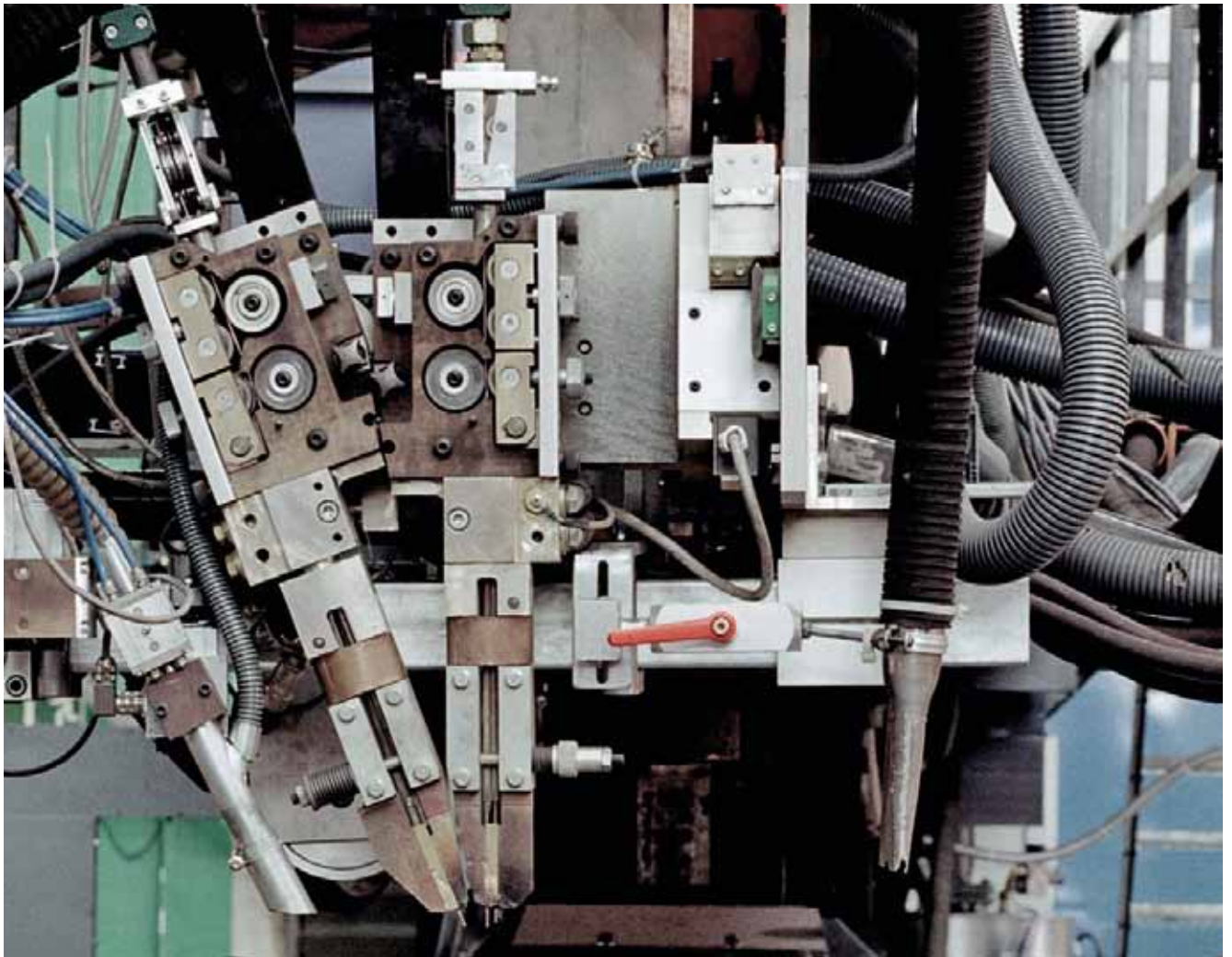


6. WELDING DEVICES



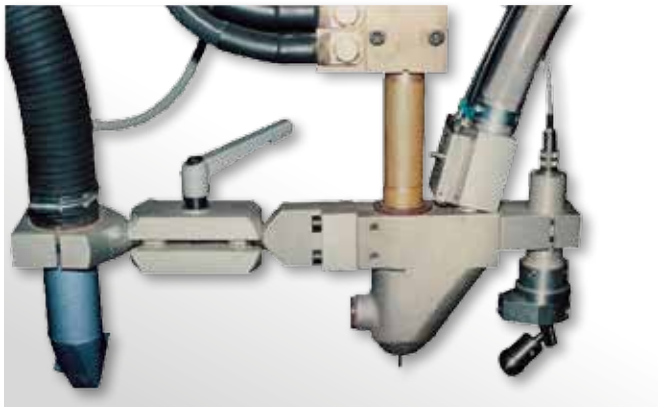
- Welding heads
- Wire feed gear motors
- Current sources
- Sensors
- Slides
- Accessories



6.1. WELDING HEADS

- SAW standard
- SAW inside
- SAW narrow gap
- GMAW narrow gap
- SAW / GMAW turret heads
- SAW multiwire inside welding head
- Multi - Mode

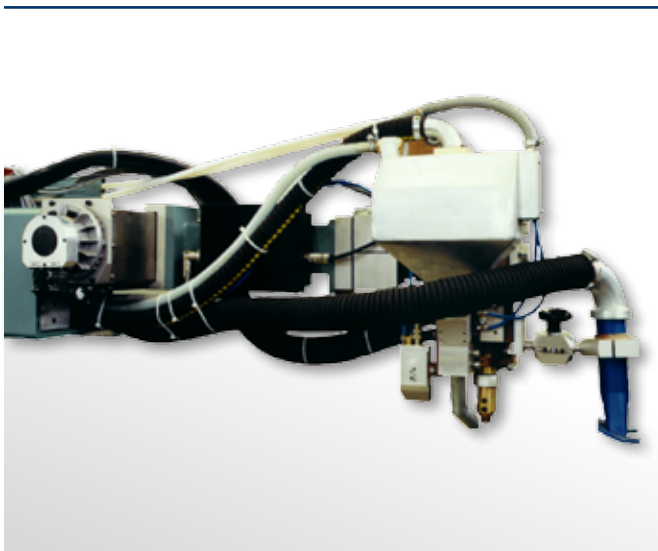
6.1.1. SAW-STANDARD



TECHNICAL DATA:

- Circular flux fill-up nozzle and pneumatically operated power flap
- With tactile sensor
- Double ball-and-socket joint including flux suction nozzle
- Wire driving mechanism: 5000 mm/min
- Max. current: 1500 A

6.1.2. SAW-INSIDE-DOUBLE WIRE

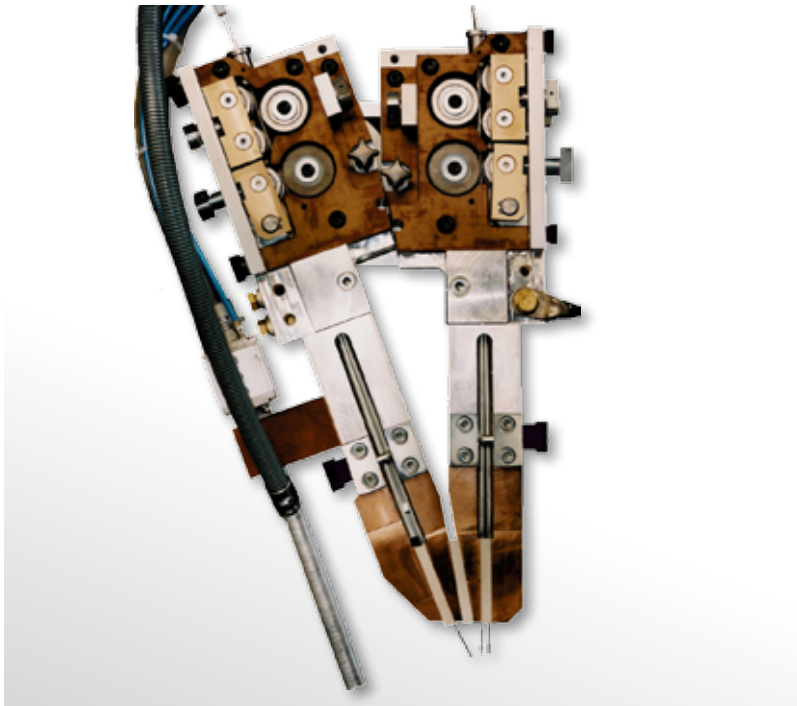


TECHNICAL DATA:

- SAW torch with contact jaws
- Current 1200 A
- Wire diameter 2 x 1.2 mm to 2 x 2.0 mm
- Max. wire feed speed: 10000 mm/min.
- Integrated flux container
- Stickout and welding head guidance, fully automatically via laser sensors including servoslides
- Min. tube diameter 480 mm (19")



6.1.3. SAW-NARROW GAP-TANDEM-WELDING HEAD

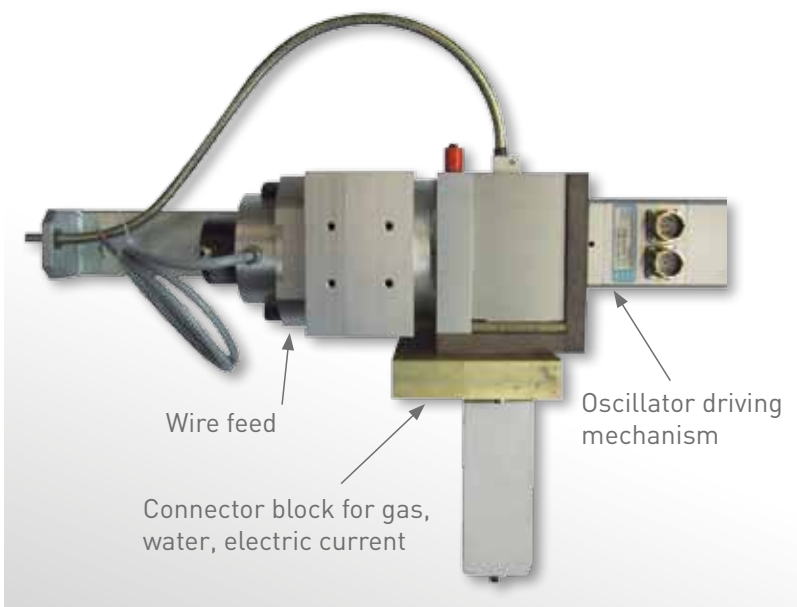


TECHNICAL DATA:

Groove width:	20 mm
Groove depth:	60 mm (150 mm)
Current:	2 x 1500 A
Wire feed:	2 x 10000 mm/min.

Wire distance and angle fixed;
Mounting surfaces for additional
elements such as sensor, flux
supply unit etc.
Single or double wire optionally

6.1.4. GMAW -NARROW GAP-WELDING HEAD

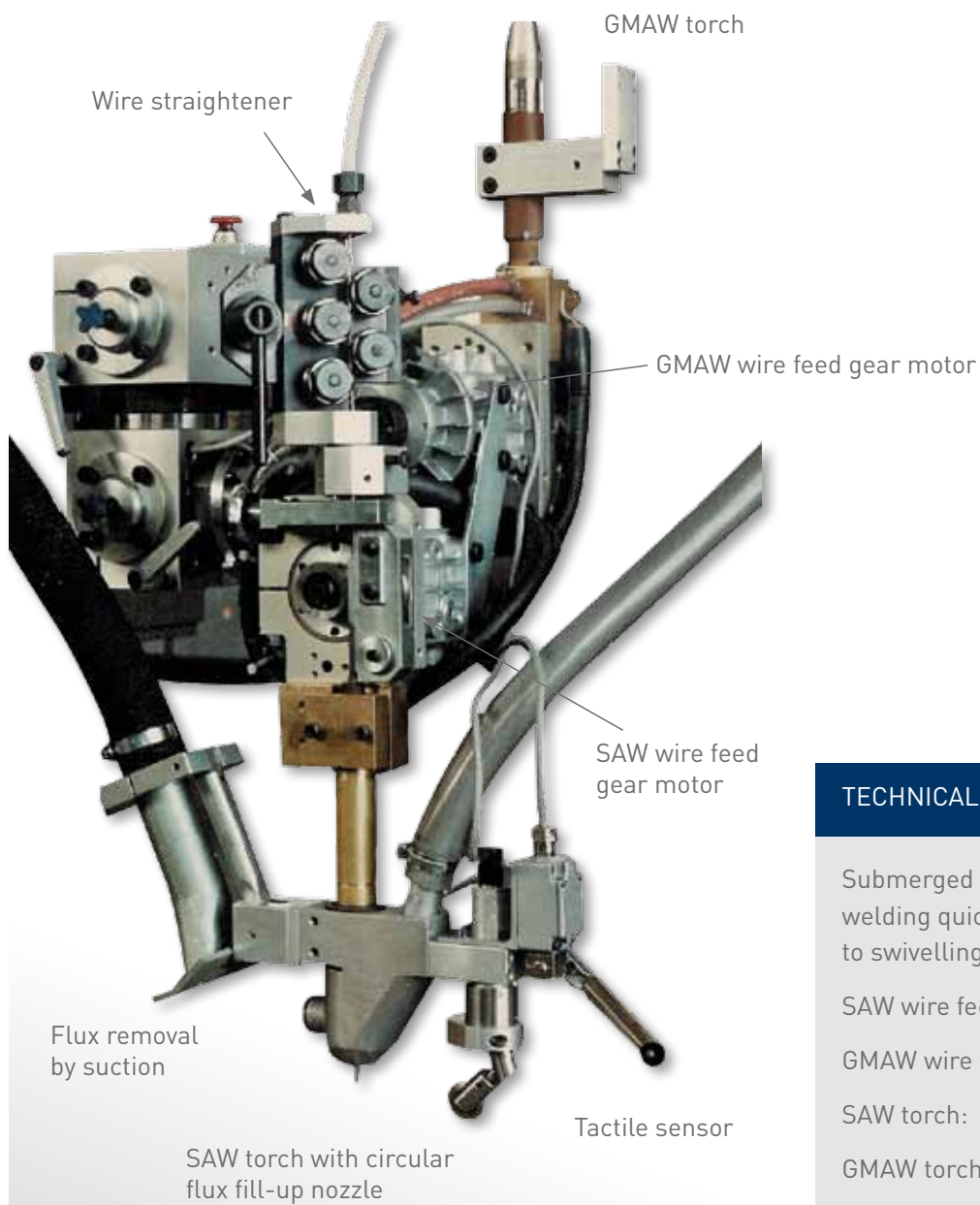


TECHNICAL DATA:

Groove width:	10 mm
Groove depth:	100 mm
Wire feed:	20000 mm/min
Oscillation frequency:	0.2-2 Hz
Max current:	450 A



6.1.5. SAW / GMAW TURRET HEAD



TECHNICAL DATA:

Submerged arc and gas-metal arc welding quickly exchangeable thanks to swivelling unit

SAW wire feed: 5000 mm/min

GMAW wire feed: 20000 mm/min

SAW torch: 1500 A

GMAW torch: 600 A



6.1.6. MULTI - MODE

For the welding of greatly differing wall thickness and groove geometries we have developed an innovative welding head, which makes it possible to weld either single wires or double wires without any modifications: the wire feed contacting and wire guide systems for single and double wire are integrated in this new welding head.

Single wire welding is possible from \varnothing 2.5 mm to \varnothing 4.0 mm whereas the double wire variant is feasible within the range from \varnothing 1.6 mm to \varnothing 2.5 mm. This makes it possible to benefit from the advantages of the single process variants without the need for a sudden resetting of the welding head.

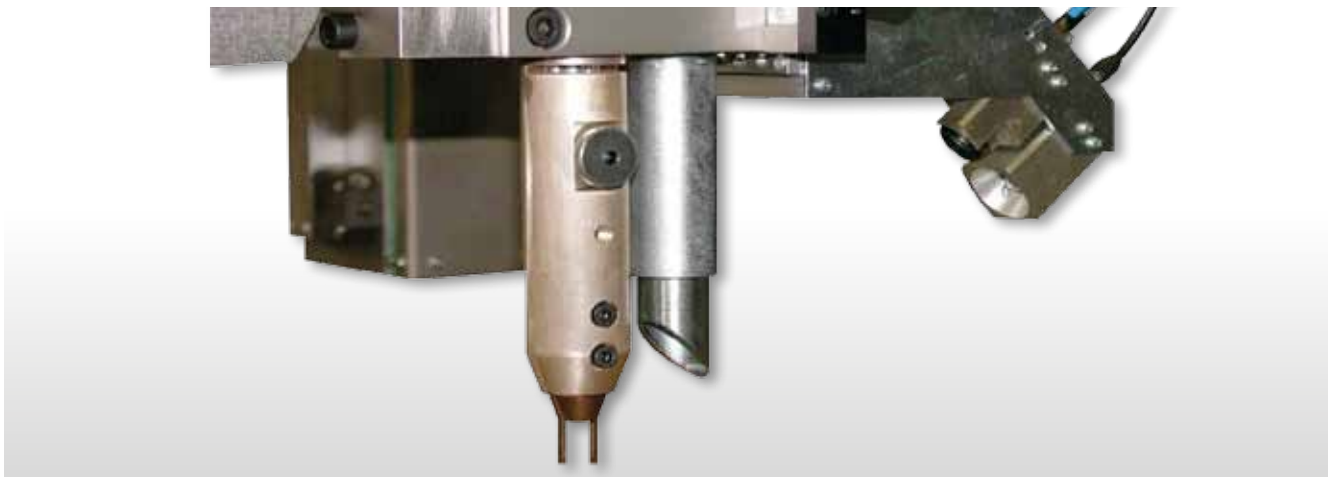
During single wire welding, it is possible to profit from the advantage of the high fusion penetration, primarily upon the welding of the welding root passes and upon the welding of square butt joints in root pass cap/capping pass. In any other application such as back gouging and filler beads with V-weld and single-U-groove

welds, double wire welding leads to an increase in the deposition rate of 50 – 80% and an improved modulation of the welding beads.

It is also possible to weld single wire using one of the double wires with a suitable small diameter, without any resetting. This is an application which should be chosen with small sheet thickness or with low permissible heat introduction.

During multiple layer welding, the root will be welded using the single wire system, before you switch over directly to double wire, in order to realise the filler beads and final runs with an increased deposition rate. The other advantages such as the good gap bridging with square butt joints or the wider welding bead with build-up welding using the double wire method can still be used utilised without any limitations.

Thanks to the central location of the torch it is still possible to vary the position of the double wire electrodes from longitudinal position up to cross position.





6.2. WIRE FEED GEAR MECHANISMS

- SAW / GMAW wire feed gear motor
- GMAW DC wire feed gear motor
- Cold wire feed gear motor
- CNC-controlled oscillation unit for MIG-MAG / TIG-automatic welding machine

6.2.1. SAW / GMAW - WIRE FEED GEAR MOTOR

The represented wire feed gear motor is designed for the demanding requirements of submerged arc welding - and gas metal-arc welding, in particular of submerged arc welding with double wire. The power of 335 W is especially suitable for the requirements

of submerged arc welding. The very strong wire pull force of this drive unit is more than sufficient to convey the wire electrodes across very long distances, for example 1000 kg headstocks.



TECHNICAL DATA:

Wire diameter:

1 x 2.5 mm – 5.0 mm

or: 2 x 1.2 mm – 3.0 mm

Max. wire feed:

5000...10000 mm/min

Max. torque:

30...100 Nm

Brushless AC servomotor 42 V

Maintenance-free Harmonic

Drive mechanism

Integrated motor control

6.2.2. GMAW - DC WIRE FEED GEAR MOTOR



The newly developed wire feed gear motor is designed for a high feed performance in continuous operation. The driving mechanism is a very compact and highly dynamic DC - disk armature motor with a DC tachometer generator mounted on it.

The gear is designed as a two-stage spur gear with hardened and ground, helical gearwheels for a quiet running at a very high efficiency degree (98%). The large diameter of the wire feed roll of 50 mm ensures that the wire transport is extremely safe.

TECHNICAL DATA:

Wire feed speed, continuously adjustable	33 to 33000 mm/min.
Range of adjustment:	1 : 1000
Adjustment precision:	0.5 %
Wire diameter massive wire up to	2.0 mm
Filler wire diameter up to	2.8 mm
Driving power	250 Watt



6.2.3. COLD WIRE FEED GEAR MOTOR

Primarily, this wire feed gear motor serves to convey cold filler wire in TIG and laser beam welding. When using these welding methods a high degree of constancy of the wire feed speed is very important for the welding.



The driving mechanism has been designed exactly for this purpose. With regard to the components chosen and the high gear efficiency, the construction of the driving mechanism is extremely compact.

TECHNICAL DATA:

Operating voltage:	42 V
Power:	75 W
Wire speed:	16-8000 mm/min
Torque:	5.5 Nm
Wire tensile force:	220 N

6.2.4. CNC-CONTROLLED OSCILLATION UNIT FOR MIG-MAG / TIG

The oscillation unit can be swivelled easily and quickly for round and longitudinal seams by 90°.

The actuation is effected by a practically wear-free AC servomotor with mounted incremental encoder and a Harmonic drive gear which is free from play.

The torch is oscillated in parallel with the work-piece surface. Moreover, the device is ideally suitable for overlay welding. The following parameters are programmable in the completed program of the oscillation software at the screen in the respective mask: oscillation speed, oscillation amplitude, flank dwell time.

TECHNICAL DATA:

Oscillation speed (cross speed)	
as target speed towards right	0 to 5000 mm/min.
as target speed towards left	0 to 5000 mm/min.
Dwell time right-hand in 0.1 sec.	0 – 9.9 sek.
Dwell time left-hand in 0.1 sec.	0 – 9.9 sek.
Amplitude	0 – 30 mm
Offset = centre displacement +/-	5 mm



6.3. SAW - SOURCES OF ELECTRIC POWER

The current source consists of a solid frame with steel plate sheathing. Two current sources may be stacked. A low-noise ventilator provides for the required cooling. The control electronics is separated by a lockable intermediate case.

The characteristic reversion is carried out externally and the slope adjustment internally. The current source is provided with a standardised interface with standardised values (0-10V) for the respective submerged arc welding-control unit.

	DC AWS 080	DC AWS 100	DC AWS 125	AC AWS 100T
Current range [A]	100 – 800	100 – 1000	100 – 1250	100 – 1000
Voltage range [V]	15 – 46	15 – 50	15 – 45	20 – 45
Current 100% .continuous duty [A]	800	1000	1250	1000
Max. no-load circuit voltage [V]	60	65	70	80
Mains voltage [V]	3 x 400	3 x 400	3 x 400	2 x 400
Power factor cos φ	0.8	0.8	0.75	0.55
Rated power [KVA]	48	69	94	85
Fuse protection [A]	80	125	160	200
Noise level [dB]	70	70	70	70
Weight [kg]	370	540	700	620
Dimensions (LxWxH) [mm]	800 x 500 x 1200	760 x 800 x 1130	850 x 750 x 1200	850 x 750 x 1200
* Specifications subject to alterations				

6.3.1. SAW - RECTIFIER WELDING SET AWS 125





6.4. SENSORS

- Laser optical height sensor
- Tactile sensor
- Laser sensor

6.4.1. LASER OPTICAL HEIGHT SENSOR



TECHNICAL DATA:

Measuring range:	50...150 mm
Power supply:	DC 10...30 V
Resolution:	< 0.1 mm
Exactness:	± 0.5 mm
Reproducibility:	0.2 mm
Analogue output:	4...20 mA
Type of connection:	Plug-type connector, M12.5-pole
System of protection:	IP 65
Working temperature:	-20° C...+55° C
Laser protection class:	2



6.4.2. TACTILE SENSOR

Tactile sensors are frequently used for automated arc welding applications since they are reliable, robust and user-friendly. The here considered welding head guide system is based on a tactile sensor, working analogue proportionally. This is why it is preferably used for automated arc welding in connection with handling machines.

The sensor signals control the main axes of the handling machine via the sensor processor. This means that it is possible to reguide across the entire travel way of the handling machine.

Almost all groove geometries can be scanned with the exception of the gapless I-groove.

BENEFITS

- The analogue-proportional signalling allows for a highly precise and fast deviation correction without jolt.
- High-resolution, inductive distance sensors allow for a tracking precision of 0.1 to 0.2 mm.
- Due to the nearness of the torch, feed errors are negligible. The sensor position is always exactly defined, even from changing from circular to longitudinal seam welding.
- The electronic fine adjustment of the torch position in 2 axes in respect of the sensor with an ample range of adjustment permits any layering in the weld groove.





6.4.3. LASER SENSOR

The sensor system of the 294 production series is the latest generation of high-grade, fully equipped optical welding head guide systems. The sensor system works according to the triangulation principle. This is why a large measuring range is obtained with a high degree of measuring safety and precision. The key part of the evaluation unit is a power PC with integrated frame grabber.

The sensor system can also be operated without screen and keyboard and is thus suitable for automatic operation.

All common groove shapes are pre-programmed. Special groove shapes can be retrofitted.

6.4.4. LASER SENSOR CAMERA HEAD



TECHNICAL DATA:

Operating principle:	Optical surface scanning acc. to the triangulation principle
Measuring range:	200 mm
Measuring distance:	60 to 260 mm
Linearity:	+/- 0.4%
Measuring rate:	1 kHz
Resolution:	0.1% of the measuring range
Source of light:	Semiconductor laser 1mW, 670 nm (red) laser protection class 2 pursuant to DIN EN 60825-1 03.97 (no special protective measurements required)
System of protection:	IP 67
Vibration:	15 g ... 1 kHz
Weight:	ca. 100 g (without cable)
Working temperature:	0...55° C
Analogue output:	4...20 mA
Current supply:	11...33 V DC, typically 24 V DC/150mA
Electronics:	integrated signal processor
Electro-magnetic compatibility:	(EMV) acc. to EN 50081-1 and EN50082-2



6.5. SLIDES

- Precision hand slide
- Mechatronic precision servo slide

6.5.1. PRECISION HAND SLIDE



TECHNICAL DATA:

- Actuation via hand crank
- High-precision, hardened and precision-ground anti-friction slideways
- The guide rail is continuously bolted together with the rigid, box-shaped, slide bed and offers a high degree of rigidity and torque resistance.
- Setting range from 110 mm to 600 mm, depending on execution.
- Max. load 300 kg
- Max. lifting performance 100 kg
- Max. torque 700 Nm.

6.5.2. MECHATRONIC PRECISION SERVO SLIDE

with integrated AC servomotor, mechanism, absolute encoder, limit switch and driving gear electronics



The precision servo slides are used for positioning purposes.

High-precision, hardened and precision-ground anti-friction guideways are used.

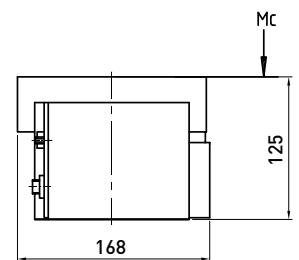
The guide rail is continuously bolted together with the rigid, box-shaped, slide bed. This construction leads to a substantially improved rigidity and torque resistance when compared with round shaft slides. Thanks to a completely encapsulated or spherical roller spindle, applications under rough ambience conditions are possible. The modular design allows the combinability with the X-,Y- and Z system of coordinates.

Benefits:

- Compact design including AC servomotor, mechanism, absolute encoder, limit switch and driving gear electronics
- Modular design to X, Y and Z-system of coordinates
- CANopen bus communication
- The decentralised structure including intelligence allows for a reduction of cable lines
- There is no need for a control cabinet

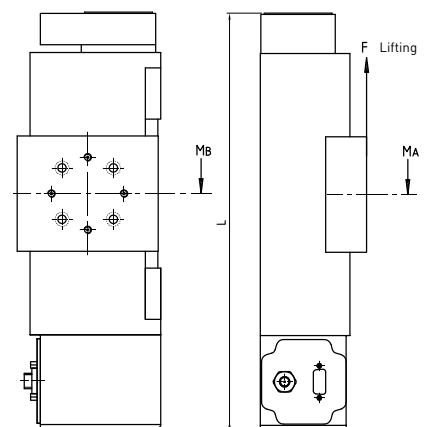
Option:

- Special designs available upon request.



AWS-No.		3153-4097	3154-4097	3155-4097	3156-4097
Lifting	mm	100	180	340	500
L (= Length)	mm	346	437	615	775
Lifting performance	N	300	300	300	300
Lifting speed	mm/min.	1100	1100	1100	1100
Torque MB	Nm	72	104	168	168
Torque MA	Nm	72	104	168	168
Torque MC	Nm	128	140	173	173
Motor voltage	Volt	24	24	24	24
Motor current	A	2.4	2.4	2.4	2.4
Nominal speed	r.p.m.	5260	5260	5260	5260
Operating voltage	Volt	24-30	24-30	24-30	24-30

* Figures may occasionally deviate.



6.5.2. MECHATRONIC PRECISION SERVO SLIDE

with integrated AC servomotor, mechanism, absolute encoder, limit switch and driving gear electronics



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High-precision, hardened and precision-ground anti-friction guideways are used.

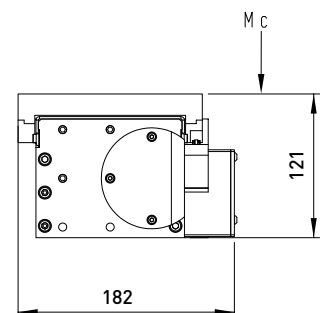
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Benefits:

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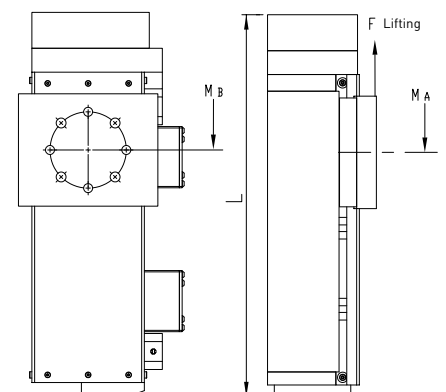
Option:

- Special designs available upon request.



AWS-No.		3159-4199	3158-4199	3157-4199	3149-4199
Lifting	mm	100	180	340	500
L (= Length)	mm	333	425	609	769
Lifting performance	N	1500	1500	1500	1500
Lifting speed	mm/min.	660	660	660	660
Torque MB	Nm	180	280	455	455
Torque MA	Nm	180	280	455	455
Torque MC	Nm	356	455	550	550
Motor voltage	Volt	24	24	24	24
Motor current	A	5.4	5.4	5.4	5.4
Nominal speed	r.p.m.	2650	2650	2650	2650
Operating voltage	Volt	24-30	24-30	24-30	24-30

* Figures may occasionally deviate.





6.6. WELDING TECHNIC ACCESSORIES

- Swivelling unit
- Wire straightener
- Flux carriage

6.6.1. SWIVELLING UNIT

- Continuously adjustable on two levels
- Indexing every 7.5°
- Capacity approx. 20 kg





6.6.2. WIRE STRAIGHTENER 1



Wire straightener at 2 levels with measuring system

6.6.3. WIRE STRAIGHTENER 2



7-roller wire straightener with separately adjustable rollers



6.6.4. FLUX CARRIAGE

- Capacity: 130 l.
- Mechanically operated flaps for filling and emptying.
- Suspension straps for crane transport

