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>9 V ... 32 V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 °C ... +85 °C</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP 40</td>
</tr>
<tr>
<td>CAN interface</td>
<td>8</td>
</tr>
<tr>
<td>Processor</td>
<td>32-bit ARM® based core</td>
</tr>
<tr>
<td>Internal flash</td>
<td>4 MByte</td>
</tr>
<tr>
<td>Internal SRAM / external EEPROM</td>
<td>512 kByte / 32 kByte</td>
</tr>
<tr>
<td>Input, digital (level programmable)</td>
<td>8 (there of 4 wake up capable)</td>
</tr>
<tr>
<td>Output low side, 0.1 A</td>
<td>9 (alternative as inputs)</td>
</tr>
<tr>
<td>4 (5) CAN (FD)</td>
<td>protocol SAE J 1939, generic CAN objects</td>
</tr>
<tr>
<td>Diagnosis CAN</td>
<td>protocol UDS</td>
</tr>
<tr>
<td>3 multiplex CAN</td>
<td>MUX5-B (opt. MUX4-Pn)</td>
</tr>
<tr>
<td>2 LIN</td>
<td>12 V</td>
</tr>
<tr>
<td>Ethernet (BroadR-Reach)</td>
<td>yes</td>
</tr>
<tr>
<td>Wake up</td>
<td>digital inputs, CAN, LIN</td>
</tr>
<tr>
<td>EOL programming</td>
<td>UDS on D CAN</td>
</tr>
<tr>
<td>Diagnostic services</td>
<td>onboard DM1... offboard UDS on D CAN, ASAM</td>
</tr>
<tr>
<td>Frequency inputs</td>
<td>speed, RPM</td>
</tr>
</tbody>
</table>
Maximum configuration.
CBCU3 family – Central body control unit.

CBCU3 satisfies the growing demand for reliable and powerful onboard control units by centralizing the intelligence and input/output management of the cabin and body to one device.

### CBCU3

![CBCU3 image]

### Technical specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>276 x 185 x 43 mm</td>
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<tr>
<td>Nominal voltage</td>
<td>24 V (12 V optional for CBCU3-EL)</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>18 V ... 32 V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 °C ... +85 °C</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP 30 (IP 54 with add. cover)</td>
</tr>
<tr>
<td>LIN interface</td>
<td>only CBCU3-EL (1 x 12 / 24 V)</td>
</tr>
<tr>
<td>Processor</td>
<td>32-bit RISC</td>
</tr>
<tr>
<td>Internal flash</td>
<td>1024 kByte</td>
</tr>
<tr>
<td>External SRAM / external EEPROM</td>
<td>256 kByte / 32 kByte</td>
</tr>
<tr>
<td>Input digital</td>
<td>8 mA, 1 mA</td>
</tr>
<tr>
<td>Input analog (parametric)</td>
<td>6</td>
</tr>
<tr>
<td>Input frequency</td>
<td>speed 1 RPM 1</td>
</tr>
<tr>
<td>Input MSC interface</td>
<td>1</td>
</tr>
<tr>
<td>Output high side</td>
<td>7.5 A, 5.6 A, 3.6 A, 2.7 A, 1.8 A, 1.0 A, 0.2 A, 0.1 A (1 PWM)</td>
</tr>
<tr>
<td>Output low side, 1.0 A</td>
<td>2 (configuration a PWM)</td>
</tr>
<tr>
<td>Output power supply</td>
<td>8 V / 10 mA, 5 V / 20 mA</td>
</tr>
<tr>
<td>Powertrain CAN</td>
<td>ISO 11898, 250 kBaud, protocol SAE J 1939, generic CAN objects</td>
</tr>
<tr>
<td>Instrument CAN</td>
<td>ISO 11898, 250 kBaud, generic CAN objects, compatible with CMIC, VDR</td>
</tr>
<tr>
<td>Multiplex CAN</td>
<td>ISO 11898, 125 kBaud, for MUX2-B+ (max. 4 nodes)</td>
</tr>
<tr>
<td>Human machine interface</td>
<td>MCU</td>
</tr>
<tr>
<td>Wake up</td>
<td>5 digital inputs, e.g. term 15, hazard switch, 5 free configurable inputs</td>
</tr>
<tr>
<td>EOL programming</td>
<td>KWP2000 on K-line, powertrain CAN</td>
</tr>
<tr>
<td>Sensor supply</td>
<td>1 x 5 V / 20 mA, 2 x 8 V / 10 mA</td>
</tr>
<tr>
<td>Diagnostic services</td>
<td>onboard DM1, offboard: KWP2000 on K-line, ASAM, powertrain CAN</td>
</tr>
</tbody>
</table>

### Advantages at a glance

- Management of digital and analog input signals
- Electronically-controlled power outputs with full diagnostic features
- Enhanced network functionality using platform multiplexing nodes
CBCU3 implies not only high reliability and robustness but also a high potential for reduction of wiring harness, connectors, relays and fuses. It can be connected to up to four nodes (compatible are MUX2-B+ and MUX2-M+) via powerful multiplex CAN connection. CBCU3 can be connected to a number of different instrument clusters via instrument CAN. Configurations with FlexCluster, MultiVi®Professional12, LoaderIC or CB500 are possible. The CBCU3 family provides a complete system solution for bus, truck and special vehicle applications, off-the-shelf in three different variants: CBCU3-E is a large, also water protected available body controller to cover all possible functional requirements for heavy duty trucks as well as large buses and coaches; CBCU3-E24L provides a 24 V LIN interface for low-cost communication between the actuators and sensors in the vehicle; CBCU3-EL provides a standard 12 V LIN interface.
Mux5-Pcu – Generic chassis master control unit concept.

The MUX5-Pcu is the master of a generic multiplex system for general purposes. It is suitable for installation outside the cabin, for instance on the chassis of the vehicle.

The placement outside the cabin leaves more space in the already packed cabin. The MUX5-Pcu has a fully water protected and very sturdy housing design with fastening possibilities for the cable harnesses. It provides a high output current capability, built-in diagnostic and protection capabilities including LED diagnostic (according to ISO 13207).

This multiplex system master can be connected to up to four high-speed CAN buses of the vehicle. Two multiplex CAN buses provide the connection for up to four nodes per bus.

The LIN interfaces enable the vehicle manufacturer to use intelligent switches or switch panels to reduce the cable harness. SENT and PSI5 sensor interfaces provide new and robust sensor connection for safe machine operation in harsh environments. The ISO-bus protocol supports the integration of implements in agriculture applications.

Remark: The mentioned features and definitions are the basis of a concept for on- and off-highway applications.

### Technical specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>12 V and 24 V</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP 67 / IP 6K9K</td>
</tr>
<tr>
<td>CAN interface</td>
<td>4 (FD), 2 M CAN J</td>
</tr>
<tr>
<td>LIN</td>
<td>2</td>
</tr>
<tr>
<td>SENT</td>
<td>2</td>
</tr>
<tr>
<td>SENT (sensor bus)</td>
<td>2</td>
</tr>
<tr>
<td>Input digital</td>
<td>16</td>
</tr>
<tr>
<td>Input analog (parametric)</td>
<td>16 (8 also usable as digital inputs)</td>
</tr>
<tr>
<td>Input frequency</td>
<td>4</td>
</tr>
<tr>
<td>Output high side</td>
<td>2</td>
</tr>
<tr>
<td>3.0 A</td>
<td>3</td>
</tr>
<tr>
<td>2.0 A (PWM @ 400 Hz)</td>
<td>8</td>
</tr>
<tr>
<td>Output half bridge, 10 A</td>
<td>2</td>
</tr>
<tr>
<td>Wake up</td>
<td>2 digital inputs</td>
</tr>
<tr>
<td>Sensor supply</td>
<td>5 V / 40 mA, 2 x 8 V / 15 mA</td>
</tr>
<tr>
<td>Diagnostic services</td>
<td>built-in diagnostic &amp; protection capabilities</td>
</tr>
<tr>
<td>Connectors</td>
<td></td>
</tr>
<tr>
<td>15 pin 2.8 mm MCP</td>
<td>2</td>
</tr>
<tr>
<td>6 pin 2.8 mm MCP</td>
<td>1</td>
</tr>
<tr>
<td>56 pin 1.5 mm MCP</td>
<td>1</td>
</tr>
</tbody>
</table>

### Advantages at a glance

- Built-in diagnostic & protection capabilities
- Installation outside the cabin
- Master with two multiplex CAN and four generic CANs (FD)
- Reliable sensor interfaces / buses (SENT / PSI5)
- Waterproof, high output current capability
Maximum configuration.
The MUX3-E controller is an intelligent gateway for cabin installation.

MUX3-E is a multiple input/output controller with built-in diagnostic and protection capabilities. Its electronic CAN network covers three CAN interfaces and one optional commercial vehicle satellite gauge interface. It can be programmed via application programming tool KIBES®-32.

**Advantages at a glance**

- Intelligent gateway for cabin installation, applicable as Body Builder ECU
- Multiple I/O controller with built-in diagnostic and protection capabilities
- Application programming tool KIBES®-32

**Technical specifications**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>155 x 111 x 40 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>24 V</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>18 V ... 32 V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-30 °C ... +70 °C</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP 40</td>
</tr>
<tr>
<td>Processor</td>
<td>32-bit RISC</td>
</tr>
<tr>
<td>Internal flash</td>
<td>512 kByte</td>
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<tr>
<td>External SRAM/external EEPROM</td>
<td>128 kByte/2 kByte</td>
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<tr>
<td>Input digital</td>
<td>8 (optional 18 or 24)</td>
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<td>Input analog (parametric)</td>
<td>2 (optional 3)</td>
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<tr>
<td>Input frequency</td>
<td>1 (0-2000 Hz)</td>
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<tr>
<td>Output high side</td>
<td>16</td>
</tr>
<tr>
<td>1.5 A</td>
<td>6</td>
</tr>
<tr>
<td>0.5 A</td>
<td>10</td>
</tr>
<tr>
<td>Output low side</td>
<td>1</td>
</tr>
<tr>
<td>0.5 A</td>
<td>1 (2 PWM)</td>
</tr>
<tr>
<td>Powertrain CAN</td>
<td>ISO 11898, 250 kbaud, protocol SAE J 1939, generic CAN objects</td>
</tr>
<tr>
<td>Generic CAN</td>
<td>ISO 11898, 250 kbaud, protocol SAE J 1939, generic CAN objects</td>
</tr>
<tr>
<td>Wake up</td>
<td>1 digital input (term 15)</td>
</tr>
<tr>
<td>EOL programming</td>
<td>KWP2000 on K-line</td>
</tr>
<tr>
<td>Diagnostic services</td>
<td>onboard DMI, offline: KWP2000 on K-line, ASAM, powertrain CAN</td>
</tr>
</tbody>
</table>
Maximum configuration.
MUX5-B – Multiplex node.

The MUX5-B is a generic multiplex node for general purposes to decentralize and optimize the system. It provides one CAN interface connected to ZR5-A central computer and a large number of inputs and outputs.

It is designed for cabin installation and provides built-in diagnostic and protection capabilities as well as multiple input and output capabilities:

- 24 high side switch outputs, 8 low side switch outputs, 20 digital inputs and 10 analog inputs.
- This device is designed according to ISO 26262 and supports applications level up to ASIL B.

**Technical specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>258 x 155 x 30 mm</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>12 V and 24 V</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>8 V ... 32 V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 °C ... +85 °C</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP 40</td>
</tr>
<tr>
<td>Input digital 8 mA (parametric)</td>
<td>20</td>
</tr>
<tr>
<td>Input analog (parametric)</td>
<td>10</td>
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<tr>
<td>Output high side</td>
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<tr>
<td>9.0 A</td>
<td>2</td>
</tr>
<tr>
<td>5.0 A</td>
<td>4</td>
</tr>
<tr>
<td>3.0 A</td>
<td>6</td>
</tr>
<tr>
<td>1.0 A</td>
<td>8</td>
</tr>
<tr>
<td>0.3 A</td>
<td>4</td>
</tr>
<tr>
<td>Output low side 1.0 A</td>
<td>8 (4 PWM)</td>
</tr>
<tr>
<td>Output half bridge 3.0 A</td>
<td>4</td>
</tr>
<tr>
<td>Wake up CAN</td>
<td></td>
</tr>
<tr>
<td>Sensor supply 20 mA</td>
<td>2</td>
</tr>
</tbody>
</table>

**Maximum configuration**

![MUX5-B Maximum Configuration Diagram]

**Interface**

- Multiplex CAN
MUX2-B+ – Multiplex node.

The MUX2-B+ is a generic multiplex node for general purposes to decentralize and optimize the system. It provides one CAN interface connected to ZR5-A central computer or CBCU3 and a large number of inputs and outputs.

It is designed for cabin installation and provides built-in diagnostic and protection capabilities as well as multiple input and output capabilities:

- 24 high side switch outputs, 8 low side switch outputs, 24 digital inputs and 6 analog inputs.

### Technical specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>258 x 155 x 30 mm</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>12 V and 24 V</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>8 V ... 32 V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-30 °C ... +70 °C</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP 40</td>
</tr>
<tr>
<td>Input digital, 8 mA</td>
<td>24</td>
</tr>
<tr>
<td>Input analog (parametric)</td>
<td>6</td>
</tr>
<tr>
<td>Output high side</td>
<td>10.0 A: 2, 5.0 A: 4, 3.0 A: 10, 1.0 A: 8</td>
</tr>
<tr>
<td>Output low side, 1.0 A</td>
<td>8 (4 PWM)</td>
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<tr>
<td>Max. current at same time</td>
<td>30 A</td>
</tr>
<tr>
<td>Wake up</td>
<td>CAN</td>
</tr>
<tr>
<td>No. of power supply groups (15 A)</td>
<td>5</td>
</tr>
</tbody>
</table>

### Maximum configuration

```
MUX2-B+  MUX2-M+  MUX2-B+  MUX2-M+
```

CBCU3 family / ZR32

### Interface

- Multiplex CAN
MUX2-M+ – Multiplex node.

The MUX2-M+ is a generic multiplex node for general purposes to decentralize and optimize the system. It provides one CAN interface connected to ZR5-A central computer or CBCU3.

It is designed for cabin installation and provides built-in diagnostic and protection capabilities as well as multiple input and output capabilities:

- 14 high side switch outputs
- 2 low side switch outputs
- 12 digital inputs
- 2 analog inputs

**Technical specifications**

- **Dimensions**: 162 x 165 x 30 mm
- **Nominal voltage**: 12 V and 24 V
- **Supply voltage**: 8 V ... 32 V
- **Operating temperature**: -30 °C ... +70 °C
- **Protection degree**: IP 40
- **Input digital**: 8.0 mA
- **Input analog (parametric)**: 2
- **Output high side**: 3.0 A
- **Output low side**: 1.0 A (HB switch, PWM)
- **Max. current at same time**: 25 A
- **No. of power supply groups (15 A)**: 2

**Maximum configuration**

- MUX2-B+ → MUX2-M+ → MUX2-B+ → CBSU3 family / ZR32

**Interface**

- Multiplex CAN
The MUX4-Pn is a generic multiplex node for general purposes. It is suitable for installation outside the cabin, for instance on the frame of the vehicle.

The MUX4-Pn provides a large number of inputs and outputs. It is water protected with a high protection level (protection degree IP 67). It has built-in diagnostic and protection capabilities and is suitable for the connection with MUX5-Pcu or one of the CBCU3 family via multiplex CAN.

### Technical specifications

**Nominal voltage** | 12 V and 24 V  
**Protection degree** | IP 67/IP 6K9K  
**Input digital** | 8 mA  
**Input analog (parametric)** | 8 (also usable as digital inputs)  
**Input frequency** | 3  
**Output high side** | 8.0 A, 6.0 A, 5.0 A, 3.3 A, 1.1 A  
**Wake up** | 2 digital inputs  
**Sensor supply** | 5 V/40 mA  
**Diagnostic services** | built-in diagnostic & protection capabilities

### Interface

- Multiplex CAN
- Multiplex CAN
KIBES® system and application development.

To provide easy KIBES®-5 system installation and programming we offer powerful and efficient programming tools for our electronic control units. Additionally, instrument clusters and driver’s workplaces can be handled effectively. No specific knowledge is needed to set up the functional programming, instead you may concentrate on your individual vehicle needs. A fast delivery time to market is one of the benefits of this KIBES® system approach.

Board electronic software

KIBES®-5 with logi.CAD 3

The new, powerful development tools for the next generation KIBES®-5 family is a significant step forward in programming, making it easier and more innovative, according to IEC 61131-3 compliant PLC.

It offers additional features like
- automatically generated documentation
- an online and offline simulation
- a comfortable configuration manager
- download etc.

Improved graphic representation and helpful features bring not only better visibility into complex structures, but also give the user an overview of large projects through free positioning of views/windows.

- Context sensitive extended assistance
- Syntax highlighting in structured text, as well as step by step debugging features to save time in analyzing complex application programs
- Predefined templates to save programming time and reduce syntax problems

On the whole, an impressive improvement for beginners and professionals already using logi.CAD 32 with our KIBES®-32 system.

KIBES®-32 with logi.CAD 32

The KIBES®-32 software has been used successfully for many years for creating the application program on a graphical level according to standard IEC 61131-3. It offers additional features like automatically generated documentation, an online and offline simulation, a comfortable configuration manager, download, etc. A patch generator provides flexibility in module linking according to the vehicle functions. A quasi-multitasking operation supports the separation of time-critical and standard modules to run.

- Reduced development time and risk
- Offline simulation and online test
- Integrated version and revision management
- Easy to learn GUI for human machine interface implementation
- Configuration manager
Clusters

**MultiViu® Professional12**
The MultiViu® Professional12 is the most innovative instrument cluster. It is fully programmable to the needs and wishes of the individual user, while its 12.3” wide-view colored TFT display is in line with the trend towards larger, more colorful displays.

**CIMOT**
The CIMOT is a cost-optimized instrument cluster solution. It has two major and four minor gauges, a set of telltales and a monochrome TFT display for drivers’ information and onboard diagnosis. The display is customizable and can be programmed to show icons and corporate logos.

**MOKI3**
The MOKI3 is a reliable and customized solution, especially suited to small production volumes. The MOKI3 platform offers an extremely high degree of design flexibility with a large number of fully customizable components. Continental has been leader in the bus market with MOKI3 for many years.

**BusIC**
The BusIC is the ideal instrument cluster for customized driver’s workplace and citybus dashboard. With its module design concept it can be used in various vehicle configurations and fulfills a wide range of different requirements.

Software for graphic user interface

grADI
The grADI software is a tool for professional mask design. It is available for many commercial vehicle clusters and display products like MOKI3, CIMOT and BusIC by Continental. It gives customers the possibility to create their own graphic human machine interface and to easily adapt to market demands.

- Supports screen design of dot-matrix and colored TFT displays up to WVGA resolution
- Fits seamlessly to the KIBES®-32 and KIBES®-5 software tool chain
- Graphic objects and text files are created by a common software tool like Adobe and can be easily imported into grADI
- Multi-language support for international applications
- Development tool based on CINEMA 4D
- Intuitive GUI for human machine interface implementation

CGI Studio
CGI Studio is a professional software tool to create a premium human machine interface with high definition graphics. It is compatible to the MultiViu® Professional12 and is adapted to the KIBES®-32 software, which controls the cluster’s functionality. With CGI Studio you will receive brilliant looking human machine interfaces displayed with the MultiViu® Professional12.

- Highly intuitive software tool with a fast learning curve
- Drag and drop scene editor
- Time and curve editor for key frame animations
- Multiple rendering modes
- Advanced graphic tools (e.g. shader editor, render time analysis)
- Benefits from Continental widgets set
- Multi-language support (Texteffect Widget, UTF16)
- Intuitive GUI for human machine interface implementation

Continental provides a wide range of instrument cluster solutions suitable for various requirements. These can all be easily integrated into the KIBES® board electronic architecture. Using KIBES® as a software tool chain for application and human machine interface programming, all solutions meet relevant standards and are highly reliable.
Driver’s workplace.

Continental offers a wide range of driver’s workplace solutions for different purposes: city and intercity buses as well as special vehicle applications.

Product series driver’s workplace (DWP)

**DWP+**
The workplace for functionality and flexibility offers an innovative design with contemporary features. Equipped with the instrument cluster solutions MultiViu®Professional12, BusIC or MOKI3, it provides various possibilities of customer-specific adaption. The color pad of the DWP+ is also customizable to match with vehicle design. Moreover, an accessory holder and a power outlet for miscellaneous applications (mobile phones, navigation, etc.) are available as optional features.

**DWP Individual**
The DWP Individual is engineered to fit individual customer requirements, saving time and development costs when choosing from a portfolio of proven electronic and mechanical components, e.g. instrumentation, switches, instrumentation panels (shells and covers) and steering columns and wheels.
The new modular concept of a driver’s workplace for city buses and coaches sets a new standard in flexibility, individuality, design and technology. It can easily be adapted to different cases, in compliance with all ergonomic requirements, safety and usability according to VDV and EBSF standards. The individual modular elements fit perfectly with the interior design used in the latest generation of buses, resulting in attractive, flexible and very practical driver’s workplaces. The separation of the individual elements provides flexible and individual design possibilities. The modular driver’s workplace was recognized by IF Design Award and German Design Award for its stylish design.

**Modular concept**

**mDWP**

The driver’s workplaces are available in two versions: a base version with two panels and an extended version with four panels.

The integrated instrument cluster solution MultiViu®Professional12 is fully programmable, easy to handle and displays all relevant information according to the bus operating mode. The switch panels with PowerOn or memory function (CAN-based) are fully programmable and customizable, as well as integrated RGB-LEDs to support individual switch state lightening and ambient light, for example. You can even create your own panel or use a 3rd party module for integration into the modular concept.

On demand, functions like the display of camera information can be implemented.
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