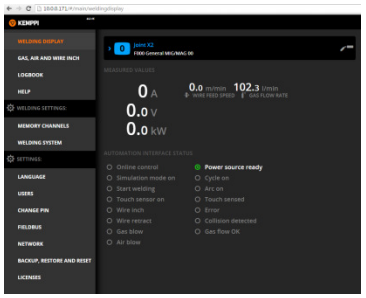
KEMPPI

A7 MIG Welder 350/450
New standard in Robotic welding

General presentation

2016.04.18



Complete arc welding function package for robotic welding from KEMPPI

Torch cable bundle length according to robot type

- Euro –version
  - **Gas cooled –version**
  - **Water cooled –version**
- Power pin –version

Wire feeder

- Euro –version
- Power pin –version

→ **A7 Wire Feeder 25**

Wire hose with liner and connectors

Bracket for Wire feeder with bolts, according to robot type

Robot interface

- **Fieldbus module according to robot type**

K-bus cable

Cable clamps

Welding power source

- **A7 MIG Welder 350**
- **A7 MIG Welder 450**

Water cooler

Wire coil mounting (bob holder) with attachment bracket according to robot type

Adapter flange according to robot type and torch clamp type

Kemppi Torch clamp

- Hollow wrist version
  - **Collision detector version**
    - Robot mount T1
  - **Dummy version:**
    - Robot mount T3
- Standard version
  - **Collision detector version**
    - Robot mount T2
  - **Dummy version:**
    - Holding bracket

Kemppi Welding Gun Neck

- **Gas cooled version:**
  - A7 MIG Gun 500-g (22°, 35°, 45°)
- **Water cooled version:**
  - A7 MIG Gun 500-w (22°, 35°, 45°)

Torch cleaning unit

A7 MIG Welder 350/450

The A7 MIG Welder power sources are based on top of the class inverter technology. They belong to the high-end system class of Kemppi products.

There is a wide range of processes for you to choose the one that suits your application: MIG, 1-MIG, Pulse, Double Pulse, Brazing, Cladding, WiseRoot+, WiseThin+, WiseFusion and WisePenetration.

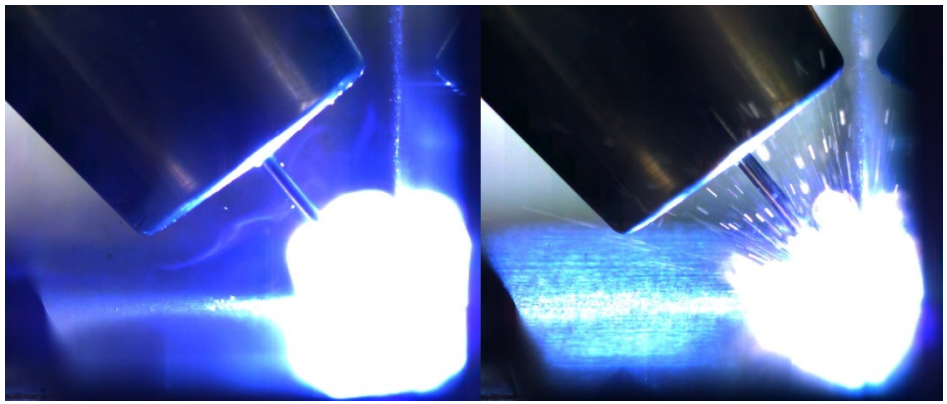
The system can be configured to contain an optimal choice of just the right welding programs for the application. There are welding programs available for all the common filler wire and shielding gas combinations for mild steel, stainless steel and aluminum.

When applicable, welding programs are naturally optimized for high welding speeds, typically exceeding 750mm/min. With its stable arc, WiseFusion can support welding speeds up to 1500 mm/min.

A7 MIG Welder 350/450

Especially in thin sheet welding it is very important to minimize the amount of spatters and to have the arc stabilized immediately after ignition. The A7 MIG Welder provides an excellent solution for this.

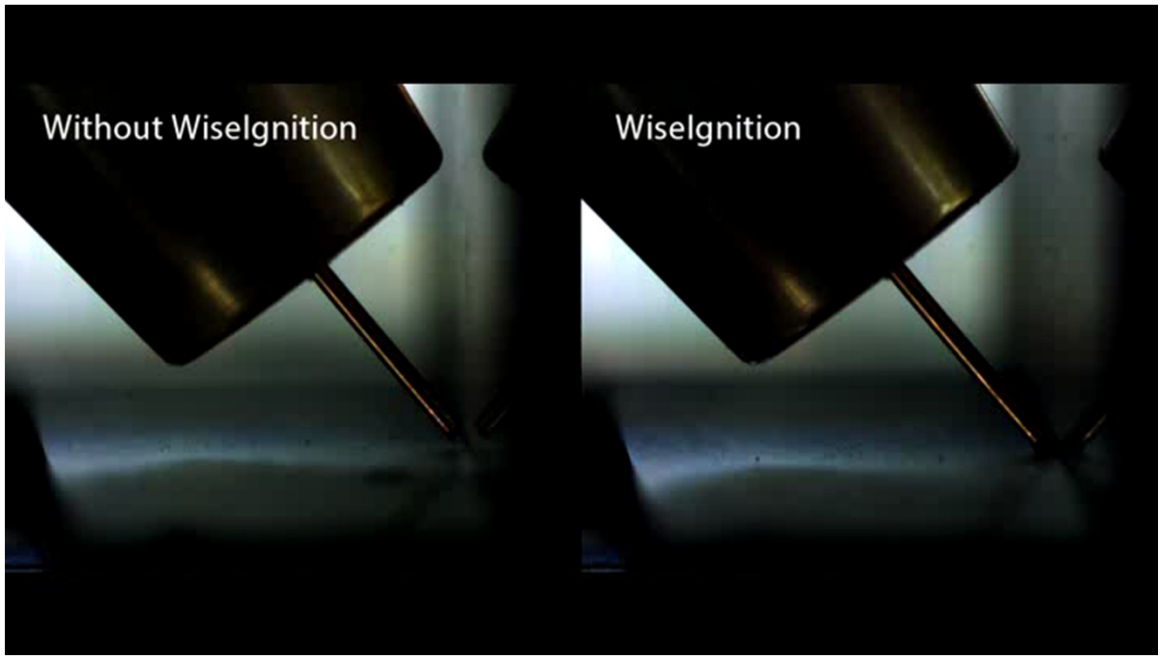
Touch Sense Ignition is an A7 MIG Welder function that provides smooth arc start characteristics with minimum amount of spatters.



Touch Sense Ignition

No Touch Sense Ignition

Arc ignition feature

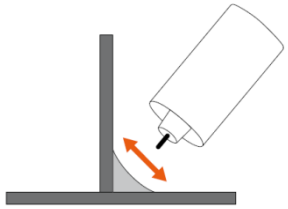


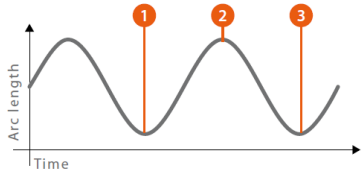
A7 MIG Welder 350/450

As a standard feature, A7 MIG Welder provides a signal for Through the Arc Seam Tracking (**TAST**). The signal is transmitted via fieldbus communication to the robot controller.

Benefits:

- Reliable tracking also with Kemppi's pulsed MIG, WiseFusion and MIG processes
- Cost savings and simpler robot cell design, because no additional hardware is required at the robot controller end





A7 MIG Welder 350/450

All welding applications differ slightly from each another. Cable lengths eat some of the voltage, and therefore the actual arc voltage at the welding gun can be something different from what the robot program has requested.

A7 MIG Welder has a solution for this. The arc voltage function provides means to calibrate the system so that the voltage values set in robot program are guaranteed to be delivered all the way to the actual arc at the welding gun. This calibration is done once when the system is set up. After that it is required only if essential parts of the systems are changed at some point.

A7 MIG Welder 350/450

Summary

- Two amperage levels available: 350 and 450
- KeBus communication with the wire feeder
- Welding characteristics optimized for automated welding
- Enhanced arc ignition feature: Touch Sense Ignition
  - better control, less spatter
- Through the arc seam tracking signal available for robot controller
- Seam searching voltage approx. 50−180 V available and Highspeed signal through Analog output
- Two models for integrated water cooling unit:
  - Model with a pressure sensor
  - Model with a water flow sensor
- Logbook function with export to spred sheet through Parser tool (see example)
- New FB Modules Compact com
  -Devicenet, EtherCat, Ethernet/IP, Profibus, Modbus
  -Some modules also in M12*1 connector available

A7 MIG Wire Feeder 25

- Two motors and 4-wheel drive for stable and reliable wire feed up to 25 m/min
  - Kemppi original wheel sets for Fe, Ss and Al available
- Integrated WF controller electronics in the WF casing
  - Faster and more accurate control located close to the arc
  - Wire feed control closer to the arc control signals is more resistant against external interferences
- KeBus communication to power source
  - Number of required contact wires is only 4 leads, easy to maintaine
  - Allows longer distances between the wire feeder and power source
- Robust casing
- Current cable is attached with a screw to WF. No fear of loosening the contact when robot is moving and rotating the cables.
- Comes with suitable adapter plate for the robot's 3rd joint attachment
- Precise force adjustment with robust aluminum cast handle good visible scaling
- Quick release feeder roll knobs

A7 MIG Wire feeder 25

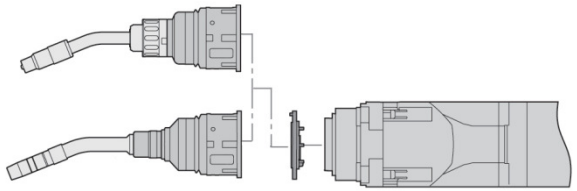
Integrated functionalities:

- Gas test, Wire feed, wire retract and blow out test buttons illuminated
- Integrated gas flow sensor
  - Min. flow rate monitoring adjustable
- Euro and PowerPin connections available
- Integrated blow out valve as standard
- Back light provided behind drive wheels
- Support for push-pull torches (Dinse, Binzel, TBi)
- Transparent door for easy control even from outside of the welding cell
- Feeder roll sets according to the selected torch type and brand (optimizes length of the guide tubes)
- New inter connection cables with zipper for fast maintenance.

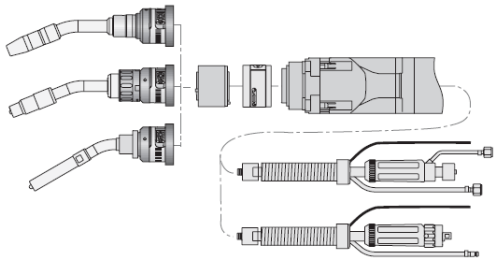
A7 MIG Gun 500 -g/-w

- Ordering based on information on robot type and welding application
- Covering all common robot brands and models
- Hollow wrist (T1&T3) / non-hollow wrist versions (T2)
  - With (T1&T2) or without (T3) shock sensor modules
  - Adapter flange to 6th axis of robot
  - Cable bundle
- Gun necks for gas and water cooled versions
- Wire or gas nozzle search versions
- Wire brake option available for non HW-models
- Consumables:
  - Kemppi: Gas nozzle, contact tip holder

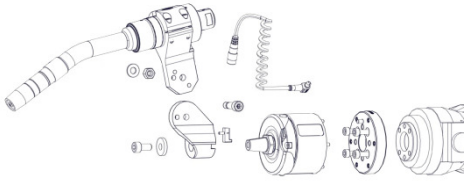
T1



T3



T2



A7 MIG Gun 500 -g/-w

Consumables that make the difference

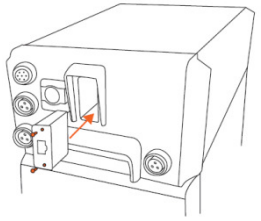
- Inside the robotic gun cable bundle a Kemppi DL Chili liner is used to ensure smooth and effortless wire conduction from wire feeder to contact tip. DL Chili liner is a two-component plastic liner that suits solid filler wires including aluminum, stainless steel, and steel. DL Chili technology reduces the surface friction losses between the filler wire surface and the liner wall, reducing drag by up to six times compared to traditional plastic.
- Kemppi LiFE+ contact tips last up to 5 times longer than standard copper tips, due to innovative alloying and hardening techniques. The LiFE+ core element retains its hardness and refined micro structure, even after elevated welding temperatures of 1000 °C.

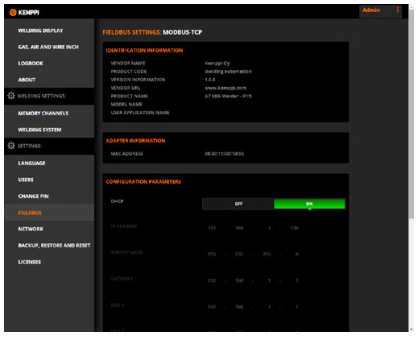
Web User Interface - New era for accessibility and management

- Access to power source from external computer via Ethernet with a regular web browser
- User management and login
- Memory channel configuration
- Fieldbus configuration
- Logbook monitoring and download
- Welding system settings
  - Emergency stop configuration
  - Gate door switch configuration
  - Setup panel functionality
- Online meters
  - Welding parameters and I/O´s
- Backup and restore

A7 Robot Interface Unit

- Extended fieldbus interfaces for robots with HMS CompactCom hardware modules like:
  - DeviceNet,
  - EtherCAT,
  - EtherNet/IP,
  - Profibus,
  - Modbus
- Module is inserted to Kemppi robot interface unit and fixed with two screws – fast and easy
- Selected fieldbus connection parameters are configured by using dedicated web browser interface menu page – fast and easy





Robot Interface Technical Information

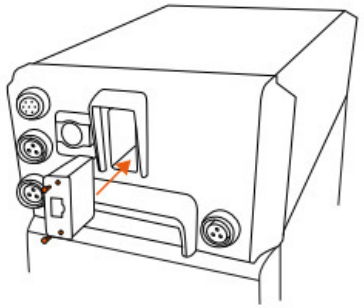


Figure 3.13: Installing a fieldbus adapter

Table 3.2: Kemppi Oy vendor IDs and device description files

Fieldbus	*Vendor ID*	*Device description file*
EtherNet/IP 1-port and 2-port	1403 (integer)	EDS (Electronic Data Sheet)
EtherCAT	00FE0001h (hexadecimal)	ESI (EtherCAT Slave Information)
PROFINET 1-port and 2-port	0368h (hexadecimal)	GSD (General Station Description)
Modbus TCP 1-port and 2-port	"Kemppi Oy" (text)	The Modbus standard does not feature a device description file.
DeviceNet	1403 (integer)	EDS (Electronic Data Sheet)
PROFIBUS	0368h (hexadecimal)	GSD (General Station Description)
Modbus RTU	"Kemppi Oy" (text)	The Modbus standard does not feature a device description file.

A7 Robot Interface Unit

- Communication between the automation device (robot) and welding equipment is based on I/O tables (interface modes).
- There are I/O tables available for different welding robot setups.
- The comprehensive list of I/O tables is included in the Integration guide.
- Default I/O table for A7 MIG Welder 350/450 is 15.

Function	Bits	Value range				I/O table								
		Min	Max	Step	Units	KEMPPI 1	KEMPPI 2	KEMPPI 3	KEMPPI 4	CUST1	CUST2	CUST3	CUST4	CUST5
						1	13	14	15	3	5	6	7	9
Control values														
WireFeedSpeed	16	5	250	1	0.1 m/min	X	X	X	X	X	X	X	X	X
Voltage	16	80	460	1	0.1 V	X	X	X	X	X	X	X	X	X
FineTuning	16	0	180	1	0.1	X	X	X	X	X	X	X	X	X
Dynamics	8	0	18	1	1	X	X	X	X					
MemoryChannel	7/8	0	199	1		8	8	8	8	8	7	8	8	8
Control signals														
WeldingAllowed	1									X			X	X
SimulationMode	1					X	X	X	X				X	X
StartWelding	1					X	X	X	X	X	X	X	X	X
WireInch	1					X	X	X	X	X	X	X	X	X
WireRetract	1					X	X	X	X	X	X	X	X	X
GasBlow	1					X	X	X	X	X	X	X	X	X
AirBlow	1					X	X	X	X					
TouchSensorToolSel	1					X	X	X	X					
TouchSensorOn	1					X	X	X	X	X	X	X	X	X
OnlineControl	1					X	X	X	X	X	X	X	X	X
FieldbusCheck	1					X	X	X						
ErrorReset	1					X	X	X	X				X	X
DigitalOutput1	1					X	X	X	X	X	X	X	X	X
DigitalOutput2	1					X	X	X	X	X	X	X	X	
DigitalOutput3	1					X	X	X	X	X	X	X	X	
DigitalOutput4	1								X					
DigitalOutput5	1								X					
DigitalOutput6	1								X					
DigitalOutput7	1								X					
DigitalOutput8	1								X					

Extended communication through the fieldbus

- More control from Robot like:

-Dynamic control
-Touch sensing control (wire or Gas nozzle
-up to 8 digital outputs to driver cleaning station or other devices
-simulation mode for start up test of the equipment without real arc

- More feedback control to the Robot like

-Motor current in binary value (Amps)
-Gas flow rate in binary value (liter/min)
-TAST signal amplified for Synergic & Pulse mode
-up to 8 throughput signals for example to read an wire sensor or other devices
-measured wire feed speed (m/min) as feedback information
- Process feedback byte:
  0 = No process active (an empty memory channel)/1 = MIG/2 = 1-MIG/3 = Pulse MIG/4 = Double Pulse MIG/11 = WiseRoot+/14 = WiseThin+

Network Setup examples

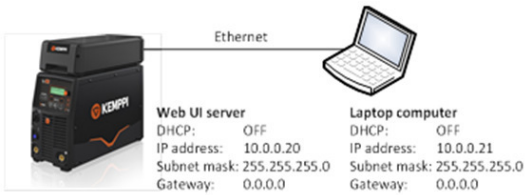


Figure 1: Example settings for direct connection with a computer

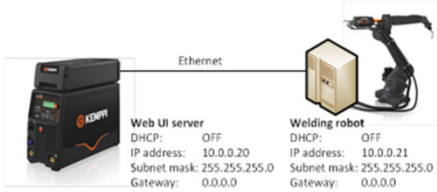


Figure 2: Example settings for direct connection with a robot

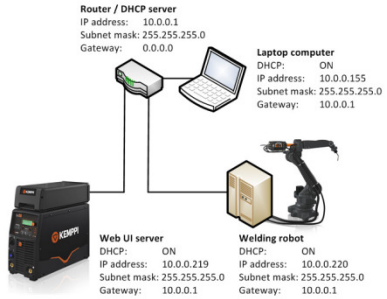
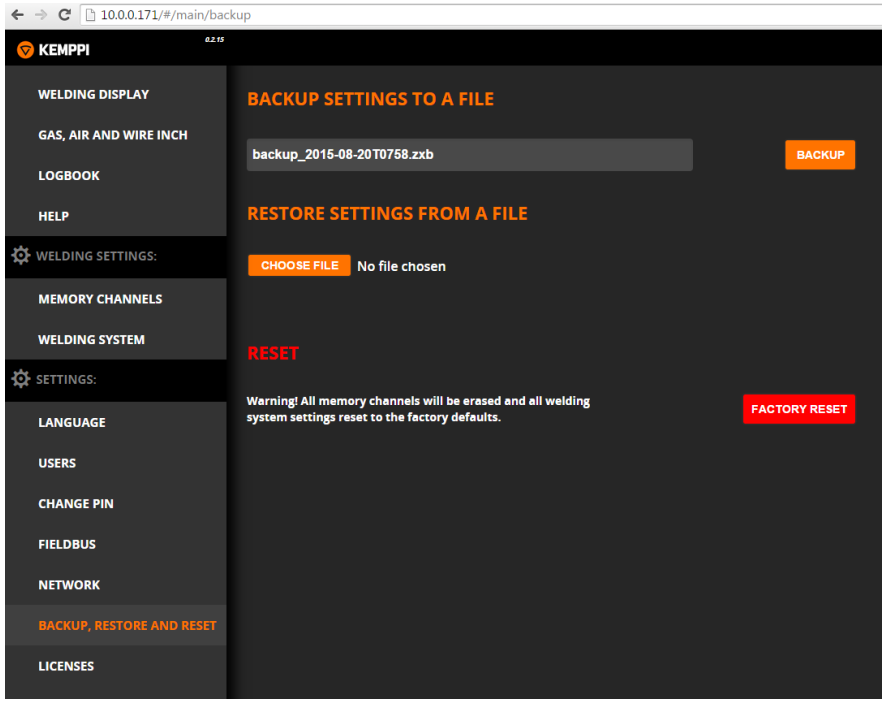


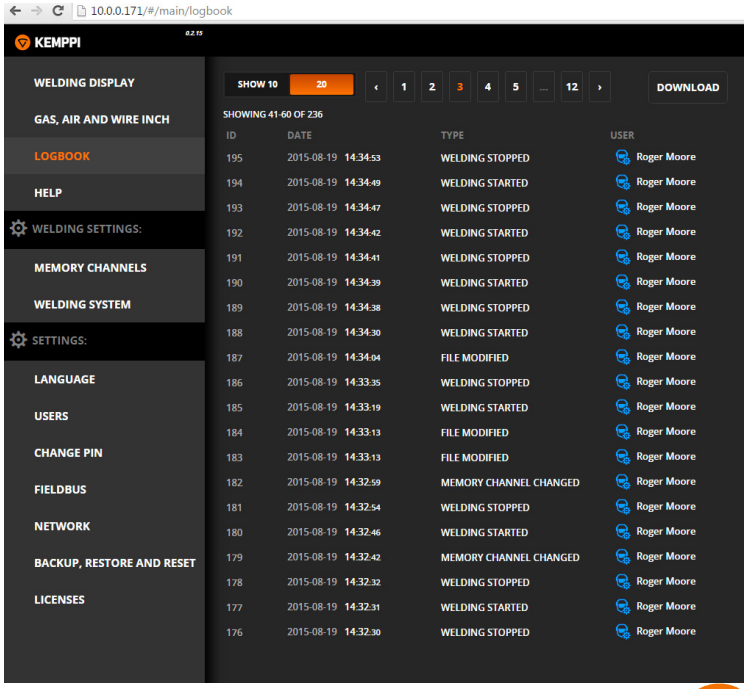
Figure 3: Example DHCP-enabled LAN configuration without internet access

User Levels and their definition

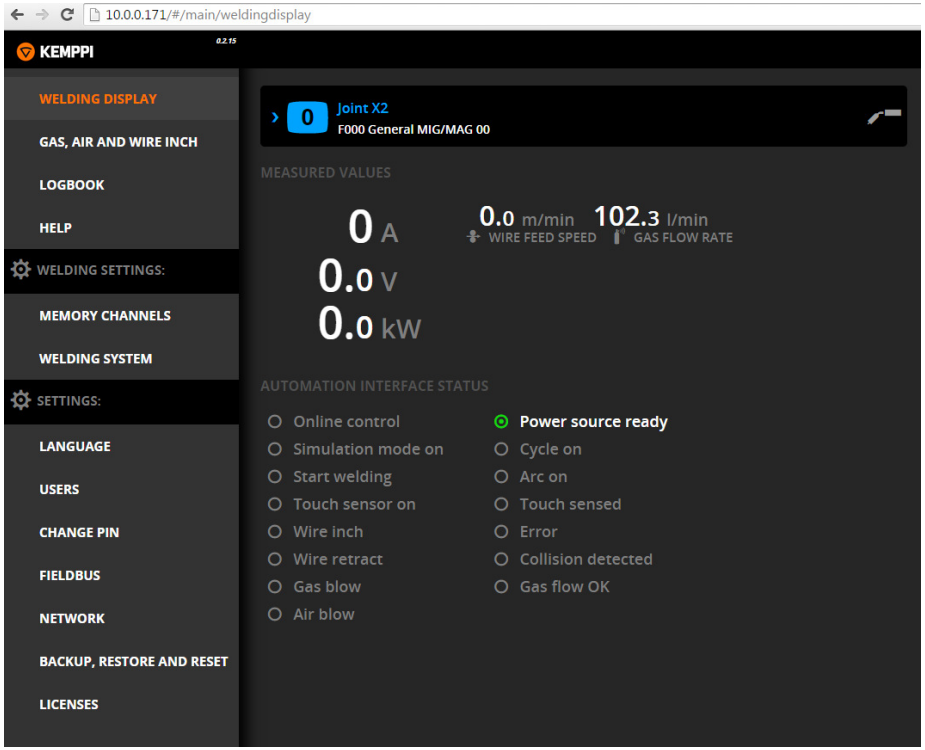
Role	Access level	Description
Welder	Level 0	A welder works on a robot cell changing work pieces and welding. The welder can adjust welding values within the limits set by the supervisor. The welder can't change system settings or memory channels.
Supervisor	Level 1	A supervisor teaches the robot new works and prepares the system for welding. The supervisor specifies welding value limits to be used by welders. The supervisor creates memory channels and deletes and modifies them. The supervisor cannot change the system settings related to the cell configuration.
Administrator	Level 2	An administrator builds and maintains the robot cell. The administrator specifies all system settings related to the fixed environment, that is, emergency stop or welding cable length. The administrator can create, modify and delete other users and set user identification system off if needed.
Service supervisor	Level 2	The service supervisor role has a fixed user account in the welding system. It has the same user rights as the administrator. This user account is hidden and has been reserved for use by service personnel. Service supervisor's user account can't be changed or deleted. The service supervisor can log in only from the Web UI. The setup panel doesn't allow that user.

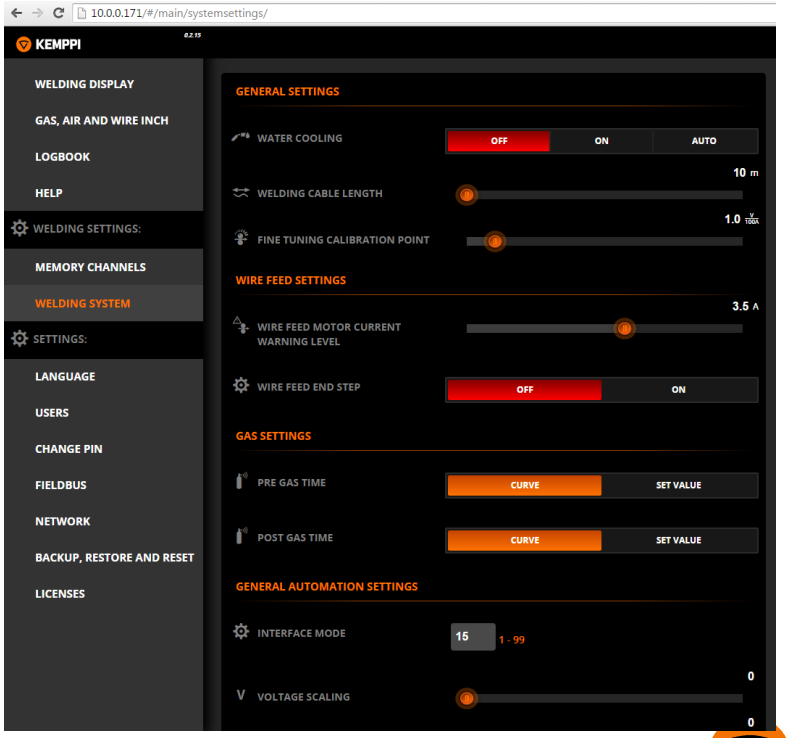
Web User Interface - New era for accessibility and management





Web User Interface - New era for accessibility and management





Summary of Sales supporting Functions and Argumentations

- Configurator for fast and easy item selection according the robot type and communications FB
- Detailed Integrator manual to guide the start up
- Log book with converter Software to Excel
- Backup without additional Hard- or Software
- Kemppi torch with own Kemppi-TCP, Kemppi Chili-Liner, Kemppi LongLife+ contact tips
- Browser, blow out, gas sensor without additional workload and costs
- Automatic recognition of the FB module through the Browser, fast and easy to configure.
- New cooling unit with in builded water flow sensor and external attached filter unit.
- Wire Feeder Features:
  - 2 Versions Euro ZA and PowerPin
  - Gas sensor und blow out valve
  - Buttons for Gas, blow out, wire inch and retract with LED
  - Illuminated wire mechanism and transparent door
  - Screwed power cable connection
  - big buttons for wire pressure for precise adjustment of the force through good visible scale
  - robust Al cast box
- Available in Q3 I/O Box with 8 in- and outputs for different user functions like wire sensor or drive an cleaning station.

Summary of Sales supporting Functions and Argumentations

- EM-Stop input free configurable without additional hardware work → no extra costs!
- Door switch input free configurable without hardware work → no extra costs!
- PP- Synchronization pre installed with activation through the browser → no extra costs! (!!use only 24V PP-Motor!!)
- Special develop synergic curves for automated welding → less testing time & faster results!
- Free configurable user levels in the browser or setup panel
- Web-Browser through teach pendant if an Fanuc, Kuka or Kawasaki Robot is in use.
- Extended communication through the FB like for example Dynamic, or feedback signals for Gas amount or motor current
- High speed seam searching, analog output for faster searching (no time lost through FB communication). Currently tested only with Kuka robots..
- New inter connection hose, less weight, with zipper for fast changing of the hoses or control cable in case of repair or maintenance
- "Fast Touch Sensing ingnition" for less spatters and faster ignition stability
- Compatible with Kemppi Arc System KAS 3

Main arguments for the Kemppi Wise welding processes

Wise Processes:

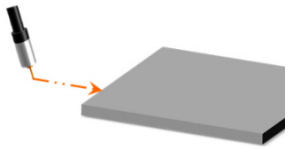
- - WiseFusion, controlled arc length, increased welding speed and reduced heat input
- - Wise RGT, less welding layers, reduced welding time and wire consumption through smaller openings.
- - WisePenetration, keeps the welding current constant in case of different sickout length. Limited applications in Robot or Automation projects
- - WiseRoot+, for root welding even in falling position. In automation project only in combination with an camera or laser system.

  - WiseThin+, special short arc process for thin sheet applications. Less heat input and spatters. Very good for MIG-brazing even in position welding

Customized Solutions & Developments

KUKA Touch sensing

- High speed touch sensing
- Kemppi A7 welder supports KUKA high speed touch sensing with 125 µs communication speed
- Search speed up to 100 mm/s for lowest cycle time and accurate search results
- Kuka fast implementation and startup Software Support for Ethercat

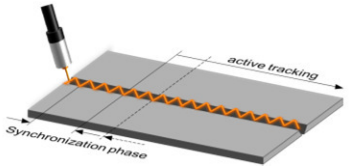


EtherCAT communication

- High speed Ethernet based field bus communication
- KUKA WorkVisual “drag and drop” catalog configuration
- Kemppi individual adapted ArcTech commands

KUKA Through the arc seam tracking

- Kemppi A7 welder provides fieldbus based tracking feedback signal
- Tracking without KUKA Arc Sense shunt box
- Even with Pulse& Fusion Processes

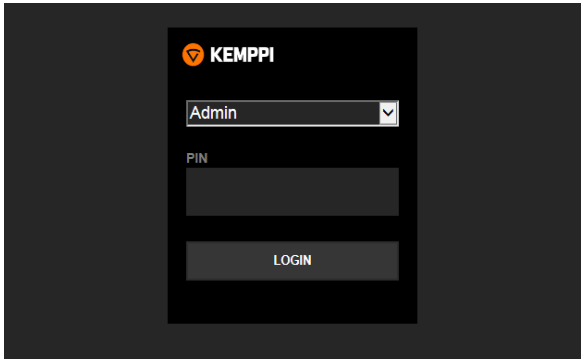


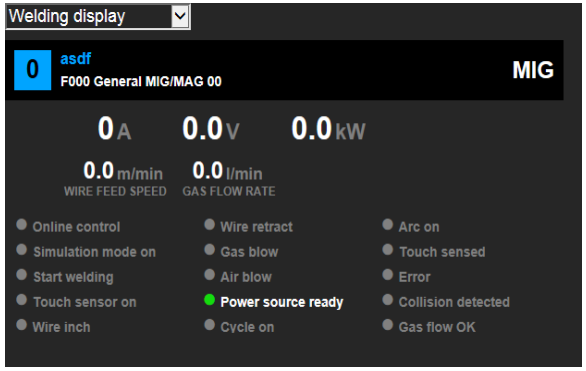
Customized Solutions & Developments

FANUC Robotics

Fanuc Through the arc seam tracking

- With A7 amplified signal and the special Fanuc controller Software we are able to perform “Through the Arc Seam Tracking” even under Pulse and Fusion welding processes.
- Full integration of Kemppi Web browser into the Fanuc teach pendant





A7 MIG Welder 350/450

Product name	A7 MIG Power Source 450
Product code	6201450
Mains connection voltage 1~ 50/60 Hz	N/A
Mains connection voltage 3~ 50/60 Hz	400 V, -15 …+20 %
Mains connection cable	4G6 (5 m)
Supply current (maximum)	32 A
Supply current (effective)	25 A
Fuse (delayed)	35 A
No-load voltage (peak)	U0 = 80 V – 98 V
Open circuit voltage (average)	85 V – 103 V
Operating temperature range	-20…+40 °C
Minimum generator power	35 kVA
External dimensions LxWxH	610 x 240 x 520 mm
Weight (no accessories)	40.2 kg
Weight (with mains connection cable)	42.6 kg
Degree of protection	IP23S
Efficiency (100 % duty cycle)	87 %
Power factor at max. current	0.88

A7 MIG Welder 350/450

Product name	A7 MIG Power Source 450
Storage temperature range	-40 …+60 °C
Temperature class	155 (F)
EMC class	A
Minimum short circuit power Ssc of supply network	5.5 MVA
Welding range	20 A / 12 V – 450 A / 46 V
Output (at 60 % duty cycle)	450 A
Output (at 100 % duty cycle)	350 A
Power supply for auxiliary devices	50 V DC / 100 W
Max. apparent power	22 kVA
Idle power	25 W
Power supply for cooling unit	24 V DC / 50 VA

Product name	Cool X
Product code	6068200
Operating temperature range	-20 …+40 °C
External dimensions LxWxH	570 x 230 x 280 mm
Weight (no accessories)	11 kg
Degree of protection	IP23S
Storage temperature range	-40 …+60 °C
EMC class	A
Operating voltage (safety voltage)	400 V -15 …+20 %
Cooling power	1 kW
Maximum pressure	0.4 Mpa
Tank volume	noin 3 l

Kemppi A7 MIG Wire feeder 25

Product name	A7 MIG Wire Feeder
Product code	6203500
Operating temperature range	-20...+40 °C
External dimensions LxWxH	380 x 250 x 170 mm
Weight (no accessories)	7.8 kg
Degree of protection	IP21S
Storage temperature range	-40...+60 °C
EMC class	A
Gun connection	Euro
Wire feed mechanism	4-roll, two motors
Filler wire sizes (Fe solid)	0.8 – 1.6
Filler wire sizes (Fe cored)	1.0 – 1.6
Filler wire sizes (Ss)	0.8 – 1.6
Filler wire sizes (Al)	1.0 – 2.4
Filler wire sizes (CuSi)	0.8 – 1.2
Wire feed speed adjustment	0.5 – 25 m/min
Operating voltage (safety voltage)	50 V DC

And you know.