Automation and Robotics.

Modular systems for the highest productivity!
Merkle Automation and Robotics.
From modular components to highly productive Robotic-systems!

Merkle solutions for automation and robotics are as varied and flexible as the differing requirements for the welding tasks involved in small, medium and mass production. Merkle has offered modular systems for over 40 years as an answer to the automation of welding processes. From the outset we have strived to offer highly efficient, and at the same time, economical solutions for all types and sizes of production organisations.

Thus we have developed a modular system, which covers each desired degree of automation perfectly.

The basis of each Merkle system is always a high performance power source, which is based on our total experience resulting from over 45 years’ know-how in welding engineering and production. Our customers are enterprises in the most demanding industries including automotive, aerospace, pipe construction, machine construction and many more.

We always supply perfect, customized solutions, from individual components, to complete automated welding systems. Merkle automation solutions are simple to use, are of the highest quality, and can be systematically expanded in all levels to meet the demands of todays and tomorrows production demands.

For today’s welding process demands in mass production, there is no way of ignoring the possibility of automation with robots. Merkle offers high performance welding power sources, high precision welding torches, extremely reliable peripheral components, highly intelligent software, right up to the possibility to interface with every well-known robot on the market, giving you the perfect automated welding solution packet.

Whether MIG/MAG and PulseARC, TIG or plasma, for every welding process, our systems will enable your next quantum leap in productivity.

Speak with our specialists
Welcome to the Merkle World of Welding!
Merkle Power Sources.
Technology for MIG/MAG- and the PulseARC-Process!

With the power sources HighPULSE 350, 450 and 550 RS, Merkle offers a perfectly balanced performance program for all demands in the automation of your welding processes.

The HighPULSE-Line consists of Synergic PulseARC-welding power sources which are especially designed for the interface with Robots and SPS controllers. Based on modern and highly efficient, high performance 100kHz Inverter power modules and 32 bit high speed processors.

HighPULSE-Power Sources:

<table>
<thead>
<tr>
<th>Type</th>
<th>Welding Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>HighPULSE 350 RS</td>
<td>20 - 350 A, 60 %</td>
</tr>
<tr>
<td>HighPULSE 450 RS</td>
<td>20 - 450 A, 50 %</td>
</tr>
<tr>
<td>HighPULSE 550 RS</td>
<td>20 - 550 A, 40 %</td>
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</tbody>
</table>

Our Power Sources are perfectly suited to the following welding processes:
- MIG/MAG
- PulseARC
- MIG-Brazing/Soldering
- High-Performance welding (HighPULSE 550 RS)
- DeepARC
- ColdMIG
- Interpulse

Interface-Options:
Various versions of interface for control of the welding power sources are available:
- Bus-Interfaces:
  - DeviceNet
  - CANopen
  - Profibus
  - Interbus
  - ProfiNet
  - further Bus-Interfaces on demand
- Analog Interface
- Digital Job-Function
Tactile sensor – Stylus

A simple mechanical surface scan in 2 axis, e.g. height and sideways correction is possible with the tactile sensor. The mechanical registration of movement through the tactile sensor is transmitted as an impulse over the electrical controller directly to the motorised slide unit. Various exchangeable stylus tips are available to enable a constant and precise sensing when riding over spot welds, stamped holes etc.

Laser Sensor

The laser sensor is used to achieve a contactless scan of the weld bead position. Three parallel beams of light illuminate the welding joint. The output is in the form of analog signals for controlling the torch carrier adjusting motors in height and sideways movement. To enable a successful scanning of the joint, a Hi-Lo, a lip, or an air gap of at least 0.2mm (0.008”) is required.
Merkle Welding Torch ROB 505/355 W.
The first choice for automation and robotics!

Patented: Forced Wire Contact:

- This Merkle patent ensures that the wire is forced into contact with the contact tip through eccentric feeding into the tip holder. A permanent electrical contact between wire and contact tip is thus guaranteed under all conditions.
- The result is perfect quality, process safety and reliability under the most arduous of operating conditions.
- For the reliable evacuation of swarf or wire dust build-up, evacuation channels are integrated into the tip holder

Twin chamber cooling system:

Our time proven cooling systems ensure:

- Optimal cooling of the gas nozzle directly through the water jacket
- Systematic and reliable transport of heat from the torch internals
Automation and robotics welding torch
ROB 505 W:

Three variants are available as option: straight, 22° angled, or 45° angled. All three variants impress through a robust construction, with the torch neck manufactured in stainless steel, capable of withstanding the most arduous of conditions. With the quick change mechanism, a simple exchange of torch bodies is possible. The TCP remains accurate even after a torch body change.

Standard and High Performance gas nozzles:

Both types of gas nozzle offer, through a combination of push-on and screw fixing, an optimized heat conductance and a perfect mechanical restraint. The High Performance gas nozzle is designed for extreme heat loading.

<table>
<thead>
<tr>
<th>Gas nozzle</th>
<th>Standard-Version</th>
<th>High performance-Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty cycle* 40 % ED</td>
<td>450 A (36,5 V)</td>
<td>500 A (39,0 V)</td>
</tr>
<tr>
<td>Duty cycle* 100 % ED</td>
<td>400 A (34,0 V)</td>
<td>450 A (36,5 V)</td>
</tr>
</tbody>
</table>

* With MIG/MAG using mix gas 82/18

Optional Push-Pull-Gearbox:

When welding with aluminium wires, very thin welding wires, or long inter-connecting packets, we recommend the use of our push-pull gearbox. Attachment is between the welding torch body and the fixing flange, and ensures that a permanent tensioning load is applied to the welding wire, guaranteeing a reliable and constant wire feed under the most difficult of conditions.

Hollow Wrist Robot Welding Torch
ROB 355 W:

The Merkle welding torch for hollow wrist robots offers all the benefits of our forced wire contact and twin chamber cooling. The hose package allows an unlimited rotation about its own axis and therefore a 360° rotation of the robot welding torch about the robot arm axis.
Merkle Periphery-Modules.
Technology leading solutions for the highest usability!

Water Cooling Unit WK 325:

- Mounting possibility directly under the welding power source (if required)
- Highly effective cooling capabilities due to the high performance rotary pump and high performance heat exchanger
- Optional connector on the welding power source as well as coolant-pressure monitoring over the electrical connection on the rear of the machine

Torch cleaning system with integrated wire length trimming station:

- Mechanical cleaning and reaming
- Milling tool available as spare/wear part
- Function for applying anti spatter spray
Wire Feed Units:
Merkle offers three solutions for automated wire feeding:

**Standard-Wire Feed Unit ROB DV 26**
For standard Robots, Hollow Wrist Robots and Automation
- 4-Roller-gearbox, 0,5 - 25 m/min
- Button for gas test
- Purge function
- Compact form, 5 kg

**High performance Wire Feed Unit ROB DV 31**
For standard Robots and Automation
- 4-Roller gearbox, 0,5 - 30 m/min
- Wire straightening module
- High performance motor
- Gas test and purge functions

**Wire Feed Unit Auto DV 31**
For Automation
- Room for an internal wire spool D300/15

**Integrated Crash Protection:**
A totally reliable damage limitation system resulting from the fully integrated crash protection for standard and hollow wrist robots.

**Standard Crash Protection**
- Protects the robot and torch from major damage
- Collision protection with an especially long shutdown stroke whilst still maintaining the highest levels of TCP precision
- Mounting flange for all common robot types

**Hollow Wrist Crash Protection**
- Only suitable for hollow wrist robots
- Unlimited rotation possibilities for the hose package
- Transportation of coolant feed and return
Merkle Software-Products.
Perfect Solutions for all of your Hardware!

**Merkle ProJOBpro**
The correct software for producing and documenting your welding jobs. Can be used in online or offline modes.

**Merkle ProDOC**
Connecting through the serial interface allows programming, changing and administration of jobs within the power source. The user interface is very comfortable and simple in use.

**Merkle Q.MACS**
Our newest software is capable of monitoring, controlling and recording all welding parameters, whilst simultaneously providing values for machine time, Arc-on time, wire and gas consumption to name just a few functions, and this also with multiple robots welding one component simultaneously. Online and offline monitoring with practically unlimited network capabilities round off the currently best automation software on the market.
Four Hardware Variants, from Stationary to Wireless:

1. **PC/Laptop**
   Use a standard PC or Laptop

2. **Panel-PC, integrated**
   Integrated into the automation control board

3. **Panel-PC, mobile**
   Mobile solution: Connect to the power source with a cable

4. **Tablet-PC, wireless**
   Wireless using WLAN connection to the power source

**Sequence Controller Merkle PSC32**
The PSC32 is to be used for the control of complex automation solutions. The PSC32 assumes overriding sequence control for the complete welding technology process. Up to 4 welding power sources can be simultaneously controlled. Use of the software is made possible with a Panel PC.
DeepARC-Process
The Merkle DeepARC- Process is instantly recognizable due to its concentrated, almost arrow formed arc. This results from a highly dynamic voltage regulation. The process allows a deep penetration and an increase in welding speed of up to 100%. Applications using low and high alloyed steels and aluminium can be realized using the DeepARC process. DeepARC is available for all machines in the High-Pulse machine series.

Greatly reduced undercut tendencies
- Concentrated, directionally stable arc
- Reduced heat input and HAZ
- Reduced weld bead height
- Tendency to undercut is greatly reduced

Reduction of welding passes
- Due to the directionally stable arc and higher penetration capabilities, a reduction in prep angles can be achieved
- Reduction in edge preparation costs
- Reduced consumption of consumable wires and gasses
- Time saving through fewer passes and interpass temp delays

Deeper Penetration
- Deeper penetration through higher arc pressure
- Safe, guaranteed root capture every time

Areas of Use:
- Steel construction
- Ships construction
- Machine construction
- Apparatus construction
- Container/ Silo construction
ColdMIG – Reduced Heat Input!

ColdMIG-Process
The Merkle ColdMIG process sets new standards in joining. With as much as 30% less heat input, thin sheet welding (0.6 - 3.0mm) is achieved to perfection. ColdMIG’s high gap bridging capabilities and optimum welding, brazing and soldering attributes when joining mixed or galvanised materials are also world-class features.

Welding current: 20 – 140 A
Arc voltage: 13.5 – 20 V
Wire feed speed: 0.7 – 5 m/min

ColdMIG-Principle of operation
The characteristic curve is controlled during the up and down slope by a highly dynamic digital signal processor.

- Steep controlled upslope in the short circuit cycle
- Steep [almost vertical] downslope of current after the drop release/transfer
- Constant material/drop transfer frequency

Comparison of heat input

- 25 – 30 % reduced heat input in comparison to the standard short circuit arc process

Application advantage:

- Weldability of thin plates, from 0.6 – 3.0 mm
- High gap bridging capabilities
- MIG-brazing and soldering with minimum heat input
- Weldability of mixed and galvanised joints
Merkle Configuration.
Complete Solutions for Automation and Robotics!

With over 40 years experience in the field of automation and robotics, Merkle offers complete system solutions for small, middle and mass producing companies. The configuration overview shows examples for the construction of a complete solution for standard as well as hollow wrist robots.

- Front without user panel
- Front with display for manual program and process selection
- External user panel for manual program and process selection
- Front with digital display for Amperage/voltage/wire feed speed
- PC/Laptop
- Panel-PC integrated
- Panel-PC mobile
- Tablet-PC
- Sequence Controller PSC32
- Robot/Automation controller
- Water cooling
- Welding Power Source
TIG-Welding Process.
Perfectly compatible automation components!

For the automated solutions in the TIG welding process, Merkle offers you perfectly compatible components and systems. This guarantees you the highest productivity and reproducibility.

The systems are especially suited and proportioned for use in heavy industry, and designed for use in automation or Robotics. The control possibilities are equal using an SPS or robotic interface. The parameters, welding current, AC frequency (in AC mode) and wave compensation - balance, can all be influenced in this way.

Merkle Insquare-Systems
The TIG inverter based welding systems in the Insquare series offer professional performance throughout the whole range. Five models from 320 A to 600 A for DC or AC/DC welding fill all even the highest of demands placed on industrial welding equipment in today’s ever more production oriented marketplace. Professionals are inspired by the perfect technology and wide range of functions in the Insquare!

DC-High frequency pulsing (kHz)

The machines in the Insquare series are equipped as standard with High Frequency Pulsing. The welding arc is pulsed with a frequency of up to 5 kHz. The kHz function opens fantastic possibilities in TIG DC welding which are just not possible with a standard TIG DC welding arc.

eg:

- Noticeable concentration of the welding arc.
- Arc form similar to Plasma.
- Reduced heat input.
- Higher welding speeds.
- Extremely directionally stable arc.
- Perfect for corner joints.

Standard TIG-Weld

DC-High Frequency Pulsing [kHz]

eg High Frequency Pulsing [kHz] for the perfect corner joint
Merkle TIG-Welding Torch TM 450 W.
The torch for all automated TIG applications!

The welding torch TM 450 W is available in 3 versions:
- straight
- angled, 30°
- angled, 70°

The straight version is available with options for cold wire feeding and purging gas adaptors. All torch heads can be swapped “during use” using our torch interchange system.

Cold Wire Feeding
For the TIG welding torch TM 450 W, we supply the cold wire supply system KDZF. This can be attached directly to the torch body.

Peripheries and accessories
- Tow shoes for forming/purging gas
- Cold wire control unit
- Cold wire feed unit
- Sequence controller PSC32

The PSC32 is to be used for the control of complex automation solutions. The PSC32 assumes overriding sequence control for the complete welding technology process. Up to 4 welding power sources can be simultaneously controlled. Use of the software is made possible with a Panel PC.
Plasma welding is a modification of the TIG-welding process. As in TIG welding, we use a non consumable electrode (Tungsten or alloy thereof), under an inert protective gas environment. The Plasma-arc is extremely stable and concentrated. It forms a „keyhole“ in the welding bead which can be used to fully penetrate and join the workpiece.

The main difference to TIG welding lays in the construction and function of the welding torch. The tungsten electrode is situated in the torch so that the arc is totally encapsulated by the protective gas housing. A copper gas jet with a very fine drilling concentrates the Plasma welding arc as it leaves the jet. The Plasma welding arc length is not as critical when compared to the TIG welding arc length. The Plasma welding arc is extremely concentrated and achieves a much deeper penetration whilst at the same time maintaining a smaller heat affected zone as compared to the TIG welding arc. The plasma process is perfectly suited to automated welding.

Advantages of Plasma-Welding:
- 100 % X-Ray safe welds
- Perfect penetration
- Equal/proportional formation of the root
- Low distortion welding
- Locally limited heat input
- Welding of low and high alloy steels
- CrNi-Steels from 3 to 8 mm in a single pass without edge prep (butt)

Applications:
- Automated pipe welding
- Container/Silo construction
- Longitudinal seam welding
- Plant construction

Merkle Power Sources:
We have four different types of power source for Plasma-welding to choose from. All can also be used for the TIG welding process in DC and AC/DC:

For DC welding:
- P 421 DC-PT11, 420 A at 60 % ED
- P 601 DC-PT11, 600 A at 50 % ED

For AC/DC welding:
- P 421 AC/DC-PT11, 420 A at 60 % ED
- P 601 AC/DC-PT11, 600 A at 50 % ED

Principles of Plasma-Welding:

![Principles of Plasma-Welding](image-url)
Merkle Plasma-Welding Torch

The Plasma machine welding torch PM 400 W is equipped with a quick-change mechanism. This enables a fast and simple exchange of the welding head to the hose package. The torch is water-cooled and can be used with up to 400A* @ 100% duty cycle in DC mode, and up to 350A* @ 100% duty cycle in AC mode.

*: with a coolant supply flow temperature of 20 °C

Cold Wire Feeding

For the Plasma welding torch PM 400 W we supply the cold wire supply system KDZF. This can be attached directly to the torch body.

Peripheries and accessories

- Tow shoes for forming/purging gas
- Cold wire control unit
- Cold wire feed unit
- Sequence controller PSC32

The PSC32 is to be used for the control of complex automation solutions. The PSC32 assumes overriding sequence control for the complete welding technology process. Up to 4 welding power sources can be simultaneously controlled. Use of the software is made possible with a Panel PC.
Create a successful future.

With Merkle, your specialist for welding units, welding machines, torches and intelligent automation systems. With our own subsidiaries and Merkle Dealers in Germany, Europe and the rest of the world.

Welcome to the Merkle World of Welding.

- MIG/MAG Welding Units
- Synergic Pulse Welding Units
- TIG Welding Units
- MMA/Stick Electrode Welding Units
- Plasma Welding and Cutting Units
- Welding and Cutting Torches
- Turntables, Booms, Parallel/Rotation Banks and Roller Drive Units
- Complete Automation Systems and components
- Merkle Robotics