

EQUIPMENT FOR TESTING & CHECKING THE TECHNICAL CHARACTERISTICS OF PRESSURE TRANSDUCERS IN A NON-STEADY REGIME

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Abstract: The present work follows the development of a new system what achieve description of the variform characteristics to transducers of pressure measurement in transitory pressure conditions, this facilitating an exact know operation testate transducers through the presentation diverselor diagrams and gived results from the testing on this stand. Also, standing may be used in the laboratories of metrology. These, propose the integration in system of a new elements of generate the pressure and supervision the conditions obtained, with the possibility display informations, caning also compare it further on output mensurations obtained through the stockage of the informations in database.

Keywords: equipment for dynamics mensurations, strain gauge

1 FORWARD

In the last time, the very fast development of communication and IT technologies generate new opportunities for the creation of new, modern equipments for testing & checking the pressure measurement instruments.

Regarding the development of pressure equipments, they are orientd to the creation of new designing methods, based on data - acquisition and assisted design. The new pressure generator systems, the new systems for tightness, all following the european level and reccomandations are well known at the international level.

The principal aim of this work is to developpe new equipments in the field of pressure measurements, by creating competitive macatronical systems (stands), with good chances to be offered to the pressure transducers producers and/or in metrological laboratories.

Using inside the proposed system of a new elements for generating the pressure, supplemented with the computer – monitoring of the created conditions, it will be possible to reach the european level of technology for such equipments.

To measure the preformances of pressure transducers in a non-steady regim, and to guarantee the gauges, the equipment will be realised under the european inquiries. It will be used high level technologies to increase the quality and the accuracy for measurements and control of gauges dedicated to the pressure gange.

Till now, in the country exist only few tentatives for developping such systems. For this reason, the realisation of a mecatronical product, able to generate and monitoring the pressure conditions, with very fast feedback of the information to the utiliser via the computer, will be very good received by the interested people.

2 GENERAL PRESENTATION

The nopvelty degree consist in the integration in the proposed stand of some new elements for generating the pressure and for the surveillance of the created conditions, this surveillance being possible thru the computer aid, who offer too the possibility of monitoring and stcking the infos, and permitting too the following-up comparison of the results of realised measurements by stcking this in a data-base, and , in the same time, a comparison between the technical

characteristics of an etalon with the checked instrument, in the same conditions.

The difficulty consists in coupling together the elements defining the complex mechatronic system, like follows:

- An electro – mechanical part, able to generate all the conditions for the variation of the pressure, based on a very precise electromechanical moving assembly;
- A pneumatical part, offering conditions for generate the pressure and to be very tight, creating all the needed conditions for good measurements;
- A computed monitoring & stocking part, strictly imposed in such process of following – up the characteristics of different pressure transducers in non-steady regime; the classical methods of observation (dial + indicator or electronic display) are not enough precise, inducing big approximations and errors, due to the time – factor.

The novelty of this presented work consists in the solving of all this important problems.

3 DESTINATION OF THE PRODUCT

The realised equipment is dedicated to all users having in operation automation installations containing pressure measuring gauges in non-steady regime.

In the same time, potentially users can be the producers of instruments for measuring- controlling for pressure, and too the specialised laboratories inside research-development institutions, universities and companies, as in Bucharest, Ploiesti, Vaslui, Pascani, Craiova, Constanta, Galati, Cluj-Napoca a.s.o.

The presence of the computer system inside the equipment offers a high level of novelty and respects the international standards & inquiries.

4 SCIENTIFIC AND TECHNICAL PRESENTATION

The novelty consists in the use of the remote technique for checking - controlling – monitoring like a frequently used technique at international level. This kind of approach permits a better knowledge of functional parameters of pressure transducers in a non-steady regime.

More, the possible changes in the good functioning of the transducer, like the extension of the measuring range, can be very easily realised, by modifying the software or by adding, with minimal hardware connections needed, new programmable software modules.

The equipment will realise the acquisition of data from the two resistive transducers and their

transmission to the computer, for the comparison of the response-characteristics in a non-steady regime of the tested pressure transducers. This will facilitate a concrete presentation of the functioning by representing different graphics and registrations and data resulting from the test made on this equipment.

The practical functional analysis started by the identifying the conditions regarding the limits of the proposed equipment; the desired inputs and outputs offered a list of functions to be fulfilled. As it is well-known, every function of the system has its own inputs and outputs. These functions are put together, and define the necessary sequences or informational flux. In the end of this functional analysis, results a principle sketch.

Following is presented the equipment and its modus-operandi.



Fig. 1. Equipment For Testing & Checking The Technical Characteristics Of Pressure Transducers In A Non-Steady Regime

The principal components of the equipment are:

1. PC;
2. Printer;
3. Os – Oscilloscope TDS 2012;
4. Rp – Pressure regulator LR-1/4-D-MIDI;
5. S1- Valve;
6. Md- Digital Manometer DPI- 103;
7. Amplifier AED 9101 B;
8. Rez – Pressure tank of 5 l. volume;
9. S2 – Valve;
10. Power supply for the Amplifier (12 V);
11. T2- Pressure transducer under test;
12. T1 – Etalon pressure transducer P8AP;
13. D3/2 – electro-valve (power supply 220V AC);
14. Switch.

5 WORKING MODE

The transmission of pressure is like this: pressure source (compressor) – pressure regulator Rp - Ball valve S1 – pressure tank Rez – ball valve S2 – digital manometer Md – electrovalve D3/2 – etalon pressure transducer T1 – pressure transducer under test T2.

The followings are the steps of work:

Step 1 – S1 and S2 are in position “open”; the pressure from the compressor will be set with Rp thru the tank and in the all circuit, till the electrovalve.

Step 2 - when the desired for test pressure will be realised (readed on Md), close S1;

Step 3 - with manual switch pos.27, act on D3/2, switching from the preferential position 0 to the working position 1. The pressure existing in tank will détente instantly in both pressure transducers, realising a “step of pressure”.

Step 4 - the signals obtained from both pressure transducers (2mV/V) are amplified and sent to Os, pos.12. Thru RS232 interface, the signals from Os are transmitted to PC. This data are processed, memorised and stocked in the data base with the specialised software.

Step 5 - With the same manual switch pos.27, act on the D3/2 electrovalve, putting it from position 1 (work) to the position 0 (out of work), in this way both pressure transducers are free of pressure .

Step 6 – after finishing the test, the all equipment will be free of pressure acting the needle like part of the assembly pos.6.

Using the specialised software, the signals from the Os are processed and sent to the computer, where they are processed, displayed and memorated for every sequence of work. More, for stockage of data and for a better visualisation and comparison of graphics resulted from both pressure transducers, it can be used the printer .

6 TECHNICAL CHARACTERISTIQUES

- media used for pressure generation: air;
- range of pressure transducers to be checked: 0...10 bar;
- range of pressure possible to be generated by the stand: 0...15 bar (possible reglage);
- accuracy of the comparison element: 0,4
- possibilities to indicate the response-parameters in non-steady regim:
 - ♣ maximum pressure (peak value);
 - ♣ accuracy of measurement;
 - ♣ response in amplitude;
 - ♣ response in phase;
 - ♣ resonancy frequency;
 - ♣ amortisation period;
 - ♣ amplitude for super-oscillation.
- working temperature 5...40 °C.

7 CONCLUSION

The project is relevant for the re-start of the industrial sector, offering new thermotechnical products and trying to eliminate the difference between romanian producers and the similar europeans. More, the project offer the alignment to the European Market, thru this modern method for realisation of an equipment dedicated to the testing and checking of technical characteristics of

pressure measuring instruments working in non-steady regim.

The practical realisation of the stand for obtaining the non-steady regim is dedicated to the testing of pressure transducers, offering the possibility of increasing the performances and the productivity, and able to offer a fast reaction of the producer receiving infos from the user.

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