Connection and Programming Manual for

DATA RECORDER

(also available in the diagnostic software and at www.ac.com.pl)

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1. General information

1.1   Specifications:

Power supply voltage:	12V ± 25%
Maximum power consumption in the data recording mode:	120 mA
Memory card capacity (standard version):	2 GB
Maximum duration of continuous recording with a standard 2 GB memory card:	45 days
USB interface:	v.2.0 full-speed
Operating temperature:	-20ºC ÷ 70ºC
Protection class:	IP50

1.2   Intended use and principle of operation

STAG Data Recorder is intended for recording STAG (STAG-300 plus, STAG-300 premium, STAG-4 and STAG 200) operation parameters in LPG/CNG systems (a kind of a "black box"). The data recorder cyclically sends a request to a STAG controller for parameters and then records these parameters on an embedded memory card. The recorded parameters are saved in files which can be read out and analysed in the AC-Gaz Synchro program after selecting an appropriate tab. An event log is also created (as a text file which is also analysed by the AC-Gaz Synchro program).

The files are read out via a USB interface. The data recorder is detected (after disconnecting the installation harness and connecting to an available USB port in a computer) as an external disk. The recorded files can also be copied from the data recorder for future reference. The data recorder can be used as a pen drive-type data storage device (operation in the pen drive mode is automatically activated when the installation harness is disconnected and a USB cable is connected to a computer). The data recorder communicates with the STAG controller by means of the RS232 interface (TTL level). The USB interface is used to read out the recorded data and to update the software. It is not used during operation in a vehicle.

Data are recorded only when power supply is available, the USB cable is disconnected and STAG controller is turned on. The data recorder can be at any time disconnected from the system – then all used data files are closed and an entry is made in the log about the absence of the main 12V power supply.

Additionally, the data recorder can record the fact of pressing the so-called user event button (positioned in the driver's cab). This button is to record errors and irregularities in operation of the LPG/CNG system with the STAG controller. If the user notices any irregularities in the system operation, pressing the button is recorded along with the current date and time and information on the place in the recorded data where the button has been pressed. Therefore, it is then possible to analyse the recorded information and identify a cause of irregularities and errors.

1.3 Operation status signalling

The recorder is equipped with 2 lights (red and green LEDs) near the installation harness connection. Additionally, the green LED is doubled and connected to the user button (the button is backlit by this LED). The green LED indicates the process of data recording and the lack of communication with the STAG controller. The red LED indicates errors in the device operation and, together with the green LED, other operation statuses. The table below shows the way particular operation statuses are indicated.

Green LED	Red LED	Status
continuous light	is not on	data recording
flashing slowly	is not on	no communication with the STAG controller
several quick flashes	is not on	pressing the user event button and recording this fact in a log file
is not on	flashing	a problem with the memory card (damage, no memory card, no connection in the memory card slot)
continuous light	continuous light	formatting of the memory card
is not on	continuous light	the memory card is full
quick flashes	quick flashes	software update

1.3.1 The size of information recorded on the memory card

With the standard manufacturer's settings the data recorder saves in each file 86 B data packets received every 100 ms from the STAG controller. Immediately after a data file is created, a 41 B header is added. The size of data files increase by 860 B every 1 s. Approximately 3 MB of data are saved on the memory card after one hour of the data recorder operation. The size of the data packets can depend on the version of the installed STAG controller. The time step can also be modified in the advanced settings in the AC Gas Synchro program. These settings should be changed only in special cases.

1.4 Connecting the data recorder

1. Install the data recorder harness by connecting it to the diagnostic connector of the STAG controller and lead it to the driver's cab. Connect the +12V power cable (red) after the ignition (power has to be supplied only after the ignition has been turned on). The cable can be connected to pin 15 in the STAG-300 controller or to pin 1E in the STAG-4 controller as the power is supplied to these pins only when the ignition has been turned on.
2. The user button should be installed in a place convenient for a driver.
3. Start the engine.
4. If the harness is correctly connected, the data recorder should start after max. 7 s from the moment when the engine has been started. The green LED will be emitting continuous light. If the LED flashes, there is no communication with the STAG controller.
5. This item is to check the correctness of recorded data.

When the engine is on and data recording is in progress, wait approximately 10 to 20 seconds and disconnect the recorder from the harness. Then connect the data recorder via a USB port to a computer, run the AC Gas Synchro software and select the "Data Recorder" tab (NOTE: Wait approximately 10 s after the data recorder has been connected to a USB port in order make it possible for the computer to detect the device). If no error message is displayed after selecting a file, the data recorder is ready for work. The recorded file should be deleted (by clicking the "Erase" button) and the device should be reconnected to the installation harness. The installed data recorder does not require any operation activities except for possible pressing the event button.
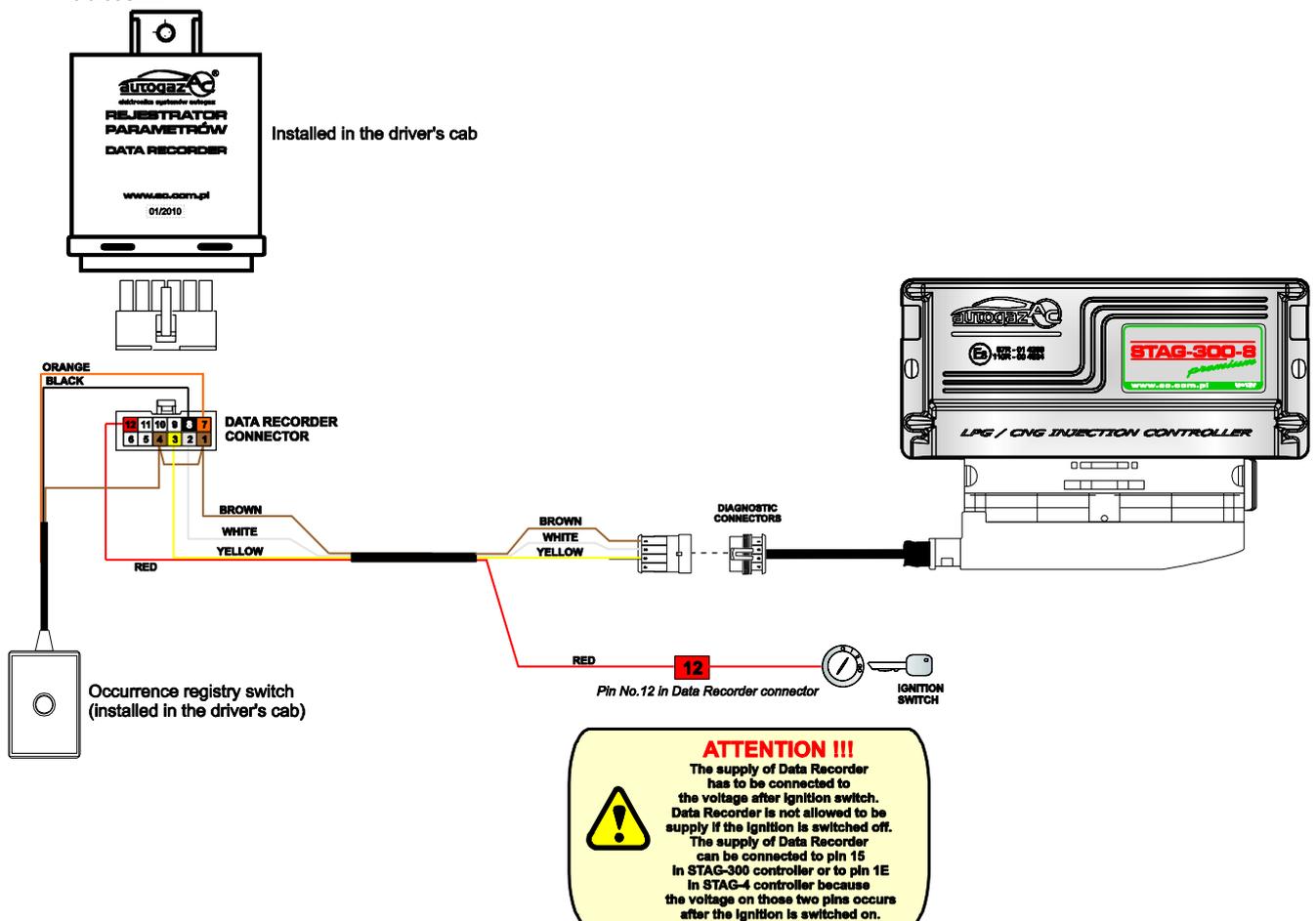

Fig. 1 Data Recorder Connection Diagram for Vehicle Installation.

NOTE: The memory card must not be removed during the data recorder operation.

1.5 Reading out the recorded data in the AC Gas Synchro program

The data recorder can be at any time disconnected from the system and connected via a USB cable to a computer in order to analyse the recorded data. Ac Gas Synchro program should be used to read out the recorded data. All data recorder information is to be found in the "Data recorder" tab. When the data recorder has been connected and the "Data recorder" tab is active, the program should automatically notify of the data recorder presence within 10 seconds. Fig. 2 below shows the tab with the connected data recorder.
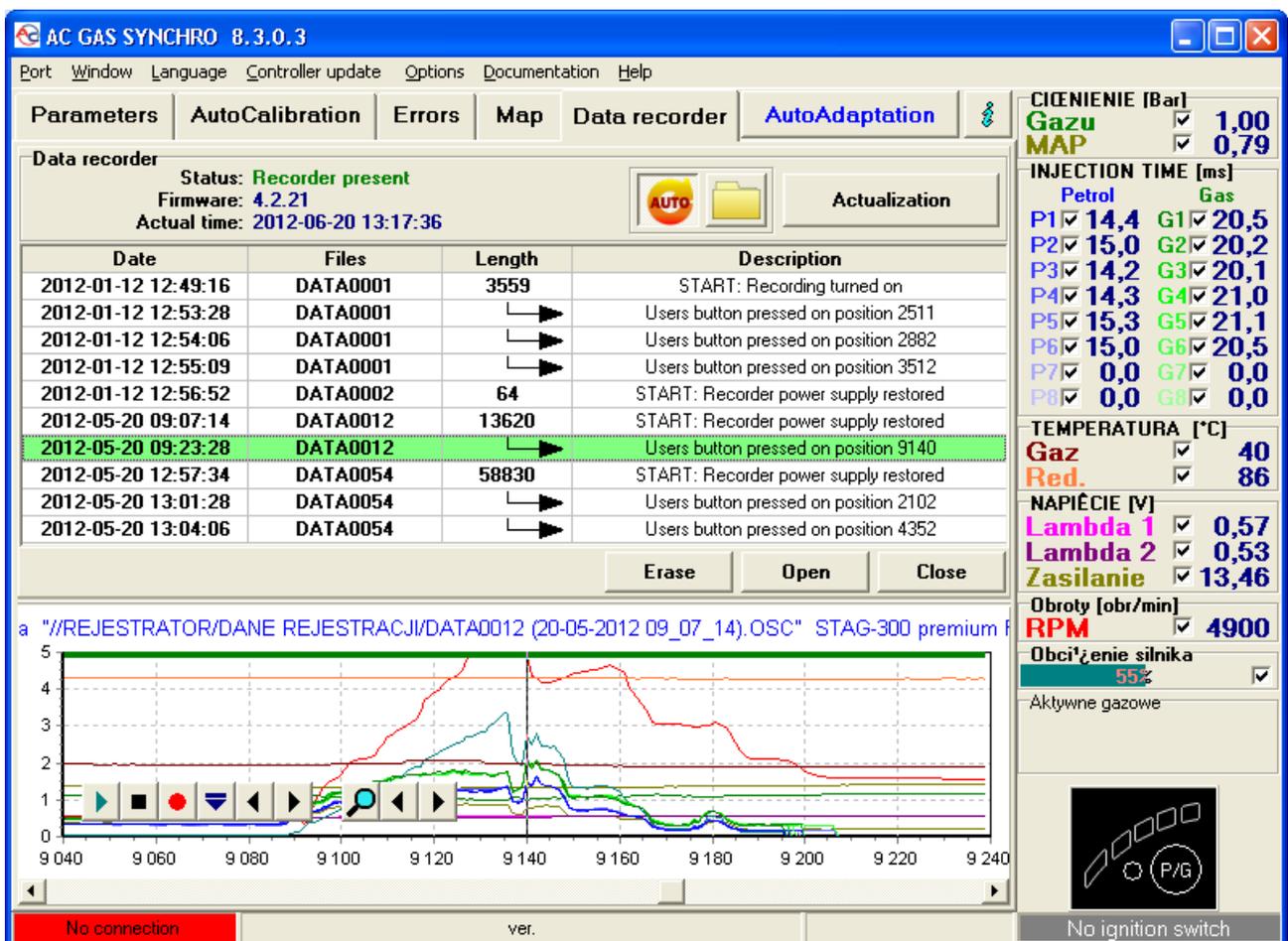

Fig. 2 Data recorder parameter window.

The following information is displayed in the connected data recorder window: data recorder firmware version, internal clock time and date (the clock is automatically synchronised every time the data recorder communicates with Ac Gas Synchro) and the table with recorded data. The following information is shown in the table (starting from the left):

− date on which recording has commenced,
− name of the file with the recorded data,
− duration of data recording reflected in the number of collected oscilloscope points or ⌐▶ symbol which means that a given item is related to the preceding item; this symbol is usually displayed in the case of items where the user button has been pressed,
− item description.

You can open the data recorder files in several ways: by double-clicking a selected item, by clicking the "Open" button or by pressing the enter key on your keyboard. When the file is open, the file data are displayed in the oscilloscope window in the bottom part of the "Data recorder" tab. If you open the item described as "event button pressed on position ...," the oscilloscope view and oscilloscope cursor will be moved to the place where the button has been pressed during data recording.

Except from possibility to read diagrams directly from data register, application allows to read stored data from specified folder. To do so, button [folder icon] need to be pressed and then folder which data will be read picked. Pressing in turn button [AUTO icon] will bring back data register to auto-search mode.

1.6   Data Recorder firmware update

To update the data recorder, connect to the device by means of the Ac Gas Synchro program. Click the "Actualization" button in the "Data recorder" tab. The "Actualization" window will be displayed. Information on the firmware version is displayed in the "Data Recorder" frame. A list of updates available for the connected Data Recorder is displayed in the "Available actualizations" frame. If you wish to load updates not included in the program directory, click the "Load update" button and select the update file. The loaded update should be displayed on the list of available updates. Having selected update from the list, click the "Update" button. When the update progress bar displays 100%, the program will notify you of the update result. If the update is successful, you can reconnect to the data recorder.
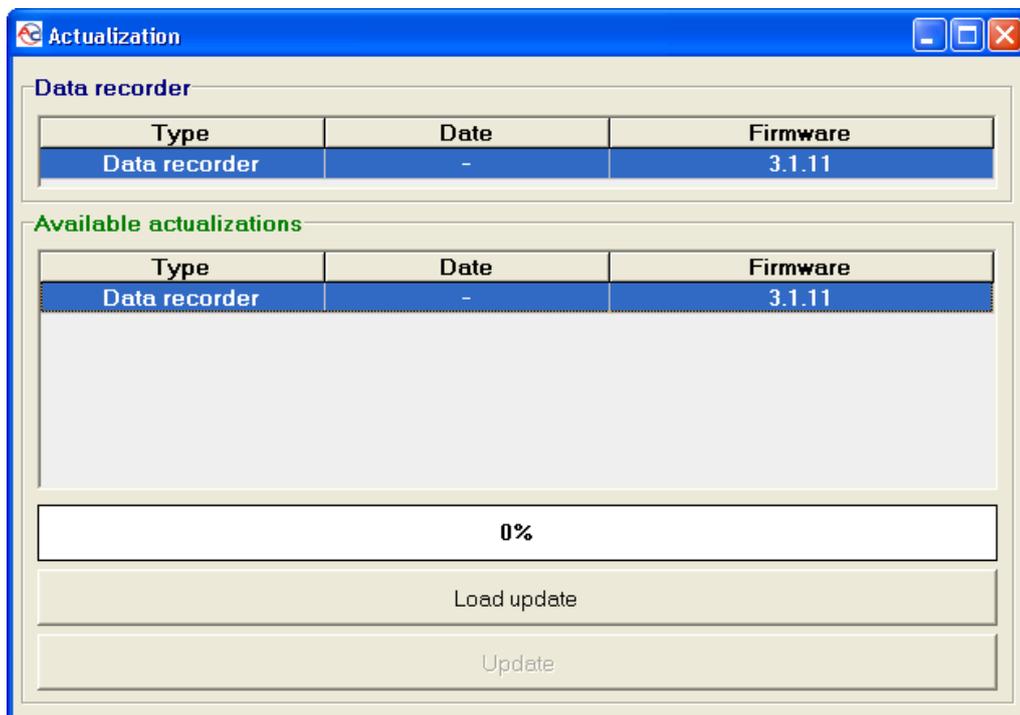

Fig. 3 "Actualization" window.