16-1 Digital tachograph

16-1.1 Effective date and Scope:

Effective from 2021/1/1, new vehicle types of category M2,M3,N2 and N3, and from 2023/1/1, all vehicle types of category M2,M3,N2 and N3, shall installed with digital tachograph which comply with this regulation.

16-1.2 Definition

16-1.2.1 Recording equipment: The equipment intended for installation in road vehicles to show and record automatically or semi-automatically details of the movement of those vehicles and of certain working periods of their drivers;

16-1.2.2 Vehicle unit (VU): The recording equipment excluding the motion sensor and the cables connecting the motion sensor.

16-1.2.3 Continuous driving time: Adjacent 2 cumulative break/rest period of cumulative driving time. Each cumulative rest period shall greater than cumulative rest time threshold that in accordance with paragraph 16-1.5.8.3.

16-1.2.4 Cumulative break time: After the latest cumulative break/rest period, each greater than 15 minutes of break/rest time shall be cumulated.

16-1.3 Digital tachograph shall according to suitable types and range of principle:

16-1.3.1 The same brand and type series.

16-1.3.2 The same functions. (the category of record documents, the stored way of documents)

16-1.4 Description of the function and specification: Shall describe activating method with transmission system, way of data recording and storing, explanation on the design and operation of rewrite-proof, and the period and correction method of regular inspection.

16-1.5 Construction and functional requirements for recording equipment

16-1.5.1 Construction requirements

16-1.5.1.1 The purpose of the recording equipment is to record, store, display, print, and output data related to driver activities.

16-1.5.1.2 The recording equipment includes cables, an operational sensor, a vehicle unit and a software for checking and reading of recording data.

16-1.5.1.3 The vehicle unit includes a processing unit, a data memory, a real time clock, a printer, a display, a visual warning, a calibration/downloading connector, and facilities for entry of user's inputs. The recording equipment may be connected to other devices through additional connectors.

16-1.5.1.4 Applicants shall provide an evidence documents that conform with “Electromagnetic Compatibility” of VSTD.

16-1.5.1.5 The recording equipment shall record and store the information of driving at least 30 days.

16-1.5.1.6 Alteration-proof design: shall be difficult altering the internal mechanism performed externally, to fulfill the purpose of alteration-proof.

16-1.5.1.7 The function requirements for speed, time, distance measurement:

16-1.5.1.7.1 General characteristics

This function shall continuously measure and be able to provide the distance value corresponding to the total driving distance by the vehicle. The speed measurement function shall also provide the information whether the vehicle is moving or stopped. The vehicle shall be considered as moving as soon as the function detects more than 1 imp/sec for at least five seconds from the motion sensor, otherwise the vehicle shall be considered as stopped.

16-1.5.1.7.1.1 Measurement of driving distance: The Driving distance may be measured either:

so as to cumulate both forward and reverse movements, or so as to include only forward movement.

16-1.5.1.7.1.1.1 The recording equipment shall measure distance from 0 to 9,999,999.9 km.

16-1.5.1.7.1.1.2 Distance measured shall have a resolution better than or equal to 0,1 km.

16-1.5.1.7.1.1.3 The allowable error of driving distance records: 2 km per 100 km.

16-1.5.1.7.1.2 Measurement of speed

16-1.5.1.7.1.2.1 The recording equipment shall measure speed from 0 to 220 km/h

16-1.5.1.7.1.2.2 Speed measurement shall have a resolution better than or equal to 1 km/h.

16-1.5.1.7.1.2.3 The allowable error of transient speed records (unit: km/hr)

Standard speed	30	40	60	80	100	120
Allowable error on tachograph	2.5	3.0	3.0	3.5	4.5	4.5

16-1.5.1.7.1.3 Time measurement

16-1.5.1.7.1.3.1 The time measurement function shall measure permanently and digitally provide date and time.

16-1.5.1.7.1.3.2 Date and time shall be used for dating throughout the recording equipment (recordings, printouts, data exchange, display, ...).

16-1.5.1.7.1.3.3 In order to visualise the local time, it shall be possible to change the offset of the time displayed, in half

hour steps.

16-1.5.1.7.1.3.4 Time measured shall have a resolution better than or equal to 1 second.

16-1.5.1.7.1.3.5 Time measurement shall not be affected by an external power supply cut-off of less than 12 months in type approval conditions (Applicants shall provide relevant information of RTC output and battery capacity to confirm by technical service).

16-1.5.1.7.1.3.6 The allowable error of driving time records: 4 minutes for less than two day-use. [4+2(N-1)] minutes for N day-use equal or above two days.

16-1.5.1.7.1.4 Orientation measurement: The recording equipment shall record and store the data of vehicle location continuously. Orientation recording shall include time, location, average speed of vehicle during driving period.

16-1.5.1.7.2 Temperature characteristics: in the range of –15°C to 60°C (the humidity (RH) at 60°C is approximate 50%), no abnormal condition in any parts. The record deviation shall comply with the requirements specified below:

16-1.5.1.7.2.1 Driving distance: within 1 km at the driving distance of 100 km.

16-1.5.1.7.2.2 Transient speed: for 60 km/hr, within 6 km of deviation.

16-1.5.1.7.2.3 Driving-time deviation at 24 hrs: within 2 minutes for electric tachograph.

16-1.5.1.7.3 Temperature-enduring characteristics: staying for one hour under the environment of 70^{o}C and –30^{o}C, the tachograph shall have no abnormal condition in any parts. Then performs the accuracy tests specified above, the allowable errors of transient speed, driving distance and driving time shall comply with the respective requirements of 16-1.5.1.7.1.1.3, 16-1.5.1.7.1.2.3 and 16-1.5.1.7.1.3.6.

16-1.5.1.7.4 Vibration endurance characteristics: putting the tachograph on the vibration table under normal installing status, feeds in recording papers and activates it therewith, the driving shaft is rotated on 80% of the full-scale speed. Making vibration continuously in the up-down direction (4 hrs), forward-backward direction (2 hrs) and right-left direction (2 hrs) with the vibrating frequency of 33 Hz and full-scale amplitude of 2 mm. The tachograph shall have no abnormal condition in any parts. The records of allowable errors for transient speed, driving distance and driving time, compared with pre-test, shall meet following requirements:

16-1.5.1.7.4.1 Driving distance: within 1 km at the driving distance of 100 km.

16-1.5.1.7.4.2 Transient speed: with 3% of full-scale

16-1.5.1.7.4.3 Driving-time deviation at 24 hrs: within 3 minutes for mechanical tachograph, and within 2 minutes for electric tachograph.

16-1.5.1.7.5 Durability test: install the tachograph under normal installing status, operate it with 80% of the full-scale speed for 30,000 km continuously, the tachograph shall have no abnormal condition in any parts. The records of allowable errors for transient speed, driving distance and driving time shall be within the range of the following requirements:

16-1.5.1.7.5.1 Driving distance: within 1 km at the driving distance of 100 km.

16-1.5.1.7.5.2 Transient speed: within 3% of full-scale.

16-1.5.1.7.5.3 Driving-time deviation at 24 hrs: within 3 minutes for mechanical type, and within 2 minutes for electric type.

16-1.5.2 Monitoring driver activities

16-1.5.2.1 This function shall permanently and separately monitor the activities of one driver and one co-driver.

16-1.5.2.2 Driver activity shall be DRIVING, WORK, AVAILABILITY, or BREAK/REST.

16-1.5.2.3 It shall be possible for the driver and/or the co-driver to manually select WORK, AVAILABILITY, or BREAK/REST.

16-1.5.2.4 When the vehicle is moving, DRIVING shall be selected automatically for the driver and AVAILABIL-ITY shall be selected automatically for the co-driver.

16-1.5.2.5 When the vehicle stops, WORK shall be selected automatically for the driver.

16-1.5.2.6 This function shall output activity changes to the recording functions at a resolution of one minute.

16-1.5.2.7 This function shall also permanently monitor the continuous driving time and the cumulative break time of the driver.

16-1.5.3 Monitoring control activities

This function shall monitor DISPLAYING, PRINTING, VU and card DOWNLOADING activities carried while in control mode.

16-1.5.4 Detection of events and/or faults

This function shall detect the following events and/or faults:

16-1.5.4.1 "Power supply interruption" event

This event shall be triggered, while not in calibration mode, in case of any interruption exceeding 200 milliseconds of the power supply of the motion sensor and/or of the vehicle unit. The interruption threshold shall be defined by the manufacturer. The drop in pow-er supply due to the starting of the engine of the vehicle shall not trigger this event.

16-1.5.4.2 "Security breach attempt" event

This event shall be triggered for any other event affecting the security of the motion sensor and/or of the vehicle unit as specified within the generic security targets of these components, while not in calibration mode.

16-1.5.4.3 "Recording equipment" fault

This fault shall be triggered for any of these failures, while not in calibration mode:

(a)VU internal fault,

(b)downloading fault

16-1.5.5 Built-in and self-check function: the recording equipment shall carry out built-in and self-check function to check itself and via displaying related light signal or related modules of normally operation status when each turn on equipment.

16-1.5.6 The recording equipment shall be able to read any data stored in its data memory.

16-1.5.7 Recording and storing in the data memory

16-1.5.7.1 For the purpose of this paragraph, times are recorded with a resolution of one minute, unless otherwise specified, odometer values are recorded with a resolution of 1 kilometer. Speeds are recorded with a resolution of 1 km/h.

16-1.5.7.2 Data stored into the data memory shall not be affected by an external power supply cutoff in type approval conditions.

16-1.5.7.3 The recording equipment shall be able to store in its data memory the following data:

16-1.5.7.3.1 Equipment identification data

16-1.5.7.3.1.1 Equipment shall store the following vehicle unit identification data:

(a) Name of the manufacturer

(b) Address of the manufacturer

(c) Serial number or part number

(d) Software version number

(e) Software version installation date

(f) Manufactured year of equipment

(g) Approval number

(h) License plate number

16-1.5.7.3.1.2 Vehicle unit identification data are recorded and stored once, except the vehicle registration number.

16-1.5.7.3.2 Driver activity data

16-1.5.7.3.2.1 The recording equipment shall record and store in its data memory whenever there is a change of activity for the driver and/or the co-driver, and/or whenever there is a change of driving status：

(a) the activity (DRIVING, AVAILABILITY, WORK, BREAK/REST),

(b) the date and time of the change.

16-1.5.7.3.2.2 The data memory shall be able to hold driver activity data for at least 365 days.

16-1.5.7.3.2.3 When storage capacity is exhausted, new data shall replace oldest data.

16-1.5.7.3.3 Detailed speed data

The recording equipment shall record and store in its data memory the instantaneous speed of the vehicle and the corresponding date and time at per 0.5 second of at least the last 24 hours that the vehicle has been moving.

16-1.5.7.3.4 Events data

For the purpose of this subparagraph, time shall be recorded with a resolution of one second. The recording equipment shall record and store in its data memory the following data for each event detected according to the following storage rules:

Event	Storage rules	Recorded per event
Power supply interruption	1. the longest event for each of the 10 last days of occurrence 2. the five longest events over the last 365 days.	1.date and time of beginning and end of event, 2. number of similar events that day.
Security breach attempt	the 10 most recent events per type of event.	1. date and time of beginning and end of event, 2. type of event.

16-1.5.7.3.5 Faults data

16-1.5.7.3.5.1 For the purpose of this subparagraph, time shall be recorded with a resolution of one second.

16-1.5.7.3.5.2 The recording equipment shall attempt to record and store in its data memory the following data for each fault

detected according to the following storage rules:

Fault	Storage rules	Recorded per fault
Recording equipment faults	1. the10 most recent faults for each type of fault 2. the first fault after the last calibration	1. date and time of beginning and end of fault。 2. type of fault

16-1.5.7.3.6 orientation data:

The data memory shall be able to hold orientation data for at least 365 days.

16-1.5.8 The recording function of setting and adjusting of time and continuous driving/cumulative-rest time threshold:

16-1.5.8.1 The recording equipment shall record and store in its data memory data relevant to:

(a) the most recent latest time adjustment,

(b) the five largest time adjustments, since last calibration

16-1.5.8.2 The following data shall be recorded for each of these time adjustments:

(a) date and time, old value

(b) date and time, new value

16-1.5.8.3 Default value of continuous-driving time threshold shall be set in 4 hours, default value of cumulative rest time threshold shall be set in 30 minutes. The following data shall be recorded for each of these continuous driving/cumulative-rest time threshold adjustments:

16-1.5.8.4 Performed in calibration mode outside the frame of a regular calibration

16-1.5.9 Control activity data

16-1.5.9.1 The recording equipment shall record and store in its data memory the following data relevant to the 20 latest control activities:

(a) date and time of the control

(b) type of the control (displaying and/or printing and/or VU downloading and/or card downloading).

16-1.5.9.2 In case of downloading, the dates of the oldest and the dates of the latest downloaded shall also be recorded.

16-1.5.10 Download activity data

The recording equipment shall record and store in its data memory the following data relevant to the last data memory downloading to external media while in company or in calibration mode

16-1.5.11 Displaying

16-1.5.11.1 The display shall include at least 20 characters

16-1.5.11.2 The minimum character size shall be 5 mm high and 3,5 mm wide.

16-1.5.11.3 The display shall be provided with adequate non-dazzling lighting.

16-1.5.11.4 Indications shall be visible from outside the re-cording equipment.

16-1.5.11.5 The recording equipment shall be able to display:

(a) default data

(b) data related to warnings

(c) data related to menu access

(d) other data requested by a user.

16-1.5.11.6 Additional information may be displayed by the recording equipment, provided that it is clearly distin-guishable from information required above.

16-1.5.11.7 The display shall always be ON when the vehicle is moving.

16-1.5.11.8 The recording equipment may include a manual or automatic feature to turn the display OFF when the vehicle is not moving.

16-1.5.11.9 The data showed in paragraph16-1.5.11.5 (a) should include the following data:

(a) Current date and time;

(b) Current type of driver activity and current type of co-driver activity;

(c) Relevant data of driver;

(d) Current continuous driving time and the cumulative break time of the driver during driving;

(e) Current type of activity period and the cumulative break time of the driver who are not driving;

16-1.5.11.10 The data showed in paragraph 16-1.5.11.5(d) should include the following data:

(a) Current date and time;

(b) Continuous driving time and the cumulative break time of the driver;

(c) Continuous driving time and the cumulative break time of the co-driver;

(d) Cumulative driving time of the driver in previous week and this week;

(e) Cumulative driving time of co-driver in previous week and this week;

16-1.5.12 Printing function

16-1.5.12.1The recording equipment shall be able to print the following documents from its data memory :

(a) Driving activity(date and time of print, type of driver activity, license plate number, the total activity of driver in the most recent 24 hours and specified date(within 365 days),driver signature column) in the most recent 24 hours and specified date(within 365 days),printouts are showed in Table 1.

(b) The events and fault data(date and time of print, events and type of faults ,license plate number, the record of the events and faults, vehicle unit identification, the record of calibration/control in the most recent time, driver signature column) in the most recent 24 hours and specified date(within 365 days),printouts are showed in Table 2.

(c) The technical specification(date and time of print, type of technical specification ,license plate number ,Vehicle unit identification, the events and faults in the most recent time) in the most recent 24 hours and specified date(within 365 days),printouts are showed in Table 3

16-1.5.12.2 Additional printouts may also be printed by the recording equipment, it shall be clearly distinguishable from the data above.

16-1.5.12.3 The printer shall be able to print 24 characters per line (English and numerical).

16-1.5.12.4 The minimum character size (English and numerical) shall be 2.1 mm high and 1.5 mm wide, Chinese words and numbers shall bigger than this specification.

16-1.5.12.5 Printers shall be so designed as to produce these printouts with a degree of definition likely to avoid any ambiguity when they are read.

16-1.5.12.6 Printouts shall retain their dimensions and recordings under normal conditions of humidity (10 to 90 %) and temperature.

16-1.5.12.7 It shall also be possible to add handwritten notes, such as the driver's signature, to these documents.

16-1.5.12.8 The recording equipment shall manage "paper out" events while printing by, once paper has been re-loaded, restarting printing from printout beginning or by continuing printing and providing an unambiguous reference to previously printed part.

16-1.5.13 Warnings

The recording equipment shall warn the driver when detecting any event and/or fault.

16-1.5.13.1 Warning of a power supply interruption event may be delayed until the power supply is reconnected.

16-1.5.13.2 The recording equipment shall warn the driver 15 minutes before continuous driving time threshold according to paragraph16-1.5.8.3 and at the time of exceeding it.

16-1.5.13.3 Warnings shall be visual. Audible warnings may also be provided in addition to visual warnings.

16-1.5.13.4 Visual warnings shall be clearly recognizable by the user, shall be situated in the driver's field of vision and shall be clearly legible both by day and by night.

16-1.5.13.5 Visual warnings may be built into the recording equipment and/or remote from the recording equipment. In the latter case it shall bear a "T" symbol and shall be amber or orange.

16-1.5.13.6 Warnings shall have a duration of at least 30 seconds, unless acknowledged by the user by hitting any key of the recording equipment. This first acknowledgement shall not erase warning cause display referred to in next paragraph.

16-1.5.13.7 Warning cause shall be displayed on the recording equipment and remain visible until acknowledged by the user using a specific key or command of the recording equipment.

16-1.5.13.8 Additional warnings may be provided, as long as they do not confuse drivers in relation to previously defined ones.

16-1.5.14 Data downloading to external media

16-1.5.14.1 The recording equipment shall be able to set a download date of time segment (hour is indicated by the unit, default value of time segment is 24 hours before downloading) it enables to download requested data from its data memory or from a driver card to external storage media via the calibration/downloading connector (RS232 and USB connector).

16-1.5.14.2 It shall be able to download reading software by using data on paragraph 16-1.7.that provided by applicant and download to external computer(operating systems shall better than Chinese Microsoft windows 95 or Linux) via downloading connector of recording equipment.

16-1.5.14.3 Downloading process includes transforming data from data memory, and stores all data on paragraph16-1.6.3 into 1 file that conform with paragraph 16-1.6.

16-1.5.14.4 Downloading shall not alter or delete any stored data.

16-1.5.14.5 Format of downloading data shall conform with requirements on paragraph 16-1.6.

16-1.6 Requirements of downloading function

16-1.6.1 Specification of RS232: RS232 must be DB9 type.

16-1.6.1.1 Downloading data agreement:

16-1.6.1.1.1 The way of downloading data:

The way of transmitting data of the recording equipment's RS232 connector shall use asynchronous receiver transmitter TX(3)，RX(2)，GND(5), transmission rate shall be 115200bps, expressed in bit and include 1 start bit, 8 data bits, 1 stop bit, 1 odd parity bit.

16-1.6.1.1.2 The downloading data via RS232 recording equipment shall comply with following requirements:

(1) Communication between personal computer and recording equipment, a command frame is sent by personal computer, recording equipment shall response corresponding to its specific-return acknowledgement frame (ACK).

(2) A command frame sent by personal computer shall include 2-bytes of start character, 1-byte of command character, 2-bytes of data block length,1-byte of reserve character, several bits of data block and one-bit of odd parity character.

(3) The length of acknowledgement frame (ACK) shall not greater than 1000 bytes, the larger data block shall be completed by sending command frame in several times.

(4) Data download agreement is showed as Table 4.

16-1.6.2 Specification of USB:

The USB connector shall be USB 2.0 A type. The recording equipment shall download recording data via USB connector to USB storage.

16-1.6.3 Format of downloading data and file data:

16-1.6.3.1 Data of the events and faults:

Showed as Table 5.

16-1.6.3.2 Data of the detailed vehicle speed:

Showed as Table 6.

16-1.6.3.3 Technical data

Showed as Table 7.

16-1.6.3.4 Data of Type of driver activity

Showed as Table 8.

16-1.6.3.5 Data of orientation

Showed as Table 9.

16-1.6.3.6 The rule for giving a stored file's name. The file name shall be " DXXXXXXXX_XXXXXX_XXXXXXXX.VDR", which divided into 5 parts:

(1) First part(D): Use a English letter "D" for document

(2) Second part (XXXXXXXX): Use 8 digits for the date of the recording equipment while downloading data (XXXX(year)/XX(month)/XX(day)).

(3) Third part (XXXXXX): Use 6 digits for the time of the recording equipment while downloading data, the beginning of 2 digits are hours, in the middle digits are minutes, the end of 2 digits are seconds;

(4) Fourth part (XXXXXXXX): It means the license plate number set in the recording equipment (include"-",all letters and digits). Replace with "unknown license plate number", when it is not valid.

(5) Fifth part: Use 3 letters "VDR" to show filename extension .

16-1.6.3.7 Format of stored file: It shall use hexadecimal coding, 8421BCD code and ASC II.

16-1.6.3.8 Format of stored file which downloaded from the recording equipment is showed as Table 10.The format of data block in Table 10 is defined in Table 11.The definition of data code, data name, data record are defined in Table 12, and both data name and name of data block are the same.

16-1.6.3.9 The examination of correct file storage:

The technical service shall confirm if the format of stored data downloaded via the recording equipment complies with this regulation and the content is correct by using its test software, and confirm applicant's recording equipment data for downloading reading software(according to paragraph 7) displays correct data content.

16-1.7 A recording equipment reading software for downloading data:

Applicant shall provide a recording equipment data for downloading reading software that compatible with the agreement of data communication in this regulation, it must use Chinese interface and operating systems shall better than Chinese Microsoft windows 95 or Linux.

16-1.7.1 Reading software for downloading data shall have at least download/display of original data that specified on paragraph 16-1.5.7.3, and drawing the curve diagram of driving speed record as below:

The content and recording format shall conform with requirements on paragraph16-1.5.7.3.3, which abscissa is time and ordinate is the vehicle driving speed value corresponding to the time. Curve diagram shall include license plate number, name/ID of driver at same time.

The name/ID of driver may vary with login time of the different driver.

16-1.7.2 Reading software for downloading data shall not change or delete important parameters, such as license plate number, impulse coefficient, name/ID of driver. It shall be authorized for initializing recording equipment, calibration, maintenance or in other special condition that requires to set important parameters above.

Table 1.Print format – The latest 24 hours and specified date of driver activity

1. Date and time of print

Print date／time: dd/mm/yyyy hh:mm

2. License plate number

License plate number:

3. Type of the driver activity（List by each driver and type）

Name/ID of the driver: （Type of driver activity）Beginning date/ time： dd/mm/yyyy hh: mm Process: hh**h**mm

4. Total activity of the driver

Cumulative driving time /odometer value: hh**h**mm XXXX kilometer Cumulative work time: hh**h**mm Cumulative break time: hh**h**mm Cumulative rest time: hh**h**mm

5. Curve diagram of time and distance/vehicle speed (Time abscissa: per 15minutes for one scale / Vehicle speed ordinate: 10km/hr for one scale, maximum of vehicle speed is 140 km/hr, the unit of the distance ordinate is km)

Curve diagram of time and distance/vehicle speed:

6. Driver signature column

Signature of driver:

Table 2. Print format – The latest 24 hours and specified date of events and faults

1. Date and time of print

Print date／time: dd/mm/yyyy hh: mm

2. Name/ID of the driver（all drivers）

Name/ID of the driver:

3. License plate number

License plate number:

4. Recorded events（All events that have been stored or been happening）

Type of events:
Beginning date/time of events: dd/mm/yyyy hh:mm:ss
The number of times of same events: XXX Process: hh**h**mm**m**ss
Name/ID of the driver at the beginning and end of events:

5. Record of fault（All events that have been stored or been happening）

Type of fault:
Beginning date/time of fault: dd/mm/yyyy hh:mm:ss
The number of times of same faults: XXX Process: hh**h**mm**m**ss
Name/ID of the driver at the beginning and end of faults:

6. Vehicle unit identification

Name of vehicle unit manufacturer:
The address of vehicle unit manufacturer:
The serial number or component number of the vehicle unit:
The software number of the vehicle unit:
The software version installation date of the vehicle unit：dd/mm/yyyy hh:mm
Manufacture year of the vehicle unit:
Approval number of the vehicle unit:

7. The latest calibration record

Name of adjuster:
Date of calibration: dd/mm/yyyy
Odometer value of before/after calibration:
Time of before/after calibration:

8. Driver signature column

Signature of driver:

The official directions are written in Chinese, this English edition is for your reference only.

Table 3.Print format - The latest 24 hours and specified date of technical data

1. Date and time of print

Print date／time: dd/mm/yyyy hh:mm

2. Name/ID of the driver（all drivers）

Name/ID of driver:

3. License plate number

License plate number:

4. Vehicle unit identification

Name of vehicle unit manufacturer:
The address of vehicle unit manufacture:
The serial number or component number of the vehicle unit:
The software number of the vehicle unit:
The installation date of software version in the vehicle unit: dd/mm/yyyy hh:mm
Manufacture year of the vehicle unit:
Approval number of the vehicle unit:

5. The record of calibration (All of the calibration)

Name of the adjuster:
Date of calibration: dd/mm/yyyy
Odometer value of before/after calibration:
Time of before/after calibration:

6. Record of time adjustment（All of time adjustment）

Name of the adjuster:
Date/time before adjustment: dd/mm/yyyy hh:mm:ss
Date/time after adjustment: dd/mm/yyyy hh:mm:ss

7. Continuous-driving/cumulative-rest time threshold of adjusted record（All of adjustments of continuous-driving/cumulative-rest time threshold）

Name of the adjuster:
Type of the adjustment:
Date/time before adjustment: dd/mm/yyyy hh:mm:ss
Threshold before adjustment:
Date/time after adjustment: dd/mm/yyyy hh:mm:ss
Threshold after adjustment:

8. The latest record of the events and faults

Date/time of events: dd/mm/yyyy hh:mm:ss
Date/time of faults: dd/mm/yyyy hh:mm:ss

Table 4. RS232 data download agreement

1. The data format of command frame		
Name	The range and format of data	Explanation
Start code	AAH	Data frame of identified place
Start code	75H	Data frame of identified place
Command character （according to data code in Table 11）	00~FFH	
Data block length	00~FFH（high byte）	Data length from 0K~64K. Data block length "0" means data block of frame is blank.
Data block length	00~FFH（low byte）	
Reserve character		Preset 00H
Data block	Command character corresponding to data	Data that relates to command character, data length based on data block length.
Check code	00~FFH	Odd parity bit
2. Correct receiving of data format of acknowledgement frame		
Start code	55H	Data frame of identified place
Start code	75H	Data frame of identified place
Command character （according to data code in Table 11）	00~FFH	It is same as command character of command frame.
Data block length	00~FFH（high byte）	Data length from 0K~64K. Data block length "0" means data block of frame is blank.
Data block length	00~FFH（low byte）	
Reserve character		Preset 00H
Data block	Command character corresponding to data	Data length based on data block length.
Check code	00~FFH	Odd parity bit.
3. Receiving error data command frame of format of acknowledgement frame		
Start code（55H）		
Start code（7AH）		

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Error code（FAH）
Reserve character
Odd parity byte

Table 5.The format for data of events and faults

Name	The length and format of data		Explanation
Number of record of happened faults	1 byte		All of stored or had been happening fault data, the number of faults is zero if data block is blank
Type of the fault	1 byte	ASC II code	
Date and time of beginning of fault	7 bytes	BCD code	X X X X (year)/ X X (month)/ X X (day)/ X X (hour)/ X X (minute)/ X X (second).
date and time of end of fault	7 bytes	BCD code	
Number of record of happened events	1 byte		All of stored or has been happening event data, it means the number of events is zero if data block is blank
Type of the event	1 byte	1 byte	
Date and time of beginning of fault	7 bytes	7 bytes	X X X X (year)/ X X (month)/ X X (day)/ X X (hour)/ X X (minute)/ X X (second).
date and time of end of fault	7 bytes	7 bytes	
The number of times of same happened events	1 byte		

Table 6. The format for data of detailed vehicle speed

Name	The length and format of data		Explanation
Number of data block of vehicle speed	2 bytes		All records of detailed vehicle speed that stored in data memory. Each minute recorded as a data block, every 0.5second recorded as a piece of speed record. The number of record is zero if data block is blank.
Beginning date and time of data block of vehicle speed	7 bytes	BCD code	XXXX(year)/XX(month)/XX(day)/XX(hour)/XX(minute)/XX(second).
Record of vehicle speed per 0.5 second	120 bytes		

Table 7. The format for technical data

Name	The length and format of data		
Name of vehicle unit manufacturer	36 bytes	ASC II code	
The address of vehicle unit manufacturer	36 bytes	ASC II code	
The serial number or part number of the vehicle unit	8 bytes	ASC II code	
The software number of the vehicle unit	4 bytes	ASC II code	
The software version installation date of the vehicle unit	7 bytes	BCD code	XXXX(year)/XX(month)/XX(day)/XX(hour)/XX(minute)/XX(second).
Manufactured year of the vehicle unit	4 bytes	BCD code	---
Approval number of the vehicle unit	8 bytes	ASC II code	
License plate number	17 bytes	ASC II code	
Number of record of calibration	2 bytes		The number of record is zero if data block is blank
Name of adjuster	36 bytes	ASC II code	
Odometer value before calibration	4 bytes	BCD code	00~99999999, 0.1km/bit
Odometer value after calibration	4 bytes	BCD code	
Date and time before calibration	7 bytes	BCD code	XXXX(year)/XX(month)/XX(day)/XX(hour)/XX(minute)/XX(second).
Date and time after calibration	7 bytes	BCD code	
Number of record of time adjustments	1 byte		All of time adjustment records that stored in data memory, if data block is blank that the number of adjusted time shall be zero.
Date and time before adjustment	7 bytes	BCD code	XXXX(year)/XX(month)/XX(day)/XX(hour)/XX(minute)/XX(second).
Date and time after adjustment	7 bytes	BCD code	
Number of record of time adjustments of continuous driving	1 byte		All of time threshold adjustment records

time threshold			that stored in data memory, if data block is blank that the number of adjusted time shall be zero.
Date and time before adjustment	7 bytes	BCD code	X X X X (year)/ X X (month)/ X X (day)/ X X (hour)/ X X (minute)/ X X (second).
Date and time after adjustment	7 bytes	BCD code	
Threshold before adjustment	2 bytes	BCD code	X X (hours)/ X X (minutes).
Threshold after adjustment	2 bytes	BCD code	
Number of record of cumulative rest time threshold adjustments	1 byte		All of time threshold adjustments records that stored in data memory, if data block is blank that the number of adjusted time shall be zero.
Date and time before adjustment	7 bytes	BCD code	X X X X (year)/ X X (month)/ X X (day)/ X X (hour)/ X X (minute)/ X X (second).
Date and time after adjustment	7 bytes	BCD code	
Threshold before adjustment	2 bytes	BCD code	X X (hours)/ X X (minute).
Threshold after adjustment	2 bytes	BCD code	

Table 8. The format for data of driver activity type

Name	The length and format of data		Explanation
Number of record of activity type change	2 bytes		All of driver activity type that stored in data memory, if data block is blank that the number of adjusted time shall be zero.
Name/ID of driver	18 bytes	ASC II code	
Activity type after changing	1 byte	ASC II code	
Date and time of activity type change	7 bytes	BCD code	X X X X (year)/ X X (month)/ X X (day)/ X X (hour)/ X X (minute)/ X X (second).

Table 9. The format for data of orientation

1. The format of data of orientation record			
Name	The length and format of data		Explanation
Number of orientation record	2 bytes		---
The latest first hour of orientation record before the end of time	666 bytes	BCD code	The data block is blank if there is no data record within setting time period
The latest second hour of orientation record before the end of time	666 bytes	BCD code	
…	…		
2. The format for orientation record— per hour			
The beginning date and time of specific hour	7 bytes	BCD code	XXXX(year)/XX(month)/XX(day)/XX(hour)/XX(minute)/XX(second).
The first minute of location after beginning date and time of specific hour	10 bytes	BCD code	---
The first minute of average speed after beginning date and time of specific hour	1 byte		
The second minute of location after beginning date and time of specific hour	10 bytes	BCD code	
The second minute of average speed after beginning date and time of this hour	1 byte		
…	…		
The sixtieth minute of location after beginning date and time of specific hour	10 bytes	BCD code	---

The sixtieth minute of average speed after beginning date and time of specific hour	1 byte		---
3. The format for data of location—per minute			
High-longitude high byte	1 byte	BCD code	1. The latitude and longitude are composed of 4 bytes respectively to form a 32 bits- character, which represents them, and unit is 0.00001meter/bit. 2. The effective value of the longitude from -180° to 180°(for >0°, it means East longitude, for <0°, it means west longitude. 3. The effective value of the latitude from -90° to 90°（for >0°, it means north latitude, for <0°, it means south latitude.
Longitude high byte	1 byte	BCD code	
Longitude low byte	1 byte	BCD code	
Low-longitude low byte	1 byte	BCD code	
High-latitude high byte	1 byte	BCD code	
latitude high byte	1 byte	BCD code	
latitude low byte	1 byte	BCD code	
Low- latitude low byte	1 byte	BCD code	
Elevation high byte	1 byte	BCD code	Elevation is composed of 2 bytes to form a 16 bit characters, the unit is one meter/bit. The effective value from -32767 meter to 32767meter.
Elevation low byte	1 byte	BCD code	

Table 10. Stored type of file

Number of data block（2 bytes）
data block 1
data block 2
…
data block N
Calibration value（1 byte）

Table 11.The format f data block

Data code（1 byte）
Data name（18 bytes）
The length of data（4 bytes）
The record of data（the number of byte according to the length of data）