Product specification DCM

Table of Contents

Changelog

Version	Author	Date	
1.0	AK	26.03.2024	Initial release
1.1	AK	10.05.2024	Added section DCM Pinouts and Connection Instructions
1.2	AK	19.06.2024	Added section DCM-F80/F82 Plug&Play Instructions

Product description

The DCM (Diff Control Module) is an advanced control unit specifically designed for managing the differential lock system in BMW M3/M4/M5 F-series vehicles. This module offers a comprehensive solution, seamlessly replacing the original control module while enhancing the functionality and compatibility of the rear axle differential lock assembly. Below is a detailed specification outlining its key features and capabilities:

Compatibility:

- Compatible with BMW M3/M4/M5 F-series vehicles.
- Designed to seamlessly integrate with the regulated rear axle differential lock system.

Standalone Functionality:

- Operates as a standalone unit, independently controlling the differential lock assembly.
- Requires only one signal (Canbus or Analog) to control the diff.
- Canbus signal can be provided by any canbus compatible device allowing user to develop it’s own strategies.

Retrofit Capability:

- Facilitates easy retrofitting of the differential lock assembly to any chassis.

Communication Interfaces:

- Accepts signals over CAN bus for efficient data exchange.
- Analog input capability for simple integration with older chasis.

Power specification:

- Equipped with three power outputs capable of handling up to 30A each.
- Robust power delivery ensures optimal performance and reliability.
- Integrated diagnostics capability for real-time monitoring of power output status.
- Less than 0.5mA quiescent current allows the device to be connected to constant power without risk of killing battery.

Temperature Measurement:

- Analog input channels dedicated to temperature measurements.
- Enables accurate monitoring of differential temperature for enhanced performance and durability.

USB-C Connector:

- Features a USB-C connector for convenient connectivity and configuration.
- Allows for easy firmware updates and parameter adjustments.

DCM (Diff Control Module) Pinouts and Connection Instructions:

The Diff Control Module (DCM) is designed for seamless integration into your vehicle's differential lock system. Properly following the pinout and connection instructions is crucial for ensuring optimal performance and safety. Below is the pinout diagram and step-by-step connection instructions to guide you through the installation process:

Pinout Diagram:

The DCM features two connectors for interfacing with the vehicle's differential lock system and power supply:

12-Pin Connector (DT06-12PB):

- **Pin 1:** *Position Input 1* – Input for position sensor.
- **Pin 2:** *Position Input 2* – Input for position sensor.
- **Pin 3:** *5V* – 5V power supply for sensors.
- **Pin 4:** *Power Output 1* – Up to 30A.
- **Pin 5:** *Power Output 2* – Up to 30A.
- **Pin 6:** *Power Output 3* – Up to 30A.
- **Pin 7:** *Ground for Shield* – Ground connection for shielded wires.
- **Pin 8:** *Signal Ground* – Ground for analog signals.
- **Pin 9:** *Signal Ground* – Ground for analog signals.
- **Pin 10:** *Temperature Input 1* – Temperature measurement input 1.
- **Pin 11:** *Temperature Input 2* – Temperature measurement input 2.
- **Pin 12:** *Signal Ground* – Ground for analog signals.

6-Pin Connector (DT06-6P):

- **Pin 1:** *Ground (KL31)* – Ground connection for power supply and other components.
- **Pin 2:** *Wakeup or Ignition (KL15)* – Ignition signal to wake up the module when the vehicle is started.
- **Pin 3:** *Constant Power (KL30)* – Constant power supply to the module.
- **Pin 4:** *CAN Low* – CAN bus communication.

- **Pin 5:** *CAN High* – CAN bus communication.
- **Pin 6:** *User Analog Input* – Input for user-specified analog signals.

Diff Pinout:

The differential has two connectors: Y532B (11 Pin on the motor) and Y531B (2 Pin). Here are the pinout details:

*Y53*2B (11 Pin on the motor):*

BMW part number 7578676

- **Pin 2**: Motor + connects to Power Output 3 (+) on the DCM (Pin 6).
- **Pin 3**: Motor – connects to Power Output 2 (+) on the DCM (Pin 5).
- **Pin 4**: 5V – Connects to 5V on the DCM (Pin 3).
- **Pin 5**: Temperature connects to Temperature Input 2 on the DCM (Pin 11).
- **Pin 6**: Position connects to Position Input 1 on the DCM (Pin 1).
- **Pin 7**: Shield Ground – Connects to Ground for Shield on the DCM (Pin 7).
- **Pin 8**: Signal Ground – Connects to Signal Ground on the DCM (Pin 12).
- **Pin 9**: Signal Ground – Connects to Signal Ground on the DCM (Pin 4).
- **Pin 10**: Position connects to Position Input 2 on the DCM (Pin 2).
- **Pin 11**: Temperature connects to Temperature Input 1 on the DCM (Pin 10).

*Y53*1B (2 Pin):*

BMW part number: 7543311

- **Pin 1**: Temperature connects to Temperature Input 1 on the DCM (Pin 10).
- **Pin 2**: Signal Ground connects to Signal Ground on the DCM (Pin 9).

Connection Instructions:

Cross table:

DCM (12pin)	Diff Y53*1B (11pin)	Diff Y53*2B (2 pin)	Name
1	6		Position
2	10		Position
3	4		5V
4	9		Signal ground
5	2		Motor +
6	3		Motor -
7	7		Motor shield
8			
9		2	Signal ground
10		1	Oil temperature
11	5		Motor temperature
12	8		Signal ground

Preparation:

- Ensure the vehicle is turned off and safely secured.
- Disconnect the battery to prevent any electrical hazards during installation.

Locating the DCM Mounting Area:

- Identify a suitable location near the differential lock system to install the DCM.
- Make sure there is sufficient space and ventilation to accommodate the module.

Connecting Power Outputs:

- Use shielded wire with a cross-sectional area of 2.5mm² (AWG 14) for the power outputs.
- Connect the positive wires of the differential lock system actuators to the appropriate Power Output pins on the 12-pin connector.
- Connect the shield to Ground for Shield (Pin 7) on the 12-pin connector.
- Ensure connections are secure and properly grounded.

Connecting Analog Inputs and Temperature Sensors:

- Connect position sensor outputs to Position Inputs (Pins 1 and 2) using unshielded wire with a cross-sectional area of 0.5mm² (AWG 20).
- Connect temperature sensors to Temperature Inputs (Pins 10 and 11) using unshielded wire with a cross-sectional area of 0.5mm² (AWG 20).

- Ensure the sensor ground wires are connected to Signal Ground pins (Pins 8, 9, and 12) and check for secure connections.

Connecting CAN Bus:

- Use unshielded twisted pair wire with a cross-sectional area of 0.5mm² (AWG 20) for the CAN bus connections.
- Connect CAN High (Pin 5) and CAN Low (Pin 4) wires from the vehicle's CAN bus to the respective pins on the 6-pin connector.
- Ensure the CAN bus is properly terminated for stable communication.

Connecting Power Supply and Ignition:

- Connect the Ground (Pin 1) to the vehicle's ground using unshielded wire with a cross-sectional area of 2.5mm² (AWG 14).
- Connect the Wakeup/Ignition (Pin 2) to the vehicle's ignition signal using unshielded wire with a cross-sectional area of 0.5mm² (AWG 20).
- Connect Constant Power (Pin 3) to the vehicle's constant power source using unshielded wire with a cross-sectional area of 2.5mm² (AWG 14).

Connecting User Analog Input:

- Connect the user analog input (Pin 6) to any user-specified analog signal, such as sensors or other inputs as needed.
- Use unshielded wire with a cross-sectional area of 0.5mm² (AWG 20) for this connection.

Final Checks:

- Double-check all connections to ensure they are secure and correctly placed.
- Reconnect the vehicle battery once all connections are verified.

Testing the DCM:

- Turn on the vehicle and observe the DCM's operation.
- Ensure the module is functioning as expected, and monitor for any error codes or abnormal behavior.

Configuration:

- Use the USB-C connection on the DCM for any necessary configuration or parameter adjustments.
- Follow the user manual for guidance on configuring settings according to your preferences.

By following these connection instructions and pinout details, you will ensure a smooth installation of the Diff Control Module (DCM) and achieve optimal performance in managing the differential lock system. Always refer to the manufacturer's user manual for any specific guidelines and safety precautions.

Connecting to OEM F80/F82 Loom Using Adapters:

When integrating the Diff Control Module (DCM) with the OEM F80/F82 loom, two specific adapters are required. These adapters facilitate the connection of the DCM to the differential module and the power supply, ground, and wakeup signals. Additionally, CAN bus wiring needs to be routed appropriately. Below are the detailed steps for making these connections:

Required Adapters:

1. **18-Pin Adapter:**
    - Connects the DCM’s 12-pin connector (DT06-12PB) to the A220*3B connector on the OEM loom.
    - Routes wires to the differential module.
2. **6-Pin Adapter:**
    - Connects the DCM’s 6-pin connector (DT06-6P) to the A220*2B connector on the OEM loom.
    - Includes a length of CAN bus wire that needs to be routed to the fuel pump control module.

Connection Instructions:

1. **Preparation:**
    - Ensure the vehicle is turned off and safely secured.
    - Disconnect the battery to prevent any electrical hazards during the installation process.
2. **Identify Connector Locations:**
    - Locate the A220**3B and A220**2B connectors in the OEM F80/F82 loom.
    - Familiarize yourself with the OEM wiring harness and connector locations to ensure proper connections.
3. **18-Pin Adapter for Differential Module:**
    - Connect the 18-pin adapter to the A220*3B connector on the OEM loom.
    - Connect the black DT06-12PB connector to DCM
    - The crossing on the adapter is as follows:
        - **Pin 1 (Position Input 1 on DT06-12PB):** Connects to Pin 4 (Position Input 1) on A220*3B.

- **Pin 2 (Position Input 2 on DT06-12PB):** Connects to Pin 1 (Position Input 2) on A220*3B.
- **Pin 3 (5V on DT06-12PB):** Connects to Pin 2 (5V) on A220*3B.
- **Pin 4 (Power Output 1 on DT06-12PB):** Connects to Pin 16 (Motor +) on A220*3B.
- **Pin 5 (Power Output 2 on DT06-12PB):** Connects to Pin 17 (Motor -) on A220*3B.
- **Pin 6 (Power Output 3 on DT06-12PB):** Not used.
- **Pin 7 (Ground for Shield on DT06-12PB):** Connects to Pin 14 (Shield Ground) on A220*3B.
- **Pin 8 (Signal Ground on DT06-12PB):** Connects to Pin 8 (Signal Ground) on A220*3B.
- **Pin 9 (Signal Ground on DT06-12PB):** Connects to Pin 11 (Signal Ground) on A220*3B.
- **Pin 10 (Temperature Input 1 on DT06-12PB):** Connects to Pin 7 (Temperature Input 1) on A220*3B.
- **Pin 11 (Temperature Input 2 on DT06-12PB):** Connects to Pin 10 (Temperature Input 2) on A220*3B.
- **Pin 12 (Signal Ground on DT06-12PB):** Connects to Pin 5 (Signal Ground) on A220*3B.

4. **6-Pin Adapter for Power, Ground, and Wakeup Signal:**

   - Connect the 6-pin adapter to the A220*2B connector on the OEM loom.
   - Connect the 6 pin DT06-6P connector to the DCM.
   - The crossing on the adapter is as follows:
     - **Pin 1 (Ground - KL31 on DT06-6P):** Connects to Pin 4 (Ground) on A220*2B.
     - **Pin 2 (Wakeup or Ignition - KL15 on DT06-6P):** Connects to Pin 5 (Wakeup) on A220*2B.
     - **Pin 3 (Constant Power - KL30 on DT06-6P):** Connects to Pin 1 (Constant Power) on A220*2B.
     - **Pin 4 (CAN Low on DT06-6P):** Connects to CAN Low wire in the OEM loom.
     - **Pin 5 (CAN High on DT06-6P):** Connects to CAN High wire in the OEM loom.
     - **Pin 6 (User Analog Input on DT06-6P):** Not used in this application.

5. **Routing CAN Bus Wire:**

   - The 6-pin adapter includes a length of CAN bus wire that needs to be routed to the fuel pump control module.
   - Locate the fuel pump control module, which is situated on the C-pillar on the passenger side of the car.
   - Depin the OEM CAN bus wires from the A98*1B connector for the fuel pump module.
     - **Pin 9 (CAN High on A98*1B, blue with red stripe):** Depin and connect to the included housing.

    - **Pin 16 (CAN Low on A98*1B, red):** Depin and connect to the included housing.
  - Insert the original terminals from the CAN bus wires into the included housing.
  - Route the CAN bus wire from the 6-pin adapter along the vehicle’s interior trim to the fuel pump control module.
  - Ensure the wire is securely fastened and free from potential damage or interference.
6. **Secure Connections:**
   - Once all connections are made, secure them using appropriate cable management tools such as zip ties or clips.
   - Ensure the wires are routed safely and away from moving parts or heat sources.
7. **Verify Grounding:**
   - Double-check that all ground connections are secure and properly grounded.
   - This is critical for both safety and functionality.
8. **Testing and Calibration:**
   - Once the DCM is connected to the OEM loom via the adapters, reconnect the vehicle's battery.
   - Power on the vehicle and observe the DCM's operation.
   - Verify that all functions, including differential lock, position sensing, and temperature monitoring, are working correctly.
   - Check for any error codes or anomalies.
9. **Configuration and Adjustment:**
   - Use the USB-C connection for any necessary configuration and fine-tuning of the DCM's settings to match the OEM setup.
   - Follow the user manual for guidance on configuring settings according to your preferences and OEM specifications.

By following these instructions and using the specified adapters, you can successfully integrate the Diff Control Module (DCM) with the OEM F80/F82 loom, ensuring optimal performance and compatibility with the vehicle's existing systems. Always refer to the manufacturer's user manual and OEM documentation for additional guidance and safety precautions during the installation process.