

Function

The Knorr-Bremse electronic braking system for trailers (**TEBS G2.2**) combines, in one compact assembly, the electronic control unit, the sensor technology and the pneumatic control.

The braking functions of anti-lock and load sensing control are both electronically managed within the module as integrated features. This provides more accurate and consistent control of the generated braking force including reduced hysteresis compared to a conventional braking system, thereby improving tractor-trailer compatibility, optimising the brake pad wear and helping to reduce the overall operating costs of the trailer.

The anti-compounding function is also housed within the module offering four delivery ports to the spring brake chambers.

The **TEBS G2.2 Brake Module** is capable of working on trailers coupled to towing vehicles equipped with pneumatic only braking, pneumatic braking plus ABS or EBS systems. To achieve the full capability of the module the trailer should be connected to an EBS equipped towing vehicle fitted with an ISO 7638 7-pin connector.

The **TEBS G2.2 Premium Brake Module** offers the following features in common with the TEBS G2.2 Standard Plus brake module (see PD-214-325, Document No. Y172339):

- the modules are available with push-to-connect (PTC) fittings.
- all electrical connections face downwards for ease of accessibility.
- integrated emergency valve to provide the automatic brake function. The integrated emergency valve vents the spring brakes directly at the module ensuring faster response. The emergency valve also performs the anti-compounding function.
- iLvl suspension control system (see PD-214-F010, Document No. Y172340).

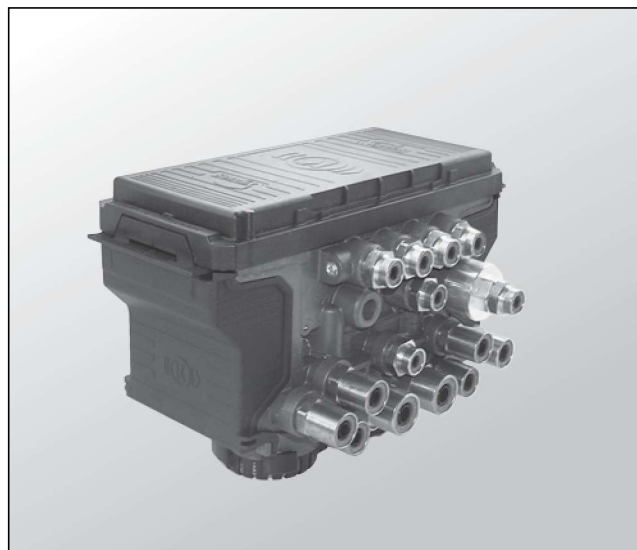
In addition the **TEBS G2.2 Premium Brake Module** offers the following features:

- supports 4S2M, 4S3M and 6S3M system configurations.
- more input and output connections.
- second J1939 (Brake) CAN for improved safety and reliability.
- stop lamp powering.

The service-proven anti-roll system, RSP (Roll Stability Program), is included as standard in all **TEBS G2.2 Brake Modules**.

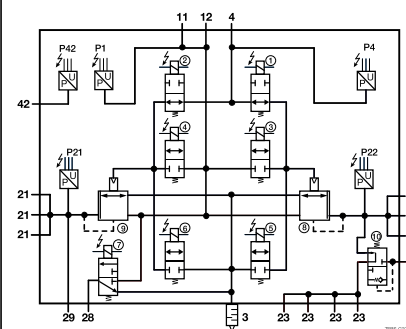
Technical Features

| | |
|------------------------------|--------------------------------------|
| Operating pressure: | 10.5 bar |
| Max. permissible pressure: | 12.5 bar |
| Operating temperature range: | -40 °C to +65 °C |
| Maximum temperature: | +110 °C for 1 hour (non-operational) |
| Weight: | 5.7 kg approx. |
| Nominal Voltage: | 9 to 32 V DC |



Standard Symbol as DIN ISO 1219

TEBS G2.2



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ES2095

TEBS G2.2 Premium Brake Module

Doc. No. Y200882 (EN - Rev. 002)
September 2015

Towing vehicle requirements

Trailers fitted with an electronic braking system (TEBS) only comply with the legal requirements of regulations 98/12/EC and ECE R13/11 Supplement 8, when the towing vehicle is equipped with a electrical interface of one of the following specifications:

| | | | |
|------------------------------|-------|------------------------------|-------|
| ISO 7638: 1985 | 5 Pin | ISO 7638: 1997 Part 1 (24 V) | 7 Pin |
| ISO 7638: 1997 Part 1 (24 V) | 5 Pin | | |

Standard Auxiliary Functions

The following auxiliary functions may be configured to the associated auxiliary connections of the TEBS G2.2 Premium Brake Module:

Outputs

- **Tilt Angle:** This signal can be utilised to switch off a lifting device for the tipping body. See PD-214-F201, Document No. Y136126.
- **Fully Automatic Lift Axle Control:** The module can control up to two lift axle control valves, each valve may then be connected to 1 or 2 lifting axles. See PD-214-F101, Document No. Y136118.
- **Speed Pulse (SP):** When the vehicle exceeds a predetermined threshold speed, a signal of programmable duration is activated. This signal causes the Raise / Lower valve to automatically switch to the "drive" position. See PD-214-F106, Document No. Y136123.
- **Integrated Speed Switch (ISS):** This signal may be used to fulfil numerous operational requirements such as locking of steering axles etc. See PD-214-F107, Document No. Y136124.
- **Steering Axle Lock (SAL):** This signal can be utilised to lock the steering axle in the 'straight-ahead' condition. It is similar to ISS but can also be triggered from an input, e.g. Back-up Light (Reversing Lamps). See PD-214-F251, Document No. Y136130.
- **24 V Supply:** provides a permanent power supply that may be used to power additional brake and running gear systems / functions on the trailer. See PD-214-F006, Document No. Y136112.
- **ABS active:** Typically this function may be used to directly control a retarder installed on the trailer. See PD-214-F004, Document No. Y136110.
- **RSP active:** When the Roll Stability Program (RSP) of the trailer is active, a 24 V or a pneumatic output (depending on configuration) is transmitted by the brake module. See PD-214-F005, Document No. Y136111.
- **SLR:** When a function of TEBS causes the brakes to be applied a Stop Lamp Request signal can be generated. See PD-214-F401, Document No. Y137240.
- **P_{out}:** Brake modules that have the P₂₈ function available, which can be programmed to provide a pneumatic output for any of the above functions or a constant pressure supply. See PD-214-F006, Document No. Y136112.
- **iLvl valve:** When iLvl is configured in ECUTalk® the iLvl valve outputs are automatically assigned to pins 1 and 2 (AUXIO1 and AUXIO2). See PD-214-F010, Document No. Y172340.

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Inputs:

The TEBS G2.2 Premium Brake Modules can be programmed to receive inputs on various connectors. See page 5 for more information on the connections. Typical inputs are described below:

- **Brake pad wear control (PW)** : Input is received that the wear limit of at least one brake has been reached. See PD-214-F351, Document No. Y136131.
- **TH**: Traction Help actuated by a manual switch. See PD-214-F102, Document No. Y136119.
- **MH**: Manoeuvring Help actuated by a manual switch. See PD-214-F103, Document No. Y136120.
- **LL_ALL / LL_LAC1 / LL_LAC2** : These functions lower lift axles as a result of a signal from a manual switch. See PD-214-F101, Document No. Y136118.
- **LLTH - Advanced Lift Axle Control**: This is a combined function which offers lift axle lowering and traction help via the same input. See PD-214-F101 and PD-214-F102, Document Nos. Y136118 and Y136119.
- **Road Laying Function (RLF)**: This function is typically used when the trailer is working with a road laying machine. See PD-214-F203, Document No. Y136128.
- **Body Lift Sensor (BLS)**: This sensor is used with tipping trailers. See PD-214-F201, Document No. Y136126 and PD-214-F202, Document No. Y136127.
- **Trailer Brake Release (TBR)**: This function is typically used with extendable trailers. See PD-214-F301, Document No. Y137238.
- **Trailer Suspension Release (TSR)**: This input is used when raise/lower valves are installed. See PD-214-F108, Document No. Y137237.
- **Back-up Light**: This takes an input from the reversing lamps and is typically used with the Steering Axle Lock function. See PD-214-F251, Document No. Y136130.
- **iLvl Level sensor**: When iLvl is configured in ECUtalk® the level sensor is automatically assigned to pins 5 and 6 (SENS_IN1 and SENS_SUP). See PD-214-F010, Document No. Y172340.

Auxiliary Design Language (ADL) - Non-standard Auxiliary Functions

Should a customer require a function other than those normally available it is possible to create a non-standard function by the use of a special file known as ADL (Auxiliary Design Language) produced by Knorr-Bremse. See PD-214-F950, Document No. Y136136.

Stop Lamp Powering

To obtain full functionality, any trailer electronic braking system requires a permanent power supply (achieved by using the legally specified ISO 7638 connection in 5 or 7 pin format); this ensures load sensing, anti-lock control and all auxiliary functions are automatically maintained. In the event of a failure of this power supply, whilst trailer braking will be maintained via the pneumatic back-up function, all electronically controlled functionality would no longer be active.

Continued operation of the vehicle without electrical power, irrespective of axle load, may therefore result in higher brake operating temperatures leading to increased brake pad wear, tyre flat spotting and trailer instability. To overcome this problem, some versions of the TEBS G2.2 Brake Module will continue to operate by taking power from the stop lamp circuit and thereby load sensing and anti-lock functions remain active.

Note: Stop lamp powering should only be considered as a backup function to ensure some safety features are retained in the event of failure of the ISO 7638 connection.

Note: When stop lamp powering is in operation in a 4S3M or 6S3M system configuration the module will switch to 2S2M operation.

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ES2095

TEBS G2.2 Premium Brake Module

Doc. No. Y200882 (EN - Rev. 002)
September 2015

Legal Requirements

TEBS G2.2 has been approved in accordance with the requirements of annex XIV of the Directive 98/12/EC and annex 19 of ECE Regulation 13 with respect to ABS performance. The system also fulfils the requirements of the ECE Regulation 13/11 Supplement 8 with respect to the prescribed requirements for vehicles with an electric control line and electric control transmission:

| Approval | ECE Report No. | Knorr-Bremse Document No. |
|--|------------------|---------------------------|
| ABS approval | EB 154 | Y038142 |
| Electronics approval | EB 155 | Y038143 |
| RSP approval | EB 166 | Y080682 |
| Use of AC574AY Relay Valve with long pipes | EB 154 extension | Y158131 |

Options

All TEBS G2.2 Premium variants offer:

- **ABS configurations 2S/2M, 4S/2M, 4S/3M and 6S/3M.**
- RSP.
- Operating voltage range 9 - 32 Volts.
- Four pneumatic ports to the spring brake actuators.
- Two internal J1939 CANs (5 V TI CAN and Brake CAN).
- Configuration of different braking characteristics for the CAN and pneumatic brake demands.
- Integrated automatic brake function.
- A programmable pneumatic output from Port 28 (P₂₈) and a test point Port 29 (P₂₉).

The following table shows the part number of the available module:

| Part Number ¹⁾ | Type Number | P ₂₈ | P ₂₉ | PTC Fittings | Stop Lamp Powering |
|---------------------------|-------------|-----------------|-----------------|--------------|--------------------|
| K110612 | ES2095 | yes | yes | yes | yes |

¹⁾ The part number of the module will carry two suffices, firstly "V##" which represents the software revision of the product, e.g. V01, V02 etc., and secondly "N##" which defines the packaging requirements of different market sectors, e.g. N00, N49, N50, N99, etc. Example: K110612V02N50 - is supplied with software to revision 02 and packaged as described below.

Note: The N00 and N49 variants will be supplied without packaging. The N50 and N99 variants will be shipped in a box containing the data labels II39797F, II39796F and K112780N00. These data labels may also be ordered separately. The N49 and N99 variants are for OE use only and the N00 and N50 variants are for IAM use only.

Additional Parts:

| | |
|------------------------------|--|
| Silencer | K000847K50 (two required per module) |
| Side Cover | K092404K50 (two required per module) |
| Port Filters | K004904K50 (contains 10 conical filters for Ports 11 and 12) K108643K50 (contains 20 flat filters for Port 4) |
| Blanking plug for 8 mm pipe | 96210008 |
| Blanking plug for 12 mm pipe | 96210012 |
| Blanking plug for 15 mm pipe | 96210015 |
| Self-adhesive TEBS label | K112780N00 (supplied with the TEBS Module for mounting on the trailer) |
| Information sticker | II39796F (TEBS power supply) |
| EBS-System Plate | II39797F |

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Pneumatic Connections

| Port | Thread | Qty | Used for | PTC Fittings (to suit pipe size) |
|------|---------|-----|--|-------------------------------------|
| 11 | M22x1.5 | 1 | Supply to Reservoir | 15x1.5 |
| 12 | M22x1.5 | 1 | Supply to Reservoir | 15x1.5 |
| 21 | M16x1.5 | 3 | Delivery to brake chambers to wheel speed sensor D | 12x1.5 |
| 22 | M16x1.5 | 3 | Delivery to brake chambers to wheel speed sensor C | 12x1.5 |
| 23 | M16x1.5 | 4 | Delivery to parking brake | 8x1 |
| 28 | M16x1.5 | 1 | Programmable pneumatic signal | 8x1 |
| 29 | M16x1.5 | 1 | Test point | 8x1 |
| 4 | M16x1.5 | 1 | Brake demand (Yellow Line) | 8x1 |
| 42 | M16x1.5 | 1 | Air spring pressure | 8x1 |
| 43 | M16x1.5 | 1 | Park/Shunt Valve | 8x1 |

Pneumatic Backup

If all electrical power supplies to the TEBS G2.2 Brake Module are lost the system reverts to the Pneumatic Backup mode which provides the facility for the trailer to maintain normal pneumatic braking albeit without the load sensing and anti-lock functions.

The TEBS G2.2 Premium Brake Module has the ability to switch itself to the Pneumatic Backup mode and does so if the trailer reservoir pressure drops below 2.5 bar. The module will switch back to normal operation when the reservoir pressure is restored.

The TEBS G2.2 Premium Brake Module also switches to Pneumatic Backup mode whenever the trailer is stationary and the service brake pressure is greater than 4.5 bar. This is to reduce electrical power consumption. The module will switch back to normal operation as soon as service brake pressure drops below 4.25 bar.

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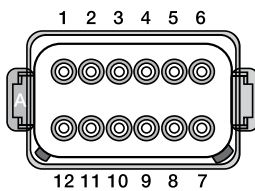
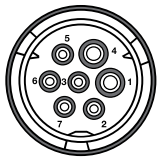
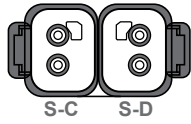
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September 2015

Electrical Connections

See PD-214-F006, Document No. Y136112 for details of all of the Input and Output configurations.

| In - Out Connector | | Power Connector | | Wheel Speed Sensor Connector | | |
|---|---|---|---------------------------|---|-----------|--------------------|
|  | |  | |  | | |
| Pin Number | Function | Pin Number | Function | System | Connector | Function |
| 1 | AUXIO 1 | 1 | Battery Supply (+) | 2S/2M 4S/2M 4S/3M | S-C | Wheel Speed Sensor |
| 2 | AUXIO 2 | 2 | Electronic Supply (+) | | S-D | |
| 3 | AUXIO 3 | 3 | Electronic Ground (-) | | | |
| 4 | Sensor Ground | 4 | Battery Ground (-) | | | |
| 5 | Sensor Input 1 [SENS_IN1] (tri-state or analogue input) | 5 | Warning Lamp | | | |
| 6 | Sensor Supply [SENS_SUP] (tri-state or analogue input) | 6 | ISO 11992 CAN (24 V) High | | | |
| 7 | Stop Lamp Supply (+) | 7 | ISO 11992 CAN (24 V) Low | | | |
| 8 | Stop Lamp Ground (-) | | | | | |
| 9 | J1939 TI CAN (5 V) Low | | | | | |
| 10 | J1939 TI CAN (5 V) High | | | | | |
| 11 | AuxRet 3 | | | | | |
| 12 | AuxRet 12 (Return for AUXIO 1 & 2) | | | | | |

Note:

AUXIO 1 and AUXIO 2 cannot be configured as an input and an output in parallel.

Note:

If no connections on the In-Out Connector are used, a blanking plug (K026197V01N00) must be installed to prevent the ingress of moisture to the ECU.

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| 2.3 Connector | | 2.4 Connector | | 2.5 Connector | | Wheel Speed Sensor Connector | | |
|---------------|-----------------------------------|---------------|---|---------------|---------------|------------------------------|-----------|---|
| | | | | | | | | |
| Pin Number | Function | Pin Number | Function | Pin Number | Function | System | Connector | Function |
| 1 | AUXIO 4 (typically 3rd modulator) | 1 | Sensor Supply [SENS_SUP2] (tri-state or analogue input) | 1 | Not connected | 2S/2M | S-E | Optional Aux Input (Digital or Tri-state) |
| 2 | AuxRet 4 | 2 | Sensor Ground2 | 2 | | | S-F | |
| 3 | AUXIO 5 | 3 | AUXIO 6 | 3 | | 4S/2M 4S/3M | S-E | Wheel Speed Sensor |
| 4 | AuxRet 5 | 4 | AuxRet 6 | 4 | | | S-F | |
| 5 | J1939 Brake CAN (5 V) Low | 5 | Sensor Input 2 [SENS_IN2] (analogue input) | 5 | | | | |
| 6 | J1939 Brake CAN (5 V) High | 6 | Not connected | 6 | | | | |

Note:

If no connections on the 2.3 or 2.4 Connector are used, a blanking plug (Z005861) must be installed to prevent the ingress of moisture to the ECU.

If the Wheel Speed Sensor connections are not used, two blanking plug (Z005860) must be installed to prevent the ingress of moisture to the ECU.

5 V J1939 TI CAN

The TEBS G2.2 Premium Brake Module has two 5 V J1939 CAN connections. This enables the separation of CAN 'data' inputs/outputs from those dedicated to brake control (third modulator). This improves both safety and reliability of the TEBS system.

The 'Data' TI CAN is connected to the In/Out Connector and the 'Brake' CAN is connected to the 2.3 Connector.

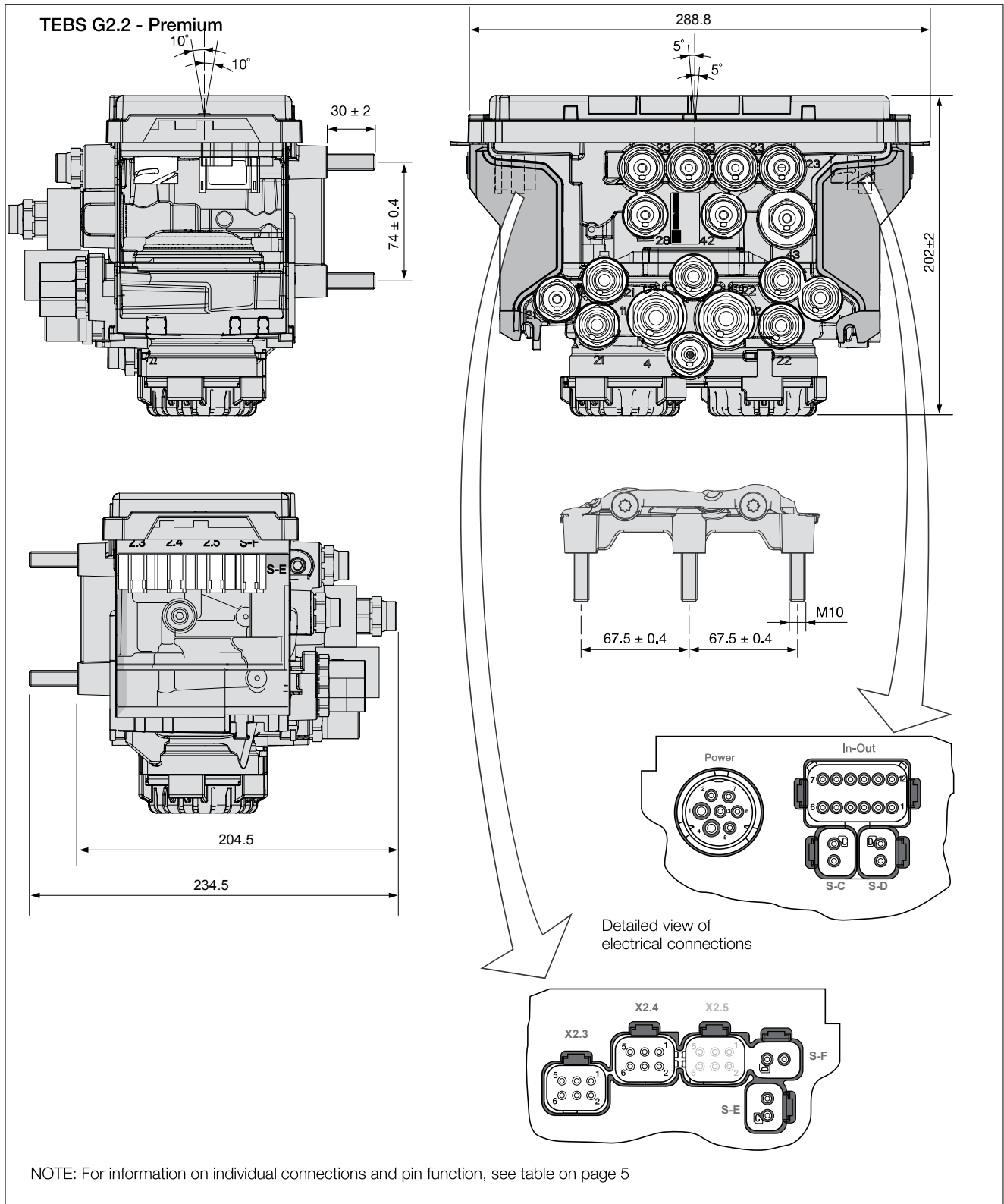
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Dimensions



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