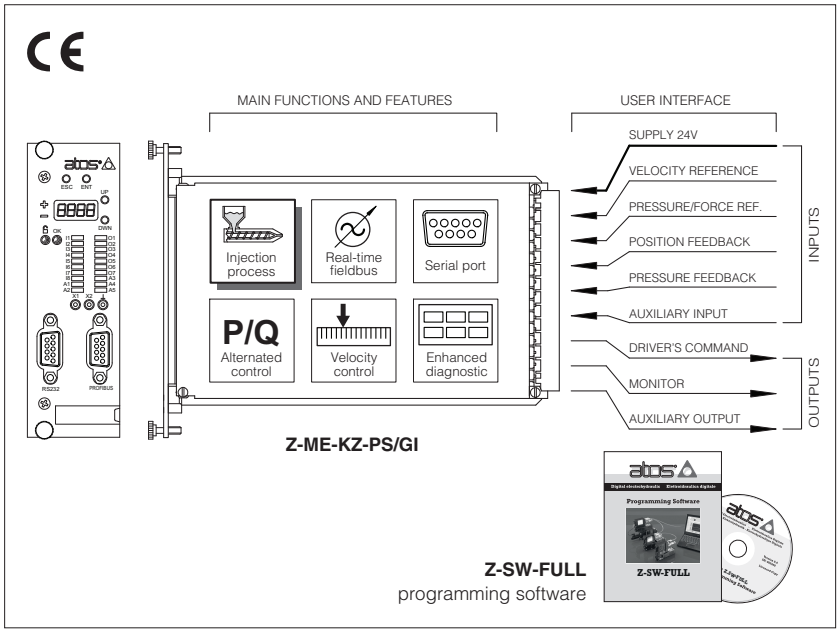
Plastic injection Z-ME-KZ-PS/GI controllers

Eurocard format, for electrohydraulic closed loop controls of injection in plastic presses

obsolete components - availability on request



Z-SW-FULL
programming software

1 MODEL CODE

Z-ME	-	KZ	-	PS	/	*	GI	/	*	/	*

- **Z-ME**: Electronic axis controller in Eurocard format
- **KZ**: Alternated position / velocity / force control module
- **PS**: Serial communication interface for configuration and monitoring function
- *****: **Optional fieldbus interfaces:**
  - = standard without fieldbus interface
  BC = CANopen communication interface
  BP = PROFIBUS DP communication interface
- **GI**: Injection process control
- ***** (Series number)
- ***** (Set code)

Z-ME-KZ-PS/GI

Plastic injection controllers perform velocity and force closed loop controls, according to real time commands (analog or fieldbus) generated by machine control unit (e.g. PLC).

The controller receives position / pressure feedbacks and generates reference signal to the proportional valve which regulates the hydraulic flow to the injection actuator.

The position feedback signal is software selectable: SSI, incremental encoder, potentiometer or analog (voltage or current).

Remote pressure transducers have to be remotely installed close to the injection actuator and connected to the controller (see section 5).

The machine electronic control unit manages the injection process through dedicated digital commands or fieldbus communication.

Serial and Profibus (only for BP option) ports are available on the front panel for controller configuration and diagnostics.

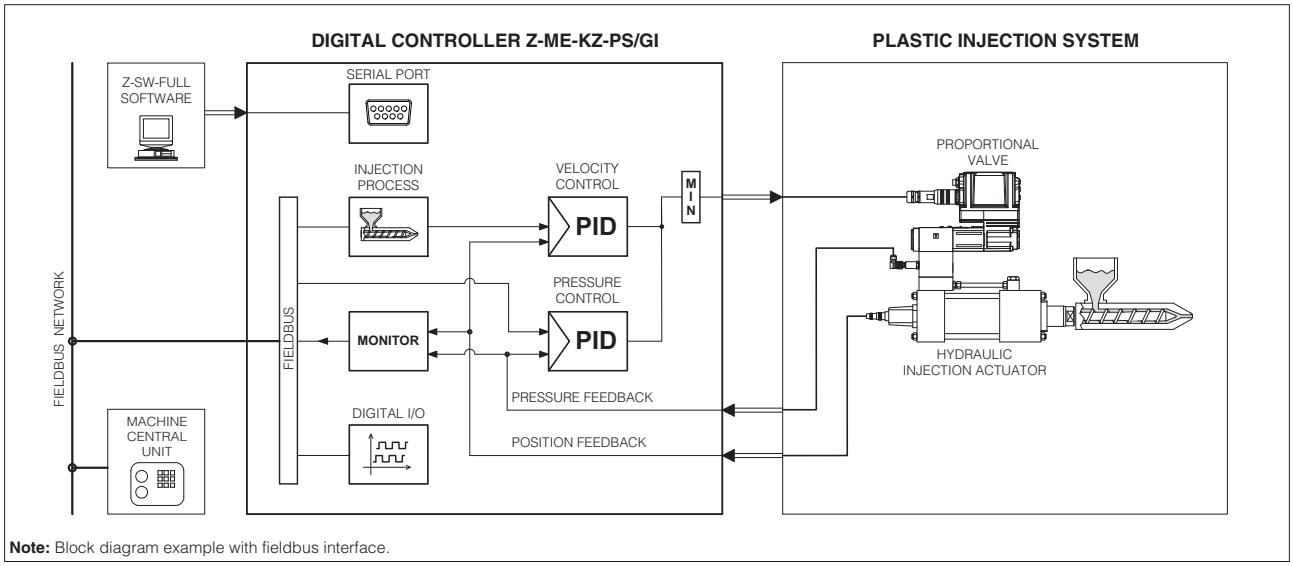
Electrical Features:

- 4 digits front panel display to check and change parameters as well as for diagnostics
- Front panel DB9 connector for serial programming interface
- Front panel test points for debug and maintenance
- Eurocard format (DIN 41494 - Plug-in-units)
- CE mark according to EMC directive

Software Features:

- Internal generation of injection cycle
- Setting of axis's dynamic response (PID) to optimize the injection performances
- Monitoring of injection process
- Software selectable range of electronic reference analog inputs: voltage or current
- Diagnostics of the injection status
- Intuitive graphic interface
- In field firmware update through standard serial communication port
- Internal oscilloscope function

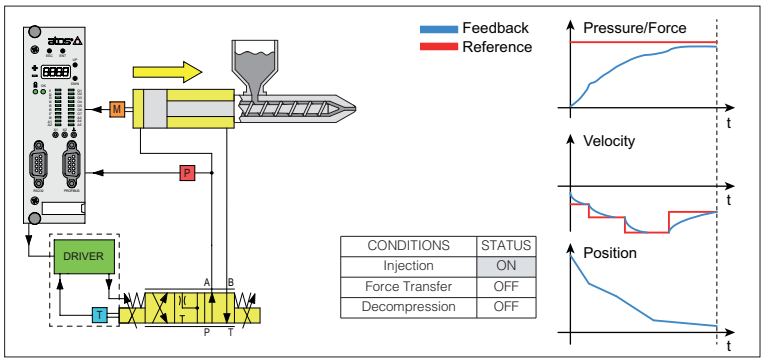
2 BLOCK DIAGRAM



Note: Block diagram example with fieldbus interface.

3 INJECTION PHASES

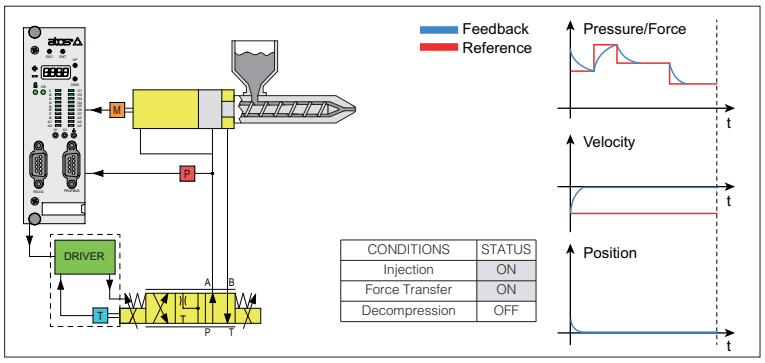
3.1 Injection - Velocity closed loop control with max pressure limitation



3.1 Injection

Injection phase starts when the machine control unit (e.g. PLC) enables the command “Injection”. The controller performs velocity closed loop profile according to the external velocity reference, with a maximum force limitation during traversing. Machine control unit provides velocity step reference to the controller, which internally limits acceleration and deceleration in order to avoid mechanicals stress during velocity variations

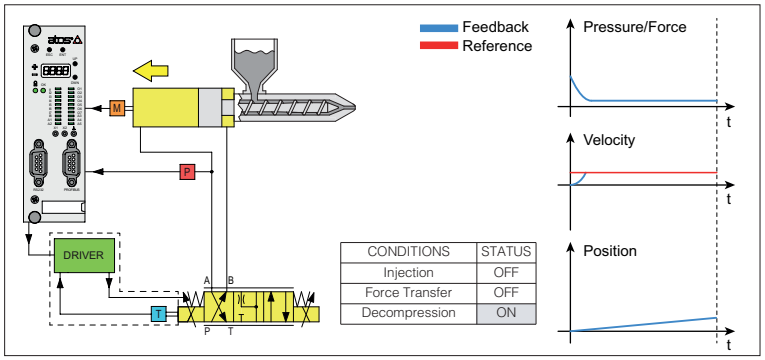
3.2 Pack and Hold - Pressure closed loop control with max velocity limitation



3.2 Pack and Hold

Pack and Hold phase starts when the machine control unit enables the command “Force Transfer” with “Injection” condition active. The controller performs pressure/force closed loop control with max velocity limitation to prevent sudden forward actuator movements in the transition from Injection to Pack and Hold phase

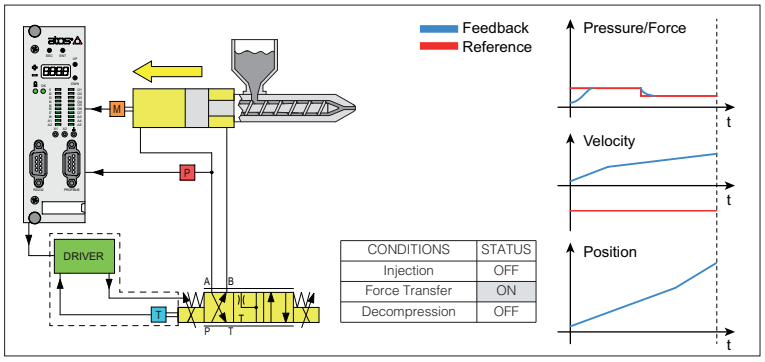
3.3 Pre-Decompression - Velocity open loop control



3.3 Pre-Decompression - optional phase

Pre-Decompression phase starts when the machine control unit enables the “Decompression” condition. The controller regulates in open loop the backward velocity of the injection actuator according to the external command signal (velocity reference)

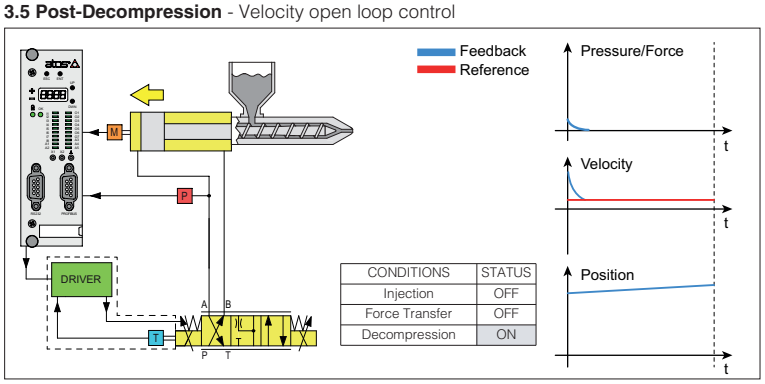
3.4 Back Pressure - Pressure closed loop control with max velocity limitation



3.4 Back Pressure

Back Pressure phase starts when the machine control unit enables the command “Force Transfer” with “Injection” condition not active. The controller performs force closed loop control with max velocity limitation to prevent sudden backward actuator movements in the transition from Pack and Hold or Pre-Decompression phase to Back Pressure ones

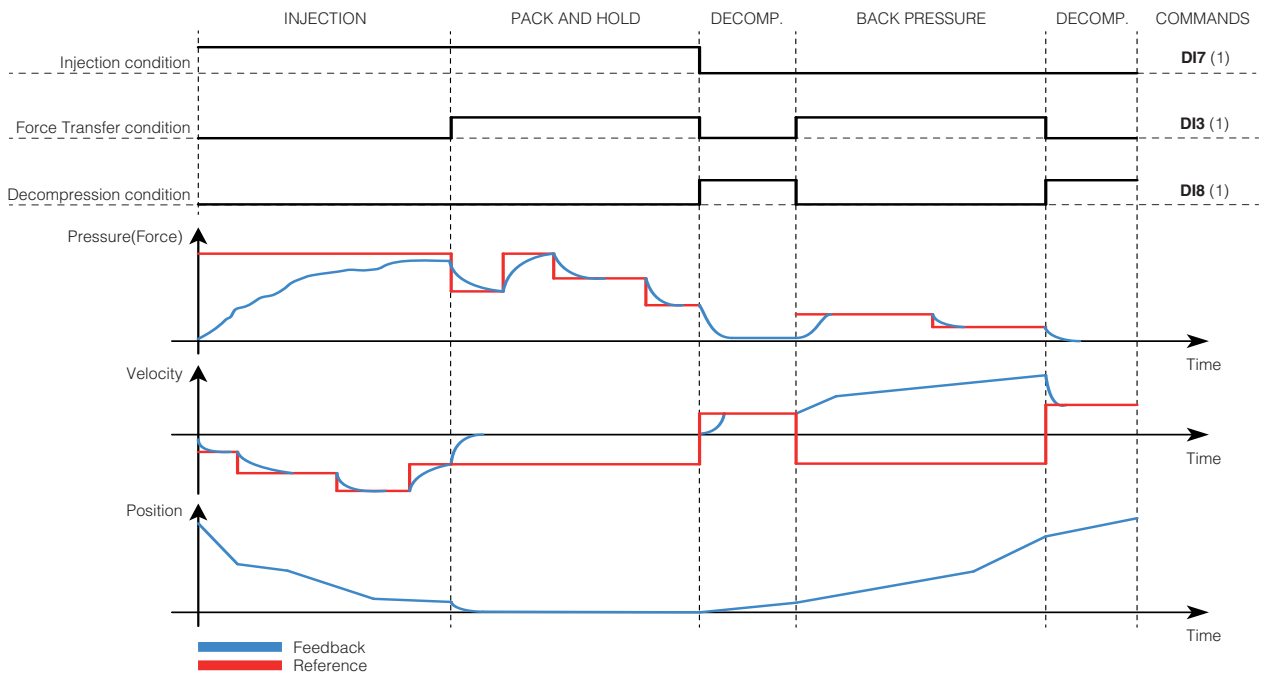
3.5 Post-Decompression - Velocity open loop control



3.5 Post-Decompression - optional phase

Post-Decompression phase starts when the machine control unit enables the “Decompression” condition. The controller regulates in open loop the backward velocity of the injection actuator according to the external command signal (velocity reference)

4 EXAMPLE OF INJECTION CYCLE WITH DIGITAL COMMANDS FROM MACHINE CENTRAL UNIT

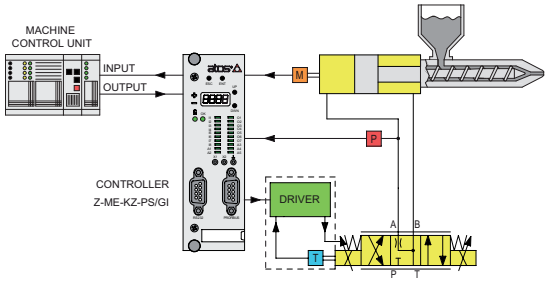
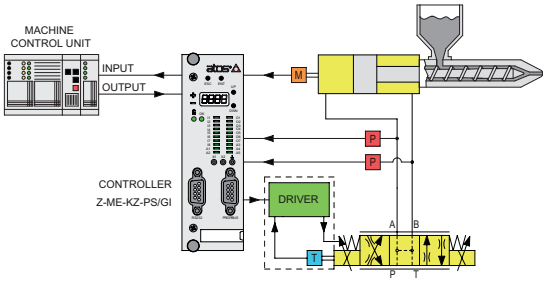


Note: (1) see section 11 for digital inputs commands connection

Note: for controllers with BP or BC option the injection cycle is managed by fieldbus commands

5 PRESSURE / FORCE CONFIGURATION

For technical support about proportional valve selection and control electronic configuration, please contact Atos tech assistance at ele-support@atos.com

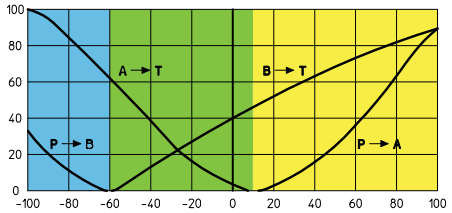
Alternated Velocity/Pressure Control - One pressure transducer	Alternated Velocity/Force Control - Two pressure transducers
	
Typical schemes used in injection molding machines designed for **high/medium density materials**. Proportional valves with V9 spool type (see section 6) should be used. A remote pressure transducer has to be installed on the injection line of the actuator.	Typical schemes used in injection molding machines designed for **low density materials**. Proportional valves with linear spool type with zero overlap characteristics is strictly recommended to obtain improved force control. Two remote pressure transducers have to be installed on the actuator's ports; the actuator force is calculated by the pressure feedbacks (Pa - Pb).

T valve's spool transducer M actuator's position transducer P pressure transducer

6 SPECIAL SPOOL FOR INJECTION PROCESS

V9 main features:

- strong meter-in characteristic allows the pressure control during the holding pressure and the plasticizing phases
- safety central position depressurizes the actuator chambers
- large flow capability, required during the plasticizing phase, discharges big oil volumes from injection actuators with low pressure drops and also permits the contemporary oil suction from tank



backward movements (flow active)

depressuring (pressure active)

forward movements (flow or pressure active)