



**FISCHER - W.MÜLLER
BLASFORMTECHNIK**

**Blow molding machines
series FMB2**



With the type FMB2 machines, Fischer-W. Müller has developed a replacement for the proven VK3 and BFB8 series in the lower clamping force segment. The largest machine of this series, the FMB2-80, is predestined for the production of L-ring drums.

The machines are suitable for discontinuous operation with accumulator heads up to an ejection volume of 25 litres.

Movable clamping units enable a significant reduction of non-productive time.

Alternatively, continuous parison heads can be used in conjunction with movable clamping units and robotic parison feed. The FMB2 is thus ideal for coextrusion.

Type FMB2 blow-molding machines have a hybrid drive for the clamping unit(s). An electric servo motor ensures fast quick-traverse motions. A hydraulic system looks after the slow motions and provides fast development of the clamping force in this energy-saving concept. There are three models available with clamping forces of 400, 600 and 800 kN. The clamping force is applied by means of three crossbar units and is introduced centrally to the clamping platens.

For fast installation and removal of the blow mold, the tie bars can be retracted to the end position. This means that the operator can install or remove both halves of the mold at the same time by making use of the maximum opening.

The machines can be fitted with one or several extrusion heads and can be used for all common processes:

- Discontinuous extrusion with accumulator head
- Continuous extrusion and coextrusion, also with parison feeder.

All three extrusion methods can be of fixed or movable arrangement and designed as single and double station machines.

Special techniques

- 3D technology for parison manipulation using robots with 6-axis control and/or suction blow-molding
- Sequential coextrusion.

The machine control system BlowCommand 3 is based on Siemens S7 and thus represents the state of the art in control technology.

The key technological advantages of this series:

- Extremely deflection-resistant clamping unit.
- Quick development of clamping force due to direct application of force, outstanding energy saving due to hybrid drive.
- Ideal distribution of clamping force.
- Perfect isolation of forces from the guide.
- Generous opening widths.
- Simplified mold changing through sliding crossbars.
- Generous amount of space below the blow mold. Additional devices such as spreader, pre-pincher or central blow pin can be easily installed and set up.
- 25 L/D extruder.
- Wide range of heads for discontinuous extrusion, continuous extrusion and coextrusion.
- Remote centring of die with machine running (option).
- Decentralised machine control system with Profibus technology.
- Freely selectable article ejection direction according to customer's requirement.
- Saving in cycle time through movable clamping unit(s) (optional).

Components of this machine are used for a special suction blow molding machine.

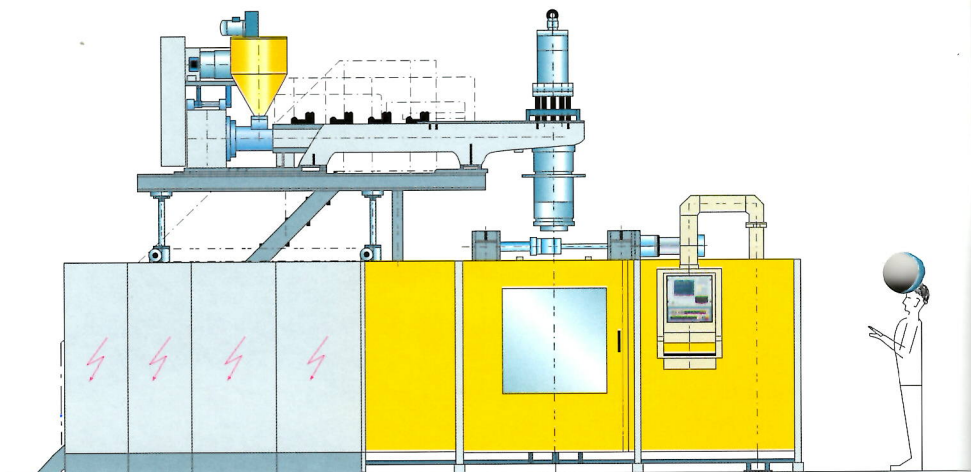


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Extrusion processes

Discontinuous operation with accumulator heads

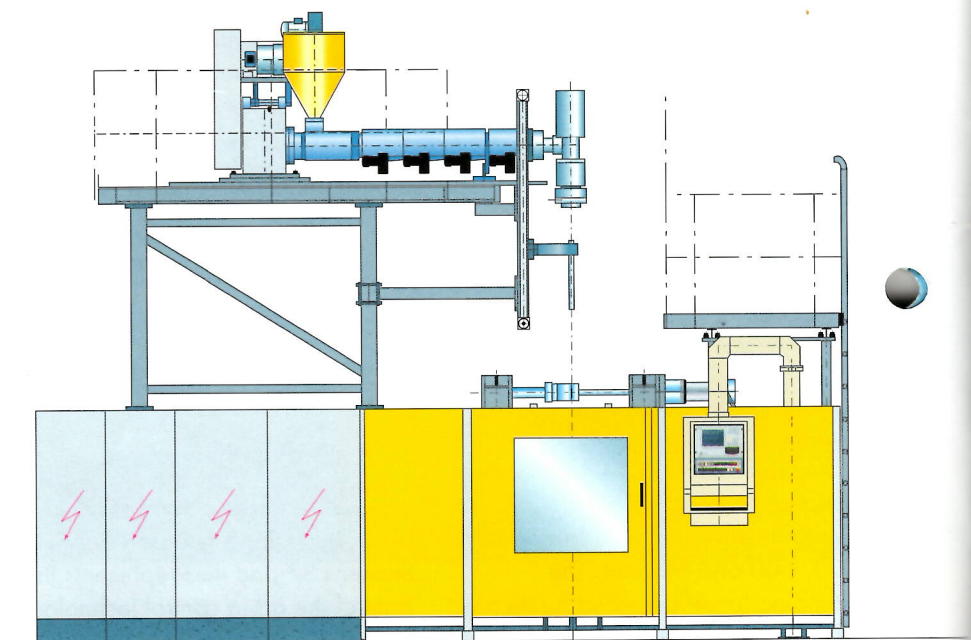
Accumulator heads are used for heavy or long preforms or raw materials of low viscosity. They enable high-speed ejection of the preform and thus rapid take-over by the blow mold. Extruder platforms of variable height permit adjustment to different mold lengths.



Continuous extrusion

For processing high-viscosity thermoplastics such as high molecular weight polyethylenes, continuous processing in single and multi-layer techniques is possible as an option for certain products. Continuous coextrusion is suitable for processing of recycling materials in the Reco process or for 4 to 6 layer coextrusion for optimisation of barrier properties.

Blow molding machines of the FMB2 series can be operated with movable clamping unit or parison feeder. Cycle time and flash percentage are reduced by using a short-stroke feeder which takes the preform over from the die and lowers it into the mold.



Extruders/extruder platforms for simple die and mold changing

Extruders

Extruders are available in diameters from 60 to 150 mm and lengths of 25D. They are mounted on base plates which permit the extruder and the head to be swung out and thus allow to exchange the tooling quickly from above with the help of a hoist. *)

As an option, all extruders are fitted with a convenient automatic start and stop system including hydraulic hopper slides.

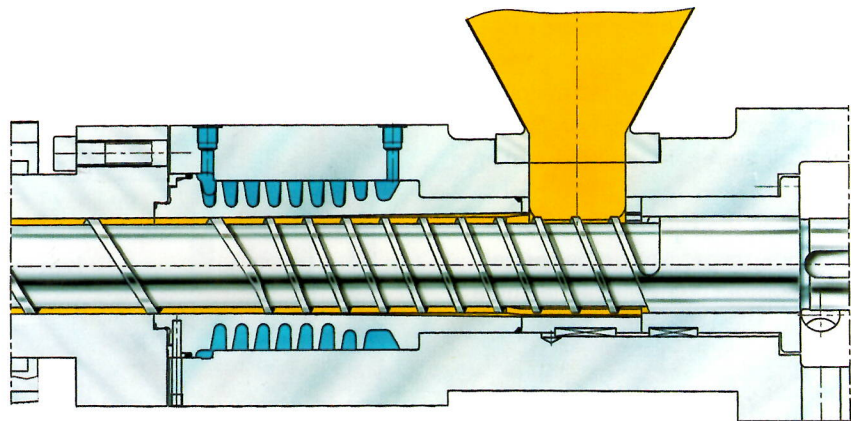
Gravimetric weighing systems for exact metering and monitoring of quantities are available for coextrusion.

**) applies only to machines with stationary clamping unit.*

Extruder platform

The extruder platform is adjustable in height by an electric motor and is accessible by means of a ladder or optionally by convenient steps.

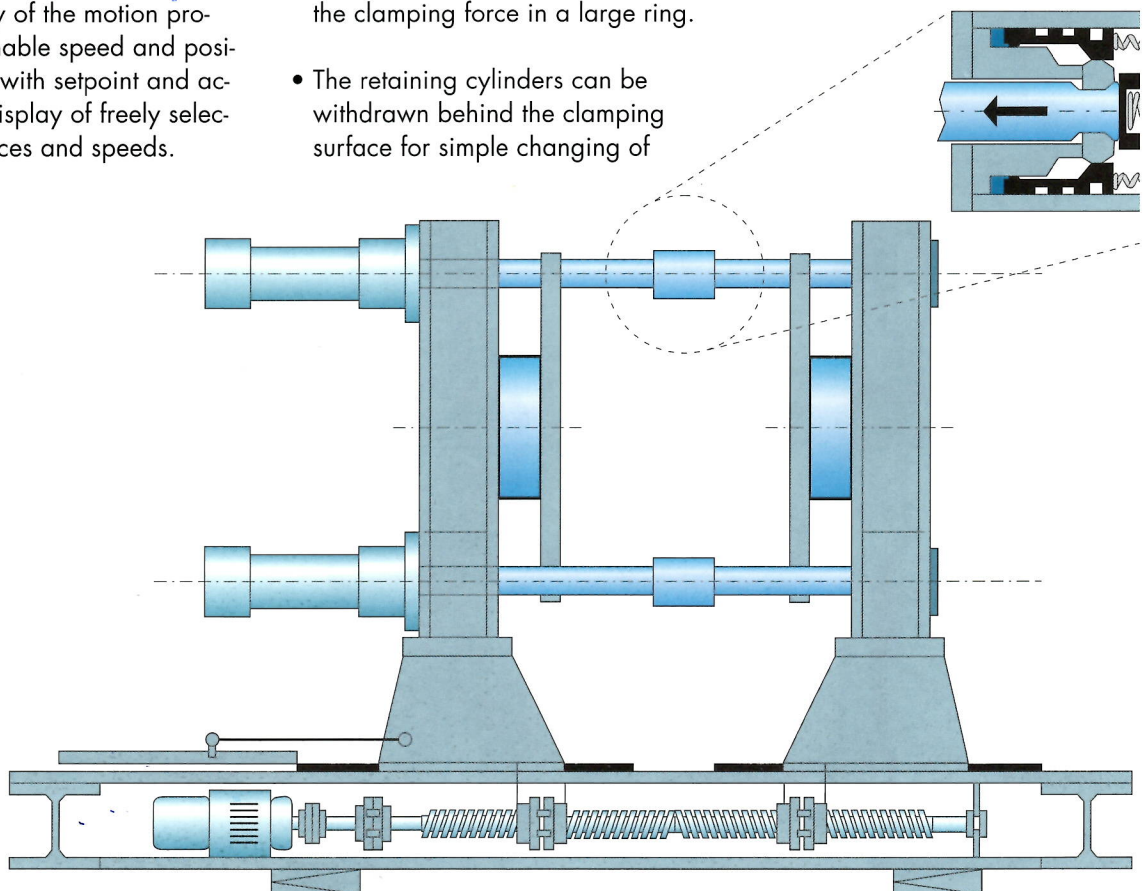
The heating control for heads and extruder as well as the wall thickness control are installed in a terminal box on the extruder platform:



Extruder with grooved feeding zone

Clamping unit

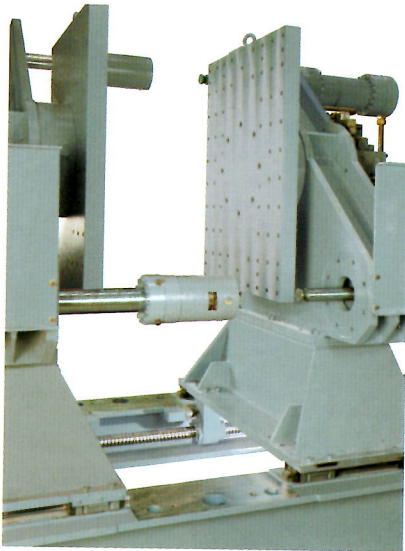
- After mold closure, the clamping force is rapidly developed due to the hydraulic accumulator / proportional valve / locking cylinder system. The mold clamping motion is position-controlled by means of a hybrid drive. The mold clamping platens are moved servo-electrically to the locking position by means of a ball screw. The speed profile - clamping fast-slow - to form the weld seam is controlled by means of a proportional hydraulic valve.
- Linking of quick motion and clamping cycle into a one control loop for the greatest possible reproducibility of the motion process. Switchable speed and position control with setpoint and actual value display of freely selectable distances and speeds.
- Economic use of energy: The servo-electric drive of the ball screw is designed for high speed and the locking cylinder for maximum clamping force.
- Mold closure monitoring and mold protection. Position control of machine functions with freely selectable switching points related to the blow mold clamping and opening distance. Position detection by means of non-wearing ultrasonic displacement sensor.
- Perfect distribution of clamping force over the full circumference of the mold as a result of applying the clamping force in a large ring.
- The retaining cylinders can be withdrawn behind the clamping surface for simple changing of molds; this ensures that mold can be changed from above or from the side without obstruction.
- The dimensions of the mold clamping platens can be adjusted to requirements.
- The mold clamping platens can be adjusted to accommodate different blow mold thicknesses (optional).
- Generous space beneath the mold for installing devices, for which all article-related control circuits are available (optional).



Detail of the locking system of the tie crossbars

Discharge grippers

Blowing and calibrating device



The blow molded article is withdrawn from the mold and ejected by the discharge gripper.

There are different variations of ejection depending on machine configuration which enable the FMB2 to be adapted to the logistics and space available in the production area.

Generous space is provided beneath the blow mold for:

- blowing units or central blow pins,
- spreading devices,
- parison welding devices,
- feed devices or manipulators.

These devices are mounted on a deflection-resistant platen which can be adjusted in height. Once the correct position for an article is found, this can be stored at the control desk, if an electric system has been provided.

In addition to this convenient and quick adjustment, the devices are mounted on exchangeable platens thus reducing the set-up time.

- Generous space underneath the blow mold for the installation of devices. All controls depending on the article are available (optional).
- Rigid and precise guiding of clamping platen module on the base frame in virtually play- and maintenance-free linear guides.
- Precisely synchronised motion by means of a ball screw mechanism in the base frame.
- Base frame not affected by clamping forces.

The clamping units are available in different versions for the following operating arrangements:

- Fixed (standard).
- Automatic travel operation with electric drive to reduce the cycle time for operation with accumulator heads or for continuous extrusion.

Technical data FMB2 series

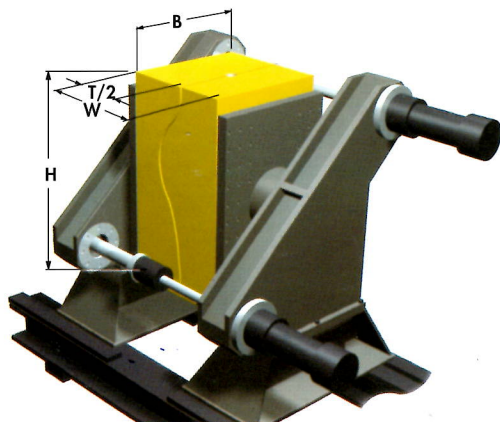
Clamping unit		FMB2-40	FMB2-60	FMB2-80**)
Clamping force	kN	400	600	800
Blow mold width W	mm	800 (1000)	1000 (1200)	1150
Blow mold height H	mm	1200	1700	1800
Blow mold depth T	mm	600	800	800
Mold opening stroke	mm	800	800	900
Max. opening width	mm	1400	1600	1700
Min. opening width	mm	600	800	800
Closing speed	mm/s	600	600	600
Max. cycles per hour, continuous	-	200	180	150
Max. cycles per hour, discontinuous ^{*)}	-	-	144	133 120
Hydraulic capacity	kW	22	22	22

^{*)} for 6.3 dm³ accumulator capacity, decreases with increasing head size

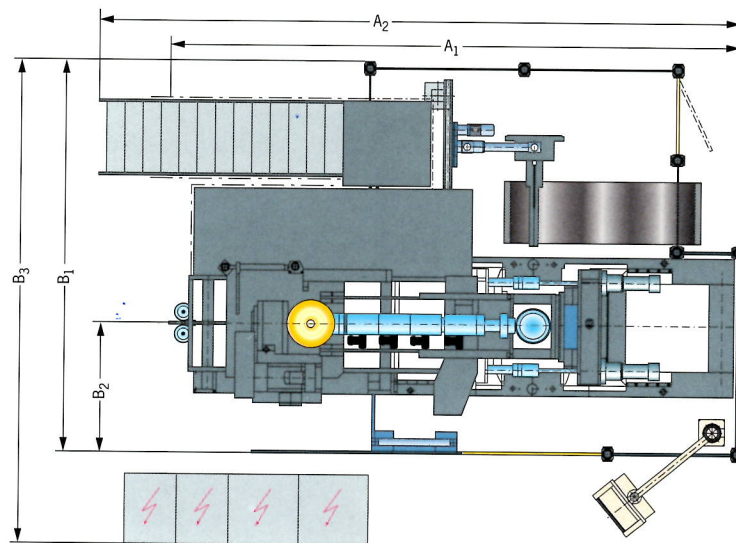
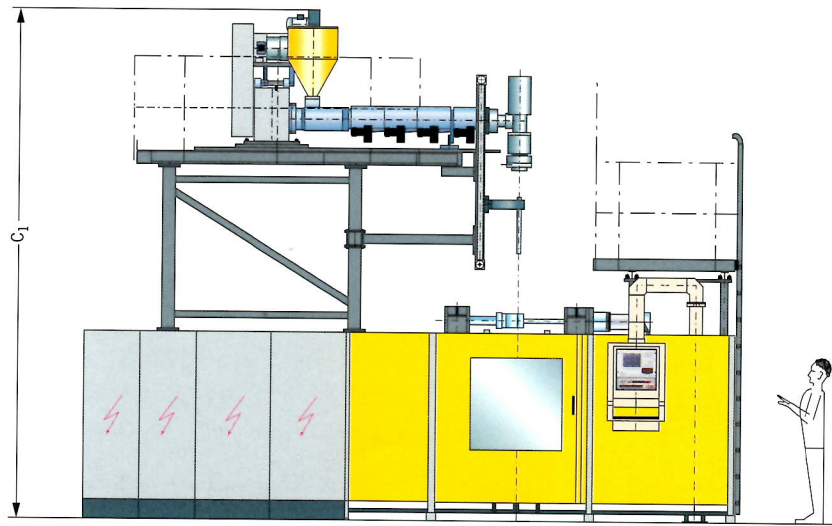
^{**)} horizontal tie bars

BFKS accumulator head		BFKS 1	BFKS 1.3	BFKS 2.5	BFKS 4	BFKS 6.3	BFKS 10	BFKS 20	BFKS 25
Capacity	dm ³	1	1.3	2.5	4	6.3	10	20	25
Heating sections	-	5	4	4	5	5	5	5	5
Heating power	kW	15	8.2	10.2	16.3	17.9	29.2	43	47
Die size / standard	mm	10-35	40-170	40-190	50-220	50-220	60-260	100-470	100-470
Die size / large	mm	-	-	80-250	85-300	85-300	100-300	-	-

Dimensions and technical data are mere non-binding approximate values.
Subject to alterations in line with technical progress.



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Continuous extrusion

Dimension	FMB2-40	FMB2-60	FMB2-80
A ₁	7,000	7,000	7,000
A ₂	7,750	7,750	7,750
B ₁	4,400	4,400	4,400
B ₂	1,500	1,500	1,500
B ₃	5,400	5,400	5,400
C ₁	5,500	5,500	6,000

Discontinuous extrusion

C ₁	4,500	5,000	5,500
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All other dimensions identical to continuous extrusion.

Dimensions may vary considerably, depending on design and configuration.

Extruders

Screw diameter/length in mm

Main extruder	60/25	70/25	80/25	90/25	100/25	120/25	150/25
Plasticising capacity HMPE ^{x)} kg/h	110/100	135/125	190/175	230/210	300/275	420/385	540/500
DC motor kW	32	40	55	70	90	130	180
Number of heating sections -	4	4	4	4	4	4	5
Heating power kW	12	16	22	27	28	50	73
Cooling water requirement for feed section kJ/kg	170						

Coex/Reco/Seco extruders	50/25	60/25	80/25	90/25
Plasticising capacity HMPE ^{x)} kg/h	70/65	110/100	190/175	230/210
DC motor kW	22	32	55	70
Number of heating sections -	4	4	4	4
Heating power kW	9	12	22	27
Cooling water requirement for feed section kJ/kg	170			

^{x)} The performance data relate to the individual extruders with 70/30 mixing (new material/reclaimed flashes).

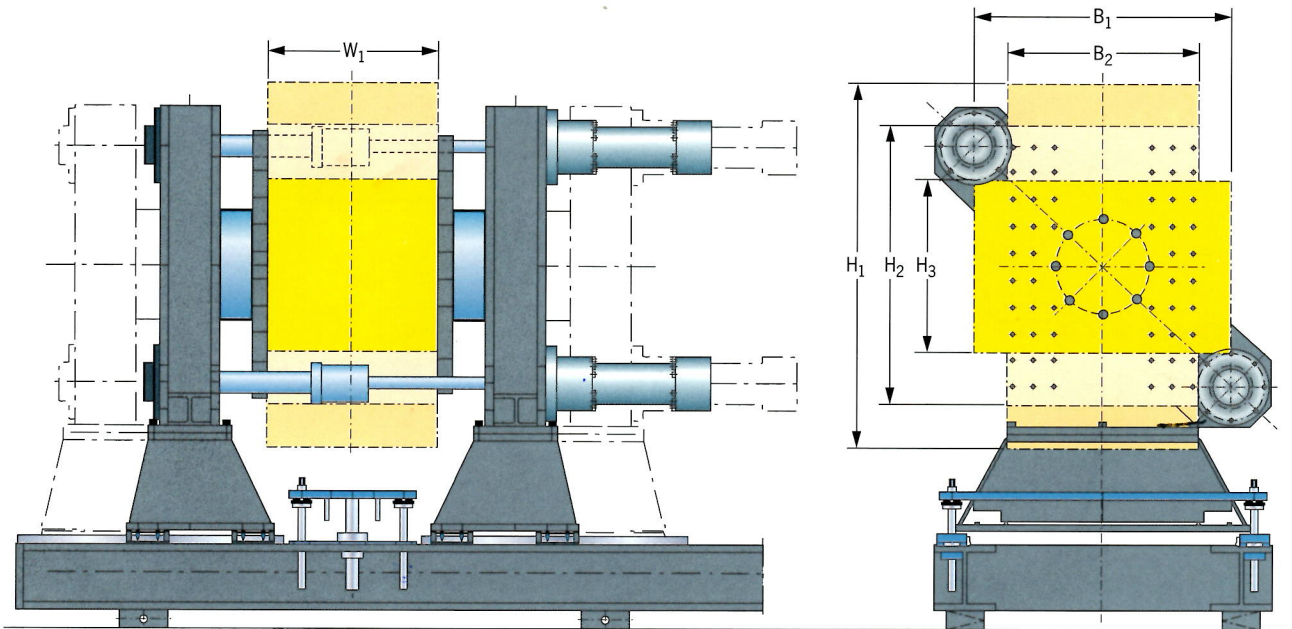
Type code:

Example: **100/25 WT DC kW 130**

- 100 = Screw diameter "D"
- 25 = Screw length 25 times "D"
- WT = Thermally-insulated barrel
- DC = DC motor
- kW = Extruder drive rating

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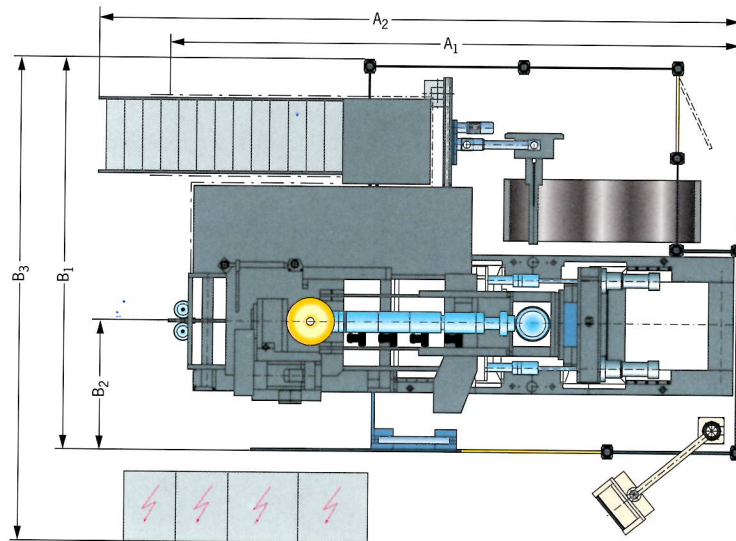
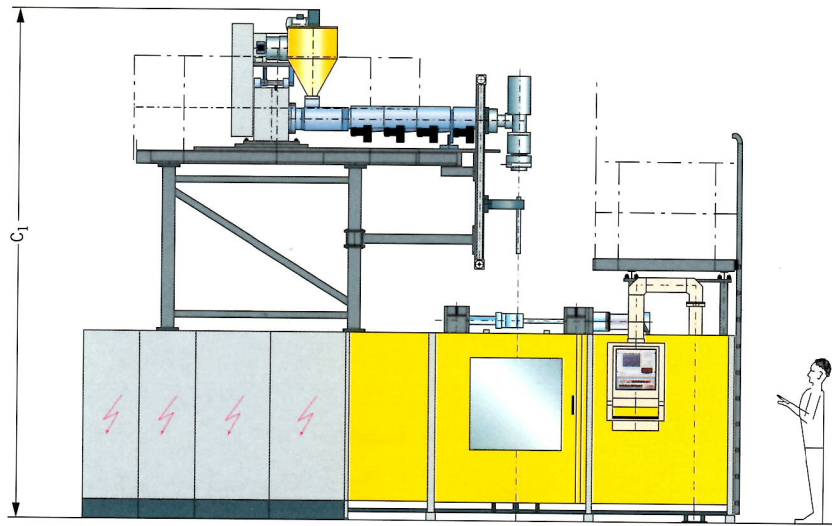
Clamping unit



Dimension	Installation	FMB2-40	FMB2-60	FMB2-80 ^{*)}
H1	Suction blow molding	1,200	1,700	-
H2	Vertical blow mold	1,000	1,300	1,800
H3	Horizontal blow mold	800	850	-
B1	Horizontal blow mold	1,000	1,200	-
B2	Vertical blow mold	800	1,000	1,150
W1	Blow mold thickness	600	800	800

^{*)} horizontal tie bars

Subject to alterations in line with technical progress.



Continuous extrusion

Dimension	FMB2-40	FMB2-60	FMB2-80
A ₁	7,000	7,000	7,000
A ₂	7,750	7,750	7,750
B ₁	4,400	4,400	4,400
B ₂	1,500	1,500	1,500
B ₃	5,400	5,400	5,400
C ₁	5,500	5,500	6,000

Discontinuous extrusion

C ₁	4,500	5,000	5,500
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All other dimensions identical to continuous extrusion.

Dimensions may vary considerably, depending on design and configuration.