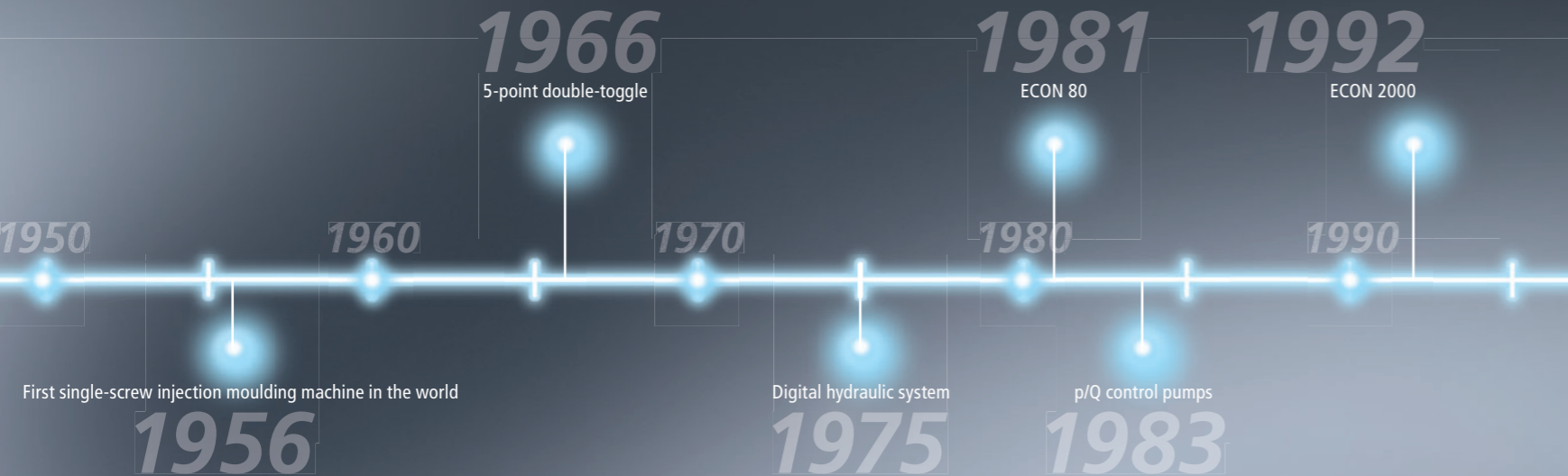


# *Efficiency of production*

12 Components



Der Zukunft voraus  
Ready for the future 未来をみつめて

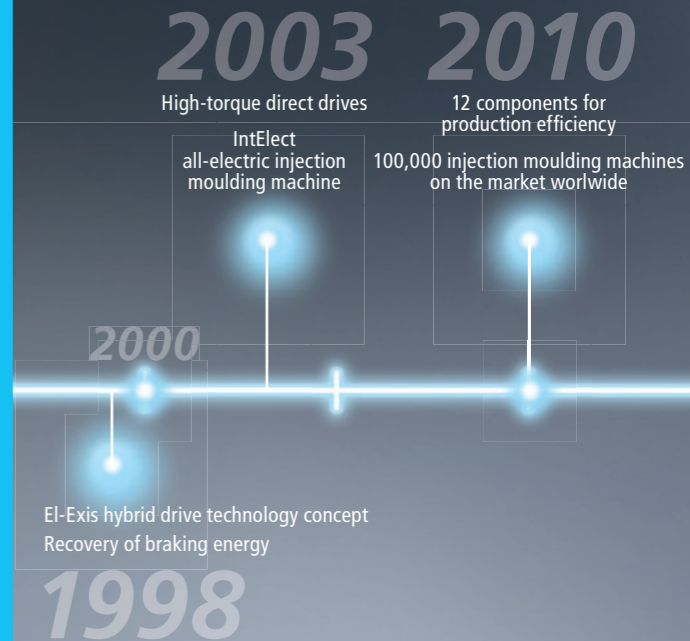


### Efficiency of production

It has been a long tradition in our company to develop innovative technologies for the efficient use of resources. We have constantly promoted our development projects and have achieved numerous detail improvements. Throughout our entire machine program, these technological advancements have resulted in higher production efficiency and many benefits for our customers.

We achieve the highest possible efficiency of production through the interaction of four essential aspects:

- Production output
- Availability
- Energy efficiency
- Durability

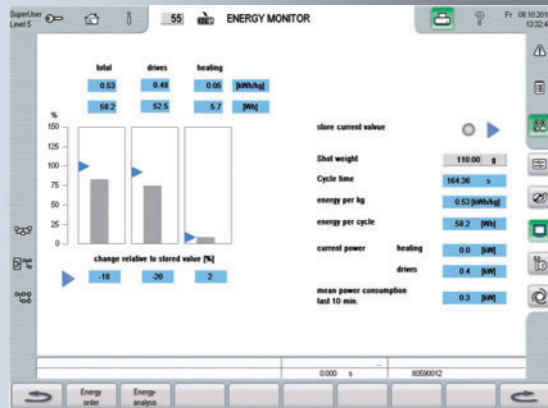


## Component 01

### activeEcon

Making energy consumption visible is the first step toward an optimum process setting. With activeEcon energy consumption analysis, the influence of the process settings on the energy consumption of the machine can be evaluated. The optimum energy setting of the machine is determined through a before and after comparison. The program automatically calculates the effects on production costs.

- Effects of process setting on energy consumption and production costs are made visible
- Peripheral devices can also be included in the analysis



Operating page activeEcon of the NC5 control

*activeEcon*

## Component 02

### activeCool&Clean

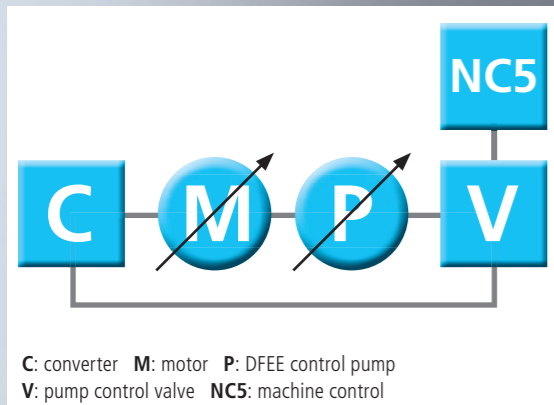
The activeCool&Clean cooling and filter system ensures optimum oil quality and long oil lifetimes. In a separate low-pressure circuit, a laminar, pulsation-free oil flow enables optimum dirt separation in the generously dimensioned superfine filter and optimum heat transition in the cooler. This ensures long filter lifetimes and oil change intervals of 40,000 operating hours. Clean oil also leads to less wear in the remaining hydraulic components, which further reduces maintenance-related downtime. Due to the optimum heat transition, higher flow temperatures of the cooler are possible.

- Oil lifetime 40,000 operating hours
- Reduced wear of hydraulic components
- Reduced maintenance cost and times



Ultra fine oil filter

*activeCool&Clean*



Functional principle activeDrive

## Component 03

### activeDrive

The electro hydraulic pressure and flow rate controlled pump (DFEE) is tried and tested for use in injection moulding machines. activeDrive is a further development based on proven technology. Dynamic adjustment of output to all phases of the injection moulding cycle provides optimum levels of efficiency and minimal losses, particularly in partial load and idle operation. The combination of frequency-controlled electric motor and highly dynamic control pump enables savings of 10–50 % compared to standard hydraulics.

- Reduced energy consumption
- Available as a retrofit for Systec machines

### smartDrive

smartDrive also provides for dynamic output adjustment on older NC4 machines.

- Reduced energy consumption
- Available as a retrofit for machines with NC4 control

*activeDrive*

## Component 04

### activeAdjust

With the new EI-Exis SP our customers have individual access to our control technology.

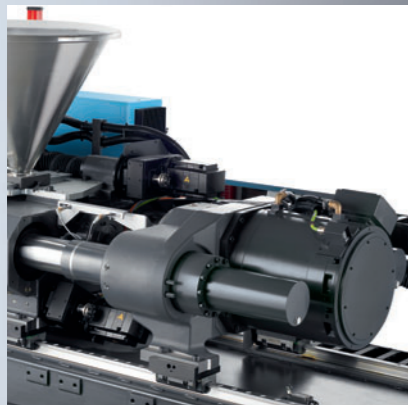
Every user can, without external help, select the optimum controller characteristics with an easy-to-use slider system which provides the advantage of customizing the EI-Exis SP to the individual product, within safety limits defined by the manufacturer. This means that optimum acceleration and braking ramps can be selected for hard or soft operation, depending on the mould. This function reduces the cycle time and increases production output by 3–5 %. Even the dynamics for switching from injection to holding pressure can be influenced for realizing superior part quality.

- Individually adjustable controller characteristics
- Reduced cycle times



Operating page activeAdjust of the NC5 control

*activeAdjust*



Direct drive injection unit

## Component 05

### Optimum drive technology

Any energy-efficient machine is based on a drive technology specifically adapted to the requirements of injection moulding. In hydraulic machines, the proven electro hydraulic pressure and flow rate controlled pump (DFEE) can be perfectly adapted to the individual requirements through flexible layout and optional equipment.

With its hybrid drive concept, El-Exis meets the expectations concerning efficient high-performance machines. The IntElect electric drive technology with high-torque direct drives and drive components from in-house production are developed and produced particularly for injection moulding. Direct drive power transmission makes for a high degree of dynamics, with low latency, freedom from play and high degree of system rigidity.

- High degree of dynamics, precision, and reproducibility
- Optimum energy efficiency
- High degree of availability

*Optimum drive technology*

## Component 06

### activeDynamics

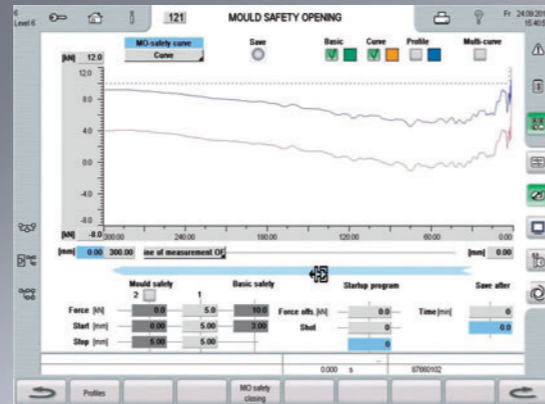
The all-electric drive technology developed and produced by Sumitomo (SHI) Demag guarantees perfect interaction of all components involved in the drive train. Perfectly synchronized motors, frequency converters and machine controls enable extremely short sampling times of the axis controllers. Together with the construction geared for a high degree of dynamics, the result is an overall system perfectly adapted to the requirements of injection moulding.

- High degree of dynamics, precision, and reproducibility

*activeDynamics*



Operating page activeQ of the NC5 control



Operating page activeQ+ of the NC5 control

## Component 07

### activeQ

One of the main tasks of the injection moulding machine is to protect the mould. activeQ fulfils this function while providing high productivity based on short cycle times. Measuring and monitoring the required forces during tool movement allow for active and immediate reaction to deviations. Therefore, the moulds can be protected precisely even with high travel speeds. Damage or wear are detected early and unscheduled downtimes due to mould damage is mostly avoided.

- Sensitive protection of your mould
- High travel speeds
- Reduced machine downtimes

### activeQ+

While activeQ is responsible for closing the mould, activeQ+ now offers an additional option for controlling the mould opening. This provides the highest level of safety for the equipment (stack moulds, sliders, etc.) and a valuable additional benefit for our customers.

## Component 08

### activeLock

In the past years, substantial progress in terms of precision and reproducibility has been made with all-electric injection moulding machines. The non-return valve is frequently the weak point for high-precision parts. Conventional systems are only closed passively by the injection process and the injection pressure applied. Variations of the melt homogeneity frequently result in variations of the closing behaviour, the melt cushion and therefore the shot weight and quality of the parts. Active closing of the non-return valve at the end of the dosing process leads to increased process stability. A defined closing motion through contra-rotation of the screw closes the non-return valve and provides for absolutely constant and actively controllable closing behaviour. Process stability is increased, variations in the melt cushion and the shot weight are reduced, and the risk of rejects is minimized.

- Higher degree of precision
- Minimized rejects
- Higher degree of process stability



activeLock – lockable non-return valve

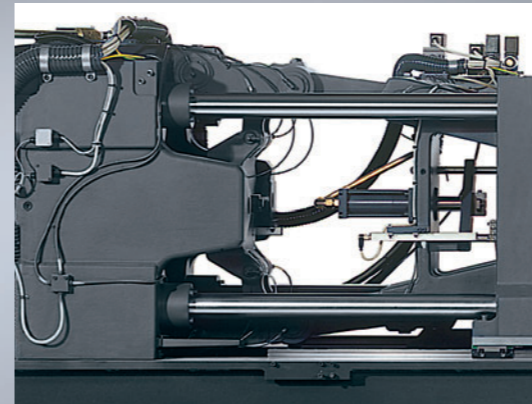
*activeLock*

## Component 09

### Toggle

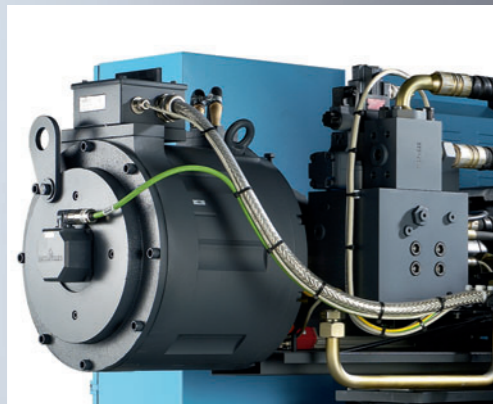
Heavy-duty and durable engineering – this is what the toggle stands for. However, it is even more: The mechanical gear transmission ratio provides for highest dynamics and working speeds with minimal energy consumption, as well as safe locking without additional energy demand. The central power feed and high degree of rigidity deliver the closing force reliably to where it is needed – in the centre of the platens. The powerful kinematics of the double toggle provides short locking times and strong opening forces. Particularly in the end positions, the long travel of the toggle is translated into a relatively short travel of the clamping platen, permitting very sensitive control of closing and opening procedures.

- Low energy consumption
- High degree of dynamics
- Fast mould movement
- High degree of availability
- Reliable and durable

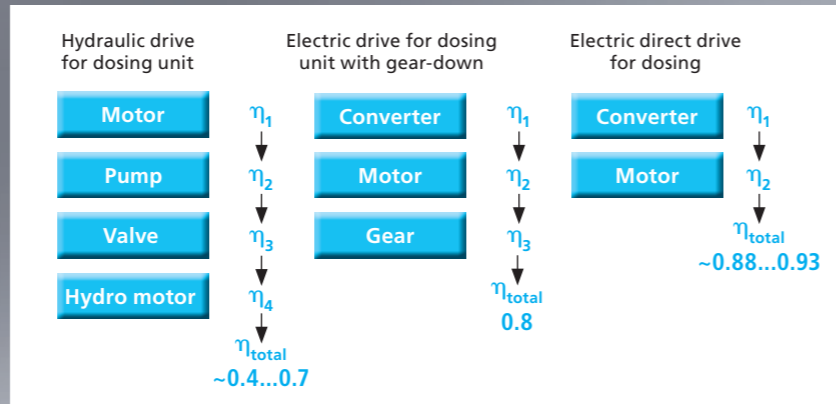


Detailed view of toggle

*Toggle*



All-electric dosing drive



Reduction of elements in the efficiency chain to increase energy efficiency

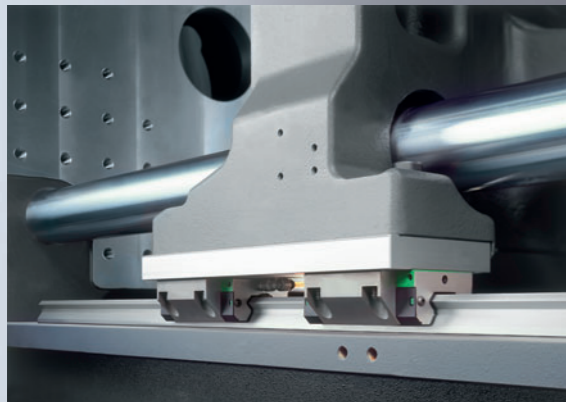
# All-electric dosing drive

## Component 10

### All-electric dosing drive

The dosing drive is the part of the injection moulding machine with the highest energy consumption, while at the same time even state-of-the-art hydro motors have rather low degrees of efficiency. The solution is an optionally available electric screw drive. For many sizes, direct drives without gearboxes are implemented. This solution practically doubles the efficiency of the dosing drive as the main consumer. De-coupling the dosing process from the other machine movements creates the scope for reducing the speed and increasing the plasticizing output.

- Efficiency of the dosing drive, the largest consumer, can be doubled
- Reduced speeds possible
- Higher shot weights possible



Linear guide

## Component 11

### Linear guide

The linear guidance of the moving platen provide for minimal friction losses, due to the lubricant-free tie bar bushes, and perfectly parallel platens, even with heavy moulds. This technology stands for low energy consumption as well as for minimal mould wear.

- Minimal friction
- Perfectly parallel platens
- Reduced mould wear

*Linear guide*



Insulation sleeve

## Component 12

### Cylinder insulation

The cylinder insulation covers, optionally available and may be retrofitted, reduce energy losses through heat dissipation of the plasticizing cylinder. This reduces energy consumption and heating times of the cylinder. The service life of the heaterbands is prolonged by reduced switching cycles and the reduced heat dissipation leads to better ambient room temperatures. The insulating sleeves can simply be mounted underneath the standard protective cover of the plasticizing cylinder.

If required by the process, the insulation of individual zones can be removed at any time. On the basis of savings between 15 and 40 % of the heating output, the purchase of the cylinder insulation will be frequently amortized within the first year.

- Fast amortization
- Easy retrofitting
- Reduced energy consumption

*Cylinder insulation*

## Overview

|                           | Systec < 1,300 kN | Systec ≥ 1,300 kN | EI-Exis SP | IntElect < 2,200 kN | IntElect ≥ 2,200 kN |
|---------------------------|-------------------|-------------------|------------|---------------------|---------------------|
| activeAdjust              | –                 | –                 | •          | –                   | –                   |
| activeCool&Clean          | ✓                 | ✓                 | ✓          | –                   | –                   |
| activeDrive               | –                 | •                 | –          | –                   | –                   |
| activeDynamics            | –                 | –                 | –          | –                   | ✓                   |
| activeEcon                | •                 | •                 | •          | •                   | •                   |
| activeLock                | –                 | –                 | –          | •                   | –                   |
| activeQ                   | •                 | •                 | ✓          | ✓                   | ✓                   |
| activeQ+                  | –                 | –                 | •          | –                   | –                   |
| Toggle                    | –                 | ✓                 | ✓          | ✓                   | ✓                   |
| Linear guide              | ✓                 | ✓                 | ✓          | ✓                   | ✓                   |
| Optimum drive technology  | ✓                 | ✓                 | ✓          | ✓                   | ✓                   |
| All-electric dosing drive | –                 | •                 | ✓          | ✓                   | ✓                   |
| Cylinder insulation       | •                 | •                 | •          | •                   | •                   |

– Not available or not required   • Optionally available   ✓ Standard



## EUROMAP 60

Europe's Association for Plastics and Rubber Machinery Manufacturers developed the EUROMAP 60 recommendation for determining the energy consumption of injection moulding machines.

This recommendation helps the manufacturers of injection moulding machines to determine the energy consumption of their machines under defined conditions. For this purpose, three different test cycles were defined, covering typical applications of injection moulding machines.

Cycle I – high-speed parts

Cycle II – technical parts

Cycle III – thick-walled parts

Example for determining the energy consumption according to EUROMAP 60:

Specific machine related energy consumption (EUROMAP 60),  
Cycle II: 0.95 kWh/kg; 20kW; 30s;  $\cos \varphi = 0.85$

The Sumitomo (SHI) Demag machine concepts have always contributed to optimum energy and production efficiency. Our EUROMAP 60 logo gives you information on the energy requirements of our energy consumption-optimized machines.

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