

OPERATION MANUAL

FORCE GAUGE

FA Series

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1. Introduction

The FA series force gauges are designed for measuring pressure or pulling force in laboratory, manufacturing and quality control applications.

Measurements up to 200N are executed by holding the gauge in hand. Measurements from 200N to 500N require using a double-hand handle (additional equipment). It is also possible to use the force gauge mounted on a stand (additional equipment).

To measure bigger forces (over 500N) force gauges with external sensor are used.

The RS232C serial connector allows the measurement results to be transmitted to a computer or a printer for further analysis or recording.

Additional information regarding FA00 force gauge are located in Appendix A (p.41).

2. Basic Set

- 1. The basic set includes the following elements:
- 2. Force gauge,
- 3. Power supply unit ~230 V 50 Hz / =12 V; 1.25 A,
- 4. SK-1 cable (dynamometer computer),
- 5. CD containing an operation manual and software,
- 6. Warranty.

Moreover: for FA50-FA500: Push tips -4 pcs, 1 hook tip, 1 extension piece for FA1k-FA50k: bearings -2 pcs

3. Safety instructions

3.1 Main safety rules



Read carefully the safety instructions included below. Observe these instructions to avoid electrocution or damage to the force gauge itself or other devices connected to the force gauge.

- Repairs and any necessary adjustments may only be conducted by qualified personnel.
- Do not use the force gauge when any part of the enclosure has been removed.
- Do not use the force gauge in potentially explosive atmospheres.
- Do not use the force gauge in areas with a high humidity.
- In the case of suspected damage to the force gauge, turn off the gauge and do not use it until it is examined by a specialised servicing facility.

3.2 Safety rules during measurements above 1kN (about 100kg)

• Putting into service

Measurement set, which includes force gauge must exceed actual forces during measuring by its measurement range. Exceeding force gauge range (by more than 10%) may cause damaging the sensor and constitutes a threat to personnel.

Measurement stand that consists of force sensor, screw with bearings for transferring forces and measured objects, must be mounted safely.

• Mounting and dismounting

Mounting and dismounting the measurement stand should be made under control of authorized personnel (technical supervision). Installation consists of attaching sensor to measured objects. This should be made using screw with bearings. The screws should be screwed into sensor threaded holes over the entire depth of the thread and spin by nuts. In light of the bearing (in the eye), insert the power transfer element (from measured object) with a circular cross-section matched to the diameter of the bearing, such as shackle. All elements of the power transfer from one side and the other side of the sensor must have adequate strength, as evidenced by a proper certificate.

• Exploitation

On the basis of this force gauge manual, a whole measurement system manual should be developed by user. Measurement system manual should be available on the measurement post during exploitation. Personnel should be familiar with security rules.



If any damage is noticed immediately stop operation.

Maintenance, inspections and repairs

Maintenance, inspections and repairs on measurement post should be executed only by representatives of contractor or trained personnel. If the post is under technical supervision, this activities should be executed under supervision of qualified person within the meaning of act on technical supervision.

4. Rules for handling a worn force gauge



According to the applicable regulations on the protection of the environment, do not put worn electronic devices in containers for common waste.

• When put out of operation, a worn force gauge can be delivered to bodies authorised to collect old electronic equipment or to the point of purchase.

5. Technical data

Туре	FA50	FA200	FA500	
Maximum force measured	50N (~5kg)	200N (~20kg)	500N (~50kg)	
Reading graduation (d)	0,01N (1g)	0,05N (5g)	0,1N (10g)	
Accuracy		±0,05%		
Measurement units		N, g, lb, oz, kg		
Maximum overload		20%		
Operating temperature		-10 ÷ 40°C		
Internal resolution		24 bits (16mln gradua	ation)	
Process speed		10 or 40 measureme	nts/s	
Internal memory capacity	8x800 measurements			
Interface	RS	-232C (standard) or US	B (option)	
Assisting software	FM (time characteristics, statistic analysis,			
	data archiving)			
Display		LCD graphical 61x	34mm	
Measurement ontions	Maximal value measurement, serial measurement,			
	dynamic measurement (time diagrams)			
Power supply	lithium polymer batteries set 1000mAh (LP703048P6H type)			
	+ supply ~230V 50Hz / 12V 1,2A			
Accumulator working time	~20h (~45h backlighting off)			
Measurement mantrel	11mm (thread M6x9mm)			
Dimensions	210x110x40mm			
Weight		700g		

Туре	FA1k	FA2k	FA5k	FA10k	FA20k	
Maximum force measured	1kN	2kN	5kN	10kN	20kN	
Maximum force measured	(~100kg)	(~200kg)	(~500kg)	(~1t)	(~2t)	
Reading graduation (d)	0,2N (20g)	0,5N (50g)	1N (100g)	2N (200g)	5N (500g)	
Accuracy	±0,05%					
Measurement units			N, g, lb, oz, kg			
Maximum overload			20%			
Operating temperature			-10 ÷ 40°C			
Internal resolution		24 bi	ts (16mln gradua	ation)		
Process speed		10 o	r 40 measureme	nts/s		
Internal memory capacity	8x800 measurements					
Interface	RS-232C (standard) or USB (option)					
Assisting software	FM (time characteristics, statistic analysis,					
	data archiving)					
Display	LCD graphical 61x34mm					
Moasurement ontions	Maximal value measurement, serial measurement,					
	dynamic measurement (time diagrams)					
Power supply	lithium polymer batteries set 1000mAh (LP703048P6H type)					
	+ supply ~230V 50Hz / 12V 1,2A					
Accumulator working time	~20h (~45h backlighting off)					
Measurement mantrel	-					
Dimensions	210x110x40mm + sensor					
Weight		46	60g+sensor weig	ht		

Туре	FA50k	FA100k	FA200k	
Maximum force measured	50kN	100kN	200kN	
Maximum force measured	(~5t)	(~10t)	(~20t)	
Reading graduation (d)	10N (1kg)	20N (2kg)	50N (5kg)	
Accuracy	±0,05%			
Measurement units		N, g, lb, oz, kg		
Maximum overload		20%		
Operating temperature		-10 ÷ 40°C		
Internal resolution	2	4 bits (16mln graduation		
Process speed	10 or 40 measurements/s			
Internal memory capacity	8x800 measurements			
Interface	RS-232C (standard) or USB (option)			
Assisting software	FM (time characteristics, statistic analysis,			
	data archiving)			
Display	LCD graphical 61x34mm			
Measurement options	Maximal value measurement, serial measurement,			
	dynamic measurement (time diagrams)			
Power supply	lithium polymer batteries set 1000mAh (LP703048P6H type)			
	+ supply ~230V 50Hz / 12V 1,2A			
Accumulator working time	~20h (~45h backlighting off)			
Measurement mantrel	-			
Dimensions	210x110x40mm + sensor			
Weight	460g+sensor weight			

6. Keys and indicators



Main keys

ON/OFF UNIT/CLEAR BACKLIGHT ENTER (→0←)	 ON / OFF key (standby), Change units / cancel selection or change a parameter value, Turn on illumination (ECO mode), Confirm / select an option or a digit, Zeroing / resetting (entering the current reference value to be subtracted from the manufacture values in each consecutive manufacture).
	Navigation keys:
↑ ↓ → ENTER	 Move cursor up or increase the digit marked by the cursor, Move cursor down or decrease the digit marked by the cursor, Move to the next menu level or display the next option, Move to the previous menu level or display the previous option. Confirm the entered parameter or select a highlighted option,
MENU PEAK MEM PRINT	 Function Keys: Meter function menu (diagram menu - chapter 18), Measure the maximum value, Save the result to the memory, press and hold – save to memory menu, Print result (transmission via RS-232C connector).
OFF SLW/FST ACQ	 Indicators: Indicates that the weighing result has stabilised, Appears after turning off the gauge using the ON/OFF key (standby), Slow/fast measurement mode, Automatically acquire measurement results.

- Automatically acquire measurement results. AUT
 - Autozeroing on

Note:

Numbers are entered using the navigation keys. First, the cursor is placed in the right digit position.

7. Preparing the force gauge for operation



If the force gauge has been transported from an area with low temperature to an area with a higher temperature, e.g. during winter, water may condensate on the gauge's enclosure. In such a case, do not turn on the gauge's power supply, as it may lead to damage to the gauge or improper operation. Before turning on the gauge, leave it for 1 hour to acclimatise.

- 1. Take the gauge out of the case.
- 2. Fit a measurement tip suitable for the measurements to be conducted on the gauge plunger.



Intended use of the individual tips:

- tip A measurement of surface pressure force,
- tip B measurement of point pressure force,
- tip C measurement of pressure on an axis or an edge,
- tip D measurement of edge pressure force,
- tip E hook for measuring pull force or suspending and weighing an object,
- tip F extension piece suitable for all types of above-mentioned tips.

Force gauges with a range from 1kN to 20kN are equipped with an external force sensor connected by a rod with a plug. Bearings are connected to the extensionetric force gauge in order to avoid unwanted stress when mounting load.-{}-

The meter is delivered in two carrying cases (separate for the meter and for the sensor).



8. General rules for use



When transporting the force gauge, unscrew the measurement tip and put the gauge in the case to protect it against accidental pressure on the gauge plunger.

- 1. When conducting measurements by hand, make sure that the direction of the measured force is identical with the gauge's axis (axis of the gauge plunger). Otherwise, only a component force along the gauge's axis will be measured.
- 2. The gauge allows for resetting in the entire measurement range (this operation is called taring in the case of measuring the mass) by pressing the $\rightarrow T(0) \leftarrow$ key. Resetting/taring does not extend the measurement range but only subtracts the entered reference value from the measured value.
- 3. The measurement mechanism is a precision device and is sensitive to shocks and vibrations. It is not allowed to hit the measurement tip against any objects.
- 4. Do not overload the gauge above the maximum overload value (20%).
- 5. Accumulators set situated inside the force gauge housing, should be exchanged when working time decreases to 20 % of nominal time (below 4 hours).

9. Turning on the gauge

AXIS
AXIS Sp. z o.o.

ul. Kartuska 375B 80-125 Gdańsk



CONTINUOUS M	IEASUREMENT
•	0.00N
 ⇒	+
•	

Place the gauge in the operating position, e.g. horizontal position (by laying it on a table). Turn on the gauge by pressing the *ON/OFF* key.

When necessary, plug the gauge's power supply unit to a $\sim 230 \text{ V}/50 \text{ Hz}$ socket and connect the power supply unit's plug to the gauge's 12 V socket.

The gauge automatically tests the electronic subassemblies and then resets. During this operation, the gauge should remain stationary and its sensor should not be affected by any forces.

After the resetting has been successfully completed, the gauge indicates zero.

Unsuccessful resetting is signalled by an appropriate message.

Note:

It is possible to accelerate the resetting process by pressing the *MENU* key, which will recall the results from the previous resetting.

If the batteries are low, leave the gauge's external power supply unit ON until they are fully recharged. The batteries' charge level is signalled by an indicator in the upper section of the display.

10. Description of measurement methods

The gauge can be used to measure pressure and pull forces. In addition, when mounted properly, it can be used as suspension scales to measure the mass.

10.1 Measuring actual and peak value of a pressure/pull force





Measuring pressure force





Measuring pull force external load cell vertion

Before starting the measurement, choose a suitable measurement tip, screw it to the gauge plunger and reset the gauge in the operating position, e.g. horizontal position (laying the gauge on a table). The resetting process starts automatically after turning on the gauge or by pressing the $\rightarrow T(0) \leftarrow$ key.

RESETTING



	PEAK MEASUREMENT		 }
	РК↑	LOCK	0.10N
		⇒	+
↓	0,00		0,10

To perform the measurement, indicate the force direction using an arrow in the display's lower bar section and "+" (pressure) or "-" (pull force) symbol.

To change the measurement from the actual value (continuous measurement) to the maximum value (peak measurement), use the *PEAK* key. Pressing again *PEAK* button will change direction of the measured force(PK \uparrow , PK \downarrow), zeroing by using $\rightarrow 0 \leftarrow$ key.

When measuring maximum value, at the bottom of the screen appears a bar showing actual force value and maximum force value for other force direction if it was measured before otherwise 0,00 value will indicate.

10.2 Force characteristics measurement, measurement registration to memory

In order to enable changing force measurement and to create results visualizations (graphs or histograms), force gauge is equipped with actual results buffer memory and a memory that holds up to 8 files with measurement results. Detailed description of available options can be found in 13.1 chapter.



↑

After pressing MEM key results are stored in buffer memory

If ACQ indication is turned off, single measurement is stored.

When ACQ indication is turned on, *MEM* key starts storing measurements in equal time intervals.

During measurement storing, numbers of samples and total sum of samples are displayed.

After storing all samples a graph is displayed.

ENTER – returns to force indications, *MEM* – *Statistics* results displaying.

Statistics option is used for obligatory storing or deleting actual results (next measurement is possible only after deleting).

UNIT/CLEAR enables quick exit from *Statistics* option.

10.3 Measurement of the mass – using the gauge as scales

When using an additional element (bowl, basket, etc.) for suspending an object to be weighed, the gauge can be used to measure the mass. In the case of measurements which do not require a high level of precision, the gauge can be hand-held. To ensure maximum precision of the measurement, the gauge should be mounted on a stand using the four threaded holes at the bottom of the enclosure or it can be suspended using a special suspension element (option available on request).

While the measurement of the force is independent of geographical factors, the measurement of mass requires gravity force. Since the value of the gravity force used to calculate the mass depends on the gravitational acceleration in the location where the gauge is used, the device is calibrated for a specific value of the gravitational acceleration.

Example: Force gauge calibrated by producer in Gdansk (54° 21' N, h=114m above sea-level), during weighing 5kg will indicate 5,000kg, but when it will be moved to Katowice (50° 15' N, h=250m above sea-level.) it will indicate 4,998kg.

The factory preset value is the gravitational acceleration in AXIS headquarters location ($g_R = 9.81415 \text{ m/s}^2$). When using force gauge as a balance in place with significantly different gravity force (more than ±0,00 200m/s2) inscribe proper gravity force or inscribe latitude with above sea-level value. To do that use *Calibration* option from force gauge menu.

The values of the gravitational acceleration for some of the Polish cities are presented in the table below.

City	$g_R[m/s^2]$	City	$g_R[m/s^2]$
AXIS	9.81415	Olsztyn	9.81354
Gdańsk	9.81446	Łódź	9.81164
Gdynia	9.81453	Mława	9.81295
Białystok	9.81294	Opole	9.81076
Bydgoszcz	9.81327	Piła	9.81330
Chojnice	9.81342	Poznań	9.81266
Cieszyn	9.80960	Przemyśl	9.80991
Częstochowa	9.81061	Przeworsk	9.81009
Elbląg	9.81430	Radom	9.81146
Ełk	9.81361	Rybnik	9.81008
Gliwice	9.81025	Rzeszów	9.81010
Gorzów Wielkopolski	9.81305	Słupsk	9.81449
Grudziądz	9.81368	Suwałki	9.81377
Kalisz	9.81184	Szczecin	9.81370
Katowice	9.81008	Tarnów	9.81005
Kielce	9.81063	Toruń	9.81313
Koszalin	9.81427	Warszawa	9.81240
Kraków	9.81005	Włocławek	9.81288
Leszno	9.81206	Wrocław	9.81131
Lublin	9.81128	Zielona Góra	9.81190

Gravitational acceleration for selected cities



Measurement using a hand-held gauge



Measurement using a gauge mounted on a stand (stand available on request)



Suspended weight measurement (suspension element available on request)



Screw the hook tip to the gauge plunger, suspend a bowl on the hook and place the gauge in the operating position (as shown in the figure). The display's indications will rotate by 180°.

To change force units to mass units, press the UNIT/CLEAR or MENU key several times. When using the MENU key, move the cursor to Units and press ENTER.

Move the cursor to a mass unit (*kilogram* or *gram*) and press *ENTER*.

Reset the gauge in the operating position by pressing the $\rightarrow T(0) \leftarrow$ key.

Place the object to be weighed on the bowl.



Read the mass.

11. Connecting external devices

The force gauge is equipped with a socket for an external power supply unit and RS232C serial connector for a printer or a computer.



PL	EN
ZASILACZ	POWER SUPPLY UNIT
masa	gnd

Description of the data transmission protocol when working with a computer *(LonG)*:

The scales transmit the result as follows (8 bits, 1 stop, no parity, 4,800 bps): Computer→Gauge: initiating signal S I CR LF (53 h 49 h 0Dh 0 Ah), Gauge→Computer: gauge indication according to the following format (16 bytes):

Description of individual bytes:

byte	1	- "-" or space
byte	2	- space
byte	3÷4	- digit or space
byte	5÷9	- digit, comma or space
byte	10	- digit
byte	11	- space
byte	12	- k, l, c, p or space
byte	13	- g, b, t, c or %
byte	14	- space
byte	15	- CR
byte	16	- LF

12. User's Menu

The User's Menu includes all functions and options necessary to operate the gauge or extend its functionalities.

	USER's MENU	
1.	Applications	

- 2. Units
- 3. Configuration
- 4. Calibration
- 5. Info
- 6. Exit

To use the options of the USER's MENU, use the *MENU* key. Move the cursor to the desired option and press *ENTER*.

The menu includes:

- 1. Applications advanced measurement functions,
- 2. Units select measurement units,
- 3. Configuration set the gauge's mode of operation,
- 4. *Calibration* adjust the measurement accuracy using an external standard of mass.
- 5. *Info* basic information about device: model, measurement range (Max), internal program version, serial number, manufacturer
- 6. *Exit*.

13. Applications

This selection includes the following functions to effectively assist you with the measurement:

- memory operations and data analysis,
- comparison with two threshold values (MIN / MAX).



Move the cursor to *Applications* and press *ENTER*.

Move the cursor to the desired application and press *ENTER*.

13.1 Data stored

The Data memory application allows for the following:

- presentation of the collected measurements, saving, reading, erasing memory (Statistics),
- selecting the mode for collecting data,
- exit.



APPLICATIONS	
1. Statistics	
2. Mode	<manual> <auto></auto></manual>
3. Smp. count	100
4. Smp. time	0.1 sec
5. Exit	

A	PPLICATIONS	
1. 2. 3. 4. 5.	Statistics Mode Smp. count Smp. time Exit	AUTO 100 0.1 sec

↑ ↓ ENTER

Move the cursor to *Applications* and press *ENTER*.

Move the cursor to *Data stored* and press *ENTER*.

Setting the mode for collecting data:

- *MANUAL* – each time after *MEM* is pressed,

- *AUTO* – automatically at specified intervals.

Po wybraniu trybu *RĘCZNEGO* należy określić czy zapisywany ma być czas każdego pomiaru (opcja *R/D&T*) oraz miejsce zapisu wyników (*RAM* lub plik 01÷08) After selecting *AUTO*, enter the number of samples (max 100) and sampling time (0.1÷99.9 s. or 0,025÷25s zależnie od ustawienia szybkości pomiaru w *Konfiguracji*).

To start the collection of measurements, exit the menu and press *MEM* several times or press *MEM* for automatic save. When in the automatic save mode, press and hold *MEM* to go to the data save menu.

Presentation of collected measurements (Statistics)

The *Statistics* option allows for the following forms of presentation of the collected data:

<PRINT> - transmission to a printer,

<HISTOGRAM> – bar graph,

<GRAPH> – graph with a time axis.



Save, read, erase memory (Statistics)

The Statistics option allows for the following:

- < SAVE > saves the data currently presented,
- < READ > reads a file from the memory,
- < *RESET* > erases the data currently presented,

< DELETE> – deletes a selected data file.

USER's MENU	
 Applications Units Configuration Calibration Info 	Move the cursor to <i>Applications</i> and press <i>ENTER</i> .
APPLICATIONS	
 Data stored Threshold Exit 	Move the cursor to <i>Data stored</i> and press <i>ENTER</i> .
DATA MEMORY1. Stats2. Mode3. Number of samples4. Sampling time5. Exit	Move the cursor to <i>Stats</i> and press <i>ENTER</i> . The following options (lower bar)
Statistics Quantity 100 Sum 990 g Average 9 g MAX 12 g MIN 8 g <print> <save><read> <reset><exit></exit></reset></read></save></print>	 will appear: SAVE – saves the measurements currently presented, <i>READ</i> – reads a measurement file, <i>RESET</i> eroses the memory
SAVE DATA < FILE01 > < FILE02 > < FILE08 >	- EXIT – exits the option. Select the SAVE option. Select a file (FILE) to be saved.
	R
SAVE DATA 2009-12-17 10:00 < FILE02 > < FILE08 >	The default file name includes date and time. Confirm the default file name or enter another name using the \rightarrow , \leftarrow , \uparrow and \downarrow keys.
↑ ↓ ENTE	R

13.2 Comparison with threshold values MIN / OK / MAX

This selection includes the following functions to effectively assist you with the measurement:

- memory operations and data analysis,
- comparison with two threshold values (MIN / MAX).

14. Units

Basic measurement unit for force gauge is 1N (force in SI unit) The following units are available to the user:

- kilogram (kg) 1kg ≈ 9,81415N
- Pound: 1 lb = 453.592374 g
- ounce: 1 oz = 28.349523 g
- Newton: 1 N = 0.10197 kg

(starting from FA0021 program version):

- kilogram-siła (kgf): 1kgf=9,80665N
- pound-force (lbf) 1lbf=4,4482N
- ounce-force (ozf) : 1ozf= 0,278N

To change the units, press the UNIT/CLEAR or MENU key several times.

USER's MENU	
 Applications Units Configuration Calibration Exit 	
UNITS [N] [kgf] [lbf] [ozf] [kg] [lb] [lb] [oz]	
	ENTER

Press the *MENU* key, move the cursor to *Units* and press *ENTER*.

Move the cursor to the desired unit and press *ENTER*.

Calculating force and mass units is connected with gravitation force for the place of measurement. Taking preset value of gravitation:

$$g_R = 9,81415 \text{m/s}^2$$

1kg= 9,81415N

we get conversion: 1k

In order to use mass units (kg or lb) as force units derived from mass units: kG (kilogram force), Lb and Lbf (pound force) it is necessary to inscribe normal gravity acceleration value : $g_N=9,80665$ m/s² (*Calibration*) instead of preset value $g_R = 9,81415$ m/s².

The difference is important only in very precise measurements.

15. Configuration

This selection includes all options for setting the gauge's modes of operation.

USER's MENU	7
 Applications Units Configuration Calibration Info 	Mov and
CONFIGURATION	
 Measure speed Auto-zeroing Printout Interface LCD settings Language Time and date Keyboard Auto-OFF Battery Firmware update Defaults Exit 	Mov

Move the cursor to *Configuration* and press *ENTER*.

Move the cursor to the desired option and press *ENTER*.

15.1 Measure speed

To obtain clear measurement results, it is recommended to adjust the speed of measurement to the dynamic properties of the measured object.

Press *ENTER* to select one of the options:

- SLOW - slow measurement

(10 measurements/s),

- FAST – fast measurement

(40 measurements/s).

15.2 Auto-zeroing

When activated, this option automatically maintains zero indications on the gauge, if the gauge's sensor is not affected by any external force or if the zero indication was produced by pressing the $\rightarrow(0) \leftarrow$ key. The range of values (calculated in the gauge's reading graduation near zero) subject to the reset must be entered under the *Range* option (2 digits).

Use the navigation keys and *ENTER* to select *Status* and one of the following options:

- ON auto-reset ON,
- OFF auto-reset OFF.

Next, select *Range* and use \uparrow , \downarrow , \rightarrow , \leftarrow and *ENTER* to enter the auto-reset range (in reading graduation).

Referen. option enables to set start zero value to the value indicated before entering *MENU* (during each force meter turning on the actual load compared to set value will be indicated).

15.3 Print settings

According to the requirements of GLP procedures, it is possible use an external printer to produce print-outs from the gauge including text information.

15.4 Setting parameters for serial connectors

The parameters of the serial connector must be suitable for the device receiving the signal.

USER's MENU		Parameters to be set:
 Applications Units Configuration Calibration CONFIGURA 	ATION	 Baudrate – transmission and receiving rate (4,800 ÷ 115,200 bps), Bits – number of bits which constitute a character (7 or 8 bits)
 Measure speed Auto-zeroing Printout Interface LCD settings 		 <i>Parity</i> – control of parity (no control, even – confirmation of parity, or odd – confirmation of odd parity),
1. Baudrate 2. Bits 3. Parity 4. Sending 5. Exit	4800 8-bit none NORMAL	 Sending – transmission method during measurement: NORMAL – after using the PRINT key, with stable result, NOSTB – after using the PRINT key, irrespectively of the result stability,
RS-232C 1. Baudrate 2. Bits 3. Parity 4. Sending <normal><no sti<br="">5. Exit</no></normal>	4800 8-bit none 3> <autostb> <contin< td=""><td>- AUTOSTB – automatically after the result has stabilised, - CONTIN. – continuous transmission, approx. every 0.1 s.</td></contin<></autostb>	- AUTOSTB – automatically after the result has stabilised, - CONTIN. – continuous transmission, approx. every 0.1 s.
<i>←</i>		R

When the force meter is equipped with two serial interfaces (RS232C and USB) in submenu *Interface* two options are available *Port 1* (RS232C) and *Port 2* (USB). After choosing proper port all settings are done the same way as above.

15.5 LCD settings

This option adjusts the gauge's display to external lighting conditions.

15.6 Selecting the menu language

Three menu languages are available: <PL> – Polish, <ENG> – English,

 \sim ENU> – English

- <DE> German,
- <ESP> Spanish.

Use the navigation keys and *ENTER* to select *Language*. To select one of the available menu languages, use the \rightarrow , \leftarrow keys and *ENTER*.

To enter a new code (*NEW*), select the *PIN* option. When entering a new code, type in the same number twice (message: *REP*.).

15.7 Setting date and time

This option is used for entering the current date and time. Access to this setting is secured by the PIN code.

ENTER

 \downarrow

1

USE	R's MENU	
 Applications Units Configuration Calibration Exit 		
(CONFIGURATION	
 Print settings Interface LCD settings Language Time and date Auto-OFF DATE AND) TIME	
1. Time 2. Date 3. PIN 4. Format 5. Exit	10:00:00 2011-01-11 0 <yyyy-mm-dd><mm- dd-<br="">YYYY> <dd-mm-yyyy></dd-mm-yyyy></mm-></yyyy-mm-dd>	

Use the navigation keys and *ENTER* to select *Date and time*. If a *PIN* has already been entered (other than 0), after selecting *Time* or *Date*, the cursor will move to the *PIN* option, where a correct 4-digit *PIN* has to be entered. To enter the correct digits, use the $\uparrow, \downarrow, \rightarrow, \leftarrow$ keys and *ENTER*.

To enter a new code (*NEW*), select the *PIN* option. When entering a new code, type in the same number twice (message: *REP*.).

The *FORMAT* option allows for the selection of the date format on print-outs.

15.8 Turning the sound ON/OFF when using the keypad (beep)

This options turns ON or OFF the sound signalling that a key on the keypad has been pressed. When the sound is turned on, the user usually does not apply excessive force when pushing the keys.

USER's N	1ENU
 Applications Units Configuration Calibration Exit 	
CON	NFIGURATION
 Print settings RS-232C settings LCD settings Date and time Keypad 	
AUTO-OFF	
1. Beep 2. Exit	<on><off></off></on>
	↑ ↓ ENTER
AUTO-OFF	
1. Beep 2. Exit	<0N>
	$\leftarrow \rightarrow ENTER$

Use the navigation keys and *ENTER* to select *Keypad* and *Buzzer*, and one of the following options:

- -ON sound ON,
- OFF sound OFF.

15.9 Automatic power OFF (Auto-OFF)

This option allows for an automatic cut-off of the gauge's power supply to save the battery's energy.

	USER's	S MENU
1. A 2. U 3. C 4. C 5. E	opplications Inits Configuration Calibration	
4	С	ONFIGURATION
3. 4. 5. 6. 7.	Print settings RS-232C settings LCD settings Date and time Auto-OFF	s
Ч	AUTO-OFF	
	1. <mark>Status</mark> 2. Exit	OFF
		↑ ↓ ENTER
	AUTO-OFF	
	1. <mark>Status</mark> : 2. Exit	<off> Bat> <on></on></off>
I		← → ENTER

Use the navigation keys and *ENTER* to select *Auto-OFF* and *Status*, and one of the following options:

- ON – the power is turned off after 5 minutes, the indications remain unchanged,

-BAT – the power is turned off when the battery is low,

- OFF – the power is not turned off.

15.10 Monitoring the batteries' charge level (Battery)

This option is used for reading the charge level of the batteries and allows for the charging to be turned off to protect ordinary batteries, if such batteries are used instead of rechargeable batteries.

Charging ordinary batteries used instead of rechargeable batteries may lead to major damage to the gauge.

USER's ME	INU
 Applications Units Configuration Calibration Exit 	
CON	FIGURATION
5. LCD settings 6. Language 7. Date and time 8. Auto-OFF 9 <u>. Battery</u>	
BATTERY	
1. Charging 2. Charge level 3. Exit	OFF 80%
	↑ ↓ ENTER
BATTERY	
1. Charging 2. Charge level 3. Exit	<off> <on> 80%</on></off>
L	\leftarrow \rightarrow ENTER

Use the navigation keys and *ENTER* to select *Battery* and *Charging*, and one of the following options:

- ON charging ON,
- OFF charging OFF.

15.11 Firmware update

Option available starting from FA0021 program version and designated for service.

Option enables to update force meter program version by connecting force gauge to computer using RS232 or USB interface.

Use the navigation keys and *ENTER* to select *Firmware update* and the option YES.

After setting force gauge into update mode (sign *Firmware update* displayed) turn on *AXIS Loader* computer program and follow the instructions in program manual.

15.12 Reset settings

This option restores factory settings (default settings) for all options.

USER's MENU		
 8. Applications 9. Units 10. Configuration 11. Calibration 12. Exit 	_	
CONFIGURATION		
 7. Date and time 8. Auto-OFF 9. Battery 10. Reset settings 		
RESET SETTINGS		
Restore default settings?		
NO YES		

Use the navigation keys and *ENTER* to select *Reset settings* and the option *YES*.

As a result of restoring factory settings, the gauge will reset and start continuous measurement.

16. Calibration

To calibrate the gauge, select the method of applying load. For this purpose, use a stand or suspend a standard of mass on the gauge.

Reset the gauge without load using the $\rightarrow 0 \leftarrow$ key.

Use the navigation keys and *ENTER* to select *Calibration* and *Load*.

Select the load depending on the standard of mass. The <...> option allows for entering any value.

Enter the gravitational acceleration to correctly convert mass (kg) into force (N).

If the exact "g" value is not known, enter the parameters of the geographical location (latitude and above mean sea level). The "g" value will be calculated automatically.

Apply the standard of mass to the gauge.

Use the navigation keys and *ENTER* to select *Calibration* and wait until the calibration process is completed.

Correction option enables changing force indications with inscribed value.

Direction option enables changing force meter indications direction.

17. Maintenance, troubleshooting and repairing minor types of damage

- 1. Keep the gauge clean.
- 2. When using the force gauge, make sure that no contamination gets between the gauge plunger and the enclosure. Upon identifying any contamination, remove it using a tool which does not conduct electricity.
- 3. Unauthorised person may not perform any repairs.
- 4. Have the gauge repaired by your local servicing facility. A list of servicing facilities is enclosed in the warranty.

Messages and faults:

Message/fault	Cause	Recommendation
The message RESETTING is	Resetting process	Keep the gauge in motionless position
displayed for an extended	disturbed	and press $\rightarrow T(0) \leftarrow$
period of time.		
Message:	Resetting process	Put the gauge in horizontal position and
	disturbed	turn it off and on using the ON/OFF key.
AD range exceeded (+/-)		
The values indicated by the	Gauge out of	Contact a servicing facility to calibrate
gauge diverge significantly	adjustment	the gauge
from correct values		
Units displayed are different	UNIT/CLEAR key	Press the UNIT/CLEAR key several times
from the selected units	pressed by accident	to display the correct units

Declaration of Conformity CE

We:

AXIS Spółka z o.o. 80-125 Gdańsk, ul.Kartuska 375B

confirm with all responsibility that force gauges:

FA50, FA200, FA500, FA1k, FA2k, FA5k, FA10k, FA20k, FA50k, FA100k i FA200k

marked with CE mark comply with the following:

- 1. PN-EN 61000-6-1:2008 Electromagnetic compatibility (EMC) Part 6-1: General standard Resistance in environments: residential environment, trading environment and lightly industrial.
- 2. PN-EN 61000-4-3:2007/A1: Electromagnetic compatibility (EMC). Part 4-3: Methods of research and measurements. Radio-frequency electromagnetic field immunity test (orig..)
- 3. PN-EN 55011:2007/A2:2007 Industrial, medical and scientific (PMN) devices with radio-frequency. Radio-electric disturbance characteristics. Allowable levels and methods of measurements (orig.).

Additional information:

- Conformity evaluation were carried out by Laboratorium Badawcze Oddziału Instytutu Elektrotechniki in Gdańsk, accredited by PCA (AB007), examination report nr 109/LMC-738/2009 from 28.09.2009 r..

Gdańsk, 1.10.2009 r.

Per pro Director of AXIS Sp. z o.o.:

Production Manager Jan Kończak

Signature

Appendix A

FA00 meter with external sensor

1. General description

FA00 force gauge requires joining the force sensor by using connector situated in meter housing. Moreover it is crucial to set force gauge working parameters. After this actions earlier chapters of the manual are applied.

2. Extensometer sensor assembly

To connect sensor use pin supplied with

force gauge according to diagram:

3. Meter configuration

In order to achieve proper force gauge parameters use additional options *Configuration / Force meter setting* (not mentioned in 15 chapter).

USER MENU		
 Application Units Configuration Calibration 		
CONFIGURATION		
9. Auto-OFF 10. Battery 11. Default 12. Force meter settings		
FORCE METER SETTINGS		
1. Max 2. Over 3. d 4. Point 5. Last 6. Unit 7. Out		

Using navigation keys and ENTER key choose Configuration and Force meter settings option.

Insert proper force gauge parameters: Max – measurement range, Over – maximal indication, d – readout unit, *Point* – coma position, indication Last _ last digit expiration, Unit – indication unit.

4. Meter calibration

FA00 meter calibration method doesn't differ from the description in 16 chapter - *Calibration*. Calibration weight value must respond to force gauge parameters.

Notes