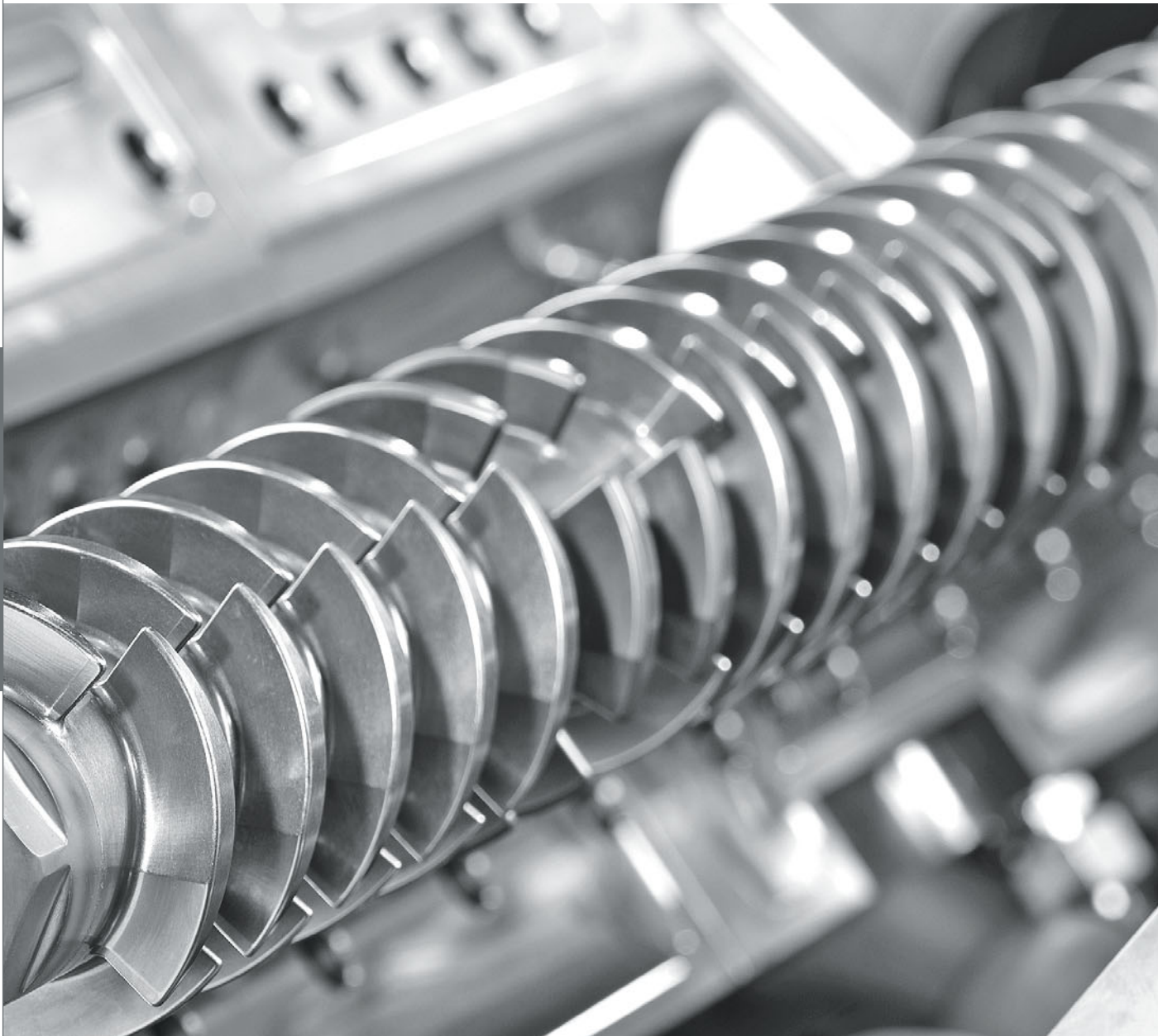


BUSS Kneader technology

Engineered compounding solutions

BUSS KNEADER TECHNOLOGY



BUSS

excellence in compounding

High-end systems for value-added compounds

BUSS Kneader systems set the standard, in particular for demanding heat- and shear-sensitive applications.





Medical-grade PVC



Carbon black masterbatch

BUSS Kneader systems, with their unique operating principle, are well proven as first-class machines with excellent references in the plastics, aluminium, chemical and food industries.

The polyvalent BUSS Kneader technology is ideal for continuous processes requiring:

- Mixing
- Fusing
- Plasticizing
- Homogenizing
- Dispersing
- Degassing
- Reacting

Thanks to their process versatility, BUSS Kneaders have an extremely successful track record in various industrial applications:

Cable compounds

- Halogen-free flame retardant (HFFR)
- Semiconductives
- Flexible PVC
- XLPE, peroxide crosslinkable
- XLPE, silane crosslinkable (Sioplas)
- Telecommunication, foamable
- Black-jacketing
- Elastomerics

PVC pelletizing

- Flexible PVC
- Rigid PVC
- PVC alloys
- Chlorinated PVC (C-PVC)
- Wood-plastic composites (WPC)

Calender feeding

- PVC (rigid, flexible, transparent or filled)
- PP, PET
- TPE

Masterbatches

- Carbon black
- Filler
- Additives

Coatings, thermosets

- Powder coatings
- Toners
- Epoxy-moulding compounds (EMC)
- Thermosets

Foodstuffs

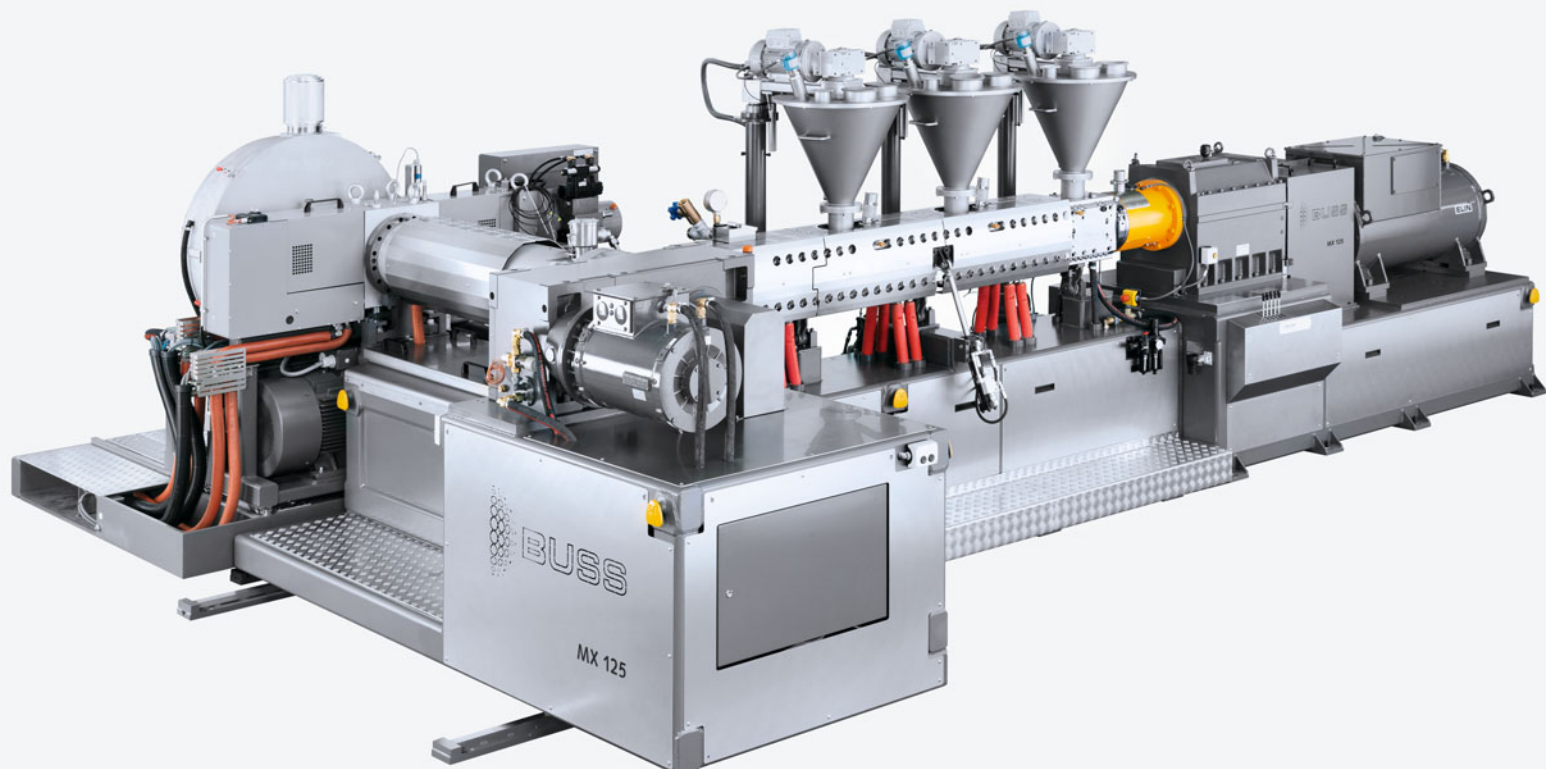
- Gum base
- Chewing gum
- Chewy sweets

Specialities

- Biopolymers
- Magnetoplastics
- Conductive compounds
- Fluoropolymers
- Thermoplastic elastomers
- High-performance plastics
- Crosslinkable compounds
- Reactive extrusion
- Nano composites
- Anode paste

Success through flexibility

A maximum degree of efficiency in an extremely wide spectrum of applications, from anode pastes to thermoplastics, thermosets and elastomers.





quantec® 85 G3-14 C

The BUSS Kneader is a highly versatile compounding system capable of the most demanding mixing tasks.

The latest generation of BUSS Kneaders, **quantec®** and **MX**, represent highly developed machine concepts based on the proven reciprocating screw working principle.

quantec® series

- PVC compounds
- XLPE, peroxide crosslinkable
- Calender feeding (films, sheets)

MX series

- Cable compounds
- Semiconductives
- Flame retardant
- Masterbatches
- XLPE, silane crosslinkable (Sioplas)

MKS series

- Thermosets and magnetoplastics
- EMC (epoxy moulding compounds)
- High-performance plastics

PCS series

- Powder coatings

TCS series

- Toners

LR series

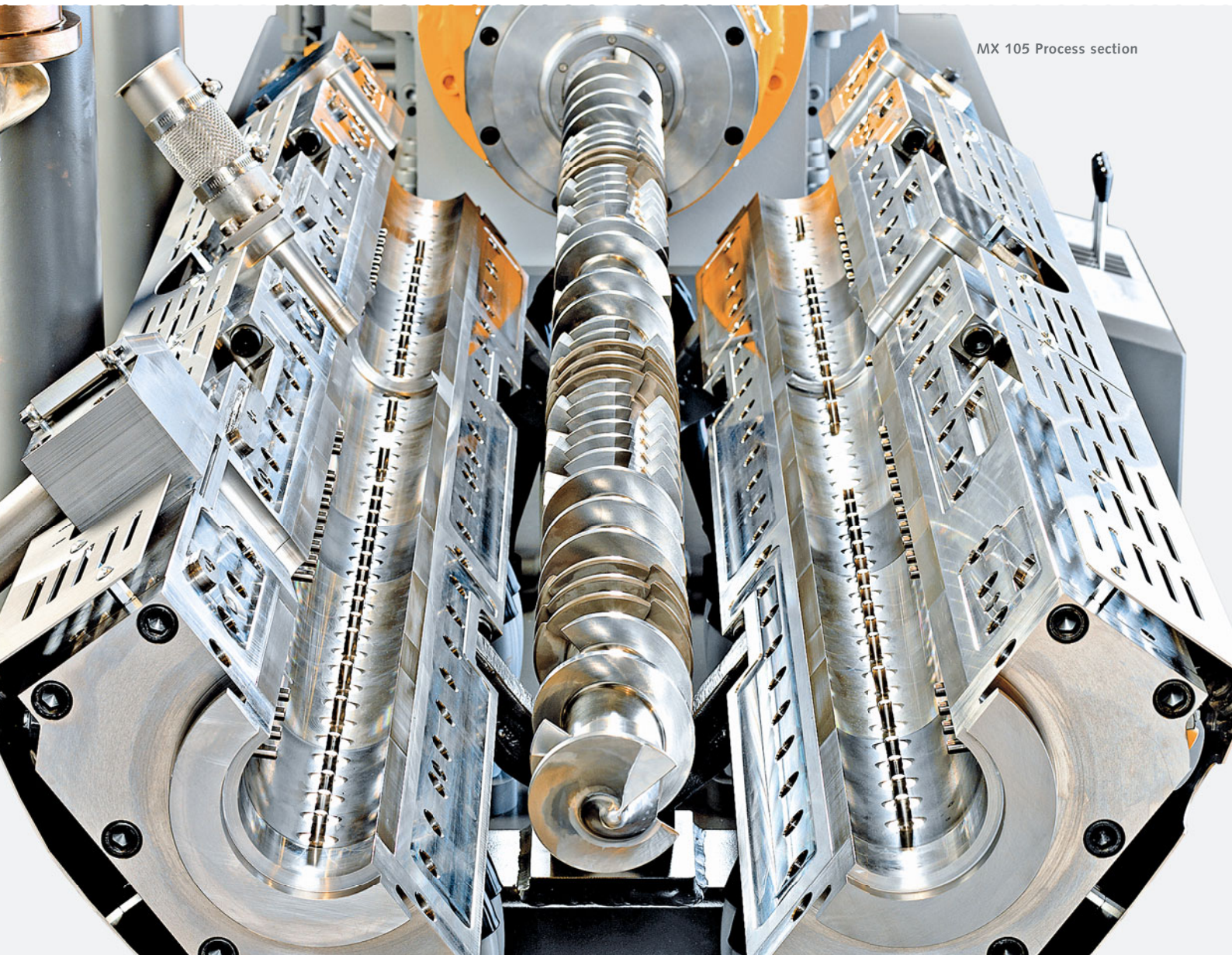
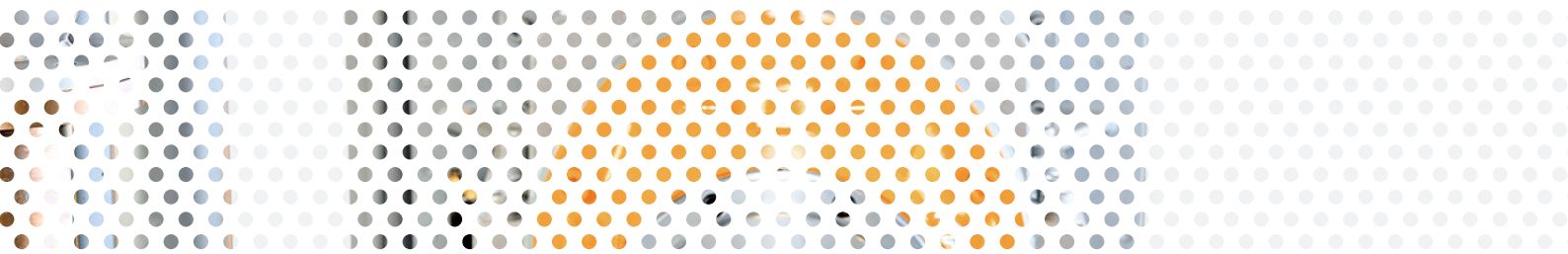
- Foodstuffs
- Reaction processes
- Special applications

KX series

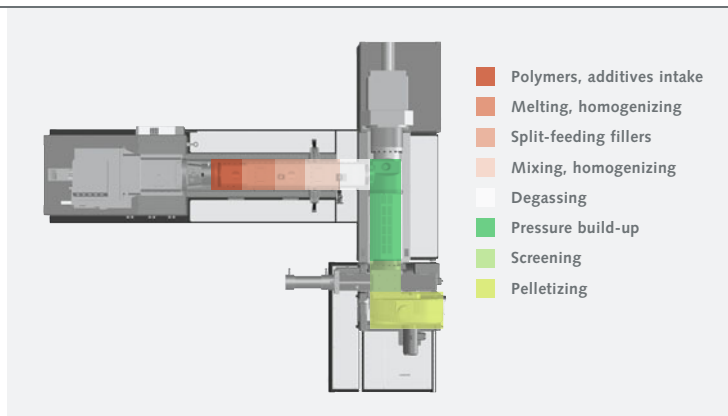
- Anode paste

Outstanding in detail, perfect as a whole

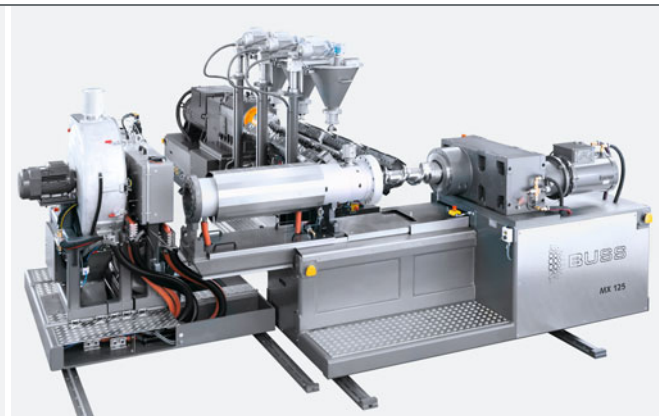
Modular construction, easy-to-open processing section, easy cleaning between formulation changes.



MX 105 Process section



Process zones – cable compounds set-up



Discharge extruder with pelletizing system

Machine concept

The basic construction of all BUSS Kneader series is similar. The process section and the drive unit are mounted on a compact, integrated base frame.

All models feature a temperature-controlled oscillating mixing and kneading screw. The split barrel enables wide opening for easy access.

Optimized processing zones

Within the processing section, several processing zones can be identified. Each of these zones has been integrally evaluated and optimized using mathematical models, and the results confirmed by laboratory trials and field experience.

Polymers, additives and fillers feeding

Specific feed devices allow all kinds of bulk solids to be handled and fed at optimal rates. Liquid components are injected directly into the melt through hollow kneading teeth.

Melting with dissipative energy input

The energy required for melting is dissipated almost entirely by the mixing and kneading screw as shear energy.

Split-feeding fillers

A second feed section, optimized for fillers, is equipped with a rear vent in the barrel. This allows entrained air to escape naturally, and higher filler levels and output ratios to be achieved.

Downstream homogenizing with minimal energy input

When the remaining fillers are added to the now molten material, the resultant cooling of the melt contributes significantly to keeping the stock temperature low.

Following this is a further mixing section without any significant energy input.

For particularly critical compounding requirements, another mixing and homogenizing zone can be added.

Degassing and transfer to a pressurizing module

The final zone of the kneader processing section has a degassing port for removing volatiles and moisture from the melt before it is transferred to the pressurizing module.

Pressure build-up for filtration and pelletizing

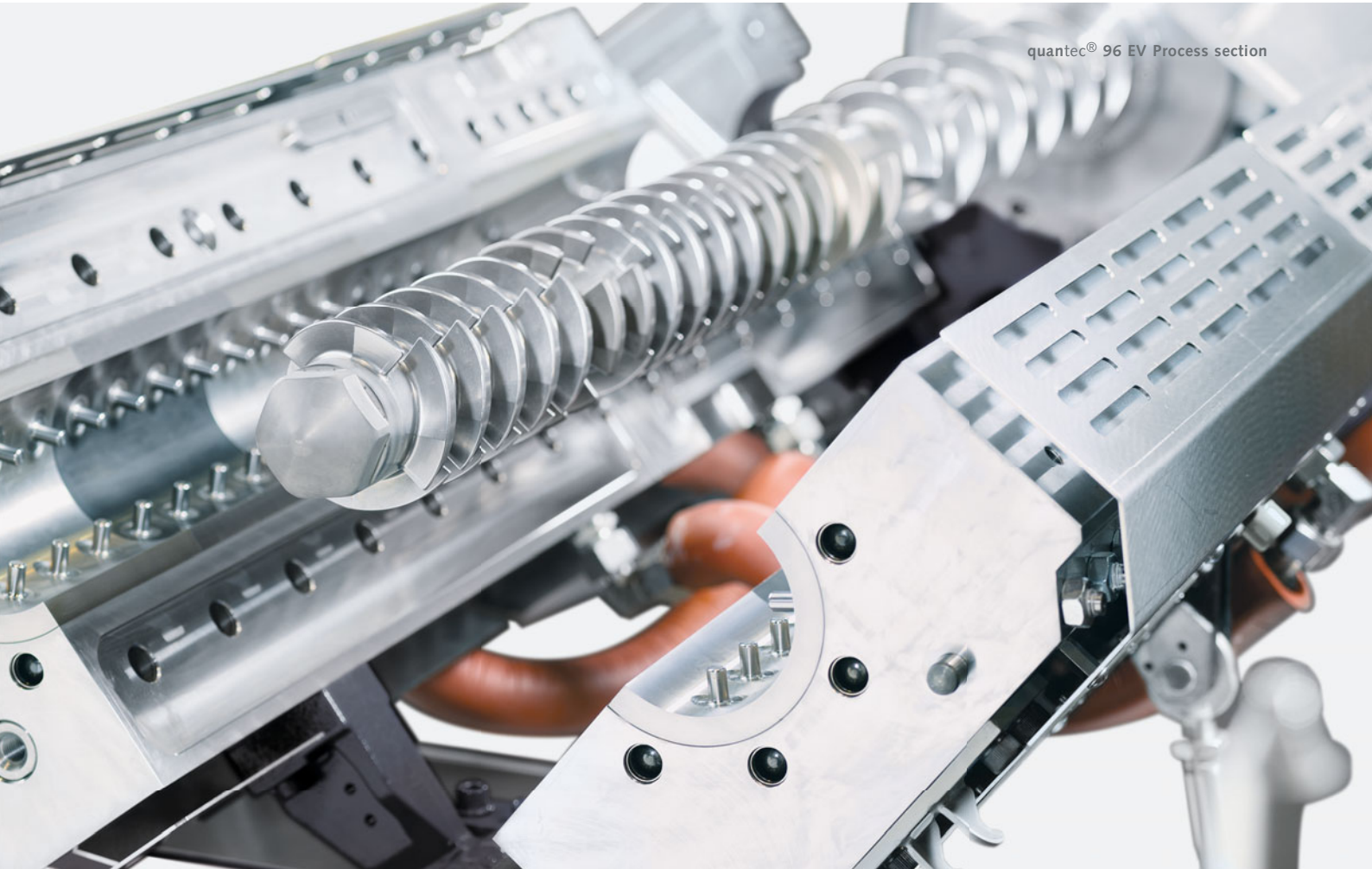
A single-screw discharge extruder or a gear pump, mounted directly to the kneader, efficiently builds up the pressure required for melt filtration and pelletizing. If a discharge extruder is used, it is equipped with an additional venting/degassing port.

The two-stage arrangement of BUSS Kneader systems enables independent optimization of the processing and pressurizing sections. This ensures flexible adaptation to the application requirements.

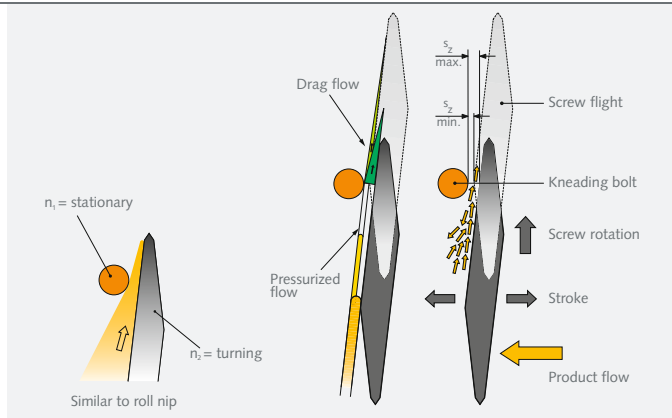
Both air/water and underwater pelletizing systems are available, according to requirements.

BUSS Kneader operating principle

Oscillating screw shaft, extremely short processing length, controlled temperature profile.



quantec® 96 EV Process section



BUSS Kneader working principle



Advanced MX screw geometry

The BUSS Kneader is a unique compounding extruder. Its distinguishing feature is a special operating principle whereby the screw shaft oscillates axially once per revolution.

The characteristic kneading flights of the reciprocating mixing and kneading screw interact in conjunction with each of the stationary kneading teeth in the barrel. This allows for an extremely short processing length.

Oscillating screw shaft

The oscillating screw shaft ensures simultaneous intensive material exchange in an axial direction by multiple splitting, folding and reorientation of the product. This results in an excellent distributive mixing effect and hence optimal distribution of the raw materials.

This is particularly effective when significant differences exist between melt viscosities and melting ranges of the formulation components, when liquid components have to be incorporated or high proportions of fibres or fillers need to be added.

Optimal mixing effect

The dispersive mixing effect avoids product damaging pressure peaks and high radial pressures.

Stress relief is achieved in the matrix after each shear cycle by distribution to neighbouring channels before renewed splitting, folding and reorientation during the next shear cycle.

This results in a number of advantages, such as:

- Extremely short processing length
- Uniform shearing effect without temperature peaks
- Significantly lower product temperatures
- Precise temperature control
- Narrow residence time distribution
- Excellent self-cleaning

Increased flexibility with engineered processing options

Specific product input, individual product output – the right option for every processing requirement.

BUSS offers a range of technical options – each tailored to suit the specific task and the associated processing requirements. These options include:

→ **Vertical inlet screw** consisting of conveying screw with drive unit, intake guide and lifting and swivelling system fitted to the base frame. Suitable for feeding pellets, chips, powders and fibres.

→ **Injection nozzle** with locking pin for attachment to kneader barrel. Suitable for injection of liquid components via a drilled kneading pin with retractable needle valve to prevent backflow of polymer.

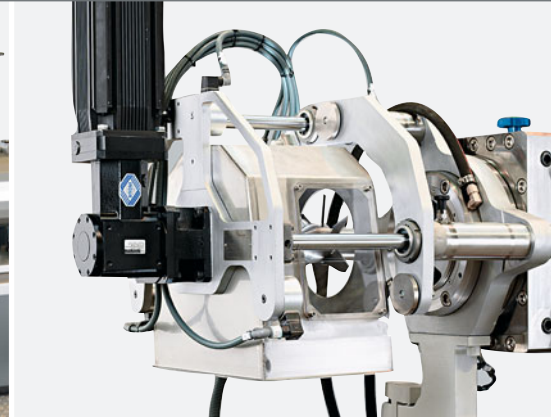
→ **Vacuum dome** with inspection glass for connection to vacuum system.

Die plate with cutter





Air/water pelletizing system



Intermittent cutting device

- **Vertical connecting tube**, for cascade configuration between kneader barrel and discharge extruder. Includes vacuum connection and inspection glass.
- **Discharge extruder**, linked with connecting tube, consisting of single screw and barrel, both temperature-controlled by means of heat transfer fluid, base frame with gear reducer and drive unit. Cascade design is especially suitable for production of PVC or peroxide crosslinkable XLPE.
- **Discharge extruder**, flange-mounted at right angles to kneader barrel, consisting of temperature-controlled single screw and barrel, temperature controlled by means of heat transfer fluid or electric heating, base frame with gear reducer and drive unit, movable on rails. Especially suitable for production of flame retardants.
- **Discharge pump**, flange-mounted to kneader barrel, consisting of gear pump, electrically heated or temperature-controlled using heat transfer fluid. Base frame with gear box and drive unit, mounted on movable cart. Especially suitable for low-viscosity melts in combination with a screen changer.
- **Screen changer**, flange-mounted to discharge pump or discharge extruder. Used according to specific application.
- **Air/water pelletizing system**, flange-mounted to discharge extruder or melt pump, consisting of heatable die head with die plate, pelletizer cutting assembly and knife motor, pellet collector or casing with air, air/water vapour or water connection. Especially suitable for PVC, elastomers, cable compounds and other highly viscous melts or highly filled formulations.
- **Underwater pelletizing system**, movable unit, flange-mounted to discharge pump or discharge extruder, consisting of die plate with cutting device and water transport system. Especially suitable for low-viscosity and sticky melts.
- **Strand pelletizer system**, consisting of a strand die head flange-mounted to discharge extruder or discharge pump, water bath and strand pelletizer. Especially suitable for low-viscosity melts.
- **Intermittent cutting device**, forms uniformly shaped product pieces for calender feeding. Ensures uniform cutting speeds for both high and low throughputs and helps to ensure smooth control of the filling operation of the calender roller gap, which in turn leads to a better film quality.
- **Pellet cooling and conveying system**, cooling and/or drying units for each pelletizing system, comprising a pellet conveyor, cooling or drying system to suit each process. The pellets are cooled and/or dried with hot air in a centrifugal chamber, or quenched with water and cooled and/or dried with a centrifugal drier.

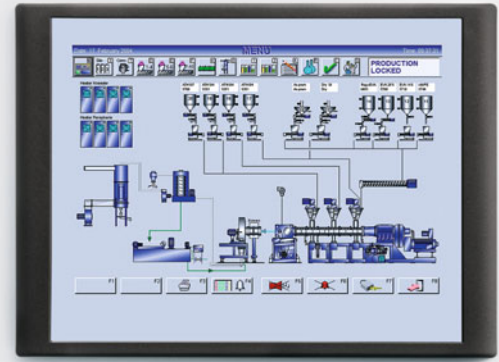
Optimal operation with the right control system

Control systems have to meet complex requirements. The choice of components should be as flexible as possible, keeping operation and maintenance simple at the same time.





BUSS Basic Control



BUSS Process Control

Flexible choice

BUSS offers three different application-oriented control systems:

BUSS Basic Control

A simple and self-explanatory control system with all essential functions and information.

Based on a state-of-the-art 7" TFT touch screen, BUSS Basic Control (BBC) is the perfect user interface for stand-alone machinery.

BUSS Standard Control

Originally designed for standard use in the PVC industry, BUSS Standard Control (BSC) with its 12–15" TFT panel and membrane keypad (short-stroke buttons for fast operation) has become increasingly popular for other applications as well.

BSC offers all the flexibility required for customized design of production-line control systems.

BUSS Process Control

For complete installations and even entire production plants requiring extensive data transfer and backup, with expandable workstation-based visualization.

BUSS Process Control (BPC) is a scalable concept incorporating extensive trending and archiving options. Almost all known communication interfaces are adaptable to this expandable control system.

Maximal automation

All three control concepts are equipped with the latest components available worldwide, making updates in response to technical advances and production situations possible at any time.

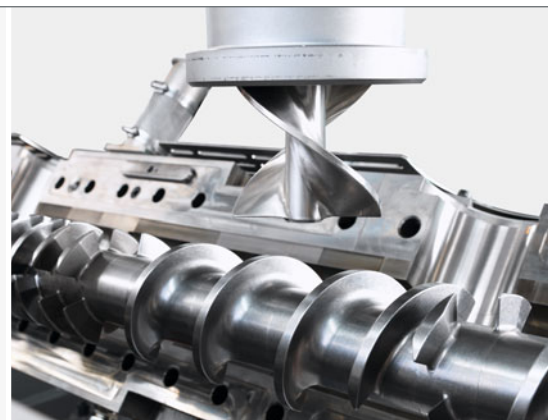
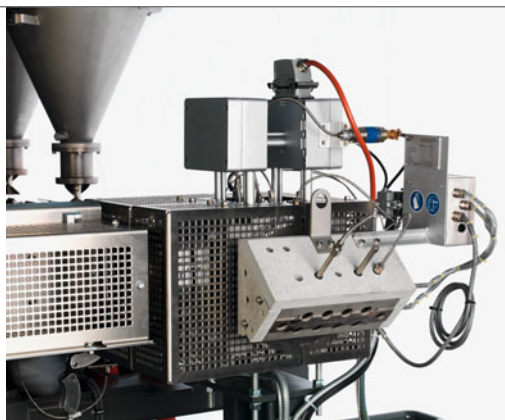
Control components by Siemens and other renowned manufacturers are used mainly to guarantee both maximum automation know-how and access to services provided by a technology leader.

The outstanding competence of BUSS Control engineers, ISO-certified project management as well as an in-house testing laboratory are further significant advantages from which users may benefit – ensuring a maximum degree of process and investment security.

Technical data

	Screw diameter	Process length	Max. screw speed	Max. drive power	PVC pelletizing		PVC calendering	Cable compounds	
	[mm]	L/D	[rpm]	[kW]	unfilled [kg/h]	filled [kg/h]	[kg/h]*	XLPE (peroxide) [kg/h]	HFFR [kg/h]
quantec® 46 G3	46 (58)	14	750	55	200–400	250–500	–	–	–
quantec® 72 G3	72 (90)	14	750	200	730–1500	900–1800	–	–	–
quantec® 85 G3	85 (106)	14	750	315	1250–2500	1500–3000	–	–	–
quantec® 110 G3	110 (138)	14	750	630	2250–4500	3000–6000	–	–	–
quantec® 80 EV	86	10 or 15	750	200	–	–	600–1800	400–600	–
quantec® 96 EV	105	10 or 15	750	350	–	–	900–2800	700–1000	–
quantec® 110 EV	121	10 or 15	750	450	–	–	1300–4100	1100–1500	–
MX 30	30	22	800	11	–	–	–	–	5–25
MX 58	58	15 or 22	800	70	–	–	–	–	180–250
MX 85	85	15 or 22	800	230	–	–	–	–	550–750
MX 105	105	15 or 22	750	350	–	–	–	–	1000–1400
MX 125	125	15 or 22	750	630	–	–	–	–	1800–2500
MX 140	140	15 or 22	750	980	–	–	–	–	2500–3500
MKS 30	30	11 to 20	500	7.5	–	–	–	–	–
MKS 70	70	8 to 20	650	160	–	–	–	–	–
MKS 100	100	8 to 20	500	260	–	–	–	–	–
MKS 140	140	8 to 20	500	650	–	–	500–2000	–	–
MKS 200	200	8 to 20	500	1200	–	–	1000–4000	–	–
PCS 30	30	11 or 17	500	5.5	–	–	–	–	–
PCS 46	46	11 or 15	650	30	–	–	–	–	–
PCS 70	70	11 or 15	650	65	–	–	–	–	–
PCS 100	100	11 or 15	650	110	–	–	–	–	–
LR 100	100	7 or 19	300	50	–	–	–	–	–
LR 200	200	7 or 19	250	200	–	–	–	–	–
LR 300	300	7 or 19	150	400	–	–	–	–	–
LR 400	400	7 or 19	120	500	–	–	–	–	–
KX 540 DT	540	9.5	70	400	–	–	–	–	–
KX 650 DT	650	9.5	70	600	–	–	–	–	–
KX 750 DT	750	9.5	70	900	–	–	–	–	–

* Throughput ratio 1:3

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