ELECTRIC CYLINDERS AND PRESSES

with press-force of up to 100kN

Alfamatic

The electromechanical system

Stroke, speed, force, precision and life cycle are the most important characteristics of the system

The cylinder consists basically of a motor and a spindle screw, with a nut running along it.

Our spindle screw uses planetary roller technology (the finest at the state of the art) housed inside a sturdy tubular structure

The motor is driven by a servo drive, managed by the instrument Press-Right.

The benefits of the system

Being a press and not just a linear actuator, there are built-in sensors that enable the complete and accurate control of the pressing operations.

The physical dimensions controlled are force and position. The force is measured by a load cell and the position is detected by an absolute encoder.

The electric cylinders and presses are used where it is necessary to control the production process in real time for all pieces manufactured, in order to ensure that there are zero defects.

• Active control of the process
The movements are constantly controlled in terms of acceleration, speed and position.

• Stopping point precision
Active position control allows extreme precision of the stopping point.
With the possibility to add a micrometric external position transducer for extra accuracy.

• Clean
Requires no pneumatic and/or hydraulic powering.

• Low management cost
Energy is used during the processing phase only. Reduced maintenance costs.

• Application flexibility
Possibility to program even the most complex work cycles.
All the working parameters are memorized and independent of the operator's skill.

• High reliability
The planetary roller screw and the best mechanical choices guarantee exceptional duration in time, even in severe working conditions.

• Cycle time
The possibility to reduce the working stroke guarantees a short cycle time.

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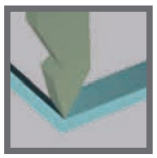
The electric Cylinders and Presses are used in various industrial processes, like: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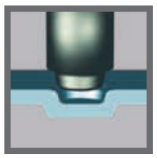
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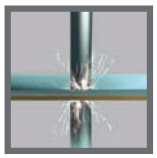
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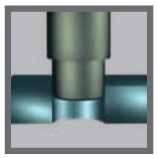
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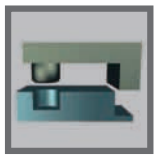
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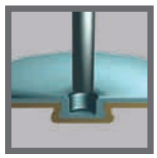
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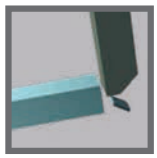
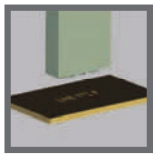

TRIMMING

CHAMFERING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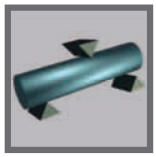
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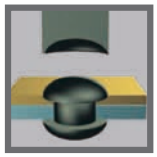
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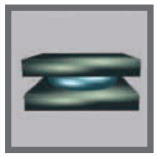
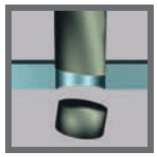

PRESSING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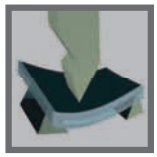

COMPRESSING

Production management and control

The system regulates the cylinder speed in real time, using the force and position transducers for feedback.

The continuous regulation of the speed with feedback from the force transducer makes it possible to reach the required force in the best way: the speed is reduced only when the force measured during pressing approaches the required value.

This reduces the cycle time and the real force applied does not exceed the required value.

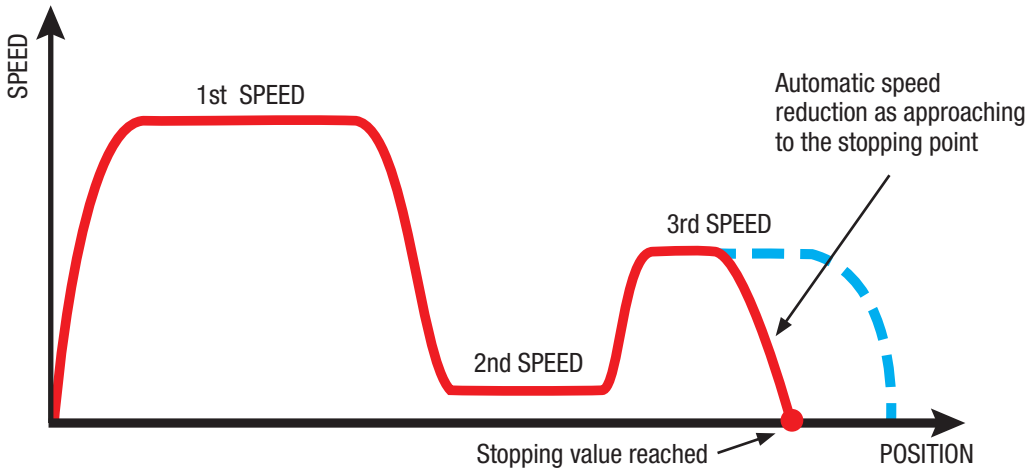
The system architecture also makes it possible to maintain the force constant for a specific time, correcting the cylinder position constantly.

The cylinder will be drawn back if the force increases beyond the required value and will be moved forward if the force drops below the required value.

The continuous regulation of the speed with feedback from a precision position transducer gives to the system the capacity to bring the cylinder to a required position in just one movement, with micrometric precision.

The cylinder will reach the stopping point at a speed close to zero, stopping exactly where required.

There is no need to correct the position with subsequent movements requiring several stops and restarts in the same pressing operation.



The elimination of the intermediate stops prevents the sticking during the assembly of the pieces.

The possibility of using an additional linear displacement probe solves positioning problems in the best way, with values directly detected on the piece.

The cylinder speed follows a profile divided into three sections, with three different speeds.

The cylinder is moved without interruption, accelerating or decelerating between one section to the next.

The most useful profile in pressing consists in approaching to the piece at high speed, following the main pressing at medium speed, and ending it with force feedback for precise stopping.

The profile used for general movements has a single very high speed.

There are applications in which it is useful to have a first section with a lower speed, while picking up the piece with loading tongs for example.

It could also be necessary, when inserting a piece, to complete the last section of the movement at a very slow speed in order to avoid dangerous collisions.

A work procedure can require a phase in which it is necessary to measure the position of the piece before deciding how to proceed in the next phase; in this case, the profile will have a first approach at high speed and a very slow second section for the precise measurement of the point of contact with the piece.

The point of contact can be identified by measuring the force when impacting the piece, or using an electrical contact.

Another example of profile is the one used in typical imprinting operations in the manufacture of watertight metal valves. In this case, the profile will have a first high-speed section to approach the piece quickly, a very slow second section to measure the point of contact to the piece and a third section for the actual imprinting.

The profile is directly parameterised in the instrument, so the PLC is not responsible for this (no operator panel and no extra programming required).

The ease with which it is possible to regulate a complex profile, setting just a few values, makes it easier to achieve an optimal working cycle for every application
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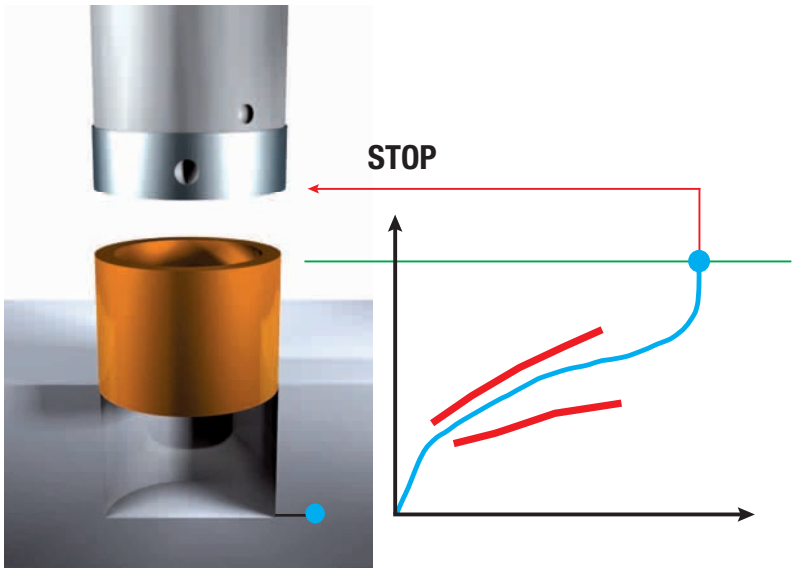
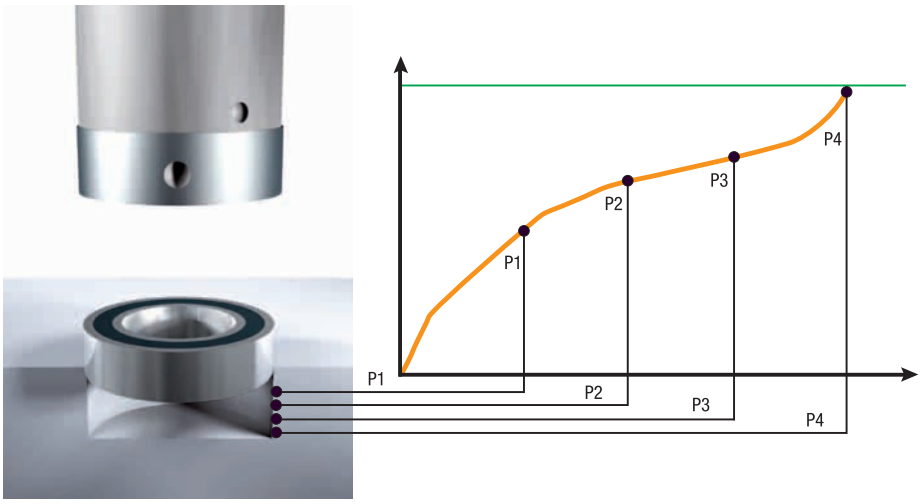


Management of the cylinder stopping point

When a determined force and/or stroke value is reached, the stop and return of the press are commanded.



Pressing interference control

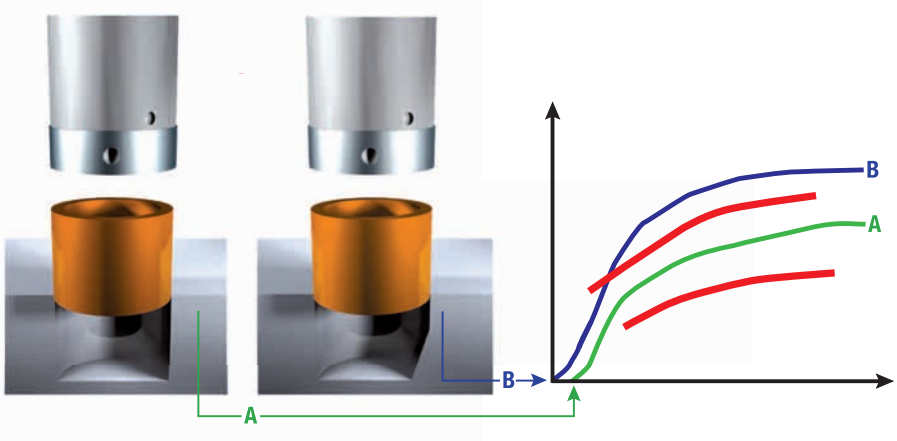
During the entire pressing operation, the interference between the two pieces to be assembled is checked.

Control band

The continuous band system guarantees control of every point of the press curve.

This prevents all the uncertainties deriving from the use of discreet windows which leave some areas uncontrolled.

The bundled software also allows the automatic creation of the band, based on sample curves.



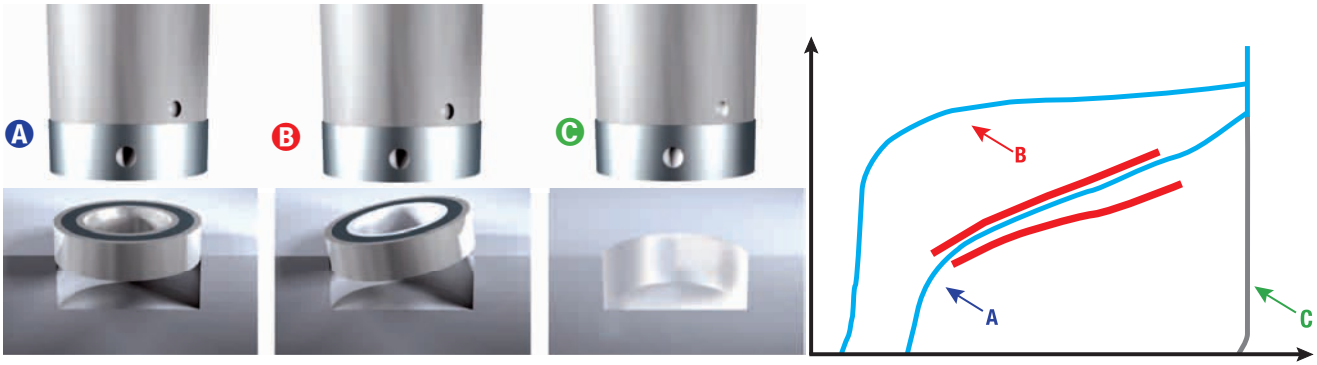
Geometric check on the piece using the continuous band

Any geometric errors of the piece are highlighted by non-compliant press curves.

Check of presence and correct positioning of the piece

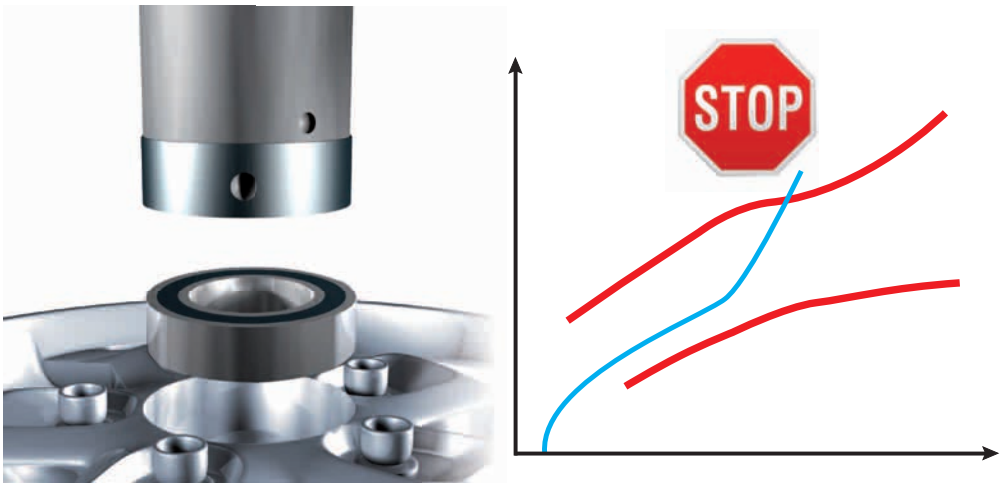
A correctly positioned
B incorrectly positioned
C piece not inserted in the relative housing

Example of positioning
and relative press curves



Non-destructive measurement

For large and expensive parts.
The cycle stops whenever the monitoring curve goes outside the tolerance band.
As the check takes place in real time, it preserves the integrity of the piece.

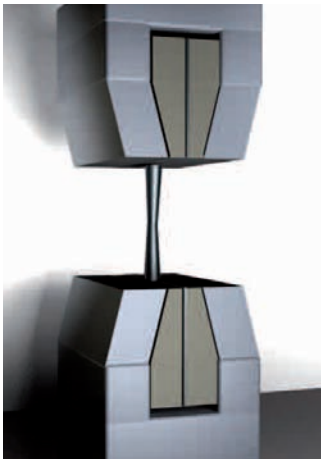


Check on elastic elements

From the curve measured, it is possible to determine the correspondence of the elastic element with the project specifications.

Determining fracture values

The active check on the position allows precise measurement of force and height values at the time of fracture



Stopping and holding the programmed force value

Thanks to the feedback of the closed loop force value, the force is held constant, automatically and continually correcting the cylinder position.

Correcting the structure deformation

The instrument continuously calculates the real position of the cylinder, taking into account the deformation of the loaded structure.

Relative position

The working parameters can be automatically set referring to the contact point between the tool and the piece, regardless of the dimensional tolerances.
Using a micrometric probe, this possibility is particularly useful for high-precision imprinting cycles.

Checking the contact point

Checking the contact point allows the interruption of the cycles, should the piece be missing or poorly positioned.

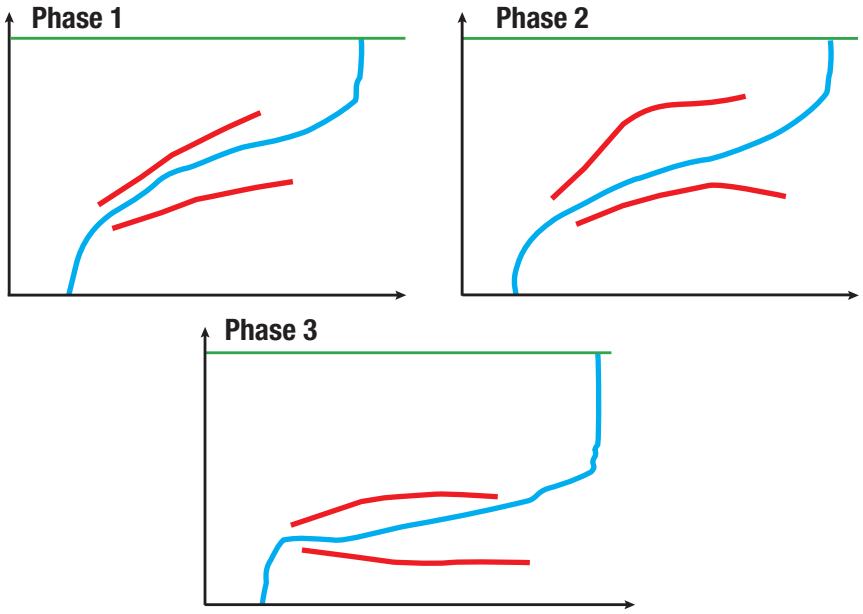
External micrometric probe

The use of an external probe allows micrometric precise measurement of the real position of the tool compared to a reference point on the piece.

This eliminates all the inaccuracies due to clearances and deformations of the structure.

Thanks to the peculiarity of the system, it is possible to regulate the cylinder speed in real time, reaching a programmed position at zero speed.

This prevents successive positionings by approximation which, in addition to requiring long times, involve the subsequent stopping and restarting of the cylinder, with the risk of the piece getting stuck all the time.



Management of work by phases

The instrument makes it possible to breakdown every job into several phases (up to four), automatically managing the selection of the correct parameters for every phase.

The phases can be used for a single job with several cycles (e.g.: the insertion of a bush with subsequent chamfering) or for several jobs linked together by a single piece (e.g.: the sequential pressing of several bearings on a drive shaft).

The Cylinder and its components

Transmission group

Made up of drive and conduct pulleys, connected by an inclined teeth belt.

The fine pitch of the roller screw allows the assembly without speed reducer, benefiting reliability, noise and performance.

The special inclined teeth belt guarantees:
- silence
- low vibrations

Load cell built into the actuator

This works in compression and in traction, and it is based on strain gauge technology.
It guarantees the following advantages:
- improved linearity and precision in the measurement of static and dynamic forces
- precision with any force profile
- increased immunity to electromagnetic interference.

Chromium-plated press stem

The cylinder stem is chromium-plated internally and externally, with substantial reduction of the radial clearance and improved resistance to wear and tear.

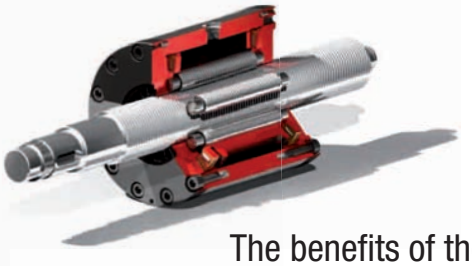
Brushless motor with absolute encoder

The best solution for:
- torque curves
- no maintenance
- dimension-to-power ratio

The absolute encoder keeps the cylinder position constantly in the memory (NO zero search): the cylinder is immediately ready to go.

Planetary roller screw

Designed specifically to resist high loads for millions of circles, this is the best choice for heavy-duty press applications.

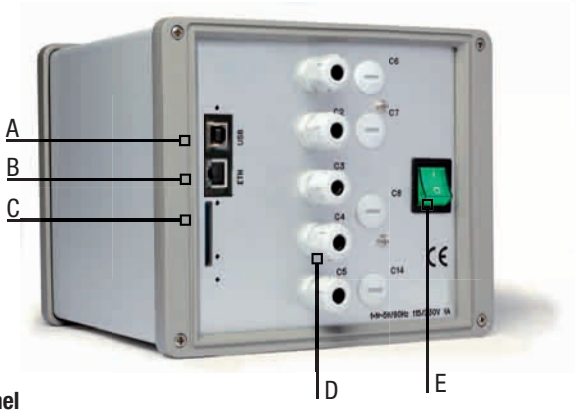


The benefits of the planetary roller screw:

- improved durability, even under harsh conditions of use.
- improved shock resistance
- reduced external dimensions

Press-Right

Press-Right is a measurement system that provides 100% quality control on the manufacturing process.
Interfaced to a position transducer and a force transducer, it continuously monitors the position/force curve and verifies that it stays within a purposely positioned continuous control range.
The system architecture is based on a multiprocessor for data monitoring and analysis and is connected directly to the sensors.
The instrument actively controls the movement of the motor, promptly controlling the force and position values.



Rear panel

A - USB connection
B - Ethernet connection (optional MODBUS TCP)
C - SD memory slot
D - direct connections to the sensors and utilities
E - on/off switch

(D) SD memory card

An SD memory card allows to memorize the working curves, which can then be displayed and analysed using WinScope software.
The program is included in the supply package.
The instrument also has an internal memory, able to store more than one hundred different types of process.

(E) I/O operation

The instrument can be managed using simple ON/OFF digital signals and it is easy to integrate with any controller.

Servo drive

To drive the brushless motor of the cylinder and have an extremely high performance it is necessary to feed the phases, taking into consideration the angular position of the shaft.
This job is performed by the servo drive.
The servo drive also controls the position of the cylinder, preventing movements beyond the maximum stroke.
The configuration and the various regulations of the servo drive are programmed in the factory by Alfamatic.
The movement is fully controlled by the Press-Right instrument.
No special skills or abilities are required for the configuration of the servo drive, hugely simplifying the use of the Alfamatic system.

The command and control chain

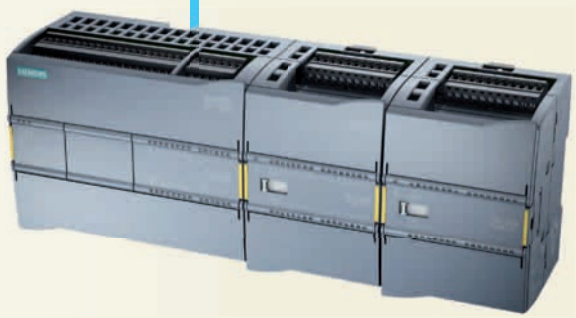
The synergy between servo-drive and electronics is essential.

The control system has been designed specifically for pressing operations and employs the experience of Alfamatic in this sector, dating back to 1992.

Tool
Press-Right

WinScope® Software

PLC



For machine manufacturers, Alfamatic supplies an installation kit complete with press structure and electrical cabinet.
See page 24-25.

Alfamatic also offers a series of complete and certified pressing stations in a variety of configurations (with a c-frame, 2-column and electro-mechanical rotary table).)

Press-Right
It controls the force and instantaneous position of the cylinder in real time.
It shows the working curve and checks that it stays within pre-set parameters.

Servo drive
It drives the brushless motor of the cylinder and controls the position of the press stem. The standard version of the system is in safety category 4.
This is made possible by the interruption, at every cycle, of the power supply to the servo drive.
This guarantees maximum safety in pressing applications.

SA cylinder
A planetary roller nut on a spindle screw converts the rotary motion of the motor into linear motion.
The cylinder houses a load cell and an absolute encoder, for measuring the force and the position of the press stem in the cylinder.

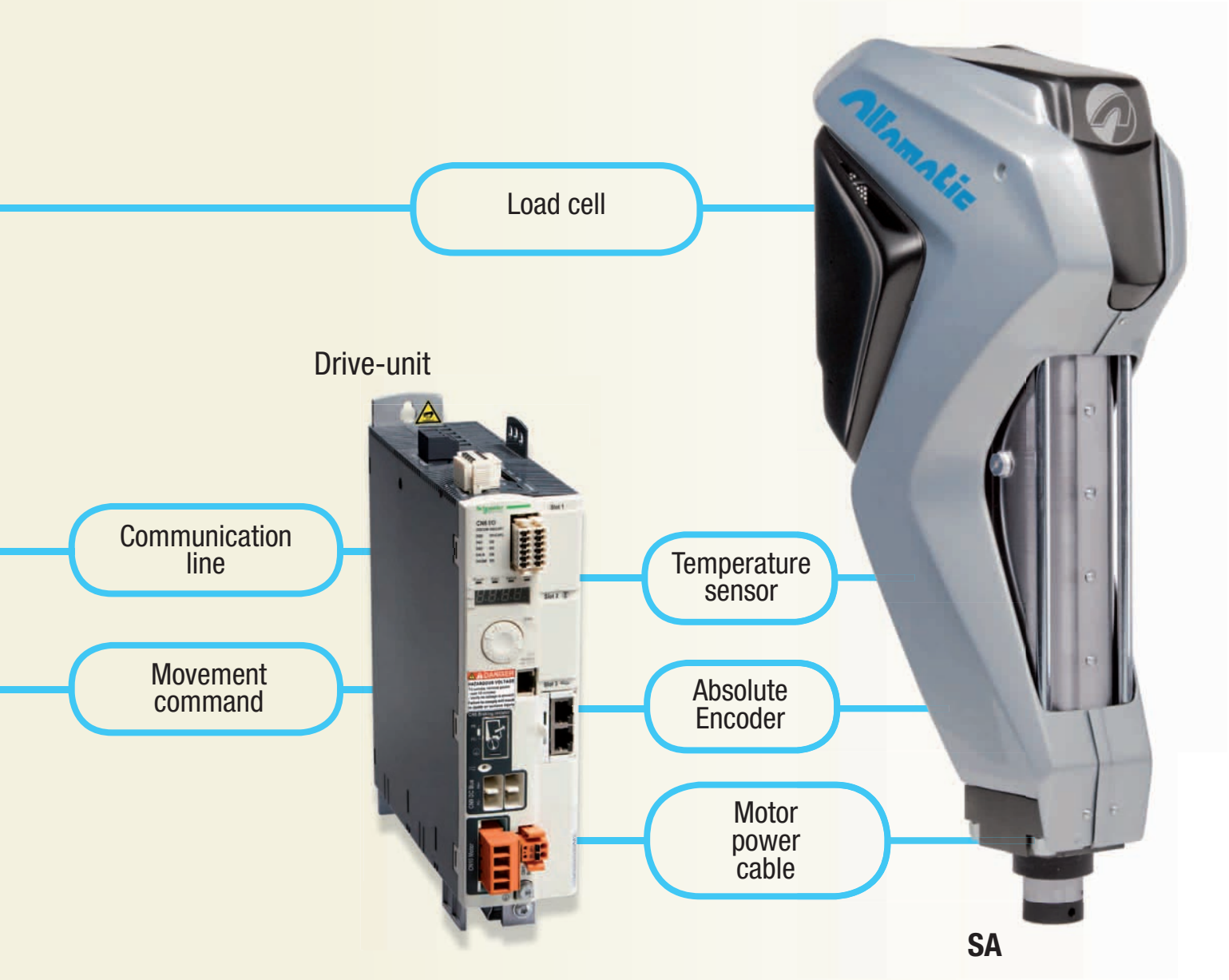


Table for cylinder/press selection

Type																		speed mm/s
SA 1	■	■	■	■	■													250
SA 2	■	■	■	■	■	■	■											250
SA 5		■	■	■	■	■	■	■	■	■								250
SA 10				■	■	■	■	■	■	■	■	■						250
SA 25				■	■	■	■	■	■	■	■	■	■	■				140
SA 50							■	■	■	■	■	■	■	■	■			250
SA 70							■	■	■	■	■	■	■	■	■	■		200
SA 100							■	■	■	■	■	■	■	■	■	■	■	100
kN	01	03	05	07	1	1.5	2	2.5	3.5	5	7	10	20	25	50	70	100	

The Cylinder range

The models SA 10 and SA 25 use the same structure and size of the model with the highest force.

The force and the maximum speed of the cylinder depend on the different transmission ratio.

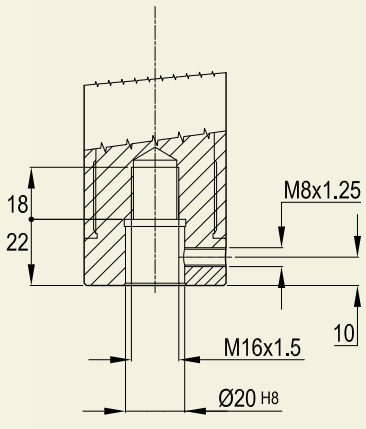
This allows the subsequent transformation of model SA 10 into SA 25 and vice-versa.

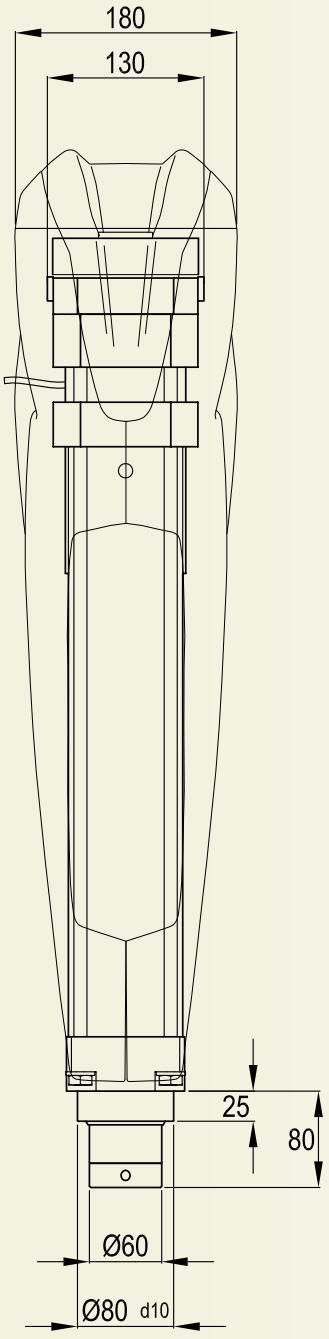
The operation involves only the replacement of the load cell and the transmission group.

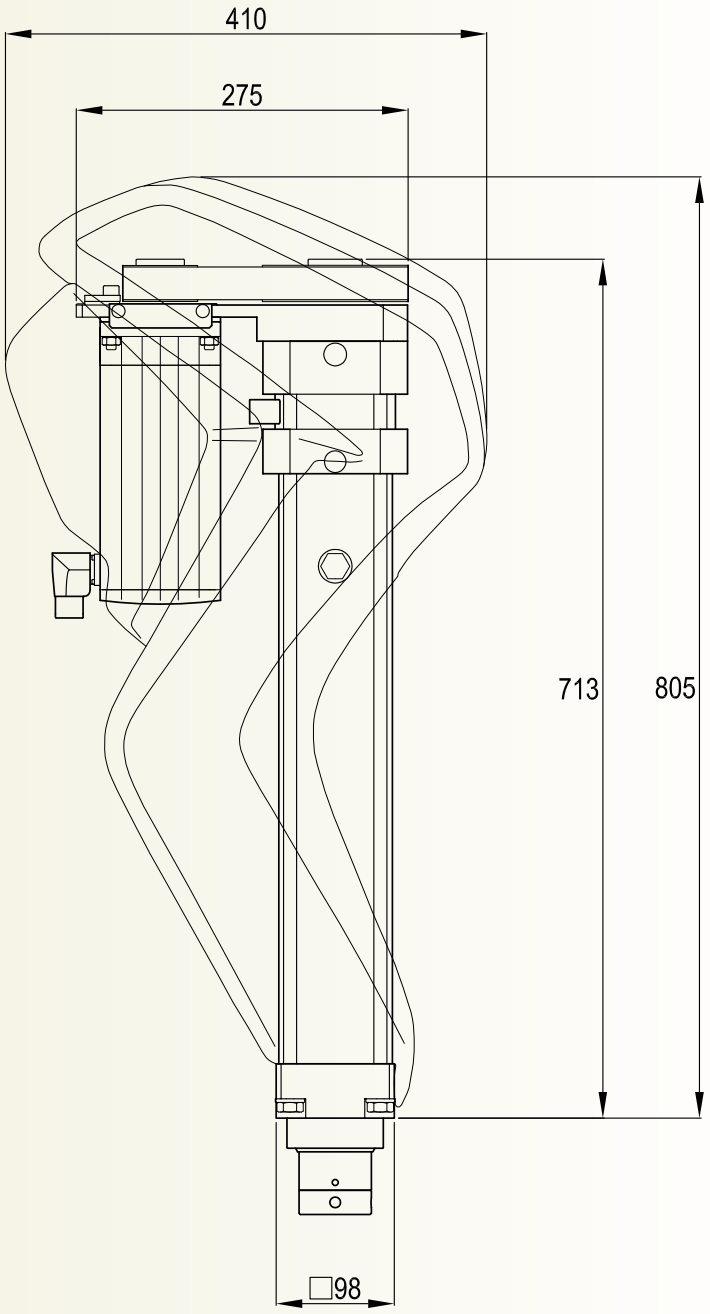
Model SA 10-25

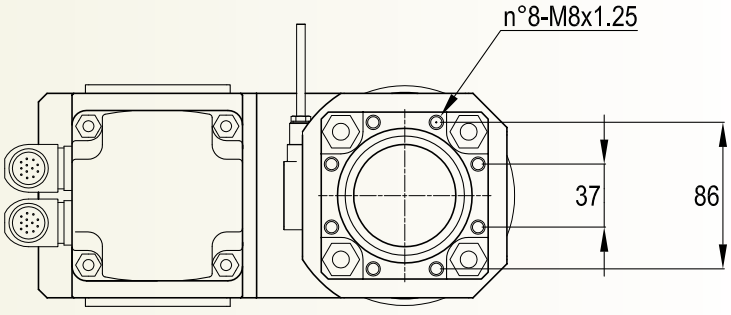
Technical features

	SA 10	SA 25
Maximum force	10 kN	25 kN
Maximum speed	250 mm/s	140 mm/s
Repeatability with a constant load	±0,01mm	
Precision of force measured	±0,5% F.S.	
Stroke	290 mm	
Absorbed power	3.3 kW	
Voltage	400V three-phase 50/60Hz	
Weight	45 kg	
Ambient temperature	10...40 °C	
Relative air humidity	90% (no condensation allowed)	
Precision of the anti-rotation system	0.7°	









Fixing data **SA 10-25**

Screw	M8x1.25
Minimum length screwed	20 mm
Hole depth	30 mm
Tightening torque	40 Nm

The Cylinder range

The models SA 50, SA 70 and SA 100 share the same structure, sized on the model with the highest force.

The force and the maximum speed of the cylinder depend on the different transmission ratio.

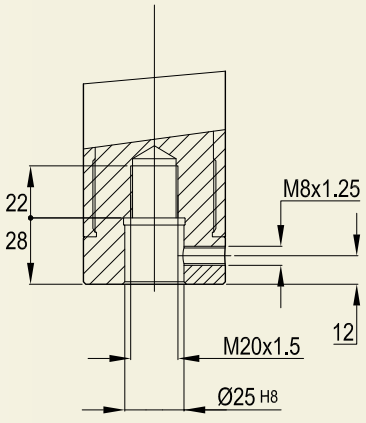
This allows the modification of the press characteristics after purchase.

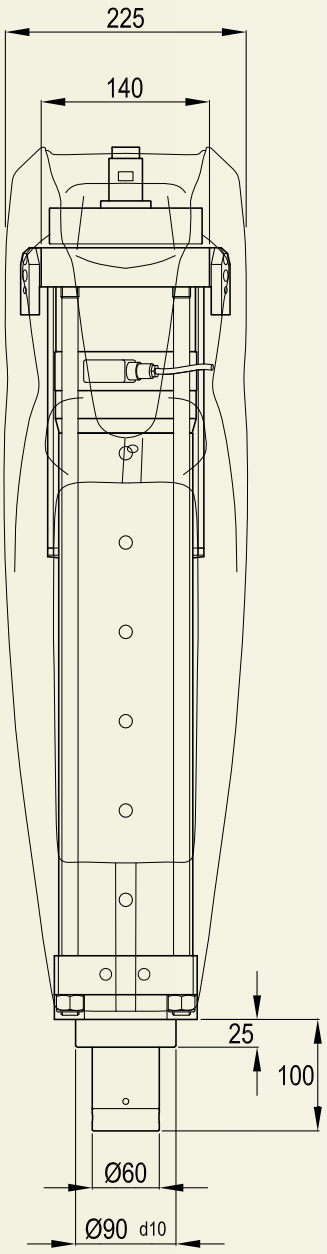
The operation involves only the replacement of the transmission group.

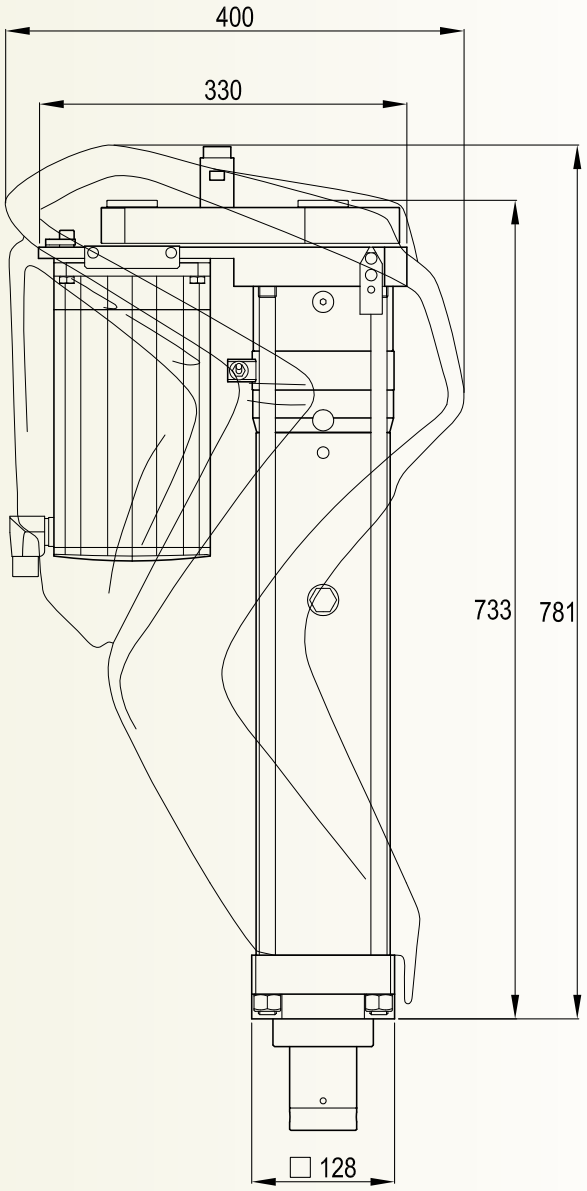
Model SA 50-70-100

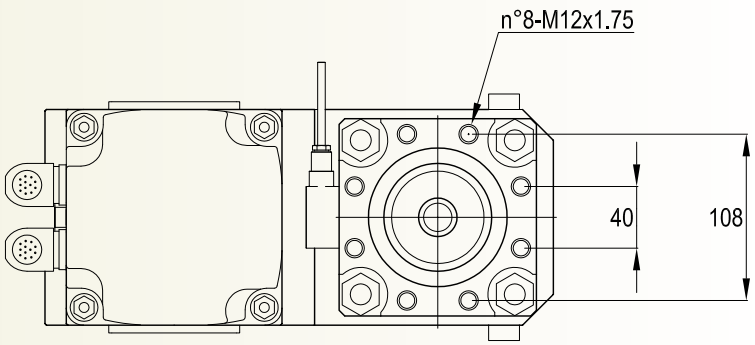
Technical features

	SA 50	SA 70	SA 100
Maximum force	50 kN	70 kN	100 kN
Maximum speed	250 mm/s	200 mm/s	100 mm/s
Repeatability with a constant load	±0,01mm	±0,01mm	±0,01mm
Precision of force measured	±1% F.S.	±0,7% F.S.	±0,5% F.S.
Stroke	250 mm		
Absorbed power	5 kW		
Voltage	400V three-phase 50/60Hz		
Weight	75 kg		
Ambient temperature	10...40 °C		
Relative air humidity	90% (no condensation allowed)		
Precision of the anti-rotation system	0.7°		









Fixing data **SA 50-70-100**

Screw	M12x1.75
Minimum length screwed	20 mm
Hole depth	30 mm
Tightening torque	40 Nm

Constructive features

Alfamatic offers a range of complete and certified pressing stations, with press force up to 100kN, in multiple structure configurations:

- C-frame structure (swan neck)
- 2-column structure
- with rotating table

Features:

- Press force from 1 to 100kN
- Integrated command and control chain, governed by the instrument Press-Right
- safety guards with light curtains
- support table with integrated electrical cabinet
- CE certified

1

The electric cylinder

Available with thrust force from 1 to 100kN.
Depending on size, equipped with roller or ball screw.
Models 1-2-5 are equipped with a external load cell attached to the end of the stem.

2

The structure is available in two configurations:

• C-frame, monolithic, Fe 430 B UNI 7070 steel.
• 2 column with upper and lower steel plates, Fe 430 B UNI 7070 and chromed steel Fe 430 support columns.

3

The work plate

In Fe 430 B UNI 7070 steel with rectified surface. Equipped with T-grooves for mold fixing.

SA 50-70-100

SA 10-25

SA 1-2-5

4

The control panel

For the operation of the press and the control of the operating parameters. It comes with light-touch buttons (optional) for maximum easy of use.

5

Safety guard

With Lexan® perimeter panels and free access front section, protected by light curtains (photo-electric, complying with current EC regulations)

6

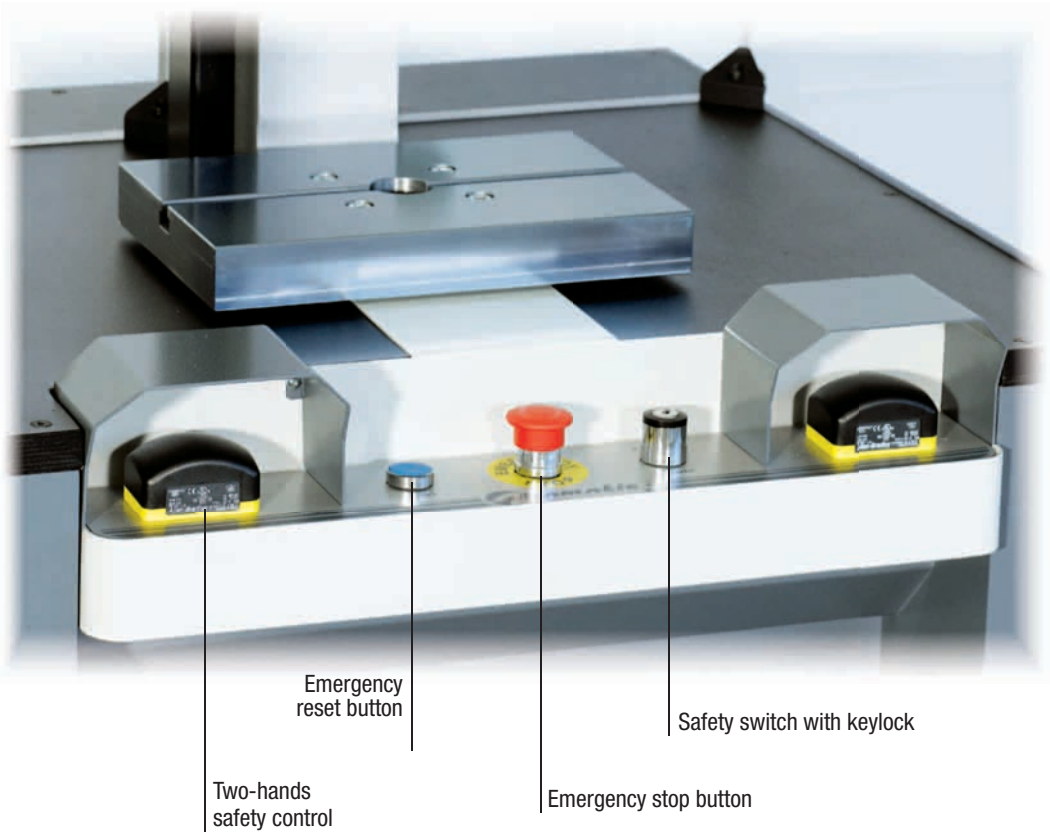
The electric cabinet

Incorporated on the right side of the table, easily accessible for inspection and maintenance.

7

The support table

Equipped with adjustable feet (with height to be determined at order).



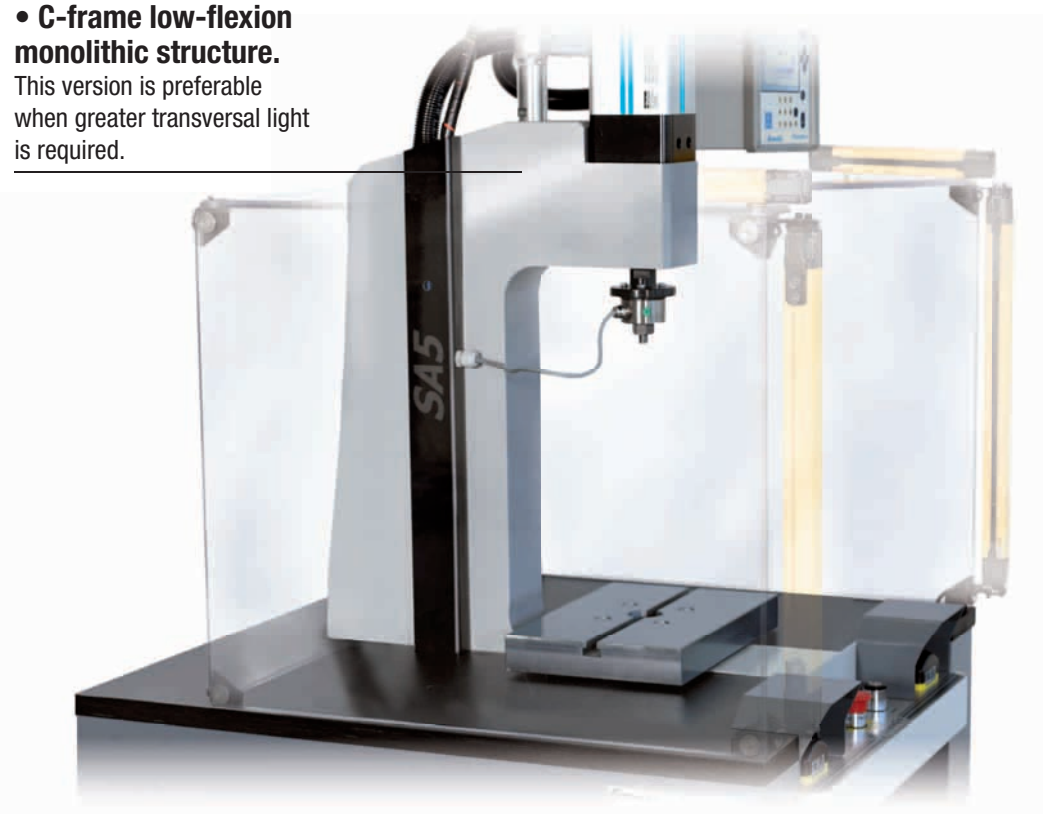
The press structure configurations and the safety device

The Electric Presses of Alfamatic are available in configuration with C-frame or 2-column structures. They meet all the current stringent EC safety regulations.

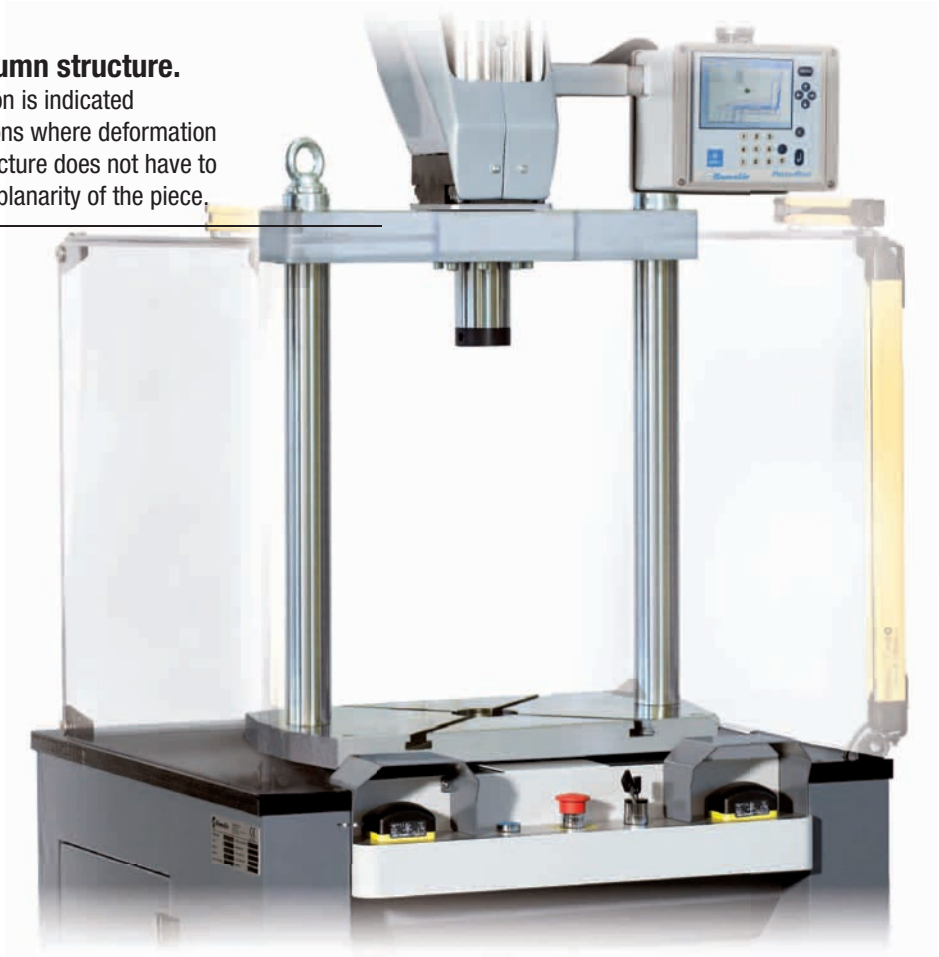
They are equipped with light curtains barriers and perimeter protections in Lexan®.
A further pair of barriers, located at the top of the work area, frees both visual and access barriers to the workpiece.
The press cycle is started by pressing the two-buttons control. Once the cycle is started, the operator can release
the buttons and the press will continue autonomously, until the pre-set parameters for the piece are reached.

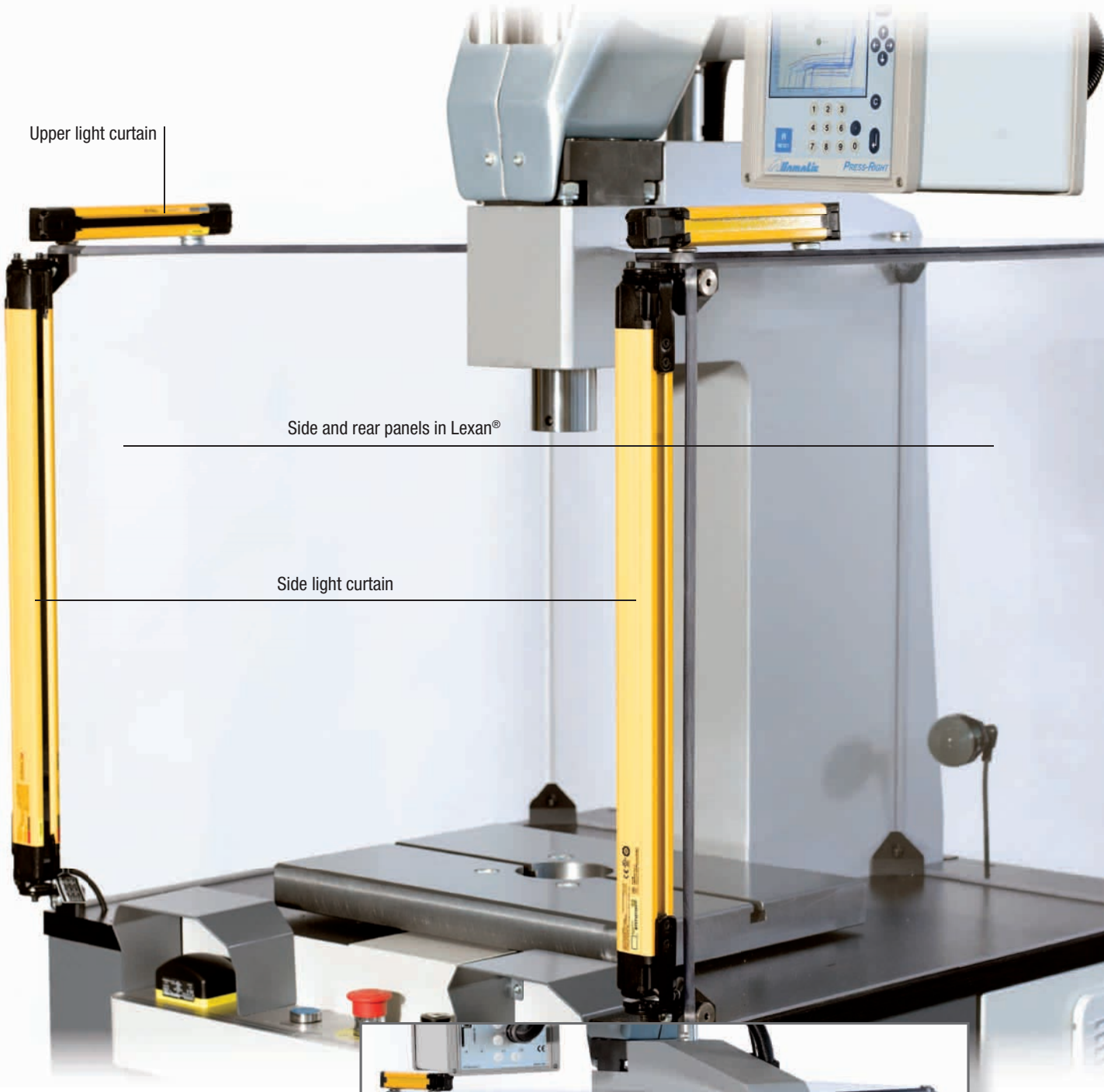
In the event of a breach of the work area during the movement of the press stem, the safety is guarantee by the upstream cutting of the cylinder electrical supply.

• C-frame low-flexion monolithic structure.
This version is preferable when greater transversal light is required.



• 2-column structure.
This version is indicated in operations where deformation of the structure does not have to affect the planarity of the piece.





The absence of any metal frame
ensures greater brightness of the work area.

The structure remains sturdy thanks to the use
of high thickness Lexan® panels.

Light signal for easy access of the work area (optional)
A visual device signals the press at
rest and the accessibility to the work area.

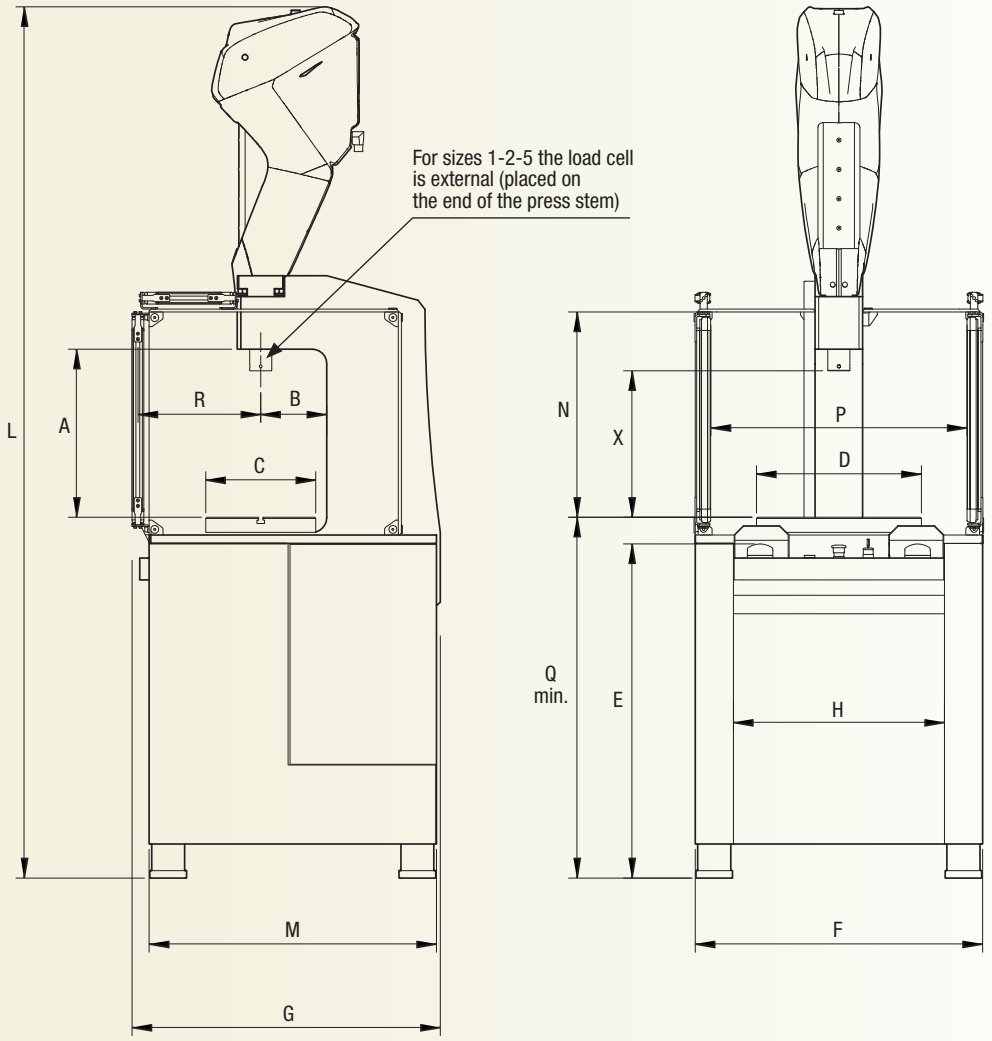
This avoids the press lock caused
by accidental access to the area during
the press stem motion.

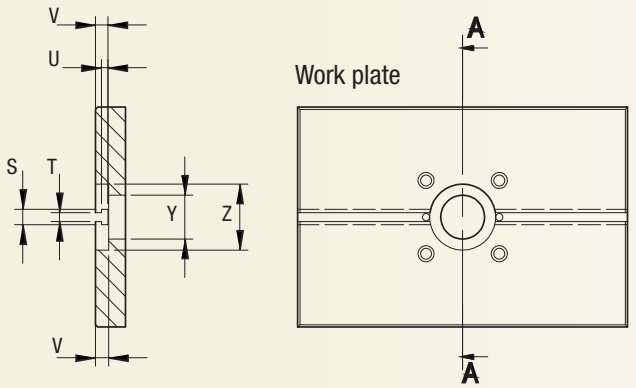
The Press range

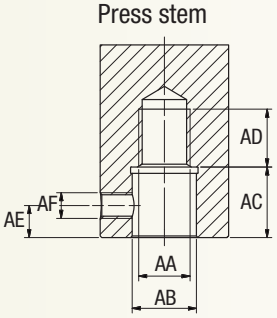
Model **EP** (C-frame)

Technical features

	EP 1	EP 2	EP 5	EP 10	EP 25	EP 50	EP 70	EP 100
Maximum force	1 kN	2 kN	5 kN	10 kN	25 kN	50 kN	70 kN	100 kN
Maximum speed	250 mm/s	250 mm/s	250 mm/s	250 mm/s	140 mm/s	250 mm/s	200 mm/s	100 mm/s
Repeatability with a constant load (±)	0,04mm	0,04mm	0,04mm	0,01mm	0,01mm	0,01mm	0,01mm	0,01mm
Precision of force measured (±)	0,5% F.S.	0,5% F.S.	0,5% F.S.	0,5% F.S.	0,5% F.S.	1% F.S.	0,7% F.S.	0,5% F.S.
Stroke	280 mm			290 mm		250 mm		
Absorbed power	1.1kW	1.1kW	2 kW	3.3 kW		5 kW		
Insatalled power	2 kW	2 kW	3 kW	4 kW		6 kW		
Voltage	230V single-phase 50/60Hz			400V three-phase 50/60Hz		400V three-phase 50/60Hz		
Ambient temperature	10...40 °C							
Relative air humidity	90% (no condensation allowed)							
Precision of the anti-rotation system	0.7°							







Standard press stem

	EP 10-25	EP 50-100
AA	M16x1,5-6H	M20x1,5-6H
AB	Ø20 H8	Ø25 H8
AC	22	28
AD	18	22
AE	10	12
AF	M8x1,25-6H	M8x1,25-6H

Press stem with external load cell

	EP 1-2-5-10-25	EP 50-100
AA	M12x1,5-6H	M20x1,5-6H
AB	Ø16 H8	Ø25 H8
AC	18	28
AD	15	22
AE	8	12
AF	M6x1-6H	M8x1,25-6H

	A	B	C	D	E	F	G	H	L	M	N	P	Q	R	S	T	U	V	X(A)*	X(B)*	Y	Z(H7)
EP 1-2-5	325	120	200	300	900	784	840	576	1893	784	370	700	984	340	21	12	9	17	/	230	40	60
EP 10-25	394	150	250	350	900	784	840	576	2268	784	478	700	984	340	21	12	9	17	360	275	50	70
EP 50-70-100	459	180	300	450	900	784	840	576	2268	784	478	700	984	340	21	12	9	17	400	315	50	70

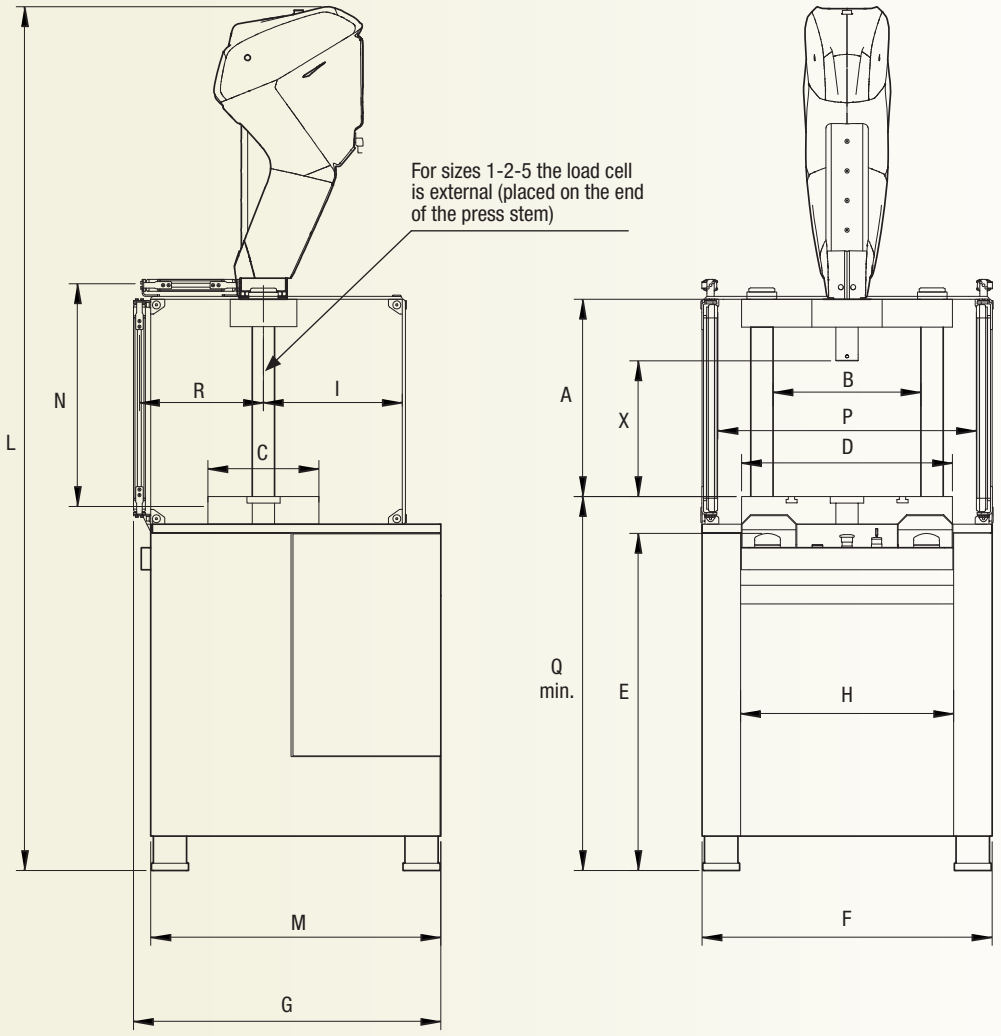
***X(A)** standard - ***X(B)** with external load cell

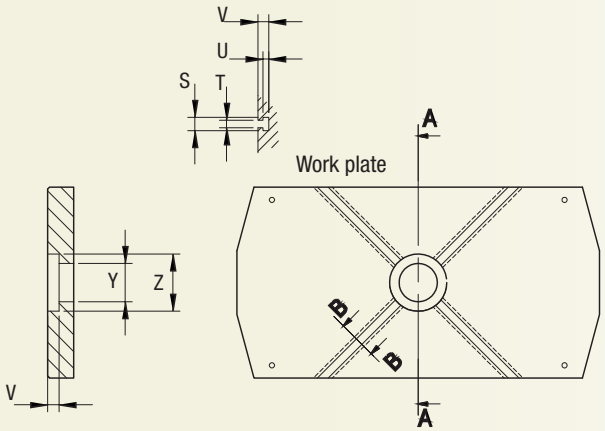
The Press range

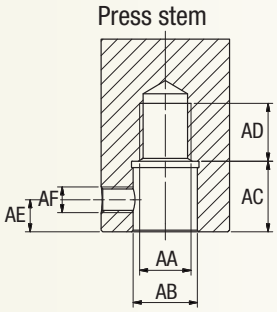
Model **EP 2M** (2-column)

Technical features

	EP 2M 1	EP 2M 2	EP 2M 5	EP 2M 10	EP 2M 25	EP 2M 50	EP 2M 70	EP 2M 100
Maximum force	1 kN	2 kN	5 kN	10 kN	25 kN	50 kN	70 kN	100 kN
Maximum speed	250 mm/s	250 mm/s	250 mm/s	250 mm/s	140 mm/s	250 mm/s	200 mm/s	100 mm/s
Repeatability with a constant load (±)	0,04mm	0,04mm	0,04mm	0,01mm	0,01mm	0,01mm	0,01mm	0,01mm
Precision of force measured (±)	0,5% F.S.	0,5% F.S.	0,5% F.S.	0,5% F.S.	0,5% F.S.	1% F.S.	0,7% F.S.	0,5% F.S.
Stroke	280 mm			290 mm		250 mm		
Absorbed power	1.1kW	1.1kW	2 kW	3.3 kW		5 kW		
Insatalled power	2 kW	2 kW	3 kW	4 kW		6 kW		
Voltage	230V single-phase 50/60Hz			400V three-phase 50/60Hz		400V three-phase 50/60Hz		
Ambient temperature	10...40 °C							
Relative air humidity	90% (no condensation allowed)							
Precision of the anti-rotation system	0.7°							







Standard press stem

	EP 2M 10-25	EP 2M 50-100
AA	M16x1,5-6H	M20x1,5-6H
AB	Ø20 H8	Ø25 H8
AC	22	28
AD	18	22
AE	10	12
AF	M8x1,25-6H	M8x1,25-6H

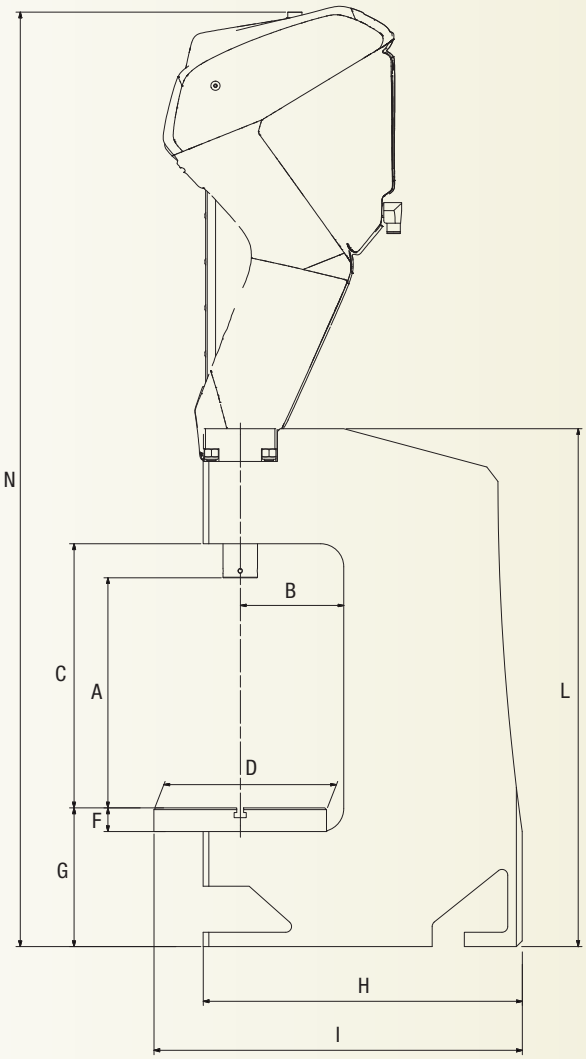
Press stem with external load cell

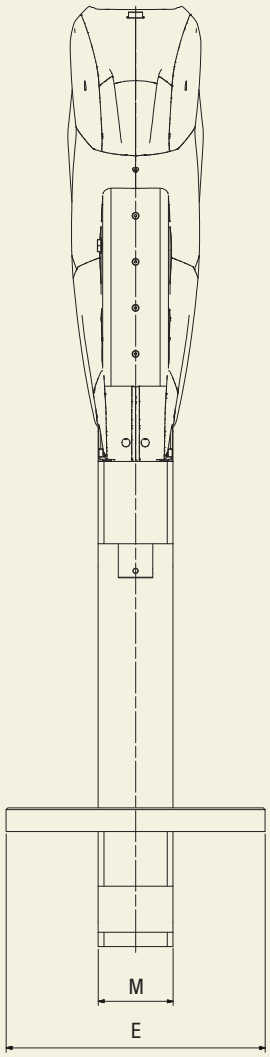
	EP 2M 1-2-5-10-25	EP 2M 50-100
AA	M12x1,5-6H	M20x1,5-6H
AB	Ø16 H8	Ø25 H8
AC	18	28
AD	15	22
AE	8	12
AF	M6x1-6H	M8x1,25-6H

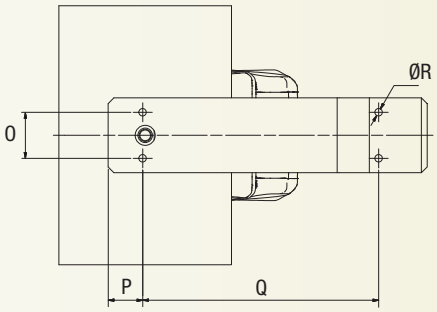
	A	B	C	D	E	F	G	H	I	L	M	N	P	Q	R	S	T	U	V	X(A)*	X(B)*	Y	Z(H7)
EP 2M 1-2-5	498	360	250	470	900	784	840	576	375	2250	784	561	700	990(min.900)	340	21	12	9	17	/	300	50	70
EP 2M 10-25	498	360	250	470	900	784	840	576	375	2341	784	561	700	990(min.900)	340	21	12	9	17	370	285	50	70
EP 2M 50-70-100	458	400	300	570	900	784	840	576	375	2341	784	541	700	1010(min.900)	340	21	12	9	17	370	285	60	90

***X(A)** standard - ***X(B)** with external load cell

C-Frame (structure only)







	A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q	R
MP 10-25	360	150	394	250	350	31	191	442	517	745	100	1475	60	60	322	Ø13
MP 50-70-100	400	180	459	300	450	41	241	554,5	640	900	130	1624	80	60	410	Ø13

Electrical installation and accessories

Electric cabinet

pre-wired, containing:

- Drive unit
- General on-off switch with door lock
- Magnetic thermal protection switches
- Redundant power supply switches
- Cooling system
- Terminal block for connection to main panel

Lubricating grease

Lubricating grease specific for presses with ball and satellite roller screws

Grease Pump

Enables the addition of grease through the grease bore into the nut of the electric actuator.

Access-ready area lighting.

A luminous device signals the press at rest and and access to the work area.
This avoids the machine block caused by the accidental activation of the barriers during the press stem motion.

Work area Lightning

Led lighting unit of the working area

Light-touch buttons

They provide maximum user comfort for the operator.

Standard version

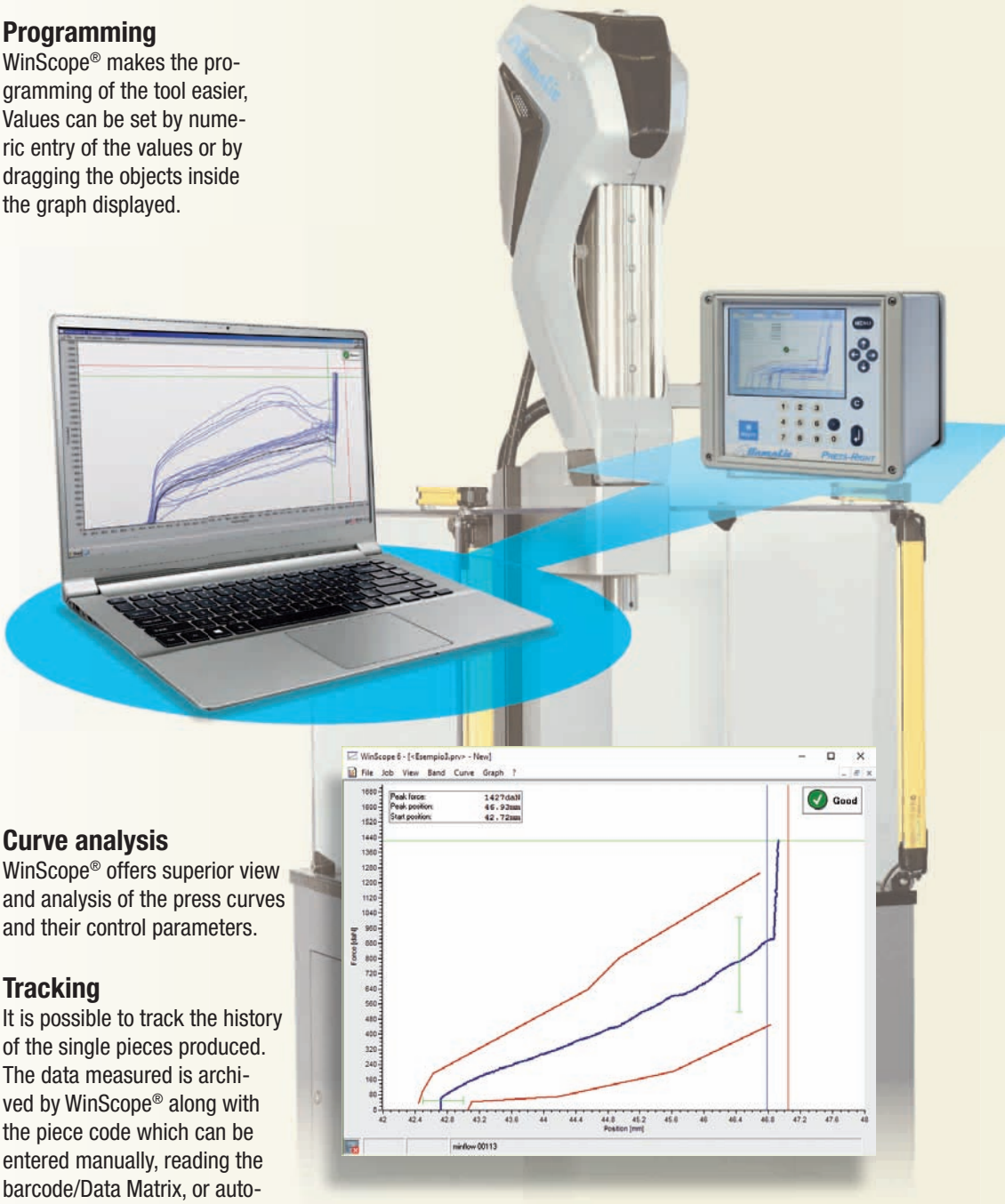
Light-touch version

WinScope® software

The electric cylinders and presses are equipped with the instrument Press-Right
They are a stand-alone system and do not require the use of a computer. The programming and control functions are performed by the instrument in a clear and simple way.
However, the occasional or continuing use of a computer connected to the instrument can add some functions to the system.
The WinScope® programme is supplied for this purpose.

Programming

WinScope® makes the programming of the tool easier, Values can be set by numeric entry of the values or by dragging the objects inside the graph displayed.



Central management

With WinScope® it is possible to simultaneously monitor, control, programming and archiving of the data of several presses from a single computer.

IP communication

The interface, with a supervision and data archiving software, is simplified thanks to simple commands and the IP protocol.

Curve analysis

WinScope® offers superior view and analysis of the press curves and their control parameters.

Tracking

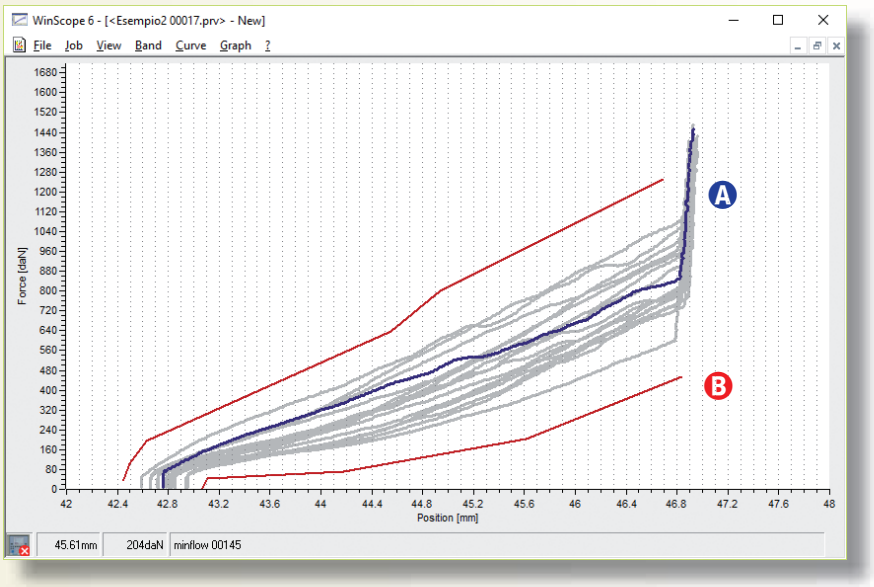
It is possible to track the history of the single pieces produced. The data measured is archived by WinScope® along with the piece code which can be entered manually, reading the barcode/Data Matrix, or automatically on the PLC.
As well as reading, the printing of a Data Matrix on a label to associate with the piece processed is also allowed.

Automatic determination of the control parameters

Available in manual or statistic method, with envelope of the minimum values and definition of the mean curve.

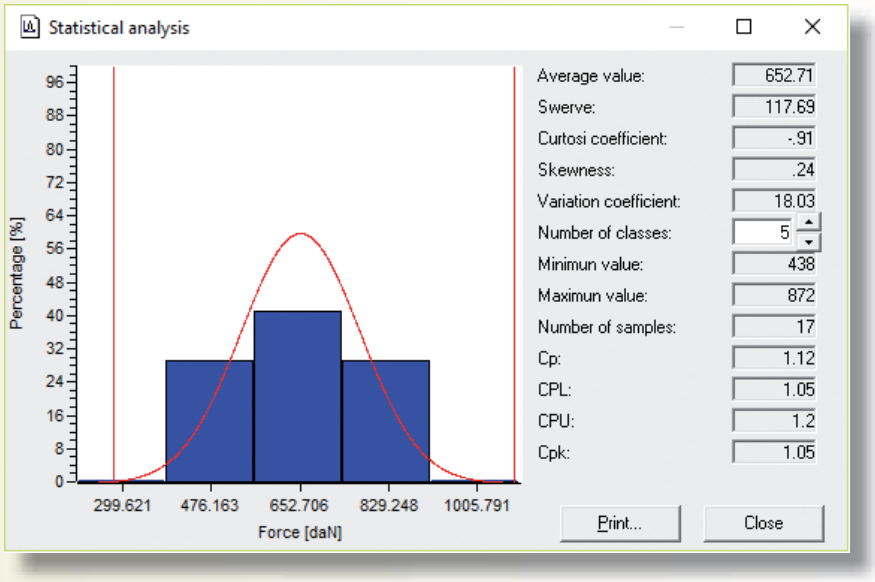
mean curve from envelope of several working curves **A**

control band generated by assigning a determined tolerance to the mean curve of point A. **B**



Statistical analysis

The software incorporates a powerful statistical analysis function of production (with calculation of CP/CPK, means, variances, etc.)



Storing curves

Press curves can be saved for further analysis, individually or superimposing an entire family.

Database

As well as saving single curves, it is possible to archive the values measured in a database.

Printing

Another function of WinScope® is the possibility to connect a standard printer for graphs printouts.

Available catalogues:

PNEUMO-HYDRAULIC PRESSES

MANUALLY OPERATED PNEUMO-HYDRAULIC PRESSES

PRESSING PROCESS CONTROL SYSTEMS

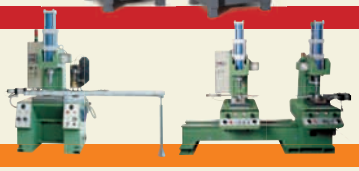
SERIES AP/AX POWER GROUPS

SERIES PK POWER GROUPS

PRESSURE BOOSTERS

ELECTRIC CYLINDERS

ELECTRIC PRESSES



SPECIAL PURPOSE PRESSES

Technical data and pictures may change without prior notice

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