



F600 Series – Profibus Manual





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Functional description of an ATEQ device



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ATEQ Manufacturer Plants – Measurement Solution, Global Leader

|  |  |  |
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-  We continuously work on improving our products. This is why information contained in this manual, the device and the technical specifications may be modified without prior notification.
-  Pictures and figures in this manual are non contractual



Safety advisory / Warranty

GOOD PRACTICES AND SAFETY INSTRUCTIONS

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Safety recommendations



If the device is supplied with 100 / 240 V AC, it is mandatory to connect it to the ground with a good link to the ground, to protect against electric hazard or electrocution.



It is dangerous to change the status of the outputs.
They can control power actuators or other equipment (mechanical, pneumatic, hydraulic, electrical or other) which can cause serious personal injury and damage to surrounding material.



For safety and quality measurement reasons, it is important, before powering on the device, to ensure that it is air supplied with a minimum operating pressure (0.6 MPa \pm 15%).

Recommendations for the test environment

Keep the test area as clean as possible.

Recommendations for operators

ATEQ recommends that the operators who use the devices have training and a level of qualification that correspond to the job to perform.

General recommendations

- Read the user manual before using the device.
- All electrical connections to the device must be equipped with safety systems (fuses, circuit breakers, etc.) adapted to the needs and in accordance with the applicable standards and rules.
- To avoid electromagnetic interference, electrical connections to the device must be shorter than 2 meters.
- Power supply plug must be grounded.
- Disconnect the device from the mains before performing any maintenance work.
- Shut off the compressed air supply when working on the pneumatic assembly.
- Do not open a connected device.
- Avoid splashing water on the device.

ATEQ is at your disposal for any information concerning the use of the device under maximum safety conditions.

We draw your attention to the fact that ATEQ cannot be held responsible for any accident related to a misuse of the measuring instrument, the workstation or non-compliance of the installation with safety rules.

In addition, ATEQ declines any responsibility for the calibration or the fitting of their instruments that is not done by ATEQ.

ATEQ also declines any responsibility for any modification (program, mechanical or electrical) of the device done without their written consent.



Preamble

INTRODUCTION

This manual intends to help you for the configuration and the use of your ATEQ F600 device on the Profibus network.

i | For more information on your ATEQ equipment, refer to the Quick Start Manual.



BASIC NOTIONS

The numerical values used in the ATEQ device are coded on a **Long** format.



ATEQ devices are configured in **Little Endian format**. It means that the **Least Significant Byte** is sent **first** on the network.

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Word

A word is a 16-bit data. It is coded with two bytes (8bits):

- The first byte is the Least Significant Byte (**LSB**)
- The second byte is the Most Significant Byte (**MSB**)

Example of a word:



Reminder: “h” indicates a hexadecimal code, “(d)” indicates a decimal code.

On network:

| | |
|----|----|
| 98 | 28 |
|----|----|

Byte Byte
0 1

- Word = 2898h
- LSB = 98h
- MSB = 28h

Long format (Signed Double word)

A **Long** format data is coded with two words (of 16 bits).

In the memory range of the ATEQ device or when they are transmitted, both words are coming in the following order:

- The first word is the least significant word
- The second word is the most significant word
- Example of a **Long** format:

On network:

| | | | |
|----|----|----|----|
| 98 | 28 | 03 | 00 |
|----|----|----|----|

Byte Byte Byte Byte
0 1 2 3

- Word 1 = 2898h (least significant word)
- Word 2 = 0003h (most significant word)
- Long value = 00032898h = 207000(d)

Address value

All address values are treated with the **Long** format.

Example – address of the “millibar” unit in the Unit table (see Unit table):

On network:

| | | | |
|----|----|----|----|
| B0 | 36 | 00 | 00 |
|----|----|----|----|

Byte Byte Byte Byte
0 1 2 3

- Word 1 = 36B0h
- Word 2 = 0000h
- Address value = 000036B0h



Numerical value

All the numerical values are treated with the **Long** format with fixed comma (10^{-3}).

Thus, their value is expressed in thousandths of unit. So, this value must be multiplied by 1000 to get the value in units.

For example, a value of 207055 represents 207.055. So, any numerical value must be divided by 1000 to get the real value:

$$- 207.055 = 207055 \div 1000$$

Example – Pressure:

On network:

| | | | |
|------|------|------|------|
| E3 | 28 | 03 | 00 |
| Byte | Byte | Byte | Byte |
| 0 | 1 | 2 | 3 |

- Word 1 = 28E3h

- Word 2 = 0003h

- Value = 000328E3h = 207 055(d) = 207 055 of thousandths of unit

- Real value = 207 055 ÷ 1000 = 207.055 expressed in units

Negative numerical value

All the negative numerical values are treated with **Signed long** format with fixed comma (10^{-3}).

Thus, they must be multiplied by 1000 to get the value in units.

Example – Leak value (signed long):

On network:

| | | | |
|------|------|------|------|
| 94 | FF | FF | FF |
| Byte | Byte | Byte | Byte |
| 0 | 1 | 2 | 3 |

- Word 1 = FF94h

- Word 2 = FFFFh

- Value = FFFFFFFF94h = - 108(d) = - 108 of thousandths of unit

- Real value = - 108 ÷ 1000 = - 0.108 expressed in units



Hardware installation

HARDWARE CONFIGURATION

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Connect your ATEQ equipment to the Profibus fieldbus using its Profibus connectors and compatible cables.

Your device has a Profibus internal board and one Profibus connectors.

The Profibus internal board is located inside your device. Only one version is available:

- **COMX 100**



You can see the version installed using your user interface (see Identification of the version of the Profibus module).

Your device has one Profibus type connectors.

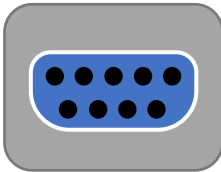


For more information on your ATEQ equipment, refer to the Quick Start Manual.

Profibus connector

Standard connection RS 232 protocol.

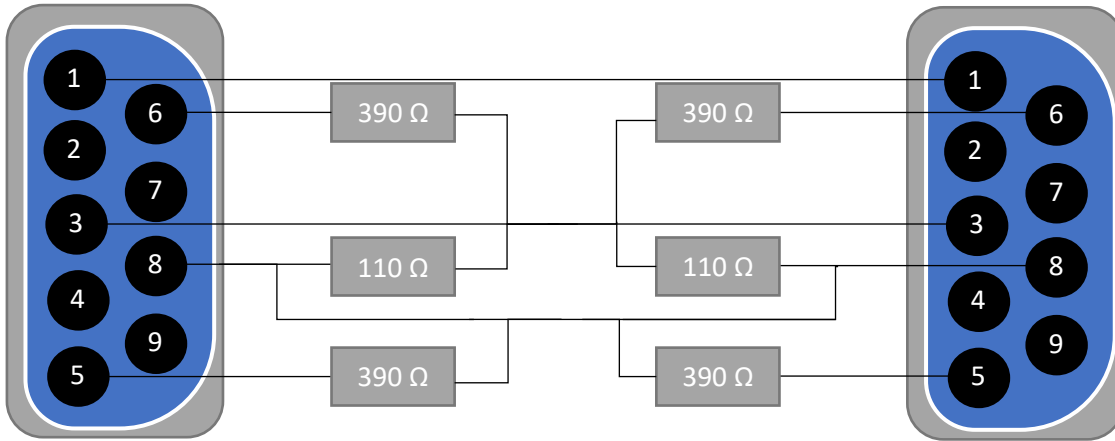
Profibus connector





Wiring instructions

Profibus Cabling



| | | | |
|-------|------------------------------------|-------|-------------------|
| Pin 1 | PE (Ground) | Pin 6 | VP (Power Supply) |
| Pin 2 | Not Connected | Pin 7 | Not Connected |
| Pin 3 | Data Line A | Pin 8 | Data Line B |
| Pin 4 | CNTR – A (Repeater Control Signal) | Pin 9 | Not Connected |
| Pin 5 | DGND (Data Reference Potential) | | |



Configuration of the ATEQ device (slave)

Use this procedure to configure your device.



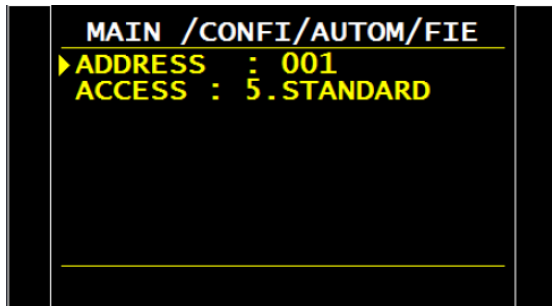
This configuration can be done with the front panel of your ATEQ device or with the ATEQ Fieldbus Configurator software.

SETUP OF THE STATION NUMBER



The **station number** must be the same on slave and master.

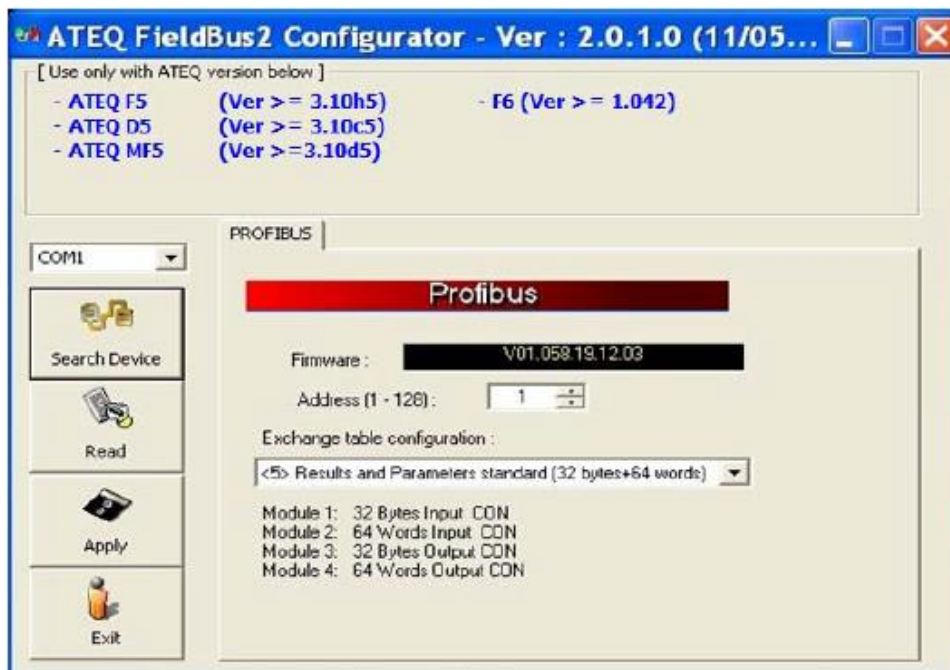
From the ATEQ device



From the **MAIN MENU** screen of your ATEQ device:

- **CONFIGURATION**
- **AUTOMATISM**
- **FIELDBUS**
- **ADDRESS**

From the ATEQ Fieldbus Configurator software





SETUP OF THE PROFIBUS CONFIGURATION MODE

Five configuration modes are available according to the bytes number available:

| Mode number | Configuration mode | Use |
|-------------|-------------------------------|--|
| 5 | Standard mode (normal) | For the inputs/outputs, real time measurements, the live cycle results and parameters management |
| 4 | Standard less mode | For the inputs/outputs, real time measurements, the live cycle results and parameters management |
| 3 | Medium more mode | For the inputs/outputs, the real time measurements, the live cycle results and parameters management |
| 2 | Medium mode | For the inputs/outputs and the real time measurements |
| 1 | Light mode | For the digital inputs/outputs |

Configuration modes according to bytes number available

| Memory range | Mode number and bytes available | | | | | Functions available |
|--------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------|--------------------|---|
| | (5) 32 Bytes / 64 words | (4) 32 Bytes / 32 words | (3) 32 Bytes / 16 words | (2) 32 bytes | (1) 16 bytes | |
| 00h-0Fh | X | X | X | X | X | Inputs/outputs |
| 10h-1Fh | X | X | X | X | | Real time measurements |
| 20h-3Fh | X | X | X | | | Exchange zone: cycle result reading or 5 parameters management |
| 40h-5Fh | X | X | | | | Exchange zone: cycle result reading or 10 parameters management |
| 60h-9Fh | X | | | | | Exchange zone: cycle result reading or 20 parameters management |

From the **MAIN MENU** screen of your ATEQ device:

- **CONFIGURATION**
- **AUTOMATISM**
- **FIELDBUS**
- **ACCESS**



Configuration of the master

INSTALLATION OF THE PROFIBUS MODULE

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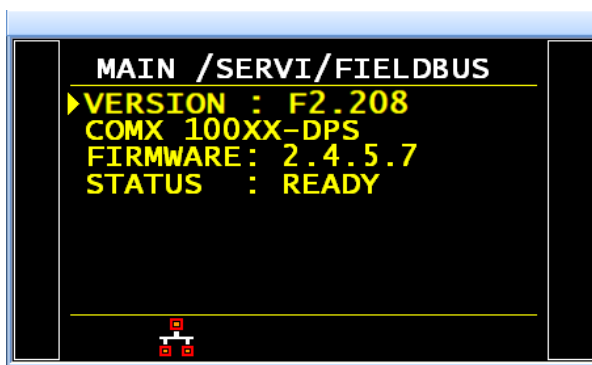
Identification of the version of the Profibus module

You can identify the hardware configuration using your ATEQ device or using a fieldbus configuration software.



For the installation and configuration of the Profibus module, you have to select the component that corresponds to the firmware (see Configuration files).

From the ATEQ device



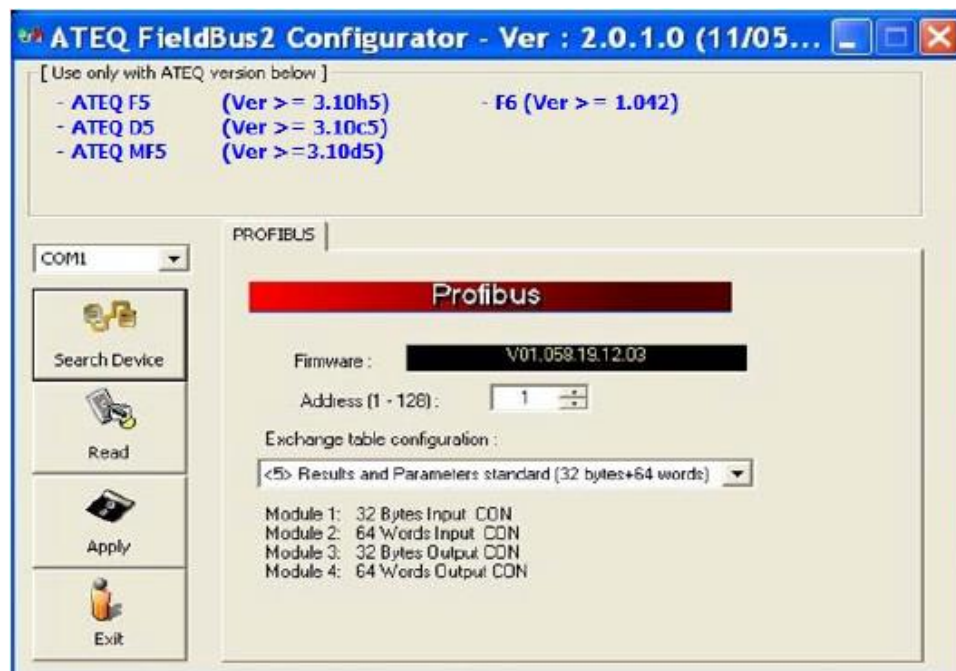
From the **MAIN MENU** screen of your ATEQ device:

- **SERVICE**
- **FIELDBUS**

The Hilscher firmware version is displayed in the **FIRMWARE** parameter.

From the ATEQ Fieldbus Configurator software

Connect your PC to the RS232 connector of your ATEQ device.
Run the ATEQ Fieldbus Configurator software:



The Hilscher firmware version is displayed in the **FIRMWARE** parameter.



CONFIGURATION FILES

Configuration files to use for the configuration of the master instrument.

Profibus hardware and software compatibilities

The table below gives the configuration file to use according to the hardware reference of the Profibus internal board of your ATEQ device (Hilscher hardware reference).

| Device software | Fieldbus Software | Hilscher Firmware | Config Files | Hilscher Hardware Ref |
|-----------------|-------------------|-------------------|----------------------------------|-----------------------|
| ≥ 1.324 | > 2.104 | 2.7.2 | HIL_7501.GSD (09/03/2000) | COMX 100 |



In all cases, use the HIL_7501.GSD configuration file and the COM_DPS module name, even if the COMX 100XXDP/DPS module is used.

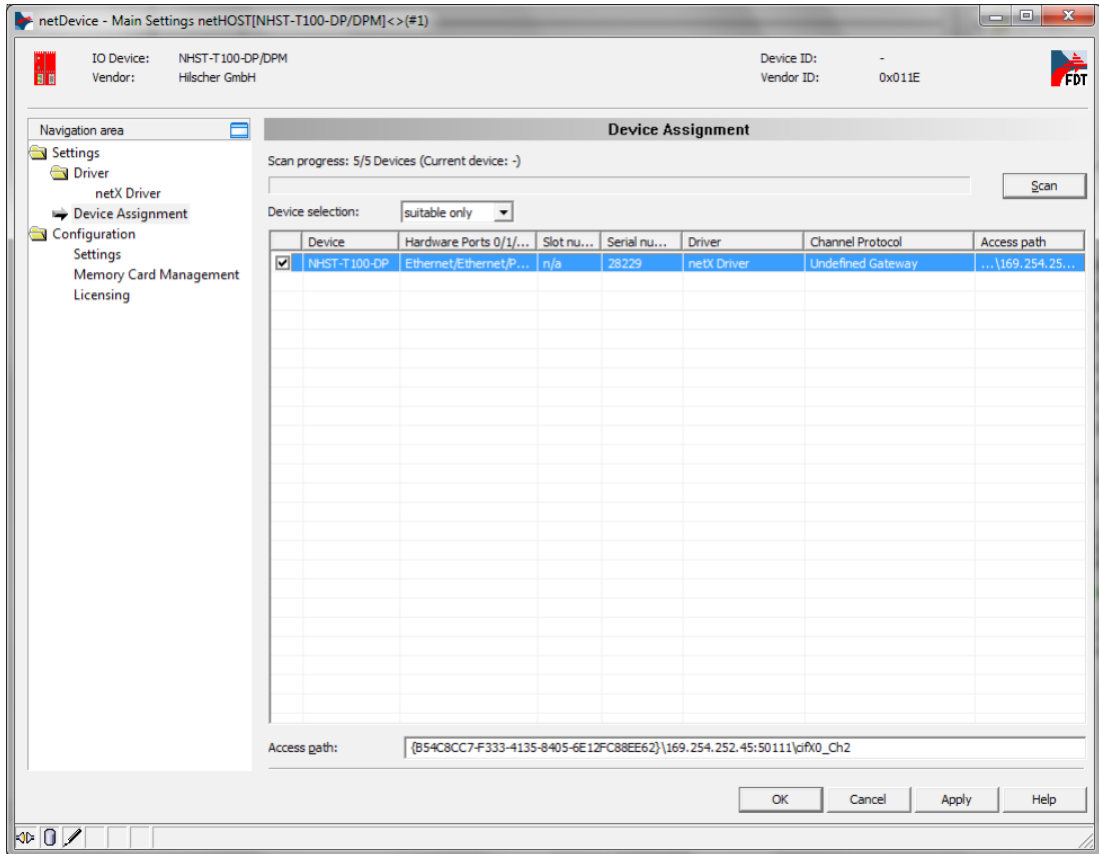


SELECTION OF THE MASTER BOARD



The screenshot used in this section correspond to the Sycon.net from Hilscher software. Nevertheless, you may use your own software to configure the master.

From the **Device Assignment** screen, select the master card:



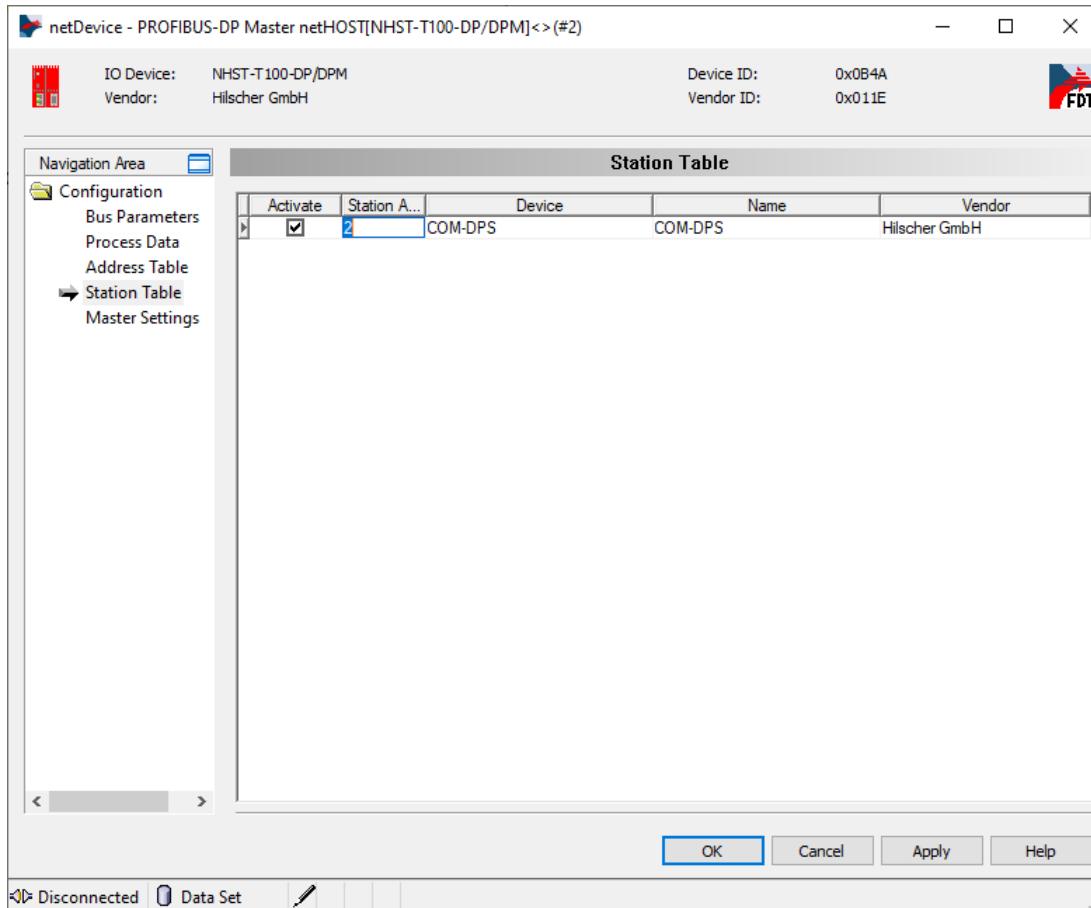


SETUP OF THE STATION ADDRESS



The screenshot used in this section correspond to the Sycon.net from Hilscher software. Nevertheless, you may use your own software to configure the master.

Select the Station Table Settings screen to set up the Station Address:





SETUP OF THE PROFIBUS CONFIGURATION MODES



Five configuration modes are available according to the bytes number available (see Configuration of the ATEQ device (slave)).

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Setup of the Standard mode (normal)

The parameters configuration must be like the following ones:

- 32 bytes input con (IB) : module 1.
- 64 words input con (IW) : module 2.
- 32 bytes output con (OB) : module 3.
- 64 words output con (OW) : module 4.

The screenshot shows the 'netDevice - Configuration COM-DPS[COM-DPS]<2>' window. The 'IO Device' is 'COM-DPS' and the 'Vendor' is 'Hilscher GmbH'. The 'Device ID' is '0x7501' and the 'Vendor ID' is '-'. The 'Navigation Area' on the left includes 'Configuration', 'General', 'Modules', 'Signal Configuration', 'Parameters', 'Groups', 'Extensions', 'DPV1', 'DPV2', 'Redundancy', and 'Device Description'. The 'Modules' section is active, showing 'Available Modules' and 'Configured Modules'.

| Module | Inputs | Outputs | In/Out | Identifier | Slot Restrictions |
|--------------------------------|--------|---------|--------|------------|-------------------|
| 3 word output con (0xE2) | 0 | 6 | 0 | 0xE2 | |
| 4 word output con (0xE3) | 0 | 8 | 0 | 0xE3 | |
| 8 word output con (0xE7) | 0 | 16 | 0 | 0xE7 | |
| 12 word output con (0xEB) | 0 | 24 | 0 | 0xEB | |
| 16 word output con (0xEF) | 0 | 32 | 0 | 0xEF | |
| 20 word output con (0x80,0xD3) | 0 | 40 | 0 | 0x80,0xD3 | |
| 32 word output con (0x80,0xDF) | 0 | 64 | 0 | 0x80,0xDF | |
| 64 word output con (0x80,0xFF) | 0 | 128 | 0 | 0x80,0xFF | |

| Slot | Module | Inputs | Outputs | In/Out | Identifier | Slot Restrictions |
|------|--------------------------------|--------|---------|--------|------------|-------------------|
| 1 | 32 byte input con (0x40,0x9F) | 32 | 0 | 0 | 0x40,0x9F | |
| 2 | 64 word input con (0x40,0xFF) | 128 | 0 | 0 | 0x40,0xFF | |
| 3 | 32 byte output con (0x80,0x9F) | 0 | 32 | 0 | 0x80,0x9F | |
| 4 | 64 word output con (0x80,0xFF) | 0 | 128 | 0 | 0x80,0xFF | |

Length of input/output data: 320 bytes (max. 368 bytes)
Length of input data: 160 bytes (max. 244 bytes)
Length of output data: 160 bytes (max. 244 bytes)
Number of modules: 4 (max. 24)

Buttons: OK, Cancel, Apply, Help



Setup of the Standard less mode

The parameters configuration must be like the following ones:

- 32 bytes input con (IB) : module 1.
- 32 words input con (IW) : module 2.
- 32 bytes output con (OB) : module 3.
- 32 words output con (OW) : module 4.

The screenshot shows the netDevice configuration window for a COM-DPS device. The interface includes a navigation area on the left with options like General, Modules, Signal Configuration, Parameters, Groups, Extensions, DPV1, DPV2, Redundancy, Device Description, Device, and GSD. The main area is titled 'Modules' and contains two tables: 'Available Modules' and 'Configured Modules'. The 'Available Modules' table lists various module types with their input/output counts and identifiers. The 'Configured Modules' table shows the current setup, which matches the requirements listed in the text. Below the tables, there are summary statistics for input/output data lengths and the number of modules. At the bottom, there are buttons for 'OK', 'Cancel', 'Apply', and 'Help'.

| Module | Inputs | Outputs | In/Out | Identifier | Slot Restrictions |
|--------------------------------|--------|---------|--------|------------|-------------------|
| 12 word output con (0xEB) | 0 | 24 | 0 | 0xEB | |
| 16 word output con (0xEF) | 0 | 32 | 0 | 0xEF | |
| 20 word output con (0x80,0xD3) | 0 | 40 | 0 | 0x80,0xD3 | |
| 32 word output con (0x80,0xDF) | 0 | 64 | 0 | 0x80,0xDF | |
| 64 word output con (0x80,0xFF) | 0 | 128 | 0 | 0x80,0xFF | |
| 1 byte input (0x10) | 1 | 0 | 0 | 0x10 | |
| 2 byte input (0x11) | 2 | 0 | 0 | 0x11 | |
| 3 byte input (0x12) | 3 | 0 | 0 | 0x12 | |

| Slot | Module | Inputs | Outputs | In/Out | Identifier | Slot Restrictions |
|------|--------------------------------|--------|---------|--------|------------|-------------------|
| 1 | 32 byte input con (0x40,0x9F) | 32 | 0 | 0 | 0x40,0x9F | |
| 2 | 32 word input con (0x40,0xDF) | 64 | 0 | 0 | 0x40,0xDF | |
| 3 | 32 byte output con (0x80,0x9F) | 0 | 32 | 0 | 0x80,0x9F | |
| 4 | 32 word output con (0x80,0xDF) | 0 | 64 | 0 | 0x80,0xDF | |

Length of input/output data: 192 bytes (max. 368 bytes)
Length of input data: 96 bytes (max. 244 bytes)
Length of output data: 96 bytes (max. 244 bytes)
Number of modules: 4 (max. 24)



Setup of the Medium more mode

The parameters configuration must be like the following ones:

- 32 bytes input con (IB) : module 1.
- 16 words input con (IW) : module 2.
- 32 bytes output con (OB) : module 3.
- 16 words output con (OW) : module 4.

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The screenshot shows the netDevice configuration window for a COM-DPS device. The window title is "netDevice - Configuration COM-DPS[COM-DPS]<2>". The IO Device is "COM-DPS" and the Vendor is "Hilscher GmbH". The Device ID is "0x7501" and the Vendor ID is "-".

The "Modules" section is active, showing a list of available modules and a list of configured modules.

Available Modules:

| Module | Inputs | Outputs | In/Out | Identifier | Slot Restrictions |
|----------------------------------|----------|-----------|----------|-------------|-------------------|
| 64 byte output con (0x80,0xBF) | 0 | 64 | 0 | 0x80,0xBF | |
| 1 word output con (0xE0) | 0 | 2 | 0 | 0xE0 | |
| 2 word output con (0xE1) | 0 | 4 | 0 | 0xE1 | |
| 3 word output con (0xE2) | 0 | 6 | 0 | 0xE2 | |
| 4 word output con (0xE3) | 0 | 8 | 0 | 0xE3 | |
| 8 word output con (0xE7) | 0 | 16 | 0 | 0xE7 | |
| 12 word output con (0xEB) | 0 | 24 | 0 | 0xEB | |
| 16 word output con (0xEF) | 0 | 32 | 0 | 0xEF | |

Configured Modules:

| Slot | Module | Inputs | Outputs | In/Out | Identifier | Slot Restrictions |
|------|--------------------------------|--------|---------|--------|------------|-------------------|
| 1 | 32 byte input con (0x40,0x9F) | 32 | 0 | 0 | 0x40,0x9F | |
| 2 | 16 word input con (0xDF) | 32 | 0 | 0 | 0xDF | |
| 3 | 32 byte output con (0x80,0x9F) | 0 | 32 | 0 | 0x80,0x9F | |
| 4 | 16 word output con (0xEF) | 0 | 32 | 0 | 0xEF | |

Summary statistics:

- Length of input/output data: 128 bytes (max. 368 bytes)
- Length of input data: 64 bytes (max. 244 bytes)
- Length of output data: 64 bytes (max. 244 bytes)
- Number of modules: 4 (max. 24)

Buttons: OK, Cancel, Apply, Help



Setup of the Medium mode

The parameters configuration must be like the following ones:

- 32 bytes input con (IB) : module 1.
- 32 bytes output con (OB) : module 2.

The screenshot shows the netDevice Configuration COM-DPS[COM-DPS]<2> window. The IO Device is COM-DPS and the Vendor is Hilscher GmbH. The Device ID is 0x7501 and the Vendor ID is -. The FDT logo is visible in the top right corner.

Navigation Area

- Configuration
 - General
 - Modules
 - Signal Configuration
 - Parameters
 - Groups
 - Extensions
 - DPV1
 - DPV2
 - Redundancy
- Device Description
 - Device
 - GSD

Modules

Available Modules:

| | Module | Inputs | Outputs | In/Out | Identifier | Slot Restrictions |
|-------------------------------------|--------------------------------|--------|---------|--------|------------|-------------------|
| <input type="checkbox"/> | 4 byte output con (0xA3) | 0 | 4 | 0 | 0xA3 | |
| <input type="checkbox"/> | 8 byte output con (0xA7) | 0 | 8 | 0 | 0xA7 | |
| <input type="checkbox"/> | 12 byte output con (0xAB) | 0 | 12 | 0 | 0xAB | |
| <input type="checkbox"/> | 16 byte output con (0xAF) | 0 | 16 | 0 | 0xAF | |
| <input type="checkbox"/> | 20 byte output con (0x80,0x93) | 0 | 20 | 0 | 0x80,0x93 | |
| <input checked="" type="checkbox"/> | 32 byte output con (0x80,0x9F) | 0 | 32 | 0 | 0x80,0x9F | |
| <input type="checkbox"/> | 64 byte output con (0x80,0xBF) | 0 | 64 | 0 | 0x80,0xBF | |
| <input type="checkbox"/> | 1 word output con (0xE0) | 0 | 2 | 0 | 0xE0 | |

Configured Modules:

| | Slot | Module | Inputs | Outputs | In/Out | Identifier | Slot Restrictions |
|-------------------------------------|------|--------------------------------|--------|---------|--------|------------|-------------------|
| <input checked="" type="checkbox"/> | 1 | 32 byte input con (0x40,0x9F) | 32 | 0 | 0 | 0x40,0x9F | |
| <input checked="" type="checkbox"/> | 2 | 32 byte output con (0x80,0x9F) | 0 | 32 | 0 | 0x80,0x9F | |

Length of input/output data: 64 bytes (max. 368 bytes) Remove

Length of input data: 32 bytes (max. 244 bytes)

Length of output data: 32 bytes (max. 244 bytes)

Number of modules: 2 (max. 24)

Buttons: OK, Cancel, Apply, Help

Status: Disconnected, Data Set



Setup of the Light mode

The parameters configuration must be like the following ones:

- 16 bytes input con (IB) : module 1.
- 16 bytes output con (OB) : module 2.

The screenshot shows the 'netDevice - Configuration COM-DPS[COM-DPS]<2>' window. The top bar displays 'IO Device: COM-DPS' and 'Vendor: Hilscher GmbH'. On the right, it shows 'Device ID: 0x7501' and 'Vendor ID: -'. The 'FDT' logo is in the top right corner.

The main area is titled 'Modules' and is divided into two sections:

- Available Modules:** A table listing various modules with columns for Module, Inputs, Outputs, In/Out, Identifier, and Slot Restrictions. The '16 byte output con (0xAF)' module is highlighted in blue.
- Configured Modules:** A table showing the current configuration. Slot 1 contains a '16 byte input con (0x9F)' module, and Slot 2 contains a '16 byte output con (0xAF)' module.

Below the tables, there are summary statistics:

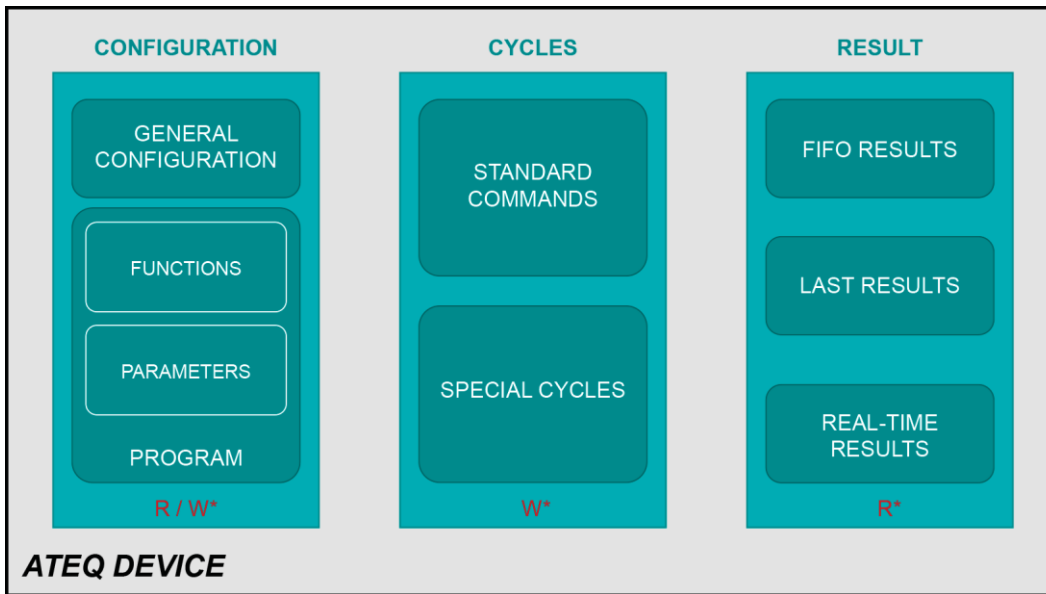
- Length of input/output data: 32 bytes (max. 368 bytes)
- Length of input data: 16 bytes (max. 244 bytes)
- Length of output data: 16 bytes (max. 244 bytes)
- Number of modules: 2 (max. 24)

Buttons for 'Insert', 'Append', 'Remove', 'OK', 'Cancel', 'Apply', and 'Help' are visible. The bottom status bar shows 'Disconnected' and 'Data Set'.



Functional description of an ATEQ device

INTRODUCTION



- R/W*: reading and writing
- W*: writing only
- R*: reading only



Write table

Writing table structure

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| | | |
|--------------|--|--|
| 0x00 0x01 | | Commands |
| | | |
| 0x02 0x04 | | Reserved |
| | | |
| 0x06 0x09 | | The program number (Running and Edit) Special cycle |
| | | |
| 0x0A 0x1F | | Reserved |
| | | |
| 0x20 | | Exchange table: Config Bits or Functions Bits or Parameters |



Details writing table structure

| Address (bytes) | Description |
|-----------------|---|
| 00h Commands | Bit 0 = 1 > Reset (stop the current cycle). |
| | Bit 1 = 1 > Start (starting a test cycle). |
| | Bit 2 = 1 > Special cycle (start a special cycle, example: regulator adjust). |
| | Bit 3 = 1 > Program selection. |
| | Bit 4 = 1 > Read the FIFO cycles results (the FIFO contains the 8 lasts results, standard mode only). |
| | Bit 5 = 1 > Read of the parameters. |
| | Bit 6 = 1 > Write of the parameters. |
| | Bit 7 = 1 > Reset of the results FIFO (reset all available results in the FIFO). |
| 01h Commands | Bit 0 = 1 > Read of the instrument configuration. |
| | Bit 1 = 1 > Read of the configuration / extended menu bits. |
| | Bit 2 = 1 > Read of the function bits. |
| | Bit 3 = 1 > Write of the configuration / extended menu bits. |
| | Bit 4 = 1 > Write of the function bits. |
| | Bit 5 = 1 > Read of the program name. |
| | Bit 6 = 1 > Write of the program name. |
| | Bit 7 = 1 > Read last result. |
| 02h – 05h | <i>Reserved.</i> |
| 06h – 07h | Address 06h: Number of the program to be selected. Address 07h = 0. |
| 08h – 09h | Address 08h: Special cycle. Address 09h=0. |
| 0Ah – 0Fh | <i>Reserved.</i> |



Read table

Reading table structure

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| | | |
|------|--|---|
| 0x00 | | State of the unit: Echo / Error code command Status Current program Number of results available |
| 0x0F | | Program step |
| 0x10 | | Real time measurements. |
| 0x1F | | |
| 0x20 | | Exchange table: FIFO Results or Last Result or Parameters |



Results status: (@: 00h – 0Fh)



Echo: Acknowledgement of delivery of the master command allowing to determinate in which state is the slave (current command or command realised).

Error code: In case of command execution error, the corresponding command error bit is activated.

| Address (bytes) | Description |
|------------------------------|---|
| 00h Echo | Bit 0 = 1 > Echo reset. |
| | Bit 1 = 1 > Echo start. |
| | Bit 2 = 1 > Echo special cycle. |
| | Bit 3 = 1 > Echo program selection. |
| | Bit 4 = 1 > Echo reading of the results FIFO. |
| | Bit 5 = 1 > Echo reading of the parameters. |
| | Bit 6 = 1 > Echo writing of the parameters. |
| | Bit 7 = 1 > Echo reset of the results FIFO. |
| 01h Echo | Bit 0 = 1 > Echo reading of the instrument configuration. |
| | Bit 1 = 1 > Echo reading of the configuration / extended menu bits. |
| | Bit 2 = 1 > Echo reading of the function bits. |
| | Bit 3 = 1 > Echo writing of the configuration / extended menu bits. |
| | Bit 4 = 1 > Echo writing of the function bits. |
| | Bit 5 = 1 > Echo reading of the program name. |
| | Bit 6 = 1 > Echo writing of the program name. |
| | Bit 7 = 1 > Echo reading last result. |
| 02h Error code (≠ FFh) | Bit 0 = 1 > Reset error. |
| | Bit 1 = 1 > Start error. |
| | Bit 2 = 1 > Special cycle error. |
| | Bit 3 = 1 > Program selection error. |
| | Bit 4 = 1 > Reading of the results FIFO error. |
| | Bit 5 = 1 > Reading of the parameters error. |
| | Bit 6 = 1 > Writing of the parameters error. |
| | Bit 7 = 1 > Reset of the results FIFO error. |
| 03h Error code (≠ FFh) | Bit 0 = 1 > Reading of the instrument configuration error. |
| | Bit 1 = 1 > Reading of the configuration bits error. |
| | Bit 2 = 1 > Reading of the function bits error. |
| | Bit 3 = 1 > Writing of the configuration bits error. |
| | Bit 4 = 1 > Writing of the function bits error. |
| | Bit 5 = 1 > Reading of the program name error. |
| | Bit 6 = 1 > Writing of the program name error. |
| | Bit 7 = 1 > Reading last result error. |
| 04h – 05h | <i>Reserved.</i> |
| 06h – 07h | Current program in use. |
| 08h – 09h | Number of results in FIFO (quantity of available results recorded in the FIFO). |
| 0Ah – 0Bh | Type of test in progress. |



| Address (bytes) | Description |
|--|--|
| 0Ch – 0Dh Real time test results | Bit 0 = 1 > Pass part. (OK) |
| | Bit 1 = 1 > Fail test part. (NOK) |
| | Bit 2 = 1 > Fail reference part. (NOK) |
| | Bit 3 = 1 > Alarm. |
| | Bit 4 = 1 > Pressure error. |
| | Bit 5 = 1 > Cycle end (system ready). |
| | Bit 6 = 1 > Part recoverable. |
| | Bit 7 = 1 > Calibration error. |
| | Bit 0 = 1 > Calibration check error. |
| | Bit 1 = 1 > ATR fault. |
| Bit 2 to 7 > <i>Not used, all always at 0.</i> | |
| 0Eh – 0Fh | Program step in progress. |



Real time measurements: (@: 10h – 1Fh)

| Address (bytes) | Description |
|-----------------|---|
| 10h – 13h | Pressure current value Example: reading of 524000 (7FEE0h) = 524 x 1000, thus the real value is 524. |
| 14h – 17h | Pressure unit code Example: reading 6000 (1770h) = 6 x 1000, thus the value is 6 which corresponds to Pa (see Unit table). |
| 18h – 1Bh | Leak current value Examples: reading 20000 (4E20h) = 20 x 1000, thus the real value is 20 reading - 108 (FFFFFF94h) = - 0.108 x 1000, thus the real value is - 0.108 (see Basic notions) |
| 1Ch – 1Fh | Leak unit code Example: reading 8000 (1F40h) = 8 x 1000 thus the value is 8, which corresponds to the Pa/s unity. |

Exchange zone: (@: 20h – 9Fh)

| Address (bytes) | Description |
|-----------------|---|
| 20h – 9Fh | Cycle results exchange zone. Parameters reading and writing exchange zone. |



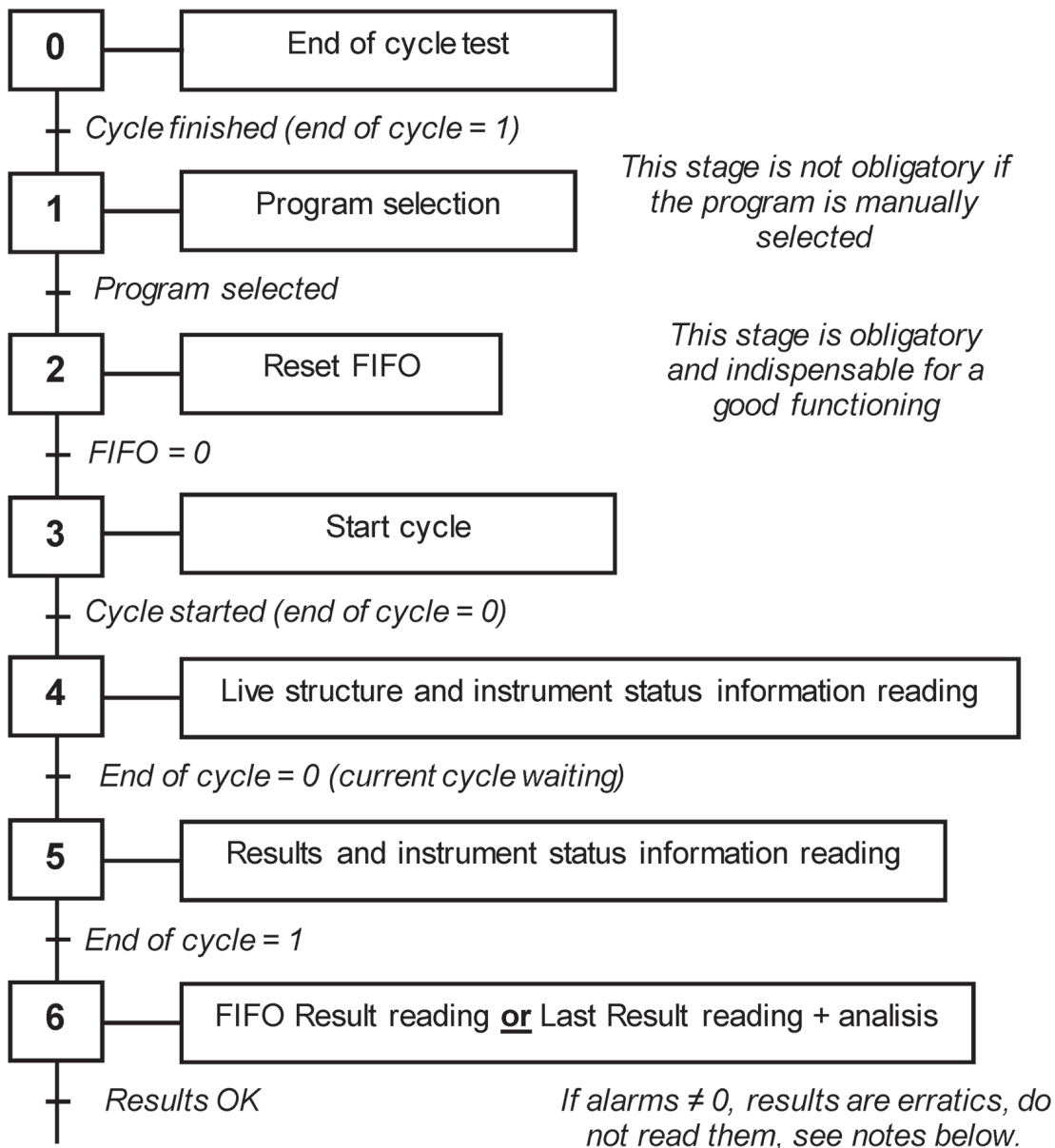
Treatment of the commands

i | Reminder: "h" indicates a hexadecimal code, "(d)" indicates a decimal code.

ATEQ device using

Base procedure for using an ATEQ instrument.

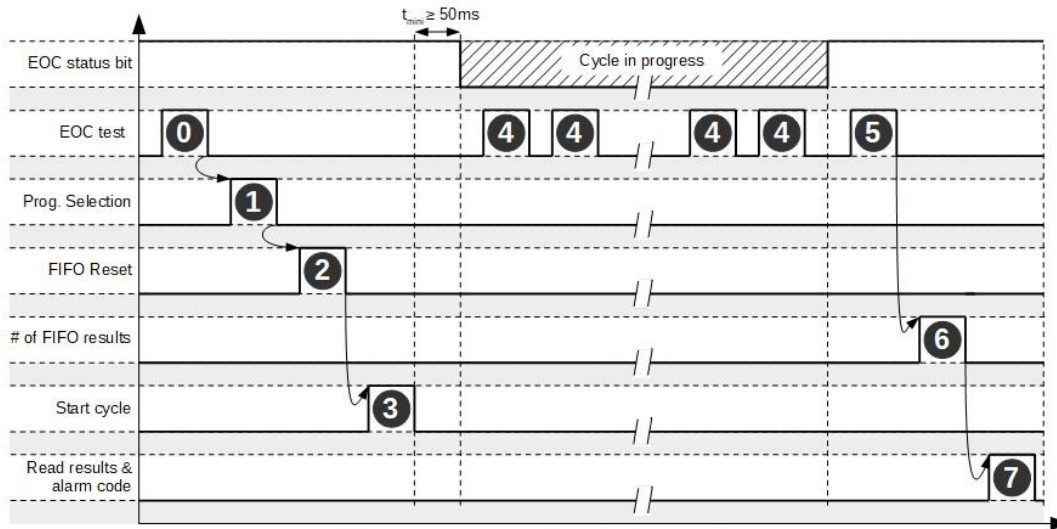
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i | If the number of results in the FIFO = 0, the results are erratic, **do not read them**.
If there's an alarm bit, read the alarm code and **do not use the measurements results (erratic results)**.



Fieldbus progress chart



WARNING : The status bits update rate is about 50ms

| | | |
|---|---|-----------------------------------|
| <p>0 : Read @0Ch - 0Dh : Status bit 5 = 1 (EOC status bit)</p> | <p>6 : Read the number of results in FIFO : Read @08h - 09h : if > 0 go to step 7, else END</p> | <p><i>Use of FIFO Results</i></p> |
| <p>1 : Write @06h : 1 word = n° prog (0001h = prog 2) Write @00h : bit 3 = 1 (command « Prog. Selection »)</p> | <p>7 : Write @00h : bit 4 = 1 (command « Read FIFO results ») Read @20h : 12 words (size of standard results) if Alarm Code = 0 go to step 8, else END</p> | |
| <p>2 : ALWAYS RESET THE FIFO Write @00h : bit 7 = 1 (command « Reset FIFO »)</p> | <p>8 : Use the results recovered at step 7 (if Alarm code was equal to 0)</p> | |
| <p>3 : Write @00h : bit 1 = 1 (command « Start ») $t_{min} \geq 50ms$</p> | <p>6 : Read the number of results in FIFO : Read @08h - 09h : if ≥ 1 go to step 7, else END</p> | <p><i>Use of Last Results</i></p> |
| <p>4 : Read @0Ch - 0Dh : Status bit 5 = 0 (EOC status bit)</p> | <p>7 : Write @01h : bit 7 = 1 (command « Read Last results ») Read @20h : 12 words (size of standard results) if Alarm Code = 0 go to step 8, else END</p> | |
| <p>5 : Read @0Ch - 0Dh : Status bit 5 = 1 (EOC status bit)</p> | <p>8 : Use the results recovered at step 7 (if Alarm code was equal to 0)</p> | |



CONFIGURATION

General configuration

Table of the configuration / extended menus bits

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Reminder: “h” indicates a hexadecimal code, “(d)” indicates a decimal code.

The bits below are mostly present in the **CONFIGURATION** or **More functions...** menus. They are only used to allow the access to other parameters according to the configuration, depending on the configuration, these are active or not.



Acronyms used in the “Menu” column:

- Conf: CONFIGURATION
- +Func: FUNCTIONS > More functions...
- RS232: CONFIGURATION > RS232

| Word | Bit n° | Mask | | Meaning | Menu |
|------|--------|-------|----------------------|-------------------------------|--------|
| | | Hexa | Dec | | |
| 1 | 0 | 0001 | 1 | Permanent blowing activation. | Conf |
| | 1 | 0002 | 2 | Reserved. | |
| | 2 | 0004 | 4 | Fill type. | +Funct |
| | 3 | 0008 | 8 | Pre-fill type. | +Funct |
| | 4 | 0010 | 16 | Recovery thresholds. | +Funct |
| | 5 | 0020 | 32 | Cycle end. | +Funct |
| | 6 | 0040 | 64 | Reserved. | |
| | 7 | 0080 | 128 | Peak meter. | +Funct |
| | 8 | 0100 | 256 | Reserved. | |
| | 9 | 0200 | 512 | Reference volume. | +Funct |
| | 10 | 0400 | 1024 | ATR 0. | +Funct |
| | 11 | 0800 | 2048 | ATR 1. | +Funct |
| | 12 | 1000 | 4096 | ATR 2. | +Funct |
| | 13 | 2000 | 8192 | Program name. | +Funct |
| | 14 | 4000 | 16384 | Chaining. | +Funct |
| 15 | 8000 | 32768 | Automatic connector. | +Funct | |



| Word | Bit n° | Mask | | Meaning | Menu |
|------|--------|------|-------|---------------------------------|----------------------------|
| | | Hexa | Dec | | |
| 2 | 16 | 0001 | 1 | Calibration check. | +Funct |
| | 17 | 0002 | 2 | Valve codes (output codes). | +Funct |
| | 18 | 0004 | 4 | Reserved. | |
| | 19 | 0008 | 8 | Stamping. | +Funct |
| | 20 | 0010 | 16 | Reserved. | |
| | 21 | 0020 | 32 | N test. | +Funct |
| | 22 | 0040 | 64 | Reserved. | |
| | 23 | 0080 | 128 | Sending cond.: pass part. | RS232 |
| | 24 | 0100 | 256 | Sending cond.: fail test part. | RS232 |
| | 25 | 0200 | 512 | Sending cond.: fail ref. part. | RS232 |
| | 26 | 0400 | 1024 | Sending cond.: alarm presence. | RS232 |
| | 27 | 0800 | 2048 | Sending cond.: pressure error. | RS232 |
| | 28 | 1000 | 4096 | Sending cond.: end of cycle. | RS232 |
| | 29 | 2000 | 8192 | Sending cond.: recoverable. | RS232 |
| | 30 | 4000 | 16384 | Sending cond.: calibration. | RS232 |
| | 3 | 31 | 8000 | 32768 | Frame content: time stamp. |
| 32 | | 0001 | 1 | Frame content: name. | RS232 |
| 33 | | 0002 | 2 | Content of the frame: pressure. | RS232 |
| 34 | | 0004 | 4 | Security. | Conf |
| 35 | | 0008 | 8 | External dump. | Conf |
| 36 | | 0010 | 16 | Exportation. | RS232 |
| 37 | | 0020 | 32 | Automatic reset. | Conf |
| 38 | | 0040 | 64 | Reserved. | |
| 39 | | 0080 | 128 | Reserved. | |
| 40 | | 0100 | 256 | Reserved. | |
| 41 | | 0200 | 512 | Reserved. | |
| 42 | | 0400 | 1024 | Reserved. | |
| 43 | | 0800 | 2048 | Parameters automatic setting. | Conf |
| 44 | | 1000 | 4096 | Reserved. | |
| 45 | | 2000 | 8192 | Page feed. | RS232 |
| 46 | | 4000 | 16384 | Sign change. | +Funct |
| 47 | | 8000 | 32768 | After sale service cycle. | +Funct |



| Word | Bit n° | Mask | | Meaning | Menu |
|------|---------|------|-------|--|--------|
| | | Hexa | Dec | | |
| 4 | 48 | 0001 | 1 | Unit type. | +Funct |
| | 49 | 0002 | 2 | Automatic reset piezo 2. | Conf |
| | 50 | 0004 | 4 | Reserved. | |
| | 51 | 0008 | 8 | Electronic regulator mode. | Conf |
| | 52 | 0010 | 16 | Auxiliary codes activation. | +Funct |
| | 53 | 0020 | 32 | Filtering. | +Funct |
| | 54 | 0040 | 64 | Reserved. | |
| | 55 | 0080 | 128 | Quick automatic reset activation. | Conf |
| | 56 | 0100 | 256 | Permanent electronic regulator. | Conf |
| | 57 | 0200 | 512 | Bar code. | Conf |
| | 58 | 0400 | 1028 | Flow reject. | +Funct |
| | 59 | 0800 | 2048 | No negative. | +Funct |
| | 60 | 1000 | 4096 | Dump threshold. | +Funct |
| | 61 | 2000 | 8192 | ATR 3. | +Funct |
| | 62 | 4000 | 16384 | In 7 test configuration. | Conf |
| 5 | 63 | 8000 | 32768 | Reserved. | |
| | 64 | 0001 | 1 | Absolute value. | Conf |
| | 65 | 0002 | 2 | Leak display mode. | +Funct |
| | 66 | 0004 | 4 | By pass valve. | Conf |
| | 67 | 0008 | 8 | Reserved. | |
| | 68 | 0010 | 16 | Reserved. | |
| | 69 | 0020 | 32 | Reserved. | |
| | 70 | 0040 | 64 | Reserved. | |
| | 71 | 0080 | 128 | Dump Off. | +Funct |
| | 72 | 0100 | 256 | Program selection on bar code reading. | +Funct |
| | 73 | 0200 | 512 | Bar code reset on end of cycle. | +Funct |
| | 74 | 0400 | 1024 | Cut Off. | +Funct |
| | 75 | 0800 | 2048 | ATF. | +Funct |
| | 76 | 1000 | 4096 | Reserved. | |
| | 77 | 2000 | 8192 | Reserved. | |
| | 78 | 4000 | 16384 | Reserved. | |
| | 79 | 8000 | 32768 | Reserved. | |
| 6 | 80 > 95 | | | Word Reserved. | |



| Word | Bit n° | Mask | | Meaning | Menu |
|------|--------|-------|------------------------|--|--------|
| | | Hexa | Dec | | |
| 7 | 96 | 0001 | 1 | Buzzer function. | +Funct |
| | 97 | 0002 | 2 | Long test (x100) function. | +Funct |
| | 98 | 0004 | 4 | Permanent blowing. | Conf |
| | 99 | 0008 | 8 | Reserved. | |
| | 100 | 0010 | 16 | Reserved. | |
| | 101 | 0020 | 32 | Display optional. | +Funct |
| | 102 | 0040 | 64 | Pressure Drop. | +Funct |
| | 103 | 0080 | 128 | Pressure correction ($\geq v1.400$). | +Funct |
| | 104 | 0100 | 256 | Standard conditions ($\geq v1.400$). | +Funct |
| | 105 | 0200 | 512 | Ref No Dump. | +Funct |
| | 106 | 0400 | 1024 | Reserved. | |
| | 107 | 0800 | 2048 | Offset. | +Funct |
| | 108 | 1000 | 4096 | Reserved. | |
| | 109 | 2000 | 8192 | Reserved. | |
| | 110 | 4000 | 16384 | Auto Selection Prog. | Conf |
| 111 | 8000 | 32768 | Save Volume Selection. | Conf | |

Example: bit number 13 (automatic mode) activated to 1, will place to "2000h" the value in the first word.

2000h is equivalent to 8192 in decimal and 0010000000000000 in binary.

In the Modbus frame, the words will follow each other: word 1 + word 2 + + word n.



Reading of the configuration / extended menu bits

| Master | Slave |
|--|---|
| <p>— Activate the “Read extended menu bits” command: Write at the address 00(h), the value 0200(h) Byte 0 = 00(h) Byte 1 = 02(h) (Bit 1 = 1)</p> | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo: — Byte 0 = 00(h) — Byte 1 = 02(h) (Bit 1 = 1)</p> <p>Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)</p> |
| | <p>Running “Read extended menu bits” command</p> |
| | <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo: — Byte 0 = 00(h) — Byte 1 = 02(h) (Bit 1 = 1)</p> <p>Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h)</p> <p>OR if an error occurred during the command: — Byte 2 = 00(h) — Byte 3 = 02(h) (Bit 1 = 1)</p> |
| <p>— Wait the end of the command: command echo = 0200(h) command error code ≠ FFFF(h) (end of command)</p> | |
| <p>— Deactivate the “Read extended menu bits” command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) Byte 1 = 00(h) (Bit 1 = 0)</p> | |
| <p>— Read the configuration bits at the address 20h of X Words or read the function bits at the address 20h of X Words.</p> | |

i | The configuration / extended menu bits are defined in the table above for the “Extended menus” of each specific chapter for the instruments.

i | The configuration / extended menu bits are independent of the program number.

! | The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).





Writing of the configuration / extended menu bits

| Master | Slave |
|--|--|
| <ul style="list-style-type: none"> — Write the extended menu bits at the address 20(h) — Activate the “Write extended menu bits” command: Write at the address 00(h), the value 0800(h) Byte 0 = 00(h) Byte 1 = 08(h) (Bit 3 = 1) | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 08(h) (Bit 3 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> |
| | <p>Running “Write extended menu bits” command</p> |
| | <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 08(h) (Bit 3 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 08(h) (Bit 3 = 1) |
| <ul style="list-style-type: none"> — Wait the end of the command: command echo = 0800(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none"> — Deactivate the “Write extended menu bits” command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) Byte 1 = 00(h) (Bit 3 = 0) | |

i | The configuration / extended menu bits are defined in the table above for the “Extended menus” of each specific chapter for the instruments.

i | The configuration / extended menu bits are independents of the program number.

! | The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Program

Program selection command on the ATEQ device

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| Master | Slave |
|--|---|
| <ul style="list-style-type: none"> — Write 1 word at the address 06(h) corresponding to the program number to be selected: @06(h) = 0001(h) (= program n°2) — Activate the “Program selection” command: Write at the address 00(h), the value 0008(h) Byte 0 = 08(h) (Bit 3 = 1) Byte 1 = 00(h) | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 08(h) (Bit 3 = 1) — Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> |
| | <p style="text-align: center;">Running “Program selection” command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 08(h) (Bit 3 = 1) — Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 08(h) (Bit 3 = 1) — Byte 3 = 00(h) |
| <ul style="list-style-type: none"> — Wait the end of the command: command echo = 0008(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none"> — Deactivate the “Program selection” command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) (Bit 3 = 0) Byte 1 = 00(h) | |



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Function

Table of the function bits

Table of the function bits per program.

i Reminder: “h” indicates a hexadecimal code, “(d)” indicates a decimal code.

The bits below are present in the **FUNCTIONS** menu of each program, if these have been previously validated in the **More functions...** menu.

| Word | Bit n° | Mask | | Meaning | Menu |
|------|--------|-------|--------------------------------|--|-------|
| | | Hexa | Dec | | |
| 1 | 0 | 0001 | 1 | Fill regulator Number. | Funct |
| | 1 | 0002 | 2 | Pre-fill regulator Number. | Funct |
| | 2 | 0004 | 4 | Fill type function. | Funct |
| | 3 | 0008 | 8 | Pre-fill type function. | Funct |
| | 4 | 0010 | 16 | Recovery level function. | Funct |
| | 5 | 0020 | 32 | End of cycle function. | Funct |
| | 6 | 0040 | 64 | Automatic reset end cycle function. | Funct |
| | 7 | 0080 | 128 | Reset and dump end of cycle function. | Funct |
| | 8 | 0100 | 256 | Fill mode end of cycle function. | Funct |
| | 9 | 0200 | 512 | Peak hold function. | Funct |
| | 10 | 0400 | 1024 | Reference volume function. | Funct |
| | 11 | 0800 | 2048 | ATR0 function. | Funct |
| | 12 | 1000 | 4096 | ATR1 function. | Funct |
| | 13 | 2000 | 8192 | ATR2 function. | Funct |
| | 14 | 4000 | 16384 | Sequencing function. | Funct |
| 15 | 8000 | 32768 | Pass part sequencing function. | Funct | |
| 2 | 16 | 0001 | 1 | Fail test part sequencing function. | Funct |
| | 17 | 0002 | 2 | Fail reference part sequencing function. | Funct |
| | 18 | 0004 | 4 | Alarm sequencing function. | Funct |
| | 19 | 0008 | 8 | Pressure fault sequencing function. | Funct |
| | 20 | 0010 | 16 | End of cycle sequencing function. | Funct |
| | 21 | 0020 | 32 | Reserved. | |
| | 22 | 0040 | 64 | Recovery part sequencing function. | Funct |
| | 23 | 0080 | 128 | Calibration check sequencing function. | Funct |
| | 24 | 0100 | 256 | Automatic connector function. | Funct |
| | 25 | 0200 | 512 | Calibration check function. | Funct |
| | 26 | 0400 | 1024 | Valve code function. | Funct |
| | 27 | 0800 | 2048 | External valve code 1 function. | Funct |
| | 28 | 1000 | 4096 | External valve code 2 function. | Funct |
| | 29 | 2000 | 8192 | External valve code 3 function. | Funct |
| | 30 | 4000 | 16384 | External valve code 4 function. | Funct |
| | 31 | 8000 | 32768 | External valve code 5 function. | Funct |



| Word | Bit n° | Mask | | Meaning | Menu |
|------|--------|-------|-----------|-------------------------------------|-------|
| | | Hexa | Dec | | |
| 3 | 32 | 0001 | 1 | External valve code 6 function. | Funct |
| | 33 | 0002 | 2 | Internal valve code 1 function. | Funct |
| | 34 | 0004 | 4 | Internal valve code 2 function. | Funct |
| | 35 | 0008 | 8 | Stamp function. | Funct |
| | 36 | 0010 | 16 | Pass part stamp function. | Funct |
| | 37 | 0020 | 32 | Fail test part stamp function. | Funct |
| | 38 | 0040 | 64 | Fail reference part stamp function. | Funct |
| | 39 | 0080 | 128 | Alarm stamp function. | Funct |
| | 40 | 0100 | 256 | Pressure fault stamp function. | Funct |
| | 41 | 0200 | 512 | End of cycle stamp function. | Funct |
| | 42 | 0400 | 1024 | Recovery part stamp function. | Funct |
| | 43 | 0800 | 2048 | Calibration check stamp function. | Funct |
| | 44 | 1000 | 4096 | N test function. | Funct |
| | 45 | 2000 | 8192 | Reserved. | |
| | 46 | 4000 | 16384 | Reserved. | |
| 47 | 8000 | 32768 | Reserved. | | |
| 4 | 48 | 0001 | 1 | External dump function. | Funct |
| | 49 | 0002 | 2 | Reserved. | |
| | 50 | 0004 | 4 | Reserved. | |
| | 51 | 0008 | 8 | Reserved. | |
| | 52 | 0010 | 16 | Sign change function. | Funct |
| | 53 | 0020 | 32 | Obligatory reset on end of cycle. | Funct |
| | 54 | 0040 | 64 | Auxiliaries codes function. | Funct |
| | 55 | 0080 | 128 | Auxiliaries codes 1 function. | Funct |
| | 56 | 0100 | 256 | Auxiliaries codes 2 function. | Funct |
| | 57 | 0200 | 512 | Auxiliaries codes 3 function. | Funct |
| | 58 | 0400 | 1024 | Auxiliaries codes 4 function. | Funct |
| | 59 | 0800 | 2048 | Reserved. | |
| | 60 | 1000 | 4096 | Filtering function. | Funct |
| | 61 | 2000 | 8192 | Bar code function. | Funct |
| | 62 | 4000 | 16384 | Flow reject function. | Funct |
| | 63 | 8000 | 32768 | No negative function. | Funct |



| Word | Bit n° | Mask | | Meaning | Menu |
|------|---------|-------|----------------------------|--|-------|
| | | Hexa | Dec | | |
| 5 | 64 | 0001 | 1 | Start after reading bar code function. | Funct |
| | 65 | 0002 | 2 | ATR3 function. | Funct |
| | 66 | 0004 | 4 | Absolute value function. | Funct |
| | 67 | 0008 | 8 | Bypass valve function. | Funct |
| | 68 | 0010 | 16 | Reserved. | |
| | 69 | 0020 | 32 | Reserved. | |
| | 70 | 0040 | 64 | Reserved. | |
| | 71 | 0080 | 128 | Dump off function. | Funct |
| | 72 | 0100 | 256 | Cut off function. | Funct |
| | 73 | 0200 | 512 | ATF function. | Funct |
| | 74 | 0400 | 1024 | Reserved. | |
| | 75 > 79 | | | Reserved. | |
| 6 | 80 > 95 | | | Word Reserved. | |
| 7 | 96 | 0001 | 1 | Optional auxiliaries codes function. | Funct |
| | 97 | 0002 | 2 | Optional auxiliaries codes 1 function. | Funct |
| | 98 | 0004 | 4 | Optional auxiliaries codes 2 function. | Funct |
| | 99 | 0008 | 8 | Optional auxiliaries codes 3function. | Funct |
| | 100 | 0010 | 16 | Optional auxiliaries codes 4 function. | Funct |
| | 101 | 0020 | 32 | Optional valves codes function. | Funct |
| | 102 | 0040 | 64 | Optional external valves codes 1. | Funct |
| | 103 | 0080 | 128 | Optional external valves codes 2. | Funct |
| | 104 | 0100 | 256 | Optional external valves codes 3. | Funct |
| | 105 | 0200 | 512 | Optional external valves codes 4. | Funct |
| | 106 | 0400 | 1024 | Optional external valves codes 5. | Funct |
| | 107 | 0800 | 2048 | Optional external valves codes 6. | Funct |
| | 108 | 1000 | 4096 | Optional internal valves codes 1. | Funct |
| | 109 | 2000 | 8192 | Optional internal valves codes 2. | Funct |
| 110 | 4000 | 16384 | Buzzer function. | Funct | |
| 111 | 8000 | 32768 | Pass part buzzer function. | Funct | |
| 8 | 112 | 0001 | 1 | Fail part buzzer function. | Funct |
| | 113 | 0002 | 2 | Alarm buzzer function. | Funct |
| | 114 | 0004 | 4 | End of cycle buzzer function. | Funct |
| | 115 | 0008 | 8 | Long Test Time function. | Funct |
| | 116 | 0010 | 16 | Permanent dump function. | Funct |
| | 117 | 0020 | 32 | Input 7 test function. | Funct |
| | 118 | 0040 | 64 | Reserved. | |
| | 119 | 0080 | 128 | Reserved. | |
| | 120 | 0100 | 256 | Reserved. | |
| | 121 | 0200 | 512 | Pressure Drop. | Funct |
| | 122 | 0400 | 1024 | Auto Verif Etal. | Funct |
| | 123 | 0800 | 2048 | Pressure correction (≥v1.400). | Funct |
| | 124 | 1000 | 4096 | Standard conditions (≥v1.400). | Funct |
| | 125 | 2000 | 8192 | Ref No Dump. | Funct |
| | 126 | 4000 | 16384 | Offset. | Funct |
| | 127 | 8000 | 32768 | Permanent Fill. | Funct |





| Word | Bit n° | Mask | | Meaning | Menu |
|------|---------|------|-----|-----------|------|
| | | Hexa | Dec | | |
| 9 | 128 | 0001 | 1 | Reserved. | |
| | 129>143 | | | Reserved. | |

Example: bit number 46 (Offset function) activated on 1, will put to "4000h" the value in the third word.

4000h is equivalent to 16384 in decimal and 0100000000000000 in binary.

In the Modbus frame, the words will follow as such: word 1 + word 2 + + word n.



Reading of the function bits

| Master | Slave |
|---|---|
| <ul style="list-style-type: none"> Select the program number on which the functions bits have to be read Activate the "Read functions bits" command: Write at the address 00(h), the value 0400(h) Byte 0 = 00(h) Byte 1 = 04(h) (Bit 2 = 1) | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 00(h) Byte 1 = 04(h) (Bit 2 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> Byte 2 = FF(h) Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> |
| | <p>Running "Read functions bits" command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 00(h) Byte 1 = 04(h) (Bit 2 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> Byte 2 = 00(h) Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> Byte 2 = 00(h) Byte 3 = 04(h) (Bit 2 = 1) |
| <ul style="list-style-type: none"> Wait the end of the command: command echo = 0400(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none"> Deactivate the "Read functions bits" command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) Byte 1 = 00(h) (Bit 2 = 0) | |
| <ul style="list-style-type: none"> Read the functions bits at the address 20(h) of X words. | |



The functions bits are dependents of the program number.
A program selection has to be realised before executing command.



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Writing of the function bits

| Master | Slave |
|--|--|
| <ul style="list-style-type: none"> — Select the program number on which the functions bits have to be read. — Write the functions bits at the address 20(h) — Activate the “Write functions bits” command: Write at the address 00(h), the value 1000(h) Byte 0 = 00(h) Byte 1 = 10(h) (Bit 4 = 1) | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 10(h) (Bit 4 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> |
| | <p>Running “Write functions bits” command</p> |
| | <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 10(h) (Bit 4 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 10(h) (Bit 4 = 1) |
| <ul style="list-style-type: none"> — Wait the end of the command: command echo = 1000(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none"> — Deactivate the “Write functions bits” command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) Byte 1 = 00(h) (Bit 4 = 0) | |



The functions bits are dependents of the program number.
A program selection has to be realised before executing command.



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Parameters

Downloading of the parameters



All the parameters values below have a treatment by the ATEQ device as **Long** format with fixed comma (10^{-3}). A **Long** is a two words set.

| Identifier N° | | Meaning | Value | |
|---------------|------|--|---|--------------------------------------|
| Dec | Hexa | | | |
| 01 | 0001 | "FILL TIME" Fill time | 0 > 650 seconds | |
| 02 | 0002 | "STAB TIME": Stabilization time | 0 > 650 seconds | |
| 03 | 0003 | "TEST TIME" Test time | 0 > 650 seconds | |
| 06 | 0006 | "PRE FILL" Pre fill time | 0 > 650 seconds | |
| 07 | 0007 | "PRE DUMP" Pre dump time | 0 > 650 seconds | |
| 09 | 0009 | "DUMP TIME" Dump time | 0 > 650 seconds | |
| 10 | 000A | "COUPL. A": Coupling time 1 | 0 > 650 seconds | |
| 11 | 000B | "COUPL. B": Coupling time 2 | 0 > 650 seconds | |
| 17 | 0011 | "Min Vol." Minimum volume reject level (volume test type measure) | 0 > 9999 | |
| 18 | 0012 | "Max. Vol." Maximum volume reject level (volume test type measure). | 0 > 9999 | |
| 20 | 0014 | "VOLUME" Part volume. | 0 > 9999 | |
| 21 | 0015 | "TYPE": Test type | Invalid Leak Desensitized Blockage Operator | 0000 1000 2000 3000 4000 |
| 29 | 001D | "Inter-Cycle": Time between 2 chained cycles | 0 > 650 seconds | |
| 48 | 0030 | "DURATION" Maintain time of the result during stamp | 0 > 650 seconds | |
| 50 | 0032 | "Min FILL" Minimum pressure value | - 9999 > 9999 | |
| 51 | 0033 | "Max FILL" Maximum pressure value | - 9999 > 9999 | |



| Identifier N° | | Meaning | Value | |
|---------------|------|--|---|--------------------------------------|
| Dec | Hexa | | | |
| 53 | 0035 | “Press. UNIT” Pressure unit. | Refer to Unit table. | |
| 60 | 003C | “Test FAIL” Natural reject value of the test part | 0 > 9999 | |
| 61 | 003D | “TestREWORK” Natural reject level of the test part in recovery | 0 > 9999 | |
| 62 | 003E | “Ref. FAIL” Natural reject level of the reference part | 0 > 9999 | |
| 63 | 003F | “Ref.REWORK” Natural reject value of the ref. part in recovery | 0 > 9999 | |
| 66 | 0042 | “Set FILL” Fill instruction value: | - 9999 > 9999 | |
| 67 | 0043 | “Set PreFILL” Pre-fill instruction value: | - 9999 > 9999 | |
| 68 | 0044 | Reserved. | | |
| 72 | 0048 | “Drift Unit” Calibration drifts percent. | 0 > 100% | |
| 80 | 0050 | “Diff A-Z” Differential auto reset time. | 0 > 650 seconds | |
| 102 | 0066 | “BLOW MODE” Type of permanent blowing | Regulator 2 Regulator 1 | 0000 1000 |
| 103 | 0067 | “FILL MODE” Type of fill. | Standard Instruction Ballistic EASY EASY Auto | 0000 1000 2000 7000 8000 |
| 104 | 0068 | “PreFILL” Type of pre-fill. | Standard Instruction Ballistic EASY EASY Auto | 0000 1000 2000 4000 5000 |
| 106 | 006A | “CheckTime” Commutation time of the equalization valve calibration check. | 0 > 650 seconds | |
| 107 | 006B | “% Drift” ATR absorption tolerance. | 0 > 100% | |
| 108 | 006C | “Start” Start value of the transient (ATR). | - 9999 > 9999 | |
| 110 | 006E | “EXT. DUMP” Type of external dump. | Normally close Normally open | 0000 1000 |
| 111 | 006F | Reserved. | | |



| Identifier N° | | Meaning | Value | |
|---------------|------|---|---|----------------------|
| Dec | Hexa | | | |
| 112 | 0070 | 'IN7.' Function attributed to the entry of the special cycles (input 7) | Refer to the "Configurable input values" table at the end of this chapter | |
| 117 | 0075 | "Set Blow" Permanent blowing pressure instruction. | - 9999 > 9999 | |
| 118 | 0076 | "REJECT CALC." Original unit for the calculation of rejects in cm3/ min (Pa, Pa/s...). | Refer to Unit table. | |
| 119 | 0077 | Reserved. | | |
| 120 | 0078 | Reserved. | | |
| 121 | 0079 | Reserved. | | |
| 122 | 007A | Reserved. | | |
| 123 | 007B | "LANGUAGE" Choice of the language. | Default language 2 nd predefined language | 0000 1000 |
| 124 | 007C | "Max Value" Reject in calibration check. | 0 > 9999 | |
| 125 | 007D | "% Drift" Percentage of the calibration check. | 0 > 100% | |
| 126 | 007E | "Max PreFILL" Maximum pressure value in pre-fill. | - 9999 > 9999 | |
| 127 | 007F | "LeakUnit" Reject unit. | Refer to Unit table | |
| 128 | 0080 | "Leak Rate" Instruction value during a calibration. | 0 > 9999 | |
| 135 | 0087 | "% of T FAIL" Reject level percent of the auto parameter function | 0 > 100% | |
| 138 | 008A | "FILL REG" Regulator number selection for the fill. | Regulator 1 Regulator 2 | 0000 1000 |
| 139 | 008B | "PRE FILL REG" Regulator number selection for the pre-fill. | Regulator 1 Regulator 2 | 0000 1000 |
| 140 | 008C | Reserved. | | |
| 141 | 008D | Reserved. | | |
| 142 | 008E | Reserved. | | |
| 143 | 008F | Reserved. | | |
| 144 | 0090 | "OUTPUTS CONFIG." Setup of the outputs (standard or compact). | Standard Compact | 0000 1000 |
| 148 | 0094 | "FILTER" Filtering. | 0 > 650 seconds | |
| 149 | 0095 | "UNITS" Unit type | SI SAE CUSTOM | 0000 1000 2000 |



| Identifier N° | | Meaning | Value | |
|---------------|------|---|-----------------------------------|------------------------------|
| Dec | Hexa | | | |
| 161 | 00A1 | “Volume UNIT” Volume unit. | Refer to Unit table. | |
| 164 | 00A4 | “NEXT PROG.” Number of the following program in sequencing. | 1 > 128 | |
| 165 | 00A5 | “N. OF CYCLES”(PIEZO AUTO AZ menu) Number of cycles between two automatic reset. | 0 > 9999 | |
| 166 | 00A6 | “N. OF MINUTES”(PIEZO AUTO AZ menu) Time between two automatic reset. | 0 > 999 minutes | |
| 175 | 00AF | “REGUL. CTRL.” Regulator check during its learning. | Automatic Ext | 0000 1000 |
| 203 | 00CB | “ELEC. REG.” Activation or not of the built in electronics regulators. | None Reg 1 Reg 2 ALL Reg | 0000 1000 2000 3000 |
| 232 | 00E8 | “ATR DRIFT” Drift transient (ATR). | 0 > 100% | |
| 233 | 00E9 | “AZ SHORT” Quick auto-zero time. | 0 > 650 seconds | |
| 273 | 0111 | “DUMP” Dump time in calibration check mode | 0 > 650 seconds | |
| 291 | 0123 | “T.ATR2” Stabilization time for the ATR 2 function | 0 > 650 seconds | |
| 295 | 0127 | “DUMP LEVEL” Minimum dump pressure level to reach | - 9999 > 9999 | |
| 297 | 0129 | “MAX BLOW” Blowing maximum pressure level | - 9999 > 9999 | |
| 298 | 012A | “MIN BLOW” Blowing minimum pressure level | - 9999 > 9999 | |
| 315 | 013B | Reserved. | | |
| 334 | 014E | Reserved. | | |
| 335 | 014F | Reserved. | | |
| 336 | 0150 | Reserved. | | |
| 340 | 0154 | “Transient” ATR transient value. | - 9999 > 9999 | |
| 349 | 015D | Reserved. | | |
| 353 | 0161 | “Press. UNIT” (configuration/pneumatic menu) General pressure unit | Refer to Unit table. | |
| 354 | 0162 | “LINE P. MIN” Minimum line pressure level | - 9999 > 9999 | |
| 355 | 0163 | Reserved. | | |
| 356 | 0164 | Reserved. | | |



| Identifier N° | | Meaning | Value | |
|---------------|------|--|---|------------------------------|
| Dec | Hexa | | | |
| 357 | 0165 | Reserved. | | |
| 358 | 0166 | Reserved. | | |
| 359 | 0167 | Reserved. | | |
| 360 | 0168 | Reserved. | | |
| 361 | 0169 | Reserved. | | |
| 362 | 016A | Reserved. | | |
| 363 | 016B | Reserved. | | |
| 364 | 016C | “DISPLAY MODE” Leak display management | xxxx xxx.x xx.xx x.xxx | 0000 1000 2000 3000 |
| 366 | 016E | “MODE” (EXT DUMP menu) Dump mode | Continuous Time | 0000 1000 |
| 367 | 016F | “Program” (DUMP OFF menu) Program number of the dump of function | 0 > 128 | |
| 368 | 0170 | “Tolerance A” Tolerance level A for ntest cycle | 0 > 100% | |
| 369 | 0171 | “Tolerance B” Tolerance level B for ntest cycle | 0 > 100% | |
| 370 | 0172 | Reserved. | | |
| 371 | 0173 | “NAME:”(Units menu) CAL unit personalization | CHAR[5] | |
| 372 | 0174 | “BYPASS” Bypass valve mode selection | Pre-Fill + Fill Pre-Fill Fill | 0000 1000 2000 |
| 373 | 0175 | “% Cut OFF” Cut off function Percent | 0 > 100% | |
| 374 | 0176 | “ATF TIME” Divisor time of ATF function | 0 > 650 seconds | |
| 375 | 0177 | ‘IN8:’ Function attributed to the entry of the special cycles (input 8) | Refer to the “Configurable input values” table at the end of this chapter | |
| 376 | 0178 | ‘IN9:’ Function attributed to the entry of the special cycles (input 9) | Refer to the “Configurable input values” table at the end of this chapter | |
| 377 | 0179 | “MEAS. START” Waiting time for starting the measurement in burst test | 0 > 650 seconds | |
| 378 | 017A | “Time Adj” Adjusting fill time (electronic regulator) | 0 > 650 seconds | |





| Identifier N° | | Meaning | Value | |
|---------------|------|---|---|--|
| Dec | Hexa | | | |
| 379 | 017B | “USB:” USB mode (printer or supervision) | Supervision Printer Bar code Auto None | 0000 1000 2000 3000 4000 |
| 380 | 017C | Reserved. | Refer to Unit table | |
| 405 | 0195 | Reserved. | | |
| 406 | 0196 | Reserved. | | |
| 407 | 0197 | Reserved. | | |
| 408 | 0198 | Reserved. | | |
| 409 | 0199 | Reserved. | | |
| 410 | 019A | Reserved. | | |
| 455 | 01C7 | “DROP PRESS.%” Drop Press function Percent | 0 > 100% | |
| 456 | 01C8 | “ATM PRESS.” Atmospheric Pressure | 900 > 1100 | |
| 457 | 01C9 | “TEMP.” Temperature | 0 > 800 | |
| 458 | 01CA | “DISP. OPT.” Display Option in flow reject | None Pa Display Ambient Temp. Object Temp. Test check ATR Temp. correction Leak offset learning PATM correction | 0000 1000 2000 3000 4000 5000 6000 7000 8000 |
| 459 | 01CB | “N. OF CYCLES” Number of learning cycle | 2 > 9999 | |
| 460 | 01CC | “INTER-CYCLE” Time between 2 learning cycle | 0 > 650 seconds | |
| 461 | 01CD | “MAX OFFSET” Offset max for learning cycle | 0 > 9999 | |
| 462 | 01CE | “FLOW MASTER” Value of Flow master for learning cycle | 0 > 9999 | |
| 463 | 01CF | “PRESS MASTER” Value of Pressure master for learning cycle | - 9999 > 9999 | |
| 464 | 01D0 | “Min. Vol.” Minimum Volume for learning | 0 > 9999 | |
| 465 | 01D1 | “Max. Vol.” Maximum Volume for learning | 0 > 9999 | |



| Identifier N° | | Meaning | Value | |
|---------------|-------|---|--------------------------------------|----------------------|
| Dec | Hexa | | | |
| 485 | 01 E5 | "EXT. ACCES" Security by external access (Fieldbus/Modbus) Reset value with Modbus: → Writing at address 0xC1E5 Reset value with Fieldbus: → Writing one word with ID = 0xC1E5 | Read/Write Read Only No Access | 0000 1000 2000 |
| 486 | 01 E6 | "OFFSET" Offset Learning | - 9999 > 9999 | |

Regulator selection

Regulator selection for fill and pre-fill (word 1, bit n°0 and 1) in the table of the functions bits.

| | Fill regulator | Pre-fill regulator |
|-------------|----------------|--------------------|
| Regulator 1 | 0 | 0 |
| Regulator 2 | 1 | 1 |

Configurable input values

| F6 V1.3XX | | | |
|-----------------------|------------|--------------------|------------|
| Input value | Value code | Input value | Value code |
| Program Selection | 0000 | Atr Learning Cycle | 17000 |
| P1 Sensor Check (*) | 4000 | Sd Prt Pass Learn | 18000 |
| P1 Reg1 Check (*) | 5000 | Sd Prt Fail Learn | 19000 |
| P2 Sensor Check (*) | 6000 | Volume Comp. | 20000 |
| Leak Sensor Check (*) | 7000 | Test Check Result | 21000 |
| Auto Test (*) | 8000 | Step By Step | 22000 |
| Regul. 2 Adjust | 9000 | Auto Setup | 23000 |
| Regul. 1 Adjust | 10000 | Atr+Custom Learn. | 24000 |
| Part Regulator | 11000 | Code Reader | 25000 |
| Infinite Fill | 12000 | Auto Vol | 26000 |
| Piezo Auto Zero | 13000 | Test On Caps | 27000 |
| Custom Unit Learn | 14000 | Temp.2 Corr. Learn | 30000 |
| Custom Unit Check | 15000 | Temp.2 Sensor Read | 31000 |
| Chck+Lrn Cust. Unit | 16000 | | |

(*) Available when the **Service special cycle** function is checked.



| F6 V2.XXX | | | |
|--------------------------|------------|---------------------|------------|
| Input value | Value code | Input value | Value code |
| Program Selection | 0000 | Chck+Lrn Cust. Unit | 24000 |
| Diff Temp. Check (*) | 8000 | Atr Learning Cycle | 25000 |
| Direct P. Check (*) | 9000 | Sd Prt Pass Learn | 26000 |
| P1 Reg1 Check (*) | 10000 | Sd Prt Fail Learn | 27000 |
| Indirect P. Check (*) | 11000 | Volume Comp. | 28000 |
| Leak Sensor Check (*) | 12000 | Test Check Result | 29000 |
| Line P. Sensor Check (*) | 13000 | Atr+Custom Learn. | 30000 |
| Temperature Check (*) | 14000 | Code Reader | 31000 |
| Atm Pressure Check (*) | 15000 | Auto Vol | 32000 |
| Auto Test (*) | 16000 | Test On Caps | 33000 |
| Regul. 2 Adjust | 17000 | Temp.2 Corr. Learn | 36000 |
| Regulator Adj. | 18000 | Temp.2 Sensor Read | 37000 |
| Part. Regulator Adj. | 19000 | Leak Offset Learn | 38000 |
| Infinite Fill | 20000 | Offset+Vol. Learn | 39000 |
| Piezo Auto Zero | 21000 | N Start | 40000 |
| Custom Unit Learn | 22000 | Sync Test | 41000 |
| Custom Unit Check | 23000 | | |

(*) Available when the **Service special cycle** function is checked.



Unit table

This list gives all the units used in the instrument in hexadecimal code.

| Unit code | | Unit |
|-----------|-------------|---|
| Decimal | Hexadecimal | |
| 0000 | 0000 | cm ³ /s |
| 1000 | 03E8 | cm ³ /min |
| 2000 | 07D0 | cm ³ /h |
| 3000 | 0BB8 | mm ³ /s |
| 4000 | 0FA0 | Calibrated Pascal (Pa) |
| 5000 | 1388 | Calibrated Pascal/second (Pa/s) |
| 6000 | 1770 | Pascal (Pa) |
| 7000 | 1B58 | High resolution Pascal (Pa HR) |
| 8000 | 1F40 | Pascal/second (Pa/s) |
| 9000 | 2328 | High resolution Pascal/second (Pa/s HR) |
| 10000 | 2710 | Second (s) |
| 11000 | 2AF8 | Bar |
| 12000 | 2EE0 | KiloPascal (kPa) |
| 13000 | 32C8 | PSI |
| 14000 | 36B0 | Millibar (mbar) |
| 15000 | 3A98 | Mega Pascal (MPa) |
| 16000 | 3E80 | Liter (l) |
| 17000 | 4268 | Calibration check unit |
| 18000 | 4650 | KiloPascal/second (kPa/s) |
| 19000 | 4A38 | Millimeter (mm) |
| 30000 | 7530 | Liter/hour (l/h) |
| 43000 | A7F8 | D mode Pascal (Pa) |
| 44000 | ABE0 | Low resolution Pascal (Pa LR) |
| 45000 | AFC8 | Low resolution Pascal/second (Pa/s LR) |
| 46000 | B3B0 | Inch ³ /s |
| 47000 | B798 | Inch ³ /min |
| 48000 | BB80 | Inch ³ /hour |
| 49000 | BF68 | Feet ³ /hour |
| 50000 | C350 | Milliliter/second (mm/s) |
| 51000 | C738 | Milliliter/minute (mm/min) |
| 52000 | CB20 | Milliliter/hour (mm/h) |
| 53000 | CF08 | Liter/minute (l/min) |
| 54000 | D2F0 | Meter ³ /hour (m ³ /h) |
| 55000 | D6D8 | Millimeter ³ (mm ³) |
| 56000 | DAC0 | Centimeter ³ (cm ³) |
| 57000 | DEA8 | Microsecond (μs) |
| 58000 | E290 | USA cm ³ /s same as the cm ³ /s |
| 59000 | E678 | USA cm ³ /min same as the cm ³ /min |
| 60000 | EA60 | USA cm ³ /h same as the cm ³ /h |
| 61000 | EE48 | Milliliter (ml) |



| Unit code | | Unit |
|-----------|-------------|-----------------------------|
| Decimal | Hexadecimal | |
| 62000 | F230 | Liter (l) |
| 63000 | F618 | Inch ³ |
| 64000 | FA00 | Feet ³ |
| 68000 | 01 09A0 | oz(US)/s |
| 69000 | 01 0D88 | oz(US)/mn |
| 70000 | 01 1170 | oz(US)/h |
| 71000 | 01 1558 | oz(UK)/s |
| 72000 | 01 1940 | oz(UK)/mn |
| 73000 | 01 1D28 | oz(UK)/h |
| 74000 | 01 2110 | US gallon |
| 75000 | 01 24F8 | UK gallon |
| 76000 | 01 28E0 | PPM |
| 77000 | 01 2CC8 | PPM HR |
| 78000 | 01 30B0 | Calibrated PPM |
| 80000 | 01 3880 | mmCE |
| 81000 | 01 3C68 | mmCE/s |
| 84000 | 01 4820 | SCCM |
| 92000 | 01 6760 | Points |
| 93000 | 01 6B48 | Feet ³ /s F620 |
| 94000 | 01 6F30 | Feet ³ /min F620 |
| 95000 | 01 7318 | ACCM MF |
| 96000 | 01 7700 | Inch Mercure (inHg) |
| 99000 | 01 82B8 | Millimeter Mercure (mmHg) |
| 100000 | 01 86A0 | µg H ₂ O/min |
| 102000 | 01 8E70 | No unit |



Reading of the parameters

The reading of the parameters is carried out by data exchange in the corresponding area depending on the configuration mode of the slave. Each parameter is identified by one identifier. See identifiers tables.

This table is an example based on the reading of two parameters:

- **Test time** (identifier number 3)
- **Stabilization time** (identifier number 2)

| Master | Slave | | | | | | |
|--|---|----|----|----|----|----|--|
| <ul style="list-style-type: none"> — Select the program on which parameters has to be read — Write in the parameter area at the address 20(h), the number of parameters followed by their identifiers: <p>On network:</p> <table border="1" style="margin-left: 20px;"> <tr> <td>02</td><td>00</td><td>03</td><td>00</td><td>02</td><td>00</td> </tr> </table> <p>0002(h) 0003(h) 0002(h) 0002(h) = two parameters 0003(h) = test time identifier 0002(h) = stabilization time identifier</p> <ul style="list-style-type: none"> — Activate the “Read parameters” command: <p>Write at the address 00(h), the value 0020(h) Byte 0 = 20(h) (Bit 5 = 1) Byte 1 = 00(h)</p> | 02 | 00 | 03 | 00 | 02 | 00 | |
| 02 | 00 | 03 | 00 | 02 | 00 | | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 20(h) (Bit 5 = 1) — Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> | | | | | | |
| | <p>Running “Read parameters” command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 20(h) (Bit 5 = 1) — Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 20(h) (Bit 5 = 1) — Byte 3 = 00(h) | | | | | | |
| <ul style="list-style-type: none"> — Wait the end of the command: <p>command echo = 0020(h) command error code ≠ FFFF(h) (end of command)</p> | | | | | | | |
| <ul style="list-style-type: none"> — Deactivate the “Read parameters” command: <p>Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) (Bit 5 = 0) Byte 1 = 00(h)</p> | | | | | | | |



| Master | Slave | | | | | | | | | | | | |
|--|-------|----|----|----|----|----|----|----|----|----|----|----|--|
| <p>— Read the parameters at the address 20(h): Word 1 = identifier number of the first read parameter. Word 2 and Word 3 = first parameter value x1000 (long format). Word 4 = second identifier number of the read parameter. Word 5 and Word 6 = second parameter value x1000 (long format).</p> <p>Example: On network:</p> <table border="1"><tr><td>03</td><td>00</td><td>E8</td><td>03</td><td>00</td><td>00</td><td>02</td><td>00</td><td>F4</td><td>01</td><td>00</td><td>00</td></tr></table> <p>@20h = 0003h 03E8h 0000h 0002h 01F4h 0000h. - 0003h: test time identifier. - 000003E8h: test time value 1000(d)/1000 → 1 sec. - 0002h: fill time identifier. - 000001F4h: stabilization time value 500(d)/1000 → 0,5 sec.</p> | 03 | 00 | E8 | 03 | 00 | 00 | 02 | 00 | F4 | 01 | 00 | 00 | |
| 03 | 00 | E8 | 03 | 00 | 00 | 02 | 00 | F4 | 01 | 00 | 00 | | |



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Writing of the parameters

The writing of the parameters is carried out by data exchange in the corresponding area depending on the configuration mode of the slave. Each parameter is identified by one identifier. See identifiers tables.

This table is an example based on the reading of two parameters:

- **Test time** (identifier number 3)
- **Stabilization time** (identifier number 2)

| Master | Slave | | | | | | | | | | | | | | |
|---|--|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| <ul style="list-style-type: none"> — Select the program on which the parameters have to be modified — Write in the parameter area at address 20(h), the number of parameters followed by their identifiers and their wanted value: <p>Example: On network:</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td>02</td><td>00</td><td>03</td><td>00</td><td>E8</td><td>03</td><td>00</td><td>00</td><td>02</td><td>00</td><td>D0</td><td>07</td><td>00</td><td>00</td> </tr> </table> <p>0002(h) 0003(h) 03E8(h) 0000(h) 0002(h) 07D0(h) 0000(h) 0002(h) = two parameters 0003(h) = test time identifier 000003E8(h) = 1000 => 1 second 0002(h) = stabilization time identifier 000007D0(h) = 2000 => 2 second</p> <ul style="list-style-type: none"> — Activate the “Write parameters” command: Write at the address 00(h), the value 0040(h) Byte 0 = 40(h) (Bit 6 = 1) Byte 1 = 00(h) | 02 | 00 | 03 | 00 | E8 | 03 | 00 | 00 | 02 | 00 | D0 | 07 | 00 | 00 | |
| 02 | 00 | 03 | 00 | E8 | 03 | 00 | 00 | 02 | 00 | D0 | 07 | 00 | 00 | | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 40(h) (Bit 6 = 1) — Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> | | | | | | | | | | | | | | |
| | <p>Running “Write parameters” command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 40(h) (Bit 6 = 1) — Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 40(h) (Bit 6 = 1) — Byte 3 = 00(h) | | | | | | | | | | | | | | |



| Master | Slave |
|--|-------|
| <ul style="list-style-type: none">— Wait the end of the command: command echo = 0040(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none">— Deactivate the “Write parameters” command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) (Bit 6 = 0) Byte 1 = 00(h) | |



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Reading of the program name

| Master | Slave |
|--|---|
| <ul style="list-style-type: none"> Select the program whose name you want to read Activate the "Read program name" command: Write at the address 00(h), the value 2000(h) Byte 0 = 00(h) Byte 1 = 20(h) (Bit 5 = 1) | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 00(h) Byte 1 = 20(h) (Bit 5 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> Byte 2 = FF(h) Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> |
| | <p>Running "Read program name" command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 00(h) Byte 1 = 20(h) (Bit 5 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> Byte 2 = 00(h) Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> Byte 2 = 00(h) Byte 3 = 20(h) (Bit 5 = 1) |
| <ul style="list-style-type: none"> Wait the end of the command: command echo = 2000(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none"> Deactivate the "Read program name" command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) Byte 1 = 00(h) (Bit 5 = 0) | |
| <ul style="list-style-type: none"> Read the program name of 12 characters/bytes maximum at the address 20(h): | |



The program name is dependant of the program number in edition, a program selection has to be realized.



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Writing of the program name

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| Master | Slave |
|--|--|
| <ul style="list-style-type: none"> — Select the program whose name you want to modify — Write the program name of 12 characters/bytes maximum at the address 20(h). — Activate the “Write program name” command: Write at the address 00(h), the value 4000(h) Byte 0 = 00(h) Byte 1 = 40(h) (Bit 6 = 1) | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 40(h) (Bit 6 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> |
| | <p style="text-align: center;">Running “Write program name” command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 40(h) (Bit 6 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 40(h) (Bit 6 = 1) |
| <ul style="list-style-type: none"> — Wait the end of the command: command echo = 4000(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none"> — Deactivate the “Write program name” command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) Byte 1 = 00(h) (Bit 6 = 0) | |



The program name is dependant of the program number in edition, a program selection has to be realized.



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Standard command cycle

Start cycle command on the ATEQ device

| Master | Slave |
|--|---|
| <ul style="list-style-type: none"> Select the program you want to start Activate the "Start" command: Write at the address 00(h), the value 0002(h) Byte 0 = 02(h) (Bit 1 = 1) Byte 1 = 00(h) | |
| | <p align="center"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 02(h) (Bit 1 = 1) Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> Byte 2 = FF(h) Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> |
| | <p>Running "Start" command</p> |
| | <p align="center"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 02(h) (Bit 1 = 1) Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> Byte 2 = 00(h) Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> Byte 2 = 02(h) (Bit 1 = 1) Byte 3 = 00(h) |
| <ul style="list-style-type: none"> Wait the end of the command: command echo = 0002(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none"> Deactivate the "Start" command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) (Bit 1 = 0) Byte 1 = 00(h) | |

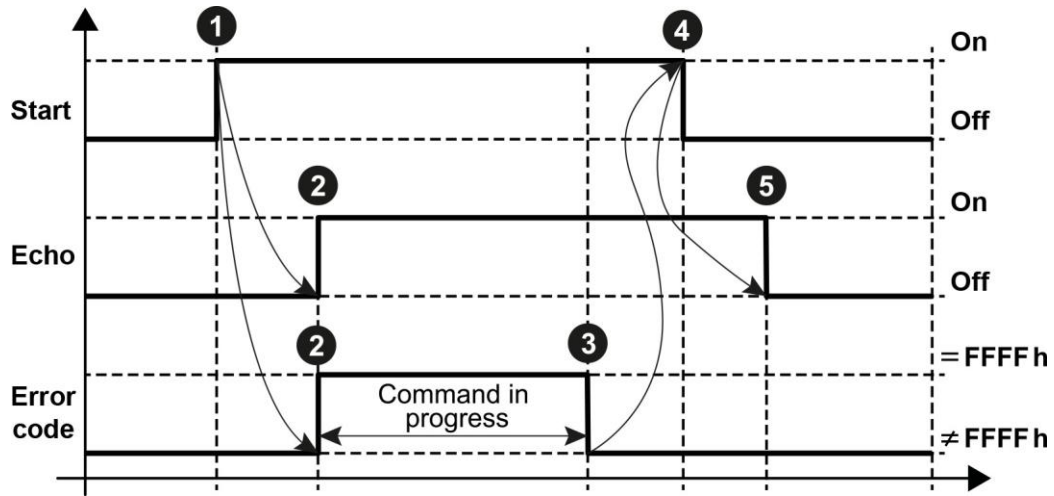


The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).





Start command diagram



| | |
|---|--|
| 1 | Start command = On |
| 2 | Acknowledge by ATEQ = (Echo command = On) and (Error code command = FFFFh) |
| 3 | Wait end of Start command = (Echo command = On) and (Error code command ≠ FFFFh) |
| 4 | Start command = Off |
| 5 | Acknowledge by ATEQ = (Echo command = Off) and (Error code command ≠ FFFFh) |



The **Echo** command is a copy of the **Start** command. The **Start** signal must be maintained (ON) till the end of the **Start** command condition is reached.



Reset command on the ATEQ device

| Master | Slave |
|---|---|
| <ul style="list-style-type: none">— Activate the “Reset” command:— Write at the address 00(h), the value 0001(h) Byte 0 = 01(h) (Bit 0 = 1) Byte 1 = 00(h) | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> Command echo: <ul style="list-style-type: none">— Byte 0 = 01(h) (Bit 0 = 1)— Byte 1 = 00(h) Command error code: <ul style="list-style-type: none">— Byte 2 = FF(h)— Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress) |
| | <p style="text-align: center;">Running “Reset” command</p> <p style="text-align: center;"><u>Command finished</u></p> Command echo: <ul style="list-style-type: none">— Byte 0 = 01(h) (Bit 0 = 1)— Byte 1 = 00(h) Command error code if the command is correctly carried out: <ul style="list-style-type: none">— Byte 2 = 00(h)— Byte 3 = 00(h) OR if an error occurred during the command: <ul style="list-style-type: none">— Byte 2 = 01(h) (Bit 0 = 1)— Byte 3 = 00(h) |
| <ul style="list-style-type: none">— Wait the end of the command: command echo = 0001(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none">— Deactivate the “Reset” command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) (Bit 0 = 0) Byte 1 = 00(h) | |



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Special cycles

Special cycle table

Write the identifier number of the wanted special cycle at the address 04(h) and its instruction if necessary.

@08(h) = identifier number of the special cycle

@09(h) = instruction for the special cycle

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| Numb | Special cycle | Numb | Special cycle |
|------|-----------------------|------|-------------------------------|
| 1 | ATR Learning Cycle | 17 | Sd Prt FAIL Learn |
| 2 | Test Check Result | 18 | Direct P. Check (*) (**) |
| 3 | AUTO TEST | 19 | Leak Sensor Check (*) (**) |
| 4 | Custom Unit Learn | 20 | Reserved |
| 5 | Custom Unit Check | 21 | Reserved |
| 6 | ATR+Custom Learn | 22 | Reserved |
| 7 | Piezo auto zero Reg 1 | 23 | No special cycle |
| 8 | Piezo auto zero Reg 2 | 24 | Reserved |
| 9 | Regul. 2 adjust | 25 | Line P. Sensor Check (*) (**) |
| 10 | Regulator Adj | 26 | No special cycle |
| 11 | Infinite fill | 27 | Reserved |
| 12 | Volume Comp | 28 | Reserved |
| 13 | Auto Vol | 29 | Temperature check (*) (**) |
| 14 | No special cycle | 30 | Atm Pressure Check (*) (**) |
| 15 | No special cycle | 31 | No special cycle |
| 16 | Sd Prt PASS Learn | | |

To activate a special cycle, you must send a **Start** command (Bit 1) and a **Start special cycle** command (Bit 2).

(*) For version ≥ 1.400 only.

(**) Appears with the **Service special cycle** function checked.



Auto-zero on the ATEQ device

| Master | Slave |
|--|--|
| <ul style="list-style-type: none"> — Select the program on which you want to make the auto zero — Write at the address 08(h) the identifier number of the special cycle for an auto zero — Activate the “Start” and the “Start special cycle” commands: <p>Write at the address 00(h), the value 0006(h) Byte 0 = 06(h) (Bit 1 = 1 and Bit 2 = 1) Byte 1 = 00(h)</p> | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 06(h) (Bit 1 = 1 and Bit 2 = 1) — Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> |
| | <p>Running “Start” and “Start special cycle” commands</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 06(h) (Bit 1 = 1 and Bit 2 = 1) — Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 06(h) (Bit 1 = 1 and Bit 2 = 1) — Byte 3 = 00(h) |
| <ul style="list-style-type: none"> — Wait the end of the command: command echo = 0006(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none"> — Deactivate the “Start” and “Start special cycle” commands: <p>Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) (Bit 1 = 0 and Bit 2 = 0) Byte 1 = 00(h)</p> | |



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



RESULTS

FIFO results

FIFO list results structure

At the end of each cycle, a result is stored as an array of 40 words contained in a FIFO of 8 results. This result includes the final state of the instrument (relays position, alarm signal, indicators state...), but also of the test (units, values measured for pressure and flow).

The results are in the memory of the instrument. To obtain them, it is necessary to carry out a “Read FIFO results” request.

| Words | Meaning | Type | Bytes | Coeff |
|-------|--|------|-------|-------|
| 1 | Program number. | Word | 2 | |
| 2 | Test type. | Word | 2 | |
| 3 | Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part, maximum flow reject. Bit 2 = 1: fail part, minimum flow reject. Bit 3 = 1: alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused. | Word | 2 | |
| 4 | Alarm code (refer to the alarm codes table). | Word | 2 | |
| 5 | Pressure low part word. | Long | 4 | x1000 |
| 6 | Pressure high part word. | | | |
| 7 | Pressure unit code low part word (refer to units table). | Long | 4 | x1000 |
| 8 | Pressure unit code high part word (refer to units table). | | | |
| 9 | Leak low section word. | Long | 4 | x1000 |
| 10 | Leak high section word. | | | |
| 11 | Leak unit code low part word (refer to. Units table). | Long | 4 | x1000 |
| 12 | Leak unit code high part word (refer to. Units table). | | | |
| 13 | Pressure piezo 2 low part word. | Long | 4 | x1000 |
| 14 | Pressure piezo 2 high part word. | | | |
| 15 | Pressure piezo 2 unit code low part word (refer to units table). | Long | 4 | x1000 |
| 16 | Pressure piezo 2 unit code high part word (refer to units table). | | | |
| 17 | Test check result low part word. | Long | 4 | x1000 |
| 18 | Test check result high part word. | | | |
| 19 | Test check result unit code low part word (refer to units table). | Long | 4 | x1000 |
| 20 | Test check result unit code high part word (refer to units table). | | | |
| 21 | Large Leak low part word. | Long | 4 | x1000 |
| 22 | Large Leak high part word. | | | |
| 23 | Large Leak unit code low part word (refer to units table). | Long | 4 | x1000 |
| 24 | Large Leak unit code high part word (refer to units table). | | | |



| Words | Meaning | Type | Bytes | Coeff |
|-------------|--|------|-------|-------|
| V2.xxx Only | | | | |
| 25 | Pa – Pa/s Leak result low part word | Long | 4 | x1000 |
| 26 | Pa – Pa/s Leak result high part word | | | |
| 27 - 36 | <i>Unused</i> | | | |
| 37 | Atmospheric pressure in hPa low part word | Long | 4 | x1000 |
| 38 | Atmospheric pressure in hPa high part word | | | |
| 39 | Temperature in °C low part word | Long | 4 | x1000 |
| 40 | Temperature in °C high part word | | | |



All the numerical values are treated with **Long** format with fixed comma (10^{-3}). Thus, they must be multiplied by 1000 to get the value in units (see examples in “Basic notions” section).



Step table

This table represents the codes of the steps in the cycle.

| Code | | Steps |
|---------|-------------|---------------------------------|
| Decimal | Hexadecimal | |
| 0 | 0000 | Pre-fill. |
| 1 | 0001 | Pre-dump. |
| 2 | 0002 | Sealed component fill. |
| 3 | 0003 | Sealed component stabilization. |
| 4 | 0004 | Fill. |
| 5 | 0005 | Stabilization. |
| 6 | 0006 | Test. |
| 7 | 0007 | Dump. |
| 65535 | FFFF | No steps in progress. |



Alarm codes table

This list gives all the alarms in hexadecimal code.

| Identifier n° | | Alarm |
|---------------|-------------|---|
| Decimal | Hexadecimal | |
| 0 | 0000 | No alarm. |
| 1 | 0001 | Pressure switched alarm (test pressure too high). |
| 2 | 0002 | Pressure switch (test pressure too small). |
| 3 | 0003 | Large leak on TEST (EEEE). |
| 4 | 0004 | Large leak on REF (MMMM). |
| 7 | 0007 | Sensor out of order (overrun). |
| 8 | 0008 | ATR error. |
| 9 | 0009 | ATR drift. |
| 10 | 000A | CAL error. |
| 11 | 000B | Volume too small (sealed component). |
| 12 | 000C | Volume too large (sealed component). |
| 14 | 000E | Equalization valve switching error. |
| 43 | 002B | Pressure too high. |
| 44 | 002C | Pressure too low. |
| 45 | 002D | Piezo sensor out of order. |
| 46 | 002E | Dump error. |
| 47 | 002F | CAL drift error. |
| 48 | 0030 | Calibration check error. |
| 49 | 0031 | Leak in calibration check too high. |
| 50 | 0032 | Leak in calibration check too low. |
| 51 | 0033 | Sealed component learning error. |
| 64 | 0040 | Piezo sensor 2 out of order. |
| 65 | 0041 | Pressure Piezo 2 too high. |
| 66 | 0042 | Pressure Piezo 2 too low. |
| 68 | 0044 | Pressure Piezo 2 switched alarm (test pressure too high). |
| 69 | 0045 | Pressure Piezo 2 switch (test pressure too small). |
| 72 | 0048 | Learning Electrical Regulator Default. |



Cycle results reading (last 8 results in FIFO)

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| Master | Slave |
|--|---|
| <ul style="list-style-type: none"> — Read the number of available results in the FIFO at the address 08(h): 08(h) = 0000(h) → no results 08(h) > 0000(h) → results available — Activate the “Read FIFO results” command: Write at the address 00(h), the value 0010(h) Byte 0 = 10(h) (Bit 4 = 1) Byte 1 = 00(h) | |
| | <p align="center"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 10(h) (Bit 4 = 1) — Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> |
| | <p align="center">Running “Read FIFO results” command</p> <p align="center"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 10(h) (Bit 4 = 1) — Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 10(h) (Bit 4 = 1) — Byte 3 = 00(h) |
| <ul style="list-style-type: none"> — Wait the end of the command: command echo = 0010(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none"> — Deactivate the “Read FIFO results” command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) (Bit 4 = 0) Byte 1 = 00(h) | |
| <ul style="list-style-type: none"> — Read the result of 40 words at the address 20(h) | |



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Reset FIFO results

This command resets the 8 last cycle's results available in the FIFO.

| Master | Slave |
|--|--|
| <ul style="list-style-type: none">— Activate the “Reset FIFO results” command: Write at the address 00(h), the value 0080(h) Byte 0 = 80(h) (Bit 7 = 1) Byte 1 = 00(h) | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> Command echo: <ul style="list-style-type: none">— Byte 0 = 80(h) (Bit 7 = 1)— Byte 1 = 00(h) Command error code: <ul style="list-style-type: none">— Byte 2 = FF(h)— Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress) |
| | <p style="text-align: center;">Running “Reset FIFO results” command</p> <p style="text-align: center;"><u>Command finished</u></p> Command echo: <ul style="list-style-type: none">— Byte 0 = 80(h) (Bit 7 = 1)— Byte 1 = 00(h) Command error code if the command is correctly carried out: <ul style="list-style-type: none">— Byte 2 = 00(h)— Byte 3 = 00(h) OR if an error occurred during the command: <ul style="list-style-type: none">— Byte 2 = 80(h) (Bit 7 = 1)— Byte 3 = 00(h) |
| <ul style="list-style-type: none">— Wait the end of the command: command echo = 0080(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none">— Deactivate the “Reset FIFO results” command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) (Bit 7 = 0) Byte 1 = 00(h) | |



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Last results

Last results structure

At the end of each cycle, the last result is as an array of 40 words. This result includes the final state of the instrument (relays position, alarm signal, indicators state...), but also of the test (units, values measured for the pressure and the flow).

The last result is in the memory of the instrument. To obtain them, it is necessary to carry out a “Read last results” request.

| Words | Meaning | Type | Bytes | Coeff |
|-------|--|------|-------|-------|
| 1 | Program number. | Word | 2 | |
| 2 | Test type. | Word | 2 | |
| 3 | Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part, maximum flow reject. Bit 2 = 1: fail part, minimum flow reject. Bit 3 = 1: alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused. | Word | 2 | |
| 4 | Alarm code (refer to the alarm codes table). | Word | 2 | |
| 5 | Pressure low part word. | Long | 4 | x1000 |
| 6 | Pressure high part word. | | | |
| 7 | Pressure unit code low part word (refer to units table). | Long | 4 | x1000 |
| 8 | Pressure unit code high part word (refer to units table). | | | |
| 9 | Leak low section word. | Long | 4 | x1000 |
| 10 | Leak high section word. | | | |
| 11 | Leak unit code low part word (refer to. Units table). | Long | 4 | x1000 |
| 12 | Leak unit code high part word (refer to. Units table). | | | |
| 13 | Pressure piezo 2 low part word. | Long | 4 | x1000 |
| 14 | Pressure piezo 2 high part word. | | | |
| 15 | Pressure piezo 2 unit code low part word (refer to units table). | Long | 4 | x1000 |
| 16 | Pressure piezo 2 unit code high part word (refer to units table). | | | |
| 17 | Test check result low part word. | Long | 4 | x1000 |
| 18 | Test check result high part word. | | | |
| 19 | Test check result unit code low part word (refer to units table). | Long | 4 | x1000 |
| 20 | Test check result unit code high part word (refer to units table). | | | |
| 21 | Large Leak low part word. | Long | 4 | x1000 |
| 22 | Large Leak high part word. | | | |
| 23 | Large Leak unit code low part word (refer to units table). | Long | 4 | x1000 |
| 24 | Large Leak unit code high part word (refer to units table). | | | |



| Words | Meaning | Type | Bytes | Coeff |
|-------------|--|------|-------|-------|
| V2.xxx Only | | | | |
| 25 | Pa – Pa/s Leak result low part word | Long | 4 | x1000 |
| 26 | Pa – Pa/s Leak result high part word | | | |
| 27 - 36 | <i>Unused</i> | | | |
| 37 | Atmospheric pressure in hPa low part word | Long | 4 | x1000 |
| 38 | Atmospheric pressure in hPa high part word | | | |
| 39 | Temperature in °C low part word | Long | 4 | x1000 |
| 40 | Temperature in °C high part word | | | |



All the numerical values are treated with **Long** format with fixed comma (10^{-3}). Thus, they must be multiplied by 1000 to get the value in units (see examples in “Basic notions” section).



Last results reading



For using this function, it is important to:

- Having done a start on the instrument before (“End of cycle” bit on in the relay status)
- Not having done a reset of the FIFO

| Master | Slave |
|--|---|
| <ul style="list-style-type: none"> — Activate the “Read Last result” command: Write at the address 00(h), the value 8000(h) Byte 0 = 00(h) Byte 1 = 80(h) (Bit 7 = 1) | |
| | <p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 80(h) (Bit 7 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> |
| | <p>Running “Read Last result” command</p> <p>Command finished</p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 80(h) (Bit 7 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 80(h) (Bit 7 = 1) |
| <ul style="list-style-type: none"> — Wait the end of the command: command echo = 8000(h) command error code ≠ FFFF(h) (end of command) | |
| <ul style="list-style-type: none"> — Deactivate the “Read Last result” command: Write at the address 00(h) the value 0000(h) Byte 0 = 00(h) Byte 1 = 00(h) (Bit 7 = 0) | |



The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).



Real time

Status and real time measures

The real time measurement is used for display curve or values during the cycle and not for the final measurement.



Do not take or use the final results in this section, it is just to see the status of the device for the “Cycle end” (bit 5) and “Key presence” (bit 15) information.

For the results, use only the FIFO list results structure or the Last results structure (see above)

| Words | Meaning | Type | Bytes | Coeff |
|-------|---|---|-------|-------|
| 1 | Program number. | Word | 2 | |
| 2 | Number of results waiting in the results FIFO memory. | Word | 2 | |
| 3 | Test type. | Word | 2 | |
| 4 | Status: Bit 0 = 1: pass part. Bit 1 = 1: fail part maximum flow. Bit 2 = 1: fail part minimum flow. Bit 3 = 1: alarm. Bit 4 = 1: pressure error. | Do not use these results while the Bit 5 (cycle end is not 1). Use only Bit 5 (cycle end) and Bit 15 (key presence). | | |
| | Bit 5 = 1: cycle end. | Word | 2 | |
| 4 | Bit 6 = 1: recoverable part. Bit 7 = 1: CAL error or drift. Bit 8 = 1: Calibration check error Bit 9 = 1: ATR error or drift. Bits 10 / 11 / 12 / 13 / 14 = 1: <i>Unused</i> . Bit 15 = 1: key presence. | Do not use these results while the Bit 5 (cycle end is not 1). Use only Bit 5 (cycle end) and Bit 15 (key presence). | | |
| | 5 | Step code (refer to steps table). | Word | 2 |
| 6 | Low pressure section word. | Long | 4 | x1000 |
| 7 | High pressure section word. | | | |
| 8 | Pressure unit code low part word (see units table). | Long | 4 | x1000 |
| 9 | Pressure unit code high part word (see units table). | | | |
| 10 | Flow low section word. | Long | 4 | x1000 |
| 11 | Flow high section word. | | | |
| 12 | Flow unit code low part word (refer to. Units table). | Long | 4 | x1000 |
| 13 | Flow unit code high part word (refer to. Units table). | | | |



Examples

Pressure value = 207

Pressure: Words 6 and 7

On network:

98 28 03 00

00032898h → 207000(d)/1000 → 207

Leak value = -0.108

Leak: Words 10 and 11

On network:

94 FF FF FF

FFFFFF94h → -108(d)/1000 → -0.108

