Operating instructions

ewm

WE ARE WELDING

⚠ 📖

EN

Control

L1.04 - RC XQ Expert 2.0 Rob
L1.05 - RC XQ Expert 2.0 Rob

General instructions

⚠ WARNING
Read the operating instructions! **The operating instructions provide an introduction to the safe use of the products.** • Read and observe the operating instructions for all system components, especially the safety instructions and warning notices! • Observe the accident prevention regulations and any regional regulations! • The operating instructions must be kept at the location where the machine is operated. • Safety and warning labels on the machine indicate any possible risks.   Keep these labels clean and legible at all times. • The machine has been constructed to state-of-the-art standards in line with any applicable regulations and industrial standards. Only trained personnel may operate, service and repair the machine. • Technical changes due to further development in machine technology may lead to a differing welding behaviour.

In the event of queries on installation, commissioning, operation or special conditions at the installation site, or on usage, please contact your sales partner or our customer service department on +49 2680 181-0.

A list of authorised sales partners can be found at www.ewm-group.com/en/specialist-dealers.

Liability relating to the operation of this equipment is restricted solely to the function of the equipment. No other form of liability, regardless of type, shall be accepted. This exclusion of liability shall be deemed accepted by the user on commissioning the equipment.

The manufacturer is unable to monitor whether or not these instructions or the conditions and methods are observed during installation, operation, usage and maintenance of the equipment.

An incorrectly performed installation can result in material damage and injure persons as a result. For this reason, we do not accept any responsibility or liability for losses, damages or costs arising from incorrect installation, improper operation or incorrect usage and maintenance or any actions connected to this in any way.

1 Contents

2 For your safety

2.1 Notes on using these operating instructions

⚠ DANGER

Working or operating procedures which must be closely observed to prevent imminent serious and even fatal injuries.
- Safety notes include the "DANGER" keyword in the heading with a general warning symbol.
- The hazard is also highlighted using a symbol on the edge of the page.

⚠ WARNING

Working or operating procedures which must be closely observed to prevent serious and even fatal injuries.
- Safety notes include the "WARNING" keyword in the heading with a general warning symbol.
- The hazard is also highlighted using a symbol in the page margin.

⚠ CAUTION

Working or operating procedures which must be closely observed to prevent possible minor personal injury.
- The safety information includes the "CAUTION" keyword in its heading with a general warning symbol.
- The risk is explained using a symbol on the edge of the page.

☞ *Technical aspects which the user must observe to avoid material or equipment damage.*

Instructions and lists detailing step-by-step actions for given situations can be recognised via bullet points, e.g.:

- Insert the welding current lead socket into the relevant socket and lock.

2.2 Explanation of icons

Symbol	Description	Symbol	Description
☞	Indicates technical aspects which the user must observe.	⇔✍	Activate and release / Tap / Tip
(switch off)	Switch off machine	⇨✍	Release
(switch on)	Switch on machine	⇦✍	Press and hold
		↕✍	Switch
✖	Incorrect / Invalid	↻✍	Turn
✔	Correct / Valid	◺	Numerical value – adjustable
Input	Input	☀ (green)	Signal light lights up in green
Navigation	Navigation	☀ (green flashing)	Signal light flashes green
Output	Output	☀ (red)	Signal light lights up in red
⏱ 4s	Time representation (e.g.: wait 4 s / actuate)	☀ (red flashing)	Signal light flashes red
–⁄–	Interruption in the menu display (other setting options possible)		
⚒✖	Tool not required/do not use		
⚒	Tool required/use		

2.3 Part of the complete documentation

These operating instructions are part of the complete documentation and valid only in combination with all other parts of these instructions! Read and observe the operating instructions for all system components, especially the safety instructions!

The illustration shows a general example of a welding system.
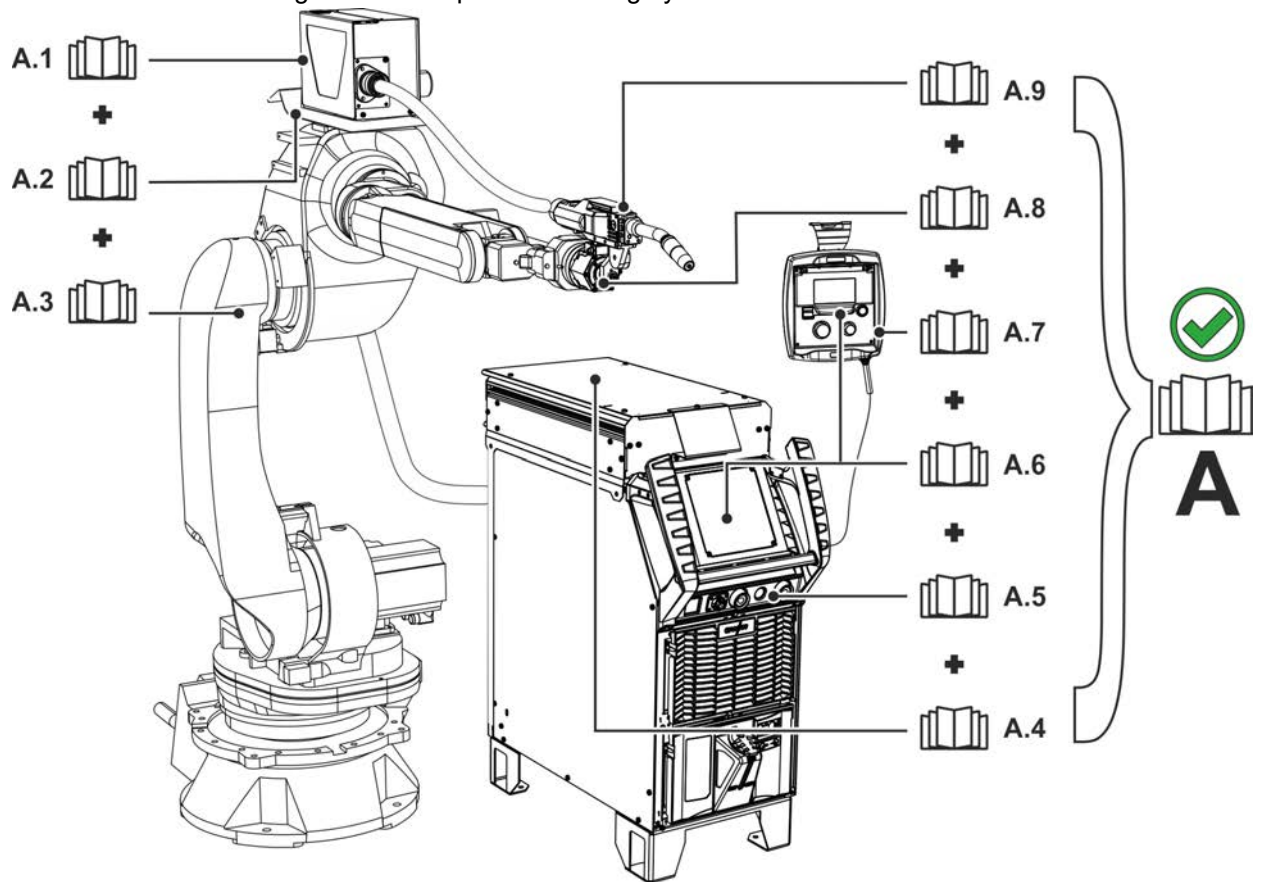
Figure 2-1

Item	Operating instructions
A.1	Wire feeder, media separation box
A.2	Options conversion instructions
A.3	Robot
A.4	Robot interface
A.5	Power source
A.6	Control
A.7	Remote control
A.8	Collision sensor
A.9	Welding torch
A	Complete documentation

3 Intended use

> ⚠ **WARNING**
>
> § **Hazards due to improper usage!**
> **The machine has been constructed to the state of the art and any regulations and standards applicable for use in industry and trade. It may only be used for the welding procedures indicated at the rating plate. Hazards may arise for persons, animals and material objects if the equipment is not used correctly. No liability is accepted for any damages arising from improper usage!**
> - The equipment must only be used in line with its designated purpose and by trained or expert personnel!
> - Do not improperly modify or convert the equipment!

3.1 Applications

Device control of multi-process welding machines for arc welding covering the following welding procedures:

Machine series	Main procedure for MIG/MAG welding									
	Standard arc					Pulsed arc				
	MIG/MAG XQ	MIG/MAG pulse XQ	coldArc XQ	forceArc XQ	rootArc XQ	forceArc puls XQ	rootArc puls XQ	coldArc puls XQ	acArc puls XQ	Positionweld
Titan XQR AC	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅
Titan XQR	✅	✅	✅	✅	✅	✅	✅	✅	❌	✅

3.2 Use and operation solely with the following machines

The following system components can be combined:

This description may be applied only to machines with the RC XQ Expert 2.0 Rob machine control.

Machine control	RC XQ Expert 2.0 Rob	RC XQ Expert 2.0 Rob LG	RC XQ Expert 2.0 Rob WLG
Description	No network connection	Version with LAN	Version with WiFi and LAN

3.3 Documents which also apply

- Operating instructions for the connected welding machines
- Documents of the optional expansions

3.4 Software version

These instructions apply to the following software version:

2.1.0.0

The machine control software version is shown on the screen during the start process.

4 Quick overview

4.1 Machine control – Operating elements
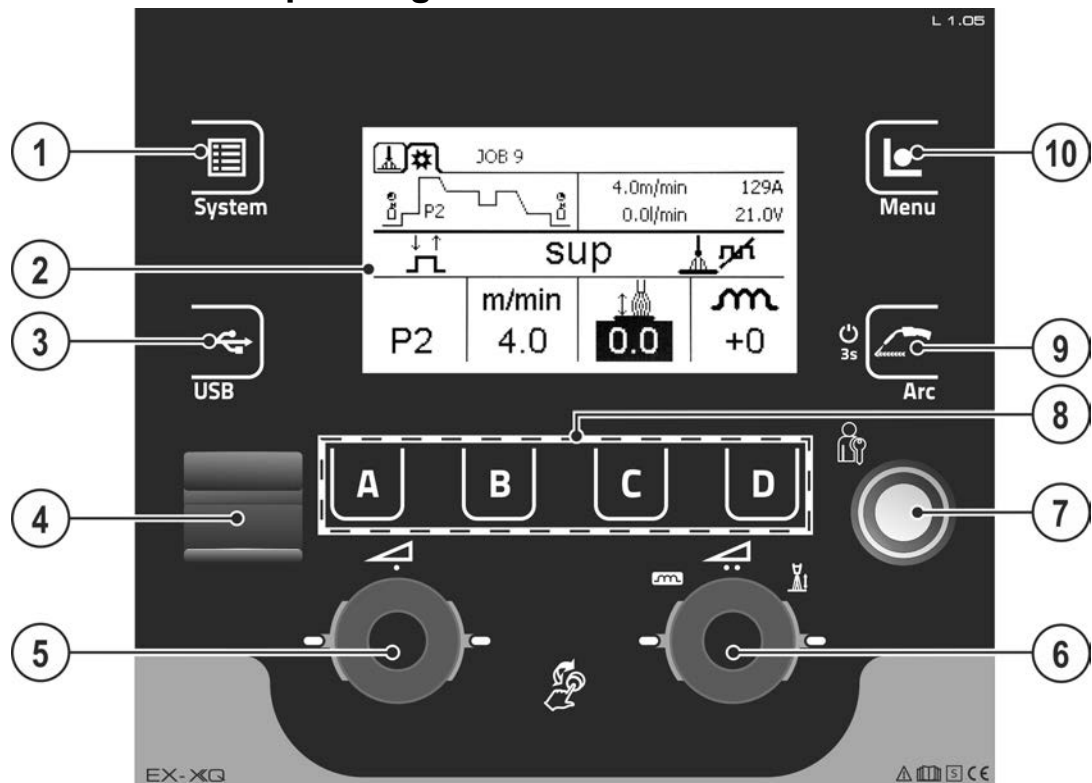
Figure 4-1

Item	Symbol	Description
1		**Push-button for system settings** Display for system and configuration of system settings.
2		**Machine display** Graphical machine display showing all machine functions, menus and parameters with their values.
3		**Push-button for USB interface** Operation and settings of the USB interface.
4		**USB interface** Offline data transfer (connection capability for USB flash drive - preferably industrial USB flash drive).
5		**Rotary knob (click wheel) for welding power** • ----------- Setting the welding power • ----------- Setting various parameters values depending on the preselection. (Settings can be made when the backlight is activated.)
6		**Rotary knob (click wheel) for correction of arc** • ----------- Setting the correction of arc length • ----------- Setting the arc dynamics Settings can be made when the backlight is activated.
7		**Interface - Xbutton** Welding release with user-defined rights to protect against unauthorised use.
8	A B C D	**Push-buttons A B C D (depending on context)**

Item	Symbol	Description
9		**Arc push-button** • Initial state of main screen: Switch between main screen types 1 and 2. • Initial state of any sub-menu: Display switches back to the main screen. • Press and hold: After 3 s the machine changes to the lock mode. To unlock, press and hold again for 3 s.
10		**Push-button for menu**

4.2 Screen icons

Symbol	Description
	Shielding gas
	Material type
	Wire inching
	Wire return
	Advanced settings
	Set-up mode
	Non-latched operating mode
	Special non-latched operating mode
	Latched operating mode
	Special latched operating mode
JOB	Welding task
sup	superPuls
sup	superPuls switched off
	Interference
	Temperature error
	Spot welding operating mode
mm	Material thickness
	Disabled; selected function is not available with the current access rights - check access rights.
m/min	Wire feed speed
	Arc length correction
kW	Welding power
P	Programs (P0 - P15)
	Warning; could be an imminent interference
	Wired local network (LAN)
	Wireless local network (WiFi)
	User logged in
	Not possible, check priorities
	Xbutton login
	Xbutton logout
	Arc dynamics

Symbol	Description
?	Xbutton version number not recognised
⊗	Cancel operation
⊘	Confirm operation
⌀	Wire diameter (welding consumable)
↰	Menu navigation; one menu back
▼	Menu navigation; expanding the content of the display
	Save data to USB medium
	Load data from USB medium
	USB data recording
	Screen type 3/4, switching buttons
	Pulse arc welding
	Standard arc welding
	Welding procedure
↻	Refresh
Ⓗ	After welding, the last weld values (hold values) from the main program are displayed
ⓘ	Information
	Welding current
	Welding voltage
	Motor current, wire feed motor
	Welding duration
	Plasma gas
	Wire feed speed
✓	Value correct or applicable

4.3 Machine display

The machine display shows all the information relevant to the user as text and/or graphics.

4.3.1 Actual values, nominal values, hold values

Parameter	Before welding	During welding		After welding	
	Nominal value	Actual value	Nominal value	Hold value	Nominal value
Welding current	☑	☑	☐	☑	☐
Material thickness	☑	☐	☑	☐	☑
Wire feed speed	☑	☑	☐	☑	☐
Welding voltage	☑	☑	☐	☑	☐

4.3.2 Main screen

The main screen shows all the information relevant for the welding process before, while and after it is carried out. In addition, it shows status information on the machine state. The assignment of the context-dependent push-buttons is also shown on the main screen.

The user can choose between different main screens.

4.3.2.1 Actual values
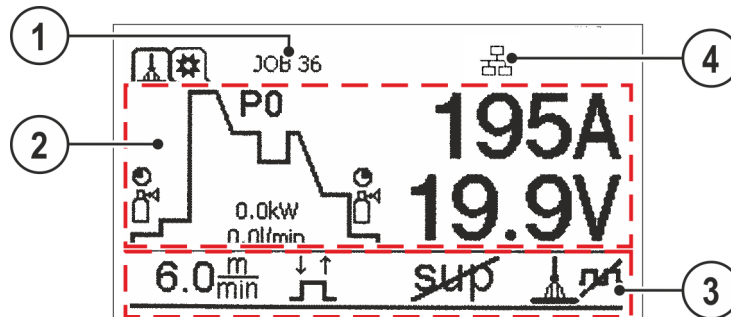
Figure 4-2

Item	Symbol	Description
1		**Information on the welding task selected** JOB number.
2		**Display area for welding data** Welding current and voltage, current status of the welding sequence.
3		**Display area for process parameters** Wire feed speed, operating mode etc.
4		**Display area for system status** Network status, error status etc.

4.3.2.2 Nominal values
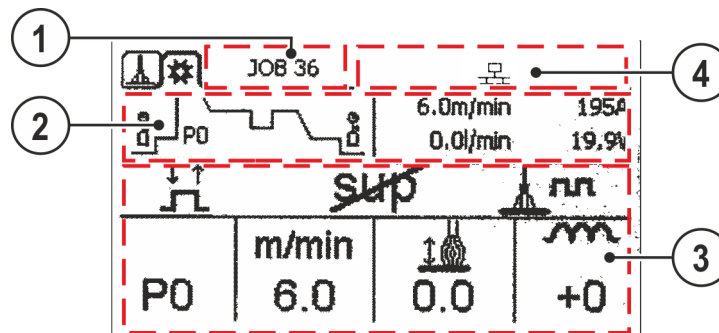
Figure 4-3

Item	Symbol	Description
1		**Information on the welding task selected** JOB number.
2		**Display area for process parameters** Wire feed speed, operating mode etc.
3		**Process parameter setting range** Operating mode, voltage correction, program, welding type etc.
4		**Display area for system status** Network status, error status etc.

4.3.2.3 Main screen variants

Main screen type 1 | Main screen type 2
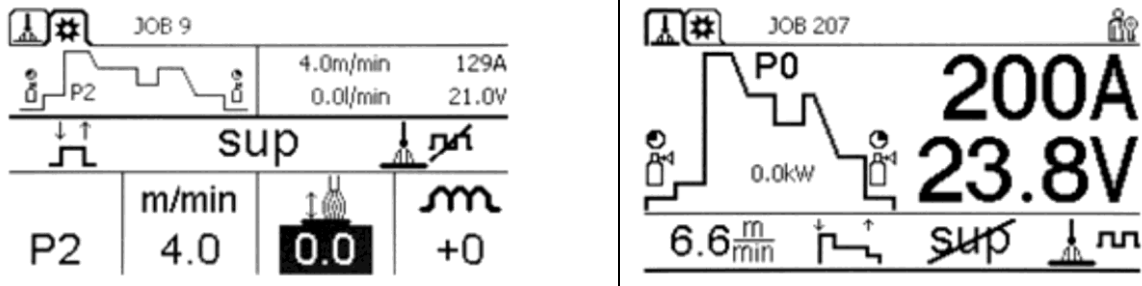
Figure 4-4

You can select the required variant (type of main screen) in the Machine configuration (system) menu .
You can toggle between main screen types 1 and 2 directly on the main screen as well (buttons at the top left or use the push-button Arc).

4.3.3 Initial screen

During the start process the control name, machine software version and selected language are shown on the screen.

Figure 4-5

Item	Symbol	Description
1		**Machine control name**
2		**Progress bar** Shows the load progress during the start process.
3		**Indication of the system language selected** The system language can be changed during the start process.
4		**Control software version**

4.3.3.1 Change system language

During the start process the user can select or change the system language at the machine control.

- Switch the machine off and on again.

- Press the context-dependent push-button [D] during the start phase (the word WELDING 4.0 is displayed).

- Select the required language by turning the control button.

- Confirm the selected language by pressing the control button (the user can exit the menu by pressing the context-dependent push-button [A] without making any changes).
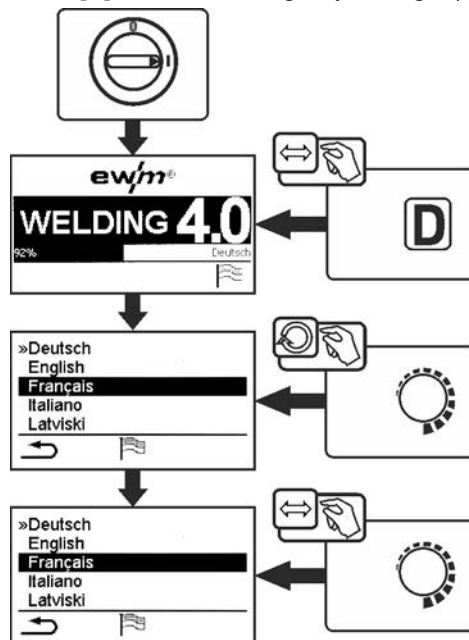
Figure 4-6

4.4 Operating the machine control

In general the control is operated with the central control button below the machine display.

Select the required menu item by turning (navigate) and pressing (confirm) the central control button. In addition, the context-dependent push-buttons below the machine display can be used for confirmation.

4.4.1 Welding power setting

The welding power is adjusted with the rotary knob (click wheel) for welding power. You can also adjust the parameters in the operation sequence or settings in the various machine menus.

MIG/MAG settings

The welding power (heat input into the material) can be changed by setting the following three parameters:

- wire feed speed θ
- material thickness ✛
- welding current A

These three parameters are interdependent and always change together. The significant parameter is the wire feed speed in m/min. The wire feed speed can be adjusted in increments of 0.1 m/min (4.0 ipm). The associated welding current and material thickness are determined from the wire feed speed.

The welding current displayed and material thickness are to be understood as guide values for the user and rounded to full amperage and 0.1 mm material thickness.

A change in the wire feed speed, for example by 0.1 m/min, leads to a more or less large change in the welding current displayed or in the material thickness displayed depending on the selected welding wire diameter. The display of the welding current and the material thickness are also dependent on the selected wire diameter.

For example, a change in wire feed speed of 0.1 m/min and a selected wire diameter of 0.8 mm results in a smaller change in the current or thickness of material than a change in wire feed speed of 0.1 m/min and a selected wire diameter of 1.6 mm.

Depending on the diameter of the wire to be welded, it is possible that smaller or larger jumps in the display of material thickness or welding current take place or changes of these values become visible only after several "clicks" on the rotary transducer. As described above, the reason for this is the change in the wire feed speed by 0.1 m/min per click and the resulting change in the current or material thickness as a function of the preselected welding wire diameter.

Please note also that the guide value of the welding current displayed before welding may deviate from the guide value during welding depending on the actual stick-out (free wire end used for welding).

The reason lies in the preheating of the free wire end by the welding current. For example, the preheating in the welding wire increases with the length of the stick-out. This means if the stick-out (free wire end) increases, the actual welding current decreases due to larger preheating in the wire. If the free wire end decreases, the actual welding current increases. This enables the welder to influence the heat input in the component within limits by changing the distance of the welding torch.

Setting of TIG/MMA:

The welding power is set with the parameter "welding current" that can be adjusted in increments of 1 ampere.

4.5 Direct access keys

Several push-buttons on the right and left of the display can be used to directly access the most important menus.

4.6 Context-dependent push-buttons

The bottom push-buttons are so-called context-dependent operating elements. The selection options of these buttons depend on each screen content.

If the ⭢ icon is shown on the display the user can skip back to the previous menu item (often assigned to the [A] push-button).

4.7 Changing basic settings (machine configuration menu)

The basic welding system functions can be adjusted in the machine configuration menu. Only experienced users should change the settings.

4.7.1 Lock function

The lock function protects against accidental adjustment of the device settings.

The user can switch the lock function on or off by pressing the button for a long time from each machine control or accessory component with the symbol ⏻.

4.8 Machine configuration (system)

In the System menu the user can set the basic machine configuration.

Enter the menu:
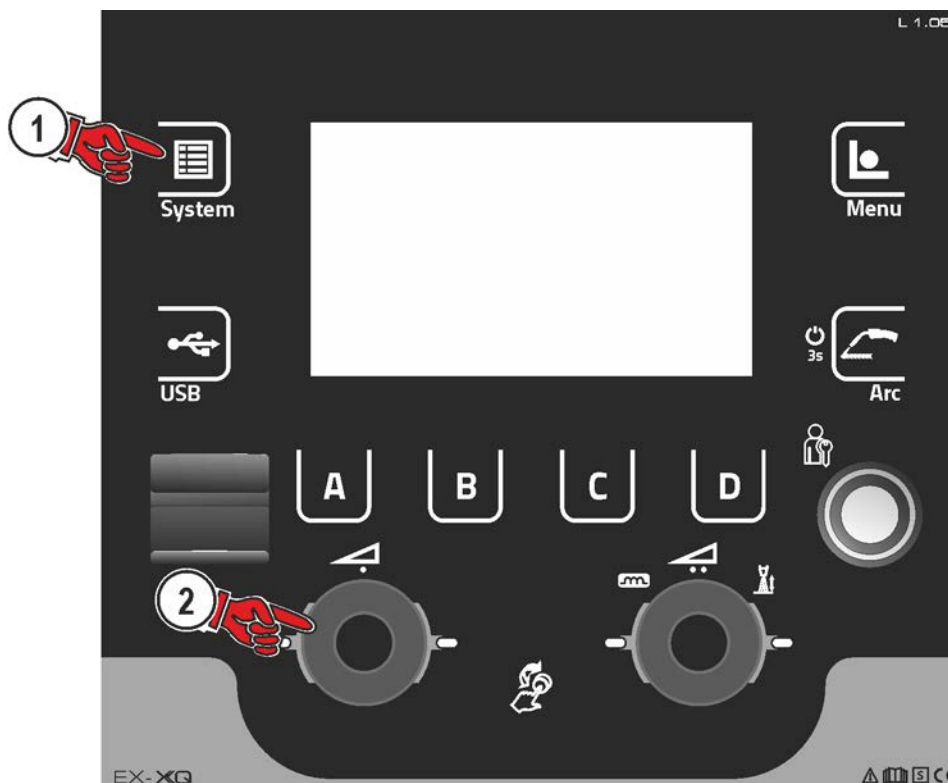
Figure 4-7

4.8.1 Power-saving mode (Standby)

You can activate the power-saving mode by setting a parameter in the configuration menu (time-controlled power-saving mode). When power-saving mode is active, the Expert XQ 2.0 machine controller display is dimmed and only the middle digit of the display is shown in the wire feed unit. Pressing any operating element (e.g. tapping the torch trigger) deactivates power-saving mode and the machine is ready for welding again.

Menu item/parameter	Value	Comment
Time automatic [min.]	Off	Function switched off
	5-60	Time to activation of the power-saving mode in case of inactivity.
Log off user in standby mode	Yes	The user will be logged off when the power-saving mode is active.
	No	The user will not be logged off when the power-saving mode is active.

4.8.2 Access permission (Xbutton)

The welding system offers two options to prevent unauthorised access to welding parameters or unintentional reconfiguration.

1 Key switch (available depending on machine version). With the key switch in position 1 all functions and parameters can be configured without any restriction. In position 0 certain predefined welding parameters or functions cannot be modified (see relevant documentation).

2 Xbutton. With this function, permissions can be assigned to users to access those areas of the machine control defined for them. To do so, the user needs a digital key (Xbutton) to log on to the machine via the Xbutton interface. The key itself is configured by the system user (welding supervisor).

If the Xbutton function is activated, the key switch/key switch function is deactivated.
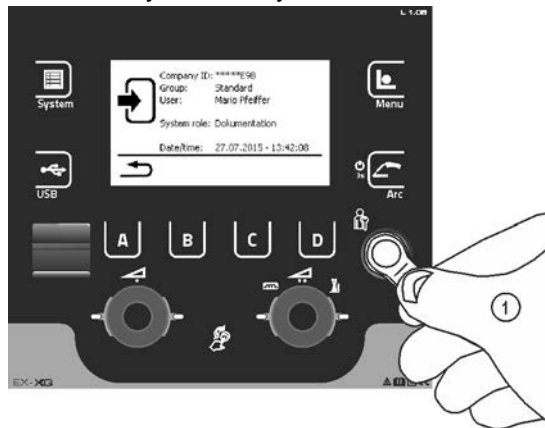
Figure 4-8

To activate Xbutton rights follow these instructions:

1. Set key switch to position "1".

2. Log on with a Xbutton and administrator rights.

3. Set menu option "Xbutton rights active" to "yes".

By following these instructions you make sure not to inadvertently block your access while not owning an Xbutton with administrator rights.

4.8.2.1 User information

User information such as company ID, user name, group etc. are shown.

4.8.2.2 Activating the Xbutton rights

Menu navigation:

Menu item/parameter	Value	Comment
Xbutton rights active:	Yes	Access rights active
	No	Key switch active
Reset Xbutton configuration:	Yes	Company ID, group and access rights when logged off will be reset to the factory settings. Xbutton rights will be deactivated.
	No	

4.8.3 Status information

This menu provides the user with information on current system interferences and warnings..

4.8.3.1 Errors and warnings
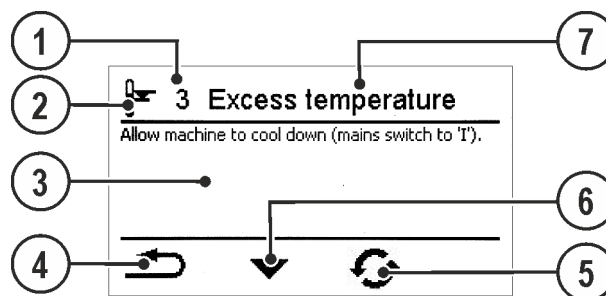
Figure 4-9

Item	Symbol	Description
1		**Error number**
2		**Error icons**
		⚠ ------- Warning (prior to interference)
		⌐ ------- Interference (welding process will be stopped)
		⌐ ------- Specific (e.g. temperature error)
3		**Long error description**
4	↩	**Menu navigation**
		Skip back to previous menu
5	↻	**Reset message**
		The message can be reset
6	▼	**Menu navigation (if available)**
		Scroll to next page or message
7		**Error name**

4.8.3.2 Running time

Menu item/parameter	Value	Comment
Duty cycle can be reset:	0:00 h	Values can be reset by pressing or turning the main control button
Arc time can be reset:	0:00 h	
Overall duty cycle:	0:00 h	
Overall arc time:	0:00 h	

4.8.3.3 System components

A list of all components available in the system is displayed, along with ID number, software version and name.

4.8.3.4 Temperatures

Menu item / parameter	Value	Comment
Housing inside	-	-
Transformer secondary	-	-
RCC heatsink	-	-
Coolant return	-	-
Primary heatsink	-	-
Wire heater, unit 1	-	Display of "---" if no wire heater is installed
Wire heater, unit 2	-	
Temperature 8	-	free
Temperature 9	-	free
Temperature 10	-	free

4.8.3.5 Sensor values

Menu item / parameter	Value	Comment
Coolant flow	-	-
Wire reserve, unit 1	0-100%	Display of "---" if no wire sensor is installed or value could not yet be determined (at least one reel revolution required).
Wire reserve, unit 2		

4.8.4 System settings

In this area the user can configure advanced system settings.

4.8.4.1 Date

Menu item/parameter	Value	Comment
Year:	2014	
Month:	10	
Day:	28	
Date format:	DD.MM.YYYY	
	YYYY.MM.DD	

4.8.4.2 Time

Menu item/parameter	Value	Comment
Hour:	0–24	
Minute:	0–59	
Time zone (UTC +/-):	-12h to +14h	
Summer time:	Yes	
	No	
Time format:	24 h	
	12 h AM/PM	

4.8.4.3 Water block

Permanently switching off the water block may damage the welding torch.

Menu item / parameter	Value	Comment
Cooling unit postflow time [min.]:	1-60 min	
Cooling unit control:	Automatic	
	Permanently ON	
	Permanently OFF	
Temperature error limit	50-80 °C	
Flow monitoring	On	
	Off	
Flow error limit	0.5-2.0 l/min	
Reset to factory setting	No	
	Yes	Resets the water block parameters to factory settings.

4.8.4.4 Control

Menu item / parameter	Value	Comment
Operation without wire feeder is possible (This parameter controls the system behaviour depending on the connected wire feeder)	No (factory setting)	The wire feeder (WF) can be changed during operation. Operation without a connected wire feeder is not possible.
	Yes	The welding system can be operated without a wire feeder connected.

4.8.5 Operating panel settings

Menu item / parameter	Value	Comment
Type of main screen	1-2	
Automatic selection of welding power	Off–30 s	
Display brightness:	0-100 %	
Display contrast:	0-100 %	
Display negative:	No	
	Yes	
Non-latched selectable	No	
	Yes	
Special non-latched selectable	No	
	Yes	
Spot welding selectable	No	
	Yes	
Special latched selectable	No	
	Yes	
P0 of RC XQ Expert 2.0 Rob can be changed:	No	
	Yes	
Average value display for superPuls:	Yes	When superPuls is enabled, the welding power is displayed as an average value.
	No	The welding power is displayed by program A even when superPuls is enabled.
Hold function:	On	
	Off	
Language	German	
Measuring units	Metric	
	Imperial	
Numbering files consecutively	No	
	Yes	
RC XQ Expert 2.0 Rob Reset to factory settings	Yes	Only parameters that relate to RC XQ Expert 2.0 Rob are reset (e.g. display settings, language and texts). System parameters such as Xbutton activation or JOBs are not affected.
	No	
Operation using the interface for automated welding	No	
	Yes	The mode of operation and welding is implemented using RC XQ Expert 2.0 Rob (robot interface not available).

4.8.6 Aligning the cable resistance

The resistance value of cables can either be set directly or it can be aligned using the power source. The factory setting of the power sources is 8 mΩ. This value correponds to a 5 m earth cable, a 1.5 m intermediate hose package and a 3 m water-cooled welding torch. With other hose package lengths, it is necessary to carry out a +/- voltage correction to optimise welding properties. The voltage correction value can be set close to zero by means of realigning the cable resistance. It is recommended to align the electric cable resistance after replacing accessories such as torches or intermediate hose packages.

In case a second wire feeder is used the (rL2) parameter has to be aligned. For all other configurations it is sufficient to align the (rL1) parameter.

1 Preparation

- Switch off the welding machine.
- Unscrew the gas nozzle from the welding torch.
- Trim the welding wire so that it is flush with the contact tip.
- Pull the welding wire back a little (about 50 mm) on the wire feeder (by pressing button B - wire return). There should be no more welding wire in the contact tip at this point.

2 Configuration

- Switch on the welding machine
- Press the "System" push-button.
- Select the "Cable resistance alignment" parameter using the main control button. Parameter RL1 must be aligned for all machine combinations. In case of welding systems with a second power circuit – if two wire feeders are to be operated from a single power source, for example – a second alignment with parameter RL2 must be made. To activate the required wire feeder for measurement, briefly activate (tap) the torch trigger of this machine.

3 Alignment / Measurement

- Press the "D" push-button.
- Place the welding torch with the contact tip on a clean spot of the workpiece with a little pressure and press the torch trigger for approx. 2 seconds. A short-circuit current will flow briefly, which is used to determine and display the cable resistance. The value can be between 0 mΩ and 40 mΩ. The new value is immediately saved without requiring further confirmation. If no value is shown on the display, then the measurement failed. The measurement must be repeated.
- Press the "A" push-button after successful measurement.

4 Restoring welding standby mode

- Switch off the welding machine.
- Screw the gas nozzle onto the welding torch.
- Switch on the welding machine.
- Insert the welding wire again.

1

2

DE - Abgleich Leitungswiderstand
EN - Cable resistance alignment
FR - Alignement résistance ligne
IT - Compensazione resistenza circuito
ES - Compensación de la resistencia del cable
NL - Compensatie leidingsweerstand
SE - Kalibrering av ledningsmotståndet
PL - Porównanie rezystancji przewodu
RU - Компенсация сопротивления проводника

RL : 40mΩ ◄- - - - - **RINT X12 BUSINT X11** - - - - -► RL : 0mΩ

3

Cable resistance alignment
RL1: 9mΩ   RL2: 8mΩ

start = D

__mΩ ✖

0mΩ - 40mΩ ✔

Cable resistance alignment
RL1: 16mΩ   RL2: 8mΩ

end = A

4

Figure 4-10

4.8.7 Xnet machine

The Xnet machine defines the system component required for operating the Xnet system as part of the Expert 2.0 Net/Gateway to connect to power sources or to record welding data.

4.8.7.1 Coupling mobile machines

QR code for coupling mobile end devices. Upon a successful connection, welding data are displayed on the end device.
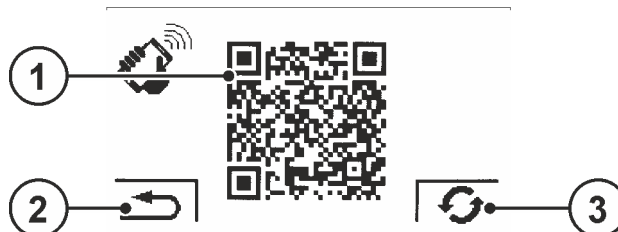
Figure 4-11

Item	Symbol	Description
1		**QR code**
2		**Menu navigation** Skip back to previous menu
3		**Reset message** The message can be reset and a new QR code may be requested from the network.

4.8.7.2 Component identification

Bar codes predefined in ewm Xnet are recorded with a manual scanner. Component data are retrieved and displayed in the control.
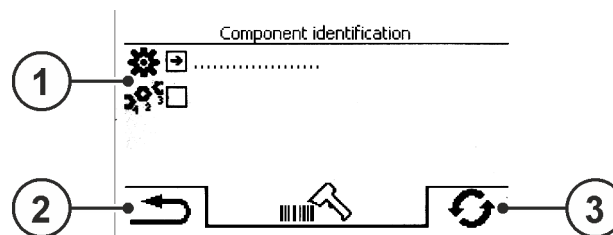
Figure 4-12

Item	Symbol	Description
1		**Component data**
2		**Menu navigation** Skip back to previous menu
3		**Reset message** The message can be reset

4.8.7.3 Component details
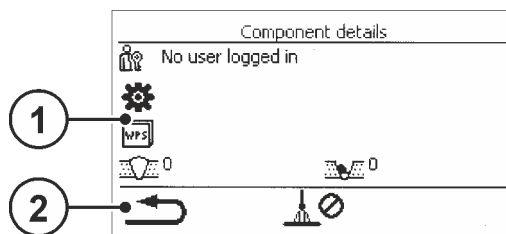
Figure 4-13

Item	Symbol	Description
1		**Component data**
2		**Menu navigation** Skip back to previous menu

4.8.7.4 Errors and warnings

A list of all ewm Xnet-specific errors and warnings are displayed with their ID number and description.

4.8.7.5 Status information

Figure 4-14

4.8.7.6 Network

Figure 4-15

4.8.7.7 Clear system memory

Resets the internal system memory used for saving welding and log data and deletes all data.

All welding data recorded so far, which have not been transferred to the Xnet server via flash drive or network connection, will be permanently deleted.

4.8.7.8 Reset to factory settings

All machine configuration data relating to Xnet will be reset to the factory setting. The system memory data will not be affected, i.e. any welding or log data recorded will be saved.

4.9 Offline data transfer (USB)

☞ *You may only use this USB interface to exchange data with a USB flash memory. You must not connect any other USB devices such as keyboards, hard disks, mobile telephones, cameras or other devices so as to avoid any damage tp the machine. The interface does not provide any load functions either.*

Using the USB interface, data can be transferred between the machine control and a USB storage medium.
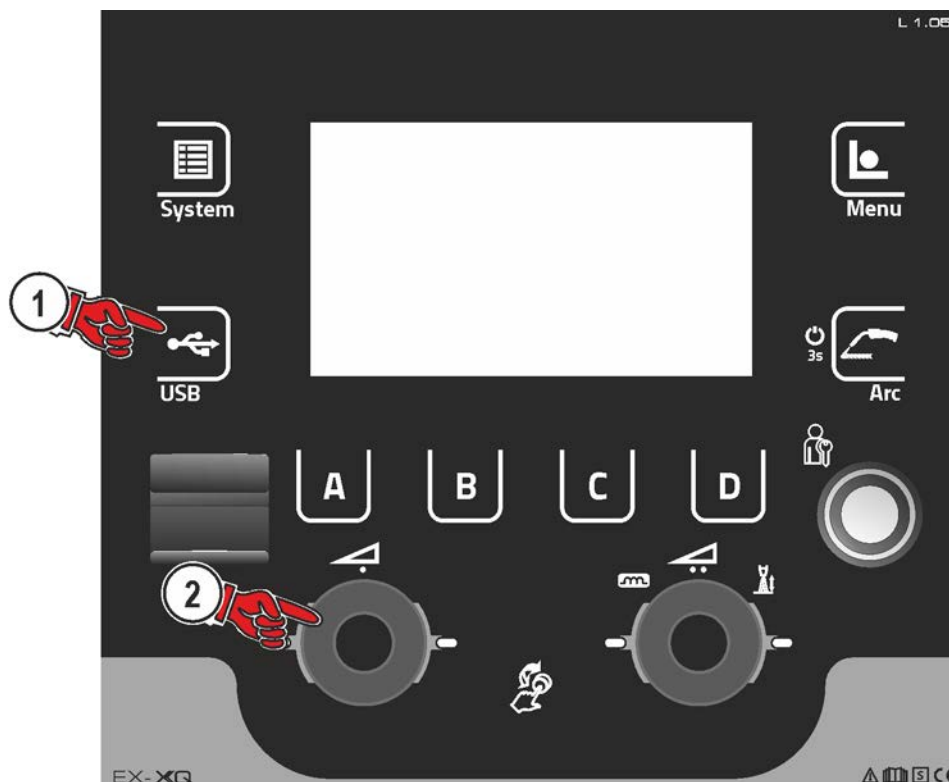
Figure 4-16

4.9.1 Save JOB(s)

Saving a single (JOB) or a range of welding tasks (JOB)s) (from–to) from the welding machine to the storage media (USB).

4.9.2 Load JOB(s)

Loading a single JOB or a range of welding tasks (JOBs) (from–to) from the storage media (USB) to the welding machine.

4.9.3 Save configuration

4.9.3.1 System

Configuration data of the power source's system components.

4.9.3.2 Xnet machine

Master configuration

Core date for network communication (independent of machine).

Individual configuration

Machine-related configuration data, matching the current power source only.

4.9.4 Load configuration

4.9.4.1 System

Configuration data of the power source's system components.

4.9.4.2 Xnet machine

Master configuration

Core date for network communication (independent of machine).

Individual configuration

Machine-related configuration data, matching the current power source only.

4.9.5 Load languages and texts

Load a language and text package from the storage medium (USB) to the welding machine.

4.9.6 Record on USB drive

You can record welding data on a storage medium and read or analyse them using the Xnet quality management software when required. For machine variants with network capability (LG/WLG) only!

4.9.6.1 Register USB drive

To identify and allocate the welding data between power source and storage medium the storage medium has to be registered once. This is done by selecting the menu option "Register USB drive" or by starting a data recording process. Successful registration is indicated by a checkmark next to the relevant menu option.

If the storage medium is registered and connected when the power source is being switched on, recording of the welding data starts automatically.

4.9.6.2 Start recording

After confirming the start of data recording the storage medium will be registered (if not registered yet). Data recording starts and is indicated at the main screen by a slow flashing of the ▮▯ icon.

4.9.6.3 Stop recording

To avoid data loss, finish the recording with this menu option before removing the USB drive or switching off the machine.

Welding data must be imported into the Xnet quality management software using the XWDImport software. This software is an integral part of the Xnet installation.

4.10 Welding task administration (Menu)

In this menu the user can carry out all welding task (JOB) organisation operations.

This machine series offers user-friendly operation and a multitude of features.

- Various welding tasks (JOBs) consisting of welding procedure, material type, wire diameter and shielding gas type have been predefined.
- The system calculates the required process parameters depending on the operating point specified (one-knob operation via wire feed speed rotary transducer).
- You can adjust additional parameters at the machine control or using the PC300.NET welding parameter software, if required.

Enter the menu:

Figure 4-17

4.10.1 JOB selection (material/wire/gas)

The welding task (JOB) can be set in two ways:

a) Enter the relevant JOB number. Each welding task has a unique JOB number (for predefined JOBs , see the JOB list in the annex or the sticker on the machine).

b) Enter the basic welding parameters: welding procedure, material type, wire diameter and shielding gas type.

4.10.2 JOB manager

4.10.2.1 Copy JOB to number

Copy JOB to a number of the definable range (129–169).

4.10.2.2 Reset current JOB

Reset all parameters of the selected JOB to the factory setting

4.10.2.3 Reset all JOBs

Reset all JOBs to the factory setting, except JOBs in the definable range (129–169).

4.10.3 Program sequence

The setting range for the parameter values are summarised in the parameter overview section.

In the program sequence, you can select welding parameters and set their values. The number of parameters shown depends on the selected operating mode.

In addition, the user can access advanced settings and the setup mode.
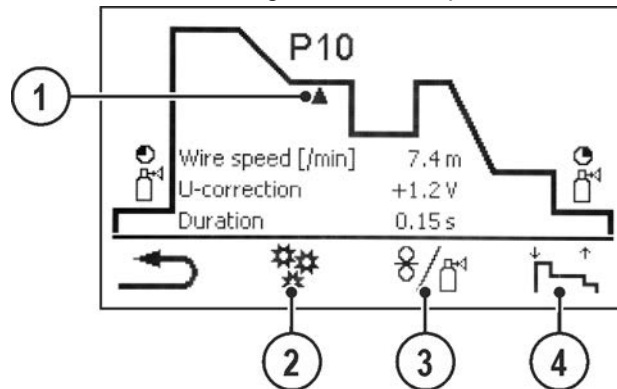
Figure 4-18

Item	Symbol	Description
1	▲	**Parameter position**
		Displays the currently selected welding parameters in the functional sequence
2	❁	**Advanced settings**
		Display and setting of advanced process parameters
3	🗜/🗜	**Setup mode**
4		**Operating mode setting**

4.10.3.1 MIG/MAG welding

In every JOB, separate settings can be made for the ignition program, reduced main program and end program as to whether or not to alternate with the pulse process.

These properties are stored on the welding machine with the JOB. This means that in the factory settings, the pulse process is active during the end program in all forceArc JOBs.
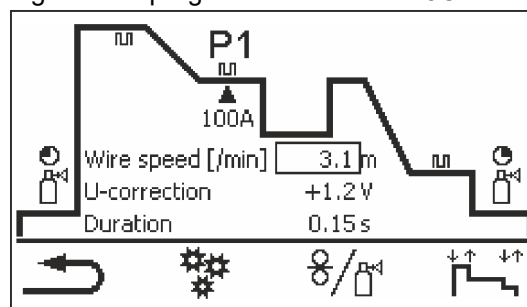
Figure 4-19

P_{START}, P_B and P_{END} are set as relative programs ex factory. They relate to percentages of the wire feed value of the main program P_A. These programs can also be configured using absolute values, if desired (see Absolute value set point)..

Menu item/parameter	Program	Comment
Gas pre-flow time		
Gas nominal value		GFE option/variant (electronic gas volume control) required
WF relative	P_{START}	Wire feed speed, relative
Duration		Duration (start program)
U correction		Arc length correction
Slope time		Slope duration from P_{START} to P_A

Menu item/parameter	Program	Comment
WF (/min.)	P_A	Wire feed speed, absolute
U correction		Arc length correction
Duration		Duration (spot time and superPuls time)
Slope time		Slope duration from P_A to P_B
WF relative	P_B	Wire feed speed, relative
Duration		Duration (reduced main program)
U correction		Arc length correction, relative
Slope time		Slope duration from P_B to P_A
Slope time		Slope duration from P_B to P_{END}
WF relative	P_{END}	Wire feed speed, relative
Duration		Duration (end program)
U correction		Arc length correction, relative
Wire burn-back		
Gas post-flow time		

4.10.3.2 Advanced settings

Menu item / parameter	Value	Comment
Process switching	Off	-
	On	
Start program pulsing	Off	-
	On	
End program pulsing	Off	-
	On	
Wire retraction ignition	Off	-
	Lift arc (PP)	
	Lift arc	
End pulse duration	0.0–20 ms	-
U correction limit	0.0-9.9V	Applies with correction operation enabled
Wire correction limit	0–30%	
N cycle program limit	Off	-
	1-15	RC XQ Expert 2.0 Rob
	2-9	Expert 2.0
Slope between programs (/100 ms)	Off	-
	0.1-2.0 m/min.	
waveArc	Off	-
	On	

4.10.4 Setup mode
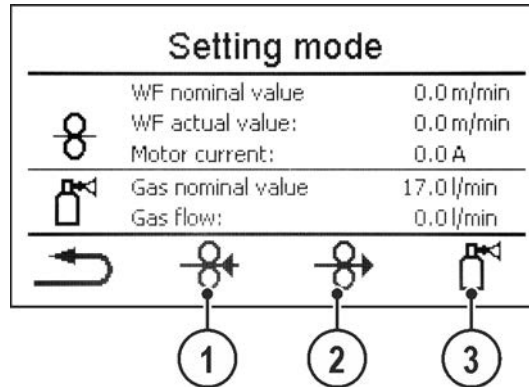
Figure 4-20

Item	Symbol	Description
1		**Wire return** Results in reverse inching of the wire. Pressing the push-button longer will increase the wire reversing speed.
2		**Wire inching** The wire is inched into the hose package. Pressing the push-button longer will increase the wire inching speed.
3		**Push-button, gas test/purge hose package** • ----------- Gas test: Shielding gas (symbol flashes slowly) will flow for approximately 20 seconds after pressing the push-button once. Press the button again to cancel the process early. • ----------- Purge hose package: Press push-button for about 5 sec: Shielding gas flows permanently (mac 300 s) until the Gas test push-button is pressed again (shielding gas flashes fast).

All functions run without current (set-up phase). This provides a high degree of safety for the welder, since the arc cannot be inadvertently ignited. The following parameters can be monitored during the wire configuration:

Menu item/parameter	Value	Comment
WF nominal value	0.0 m/min	only if the control is integrated in the wire fee-der
WF actual value	0.0 m/min	
Motor current	0.0 A	
Gas nominal value	0.0 l/min	GFE option/variant (electronic gas volume control) required
Gas flow	0.0 l/min	

4.10.5 WPQR welding data assistant

The cooling-down time from 800°C to 500°C essential for the welding result (known also as t8/5 time) can be calculated using the input data in the WPQR welding data assistant. Prerequisite is the prior determination of the heat input. Upon input of the values, the valid t8/5 time is displayed with a black background.

Menu item/parameter	Value	Comment
Weld length:	1.0-999.9 cm	
Welding speed:	1.0-999.9 cm/min.	
Thermal efficiency:	10-100%	
Heat input:	kJ/mm	
Preheating temperature:	0-499 °C	
Material thickness:	1.0-999.9 mm	
Weld seam factor:	0.01-1.5	
Transition thickness:	mm	
t8/5-time:	s	

4.10.6 Welding monitoring
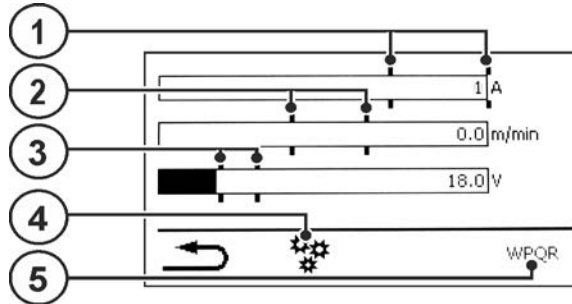
Figure 4-21

Item	Symbol	Description
1		**Current tolerance**
2		**WF tolerance**
3		**Voltage tolerance**
4	⚙	**Advanced settings** Display and setting of advanced process parameters
5	WPQR	**WPQR welding data assistant**

Menu item / parameter	Value	Comment
Automatic	No	
	Yes	The welding monitoring window opens automatically from the main screen after a welding start. A rotary knob actuation automatically switches back to the main window.
Errors and warnings	Off	
	Warnings	Exceeding a tolerance limit for the duration of the tolerance response time triggers warning 12.
	Error	Exceeding a tolerance limit for the duration of the tolerance response time triggers error 61. Please note: Error leads to immediate stop of the ongoing welding!
Voltage tolerance	0-100 %	
Current tolerance	0-100 %	
Tolerance response time	0.00-20.0 s	For voltage and current tolerance
Wire feeder tolerance	0-100 %	
Maximum permissible motor current	0.0-5.0 A	
Tolerance response time	0.00-20.0 s	For WF tolerance and motor current

4.10.7 Process parameters

4.10.7.1 Ignition parameters

Menu item/parameter	Value	Comment
I-ign:	1–1000 A	
WF-ign:	0.0–100.0%	
WF-ign 1:	0.0-20.0 m/min.	
U-ign:	0.0–38.2 V	
T-ign:	0.1–20.0 ms	
I-sense:	0–500 A	
WF-sense:	0.0–20.0 m/min.	
MI	OFF	
	ON	

4.10.7.2 Wire retraction ignition

Menu item/parameter	Value	Comment
Wire retraction ignition:	OFF	
	Lift arc (PP)	
	Lift arc	
I-ign 1:	0–250 A	
I-ign 2:	0–500 A	
T-ign 2:	0.0–100.0 ms	
TV-pro:	0–200 ms	
WF-back:	5–150	
TV-back:	0–250 A	

4.10.7.3 WF setting range

Menu item/parameter	Value	Comment
WF-min.:	0.0–40.0 m/min.	
WF-max.:	0.0–40.0 m/min.	

4.10.7.4 Process signal handling

Menu item/parameter	Value	Comment
TZ-ign:	0.00–5.00 s	
TZ-libo:	0.00–5.00 s	
TZ-set:	0–500 ms	
TZ-reset:	0–500 ms	

4.10.8 JOB display setting

Menu item/parameter	Value	Comment
Text for material:	Standard	
	Alternative	
Text for gas:	Standard	
	Alternative	
Absolute value set point:	Yes	Ignition current, secondary current and end current are set and displayed as absolute values.
	No	Ignition current, secondary current and end current are defined and displayed as a percentage of program A (ex works)

4.11 Online data transfer (network)

For machine variants with network capability (LG/WLG) only!

The network is used to transfer welding data from manual, automated and welding machines. It can include as many welding machines and computers as require and the collected data can be retrieved from one or several server PCs.

The Xnet software allows the user to monitor all welding parameters in real time and/or to subsequently analyse the saved welding data. The results can be used for process optimisation, welding calculations or checking welding wire batches.

Depending on the welding machine the data are transferred to the server via LAN/WiFi and can then be accessed in a browser window. The user interface and web-based design of the software offer the possibility to analyse and monitor the welding data via a tablet PC.

4.11.1 Wired local network (LAN)

LAN status:

Status description	Status display Expert XQ 2.0
No physical connection to a network	LAN symbol deactivated
Connection to the network, the machine has been configured, no data transfer	LAN symbol activated
Connection to the network, the machine has been configured and transfers data	LAN symbol flashing
Connection to the network, the machine has been configured and tries to connect to the data server	LAN symbol flashing in the specified rhythm

4.11.2 Wireless local network (WiFi)

WiFi status:

Status description	Status display Expert XQ 2.0	LED WiFi status (LAN/WiFi gateway)
No physical connection to a network	WiFi icon deactivated	Off
Connection to a network, no data transfer	WiFi icon activated	Permanently on
Connection to a network, transferring data	WiFi icon flashing	Flashing with 1 Hz
Connection to the network, the machine has been configured and tries to connect to the data server	LAN icon flashing in the specified rhythm	Green, flashing in the following rhythm: 1 s off, 0.2 s on

5 Welding procedure

The welding task is selected in the JOB selection menu (material/wire/gas).

The basic settings of the relevant welding procedure, such as operating mode or arc length correction, can be selected on the main screen on the process parameter panel.

The program sequence settings are set in the program sequence menu.

5.1 MIG/MAG welding

5.1.1 Operating modes

There are optimum pre-sets for welding parameters such as gas pre-flow and burn back, etc. for numerous applications (although these can also be changed if required).

5.1.1.1 Explanation of signs and functions

Symbol	Meaning
	Start of welding
	End of welding
	Shielding gas flowing
I	Welding output
	Wire electrode is being conveyed
	Wire creep
	Wire burn-back
	Gas pre-flows
	Gas post-flows
	Non-latched
	Non-latched special
t	Time
P_{START}	Start program
P_A	Main program
P_{END}	End program

Non-latched mode
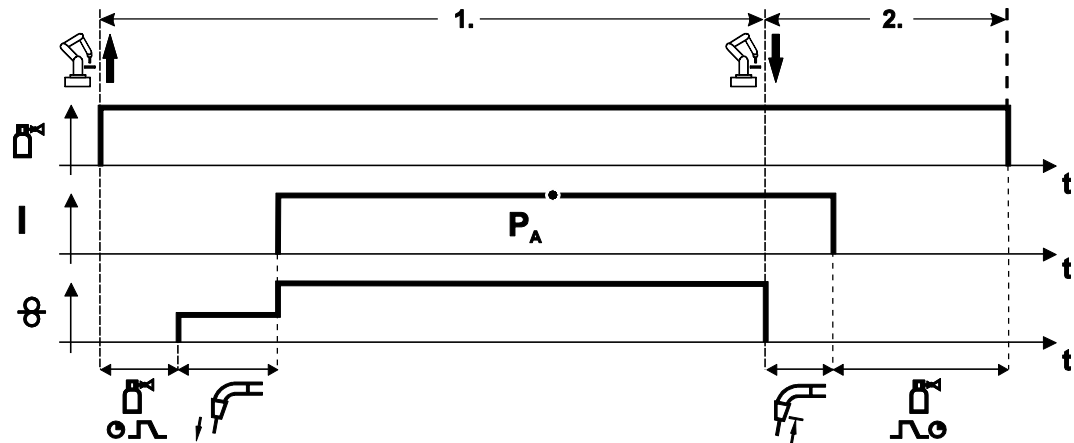
Figure 5-1

Step 1

- Robot issues the start signal to the power source.
- Shielding gas is expelled (gas pre-flows).
- Wire feed motor runs at "creep speed".
- Arc ignites after the wire electrode makes contact with the workpiece; welding current flows.
- Changeover to pre-selected wire speed (main program P_A).

Step 2

- Robot issues the stop signal to the power source.
- WF motor stops.
- Arc is extinguished after the pre-selected wire burn-back time elapses.
- Gas post-flow time elapses.

Non-latched operation with superpulse

For machine versions with pulsed arc welding procedures only.
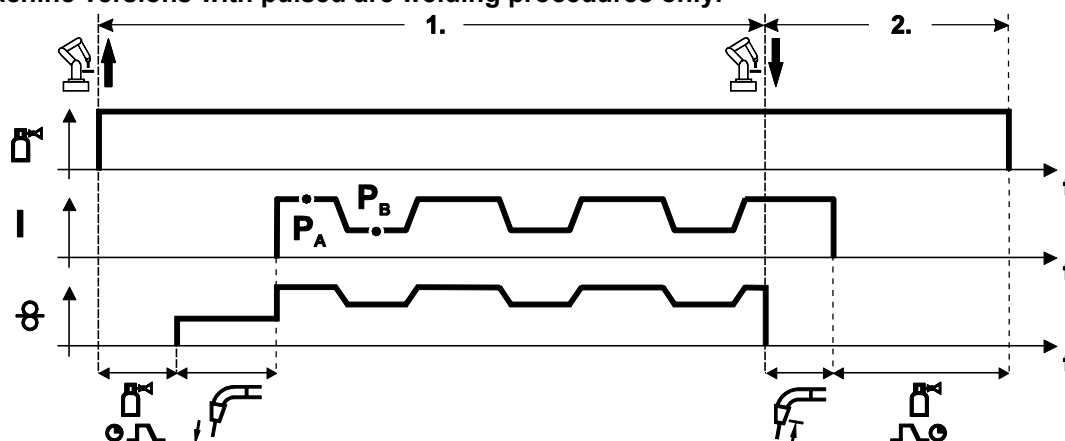
Figure 5-2

Step 1

- Robot issues the start signal to the power source.
- Shielding gas is expelled (gas pre-flows).
- Wire feed motor runs at "creep speed".
- Arc ignites after the wire electrode makes contact with the workpiece; welding current flows.
- Start the super pulse function beginning with main program P_A:
  The welding parameters switch between main program P_A and the reduced main program P_B at the specified times.

Step 2

- Robot issues the stop signal to the power source.
- Super pulse function is ended.
- Wire feed motor stops.
- Arc is extinguished after the pre-selected wire burn-back time elapses.
- Gas post-flow time elapses.

Special, non-latched
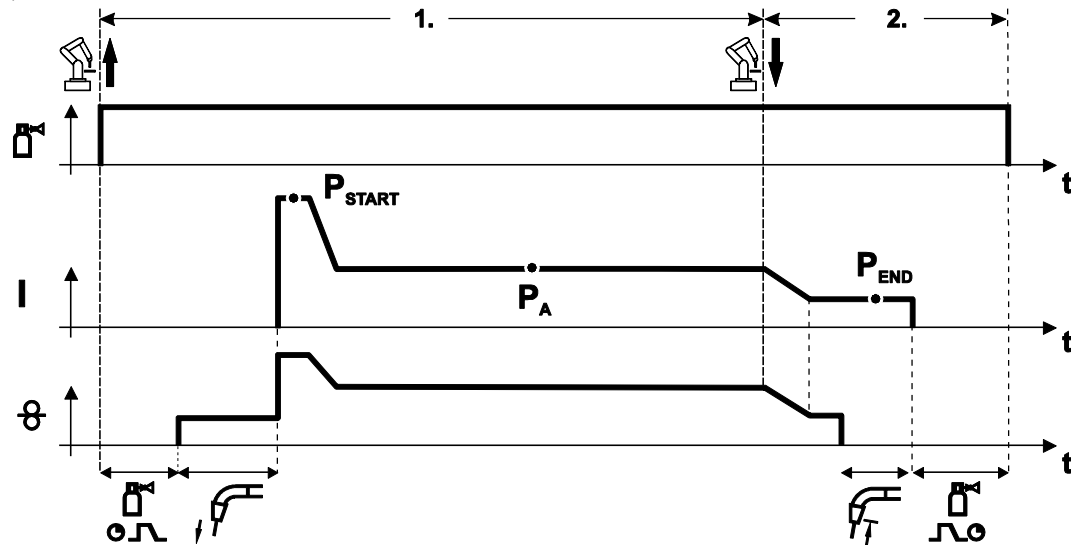
Figure 5-3

Step 1

- Robot issues the start signal to the power source.
- Shielding gas is expelled (gas pre-flows)
- Wire feed motor runs at "creep speed".
- Arc ignites after the wire electrode makes contact with the workpiece, welding current is flowing (start program P_{START} for the time t_{start}).
- Slope to main program P_A.

Step 2

- Robot issues the stop signal to the power source.
- Slope to end program P_{END} for the time t_{end}.
- WF motor stops.
- Arc is extinguished after the pre-selected wire burn-back time elapses.
- Gas post-flow time elapses.

Special, non-latched with superpulse

For machine versions with pulsed arc welding procedures only.
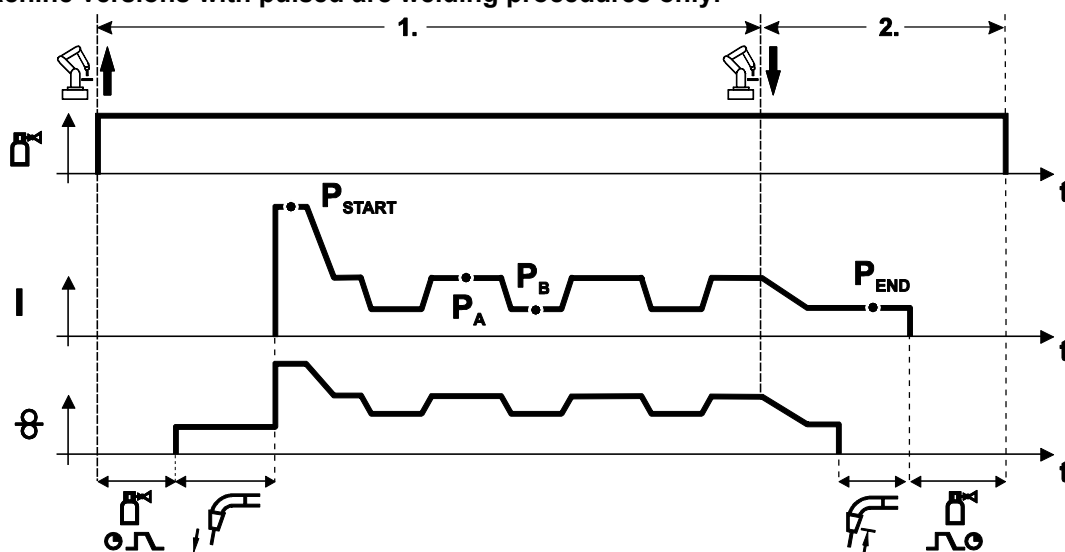
Figure 5-4

Step 1

- Robot issues the start signal to the power source.
- Shielding gas is expelled (gas pre-flows)
- Wire feed motor runs at "creep speed".
- Arc ignites after the wire electrode makes contact with the workpiece, welding current is flowing (start program P_{START} for the time t_{start}).
- Slope on main program P_A.
- Start the super pulse function beginning with main program P_A:
The welding parameters switch between main program P_A and the reduced main program P_B at the specified times.

Step 2

- Robot issues the stop signal to the power source.
- Super pulse function is ended.
- Slope to end program P_{END} for the time t_{end}.
- WF motor stops.
- Arc is extinguished after the pre-selected wire burn-back time elapses.
- Gas post-flow time elapses.

5.1.2 coldArc / coldArc puls

Heat-reduced, low-spatter short arc for high dimensional stability welding and brazing of thin metal sheets with excellent gap-bridging.

Figure 5-5

After selecting the coldArc process you benefit from:

- Less distortion and reduced discolouration thanks to minimised heat input
- Considerably reduced spatter thanks to virtually power-free material transfer
- Easy welding of the root passes in all plate thicknesses and in all positions
- Perfect gap bridging even with inconsistent gap widths
- Manual and automated applications

You can make use of these properties after selecting the coldArc process (see the "Selecting a MIG/MAG welding task" chapter).

With coldArc welding, it is important to ensure good quality wire feeding because of the welding filler materials being used!

- Equip the welding torch and torch hose package to suit the task! (and the operating instructions for the welding torch.)

This function can only be enabled with the PC300.NET software.

(See operating instructions for the software)

5.1.3 forceArc / forceArc puls

Heat-reduced, directionally-stable and powerful arc with deep fusion penetration for the upper power range.
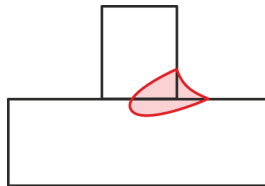
Figure 5-6

- Smaller included angle due to deep penetration and directionally stable arc
- Excellent root and sidewall fusion
- Secure welding also with very long stick-outs
- Reduced undercuts
- Manual and automated applications

You can make use of these properties after selecting the forceArc process.

As with pulse arc welding, it is important to make sure of a good welding current connection.

- Keep welding current cables as short as possible and ensure that cable cross-sections are adequate!
- Fully unroll welding current cables, torche hose packages and, if applicable, intermediate hose packages. Avoid loops!
- Use welding torches, preferably water-cooled, that are suitable for the higher power range.
- Use welding wire with adequate copper coating when welding steel. The wire spool should have layer spooling.

Unstable arc!

Welding current cables that are not fully unrolled can cause faults in the arc (flickering).

- **Fully unroll welding current cables, torch hose packages and, if applicable, intermediate hose packages. Avoid loops!**

5.1.4 rootArc/rootArc puls

Short arc with perfect weld modelling capabilities for effortless gap bridging, especially for root welding

Figure 5-7

- Reduced spatter compared to standard short arc
- Good root formation and secure sidewall fusion
- Manual and automated applications

Unstable arc!

Welding current cables that are not fully unrolled can cause faults in the arc (flickering).

- **Fully unroll welding current cables, torch hose packages and, if applicable, intermediate hose packages. Avoid loops!**

5.1.5 wiredArc

Welding process with active wire control for stable and uniform penetration characteristics and perfect arc length stability, even in difficult applications and positional welding.

With a GMAW arc, the welding current (AMP) changes with the change of the stick-out. If, for instance, the stick-out is extended, the welding current decreases at constant wire feed speed (DG). Thus, the heat input into the workpiece (molten metal) decreases and the penetration reduces.
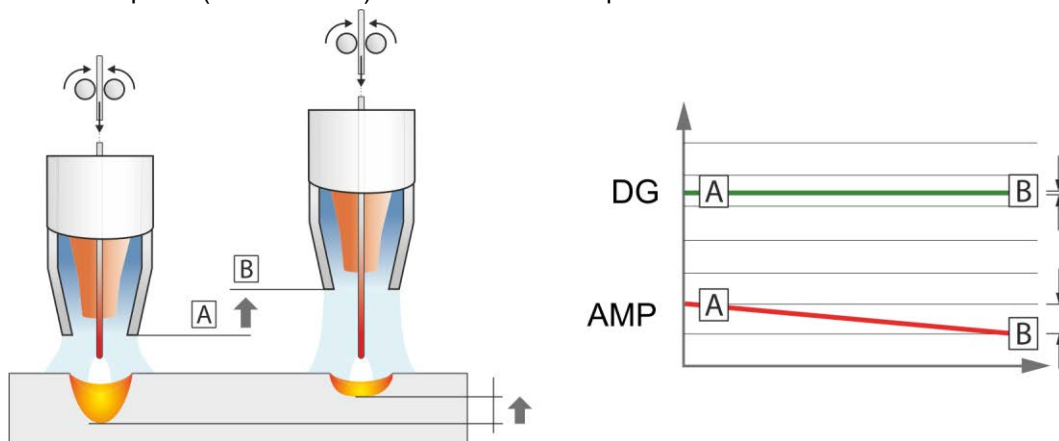
Figure 5-8

With the EWM wiredArc arc with wire control, the welding current (AMP) changes with the change of the stick-out only slightly. The compensation of the welding current takes place with an active control of wire feed speed (DG). If, for instance, the stick-out is extended, the wire feed speed will be increased. Due to this, the welding current remains almost constant and thus the heat input into the workpiece remains almost constant. As a result, the penetration changes with the change of the stick-out only slightly.
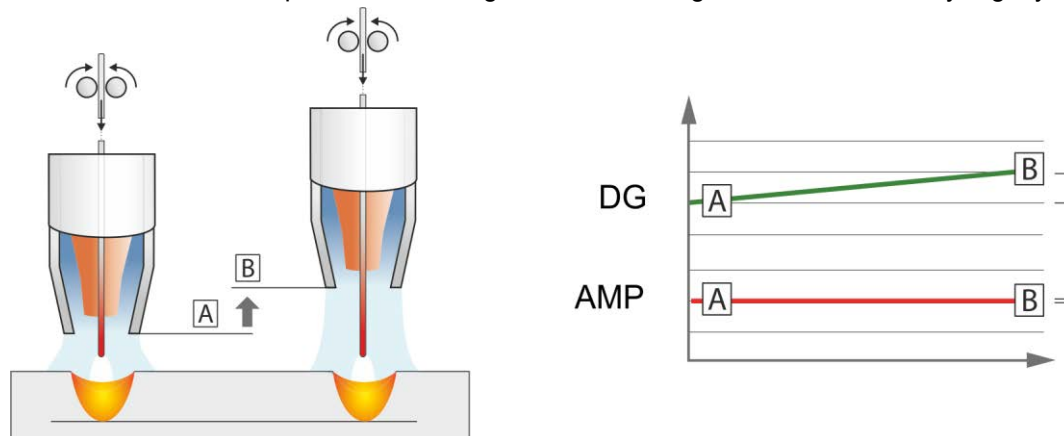
Figure 5-9

5.1.6 acArc puls XQ

The alternating current welding process acArc puls XQ makes MIG aluminium welding even easier in manual and automated modes. Clean weld seams with no traces of powder on the thinnest metal sheets, even with AlMg alloys, are possible with acArc puls XQ.

Advantages

- Perfect aluminium welding, especially in thin sheet metal due to directed heat reduction
- Excellent gap bridging, also facilitates automated applications
- Minimised heat input - reduces the risk of burn-through
- Less welding fume emissions
- Clean weld seams due to greatly reduced magnesium burn-off
- Easy and safe handling of the arc for manual and automated welding

A constant change of polarity (see following figure) takes place during the process.

The heat input from the material shifts to the welding consumable and the drop size increases significantly (compared to the direct current welding process). This ensures excellent bridging of air gaps and reduced welding fume emissions.
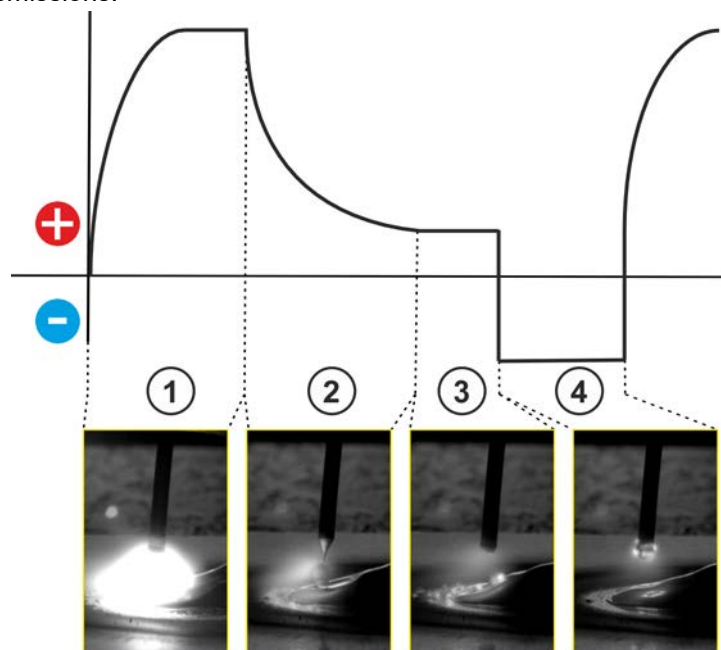
Figure 5-10

Item	Symbol	Description
1		**Droplet formation in the pulse phase**
2		**Droplet detachment after the pulse phase**
3		**Fundamental current phase**
4		**Cleaning and preheating the wire in the negative phase**

With the rotary knob "arc dynamics", the negative phase in the process can be influenced.

	Setting of the dynamics	Welding properties
	Left turn (more minus), negative phase gets longer	• ---------- More power on the wire • ---------- Droplet volume increases • ---------- Process becomes cooler
	Right turn (more plus), negative phase gets shorter	• ---------- More power on the workpiece • ---------- Droplet volume decreases • ---------- Process becomes hotter

The basic requirement for optimum welding results is the application-specific equipment of the wire feed system. For the acArc puls XQ welding process, the entire wire feed system of the Titan XQ AC series is factory-equipped with components for aluminium welding consumables! Recommended system components:

- **Power source of type Titan XQ 400 AC puls D**
- **Wire feeder of type Drive XQ AC**
- **Welding torch series of type PM 551 W Alu**

Note the following equipment and setting features of the wire feed system:

- **Wire feed rolls (set contact pressure depending on welding consumables and hose package lengths)**
- **Central torch connection (use guide tube instead of capillary tube)**
- **Combined liner (PA liner with matching inner diameter for welding consumables)**
- **Use contact tips with forced contact**

6 Rectifying faults
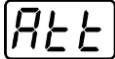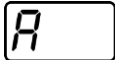
All products are subject to rigorous production checks and final checks. If, despite this, something fails to work at any time, please check the product using the following flowchart. If none of the fault rectification procedures described leads to the correct functioning of the product, please inform your authorised dealer.

6.1 Display machine control software version

Identifying the machine software is key to quick troubleshooting by the authorised service technician. The version number is shown on the initial screen of the machine control for about 5 seconds (switch the machine off and on again).

6.2 Warnings

Depending on the display options of the machine display, a warning message is displayed as follows:

Display type - machine control	Display
Graphic display	⚠
two 7-segment displays	Att
one 7-segment display	A

The cause of the warning is indicated by a corresponding warning number (see table).

- In case of multiple warnings, these are displayed in sequence.
- Document machine warning and inform service personnel, if required.

No.	Warning	Possible cause
1	Excess temperature	A shutdown is imminent due to excess temperature.
4	Shielding gas [2]	Check shielding gas supply.
5	Coolant flow [3]	Flow rate (<= 0.7l/min / <= 0.18 gal./min) [1]
6	low wire	Only a small amount of wire is left on the spool.
7	CAN bus failure	Wire feeder not connected, automatic circuit-breaker of wire feed motor (reset the tripped automatic circuit-breaker by actuating).
8	Welding circuit	The welding circuit inductance is too high for the selected welding task.
10	Partial inverter	One of several partial inverters is not supplying welding current.
11	Excess temperature, coolant [3]	Coolant (>= 65°C / >= 149°F) [1]
12	Welding monitor	The actual value of a welding parameter is outside the specified tolerance field.
13	Contact error	The resistance in the welding circuit is too high. Check earth connection.
32	Tacho error	Fault of wire feeder, permanent overload of the wire drive.
33	WF excess current	Overcurrent detection of the main WF drive.
34	JOB unknown	JOB selection was not performed because the JOB number is unknown.
35	WF excess current slave	Overload of the slave WF drive (front drive push/push system or intermediate drive).
36	Slave tacho error	Fault of wire feeder, permanent overload of the slave WF drive (front drive push/push system or intermediate drive).
37	FST bus failure	Wire feeder not connected, automatic circuit-breaker of wire feed motor (reset the tripped automatic circuit-breaker by actuating).

[1] factory setting

[2] option

[3] only machine series Titan XQ

6.3 Error messages

Depending on the options of the machine display, a fault is shown as follows:

Display type - machine control	Display
Graphic display	⌐
two 7-segment displays	*Err*
one 7-segment display	*E*

The possible cause of the fault is signalled by a corresponding fault number (see table). In the case of an error, the power unit shuts down.

The display of possible error numbers depends on the machine version (interfaces/functions).

• Document machine errors and inform service staff as necessary.

• If multiple errors occur, these are displayed in succession.

• Document machine errors and inform service staff as necessary.

• If multiple errors occur, these are displayed in succession.

Legend for categories (reset error)

a) The error message will disappear once the error has been rectified.

b) The error message can be reset by pressing a context-dependent push-button with the ♻ icon.

c) The error message can only be reset by switching the machine off and on again.

Err	Category			Error	Possible cause	Remedy
	a)	b)	c)			
3	✓	✓	✗	Tacho error	Error of wire feeder	Check connections (connections, pipes)
					Permanent overload of the wire drive	Do not place the liner in tight radii; check wire core for smooth movement
4	✓	✗	✗	Excess temperature	Power source overheated	Allow the power source to cool down (mains switch to "1")
					Fan blocked, dirty or defective	Check fan and clean or replace
					Air inlet or outlet blocked	Check air inlet and outlet
5	✗	✗	✓	Mains overvoltage	Mains voltage is too high	Check the mains voltages and compare with the power source connection voltages
6	✗	✗	✓	Mains undervoltage	Mains voltage is too low	
7	✗	✓	✗	Low coolant level	Flow rate too low (< = 0.7 l/min) / (< = 0.18 gal/min) [1] [3]	Check coolant flow, clean water block, remove kinks in hose package, adjust flow threshold
					Coolant volume too low	Fill coolant
					Pump does not run	Turn the pump shaft
					Air in the coolant circuit	Vent coolant circuit
					Hose package not completely filled with coolant	Switch machine off / on (pump runs for 2 min)
					Operation with gas-cooled welding torch	Connect coolant feed and coolant return (insert hose bridge); deactivate water block

Err	Category			Error	Possible cause	Remedy
	a)	b)	c)			
					Failure of automatic circuit-breaker [4]	Press to reset automatic circuit-breaker
8	✓	✓	✗	Shielding gas error [2]	No shielding gas	Check shielding gas supply
					Pre-pressure too low	Remove kinks in the hose package; nominal value: 4-6 bar primary pressure
9	✗	✗	✓	Sec. overvoltage	Overvoltage at output: Inverter error	Inform Service
10	✗	✗	✓	Earth fault (PE error)	Connection between welding wire and machine casing	Remove electrical connection
11	✓	✓	✗	Quick shut-down	Removing the logical signal "robot ready" during the process	Eliminate errors on the higher-level control
22	✓	✗	✗	Coolant excess temperature [3]	Coolant is overheating (>=70°C / >=158°F) [1] measured in the coolant return line	Allow the power source to cool down (mains switch to "1")
					Fan blocked, dirty or defective	Check fan, clean or replace
					Air inlet or outlet blocked	Check air inlet and outlet
32	✗	✗	✓	Error I>0 [3]		Inform Service
33	✗	✗	✓	Error UIST [3]	Short circuit in welding circuit before welding	Eliminate short circuit in welding circuit; remove external sensor voltage
38	✗	✗	✓	Error IIST [3]	Short circuit in welding circuit before welding	Eliminate short circuit in welding circuit
48	✗	✓	✗	Ignition error	No ignition occurred during a process start with automated machines	Check the wire feeding, check the connections of the load cables in the welding circuit, clean corroded surfaces on the workpiece before welding if applicable
49	✗	✓	✗	Arc interruption	An arc interruption occurred during welding with an automated system	Check wire feeding; adjust welding speed.
51	✓	✗	✗	Emergency stop	The emergency stop circuit of the power source has been activated.	Disable the activation of the emergency stop circuit (release protective circuit)
52	✗	✗	✓	No wire feeder	After switching on the automated system, no wire feeder was detected	Check or connect control cables of wire feeders; check the identification number of the automated wire feeder (for 1DV: number 1, for 2DV: each a wire feeder with number 1 and a wire feeder with number 2)
53	✗	✓	✗	No wire feeder 2	Wire feeder 2 not detected	Check or connect the control lines of the wire feeders
54	✗	✗	✓	VRD error [2]	Open circuit voltage reduction error	if necessary, disconnect external machine from the welding circuit; inform Service
55	✗	✓	✗	WF excess current	Overcurrent detection on wire feeder	Do not place the liner in tight radii; check wire core for smooth movement

Err	Category a)	b)	c)	Error	Possible cause	Remedy
56	✖	✖	✔	Mains phase failure	One phase of the mains voltage has failed	Check mains connection, mains plug and mains fuses
57	✖	✔	✖	Slave tacho error	Wire feeder fault (slave drive)	Check connectors, cables, connections
					Permanent overload of the wire drive (slave drive)	Do not place the liner in tight radii; check wire core for smooth movement
58	✖	✔	✖	Short circuit	Check welding circuit for short circuit	Check welding circuit; isolate welding torch before depositing
59	✖	✖	✔	Incompatible machine	A machine connected to the system is not compatible	Please disconnect the incompatible machine from the system
60	✖	✖	✔	Incompatible software	A machine's software is not compatible.	Inform Service
61	✖	✔	✖	Welding monitor	The actual value of a welding parameter is outside the specified tolerance field	Observe tolerance fields; adjust welding parameters
62	✖	✖	✔	System component [3]	System component not found	Inform Service

[1] factory setting

[2] option

[3] only machine series Titan

[4] not machine series Titan

6.4   Resetting JOBs (welding tasks) to the factory settings

All customised welding parameters that are stored will be replaced by the factory settings.

Instructions on how to reset welding tasks (JOBs) to the factory setting can be found in the JOB manager chapter.

7 Appendix

7.1 Parameter overview – setting ranges

Parameter	Setting range			Comment
	Unit	**min.**	**max.**	
MIG/MAG				
Gas pre-flow time	s	0	-	20	
Gas nominal value	l/min				GFE option
Start program P_{START}					
WF relative	%	1	-	200	
Duration	s	0,00	-	20,0	
U correction	V	-9,9	-	9,9	
Slope time	s	0,00		20,0	
Main program P_A					
WF [/min.]	m/min	0,00	-	20,0	
U correction	V	-9,9	-	9,9	
Duration	s	0,00	-	20,0	
Slope time	s	0,00	-	20,0	
Down-slope program P_B					
WF relative	%	0	-	200	
Duration	s	0,0	-	20,0	
U correction	V	-9,9	-	9,9	
Slope time	s	0,00	-	20,0	
Slope time	s	0,00	-	20,0	
End program P_{END}					
WF relative	%	0	-	200	
Duration	s	0,0	-	20,0	
U correction	V	-9,9	-	9,9	
Wire burn-back		0		499	
Gas post-flow time	s	0,0		20,0	

7.2 JOB-List

JOB no.	Processes	Material	Gas	Diameter [mm]
1	GMAW standard	G3Si1 / G4Si1	100% CO2	0,8
2	GMAW standard	G3Si1 / G4Si1	100% CO2	0,9
3	GMAW standard	G3Si1 / G4Si1	100% CO2	1,0
4	GMAW standard	G3Si1 / G4Si1	100% CO2	1,2
5	GMAW standard	G3Si1 / G4Si1	100% CO2	1,6
6	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	0,8
7	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	0,9
8	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,0
9	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,2
10	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,6
11	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	0,8
12	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	0,9
13	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,0
14	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,2
15	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,6
26	Standard GMAW / pulse	CrNi 19 12 3 Nb / 1.4576	Ar-97.5 / CO2-2.5 (M12)	0,8
27	Standard GMAW / pulse	CrNi 19 12 3 Nb / 1.4576	Ar-97.5 / CO2-2.5 (M12)	1,0
28	Standard GMAW / pulse	CrNi 19 12 3 Nb / 1.4576	Ar-97.5 / CO2-2.5 (M12)	1,2
29	Standard GMAW / pulse	CrNi 19 12 3 Nb / 1.4576	Ar-97.5 / CO2-2.5 (M12)	1,6
30	Standard GMAW / pulse	CrNi 18 8 / 1.4370	Ar-97.5 / CO2-2.5 (M12)	0,8
31	Standard GMAW / pulse	CrNi 18 8 / 1.4370	Ar-97.5 / CO2-2.5 (M12)	1,0
32	Standard GMAW / pulse	CrNi 18 8 / 1.4370	Ar-97.5 / CO2-2.5 (M12)	1,2
33	Standard GMAW / pulse	CrNi 18 8 / 1.4370	Ar-97.5 / CO2-2.5 (M12)	1,6
34	Standard GMAW / pulse	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	0,8
35	Standard GMAW / pulse	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	1,0
36	Standard GMAW / pulse	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	1,2
37	Standard GMAW / pulse	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	1,6
38	Standard GMAW / pulse	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	0,8
39	Standard GMAW / pulse	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	1,0
40	Standard GMAW / pulse	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	1,2
41	Standard GMAW / pulse	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	1,6
42	Standard GMAW / pulse	CrNi 22 9 3 / 1.4462	Ar-97.5 / CO2-2.5 (M12)	0,8
43	Standard GMAW / pulse	CrNi 22 9 3 / 1.4462	Ar-97.5 / CO2-2.5 (M12)	1,0
44	Standard GMAW / pulse	CrNi 22 9 3 / 1.4462	Ar-97.5 / CO2-2.5 (M12)	1,2
45	Standard GMAW / pulse	CrNi 22 9 3 / 1.4462	Ar-97.5 / CO2-2.5 (M12)	1,6
46	Standard GMAW / pulse	CrNi 22 9 3 / 1.4462	Ar-78 / He-20 / CO2-2 (M12)	0,8
47	Standard GMAW / pulse	CrNi 22 9 3 / 1.4462	Ar-78 / He-20 / CO2-2 (M12)	1,0
48	Standard GMAW / pulse	CrNi 22 9 3 / 1.4462	Ar-78 / He-20 / CO2-2 (M12)	1,2
49	Standard GMAW / pulse	CrNi 22 9 3 / 1.4462	Ar-78 / He-20 / CO2-2 (M12)	1,6

JOB no.	Processes	Material	Gas	Diameter [mm]
50	coldArc / coldArc puls	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	0,8
51	coldArc / coldArc puls	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	1,0
52	coldArc / coldArc puls	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	1,2
55	coldArc / coldArc puls	AlMg4.5Mn	Ar-100 (I1)	1,0
56	coldArc / coldArc puls	AlMg4.5Mn	Ar-100 (I1)	1,2
59	coldArc / coldArc puls	AlSi	Ar-100 (I1)	1,0
60	coldArc / coldArc puls	AlSi	Ar-100 (I1)	1,2
63	coldArc / coldArc puls	Al99	Ar-100 (I1)	1,0
64	coldArc / coldArc puls	Al99	Ar-100 (I1)	1,2
66	coldArc Brazing	CuSi	Ar-100 (I1)	0,8
67	coldArc Brazing	CuSi	Ar-100 (I1)	1,0
68	coldArc Brazing	CuSi	Ar-100 (I1)	1,2
70	coldArc Brazing	CuAl	Ar-100 (I1)	0,8
71	coldArc Brazing	CuAl	Ar-100 (I1)	1,0
72	coldArc Brazing	CuAl	Ar-100 (I1)	1,2
74	Standard GMAW / pulse	AlMg4.5Mn	Ar-100 (I1)	0,8
75	Standard GMAW / pulse	AlMg4.5Mn	Ar-100 (I1)	1,0
76	Standard GMAW / pulse	AlMg4.5Mn	Ar-100 (I1)	1,2
77	Standard GMAW / pulse	AlMg4.5Mn	Ar-100 (I1)	1,6
78	Standard GMAW / pulse	AlMg4.5Mn	Ar-70 / He-30 (I3)	0,8
79	Standard GMAW / pulse	AlMg4.5Mn	Ar-70 / He-30 (I3)	1,0
80	Standard GMAW / pulse	AlMg4.5Mn	Ar-70 / He-30 (I3)	1,2
81	Standard GMAW / pulse	AlMg4.5Mn	Ar-70 / He-30 (I3)	1,6
82	Standard GMAW / pulse	AlSi	Ar-100 (I1)	0,8
83	Standard GMAW / pulse	AlSi	Ar-100 (I1)	1,0
84	Standard GMAW / pulse	AlSi	Ar-100 (I1)	1,2
85	Standard GMAW / pulse	AlSi	Ar-100 (I1)	1,6
86	Standard GMAW / pulse	AlSi	Ar-70 / He-30 (I3)	0,8
87	Standard GMAW / pulse	AlSi	Ar-70 / He-30 (I3)	1,0
88	Standard GMAW / pulse	AlSi	Ar-70 / He-30 (I3)	1,2
89	Standard GMAW / pulse	AlSi	Ar-70 / He-30 (I3)	1,6
90	Standard GMAW / pulse	Al99	Ar-100 (I1)	0,8
91	Standard GMAW / pulse	Al99	Ar-100 (I1)	1,0
92	Standard GMAW / pulse	Al99	Ar-100 (I1)	1,2
93	Standard GMAW / pulse	Al99	Ar-100 (I1)	1,6
94	Standard GMAW / pulse	Al99	Ar-70 / He-30 (I3)	0,8
95	Standard GMAW / pulse	Al99	Ar-70 / He-30 (I3)	1,0
96	Standard GMAW / pulse	Al99	Ar-70 / He-30 (I3)	1,2
97	Standard GMAW / pulse	Al99	Ar-70 / He-30 (I3)	1,6
98	Standard GMAW / pulse	CuSi	Ar-100 (I1)	0,8
99	Standard GMAW / pulse	CuSi	Ar-100 (I1)	1,0
100	Standard GMAW / pulse	CuSi	Ar-100 (I1)	1,2
101	Standard GMAW / pulse	CuSi	Ar-100 (I1)	1,6
102	Standard GMAW / pulse	CuSi	Ar-97.5 / CO2-2.5 (M12)	0,8
103	Standard GMAW / pulse	CuSi	Ar-97.5 / CO2-2.5 (M12)	1,0
104	Standard GMAW / pulse	CuSi	Ar-97.5 / CO2-2.5 (M12)	1,2
105	Standard GMAW / pulse	CuSi	Ar-97.5 / CO2-2.5 (M12)	1,6

JOB no.	Processes	Material	Gas	Diameter [mm]
106	Standard GMAW / pulse	CuAl	Ar-100 (I1)	0,8
107	Standard GMAW / pulse	CuAl	Ar-100 (I1)	1,0
108	Standard GMAW / pulse	CuAl	Ar-100 (I1)	1,2
109	Standard GMAW / pulse	CuAl	Ar-100 (I1)	1,6
110	Brazing	CuSi	Ar-97.5 / CO2-2.5 (M12)	0,8
111	Brazing	CuSi	Ar-97.5 / CO2-2.5 (M12)	1,0
112	Brazing	CuSi	Ar-97.5 / CO2-2.5 (M12)	1,2
113	Brazing	CuSi	Ar-97.5 / CO2-2.5 (M12)	1,6
114	Brazing	CuSi	Ar-100 (I1)	0,8
115	Brazing	CuSi	Ar-100 (I1)	1,0
116	Brazing	CuSi	Ar-100 (I1)	1,2
117	Brazing	CuSi	Ar-100 (I1)	1,6
118	Brazing	CuAl	Ar-97.5 / CO2-2.5 (M12)	0,8
119	Brazing	CuAl	Ar-97.5 / CO2-2.5 (M12)	1,0
120	Brazing	CuAl	Ar-97.5 / CO2-2.5 (M12)	1,2
121	Brazing	CuAl	Ar-97.5 / CO2-2.5 (M12)	1,6
122	Brazing	CuAl	Ar-100 (I1)	0,8
123	Brazing	CuAl	Ar-100 (I1)	1,0
124	Brazing	CuAl	Ar-100 (I1)	1,2
125	Brazing	CuAl	Ar-100 (I1)	1,6
126	Gouging			
127	TIG (lift arc)			
128	MMA			
129	Special JOB 1	Special	Special	Spezial
130	Special JOB 2	Special	Special	Spezial
131	Special JOB 3	Special	Special	Spezial
132		Free JOB		
133		Free JOB		
134		Free JOB		
135		Free JOB		
136		Free JOB		
137		Free JOB		
138		Free JOB		
139		Free JOB		
140		Block 1/ JOB1		
141		Block 1/ JOB2		
142		Block 1/ JOB3		
143		Block 1/ JOB4		
144		Block 1/ JOB5		
145		Block 1/ JOB6		
146		Block 1/ JOB7		
147		Block 1/ JOB8		
148		Block 1/ JOB9		
149		Block 1/ JOB10		
150		Block 2/ JOB1		
151		Block 2/ JOB2		
152		Block 2/ JOB3		

JOB no.	Processes	Material	Gas	Diameter [mm]
153		Block 2/ JOB4		
154		Block 2/ JOB5		
155		Block 2/ JOB6		
156		Block 2/ JOB7		
157		Block 2/ JOB8		
158		Block 2/ JOB9		
159		Block 2/ JOB10		
160		Block 3/ JOB1		
161		Block 3/ JOB2		
162		Block 3/ JOB3		
163		Block 3/ JOB4		
164		Block 3/ JOB5		
165		Block 3/ JOB6		
166		Block 3/ JOB7		
167		Block 3/ JOB8		
168		Block 3/ JOB9		
169		Block 3/ JOB10		
171	coldArc / coldArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,0
172	coldArc / coldArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,2
173	rootArc / rootArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,0
174	rootArc / rootArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,2
179	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,0
180	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,2
181	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,6
182	coldArc	G3Si1 / G4Si1	CO2-100 (C1)	0,8
183	coldArc	G3Si1 / G4Si1	CO2-100 (C1)	0,9
184	coldArc	G3Si1 / G4Si1	CO2-100 (C1)	1,0
185	coldArc	G3Si1 / G4Si1	CO2-100 (C1)	1,2
188	GMAW Non-synergic	Special	Special	Spezial
189	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	0,8
190	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	0,8
191	coldArc / coldArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	0,8
192	coldArc / coldArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	0,9
193	coldArc / coldArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,0
194	coldArc / coldArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,2
195	coldArc / coldArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,6
197	coldArc Brazing	AlSi	Ar-100 (I1)	1,0
198	coldArc Brazing	AlSi	Ar-100 (I1)	1,2
201	coldArc Brazing	ZnAl	Ar-100 (I1)	1,0
202	coldArc Brazing	ZnAl	Ar-100 (I1)	1,2
204	rootArc	G3Si1 / G4Si1	CO2-100 (C1)	1,0
205	rootArc	G3Si1 / G4Si1	CO2-100 (C1)	1,2
206	rootArc / rootArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,0
207	rootArc / rootArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,2
208	coldArc - Mg/Mg	Mg	Ar-70 / He-30 (I3)	1,2
209	coldArc - Mg/Mg	Mg	Ar-70 / He-30 (I3)	1,6
212	Flux cored wire rutile	FCW CrNi Rutile	CO2-100 (C1)	1,2

JOB no.	Processes	Material	Gas	Diameter [mm]
213	Flux cored wire rutile	FCW CrNi Rutile	CO2-100 (C1)	1,6
216	Standard GMAW / pulse	AlMg3	Ar-100 (I1)	1,0
217	Standard GMAW / pulse	AlMg3	Ar-100 (I1)	1,2
218	Standard GMAW / pulse	AlMg3	Ar-100 (I1)	1,6
220	coldArc - St/Al	ZnAl	Ar-100 (I1)	1,0
221	coldArc - St/Al	ZnAl	Ar-100 (I1)	1,2
224	coldArc - St/Al	AlSi	Ar-100 (I1)	1,0
225	coldArc - St/Al	AlSi	Ar-100 (I1)	1,2
229	Flux cored wire metal	FCW CrNi Metal	Ar-97.5 / CO2-2.5 (M12)	1,2
230	Flux cored wire metal	FCW CrNi Metal	Ar-97.5 / CO2-2.5 (M12)	1,6
233	Flux cored wire rutile	FCW CrNi Rutile	Ar-82 / CO2-18 (M21)	1,2
234	Flux cored wire rutile	FCW CrNi Rutile	Ar-82 / CO2-18 (M21)	1,6
235	Flux cored wire metal	FCW Steel Metal	Ar-82 / CO2-18 (M21)	0,8
237	Flux cored wire metal	FCW Steel Metal	Ar-82 / CO2-18 (M21)	1,0
238	Flux cored wire metal	FCW Steel Metal	Ar-82 / CO2-18 (M21)	1,2
239	Flux cored wire metal	FCW Steel Metal	Ar-82 / CO2-18 (M21)	1,6
240	Flux cored wire rutile	FCW CrNi Rutile	Ar-82 / CO2-18 (M21)	0,8
242	Flux cored wire rutile	FCW CrNi Rutile	Ar-82 / CO2-18 (M21)	1,0
243	Flux cored wire rutile	FCW CrNi Rutile	Ar-82 / CO2-18 (M21)	1,2
244	Flux cored wire rutile	FCW CrNi Rutile	Ar-82 / CO2-18 (M21)	1,6
245	forceArc / forceArc puls	Al99	Ar-100 (I1)	1,2
246	forceArc / forceArc puls	Al99	Ar-100 (I1)	1,6
247	forceArc / forceArc puls	AlMg4.5Mn	Ar-100 (I1)	1,2
248	forceArc / forceArc puls	AlMg4.5Mn	Ar-100 (I1)	1,6
249	forceArc / forceArc puls	AlSi	Ar-100 (I1)	1,2
250	forceArc / forceArc puls	AlSi	Ar-100 (I1)	1,6
251	forceArc / forceArc puls	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	1,0
252	forceArc / forceArc puls	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	1,2
253	forceArc / forceArc puls	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	1,6
254	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,0
255	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,2
256	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,6
258	Standard GMAW / pulse	AlMg4.5Mn	Ar-50/He-50 (I3)	1,2
259	Standard GMAW / pulse	AlMg4.5Mn	Ar-50/He-50 (I3)	1,6
260	Flux cored wire rutile	FCW Steel Rutile	CO2-100 (C1)	1,2
261	Flux cored wire rutile	FCW Steel Rutile	CO2-100 (C1)	1,6
263	Flux cored wire metal	High-strength steels / Special	Ar-82 / CO2-18 (M21)	1,2
264	Flux cored wire basic	FCW Steel Basic	Ar-82 / CO2-18 (M21)	1,2
268	Surfacing	NiCr 6617 / 2.4627	Ar-70 / He-30 (I3)	1,2
269	Surfacing	NiCr 6617 / 2.4627	Ar-70 / He-30 (I3)	1,6
271	Surfacing	NiCr 6625 / 2.4831	Ar-70 / He-30 (I3)	1,0
272	Surfacing	NiCr 6625 / 2.4831	Ar-70 / He-30 (I3)	1,2
273	Surfacing	NiCr 6625 / 2.4831	Ar-70 / He-30 (I3)	1,6
275	Surfacing	NiCr 6625 / 2.4831	Ar-78 / He-20 / CO2-2 (M12)	1,0
276	Surfacing	NiCr 6625 / 2.4831	Ar-78 / He-20 / CO2-2 (M12)	1,2

JOB no.	Processes	Material	Gas	Diameter [mm]
277	Surfacing	NiCr 6625 / 2.4831	Ar-78 / He-20 / CO2-2 (M12)	1,6
279	Standard GMAW / pulse	CrNi 25 20 / 1.4842	Ar-97.5 / CO2-2.5 (M12)	1,0
280	Standard GMAW / pulse	CrNi 25 20 / 1.4842	Ar-97.5 / CO2-2.5 (M12)	1,2
282	Standard GMAW / pulse	CrNi 23 12 / 1.4332	Ar-97.5 / CO2-2.5 (M12)	0,8
283	Standard GMAW / pulse	CrNi 23 12 / 1.4332	Ar-97.5 / CO2-2.5 (M12)	1,0
284	Standard GMAW / pulse	CrNi 23 12 / 1.4332	Ar-97.5 / CO2-2.5 (M12)	1,2
285	Standard GMAW / pulse	CrNi 23 12 / 1.4332	Ar-97.5 / CO2-2.5 (M12)	1,6
290	forceArc / forceArc puls Flux cored wire metal	FCW Steel Metal	Ar-82 / CO2-18 (M21)	0,8
291	forceArc / forceArc puls Flux cored wire metal	FCW Steel Metal	Ar-82 / CO2-18 (M21)	1,0
292	forceArc / forceArc puls Flux cored wire metal	FCW Steel Metal	Ar-82 / CO2-18 (M21)	1,2
293	forceArc / forceArc puls Flux cored wire metal	FCW Steel Metal	Ar-82 / CO2-18 (M21)	1,6
303	forceArc / forceArc puls	CrNi 19 12 3 Nb / 1.4576	Ar-97.5 / CO2-2.5 (M12)	1,0
304	forceArc / forceArc puls	CrNi 19 12 3 Nb / 1.4576	Ar-97.5 / CO2-2.5 (M12)	1,2
305	forceArc / forceArc puls	CrNi 19 12 3 Nb / 1.4576	Ar-97.5 / CO2-2.5 (M12)	1,6
307	forceArc / forceArc puls	CrNi 18 8 / 1.4370	Ar-97.5 / CO2-2.5 (M12)	1,0
308	forceArc / forceArc puls	CrNi 18 8 / 1.4370	Ar-97.5 / CO2-2.5 (M12)	1,2
309	forceArc / forceArc puls	CrNi 18 8 / 1.4370	Ar-97.5 / CO2-2.5 (M12)	1,6
311	forceArc / forceArc puls	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	1,0
312	forceArc / forceArc puls	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	1,2
313	forceArc / forceArc puls	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	1,6
315	forceArc / forceArc puls	CrNi 22 9 3 / 1.4462	Ar-97.5 / CO2-2.5 (M12)	1,0
316	forceArc / forceArc puls	CrNi 22 9 3 / 1.4462	Ar-97.5 / CO2-2.5 (M12)	1,2
317	forceArc / forceArc puls	CrNi 22 9 3 / 1.4462	Ar-97.5 / CO2-2.5 (M12)	1,6
319	forceArc / forceArc puls	CrNi 25 20 / 1.4842	Ar-97.5 / CO2-2.5 (M12)	1,0
320	forceArc / forceArc puls	CrNi 25 20 / 1.4842	Ar-97.5 / CO2-2.5 (M12)	1,2
323	forceArc / forceArc puls	CrNi 23 12 / 1.4332	Ar-97.5 / CO2-2.5 (M12)	1,0
324	forceArc / forceArc puls	CrNi 23 12 / 1.4332	Ar-97.5 / CO2-2.5 (M12)	1,2
325	forceArc / forceArc puls	CrNi 23 12 / 1.4332	Ar-97.5 / CO2-2.5 (M12)	1,6
326	coldArc / coldArc puls	CrNi 19 12 3 Nb / 1.4576	Ar-97.5 / CO2-2.5 (M12)	0,8
327	coldArc / coldArc puls	CrNi 19 12 3 Nb / 1.4576	Ar-97.5 / CO2-2.5 (M12)	1,0
328	coldArc / coldArc puls	CrNi 19 12 3 Nb / 1.4576	Ar-97.5 / CO2-2.5 (M12)	1,2
330	coldArc / coldArc puls	CrNi 18 8 / 1.4370	Ar-97.5 / CO2-2.5 (M12)	0,8
331	coldArc / coldArc puls	CrNi 18 8 / 1.4370	Ar-97.5 / CO2-2.5 (M12)	1,0
332	coldArc / coldArc puls	CrNi 18 8 / 1.4370	Ar-97.5 / CO2-2.5 (M12)	1,2
334	coldArc / coldArc puls	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	0,8
335	coldArc / coldArc puls	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	1,0
336	coldArc / coldArc puls	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	1,2

JOB no.	Processes	Material	Gas	Diameter [mm]
338	coldArc / coldArc puls	CrNi 22 9 3/1.4462/Duplex	Ar-97.5 / CO2-2.5 (M12)	0,8
339	coldArc / coldArc puls	CrNi 22 9 3/1.4462/Duplex	Ar-97.5 / CO2-2.5 (M12)	1,0
340	coldArc / coldArc puls	CrNi 22 9 3/1.4462/Duplex	Ar-97.5 / CO2-2.5 (M12)	1,2
350	Self-shielded flux cored wire	FCW Steel Rutile	No Gas	0,9
351	Self-shielded flux cored wire	FCW Steel Rutile	No Gas	1,0
352	Self-shielded flux cored wire	FCW Steel Rutile	No Gas	1,2
359	wiredArc / wiredArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,0
360	wiredArc / wiredArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,2
367	wiredArc / wiredArc puls	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	1,0
368	wiredArc / wiredArc puls	CrNi 19 9 / 1.4316	Ar-97.5 / CO2-2.5 (M12)	1,2
371	wiredArc / wiredArc puls	CrNi 19 12 3 / 1.4430	Ar-97.5 / CO2-2.5 (M12)	1,0
384	wiredArc / wiredArc puls	AlMg4.5Mn	Ar-50/He-50 (I3)	1,2
385	wiredArc / wiredArc puls	AlMg4.5Mn	Ar-50/He-50 (I3)	1,6
386	Surfacing	Co-based	Ar-100 (I1)	1,2
387	Surfacing	Co-based	Ar-100 (I1)	1,6
388	Surfacing	CrNi 23 12 / 1.4332	Ar-97.5 / CO2-2.5 (M12)	1,2
389	Surfacing	CrNi 23 12 / 1.4332	Ar-97.5 / CO2-2.5 (M12)	1,6
391	acArc puls [1]	AlMg4.5Mn	Ar-100 (I1)	1,0
392	acArc puls [1]	AlMg4.5Mn	Ar-100 (I1)	1,2
393	acArc puls [1]	AlMg4.5Mn	Ar-100 (I1)	1,6
394	acArc puls [1]	AlSi	Ar-residue/O2-0.03	1,0
395	acArc puls [1]	AlSi	Ar-residue/O2-0.03	1,2

[1] active only in machine series Titan XQ AC.

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