

GIT – GAS INJECTION TECHNOLOGY

Innovative and complete solutions

- › ECONOMICAL
- › MODULAR
- › RELIABLE



BAUER KOMPRESSOREN offer Gas Injection Technology as a solution to the problems of plastic part production.

The end user will benefit from BAUER's years of manufacturing experience in the field of GIT and compressor technology with tailor-made systems from one source. Bauer offer starter packs to complex large-scale systems.

For a perfect system design, the BAUER team is available and willing to provide on site advice.

GIT technology from BAUER - solutions from one source

BRIEF OVERVIEW OF GIT TECHNOLOGY

A procedure similar to GIT was described for the first time in 1972. This technology has a proven reliability and market growth from the 1980's.

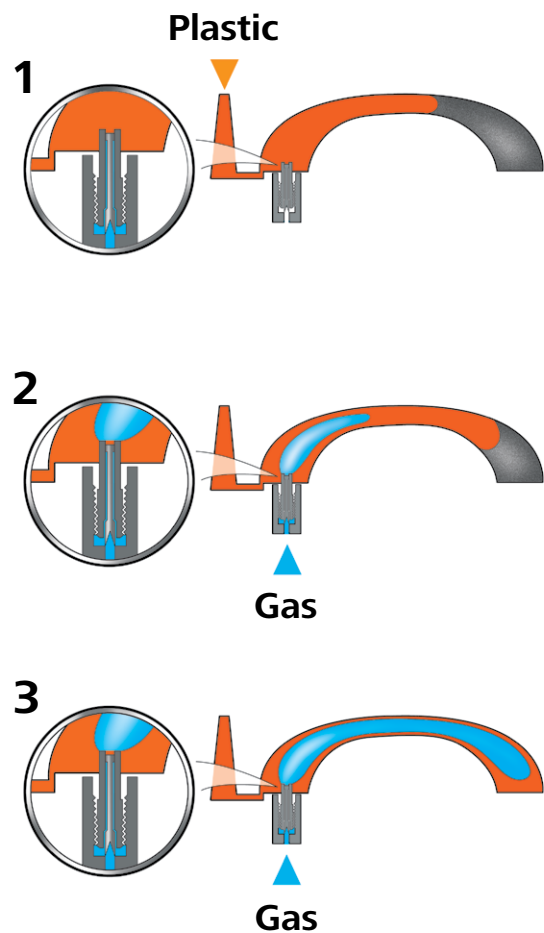
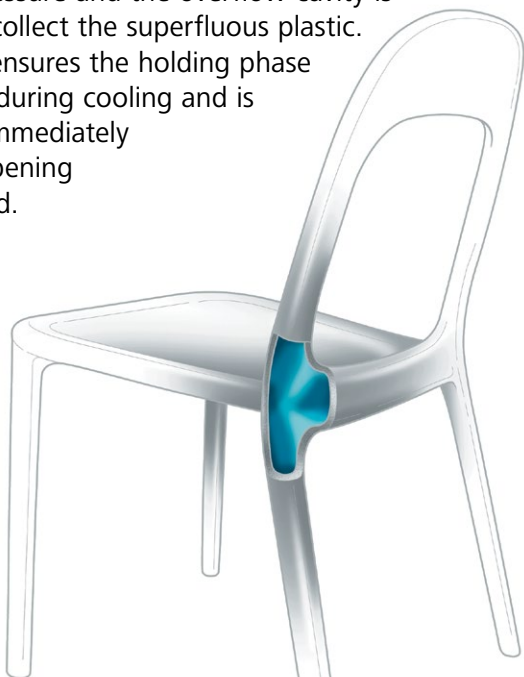
We denote by GIT, the method of blowing gas, especially nitrogen in the plastic, so that a hollow tubular channel is created.

Previously, the plastic had been melted and injected into a mould, which for thick pieces of plate, it was not possible to produce a flattened bubble.

THE DIFFERENT TECHNIQUES

There are at least 10 variants of GIT, based on the type of piece produced and its needs. The two most commonly used techniques are briefly explained as follows:

- › The partial original method, which is to fill 50-90% of the cavity with plastic. By moving the mass of hot plastic, the gas can finish filling 100% while creating a hollow tubular channel. The holding phase under pressure during the cooling phase is carried by the gas, whose pressure drop just before opening the mould.
- › The over flow cavity, which requires the addition of an annex cavity in the tool. After filling the part cavity at 100% with polymer, the gas is injected under pressure and the overflow cavity is open to collect the superfluous plastic. The gas ensures the holding phase pressure during cooling and is purged immediately before opening the mould.



BENEFITS OF GIT

The use of gas assisted injection technology allows production of technical parts with the appearance of superior quality. The manufacturing process is also more efficient, improving productivity and thus significantly increasing profitability.

- › A better quality of injected part:
 - High strength and rigidity
 - Dimensional stability, no warpage
 - Elimination of sink marks
 - No assembly, single parts
- › Simplification of tools
- › Freedom in design
- › Lower clamping force (in partial)
- › Reduced cycle time
- › Material saving
- › Realization of hollow (pipe)

BAUER EXPERIENCE

Our outstanding expertise in purifying gases, coupled with software-based control technology developed by our BAUER specialists, assures you outstanding product quality which will improve your profitability.

HIGH PRESSURE COMPRESSOR AND BOOSTER UNITS

- › Ready for use; compact and autonomous.
- › A compression of high quality nitrogen thanks to our P-filter system.
- › Booster units with low power consumption by using the inlet pressure of a nitrogen generator or evaporator.
- › A security operation through an integrated controller (B-CONTROL).

FCC CONTROL UNIT

- › A mobile and compact panel.
- › An adaptive control and therefore very precise (reactivity adjustable).

- › Easy and intuitive programming.
- › A full connectivity to transfer files (USB and Ethernet).
- › Continuous process monitoring with quality data storage.

EXCELLENT SERVICE ASSURED

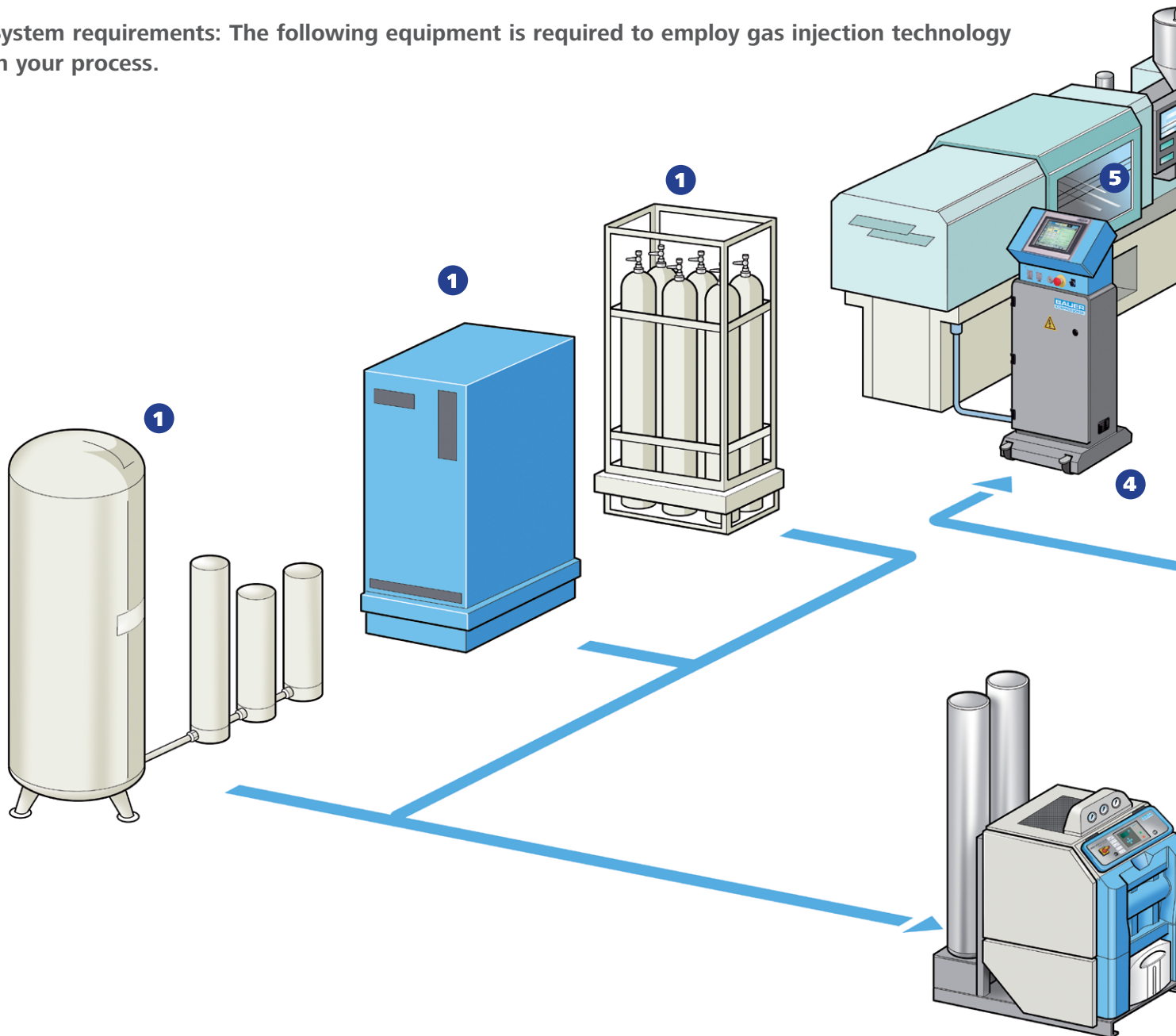
For BAUER, „quality“ does not end with the production and delivery of the system. Independent of the location of the installation, the customer benefits from the excellent and comprehensive after sales service support:

- › All major spare parts, including wearing parts, for all models are permanently in stock, and available for immediate dispatch. Parts are available for up to 25 years after delivery.
- › An integrated distribution network comprising of 22 subsidiaries, plus 360 support distributors are continually available to support our customers.
- › Maintenance kits for all systems are available worldwide.

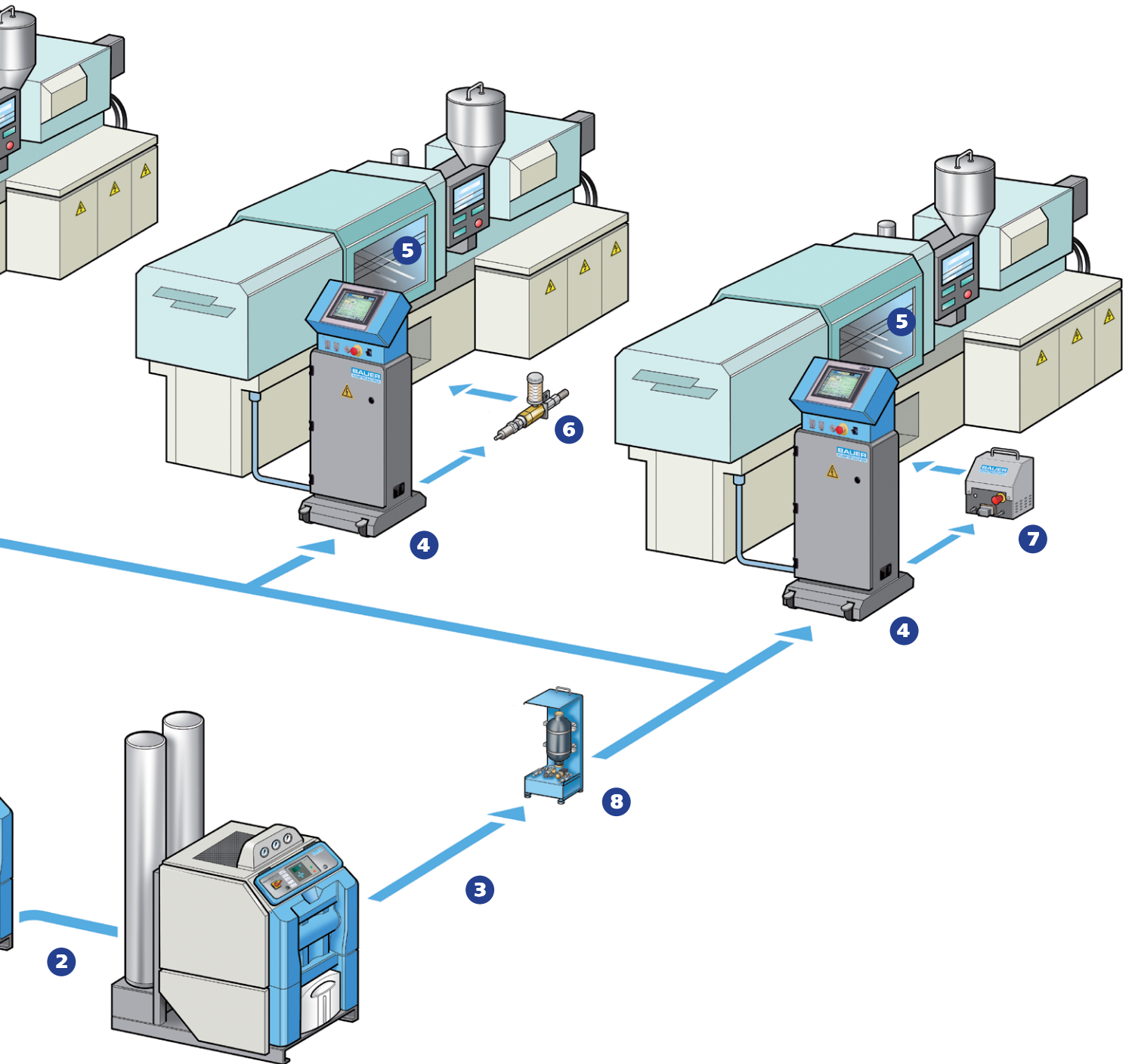


Structure of the system

System requirements: The following equipment is required to employ gas injection technology in your process.



- 1** Source of nitrogen: Liquid tank, nitrogen bottles or nitrogen generator
- 2** A high pressure compressor with a suitably sized gas receiver facility for the compression and safe storage of nitrogen at high pressures
- 3** High pressure lines to transport the nitrogen
- 4** Distribution panel that generates a pressure- / time profile to dispense the nitrogen



5 Gas injectors to fill nitrogen into the plastic parts for hallowing

6 Bypass valve available to prevent the ingress of dirt into the proportional regulating valve

7 Flushing Module FM1 assures quick cooling, which it turn reduces the cycle times

8 Volume Control VC I for exact measurement of the nitrogen consumption

Product range for nitrogen compression

Wherever high pressure nitrogen needs to be generated in a confined space providing economically efficient continuous and autonomously nitrogen supply, BAUER high pressure compressors and booster will perform the task quietly and reliably to meet the demands of one or multiple injection moulding machines.



THE MINI-VERTICUS III-RANGE

Soundproof and compact

- › The perfect unit for confined areas in industrial applications – available as a compressor with atmospheric or booster inlet conditions.
- › Multi stage piston compressor units, lubricated, soundproof <70 dB (A), with a final separator and filtration system P61 type for securing a compressed gas with high purity.
- › Complete system mounted on skid with up to two HP cylinders, compact and limited to small compressor block range.
- › Directly connectable to the source of nitrogen.
- › Designed for long life and low operating costs.

Model	F.A.D. ¹⁾		Number of stages	Speed	Motor power	Power consumption	Net weight approx.
	l/min	m ³ /h					
350 bar / 5000 psig, High pressure compressor for nitrogen							
MV-I 100-3-3	85	5	3	900	3	2,2	255
MV-I 100-4-3	125	7,5	3	1270	4	3,1	255
MV-I 120-4-3	170	10	3	1200	4	3,7	260
MV-I 120-5,5-3	215	13	3	1470	5,5	4,7	260

Model	F.A.D. ¹⁾		Number of stages	Intake pressure	Operating pressure	Speed	Motor power	Power consumption	Net weight approx.
	l/min	m ³ /h							
350 bar / 5000 psig, High pressure booster for nitrogen									
MV-GIB 12.2-5,5-3	200-475 ²⁾	12-28,5	2	5-11	90-350	1230	5,5	3,3-5,1	275

1) Measured acc. to ISO 1217.

2) Maximum capacity according to the combination of intake and final pressure.



THE VERTICUS 5 RANGE

The high pressure compression under control.

- › Multi stage piston compressor/booster units, lubricated, with a final separator and filtration type P61 / P81 for securing a compressed gas with high purity.
- › Complete system mounted on skid with up to two HP cylinders.
- › Available as soundproof version 72-76 dB(A).
- › Directly connectable to the source of nitrogen.
- › The B-CONTROL controller allows to monitor the operation of the compressor and to indicate the alarms such as temperatures, operating pressures, oil pressure and maintenance, etc.
- › 500 bar discharge pressure version optional.

Model	F.A.D. ¹⁾		Number of stages	Speed	Motor	Power consumption	Net weight approx.
	l/min	m ³ /h					
I - Range, 90 - 350 bar / 1300 - 5000 psig							
I 100-3-5	85	5,1	3	900	3	2,2	335
I 100-4-5	125	7,5	3	1270	4	3,3	340
I 120-5,5-5	215	13	3	1470	5,5	4,7	355
I 15.1-7,5-5	340	20,4	4	1050	7,5	6,9	440
I 15.1-11-5	420	25,2	4	1320	11	9,6	450
I 150-11-5	500	30	4	1230	11	10,2	460
I 180-15-5	610	36,6	4	1320	15	12	470
I - Range, 350 - 500 bar / 5000 - 7200 psig							
I 15.11-7,5-5	310	18,6	4	960	7,5	7	470
I 15.11-11-5	420	25,2	4	1320	11	10,4	470
I 18.1-15-5	520	31,2	5	1490	15	13,5	470

Model	ntake pressure	F.A.D. ¹⁾		Number of stages	Speed	Power consumption	Net weight approx.
		bar(g)	l/min				
BOOSTER GIB, 90-350 bar / 1300-5000 psig							
GIB 12.2-5,5-5	5 - 11	200 - 475 ²⁾	12 - 28,5	2	1230	3,3 - 5,3	365
GIB 15.3-11-5	7 - 10	510 - 750 ²⁾	30,6 - 45	2	1140	6,6 - 8,2	450
GIB 15.4-15-5	2 - 4	450 - 800 ²⁾	27 - 48	3	1320	7,6 - 12,2	470

1) Measured acc. to ISO 1217.

2) Maximum capacity according to the combination of intake and final pressure.

The FCC 5 - the latest first-class controller

BAUER distribution panels have been in operation worldwide for the past 10 years. Their mature and well proven control systems deliver maximum reliability with minimum downtime for users.

The fifth generation of distribution panels from BAUER provides improved „easy to use“ characteristics: The user interface has been simplified using graphic user guidance and single assignment of the control keys, thus making the units simpler and easier to learn how to operate.

INTERFACE AND CONTROLLER

- › Seven levels of time pressure with ramps transition in time
- › Password protection (3 profiles)
- › Cleaning cycle with clogged injector detection
- › Leakage detection
- › Graphic displays for pressure versus time
- › Screen quality on the relevant current values and last 100 cycles
- › Alarms (message, sound, cycle stopped) with history
- › Programs and data quality storage on internal memory Compact Flash, USB key or via Ethernet
- › Screen service with maintenance history and display technician diagnostic
- › Support and diagnosis via the Internet in real time
- › Usage with 2 moulding machines possible (option)

CONNECTIONS

- › Start signal: screw position or the start of plastic injection
- › Compatible with all injection moulding machines including EUROMAP 62 standard.

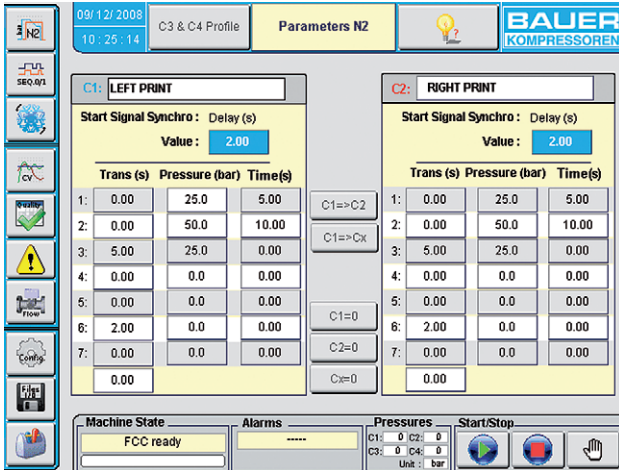
OPTIONS

- › Flushing to increase cooling effect and reduce cycle time
- › Sequential piloting to control up to maximum of 4 external hydraulic actuators (with control of oil level and temperature and 8 position sensors in the mould tool)
- › Volume control VC I to monitor the gas consumption and thereby part quality
- › Interface for using one FCC 5 with 2 moulding machines at the same time

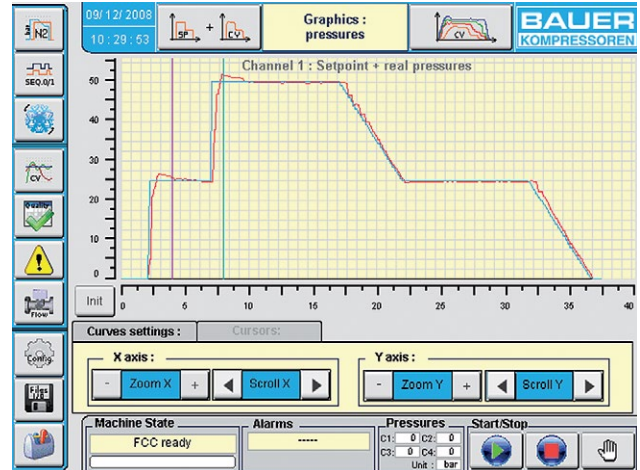


All informations at a glance!

The high resolution touch screen shows all relevant parameters. It provides clear user guidance and allows a comprehensive range of settings for controlling and monitoring the process.



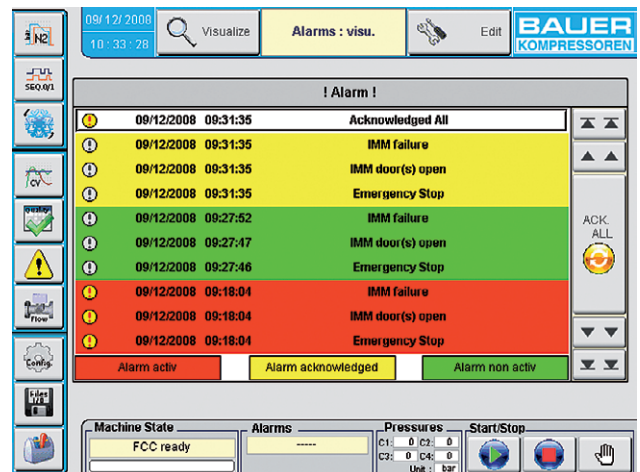
Time/pressure levels can be easily programmed.



The set-actual graph informs about the process quality.



Various alarm settings can be selected by the user.



Alarms messages on the last 1000 events

REGULATING MODULE

Built as a modular construction, the valve module can be mounted separately from the distribution panel, or near to the mould.

- Electrical proportional regulating valve.
- High reproducibility of parts.
- High precision from 5 to 400 bar.
- 1 to 4 proportional valves, exchangeable and also available for retrofit.
- 1-2 proportional valves per valve module.
- Integrated filtration of 25 µm.
- Low maintenance costs with fast service support.



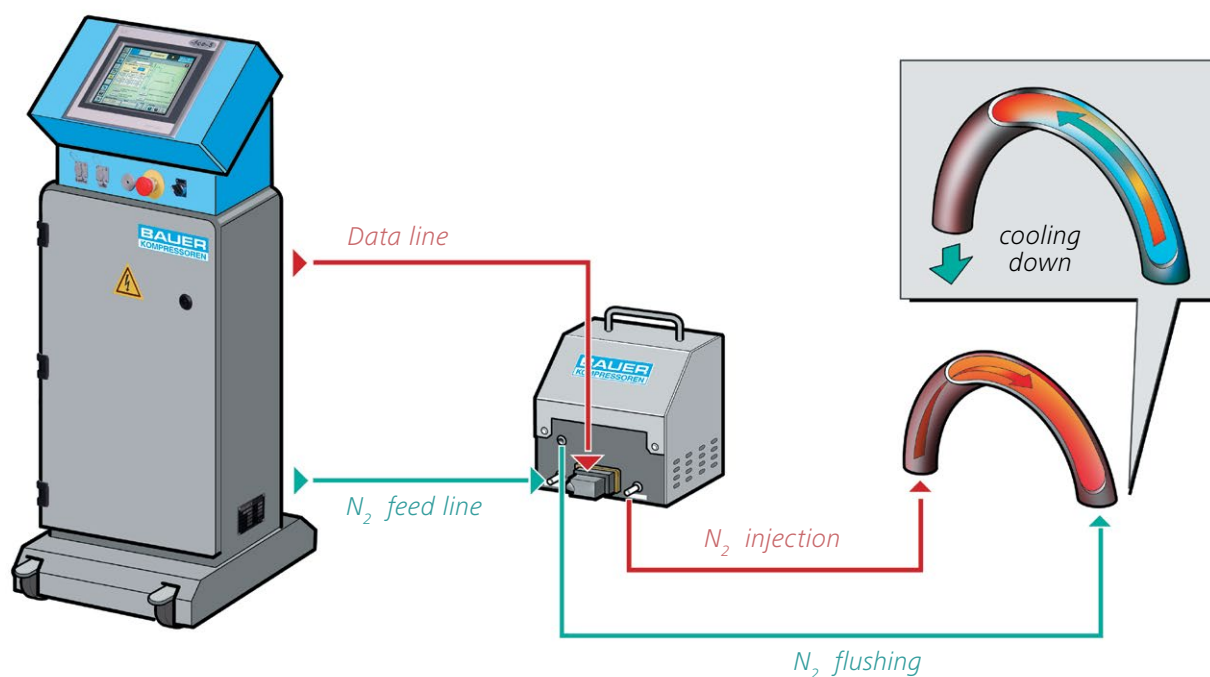
The new Flushing Module FM I

The flushing module FM I accelerates the cooling of the mould by up to 50%, thus decreasing the cycle time of GIT parts.

- › Two injectors are needed to flush, one at each end.
- › Initially, an injector introduces nitrogen, as found in the classical GIT process. Then pressure is switched on the second injector to break into the first bubble and to achieve a leakage rate through the first injector.
- › This movement generates heat exchange by forced convection inside the part in the hottest zone. This is considerably more effective than conduction through the mould with a mass of highly insulating plastic.
- › The FM I can be easily integrated into an existing process that requires only the installation of a second gas injector. The flushing module is driven directly by the panel of gas assisted injection.
- › Additional cooling of the flushing gas is not necessary!



Flushing module FM1



The system is covered by patents on the basis of a licence agreement between BAUER COMPRESSEURS S.A.S. and LINDE AG.

Keep it simple – our economically priced starter pack

LCC I – LIGHT CLASS CONTROLLER

Equipped with 1 or 2 valves, this small distribution panel is programmed via an external laptop. The LCC I can be directly mounted on the injection moulding machine, which minimizes the nitrogen consumption.

INTERFACE AND PLC

- › Programmed via an external laptop which can be removed during production.
- › Five time and pressure stages with ramp transitions in time.
- › Quality and alarms screens are available.
- › Remote control for Start/Stop, Injector test, Reset IP address functions. Green and red lights inform on panel status (ready, cycle in progress, alarms, etc.).
- › Programs and quality data storage on internal memory Compact Flash.

CONNECTION

- › Start signal: start of plastic injection.
- › Compatible with all injection moulding machines including EUROMAP 62 standard.
- › Ethernet port on remote control to connect a laptop.



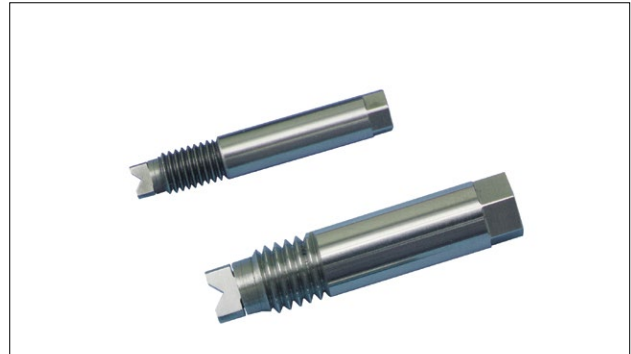
LCC I, with remote control and optional laptop

The GIT technology accessory range

GAS INJECTORS

The stainless steel injectors can be used for all gas injection processes.

- › No penetration of melt
- › Diameter: 2 – 12 mm
- › Quick and easy cleaning
- › Optional with seal
- › Specific size on demand

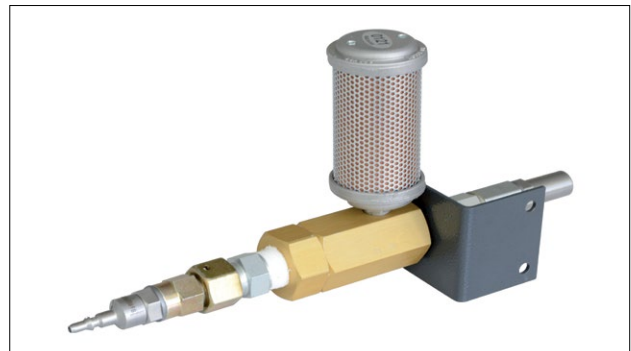


BAUER gas injectors

BYPASS VALVE

The bypass valve has to be placed between the mould and the distribution panel.

- › Protects the valve module from from plastic degassing pollution
- › No external energy needed
- › Increases the system availability



Bypass valve

VOLUME CONTROL VC I

Optional system on FCC 5

- › Allows monitoring of nitrogen consumption and control of the process repeatability
- › This volume control and its interface are completely integrated to the panel FCC 5 (alarms, graphic, quality and statistic screens).
- › Connected at the controller inlet



Volume control VC I