

WiseThin+™



A novel and productive tailored short arc process for manual and mechanised welding of sheet metals

General description of the process

Kemppi's WiseThin+ process involves very accurate real time measurement of voltage (voltage sensing cable), which serves as the input for the voltage based control. Once the power source has recognised a short circuit, increase in current triggers the transfer of a droplet of filler metal from the wire.

When the voltage measurement is exactly right, the current is dropped, before the filler-metal droplet falls and a short circuit ends. A short circuit ending at a point of low current produces smooth transfer of filler metal, with no spatter. After the short circuit is broken, a pulse is created in the current that heats the welding pool, but it does not cause transfer of filler metal.

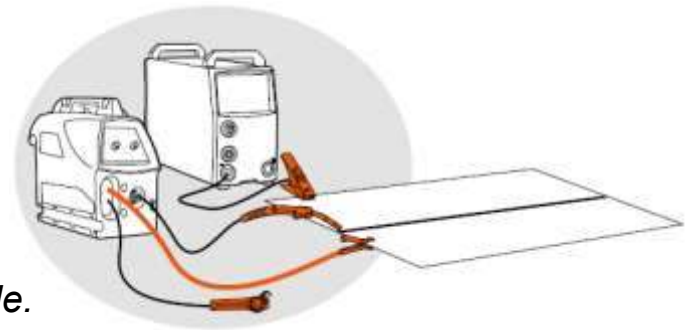


Fig. 1. WiseThin+ voltage sensing cable.

WiseThin+™

WiseThin+

In the short circuit period:

- The filler wire contacts the work piece and shorts
- The welding current rises, which forces the tip of the wire to enter the pinch mode
- Process lowers the current before droplet detachment
- The droplet detaches and softly transfers into the weld pool

In the arc period:

- The arc reignites in low current value
- The wire and the welding joint are melted
- Controlled arc force forms a molten weld pool.

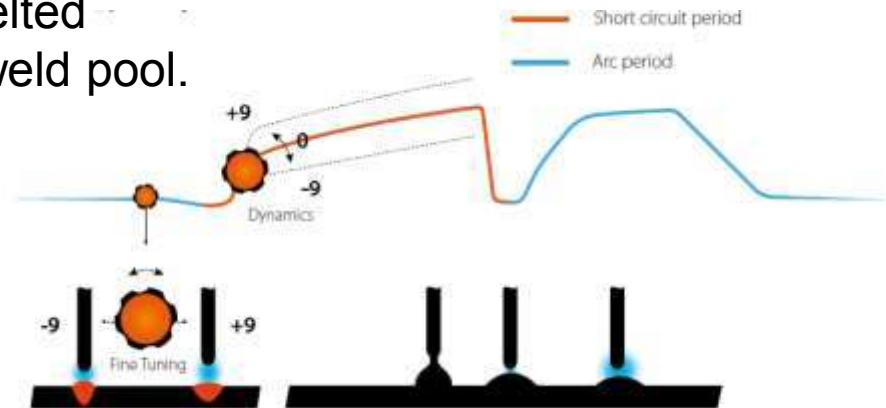


Fig. 2. WiseThin+ welding process.

Process benefits



- **WiseThin+** process is based on precise voltage measurement and current control
- Mixed gas welding characteristics with pure CO₂. Saves welding costs.
- Expands the parameter window and thus reduces the need to use smaller wire diameters
- Down hand and all positional welding
- Reduces the amount and size of spatters
- Soft pleasant arc characteristics
- Easy to use

Fig. 3. WiseThin+ is included in FastMig MXP 38.

Process benefits

- **Excellent** welding characteristics for welding plate thicknesses 0.8...3.0 mm
- Produces high quality welds
- Higher welding speed than in traditional shot arc welding
- Reduces heat input and thus also deformation
- Excellent arc ignition for tack and intermittent welds
- Stable arc for positional welding for thicker plate thicknesses
- **WiseThin+** is a MIG/MAG welding process 131, 133, 135, 136 or 138 according to standard EN ISO 4063.

Available welding programs

- There are **WiseThin+** welding programs for the most common wire types, diameters and shielding gases for structural (Fe) and stainless steels.
- Availability of welding programs depends on the order (welding program packages or MatchCurve).
- Customised **WiseThin+** welding programs can be made by order (MatchCustom).

WiseThin+™ process parameter regulation

Very simple to adjust welding parameters:

- Wire feed speed
- FineTuning (-9...+9)
 - -9 cold and tight
 - +9 warm and soft
- Dynamics (-9...+9)
 - -9 arc is soft
 - +9 arc is hard
- Other functions similar to 1-MIG or Pulse
 - CreepStart
 - HotStart
 - CraterFill

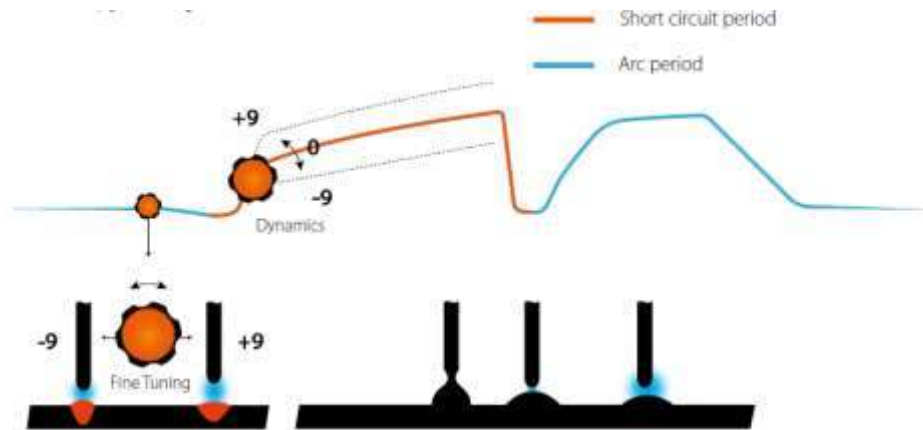
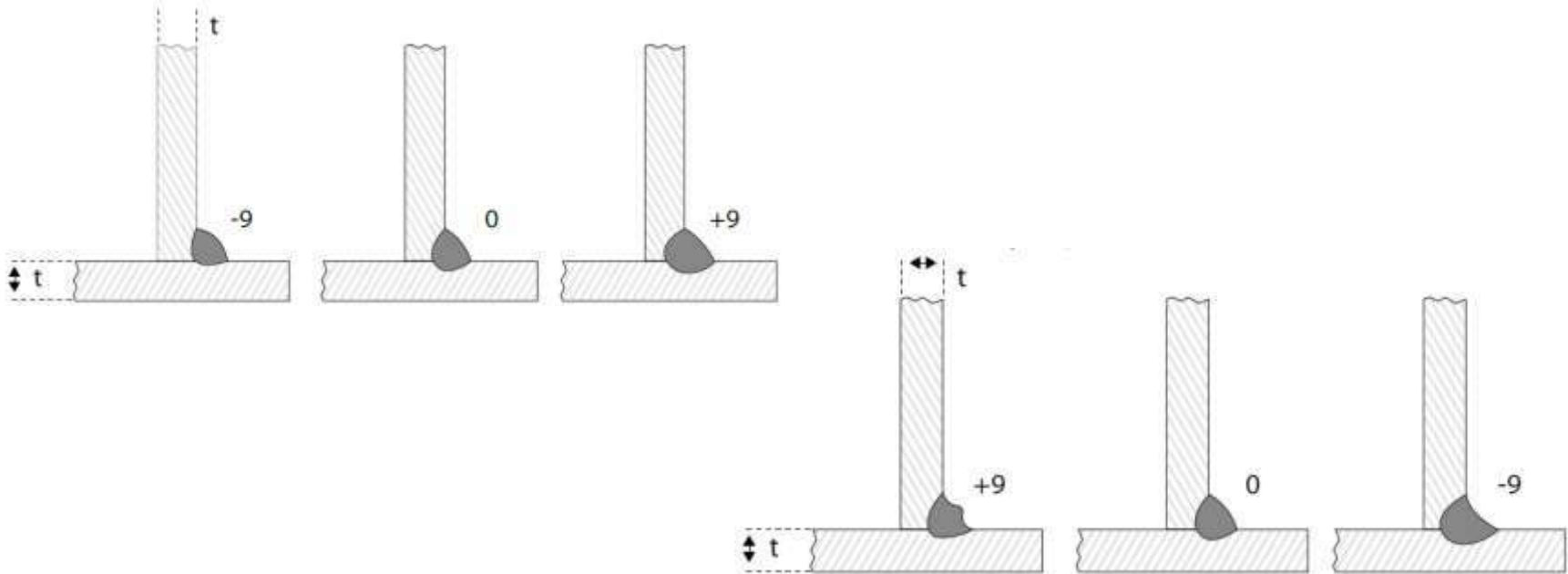


Fig. 4. Process parameter regulation.

WiseThin+™ process parameter regulation

Fine tuning affects the weld pool formation. When plate thickness $t < 2$ mm, the fine tuning setting gives a weld like the one below.



Dynamics affects the weld pool formation. When plate thickness $t < 2$ mm, the dynamics setting gives a weld like the one above.

Fig. 5. Fine tuning and dynamic adjustment

Welding techniques for WiseThin+™

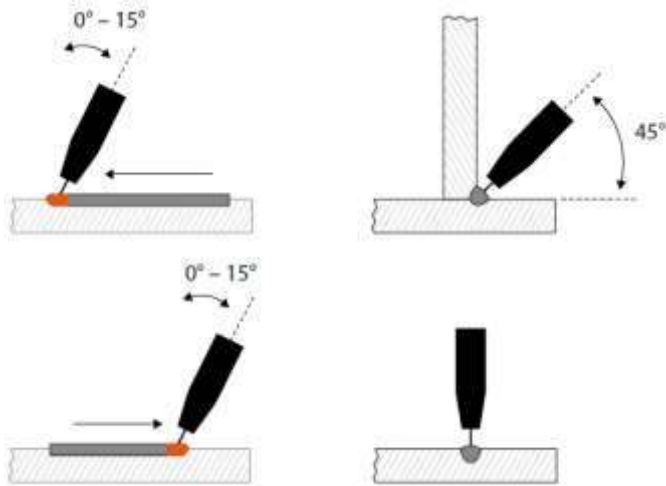


Fig. 6. Welding technique

- WiseThin+ is a welding process for sheet metal and position welding (position welding also with thicker plates).
- Welding technique is the same as standard short arc MIG/MAG welding.
- On sheet metals pushing 15°...0° gun angle.
- In thicker plates vertical up welding pushing 15°...0° gun angle.
- In sheet metals and thicker plates vertical down welding pulling 15°...0° gun angle.
- With welding plate thicknesses above 3 mm welding direction is slightly pulling gun angle, which increases penetration.

WiseThin+ case – intermittent welds

- WiseThin+ in intermittent welding in sheet metals
 - Plate thickness below 2 mm
- Excellent arc ignition (welding wire is not in contact before the arc ignites)
- No need for grinding before or after
- No spatter removal
- Position PA or PB
- 1.0 mm Fe solid wire
- CO₂ or Ar+CO₂ shielding gas

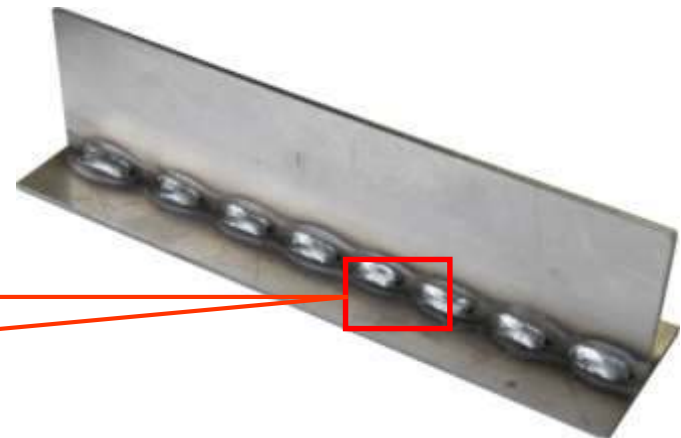


Fig. 7. Intermittent welding

WiseThin+ case – sheet metal welding with CO₂



Fig. 8. Fillet weld

- WiseThin+ welding on sheet metal
- Excellent arc characteristics for CO₂ shielding gas
- No spatter removal
- Position PA or PB
- 1.2 mm Fe solid wire
- CO₂ shielding gas
- Plate thickness 2.0 mm + 2.0 mm
- Wfs = 2.95 m/min → I = 125 A and U = 18.7 V
- Fine tuning setting +2

WiseThin+ case – different plate thickness



Fig. 9. Fillet weld – different plate thickness

- WiseThin+ welding on sheet metal to thicker plate
- Excellent arc characteristics ensure spatter-free welding
- This application is hard to weld with the same quality using standard MAG or 1-MIG
- No spatter removal
- Position PB
- Welding arc should be focused on the 5.0 mm plate and 1.0 mm from the fillet weld corner
- 1.2 mm Fe solid wire
- Ar+ CO2 or CO2 shielding gas
- Plate thickness 1.0 mm + 5.0 mm
- $Wfs = 3.5 \text{ m/min} \rightarrow I = 120 \text{ A}$ and $U = 19 \text{ V}$
- Fine tuning setting +0.



Fig. 10. Fillet weld – position welding

WiseThin+ case – position welding

- WiseThin+ welding gives excellent welding characteristics for position welding in thicker plates.
 - Arc is steady and easy to handle
 - Arc sound is uniform all the time because of stable short circuiting of the arc
 - Weld pool flows to the joint smoothly and there is no undercut risk
 - No spatters
- Position PF
- 1.2 mm Fe solid wire
- Ar+ CO₂ or CO₂ shielding gas
- Plate thickness 6.0 mm + 6.0 mm
- Wfs = 2.65 m/min → I = 105 A and U = 18.5 V
- Fine tuning setting +1.5

Summary

- WiseThin+ is an excellent choice for welding sheet metals and thicker plates in position welding.
- Advanced power source technology makes it possible to control arc fast and accurately.
- Reduces the amount and size of spatters compared to standard and synergic MAG.
- Excellent arc characteristic also with CO₂. Cheaper shielding gas saves money.
- Stable welding arc and easy to adjust parameters.
- Excellent welding characteristics for tack and intermittent welding.