

Operating Panel AWS3 System

OP-AWS3

TP-AWS3

OPERATING INSTRUCTIONS



Annex:

- Safety Regulations
- General References on Resistance welding
- Contact addresses

Valid for SW version V6.5.0 and higher:	
OP-AWS3	TP-AWS3

Version	Date	Basis of Revision
1.0	2007-06	new
1.1	2010-07	General Information: restricted functions
2.0	2015-02	Completely revised, new: TP-AWS3
2.0a	2015-09	Changes due to new company name
2.1	2016-05	Chap. 4.13: new user 'engineer'; corrections

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1 General Notes



Information about safety regulations, symbols, copyrights, protection rights, usage location conditions and notes on resistance welding can be found in the back section of these operating instructions.

Please read this information carefully before using these operating instructions.

These operating instructions should help you familiarize yourself with the system and take advantage of its application possibilities when used as directed.

It contains important notes to help operate the unit safely, properly, and economically.

Observing these notes will help avoid risks, decrease repair costs and down times, and enhance reliability and service life of the unit.



Warning

As a general rule: **safety first!**



Danger

Incorrect or inappropriate configuration, installation, settings, handling or use can cause mechanical, electrical or thermal hazards, which may result in serious damage or injury.

Ensure the correct execution of these points and follow the respective notes in the operating instructions.



Do not put the system into operation before you have read the **operating instructions!**



Danger



Persons with **cardiac pacemakers** and **metallic implants** are prohibited from approaching to within a radius of **at least 5 m** of welding equipment!



Warning

Crushing Hazard

There is a risk of crushing during the adjustment movement due to closing electrodes, stops for limiting adjustment or stroke movement and the stop on the basic pincers unit for limiting floating movement.



Warning

This **Class A welding equipment** is not supposed to be used in living quarters, where the power supply is carried out by a public low voltage supply.

There it can be difficult to ensure electromagnetic compatibility because of conducted or radiated disturbances.

2 Technical Description

There are two models of control panels available for the AWS3 system:

OP-AWS3 with toggle wheel

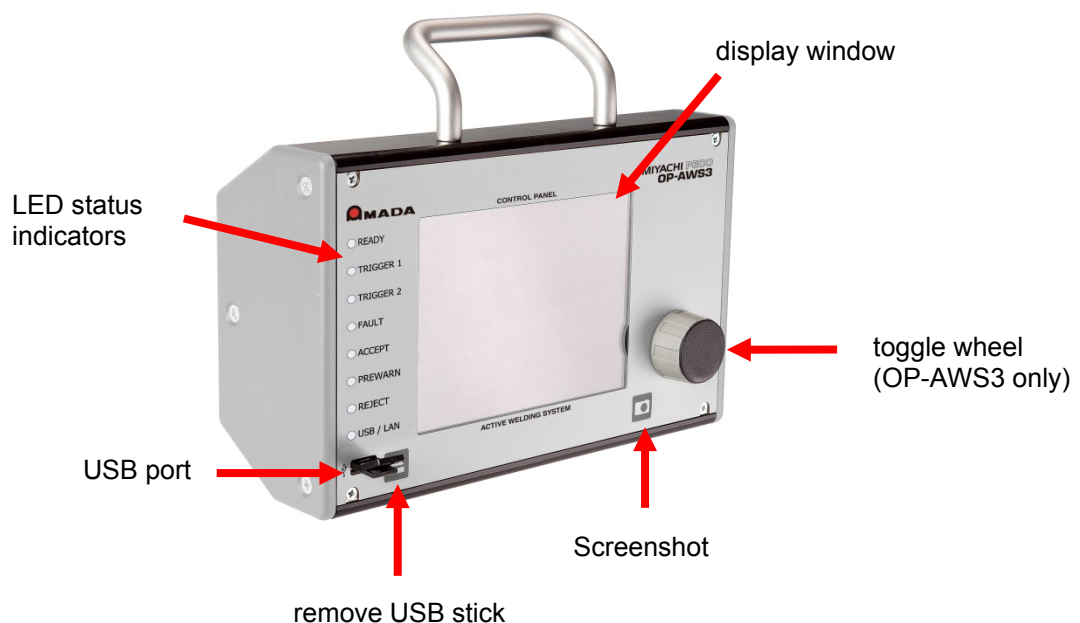
TP-AWS3 with touch screen

With the control panel all connected devices are controlled (e.g. motor control MFP-NC and inverter power source ISQ).

For more information about these devices see the respective operating manuals.

The control panel consists of:

- the display window, which can be divided into 4 free configurable parts (quadrants)
- 8 LED status indicators
- a USB port for a USB stick
- and a toggle wheel (OP-AWS3 only)



2.1 Technical Data

Type of device	Control panel AWS3
Measuring pause	variable
Graphic display	VGA, 640 x 480 Pixel
Optical indications	8 front LEDs
Ambient temperature	0 °C to 40 °C
Relative humidity	max. 70 %
Dimensions	<p>OP-AWS3:</p> <ul style="list-style-type: none"> • Housing w 228 x h 144 x d 78 mm • Housing incl. projection w 228 x h 188 x d 78 mm <p>TP-AWS3:</p> <ul style="list-style-type: none"> • Housing w 292 x h 198 x d 75 mm • Housing incl. projection w 292 x h 198 x d 100,5 mm
Weight	<p>OP-AWS3: approx. 1,7 kg (approx. 3,7 lbs)</p> <p>TP-AWS3: approx. 3,6 kg (approx. 7,9 lbs)</p>

2.2 Functional Overview AWS3 Basic - AWS3 Advanced

OP-AWS3 and TP-AWS3 are available in two versions:

- Basic
- Advanced

Functional overview:	Basic	Advanced
Convenient setting of parameters and limit values for up to 99 programs (Dual 49)	X	X
Saving of data on a USB stick (parameter/limit value settings)	X	X
Numeric display and static monitoring	X	X
Digital I/O interface	X	X
Serial data output (logging of measurement data: numeric parameters and status) via RS232	X	X
Screenshot function	X	X
Various (password protected) user levels adjustable	X	X
Flexible I/O configuration and monitoring	X	X
Graphical displays		X
SPC (Statistical Process Control)		X
Calculation of limit values via SPC evaluation		X
Dynamic monitoring (envelope waveforms)		X
Logging of measurement data on USB stick		X
Advanced analysis functions		X
Modbus/TCP interface		X
Advanced bus interface (Profibus/DP or EtherNet/IP)		optional
Ethernet interface	X	X
Firmware update function	X	X

Not all functions described in this manual are available in the basic version.

3 Construction and Mode of Action

3.1 Saving Data

Via the USB port you can save data and parameters on a USB stick.

We recommend using only industrial standard USB sticks (like the one included in the scope of the delivery).



Caution

Avoid performing fast cyclical saving in a row on the USB stick.

This can affect the function and in the long run damage the data medium.



Caution

Loss of Data!

Disable the USB stick before you remove it from the PC in order to use it in the AWS3 control panel.

Press the disable button on the control panel before you remove the USB stick from the panel.

Individual operator configurations remain stored even when the device is switched off.

Numerical measured values are buffered in the device. Buffer size is adjustable. If buffer size is set at a higher number than 0, measured values are exported automatically to the set external data medium (USB stick or LAN network) when buffer is full.

Buffered numerical measured values remain stored even when device is switched off. Measured waveforms are not buffered permanently.

It is possible to output selected parameters of each welding to a commercial printer with a serial connection. To do this, connect the printer to connector X17 (RS232 interface).

Set desired output format and baud rate in screen MENU – GENERAL.

Select with the toggle wheel (see chap. 3.2) resp. via the touch screen (see chap. 3.3).

3.2 Toggle Wheel at OP-AWS3

The toggle wheel is the central operating element of the OP-AWS3.
All settings are done via the toggle wheel:

- Select menu items by rotating the toggle wheel. The field containing the cursor is always highlighted in red.
- By pressing the toggle wheel (in the following referred to as 'clicking'), the selected element (switch, selected field, quadrant, ...) is chosen resp. activated/deactivated.
- Grayed out option points or parameters are disabled and cannot be selected.

The following elements are input fields:

- Buttons, which trigger a certain action when pressed
- Switches, which have two switching conditions (black = on / active; gray = off / inactive)
- Selection fields that allow selection from a list of options. By clicking once you can choose between the options. By clicking again the selected value is stored.
- Entry fields which allow entering numbers.
By clicking once you change to quick edit mode where you can change the whole number at once. Double-clicking changes to precision edit mode (the single digit is highlighted in red and can be changed individually). Double-click again to store the set value and leave precision edit mode.

3.3 Touch screen at TP-AWS3

The touch screen is operated as usual: touch the respective field/switch with a finger or a non-metallic blunt object.

Input of numeric values:

Enter numeric values by a fade-in numeric keyboard.

Operation of LED controls:

Select an LED control by tapping on it (LED is highlighted in red). By subsequent tapping the state of the LED can be toggled (red – blue indication).

Operation of graphic controls:

By tapping on a graphic control an indication line or a graphic cursor will be set (according to selected function). The graphic cursor can be replaced by tapping on the graphic waveform or it can be reset by clicking on ‘cursor’.

Operation of teach mode (see chap. 4.6.1):

The teach mode (in MENU – DISTANCE – ADVANCED) can be operated by continuously pressing the ‘+’ or ‘-’ button. The axis is moving in parametrizable steps (like a step motor).









Quick acknowledgement of faults and other status messages:

By directly tapping (repeatedly if required) onto the message in the status line.

Shutdown after switching off:

The touch panel initiates a shutdown procedure after switching off the power of the system. The graphic display of the panel is deactivated immediately. The LED ‘USB / LAN’ indicates the duration of the shutdown phase, in which the panel must not be switched on again. If you switch on the system too early, it needs to be switched off again to initiate a new start.

3.4 LED Status Displays

READY		AWS3 ready
TRIGGER1		Measurement activity on axis 1
TRIGGER2		Measurement activity on axis 2
FAULT		Device error or sequence fault
ACCEPT		Welding within set limits
PREWARN		Device or sequence related warning
REJECT		Welding outside of set limits
USB/LAN		USB stick missing (LED flashing) or access to USB stick (LED remains lit)

3.5 Screen (Display)



The screen (Display)

- | | |
|----------------------------------|--|
| 1. Display quadrant 1 (Q1) | 9. Button for parameter overview |
| 2. Display quadrant 2 (Q2) | 10. Button for analysis |
| 3. Menu bar | 11. Shows current operation mode |
| 4. Program number selection | 12. Status bar for status, help and fault messages |
| 5. Button „START“ | |
| 6. Button “STOP” | 13. Display quadrant 4 (Q4) |
| 7. Button for logging | 14. Display quadrant 3 (Q3) |
| 8. Button for configuration menu | |

3.5.1 Display Windows – Quadrants 1 to 4

The measured values can be shown in four fully configurable display windows (quadrants).

Each quadrant can show the values in one of the following display modes:

- numeric
- graphical
- SPC* chart * SPC: Statistical Process Control
- SPC values

Click on one of the quadrants to see an enlarged and more detailed view of this quadrant with possible additional settings.

Special feature of the numeric display mode:

After a measurement the measured value can flash in **red**.

This means, the measured value is outside of the set limits.

3.5.2 Menu Bar

The menu bar includes:

- Display/Setting of the current program number (1 to 99 at 1 axis mode, 1 to 49 at 2 axes mode)
- Buttons for selecting displays and operation mode
- Display of the current operation mode (SINGLE/AUTO)

3.5.3 Program Display

Shows the number of the welding program currently active:
1 to 99 at 1 axis mode, 1 to 49 at 2 axes mode)

Program selection via toggle wheel or touch screen.

3.5.4 Status Bar

Depending on the control elements selected, the status bar shows:

- Information on the last measurement (axis 1/2) (in black color)
- Help text containing details about the control elements selected (blue)
- General information messages / status messages (purple)
- General error messages (red)
- Error messages concerning device and process faults (dark red)

3.5.5 UNDO Function

The menu bar offers the UNDO button for all screens where parameters can be set or changed.

With this button you can undo the last (up to 50) settings in this screen one by one.

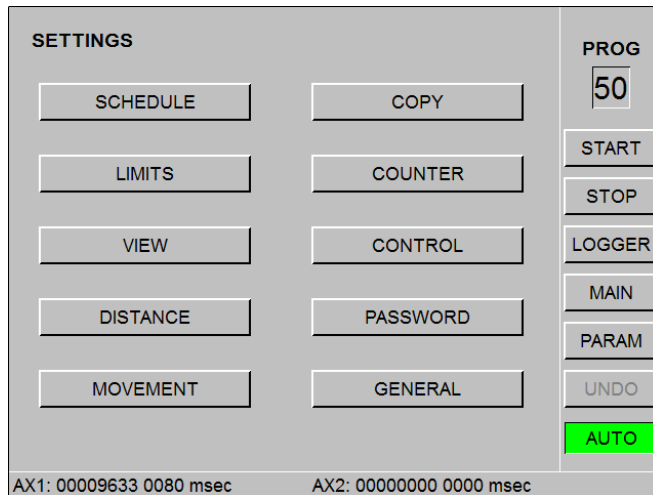
4 Operation: How to...

4.1 Perform General Settings

After starting-up and initialization the **main menu** is displayed.
(If main menu is not shown, click on **MAIN** in the menu bar.)

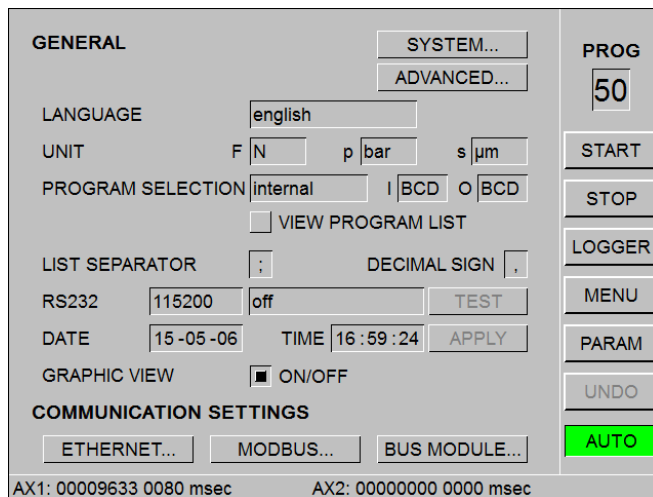
First perform general settings.
To do this click on **MENU** in the menu bar.

Screen **SETTINGS** opens.



Click on **GENERAL**.

Screen **GENERAL** opens.



Hereinafter the adjustable basic settings are shown:

LANGUAGE

Choose your language.

UNIT

Choose units of measure:

- for force measurement **F**: **N** or **lbs**
- for pressure measurement **p**: **bar** or **psi**
- for displacement measurement **s**: **μm** or **th"** (thousandth inch)

PROGRAM SELECTION

Choose the measuring program selection:

- **internal** (default) means with the toggle wheel or touch screen or via a connected bus system

VIEW PROGRAM LIST

Activated: shows a program list with program number and name (can be set via MENU – COPY – PROGRAM NAME) when you click on the program number selection field in the menu bar.

- **ext./MFP** means by external hardware input at connector X112 of MFP-NC
- **ext./HFI** means by external hardware input at connector X1 of ISQ.

RENEW MAIN VIEW

Refreshing the main view takes time, so if you use external program selection deactivate this feature in order to speed up the program changeover.

Also deactivate this feature if you configure quadrant windows for SPC. These SPC quadrant windows have to be configured in the same way for each program; otherwise the SPC chart will be reset.

Deactivation of this option is therefore advantageous when rapidly switching programs and using the SPC charts, as the main display has to be configured only once.

(Program input) and (Program output) can be set to binary coded decimal (BCD) or binary (BIN).

LIST SEPARATOR, DECIMAL SIGN

Data are stored in a CSV (comma separated value) compatible format.

To read this data with e.g. Excel, the sign used for the list separator and the decimal sign on the AWS3 has to be the same as the one used on your PC.

Choose between semicolon (;) and colon (,) for the list separator and between point (.) and colon (,) for the decimal sign.

Note:

You can find the signs used on your PC in the regional settings (system settings).

RS232

Set transmission rate and output format of the RS232 interface.

The set transmission rate has to correspond to the transmission rate of the serial interface of your PC or printer.

Output format:

- **off**
serial output is switched off.
- **AWS3 style**
Default (numerical output with parameter denomination)
- **AWS3 without header** (optional)
numerical output without parameter denomination
- **classic style**
without header (backwards compatible with older MFP-NC motor controls)
- **user style** (optional)
specific version with output of minimum and maximum values.

DATE

Set the current date in the format **YY-MM-DD** (year-month-day).

TIME

Set the current time in the format **HH:MM:SS** (hour:minute:second).

GRAPHIC VIEW

Enables graphic viewing (ON/OFF). For continuous fast clock rate disable this function, to prevent clock rate from slowing down when changing to display with graphic view.

COMMUNICATION SETTINGS

Adjust the settings for communication via Ethernet, Modbus/TCP or bus modules.

4.2 Perform System Settings



To perform system settings you have to be logged in as Configurator (see chap. 4.13).

Go to screen **SYSTEM** via MENU – GENERAL - SYSTEM.

Shows general system information, e.g. information about:

- type of **power supply** (HFI), e.g. ISQ20-3K
- type of **motor head** (MFP) e.g. MFP400
- **control panel** (RAM assignment, USB stick memory capacity, software version of control panel)

DATA LOCATION

Choose data location for programs and parameters (USB device or LAN network).



After a restart or reset of the control panel data location is set to USB device by default. Do not use **internal**, as this is reserved for remote maintenance.

For a function check of the LEDs click **LED TEST**.

All LEDs on the front panel will light up shortly.

With a double click on **LED TEST** a pop-up appears that shows the state of the LEDs in the set language.

4.2.1 Reset to Default

Only use **PARAM RESET**, if you have no other choice left. Before doing this save all set parameters on the USB stick.

After using **PARAM RESET** the system parameters of the AWS3 are no longer valid and it may not be operated in this state.

Therefore a valid system backup **must** be loaded after the reset (see chap. **Fehler! Verweisquelle konnte nicht gefunden werden.**)!



Caution

Loss of data!

If you perform **PARAM RESET**, all set parameters will be lost!

4.3 Adjust Closed-Loop Control Parameters

Go to screen **WELD CONTROL** via MENU – CONTROL – HFI.
This menu is password protected (see chap. 4.13).

Here you can change the closed-loop control parameters K_p and T_i of the weld control for **Current, Voltage and Power**.

The welding curve closed-loop control is a simple P-I controller. The associated **coupling factor K_p** (0.0...50.0) and the **integration time constant T_i** (0.1...100.0ms) can be set separately for the three different closed-loop controls. Adjust the closed-loop control in such a way that oscillations in the curve progression are prevented.

These values also depend on the length of the secondary cables and the distance between them, and the resistance of the welding head and weld material. They can be optimized by test weldings.

Adjustment:

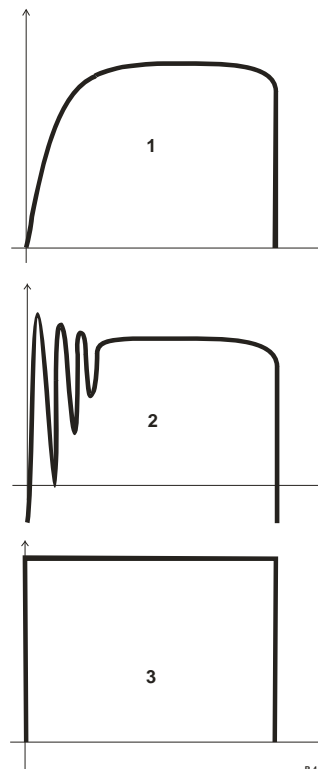
Set K_p very low, and T_i very high (1).

Now increase K_p until the curve overshoots at the start (2).

Turn back K_p briefly until the curve smoothens.

Reduce T_i continually until the curve becomes uneven.

Now turn back lightly until it is smooth (3).



Align the inverter on the basis of the secondary circuit you are using and the intended purpose by test weldings.

Examples:

For welding operations with a 3 kA inverter and a 6 kA inverter in the lower range:		
Type	K_p	T_i / ms
Current	6	4,0
Voltage	3	2,0
Power	3	2,0

For welding operations with a 6 kA inverter in the upper range:		
Type	K_p	T_i / ms
Current	6	6,0
Voltage	3	5,0
Power	5	3,0

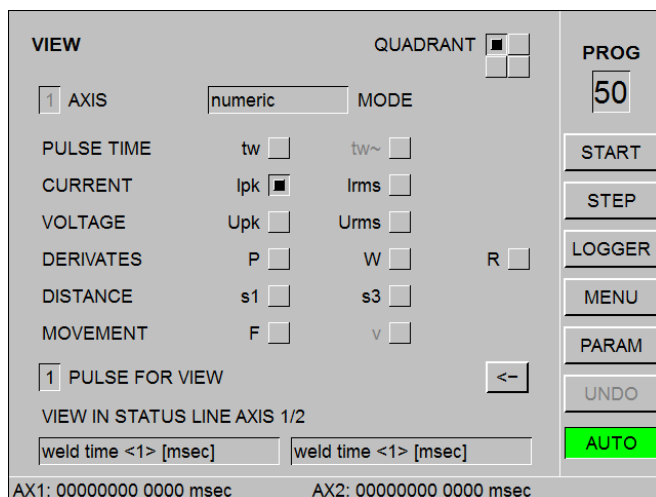
4.4 Configure Display Windows (Quadrants)



The measured values can be displayed in four configurable display windows (quadrants).

Each quadrant can be operated in four different display modes.

Go to screen **VIEW** via MENU - VIEW.



QUADRANT

Select quadrant 1...4 to be configured.
Each quadrant can show only one measured variable.

AXIS

Select the axis to be shown.

VIEW

Select the way the measured variable shall be displayed in this quadrant:

- **numeric** – numerical display of the value with limits
- **graphic** – graphical display of values as a curve (here you can also select the color of the graph)
- **SPC*-chart** – graphic as statistical run chart
*SPC: Statistical Process Control
- **SPC-values** – numerical as mean value, standard deviation CP (process suitability) and CPK (level of production)

Select the measured variable for this quadrant:

PULSE TIME **tw** (weld time per pulse)
 tw~ (weld time in cycles at alternating current)

CURRENT **Is** **Ieff**

VOLTAGE **Us** **Ueff**

DERIVATES **P** **W** **R**

DISTANCE **s1** (part detection) **s3** (Displacement value)

MOVEMENT **F** **v**

PULSE FOR VIEW (with numerical display)

Select whether values for first (1) or second (2) pulse shall be shown.

Button **<-**

Switch to next quadrant.

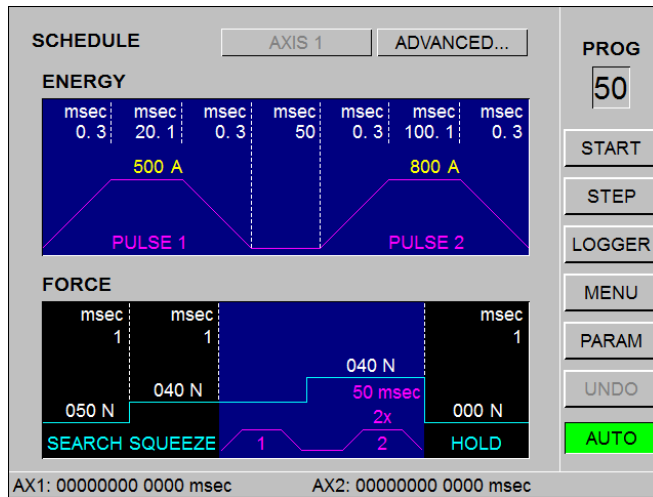
VIEW IN STATUS LINE AXIS 1/2

Select display of the status line.

4.5 Set Welding Parameters
4.5.1 Current Profile

Go to screen **SCHEDULE** via MENU – SCHEDULE.

Depending on the set control mode, current, voltage or power is specified as rated value. The adjustable amplitude ranges differ for the 3 control modes.



The second welding pulse is specified by setting the amplitude of PULSE 2 at a higher number than zero.

If second welding pulse shall be repeated one or more times, set the desired number of repetitions (2 to 10) into field 1x. PULSE 2 is then repeated this many times. The repetition time thus specifies the waiting time between the repetitions.



Only **one** overall current time of up to 620 ms can be set for each welding pulse.

4.5.2 Force Profile

A force profile is specified to which the current profile is subordinate (only for versions with servo welding head). The search force has to be set high enough to enable the head to clearly identify the part and not retract prior to this.

The following should also be specified:

- **debounce time** (after which part control should occur in the case of search forces)
- **welding force 1** (force value for squeeze time and pulse 1)
- **welding force 2** (force value for cooling time and pulse 2) and
- **holding force** (force value for hold time)



Squeeze time and cooling time should be adequately long to allow for the build-up of welding force and any transient effects!

4.5.3 Advanced

Click on **ADVANCED**.

PROGRAMMABLE VALVE

Controls the valve output user-defined (not during dual head operation without MFP-NC).

TOOLS/APC

Is a collection of tools for optimizing welding and active part conditioning.

- **Active Part Conditioning (APC)**

APC is used for welding contaminated and oxidized surfaces.

It uses the double pulse function of the inverter and parameter monitoring. Thereby the first pulse prepares (conditions) the surface and checks the conductivity. The second pulse carries out the real welding.

Settings:

Set first pulse to power [KW] or voltage [V] in screen **SCHEDULE**. Select amplitude high enough and time long enough to achieve penetration of the oxide with high voltage.

The current is monitored. For this set measuring mode to current [A].

Welding current of first pulse starts to flow and increases.

Set a value for the current limit to be monitored which will at most lead to a tacking weld or adhesion of the components. Each time the first pulse reaches this limit it is interrupted. As a result a specific current path is created on the components.

In this way varying levels of contamination / oxidation are balanced out and only lead to pulses of different lengths. If contamination/oxidation is so severe that the desired current value is not reached within the set 1st pulse time an error signal is emitted in APC mode.

Components prepared in this way are welded with the second pulse after the rest time. To do this, select parameters (current and time) which ensure sufficient welding of the cleared surfaces.

- **Pre-Weld-Check**

Checks the conductivity of the future weld. Welding is performed with current [A] while voltage [V] is monitored.

The following values should be observed:

- Current set to approx. 1/10 of welding current
- Welding time set short, i.e. 5 - 10 ms

The voltage of the first pulse increases if resistance of the weld material is too high. The first pulse is shut off as soon as the upper voltage limit is reached and an error message is output. The welding process continues if the measurements remain within the limit values of the first pulse.

- **Weld Limit**

Welding is only permitted within the set limits. If these limits are exceeded, an error signal is output and the welding is interrupted.

Here you can also use the Energy [Ws] setting, i.e. the content of the sector below the power waveform is added up until it reaches the limit value.

- **Weld to Limit**


The first and second pulse can be set separately in the welding parameters, the measuring mode is normally set to Energy. Otherwise a ramp should be set. The current is switched off when the ramp reaches the upper limit.

Here you can also use the Energy [Ws] setting, i.e. the content of the sector below the power waveform is added up until the limit value

The pulse is deactivated as soon as the upper limit is reached and the program switches to next pulse, if parameterized. No error signal is generated!

If no deactivation occurs at the upper limit during the current time, an error signal is generated.

4.6 Adjust Displacement Settings
4.6.1 Reference Run

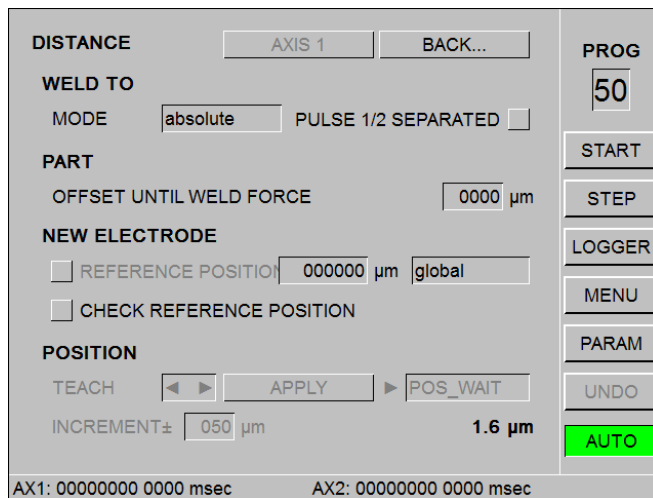


Caution

In order to avoid damage to the electrodes and the welding equipment a reference run should be done:

- prior to the initial welding operation
- after every change to the electrodes (weight, angle, position, etc.)
- after every change to the welding head

Go to screen **DISTANCE** (ADVANCED) via MENU – DISTANCE – ADVANCED.



Change to single step mode and activate **REFERENCE POSITION**.


Click on **START** in the menu bar and a reference run is performed. Now reference data is shown in the respective field and **REFERENCE POSITION** is automatically deactivated.

Reference data remains saved until a new reference run is performed or the value in the field right beside **REFERENCE POSITION** is changed manually.

The validity range of the reference point is determined by selecting **global** or **program**.

During a reference run the distances between search- and wait position resp. basic position can change, so it can happen that due to an unfavorable (high) position of the lower electrode these positions are limited to the basic position.



If you don't want this, activate **CHECK REFERENCE POSITION** and an error message is generated.



The same procedure has to be carried out after an electrode change!

Afterwards all settings (part control, basic position, waiting position and search position) are automatically adjusted.

Teaching positions (only with servo weld heads)

- Click on 
- By turning the toggle wheel (OP) or by using +/- (TP) you can adjust the electrode in the desired direction.
- Move the servo weld head to the desired position and again click on 
- Now select the corresponding position, e.g. POS_WAIT, POS_SEARCH, PART_MIN or PART_MAX.
- Click the **APPLY** button and repeat this procedure until all position are programmed.

With **INCREMENT+/-** you can set the traversing increment for the teach movement. The traversing increment influences the traversing speed and accuracy.



Motor head traversing by using the toggle wheel and teaching of positions is only possible in **Single Step Mode!**



Caution

In **Teach Mode** it is possible to compress the electrodes with the welding head. The greater the search force, the greater the increase in the squeeze force exerted on the electrodes.
This can lead to motor overloading!

4.6.2 Basic Position

Go to screen **DISTANCE** via MENU – DISTANCE.
Click on **HOME**.

If previously a reference run on the lower electrode was carried out, the basic position is within the negative range, as the zero position is on the lower electrode.



Select a basic position in which the welding stroke is not too short! Use the waiting position for cycle time optimization. This protects the motor and the mechanism of the system as a lubricating stroke is automatically carried out after every 1000 welding operations.

4.6.3 Waiting Position

Go to screen **DISTANCE** via MENU – DISTANCE.
Click on **WAIT**.

If a reference run was carried out previously it can be corrected here. To move to the waiting position you must set the assigned input.

4.6.4 Search Position

Go to screen **DISTANCE** via MENU – DISTANCE.
Click on **SEARCH**.

The search position should be selected in a way that ensures that the weld head switches to search run before it reaches the part or the electrode.

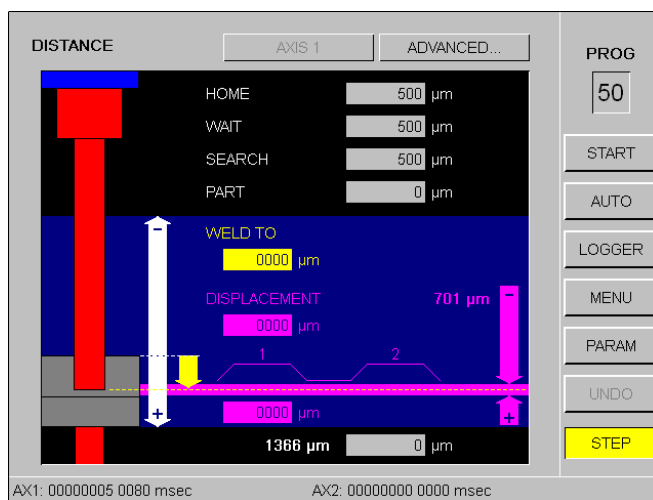


Warning

If the search position is **too short**, the head may collide with the work piece at high speed, which can cause **serious damage** to the system and its parts!

4.6.5 Part Detection

Go to screen **DISTANCE** via MENU – DISTANCE.



Select **PART** and enter the lower part detection limit. Select the undermost gray field and set the upper part detection limit.

If you have defined **PART-MIN** and **PART-MAX** in teach mode in the **DISTANCE – ADVANCED** menu, you can optimize or overwrite them here.

Rated Value Displacement

Enter the rated value for the displacement (penetration depth) in the **WELD TO** field. If this value is reached, the current in the corresponding weld pulse is turned off immediately.

Displacement Limits

Enter the upper and lower displacement limits in the **DISPLACEMENT** field.



If you mixed up the values for upper and lower limit, the system automatically swaps out values.

4.6.6 Weld to Limit Mode

Go to screen **ADVANCED** via MENU – DISTANCE – ADVANCED.
Click **MODE** and choose the mode for measuring the displacement or for specifying the deactivation distance.

- **ABSOLUTE**
Displacement is relative to the absolute position at the start of penetration.
- **REFERENCE**
Displacement is relative to the position defined by the reference run (assumed that a reference run was carries out before).
- **RELATIVE**
Penetration depth is specified relative to the position at the start of the welding pulse.



For welding on residual thickness the weld to limit mode must be set to **REFERENCE!**

PULSE 1/2 SEPARATED

Activate this switch to set or monitor the displacement and the deactivation distance for pulse 1 and pulse 2 separately.

OFFSET UNTIL WELD FORCE

Set the part recognition offset between search force and weld force.

4.7 Determine Limit Values

Go to screen **LIMITS** via MENU – LIMITS.

The screenshot shows the 'LIMITS' screen with the following parameters:

Parameter	Value	Unit
UPPER (Ip _k)	100.0	kA
LOWER (Ip _k)	0.0	kA
UPPER (Up _k)	99.90	V
LOWER (Up _k)	0.00	V
UPPER (tw)	0	msec
LOWER (tw)	0	msec
UPPER (F)	0	N
LOWER (F)	0	N
Summary (tw)	81	msec
Summary (F)	193	N

Buttons: AXIS 1, REALTIME..., ENVELOPE..., RESET, START, STEP, LOGGER, MENU, PARAM, UNDO, AUTO (highlighted in green).

PROG: 50

AX1: 00000005 0080 msec AX2: 00000000 0000 msec



Two indicators to be monitored can be specified for pulse 1 and pulse 2 for each axis. After each measurement the values of these indicators are evaluated and

- shown by the LEDs on the front side of the unit,
- recorded (logged) and
- made available on the digital outputs on the rear side of the unit.

Determine the upper and lower limits for the desired indicators (I_s , I_{eff} , U_s , U_{eff} , P , W , R , tw , F)

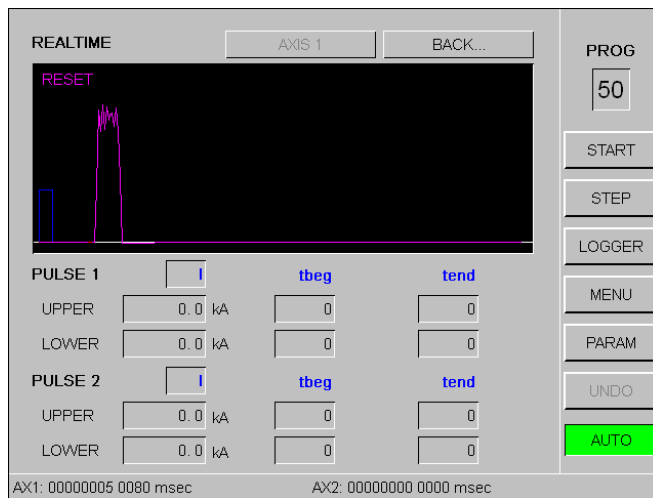
Limit value monitoring of the corresponding indicator is deactivated if **MAXIMUM** and **MINIMUM** are set to zero.

RESET

Resets the limit values to zero.

4.7.1 Determine Real Time Limit Values

Go to screen **REALTIME** via MENU – LIMIT VALUES – REALTIME.



One indicator to be monitored can be specified for pulse 1 and pulse 2 for each axis. The evaluation during the measurement

- is made available on the designated digital outputs on the rear side of the devices.

After each measurement the evaluation is

- shown by the LEDs on the front side of the unit
- recorded (logged)

Determine the upper and lower limit values for the desired indicator (I, U, P, W).

Limit value monitoring of the corresponding indicator is deactivated if **MAXIMUM** and **MINIMUM** are set to zero.

tbeg / tend

Set the beginning and end point of the monitoring

RESET

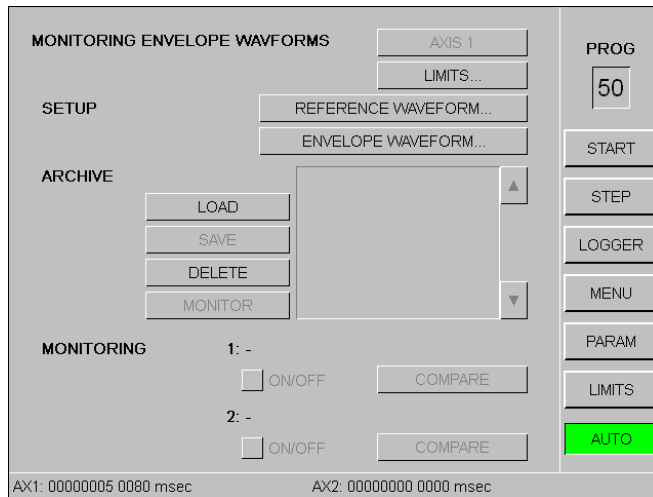
A pop-up appears with the following options:

- | | |
|----------------|--|
| YES | reset the limit values to zero |
| NO | terminate the process |
| DEFAULT | reset the limit values for the rated values (of the weld profile) to default (+/-20%). |

4.8 Generate Reference and Envelope Waveforms

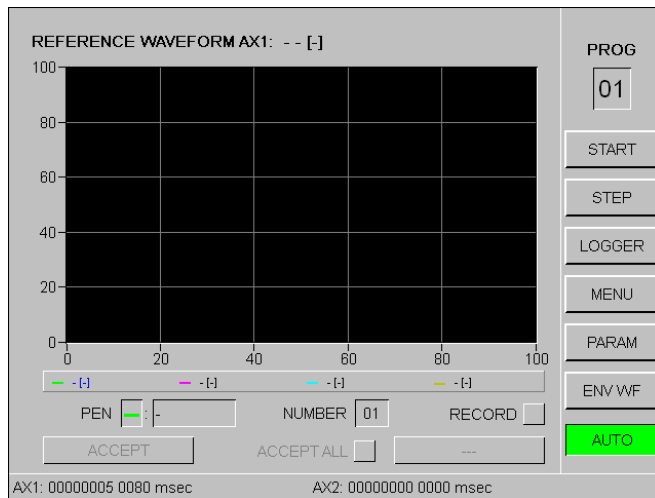
A reference waveform is the **mean waveform** derived from **n** trial welding operations. It can be seen as a reference for an optimal welding operation.

Go to screen **MONITORING ENVELOPE WAVEFORMS** via MENU – LIMITS – ENVELOPE.



4.8.1 Generate Reference Waveforms

Click to **REFERENCE WAVEFORM** in the screen **MONITORING ENVELOPE WAVEFORM** to generate a reference waveform.



PEN

Assigns a color to an indicator.

NUMBER

Indicates the number of measurements (1...99) out of which the arithmetic average value shall be derived.

RECORD

Activate **RECORD**.

When a measurement is carried out, it can be used for calculating the average value by clicking on **ACCEPT**, the value for **NUMBER** will then automatically decrease by 1.

Repeat this process until all measurements are made.

Activate the **ACCEPT ALL** button to use every triggered waveform for the calculation of the average value, until the value in the **NUMBER** field is zero.

I_001.ref

File name for the generated reference waveform.

Reference waveforms have the file extension **.ref**.

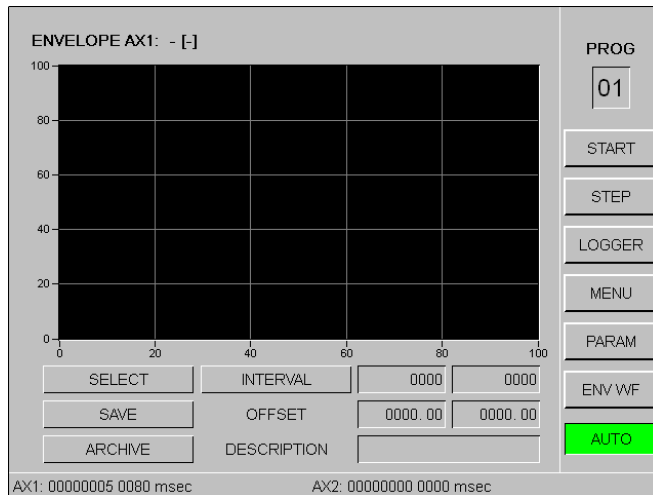


After all measurements have been made the reference waveform is automatically saved on the USB stick.

4.8.2 Generate Envelope Waveforms

An envelope waveform is based on a reference waveform and is used for additional monitoring of a weld variable.

Click to **ENVELOPE WAVEFORM** in the screen **MONITORING ENVELOPE WAVEFORM** to generate an envelope waveform.



If a reference waveform was previously generated it will appear in the dialogue field and you can skip the step **SELECT**.

SELECT

Opens an existing envelope waveform (*.ENV) for editing or a reference waveform (*.REF) to determine an envelope waveform by yourself.

INTERVAL

A vertical white line appears on the screen. You can move it by rotating the toggle wheel. Choose the position at which the monitoring interval or time slot should start and confirm by clicking.

A second white line appears which you can also move by rotating the toggle wheel.

Click again to define the end of the time slot.

In the first input field next to **OFFSET** enter the lower limit value of the envelope waveform and confirm with OK.

In the second input field next to **OFFSET** enter the upper limit value of the envelope waveform and confirm with OK.

Now the envelope waveform is fully configured and can be saved or edited again.

DESCRIPTION

Enter a name for the envelope waveform.

SAVE

Saves the envelope waveform on the USB stick.

Screen **INPUT WAVEFORM NO.** opens. Enter a number for the envelope waveform and confirm with OK.

Now the envelope waveform is saved with the number on the USB stick.

ARCHIVE

Archives the envelope waveform. This will make the envelope waveform load into the corresponding control and be accessible for monitoring.

4.8.3 Manage Envelope Waveforms

Click to **LOAD** in the screen **MONITORING ENVELOPE WAVEFORM** to load an envelope waveform from the USB stick into the control's archive.

Screen **SELECT WAVEFORM** opens. Select a waveform and confirm with OK. The waveform selected will now be loaded.

To save an envelope waveform from the archive onto the USB stick, select a waveform and click **SAVE**.

Screen **INPUT WAVEFORM NO.** opens. Enter a number for the envelope waveform and confirm with OK.

Now the waveform is saved with the number on the USB stick.

RENAME

You can change the name of the envelope waveform in the archive.

DELETE

The envelope waveform selected in the archive is deleted after repeated confirmation.



Caution

If no envelope waveform in the archive is selected, all archived envelope waveforms will be deleted!

To use an envelope waveform from the archive for monitoring, select an envelope waveform and click **MONITOR**.

Then enter a monitoring number (as waveform 1 or 2). Each program can monitor a maximum of two envelope waveforms.

After you have confirmed with **OK** the name of the envelope waveform selected will appear on the screen beside the corresponding number.

This envelope waveform is now assigned to the current program for monitoring.

ON/OFF

Switch the monitoring on/off.

4.8.4 Compare Measuring and Envelope Waveform

Click to **COMPARE** in the screen **MONITORING ENVELOPE WAVEFORM** to compare the loaded envelope waveform with the currently measured waveform. Screen **COMPARISON** opens.

AUTOSCALE

Sets the image mode.

If the button is activated, scaling is automatically selected which generates the best image of the current envelope waveform.

If the button is deactivated, the **ZOOM** enlargement mode is activated, which also activates the buttons in the lowest line of the screen.



By activating **AUTOSCALE** the selected indicator is automatically adapted to suit the diagram the best possible.

Zoom Menu

YMAX / YMIN

Click **YMAX** or **YMIN** to set the upper or lower scale value of the Y-axis for the selected envelope waveform.

XMAX / XMIN

Click **XMAX** or **XMIN** to set the upper or lower scale value of the X-axis (time) for all shown indicators.

Y<-> / X<->

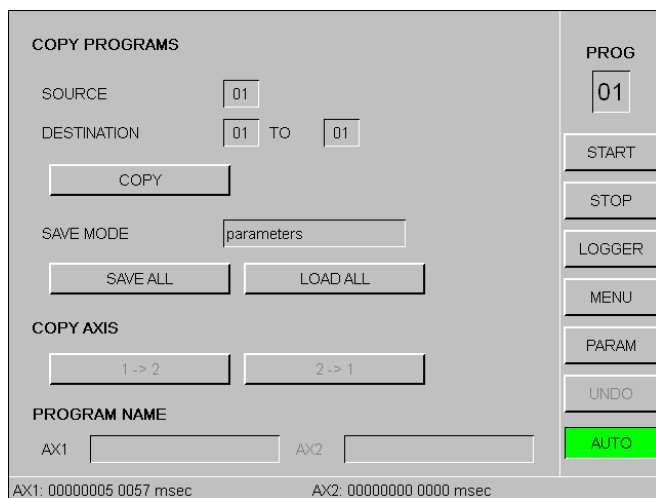
Set a range for enlarged display.

Click **Y<->** or **X<->** and a white line appears. Move the line by rotating the toggle wheel. Click to determine the beginning of the display range.

A second white line appears which initially lies on top of the first line. Rotate the toggle wheel until the second line has reached the end of your desired display range. Enlarge the diagram by clicking.

4.9 Edit Programs and Parameters

Go to screen **COPY PROGRAMS** via MENU – COPY.



4.9.1 Copy Programs and Parameters

SOURCE

Enter number of source program.

DESTINATION

Enter the number of the first and last target program to which the source program and all parameters shall be copied to.

COPY

Starts the copy process.

COPY AXIS

Copy the settings from axis 1 to axis 2 (1 → 2) or vica versa (2 → 1) by clicking the respective button.

4.9.2 Save All Programs and Parameters

SAVE ALL

A popup **INPUT PROGRAM NAME** opens.

Enter a file name and start the saving process by clicking **OK**.
Parameter files have the file extension *.PAR.



To save the welding parameter settings use the **PARAMETER** backup mode. To back up your system set the SAVE MODE to **Backup**. A system backup is only recommended prior to a firmware update or after the unit has been delivered.

4.9.3 Load All Programs and Parameters

LOAD ALL

Screen **SELECT FILE** opens. Select a file and click **OK** to load it.

To load a system backup set the SAVE MODE to **Backup**.



The backup file must be compatible with the current system settings, otherwise the backup will be interrupted and an error message will appear.

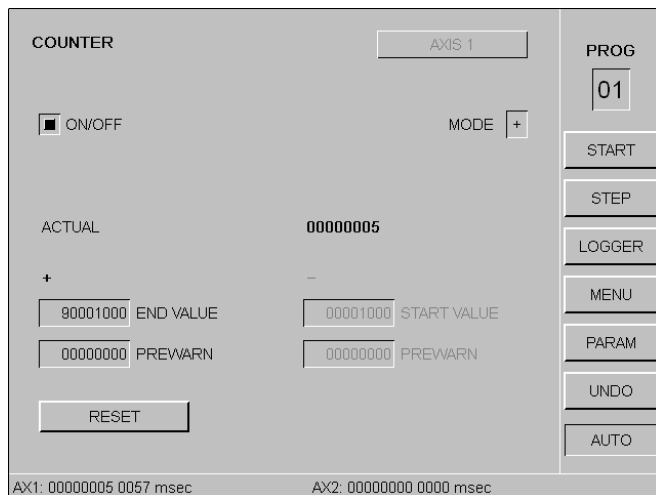
If previously a RAM Reset was carried out you may have to log in as **CONFIGURATOR** (see chap. 4.13) in order to install the required backup.

4.10 Count Measurements (Weld Counter)

You can define the method of counting the weldings for axis 1 and 2.

When reaching the set pre-warning value and reaching the final value (counting direction +) or zero (counting direction -) the corresponding signal will be made available at the digital output on the rear side of the unit.

Go to screen **COUNTER** via MENU – COUNTER.



ON/OFF

Enables/disables the counter for the respective axis.

MODE

Select counting direction:

- Plus (+) counts forwards, from zero to the set **END VALUE**.
- Minus (-) counts backwards, starts at the set **START VALUE**.

END VALUE

Last plus counter value.

START VALUE

First minus counter value.

PREWARN

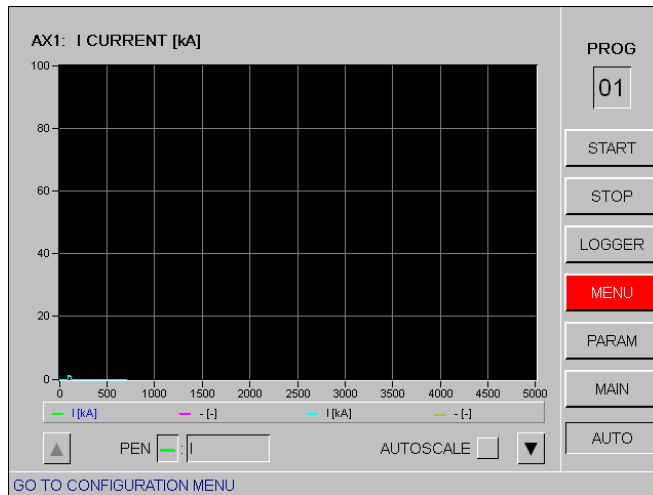
Pre-warning value of active counter.

RESET

Resets the counter.

4.11 View and Save Measuring Waveforms

In the main view, click on the quadrant that is configured for displaying graphics. The quadrant will open into a full image.



PEN

Select the color and the desired measurement variable in the corresponding field beside. Select “-“ if you don’t want to display a measurement variable.

The **variable entered at last** will be the **primary measurement variable** to which the scaling of the y-axis will refer to.

The primary measurement variable is displayed in the heading.

AUTOSCALE

Sets the image mode.

If the button is activated it automatically selects scaling that generates the best image of the current quadrant measurement variable. The primary measurement value is displayed in the heading.

If it is not activated, the viewing, enlarging and memory submenus are activated.



By activating **AUTOSCALE** the measurement variable selected is automatically adapted to suit the diagram the best possible.

▲ and ▼ (arrows)

Click on the downward pointing arrow ▼ to switch to the submenus (SETPOINT PROFILE, Zoom Menu, CURSOR and SAVE). Click again for the next submenu and so on.

To get back to the previous menu click on the upward pointing arrow ▲ on the left-hand side of the screen.

SETPOINT PROFILE

If a setpoint profile already exists choose the value in which it should be displayed additionally.

Zoom Menu

Click on ▼ to switch to the Zoom Menu.

YMAX / YMIN

Define the upper/lower y-axis scale value for the primary measurement variable selected in the PEN field by clicking YMAX and YMIN.

XMAX / XMIN

Define the upper/lower x-axis scale value for all measurement variables displayed by clicking XMAX and XMIN.

Y<-> / X<->

Define a range for enlarged display.

Click Y<-> or X<-> to make a white line appear. Rotate the toggle wheel to move the line. Press the wheel to define the beginning of the display range.

A second white line will appear which will initially be lying on top of the first line.

Rotate the toggle wheel until the second line has reached the end of your desired display range. You can enlarge the diagram by clicking.

CURSOR MENU

Click on ▼ to switch to the CURSOR menu.

Select a measurement variable by clicking on it.

A crosshair (cursor) in the color assigned to the measurement variable appears on the screen. With the toggle wheel you can move the cursor on the graph. The value pair belonging to each measurement value will be displayed numerically in the bottom of the screen.

Click again to exit Cursor mode.

SAVE MENU

Click on ▼ to switch to the SAVE menu.

Save all measurement values of individual or all measuring waveforms on the USB stick.

Select a measurement variable by clicking on it.

Allocate a number to the measurement waveform with which it is saved.

The files are saved on the USB stick in the folder **Waveform** with the file extension .crv. The corresponding formula symbol of the measurement variable will be put in front of the file name.

Click into the view screen to get back to the main view.

4.12 Print or Output Measurement Values

Via the serial interface you can connect a PC with PECO-Software (WinWeld) – for the evaluation of the data – or a printer.

In the **GENERAL** screen (see chap. 4.1) you can adjust required settings such as baud rate and mode by clicking on RS232. In the **Classic style** mode the serial output has backwards compatibility with earlier versions of MFP-NC motor control and ISQ.

The data format of the serial output can be found in the description of the respective unit.

4.13 Set and Change Passwords

Go to screen **PASSWORD** via MENU – PASSWORD.

LOGIN, LOGOUT
Log in or log out.



Caution

For safety reasons we recommend to change all preset passwords after the commissioning via **CHANGE!**



Changes can only be done if you are logged in with the correct password!
If you have forgotten your password please contact our service team.



Warning

Incorrect settings/changes can cause faulty operation and serious damage to the system, for which we assume no liability!

CHANGE

Each user can change his password.

If you are logged in as SUPERVISOR, you can also change the passwords for OPERATOR and ENGINEER.

If you are logged in as CONFIGURATOR, you can change all passwords.

Choose the user level in the field next to it and set/change the password in the pop-up window.

STATE

Shows the level of your access authority:

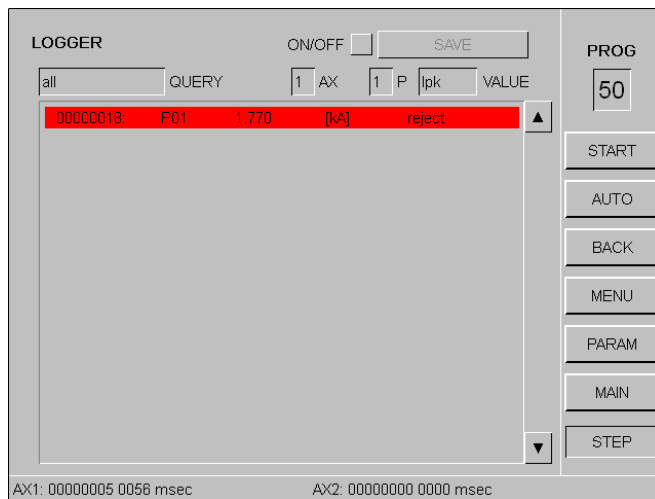
- **OPERATOR**
Authorized to edit the welding amplitude.
Recommended for system operator.
Password on delivery: **0001** (for safety reasons we recommend to change the password via **CHANGE** after commissioning).
- **ENGINEER**
Authorized to edit certain process parameters and characteristics of the display configuration.
Recommended for advanced system operation.
Password on delivery: **0002** (for safety reasons we recommend to change the password via **CHANGE** after commissioning).
- **SUPERVISOR**
Authorized to set relevant process parameters and characteristics of the display and unit configuration.
Recommended for system setup.
Password on delivery: **0000** (for safety reasons we recommend to change the password via **CHANGE** after commissioning).
- **ELECTRODE CHANGE**
Authorized to make a reference run and to set the respective parameters.
Password on delivery: **0003** (for safety reasons we recommend to change the password via **CHANGE** after commissioning).
- **SERVICE**
Authorized to update software, calibrate and change selected system parameters.
Recommended for maintenance and system setup.
Password on delivery: **0004** (for safety reasons we recommend to change the password via **CHANGE** after commissioning).
- **CONFIGURATOR**
Authorized to set all process parameters and perform comprehensive display and unit configuration, including further configuration options.
Recommended e.g. after a firmware update.
Only necessary in exceptional cases, password has to be requested separately.



The password for the CONFIGURATOR cannot be changed, so please be careful with this password!

4.14 Configure Measured Value Indication (LOGGER)

Click on **LOGGER** in the menu bar.



ON, OFF

Enables/disables the taking of measurements (measurement value logging) for the selected axis **AX**.

SAVE

Saves all values measured up until now in a log file on the USB stick or the LAN network (depending on the settings in the SYSTEM screen, see chap 4.2). If there is not enough memory space on the stick you will be asked to change the stick.

QUERY

Sets the way in which the logged data is displayed:

- **All** measuring
- **Rejected** measuring
- **Last** measuring (detailed)
- **Faults** indicates occurring faults
- **Overloads** indicates motor faults that have occurred

AX

Select axis 1, 2 or 1 / 2 (the last is only possible in "last measurement" mode).

P

Select pulse 1, 2, 3 or 1 / 2.

VALUE

Select the measurement variable which is supposed to be displayed.

On the screen the following indicates:

Gray Background = measurement is okay

Red Background = measurement exceeds the limit values

Gray Font = measurement exceeds the measurement range

You can scroll through the logging history by using the arrows **▲ ▼**

Additional information relating to individual measurements is displayed in the detailed view (last measurement).

It displays:

- which measurement variable has exceeded the limits
- the direction in which the limits were exceeded
- what kind of monitoring led to the error message

The symbols mean:

- +** exceeded upwards
- exceeded downwards
- ±** exceeded in both directions
- HK** the current measurement waveform is partially or completely outside of the waveform activated for this measurement
- RT** real time limits



The logger can save a maximum of 1500 measurements per axis in the internal memory. Afterwards the contents will be saved in a log file and the logging starts anew.

The log file has the file suffix **.log** and a format compatible with CSV, in which time, date, counter number, program number, measurement variables and status information on the measurement are stored in the form of a table.

In the log file the overall status of the measurement is illustrated with the following symbols:

- V** positive measurement,
 - X** negative measurement, indicating the measurement variable causing the problem
- +** and **-** indicate the direction in which the limit value was exceeded. **()** indicates exceeded pre-warning limits, while **{}** indicates the exceeding of a limit determined by an envelope waveform.

BUFFER (is only displayed in **last** measurement mode)

Set the number of measurements after which the data saved internally shall automatically be stored in the log file.

If you set the number to 0, automatic saving of the log file to the USB stick is deactivated. Saving via the SAVE button is still be activated though.

4.15 Monitor Parameter Overview

Click on PARAM in the menu bar.

AXIS 1

Click on **AXIS 1** to toggle between axis 1 and 2.

SAVE

Saves the parameters in a text file on the USB stick.
The file will have the file extension **.txt**.



The text file is saved as a UTF8 text format.

4.16 Analyze Accept – Reject Ratio

In the menu bar, click on MAIN and then on ANALYSIS.

RESET

Resets all counters for the axis selected.

DETAILS

Specify the accept – reject ratio by activating one of the following buttons:

- ENERGY
Limit value monitoring for configurable power source parameter settings
- s3
Limit value monitoring for displacement
- s1
Limit value monitoring for part detection
- tw
Limit value monitoring for welding time

4.17 Monitor Statistical Values

Requirements for Statistical Process Control (SPC):

- The limit values for the requested measurement variable must be activated. If they are set to zero, limit value monitoring is deactivated.
- The limit values must be preset appropriately. If there are no exact values, estimate them generously.
- A display window (quadrant) must be in SPC-chart display mode (for more details see chap. 4.4)
- Recording of the measurement values starts as soon as one display window is in SPC-chart mode and ends when the display window is reconfigured.
- In SPC-chart mode, display and calculation are carried out within sequential measurement intervals (samples).

Configuration

Configure a display window for SPC-chart mode (see chap. 4.4):

Click on the requested display window and the SPC-chart screen will open.

Click on HISTOGRAMM.

SAMPLES

Define the number of measurements of which the statistic is composed to be.
The value must be ≥ 1 .



The SPC-chart calculates and displays the average value (green) and the standard deviation (3 Sigma, blue) for the set number of samples.

Colors

The colors in the histogram have the following meanings:

- GREEN LINE** = average value (Xmw)
- RED LINE** = limit values
- BLUE LINE** = standard deviation S (+/- 3 Sigma)

4.18 Define Limit Values Statistically



Before the limit values can be accepted, limit value monitoring for each respective quantity must be activated, i.e. the button for monitoring must be **ON**. There has to be a great number of measurements already taken with statistical evaluation activated.

The more measurements are taken and the bigger the number of samples, the more exact the result of the limit value calculation will be. In the histogram the average value and the standard deviation are calculated from all taken measurement values and are then displayed.

In the SPC-chart screen, click on **HISTOGRAMM**.

DEFINE LIMITS

Calculates and displays the new limit values. After you have confirmed them the newly calculated limit values are activated.

CALCULATION LIMITS

Select the limit value calculation mode.

You can choose from:

- +/-2S / 1S
- +/-3S / 2S
- +/-4S / 3S
- +/-5S / 4S
- +/-6S / 5S
- 99% / 95%

The first value is standard deviation (S) for the limit values; the second value is not used at the moment.

RESCALE

Adapts image to window.

RESET

Resets statistical calculation history

4.19 Weld with Action Counter

With the action counter you can set a program run where several programs automatically run one after another multiple times.

This is especially suitable for manual work stations.

Go to screen **ACTION COUNTER** via MENU – CONTROL – HFI... – AC...

NO	PROG	AXIS	RUNS
1	01	1	0000 ▲
2	01	1	0000
3	01	1	0000
4	01	1	0000
5	01	1	0000
6	01	1	0000
7	01	1	0000
8	01	1	0000
9	01	1	0000
10	01	1	0000 ▼

AX1: 00000005 0005 msec AX2: 00000000 0000 msec

PROG

Select the desired program.

AXIS

Select the axis which this program is supposed to use for welding.

RUNS

Set the number of program runs after which the action counter switches to the next program.

0000 designates the end of a cycle and the run begins anew.

A maximum of 40 steps can be programmed. The sequence of program numbers and the number of runs don't matter.

ON/OFF

Enables/disables the action counter.

If the action counter is active, the current run will be displayed in red font.

LOOP-MODE / ONE-RUN MODE

ONE-RUN MODE

Tests the action counter's procedure. After a cycle the Start is locked and the LED READY switches off.

Click **RESET** to start again.

LOOP-MODE

The entire action counter procedure is processed cyclically.

CLEAR

Resets all action counter settings to 0.

4.20 Transfer Data to PC/Laptop



Caution

Data loss!

Always click the button to turn out the USB stick in the control panel before removing the stick and take note of the message on the screen!

Stop the USB stick's software related actions before you remove it from the notebook/PC.

Data structure

The data on the USB stick is stored in four directories.

DATA contains files with these file extensions:

.bmp	screenshots
.txt	text file of parameters
.par	parameter file
.bak	parameter backup file

LOGGING contains files with these file extensions:

.log	log file
------	----------

UPDATE contains files with these file extensions:

.gz	update file
-----	-------------

WAVEFORM contains files with these file extensions:

.env	envelope waveform
.ref	reference waveform
.crv	measuring waveform




Files with the file extension .log, .env, .ref and .crv are saved as a CSV format (Comma Separated Value format) and can be edited with Excel for instance.

Files with the file extension .par can be read, archived and be written back again.

4.21 Make a Screenshot

You can make a screenshot of every screen in almost every state.



Press  (underneath the toggle wheel) if you want to make a screenshot of the current screen.

The screenshot will be saved on the USB stick (or on the network – depending on your settings) as a file named **SSH_xxx.bmp** (xxx is an ongoing number).

4.22 Update Firmware



To update your firmware you have to be logged in as Service or Configurator (see chap. 4.13).

Plug in the USB stick.

Select MENU – GENERAL – SYSTEM – DATA LOCATION and set the location to **USB-device** (if you are updating on-site) or to **internal** (if you are updating from a remote place).

Go to screen **FIRMWARE UPDATE** via MENU – GENERAL – SYSTEM – UPDATE.



The update files (**Aws3Install*.gz**, **Hfilinstall*.gz** bzw. **Mfpinstall*.gz**) may not be changed in the syntax and have to be saved on the USB stick in the respective folder:

X:/aws3/update (“X” means the according drive in your Windows system).
This folder is created at the first plug-in of the USB stick.

Update:

Choose via the button **SELECT** the corresponding update file for the respective device (power supply, motorized head or operating panel).

Start the update by clicking **UPDATE**

How to update all devices simultaneously:

Choose the update files for each device..

Start the update by clicking **UPDATE ALL**.

If the update has been carried out successfully reboot the entire system by clicking **RESTART ALL**.



Caution

DO NOT switch off the AWS3 during the update and the subsequent restart. Switching it off during these phases can lead to irreparable damage to the devices.

Updating the devices can take up to about 10 minutes.



Attention

After restarting the system the message “MFP not found” may appear. The reason for this is that some updates trigger an additional internal update of subcomponents that takes additional time. Keep the system turned on in this state for at least 10 minutes. Then turn it off (turn off the power source) and restart it. The message may appear again. Wait up to 10 minutes again and then confirm by clicking “No”. If the loading of programs takes an unusually long time, turn off the system again and repeat the restart procedure. Ensure that the system then stays turned on again for at least 10 minutes.

4.23 Adjust Ethernet Settings

The RJ45 jack in the control panel enables you to create an Ethernet connection to a shared folder in a local network (LAN) to save logging data and measurement waveforms.

Adjust the settings as required by selecting MENU – GENERAL – ETHERNET.

When the window opens, first enter the Supervisor’s password.

Afterwards all other settings can be adjusted.

4.23.1 Configure the Interface

To be able to communicate in the network adjust the settings for your IP address, sub-network and optional gateway. Most networks use a DHCP server. In this case activate **OBTAIN IP-ADDRESS AUTOMATICALLY** and then click on **APPLY**. The interface settings will now be applied automatically.

ETHERNET (BETA) PASSWORD

OBTAIN IP-ADDRESS AUTOMATICALLY

IP ADDRESS: 10.30.30.61

SUBNET MASK: 255.255.255.0

GATEWAY: spacenet-std-gw APPLY

NETWORK CONNECTION

USERNAME: username

PASSWORD: *****

DOMAIN: DOMMU ...

SERVER: MECDENBAZ03 ...

DIRECTORY: Common ...

CONNECT

PROG 02

START

STEP

LOGGER

MENU

PARAM

UNDO

AUTO

CH1: 00000238 0099 msec CH2: 00000000 0000 msec

In some networks interface settings have to be adjusted manually. If you are not using a gateway you have to enter „0.0.0.0“ in the **Gateway** field.

To activate the new interface settings click **APPLY**.

4.23.2 Connect to a Shared Folder

To create a permanent connection to a folder shared within the network, the administrator first has to create a user account in this network which has the required access rights (usually full access rights) for the shared folder. In the **ETHERNET** screen, enter the user name as well as the password underneath the **NETWORK CONNECTION** field.

Please pay attention to the correct spelling.

Then enter the network domain (**DOMAIN**) the PC's name which the shared folder is located on (**SERVER**) and the name of the shared folder.

Take note that if you adjust the interface settings manually you have to enter the IP address of the PC which the shared folder is located on in the **SERVER** field.

You can enter a subdirectory and separate it from the main directory by using double slash '//'.
Example: Common//SPECIAL

ETHERNET (BETA) PASSWORD

OBTAIN IP-ADDRESS AUTOMATICALLY

IP ADDRESS: 10.30.30.61

SUBNET MASK: 255.255.255.0

GATEWAY: spacenet-std-gw APPLY

NETWORK CONNECTION

USERNAME: username

PASSWORD: *****

DOMAIN: DOMMU ...

SERVER: MECDENBAZ03 ...

DIRECTORY: Common//SPECIAL ...

CONNECT

PROG 02

START

STEP

LOGGER

MENU

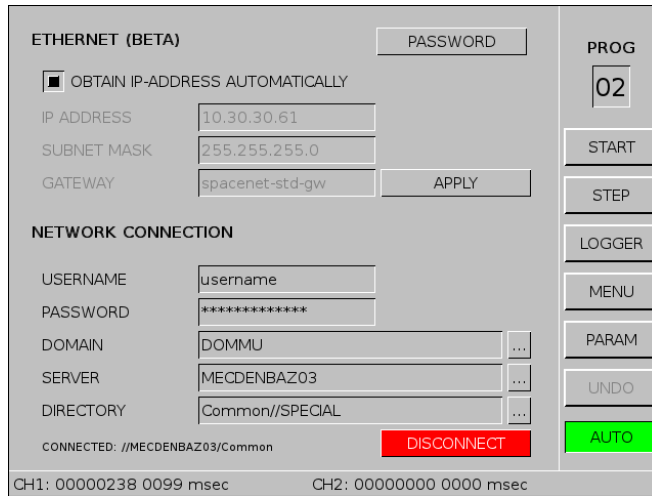
PARAM

UNDO

AUTO

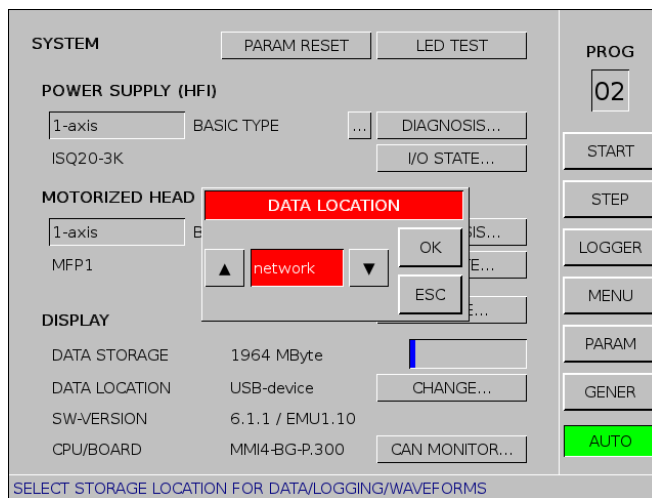
CH1: 00000238 0099 msec CH2: 00000000 0000 msec

Click **CONNECT** to create a connection.
 If you have been connected successfully the connection string will appear in the bottom left.
 If the PC fails to connect an error message is shown.



Click **DISCONNECT** to permanently break off an existing connection.

To save data in the shared folder change the data location in screen MENU – GENERAL – SYSTEM to **NETWORK**.



The connection string is saved and the device will automatically try to connect again after you have turned it off/ on.

If the connection fails, the data location will be reset to **USB-device** (default setting).

If the network connection is disconnected during operation, attempting to save data on the network will cause an error and the data location will be reset to **USB-device**.

An error message appears: “data volume more than 95% full: please change.”

As a consequence of this error the unit can be non-operable for some seconds.



Attention

The connection with the share folder should only be used in networks which guarantee a safe physical connection! The connection to wireless networks can lead to problems during operation of the unit!



Due to the fact that the AMADA MIYACHI EUROPE has no influence on the structure, management and assignment of rights in the connected network, **functionality** related to **Ethernet connections is excluded from the product warranty.**

Depending on the network, connecting the unit to a shared folder can extend the booting and shutdown times of the unit.

Connection to a shared folder is only possible in local Windows networks which support the CIFS protocol.

The system does not support other/proprietary structures such as ActiveDirectory etc.

4.23.3 Create a Shared Folder

To create a shared folder on a Windows PC, proceed as follows:

1. Open Windows Explorer.
2. Create a folder.
3. Right-click on the folder and click on Properties/Release or Advanced.
4. Click to 'Share this folder'.
5. Name the shared folder.
6. Select a a user for sharing.
7. Allow Full Access, Read and Change for this user.
8. Apply the settings.

The procedure can vary depending on the Windows version you are using.

5 Configure Interfaces

5.1 Modbus/TCP

5.1.1 Connection

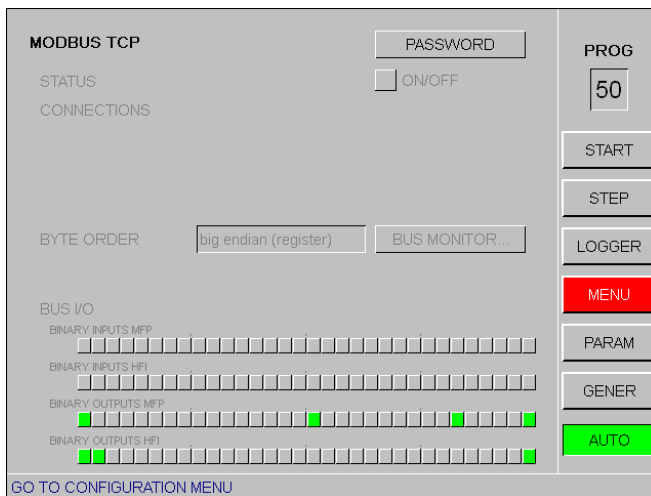
Ethernet CAT5 or CAT7 cable: X10 (RJ45 connector on control panel)

Maximum baud rate: 100 Mbit

5.1.2 Settings

Adjust the settings for the Ethernet interface in the **ETHERNET** screen by selecting MENU – GENERAL – ETHERNET. Enter the Supervisor's password.

Specific setup for Modbus/TCP can be adjusted in the **MODBUS** screen (via MENU – GENERAL – MODBUS).



Activate the communication (ON/OFF).

After activation the status of the communication as well as the IP addresses of the connected clients (Modbus Master) are shown.

A maximum of 3 clients can be connected at the same time.

STATUS

LISTENING

No client is connected and server (Modbus slave) is waiting for incoming requests.

CONNECTED

Server is connected to one or more clients. Cyclic polling or acyclic communication is completely performed by the client.

For cyclic polling there should be a time interval of at least 20 ms to avoid overloading the network.



Don't use cyclic polling in large or slow networks or in networks with high data traffic.

BUS (I/O)

Shows the binary input/output bits via the bus.

Configuring Pneumatic Weld Heads (HFI only):

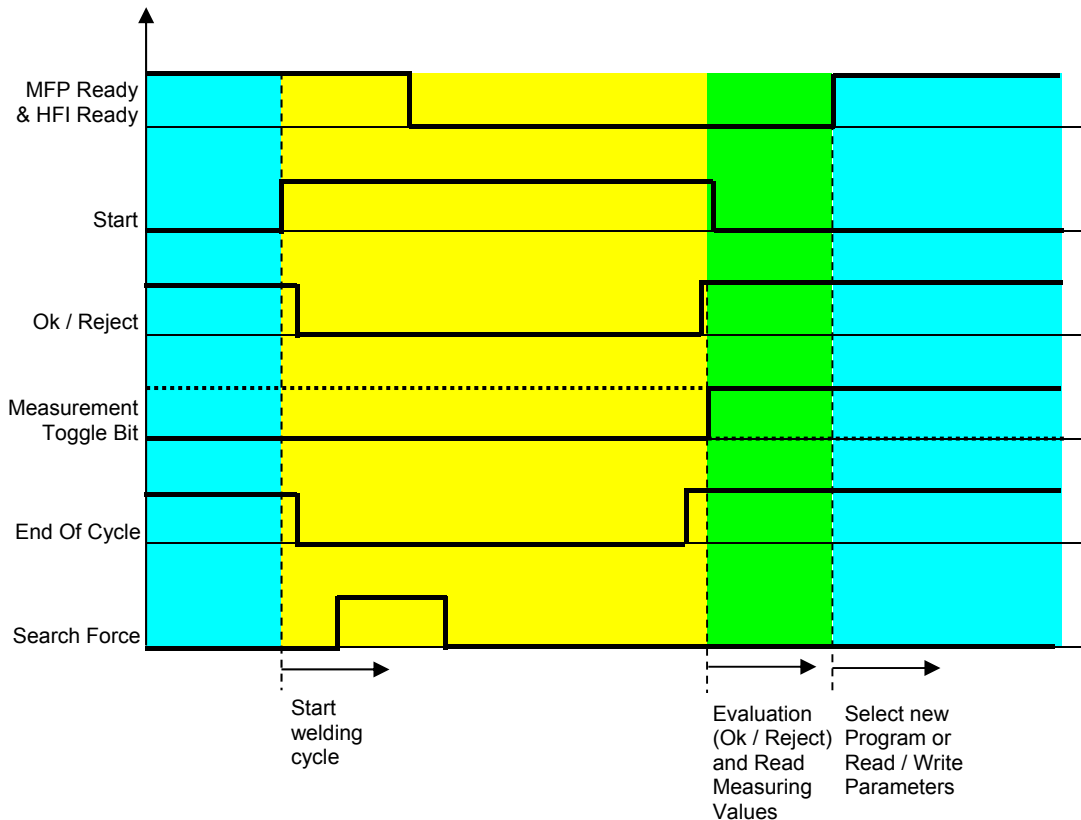
When configuring a pneumatic weld head (HFI only) observe the following things for performing the start signal :

- Wire jumper from pin 1 to pin 11 in plug X12 on rear side ISQ (plus pin 2 to pin 12 in dual head operation)
- Configuration of A64 as A_START_EXT_1 in MENU – GENERAL – SYSTEM – I/O STATUS HFI (plus A65 as A_START_EXT_2 in dual head operation)

5.1.3 Controlling the Weld Cycle

Controlling the weld cycle via Modbus/TCP differs in several points from the standard scheme of binary I/O.

The following diagram illustrates the subdivision of the weld cycle into 3 phases:



Welding phase (yellow):

Is initiated by *Start* signal. Status signals and *End Of Cycle* are cleared. The *start* signal may only be set if the signals *MFP Ready* and *HFI Ready* are active.

Note: setting the *Start* signal via the bus is only available for application configurations including MFP-NC-AWS3.

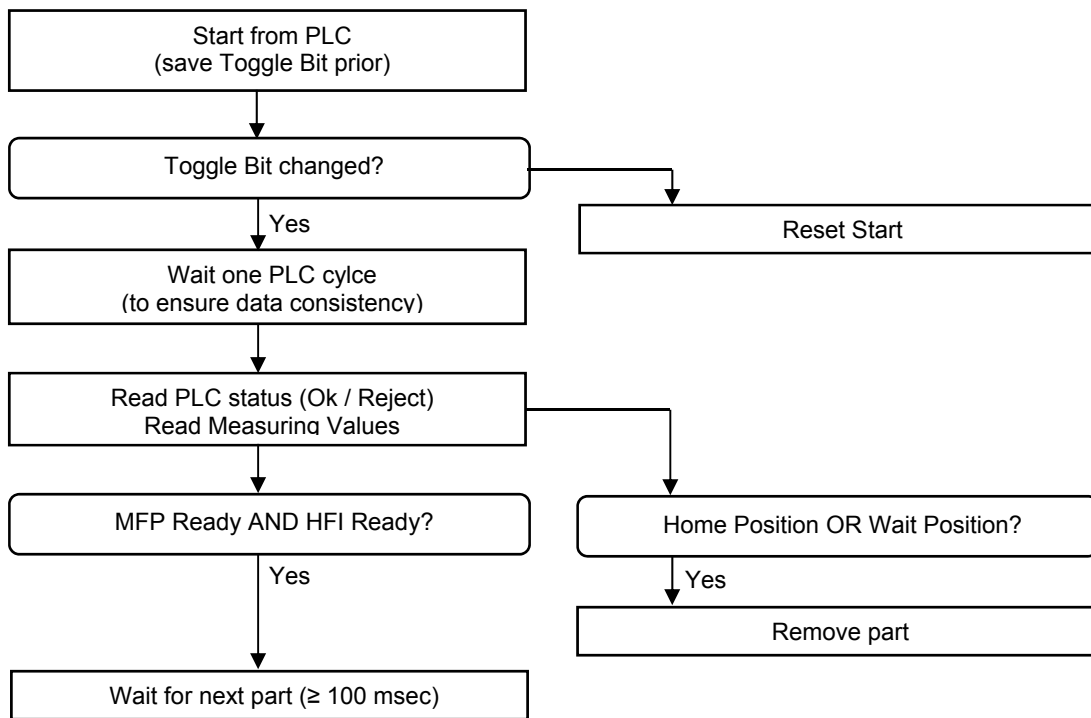
Evaluation phase (green):

Is initiated by status change of *Measurement Toggle Bits*. Afterwards the status signals (*Ok / Reject*) and the current measurement values can be read.

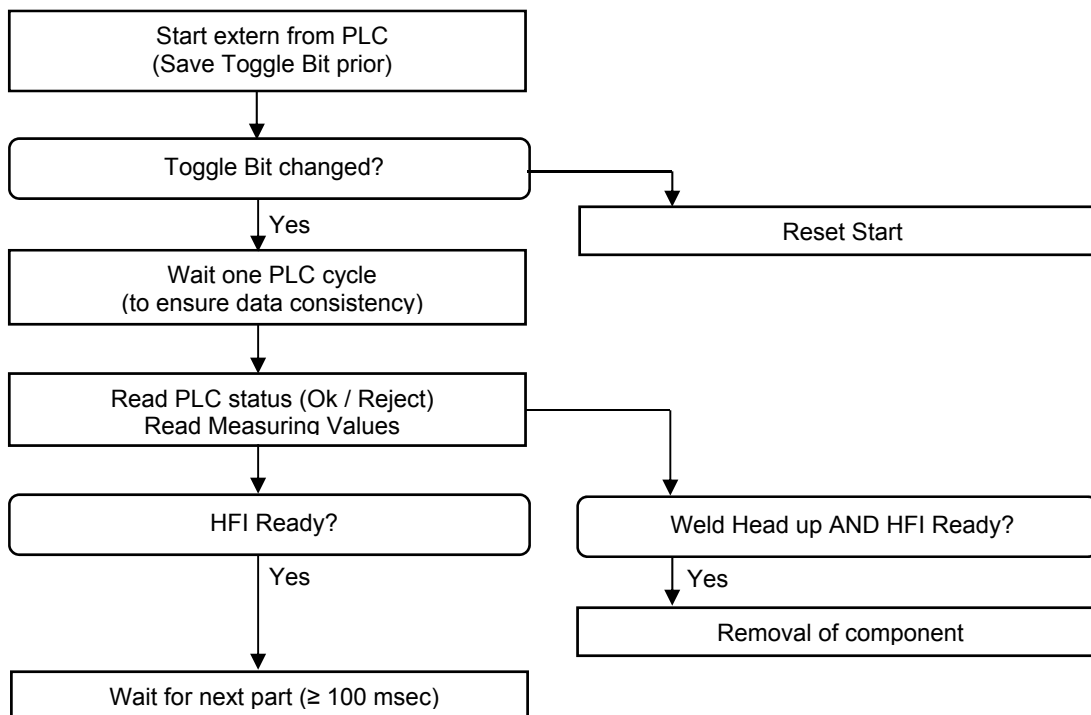
Configuration phase (blue):

Is initiated by *Ready* signal. Now a new program can be selected or parameters can be changed. The next *Start* signal may only be set after completing all configurations.

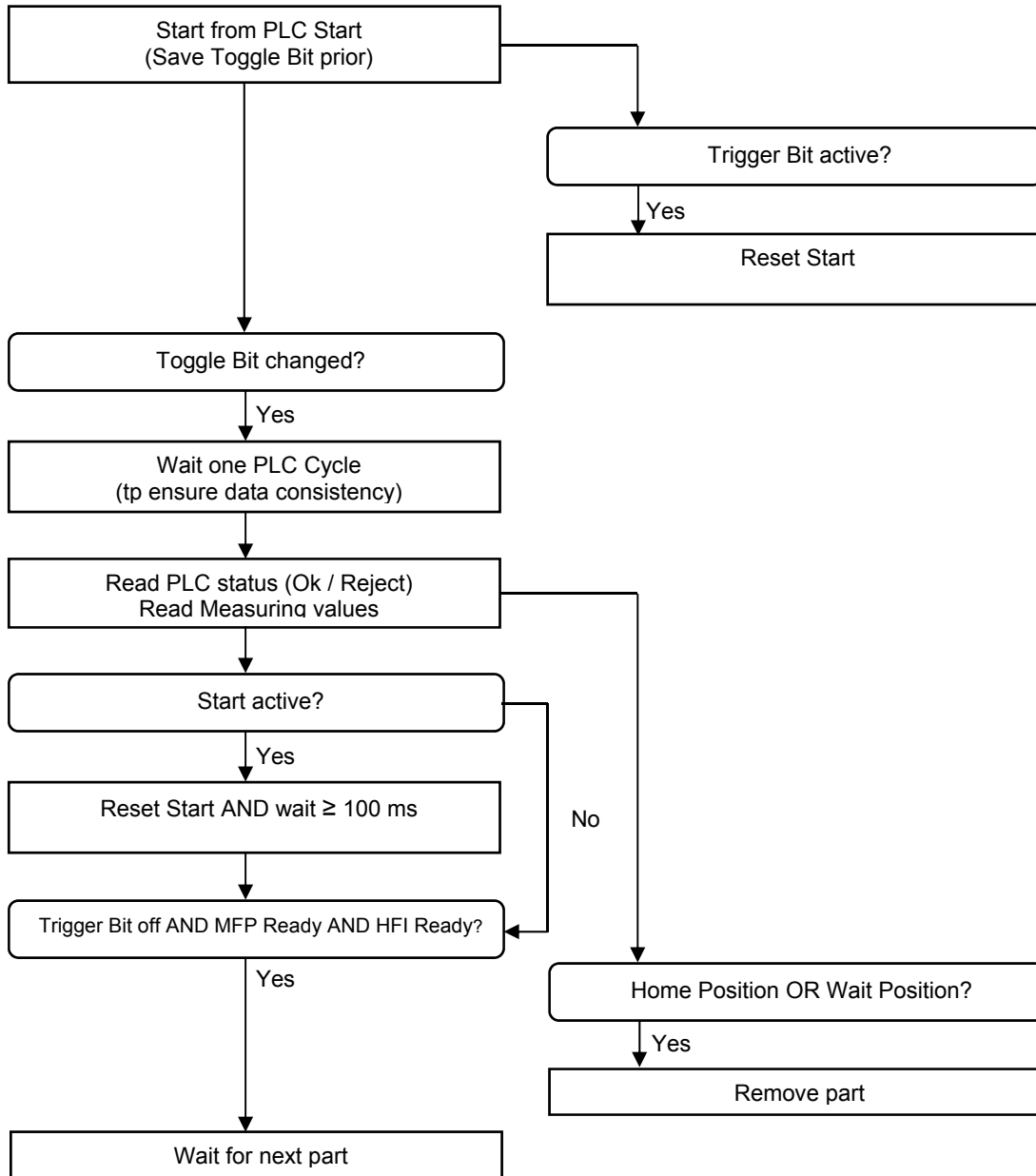
Standard Cycle at Configuration for Servo Weld Head (MFP-NC and HFI)



Standard Cycle at Configuration for Pneumatic Weld Head (HFI)



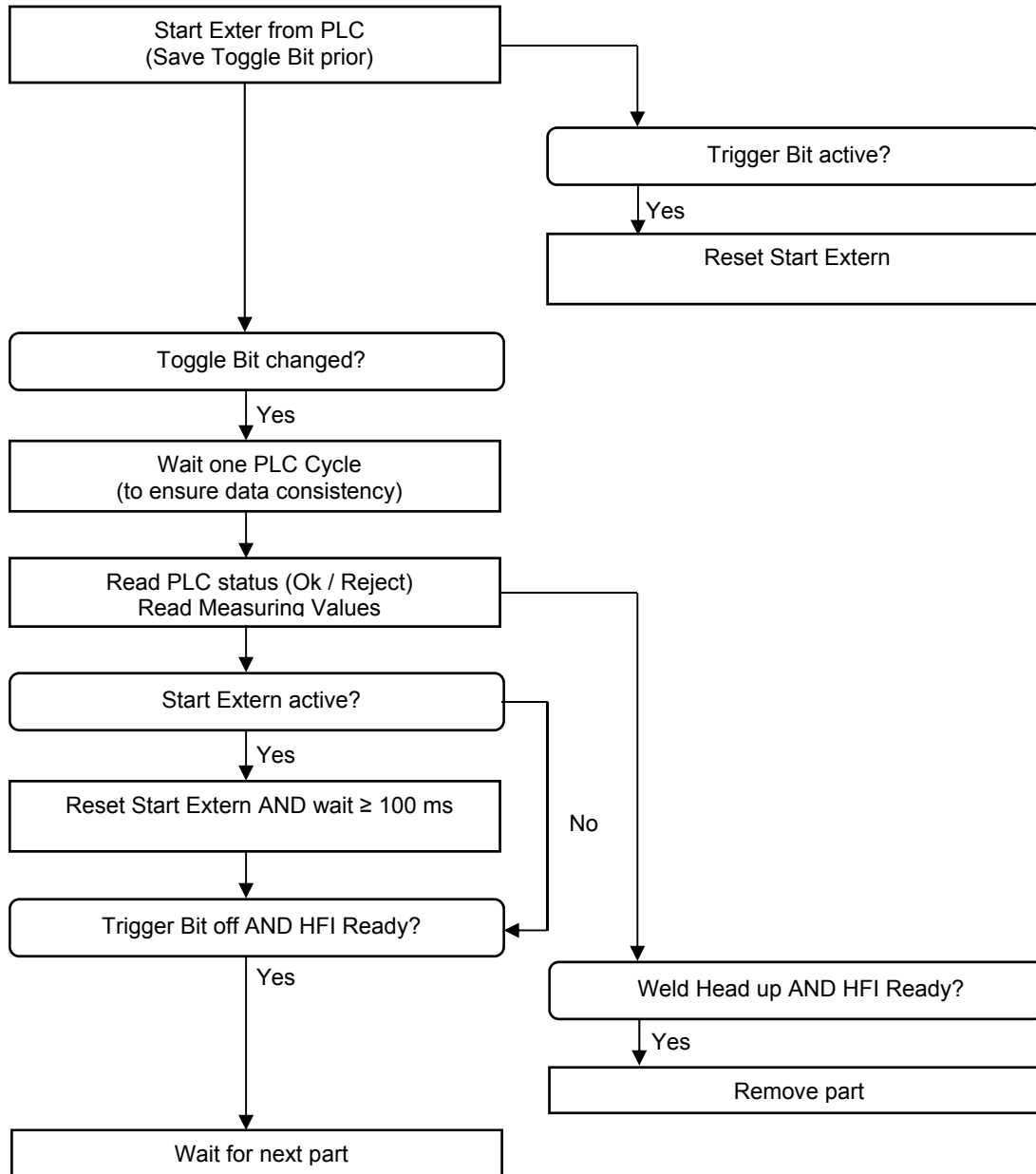
Optimized Cycle at Configuration for Servo Weld Head (MFP-NC and HFI)



Important:

When a device fault occurs (Fault HFI or Fault MFP) the cycle must be cancelled and the state before the cycle must be re-established after acknowledge of the fault.

Optimized Cycle at Configuration for Pneumatic Weld Head (HFI only)

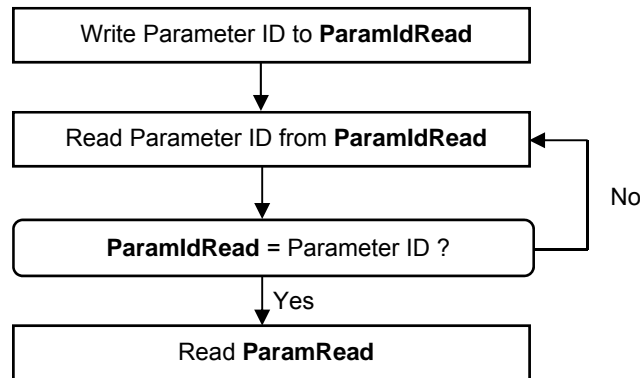


Important:

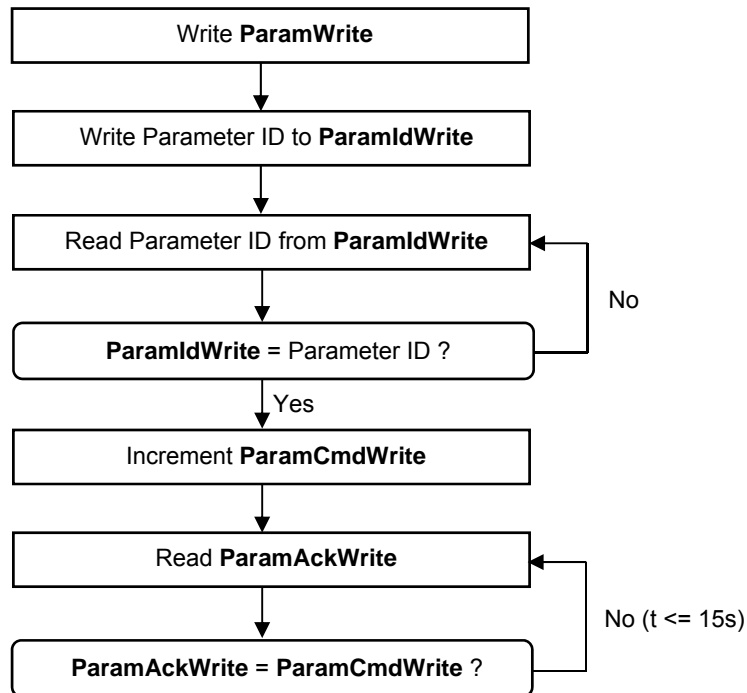
When a device fault occurs (Fault HFI) the cycle must be cancelled and the state before the cycle must be re-established after acknowledge of the fault.

5.1.4 Parameter Service Channel

Read Parameters:



Write Parameters:



Important:

Writing parameters as well as changing the program number may only be done if the MFP / HFI Ready bits are set.

If the timeout of 15 sec. of response time limit is exceeded, the value is obtained as not written. Then you either have to set an error status or try writing again.

5.2 Profibus/DP – EtherNet/IP

Settings for Profibus/DP and Ethernet/IP can be found on separate documentations (available on request).

6 Calibration - Adjusting

The AWS3 system is already calibrated when delivered.
We recommend calibrating the system annually.



Caution

Switch off the welding current before you start the calibration!

6.1 Force Calibration



To be able to calibrate the system, you have to be registered as „CONFIGURATOR“ or “SERVICE” at the control panel (see chap. 4.13).

Go to screen **MOTOR CONTROL** via MENU – CONTROL – ADVANCED.

MOTOR CONTROL	AXIS 1	BACK...	PROG			
		SPECIAL...	01			
MAINS VOLTAGE	24V		START			
OVERLOAD PROTECTION	140 °C	ON/OFF <input checked="" type="checkbox"/>	STEP			
TEST CYCLE MODE	1 s	ON/OFF <input type="checkbox"/>	LOGGER			
MAXIMUM STROKE LIMIT	50000 µm		MENU			
FORCE INTERPOLATION TABLE		ON/OFF <input checked="" type="checkbox"/>	PARAM			
SET VALUE	15	20	25	35	60 N	UNDO
REAL VALUE	16	24	26	35	60 N	AUTO
DISPLACEMENT MEASUREMENT						
ELASTICITY COMPENSATION MODE	off					

FORCE INTERPOLATION ON/OFF

Deactivate **FORCE INTERPOLATION TABLE ON/OFF**.

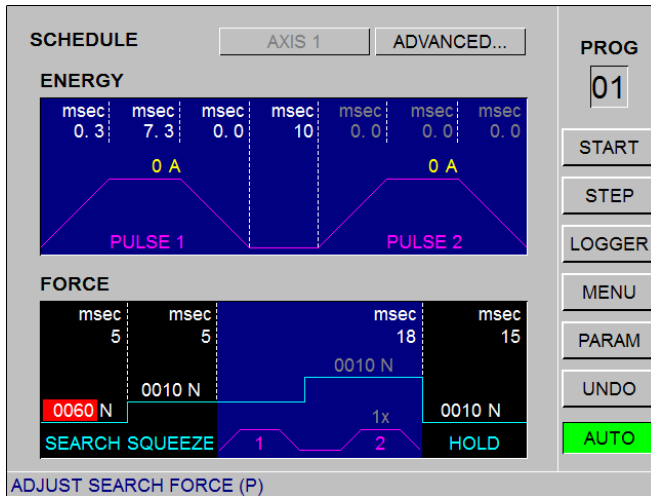
SET VALUE shows 5 values in ascending sequence. Start with the highest value.



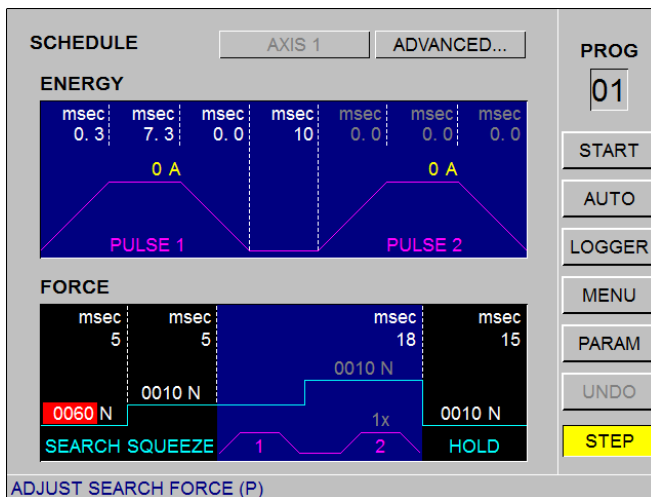
The highest REAL VALUE must equal the highest SET VALUE.

I.e. this real value **may not be changed**; calibration must be done as described below, via GEAR RATIO FORCE.

Set highest **SET VALUE** (60 in this example) as **SEARCH** force in the **SCHEDULE** screen.

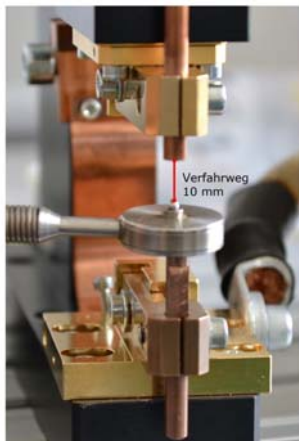


Switch to single step mode by clicking on **STEP** in the menu bar.



Place the probe of the calibrated measuring instrument between the electrodes. Ensure the probe is horizontal aligned.
Place the small ball into the probe's cut-out.

To be able to repeat this procedure, manually set the traversing distance to 10 mm.



In the **MOVEMENT** screen, set the speed for the single STEP to 10.0 mm/s.

The screenshot shows the 'MOVEMENT' screen for 'AXIS 1'. It includes sections for 'INTERLOCKING CYLINDER' (set to 'off'), 'INITIAL STROKE' (with 'AUTO-STROKE' checked), and velocity/acceleration settings for 'AUTO' and 'STEP' modes. The 'STEP' VELOCITY is highlighted in red and set to 10.0 mm/sec. A 'STEP' button is highlighted in yellow. A 'SET VELOCITY STEP MODE' link is visible at the bottom left.

Switch on the measuring instrument.

Click **START** in the screen **SCHEDULE**.

A single run is carried out and the measurement values taken are shown on the display of the measuring instrument.

After the measuring click **STOP**.

We recommend to measure 2 more times and use the average value of the 3 measurements taken as the result.

If the measured value differs from the SET VALUE more than the given tolerance, adjust the value for **GEAR RATIO FORCE** in the **MOTOR CONTROL** screen.

Here applies:

if the force value taken during the single run is too low, the value for **GEAR RATIO FORCE** must be decreased, if the value taken is too high, the value must be increased.

Based on experience the value should be changed in increments of 0.01.

To check the adjustment, you can take another measurement as described above.

Now take the next (second highest) **SET VALUE** (in this example 35), set it as SEARCH force in the **SCHEDULE** screen and start again.

Note down the measured value and repeat the measuring procedure 2 times. Then calculate an average from the three values taken and enter this average value as REAL VALUE below the corresponding SET VALUE in the **MOTOR CONTROL** screen.

Now perform the measuring in the same way with the rest of the SET VALUES until all of the REAL VALUES are adjusted.



Please note that the REAL VALUES must be ascending.

That means that every value **must** have a higher value on the right-hand side and a decrease value on the left-hand side.

After the measuring has been finished all REAL VALUES are set.

To check the calibrated values, activate **FORCE INTERPOLATION TABLE** and set the requested **SET VALUE** as search force in the **SCHEDULE** screen.

Now start the single run, the measured value should now be within the tolerance range.

Then set the next **SET VALUE** as search force and measure again.

This way all 5 **SET VALUES** can be checked.

If one of the first four **SET VALUES** should still be outside of the tolerance range even after calibration, increase or decrease the corresponding **REAL VALUE** by 1 in the **MOTOR CONTROL – ADVANCED** screen and measure again.

When doing this, leave **FORCE INTERPOLATION TABLE** activated.



Please note: the highest REAL VALUE may not be changed.

If adjustment is necessary, it must be done as described above via **GEAR RATIO FORCE**.

If all values are within the tolerance range, the force calibration is finished.

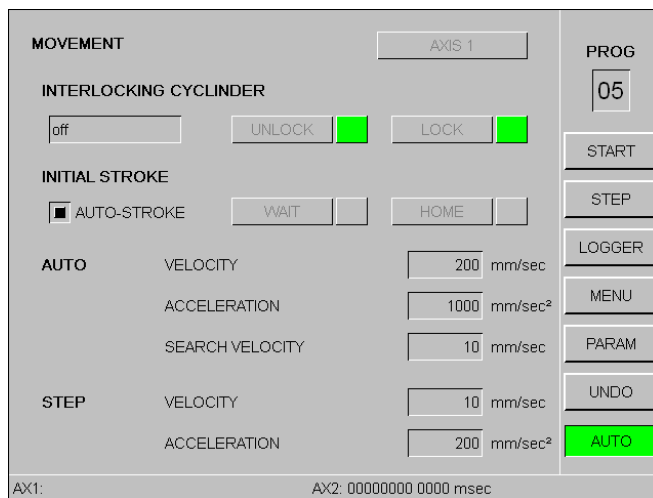
6.2 Distance Calibration

First perform a reference run using the same force you will use for the later measurement (see chap. 4.6.1).

We recommend to use half of the highest force set value (in this example highest force set value is 250, so you should set 125 as force value for the reference run).

Go to screen **MOVEMENT** and adjust the AUTO values as shown below:

- **VELOCITY**: 200.0
- **ACCELERATION**: 1000
- **SEARCH VELOCITY**: 10.0



We recommend to use the following end-gauges for the distance calibration:

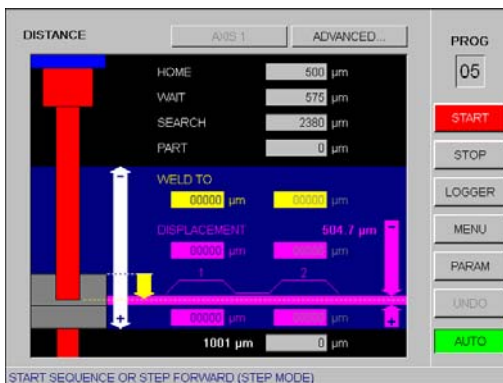
- MFP25, MFP60: 1, 1.5 and 2 mm
- MFP1, MFP2, MFP400, MFP800: 1, 3 and 5 mm



Search position has to be at least 1.5 mm larger than the largest end-gauge.

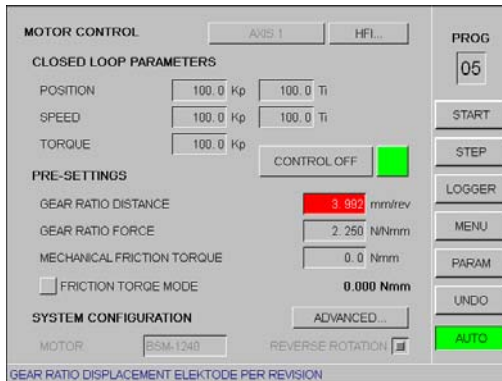
Hold the smallest end-gauge between the electrodes as horizontally as possible and start calibration by clicking on **START**.

The measured distance is displayed in the bottom left (in this example an end-gauge of 1 mm was used, the measured value is -1001 μm . That is a deviation of 0.1% and is therefore within the tolerance range).



Repeat the above procedure with the other two end-gauges. If one of the measured values should be outside of the tolerance range, calibrate as follows:

Go to screen **MOTOR CONTROL** and change the **PRE-SETTINGS** for **GEAR RATIO FORCE**.



Here applies:

If the measured value was too high, decrease the value for **GEAR RATIO FORCE**.

If the measured value was too low, increase the value for **GEAR RATIO FORCE**.

Based on experience the value should be changed in increments of 0.001.

To check the calibration, perform another measurement as described above.

If the value is then within the tolerance range, the distance calibration is finished.

7 Configuring Pneumatic Weld Heads

7.1 Set the Weld Parameter Pressure

When selecting the air control mode the pressure for the proportional valves can be pre-set (applies only to units featuring a welding pressure cylinder, e.g. FPxxx).

During the **closing time** the head is closed with the lower **closing pressure**.
Average closing time: approx. 500 ms.

Additionally, the **squeeze time** has to be long enough to enable the welding pressure to build up and the system to cool down (average squeeze time: approx. 500 ms).

The **welding pressure** remains until the end of the weld cycle.

The following applies to units featuring adjustment cylinders (e.g. F120):
Adjustment time = closing time + squeeze time.

These units use a proportional valve that harnesses a welding pressure spring together with the force cylinder. This creates the welding pressure.

The **hold time** starts after the on-time has ended. During the hold time the electrodes stay closed. This way the welding joint cools faster through the electrodes, which usually leads to a stronger connection.

8 Problem Solving

8.1 Trouble Shooting

Bluescreen:

When the control panel shows a 'Bluescreen' (blue display with icons), please initiate a shutdown by pressing both buttons simultaneously for max. 10 sec.



For a shutdown press both buttons simultaneously for max. 10 seconds

Alternatively you can shut down the control panel as follows:

- Plug in a USB keyboard.
- Switch to the "Other" icon by using the arrow keys ← and → and press ENTER.
- Then switch to the "Terminal" icon and press ENTER.
- Now enter "shutdown -h" and press ENTER (to enter the "-" symbol please use the "-" key on the number pad of the keyboard).

8.2 Error Messages in Status Bar

No.	Error	Cause
4002	Open file	USB stick or file damaged
4003	Save File	USB stick or file damaged
4004	Wrong file type or file faulty	xxx is wrong or faulty file header
4005	Refresh chart	
4006	Access to BAT RAM	Battery low
4007	Load file	USB stick or file damaged
4008	File already existing and write-protected	An attempt was made to overwrite a protected file
4010	Cursor cannot be displayed outside of display detail	
4011	Installation of data cache failed	Installation of data cache failed
4020	CAN: Time-out read data	Data transfer overloaded, possible causes: <ul style="list-style-type: none"> • connectivity problem at control panel • firmware incompatibility of control panel and MFP-NC/ISQ • possible hardware fault
4021	CAN: Time-out write data	Data transfer overloaded, possible causes: <ul style="list-style-type: none"> • connectivity problem at control panel • firmware incompatibility of control panel and MFP-NC/ISQ • possible hardware fault
4022	CAN: Time-out receive request	
4023	CAN: Time-out send request	
4024	CAN: Overload of order buffer	Bottleneck executing several tasks, possible causes: <ul style="list-style-type: none"> • connectivity problem at control panel • firmware incompatibility of control panel and MFP-NC/ISQ • possible hardware fault
4030	ETHERNET: IP address in reserved area	

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