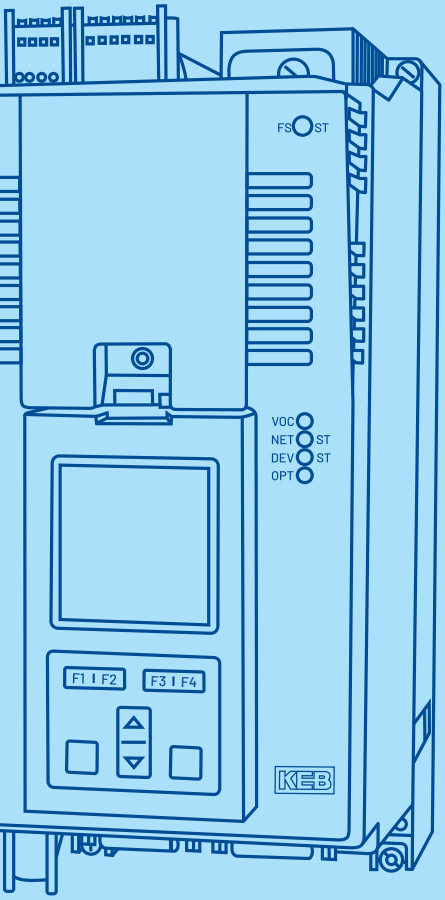
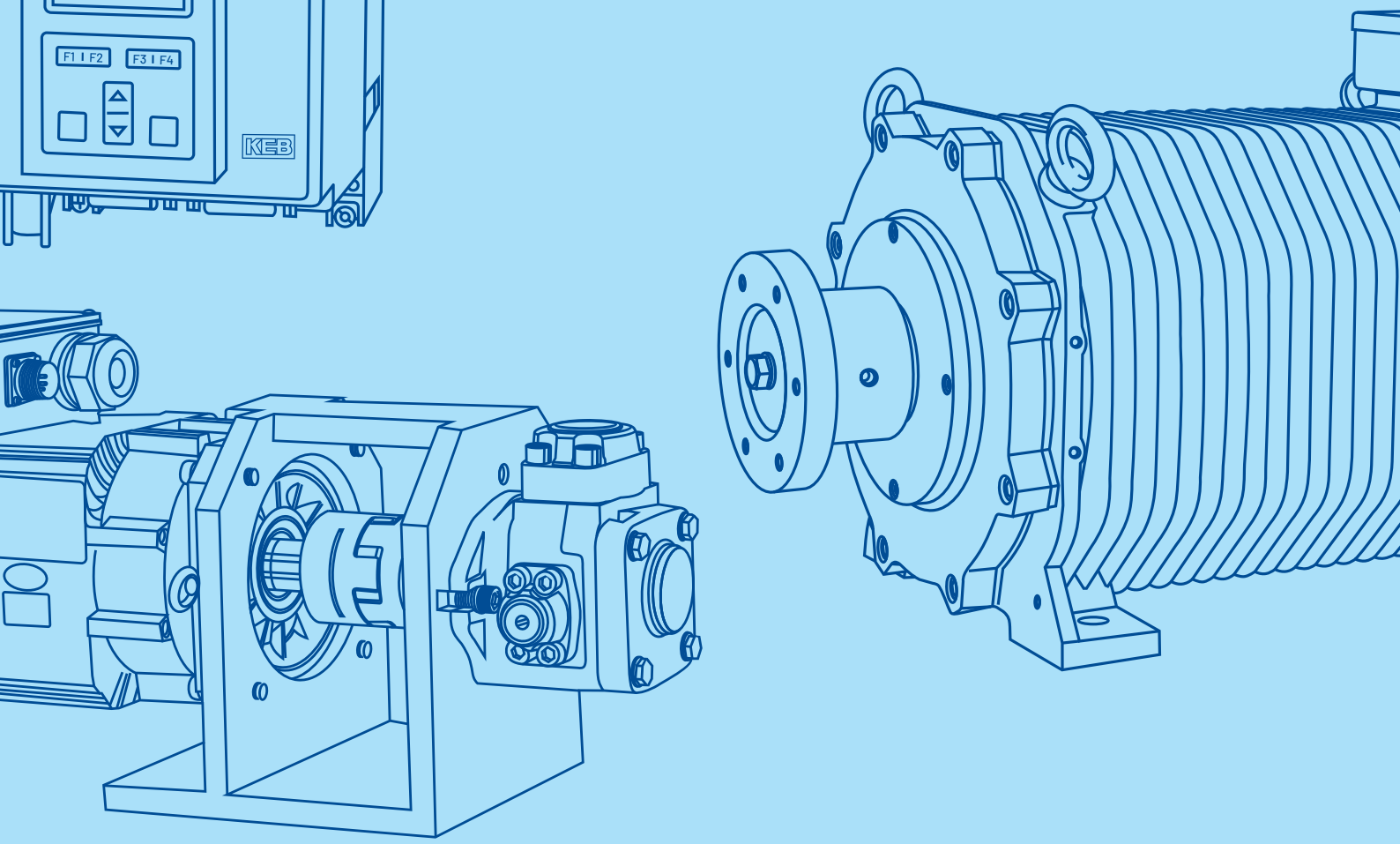
KEB Official Partner

Bharat Bijlee



AUTOMATION SOLUTIONS SIMPLIFIED



Energy Saving Solutions for
Plastic Machinery, Hydraulic Press and
Pressure Die Casting Machines

ENERGY EFFICIENCY, PRECISION AND PRODUCTIVITY FOR:

- PLASTIC INJECTION MOULDING MACHINES
- BLOW MOULDING MACHINES
- EXTRUSION MACHINES
- HYDRAULIC PRESS
- PRESSURE DIE CASTING MACHINES

Servo Drive Technology for the Hydraulic Gear Pump

12000+ installations and growing

Flow: 30LPM to 450LPM | Pressure: 120 Bar to 320 Bar in Single Pump - Motor Configuration

Complete Customised Package Comprising:

KEB F6 Servo Drive: Intelligent and Compact

SynchroTorq® **PM Servo Motor:** Excellent Dynamic Response and Low Inertia

Internal Gear Pump with Cradle: Low Noise and High Efficiency

Accessories: EMC Filter, Choke, DBR, Cables, PLC, HMI

300,000+ plastic machines are driven by KEB drives worldwide

A DECADE OF PARTNERSHIP

Our partnership with KEB Automation KG of Germany dates back to 2007. We have a license agreement with the company to manufacture and sell KEB Drives in India. KEB Drives of ratings 15kW to 450kW are assembled, tested and supplied across the country from our plant at Airoli, Navi Mumbai.

We leverage our experience of over 75 years in rotating machines, to offer a wide range of AC Variable Speed Drives and Servo Drive systems. KEB Drives cater to a variety of challenging applications that demand high performance with superior accuracy and dynamic response. KEB also designs and manufactures high speed multi-axis C6 motion controllers.

Our modern ISO 9001:2015 certified plant in Airoli conducts assembly and load testing of KEB Servo Drives from 15kW to 450kW. The parts for the Drives are sourced directly from KEB or their approved vendors. Post inward quality control, the Drives are assembled by qualified technicians with the help of appropriate tools in a dust-free environment. All the instruments in the assembly plant are periodically calibrated.

Every Drive is tested for complete functionality and on full load at elevated temperature of 50°C for one hour. The electronic boards of the Drive have Epoxy conformal coating for protection against dust and moisture deposition. This ensures that the customer receives a Drive that is reliable and has undergone stringent quality control checks.






ENERGY SAVINGS WITH KEB'S SERVO DRIVE SOLUTIONS

The Servo pump system combines a Servo Motor's fast step-less speed regulation with the hydraulic pump's self pressure adjustment. This can yield high energy savings (30% to 60% depending upon cycle time) compared to with traditional constant/variable displacement pump systems.

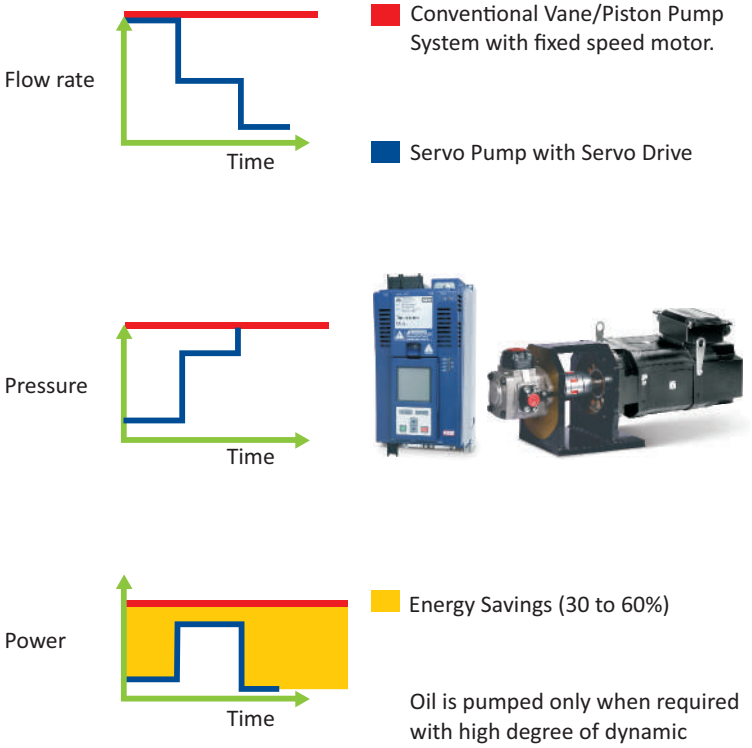
Position Repetition Accuracy

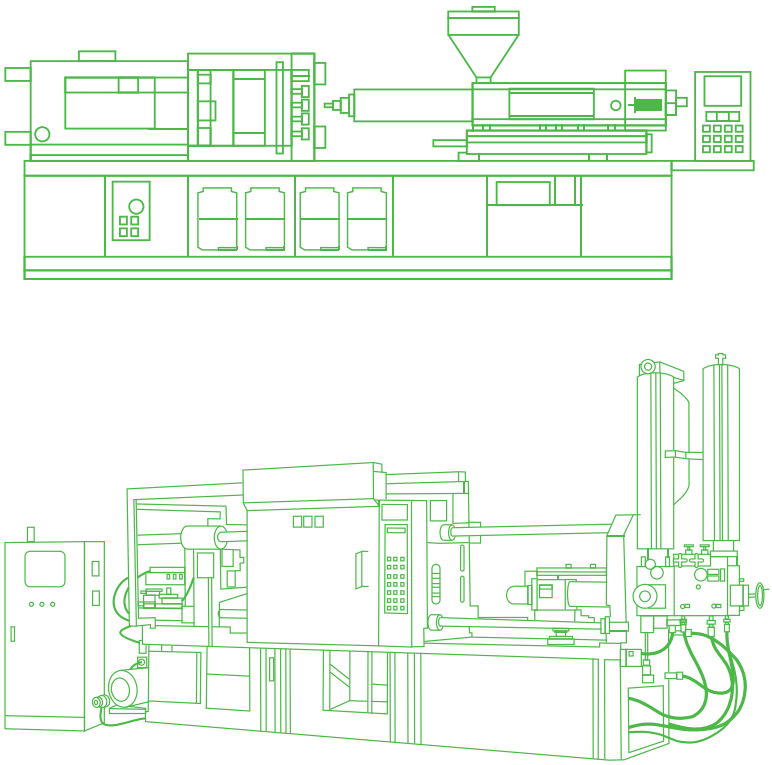
Fast response guarantees mould-close/opening accuracy as well as injection accuracy.

Pressure Control

Fast responsive PID module of the Servo Drive achieves stable system pressure and very fine accuracy due to close loop control. Long pressure holding times of >30 seconds can be achieved using KEB Drives.

The Servo Drive-Motor operates the Servo Pump @ 3000rpm and achieves additional energy savings of 5% compared to Servos that operate at lower speeds. These features result in overall improvement of machine performance by eliminating rejections, improving product quality and improving productivity.





KEB'S NEW GENERATION OF F6 SERVO DRIVES

Product Highlights:

- Power Range: 2.2kW to 400kW (upto 450kW in water cooled version)
- Wide Input Operating Voltage Range 400V class: 280V to 550V A.C (395V to 778V D.C) 230V class: 185V to 265V A.C (260V to 375V D.C).
- High Efficiency (> 98%)
- Varnished boards for protection against harsh environments
- 2 MultiEncoder Channels Onboard with Encoder Detection and Emulation
- Integrated Functional Safety Module (STO, SBC)
- RealTime Ethenet on Board
- Sensorless control of Synchronous and Asynchronous Motors
- Flexible cooling concept (Water, Air-Push Through and Built in Heatsink) with compact design
- CiA402 profiles for standardised programming
- 599Hz default frequency and upto 2000Hz by activation
- High speed, high torque operation and position control supported by adjustable switching frequency upto 16Khz
- One firmware for all the Motors-Driving Synchronous, Induction, IPM, Switch Reluctance Synchronous motors with/without Encoders.
- Strong overload capability of drives: 150% for 60 secs and 216% for 1 sec.
- Communicate Drive with Mobile App and Bluetooth adapter (optional) for parameterisation and diagnosis
- Pluggable Operator LCD Display Module with USB/Ethernet Interface
- RealTime Fault Log
- Faster Scan Times of Analog & Digital I/O Channels
  Input 500µ secs
  Output 1000µ secs
- Faster control cycle times: current: 62.5µ secs
  Speed: 250µ secs
  Position: 250µ secs
- Recipe management enables storage and selection of Drive parameter list directly on the Drive
- 16 channel oscilloscope for extensive analysis
- Multiple Operating Modes: Velocity, Homing, Profile Position, Cyclic Synchronous Velocity/Profile Position
- Power Off function
- Integrated Brake Control and Braking Chopper

Drive Networking

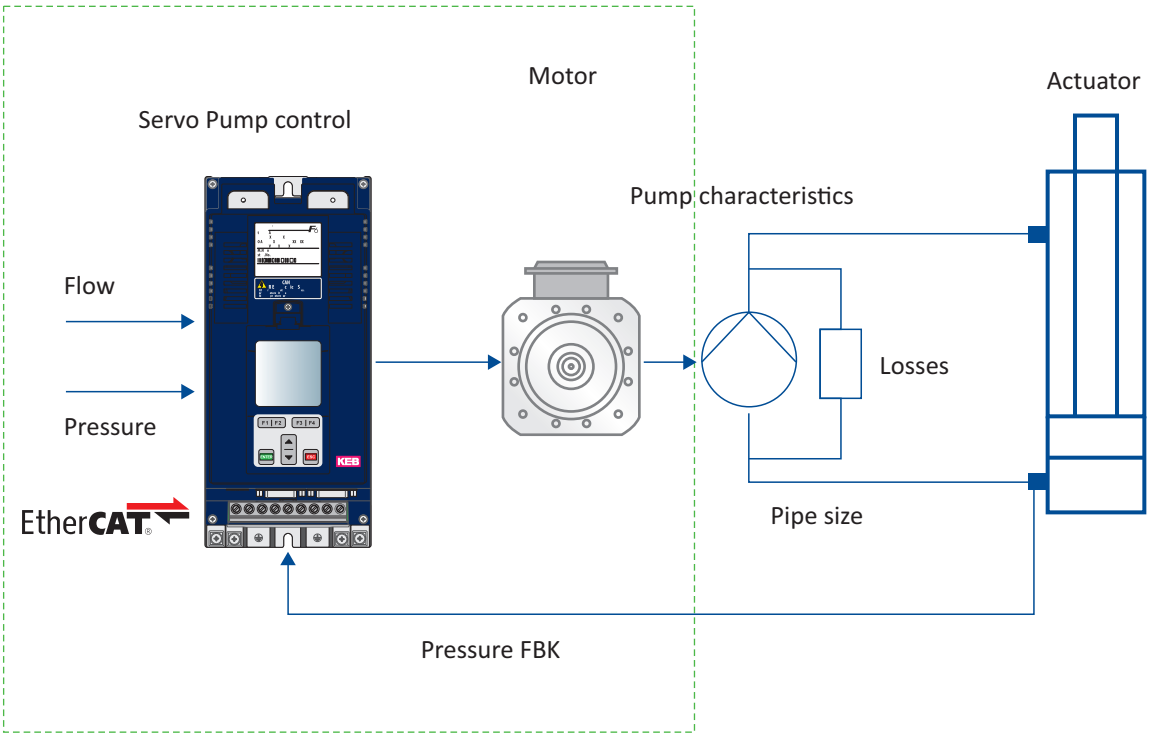
KEB drives offer an extensive range of networking options.

EtherCAT® · Sov EtherCAT® · VARAN · CANopen® · PROFINET® · ETHERNET POWERLINK · EtherNet/IP™

Applications

- Plastic Injection Moulding Machine
- Plastic All Electric Injection Moulding Machine
- Plastic Extrusion Machine
- Hydraulic Press
- Pressure Die Casting Machine

SERVO PUMP WIZARD IN F6 DRIVE FOR SERVO PUMP APPLICATIONS



Features & Benefits:

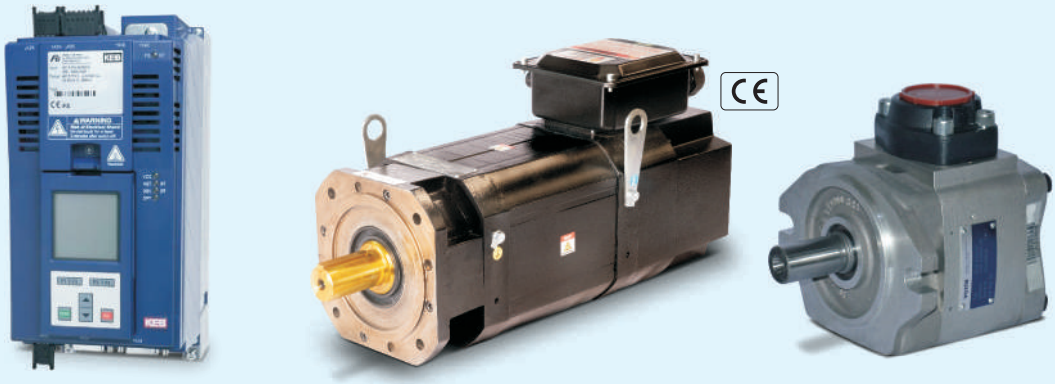
- Servo Pump Wizard enables faster and easy commissioning of the complete Drive system
- Drive parameters in Hydraulic Terminology: Pressure (P) & Flow (Q) enables setting of precise set point and pump parameters
- Pressure sensor failure detection protects pumps against high pressure
- Measurement and Display of Power (kW)/Energy (kwH) for servo motor, pump and braking resistor
- Accurate pressure and flow control improves product quality and eliminates material wastage
- Drive Auto Tuning Feature with pump in the circuit enables precise setting of Drive PID controllers parameters
- Quick and easy MultiPump configuration and operation
- Fast pressure response reduces overall cycle time and improves productivity
- Protection of pump against cavitation; reverse rotation
- Mechanical Blockage Detection by monitoring pressure derivatives provides additional safety to moulds and screw of the machine
- Hydraulic band stop filter for eliminating pressure resonance phenomenon that causes vibrations in the machine
- Supports all type of pressure transducer (0-10v; 4-20mA; 0-20mA, 0-10mV etc.) that enables easier calibration of feedback device
- Multiple PID controllers to optimise specific function of the machines (e.g flow control during injection; pressure control during clamping etc.)
- Additional protection against malfunctioning of safety relief valve or pressure transducer by current limit feature

SCL TECHNOLOGY FOR PLASTIC IMM

SCL Servo Package Ratings: 60LPM to 150LPM @150 bar Pressure

Bharat Bijlee's Servo solutions with KEB Drives for the plastics industry have a proven record of outstanding torque and speed control. They use resolver/encoder feedback for superior positioning accuracy in a highly dynamic operation. However, in some high torque applications like Plastic Extruders and lower tonnage moulding machines, the costly and vulnerable feedback devices can be eliminated without compromising performance.

When economy is as important as reliability, KEB's SCL technology becomes an ideal choice. The new SCL servo solution using our SynchroTorq® Servo Motors fulfils these twin objectives - along with precise torque control and dynamic response.



SynchroTorq® | Servo Series

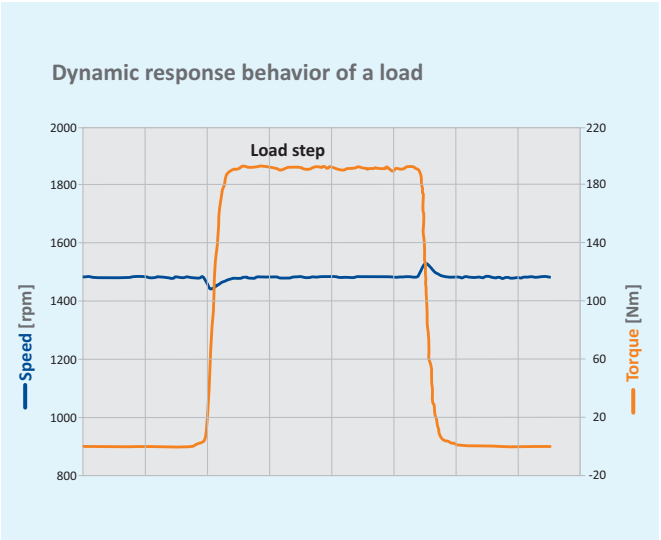
PERMANENT MAGNET SERVO MOTOR

Sensorless Closed Loop (SCL) Motor Control

KEB's unique Sensorless Closed Loop (SCL) motor control technology uses an accurate motor model with a calculated rotor position module. This is achieved without feedback of the motor shaft and enables outstanding decentralized single-axis positioning without an encoder.

What is SCL?

SCL is designed for high performance speed and torque control in processes where the system advantages of Permanent Magnet (PM) motors can be leveraged. It allows field orientated control of (PM) motors without encoder feedback. The principle of SCL is based on a very precise mathematical model of the motor that builds a virtual rotor position in the control software. During SCL operation, the KEB drive continuously measures the different components of the output current and feeds back this information to the internal motor model. Here the actual flux and torque is compared with the mathematical model. The current can then be regulated to match the required speed and torque. All feedback is handled internally by the drive.



No Feedback Devices

The major benefit of this control method is that no encoder, interface card, or associated cabling is required. This improves reliability and reduces cost by reducing the number of components and the potential problems of encoder parts, electronics, heat transfer from the motor, and noise from long cable lengths. It becomes especially important in harsh ambient environments, and under shock and vibration.

SCL Technology uses standard KEB Drive hardware, and is software selectable. The drives feature a number of different homing options that can be configured for the application.

Key Features of SCL Servo Solution for Plastic IMM

- Closed Loop (SCL): point-to-point positioning without encoder or resolver feedback
- Robust and reliable system solution: potential interference sources from the encoder system are eliminated
- Improved pump reliability due to operating speeds < 2500rpm
- Compact servo drive reduces cabinet size
- Excellent performance during sudden load variation: comparable with closed loop drives
- Torque & Speed accuracy: < 0.3% of rated values
- Ambient temperature for the system: 45°C
- Servo drives have 3c3 class conformal coated electronic boards for protection in harsh environments
- Reduced costs: elimination of encoder, interface card and its cable
- Servo motors are specially designed for maximum speed of 2500rpm and high Kt factor
- Accessories: Pump; Cradle, Coupling, Shielded Power Cables, AC Choke, Brake Resistor

SCREW ROTATION TECHNOLOGY FOR PLASTICS MACHINERY

+

SynchroTorq®

Direct Drive for Screw Applications for Plastic Machines

Direct Drive Torque Motors can be offered as a customised energy savings solution to eliminate the gear box, for driving the screw of Plastic Extrusion Machines (Blown Film/Sheet/Pipe). It offers significant energy saving and eliminates problems like noise, oil spillage, lubrication, frequent maintenance and noise. It is compact and occupies less space than a motor+gear box combination.

Direct Drive Motors can also be offered for driving the screw of Plastic Injection Moulding Machines eliminating the hydraulic motor. Hydraulic motors often have inconsistent speeds with torque pulsations and are prone to wear and tear. This reduces energy costs and also improves productivity by reducing overall cycle time.

These motors can be driven by KEB's SCL technology that does not need encoder feedback.

Direct Drive Motor Technical Specifications:

- Torque Range: 300Nm to 5000Nm
- Speed Range: 100rpm to 500 rpm
- Power Range: upto 150kW

*higher ratings also offered.

SYNCHRONOUS AC SERVO MOTORS

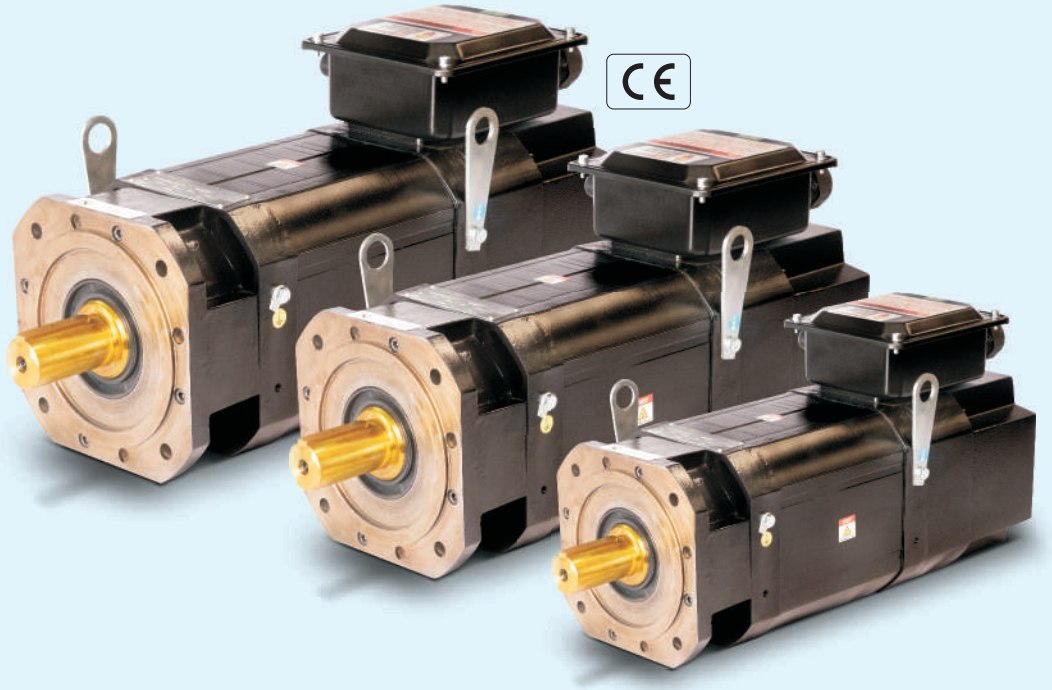
Bharat Bijlee has indigenously developed SynchroTorq® a high performance permanent magnet AC synchronous Servo Motor, for driving the gear pump in various applications, such as:

- Plastics: Injection Moulding and Blow Moulding machines
- Hydraulic Press Machines
- Pressure Die-Casting Machines
- Pipe Bending Machines

The SynchroTorq® series of Servo Motors combined with KEB Servo Drives are an energy-saving automation solution package for plastic machinery. It comes with accessories such as cables, pumps, cradle-coupling for driving the gear pump. The combined package offers dynamic control for demanding positioning and cyclic applications.

SynchroTorq® | Servo Series

PERMANENT MAGNET SERVO MOTOR



Torque Ratings: 50Nm to 280Nm | Power Ratings: 13kW to 58kW | Maximum Speed: 3200rpm

Key Features

- Ambient temperature: 45°C
- Bearings with high temperature grease
- Feedback: Encoder or Resolver
- Rotatable terminal box
- Superior grade permanent magnets with excellent thermal characteristics.
- Integrated with KEB Servo Drives: functional safety and auto-tuning features
- Shaft, mounting, and connector options
- Sturdy laminated yoke design.
- Insulation Class: H
- Protection type: IP54 (optional IP55 or IP65)
- Thermal sensors: KTY and PTC
- Certifications: CE
- Cooling: 1Ø 230V fan with high CFM
- Customisation for special load characteristics

SERVO DRIVE SOLUTIONS FOR PLASTIC ALL-ELECTRIC IMM

All-Electric Plastic Injection Moulding machines are well established across applications and markets, and offer significant advantages in terms of Energy savings; Shorter machine cycles, Accuracy and Repeatability. As technology advances, these machines can affordably cater to increasingly higher clamping tonnages and meets requirements of oil free environment and lower maintenance.

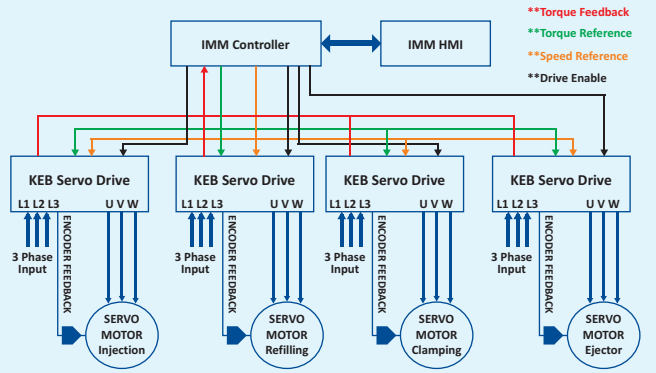
Bharat Bijlee also offers Energy savings servo solutions consisting of customized PM servo motor with various encoder devices and KEB (Germany) High Performance Servo Drives with accessories for all-electric injection moulding machines for all the 4 Axis i.e. Injection, Refilling, Clamping & Ejection. Superior technological features and application expertise combine to provide significant end-use benefits in all-electric models.

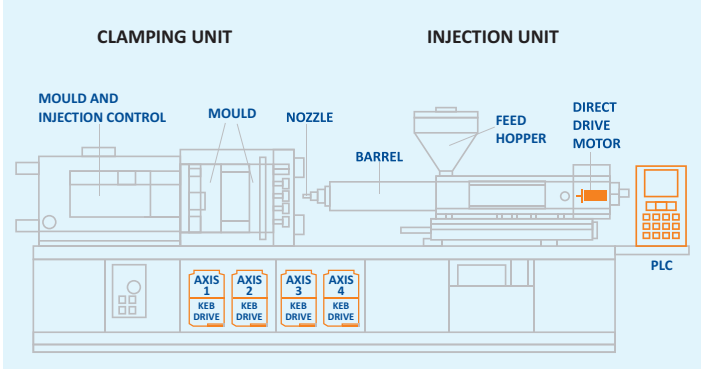
- Accuracy, precision and repeatability leading to consistency of production
- Higher Peak Torque with fast dynamic response
- High degree of cleanliness: no oil leaks and lower maintenance
- Energy savings of 30-70%. With Quieter Operation
- Rapid injection speeds (up to 800mm/sec) and faster clamp motion.
- Faster cycle times resulting in improved productivity

As the demand for injection moulded parts continue to grow across industrial and consumer sectors, there is also an opportunity to retrofit and refurbish an ageing installed base of all-electric injection moulding machines with newer technology. Obstacles can include ready availability of key system components, and integration and commissioning expertise.

Bharat Bijlee's retrofit solution is flexible and economical, and offers superior technical features. Servo drives and/or motors can be provided for each axis. A standard hydraulic machine PLC controller can be used to manage all four axes through a servo drive and a wide range of encoder options and communication protocols. The accuracy of the KEB drives enables precise torque and speed control - as well as operating torque and holding torque - using intelligent control of the drive even with the hydraulic machine controller.

Automation Scheme: KEB Servo Drive Solution for Retrofit of All-Electric Machines



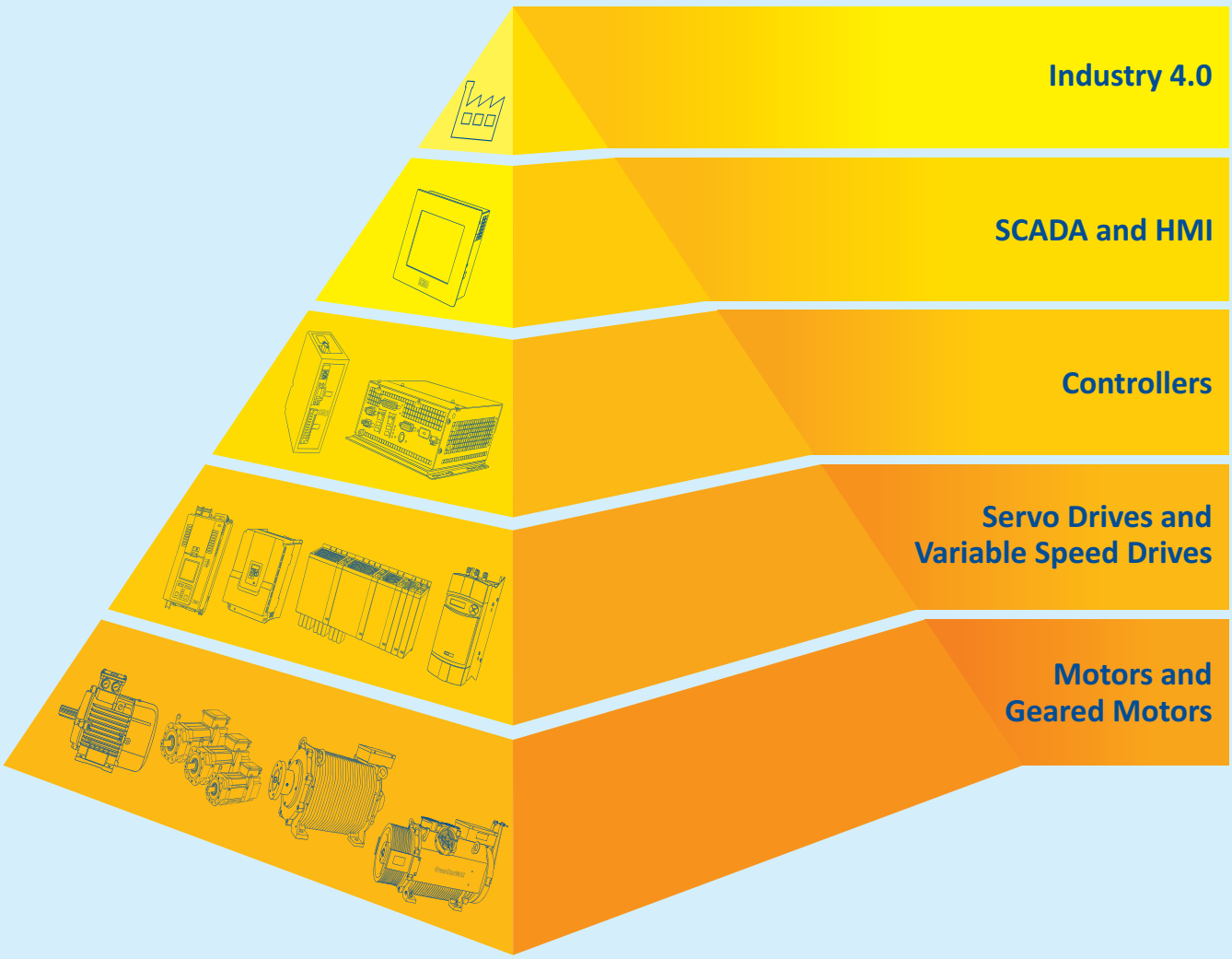


Key advantages of the Retrofit solution for All-Electric Injection Moulding Machines

- Sensor-less torque and load measurements.
- Better torque hold at zero speed.
- A standard hydraulic machine controller can be used.
- Position control can be achieved without encoder or resolver feedback using KEB's unique Sensor-less Closed Loop (SCL) motor control.
- Mould safety without external torque sensor.
- Position accuracy up to the least scale value of the linear sensor.
- Torque accuracy up to 0.1 Nm.
- Wide range of encoders and communication interfaces allows operation with any make of servo motor.

KEB Servo Drives support key field communication protocols:
EtherNet/IP | EtherNet TCP/IP | EtherCAT | Powerlink | PROFINET | PROFIBUS | CANopen | DeviceNet | Modbus

ENABLING PRODUCTIVITY, PRECISION AND ENERGY EFFICIENCY



Bharat Bijlee's Industrial Systems product portfolio caters to a spectrum of applications and spans the machine automation pyramid.

ALL INDIA SERVICE NETWORK

- Regional Offices
- Works
- Service Centre: Drives
- Service Centre: Servo Motors

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