Pulse Recorder
USER MANUAL

Rel. 01.00.0002
(Hardware code: PulseRecorder)

CONCEIVING
PLANNING
DEVELOPMENT
IN SCIENTIFIC
ELECTRONICS

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GUARANTEE

IPSES warrants to the end-user in accordance with the following provisions that its branded hardware products, purchased by the end-user from IPSES company or an authorized IPSES distributor will be free from defects in materials, workmanship and design affecting normal use, for a period of one year as of the original purchase date. Products for which proper claims are made will, at IPSES's option, be repaired or replaced at IPSES's expense[1].

Exclusions
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Making a claim
Claims must be made by contacting IPSES office within the guarantee period.
Please, contact:

<div align="center">

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[1] With the exclusion of shipping costs for and from IPSES's development office.

WARNING!
ELECTRICAL DEVICES COULD DAMAGE EQUIPMENT OR PROPERTY OR CAUSE PERSONAL INJURY

This guide contains instructions and technical features of the Pulse Recorder.
Read with attention before attempting to install.
It is the responsibility of the technician to undertake all the safety rules provided by the law during the installation and the use of this device.
For any information which is not contained in this guide, please contact:

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REVISION HISTORY

Manual revision history

Revision/ Date	Change description	Author
01.00.0000 December 2003	First version Released	Pizzocolo G.
01.00.0001 March 2008	Update template engagement	Barbera D.
01.00.0002 June, 2015	Update document template	Bottaccioli M.

GENERAL FEATURES

Pulse Recorder is a miniature, low-consumption, *stand-alone data logger* which can count and memorize pulse inputs from two channels.

The **reading and configuration** of the device is achieved trough an *ethernet* interface, using a normal *TCP/IP telnet* connection. A customizable *password* protects the access from not allowed connections.

The **counting** takes place during a "*gate time*", programmable as needed: it is possible to select a *gate time* from 1 ms up to 14 hours, with a setting precision of 1 ms. A **LED** will light when the pulse counting is activated.
Pulse counting is recorded in a 64 bit integer variable which maintains a precision of one unit, even in case of very high values. The vector containing the previous counting is memorized using an exponential notation.
Beside, the device can calculate the input signal average frequency present in its first channel.
It is possible to set an alarm counting threshold for the first channel too: a LED will light when value is reached, then an appropriate system state bit will be set to 1.

CONNECTION AND LOGIN

The default *TCP/IP* **address** is **192.168.0.15**, the *telnet* **port** used is number **23** (employed by most servers for telnet connection). These values can be changed through a specific command.

When a connection is established, system asks for a **login password**: the default password is "**ipses**", but it can be set by the user.

Using the correct *jumper* it is possible to restore all default values (*TCP/IP* address, *telnet* port and login password), until it will be removed (afterwards the stored values will be effective).

The communication with *Pulse Recorder* system takes place trough an **Ethernet** interface, using a *TCP/IP telnet* connection. It is not necessary to connect the device directly to an acquisition server: any personal computer capable of connection to an *Ethernet-based network* will suffice. It is also possible to connect the system directly to internet through a *router*.

REMOTE CONTROL COMMUNICATION PROTOCOL

The exchanged strings are in **ASCII code** ended with <CR> character; other control characters (<LF>, <VT>, etc) are ignored. To make the commands effective, use lower-case letters (the command interpreter is *case-sensitive*).

The following commands are implemented:

?	Shows the available commands
ax.x.x.x	Changes the device **TCP/IP address** [0<x<255]. To make the change effective, the configuration parameters must be memorized ("*m*" command), then the system has to be switched off and back on.
bx	Changes the device *telnet* **port**. To make the change effective, the configuration parameters must be memorized ("*m*" command), then the system has to be switched off and back on.
cxxxxxxx	Sets a new *password*. The password can be any combination of alphanumeric characters, with a maximum of nineteen characters. This command will be immediately effective (the new password will be requested at the next connection), but it will be no kept if the system is power down without saving the configuration parameters using the "*m*" command.

dx	Sets the **alarm threshold**. '*x* is the critical counting value: when the reached value is higher, the alarm is activated (this value can be from 1 up to 18.446.744.073.709.551.615). The default is 10.000.
d?	Shows the value, in hexadecimal form, of the alarm threshold.
fs	**Enables** the input signal frequency **counting** on the first channel (it works only when the counting is activated).
fk	**Interrupts** the input signal frequency **counting** on the first channel.
fp	Shows the computed frequency.
ir	Resets input interrupt counting.
i?	Shows input interrupt counting.
k	**Stops** immediately the **counting** started with "*s*" or "*t*" commands.
m	**Saves** configuration **parameters** in the internal non volatile memory (saved data are: *TCP/IP* address, *telnet* port, *password* and *checksum*).
p	Shows memorized counting, in hexadecimal form, on both channels.
q	Disconnects the device.
r	**Shows the last 100 countings memorized** on both channels in exponential notation. The execution of this command requests the use of many system resources: for this, during its execution, the pulses eventually present at the inputs could be no counted.
sx	Starts the counting. '*x* is the time in ms (it can be set out from 0 up to 51.200.000, that is from 0 and up to more than 14 hours).
tx	Starts the repetitive counting. '*x* is the time in ms (it can be set from 0 up to 51.200.000, that is from 0 and up to more than 14 hours).
u	State request (this command resets also any memorized error state)
v	Shows the firmware version and the configuration parameters (*TCP/IP* address, *telnet* port, *password* and *checksum*)

The status request message ("*u<CR>*") gets by the device a byte (2 hex characters) representing the actual status of the unit. Status code is reported here below:

bit 7: error;
bit 6: not used (always 0);
bit 5: repetitive counting state (1 = enabled);
bit 4: auxiliary output (1 = enabled);
bit 3: alarm activated (the counting has reached the set out alarm threshold value);
bit 2: alarm switched on;
**bit 1**: counting state (1 = enabled);
bit 0: frequency counting algorithm activated.

If the error *bit* is high (i. e. if device answers with a code as 81), then another code is added after a comma (more than one error code can be active). Possible codes are:

01   Syntax error
02   Illegal command (i.e. an "*s*" command when another counting is already active, or an "*k*" command during no counting)
04   Out of range parameter
08   Attempted connection when the device is already connected.
10   Invalid data on the flash
20   Invalid data checksum on the flash
40   Buffer overflow
80   Internal error

LAYOUT AND CONNECTIONS
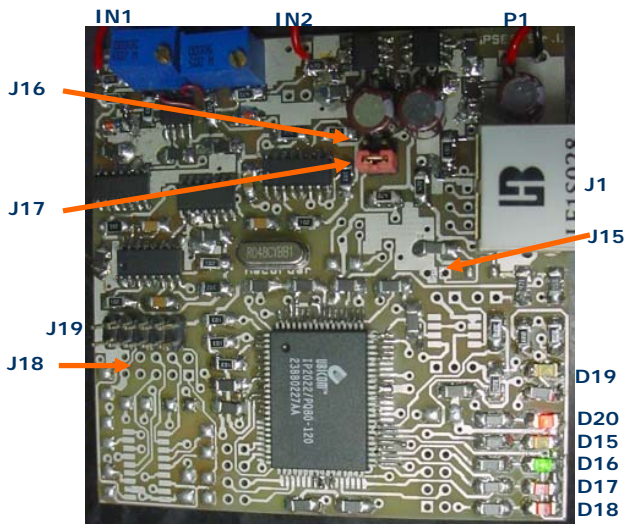
LEDs: - **D15 (green)**: Activity on the *ethernet* port.
- **D16 (yellow)**: established *link* on the *ethernet* port.
- **D17 (red)**: Collision on the *ethernet* port.
- **D18 (red)**: Error
- **D19 (yellow)**: Counting activated
- **D20 (red)**: Alarm threshold reached

Connectors:
- **IN1**: first channel input
- **IN2**: second channel input
- **P1**: power supply
- **J1**: RJ45 *ethernet* connector
- **J18**: *RS232* serial connector (optional)
- **J19**: reserved

Jumper:
- **J15**: reset
- **J16**: use the default configuration
- **J17**: reserved

TECHNICAL FEATURES

Power supply: 5Vdc stabilized.

Maximum Consumption: 150mA

Inputs: two. They accept signals from 0 up to 5V. Programmable threshold.

Max Rate: 1,6 MHz

Maximum counting: 18.446.744.073.709.551.615 (about 18 billions of billions)

Gate timer: variable continuatively from 1ms up to 51.200s (more than 14 hours).

Memory: the device can store the last 100 counting for each channel.

Alarm threshold: continuatively settable from 0 up to 18.446.744.073.709.551.615 (about 18 billions of billions)

Interface: 10base-T ethernet (RJ45 connector).

Dimension: about 70 x 70 mm (2.76 x 2.76 inches).

OTHER VERSIONS

IPSES can realize **customized versions** of this device, in order to match any customer need.
For example, is possible to ask for versions with a bigger memory or working with any **other Power Supply** value or with any kind of input signals.
Thanks to customized design, **Pulse Recorder** is a cheap device which perfectly gets all your requests.

CONTACTS

IPSES S.r.l. conceives, projects and markets electronic and scientific instruments. The customized planning of our devices allows us to answer specific necessities for customers asking for embedded systems. **IPSES** clients enjoy access to a dedicated project engineering team, available as needed.
Our pool consists of highly competent professionals whose experience in this field is extremely strong. Thanks to constant updating and technical development, **IPSES** is a leading company, combining the dynamism of a young group into the competence and reliability of a qualified staff.

IPSES S.r.l.
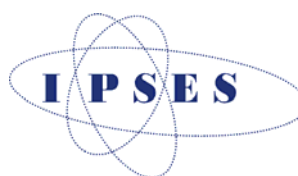
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SUPPORT INFORMATION

The customer is at liberty to contact the relevant engineer at IPSES S.r.l. directly.

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PROBLEM REPORT

The next page is a standard template used for reporting system problems. It can be copied and send as a fax. Alternative bugs may be reported by emails, in this case please insure that the mail contains similar information listed in the _Engineering Problem Report_ form.

ENGINEERING PROBLEM REPORT

Problem describer

Name			IPSES s.r.l.
			Via Suor Lazzarotto, 10
Company			**Cesate (MI)**
			Italy
			Fax (+39) 02 700403170
Date	Tel.	Fax	**e-mail** *support@ipses.com*

Product

Name	Version	Serial No.

Report Type (bug, change request or technical problem)

Major bug	☐	Urgency:	
Minor bug	☐	High	☐
Change request	☐	Medium	☐
Technical problem	☐	Low	☐

Problem Description

Reproduction of Problem

IPSES s.r.l. Action notes

Received by	Date	Report No.	Action

(Product code PulseRecorder Rel. 01.00.0002)

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