CarMedialab

Recommendations for vehicle tenders

in the commercial vehicle sector with regard to vehicle data

Foreword

Availability and quality of technical vehicle data must be understood as an important product characteristic of a modern city bus for future data-driven applications. With this document, we would like to provide you with recommendations and information that you can freely use in a vehicle tender.

Text templates for specifications

Basics

Vehicle data is accessible at an FMS interface according to the latest FMS standard (FMS V04 from 17.09.2021). The FMS standard specifies a connector, the SAE J1939 data protocol and data elements.

Depending on the application interest in the transport company, this interface is supplemented by further data elements:

- Basic requirement FMS V04
- Extended demand for electromobility
- Extended demand battery monitoring
- Extended demand diagnostic messages

Transparency

If a parameter cannot be supplied or cannot be supplied in the required quality, this is disclosed and justified. If communication protocols other than SAE J1939 are used, these must be explained.

Data translation tables

The corresponding data translation tables (e.g. data dictionary, CAN matrix, DBC, ARXML) must be provided for all data required in the specifications.

Data validation

The quality of all data generated from the signals must be proven with a real test data set at the latest during vehicle acceptance, but at least a CAN trace recording of a real test drive, which enables the customer to check the quality of the data. Details about file formats are to be agreed in the technical clarification meeting.

FMS interface

The customer requires a **complete** FMS interface according to the latest standard. All signals listed in the standard must be provided in the required resolution and frequency.

Diagnosis

The error codes of the self-diagnosis of the vehicle and the subsystems must be made available on the vehicle side via CAN on the FMS gateway. The DM1 protocol in accordance with J1939 must be used for this.

Data for electromobility

To ensure safe operation of electric bus fleets and to provide the data of the MDS of the National Organization Hydrogen and Fuel Cell Technology (NOW) the signals listed in **Appendix 1: Data for electromobility** listed signals shall be made available in addition to the FMS.

Data for battery monitoring

The client requires the provision of the signals listed in **Appendix 2: Data for battery monitoring** for the monitoring of battery conditions as well as the implementation of an optimized (battery) operation concept.

Tachographs Remote Download

It must be possible to download the data from the digital tachograph via the FMS interfaces. Data retrieval must be possible in accordance with ISO 16844.

Appendix 1: Parameter list for electromobility

Position	Group	Parameter
1	general	vehicle weight
2		remaining distance to service
3	charge status	status charger connected
4		charging status HV system
5	temperature	inside temperature
6		battery temperature
7	REX*	operating hours range extender
8		energy demand range extender
9		HV generator energy created
10		HV generator energy consumption
11	fuel heater*	fuel heater operating hours
12		fuel heater status
13		fuel heater fuel level
14		fuel heater fuel consumption
15	energy storage	SoC in %
16		SoC in kWh
17		remaining distance
18		energy flow, positive / negative
19		accumulated energy battery in
20		accumulated energy battery out
21	electric engine	energy flow, positive / negative
22		electric motor rpm
23		electric motor coolant temperature
24	vehicle electrical system	total energy consumption of secondary consumers during operation
25		total energy consumption of secondary consumers while charging
26		energy consumption of secondary consumers drivetrain relevant
27		energy consumption of secondary consumers miscellaneous
28		energy consumption of secondary consumers low-voltage
29		voltage 24 V system
30		charging status 24 V system
31	HVAC	energy consumption heating
32		energy consumption air conditioning
33		energy consumption air conditioning operator
34		energy consumption air conditioning passenger compartment
35	charging unit	received amount of energy during charging
36	fuel cell*	hydrogen consumption
37		generated electric energy
38		operating time fuel cell system

* if available

Appendix 2: Parameter list for battery monitoring

Position	Parameter
1	HV battery voltage system level
2	HV battery highest cell voltage
3	HV battery lowest cell voltage
4	HV battery average cell voltage (over all cells)
5	HV battery highest cell temperature
6	HV battery lowest cell temperature
7	HV battery average cell temperature (over all cells)
8	HV battery current power positive / negative
9	HV battery accumulated energy throughput
10	HV battery accumulated charge throughput
11	HV battery accumulated full cycles
12	HV battery available residual energy
13	HV battery SoC