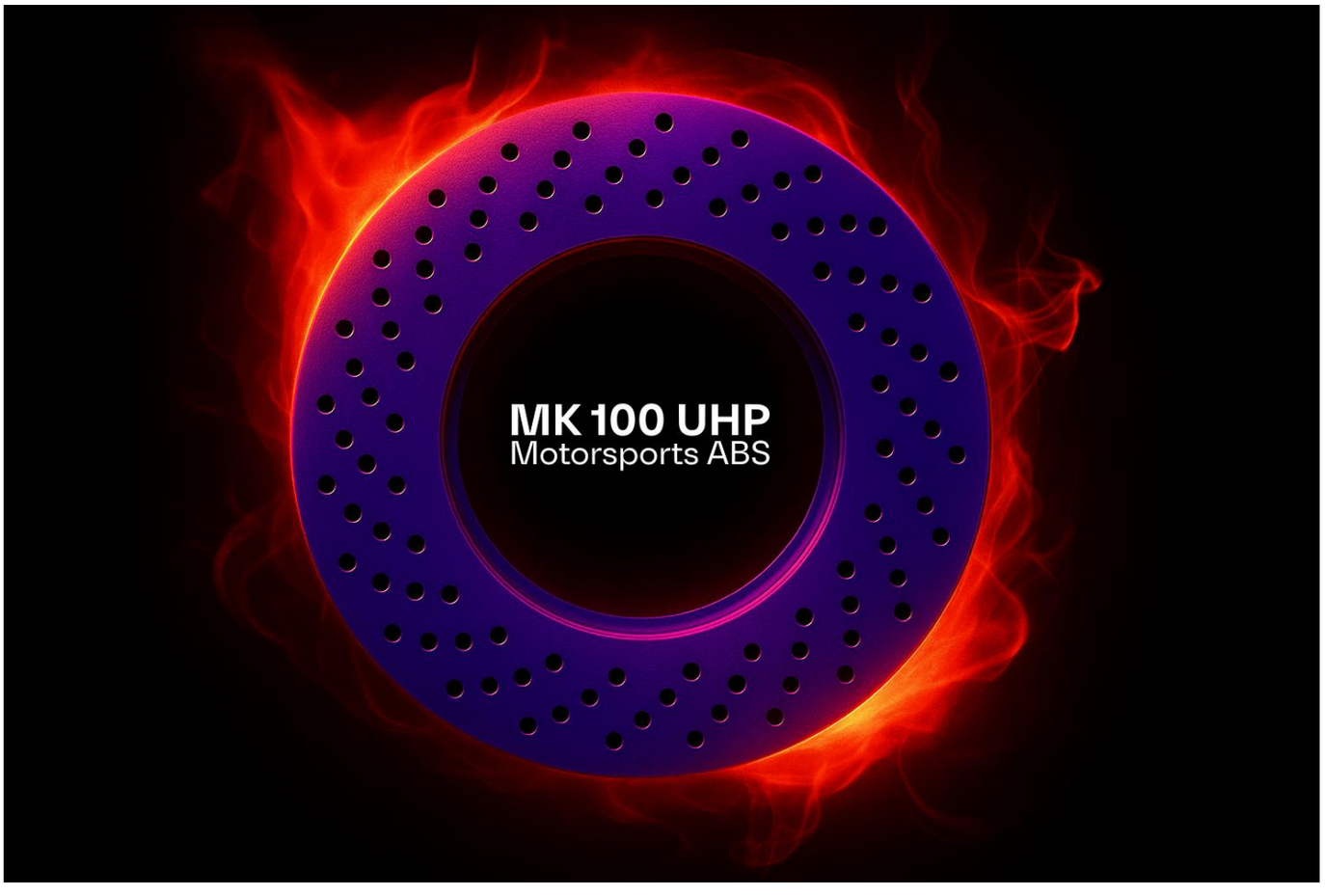


MK 100 UHP - Motorsports ABS

Technical Information Manual

Revision 2.1
March 17, 2026

Contents

1. Glossary

ABS	Anti-lock Braking System
AES	AUMOVIO Engineering Solutions GmbH
AWD	All Wheel Drive
CAN	Controller Area Network
COG	Centre of Gravity
DTC	Diagnostic Trouble Code
EBS	Electronic Braking System
EBD	Electronic Brake Force Distribution
ECU	Electronic Control Unit
EMC	Electromagnetic Compatibility
EOP	End of Production
ESC	Electronic Stability Control
FWD	Front Wheel Drive
HCU	Hydraulic Control Unit
HECU	Hydraulic-Electronic Control Unit
IMU	Inertial Measurement Unit
PS	Pressure Sensor
RWD	Rear Wheel Drive
SW	Software
WSS	Wheel Speed Sensor

2. Safety Warnings

2.1. General

	WARNING
	**Hazard from failure to observe the safety instructions.** Failure to observe the safety instructions and handling instructions given in this Installation Manual can result in significant hazards. ► Always follow the warnings and instructions provided in this manual.

Before installing or deploying the MK 100 UHP – Motorsports ABS, please read this Technical Manual carefully for safety instructions and guidance.
The MK 100 UHP is designed exclusively for use in motorsports on closed test tracks and racing circuits. It is strictly prohibited to use the MK 100 UHP on public roads or for any vehicle homologation, type approval, or IVA tests intended to obtain road release certification.
Integrating the MK 100 UHP into a production road vehicle will invalidate the vehicle's road homologation status. Failure to comply with the intended use of the MK 100 UHP may result in legal consequences and liability for damages.
The individual or entity performing the integration of the MK 100 UHP into a vehicle is solely responsible for ensuring that the product is used for its intended purpose. AUMOVIO Engineering Solutions accepts no claims or liability for damages resulting from unintended or unauthorized use of this product.

2.2. Qualification for Installation

	WARNING
	**Injury hazard due to insufficient qualification.** Installation by unqualified personnel can result in considerable personal injury and equipment damage. ► All installation work must be carried out exclusively by appropriately qualified personnel.

The brake system is a highly safety-critical subsystem of any vehicle. Integration of the MK 100 UHP – Motorsports ABS into the vehicle's braking system requires professional expertise in vehicle mechanics and electronics, particularly in motorsport environments where high temperatures, forces, and vibrations are common. Installation of the MK 100 UHP – Motorsports ABS must only be carried out by qualified personnel. Qualified personnel are individuals who, based on their technical education, training, and experience, are capable of performing the assigned tasks and recognizing and avoiding potential hazards.
For safe and reliable operation of the MK 100 UHP, all persons responsible for installation must have proven competence in hydraulic braking systems and relevant mechanical and electrical automotive experience.
The individual or entity performing the installation is solely responsible for ensuring that the MK 100 UHP is installed correctly and safely. AUMOVIO Engineering Solutions accepts no claims or liability for damages resulting from incorrect installation or unauthorized use of this product.

2.3.System Responsibility

	**WARNING**
	Injury hazard due to an inappropriate braking system layout definition. An improperly designed braking system can result in reduced vehicle deceleration. ► An evaluation of the vehicle's overall braking system must be performed.

The individual or entity integrating the MK 100 UHP into the vehicle is solely responsible for the definition, performance, and durability of the overall braking system. This includes correct sizing and specification of components such as brake master cylinders, calipers, disc assemblies, pads, tires, and related parts.
AUMOVIO Engineering Solutions is responsible only for the scope of the delivered product and does not assume responsibility for defining the vehicle's overall braking system. A suitable braking system must be designed to ensure proper brake line pressures, brake force distribution, and heat dissipation, meeting the application requirements and intended use case of the vehicle.
The primary function of the MK 100 UHP is to prevent wheel lock-up and enhance vehicle stability during hard braking. Before installing the MK 100 UHP, the braking system design must be completed and evaluated for compatibility with the ABS system.

It is mandatory to integrate an ABS warning lamp within the driver's field of view to indicate any ABS malfunction that degrades or disables system functionality.

After initial integration or any hardware/software changes to the UHP ABS, perform a non-dynamic test drive in a safe environment to verify proper brake system operation.

Always follow the instructions provided in the official manuals when installing the product.

2.4.State of Delivery

	**WARNING**
	Non-Operational State of Delivery The MK 100 UHP Hydraulic-Electronic Control Unit is delivered with a provisional software. ABS functionality is not available, which can lead to loss of vehicle stability during braking. ► Update the software according to Chapter 5.3.10 ("Firmware update") before operation.

3. Vehicle Description

The MK 100 UHP is intended for use in the following vehicle environments. As stated in chapter 2.3, the party responsible for integrating the MK 100 UHP into the vehicle assumes full responsibility for the definition, performance, and durability of the overall braking system.

- Race/track vehicles only (not approved for public road use)
- Compatible with rear-wheel drive, front-wheel drive, and all-wheel drive configurations
- Hydraulic brake system:
  - Front/rear hydraulic brake circuit split only
  - Compatible with either a tandem master cylinder, or two individual master cylinders (front/rear) integrated into a pedal box assembly with brake balance bar
  - Hydraulic system volume consumption (including calipers, pipes, flexible lines, etc.) must not exceed: 34mm³/bar on the front axle and 15mm³/bar on the rear axle
  - Maximum brake pressures to enter ABS control (wheel locking pressures) must not exceed 100 bar

4. Content of the MK 100 UHP - Motorsports ABS

- MK 100 UHP HECU (see Chapter 4.1)
- IMU (see Chapter 4.2)
- External Pressure Sensor (see Chapter 4.3)
- Rotary Switches (see Chapter 4.4)
- Connectors (see Chapter 4.5)
- Software tool for configuration and diagnosis (see Chapter 5.3)

Figure 1: MK 100 UHP

4.1. Electronic Brake System

Originating from a series-production design, the MK 100® is a proven electronic brake system developed by AUMOVIO. For motorsport applications, the MK 100® configuration is adapted to meet specific requirements, including a front/rear brake circuit split combined with a balance bar.

- AUMOVIO MK 100® HECU
- Reference no.: 3-75000-013
- Weight: 1,990 g
- HCU (Hydraulic Control Unit)
  - Internal pressure sensor for front axle master cylinder pressure measurement (for rear axle master cylinder pressure measurement an external pressure sensor is used)
  - Delivered pre-filled
- ECU (Electronic Control Unit)
  - 58-pos TE MCon connector

	WARNING
⚠	**Hazards from increased wear during motorsport use** Motorsport operation of the MK 100 UHP – Motorsports ABS subjects components to high material stress. ► An exchange of the Electronic Brake System after two years is recommended.

4.1.1 Hardwired Interfaces

The following interfaces are available as hardwired connections. Some of these can alternatively be operated via CAN signals, while others must remain hardwired to ensure proper functionality.

> 4x Wheel Speed Sensor interface (mandatory)
  - Active type sensors are supported: 2-Level (7/14 mA) or 3-Level (7/14/28 mA) with Manchester protocol
  - Pulse Width Modulation (PWM) protocol is currently not supported by the UHP ABS.
  - Wheel speed sensors are not included in the MK 100 UHP - Motorsports ABS and must be sourced separately.

	ATTENTION
⚠	**Damage to the MK 100 UHP can be caused by connecting incompatible hardware** Risk of damaging the MK 100 UHP - Motorsports ABS when connecting passive wheel speed sensors. ► Use active wheel speed sensors only!

> External pressure sensor for rear axle master cylinder pressure measurement (mandatory), see chapter 4.3
> ABS mode selection switch (hardwired switch provided or via CAN)
> Function disable switch – independent of mode selection (hardwired): ABS On/Off (hardwired switch or via CAN)
> “ABS Warning Lamp” signal output, active when ABS function is disabled (hardwired or via CAN)
> “DTC Warning Lamp” signal output, active when a fault is present (hardwired or via CAN)
> Tachometer speed signal output (hardwired or via CAN)
> Brake light activation signal output (hardwired or via CAN)

4.1.2 CAN Interfaces

> Private CAN (500 kBaud) – not terminated
  - Used for communication with external IMU
> Vehicle CAN (Configurable 1 MBaud / 500 kBaud) – not terminated
  - Provides comprehensive ABS status and signal information:
    - Wheel speeds, including direction and wheel ticks (FL, FR, RL, RR)
    - Vehicle reference speed
    - Brake circuit pressures (Front, Rear)
    - Accelerations (X, Y, Z; -5 g … +5 g)
    - Angular rates (X, Y, Z; -156°/s … +156°/s)
    - Status and activation flags
    - ABS activation flags (individually for each wheel)
    - Mode selection states
    - Function disable flags
    - Warning lamps
  - Additional functions via CAN:
    - Mode selection switches and ABS On/Off switches (alternative to hardwired)
    - Tire circumference selection for front and rear axle (quick adaptation for wet-weather tires)
    - Standardized interface for a steering angle sensor (optional)
    - Standardized transmission interface for automated gearbox data
    - Diagnostic interface (UDS)
    - Software updates via CAN
> FlexRay
  - Available for customer-specific adaptations

4.1.3 Software – Functions

> ABS - Anti-lock Braking System

The AUMOVIO Engineering Solutions MK 100 UHP ABS ensures maximum braking performance under racing conditions. The MK 100 UHP – Motorsports ABS is based on the latest generation of ABS technology. Its advanced software approach delivers best-in-class braking performance, particularly on demanding tracks such as the Nürburgring Nordschleife.
With a 5 ms control loop, the model-based algorithm responds dynamically to variations in normal forces caused by aerodynamic effects or track topography.

The Configuration Manager enables customization of ABS functionality to match driver preferences and driving style.
For details see chapter 5.3.6.

> ABS Mode Switch:

The MK 100 UHP ABS allows selection of different ABS modes. Modes can be switched either via a hardwired switch or through a predefined CAN interface. The table in Figure 2 provides an overview of the settings corresponding to each switch position:

Valve control	Name	Position		Name	Valve control	ABS control entry	Wheel Dynamic Control	Comment
Digital, thus more feedback of ABS activity in the brake pedal. Designated for race drivers, who adjust the brake pressure very close to the locking pressure. The digital valve control makes sure that even small pressure increase steps can be performed at low differences in pressure.	**Digital 1**	**12**	**1**	**Analog 1**	**Analog**, thus less feedback of ABS activity in the brake pedal. Designated for race drivers, who adjust the brake pressure above the locking pressure considerably. The analog valve control allows a sensitive control even at high differences in pressure.	Early	More dynamic	Focus on stability / less performance For a tire-road-combination with low demand for slip.
	Digital 2	**11**	**2**	**Analog 2**				
	Digital 3	**10**	**3**	**Analog 3**		⇅	⇅	⇅
	Digital 4	**9**	**4**	**Analog 4**				
	Digital 5	**8**	**5**	**Analog 5**				Focus on performance / less stability
	Digital 6	**7**	**6**	**Analog 6**		Late	Less dynamic	For a tire-road-combination with high demand for slip

Figure 2: MK 100 UHP ABS Mode Switch Setup

The MK 100 UHP ABS provides twelve selectable modes:

- Six configurations in analog valve control mode
- Six configurations in digital valve control mode

The analog mode is recommended for gentlemen drivers, while the digital mode is intended for drivers braking close to the locking pressure.

In both, analog and digital valve control mode the ABS control behavior is influenced according to Figure 2. With the focus shifting from stability to brake performance the following ABS characteristics occur:

- ABS entry is delayed, providing greater freedom for experienced race drivers.
- Reduced dynamic wheel control results in pressure modulation that offers increased brake pedal feedback.

For wet conditions, an earlier ABS entry and more dynamic wheel control are recommended, as these setups prioritize stability.

Mode selection can be performed via a hardwired switch (see chapter 4.4) or through a CAN interface. For details on configuring the interface (hardwired or CAN), refer to chapter 5.3.4.

> EBD – Electronic Brake Force Distribution

A fixed brake force distribution defined by the brake system layout cannot ensure optimal utilization of available friction in all situations, for example due to dynamic axle load shifts during braking. As a result, an overbraked rear axle may occur, negatively affecting vehicle stability.
EBD prevents both underbraking and overbraking of the rear wheels by controlling rear brake force based on wheel slip.

For racing applications, a slightly overbraked rear axle can improve vehicle agility when braking into corners. Therefore, tuning options are provided and explained in chapter 5.3.6.

> Curve Brake Feature

The MK 100 UHP ABS control strategy adapts during corner braking to enhance steer-in capability and provide the best compromise between braking performance and steerability when cornering.

4.2. IMU – Inertial Measurement Unit

The AUMOVIO SC13S is a 6-DOF (degrees of freedom) inertial measurement unit.

- Weight < 50 g
- Protection level: IP6K9K according to ISO 20653
- 3-axis acceleration
  - X, Y and Z direction
  - Range from -59 m/s² to +59 m/s²
- 3-axis rotation rate
  - yaw, roll and pitch
  - Range: -300°/s to +300°/s

Figure 3: IMU

4.3. External Pressure Sensor

The AUMOVIO PS20 pressure sensor is used to measure pressure in the rear brake circuit when a balance bar or similar device is implemented for brake balance adjustments. The measured pressure is utilized to optimize pressure modulation on the rear wheels.

- Robust design
- Protection level: IP6K9K according to ISO 20653
- M12 → M10 adapter included in delivery

Figure 4: External Pressure Sensor, incl. M10/M12 adapter

4.4. Rotary Switch

The 12-position rotary switch enables selection of the most suitable ABS-mode for the specific vehicle under current conditions. Analog switches are intentionally used for their reliability and cost efficiency.

Figure 5: Mode Switch

To switch off ABS control functions, a separate push-button switch can be used. This allows the user to retain the preferred mode when temporarily disabling the function.
Alternatively, the control mode and the off mode can be selected via predefined CAN messages instead of hardwired switches.

4.5. Diagnostic CAN Hardware

The connection between the Configuration Manager and the MK 100 UHP ABS unit is established via the Vehicle CAN.
To connect the user PC to the Vehicle CAN, the Diagnostic CAN Interface (PEAK PCAN-USB; p/n: IPEH-002021) is included in the MK 100 UHP – Motorsports ABS delivery and is part of the delivery.

4.6. Connectors

The MK 100 UHP – Motorsports ABS includes all necessary connectors to build the wiring harness according to the specific requirements of the vehicle.
If requested, AES can also design and manufacture custom wiring harnesses.

#	Connector	Description	Wire Size [mm²]	Parts per Kit
1	ABS	MK 100 UHP HECU connector - housing		1
2	ABS	MK 100 UHP HECU connector – wire cover		1
3	ABS	Pin - Size 1.2	0.5 - 0.75	35
4	ABS	Blind Plug - Size 1.2		25
5	ABS	Pin - Size 2.8	0.5 - 1.0	5
6	ABS	Wire Seal - Size 2.8		3
7	ABS	Blind Plug - Size 2.8		8
8	ABS	Pin - Size 4.8	2.5 - 4.0	6
9	ABS	Wire Seal - Size 4.8		4
10	IMU	IMU Connector Female 4 Pos		1
11	PS	IMU Connector Female 3 Pos		1
12	IMU & PS	Pin - Size 0.63	0.5 - 0.75	10
13	IMU & PS	Wire Seal - Size 0.63		7

Figure 6: Connector Parts

4.7. Configuration Manager

The Configuration Manager serves as the interface for setting up the MK 100 UHP. It is used for initial setup, calibration, fault handling, and final fine-tuning.
The latest version of the Configuration Manager can be downloaded here:
https://engineering-solutions.aumovio.com/

5. Implementation Guideline

	WARNING
	**Risk of injury due to improper braking system layout.** An unsuitable braking system can compromise vehicle deceleration. ► A thorough calculation and evaluation of the vehicle's overall braking system must be performed.

	WARNING
	**Risk of injury due to insufficient qualification.** Installation by unqualified personnel can result in severe personal injury and equipment damage. ► All work must be carried out by appropriately qualified personnel.

	WARNING
	**Non-Operational State of Delivery** The MK 100 UHP Hydraulic-Electronic Control Unit is delivered with provisional software that does **not** provide ABS functionality. ► Update the software according to Chapter 5.3.10 ("Frimware update")

Ensure the vehicle's brake system is set up according to motorsport requirements. Meeting these requirements is the responsibility of the installer. Additionally, observe the restrictions outlined in Chapter 3.
Installation, electrical connection, maintenance, and commissioning must be performed exclusively by qualified personnel.

The MK 100 UHP will be delivered without a functional firmware. After integrating the hardware (HECU), download and flash the latest firmware onto the MK 100 UHP (Chapter 5.3).

5.1. QuickStarter

- Integration of all MK 100 UHP – Motorsports ABS components:
  - HECU
  - External Pressure Sensor
  - IMU
- Connection of the hydraulic lines
- Conventional bleeding
- Wiring harness assembly
- Installation of ABS warning lamp in the driver's field of view
- Configuration Manager installation
- Update of the MK 100 UHP firmware
- Setting of vehicle-specific parameters
- Calibration of all sensors
- Bleeding via Configuration Manager using the "Initial/Rework Bleeding" routine
- Initial test: verify no DTCs, installation check of WSS wiring and hydraulic connections
- Rollout
- Tuning of MK 100 UHP ABS parameters

5.2. Hardware Setup

The following chapters describe the integration of the MK 100 UHP – Motorsports ABS components.

5.2.1 Hydraulic & Electronic Control Unit

The hydraulic setup is shown in Figure 7. It requires a front/rear brake circuit split and can be used with either a tandem master cylinder or two master cylinders in combination with a balance bar. The integration of the HECU and the external pressure sensor (PS) is described in the following.

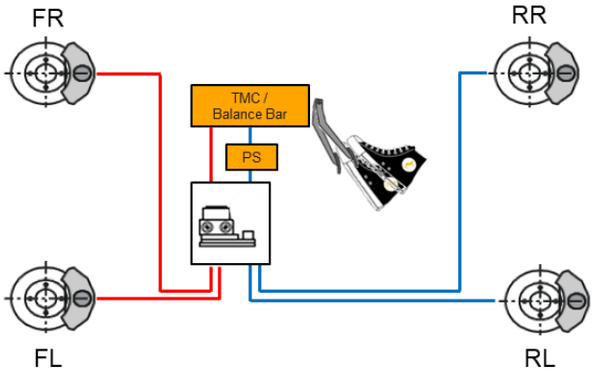


Figure 7: Hydraulic Setup

Avoid introducing air into the system when connecting the brake lines coming from the master cylinder. The HECU is delivered prefilled, meaning conventional bleeding is generally sufficient after installation. However, it is recommended to perform bleeding by using the “Initial/Rework Bleeding” routine of the Configuration Manager (chapter 5.3.7).

Integration Steps for HECU

The following steps guide through the major tasks for the integration of the HECU:

> Disconnect the battery

> Mount the MK 100 UHP HECU

- Secure the MK 100 UH HECU with at least two M6-screws to a bracket.
- Use at least two of the three possible mounting points, shown in Figure 8.
- Tighten the screws with 8-10 Nm.
- Anti-vibration mounts are required when installing the HECU in the vehicle. The rubber mount shore rating and overall mounting solution are vehicle-specific. Carefully consider vibration transmission to the HECU to avoid hardware damage.

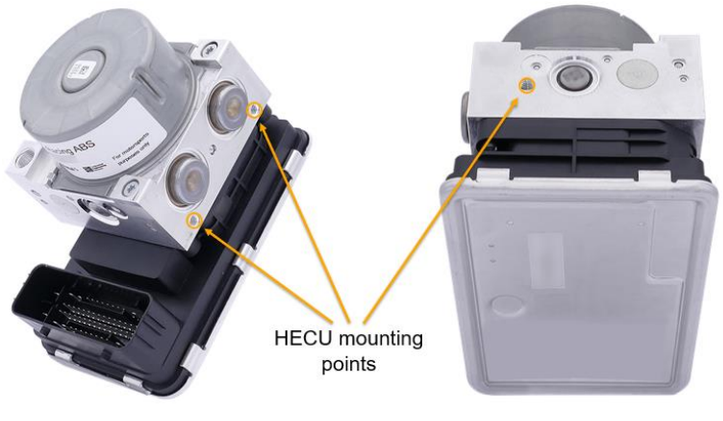


Figure 8: HECU mounting points

The two low-pressure accumulators (shown on the left side of Figure 8 above the two mounting points) must not touch the bracket.
As illustrated in Figure 9, the HECU has defined mounting position requirements. It can be rotated 360° around the vertical Z-axis but must remain within positional limits on the X and Y axes.

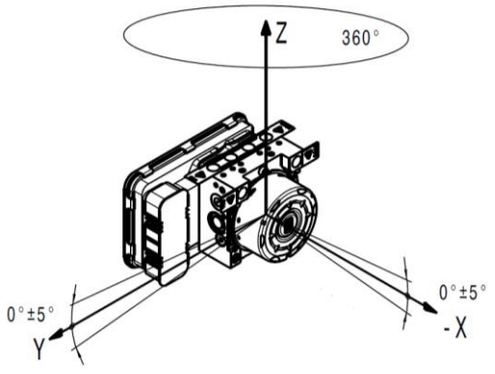


Figure 9: possible HECU mounting directions

The hydraulic connections are shown in Figure 10. Union screw sizes [M12x1] or [M10x1] are listed according to the hydraulic connection. Tighten screws to 13–20 Nm.

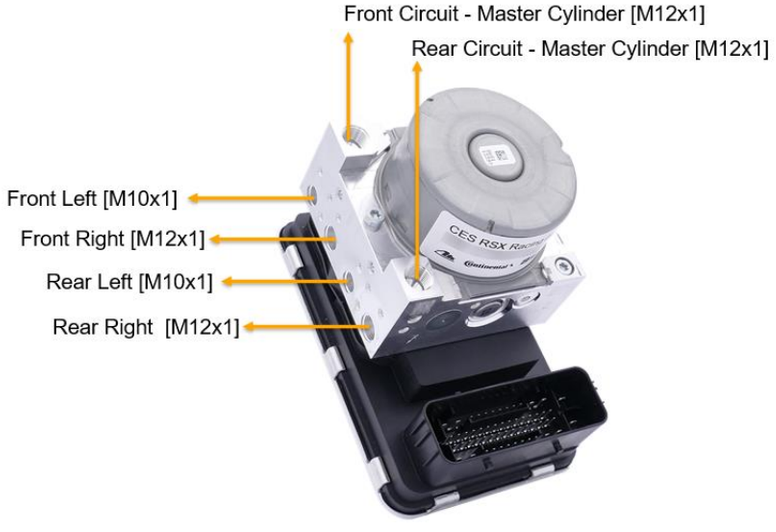
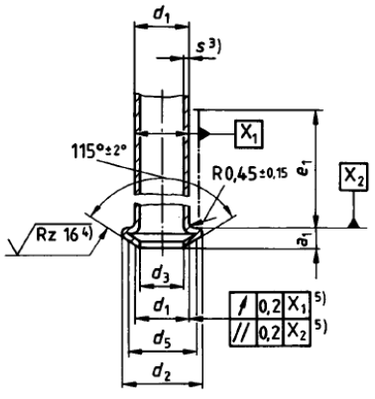


Figure 10: Hydraulic Interfaces

Connections to the calipers are labeled “Front Left,” “Front Right,” “Rear Left,” and “Rear Right.” Depending on the hydraulic setup, the tandem master cylinder or balance bar master cylinders connect to “Front Circuit – Master Cylinder” and “Rear Circuit – Master Cylinder,” respectively. The external pressure sensor must be mounted in the rear axle brake circuit between the HECU and the master cylinder.
Note: The system is not compatible with a pressure reduction valve.

	WARNING
⚠	**Risk of injury due to contact with brake fluid.** Brake fluid is an abrasive substance. Brake fluid can cause immediate damage of painted areas. Immediately flush the contaminated area with clear water. ► Always follow the safety instructions when handling brake fluid.

> Mount the provided external pressure sensor (see 5.2.2)
> Mount brake pipes:
- Brake line diameter should be ≥ 4.75 mm [3/16”].
- Flare type F (see Figure 11) is required to establish a dense connection.
- Use a union nut to connect hydraulic pipes to the HECU.



d_1	d_2 js 14	d_3 +0,3 −0,2	d_5 min.	e_1 min.	a_1 ± 0,3
4,75	7,1	3,2	5,0	17	2,3
6,00	8,4	4,5	6,0	18	2,5
8,00	10,7	6,5	8,0	24	2,6
10,00	12,7	8,5	10,0	28	2,9

Figure 11: Flare Type F [DIN74234]

> Connect cable harness (see chapter 5.2.7)
> Install warning lamp in the driver’s field of view (see chapter 5.2.5)
> Bleed the hydraulic system
- The HECU is delivered in a prefilled state.
- It is recommended to perform bleeding by using the “Initial/Rework Bleeding” routine of the Configuration Manager (chapter 5.3.7).
- Make sure the master cylinder(s), the pipes and the reservoir never run out of brake fluid.

	ATTENTION
⚠	**Air in the hydraulic brake system may enter the MK 100 UHP.** This can compromise the prefilled state of the MK 100 UHP. Air inside the unit cannot be removed by conventional bleeding. ► Perform the “Initial/Rework Routine” with the Configuration Manager, see chapter 5.3.7.

	ATTENTION
⚠	**Incorrect brake fluid can damage the MK 100 UHP.** Do not use mineral oil! ► Using DOT4 brake fluid is recommended.

> Reconnect the battery
- The MK 100 UHP requires a supply voltage between 10 V and 13.6 V.
- Inrush current: (when the pump starts running): 75 A for 50 ms at 14 V and 14 mΩ resistance.
- Steady-state current: 30 A.
- For details, see chapter 5.2.7

> Perform software setup process (Chapter 5.3):
  - Connect the provided CAN interface to the Vehicle CAN.
  - Install and open the Configuration Manager to establish a connection to the MK 100 UHP.
  - Adjust baud rate settings if necessary.
  - Update factory firmware with the latest version provided by the distributor.
  - Read and clear the failure memory using the Configuration Manager.
  - Do not start rollout if failures are detected.

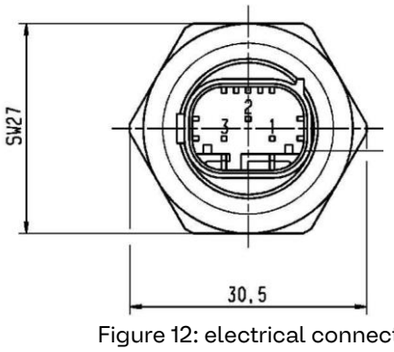
> Bleeding process with Configuration Manager

After a conventional bleeding in the previous step, start the “Initial/Rework Routine”(see Chapter 5.3.7).

> Initial test / Rollout
  - Ensure no DTCs are stored before rollout (see Chapter 5.3.9).
  - Check wiring of wheel speed sensors and hydraulic connections.
  - Use the Configuration Manager for installation checks via the “Interaction” tab and select “Installation Check” (see Chapter 5.3.7.).
  - The functionality of the MK 100 UHP should be checked carefully before usage. Perform an ABS-controlled braking maneuver in a safe environment with sufficient runoff area.
  - Re-bleed the hydraulic system if necessary.
  - Ensure the ABS warning lamp is always visible to the driver. An illuminated ABS warning lamp indicates ABS is not available.

5.2.2 External Pressure Sensor

The external hydraulic brake pressure sensor must be installed in the rear brake circuit between the master cylinder and the HECU, as shown in Figure 7: Hydraulic Setup.
For easier installation of the M12 pressure sensor, an M12/M10 adapter is included in the MK 100 UHP delivery.
Before installation, prefill the external pressure sensor PS20 (10.0522-9963) with brake fluid to prevent air from entering the system.



Contact-No.	Description
1	Ground (-)
2	Signal Output
3	Power Supply (+)

Figure 12: electrical connector of the external pressure sensor

For easier bleeding, the sensor opening should face upward, with the electrical connector pointing downward.

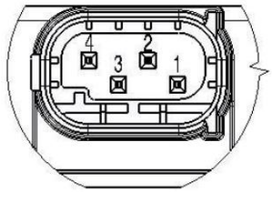
	ATTENTION
⚠	**Damage to the MK 100 UHP can occur if incompatible hardware is connected.** Risk: Connecting any sensor other than the supplied external pressure sensor may damage the system. ► Only use the delivered external pressure sensor.

5.2.3 IMU

The IMU must be mounted in a protected area of the vehicle. No additional components may be attached to the IMU bracket other than the IMU itself.
Anti-vibration mounts are required to prevent external vibrations from influencing the sensor's signal output. The shore hardness of the rubber mounts and the overall mounting solution are vehicle-specific and must be selected based on the expected vibration amplitude and frequency to ensure a robust and reliable IMU signal.
A mounting location with a low temperature range and minimal temperature gradients should be chosen.

General mounting recommendations:

- Mount the sensor as close as possible to the vehicle's center of gravity (COG) and on the longitudinal axis.
- The sensor must be installed in a level position.
- The sensor may be mounted facing either the driving direction or the opposite direction:
  - Connector facing backwards (± 3°) = 0°-position
  - Connector facing forwards (± 3°) = 180°-position



1 – GND
2 – CAN-IMU-L
3 – CAN-IMU-H
4 – Supply (12 V)

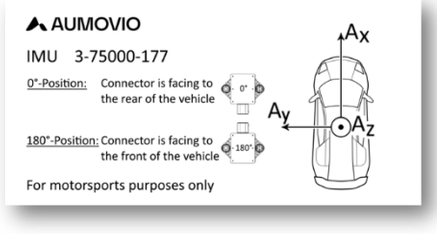


Figure 13: IMU connector – Pinout & IMU Label

5.2.4 Rotary Switch

The rotary switch must be connected to the MK 100 UHP as shown in the figure below:

Pin No.	Color	Connection to MK 100 UHP
1	Red	Pin 22: ABS_MODE_SW_SENSEEP
2	White	Pin 23: ABS_MODE_SW_SIG
3	Black	Pin 29: ABS_MODE_SW_GND

Figure 14: Rotary Switch Pinning [Haltech]

To verify the correct setup, check the Switch Position in the "Live Data" tab (Chapter 5.3.8) or the failure entries in the Configuration Manager (see Chapter 5.3.9).

	ATTENTION
⚠	**Damage to the MK 100 UHP may occur if incompatible hardware is connected.** There is a risk of damaging the MK 100 UHP when using any rotary switch other than the one delivered. ► Only use the supplied rotary switch.

Alternatively, the different modes can be selected via CAN Message MMI_24C [0x24C], signal Switch_ABS_PosReq. Information on how to switch between hardwired and CAN configuration is provided in Chapter 5.3.5.

5.2.5 Warning Lamps

The MK 100 UHP must not be used in any driving session unless an ABS warning lamp is installed and clearly visible in the driver's field of view.

	WARNING
⚠	**Hazard from undetected ABS function disable!** Undetected failures that disable the ABS function can lead to an unexpected vehicle behavior during high-deceleration maneuvers. ► The ABS warning lamp Information must be visible to the driver at all times.

The MK 100 UHP provides two types of warning lamp information as shown below.
The ABS Warning Lamp is mandatory and indicates critical system failures that result in a non-operational ABS.
The Failure Present Lamp is optional and indicates that a non-critical failure is stored. When only the Failure Present Lamp is illuminated (ABS Warning Lamp off), the ABS remains functional but may operate with reduced performance.

Warning Lamp	**OFF**	**Blinking**	**Permanent ON**	**Output**
ABS	ABS is operational	ABS is in diagnostic mode (via Configuration Manager)	ABS not working!	CAN: UHP_06 [0x5C0] – *UHP_ABS_FailureLamp* Hardwired: Pin 47
Failure Present	No failures stored	n/a	Failure stored; ABS with reduced performance	CAN: UHP_06 [0x5C0] – UHP_Failure_Present Hardwired: Pin 56

The information about the failure status is provided via two interfaces:

> CAN Bus
- Read via CAN message UHP_06 [0x5C0], which can then be forwarded to the dashboard.

> Hardwired Outputs
- ABS Warning Lamp → Pin 47
- Failure Present Lamp → Pin 56

In normal operation (ABS functional / no failures stored), each pin is actively pulled to GND when the warning lamp should be off.
If a failure is present, the output transitions to high-impedance (open-circuit) so that the lamp is energized via the external pull-up / vehicle supply and therefore turns on.
This fail-safe, active-low strategy ensures the warning lamp is activated if the MK 100 UHP is defective, disconnected, or if a power-supply fuse to the MK 100 UHP has blown. Figure 15 illustrates the principal circuitry of the hardwired warning lamp.

	ATTENTION
⚠	**Risk of damage to the MK 100 UHP** The MK 100 UHP pins are not designed to supply current for a warning lamp directly. ► Only use the signal output to control transistor logic.

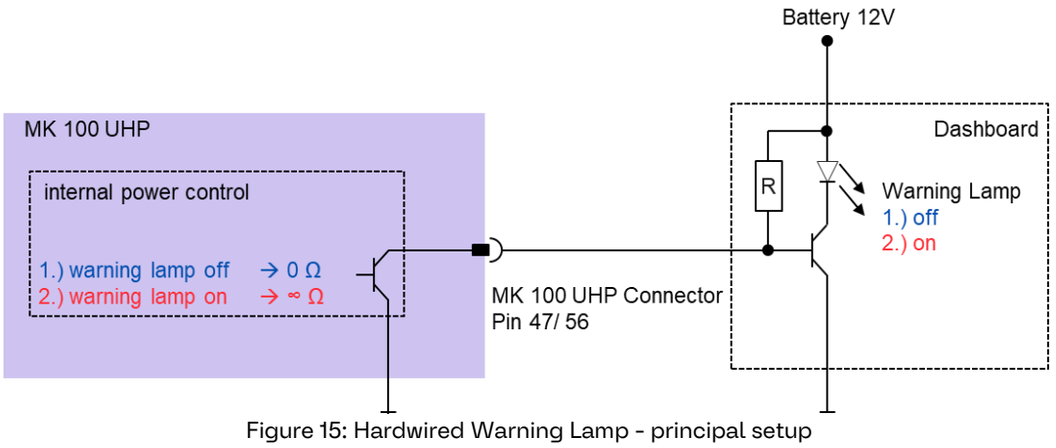


Figure 15: Hardwired Warning Lamp - principal setup

If the hardwired warning lamps are used, a transistor circuit similar to the one shown must be installed in the dashboard or a dedicated warning-lamp control module. The maximum current output is 200 mA.

Regardless of whether the warning lamp function is provided via CAN or via hardwired output, the ABS Warning Lamp must illuminate under the following conditions:

- An ABS failure occurs
- The MK 100 UHP is missing
- The fuse supplying the MK 100 UHP is blown

5.2.6 Other Hardwired Interfaces

> Tachometer speed output (Pin 57)

The Tachy output is an open-collector output with a maximum load of 40 mA. The nominal reference voltage is 14V and has a PWM signal output with a 50% (+/-5 %) duty cycle. signal frequency increases proportionally with vehicle speed.
This output is not intended for direct connection to an analog HMI. It is designed to be processed by another ECU. Vehicle speed information is also available via CAN.
The vehicle speed is proportional to the square-wave frequency according to:

$$v[kph] = a \cdot f[Hz]$$

linked by a constant factor $a = 0.36$.
The analog output is internally limited as follows:

- 0 V for vehicle speeds < 1 kph
- 12 V for vehicle speeds > 320 kph

> Brake light activation (Pin 43)

This interface provides a signal when the brake pedal is actuated. The MK 100 UHP monitors the master-cylinder brake pressure, and when a defined pressure threshold is exceeded, Pin 43 outputs 12 V. The signal may be used for downstream analog logic.
Due to the maximum current capability of 20 mA, it is not permissible to power brake lamps directly from the MK 100 UHP.
Alternatively, the brake light activation information is also available on CAN: Message UHP_06 [0x5C0] Signal UHP_Blr_Request, see chapter 6.6.

> ABS off switch (Pin 54)

To deactivate the ABS function, Pin 54 must be momentarily connected to GND.
A push-button is recommended for this interface.

- When activated, ABS regulation is disabled, and the ABS Warning Lamp is illuminated.
- CAN communication remains active, so vehicle speed and brake-light information continue to be available.
- Pressing the button a second time re-enables ABS and clears the warning-lamp request.

Note: This is not an emergency-off switch.
When ABS is disabled via Pin 54, the MK 100 UHP remains operational, but pressure regulation functionality is disabled.

5.2.7 Wiring Harness

All required components for assembling the wiring harness—excluding the wires themselves—are included in the delivery of the MK 100 UHP.
The figure below illustrates an example of the wiring setup, including typical harness lengths.

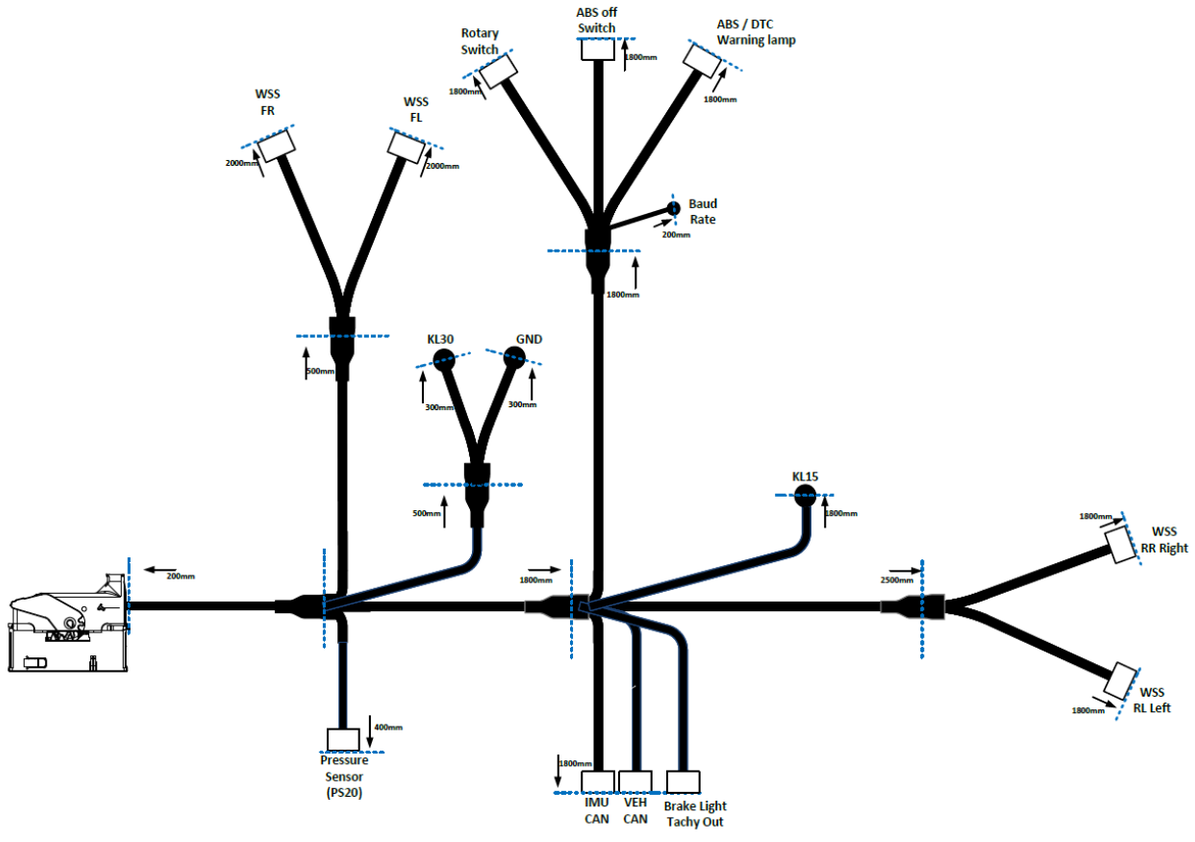


Figure 16: Wiring harness setup

> Electrical diagram (ABS only scope)

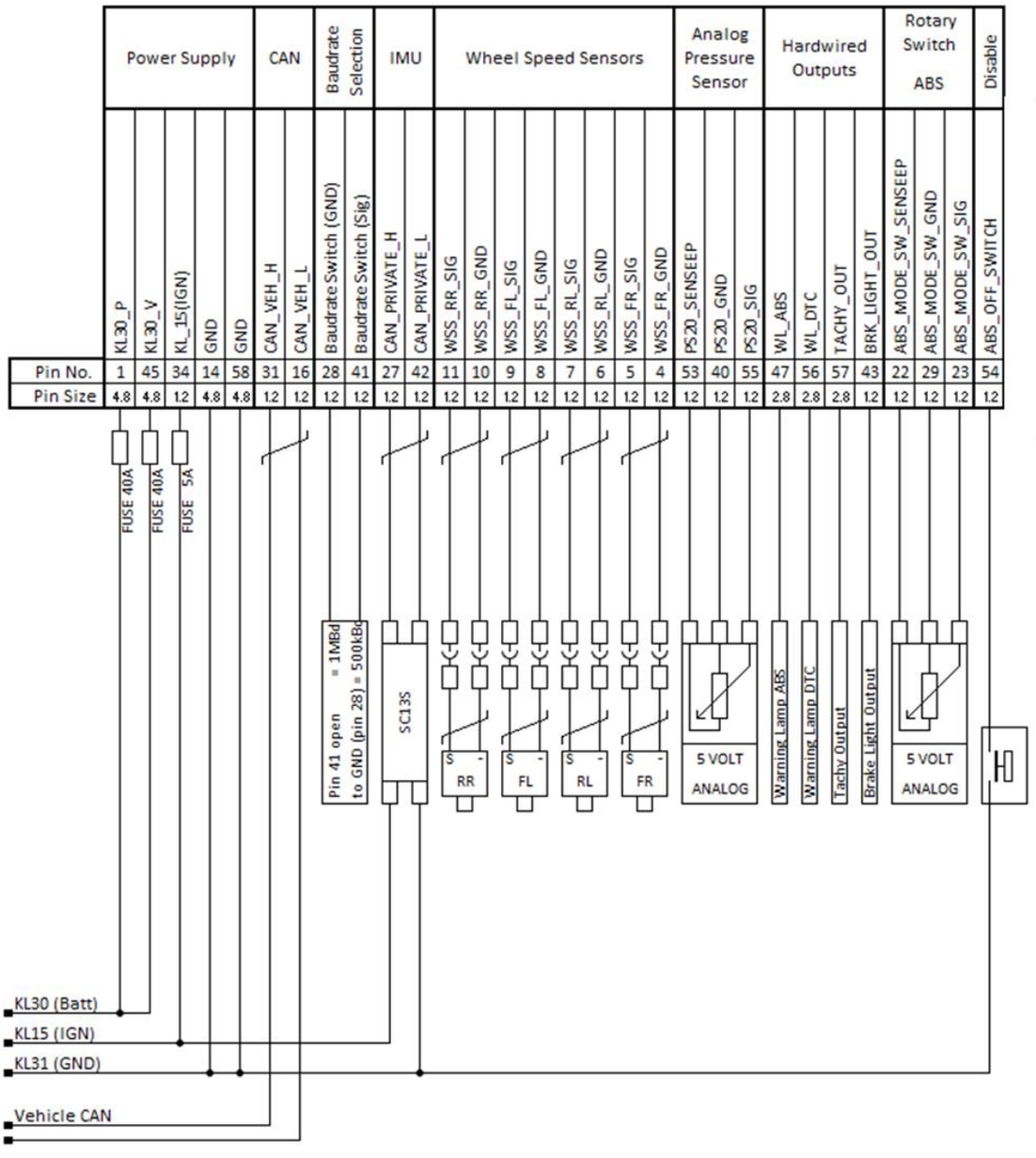


Figure 17: Electrical Diagram MK 100 UHP – ABS only scope

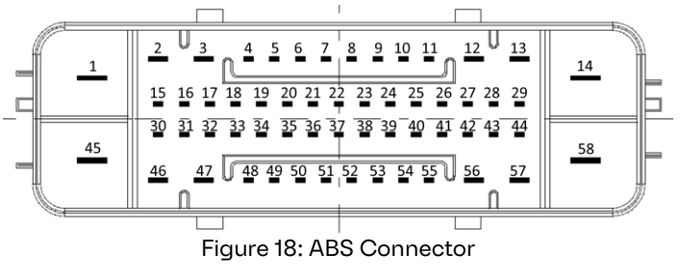


Figure 18: ABS Connector

Detailed pin descriptions are provided in attachments (6.3).

The required parts for each connector are described in chapter 4.5. All items must be selected according to the pin size specified in the electrical diagram (see Figure 17):

Pin size	Connector item # (pin)	Connector item # (blind pin)	Recommended wire size
4.8	#8	#9	4.0 mm²
2.8	#5, #6	#7	0.5 mm²
1.2	#3	#4	0.5 mm²

ATTENTION

Risk of Damage from Moisture Intrusion
Moisture or water inside the connector can damage the MK 100 UHP pins and may cause errors in transmitted analog signals.
► Ensure the wiring harness and all connectors are built to be waterproof.
► Use blind pins wherever a connector position is not wired.

For further details regarding the connector housing, refer to the manufacturer documentation (TE – Tyco Electronics Corporation): 9-2208656-9 - 58Way ABS ESP Connector

> CAN Interface

Neither the “Vehicle CAN” nor the “Private CAN” lines are internally terminated.
A CAN network requires termination resistors (120 Ω) at the two furthest nodes; therefore, termination must be considered during harness design.

The MK 100 UHP supports both 500 kBaud and 1 MBaud CAN environments.
The baud rate is selected using the jumper between Pin 28 and Pin 41:

- Open jumper → 1 MBaud
- Closed jumper → 500 kBaud

A power-cycle (hard reset) of the MK 100 UHP is required after changing this setting.

Before connecting the MK 100 UHP to the vehicle CAN, verify that no CAN identifier conflicts exist on the network.

> Wheel Speed Sensors:

Characteristics of compatible wheel speed sensors are listed in chapter 4.1.1.
It is recommended to twist the two cables (signal and ground) of each sensor to reduce electromagnetic disturbances.

5.3. Firmware Setup – Configuration Manager

The performance of the ABS depends on several vehicle-specific parameters, such as vehicle mass, tire circumference, brake coefficients, and other chassis-related characteristics.
The Configuration Manager allows the user to adapt the MK 100 UHP software parameters to the specific vehicle in which the system is installed.
These inputs are essential for ensuring the correct basic functionality of the MK 100 UHP.
In addition, the Configuration Manager enables adjustment of selected ABS and EBD control parameters.
These settings influence the control strategy and can be adapted to the vehicle's characteristics as well as the driver's preferences.

	ATTENTION
	**Initial firmware update required.** The MK 100 UHP Hydraulic-Electronic Control Unit is delivered with provisional software, which does not provide ABS functionality. To activate ABS, the firmware must be updated during the initial setup. ► Follow the procedures described in this chapter to update the firmware and enable full system functionality.

5.3.1 Overview and Safety Notes

	WARNING
	**Risk of Incorrect Software Configuration** Incorrect parameter inputs may lead to degraded ABS performance or unexpected vehicle behavior. ► Monitor entries in the Failure Memory. ► Adjust parameters gradually and perform careful test drives between changes.

Before using the Configuration Manager, read all instructions thoroughly.
If you have any doubts regarding the parameter setup, contact your supplier.
Incorrect vehicle parameter configuration can adversely affect ABS behavior.
The Configuration Manager—like the MK 100 UHP itself—is intended exclusively for motorsport use.

5.3.2 Installing the Configuration Manager Tool

The Configuration Manager must be installed on a computer before using the MK 100 UHP.
The installation file is provided by the distributor.
As the Configuration Manager is continuously improved, please ensure that you regularly check for the latest available version.
Before starting the Configuration Manager, make sure that the CAN Hardware Driver is installed (see Chapter 5.3.2.

System Requirements:
The Configuration Manager was tested on systems with the following or higher system characteristics:

- Operating System: Windows 10
- CPU: 2.4 GHz
- Memory: 7.9 GB RAM
- Free Space: 200 MB
- Screen Resolution: min. 1024x768

5.3.3 Setting Up the Diagnostic CAN Interface

The Configuration Manager communicates with the MK 100 UHP via the Vehicle CAN.
The basic setup is shown in Figure 19. The connection is established using the supplied third-party CAN interface (PEAK – PCAN; p/n: IPEH-002021).
For proper operation of the CAN hardware, the latest PCAN driver must be installed on the computer.
The driver can be downloaded from the manufacturer's website: https://www.peak-system.com/

As shown in Figure 19, the PCAN interface must be connected to the Vehicle CAN through a D-Sub 9 connector, with the following pin assignment:

- Pin 2 → CAN-Low
- Pin 7 → CAN-High

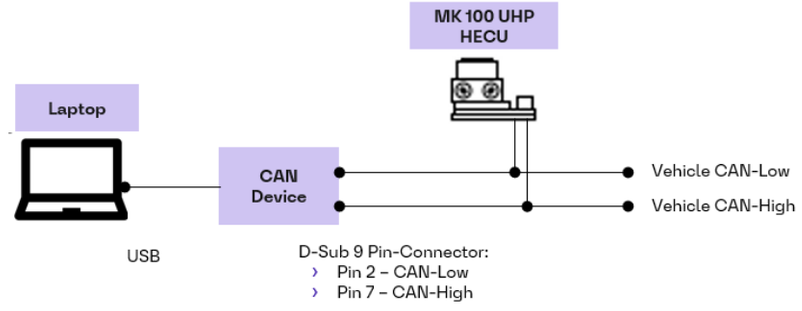


Figure 19: Connection between Laptop running the Configuration Manager and the MK 100 UHP HECU

To establish communication between the Configuration Manager and the MK 100 UHP, the CAN baud rate in the Configuration Manager must match the baud rate used by the vehicle CAN.
The baud rate can be selected under: Options → Baudrate (see Figure 20).

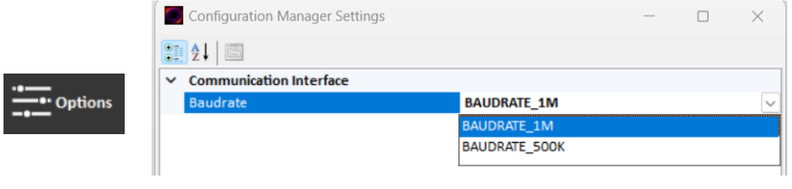


Figure 20: Baud rate selection - Configuration Manager

After selecting the appropriate baud rate, click the "Connect" button to establish communication with the MK 100 UHP.
When the Configuration Manager performs actions requiring an extended diagnostic session (e.g., IMU acceleration sensor calibration), the MK 100 UHP signals this state by blinking the ABS Warning Lamp.

5.3.4 Identification

The Identification tab displays general information about the hardware and the firmware installed on the MK 100 UHP.

	WARNING
⚠	**Hazard from a non-operational firmware state.** Incorrect software or parameter setup may result in a non-operational ABS system. ► Verify the "Software Integrity Status". ► Check all active and stored failures (see Chapter 5.3.9). ► Ensure that no warning lamps are illuminated.

ECU & HCU serial number	Serial numbers of the electronic and hydraulic control unit.
MK 100 UHP part number	Part number of the MK 100 UHP unit.
MK 100 UHP - SW version	Firmware version ID running on the MK 100 UHP HECU.
MK 100 UHP - SW date	Built date of the running software.
Bootsoftware ID	Developer information.
Calibration Information	Developer information.
Software compatibility index	Developer information.
Total flash attempts	Total number of firmware flashing attempts.
Successful flash attempts	Number of successful flash attempts.
Software integrity status	Current integrity state of the application software and the parameters running on the MK 100 UHP. Possible states are: > No issues: Application running > Software not available: (Re-)Flash Software > Initial software flash required: (Re-)Flash Software > Parameter not available: (Re-)Flash Parameter > Parameter set corrupted: (Re-)Flash Parameter > Software version not supported: (Re-)Flash correct Software > Dataset and software do not match: contact your supplier
Flush and bleed status	Most recent executed Flush & Bleed routine of the MK 100 UHP. Possible states are: > Production Fill & Bleed ok: Delivery condition; unit is prefilled. After hydraulic installation, perform a conventional bleeding followed by the Initial/Rework Bleeding using the Configuration Manager. > Bleeding Status not ok: Bleeding Routine was not executed correctly > Pump Flushing ok: Pump Flushing Routine was performed correctly > Rework Routine ok: Rework Flushing Routine was performed correctly

5.3.5 Setup

The Setup tab allows the user to adapt the base parameters of the MK 100 UHP to the vehicle. Ensure that all parameter values are correct and entered carefully before writing them to the MK 100 UHP. If you are unsure, please contact your supplier. Incorrect parameter inputs may lead to reduced control performance of the MK 100 UHP.
Functions in the Setup tab:

> Read from ECU: Read the current configuration from the ECU
> Load Configuration: Load a formerly saved configuration file
> Write to ECU: Write the set configuration to the ECU
> Save Configuration: Save the configuration shown in the Configuration Manager to a file

Powertrain	Select the driven axle: front-wheel drive (FWD); rear-wheel drive (RWD); all-wheel drive (AWD) AWD will be available in upcoming UHP versions
Gearbox	Options: Automatic (torque converter), DSG, or Manual. If no traction or stability control function is used, “Manual” should be selected. Additionally, if the expected CAN message from the gearbox is not available, “Manual” must be selected.

Tire circumferences via CAN	Choose between: On or Off. > Off: Uses the values defined in Vehicle Parameters. > On: Uses information provided in CAN message MMI_24C [ID 0x24C], signals MMI_Tcf_FrontAxle and MMI_Tcf_RearAxle. This allows adjustment of tire circumference during a race (e.g., when changing from slick to rain tires). Note: Changes to tire circumference via CAN are only applied when the vehicle is at a standstill. The values given in "Vehicle Parameters" will be used as a fallback level. Valid range: 1600 mm - 3000 mm
EBD function	Enable or disable Electronic Brake Force Distribution. EBD provides fine control of the rear axle brake force to prevent overbraking during partial braking maneuvers.
Steering Wheel Angle Sensor	Steering angle information is not mandatory for ABS functionality. However, when available, it improves agility during quick turn-in maneuvers and enhances ABS performance depending on the desired lane radius. The steering angle can optionally be provided via CAN (Message SWA_CUSTOM_DATA [0x321]). Options: not available; Custom SWA sensor or Bourns® Automotive SWA sensor, on Vehicle CAN or Private CAN
ABS Mode Switch	The ABS provides 12 different modes. The mode switch can be omitted; in this case, Mode 3 is used as default. > If mode switching is required, the following options are available: > Hardwired Switch (included in delivery) > via CAN (Message MMI_24C [0x24C]; Signal Switch_ABS_PosReq)
ABS On/Off Switch	The ABS can be switched off independently of the selected mode. Options: > Hardwired > via CAN (Message MMI_24C [0x24C]; Signal Switch_ABS_OffReq) > not connected (= ABS On)
Wheel Speed Sensors	Select the type of wheel speed sensor used. Configure all four WSS individually: 2-Level (not direction sensing), 3-Level (direction sensing) or 3-Level (direction sensing, directions swapped). For sensor details see also chapter 4.1.1.
Mounting Position of the IMU	The Inertial Measurement Unit may be mounted with the connector facing forward (0°) or rearward (180°). See chapter 5.2.3 for details

	**ATTENTION** **All available configuration options must be selected.** The configuration can only be written if every option is defined. ► Ensure that all configuration options are selected, even if set to "not available."

5.3.6 Parameters

The Parameters section allows adaptation of the control parameters for ABS and EBD.

> Load Parameters: Load a previously saved parameter file.
> Save Parameters: Save all currently displayed parameters (all tabs) to a file.
> Flash Parameters: Write the selected parameters to the ECU.

	ATTENTION
⚠	**Incorrect parameters on the MK 100 UHP can result from unintended entries in the Configuration Manager.** When pressing Flash Parameters, all available parameters are written to the ECU. ► Ensure that all parameters are correct before pressing the Flash button. ► Use the Load and Save functions to avoid unintended changes to the parameter set.

Vehicle Geometry / IMU Mounting Position / Brake Setup

The vehicle- and brake-specific parameters are required for proper functionality of the MK 100 UHP. The following values must therefore be provided:

Axle Load Front/Rear	Axle loads of the front and rear axles with the car standing on a level surface.The sum must correspond to the vehicle mass and must not be less than 500 kg. Measurements should be taken with a half-filled tank and the driver seated in the car.
Wheelbase	Distance between the front and rear axle.
Track Width Front/Rear	Distance between the left and right tire centerline on the rear/ front axle.
Height of COG	The height of center of gravity above the ground.
Wheel Circumferences Front/Rear	Circumference of wheels on front and rear axles. The circumference is required to calculate wheel speed. If tire circumferences are additionally transmitted via CAN, the values entered here serve as fallback parameters (e.g., in case of CAN communication problems).
Number of Teeth Front/Rear	Number of teeth of the encoder wheel. The system requires the number of pulses per wheel rotation to calculate wheel speed. A typical encoder wheel has 48 teeth.
Steering Ratio	Ratio between steering wheel angle and wheel angle. Use an average value representative of typical operating range. If unsure, keep the default value.
IMU – Lateral Offset	Lateral distance between the IMU and the vehicle's longitudinal axis. When seated in the car facing forward: IMU on the right side → positive value IMU on the left side → negative value
IMU – Distance to Front Axle	Distance between front axle and the IMU. Longitudinal distance between the IMU and the front axle. IMU behind the front axle → positive value IMU in front of the front axle → negative value
Brake Caliper Type	Select whether a fixed or a sliding (floating) brake caliper is used.
Brake Caliper Stiffness	Select the stiffness category of the brake caliper: soft, medium, or stiff (indicates caliper flexibility).

Brake Coefficient Front/Rear	The brake coefficient is the ratio of brake pressure and resulting brake torque. If known, the value may be entered directly. If unknown, the value can be estimated using the following parameters: > Effective Brake Disc Radius: Distance from the center of the brake disc/wheel hub to the center of the brake pad's friction contact area. > Piston Area: Total piston area per caliper (sum of the base areas of all pistons on both sides). Usually available in the brake caliper datasheet. > Friction Coefficient: Depends on the brake disk/pad combination and is typically provided in the brake pad datasheet. If the coefficient varies significantly with temperature, use an average value from the relevant operating temperature range.

ABS & EBD Tuning

The MK 100 UHP provides the unique ability to tailor control functions to the vehicle, the racetrack, prevailing conditions, and driver preferences.
It is strongly recommended to begin with the default values.
Apply tuning changes in small increments and carefully verify the resulting vehicle behavior. Incorrect or excessive adjustments may degrade the performance of the MK 100 UHP.

ABS Stability Index	This parameter adjusts the focus between stability and deceleration performance during ABS-controlled braking maneuvers. It should be adapted according to the driver's preference and the vehicle characteristics.
ABS Pressure Modulation Front/Rear Axle	Allows differentiated adjustment of pressure modulation for ABS control on the front and rear axle. For lighter wheels, a more moderate setting is recommended. For heavier wheels, the dynamic setting can be beneficial.
EBD Pressure Modulation	Allows adjustment of pressure modulation for EBD control. Dynamic modulation enables a higher pressure-increase gradient. Moderate modulation uses a lower pressure-increase gradient.
EBD Control Entry	Adjusts the entry threshold for EBD control across the vehicle speed range. Earlier activation increases rear-axle stability, but may reduce braking performance (deceleration).

5.3.7 Interaction

The Interaction tab manages the diagnostic communication with the ECU. This area provides functions for implementation checks, mode switching, and sensor calibrations.

Sensor Calibration

The Sensor Calibration tab provides the interface for calibrating all mandatory and optional sensors.
A sensor calibration is required after the initial installation and after any removal or reinstallation of sensors.

Longitudinal/ Lateral Acceleration Sensor	After mounting the IMU to the vehicle and connecting the Private CAN to the ECU (see Chapter 5.2.3), ensure that no IMU CAN timeout failures are present (see Diagnostics, Chapter 5.3.9). To calibrate the sensor signals, park the vehicle on a level surface and use the calibration buttons. The status display indicates the result of the calibration process.

Pressure Sensor	Calibrate the internal and external pressure sensors signals. Ensure the brake pedal is not pressed during the calibration.
Steering Wheel Angle Sensor	If a custom steering wheel angle sensor is coded (see Chapter 5.3.5) ensure that the steering wheel is straight when driving straight. During the calibration process, the steering wheel must be in the 0° position. This routine will in this case not calibrate the sensor itself. Using the Custom Sensor option requires a self-calibrating class 3 sensor. When coded according to Chapter 5.3.5 and when using the Bourns Steering Wheel Angel Sensor, this request will also trigger the sensor's internal calibration routine.

Flush & Bleed Wizards

The Configuration Manager provides two routines to support the bleeding of the MK 100 UHP. These processes aim to remove air within the MK 100 UHP. Air in the remaining brake system (calipers, master cylinder, piping, etc.) must be removed by manual bleeding and is not part of the Flush & Bleed Wizards.

	WARNING
	**Hazard due to incomplete conventional bleeding!** The Flush & Bleed Wizards are designed to bleed the MK 100 UHP. Air remaining in the rest of the hydraulic system will be drawn into the MK 100 UHP. ► Perform a conventional bleeding before and after running the Flush & Bleed Wizards.

	WARNING
	**Hazard due to autonomous pressure build-up!** The Flush & Bleed Wizards include autonomous brake-pressure build-up sequences. ►Ensure that the hydraulic brake system is correctly assembled. ►Be aware of potentially high brake clamping forces.

The Flush & Bleed Wizards guide the user through all required steps. The procedures require user interaction, such as pressing the brake pedal or opening/closing bleeder screws.
A brief description is provided below; detailed instructions are in Chapter 6.

Flush & Bleed

Pump Flushing	The Pump Flushing routine activates the pump of the MK 100 UHP and controls the internal valves while the user applies the brake pedal. This routine may be carried out in addition to conventional bleeding, for example between driving sessions. An overview is provided in Chapter6.4.
Initial/Rework Routine	The Initial/Rework Routine guides the user through several steps to bleed the MK 100 UHP. A correctly prefilled and conventionally bled brake system is required before starting the routine (Step 1). After completion, a follow-up bleeding is recommended. This routine is part of a multi-stage process described in Chapter 6.5. The Configuration Manager executes flush cycles and circuit-specific bleedings. User interaction is required (e.g., brake pedal actuation, using a bleeder unit, opening/closing bleeder screws). Process Overview: 1. Manually: Prefilling Routine 2. Configuration Manager: Initial/Rework Routine (Flush Cycle 1, Bleeding 2nd Circuit, Bleeding 1st circuit, Flush Cycle 2) 3. Manually: Follow-up Bleeding The Initial/Rework Routine is recommended after the first integration of the MK 100 UHP or whenever larger amounts of air enter the system (e.g., after replacing brake components).

Installation Check

The Installation Check tab allows verification of the hydraulic caliper connections and wheel-speed sensor wiring.

Pressure	Displays brake pressure for each wheel individually.
Pressure Release	Releases brake pressure for a specific wheel while the brake pedal is pressed. Use this function to verify hydraulic piping.
Speed	Displays wheel speed for each wheel individually. Use this information to verify WSS wiring.
Brake Bias	Press the brake pedal once to measure the brake balance (%) between front and rear axles.
Activate Brake Light	Activates the brake-light switch output via CAN or the hardwired interface.

After the initial installation of the MK 100 UHP, it is recommended to verify the hydraulic piping and wheel-speed sensor wiring, particularly ensuring that calipers and sensors are connected to the correct inputs of the MK 100 UHP.

5.3.8 Live Data

The Live Data tab supports system analysis during operation. Internal variables and status information can be monitored in real time.

ABS Status	Current status of the ABS function.
EBD Status	Current status of the EBD function.
Dyno Mode Status	Indicates whether Dyno Mode is active.
Brake Light Status	Status of the brake light, determined using the internal (front axle) pressure sensor.
ABS Warning Lamp	Illuminates when failures occur that deactivate the ABS function. Flashes during extended diagnostic sessions.
Failure Present Lamp	Indicates that a failure is stored, regardless of its impact. Severe failures may lead to a complete ABS shutdown, while others may have only minor or no effect.
Front Axle Pressure	Measured by the internal front-axle pressure sensor.
Rear Axle Pressure	Measured by the external rear-axle pressure sensor.
Lateral Acceleration	Measured by the lateral acceleration sensor in the IMU.
Longitudinal Acceleration	Measured by the longitudinal acceleration sensor in the IMU.
Steering Wheel Angle	Value from the steering wheel angle sensor, provided the sensor is configured and the CAN message is received correctly.
Yaw Rate	Measured by the yaw-rate sensor in the IMU.
MK 100 UHP Mode Switch	Displays the selected ABS mode. The value is determined either by the resistance of the hardwired rotary switch or by the CAN signal received in the MMI CAN frame.
MK 100 UHP Off Switch	Indicates whether the hardwired push-button switch is pressed or the corresponding CAN signal is active.
Wheel Speed	Calculated wheel speed of each wheel. The calculation is dependent on the preset parameters.
Caliper Pressure	Model Brake pressure of each caliper. The value is calculated from the front axle pressure sensor and potential valve activations in the hydraulic control unit of the ABS.
ECU KL30	Voltage measured at KL30 of the MK 100 UHP ECU.
External Pressure Sensor	Voltage at the signal line of the external (rear axle) pressure sensor.
MK 100 UHP Mode Switch	Voltage at the signal line of the hardwired ABS mode switch.

5.3.9 Diagnostics

The Diagnostics tab allows reading and clearing of DTCs (Diagnostic Trouble Codes).
The color coding indicates the status of the failure:

- Red: Active failure
- Yellow: Stored failure from the past

The Freeze Frame Info tab shows the signal values recorded at the moment the failure became active.
The Detailed Failure Description tab contains failure descriptions and potential root causes.

> Dyno Mode

Dyno Mode should be activated when spinning the wheels of the driven axle while the vehicle is lifted.
This prevents failure entries triggered by MK 100 UHP safety monitoring.

5.3.10 Firmware update

The MK 100 UHP is delivered with provisional software that does not include ABS or EBD control functionality.
To activate these functions, a firmware update must be performed during the initial integration process.
Because the MK 100 UHP software is continuously improved, it is recommended to check regularly for new firmware versions.
The latest firmware file is provided by your distributor.
To update the MK 100 UHP firmware, load the .rsx file and start the update by clicking Update Firmware.

Preconditions:

- Supply voltage > 12 V
- Wheel speed sensors connected (no WSS failures active)
- Vehicle in standstill

	ATTENTION
	**Risk of MK 100 UHP ECU damage due to interruption of the firmware update process!** Interrupting a firmware update may leave the MK 100 UHP in an undefined state that cannot be corrected using the Configuration Manager. ► Ensure a stable 12V power supply throughout the entire update process. ► Ensure the mechanical connection of the CAN device is secure. ► Ensure the Vehicle CAN is stable (no EMC issues or CAN-ID collisions).

After the software update, verify:

- Software Integrity Status (5.3.4),
- Failure Entries (5.3.9)
- ABS warning lamp in the driver's field of view

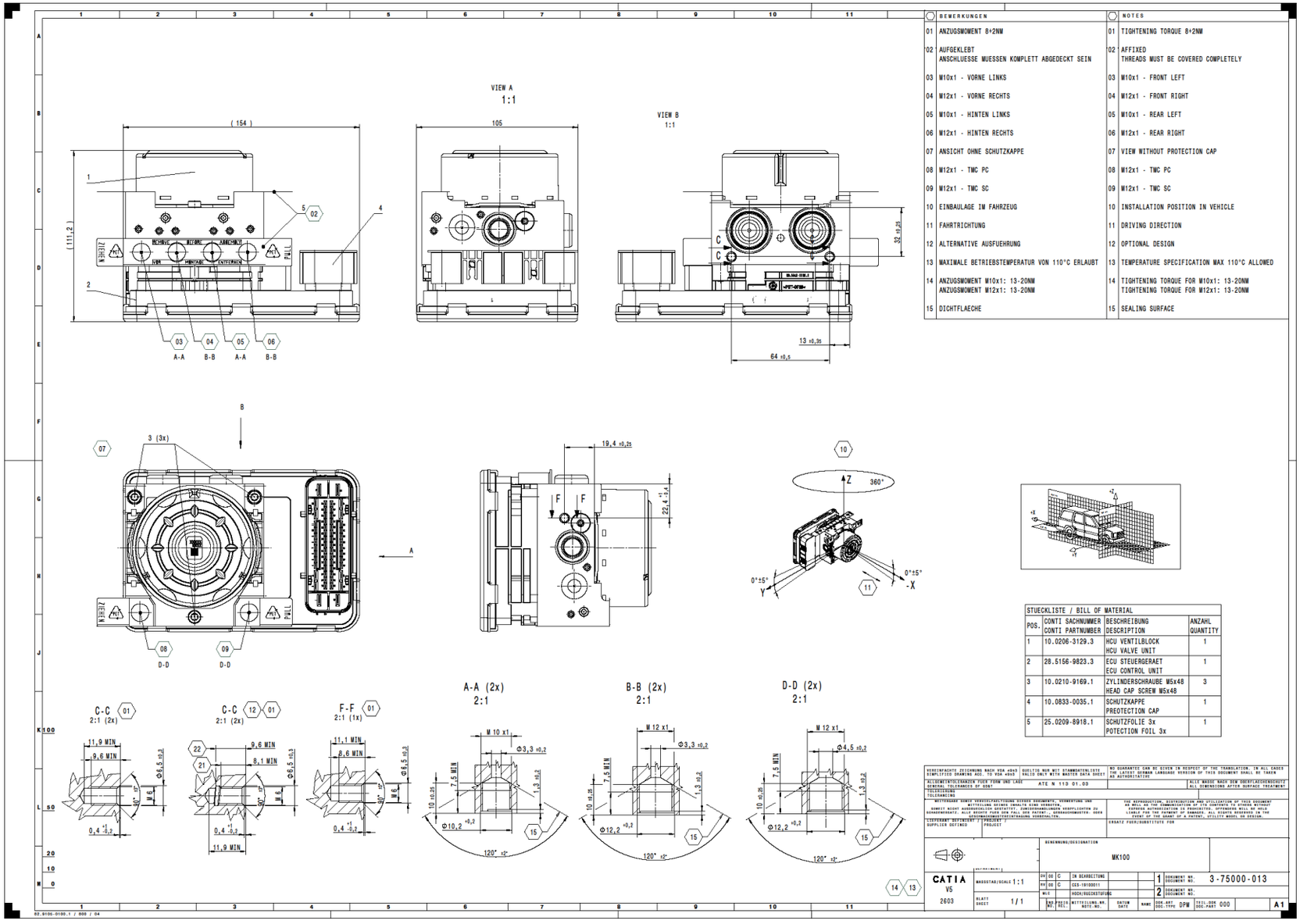
Only begin the non-dynamic test drive when the integrity status shows "no issues", no failures are present, and the ABS warning lamp is off.

6. Attachments

6.1. Disposal

	**ATTENTION** **Electrical and electronic components must not be disposed of with normal household waste.** ► Ensure that all electrical and electronic components are disposed of in accordance with 2002/96/EC-WEEE (Waste Electrical and Electronic Equipment)

6.2.HECU – Technical Drawing

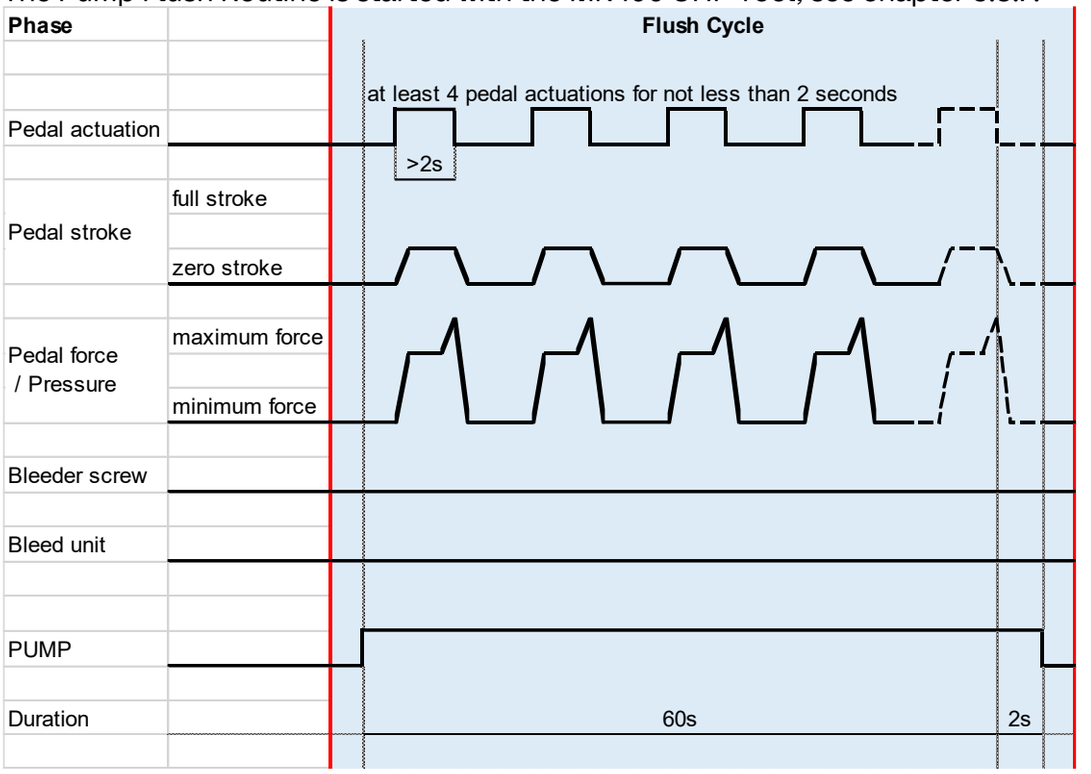


6.3.HECU – Pin Details

Pin #	Signal Name in ED	Description	R max	L max	I nom (ECU off)	I nom (ECU on / no control mode)	I nom (ECU on / in control mode)	I max	I max time	I max inrush	I max inrush time	I short	I short time	U min	U nom	U max	Type of I/O	Fuse Rating recommended	Twisted with	Comment
1	KL30_P	Power Supply		5µH	15µA		28A	40A	6sec	90A	10msec	250A	730µsec	9V	14V	18V	input	40A		MAXI fuse type mandatory
45	KL30_V			5µH		100mA	20A	40A	1sec	45A	10msec	150A	730µsec	9V	14V	18V	input	40A		
34	KL_15(IGN)							10mA						4,5V	14V	18V	input			
14	GND			5µH								250A	730µsec				input			See corresponding KL 30_P value
58	GND			5µH								150A	730µsec				input			See corresponding sum of KL 30_V and Kl 30_S values
31	CAN_VEH_H	CAN				44mA	44mA					170mA	25µsec	0V		5V	bidirectional		CAN_VEH_L	For maximum Resistance see ISO 11898.2 CAN High Speed Medium Acces UnitChapter 7.5 Physical Medium Specification
16	CAN_VEH_L					44mA	44mA					170mA	25µsec	0V		5V	bidirectional		CAN_VEH_H	For maximum Resistance see ISO 11898.2 CAN High Speed Medium Acces Unit Chapter 7.5 Physical Medium Specification
27	CAN_PRIVATE_H	ABS Private Network				44mA	44mA					170mA	25µsec	0V		5V	bidirectional		CAN_PRIVATE_L	For maximum Resistance see ISO 11898.2 CAN High Speed Medium Acces Unit Chapter 7.5 Physical Medium Specification
42	CAN_PRIVATE_L					44mA	44mA					170mA	25µsec	0V		5V	bidirectional		CAN_PRIVATE_H	For maximum Resistance see ISO 11898.2 CAN High Speed Medium Acces Unit Chapter 7.5 Physical Medium Specification
11	WSS_RR_SIG	Wheel Speed Sensors	0,5Ohm					34mA				200mA		5,5V		18V			WSS_RR_GND	Twisting only allowed with RR_GND (EMC).
10	WSS_RR_GND		0,5Ohm					34mA											WSS_RR_SIG	Twisting only allowed with RR_SIG (EMC).
9	WSS_FL_SIG		0,5Ohm					34mA				200mA		5,5V		18V			WSS_FL_GND	Twisting only allowed with FL_GND (EMC)
8	WSS_FL_GND		0,5Ohm					34mA											WSS_FL_SIG	Twisting only allowed with FL_SIG (EMC)
7	WSS_RL_SIG		0,5Ohm					34mA				200mA		5,5V		18V			WSS_RL_GND	Twisting only allowed with RL_GND (EMC).
6	WSS_RL_GND		0,5Ohm					34mA											WSS_RL_SIG	Twisting only allowed with RL_SIG (EMC).
5	WSS_FR_SIG		0,5Ohm					34mA				200mA		5,5V		18V			WSS_FR_GND	Twisting only allowed with FR_GND (EMC)
4	WSS_FR_GND		0,5Ohm					34mA											WSS_FR_SIG	Twisting only allowed with FR_SIG (EMC)
53	PS20_SENSEEP	External Pressure Sensor	0,5Ohm			2mA	2mA	4mA				400mA	5msec		5V					
40	PS20_GND		0,5Ohm			2mA	2mA	4mA												
55	PS20_SIG		0,5Ohm			1mA	1mA	1mA				1mA		0V		5V				
22	ABS_MODE_SW_SENSEEP	Analog Rotary Switch	0,5Ohm			2mA	2mA	4mA				400mA	5msec		5V					
29	ABS_MODE_SW_GND		0,5Ohm			3mA	3mA	10mA									output			
23	ABS_MODE_SW_SIG		0,5Ohm			3mA	3mA	10mA				10mA			14V		input			
47	WL_ABS	Hardwired			0mA	0,175mA	0,18mA	0,268mA						0V		18,1V	output			
56	WL_DTC	Warning Lamps				20mA	20mA	25mA				90mA			16,5V	20V	output			
43	BRK_LIGHT_OUT	Brakelight Switch				20mA	20mA	20mA				20mA		6V	16,5V	20V	output			
57	TACHY_OUT	Vehicle Speed				40mA	40mA	50mA							14V		output			Open-Collector Output; PWM Signal with a 50% (+/-5%) duty cycle; frequency depends on the vehicle speed
54	ABS_OFF_SWITCH	Disable Switch																		Pin must be connected to GND (e.g. by push button switch) for >100ms to disable and re-enable the ABS function.
28	Baudrate Switch (GND)	Baudrate Selection																		Both pins open: CAN baudrate (Vehicle CAN) is set to 1MBaud.
41	Baudrate Switch (Sig)																			Pins 28 and 41 bridged: CAN baudrate (Vehicle CAN) is set to 500kBaud.

6.4.Pump Flushing Routine

The Pump Flush Routine is started with the MK 100 UHP Tool; see chapter 5.3.7.



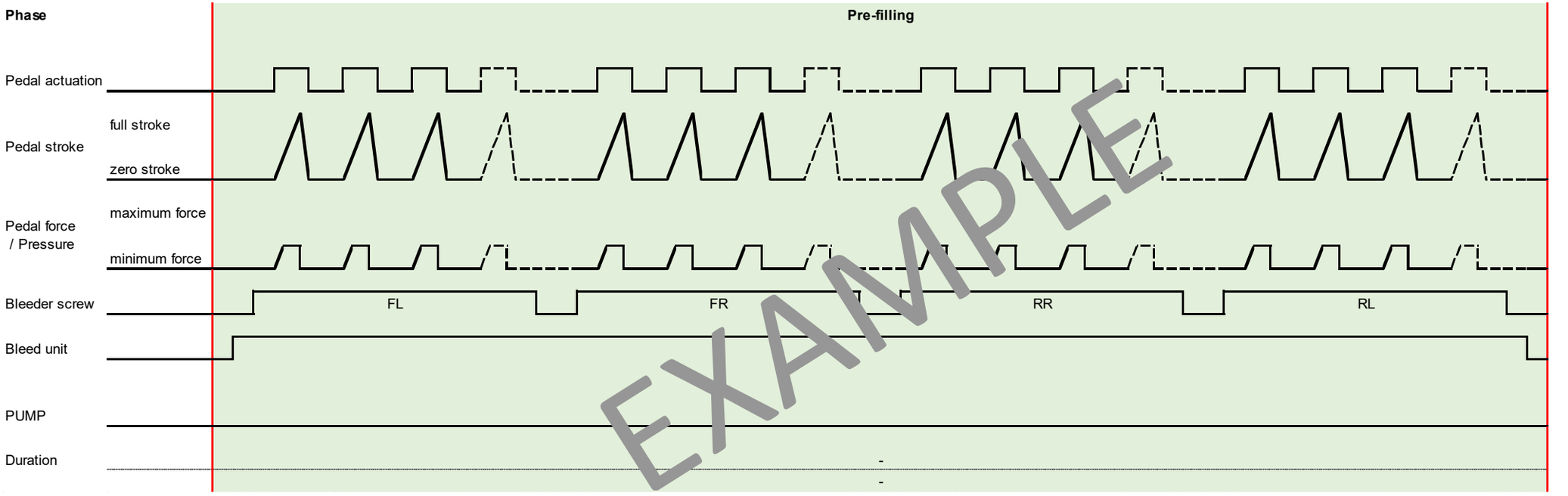
6.5.Full Bleeding Process (incl. Initial/ Rework Routine)

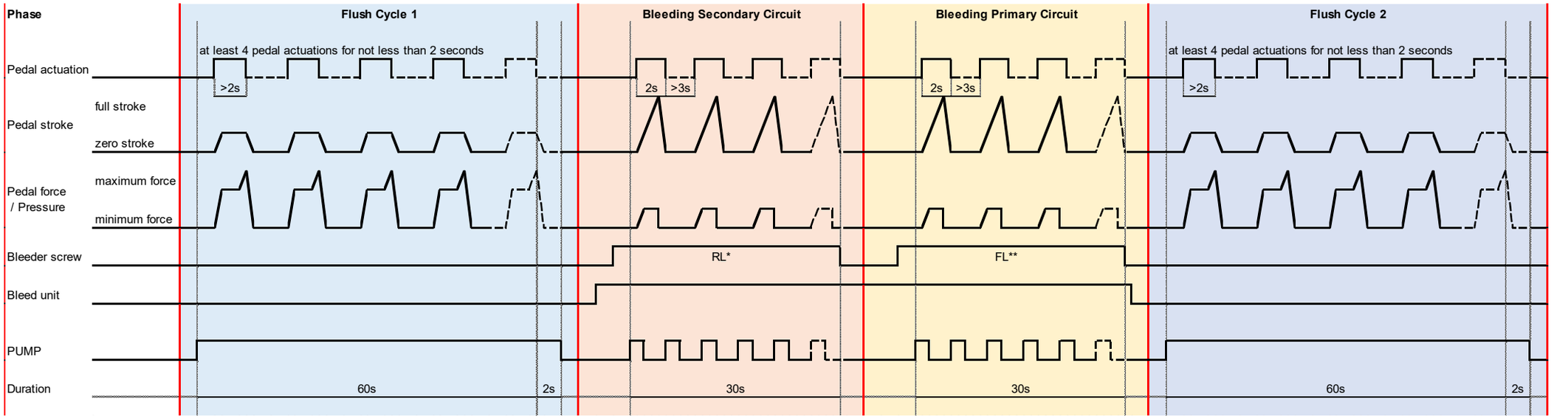
The Full Bleeding Process includes conventional bleeding processes bevor and after the Initial/ Rework Routine.

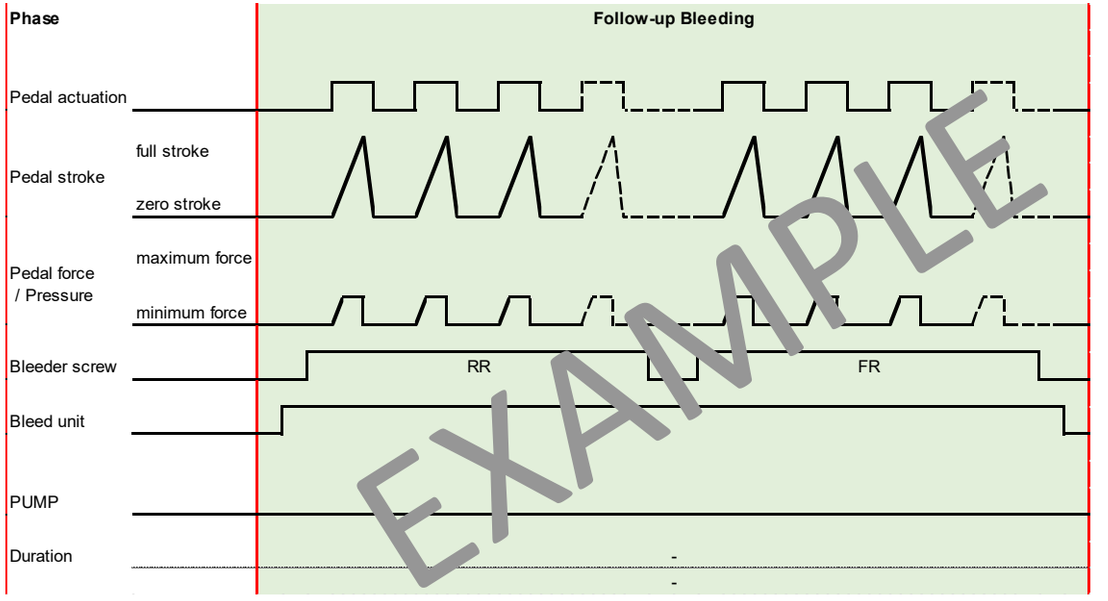
1.) Pre-filling:
It's recommended to do a conventional bleed first, to get rid of the air in the brake system. The figure below shows an example of such.

2.) Initial/ Rework Routine
The Initial/ Rework Routine bleeds only the MK 100 UHP but not the rest of the brake system. It is mandatory to have a prefilled and bleeded brake system before starting the Initial/ Rework Routine. The routine is initiated with the Configuration Manager, see chapter 5.3.7.

3.) Follow-up Bleeding:
After the routine, it's also recommended to do one final conventional bleed on the rear right and front right brake caliper.







*RL&FL **FL&RL, when using a balance bar, with two separate master cylinders

ATTENTION

Master Cylinder can be damaged during circuit bleeding, when using a Balance Bar

When running the routines for bleeding the secondary or primary brake circuit, the balance bar can be pushed in unintended positions due to one-sided pressure.

► Always open one bleeder screw on both circuits at the same time during process of “Bleeding Secondary Circuit” and “Bleeding Primary Circuit”

6.6.CAN Interface Description

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
MMI_24C ID: 0x24C DLC [Byte]: 8 Cycle Time; 10 ms	Switch_ABS_PosReq	0	4	LSB	Unsigned	0	1	0	1	12		0x0=Initialisation; 0xF=Invalid; 0xE=Invalid; 0xD=Invalid; 0xC=Mode12; 0xB=Mode11; 0xA=Mode10; 0x9=Mode9; 0x8=Mode8; 0x7=Mode7; 0x6=Mode6; 0x5=Mode5; 0x4=Mode4; 0x3=Mode3; 0x2=Mode2; 0x1=Mode1;	Signal for ABS mode selection. Signal timeout: N/A	**R**
	UHP_Reserved_24C_4_4	4	4	LSB	Unsigned	0	1	0	1	12				**R**
	Switch_ABS_OffReq	14	1	LSB	Unsigned	0	1	0	0	1		0x0=Button_not_pressed; 0x1=Button_pressed;	Signal for ABS off request. Push botton switch: pressed for >100ms to disable / re-enable the ABS function Signal timeout: N/A	**R**
	UHP_Reserved_24C_15_1	15	1	LSB	Unsigned	0	1	0	0	1				**R**
	MMI_Tcf_FrontAxle	24	12	LSB	Unsigned	0	1	0	1600	3000	mm	4095 =Invalid; 0xFFE=Initialisation;	max: 3000 mm Signal timeout: 300ms	**R**
	MMI_Tcf_RearAxle	36	12	LSB	Unsigned	0	1	0	1600	3000	mm	4094 =Initialisation; 0xFFF=Invalid;	max: 3000 mm Signal timeout: 300ms	**R**
	MMI_24C_RollingCounter	48	4	LSB	Unsigned	0	1	0	0	15			Rolling counter of ID24C message. Signal timeout: 100ms	**R**
	DynoMode_Reqeuest	55	1	LSB	Unsigned	0	1	0	0	1		0x0=Rbm_no_request; 0x1=Rbm_act_deact_request;	Signal to trigger activation of rollerbench mode. Signal timeout: N/A	**R**
	MMI_24C_Crc	56	8	LSB	Unsigned	0	1	0	0	0			Checksum = (Byte1 +Byte2 ...+ Byte7) XOR 0xFF. Signal timeout: 100ms	**R**

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_01 ID: 0x340 DLC [Byte]: 8 Cycle Time: 10 ms	UHP_WhlVel_FL	0	12	LSB	Unsigned	0	0.1	0	0	320	kph	0x1FFF=Invalid;	Signal Discription: Front left wheel speed value in kph.	**T**
	UHP_WhlVel_FR	12	12	LSB	Unsigned	0	0.1	0	0	320	kph	0x1FFF=Invalid;	Signal Discription: Front right wheel speed in kph.	**T**
	UHP_WhlVel_RL	24	12	LSB	Unsigned	0	0.1	0	0	320	kph	0x1FFF=Invalid;	Signal Discription: Rear left wheel speed in kph	**T**
	UHP_WhlVel_RR	36	12	LSB	Unsigned	0	0.1	0	0	320	kph	0x1FFF=Invalid;	Signal Discription: Rear right wheel speed in kph	**T**
	UHP_v_ref	48	12	LSB	Unsigned	0	0.1	0	0	320	kph			**T**
	UHP_v_ref_direction	60	2	LSB	Unsigned	0	1	0	0	3		0x3=Standstill; 0x2=Backward; 0x1=Forward; 0x0=Driving direction not defined;	Indication of driving direction - calculated when 3Lvl wheel speed sensors are used on non-driven axle	**T**
	UHP_v_ref_Qf	63	1	LSB	Unsigned	0	1	0	0	1		0x1=Invalid; 0x0=Valid;		**T**

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_02 ID: 0x341 DLC [Byte]: 8 Cycle Time: 10 ms	UHP_WhlDirection_FL	0	2	LSB	Unsigned	0	1	0	0	3		0x3=not_available_or_invalid; 0x2=Init; 0x1=Backward; 0x0=Forward;		**T**
	UHP_WhlDirection_FR	2	2	LSB	Unsigned	0	1	0	0	3		0x3=not_available_or_invalid; 0x2=Init; 0x1=Backward; 0x0=Forward;		**T**
	UHP_WhlDirection_RL	4	2	LSB	Unsigned	0	1	0	0	3		0x3=not_available_or_invalid; 0x2=Init; 0x1=Backward; 0x0=Forward;		**T**
	UHP_WhlDirection_RR	6	2	LSB	Unsigned	0	1	0	0	3		0x3=not_available_or_invalid; 0x2=Init; 0x1=Backward; 0x0=Forward;		**T**
	UHP_WhlTick_FL	8	8	LSB	Unsigned	0	1	0	0	255			Invalid value 0xFF Overflow after 0xFE	**T**
	UHP_WhlTick_FR	16	8	LSB	Unsigned	0	1	0	0	255			Invalid value 0xFF Overflow after 0xFE	**T**
	UHP_WhlTick_RL	24	8	LSB	Unsigned	0	1	0	0	255			Invalid value 0xFF Overflow after 0xFE	**T**
	UHP_WhlTick_RR	32	8	LSB	Unsigned	0	1	0	0	255			Invalid value 0xFF Overflow after 0xFE	**T**
	UHP_02_RollingCounter	48	4	LSB	Unsigned	0	1	0	0	15			Signal Discription: Rolling counter of ID341 message.	**T**
	UHP_StandStill	54	2	LSB	Unsigned	0	1	0	0	1		0x1=Standing_still; 0x0=Moving;	Indication whether the vehicle is moving or standing still.	**T**
	UHP_02_Crc	56	8	LSB	Unsigned	0	1	0	0	255			Checksum = (Byte1 +Byte2 ...+ Byte7) XOR 0xFF. Invalid Value: N/A	**T**

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_03 ID: 0x541 DLC [Byte]: 8 Cycle Time: 10 ms	UHP_EngTorqReq	0	14	LSB	Unsigned	0	5	-2500	-2500	2500	Nm	16382=Not_available_initalization; 0x3FFF=Not_available_error;	Max: 2500 (0x1388) Invalid value: 0x3FFF	**T**
	UHP_03_RollingCounter	48	4	LSB	Unsigned	0	1	0	0	15			Init. Value: 0 Invalid Value: N/A	**T**
	UHP_EngTorqDecActive	54	1	LSB	Unsigned	0	1	0	0	1		0x1=Active; 0x0=Not_active;	0: Not active 1: Active	**T**
	UHP_EngTorqIncActive	55	1	LSB	Unsigned	0	1	0	0	1		0x1=Active; 0x0=Not_active;	0: Not active 1: Active	**T**
	UHP_03_Crc	56	8	LSB	Unsigned	0	1	0	0	255			Checksum = (Byte1 +Byte2 ...+ Byte7) XOR 0xFF. Invalid Value: N/A	**T**

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_04 ID: 0x342 DLC [Byte]: 8 Cycle Time: 10 ms	UHP_DrvBraking	0	1	LSB	Unsigned	0	1	0	0	1		0x1=Driver_braking; 0x0=Driver_not_braking;	Indication whether the driver is braking	**T**
	UHP_MasCylBrakePressure_PC_Qf	1	1	LSB	Unsigned	0	1	0	0	1		0x1=Invalid_or_not_available; 0x0=Valid;	Validity of signal UHP_MasCylBrakePressure_PC	**T**
	UHP_MasCylBrakePressure_SC_Qf	2	1	LSB	Unsigned	0	1	0	0	1		0x1=Invalid_or_not_available; 0x0=Valid;	Validity of signal UHP_MasCylBrakePressure_SC	**T**
	UHP_DrvBraking_Qf	6	1	LSB	Unsigned	0	1	0	0	1		0x1=Invalid_or_not_available; 0x0=Valid;	Validity of signal UHP_DrvBraking	**T**
	UHP_MasCylBrakePressure_SC	8	12	LSB	Unsigned	0	0.1	0	0	409.5	bar		Brake pressure value of the secondary brake circuit (rear brake circuit).	**T**
	UHP_MasCylBrakePressure_PC	20	12	LSB	Unsigned	0	0.1	0	0	409.5	bar		Brake pressure value of the primary brake circuit (front brake circuit).	**T**
	UHP_04_RollingCounter	48	4	LSB	Unsigned	0	1	0	0	15			Rolling counter of ID342 message.	**T**
	UHP_04_Crc	56	8	LSB	Unsigned	0	1	0	0	255			Checksum = (Byte1 +Byte2 ...+ Byte7) XOR 0xFF.	**T**

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_05 ID: 0x343 DLC [Byte]: 8 Cycle Time: 10 ms													Dummy Message	**T**

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_06 ID: 0x5C0 DLC [Byte]: 8 Cycle Time: 10 ms	UHP_SystemType	0	2	LSB	Unsigned	0	1	0	0	3		0x3=ABS_TCS_ESC; 0x2=ABS_ESC; 0x1=ABS_TCS; 0x0=ABS_only;	Info of configured control functions.	**T**
	UHP_Systemstate	2	2	LSB	Unsigned	0	1	0	0	3		0x2=System_ready; 0x1=System_suspended; 0x0=System_init;	System state	**T**
	UHP_IgnitionState	4	1	LSB	Unsigned	0	1	0	0	1		0x1=Ignition_on; 0x0=Ignition_off;	State of KL15.	**T**
	UHP_PumpActive	5	1	LSB	Unsigned	0	1	0	0	1		0x1=Pump_active; 0x0=Pump_inactive;	Indication whether the ABS pump is running.	**T**
	UHP_DiaActive	6	1	LSB	Unsigned	0	1	0	0	1		0x1=Dia_active; 0x0=Dia_not_active;	Indication whether a diagnostic session is active.	**T**
	UHP_Coding_Failure	7	1	LSB	Unsigned	0	1	0	0	1		0x1=Coding_data_not_valid; 0x0=Coding_data_valid;	Validity of coding data	**T**
	UHP_EBD_Active	8	1	LSB	Unsigned	0	1	0	0	1		0x1=Ebd_active; 0x0=Ebd_inactive;	Indication whether EBD control is active.	**T**
	UHP_ABS_Active	9	1	LSB	Unsigned	0	1	0	0	1		0x1=Abs_active; 0x0=Abs_inactive;	Indication whether ABS control is active.	**T**
	UHP_Reserved_5C0_10_1	10	1	LSB	Unsigned	0	1	0	0	1				**T**
	UHP_Reserved_5C0_11_1	11	1	LSB	Unsigned	0	1	0	0	1				**T**
	UHP_Reserved_5C0_12_1	12	1	LSB	Unsigned	0	1	0	0	1				**T**
	UHP_ABS_FuncMode	13	1	LSB	Unsigned	0	1	0	0	1		0x1=ABS_off_mode; 0x0=ABS_on_mode;	Mode of ABS	**T**
	UHP_Reserved_5C0_14_1	14	1	LSB	Unsigned	0	1	0	0	1				**T**
	UHP_Blr_Request	15	1	LSB	Unsigned	0	1	0	0	1		0x1=Brake_light_active; 0x0=Brake_light_inactive;	Brake light activation request if brake pedal is pressed (estimated from internal pressure sensor)	**T**
	UHP_Reserved_5C0_16_1	16	1	LSB	Unsigned	0	1	0	0	1				**T**
	UHP_ABS_FailureLamp	17	1	LSB	Unsigned	0	1	0	0	1				**T**
	UHP_Reserved_5C0_18_1	18	1	LSB	Unsigned	0	1	0	0	0				**T**
	UHP_Reserved_5C0_19_1	19	1	LSB	Unsigned	0	1	0	0	1				**T**
	UHP_Reserved_5C0_20_1	20	1	LSB	Unsigned	0	1	0	0	1				**T**
	UHP_DynoModeActive	22	1	LSB	Unsigned	0	1	0	0	1		0x1=DynoMode_active; 0x0=DynoMod_inactive;	Indication whether the Roller Bench Mode is activated. Roller Bench Mode will be left automatically when the vehicle is moving (one of the front wheel speeds showing a value > 6kph).	**T**
	UHP_FailurePresent	23	1	LSB	Unsigned	0	1	0	0	1		0x1=DTCs_set; 0x0=No_DTCs;	Indication whether a DTC (diagnostic trouble code) is present. If set to 1 please read failure codes and take remedial actions.	**T**
	UHP_EBDStatus	24	2	LSB	Unsigned	0	1	0	0	3		0x3=Available_in_regulation; 0x2=Available; 0x1=Not_available_error; 0x0=Not_available_initalization;	Indication of EBD system status:	**T**
	UHP_ABSStatus	26	2	LSB	Unsigned	0	1	0	0	3		0x3=Available_in_regulation; 0x2=Available; 0x1=Not_available_error; 0x0=Not_available_initalization;	Indication of ABS system status:	**T**
	UHP_Reserved_5C0_28_2	28	2	LSB	Unsigned									**T**
	UHP_Reserved_5C0_30_1	30	1	LSB	Unsigned									**T**
	UHP_CtrAct_FL	32	1	LSB	Unsigned	0	1	0	0	1		0x0=No_control_at_wheel; 0x1=Control_active_at_wheel;	Indication whether control is active at the front left wheel	**T**
	UHP_CtrAct_FR	33	1	LSB	Unsigned	0	1	0	0	1		0x0=No_control_at_wheel; 0x1=Control_active_at_wheel;	Indication whether control is active at the front right wheel	**T**

	UHP_CtrAct_RL	34	1	LSB	Unsigned	0	1	0	0	1		0x0=No_control_at_wheel; 0x1=Control_active_at_wheel;	Indication whether control is active at the rear left wheel	**T**
	UHP_CtrAct_RR	35	1	LSB	Unsigned	0	1	0	0	1		0x0=No_control_at_wheel; 0x1=Control_active_at_wheel;	Indication whether control is active at the rear right wheel	**T**
	UHP_Reserved_5C0_40_4	40	4	LSB	Unsigned	0	1	0	0	15				**T**
	UHP_ABS_ModeSwPosInfo	44	4	LSB	Unsigned	0	1	0	0	15		0xF=ModeSwFailure_or_not_available; 0xC=Mode12; 0xB=Mode11; 0xA=Mode10; 0x9=Mode9; 0x8=Mode8; 0x7=Mode7; 0x6=Mode6; 0x5=Mode5; 0x4=Mode4; 0x3=Mode3; 0x2=Mode2; 0x1=Mode1; 0x0=Initialisation;	Indication which ABS mode is selected.	**T**
	UHP_BusTiming	48	4	LSB	Unsigned	0	1	0	3	15		0x3=CAN1_1000_CAN2_1000; 0x2=CAN1_500_CAN2_1000; 0x1=CAN1_1000_CAN2_500; 0x0=CAN1_500_CAN2_500;	Indication which ABS mode is selected.	**T**
	UHP_PwtCfg	54	2	LSB	Unsigned	0	1	0	0	3		0x3=Awd; 0x2=Rwd; 0x0=Invalid; 0x1=Fwd;	Info of configured CAN Baudrate.	**T**
	UHP_KL30V	56	8	LSB	Unsigned	0	1	0	0	255	V		Measured power supply (@ KL30_V)	**T**

Message	**Signal**	**Start -bit**	**Length [Bit]**	**Byte Order**	**Value Type**	**Initial Value**	**Factor**	**Offset**	**Min**	**Max**	**Unit**	**Value Table**	**Comment**	**MK 100 UHP**
UHP_07 ID: 0x70 DLC [Byte]: 8 Cycle Time: 10 ms	UHP_LatAcc	0	12	LSB	Unsigned	0	0.025	-51.2	-51.2	51.125	m/s²	4094 =Not_available_initalization; 0xFFF=Failure;	Lateral Acceleration (vehicle driving a left hand curve show positive values).	**T**
	UHP_LatAcc_Qf	15	1	LSB	Unsigned	0	1	0	0	1		0x1=Invalid_or_not_available; 0x0=Valid;	Validity of signal UHP_LatAcc	**T**
	UHP_LongAcc	16	12	LSB	Unsigned	0	0.025	-51.2	-51.2	51.125	m/s²	4094 =Not_available_initalization; 0xFFF=Failure;	Longitudinal Acceleration (vehicle deceleration show negative values).	**T**
	UHP_LongAcc_Qf	31	1	LSB	Unsigned	0	1	0	0	1		0x1=Invalid_or_not_available; 0x0=Valid;	Validity of signal UHP_LongAcc	**T**
	UHP_YawRate	32	14	LSB	Unsigned	0	0.01	0	0	93	°/s	16383 =Failure; 0x3FFE=Not_available_initalization;	Absolute value of the vehicle's yaw rate. The signal UHP_YawRate_sgn will give an indication of the turning direction.	**T**
	UHP_YawRate_sgn	46	1	LSB	Unsigned	0	1	0	0	1		0x1=Negative; 0x0=Positive;	Sign of signal UHP_YawRate (vehicle driving a left hand curve signal is positive).	**T**
	UHP_YawRate_Qf	47	1	LSB	Unsigned	0	1	0	0	1		0x1=Invalid_or_not_available; 0x0=Valid;	Validity of signal UHP_YawRate	**T**
	UHP_07_RollingCounter	48	4	LSB	Unsigned	0	1	0	0	15			Init. Value: 0 Invalid Value: N/A	**T**
	UHP_07_Crc	56	8	LSB	Unsigned	0	1	0	0	255			Checksum = (Byte1 +Byte2 ...+ Byte7) XOR 0xFF. Invalid Value: N/A	**T**

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_08 ID: 0x80 DLC [Byte]: 8 Cycle Time: 10 ms	UHP_VertAcc	0	10	LSB	Unsigned	0	0.025	-16	-51.2	51.125	m/s²	0xFF=Failure; 0xFE=Not_available_initalization;	Vertical Acceleration (vehicle standing on ground show positive gravitational acceleration).	T
	UHP_VertAcc_Qf	15	1	LSB	Unsigned	0	1	0	0	1		0x1=Invalid_or_not_available; 0x0=Valid;	Validity of signal UHP_VertAcc	T
	UHP_RollRate	16	14	LSB	Unsigned	0	0.01	0	0	93	°/s	16383 =Failure; 0x3FFE=Not_available_initalization;	Absolute value of the vehicle's roll rate. The signal UHP_RollRate_sgn will give an indication of the turning direction.	T
	UHP_RollRate_sgn	30	1	LSB	Unsigned	0	1	0	0	1		0x1=Negative; 0x0=Positive;	Sign of signal UHP_RollRate (vehicle rolling to the right hand side e.g., when initiating a left hand curve, signal is positive).	T
	UHP_RollRate_Qf	31	1	LSB	Unsigned	0	1	0	0	1		0x1=Invalid_or_not_available; 0x0=Valid;	Validity of signal UHP_RollRate	T
	UHP_PitchRate	32	14	LSB	Unsigned	0	0.01	0	0	163.83	°/s	16383 =Failure; 0x3FFE=Not_available_initalization;	Absolute value of the vehicle's pitch rate. The signal UHP_PitchRate_sgn will give an indication of the turning direction.	T
	UHP_PitchRate_sgn	46	1	LSB	Unsigned	0	1	0	0	1		0x1=Negative; 0x0=Positive;	Sign of signal UHP_PitchRate (vehicle pitching to the front, e.g., diving when initiating a braking, signal is positive).	T
	UHP_PitchRate_Qf	47	1	LSB	Unsigned	0	1	0	0	1		0x1=Invalid_or_not_available; 0x0=Valid;	Validity of signal UHP_PitchRate	T
	UHP_08_RollingCounter	48	4	LSB	Unsigned	0	1	0	0	15			Init. Value: 0 Invalid Value: N/A	T
	UHP_08_Crc	56	8	LSB	Unsigned	0	1	0	0	255			Checksum = (Byte1 +Byte2 ...+ Byte7) XOR 0xFF. Invalid Value: N/A	T

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_NMH ID: 0x 1B000009 DLC [Byte]: 5 Cycle Time: Event triggered	NM_UHP_RunAfterType	0	4	LSB	Unsigned	0	1	0	0	2		0x2=Wake_up_ign_off; 0x1=Ign_off; 0x0=Not_supported;		T
	NM_UHP_NM_aktiv_KL15	6	1	LSB	Unsigned	0	1	0	0	1		0x1=Ign_on; 0x0=Ign_off;	Ignition state detected by NM.	T
	NM_UHP_NM_aktiv_Tmin	7	1	LSB	Unsigned	0	1	0	0	1				T
	NM_UHP_State	8	6	LSB	Unsigned	0	1	0	0	2		0x2=Knockout; 0x1=Postrun; 0x0=Normal_operation;		T
	NM_UHP_Wakeup	16	4	LSB	Unsigned	0	1	0	0	2		0x2=Ign_wakeup; 0x1=Bus_wakeup; 0x0=Peripheral_or_unknown_wakeup;		T
	NM_UHP_BusKnockOutTimer	24	16	LSB	Unsigned	0	1	0	0	30000			Postrun timer, before BUS communication is switched off and ECU prepares for switch-off. The controller switches-off when BUS communication has stopped.	T

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_FunReq ID: 0x7DF DLC [Byte]: 8 Cycle Time: Event triggered	UHP_Req_Data	0	64	LSB	Unsigned	0	1	0	0	1,84E+29				**R**

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_PhyReq ID: 0x780 DLC [Byte]: 8 Cycle Time: Event triggered	UHP_Req_Data	0	64	LSB	Unsigned	0	1	0	0	1,84E+29				**R**

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
UHP_Resp ID: 0x788 DLC [Byte]: 8 Cycle Time: Event triggered	UHP_Resp_Data	0	64	LSB	Unsigned	0	1	0	0	1,84E+29				**T**

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
SWA_CUSTOM_DATA ID: 0x321 DLC [Byte]: 5 Cycle Time: 10 ms	SWA_STEER_ANGLE	7	16	MSB	Signed	0	0.1	0	-780	780	°	0x8000=Invalid;	Invalid value: 0x8000	**R**
	SWA_STEER_SPEED	23	8	MSB	Signed	0	8	0	-1016	1016	°/s	0x80=Invalid;	Invalid value: 0x80 Signal Timeout: 500ms	**R**
	SWA_STATUS_FAILURE	24	1	MSB	Unsigned	0	1	0	0	1		0x1=No_failure; 0x0=Failure;	1: No Failure Signal Timeout: 100ms	**R**
	SWA_STATUS_CALIB	25	1	MSB	Unsigned	0	1	0	0	1		0x1=Calibrated; 0x0=Not_calibrated;	1: Calibrated Signal Timeout: 100ms	**R**
	SWA_STATUS_TRIM	26	1	MSB	Unsigned	0	1	0	0	1		0x1=Trimmed; 0x0=Not_trimmed;	(If a custom SWA is not sending this information actively, please always set this signal to 1.) Signal Timeout: 100ms	**R**
	SWA_COUNTER	35	4	MSB	Unsigned	0	1	0	0	15			Max: 0xF Signal Timeout: 100ms	**R**
	SWA_CHECKSUM	39	4	MSB	Unsigned	0	1	0	0	15			SWA_CHECKSUM = higher nibble(temp_result) XOR lower nibble(temp_result) XOR SWA_COUNTER Signal Timeout: 100ms	**R**

Remark: Only applicable if the custom type steering wheel angle sensor is configured.

Message	Signal	Start -bit	Length [Bit]	Byte Order	Value Type	Initial Value	Factor	Offset	Min	Max	Unit	Value Table	Comment	MK 100 UHP
TCU_238 ID: 0x238 DLC [Byte]: 4 Cycle Time: 10 ms	TCU_ActGear	8	4	LSB	Unsigned	0	1	0	0	15		0xC=Park_gear; 0xB=Reverse_gear; 0xA=Tenth_gear; 0x9=Ninth_gear; 0x8=Eighth_gear; 0x7=Seventh_gear; 0x6=Sixth_gear; 0x5=Fifth_gear; 0x4=Fourth_gear; 0x3=Third_gear; 0x2=Second_gear; 0x1=First_gear; 0x0=Neutral_gear; 0xF=Not_available_error;	Signal indicates current gear selected by the gearbox. SignalTimeout: 200ms	**R**
	TCU_GearPos	12	4	LSB	Unsigned	0	1	0	0	15		0x4=Position_Manual; 0x3=Position_D; 0x2=Position_N; 0x1=Position_R; 0x0=Position_P; 0xF=Not_available_error;	Signal indicates selected gear by gear lever. SignalTimeout: 200ms	**R**
	TCU_238_RollingCounter	16	4	LSB	Unsigned	0	1	0	0	15			Rolling counter of ID238 message. SignalTimeout: 200ms	**R**
	TCU_238_Crc	24	8	LSB	Unsigned	0	1	0	0	255			Checksum = (Byte1 +Byte2 ...+ Byte7) XOR 0xFF. SignalTimeout: 200ms	**R**
	TCU_ShiftInProg	0	1	LSB	Unsigned	0	1	0	0	1		0x1=ShiftInProgress; 0x0=NoShiftInProgress;	Signal indicates if gearshift is in progress or not. SignalTimeout: 500ms	**R**
	TCU_TgtGear	20	4	LSB	Unsigned	0	1	0	0	15		0xC=Park_gear; 0xB=Reverse_gear; 0xA=Tenth_gear; 0x9=Ninth_gear; 0x8=Eighth_gear; 0x7=Seventh_gear; 0x6=Sixth_gear; 0x5=Fifth_gear; 0x4=Fourth_gear; 0x3=Third_gear; 0x2=Second_gear; 0x1=First_gear; 0x0=Neutral_gear; 0xF=Not_available_error;	Signal indicates target gear anticipated by the gearbox. SignalTimeout: 500ms	**R**

Remark: Only applicable if an automatic gearbox is configured.

Message	ID	Comment	MK 100 UHP
SWA_BOURNS_CAL	0x620		**R**
SWA_BOURNS_DATA	0x11F		**R**
SWA_BOURNS_DIAG_RX	0x715		**R**
SWA_BOURNS_DIAG_TX	0x71D		**T**

Remark: Reserved CAN IDs. Only applicable if the Bourns type steering wheel angle sensor is configured.

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