

PML 2 –
the universal
laboratory
Perl Mill®



Laboratory Perl Mill® PML 2. Platform for individual Process Development.



Fig. 2.1: Process unit in vertical position – SuperFlow® 4, Cosmo® 2 and MicroMedia® L; and service position for draining of the grinding beads



Fig. 2.2: Process unit in horizontal position – Centex® S1/S2 and SuperTex® 1.2l



Fig. 2.3: Service position for mounting of the process unit, filling of the grinding beads and cleaning

The universal Perl Mill® platform for lab-scaled process development has a modular design and offers unmatched flexibility.

The universal pivoting drive unit (Fig. 2.1 to 2.3) is the core part on which established Buhler process units, in several ceramic, synthetic and steel executions, can be operated:

- Centex® S1 and S2 – horizontal disc agitator with axially arranged protection sieve
- SuperTex® 1.2l – horizontal large capacity disc agitator
- SuperFlow® 4 – high performance agitator operating in recirculation mode
- MicroMedia® L – agitator for micro beads ranging from 20 to 300 µm
- Cosmo® 2 – vertical double cylinder gap agitator

Dependent on the process unit, either a vertical or horizontal operating position is selected. Selecting the service position (Fig. 2.3) allows for cleaning and maintenance of the process unit as well as filling of grinding beads and ensures easy handling and reduced set-up times.

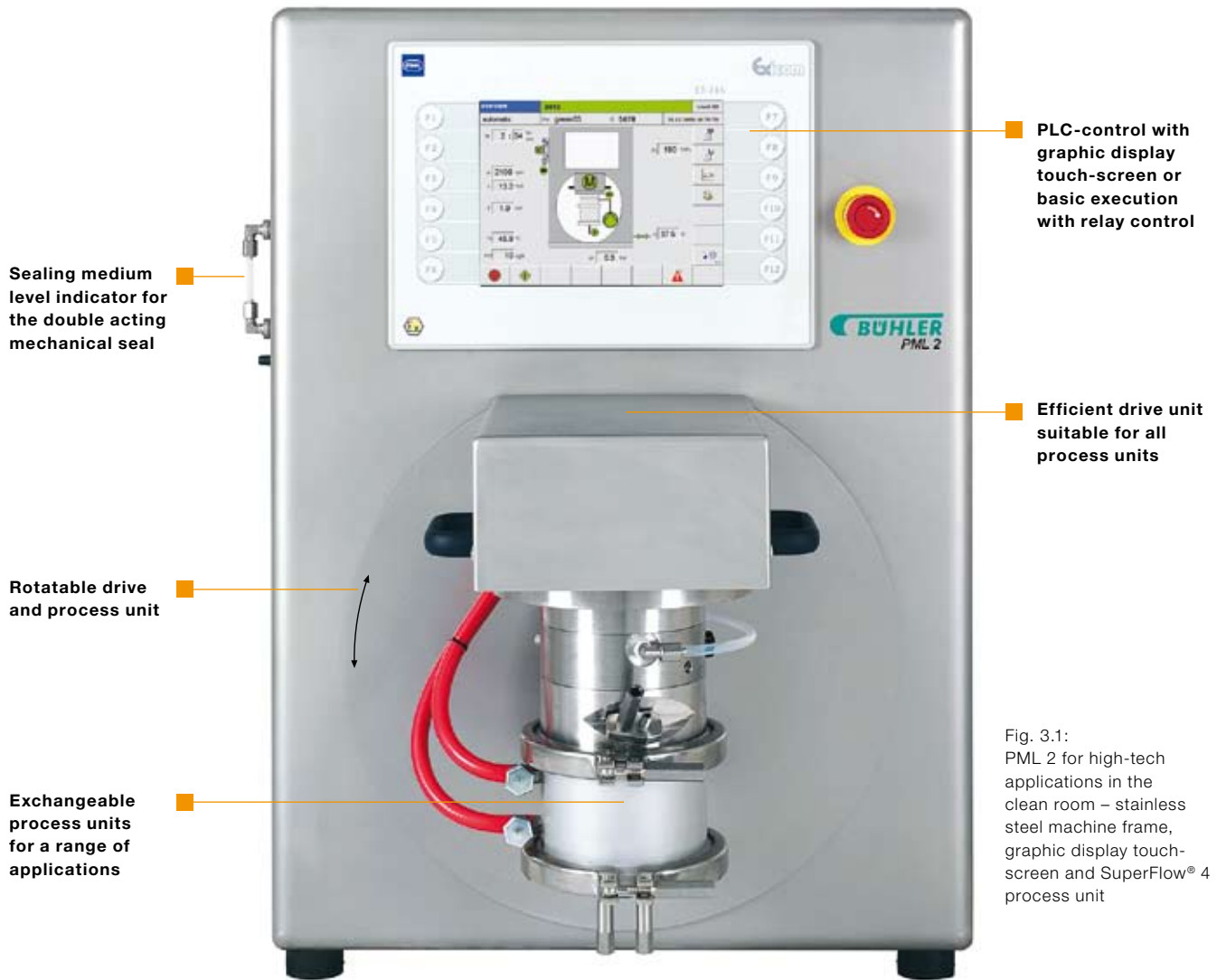
The effective grinding volume depends on the chosen process unit and varies between 0.05 and 1.05 litres. The PML 2 is suitable for basic testing, as well as scale-up to production units for processing of low to medium viscous products.

Custom-designed components

- An optional stainless steel machine frame (Fig. 3.1) is available for high-tech applications in the clean room and meets the most stringent cleaning, hygiene and acid resistance requirements.
- Wear resistant ceramic components to ensure contamination-free processing, e.g. when producing substances for the electronics industry.
- Proven material combinations for optimised processing of abrasive and corrosive products, e.g. agro chemicals, pigments and engineered ceramics.



Fig. 2.4: PML 2 with process unit Centex® S1 and BASIC control package



Sealing medium level indicator for the double acting mechanical seal

Rotatable drive and process unit

Exchangeable process units for a range of applications

PLC-control with graphic display touch-screen or basic execution with relay control

Efficient drive unit suitable for all process units

Fig. 3.1: PML 2 for high-tech applications in the clean room – stainless steel machine frame, graphic display touch-screen and SuperFlow® 4 process unit

Selection of Applications.



High value Coatings

- Automotive OEM & Refinish
- Anti-corrosion coatings
- Industrial coatings



Printing Inks

- Inkjet inks
- Liquid printing inks
- Liquid toners



Displays & Electronics

- Colour filters
- Metal pastes
- Ceramic pastes
- Glass pastes



Specialty Chemicals

- Agro chemicals
- Pigment concentrates
- TiO₂-dispersions
- Adhesives and sealants

Tailored Wet-Grinding Technology. Optimised Process Units for each Application.



Fig. 4.1: Easily exchangeable process units: SuperFlow® 4

SuperFlow®

- DCP pin/counter pin agitator with high power density in DraisResist®10
- Particle size reduction down to submicron range
- Recirculation operation
- Large-scale production units available up to 110 kW

MicroMedia®

- Optimised for operation with micro beads ranging from 20 to 300 µm
- "Soft milling" and "High energy grinding" down to nanometre range
- Recirculation operation
- Materials: DraisResist®10 and SSiC
- Large-scale production units available up to 110 kW



Fig. 4.2: Process units: Centex® S1 (left) and SuperTex® 1.2l (right)

SuperTex®

- Full volume disc agitator
- Materials: DraisResist®10, PU, PA, various ceramics
- Bead separation by ceramic screen cartridge
- Recirculation or single passage operation
- Large-scale production units available up to 355 kW

Centex®

- Full volume disc agitator
- Materials: DraisResist®10, PU, PA, various ceramics
- Bead separation by axially arranged protection sieve
- Recirculation or single passage operation
- Continuous or discontinuous operation possible
- Large-scale production units available up to 355 kW

Control packages.



Fig. 4.3: SuperFlow® 4 in recirculation operation, PREMIUM control package

PREMIUM Control package (Fig. 4.3)

Display of all inputs and operating parameters (also trend depiction) on graphic display touch-screen. The PREMIUM package allows additional selection of specific control algorithms and offers various interfaces to main control systems or the Buhler data logging system 'WinTrend'.

BASIC Control package (Fig. 2.4)

Simple relay control with the following elements:

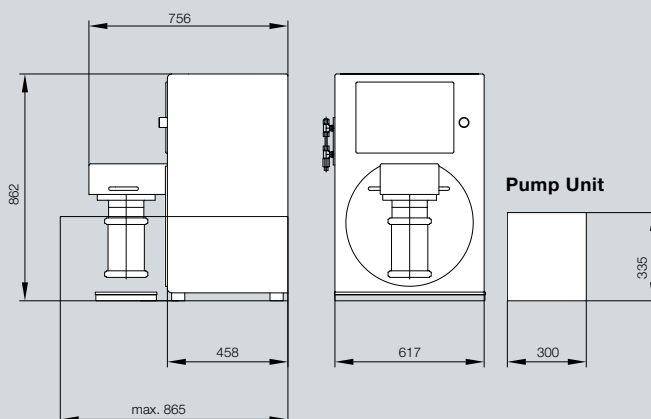
- Start/Stop agitator
- Potentiometer: rpm for agitator
- Start/Stop feed pump
- Potentiometer: capacity for feed pump
- Ampere meter for motor power
- Alarm signal and emergency-stop

Technical data.

Specification

Operating position horizontal or vertical	●
Service position vertical	●
Modular design	●
Easy to change process zones	●
Doubly acting mechanical seal	●
Gearpump, Flexible-tube Pump, or Excentric Spiral Pump	○
Control package PREMIUM	○
ATEX II2G EEx c T3	○
Monitoring of product pressure	●
Monitoring of product temperature	●
Interface for process data recording with WinTrend	○
Machine frame made of stainless steel	○

● = Basic machine ○ = Option



Technical Data, Weight, etc.

Power	2.2 kW
RPM of Motor	3000 min ⁻¹
RPM of Rotor	500–4500 min ⁻¹
Active volume of process zone	0.05–1.05 l
Weight	150 kg

Process unit		Cosmo [®] 2		SuperFlow [®] 4		MicroMedia [®] L		SuperTex [®] 1.2l						Centex [®] S1 / S2												
Agitator	Stator																									
Stainless steel	Stainless steel	● ¹⁾		●		●														●						
Chilled cast	Stainless steel							●																		
Polyurethane	Stainless steel								●												●					
Polyurethane	Polyurethane									●												●				
Polyamide	Polyamide		●								●												●			
Ceramic SiC	Ceramic SiC							●				●											●			
Ceramic ZrO ₂	Ceramic Al ₂ O ₃												●											●		
Ceramic ZrO ₂	Ceramic ZrO ₂													●												
Discontinuous operation																				○	○	○	○	○	○	○
No. of discs									6	6	6	6	6	6	6	6	6	6	6	2/4	2/4	2/4	2/4	2/4	2/4	2/4
Cooling		++	-	++	+	++	+	+	-	-	++	+	-	+	+	-	-	++	+	+	-	-	++	+	+	
Solvent resistance		+	+	+	+	++	+	-	-	+	++	++	++	+	-	-	+	++	++	+	-	-	+	++	++	++
Wear resistance		+	++	+	+	++	○	+	++	+	++	+	++	+	++	○	+	++	+	++	+	++	+	++	+	
Active volume of process zone [l]		0.185		0.275		0.050		1.050						0.280 (S1) / 0.850 (S2)												
Grinding media [mm]		0.2–0.8		0.2–0.8		0.02–0.3		0.2–2.0						0.2–2.0												
Position (horizontal / vertical)		V		V		V		H						H												

¹⁾ Inner and outer stator in SiC

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