

/ Perfect Welding / Solar Energy / Perfect Charging

**Fronius**



# LSC

## LOW SPATTER CONTROL

THE LOW-SPATTER  
WELDING PROCESS

# PREVENT SPATTER. REDUCE REWORK.

EXCEPTIONAL WELDING RESULTS REQUIRE INNOVATIVE SOLUTIONS: **THE LSC PROCESS ENSURES HIGH ARC STABILITY WITH LOW SPATTER.**

The LSC process is a modified standard arc with particularly high arc stability. As a result, the user achieves high-quality weld seams with considerably less spatter in the area of the dip transfer, intermediate, and spray arcs. In addition, the properties of LSC enable an increased deposition rate in these areas.

The LSC process is based on the short circuit occurring at a low current level, which leads to gentle arc reignition and maximum stability in the welding process. This is all made possible by the enormous capability of the TPS/i: the high-end welding system quickly detects process conditions during the short circuit, allowing it to react just as quickly.

In combination with the penetration stabilizer, the user can achieve extraordinary results.

What's your  
welding challenge?

Let's get connected.



# THE BENEFITS

## MORE ECONOMICAL WELDING WITH LSC.

UP TO  
**75%**  
LESS SPATTER\*



- / Less rework
- / Lower consumption of filler material
- / Fewer rejects
- / Less cleaning required and savings on wearing parts

WELD UP TO  
**4.5x**  
QUICKER\*\*



- / Very well suited for out-of-position welding
- / Welding in the downhand position is optimally supported by the properties of LSC
- / The powerful arc ensures optimum root formation in overhead positions

GAS COST  
SAVINGS OF UP TO  
**25%**



- / Lower gas costs through use of 100% CO<sub>2</sub>
- / Greater penetration and lower porosity due to the use of 100% CO<sub>2</sub>

HIGH PROCESS  
STABILITY WITH  
**LSC**  
ADVANCED



- / Low-spatter welding with LSC Advanced, even with long hosepacks
- / Improved process stability in the intermediate arc area
- / No additional sensor line needed



## ECONOMICAL AND SUSTAINABLE

### RESOURCE-EFFICIENCY

The low-spatter LSC process reduces rework. This means that wearing parts can be conserved, working time saved, and rejects significantly reduced.

### SAVINGS ON FILLER METAL

Due to the precise control and the resulting lower spattering of LSC, the consumption of weld filler metal as well as lifecycle costs are also cut.

### ENERGY-SAVING

A stable, precisely controlled arc improves welding quality and thus shortens the overall time taken to perform different welding tasks. Lower energy consumption is a direct result.

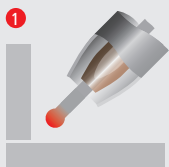
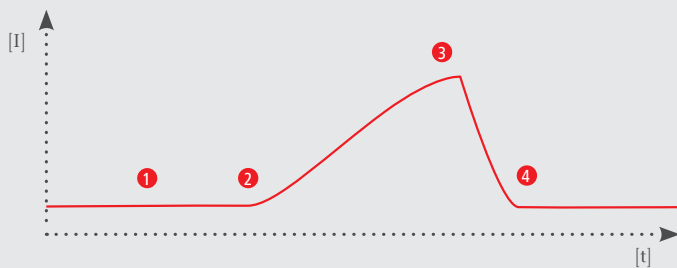
# LSC – THE MODIFIED DIP TRANSFER ARC.

THE LSC PRINCIPLE OF SOFT REIGNITION REPRESENTS A SIGNIFICANT DIFFERENCE TO THE STANDARD DIP TRANSFER ARC.

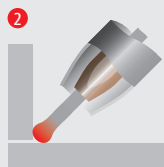
This principle is achieved by triggering the short circuit at a low current level, which in turn leads to a stable welding process.

## STANDARD DIP TRANSFER ARC

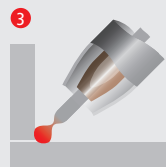
Excellent results can already be achieved with the controlled standard arc from Fronius. But why settle for the standard when virtually spatter-free welding is possible?



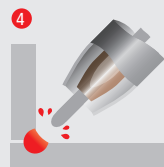
/ Droplet formation



/ Component contact



/ Droplet is "pinched"



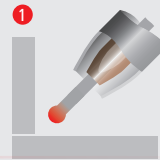
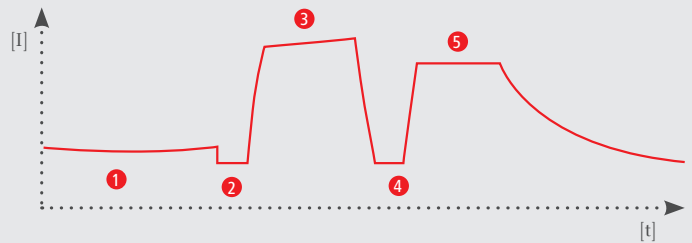
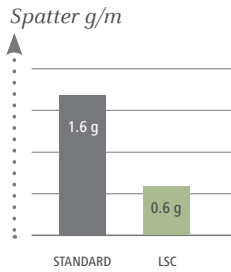
/ Droplet detachment, spatter

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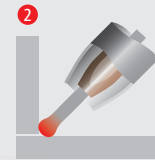
# LSC DIP TRANSFER ARC

The digitally enhanced intelligence reacts optimally to voltage fluctuations, **THUS ENSURING AN ABSOLUTELY STABLE ARC.**

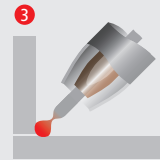
**EXTREMELY LITTLE SPATTER** ✓



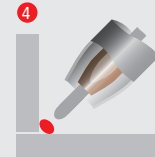
/ Droplet formation



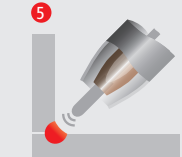
/ Component contact: current is reduced, lower droplet load



/ Droplet is "pinched"



/ Droplet detachment: current is reduced, spatter is minimized



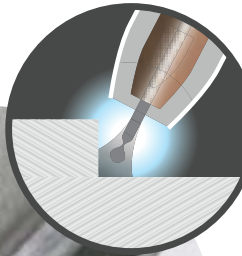
/ Deep penetration is achieved by increasing the current

## THE ADVANTAGES

 ✓

- / 75% less spatter
- / Reduction of rework
- / Fewer rejects

# EVOLUTION E ARC



# THE RIGHT CHARACTERISTIC

EVERY WELDING APPLICATION  
HAS SPECIAL CHALLENGES  
AND NEEDS CUSTOM  
SOLUTIONS.

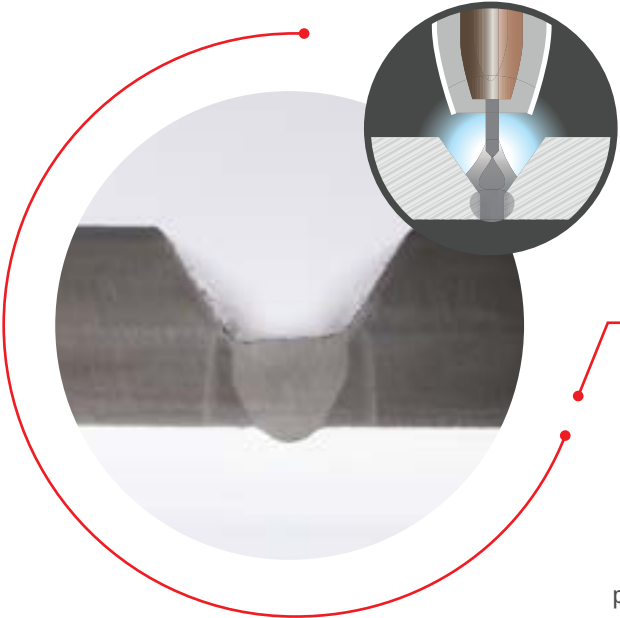
LSC therefore contains various refinements – in other words, characteristic curves that are matched to individual customer requirements. This eliminates the need for cumbersome and often lengthy device parameterization. Instead, the preconfigured characteristic can be conveniently set on the power source. This saves time and enables reproducible quality.

OPTIMALLY  
TAILORED  
TO YOUR NEEDS

# UNIVERSAL

## TIME-SAVING SIMPLE WELDING SETTINGS

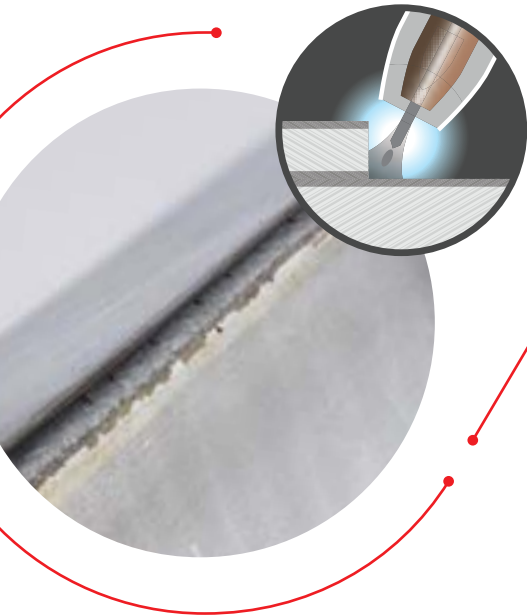
for standard applications in steel welding – with easily controllable dip transfer, intermediate, and spray arcs.



# ROOT

## THE POWERFUL ARC WITH GOOD GAP-BRIDGING ABILITY

enables simple root pass welding – even during position welding in the dip transfer arc area.

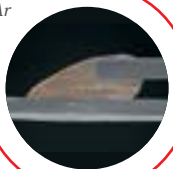


# GALVANIZED

## SPECIAL CHARACTERISTICS – DEVELOPED FOR WELDING GALVANIZED SHEET METAL PARTS.

Powerful dip transfer arc enables perfect root welding with no weld-pool support. Optimum gap-bridging ability and ideal for challenging welding positions.

Wire Ø: 1 mm  
Filler wire: CuSi-3  
U: 13.7 V  
I: 123 A  
Vd: 6.1 m/min  
Gas: 100% Ar



Wire Ø: 1 mm  
Filler wire: CuSi-3  
U: 13.1 V  
I: 71 A  
Vd: 3.7 m/min  
Gas: 100% Ar



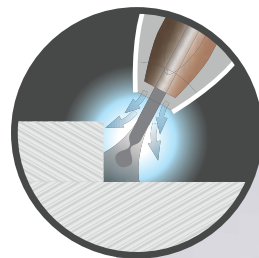
Wire Ø: 1 mm  
Filler wire: CuSi-3  
U: 13.1 V  
I: 69 A  
Vd: 3.6 m/min  
Gas: 100% Ar



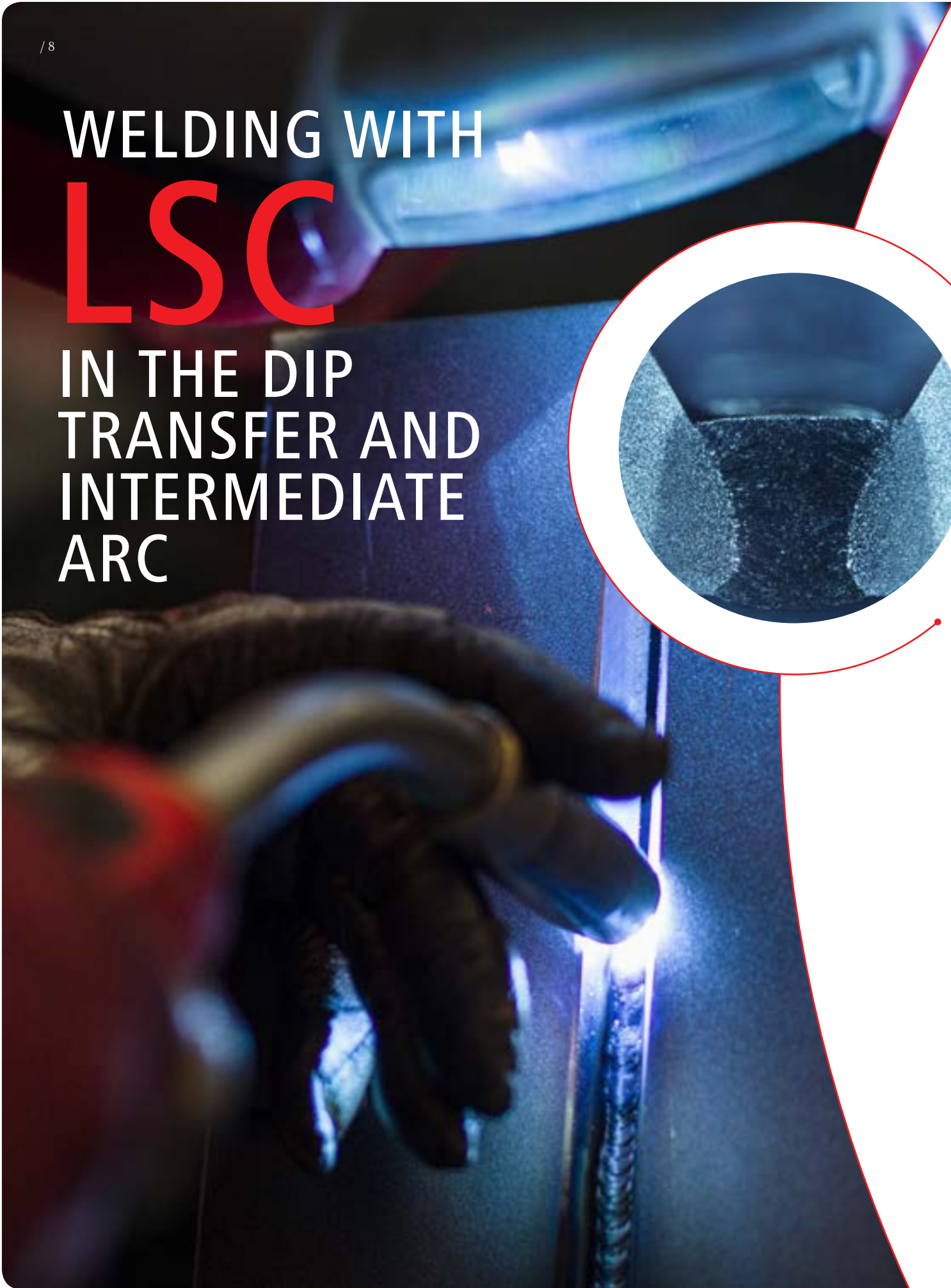
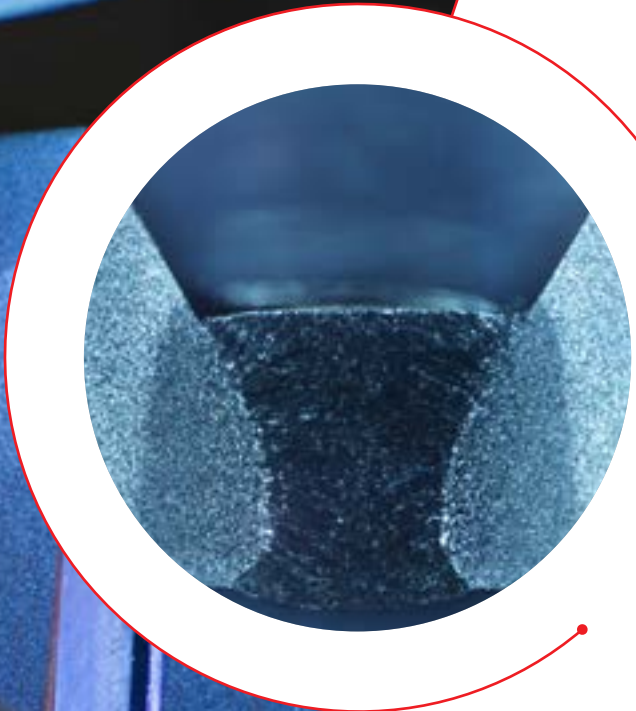
# BRAZE

## CHARACTERISTIC FOR MIG/MAG BRAZING.

High brazing speed, reliable wetting, and good flow of braze material in the dip transfer arc area.



# WELDING WITH **LSC** IN THE DIP TRANSFER AND INTERMEDIATE ARC



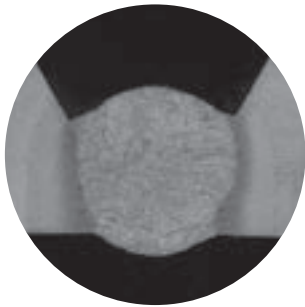


# ROOT PASS WELDING

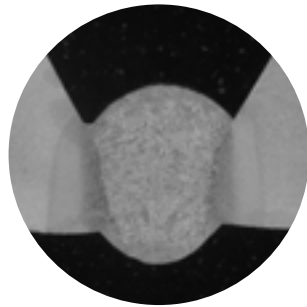
Up to now, the root pass usually had to be welded in an upward position in the conventional dip transfer arc.

In the downhand position, there was a risk that a lack of fusion would occur. Typically, this was caused by the low arc pressure as the weld pool advanced. In contrast, the LSC Root characteristic means that welding can now be carried out in a downward position and therefore faster thanks to the high arc pressure and high deposition rate. With LSC Root Advanced, a rate of 25 cm/min in a downward position can even be achieved.

## VERTICAL UP POSITION PF/3G

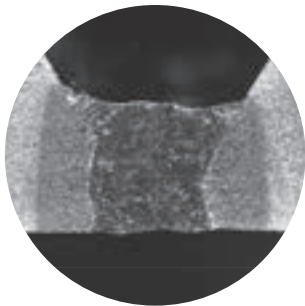


STANDARD

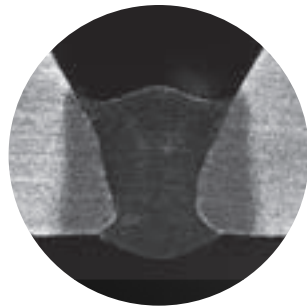


LSC

## VERTICAL DOWN POSITION PG/3G

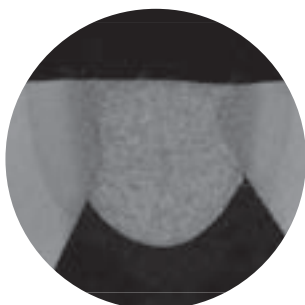


STANDARD

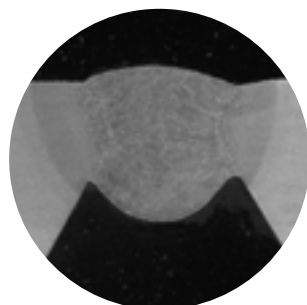


LSC

## OVERHEAD POSITION PH/4G



STANDARD



LSC

# REDUCED CLEANING EFFORT FOR GAS NOZZLES

## A COMPARISON OF THE GAS NOZZLES AFTER 340 IGNITIONS

LSC vs. standard dip transfer arc

(VD = 7.0 m/min with 15 mm stick out, contact tip 1.0 mm):

**UP TO 75% LESS SPATTER WITH LOW SPATTER CONTROL.**



WITHOUT LSC



WITH LSC

# WELDING WITH LSC IN THE SPRAY ARC

With an activated penetration stabilizer, the TPS/i readjusts the wire speed instead of the welding current, thereby ensuring constant penetration.

An additional wire control keeps the current and penetration constant if the distance between the welding torch and the component changes. The arc becomes significantly more stable and the penetration is always constant.

## ADVANTAGES OF THE PENETRATION STABILIZER

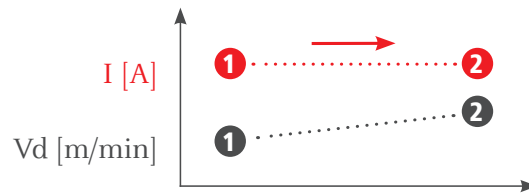
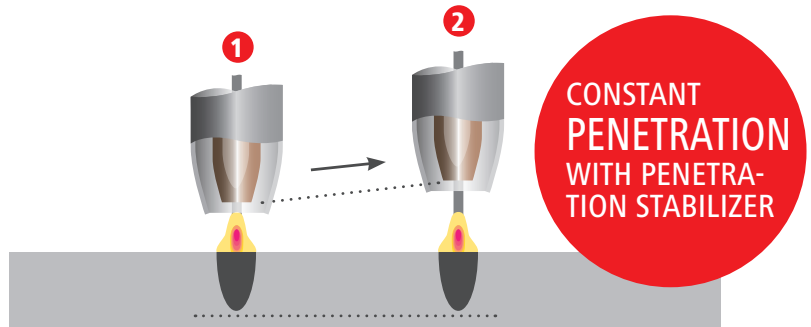
- / Improved welding quality
- / Savings in rework and additional costs
- / Ideal support in case of insufficient visibility or accessibility = stick-out fluctuations are compensated for
- / Ideal for position welding
- / Narrower opening angles can be used – saving on filler materials



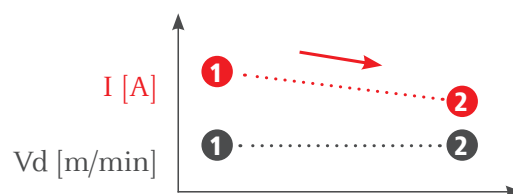
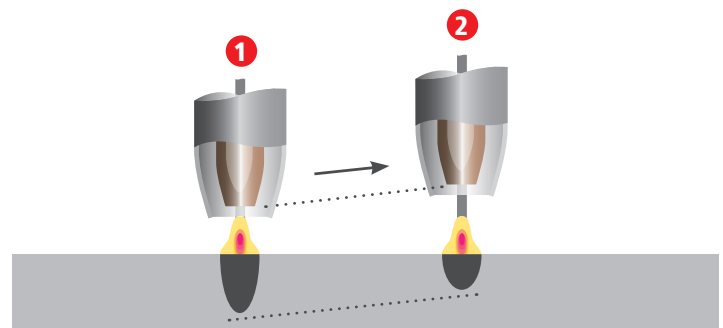
# HOW IT WORKS: PENETRATION STABILIZER



## WITH PENETRATION STABILIZER



## WITHOUT PENETRATION STABILIZER



/  $I$  = amperage,  $V_d$  = wire speed.

# OVERVIEW FRONIUS WELDING PACKAGES

WELDING PACKAGE **STANDARD**

WELDING PACKAGE **LSC**

WELDING PACKAGE **PULSE**

WELDING PACKAGE **PMC**

WELDING PACKAGE **CMT**

AREAS OF APPLICATION	STANDARD	LSC	PULSE	PMC	CMT
Sheet thickness up to 1 mm	●●●○○	●●●●○	●●○○○	●●●○○	●●●●●
Sheet thickness between 1 and 3 mm	●●●○○	●●●○○	●●●○○	●●●○○	●●●●●
Sheet thickness upwards of 3 mm	●●●○○	●●●○○	●●●○○	●●●●●	●●●○○
Welding in position	●●●○○	●●●○○	●●○○○	●●●○○	●●●●●
Welding speed	●●●○○	●●●○○	●●●○○	●●●●●	●●●●●
Welding with 100% CO <sub>2</sub>	●●●○○	●●●○○	○○○○○	○○○○○	●●●●●
Spatter prevention	●●○○○	●●●○○	●●●○○	●●●○○	●●●●●
Manual root passes	●●●○○	●●●○○	●○○○○	●●○○○	●●●○○
Mechanized root passes	●●●○○	●●●○○	●●●○○	●●●○○	●●●●●

MATERIALS	STANDARD	LSC	PULSE	PMC	CMT
Steel	●●●○○	●●●○○	●●●○○	●●●●●	●●●●●
CrNi	●●●○○	●●●○○	●●●○○	●●●●●	●●●●●
Aluminum	●○○○○	●○○○○	●●●○○	●●●●●	●●●●●
Other materials	●●○○○	●●○○○	●●○○○	●●○○○	●●●●●



/ Perfect Welding / Solar Energy / Perfect Charging

## THREE BUSINESS UNITS, ONE GOAL: TO SET THE STANDARD THROUGH TECHNOLOGICAL ADVANCEMENT.

What began in 1945 as a one-man operation now sets technological standards in the fields of welding technology, photovoltaics and battery charging. Today, the company has around 5,440 employees worldwide and 1,264 patents for product development show the innovative spirit within the company. Sustainable development means for us to implement environmentally relevant and social aspects equally with economic factors. Our goal has remained constant throughout: to be the innovation leader.

Further information about all Fronius products and our global sales partners and representatives can be found at [www.fronius.com](http://www.fronius.com)

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