

*305/178/F2/11***System do pomiaru ciśnienia spalania (indykacji) w silnikach
spalinowych.****Indicating system for combustion pressure measurement in
combustion engine.**

CPV 38540000-2

**SPECIFICATION of ESSENTIAL CONDITIONS
of the SCOPE of ORDER (SEC)****OPEN TENDERING PROCEDURE
REFERRING TO PUBLIC PROCUREMENT LAW**

(ACT of 29 January 2004 PUBLIC PROCUREMENT LAW, with amendments).

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Contents: 9 pages and 3 appendices

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§1. INTRODUCTION

1. The item of order is a high speed indicating system, for crank angle related measurements on internal combustion engines.
2. The system must be designed to be fully integrated into BOSMAL's existing test benches automation systems, specifically the AVL PUMA Open and HORIBA STARS (option) systems.
3. The indicating system should be designed, manufactured and installed for periodically continuous operation (24/7), and the system's assumed life time should be at least 10 years.

§2. THE ITEM OF ORDER DESCRIPTION

1. The item of order is an indicating system, suitable for research and development activities on engines with up to 6 cylinders. The main capabilities of the system are to include:

- Crank angle based data acquisition with simultaneous real-time evaluation of indication
- Oscilloscope mode and single measurement in real-time, multi-channel digital voltmeter
- Event monitoring
- Event triggered measurement with pre and post history
- Channels with individual measurement ranges and variable resolutions
- Test bench automation system connection: remote control from the AVL PUMA and/or HORIBA STARS (option) via serial link (RS 232) or TCP/IP
- Continuous measurement
- Snapshot measurement
- Continuous monitoring
- Cold start measurement

2. The item of order should be a system with the following technical data, as a minimum:

- 8 analogue differential inputs with individual 14 Bit / 800 kHz ADC per channel:
- Input voltage +/-10 V
- On-board data memory 64 Mbyte with the possibility to extend to 256 MByte
- Angle- and measurement resolution: definable between 0.025 to 1.0 deg. crank angle
- 8 digital outputs: TTL level (alternatively to be configured as 4 open collector and 2 relay outputs)
- Sockets for connecting to AVL Angle Encoder 364 or 365
- Integrated CDM-multiplier incl. 60-2 logic (TTL level required) for a measurement resolution up to 1.0 deg. c.a.
- PC-connection via GigaBit Ethernet

- Possibility to extend number of input channels up to 32

3. The main capabilities of the software for the indicating system:

- Detailed analysis of the combustion process: burn rate, heat release speed, peak value and position, indicated mean effective pressure (total IMEP, high pressure portion, low pressure portion), pV diagram, etc.
- Timing and angle position measurement of signals, e.g. injection timing
- Thermodynamic results: polytrophic coefficients for compression and expansion phase, start of combustion, center of gravity of heat release, mass burned fraction points, etc.
- Arithmetic functions: mean and integral values, high pass and low pass filter, first and second derivation, etc.
- Classification / distribution of result values
- Curve averaging and envelope curve display
- Statistics: minimum, maximum, mean value, standard deviation, standardised min./max. and coefficient of variance
- Fast Fourier transformation for frequency and order analysis
- Digital filters (FIR and IIR)
- Combustion noise analysis (third octave and narrow band analysis)

4. The item of order should also include the additional equipment:

4.1. An angle encoder suitable for mounting on a free crankshaft end or belt pulley. Precise measurement up to $n = 20\,000$ rpm, including during dynamic operation

4.2. 8-channel indicating amplifier for acquisition of 6 combustion pressure signals or other piezoelectric signals and 2 multi purpose channels at the test bed or in vehicle.

Technical Data:

Temperature range $-40^{\circ}\text{C} \dots +60\text{ C}$ ($-40\text{ deg. F} \dots +140\text{ deg. F}$)

Linearity $< \pm 0.01\%$ FS

Output voltage $-10\text{ V} \dots +10\text{ V}$

Piezo amplifier channels:

Sensitivity $8\text{ pC/V} \dots 800\text{ pC/V}$

Upper cut off frequency (lowpass) 20, 50 or 100 kHz remote controlled selectable

Resolution for gain factor 12 Bit

Multi-purpose amplifier channels:

Bridge supply voltage $0.001\text{ V} \dots 9.999\text{ V}$

Constant current supply $0.001\text{ mA} \dots 9.999\text{ mA}$

Frequency range $0 \dots 100\text{ kHz}$

Gain factors 1 to 5000

Resolution of offset factor 14 Bit

5. Installation and Acceptance

5.1. Media parameters onsite at BOSMAL are the following: power supply 400 V +/-5%, 230 V +/-5%, compressed air: 8 bar.

5.2. The scope of delivery of the system should include system documentation, in English (1 paper copy and electronic version on CD), consisting of at least:

- Mechanical schematics ;
- Schematics of all electric components and connections with description of usage codes;
- Operation, repair and maintenance manuals including a description of: measurement execution procedures, functions of system components and software.
- Spare parts list;
- Declarations of conformity according to at least the following safety standards:
 - 2006/42/EC – safety of machinery;
 - 89/336/EEC and 2004/108/EC – electromagnetic compatibility;
 - 73/23/EEC – low voltage devices;
 - PN-EN ISO 12100-1:2005 i 12100-2:2005 – safety of machinery;
 - PN-EN 61326-1:2006 (U) – electromagnetic compatibility;
 - PN-EN 61010-1:2004 – low voltage devices;

5.3. Scope of responsibility:

#	Task	BOSMAL	Supplier
1	Design of the system layout		x (BOSMAL acceptance required)
2	Delivery		x (DAP)
3	Unpacking		x
4	Locating the system components	x	x (Technical support + supervision)
5	Commissioning		x
6	Final acceptance	x	x
7	Training		x

6. Training, Warranty, Service

The Supplier of the unit shall be obliged to provide the following:

- Training in system operation and maintenance onsite at BOSMAL

- Warranty for minimum 12 months and necessary maintenance within this period together with all required consumable parts and service. Warranty time starts from date of commissioning (signing acceptance protocol).
- Service response within 24 hours and service action within 5 working days during the warranty period (experienced engineer with spare parts at BOSMAL side). Maximum repair period 10 working days from notification of the fault. If the failure is not resolved in the above-mentioned period, the faulty unit has to be replaced with a new one.
- Service within 10 working days after expiry of the warranty period (experienced engineer with spare parts at BOSMAL side).
- Maintenance of the complete system just before expiry of the warranty period.

The Supplier can ask for further explanations concerning the order terms on working days during the hours: 07.00 – 14.00. The person responsible in the commercial field is Mr Zbigniew Liszewski – Purchasing Department, e-mail: zbigniew.liszewski@bosmal.com.pl, room no. 328, and in the technical field is Dr Piotr Bielaczyc – Engine Research Department, e-mail: piotr.bielaczyc@bosmal.com.pl, room no. 113C.

§3. CONDITIONS FOR PARTICIPATION IN THE PROCEDURE

Tenderers which fulfil the following requirements are eligible to submit offers:

1. Have the necessary knowledge and experience and have at their disposal the technical potential and personnel capable of executing the contract;
2. Have the authorisations to perform specific activities or actions, if such authorisations are required by the law;
3. Are in a financial and economic situation to ensure full completion of the contract;
4. Have reported an annual turnover above 10 million EUR;
5. Are not liable to exclusion from the tender procedure (Polish Public Procurements Law, article 24, paragraph 1);
6. Have completed at least ten contracts similar in their nature – indicating system for combustion pressure measurement – for carmakers, engine manufacturers, and R&D centres in the last 5 years, with at least 1 such project for BOSMAL's main customers: FIAT, FPT, or GM.
7. Have paid the deposit prior to the final date for submission of the offers, the deposit for the amount of 8 000 PLN or 2 000 EUR, to be retained during the period in which the Tenderer must maintain their offer. The deposit paid in currency shall be paid by bank transfer into either the bank account for PLN: 32 1240 4142 1111 0000 4823 8630, or for EUR: 39 1240 4142 1978 0000 4823 0559 – SWIFT: PKOPPLPW; Bank Pekao SA O/Bielsko-Biała.

8. The awarding entity will retain the deposit, together with interest earned, if the Tenderer fails to submit documents, statements and powers of attorney (as referred to in article 25 paragraph 1), in response to the request referred to in article 26 paragraph 3 of the Act, unless the Tenderer can prove that this was due to events beyond the Tenderer's control.

§4. DESCRIPTION OF OFFER PREPARATION

1. The offer shall be prepared in Polish, using a document format which cannot be altered without leaving a trace of the amendments made. The awarding entity agrees on the submission of part of offer referring to technical description in English version (Polish Public Procurements Law, article 9).
2. The offer should have numbered pages, beginning with 1 on the first page. Pages of documents mentioned in points 6 and 9 must also be numbered. All pages must be securely fastened together, so that no material can be removed.
3. The offer must begin with the fully completed "Offer" form (Appendix no. 1 of SEC).
4. Each page of the offer must be signed by a person authorized to sign the offer.
5. Any corrections must be signed by a person authorized to sign the offer.
6. The offer should include the following documentation:
 - I. Documents confirming fulfilment of the conditions for participation, such as:
 - a declaration that the Tenderer has the necessary knowledge and experience and has at their disposal the technical potential and personnel capable of performing the contract,
 - a declaration that the authorisations to perform specific activities or actions, if such authorisations are required by the law;
 - a declaration that the Tenderer is in financial and economic situation to ensure the completion of the contract;
 - a financial declaration (Appendix no. 3 of SEC, with all required documents);
 - a declaration that the Tenderer is not excluded from the tender procedure according to Polish Public Procurements Law, article 24, paragraph 1;
 - a list of at least ten contracts similar in their capacity, performed within the past 5 years for carmakers and OEM Suppliers with details referring to dates of delivery and customers;
 - a current copy of the relevant entry in a Register of Companies;
 - a declaration that the Tenderer does not have social insurance and/or tax arrears;

- a declaration that the Tenderer has no entry in the applicable National Register of Criminal Records, according to Polish Public Procurements Law, article 24, paragraph 1, p. 4-9.

Foreign Tenderers should submit documents issued according to the legal regulations of the country of origin, in English.

II. The offer should also include a technical description of the item of the order, in Polish or English.

7. The Tenderer may submit only one offer containing one final price for the item of order.
8. The awarding entity does not permit the possibility of submitting supply for lots; the offer must include all analysers referred to in Part A, point 1.1.1.
9. In cases where the Tenderer is represented by a plenipotentiary, an adequate power of attorney ought to be enclosed to the offer.
10. In cases where materials other than those required for the tender application are sent, they should be delivered as a separate package, not included in the offer.
11. Documents and information presented in the offer which are confidential to the Tenderer and which should not be made available to other participants, ought to be indicated as “**Company secret**” and delivered as a separate consignment, not attached to the offer.
12. The offer shall be delivered in closed packaging and identified: “**Offer for Engine Indicating System**”.
13. Offers that do not fulfil the above-mentioned requirements shall be rejected in accordance with Polish Public Procurements Law, article 89, paragraph 1.

§5. EVALUATION OF THE OFFERS

1. The basic version of the offered indicating system must fulfil all the minimum requirements, as expressed in points: § 2 of SEC, parts 1-5.
2. The awarding entity may require the Tenderer to provide explanations concerning the contents of submitted offer and correct any computational errors in the calculation of prices, according to Polish Public Procurements Law, articles 87.

3. The weightings of the evaluation criteria of the offer are as follows:

Criterion	W
Price of the complete system (with necessary maintenance and consumable parts during warranty period), including full integration into BOSMAL's test bench automation systems, training and all relevant software	88 %
Duration of warranty period (over the 1 year minimum)	4 % per year; max. 8 %
Remote control from the HORIBA STARS automation system	4%
Total	100

Price evaluation method:

$$L_c = \frac{C_{\min}}{C} \times 88,$$

where:

- L_c is the number of points obtained for the price criterion,
 C_{\min} is the lowest price value of all offers,
 C is the price value of the offer under evaluation.

- Prices expressed in EUR will be transferred into PLN according to NBP (Polish National Bank) middle exchange rate from the day of the opening of the offers.
- The awarding entity shall inform all Tenderer who have submitted tenders of the selection of the best offer, in writing.
- Where the best offer cannot be selected as two or more offers represent the same balance of evaluation, the awarding entity shall call upon the Tenderer to submit additional offers, within a specified period.
- Decisions will be made regarding the options after the offers have been opened.
- The tender procedure may be cancelled in certain cases, as specified in Polish Public Procurements Law, article 93.

§6 TERMS

1. Submission of the offers

Offers shall to be submitted to the Purchasing Department of BOSMAL Automotive R&D Institute Ltd, room 328 or 361, ul. Sarni Stok 93, 43-300 Bielsko-Biała, by 12⁰⁰ on **21.11.2011**; any offers delivered later than this will not be considered.

2. Validity of the offers

The Tenderer must maintain their offer for a period of 30 days. The period during which the Tenderer must maintain his offer shall commence with expiry of the time limit for submission of offers (Polish Public Procurements Law, article 85).

3. Opening of the offers

Offers shall be opened in room 401 in BOSMAL Automotive R&D Institute Ltd, ul. Sarni Stok 93, 43-300 Bielsko-Biała, on **21.11.2011** at **12³⁰**.

4. Performance of the contract

The acceptance procedure of the contract must be completed by **30.12.2011 (demanded)**.

§7 ADDITIONAL CONDITIONS

1. The Tenderer shall be entitled to the legal protection measures specified in Polish Public Procurements Law.
2. The awarding entity shall request the Tenderer to provide security on due performance of the contract for the amount of 5 % of the offered net price. The awarding entity shall return the security according to the conditions specified in the contract (Appendix no 2 of SEC).

§8. APPENDICES

1. Offer form
2. Contract template
3. Financial declaration form

END of the SEC.