



# UFM Line5

PROMESS assembly presses for assembly and joining applications with force-distance monitoring

For more efficiency.

**PROMESS**

Assembly and Sensor Technology

## Your partner in the field of assembly and testing technology

Gerhard Lechler founded the company PROMESS in 1977 as an engineering office in the field of technical measurement in Berlin. Initially, the company distributed handmade patented measuring bearings for tool condition monitoring before the electro-mechanical assembly press (UFM) with integrated NC control was born at the end of the 1980s. Right from the beginning it was the strength and the passion

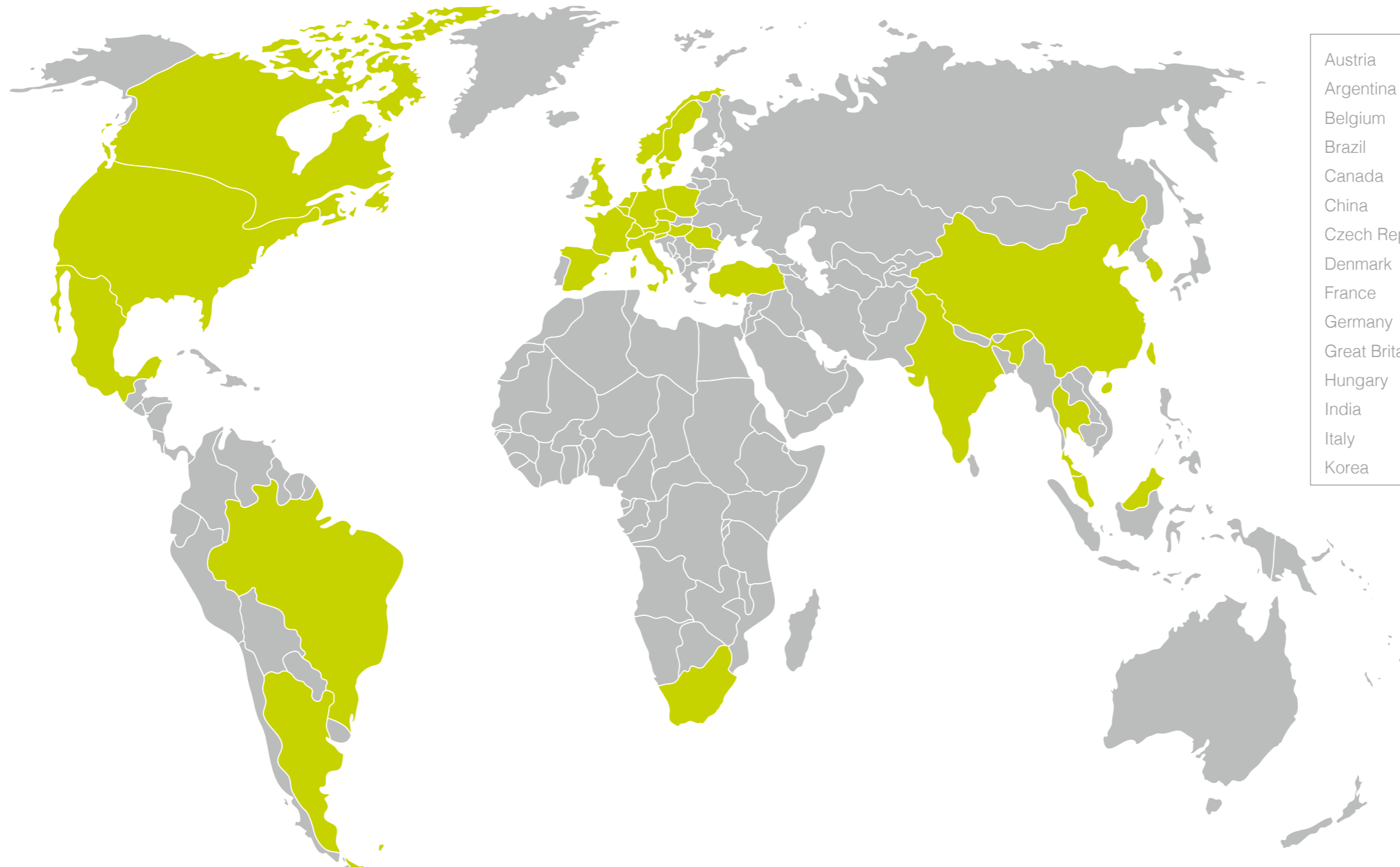
of Gerhard Lechler to develop technical solutions for his customers. And this has not changed until today. This passion has continued so that the core competence of PROMESS is still the development of complete technological systems for solving the individual and complex assembly and testing tasks and requirements of our customers.

From process development to preliminary testing, from initial installation to daily production, PROMESS offers holistic expertise from a single source. Our specialist teams have comprehensive knowledge of our products and offer prompt and effective advice worldwide.

Today PROMESS is one of the global leaders in the manufacturing of elec-

tro-mechanical assembly presses with the widest range of presses in this field. Currently, more than 15,000 presses are operating in heavy industrial applications.

In almost 30 countries all over the world our sales and service partners are looking forward to your enquiries and questions.



Austria	Malaysia
Argentina	Mexico
Belgium	Netherlands
Brazil	Norway
Canada	Poland
China	Romania
Czech Republic	Singapore
Denmark	Slovakia
France	South Africa
Germany	Spain
Great Britain	Sweden
Hungary	Switzerland
India	Thailand
Italy	Turkey
Korea	USA



# UFM Line5

The UFM Line5 range includes standard press designs with an optimum price/performance ratio. They are well suited for assembly and joining applications with force-distance monitoring and can be integrated in automated assembly lines, test stations or manual workstations.

## Overview of Press Types

TYPE	FORCE	STROKE	SPEED
Type 1	10 kN	350 mm	300 mm/s
Type 2	30 kN	350 mm	250 mm/s
Type 3	60 kN	350 mm	250 mm/s
Type 4	100 kN	350 mm	200 mm/s
Type 5	200 kN	350 mm	100 mm/s

## Advantages

- Standard model includes absolute encoders that eliminate the need for referencing
- Only the power amp is required, no need for an additional external monitoring system
- Multi measurement with 24-bit resolution
- Multi range calibration for force input (optional)
- Sensor system can be easily extended using versatile PROMESS-BUS
- Field busses can be optionally expanded using plug-in modules
- Utilization of window and envelope technologies
- No PLC knowledge required
- Movement and monitoring as an integrated solution
- Slim internal micrometer
- Automatic grease unit optionally available
- Integrated program memory
- PLe for STO by default



## Mechanics

The Line5 universal joining module is robustly designed thus making it well suited for heavy duty cycles. The mechanical system consists of the following components:

AC servo motor with integrated absolute encoder, precision gearbox (except type 1), integrated force transducer, robust steel enclosure, screw assembly, non-rotating press ram

The units use an inline design, i.e., the shaft is driven by a motor spindle in line with the shaft. The excellent rotational characteristics of this sys-

**Design basis for all mechanical parts:**

$$F_{\text{Nominal}} = 2.5 \times C_{\text{Dyn}}$$

**This guarantees an extremely long life cycle (min. 12 million strokes on average for standard assembly processes)**

tem provide excellent dynamic response. However for compact installation spaces, we recommend joining the modules using an angled motor spindle.

The integrated absolute encode ensures precise positioning and eliminates the need for referencing at the start of a cycle.

## Set-up of the mechanics

1. Servo motor with absolute encoder
2. Gearbox
3. Integrated strain-gauge force transducer
4. Steel housing
5. Mounting flange
6. Non-rotating press ram



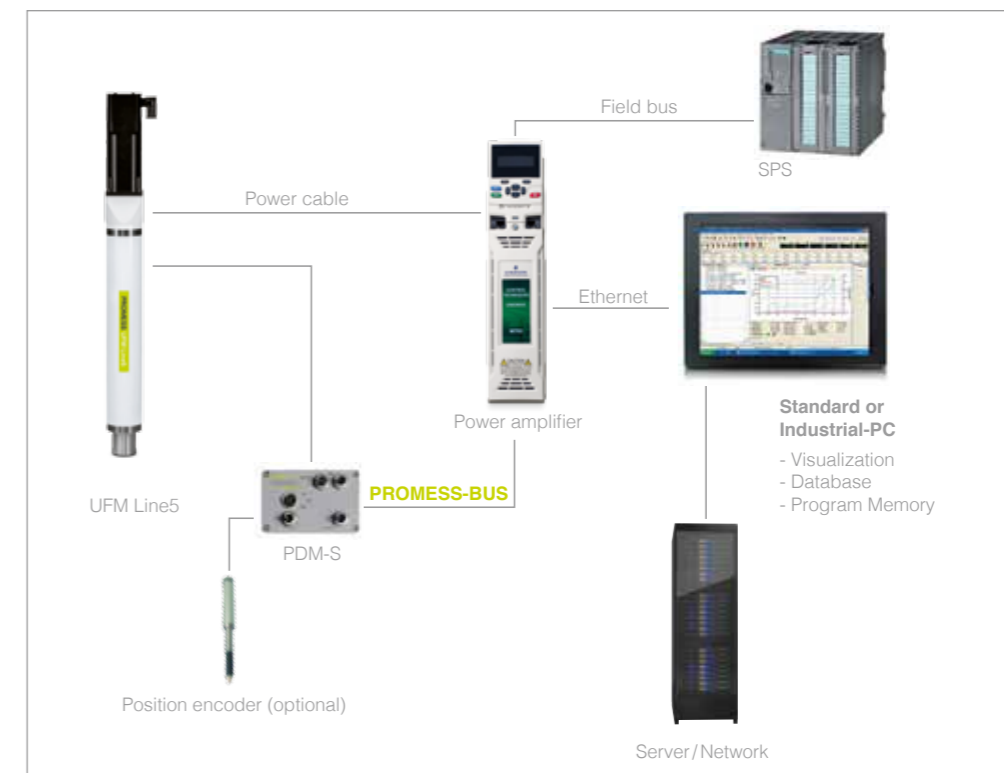
## System Design

The mechanical system is controlled by a power amplifier with an integrated NC module. The internal RISC processor coordinates the joining module and can be easily programmed and operated using a conventional PC/display.

The controller coordinates the mechanical motion of the press as well as monitoring the force and distance. The force-distance characteristic can be monitored using envelopes and/or window methods. The data can be edited numerically and graphically so

that each individual process can be easily monitored. The automatic learning function allows customers to eliminate the need for custom programming and simply learn the processing limits using a good part. Quality assurance data is stored using the database plugin and can be re-used at any time.

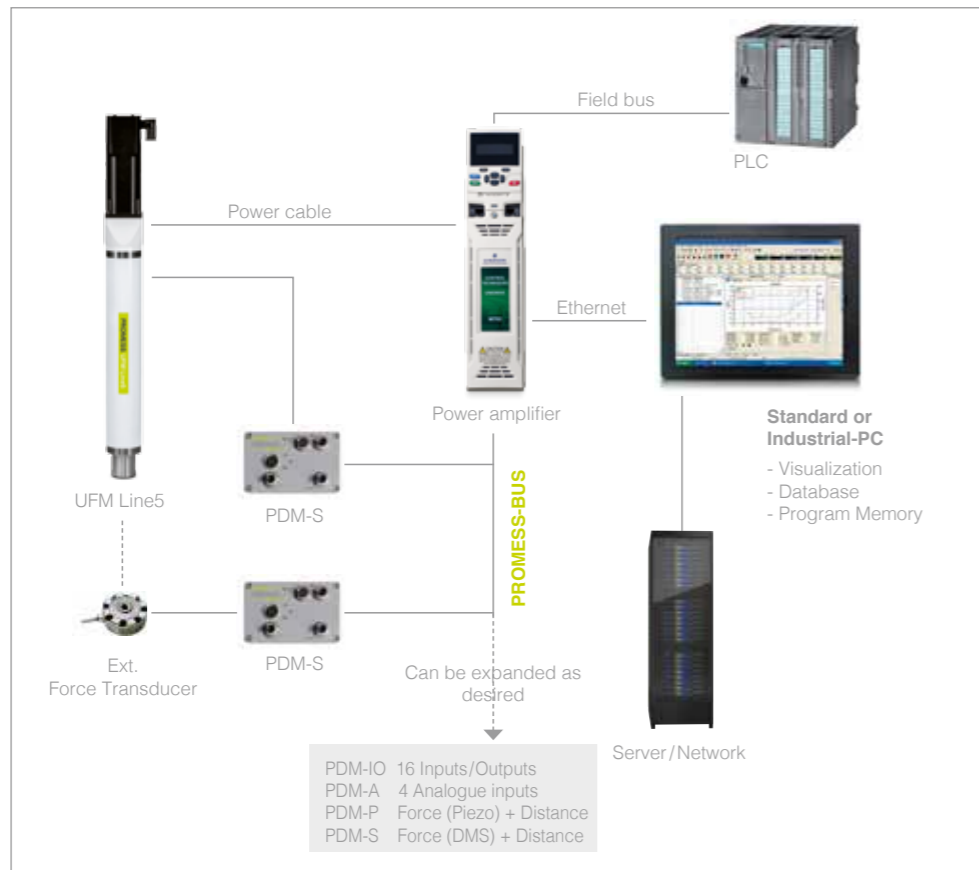
The system utilizes a digital preamplifier, PROMESS digital module PDM-S. This transfers the force signal at a resolution



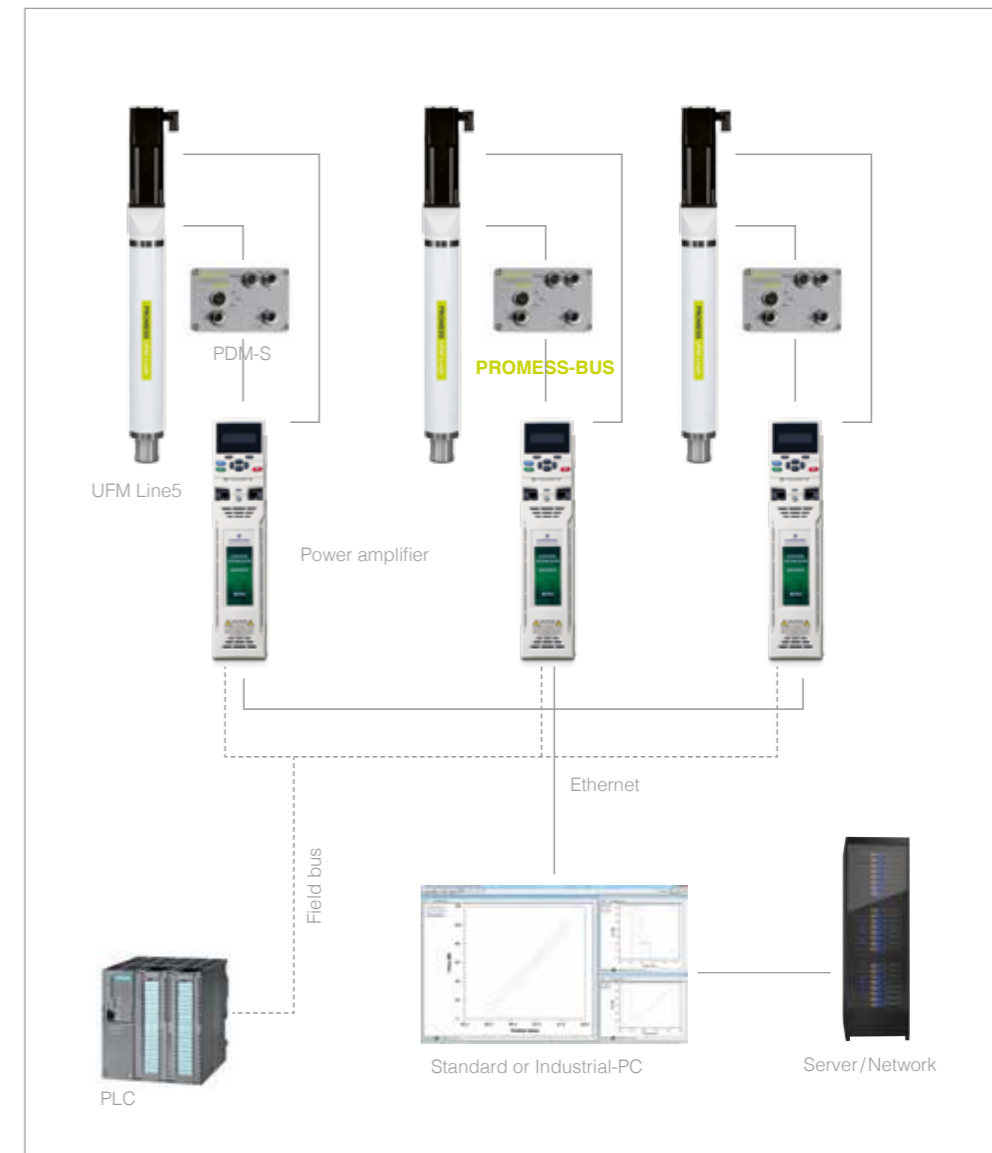
Basic version

of 24-bit almost trouble-free. When the characteristics are calibrated, the joining system achieves a system accuracy of 0.3 % from the final value. The characteristic calibration process is comparable to a multispan calibration for 10 spans. The characteristic map is created automatically using the UFM Calibrate plugin. The results are stored in a calibration report and can be printed out.

The PROMESS Digital Module PDM-S contains an input for connecting a force transducer (strain gauge) as well as an encoder input for connecting digital sensors. The PDM-S is digitally connected to the UFM control via the PROMESS BUS.



Extension/Options



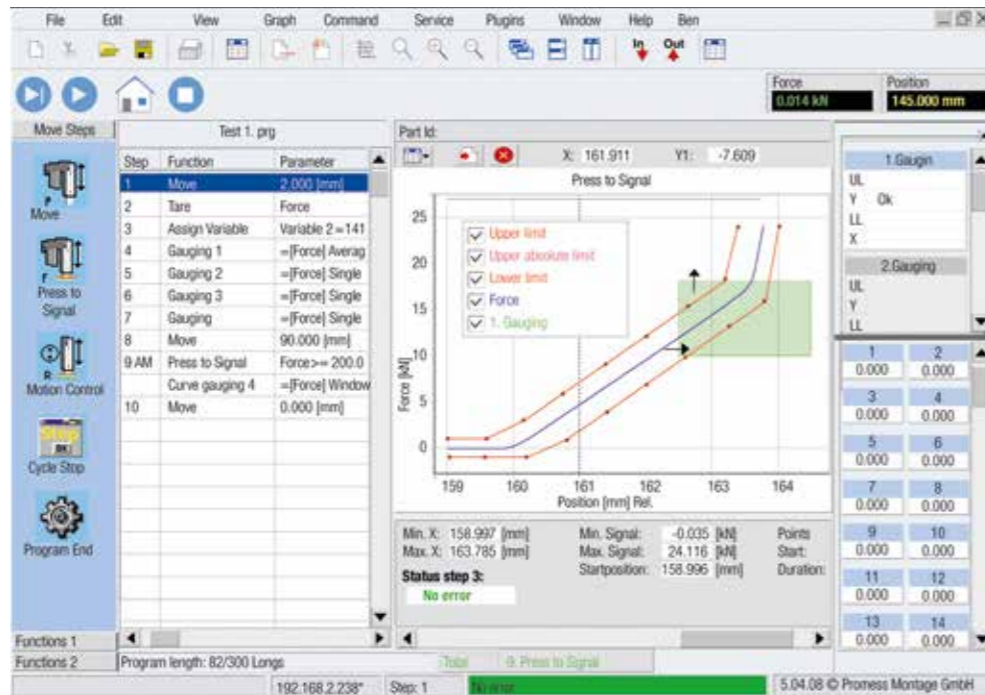
Line configuration

# Software

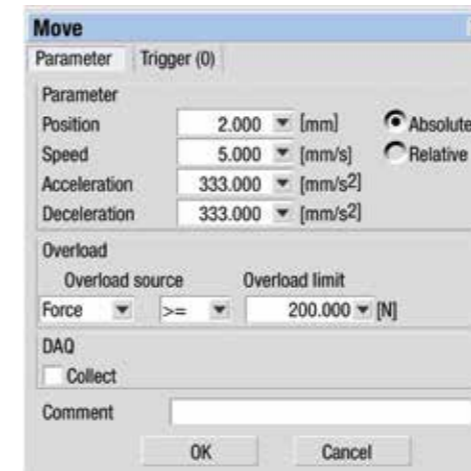
As standard, the UFM Line5 range of presses come with the UFM V5.xx programming software. This software is intuitive to operate and does not require any PLC expertise. It can be used to create simple or advanced joining processes.

The integrated User Administration feature offers multiple permission levels and logging for process safety. The log documents who makes which changes to the program. Each user profile can be exported and then imported to another station. Thus it is possible to integrate a user administration system and also to connect the system to a higher-level permission system using the .Net interface or field bus (e.g., Euchner EKS system).

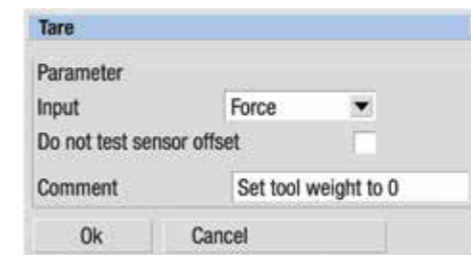
The transparent and concise program surface allows users to quickly create programs. The main window lists all programming steps together with their functions. The function screens can be opened successively to enter the process values. Thus the force, displacement, time, speed, acceleration and braking rate can be easily programmed for each step. Once the required input screens have been defined, the joining program is completed and the steps are processed automatically.



Main window



Entry screen Move



Entry screen Tare



Entry screen Press to Signal

## Highlights for demanding applications:

- Positioning on force slope:** Joining components until a definite slope (increasing force) or relatively once a knee-point has been detected.
- Controller module:** This module allows you to easily solve processes by controlling the process variables and maintaining constant signals, e.g., spinning operations with constant force controlling.
- Measurement data system:** Measurement data can be captured relative to positions and force, but also relative to freely definable reference points (e.g., relative to achieving a specific threshold).
- Bending compensation:** Not only customizable for separate systems, also for specific processes and components.

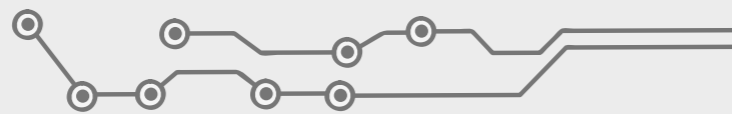
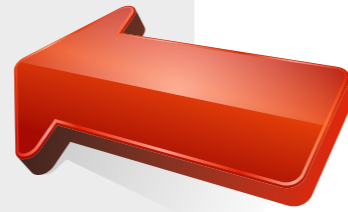
ONLY WITH  
**US**

## Trigger Technology by PROMESS

The triggers are "pulse points". Up to seven trigger points can be defined in order to react to processing events during movement.

These reactions can include:

- Smooth speeds
- Set the outputs in real time
- Change target parameters during movement
- Correct process tolerances during movement



## Modern Database Structure

All process data including the curves can be stored in a database.

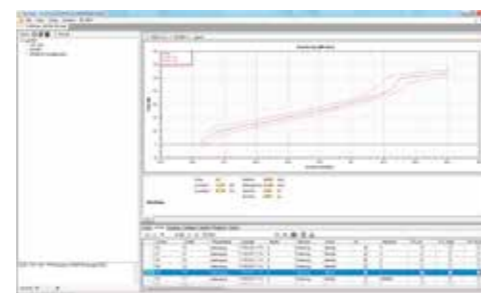
All common database formats such as Oracle, MS SQL and Access are supported. A separate database is created for each station. Programs can be stored and re-used at any time.

Since the program changes can be traced, this provides 100% traceability throughout the entire production.

The database can be analyzed using the DB Viewer with its extensive querying and filtering options. Graphs can be superimposed on each other for comparisons and analyses. Envelopes can be edited and reloaded into the

press. The data can also be exported in Excel format at any time.

The standard models include the database software package and DB viewer.



DB Viewer

## Software Highlights:

- Press to signal, press to force, press to an external signal (e.g., analogue or TTL signals)
- Force and speed can be programmed individually during the joining process
- Variables can be used to transmit setpoints, perform calculations using PLC and generate counters
- 100 % quality control using window and/or envelope methods
- 100 % process documentation using modern database structure
- 100 % process analysis using standardized interface to QS-STAT (optional), alternative to process data management software IPM (optional) – can be expanded using .net interface
- Trigger function for demanding applications
- High controller accuracy (minimization of overshoot in control processes)
- Display of two graphs in one diagram
- Quick printout of a graph report (screenshot)

## Scope of Delivery for Components:

- Universal joining module Line5
- Power amplifier incl. application module and UFM V5 firmware
- Brake resistance
- Ethernet module
- Digital preamplifier PDM-S
- Cable, field bus and more accessories on demand



# Accessories/Options

PROMESS has developed extensive accessories for the UFM Line5 range of presses that provide them with additional functionality. Together with our many years of expertise, we provide you with complete technologies for solving your own complex assembly and testing tasks.

## Safety Box PSB

As an option to our assembly presses UFM Line5 we offer our PROMESS Safety Box PSB as an alternative to the integration in electrical cabinets. The device features all safety and power components for this purpose.



PSB010G1

It can easily and quickly be connected by plug & play. All cables are pluggable. Due to the compact design, the PSB can be mounted next to the assembly press so that cable lengths can be reduced and wiring becomes unnecessary. By using the PSB your assembly press will be ready for production instantly.

### Advantages

- No integration in electrical cabinets
- Reduction of cable lengths
- No wiring work
- No adaption of electrical diagrams
- Short connection time: plug & play
- PLe for STO by default
- Extension on SLS, SS1, SS2 possible
- IP Code 54
- Extremely compact design

### Technical Data

UFM Line5	10 kN	30 kN	60 kN	100 kN
Item no.	PSB010G1	PSB030G1	PSB060G1	PSB100G1
Connection voltage	3 AC 380 V - 480 V, +/- 10 %, 48-65 Hz			
Connected load at 400 V	8,7 kVA	10 kVA	18,3 kVA	19,0 kVA
Protection class	IP 54			
Weight	17 kg	18 kg	28 kg	28 kg
Recommended protection	IEC 20 A class gG		IEC 40 A class gG	
Temperature range	0° C ... +40° C			
Power loss	368 W	493 W	654 W	756 W
PC Interface	Ethernet			
Option PLC fieldbus interface	Profibus, Profinet, EtherCAT (add. on request)			



# PSD Safety Module

The PSD safety module is delivered tested and ready to install. It contains the power electronics and safety controller for the joining unit. It offers the following safety functionality: STO in PLe in accordance with DIN ISO 13849-1; optional: SSx and SLS in PLd in accordance with DIN ISO 13849-1 (for UFM Line5 with safety brake). The safety module eases and accelerates the installation procedure for the joining unit.

The PSD is suitable for our UFM Line5 units with and without brakes. As a prerequisite, it must be controlled using field bus.

## Advantages

- Short installation times
- No wiring necessary
- Completely inspected and tested
- EMC tested

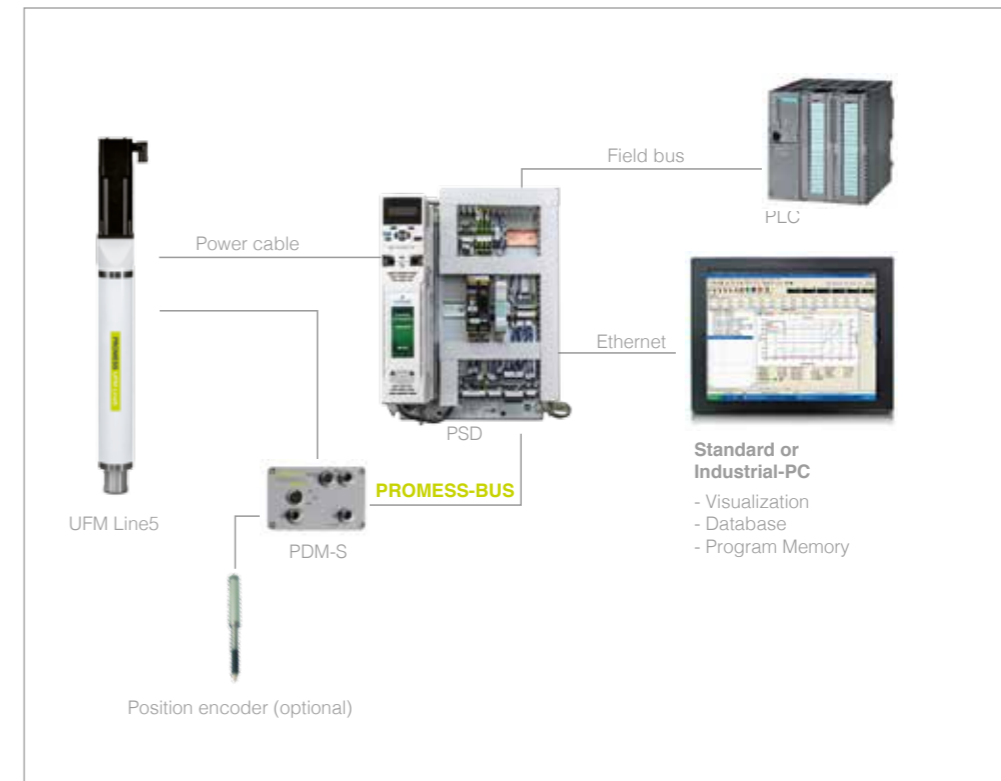
## Connected Components

- AC servo amp with NC module
- Brake resistance
- EMC components, main power filter
- Safety controller: Safety functionality
- STO in PLe in accordance with DIN ISO 13849-1; optional: SSx and SLS in PLd in accordance with DIN ISO 13849-1 (for UFM Line5 with safety brake)
- Field bus interface (must be ordered separately)
- Set of cables (must be ordered separately)
- Required connectors (connected to pins): Power supply
- 24-volt emergency stop circuit



PSD 010G1

# System Design



System Design

## Technical Data

UFM Line5	Item no.	WxHxD (mm)	Supply - voltage	Frequency	Operating temperature range	Control voltage
10 kN	PSD010G1	354x475x300	380-480 VAC +/-10%, 3 ph	50-60 Hz	+5-40 °C	24 VDC +/-10%
30 kN	PSD030G1	500x500x300				
60 kN	PSD060G1	500x500x350				
100 kN	PSD100G1	500x500x350				
200 kN	PSD200G1	500x500x350				

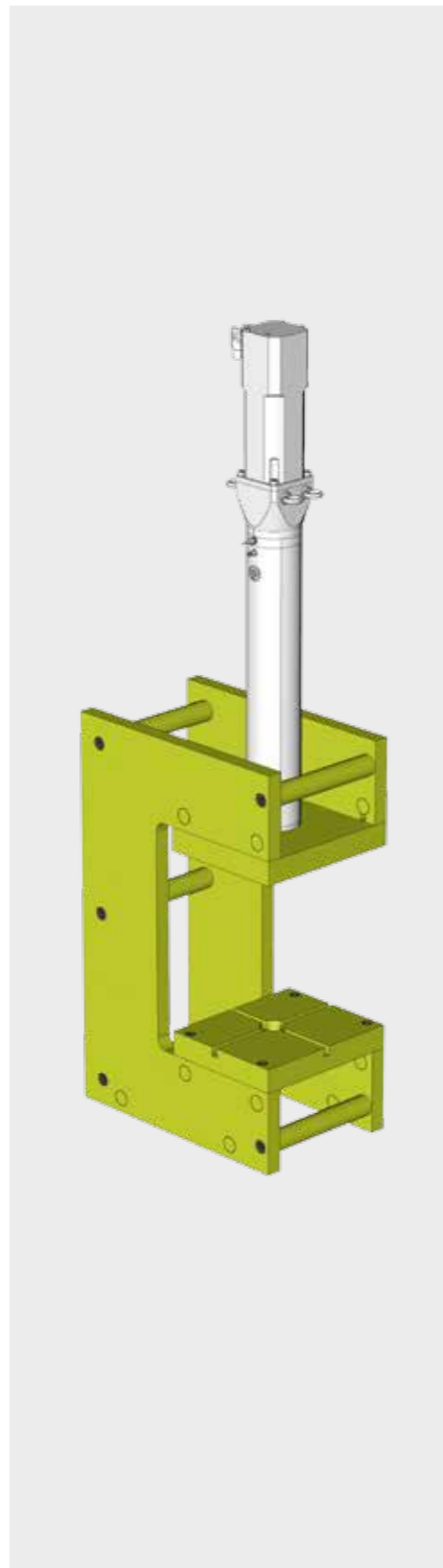
## Frames

PROMESS offers matching C- and four-column frames for each type of press in the UFM Line5 range.

### C-Frames

The robust C-frames are easily accessible from the front and sides and provide high stiffness. The max. bending is 0.2 mm under nominal load. They are mainly suitable for use in assembly lines or machines.

By default, the lower plates are equipped with a center hole and 2-T grooves as optimum tool mounts. The upper plates are pre-fabricated to hold a specific joining module.



C-Frame

#### Item no.

UFM Line5	Item no.
10 kN	850104LN
30 kN	850304LN
60 kN	850604LN
100 kN	850604LN
200 kN	852004LN

### Four-Column Frame

Four-column frames are suitable for applications with central axial application of force. They offer low bending that is solely parallel.

By default, the lower plates are equipped with a center hole and 2-T grooves as optimum tool mounts. The upper plates are pre-fabricated to hold a specific joining module.



Four-Column Frame

#### Item no.

UFM Line5	Item no.
10 kN	850106LN
30 kN	850305LN
60 kN	851602LN
100 kN	851602LN
200 kN	852005LN

## External Force Transducer

The force transducers in the Line5 range are designed to measure tension and compression forces both statically and dynamically. They offer high measurement precision and a low installation height.

### Art.-Nr.

UFM Line5	Item no.
10 kN	850102LN
30 kN	850301LN
60 kN	850603LN
100 kN	851001LN
200 kN	852001LN



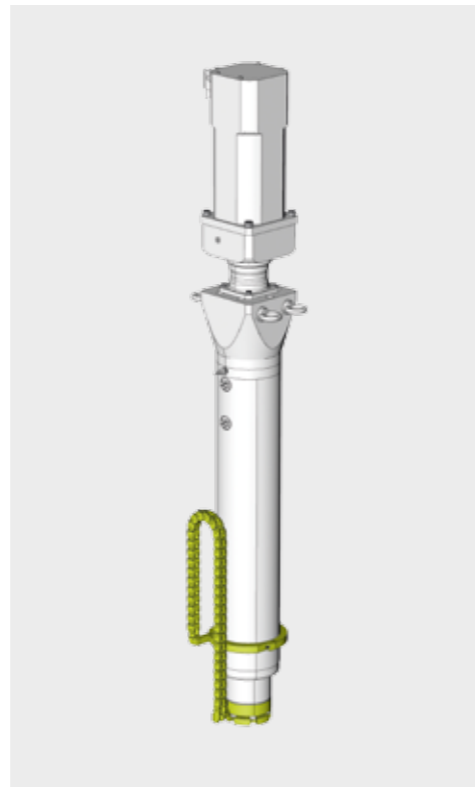
External Force Transducer

## Cable Track Module

PROMESS offers different modules for towing the force transducer cable safely without wear and tear.

### Item no.

UFM Line5	Item no.
10 kN	850002LN
30 kN	850005LN
60 kN	850003LN
100 kN	850003LN
200 kN	852002LN

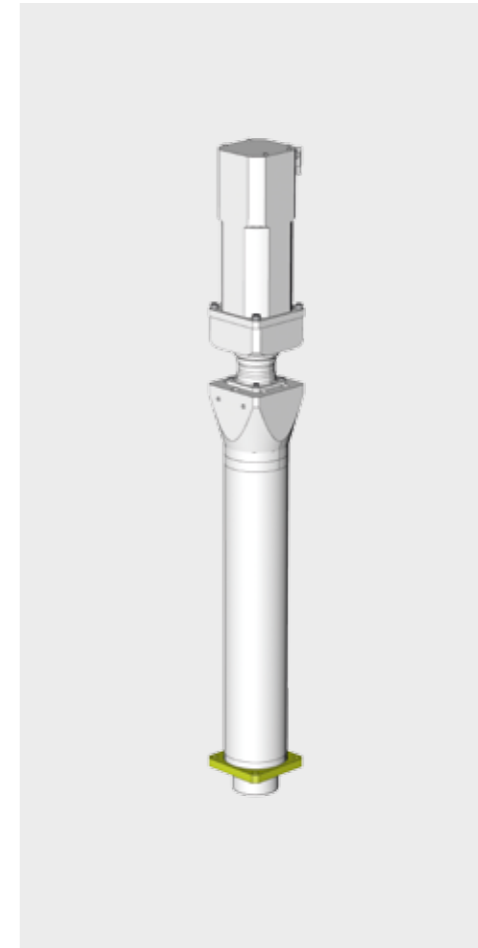


## Flange Plate

PROMESS offers corresponding flange plates for fastening the joining modules.

### Item no.

UFM Line5	Item no.
10 kN	850103LN
30 kN	850303LN
60 kN	851601LN
100 kN	851601LN
200 kN	852003LN



Flange Plate

## Sensors (Displacement Transducers)

The PROMESS NC controller allows you to connect various additional sensors for measuring force, distance, temperature or other variables.

### Technical Data

Item no.	Sensor / Accessory	Cable	Stroke	Resolution
3647	Precision sensor ST 1278	axial	12 mm, neutral position extended	+/- 0.001 mm
3640	Precision sensor ST 1278	radial	12 mm, neutral position extended	+/- 0.001 mm
4103003080	Precision sensor ST 1277	axial	12 mm, pneumatic retracted	+/- 0.001 mm
4103003078	Precision sensor ST 3078	axial	30 mm, neutral position extended	+/- 0.001 mm

Connecting cables have to be ordered separately.

## Connector Sets

If a cable set is not ordered, a connector set will be required.

UFM Line5	Item no.
10 kN	750100LNM
30 kN	750300LNM
60 kN	750600LNM
100 kN	751000LNM
200 kN	752000LNM

## Cable Sets

The cable sets are available in lengths of 5\*, 10, 15 and 20 m.

UFM Line5	Item no.
10 kN	750105LNM*
30 kN	750305LNM*
60 kN	750605LNM*
100 kN	751005LNM*
200 kN	752005LNM*

## Field Busses

PROMESS offers various field busses for communicating between the PLC and NC controller of the press.

UFM Line5	Item no.
Profibus	3302005550
Profinet	3302005585
EtherCAT	3302005595

Additional field busses on request.



## Display and PC

As a programming unit for editing NC programs and for visualizing signals, PROMESS offers an industrial PC and different displays.



**Industrie PC**  
Item no. 2601002060

- Industrial PC for installation in control cabinets – multilingual
- Compact enclosure made of sheet steel, W\*H\*D = 140\*230\*257mm
- Interfaces: 2 x Ethernet RJ45, 1 x RS232, 1 x RS-232/422/485 Serial, 2 x PS/2 for keyboard and mouse, 2 x USB, 1xIrDA,
- Hard drive 100GB IDE 2,5" HDD, 24h7d
- Windows Win7 ultimate MUI



### Display

PROMESS offers different displays on request.

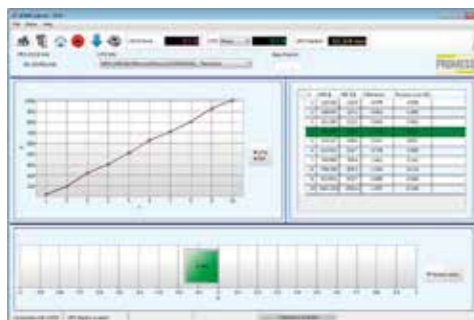
## Plugin

PROMESS offers a range of custom plugins for its powerful UFM V5.xx programming software. These can be connected to the software through the .net interface. This allows the software to be modified on a case-by-case basis and optimized for specific applications without having to update or change the firmware. The expanded database is also linked to the plugin.

### Excerpt from the plugin library:

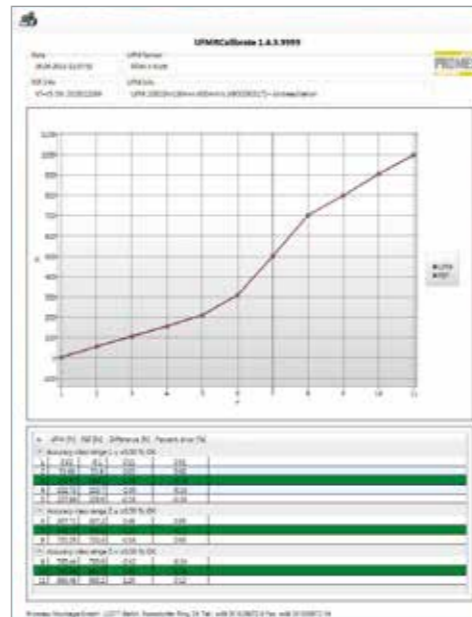
#### ■ UFM Calibrate

The UFM Calibrate plugin was developed for calibrating force transducers in the joining modules. The integrated range calibration of the PROMESS PDM-S digital preamp supports 2-point calibration as well as characteristic diagram calibration.



Calibration plugin

Calibration can be performed most simply using the PROMESS calibration set that contains a reference force transducer and the KT-V5 evaluation unit with display.



Calibration protocol

The KT-V5 is connected to the USB port of the computer and operated using the UFM in order to read in the values of the reference force. The characteristics of the reference force transducer are automatically detected by the integrated TED5 and written to a calibration log that can be exported in Excel format.

However, the calibration can also be performed using external calibration equipment. In this case, the base point values of the reference transducer are entered manually.



#### ■ UFM Barcode

The UFM Barcode plugin can be used to change the program within the UFM software using a barcode scanner. While the program runs, the barcode scanner can be used, for instance, to transfer a Part ID using the UFM dialog function.

#### ■ UFM QDE

The UFM QDE plugin allows quality assurance data to be exported to the QS-STAT statistics software from Q-DAS and supports process monitoring and optimization. Measurement, auxiliary and description data can be exported from each joining program as characteristic data.



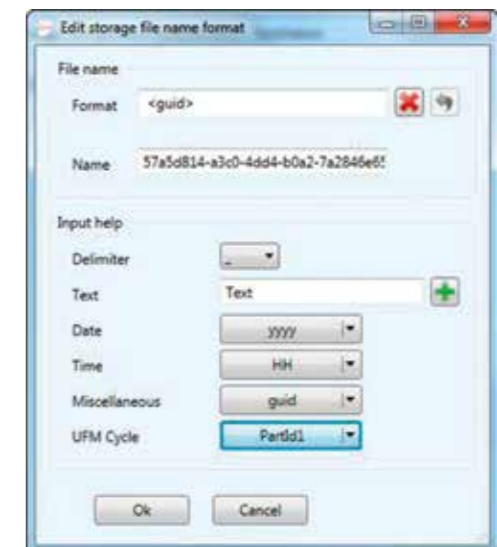
#### ■ UFM IPM

The UFM IPM plugin makes it possible to export process and measurement data to the IPM process data management from CSP and thus supports process monitoring and optimization.



#### ■ URMR XML-Writer

PROMESS developed the XML Writer plugin for exporting process, measurement and graph data as well as other variables. The XML files can be subjected to further processing and analyses.

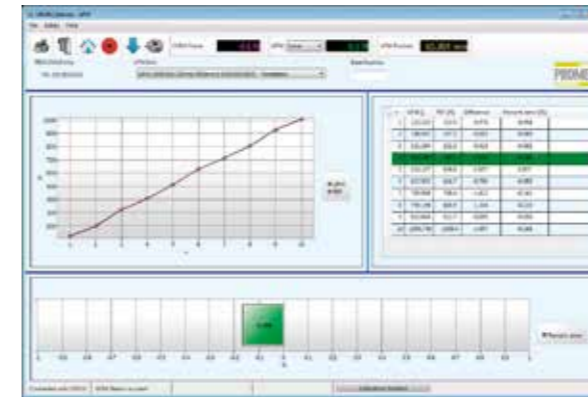
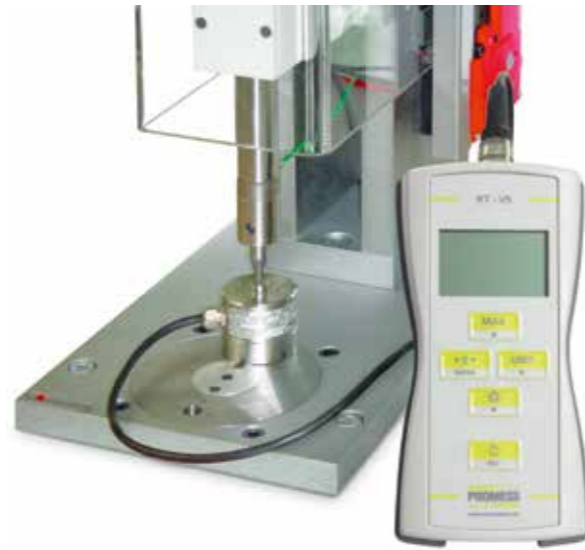


URMR XML-Writer

## Calibration & Maintenance

### Avoid expensive repairs

Preventative maintenance is the simplest means of reducing costly standstills in production, increasing machine life and boosting productivity. Our services offer flexible maintenance for your plant with minimum downtime.



Calibration plugin

### PROMESS Calibration Sets consist of:

- Reference transducer
- Evaluation unit for the reference transducer with display and USB port for connecting to a PC
- Factory calibration log (or DKD calibration by request)
- PROMESS Software UFM Calibrate (optional)
- Suitcase



## Calibration Set

Easily perform a quick calibration or test of the UFM joining unit in your machine using the PROMESS calibration set.

The process can be automated using the optionally available software.

On completion, a log file is created that can be exported to Microsoft Excel.

### Special Features:

- Simple operation
- Robust battery-driven display
- Industrial strength suitcase
- Nominal forces from 500 N to 200 kN
- With factory calibration certificates

### Our maintenance contract contains:

- 1 x annual maintenance checkup including following services:
  - Re-greasing of all lubricated areas
  - Transmission oil change when necessary
  - Inspection of mechanical and safety-relevant parts
  - Replacement of worn parts when necessary
  - Software update
  - Creation of machine status report and offer to eliminating any deficiencies or faults
  - Calibration of force transducer
  - Adjustment work
  - Issuing of calibration certification
- 12-month extension to guarantee following maintenance
- Express delivery with no additional charges
- 10% discount on single parts
- 10% discount on additional services and training

Calibration Set	1 kN	5 kN	10 kN	20 kN	50 kN	100 kN	200 kN
Item no.	5106	5107	5104	5101	5103	5105	5108
Force transducer	KAM/1kN/0,2	KAM/5kN/0,2	KAM/10kN/0,2	KAM/20kN/0,2	KAM/50kN/0,2	KAM/100kN/0,2	KAM/200kN/0,2
Base plate	XKM 096	XKM 096	XKM 096	XKM 094	XKM 094	Without	Without
Diameter/height	Ø40 / 12	Ø40 / 12	Ø40 / 12	Ø90 / 25	Ø90 / 25	Ø90 / 25	Ø90 / 25
Plug	XKC 041	XKC 041	XKC 041	XKC 041	XKC 041	XKC 041	XKC 041
Display	KT-V5	KT-V5	KT-V5	KT-V5	KT-V5	KT-V5	KT-V5
Factory calibration	XKW 221	XKW 221	XKW 221	XKW 221	XKW 221	XKW 221	XKW 221

## Our Service Competence

PROMESS universal joining modules have been used for many years in heavy industrial applications. This is made possible through the solid quality of the products as well as our extensive, sustainable worldwide service. From process development to preliminary testing, from initial installation to daily production, PROMESS offers holistic product expertise from a single source and thus provides sustainably rapid service and competent consulting.



### Our services include:

- Process development
- Preliminary testing
- Rental units
- Installation
- Extensive documentation
- Training
- Local and remote maintenance
- Calibration services
- Emergency repairs and spare part delivery
- Consignment warehouse
- Worldwide distribution and service network



## Range of Services

## Training

PROMESS has developed various training modules to simplify, as much as possible, the installation, operation, maintenance and handling of our joining modules. The modules are based on core knowledge for introducing NC joining technologies that, after consultation, can be individually modified or adapted. Training can be held on site or at our premises and are performed by experienced and qualified training personnel.



## Express Delivery

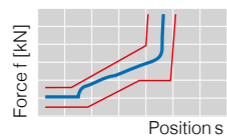
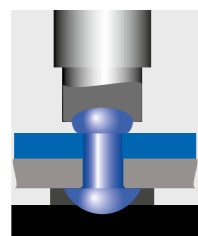
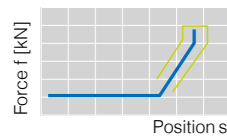
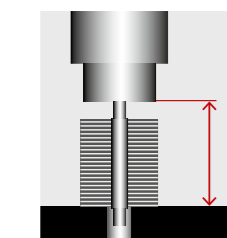
On request and for an additional charge, we can deliver within two weeks by express delivery for up to five units.



# Application Examples

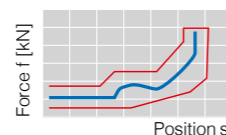
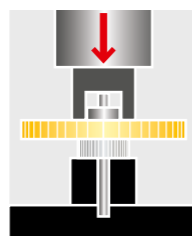
## Precision Joining

- Precision joining < 0.002 mm, collision-free due to electronic bending compensation.



## Riveting

- Rivet press with programmable press force and control of power press.

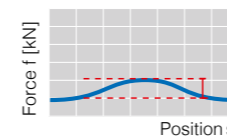
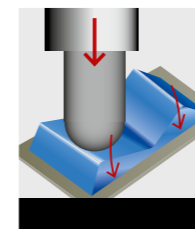
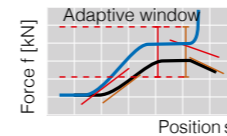
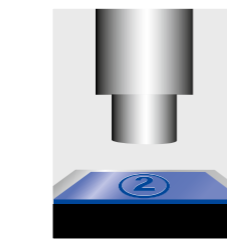


## Join on Contact

- Joining on contact with precise shutdown once absolute shoulder position has been reached.

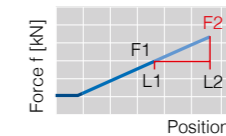
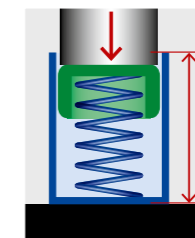
## Stamping/Forming

- Stamping and forming with detection of part height and relative forming.



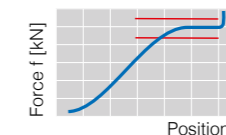
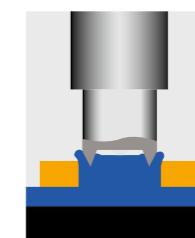
## Surface Checks

- Logging of force-distance data for multiple switch points.



## Testing/Measuring

- Logging of force-distance data for multiple positions.

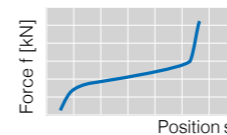
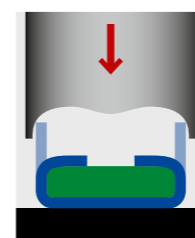


## Press-fitting

- Press-fitting with controlled force for relative displacement.

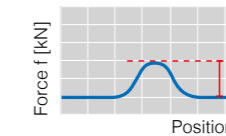
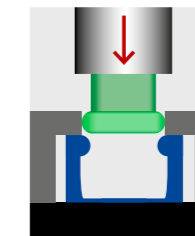
## Bending

- Monitored bending of straps, brackets etc. on safety components.



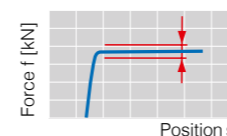
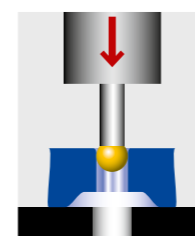
## Clipping

- Joining of plastic and medtech parts with monitoring of snapping force.



## Calibrating

- Calibration with quality assurance through monitored force.





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