MOTOWELD-RL350

Digital inverter power source for professional welding tasks with MOTOMAN industrial robots

Controlled by DX200

www.yaskawa.eu.com

MOTOWELD-RL350

A new era for arc welding

Considerabley reduced weld spatter!

Maximum reliability combined with very simple maintenance

The optimised layout of the electronic components and the advantages of entirely digital data transfer make this power source a highly reliable and maintenance-friendly device that is able to meet the requirements of an industrial environment.

Constant current mode

In this operating mode that is available for selection (Heat and Waveform Control, or HAWC), internal control keeps the actual value of the weld current strength in the arc constant. In this way, weld faults resulting from varying distances between the torch and the workpiece can be minimised (e.g. inaccuracies during programming and/or work piece tolerances).

Variable pulse control (V-Pulse)

Pulse parameters can be set individually, thereby allowing adaptation of the droplet transfer in the pulse arc to the specific welding tasks. Low-spatter processes can also be implemented in the lower power range with low voltages.

Droplet detachment correction (d-Vector)

Optimised characteristics for processes under pure CO^2 enable controlled droplet transfer: improved arc stability goes hand in hand with reduced weld spatter and a smoother seam surface.

Key Benefits

- User-friendly operation with integrated user interfaces on robot teach pendant
- Communication via Ethernet
- Maximum reliability combined with very simple maintenance
- Synergy characteristics for MAGc/MAGm/MIG/pulse operation
- Pulse parameters can be set individually
- Constant current mode possible
- Optimised metal transfer with droplet detachment correction

Maximum reliability combined with very simple maintenance

Modularised inverter circuits

The individual components can be maintained and inspected at the installation site and exchanged there if necessary. It is generally not necessary to exchange the device to inspect it. This reduces downtimes and costs.

Simple display with clearly visible display elements

Internal maintenance

Outer panels can be removed easily and the system has a minimum of fastening screws, significantly reducing the work time required for inspection and maintenance.

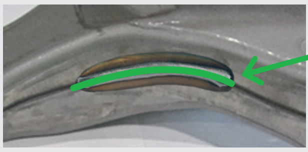
Variable pulse control

What is meant by variable pulse control?

In the past, the arc voltage had to be reduced when working with pulse processes in the lower power range in order to avoid burn-through and undercutting. This led to irregular seam appearance and increased spatter. With variable pulse control, the pulse shape responsible for droplet transfer can be adapted to the specific welding task by means of additional parameters. This enables a more stable arc with reduced weld spatter.

Test details

This behavior is illustrated, for example, in subassemblies for car axles.
Shielding gas: M21 – weld conditions: 170 A, 23 V – robot velocity: 80 cm/min

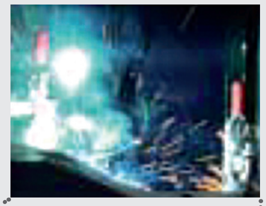


Work piece / weld seam

Welding results

Conventional method

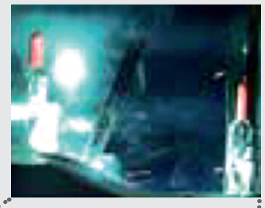
With the conventional method, there were frequently irregularities in the formation of the weld bead after welding (see figure top left).
Furthermore, there was increased spatter during welding (see figure on right).



Enlarged view

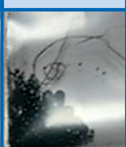
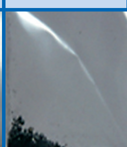
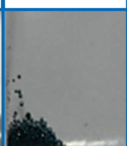
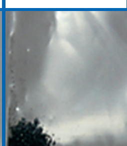
New process (with variable pulse control)

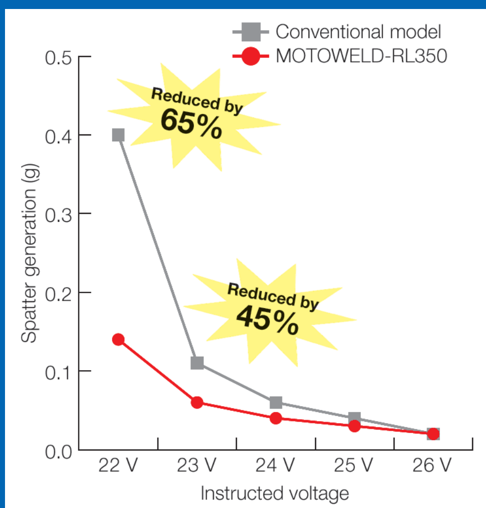
With the new method (with variable pulse control), the bead is perfectly smooth after welding (see figure).
Moreover, compared with conventional processes, significantly less spatter is generated.



Enlarged view

Comparison of spatter generation

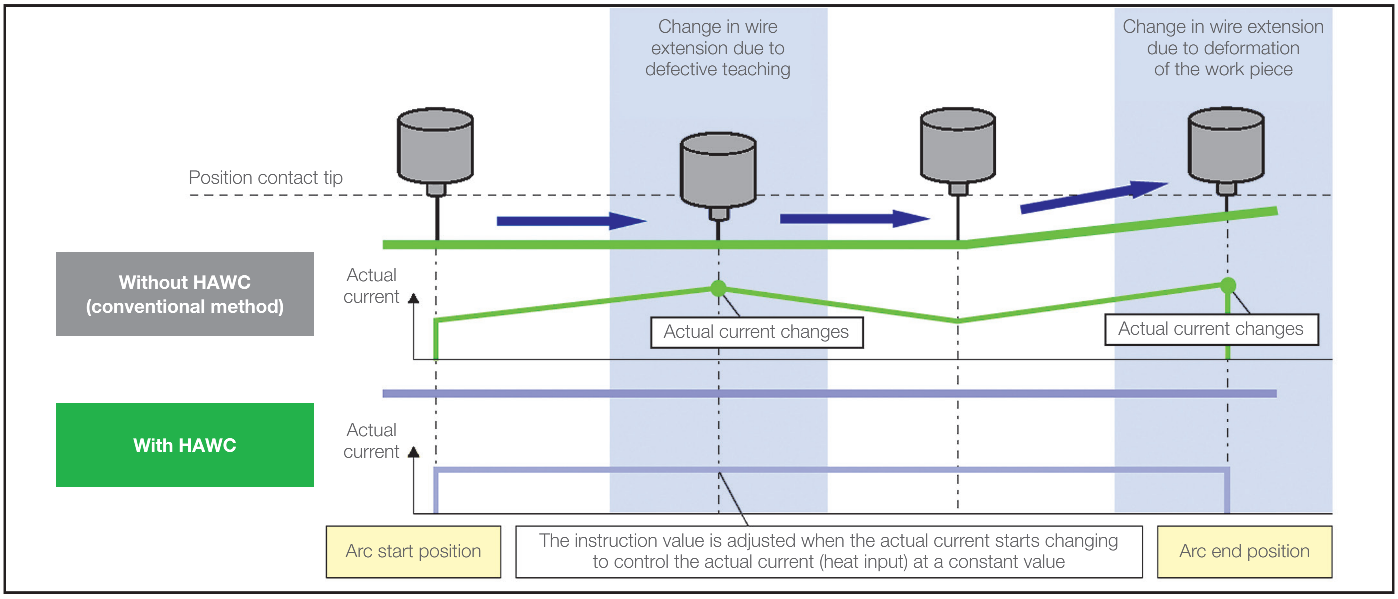
Robot velocity	80 cm/min				
Current	175 A				
Voltage	22 V	23 V	24 V	25 V	26 V
Conventional model					
Spatter generation	0.40 g	0.11 g	0.06 g	0.04 g	0.02 g
MOTOWELD-RL350 (Droplet detachment correction)					
Spatter generation	0.14 g	0.06 g	0.04 g	0.03 g	0.02 g



Constant current mode

What is meant by HAWC (Heat and Waveform Control)?

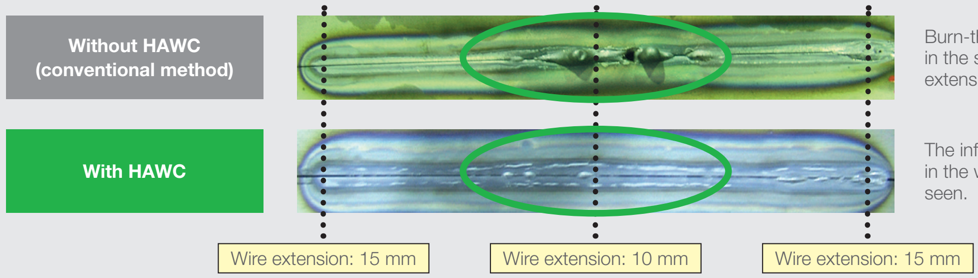
The length of free wire (distance between contact tip and work piece) may vary according to the accuracy of the work piece and programming. With conventional characteristics, the weld current changes in accordance with these changes in distance. This can result in burn-through or insufficient penetration. If the HAWC function is used, the command and actual values for current and voltage are compared in real time. The internal control of the power source keeps the arc current constant at the specified value. This enables controlled heat input, and weld faults resulting from the aforementioned tolerances can be avoided.



Test details

General conditions for test welds with and without the HAWC function. Length of free wire varies between 10 mm and 15 mm during welding. **Work piece thickness: 4.5 mm – seam type: butt joint – weld conditions: 270 A, 26 V – robot velocity: 80 cm/min**

Welding results



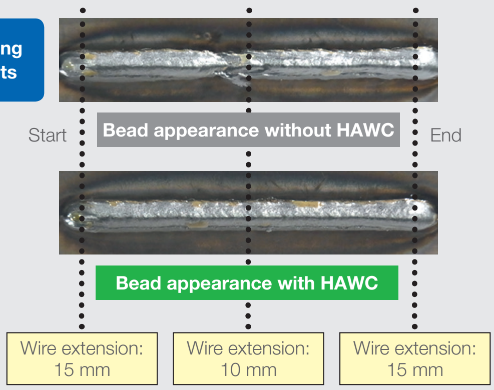
Burn-through has occurred in the section with a wire extension of 10 mm.

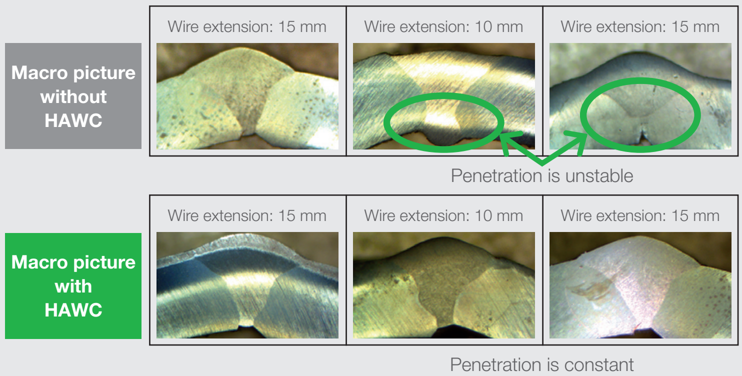
The influence by the change in the wire extension is not seen.

Test details

Welding at butt joint on tube with wall thickness of 5 mm and length of free wire continuously changing between 10 mm and 15 mm.
Shielding gas: M21 – weld conditions: 200 A, 19.7 V – robot velocity: 60 cm/min

Welding results





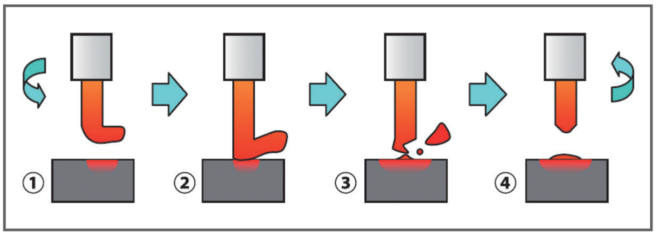
Droplet detachment correction

Conventional CO_2 welding processes

Compared with MAG welding under mixed gases, the arc under pure CO_2 is more unstable, resulting in greater production of spatter and a rippled, irregular seam surface.

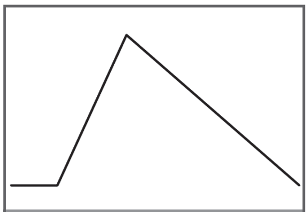
This is illustrated in the figure opposite:

1. Electromagnetic forces in the arc cause deflection of the droplet.
2. Undefined metal transfer occurs in the short circuit.
3. The surplus metal is ejected as weld spatter.
4. The arc is re-established.

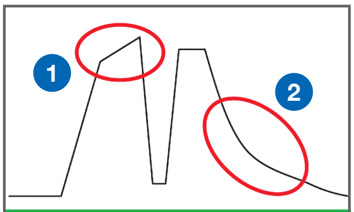


What is meant by droplet detachment correction?

The short-circuit response has been redefined by optimising the curve for the rising and falling edges of the current: the gradient of the edges can be adapted to the specific welding task, enabling stable MAGc processes with reduced spatter generation and finely rippled seam appearance.



Concentional waveform



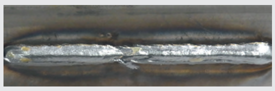
New waveform

1 Improved arc stability with gradual increase in current.
➡ **Stable process with low generation of spatter.**

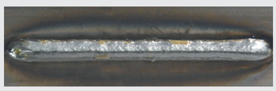
2 A non-linear drop in current after break-up of the short circuit prevents the arc from being extinguished completely in the next short circuit.
➡ **Undefined, coarse droplet formation is suppressed. The contact surface for electromagnetic forces is reduced, as is the ejection of spatter.**

Test details

Current: 150 A – Voltage: 16.3 V – Robot speed: 80 cm/min – Shielding gas: 100% CO_2 used



Conventional welding method

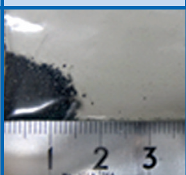
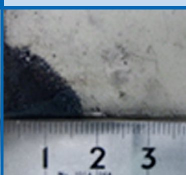
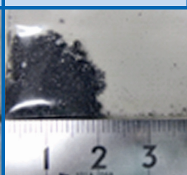
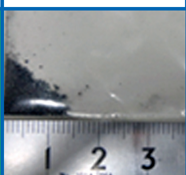
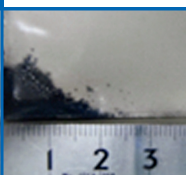
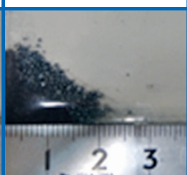


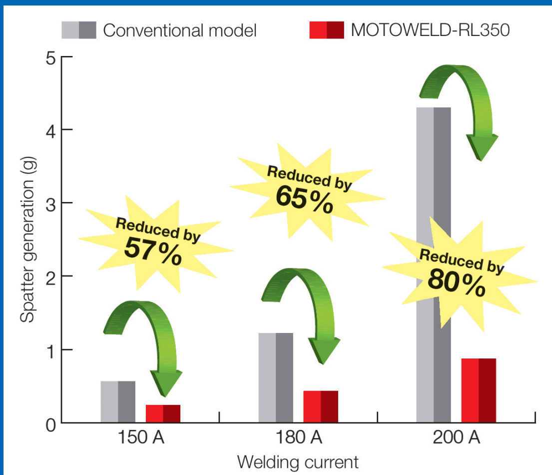
New welding method (with droplet vector control)

Welding results

The instability of the arc in conventional CO_2 welding results, in many cases, in irregular, coarsely rippled weld beads. The optimised characteristic curve with droplet detachment correction enables a stable process with uniform weld beads and a finely rippled surface.

Vergleich der Spritzererzeugung

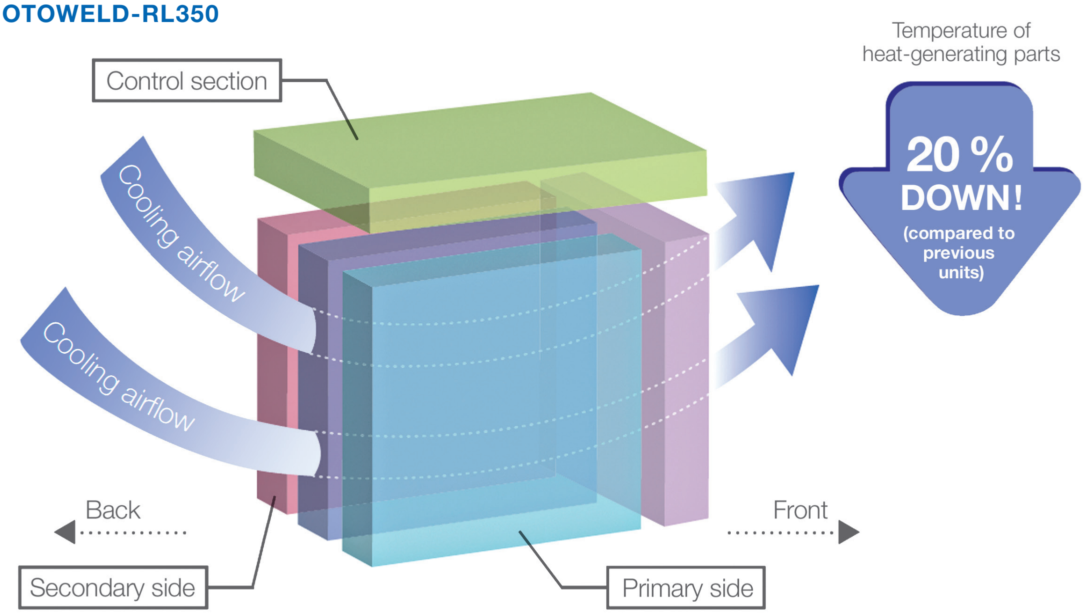
Current	150 A	180 A	200 A
Conventional model			
Spatter generation	0.565 g	1,.24 g	4.301 g
MOTOWELD-RL350 (Droplet detachment correction)			
Spatter generation	0.242 g	0.431 g	0.873 g



Reinforcement of the Cooling/Dustproofing Systems

The interior of the unit has been divided up into sections to prevent dust getting into the control and power circuits, improving reliability in adverse environments with conditions like high temperatures or dust. This is combined with a new construction that features channels providing a cooling airflow in the centre of the unit and concentrates the heat-generating parts on the cooled faces, so cooling efficiency is maximised while ensuring dustproofing. The number of exhaust routes has been increased too, giving 20% better suppression of temperature rise than previous units.

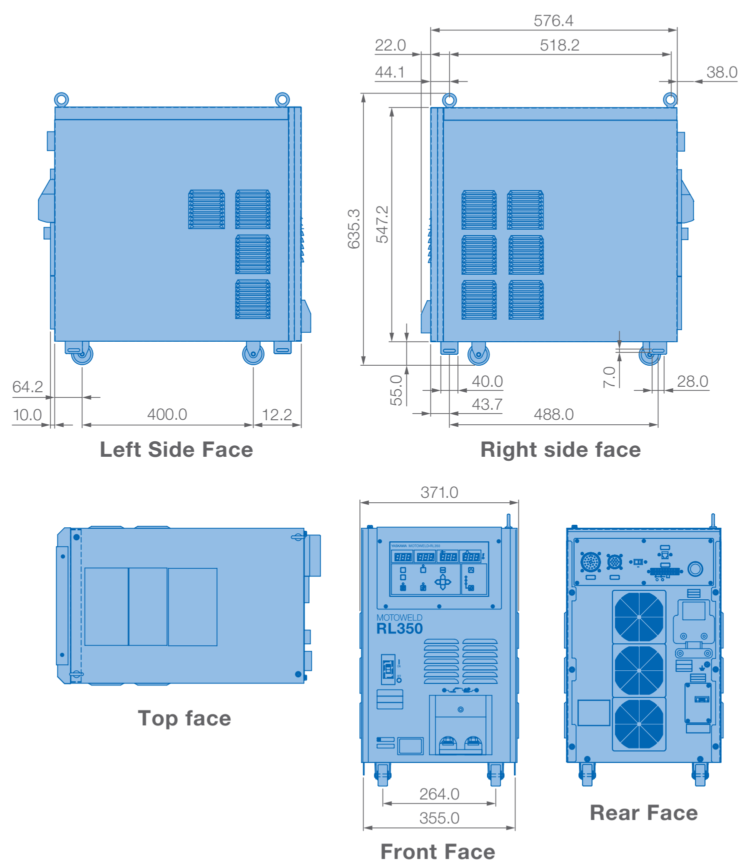
Aufbau der MOTOWELD-RL350



Ratings and Specifications

Welding power source model	YWE-RL350-CEO
Rated input voltage, number of phases	200 – 220 VAC ±10 % / 380 – 400 VAC ±10 %, three phases (Changing the input voltage requires changes to the internal wiring.) Setting on shipment: 380 – 400 VAC
Rated frequency	50/60 Hz
Rated input	18 kVA, 15 kW
Rated output current	30 – 350 A (depending on wire diameter)
Rated output voltage	12 – 36 V (depending on wire diameter)
Rated operation rate	60 % (for 10 minutes)
Welding method	CO^2/MAG/MIG/Puls
Welding material	Iron, stainless steel
Dimensions	371 (B) × 636 (D) × 602 (H) mm (not including projecting parts such as eyebolts or screws)
Approx. mass	60 kg

Dimensions



YASKAWA

YASKAWA Headquarters
YASKAWA Europe GmbH
Robotics Division
Yaskawastraße 1
85391 Allershausen, Germany
Tel. +49 (0) 8166/90-0
Fax +49 (0) 8166/90-103

YASKAWA ACADEMY
and sales office Frankfurt
YASKAWA Europe GmbH
Robotics Division
Hauptstraße 185
65760 Eschborn, Germany
Tel. +49 (0) 6196/77725-0
Fax +49 (0) 6196/77725-39

YASKAWA GROUP

AT YASKAWA Austria
Schwechat/Wien
+43(0)1-707-9324-15

CZ YASKAWA Czech s.r.o.
Rudná u Prahy
+420-257-941-718

ES YASKAWA Ibérica, S.L.
Gavà/Barcelona
+34-93-6303478

FR YASKAWA France SARL
Saint-Aignan-de-Grand-Lieu
+33-2-40131919

FI YASKAWA Finland Oy
Turku +358-(0)-403000600

GB YASKAWA UK Ltd.
Banbury +44-1295-272755

IT YASKAWA Italia s.r.l.
Torino +39-011-9005833

IL YASKAWA Europe Technology Ltd.
Rosh Ha'ayin +972-3-9004114

NL YASKAWA Benelux B.V.
Son +31-40-2895500

PL YASKAWA Polska Sp. z o.o.
Wrocław +48-71-7928670

RU YASKAWA Nordic AB
Moskva +46-480-417-800

SE YASKAWA Nordic AB
Torsås +46-480-417-800

SI YASKAWA Slovenia
Ribnica +386-1-8372-410

TR YASKAWA Turkey Elektrik
Ticaret Ltd. Sti.
İstanbul +90-216-5273450

ZA YASKAWA Southern Africa (PTY) Ltd
Johannesburg +27-11-6083182

DISTRIBUTORS

BG ARAMET ROBOTICS Ltd.
Yambol +359-885 317 294

Kammarton Bulgaria Ltd.
Sofia +359-02-926-6060

CH Messer Eutectic Castolin
Switzerland S.A.
Dällikon +41-44-847-17-17

DK Robotcenter Danmark
Løsning +45 7022 2477

EE RKR Seadmed OÜ
Tallinn/Estonia +372-68-35-235

GR Gizelis Robotics
Nea Kifissia +30-2106251455

HU Flexman Robotics Kft
Budapest +36-30-9510065

LT Profibus UAB
Panevezys +370-45-518575

NO Skala Robotech AS
Lierstranda +47-32240600

PT ROBOPLAN Lda
Aveiro +351-234 943 900

RO Sam Robotics srl
Timisoara +40-720-279-866

MPL Automation S.R.L.
Satu Mare +40 (0) 261 750 741

robotics@yaskawa.eu.com
www.yaskawa.eu.com

TÜV CERT
EN ISO 9001
Zertifikat Nr. 20 100 9864
www.tuv.at

All dimensions in mm

MOTOWELD-RL350, A-02-2017, A-N0.166328