SCHMIDT® PressControl
Machine control units

SCHMIDT® PressControl 70, 500 A, **3000** and **5000** are control units of the latest generation, which allow the design of modern production processes - from the single workstation to complete automation. You benefit from our competence in:

- Safety technology – type-approved devices
- Process measurement technology – simultaneous measuring during the process
- Process documentation

SCHMIDT® PressControl control units have the following features

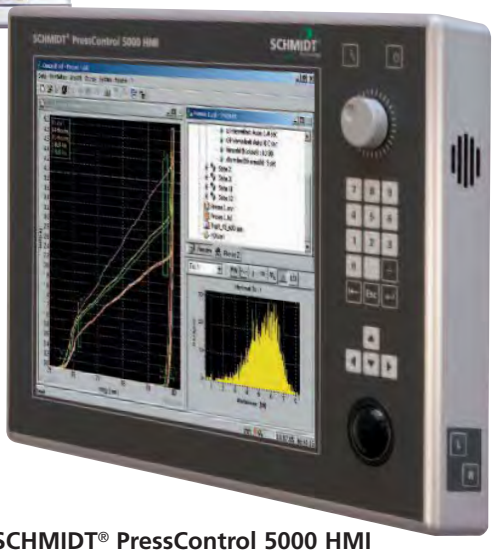
- Efficiency due to intuitive user interfaces
- Quick and secure process set-up e. g. thanks to the touch screen with **SCHMIDT® PressControl 3000** and additional hand wheel ram control function with **SCHMIDT® PressControl 5000**.
- The integrated PLC allows programming of additional inputs/outputs or sensors/actuators and the application-specific design of the workstation or the line.
- The integrated measurement technology is insensitive against interferences (EMI). This results in a high measurement security of the entire system.
- With integrated safety technology, the entire system becomes a type-approved single workstation.
- Service functions such as "Firmware Update" ensure the user has the up-to-date version of the software
- Guaranteed complete process documentation with full traceability

SCHMIDT® PressControl 70

SCHMIDT® PressControl 500 A

SCHMIDT® PressControl 5000 RT

SCHMIDT® PressControl 3000



SCHMIDT® PressControl 5000 HMI

SCHMIDT® PressControl 70and Safety Module

Compact Control Unit for pneumatic and hydropneumatic presses

With the new modular control conception of **SCHMIDT Technology**, control and safety technology are separate. The new control unit **SCHMIDT® PressControl 70** for the pneumatic and hydropneumatic **SCHMIDT® Presses** is very compact and multifunctional. The result is a flexible control that can accommodate a range of requirements, mountable anywhere via the optional magnet holder or mounting screws.

A manual work place with two-hand release or light curtain can be realized in conjunction with the **SCHMIDT® SafetyModule** with EC-type-approved safety technology. The CAN-fieldbus connects the **SCHMIDT® PressControl 70** with the SafetyModule.
This control is easy to operate via 3 keypads and 5-digit, 7-segments-display. The display informs about selected operating mode, fault condition and press status. A key switch is used to select production or setup mode. Therefore, the control setup is secure and tamper-proof without the key switch.
The following modes of operation and functions are directly selectable:

- Two-hand release
- Light curtain
- Part present verification / Poka Yoke
- Slide table, enable / disable
- Dwell timer
- Return stroke initiation with external signal
- Batch counter
- Setup mode
- Operation without SafetyModule (un-manned, fully guarded stations including the necessary safety provisions, typically as part of an automated cell)

Accessory magnet holder, optional mountable on the side or behind

Technical Data

Supply Voltage:	24 V DC
Current:	< 3 A
Operating Temperature:	0 – 40 °C
Protection Class:	IP 54 / NEMA 12
Interfaces:	CANopen for SafetyModule
I/O:	4 digital in- and outputs
Electrical Connections:	via quick disconnects
Display:	- LED: 7-segments with 5 digits - LED for stroke takeover to stroke initiation
Key Switch:	Configuaration and setup
Operation:	3 function keys
Modes of Operation:	- Two-hand release with SafetyModule - Light curtain with SafetyModule - Part present verification / Poka Yoke - Slide table operation, pneumatic - Return stroke initiation with external signal
Operating Features:	- Dwell timer - Batch counter - Setup mode
Dimensions:	90 x 120 x 60 mm / 3.5 x 4.7 x 2.3" (h x w x d)
Mounting:	fastening screws, optional magnet holder

Control unit SCHMIDT® PressControl 500 A

Control Options

The control **SCHMIDT® PressControl 500 A** is ideal for either two-hand release or integration into automated assembly system with automatic transfer of press specific control and setup features. As a supplement to option A, the user has access to 12 free digital inputs and 9 outputs. Optionally up to two bus coupler can be used via fieldbus RS 485, with up to 200 digital and analog I/O's per coupler as well as connection to CAN fieldbus.

SCHMIDT® Press systems with the **SCHMIDT® PressControl 500 A** safety control have passed EC type examinations and are therefore fully compliant with EMI regulations. Self-tests, plain text system messages and data buffering in power failures make this system highly reliable. The PLC program, which controls the entire working sequence, operates in a single-channel control environment.

Process computer with customer specific programmable PLC. The programming takes place via an instruction list without the need for external programming devices. The user can freely program the PLC using the **SCHMIDT® SPSys** PLC editor (included in the delivery). The user can therefore create a simple interface in order to communicate with another higher-level control device (Integration into Automated Assembly Systems). Furthermore user-specific functions can be integrated into the production process (i.e. slide tables, rotary index tables, automation tasks). The process computer has 12 inputs and 9 outputs, which are individually programmable for such functions.

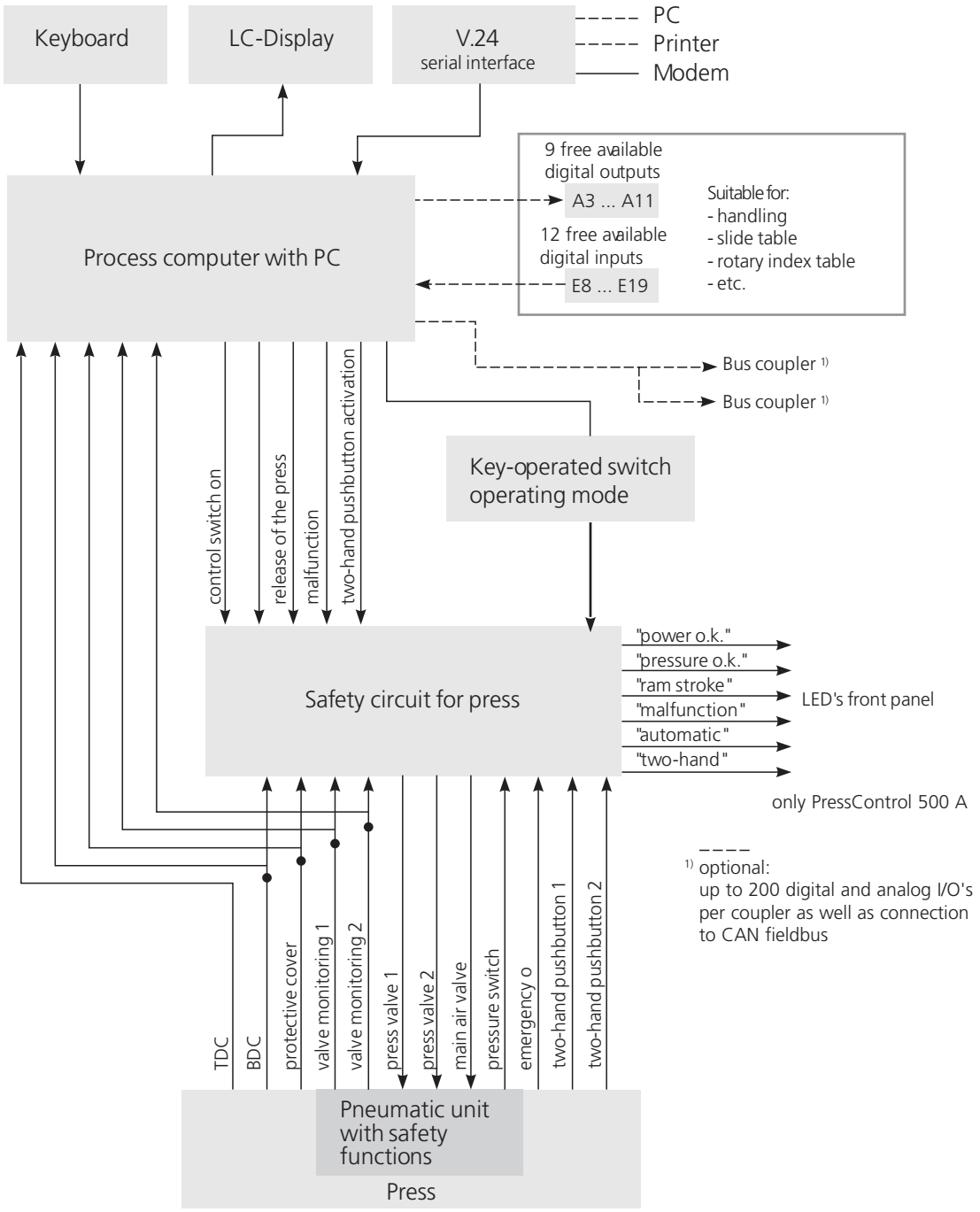
Features:

- Process computer with SPS
- two-hand push buttons for two-hand release
- emergency-off circuit
- electronic press control:
  - LCD for the indication of operator prompting texts, system messages and analyses
  - Keypad for the input of application specific data (numeric keypad, cursorkeys and function softkeys)
  - safety circuit
  - optionally, a safety switch for the monitoring of the safety guarding during automatic operation

Technical data

Main supply	230V~ / 110 V~
Control voltage	24 V DC
Interface	RS 232 (V.24)
LCD	64 x 240 pixels, 8 lines à 40 columms
Operation	5 function keys in 9 function levels, cursor and numerical keypad
Key-operated switch	Two-hand release, continuous operation
LED's for the system status	Main supply, operating pressure, stroke control, errror

SCHMIDT® PressControl 500
System architecture



The **SCHMIDT® PressControl 500** system works as follows:

- The **SCHMIDT® Pneumatic-** or **Hydro-PneumaticPress** is activated by a two-channel, cyclically monitored safety circuit, that means that the switching elements (relays, switches, valves) are monitored once per working cycle. If a malfunction occurs, the system is switched off and a corresponding error message is displayed on the LCD.
- Additional functions for which a two-channel activation is not necessary, are activated by one channel (slide tables, automation tasks etc.). This one channel activation is carried out by the process computer which handles the entire work cell.
- Control of the pressing process via PLC program, in case of PressControl 500 with a PLC programmable by customer.

Control unit SCHMIDT® PressControl 3000

The press control unit **SCHMIDT® PressControl 3000** is a compact control unit that combines the PLC functionality and the integrated process monitoring technology.

Features:
- Integrated force/stroke monitoring[1)]
- Built-in PLC for individual process design
- Quality evaluation based on window and stroke tolerances, and thus provide detection of "failed" parts
- User-friendly, intuitive menu guidance
- Quick data transfer via USB
- Electromagnetic compatibility (EMC)

This results in economic production due to increased efficiency and cost reduction by avoiding rejected parts.

Avoid verifying costs because of continuous and realtime process monitoring.

SCHMIDT® PressControl 3000 consists of a robust industry housing with touch screen display. Buttons for Emergency stop and ON/OFF switching are provided. The control unit is operated via function and cursor keys and a number pad.

The following functions can be selected directly on the user interface:

Data set management
Management of up to 20 data sets (loading, storing, renaming).

System configuration
Storage of control-specific or press-specific parameters and administration of access rights.

Graphic mode[1)]
Allows the visualization of the process. QA monitors (8 window / 4 stroke tolerances) can be defined freely, either graphically via the touch screen or numerically for each data set. Single curve areas can be displayed with high resolution using the zoom function. Switching between force/stroke **[F/s]**, force/time **[F/t]** and stroke/time **[s/t]** is possible for process optimization.

Data input
Entry of the working modes (force/stroke/set-up mode) and the process variables.

Data output
Status information for the user as text output: e. g. Pass/Fail, max. stroke/force reached as well as number of pieces and error acknowledgement.

[1)] The graphic mode is deactivated for systems without force/stroke monitoring

The **SCHMIDT® PressControl 3000** is designed as a standalone solution. Extended functions are provided with the software programs **SCHMIDT® ControlTool** and **SCHMIDT® SPC**.

USB connection
10 [Mbit/s]

Technical data

Process monitoring	8 force/stroke windows, 4 stroke tolerances
Scanning rate	2000 Hz
Graphical resolution	240 x 128 pixel
Display	Force/stroke, force/time, stroke/time
Operation	Touch panel, On/Off, Emergency stop
Interface	USB, CAN
Flow chart	Fully functional PLC with 8 inputs and 4 outputs
Data sets	20
EMC	Acc. to requirements of EMC law
Main supply	100 – 230 V
Supply voltage	24 V DC
System backup	Buffer battery
Ambient temperature	0 – 40 °C / 32 – 104 °F
Weight	7.5 kg / 17 lbs.
Dimensions (W x H x D)	283 x 312 x 71 mm / 11.14 x 12.28 x 2.79"
Protection class	IP 54

SCHMIDT® PressControl 3000
System architecture

Using the software **SCHMIDT® ControlTool**, up to 32 **SCHMIDT® PressControl 3000** control units can be linked with a PC. Six systems can be operated simultaneously.

Features:

- Data interfacing via USB (10 Mbit/s) allows for the quick transfer of high-resolution curves, also with short cycle times.
- Different press types, manual workstations and automated machines can be connected in a network.
- All production data, such as curves and data sets, are centrally stored on a PC (Statistical Process control [SPC] is optionally available).
- Short changeover times because data sets can be prepared offline.
- Parameter change is possible during the running process (hot keys).

Up to 6 systems can be operated simultaneously with one PC

USB

USB hub

SCHMIDT® ManualPress

Manual workstations

I/O processing

I/O processing

SCHMIDT® Pneumatic and **HydroPneumaticPress**

Manual workstations with SafetyModule

- redundant electronic safety circuit (cat. 4)
- wear-free, no mechanical relays
- long life
- suited for two hand safety switches or light curtain operation.

USB hub

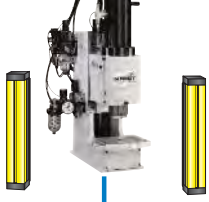
Two-hand release

Safety technology, category 4

CAN

I/O processing

Light curtain



Safety technology, category 4

CAN

I/O processing

SCHMIDT® Pneumatic and **HydroPneumaticPress**

Automation

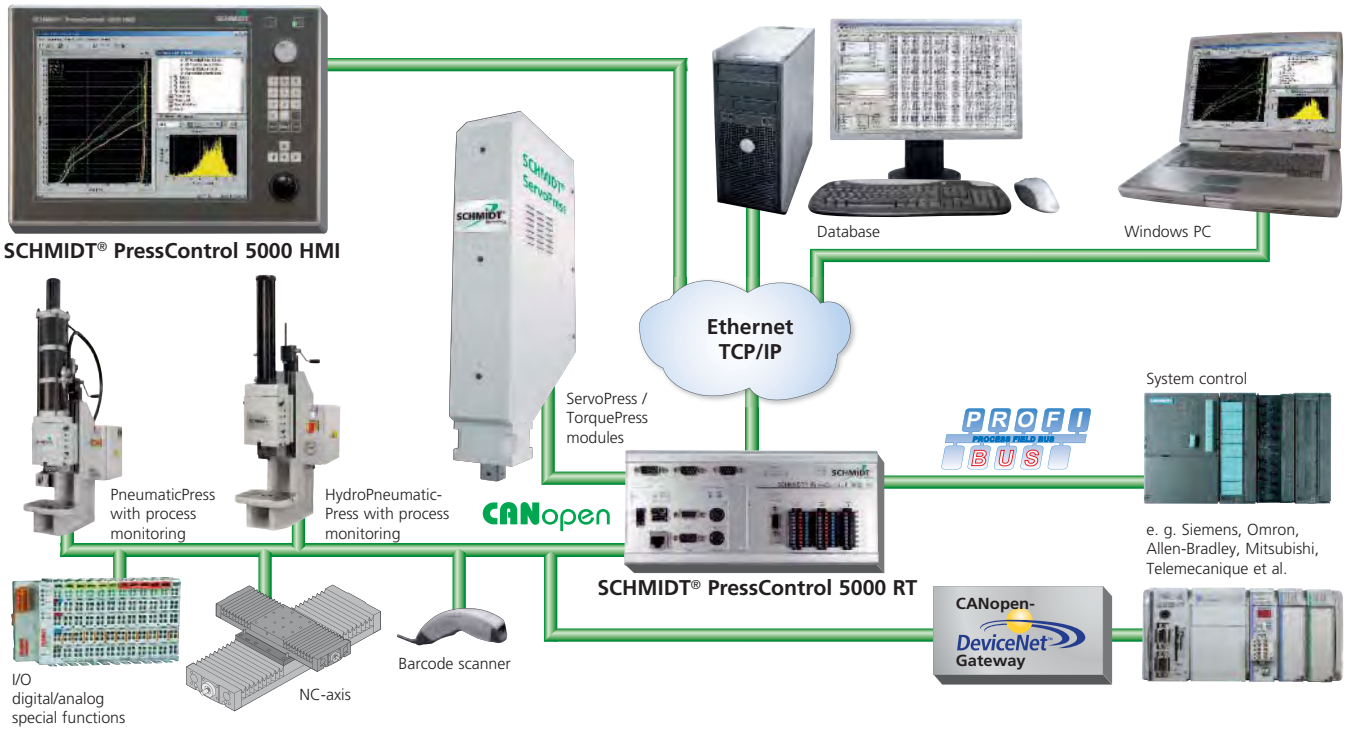
I/O processing

SCHMIDT® PressControl 5000
System architecture

SCHMIDT® PressControl 5000 does work as a system control and takes over the process monitoring. The hard- and software components forming a system concept with real time characteristics. This is guaranteed by a system architecture with CANopen field bus. The **SCHMIDT® ServoPress / TorquePress** modules or other NC axis are controlled and recorded by this field bus and process data as well as I/O data will be exchanged. Furthermore, it is possible to connect any **SCHMIDT® PneumaticPress** and **HydroPneumaticPress** to the safety technology provided by **SCHMIDT® SafetyModule** via CANopen.

The communication with other systems can be realized via:

- CANopen (**SCHMIDT® PressControl 5000 RT** is master)
- Profibus (**SCHMIDT® PressControl 5000 RT** is DP slave)
- DeviceNet (optional via external CANopen/DeviceNet-Gateway)
- Ethernet (OPC server)



SCHMIDT® PressControl 5000
Compact System Control for intelligent Process Control

SCHMIDT® PressControl 5000 for **SCHMIDT® ServoPress** is a compact, integratable system control with modular design for the operation of standardized individual workplaces up to complex, highly flexible automation lines with integrated joining modules. The realization and extension of assembly lines is considerably simplified by using **SCHMIDT® PressControl 5000** in conjunction with **SCHMIDT® ServoPress** modules.
With this control it is also possible to integrate **SCHMIDT® PneumaticPress** as well as **SCHMIDT® HydroPneumaticPress** with **SCHMIDT® SafetyModule** into the system concept via CANopen. Furthermore additional automated operations and tasks can be realized with **SCHMIDT® PressControl 5000**, in addition to controlling presses.

Control Unit SCHMIDT® PressControl 5000 RT

All system elements and data involved in the process are centrally controlled and administrated by the control unit **SCHMIDT® PressControl 5000 RT**. The integrated Profibus DP interface permits integration of the press system as an intelligent Profibus slave into existing Profibus networks.
Parametrization, operation and programming will be effected by using software components which are installed on the operating panel **SCHMIDT® PressControl 5000 HMI** or on a user PC. The standard system configuration already includes a basic programming for different operating profiles; special applications can be additionally programmed.

Features:
- Modular and can be networked
- Space-saving integratable in the switch cabinet
- Processing of all process data in real time
- Reliable production without further peripheral equipment
- Open communication with the peripherals:
  - CANopen
  - Profibus DP
  - DeviceNet (optionally via external gateway)
  - Ethernet, optionally WLAN
- Communication with other systems:
  - Master SPS
  - ERP
  - CAQ / statistic system
- Control up to 6 **SCHMIDT® ServoPress** modules or NC axis and capability of connecting **SCHMIDT® PneumaticPress** as well as **SCHMIDT® HydroPneumaticPress** with **SCHMIDT® SafetyModule** via CANopen
- Multi-functional process control for an individual design of process. PLC, process data acquisition and CNC is in permanent dialog in real time.
- Integration of more than 2000 I/O's
- Integrated process data acquisition and process monitoring
- Connection to database server via Ethernet
- Permanent use of the operating panel **SCHMIDT® PressControl 5000 HMI** or temporary use of standard PC's (e.g. laptop) for parametrization, service, diagnosis during start-up and troubleshooting, as well as for process analyses and -optimizations (snap-shots or statistical parameters of the ongoing production).

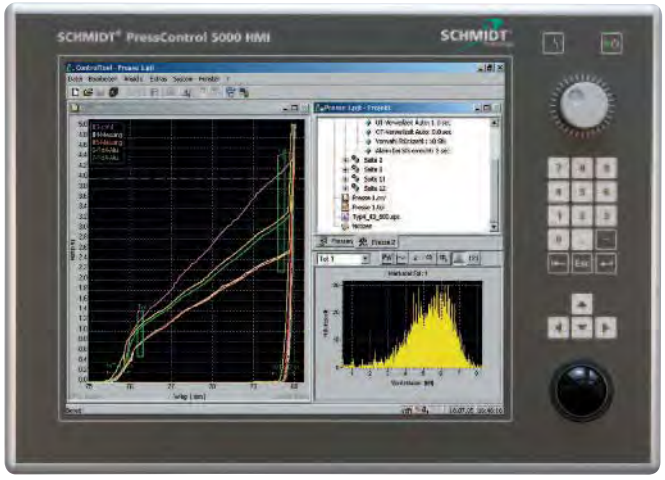
Technical Data

Industry PC with	- integrated PLC - integrated CNC with all-digital drive control (integrated force-, position- and speed control loop) for up to 6 axis - intelligent process control - diagnosis and service functions - Linux operating system - assembly on DIN rail (TS 35) according to EN 50022 (35 mm x 7.5 mm)
Drive	integrated hard disk 30 GB
Field bus	CANopen with possibility to connect: - up to 6 **SCHMIDT® ServoPress** modules or NC axis and **SCHMIDT® PneumaticPress** as well as **SCHMIDT® HydroPneumaticPress** with **SCHMIDT® SafetyModule** - more than 2000 I/O's Profibus DP: - Profibus DP Slave interface - 16 Byte input data - 16 Byte output data DeviceNet (optionally via external CANopen/DeviceNet Gateway) Ethernet, optionally WLAN
Interfaces	- Ethernet (10/100 MBit) - 2 x USB - 2 x RS 232 (COM1/COM2) for diagnosis purposes - PS/2 keyboard, PS/2 mouse, VGA for diagnosis purposes - 4 digital inputs (24 V) galvanically isolated - 4 digital outputs (24 V) galvanically isolated
EMC	acc. to requirements of EMC law
Power supply	24 V DC with integrated UPS
Ambient temperature	32–104° F

Operator Panel SCHMIDT® PressControl 5000 HMI

SCHMIDT® PressControl 5000 RT can be parametrized and operated via operator panel **SCHMIDT® PressControl 5000 HMI** with its complete operating interface. Furthermore visualization, administration and documentation of process data (dataset management) can be effected as well by this instrument.

Features:
- Industrial PC with Microsoft Windows XP™
- High-resolution process visualization by 19" TFT display for depiction of several processes
- Individual design of user interface, e.g. in conjunction with other system components
- Direct access to the process image
- User-friendly, intuitive menu navigation by touchscreen
- Operating modes:
  - Set-up mode via integrated, high-resolution hand-wheel function (mechanical)
  - Cycle mode by function key
- Integrated handwheel (for set-up mode): Switchable to any CNC axis with selectable resolution in order to simplify set-up of an operation. Press ram can be brought exactly to the required position or force by this handwheel.
- Keypad with integrated membrane for the input of numerical values and choice of functions
- Softkeys have different functions on different levels and simplify the handling
- Track ball takes over "mouse"-function and is also usable in rough working environment
- Industrial strength, even in harsh surroundings
- Protection class IP 54



Technical Data

Operating panel with	- intuitive user interface - diagnosis and service functions - Microsoft Windows XP™ operating system
Screen	integrated 19" TFT display (SXGA resolution) with touchscreen
Drive	integrated hard disk 80 GB
Interfaces	1x PS/2 keyboard 1x VGA 3x USB 1x RS232 2x Ethernet (10/100 MBit)
EMC	acc. to requirements of EMC law
Power supply	24 V DC
Current consumption	2 A
Ambient temperature	32 – 104° F
Protection class	IP 54
Weight	33 lbs

Software Components for SCHMIDT® PressControl 5000

Parametrization, operation and programming of the **SCHMIDT® PressControl 5000 RT** will be effected by using software components.
Moreover these software components are supporting project set-up, project visualization and data archiving. They are also intended for analysis and diagnosis under Microsoft Windows 2000 / XP / Vista™.
The software components can be installed on the operating panel **SCHMIDT® PressControl 5000 HMI** or on a conventional Windows PC. The communication with the control unit is realized by Ethernet TCP/IP.

SCHMIDT® PRC Studio
- PLC-Editor
- CNC-Editor
- Debugger
- Project set-up

SCHMIDT® PRC HMI
- Process visualization
- Dataset management
- User guidance
- Quality evaluation on the basis of force/stroke windows and stroke tolerances, and thus a reliable detection of NIO parts.
- Function keys

SCHMIDT® OPC
OPC server

SCHMIDT® DB-Client
for database access

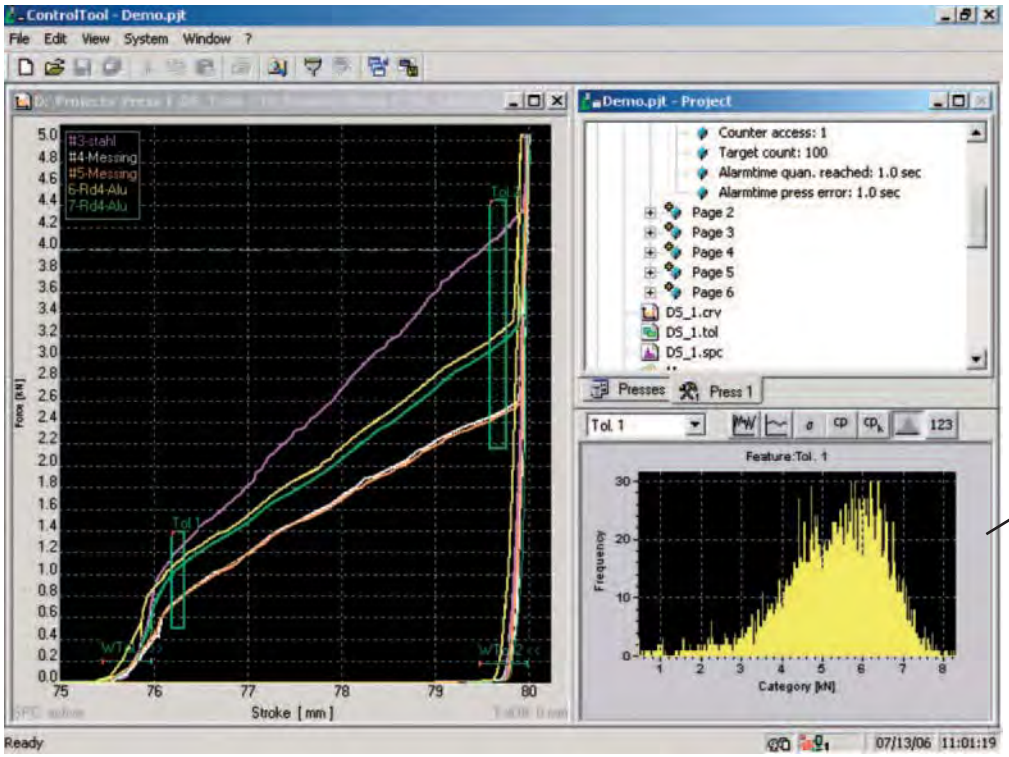
User interface for professional assembly
for PressControl 3000 and 5000

SCHMIDT® ControlTool is the platform of the **SCHMIDT® PressControl 5000** and is available optionally with **SCHMIDT® PressControl 3000** in combination with a PC. The functionality of **ControlTool** has been developed especially for assembly operations with direct intervention in the process.

SCHMIDT® ControlTool is a program with "Look and Feel" of Microsoft Windows™.

The following functions are available in ControlTool:
- Process visualization
- Process data management
- Development tool (PLC editor)
- Statistical Process Control (SPC), optional

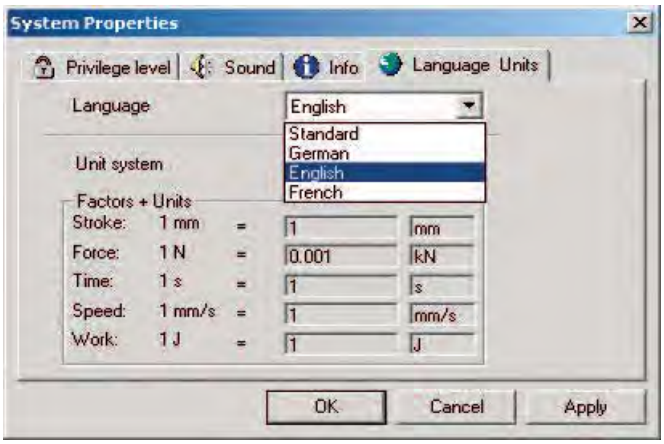
Features:
- Easy and quick setup of the processes
- Definition of the data sets and operating profiles by parameters
- Process optimization due to switchover of the process display (**F/s**, **F/t**, **s/t**)
- Easy and quick definition and evaluation of the processes using the quality monitor
- Guaranteed detection of "failed" parts
- Unambiguous documentation and component assignment
- Software PLC for freely programming processes
- Service functions for diagnosis and system updates



SCHMIDT® SPC optional for PressControl 3000

SCHMIDT® ControlTool functions

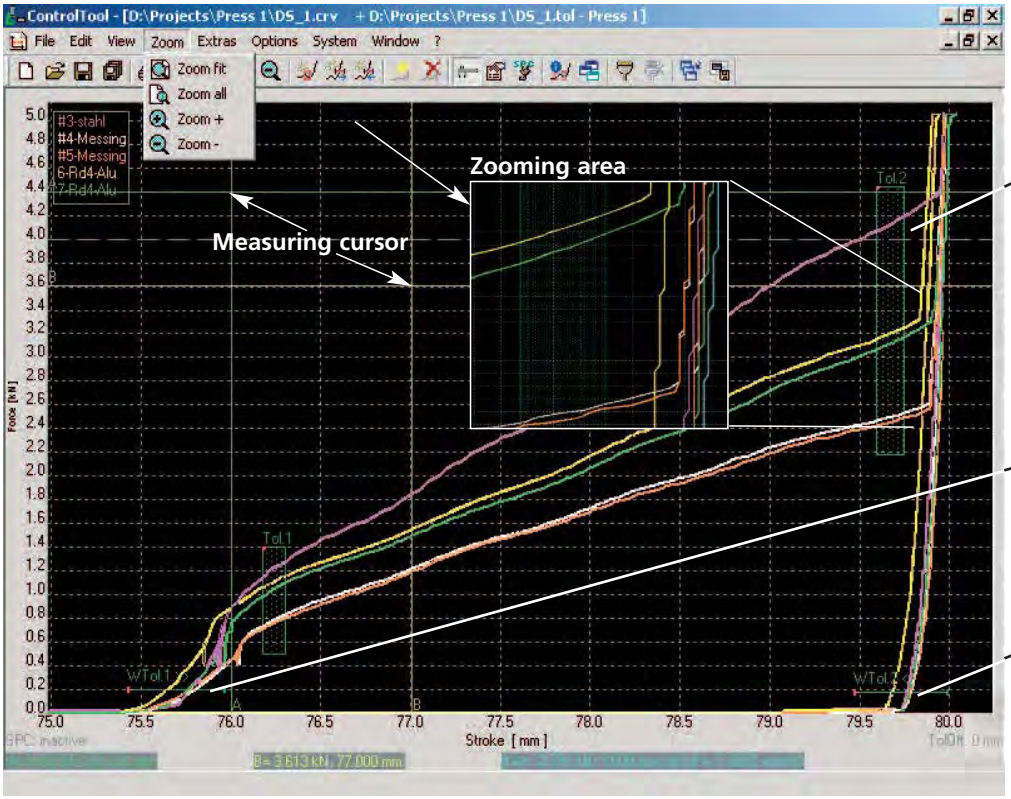
Software functions are enabled or disabled depending on the access rights.



The language of the software user interface can be set to German, English or French.

Visualization and analysis
for PressControl 3000 and 5000

Visualized display
Force output and press stroke are important parameters for evaluating the quality of pressed assemblies. The data of these measurements are recorded during the process and displayed by the software as **force/stroke behavior curve F/s**, **F/t** or **s/t**. Freely definable tolerances the form of **force/stroke windows** and **stroke tolerances** are provided for quality assurance of the assembly process. Using the software **SCHMIDT® ControlTool**, up to 8 force/stroke windows and 4 stroke tolerances can be defined. With the help of these criteria, quality-critical areas can be monitored selectively. If the tolerances in the monitored curve areas are not met, application-specific interventions can be carried out (e. g. selection measures). Using the software **SCHMIDT® ControlTool**, it is easy to create tolerance criteria and to display curve behaviors exactly. For an evaluation of the behavior, the **working stroke** and the **return stroke** are important. The high resolution of our measurement systems allows a large number of measuring points that are required for a process-safe evaluation. Zoom and measuring functions are integrated into the software allowing detailed documentation about the assembly processes.

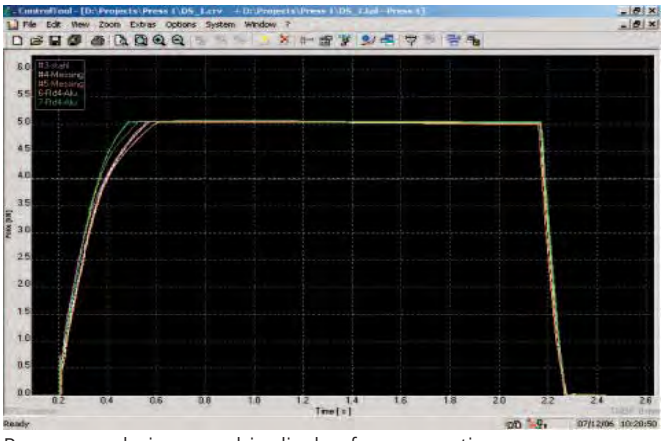


The curve must pass the window from left to right.

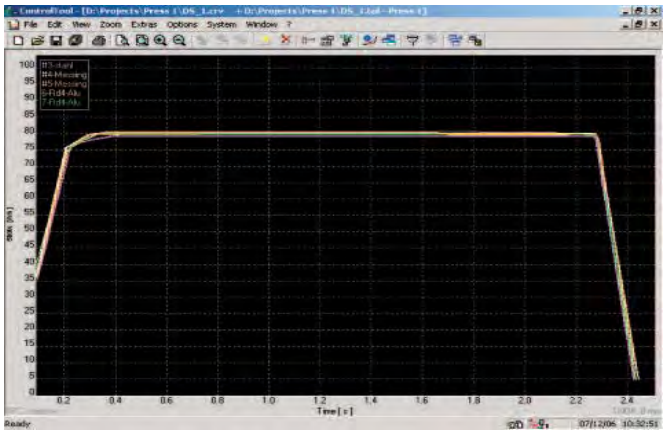
Stroke tolerance in working stroke

Stroke tolerance in return stroke

Process analysis – graphic display force over stroke



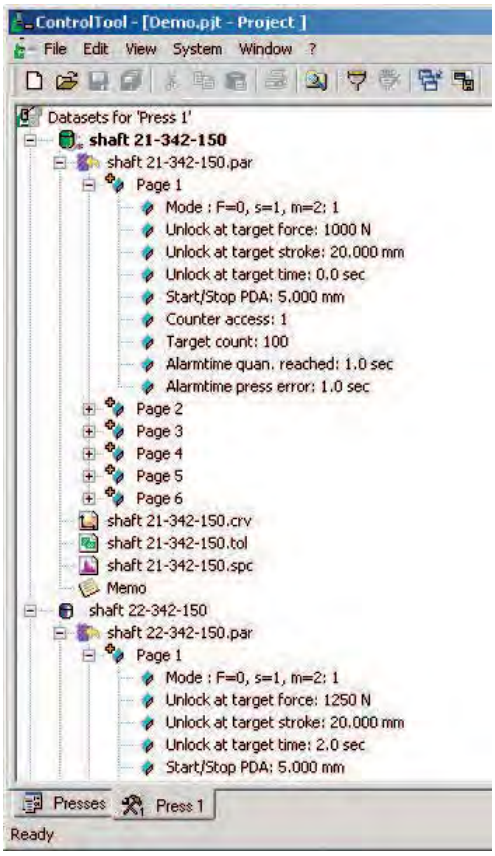
Process analysis – graphic display force over time



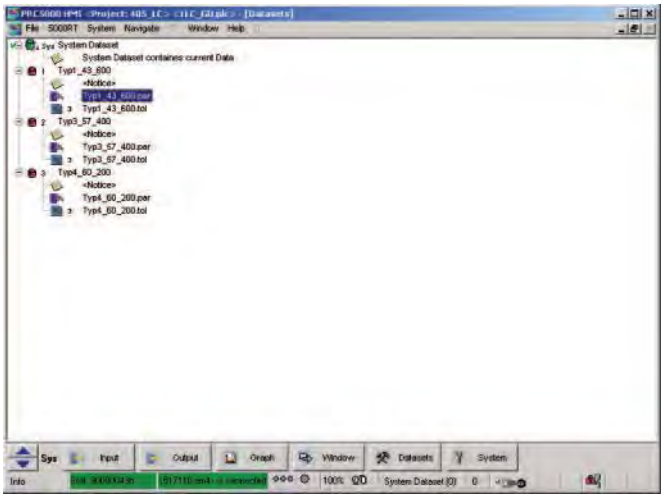
Process analysis – graphic display stroke over time

Process data management
for PressControl 3000 and 5000

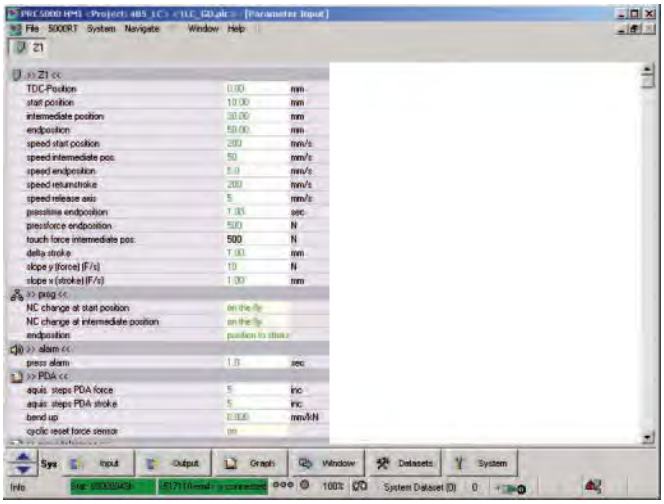
Press, quality and SPC parameters as well as system settings are menu-guided, extended and modified. This does not require programming knowledge. The parameters are defined within the data sets under customer defined identifications. Setting up additional data sets are simple via a menu driven wizard. Loading of a different data set can occur manually or via external, automated input.



SCHMIDT® PressControl 3000



SCHMIDT® PressControl 5000

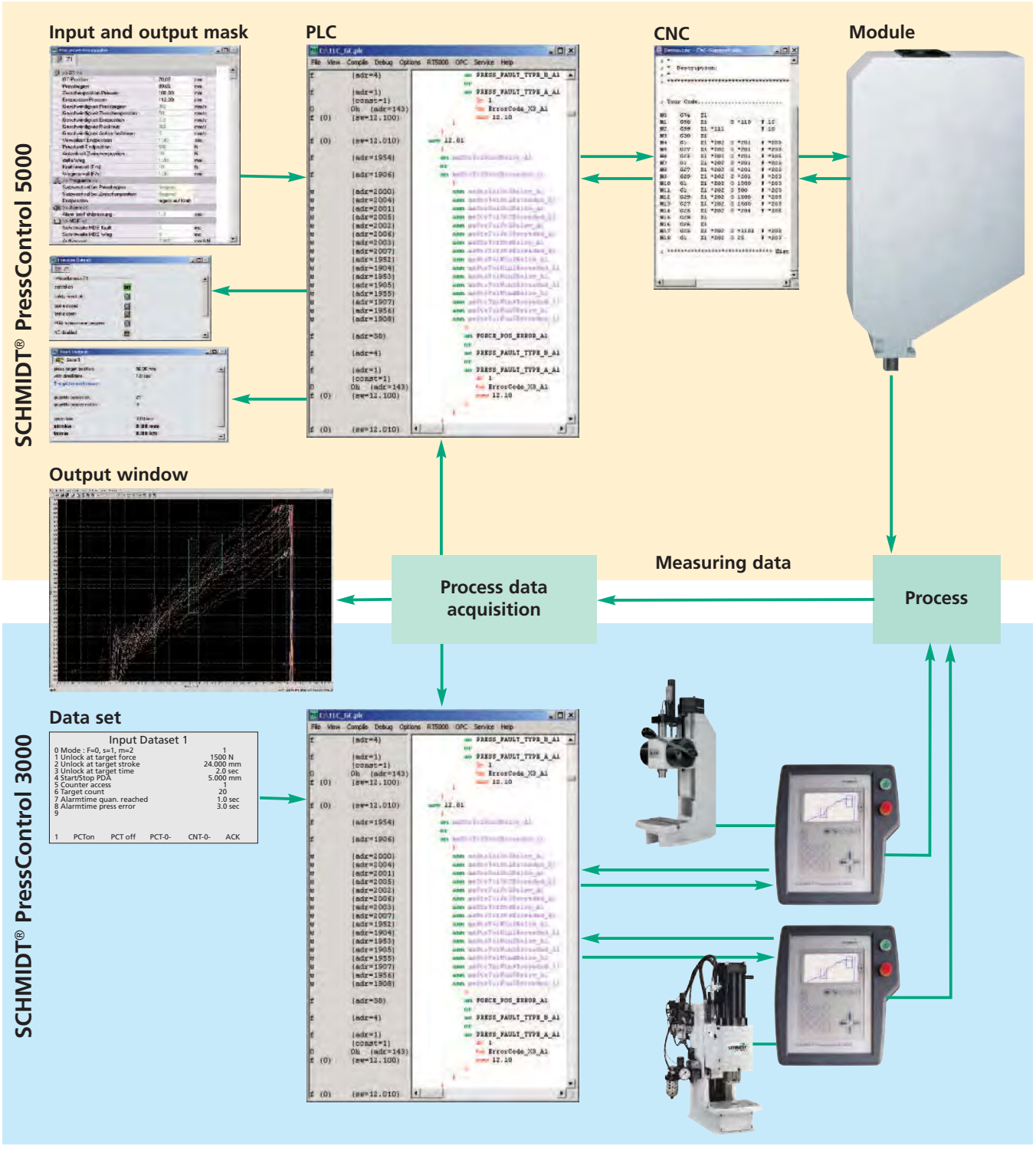


Entry of the parameters via dialog fields

Software architecture
for PressControl 3000 and 5000

The function of the **SCHMIDT presses** is based to a large extent on the control architecture. The combination of process entries, PLC, CNC and process data acquisition is the key to solving highly complex joining tasks precisely and efficiently. The force and stroke measuring systems with integrated signal amplification used in all monitoring based press systems by **SCHMIDT Technology** are evaluated in high resolution by the process data acquisition and transferred as ACTUAL values to the PLC for graphic or numeric output.

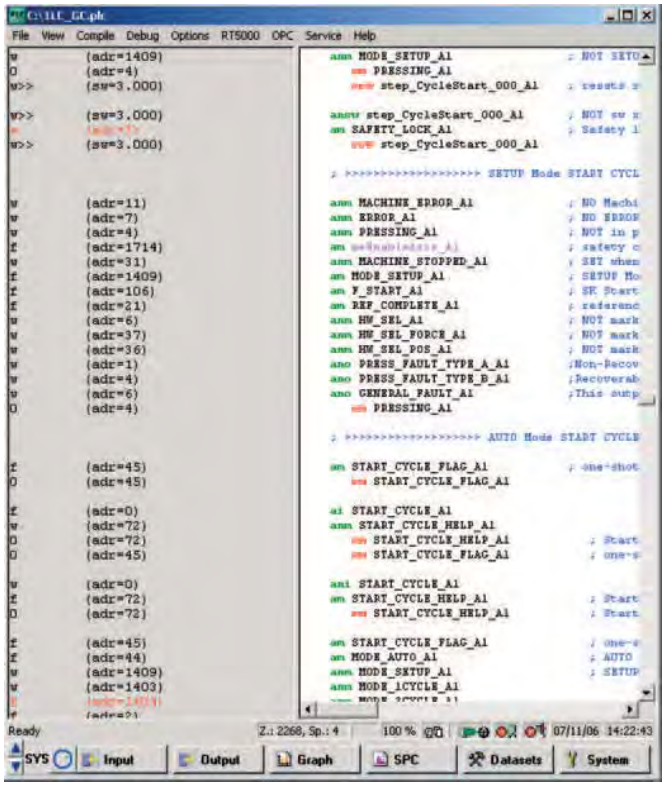
The excellent control behavior of **SCHMIDT® PressControl 5000** is a direct result of the quick, bidirectional communication between PLC, CNC and drive of the servo axis.



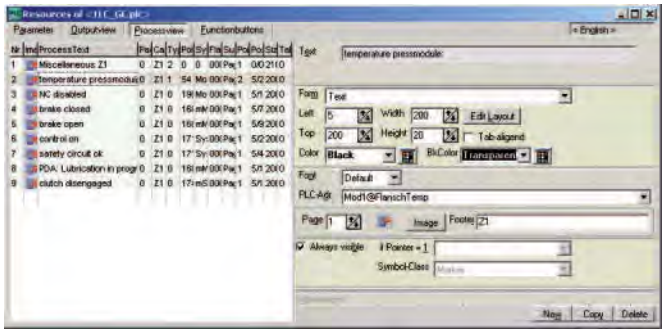
Software development tools
for PressControl 3000 and 5000

PLC process control
The PLC processes signals or values. Apart from this basic function provided with standard PLC systems, our control also carries out a large number of tasks and decisions that influence the process.

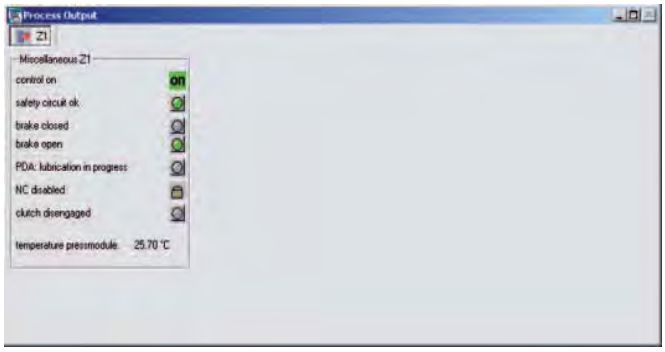
Features of the PLC editor:
- Easy troubleshooting due to cyclical and static debugger
- Easy overview due to separate debug window
- Commonly used operands (inputs/outputs, words, flags, etc.) are listed
- Useful search function
- Function-oriented programming



Resources editor
A resources editor is provided as programming interface, which supports the easy and structured creation of instruction sets. The description of the operands by user-defined symbols facilitates an easy overview. In addition, many pre-defined functions simplify programming.



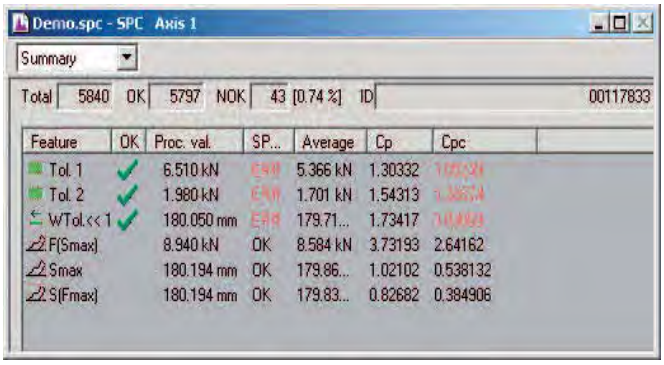
Unlimited design of the user interface
- Process output window, clear and unambiguous interface for the user with dynamic and static text and graphic display
- Clear instructions for the user to intervene in the process, e. g. by pressing a function key
- Unrestricted definition and labeling of function keys
- Individually designable text output (e. g. as supplement to the process output for the administrator) and parameter entry



SCHMIDT® SPC

Statistical Process Control for PressControl 3000 and 5000

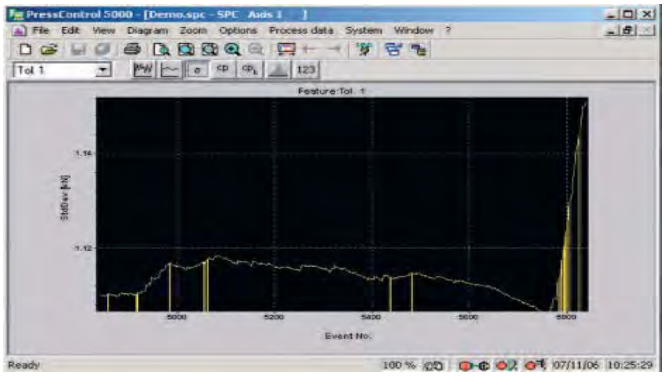
The software package **SCHMIDT® SPC** is used for determining the process capability. The program calculates the statistical parameters from the process and tolerance data. The characteristics of all quality criteria are calculated online after each assembly process, and the calculation is available for documentation. Contrary to conventional systems, the user is constantly informed about the course of the assembly and the process quality.
User-defined upper and lower warning and intervention limits inform the process control when exceeding or falling below these limits about which application-specific measures can be taken.



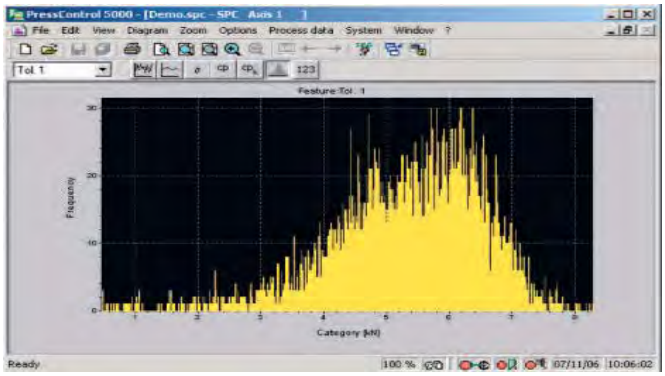
In the overview display, you see all necessary information from the process, such as characteristics (monitors), information pass/fail, current measuring value, SPC status, average value, Cp and Cpk value, at a glance.

Each single process can be reconstructed using the production backtrack.

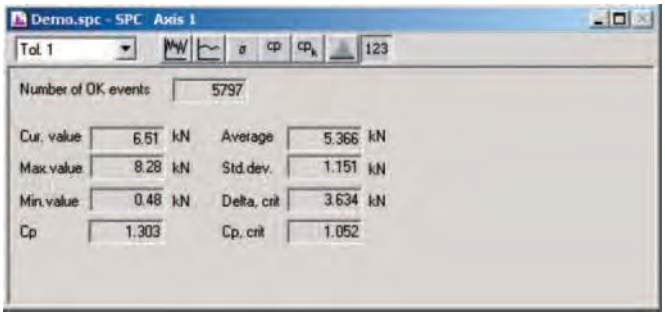
Considering the individual characteristics, additional important values are displayed graphically and numerically.



Standard deviation

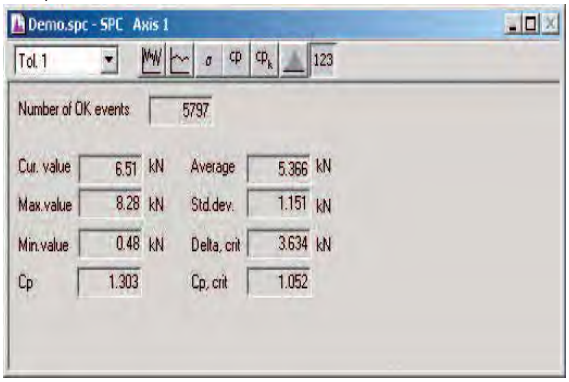


Histogram



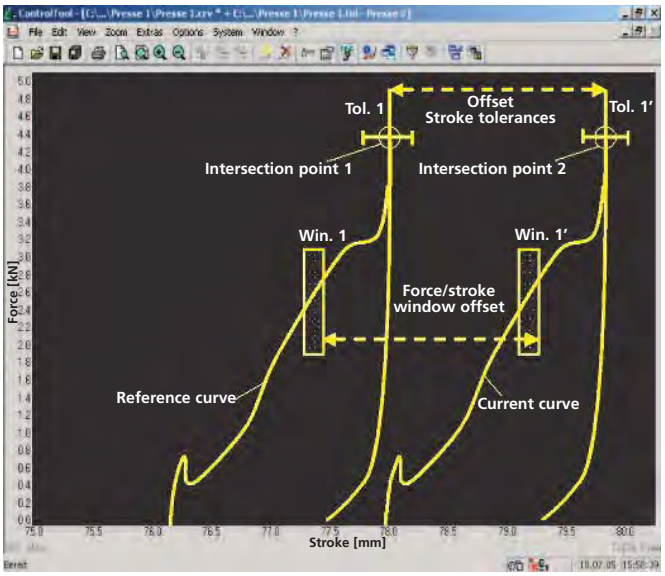
Numerical values

Apart from the system-related monitors, other process-relevant information can be prepared statistically, such as the work integral (area under the **F/s** curve) or external measuring data (e.g. temperature).



SCHMIDT® MoveTol

Patented offset of tolerance, data software for PressControl 3000 and 5000



Offset of tolerance data in relation to freely selectable reference

Individual components are subject to manufacturing tolerances and once assembled, stack up height differences still constitute good assemblies. Due to such variation, an assembly may be failed by the customer defined monitoring criteria.

Using the function "Offset of tolerance data", the height variation of parts can be taken into account. The defined tolerance windows and stroke tolerances are offset by the distance of a reference position. After that, the pass / fail evaluation is carried out.

SCHMIDT® Interface software

The communication with coordinated control system is realized via a standardized interface program with **SCHMIDT® PressControl.**

All relevant system states as well as "failed" productions are transferred from one control to another via a simple signal transfer.

The production data stored in data sets are recallable via the SPS program. If e. g. tools are equipped with an explicit identification code, the production data automatically adapt themselves to the specific process.

All standard physical interfaces, such as

- I/O interface
- CANopen
- PROFIBUS
- DeviceNet (via CANopen-DeviceNet-Gateway)

can be used for data exchange in an automated environment.

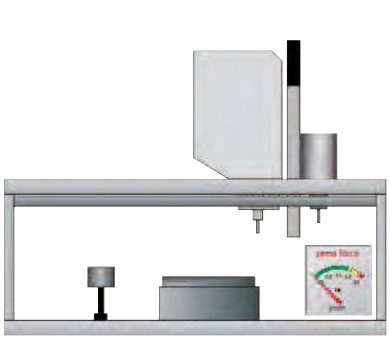
SCHMIDT® PRC OPC

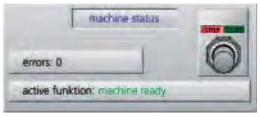
Data exchange via the de facto automation standard

In the field of automation, the data communication, using co-ordinated systems and the reference level, is becoming increasingly important. OPC defines a manufacturer-independent interface.
All parties participating in the communication must only support this interface. The OPC-capable components can be combined just like elements of a construction kit.

Example: Process visualization
OPC connects all production machines (with industry PC-based control [IPC]) of a production area to a process visualization. This achieves impressive outcomes:

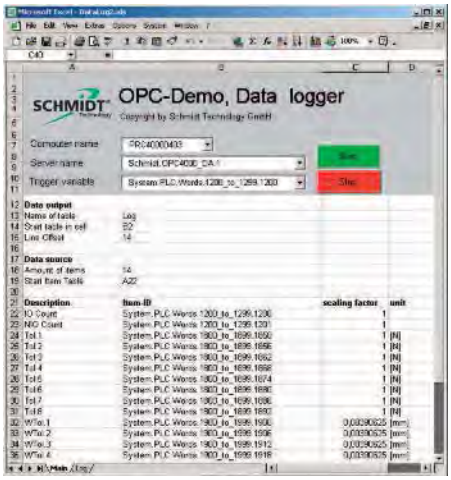
- Centralization of fault and operating messages
- Unique message system for all machines
- Individual user interface design

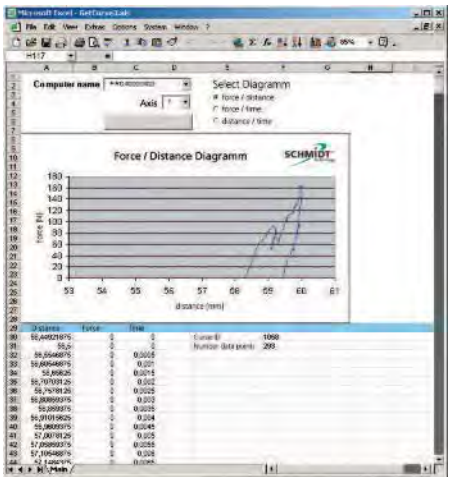




OPC
OLE for Process Control

Example: Process data evaluation by means of MS Office application
With OPC, a direct transfer of production-specific data to MS Office applications, such as Microsoft Excel™ or Microsoft Access™, is possible.





Example:
Linked production line
The following possibilities result from the central control of a production line:

- Central operation of the entire production line
- Integration of all production machines in overall transport systems (lifting bars, conveyors, etc.)
- Transfer of all relevant data, such as workpiece type, processing state, etc., from one machine to another
- Production results influence the process of the following machine
- Measurement results correct tool wear of preceding machines