



# Operating manual

for

## Fillet welding gantry

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**BAE Systems Australia Defence Pty Ltd.**

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## 1 General

### 1.1 Preface to the Operating Instructions

The machine/equipment is constructed to the latest standards of technology and to the accepted safety regulations. However, danger of death or injury to the user or third parties or damage to the machine or other property may be caused by its use.

Use the machine/equipment only in a technically perfect condition for its intended purpose, taking account of safety and dangers and observing the operating instructions. In particular, repair or have repaired faults which can be detrimental to safety immediately.

Retain the operating instructions permanently and ready for use at the installation site of the machine/equipment (in the tool compartment or the provided container).

The operating instructions must be read and observed by all persons assigned to work with/on the machine/equipment such as

- operation, including setting, fault elimination during operations, the removal of production wastes, upkeep, disposal of operating and auxiliary materials
- maintenance (maintenance, inspection, repair).

Apart from the operating instructions, observe the mandatory regulations of accident prevention and the accepted technical rules of safe working in the country of use and at the installation site.

### 1.2 Copyright

The copyright to the machine/equipment is the property of Ingenieurtechnik und Maschinenbau GmbH, Deutschland. Guarantees are agreed by contract.

Guarantee claims will be generally deferred in the case of usage contrary to the intended purpose.

### 1.3 Guarantee

IMG guarantees that these operating instructions are compiled in compliance with the technical and functional parameters of the delivered machine/equipment.

The manufacturer reserves the right to add supplementary information.

Guarantee and warranty claims will only be accepted under the conditions of the "General Conditions of Sale and Delivery" or by special contract agreement.

Guarantee and liability claims for damages to persons and/or property are void if they result from one of the following causes:

- usage of the machine/equipment contrary to the intended purpose,
- disregard of the regulations for this machine/equipment,
- inappropriate operation of maintenance,
- operation of the equipment with disabled protective measures,
- arbitrary functional or constructional modifications to the machine/equipment,
- modifications to the software of the machine/equipment,
- removal of parts or installation of spare parts or ancillary equipment not delivered or approved by the manufacturer,
- inappropriate repairs or incorrect actions,
- the effects of foreign bodies in catastrophes.

## 2 Product description

### 2.1 Appropriate use

The fillet welding gantry is a travelling welding unit that moves on rails. It is used to produce horizontal fillet welds in the production line for panels.

The welding unit is equipped with two welding carriages with 4 welding heads. Tack welded stiffeners are welded to panel sheets. Stiffeners can be welded with the fillet welding gantry in gantry travel or in welding carriage travel (longitudinal or crossways to the direction of flow). The welding equipment is primarily arranged in a mirror-image form.

The welding gantry with the torch heads is positioned over the tack-welded stiffener for welding. Welding is done after the welding heads are lowered and torch allocation. In case of welding with gantry drive the welding direction is from “North” to “South”, in case of welding with welding carriage drive the welding direction is from “East” to “West”.

The assumptions for a high quality and a fast welding process are clean edges of the profiles and a clean plate surface in the area where the profiles will be placed.

### 2.2 Layout of the machine/ plant

The fillet welding gantry consists of the following main modules

- 2 gantry girders
- supports
- 2 travelling units
- 1x welding carriage
- welding equipment
- media supply gantry
- media supply welding carriage
- pneumatic equipment
- electrical equipment

The MAG welding equipment consist of:

- 4 water cooled welding machines FASTMIG SYNERGIC 500
- 4 wire feeders KEMPARC DT 400
- 4 tube batches between machines and wire feeders
- 4 water cooled welding torches
- sensory positioning system for the torches, one tactile sensor per torch
- control panels on the welding carriage for the torch support and carriage movement, and additional control panels for the welding machines with a display for the welding parameters and storage of program parameters

The gantry girders are made of hollow profiles are used to hold the rails. The welding carriage travels on the rails.

The two travelling units (upper travelling unit and lower travelling unit) each have 2 wheel sets, each of which has one driven wheel set.

The welding carriage is supplied with energy and media via energy chains.

The welding power sources are arranged at the supports over the lower travelling unit.

The welding parameters are input from 4 control units at the welding carriage.

The welding current return from the welded panel is done by contact rail, current collectors and welding cables to the welding power sources.  
For extraction of the welding fume the Fillet welding gantry is connected with a central fume extraction.

### 2.3 Technical data of the machine/ plant

– length	11.700 mm
– width	4.234 mm
– max. height over floor level	appr. 4.400 mm
– rail span	10.650 mm
– max. travelling speed	max. 15 m/min
– travelling range	~ 70 m
– welding seam length	max. 6.400/ 17.000 mm
– weight	13.000 kg
– welding procedure	MAG Tandem
– number of welding heads	4
– welding cycle	continuous or staggered
– welding speed (a=3,5mm)	0,5 m/min.
– welding speed range	0,2 – 2,0 m/min
– max. speed of carriage	10 m/min.
– electrical supply	3/PE/415VAC/50Hz/1x35A + 4x35A

### 2.4 General drawing

drawing-no      277-660 Fillet welding gantry

## 3 Safety information for handle with the machine/ plant

### 3.1 Basic operation and designated use of the machine/ plant

The machine/plant has been built in accordance with state-of-the-art standards and the recognized safety rules. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties, or cause damage to the machine and to other material property.

The machine/plant must only be used in technically perfect condition in accordance with its designated use and the instructions set out in the operating manual, and only by safety-conscious persons who are fully aware of the risks involved in operating the machine/plant. Any functional disorders, especially those affecting the safety of the machine/plant, should therefore be rectified immediately.

The fillet welding gantry is to be used exclusively for the welding of horizontal fillet welds for tack-welded stiffeners on panel plates in the production line for panels.

Stiffeners can be welded with the welding carriage travel (longitudinal or crossways to the direction of flow).

Any other operation or one going beyond this shall be considered inappropriate.

The maker / supplier shall have no liability whatsoever for any damage caused as a result. The user shall bear the entire alone.

Operating the machine within the limits of its designated use also involves observing the instructions set out in the operating manual and complying with the inspection and maintenance directives.

### 3.2 Reference to the safety notes of the individual units

**! Follow the instructions given in the safety-related information documentation for the attached machine/unit parts!**

- DEMAG: Operating instruction wheel block system DRS
- SEW: Operating instruction gear
- SEW: Operating instruction AC motors, AC brake motors
- SEW: Operating instruction frequency inverter
- ALCATEL: Instruction manual motor with integrated speed controller
- Rexroth: Operating instruction Compact Modules CCK
- RK: Operating manual RK tube system linear unit
- KEMPPPI: Operating instruction welding equipment
- ABUS: Product manual chain hoist ABUCompact

### 3.3 General safety informations

The operating instructions must always be at hand at the place of use of the machine/plant, e.g. by stowing them in the tool compartment or tool-box provided for such purpose.

In addition to the operating instructions, observe and instruct the user in all other generally applicable legal and other mandatory regulations relevant to accident prevention and environmental protection.



These compulsory regulations may also deal with the handling of hazardous substances, issuing and/or wearing of personal protective equipment, or traffic regulations.

Personnel entrusted with work on the machine must have read the operating instructions and in particular the chapter on safety before beginning work. Reading the instructions after work has begun is too late. This applies especially to persons working only occasionally on the machine, e.g. during setting up or maintenance.

See to it that safety instructions and warnings attached to the machine are always complete and perfectly legible.

Never make any modifications, additions or conversions which might affect safety without the supplier's approval. This also applies to the installation and adjustment of safety devices and valves as well as to welding work on load-bearing elements.

Spare parts must comply with the technical requirements specified by the manufacturer. Spare parts from original equipment manufacturers can be relied to do so.

Take the necessary precautions to ensure that the machine is used only when in a safe and reliable state.

Operate the machine only if all protective and safety-oriented devices, such as removable safety devices, emergency shut-off equipment, sound-proofing elements and exhausters, are in place and fully functional.

Never switch off or remove suction and ventilation devices when the machine is in operation.

Use protective equipment wherever required by the circumstances or by law.

Observe all safety instructions and warnings attached to the machine/plant.

Carry out welding, flame-cutting and grinding work on the machine/plant only if this has been expressly authorized, as there may be a risk of explosion and fire.

Before carrying out welding, flame-cutting and grinding operations, clean the machine/plant and its surroundings from dust and other inflammable substances and make sure that the premises are adequately ventilated (risk of explosion).

When handling oil, grease and other chemical substances, observe the product-related safety regulations.

Be careful when handling hot consumables (risk of burning or scalding).

### **3.4 Selection and -qualification of personnel - Basic responsibilities**

Any work on and with the machine/plant must be executed by reliable personnel only. Statutory minimum age limits must be observed.

Employ only trained or instructed staff and set out clearly the individual responsibilities of the personnel for operation, set-up, maintenance and repair.

1

Define the machine operator's responsibilities - also with regard to observing traffic regulations - giving the operator the authority to refuse instructions by third parties that are contrary to safety.

2

Work on the electrical system and equipment of the machine/plant must be carried out only by a skilled electrician or by instructed persons under the supervision and guidance of a skilled electrician and in accordance with electrical engineering rules and regulations.

3

Work on gas-fuelled equipment (gas consumers) may be carried out by specially trained personnel only.

4

Work on the pneumatic system must be carried out only by personnel with special knowledge and experience of pneumatic equipment.

### **3.5 Safety information for the owner of the machine/ plant**

Check - at least from time to time - whether the personnel is carrying out the work in compliance with the operating instructions and paying attention to risks and safety factors.

The personnel must be familiar with the location and operation of fire extinguishers.

For the execution of maintenance work, tools and workshop equipment adapted to the task on hand are absolutely indispensable.

Make sure that only authorized personnel works on or with the machine.

Do not allow persons to be trained or instructed or persons taking part in a general training course to work on or with the machine/plant without being permanently supervised by an experienced person.

### **3.6 Safety information for the operator of the machine/ plant**

In the event of safety-relevant modifications or changes in the behaviour of the machine/plant during operation, stop the machine/plant immediately and report the malfunction to the competent authority/ person.

Observe all fire-warning and fire-fighting procedures.

Avoid any operational mode that might be prejudicial to safety.

Check the machine/plant at least once per working shift for obvious damage and defects. Report any changes (incl. changes in the machine's working behaviour) to the competent organization/person immediately. If necessary, stop the machine immediately and lock it.

In the event of malfunctions, stop the machine/plant immediately and lock it. Have any defects rectified immediately.

During start-up and shut-down procedures always watch the indicators in accordance with the operating instructions.

Before starting up or setting the machine/plant in motion, make sure that nobody is at risk.

Always wear the prescribed ear protectors.

During operation, all sound baffle must be used.

### **3.7 Safety information for maintenance and servicing of the machine/plant**

The operating instructions must be supplemented by instructions covering the duties involved in supervising and notifying special organizational features, such as job organization, working sequences or the personnel entrusted with the work.

Adhere to prescribed intervals or those specified in the operating instructions for routine checks and inspections.

Never modify the software of programmable control systems.

Replace pneumatic hoses within stipulated and appropriate intervals even if no safety-relevant defects have been detected.

Brief operating personnel before beginning special operations and maintenance work, and appoint a person to supervise the activities.

Ensure that the maintenance area is adequately secured.

Ensure that all consumables and replaced parts are disposed of safely and with minimum environmental impact.

The fastening of loads and the instructing of crane operators should be entrusted to experienced persons only. The marshaller giving the instructions must be within sight or sound of the operator.

Use only original fuses with the specified current rating. Switch off the machine/plant immediately if trouble occurs in the electrical system.

Work on the electrical system or equipment may only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such electrician and in accordance with the applicable electrical engineering rules.

The electrical equipment of machines/plants is to be inspected and checked at regular intervals. Defects such as loose connections or scorched cables must be rectified immediately.

Necessary work on live parts and elements must be carried out only in the presence of a second person who can cut off the power supply in case of danger by actuating the emergency shut-off or main switch. Secure the working area with a red-and-white safety chain and a warning sign. Use insulated tools only.

Before starting work on high-voltage assemblies and after cutting out the power supply, the feeder cable must be grounded and components, such as capacitors, short-circuited with a grounding rod.

Observe any existing national regulations if work is to be carried out in narrow rooms.

Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately. Splashed oil may cause injury and fire.

Work on pneumatic equipment may be carried out only by persons having special knowledge and experience in pneumatic systems.

## **4 Instructions for transport and setting up**

Transport and setting-up of the machine / unit will be done at the responsibility of the technical staff of IMG.

- the packages were done according the necessarily of transport
- the attachment points were signed by the package firm
- it is necessary to use lifting and transport equipment according the weights, dimensions and the attachment points
- a checking of the goods during the over handling of the transport firm
- note the transport damages and inform the IMG currently

## 5 Operating instructions

### 5.1 References to the operating instructions of the component suppliers

The following operating instructions must be read, understood and observed by the operator before operating the machine/system:

- DEMAG: Operating instruction wheel block system DRS
- SEW: Operating instruction gear
- SEW: Operating instruction AC motors, AC brake motors
- SEW: Operating instruction frequency inverter
- ALCATEL: Instruction manual motor with integrated speed controller
- Rexroth: Operating instruction Compact Modules CKK
- RK: Operating manual RK tube system linear unit
- KEMPPI: Operating instruction welding equipment
- ABUS: Product manual chain hoist ABUCompact

### 5.2 Warning of special dangers

**Attention the welding procedure will be producing a bright arc (use protective goggles).**

**Also observe the safety instructions in the documentation of the enclosed machine/system components.**

### 5.3 Technical sequence

#### **Welding in crossways direction:**

Use the control pendant P291 or the operator panel OP (see E- Projekt 279-031) to position the welding gantry above the stiffeners to be welded. Adjust the distance of the pairs of torches 1/2 and 3/4 by means of the manual supports according to the stiffener spacing.

#### **Welding in longitudinal direction:**

Use the operator panel OP to position the welding carriage above stiffeners to be welded. Adjust the distance of the pairs of torches 1/2 and 3/4 by means of the manual supports according to the stiffener spacing. Use the control pendant P291 or the operator panel OP (see E- Projekt 279-031) to position the welding gantry above the end of the stiffener.

Two stiffeners can be welded synchronous. At the operator panel OP are realized all operating functions for the welding carriage and welding (expecting welding parameters).

Adjust and record the required welding parameters for each torch at the separate console terminals MSF 55. Any time it is possible to select recorded welding programs.

It can be welded in crossways direction from east to west and in longitudinal direction from north to south. The lifting column at the welding carriage has to be turned in case of changing the welding direction (crossways- longitudinal).

Move the presetted torches to the joint and afterwards start the welding process. By means of sensor skip stops the welding process automatically at the end of the seam. It can be welded continuous or staggered seams.

For views of operator panels see point 5.5:

Pt.	Operating step	Guidelines
<b>1.</b>	<b>Emergency-Stop equipment deactivation in case of danger</b>	
1.1	One of the EMERGENCY-STOP keys must be actuated in case of a danger: <ul style="list-style-type: none"> <li>- (05) Control cabinet</li> <li>- (15) Operating lamp P291</li> <li>- (105) OP welding carriage console OP</li> </ul>	All movements are stopped Control voltage OFF , Lamps "PLANT ON" (02) (102) flash, lamps "FAULT" (03) (103) flash as long as an Emergency-Stop key remains acututed. The EMERGENCY STOP key does not serve the purpose of operative shut-down of system.
1.2	TO restart the system, unlock the actuated EMERGENCY-STOP key and Press the "ON" key (02) Steady light "ON" (02) (102)	The system can be restarted only after the cause of the danger is detected and eliminated.
<b>2.</b>	<b>Make the system operation-ready</b>	
2.1	Check compressed air supply	6 bar at the maintenance unit
2.2	Check protective gas supply	Arg/Co2 gas mixture
2.3	Activate 4x welding current source	Master switch on the machine
2.4	Actuate the master switch on the control cabinet	Control is ready after 15 seconds
2.5	Set the key switch (00) to the ON position	
2.6	Press the "ON" (02) key Steady light "ON" (02) (102)	

3.	<b>Move the gantry over the profile to be welded</b>	Operation with Pendant 1 (P291)
3.1	<p>Welding direction: across the plates Move the gantry over the profile with the help of the operating lamp P291 so that the lateral distances from the torches are identical (1,2)...(3,4).</p>	<p>Operation with Pendant 1 (P291)</p> <p>Gantry movement in fast speed mode is possible only if:</p> <ul style="list-style-type: none"> <li>- The two main supports of the welding carriage are in the upper position</li> <li>- All torches of the welding carriage are in initial position</li> </ul> <p>The keys have 2 pressing positions.</p> <p>Pressing position 1 ( creep speed)</p> <p>Pressing position 2 (rapid speed)</p> <p>Both rotating lights are activated in the fast speed mode</p> <p><b>Caution!</b> <b>The drive distance of the gantry is limited by 2 installation gantries. Mirror reflection light barriers ensure protection against collision in both travel directions.</b></p>
3.2	<p>Welding direction: longitudinal to the plates Move the gantry to the profile start with the help of the operating lamp P291</p>	<p>Gantry movement in rapid speed mode is possible only if:</p> <ul style="list-style-type: none"> <li>- Both main supports of the welding carriage are in the upper position</li> <li>- All torches of the welding carriage are in the initial position</li> </ul> <p>The keys have 2 pressing positions.</p> <p>Pressing position 1 ( creep speed)</p> <p>Pressing position 2 (rapid speed)</p> <p>Both rotating lights are activated in the rapid speed mode</p> <p><b>Caution!</b> <b>The drive distance of the gantry is limited by 2 installation gantries. Mirror reflection light barriers ensure protection against collision in both travel directions.</b></p>
3.3	Actuation of horn with (10)	Operation with pendant 1 (P291)
4.	<b>Reference travel of gantry and welding carriage</b>	<p>A referencing of the welding carriage must be undertaken, if:</p> <ul style="list-style-type: none"> <li>- Frequency converter was replaced</li> <li>- Hiperface sensor was replaced</li> <li>- Cable connection between sensor and frequency converter was opened.</li> </ul>

4.1	<p>Referencing of welding carriage:</p> <p>Actuate the “RESET” luminous pushbutton (104) for &gt; 10 sec. Luminous pushbutton flashes, it flashes faster after 3 seconds, and still faster after 10 sec. Select “Carriage Drive 4/4” in the OP77A screen, The “Absolute counter” window value goes to “0” Referencing is over.</p>	<p>Reference for counter welding carriage:</p> <ul style="list-style-type: none"> <li>- Travel welding carriage to the left end position</li> <li>- Select the “Carriage Drive 4/4” screen, Point 15.14</li> <li>- Activate the Manual mode</li> <li>- Position the torch bracket in the cross position</li> <li>- Actuate the Reset function for &gt;10 seconds</li> <li>- The IGR stand of the welding carriage is reset to 0 in the “Carriage Drive” window</li> </ul>
4.2	<p>Referencing of gantry:</p> <p>Actuate the “RESET” luminous pushbutton (104) for &gt; 10 sec. Luminous pushbutton flashes, it flashes faster after 3 seconds, and still faster after 10 sec. Select “Gantry Drive 3/3” in the OP77A screen, Point 15.10 The “Absolute counter” window value goes to “0” Referencing is over.</p>	<p>Reference for counter gantry:</p> <ul style="list-style-type: none"> <li>- Travel gantry to the start position</li> <li>- Select the “Gantry Drive 3/3” screen, Point 15.10</li> <li>- Activate the Manual mode</li> <li>- Position torch bracket in the longitudinal direction</li> <li>- Actuate the Reset function for &gt;10 seconds</li> <li>- The IGR stand of the gantry is reset to 0 in the “Gantry Drive”</li> </ul>
5.	<p><b>Align welding carriage direction for longitudinal- or cross seams</b></p>	<p>A rotary link above the torch bracket enables the rotation of the torch by 90°. The rotation takes place manually. The torch bracket is locked in the 0° and 90° positions. The locking pins are driven in or driven out with the help of pneumatic cylinders. The position of the torch bracket is monitored by initiators. The position of the locking pin is also monitored by initiators.</p> <p><b>Caution</b> <b>Different travel area limit switches are used for the movement of the welding carriage, depending on the position of the torch bracket (0° or 90°)!</b></p>
5.1	<p>Align welding direction across or longitudinally to the gantry movement</p> <p>Actuate “BOLT RELEASE” luminous key (105) The “BOLT RELEASE” luminous pushbutton (105) flashes, the “BOLT RELEASE” luminous pushbutton (105) lights up when the locking pin is taken out</p>	<p>Condition:</p> <ul style="list-style-type: none"> <li>- Compressed air is available</li> <li>- Both main axes are in the lower position</li> <li>- Locking pins have been removed</li> </ul>
5.2	<p>The torch bracket is rotated manually by the operator on the clamps provided for this purpose. The locking pins are moved to the locking position automatically during the rotation. The “BOLT RELEASE” luminous pushbutton (105) flashes. On reaching the end position, the locking pins move into the hole. The “BOLT RELEASE” luminous pushbutton (105) goes off.</p>	<p><b>Caution!</b> <b>Sufficient free space should be provided on the installation platform. There is danger of collision between the components and the torches!</b></p>



5.3	Welding direction: across the gantry movement	The welding carriage is used to weld across the gantry from east to west. The welding process can be activated only if the “DRIVE GANTRY CARR” toggle switch (116) is in the “CARR” position.
5.4	Welding direction: longitudinally to gantry movement	Welding is undertaken with the gantry longitudinally from north to south. The welding process can be activated only if the “DRIVE GANTRY CARR” toggle switch (116) is in the “GANTRY” position.
<b>6.</b>	<b>Move the welding carriage over the profile to be welded</b>	Operation with welding carriage console OP
6.1	Welding direction: longitudinal to the plates Move the welding carriage over the profile with the help of OP, so that the distances from the torches are identical.(1,2)...(3,4)	The torches are in the welding direction: longitudinal to the gantry  The gantry travels at the pre-selected speed towards north or south till it reaches the seam start. Actuate the DRIVE STOP key (120) thereafter.
6.2	Welding direction: across the plates Move the welding carriage over the profile start with the help of OP	The torches are in the welding direction: across the gantry  The welding carriage travels at the pre-selected speed to the left or right till it reaches the seam start. Actuate the “DRIVE STOP” key (120) there after.
6.3	The “DRIVE PUSH AUTO” toggle switch (114) is in the “PUSH” position	The welding carriage travels at the pre-selected speed in the inching mode, in tandem with the direction keys (119) (121)
6.4	“DRIVE GANTRY CARR” toggle switch (116) is in the “GANTRY” position “DRIVE GANTRY CARR” toggle switch (116) is in the “CARR” position	Direction keys (119) (121) are valid for gantry movement Direction keys “DRIVE EAST/SOUTH” (119) “DRIVE WEST/NORTH” (121) are valid for welding carriage drive
<b>7.</b>	<b>Position torches 1-2 on the wedge seam</b>	Operation with welding carriage console OP
7.1	Travel main axis 1 downward with the “MAIN AXIS DOWN” luminous pushbutton (107) (108)	Main axis 1 can be lowered only if both torches are in the upper position. The main axis must be driven as far as possible in the downward direction in the inching mode, till the vertical torch axes are approximately at the centre with reference to the welding seam wedge
7.2	Move torch axes manually with joystick (122) (127)	The torches can be moved freely both vertically and horizontally as long as they are not in the starting position.

7.3	<p>Torch is selected by activating the sensor automation</p> <p>Torch moves to the wedged seam position automatically</p> <p>Actuate the “SENSORAUTOMATIC” luminous pushbutton (124) (129)</p> <p>Actuate the “TORCH ON SEAM” luminous pushbutton (115)</p> <p>The (115) (124) (129) luminous pushbuttons flash as long as the torches travel to the wedge seam.</p> <p>The luminous pushbuttons (115) (124) (129) light up when the torches are in the welding position (wedge seam)</p>	<p>Depending on the torch pre-selection, the torches travel at a pre-selected (refer to Menu OP77A) speed to the wedge seam. The automatic distance regulation comes into play as soon as the tactile sensor reaches the detection range. The operation can be interrupted at any time with the help of the “TORCH ON SEAM” luminous pushbutton (115).</p>
7.4	<p><b>Position torches 3-4 on the wedge seam</b></p>	<p>Operation with welding carriage console OP</p>
7.5	<p>Move main axis 2 downwards with the “MAIN AXIS DOWN” luminous pushbutton (207) (208)</p>	<p>Main axis 2 can be moved only if both torches are in the initial position. The main axis must be moved in the downward direction in the inching mode as far as possible till the vertical torch axes are at the approximate centre with reference to the welding seam wedge</p>
7.6	<p>Move torch axes manually (222) (227)</p>	<p>The torches can be moved freely both vertically as well as horizontally till they reach the detection range.</p>
7.7	<p>The torches are pre-selected by activating the sensor automation</p> <p>Torch moves to the wedge seam automatically</p> <p>Actuate the “SENSORAUTOMATIC” luminous pushbutton (224) (229)</p> <p>Actuate the “TORCH ON SEAM” luminous pushbutton (215)</p> <p>The luminous pushbuttons (215) (224) (229) flash as long as the torches move to the wedge seam.</p> <p>The luminous pushbuttons (215) (224) (229) light up when the torches are in the welding position (wedge seam)</p>	<p>Depending on the torch pre-selection, the torches travel at a pre-selected (refer to Menu OP77A) speed to the wedge seam. The distance control comes into play automatically as soon as the sensor enters the detection range. The operation can be interrupted at any time with the help of the “TORCH ON SEAM” luminous pushbutton (215).</p>
7.8	<p>Adjust the torch in the detection range of the sensors</p> <p>Manual adjustment to the hand supports</p>	<p>The luminous pushbuttons (115) (215) light up as soon as the tactile sensors enter the detection range depending on the pre-selection of the torches. There are two hand supports for each torch (horizontal, vertical). These can be used to position the torch exactly on the wedge seam.</p> <p>(Turning the tactile sensor needle away from the wedge seam corresponds to positioning the torch closer to the wedge seam)</p> <p>(Turning the tactile sensor needle in the direction of the wedge seam corresponds to positioning the torch away from the wedge seam)</p>

7.9	Positioning the torch at the start of the plate, profile	<p>Process flow:</p> <ul style="list-style-type: none"> <li>- Bring front torch to the profile start through slow movement of the welding carriage (in inching mode)</li> <li>- Activate sensor automation</li> <li>- Move torch to wedge seam automatically</li> <li>- Bring rear torch (outside) the profile start with the help of the joystick in the vicinity of the wedge seam</li> <li>- Activate the sensor automation</li> </ul> <p>On starting the welding process, the sensor needle of the rear torch enters the detection range automatically and positions the torch. Actuate the "SENSOR AUTOMATIC" luminous pushbutton again, if it does not enter the detection range. The torch then travels automatically to the welding position.</p>
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<b>8.</b>	<b>Preselection of welding parametrs, welding carriage</b>	Operation with welding carriage console OP/ OP77
8.1	<p>Pre-select Torch 1: Actuate the "SENSORAUTOMATIC" luminous pushbutton (124) Pre-select Torch 2: Actuate the "SENSORAUTOMATIC" luminous pushbutton (129) Luminous pushbutton flashes: Torch pre-selected but not in welding position Luminous pushbutton lights up: Torch pre-selected and in welding position</p>	<p>The corresponding torches are pre-selected only if the SENSORAUTOMATIC (124) (129) is active.</p> <p>If only one torch is pre-selected, then only this torch must be moved to the detection range with the tactile sensor.</p>
8.2	<p>Pre-select Torch 3: Actuate the "SENSORAUTOMATIC" luminous pushbutton (224) Pre-select Torch 4: Actuate the "SENSORAUTOMATIC" luminous pushbutton (229) Luminous pushbutton flashes: Torch pre-selected but not in welding position Luminous pushbutton lights up: Torch pre-selected and in welding position</p>	<p>The corresponding torches are pre-selected only if the SENSORAUTOMATIC (224) (229) is active.</p> <p>If only one torch is pre-selected, then only this torch must be moved to the detection range with the tactile sensor.</p>
8.3	<p>Pre-select weld seam type Left position of the "WELD CYCLE --/_/= =" toggle switch (110) Left position: broken seam - zigzag Right position: broken seam - chain Mid position: continuous seam</p>	<p>Continuous wedge seams and broken (zigzag and chain) seams can be preselected. The welding cylce length must be entered in in OP77A in case of broken wedge seams (refer to Point 15.5)</p>
8.4	<p>Inputting of gantry speed in OP77A</p> <ul style="list-style-type: none"> <li>- Manual mode (rapid speed)</li> <li>- Automatic mode (welding speed)</li> </ul>	<p>Refer to Operating Instruction Point: 15.8</p> <p>Refer to Operating Instruction Point: 15.8</p>

8.5	<p>Inputting of welding carriage speed in OP77A</p> <ul style="list-style-type: none"> <li>- Manual mode (rapid speed)</li> <li>- Automatic mode (welding speed)</li> </ul>	<p>Refer to Operating Instruction Point: 15.11</p> <p>Refer to Operating Instruction Point: 15.11</p>
8.6	<p>Inputting of times, speeds in OP77A</p> <ul style="list-style-type: none"> <li>- Start time, end crater time</li> <li>- Gap speed</li> <li>- Water hole length</li> </ul>	<p>Refer to Operating Instruction Point: 15.16</p>
8.7	<p>Gantry drive</p> <p>Input / display of welding speed in OP77</p> <ul style="list-style-type: none"> <li>- Specification of welding speed</li> <li>- Welding speed real value</li> </ul>	<p>Refer to Operating Instruction Point: 15.8</p> <p>Welding in longitudinal direction (This screen is called automatically during welding start)</p>
8.8	<p>Welding carriage</p> <p>Input / display of welding speed in OP77</p> <ul style="list-style-type: none"> <li>- Specification of welding speed</li> <li>- Welding speed real value</li> </ul>	<p>Refer to Operating Instruction Point: 15.11</p> <p>Welding in the cross direction (This screen is called automatically during welding start)</p>
8.9	<p>Service function: (password-protected)</p> <p>Inputting of torch – sensor / torch – torch distances in OP7</p> <ul style="list-style-type: none"> <li>- Torch – sensor needle distance</li> <li>- Torch 1 --- Torch 2 distance</li> <li>- Torch 3 --- Torch 4 distance</li> </ul>	<p>Refer to Operating Instruction Point: 15.3 to 15.6</p> <p>(Adjustment possible only with password)</p>
8.10	<p>Service function: (password-protected)</p> <p>Inputting of speeds of torch delivery axes in OP7</p> <ul style="list-style-type: none"> <li>- Speeds of Torch 1 axes</li> <li>- Speeds of Torch 2 axes</li> <li>- Speeds of Torch 3 axes</li> <li>- Speeds of Torch 4 axes</li> </ul>	<p>Refer to Operating Instruction Point: 15.5 to 15.6</p> <p>(Adjustment possible only with password)</p>
8.11	<p>Adjustment of the welding parameters</p>	<p>With the help of the MSF 55 Operator Panel per torch:</p> <ul style="list-style-type: none"> <li>- All welding parameters are adjusted to an external OP per welding machine</li> <li>- Current, voltage, free combustion</li> </ul> <p>(Refer to documentation of FASTMIG SYNERGIC 500)</p>
8.12	<p>Storing the welding parameters</p>	<p>With the help of the MSF 55 Operator Panel per torch:</p> <ul style="list-style-type: none"> <li>- All the determined welding parameters can be stored under a convenient Program No.</li> </ul> <p>(Refer to documentation of FASTMIG SYNERGIC 500)</p>

8.13	Program selection for the welding process	With the help of the MSF 55 Operator Panel per torch: - The corresponding welding program for the special welding process can be selected from a list and called. (Refer to documentation of FASTMIG SYNERGIC 500)

<b>9.</b>	<b>Start welding process, welding carriage</b>	Operation with welding carriage console OP
9.1	<p>Switch to the Automatic mode Switch the “MAN AUTO” toggle switch (106) to the “AUTO” position</p> <p>Pre-selection of torch with sensor automation</p> <p>Activation of the :SENSORAUTOMATIC” luminous pushbuttons (124) (129) (224) (229)</p> <p>Switch the “REAL SIMULATION” (111) toggle switch to “REAL”</p> <p>Actuate the „WELDING START“ (flashing) luminous pushbutton (118)</p> <ul style="list-style-type: none"> <li>- The welding process is started immediately when the front torches hurry past.</li> <li>- For the rear torch, the welding process is started only after it reaches the start point of the first torch.</li> </ul> <p>The welding process can be interrupted with “WELDING STOP” (117).</p> <p>Press the key once and the welding process for the front torch is interrupted immediately. The rear torch welds the torch displacement up to the end.</p> <p>Press the key a second time and the welding process is interrupted for both torches.</p>	<p>At least one torch must be pre-selected</p> <p>The welding process can start only after the welding conditions are fulfilled:</p> <ul style="list-style-type: none"> <li>- The Automatic mode is pre-selected</li> <li>- Sensor automation is activated, depending on the pre-selection</li> <li>- Torch is in the detection position, depending on the pre-selection</li> <li>- No advance cut off or end deactivation of welding carriage</li> <li>- Torch bracket is in the correct welding direction (across to welding carriage, longitudinally to gantry) and the “DRIVE GANTRY CARR” toggle switch (116) is in the correct position (bei quer mit Welding carriage in the “CARR” position for cross-welding carriage, and in the “GANTRY” position for longitudinally to gantry)</li> <li>- The locking pins must have locked the torch bracket, the “BOLT RELEASE” luminous pushbutton (105) lights up</li> </ul>
9.2	<p>Over-welding Luminous pushbutton “WELD SEAM OVERWELD” (126) (226) (Toggle function)</p> <p>1x pressing = Over-welding ON, luminous pushbutton lights up.</p> <p>2. x pressing = over welding OFF is active, luminous pushbutton goes out.</p>	<p>In case of broken welding seam, the pre-selected torch can be activated in the welding seam gap if the welding process is on.</p> <p>The torch distance (Torch 1 - Torch 2, Torch 3 - Torch 4) is considered so that the over welding seam starts and ends at the same position on both sides of the wedge seam.</p>
<b>10.</b>	<b>Welding carriage seam detection</b>	Takes place automatically
10.1	Seam end detection	<p>The end of the profile or plate is detected with the help of the tactile sensor. A signal is created if the sensor jumps suddenly. The torch distances from the tactile sensors must be recorded correctly in the OP77 terminal. (refer to Point 15.4)</p> <p>The sensing of the corresponding torch axis (horizontal, vertical) is deactivated when the tactile sensor reaches the profile- or plate end. The torch is held in the last position. The welding process is stopped automatically for a torch when the relevant torch reaches the profile- or plate end. The welding carriage stops automatically if the last torch is deactivated.</p>

10.2	Water hole detection	The start of the water hole is detected from a jump of the sensor needle. When the torch comes to this point, the end crater is set automatically and the welding operation is interrupted. on reaching the input distance of the water hole length (input in OP77 Terminal, refer to Point 15.17) The welding operation is restarted automatically when the sensor needles are in the wedge seam again, i.e., in the detection range.
<b>11.</b>	<b>Welding carriage Move torch out of the wedge seam area</b>	Operation with welding carriage console OP
11.1	Actuate the “ZERO POSITION” luminous pushbutton (125) (130) (225) (230)	Torch axes travel to the initial position automatically (horizontal and vertical). The operation can be interrupted at any time by actuating the “ZERO POSITION” luminous pushbutton a second time.
11.2	Deactivation of sensor automation Actuate the “SENSOR AUTOMATIC” luminous pushbutton (124) (129) (224) (229). The luminous pushbutton flashes as long as the relevant torch is not in the home or initial position. The luminous pushbutton lights up on reaching the initial position. Initial position: - X-axis (side) Torch in end position, external - Y- axis (height) Torch is in end position, top - Z- axis (longitudinal) Torch is in end position in front  Move torch manually with joystick (122) (127) (222) (227)	If the profile distances are too small, there can be collisions during the automatic movement of the torches. In the Manual mode, the torches can be moved out of the collision area carefully in each direction (horizontal, vertical). The sensor automation must be deactivated in advance
11.3	Travel of longitudinal axes of Torch 1 and Torch 2 Activate the “SELECTION LENGTH AXIS” toggle switch (132) Move the joystick (122) (127) to the left or right Travel of longitudinal axes of Torch 3 and Torch 4 Activate the “SELECTION LENGTH AXIS” toggle switch (232) Move the joystick (222) (227) to the left or right	The longitudinal axes can be moved in both directions in the Manual mode. The longitudinal axes are also moved to their initial position during automatic movement towards the zero position of the torches. The front position, viewed in the direction of welding, is the initial position of the longitudinal axis.
11.4	Lifting of main axes “MAIN AXIS UP” luminous pushbutton (107) (207) The “MAIN AXIS UP” luminous pushbutton (107) (207) lights up on reaching the upper position	Inching mode Lifting is possible only if: - Torch bracket is in the 0° or 90° position - Locking pin in locking position. The “BOLT RELEASE” luminous pushbutton lights up.

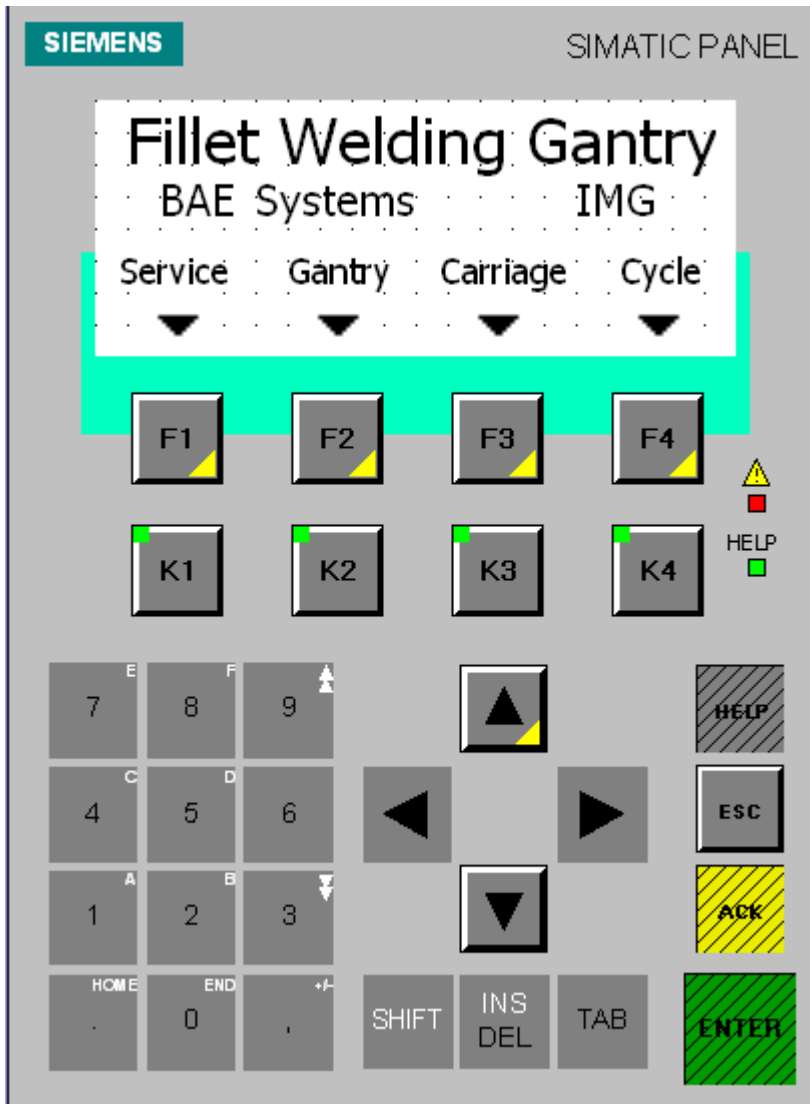
<b>12.</b>	<b>Reset function of welding carriage</b>	Operation at welding carriage console OP
12.1	Set the “MAN AUTO” toggle key (106) to Manual Actuate the “RESET” luminous pushbutton (104) for > 3 seconds (after 3 seconds, slow flashing changes over to rapid flashing)	The general Reset function The triggering of the Reset signal is displayed through rapid flashing of the luminous pushbutton.
12.2	Set the “MAN AUTO” toggle key (106) to Manual Actuate the “RESET” luminous pushbutton (104) for > 10 seconds (after 3 seconds slow flashing changes over to rapid flashing, after 10 seconds, the light flashes still faster)	Reset funktion counter on zero (referencing) The triggering of the Reset signal is displayed through rapid flashing of the luminous pushbutton.
<b>13.</b>	<b>Collision protection</b>	Safety devices for man and machine
13.1	Gantry collision protection	The gantry is located between two installation gantries on a common rail track:  - 2 Mirror reflection light switches come into play when the distance between the gantries and the switches drops below the defined safety distance, and the gantry drive is cut off. On actuating the key again, the gantry can be moved further in the inching mode, but only at creep speed. - 2 mechanical limit switches are installed on the lower carriage, which control both travel directions. The gantry is stopped immediately if there is an object (man or object) near the lower rail. The welding process is stopped immediately if the welding is undertaken with the gantry drive. The direction is released only after the object is removed from the rail area, i.e., the limit switch is in the initial position again.
13.2	Welding carriage collision protection	There is no collision protection for the welding carriage drive. The end positions of the travel area are restricted through position switches and limit switches. The carriage drive is cut off at these points automatically.  <b>Caution!</b> <b>There are different end positions of the travel area, depending on the position of the torch bracket (0° or 90°)</b>



13.3	Torch collision protection	<p>Each torch has a collision protection mechanism. If a torch collides with an object, it is deflected in a spring guide. A sensor measures the deflection and creates the following response:</p> <ul style="list-style-type: none"> <li>- Welding stop</li> <li>- Welding carriage drive stop</li> <li>- Gantry travel stop</li> <li>- Sensor automation off</li> <li>- Torch axes blocked downward and inward</li> <li>- The torches can be moved manually in the upward and outward directions with the joystick.</li> </ul>
14.	<b>Lifting chain hoists 1+2</b>	<p>2 lifting cables placed on the welding carriage enable the welding wire rolls to be replaced.</p> <p><b>Caution!</b>  <b>The 3 Emergency-Stop keys of the gantry do not work on the lifting chain hoists!</b>  <b>Each of them has a separate emergency stop key</b>  <b>These do not work in the gantry control!</b></p>
15.	<b>Smoke gas extraction</b>	<p>There is an external smoke gas extractor  The occurring smoke gas is extracted into the hall with the help of pipes, cable chain and slotted rails  The fan motor is started externally.</p>

Point 15

Main Screen OP77\_welding carriage



- |                     |                  |                    |                               |
|---------------------|------------------|--------------------|-------------------------------|
| <b>Service</b>      | Screen selection | Service functions  | (Password-protected!)         |
| <b>Gantry</b>       | Screen selection | Gantry drive       | (Gantry drive parameters)     |
| <b>Carriage</b>     | Screen selection | Welding carriage   | (Welding carriage parameters) |
| <b>Cycle</b>        | Screen selection | Seam shape         | (Cycle parameters)            |
| <b>Up arrow key</b> | Screen selection | Information screen |                               |

Point 15.1

Information screen OP77\_welding carriage

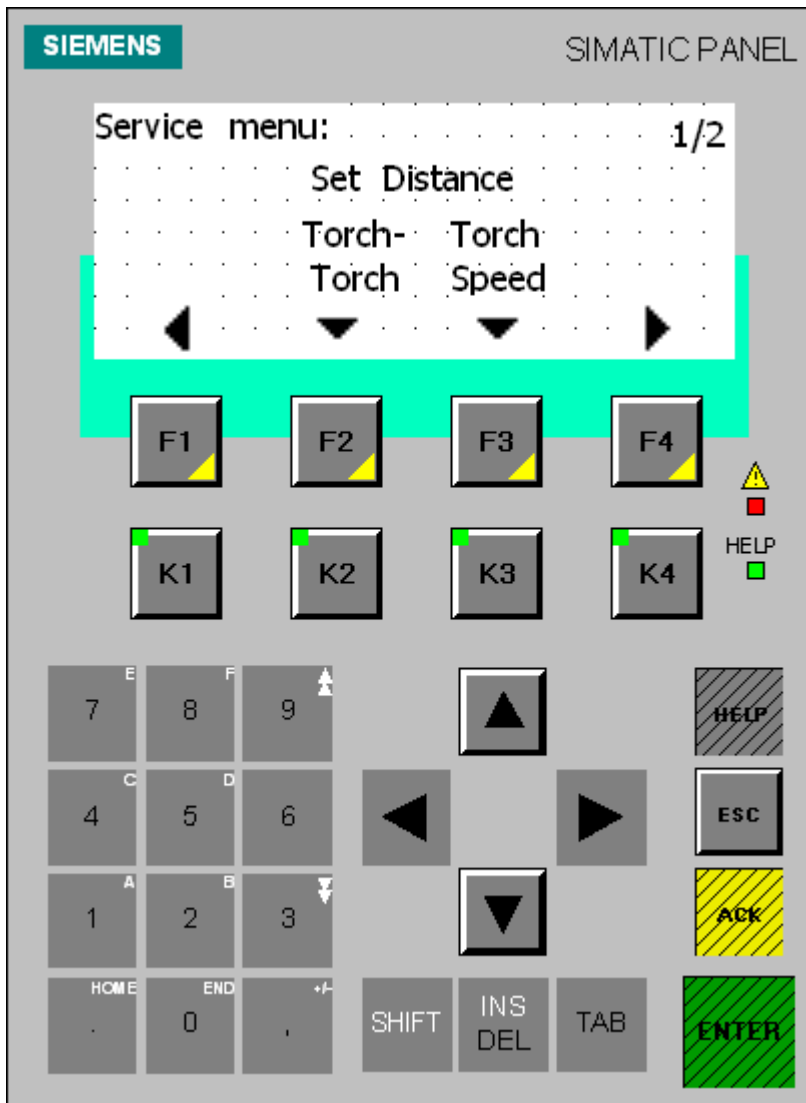


**Down arrow key**

Screen selection Back to main screen

Point 15.2

Service Menu Screen 1 OP77\_welding carriage



**Soft key F1** Back to Main Screen

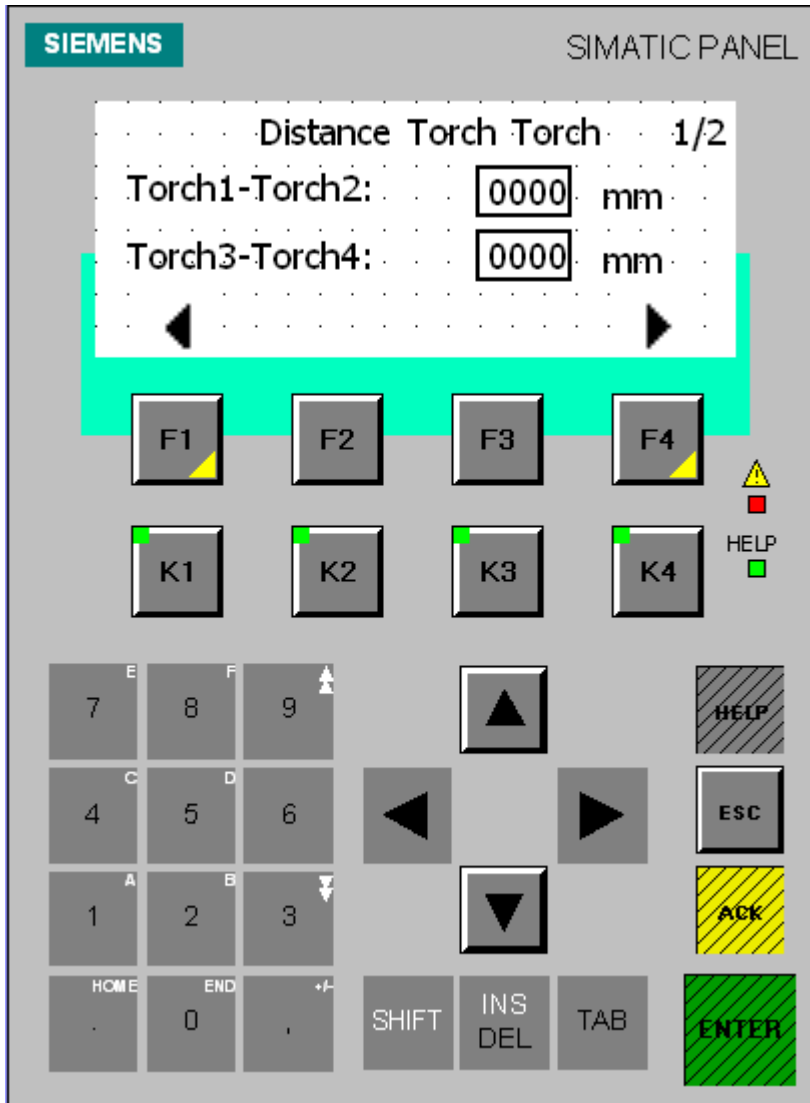
**Soft key F2** Go to Set value for torch distance (torch-torch distance) screen

**Soft key F3** Go to Set value for torch axis speeds screen

**Soft key F4** Go to Screen 2 Service Menu

Point 15.3

Torch Distance Service Menu Screen OP77\_welding carriage



**Soft key F1** Back to Screen 1 Service Menu

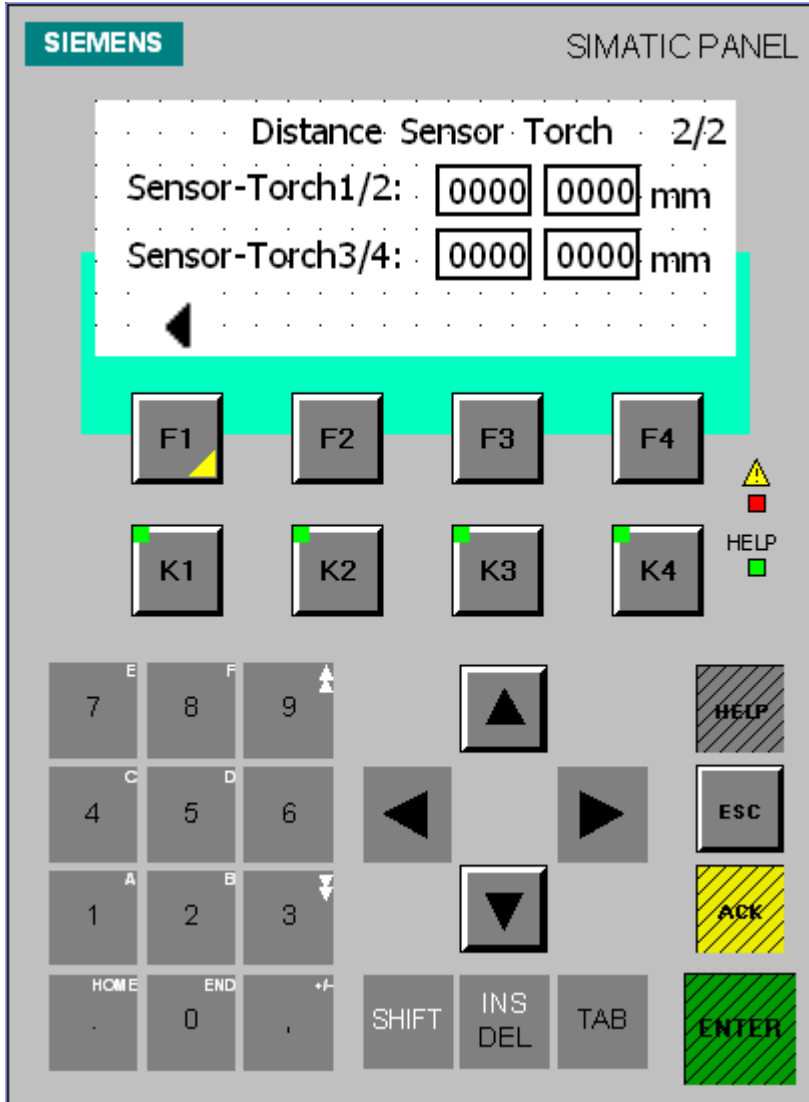
**Soft key F4** Go to Sensor – torch distance screen

**Torch1-Torch2 data entry field:** The mechanical torch distance between Torch 1 and Torch 2 is input here (input in mm)

**Torch3-Torch4 data entry field:** The mechanical torch distance between Torch 3 and Torch 4 is input here (input in mm)

Point 15.4

Sensor - Torch Distance Service Menu Screen OP77\_welding carriage



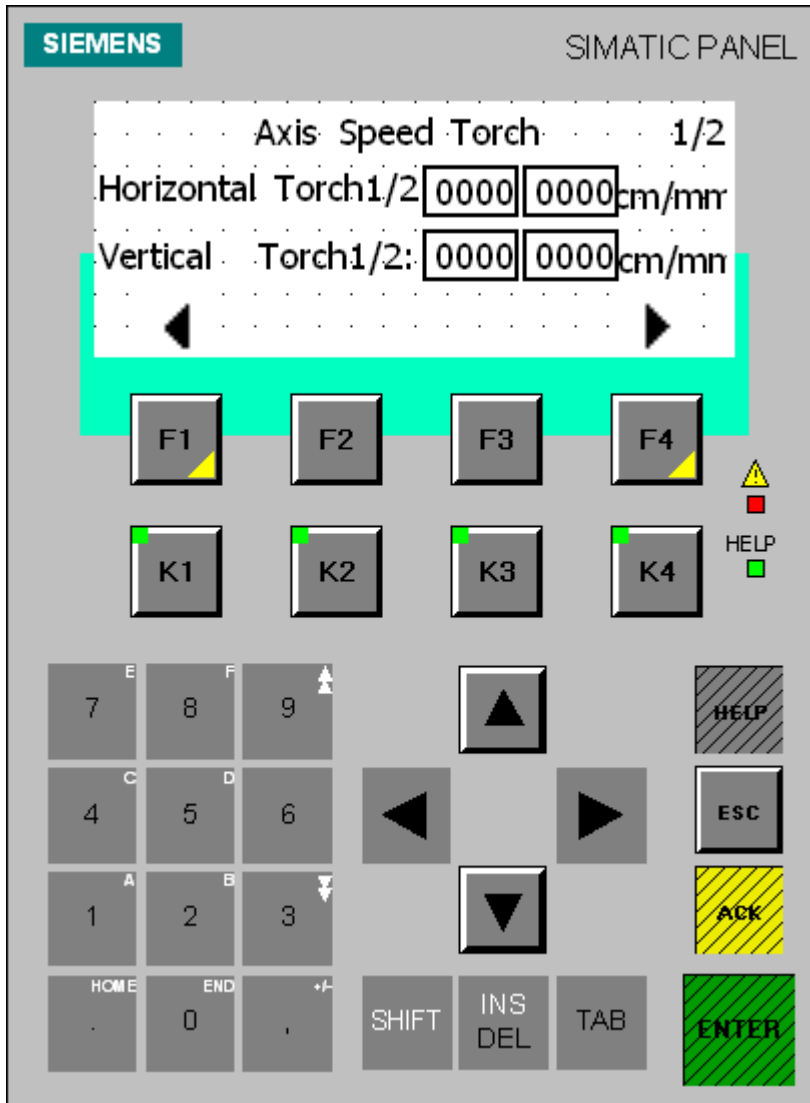
**Soft key F1** Back to Torch Distance Screen

**Sensor-Torch1/2 data entry field:** The mechanical distance between sensor needle and Torch 1 is input here (input in mm; sensing must be activated and the sensor needle must be located in the wedge seam, thereafter, the distance between contact tip and sensor key). The left window is Torch 1. The right window is Torch 2.

**Sensor-Torch3/4 data entry field:** The mechanical distance between sensor needle and Torch 1 is input here (input in mm; the sensing must be activated and the sensor needle must be in the wedge seam; there after the distance between the contact tip and sensor needle must be measured). The left window is Torch 3. The right window is Torch 4.

Pkt. 15.5

Torch Axis Speed Service Menu Screen 1 OP77\_welding carriage



**Soft key F1** Back to Service Menu 1 screen

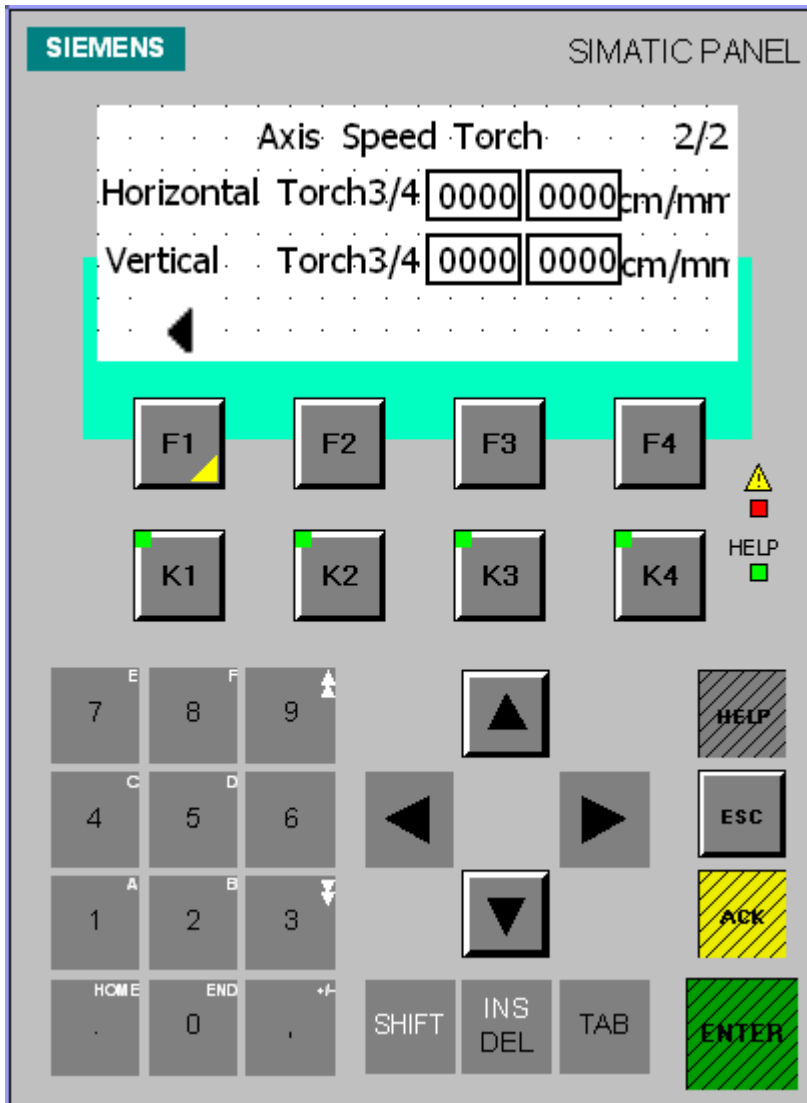
**Soft key F4** Go to Screen 2 Torch axis speed

**Horizontal Torch1/2 data entry screen:** The speed of the horizontal torch axis for the supply movements outside the detection area of the automatic sensing for Torch 1 and Torch 2 is input here (input in cm/mm). The left window is Torch 1. The right window is Torch 2.

**Vertical Torch1/2 data entry screen:** The speed of the vertical torch axis for the supply movements outside the detection area of the automatic sensing for Torch 1 and Torch 2 is input here (input in cm/mm). The left window is Torch 1. The right window is Torch 2.

Pkt. 15.6

Torch Axis Speed Service Menu Screen 2 OP77\_welding carriage



**Soft key F1** Back to Screen 1 Torch axis speed

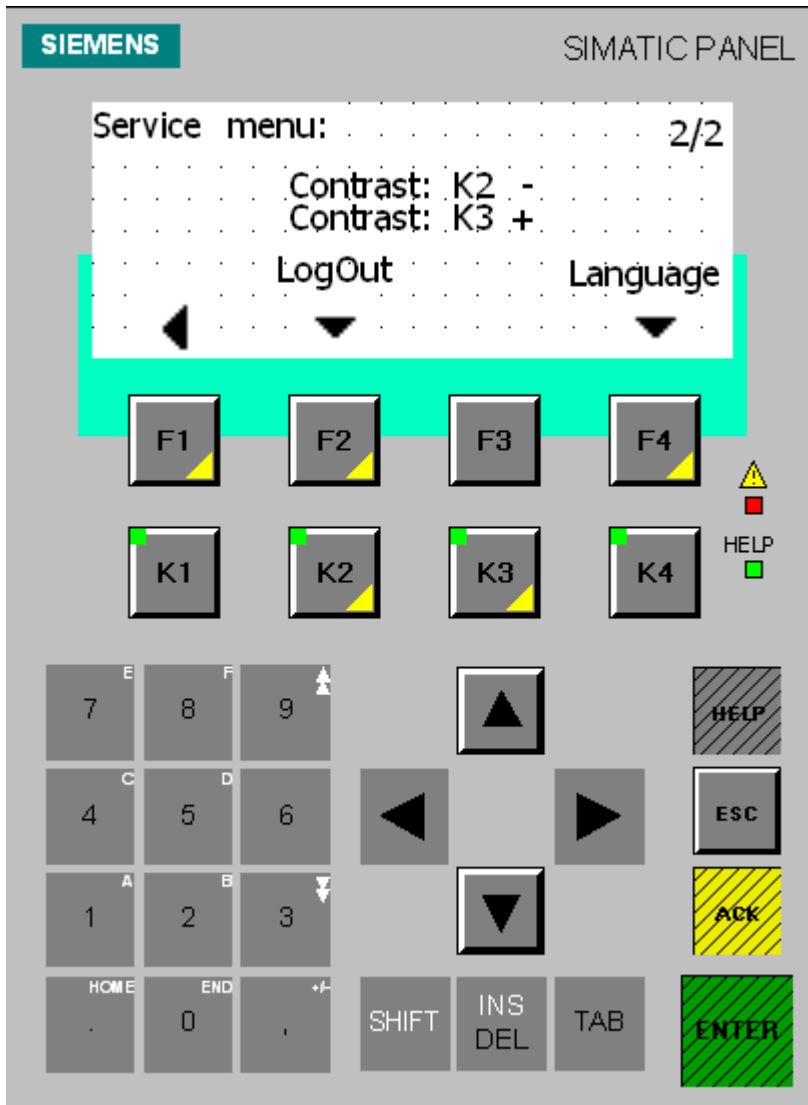
**Horizontal Torch3/4 data entry field:** The speed of the horizontal torch axes for the supply movements outside the detection area of the automatic sensing for Torch 3 and Torch 4 is input here (input in cm/mm). The left window is Torch 3. The right window is Torch 4.

**Vertical Torch3/4 data entry field:** The speed of the vertical torch axes for the supply movements outside the detection area of the automatic sensing for Torch 3 and Torch 4 is input here (input in cm/mm). The left window is Torch 3. The right window is Torch 4.



Pkt. 15.7

Service Menu Screen 2 OP77\_welding carriage



**Soft key F1** Back to Screen 1 Service Menu

**Soft key F2 LogOut** Log out (the service area is blocked again and can be recalled only through password entry, the password-protected area is blocked again automatically after 60 minutes of log in)

**Soft key F4 Language** Language switching (between German and English)

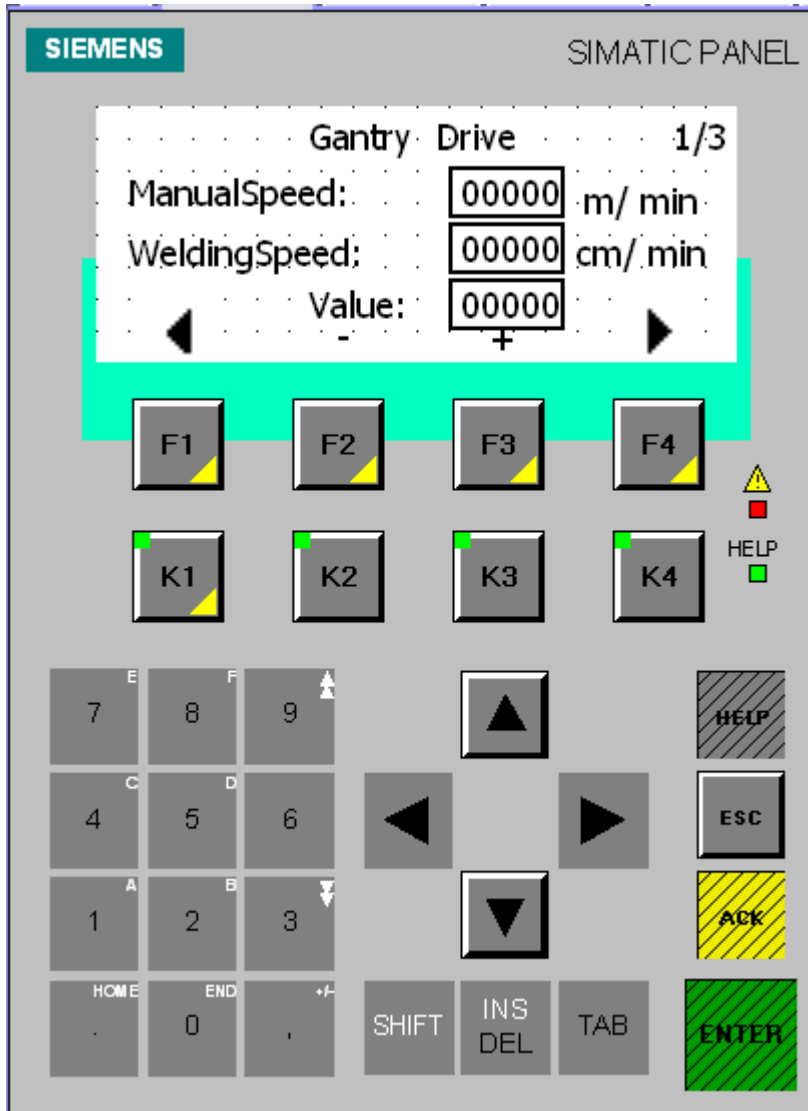
**Soft key F4** Go to screen 2 Service Menu

**Soft key K2 Contrast -** weaker contrast setting of the display

**Soft key K3 Contrast +** stronger contrast setting of the display

Pkt. 15.8

Gantry Drive Screen 1 OP77\_welding carriage



**Soft key F1** Back to Main Menu Screen

**Soft key F2** - Reduce welding speed in steps of 1 (1 cm/min)

**Soft key F3** + Increase welding speed in steps of 1 (1 cm/min)

**Soft key F4** Go to screen 2 Gantry Drive

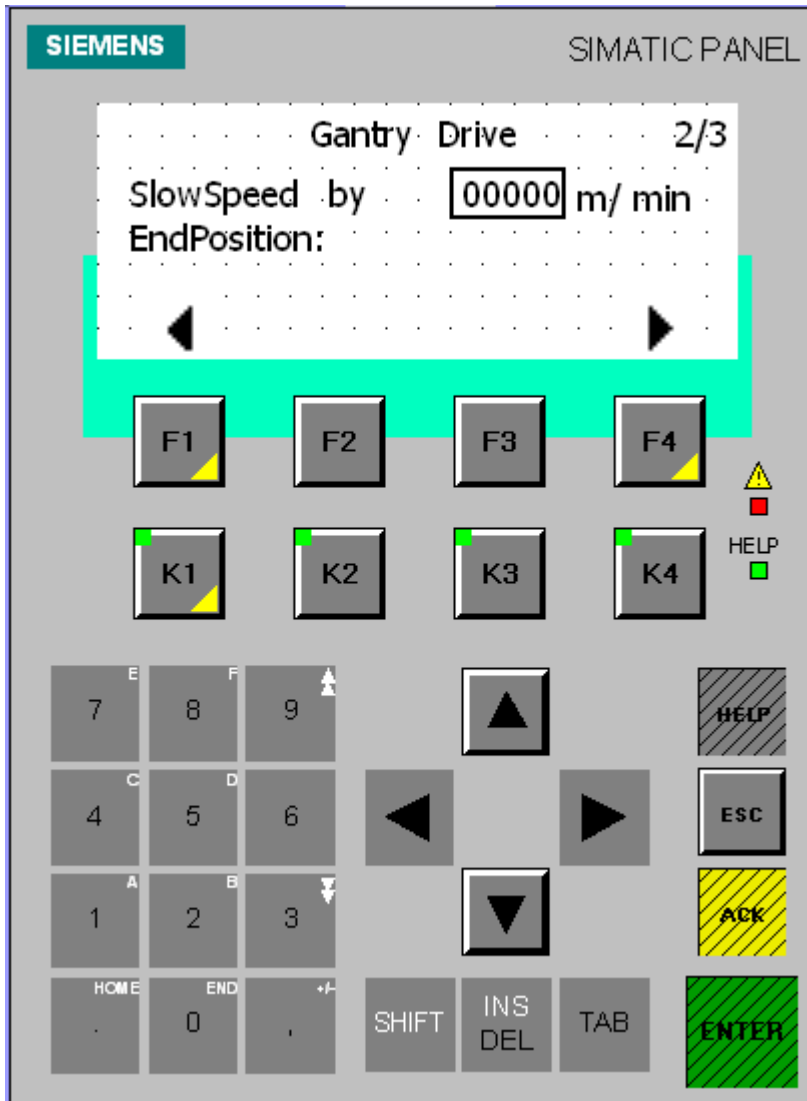
**ManualSpeed data entry field:** The speed of the gantry drive is input here in the Manual mode (m/min), maximum input value is 20m/min

**WeldingSpeed data entry field:** The welding speed of the gantry drive is input here in the Automatic mode (cm/min)

**Value output field:** The real value of the welding speed of the gantry drive is output here in the Automatic mode (cm/min)

Pkt. 15.9

Gantry Drive Screen 2 OP77\_welding carriage



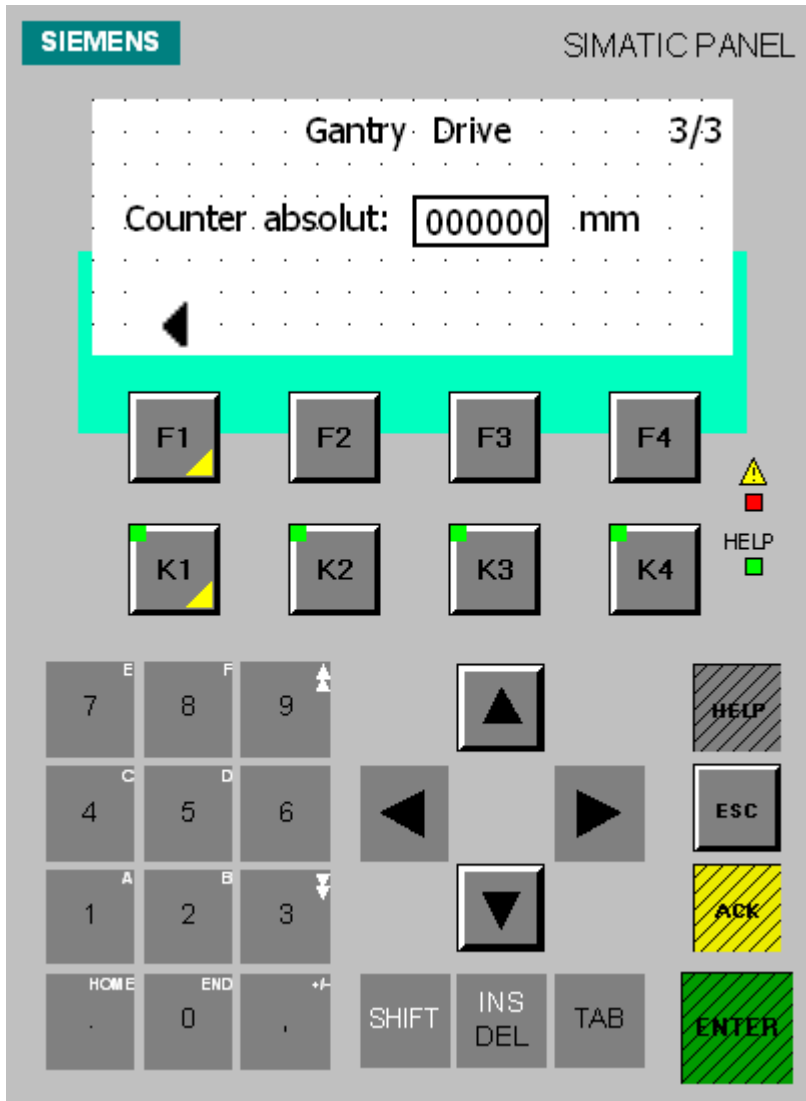
**Soft key F1** Back to Screen 1 Gantry Drive

**Soft key F4** Go to Screen 3 Gantry Drive

**SlowSpeed by Endposition data entry field:** The creep speed of the gantry drive in the end position area is input here (m/min) (password-protected)

Pkt. 15.10

Gantry Drive Screen 3 OP77\_welding carriage

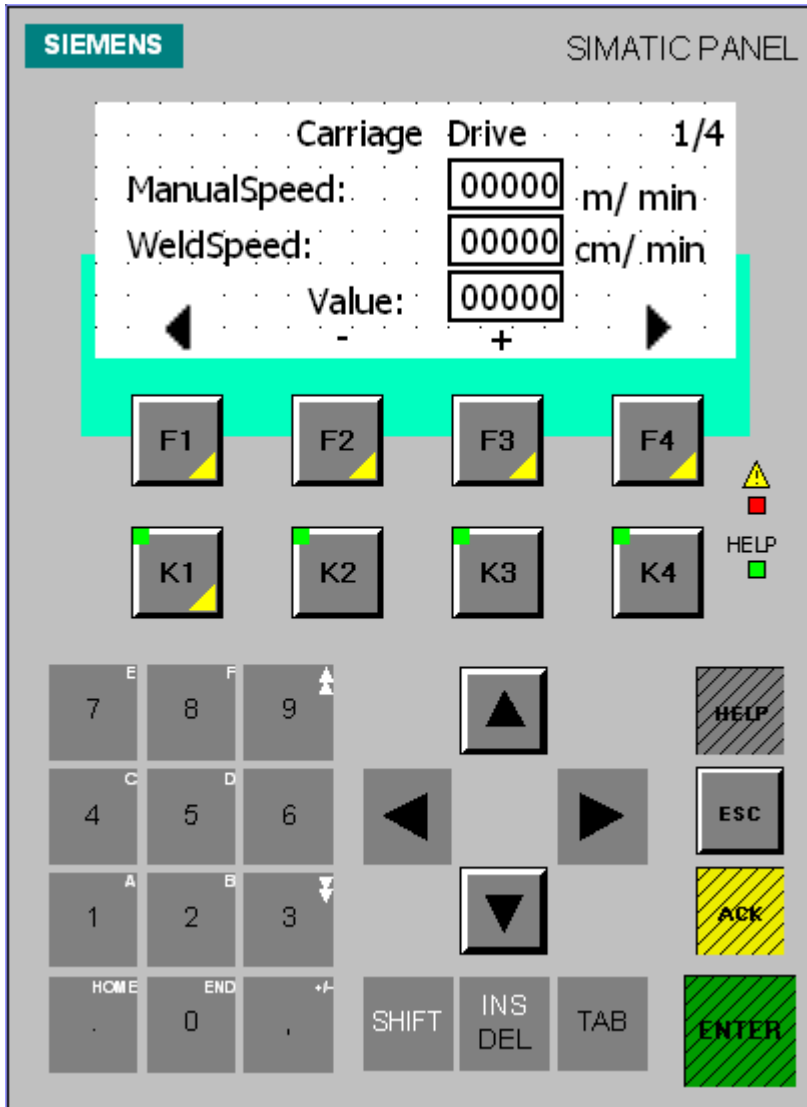


**Soft key F1** Back to Screen 2 Gantry Drive

**Absolute counter output field:** The counter status of the absolute distance encoder for the gantry drive is displayed here (output in mm). This value reverts to zero on actuating the Reset key function. The correct function of the counter can be tested with the help of this function.

Pkt. 15.11

Welding Carriage Drive Figure 1 OP77\_welding carriage



**Soft key F1** Back to Main Menu Screen

**Soft key F2** - Reduce welding speed in steps of 1 (1 cm/min)

**Soft key F3** + Increase welding speed in steps of 1 (1 cm/min)

**Soft key F4** Go to screen 2 Welding Carriage Drive

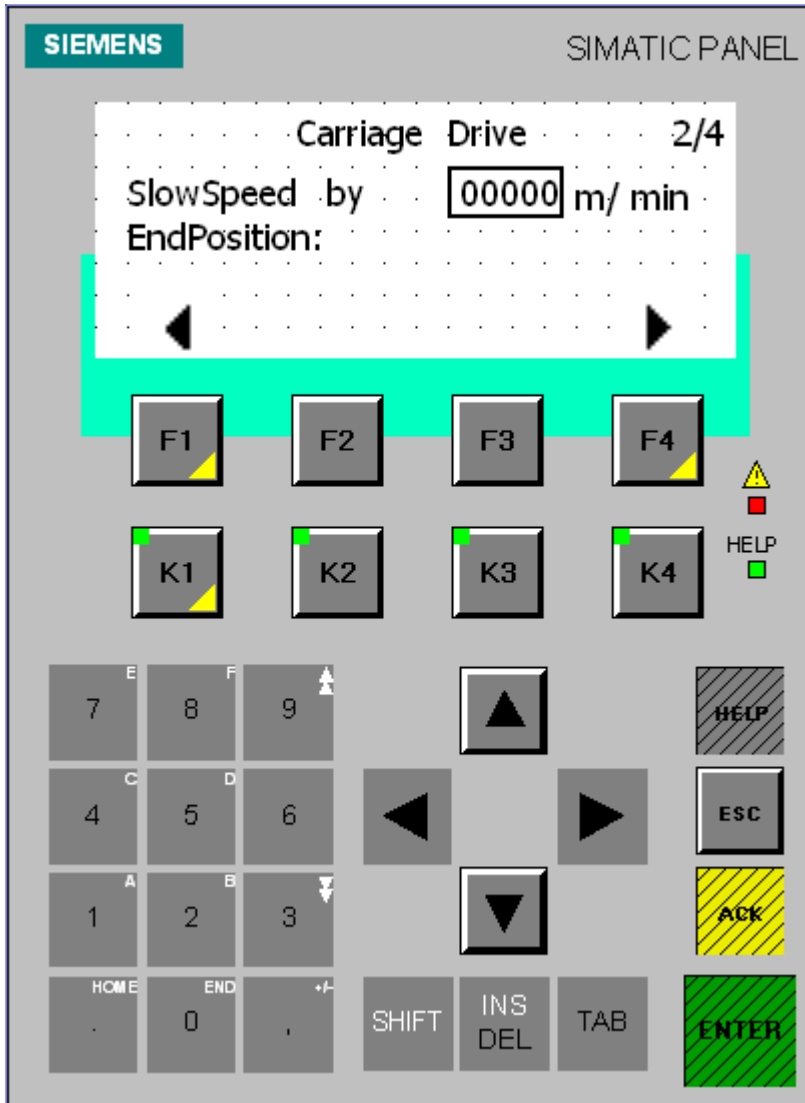
**ManualSpeed data entry screen:** The speed of the welding drive can be input here in the Manual mode (m/min), maximum input value is 10m/min

**WeldingSpeed data entry screen:** The welding speed of the welding carriage drive in the Automatic mode is input here (cm/min)

**Value Output Field:** The real value of the welding speed for the welding carriage drive in the Automatic mode is output here (cm/min)

Pkt. 15.12

Welding Carriage Drive Screen 2 OP77\_welding carriage



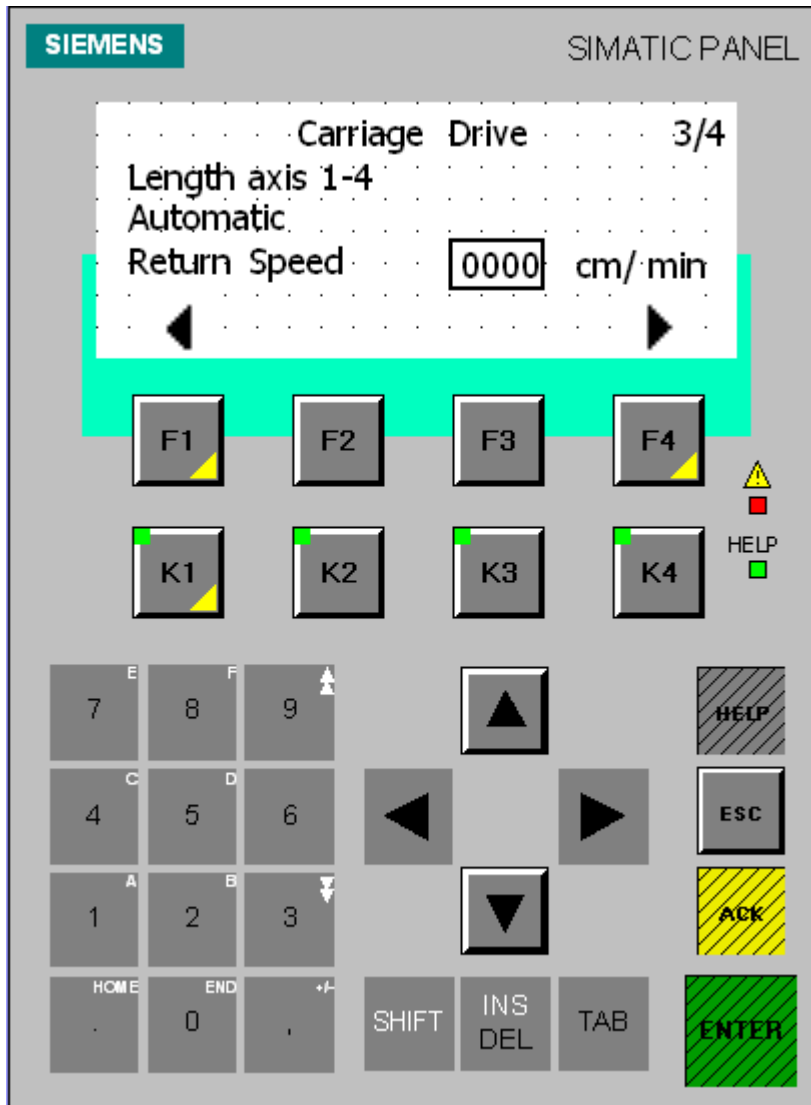
**Soft key F1** Back to Screen 1 Welding Carriage Drive

**Soft key F4** Go to Screen 3 Welding Carriage Drive

**SlowSpeed by Endposition data entry field:** The creep speed for the welding carriage drive pre-limit switch area is input here (m/min) (password-protected)

Pkt. 15.13

Welding Carriage Drive Screen 3 OP77\_welding carriage



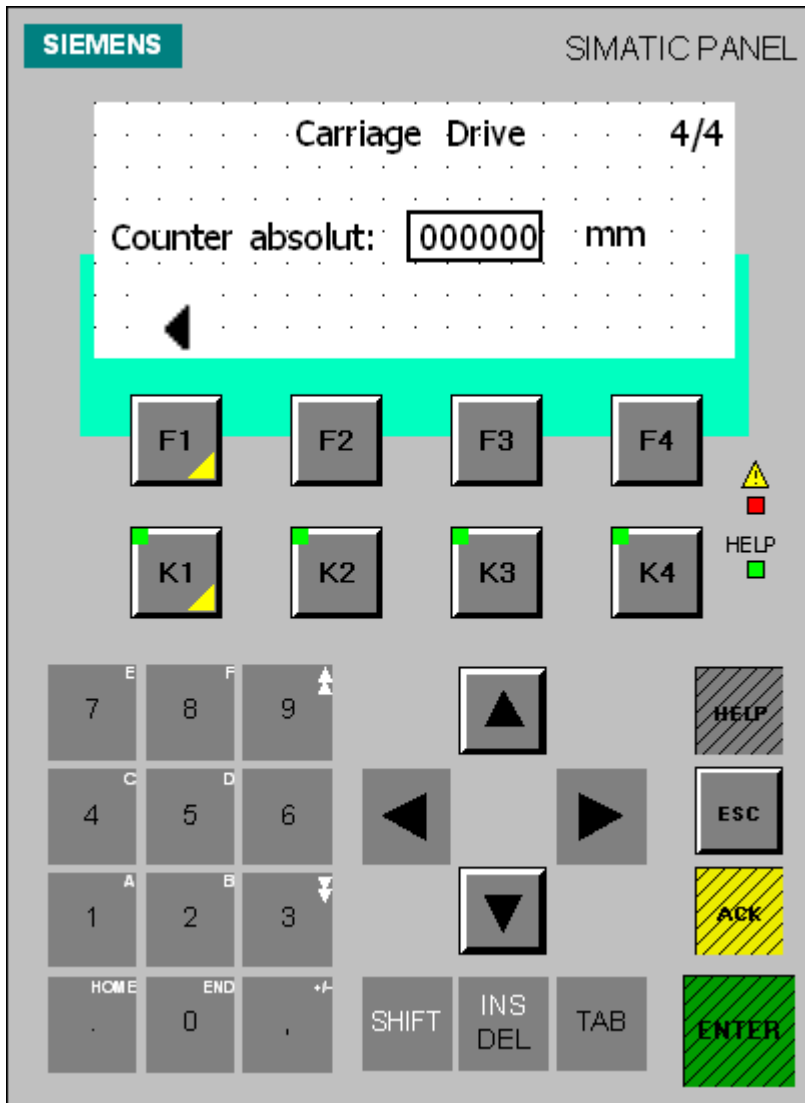
**Soft key F1** Back to Screen 2 Welding Carriage Drive

**Soft key F4** Go to Screen 4 Welding Carriage Drive

**Length axis 1-4 Automatic Return Speed data entry field:** The return drive speed of the longitudinal axes of Torches 1-4 (output in cm/min), the automatic return drive of the longitudinal axes takes place after the completion of a crater (password-protected).

Pkt. 15.14

Welding Carriage Drive Screen 4 OP77\_welding carriage



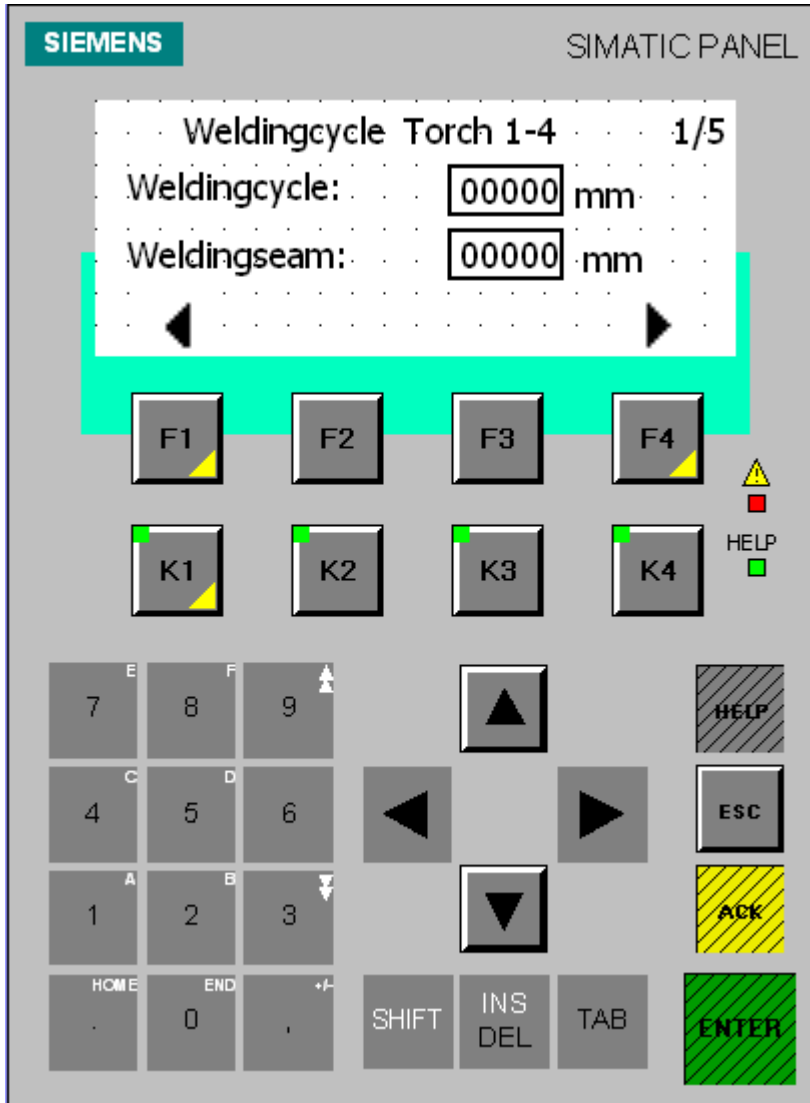
**Soft key F1** Back to Screen 3 Welding Carriage Drive

**Absolute Counter Output Field:** The counter status of the absolute distance encoder for the welding carriage is displayed here (output in mm). This value returns to zero on actuating the Reset function. The correct function of the counter can be tested with this function.



Pkt. 15.15

Welding Cycle Screen 1 OP77\_welding carriage



**Soft key F1** Back to Main Menu Screen

**Soft key F4** Go to Screen 2 Welding Cycle

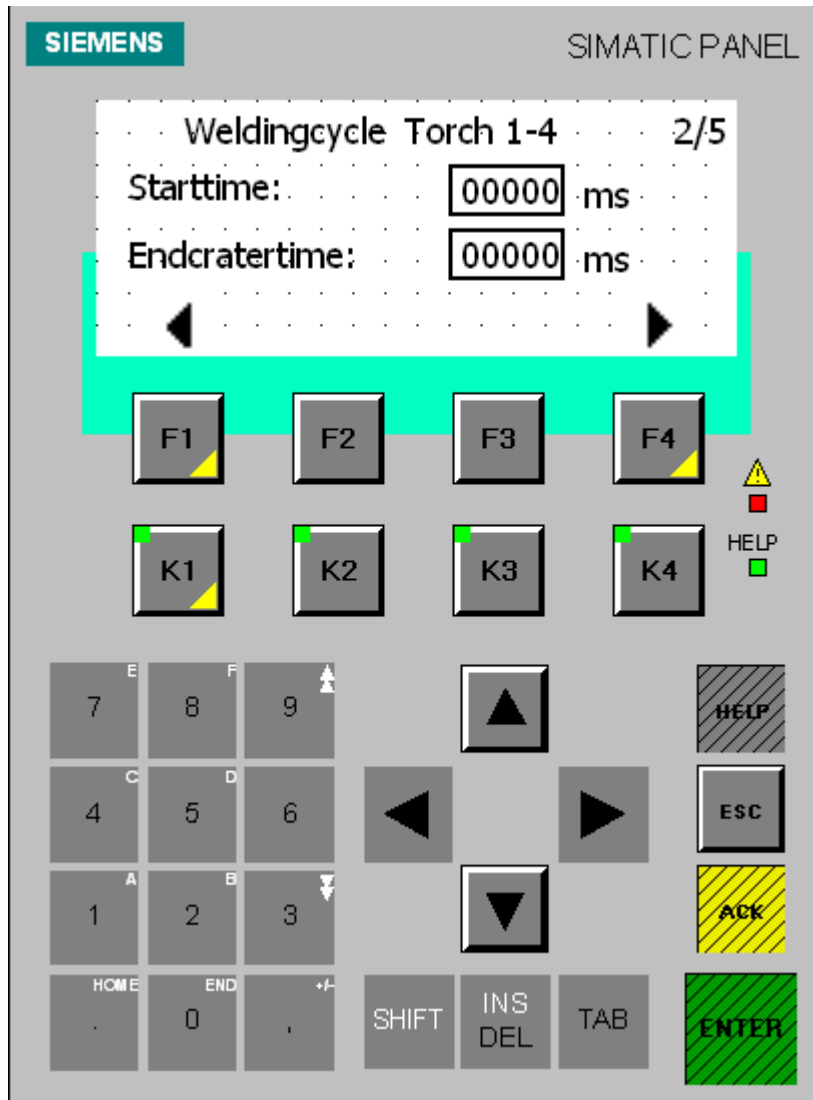
**Welding Cycle data entry screen:** The welding cycle length can be input here (input in mm)

One welding cycle consists of the welding seam length + welding gap.

Example: Welding cycle = 150 mm, welding seam length = 25 mm =  $(150-25= 125)$ , there is a welding gap of 125 mm.

Pkt. 15.16

Welding Cycle Screen 2 OP77\_welding carriage



**Soft key F1** Back to Screen 1 Welding Cycle

**Soft key F4** Go to Screen 3 Welding Cycle

**Starttime data entry screen:** The start time can be input here (input in ms)

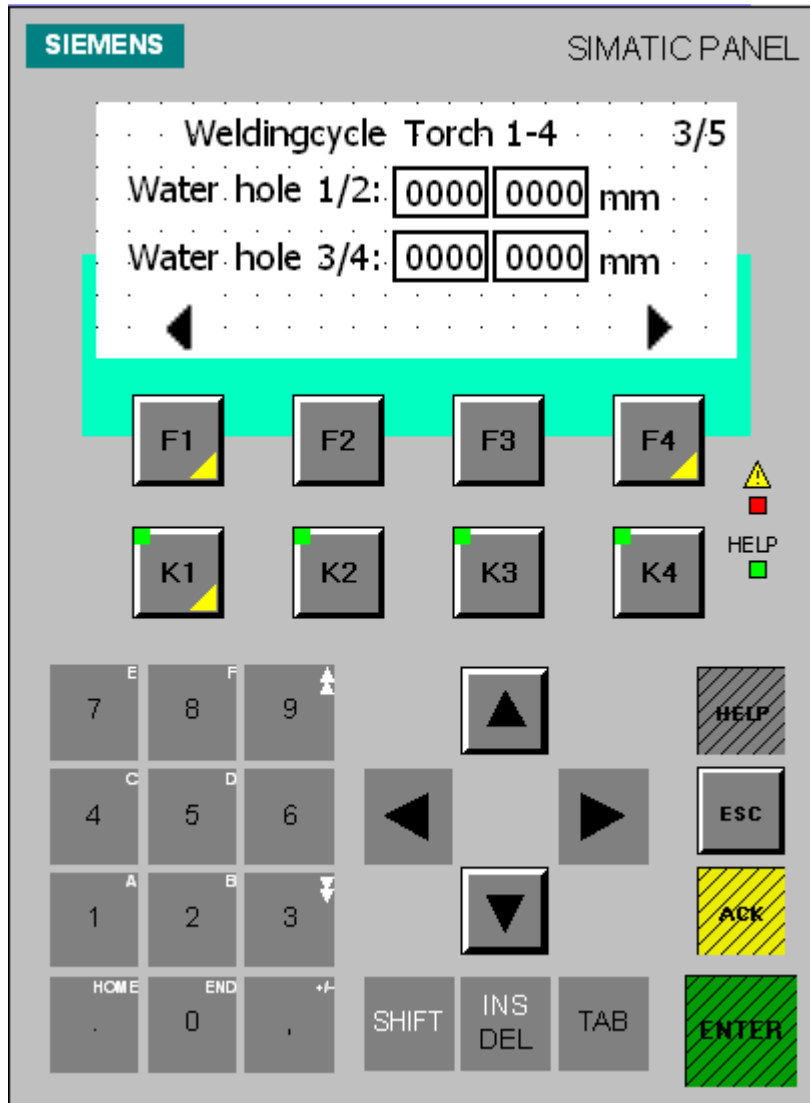
During start, the welding process drives the welding carriage or gantry at the welding speed. The longitudinal axes of the started torches travel at the same speed away from the welding. Thus, a filling of the welding material is implemented at the start point.

**Endcratertime data entry field:** The end crater time can be input here (input in ms)

On stopping the welding process, the welding carriage or the gantry travels further at the welding speed (broken welding seam). The longitudinal axes of the started torches travel at the same speed for the start duration away from the welding. A filling of the welding material at the end point (end crater) is implemented in this way.

Pkt. 15.17

Welding Cycle Screen 3 OP77\_welding carriage



**Soft key F1** Back to Screen 2 Welding Cycle

**Soft key F4** Go to Screen 4 Welding Cycle

**Water hole 1/2 data entry screen:** The length of an existing water hole (without bar in profile) for Torch 1 and Torch 2 can be input here (input in mm)  
 The left window is Torch 1. The right window is Torch 2.

**Water hole 3/4 data entry screen:** The length of an existing water hole (without bar in profile) for Torch 3 and Torch 4 can be input here (Input in mm)  
 The left window is Torch 3. The right window is Torch 4.

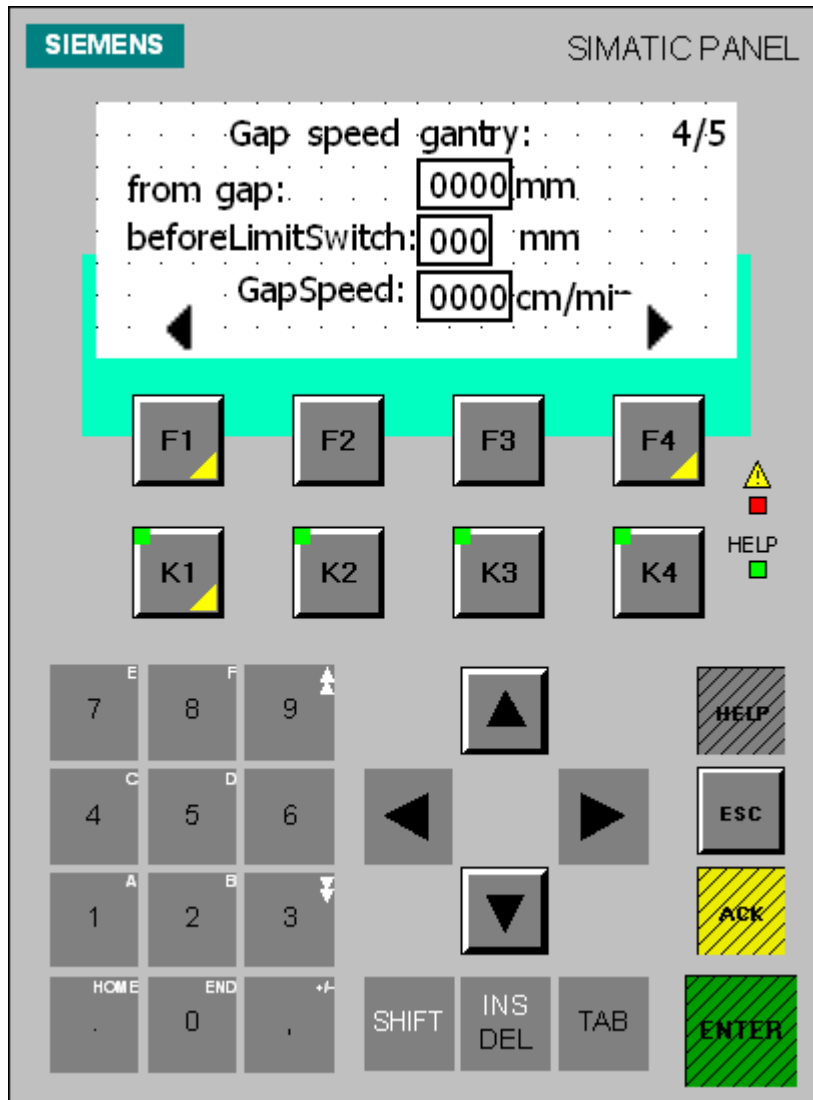
Thus the welding process can interrupt the welding operation automatically in the area of the water hole.

The start of the water hole is detected from the movement of the sensor needle. If the torch reaches this point, the end crater is set there automatically and the welding operation is interrupted. On reaching the input distance of the water hole length, the welding process is restarted automatically if the sensor needles are again in the wedge seam, and therefore within the sensing range.

**Caution! The value of the water hole length should not be more than the sensor distance between torch and sensor needle!**

Pkt. 15.18

Welding Cycle Screen 4 OP77\_welding carriage



**Soft key F1** Back to Screen 3 Welding Cycle

**Soft key F4** Go to Screen 5 Welding Cycle

**Gap speed gantry data entry screen:**

**From gap:** The distance of a welding seam gap can be input here, from where one must switch to a specified rapid speed in the welding seam gap (input in mm), in case of a broken welding seam.

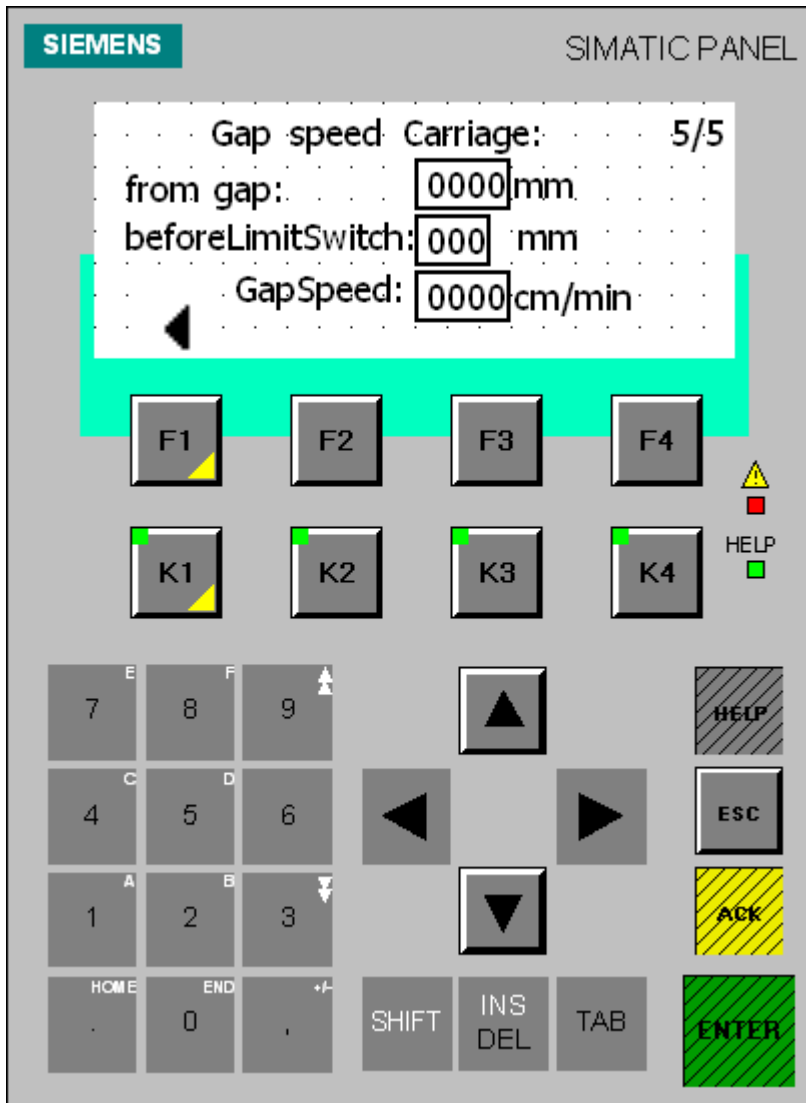
**before LimitSwitch:** In case of broken welding seam, the distance of the advance deactivation point can be input here (input in mm), from where one must switch from rapid speed back to the welding speed at the end of welding seam gap.

**GapSpeed:** The rapid speed at which the welding seam gap is to be traversed can be input here (input in cm/min)

The functions are possible only in the “Broken welding” mode. Time can be saved this way if the welding seam gaps are big.

Pkt. 15.19

Welding Cycle Screen 5 OP77\_welding carriage



**Soft key F1** Back to Screen 4 Welding Cycle

**Gap speed Carriage data entry field:**

**from gap:** The distance of a welding seam gap can be input here, from which one must switch to a specified rapid speed in the welding seam gap, in case of a broken welding seam (input in mm).

**before LinitSwitch:** The distance from the advance deactivation point can be input here, from which one must switch from the rapid speed back to the welding speed at the end of the welding seam gap, in case of broken welding seam. (Input in mm)

**GapSpeed:** The rapid speed at which the welding seam gap is to be traversed can be input here (input in cm/min).

The functions are possible only in the “broken welding” mode. This way time can be saved if the welding seam gaps are large.

## 5.4 Fault list

Id. Nr.	Display	Condition	Source of fault
1	FAULT luminous indicator (03), steady light	Control voltage ON	At least one motor protection switch is triggered in the control cabinet
2	FAULT luminous indicator (03, 103), Flashing	Key switch ON	At least one Emergency-Stop switch is actuated
3	FAULT luminous indicator (03), steady light	Control voltage ON	At least one frequency converter of the main axes reports a fault.

### Fault messages in the Operator Panel OP77 of welding carriage

Other faults are displayed on the Operator Panel OP77 of the welding carriage. If a fault occurs, it appears on the Operator Panel OP77 as free text messages along with a flashing red LED. The fault message can be acknowledged with the ACK key. The fault message disappears. The red LED lights up as long as the fault persists.

Text	Numme
Error inverter welding carriage	1
Collision torch 1	2
Collision torch 2	3
Error welding torch 1	4
Error welding torch 2	5
Welding carriage drive thermo	6
Circuitbraker main axis 1 switch off	7
Circuitbraker inverter welding carriage switch off	8
Circuitbraker brake main axis 1 switch off	9
Error 42 V axis drive torch 1-2	10
Torch 1 not in catch position!	11
Torch 2 not in catch position!	12
Error function lightsensor gantry drive forward	13
Bolt not lock	14
Welding stop, torch 1 in endposition	15
Welding stop, torch 2 in endposition	16
Error inverter gantry drive	17
Collision torch 3	18
Collision torch 4	19
Error welding torch 3	20
Error welding torch 4	21
Gantry drive thermo error	22
Circuitbraker main axis 2 switch off	23
Circuitbraker inverter gantry drive switch off	24
Circuitbraker brake main axis 2 switch off	25
Error 42 V axis drive torch 3-4	26
Torch 3 not in catch position!	27
Torch 4 not in catch position!	28
Error function lightsensor gantry drive backward	29
Reserve	30
Welding stop, torch 3 in endposition	31
Welding stop, torch 4 in endposition	32

## 5.5 Views of operator panels

Drawing	279-031	Page 225	Switch cabinet SC
Drawing	279-031	Page 240	Operator panel OP
Drawing	279-031	page 241	Pendant
Drawing	279-031	Page 245-246	Pendant Kemppi KWF 300

Drawings see following pages

The drawings are stored in the data „K7010.24\_OM\_C5\_Annex\_ENG.PDF“.

## 6 Maintenance and servicing

### 6.1 Reference to safety notices of separate plants

The following unit parts, including the safety information from the manufacturer, are described in their own separate documentation folders

- DEMAG: Operating instruction wheel block system DRS
- SEW: Operating instruction gear
- SEW: Operating instruction AC motors, AC brake motors
- SEW: Operating instruction frequency inverter
- ALCATEL: Instruction manual motor with integrated speed controller
- Rexroth: Operating instruction Compact Modules CKK
- RK: Operating manual RK tube system linear unit
- KEMPPPI: Operating instruction welding equipment
- ABUS: Product manual chain hoist ABUCompact

### 6.2 Warning of special dangers for maintenance and servicing

Observe all fire-warning and fire-fighting procedures!

In any work concerning the operation, conversion or adjustment of the machine and its safety-oriented devices or any work related to maintenance, inspection and repair, always observe the start-up and shut-down procedures set out in the operating instructions and the information on maintenance work!

If the machine/plant is completely shut down for maintenance and repair work, it must be secured against inadvertent starting by:

- Disconnection of the main circuit switch
- locking the principal control elements and removing the ignition key and/or
- attaching a warning sign to the main switch.

To avoid the risk of accidents, individual parts and large assemblies being moved for replacement purposes should be carefully attached to lifting tackle and secured. Use only suitable and technically perfect lifting gear and suspension systems with adequate lifting capacity! Never work or stand under suspended loads!

For carrying out overhead assembly work always use specially designed or otherwise safety-oriented ladders and working platforms. Never use machine parts as a climbing aid. Wear a safety harness when carrying out maintenance work at greater heights!

Keep all handles, steps, handrails, platforms, landings and ladders free from dirt, snow and ice!

Clean the machine, especially connections and threaded unions, of any traces of oil, fuel or preservatives before carrying out maintenance/repair. Never use aggressive detergents. Use lint-free cleaning rags!

Before cleaning the machine with water, steam jet (high-pressure cleaning) or detergents, cover or tape up all openings which - for safety and functional reasons - must be protected against water, steam or detergent penetration. Special care must be taken with electric motors and switch-gear cabinets.



After cleaning, remove all covers and tapes applied for that purpose!

Always tighten any screwed connections that have been loosened during maintenance and repair!

Any safety devices removed for set-up, maintenance or repair purposes must be refitted and checked immediately upon completion of the maintenance and repair work.

Ensure that all consumables and replaced parts are disposed of safely and with minimum environmental impact!

1

If provided for in the regulations, the power supply to parts of machines and plants, on which inspection, maintenance and repair work is to be carried out must be cut off. Before starting any work, check the de-energized parts for the presence of power and ground or short-circuit them in addition to insulating adjacent live parts and elements!

2

Depressurize all system sections and pressure pipes of compressed-air system to be removed in accordance with the specific instructions for the unit concerned before carrying out any repair work!

3

Compressed-air lines must be laid and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the hoses must comply with the technical requirements.

### **6.3 Initial start-up after maintenance / repair**

An initial start-up after maintenance / repair may only be done by trained technicians.

### **6.4 Inspection / Maintenance intervals**

#### **6.4.1 General**

The unit / machine is to be kept in a clean condition. In particular, it is important that the guides of moving parts are kept greased to ensure that the unit parts can move freely and to prevent the rusting of bare metal parts. Rails are to be kept clean.

Markings, information and warning plates are to be maintained in a clear and legible state. The oil change, lubrication and maintenance intervals are to be taken from the lubrication plans as per item 6.5.

The maintenance and servicing information of the component suppliers are included in the appendix of the technical documentation and should be followed.

This applies in particular to

- welding technology and current sources
- wheel sets and drive units
- motors
- pneumatic unit
- and others

## 6.4.2 Inspections

- Daily inspection:
  - Visual inspection: Overall condition of the unit / machine  
Structural parts for cracks, deformation  
Screw connections, locking elements  
Cables, clamp connections  
Hoses, pipes, connections
  - Function inspection: Warning devices (horn, indicator lights)  
Overload protection
  
- Weekly inspection:
  - Visual inspection: Energy cable chains,  
Travelling gear for the wheel sets
  - Function inspection: Displays, instruments
  
- Monthly inspection:
  - Visual inspection: Inspection of the electrical unit, including the cable guide  
Complete pneumatic unit  
Spindle drives  
Running rails
  - Function inspection: All the travelling movements
  
- Quarterly inspection:
  - Visual inspection: Oil level, operating media, lubrication
  - Function inspection: Level of protection and insulation of the electrical unit
  
- Annual inspection:
  - General inspection of the unit
  - Functional check of all movements and process technology
  - Checking the set values (e.g. pressures, speeds, mechanical play, electrical voltages and current ratings)
  - Inspection of the lettering and paint work

## 6.5 Lubricants / Lubrication plans

### Lubricants

Term	ARAL	ESSO	MOBIL	SHELL
Oil CLP 220 (VG220)	Aral Degol BG 220	BP Energol GR XP 220	Mobilgear 630	Shell Omala 220
Grease DIN 51818 2 - 3	Arallub HL 3	Exxon BEACON 2	Mobilux EP 2	Shell Alvania Fett R3

Term	Klüber			
Oil CLP PG-460- NSF-H1	Klübersynth UH1 6-460			

## Lubrication plan, drawing.-no: 277-660 SP

No.	Lubricating point	Lubricant	Quantity of each lubricating point	Number of lubricating points	Frequency/ operating hours
1	Gear KAZ67	Oil CLP 220 (VG 680)	3,55 l	2	every 4 years or after 1000 operation hour
2	Gear FVZ67	Oil CLP 220 (VG 680)	3,2 l	1	every 4 years or after 1000 operation hour
3	Gear W37	Oil CLP PG- 460-NFS-H1	0,5 l	2	every 4 years or after 1000 operation hour
4	motor height adjustment ball bearing spindle	Grease DIN 51818 2 - 3	0,1 kg	2	¼-yearly
5	motor height adjustment guiding wagon	Grease DIN 51818 2 - 3	0,2 kg	8	¼-yearly
6	Compact-module	according producer information		24	yearly
7	interlock	Grease DIN 51818 2 - 3	0,05 kg	1	½ -yearly
8	spindle hand feed	Grease DIN 51818 2 - 3	0,1 kg	2	½ -yearly
9	Supporting and guiding roller	Grease DIN 51818 2 - 3	0,05 kg	4	yearly or after 500 operation hour
10	Wire feed	according producer information		4	¼-yearly
11	Chain tension	according producer information		2	yearly

## 6.6 Environmental stipulations

The legal requirements concerning the avoidance of waste and the appropriate recycling and disposal of materials are to be complied with for all work on and with the machine.

In particular, when carrying out installation, repair and maintenance work, materials that are hazardous to water such as

- Lubricating greases and oils
- Hydraulic oils
- Coolants
- Solvent-based cleaning fluids

must not be allowed to contaminate the ground or get into the sewage system!

Such materials must be kept, transported, collected and disposed of in suitable containers.

## 7 How to handle faults

### 7.1 Addresses

# IMPORTANT INFORMATION

## ADDRESSES AND CONTACT PERSONS

#### Company Address:

This address shall be used in case of all general purposes!



IMG  
Ingenieurtechnik und Maschinenbau GmbH  
Industriestrasse 8  
18069 Rostock  
GERMANY

**Phone:** +49 (0) 381-793-0  
**Fax:** +49 (0) 381-71 21 89  
**E-mail:** info@img-tech.de

#### Service Address:

This address shall be used in case of emergencies!



IMG  
Ingenieurtechnik und Maschinenbau GmbH  
Service Manager **Mr. René Rietz**  
Industriestraße 8  
18069 Rostock  
GERMANY

**Phone:** +49 (0) 381-793-500  
**Fax:** +49 (0) 381-793-431  
**E-mail:** service@img-tech.de