TI PSS 5000

PSS 5000
Welding Control PSS 5000

Ausgabe 103

TI PSS 5000

PSS 5000
Welding Control PSS 5000
Technical Information

1070 078 216-103 (96.06) GB

Reg. Nr. 16149-01/2

Contents

Technical Information on Weld Timer PSS 5000

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Contents

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1.1.0 General

Please read this manual before putting the PSS 5000 series of resistance weld equipment into operation.

Store this Technical Information in a place to which all users have access at any time!

The products described were developed, manufactured and tested in compliance with the fundamental safety requirements of the EU machine directive.

Nevertheless, there still is some residual risk!

1.1.1 Explanation of pictographs and symbols

The following warnings and notes may be attached to the **actual timer components** which are designed to inform the user on certain circumstances.

Warning of dangerous voltages!

Components subject to electrostatic induction!

Disconnect mains plug before opening!

Pin only designed for connecting the PE (protective earth) conductor!

Only for connecting a shield conductor!

There is a certain **hierarchy of warnings** in **this manual.** The warnings are printed in **bold letters** and marked by a warning sign at the margin.

The hierarchy of the warnings is as follows:

1. WARNING
2. ATTENTION
3. NOTE

WARNING!

The term **WARNING** will be used wherever **danger is imminent.**
The possible consequences may be death or severe injury (personal injury).

ATTENTION!

The term **ATTENTION** will be used wherever a **dangerous situation is possible**.
The possible consequences include death, severe or light injury (personal injury), damage to property or environmental hazards.
In any case, no liability is accepted in the event of non–compliance.

NOTE!

*The term **NOTE** will be used for making **recommendations on the use.** The recommendations will include supplementary information, recommendations, information and tips.*
Non–compliance with these recommendations may result in damage to property, e.g. to the machine or the workpiece.

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1.1.2 Typographic conventions in this manual

– General listing	–	Example: –	The message is displayed on the screen.
– Action	●	Example:	● Insert floppy ● Read value
– Screen displays, messages, displays	*Italics*	Example:	*Battery-Low* *Tip dress request*
– (Welding) parameters	[in brackets]	Example:	[Weld time], [Schedule].
– Interface signals, keys, command fields.	**<key>**	Example:	Press **<F8>**
– Inputs: Values, texts	CAPITAL LETTERS		
– Modifications and additions to the last issue.			

1.1.3 Normal use

This manual contains all information concerning the normal use of the PSS 5000 weld control equipment.

Together with the prescribed welding hardware, the PSS 5000 weld timer serves for

● **Resistance welding of metals**

It is not intended for any other use.

ATTENTION!

The use of any and all components for purposes other than the intended use may result in personal damage to the user or third persons or damage to the equipment, the workpiece to be welded or environmental hazards.
Therefore, our products should only be used for their intended purpose!

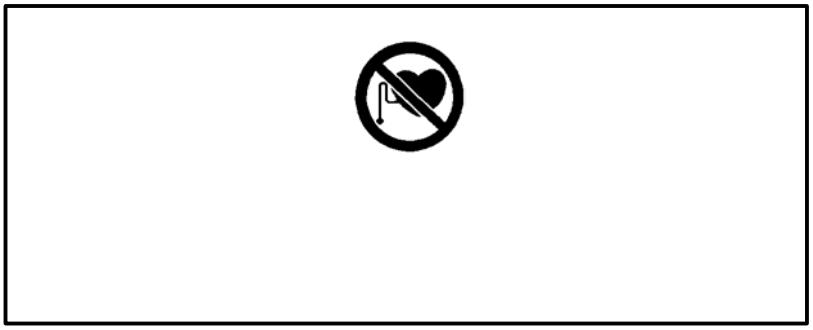
1.1.4 Not allowed for persons with cardiac pacemakers

The operation of resistance welding installations results in very high electrical currents and thus also very strong magnetic fields.

WARNING!

The function of cardiac pacemakers may be disturbed!
The possible consequences include death or severe bodily injuries of persons with cardiac pacemakers.
These persons will have to avoid the welding system.

We recommend posting a warning of the type shown below at all entrances to factory halls containing resistance welding equipment:



DIN 40023

1.1.5 Qualified personnel

This Technical Information is designed for welding technicians and engineers with special training. They require specific knowledge on the hardware and software components of the PSS 5000, the welding converter (PSU) and the welding rectifier–transformer (PSG).

– engineering personnel familiar with the safety standards of the electrical and automation technology.

– commissioning personnel entitled to commission, earth and label electrical circuits and equipment/systems in compliance with the standards of safety technology.

– operating personnel who have been instructed for operating installations in resistance welding technology and who know the contents of the present documentation as far as operation is concerned.

WARNING!

An exception are persons with cardiac pacemakers!
Due to the strong magnetic fields arising from resistance welding, the function of cardiac pacemakers may be disturbed. This may cause the death or considerable health damages to the persons concerned!
Therefore, these persons should avoid the welding system.

ATTENTION!

Any interventions in our weld timers are prohibited! Interventions in the hardware may cause severe personal injury or damage to property. No liability is accepted in the event of non-compliance.

NOTE!

Please note our comprehensive range of training courses. More information is available from our training center (Phone: 06062/78600).

1.1.6 Storage and transport

NOTE!

Please note the environmental conditions given in the Specifications section to avoid damages.
Static discharges may destroy components of the PSS 5000. Therefore, the original packaging should be used for storage and transport. The equipment must be protected against humidity.

NOTE!

Floppies must be protected against negative external influences of dust or moisture by suitable packaging. They must never be exposed to the influence of magnetic fields.

1.1.7 Installation and assembly

ATTENTION!

– Please observe all applicable safety and accident prevention regulations! The recognized rules of electrical engineering must be observed!

– Danger of injury or of damage to property due to inappropriate fastening! The place of installation and the fastening method for the modules must be in compliance with our specifications!

- Danger of injury on sharp metal edges!
  Please wear protective gloves.

- Danger of damage to property through short–circuits!
  When drilling or sawing out openings within switch cabinets, metal burr may get inside modules that have already been installed. It is also possible that water may emerge during the installation of the cooling water lines and may enter the modules.
  The possibility of short–circuits and a destruction of the units cannot be entirely ruled out.
  Therefore, the modules should be well partitioned prior to any additional work! No liability is accepted in the event of non–compliance.

– Danger of life and of damage to property through insufficient protection type!
  The protection type of the PSS 5000 modules is IP 20. PSS 5000 modules must be installed in a switch cabinet which must at least comply with protection type IP 54 (cf. also ”Specifications” paragraph in the “Hardware Description” section).

– Danger of injury and of damage to property through incorrect installation!
  The weld timer, and especially the operating elements, must be installed so as to be sufficiently protected against unintentional operation or contact.

– Danger of injury and of damage to property when operating the units outside a switch cabinet!
  The units are designed to be installed in housings or switch cabinets and may only be operated in such housings or cabinets with the door closed!

- Danger of damages through static discharge!
  Elements or components of the PSS 5000 may be damaged by static discharge. Do not touch any components or printed circuits with your hands. Installing and configuring the system is reserved to qualified personnel.

NOTE!

Connecting lines and signal lines must be laid so as to avoid negative effects on the function of the units through capacitive or inductive interference! The recognized rules of electrical engineering must be observed!

1.1.8 Electrical connection

The PSS 5000 is connected to the electrical mains. Voltage supply is usually effected by the thyristor unit or the converter. The recognized rules of electrical engineering are applicable.

WARNING!

- Considerable dangers are associated with the mains connection of the thyristor unit or the converter!
  The possible consequences of inapproriate handling include death, severe bodily injury and damage to property.
  Therefore, the electrical connection may only be made by a skilled electrician who observes the valid safety regulations, the mains voltage and the maximum current consumption of the modules.
  The mains voltage must be identical with the nominal voltage indicated on the nameplate of the product!
  The mains system must be appropriately fused!

- Danger of life through electrical voltage!
  Suitable protective measures in accordance with DIN 57 113, VDE 0113 etc. must be installed (e.g. by grounding the welding gun) prior to any works on the welding hardware! In addition, the transformer must be labelled accordingly.

1.1.9 Operation of this PSS 5000

WARNING!

- During operation of the welding equipment welding splashes are to be expected! The consequence may be injuries to the eyes or burns. Therefore:
  - wear protective goggles
  - wear protective gloves
  - wear flame–retardant clothes

- Danger of injury at sheet metal edges and danger of getting burnt at the parts to be welded!
  Therefore:
  - wear protective gloves

ATTENTION!

– Danger of injury and of damage to property when operating the units outside a switch cabinet or for purposes other than the intended use!
The units are designed to be installed in housings or switch cabinets and may only be operated in such housings or cabinets with the door closed! The recognized rules of electrical engineering must be observed.

– Danger of injury and of damage to property through missing or false interpretation of fault messages!

For interpreting the fault messages also note the information contained in the *Diagnostics under Operation* section.

– Danger of bruises through electrode movement!
All users, line designers, welding machine manufacturers and welding gun producers are obliged to connect the output signal of the Bosch weld timer which initiates the electrode movement so that the applicable safety regulations are complied with.
The risk of bruises can be considerably reduced by means of, e.g.,
  – two–handed start
  – guard rails
  – light barriers etc.

– The modules, and especially the operating elements, must be installed so as to be sufficiently protected against unintentional operation or contact. Please observe all applicable safety standards and accident prevention regulations!

– Systems without Monitor contact (ÜK)
  If Monitor contact is connected to +24 VDC, the squeeze times must be selected long enough to permit optimal contact of the part to be welded prior to the weld time. If the squeeze times are too short, the electrodes move together during weld time. This will cause strong welding splashes, resulting in damages to the electrodes and the part to be welded.

- Fault reset
  If the start signal is present when a fault is reset, the timer will immediately start executing the program! This may result in dangerous machine movements! Therefore, before resetting a fault it must be ensured that nobody is in the dangerous area of the welding machine!

– Simulated start
  In remote–controlled systems, program execution may begin which may result in dangerous machine movements. Therefore, before remote starting, it must be ensured that nobody is in the dangerous area of the welding machine!

ATTENTION!

Damage to property through excessive welding current!
The maximum welding current of the welding hardware used must not be exceeded.
No liability is accepted in the event of non–compliance.

1.1.10 Retrofits and modifications by the user

The PSS 5000 has been designed and manufactured by us as a safe unit.

WARNING!

Retrofits or modifications may have negative effects on the safety of the unit!
The possible consequences include death, severe or light bodily injury (personal injury), damage to property or environmental hazards.
Therefore, please contact us prior to retrofits or modifications to the PSS 5000 using third-party equipment. This is the only way to determine whether these parts are suitable for use with our product.

1.1.11 Maintenance, repair

WARNING!

- Danger of life through electrical voltage of converters and thyristor units!
  Prior to any maintenance work – unless described otherwise – the system must always be switched off! In the event of necessary measurement or test procedures on the active system, the applicable safety and accident prevention regulations must be strictly observed. In any case, suitable insulated tools must be used!

- Danger of life through inappropriate EMERGENCY–STOP facilities!
  EMERGENCY–STOP facilities must be operative in all modes of the system. Releasing the EMERGENCY–STOP facility must by no means result in an uncontrolled restart of the system!

- Danger of explosion of batteries!
  Do not forcefully open batteries, do not attempt to charge, solder or incinerate the battery.
  Empty batteries should always be replaced by new ones!

ATTENTION!

– The right to perform repair/maintenance work on the PSS 5000 components is reserved to the BOSCH service department or to repair/maintenance units authorized by BOSCH!

– Only use spare parts/replacement parts approved by BOSCH!

– The applicable regulations on the disposal of empty batteries or accumulators must be observed.

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1.1.12 Working with floppy disks

NOTE!

Floppies must be protected against negative external influences of dust or moisture by suitable packaging. They must never be exposed to the influence of magnetic fields. Do not bend floppies!

NOTE!

You should always make backups of all original floppies. Afterwards, you should only use your backup and keep the original disks in a safe place. In the event that your bakkups should be damaged, you will then be able to make new backups of your original disks.

Contents

Maintenance

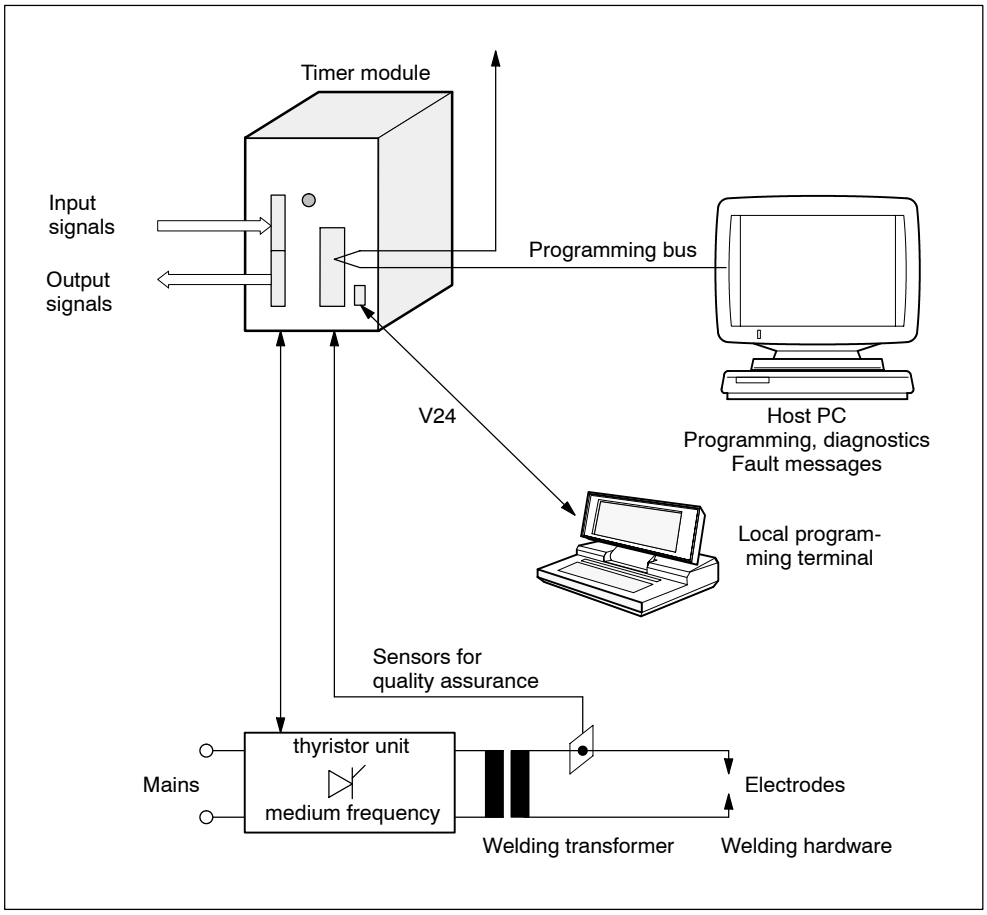
Profibus

2.1.0 System Description

The series PSS5000 welding control is suitable for spot, projection and roller seam welding, as well as for other resistance welding processes.

The welding system consists of

- Welding hardware (welding gun, robot or multi point ...)
- **Timer module PSS 5000**
- Thyristor unit and Transformer (AC, medium frequency...)
- A programming terminal for data entry and monitoring



The welding timers are equipped with microprocessors. Up to **256** welding programs can be programmed and called up. Single spot (SING), repeat mode (REPT) or seam operation can be selected.
The welding parameters are stored in a RAM memory. The memory has battery backup to prevent loss of data. The condition of the battery and the data is being monitored.

The PSS5000 is an **open** system timer. You can select control functions from a variety of selections by entering or modifying the basic parameters.

In the configuration section you can for example select between operation with a thyristor output stage (AC) or a medium–frequency converter (DC).

You can configure **your** control by selecting various basic parameters.

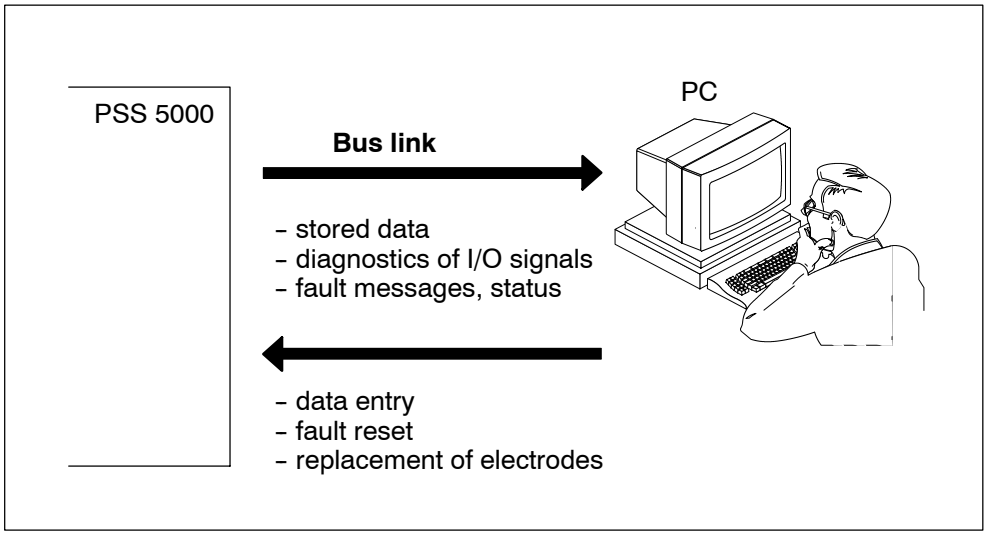
This means that you:

- have to set up parameters for a control type only once
- can transfer the parameter settings to all your controls

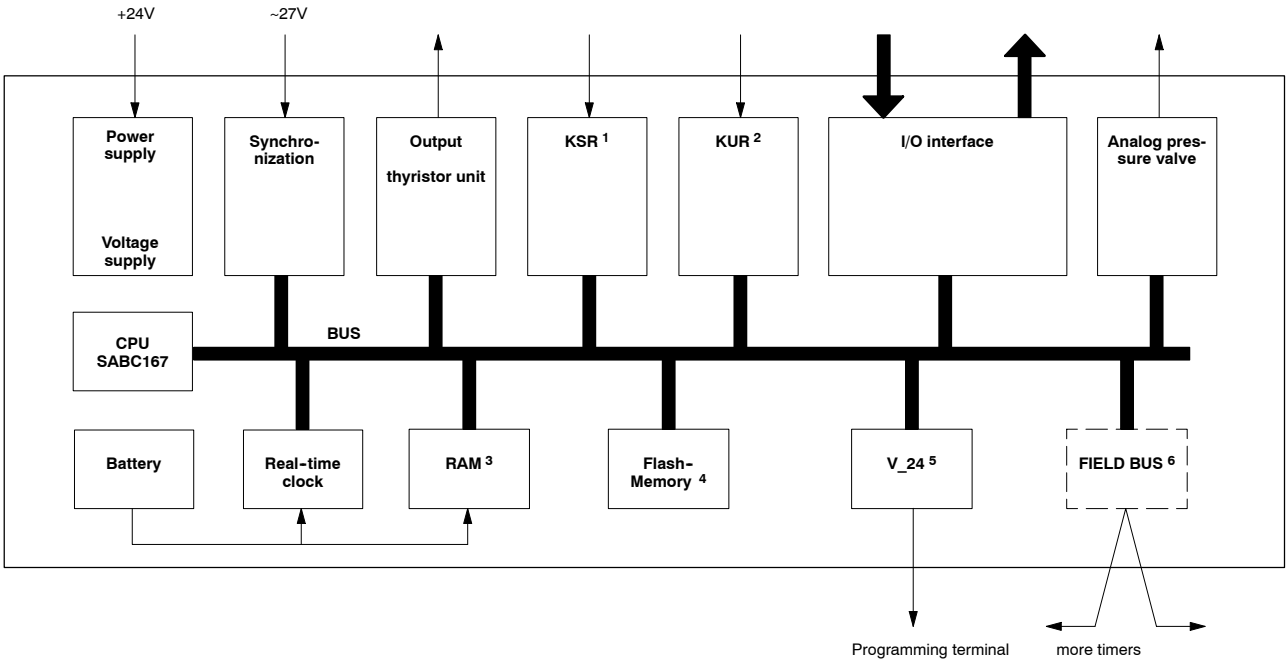
You can make it even easier for yourself: You can have our application technicians make the set–up for your control type from the available options for you.

2.1.1 Field bus/FMS

With the use of a FIELD BUS module (option) you can connect the timer to a PC (also equipped with a FIELD BUS). All information between the timer and the PC is transferred over this bus.



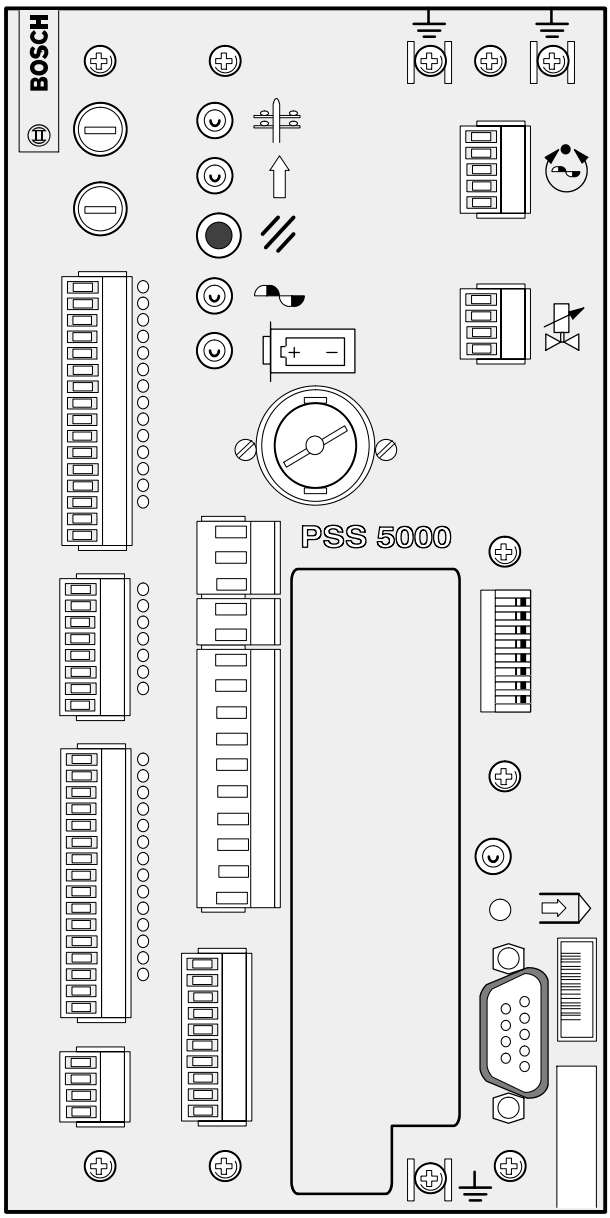
On the front panel of the timer is a V24 interface. This can be used for connecting a laptop for example. This laptop can be used for programming as well as to operate the timer on location.



1 Constant current control
2 Constant voltage control
3 RAM for storing the welding parameters
4 Flash–Memory for storing the operating system
5 V24 interface, for connecting a PC on location for programming and monitoring. The operating system can be loaded from this interface.
6 FIELD BUS interface (Option)

2.2.0 General hardware description

The control module is enclosed in a compact housing. This housing is designed for installation in a control cabinet. The standard width of the housing is marked by the letter **B**.



PSS 5100.100 B

All settings required for operation can be accomplished from a PC connected to the front panel. You should never disassemble the timer.

NOTE:

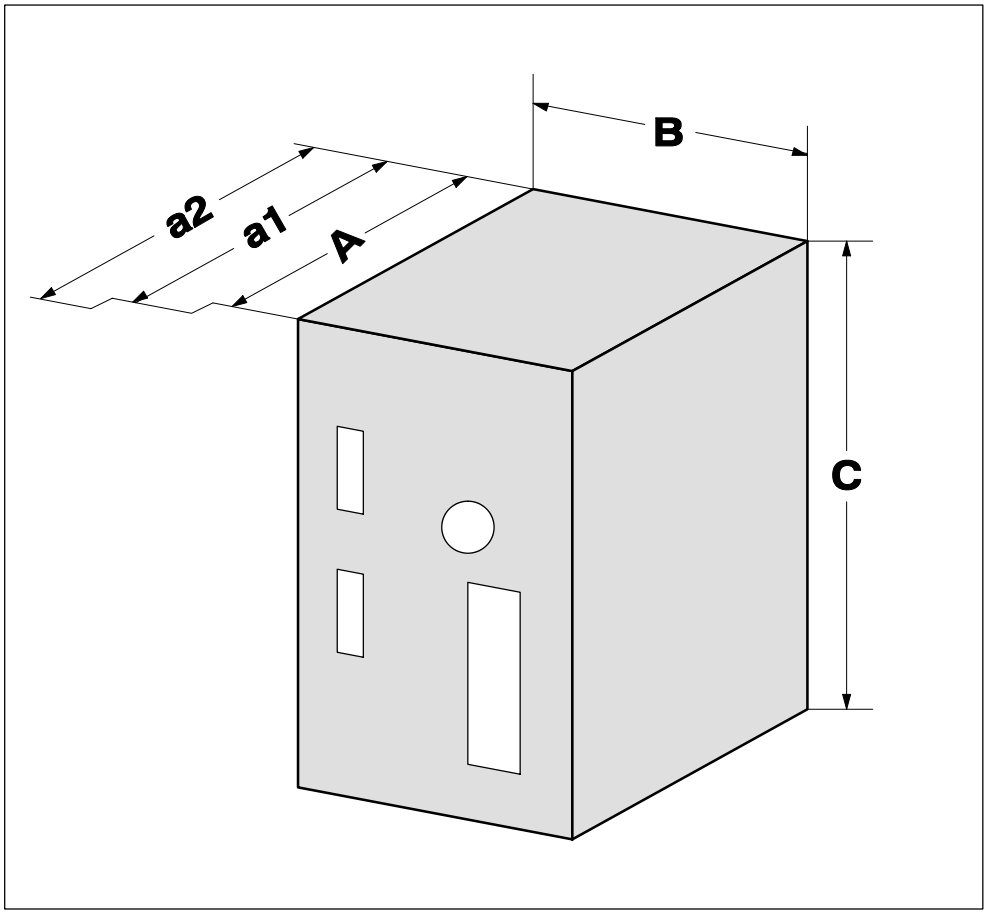
Damaging the attached seal, results in a loss of warranty.

2.2.1 Specifications

Protection type	IP20
Operating voltage	24V DC +20% −15% with max. ±5% ripple
Synchronizing voltage	27V AC ±20% 50/60Hz with auto detection
Rated current (w/o I/O) at 24V	approx. 250mA without PROFIBUS approx. 350mA with PROFIBUS
Starting current	approx. .5 – 1.0A
Power losses	approx. 8.5VA +.5VA per active input + 2.4VA per active output
Environmental conditions	
– Operation – Storage – Transport – Air pressure – Humidity	0°C . . . . . +60°C −25°C . . . . . +70°C −25°C . . . . . +70°C 0 . . . . . 2000m above sea level No dew point excursion allowed
Number of programs	256, access to each individually from program selection.
Parity	for program selection Off/Even/Odd
Discrete I/O	
– Inputs	logic ‘1‘ +24V ±15% logic ‘0‘ −1V . . +2V or open
– Outputs	A) 24V max. 1A B) 24V max. 0.1A A+B) protected with instrument fuse, display over LED
Supply I/O signals	24V DC +20% −15% with max. ±5% ripple
Discrete I/O, BUS	
– Sensor/Actuator bus types	PROFIBUS-DP or INTERBUS-S
– Sensor/Actuator bus	Data exchange over 3 input bytes and 3 output bytes
Programming	– over internal V24-interface – over FIELDBUS (PROFIBUS, option)
Operating system	in Flash-Memory, reloadable from software package (option).
Program memory	RAM memory
Backup battery	Lithium-Battery Type AA/S Part No. 1070914446, to buffer RAM data and internal clock during power loss. Battery life approx. 2 years.

2.2.2 Dimensions, Weight, Packaging

Housing construction type B Without plug Without hangers	A = 175mm B = 113mm C = 237mm
Depth with plug in front	a1 = approx. 200mm
Depth with V24 plug in front	a2 = approx. 250mm
Weight	approx. 3kg



NOTE:

The addition of hangers and mounting rails is not included in the depth dimension.

The timer is to be supplied only in original BOSCH shipping containers.

2.2.3 Installation and Removal

The timer is to be mounted in a suitable cabinet. Temperature and humidity must comply with the specifications from page 8 (0°C ... +60°C).

NOTE:

When mounting the U-shaped mounting rails in the timer cabinet, note the hole dimensions. In this way you avoid conflict with the timer hangers.

Clearance

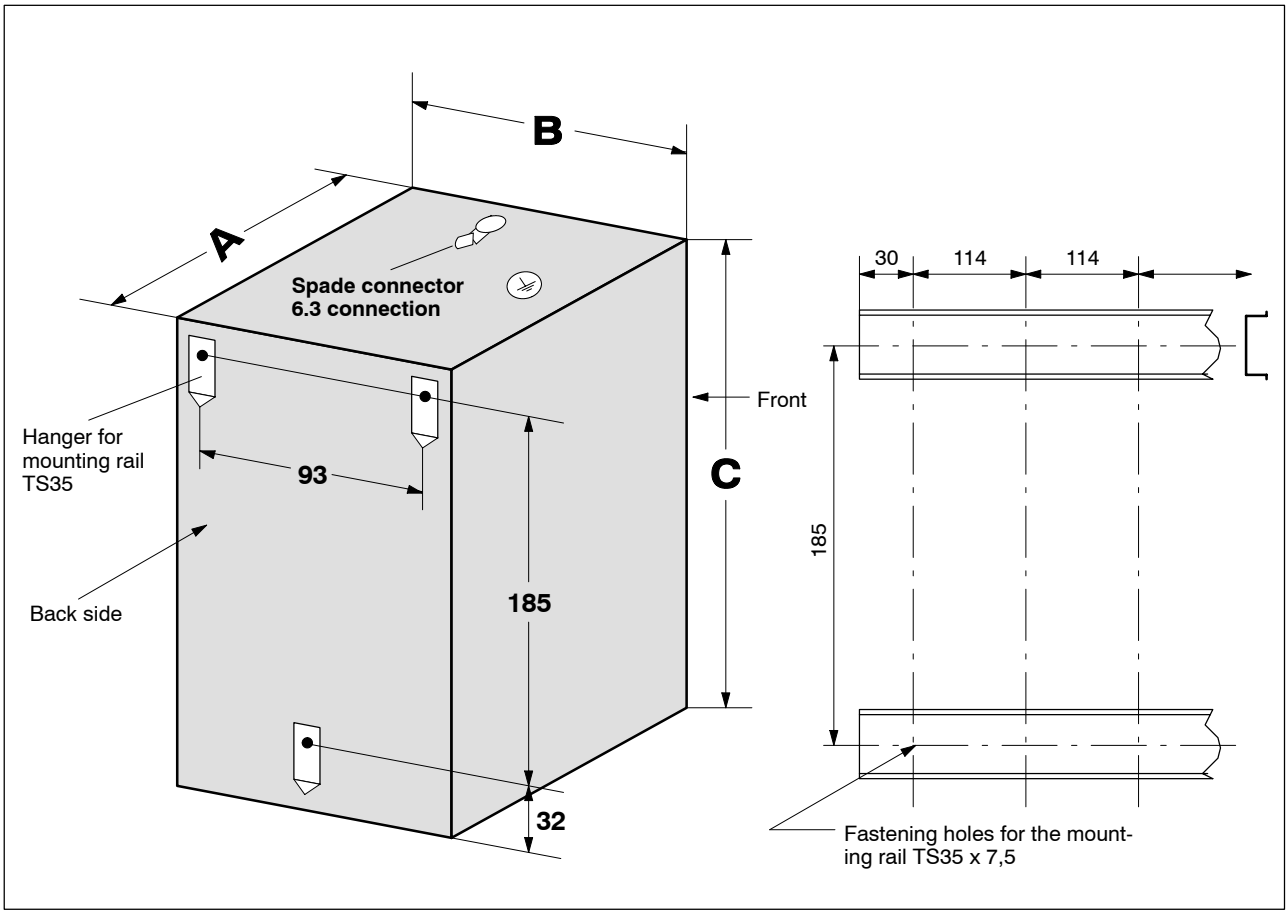
A clearance of 40 mm for ventilation is to be provided above and below the timer in the housing (over the entire device depth).

Timers side by side

A space of approx. 1 cm must be allowed, if several timers are mounted on one set of mounting rails.

NOTE:

The raised portions of the rear wall serve to position the hangers.



Installation

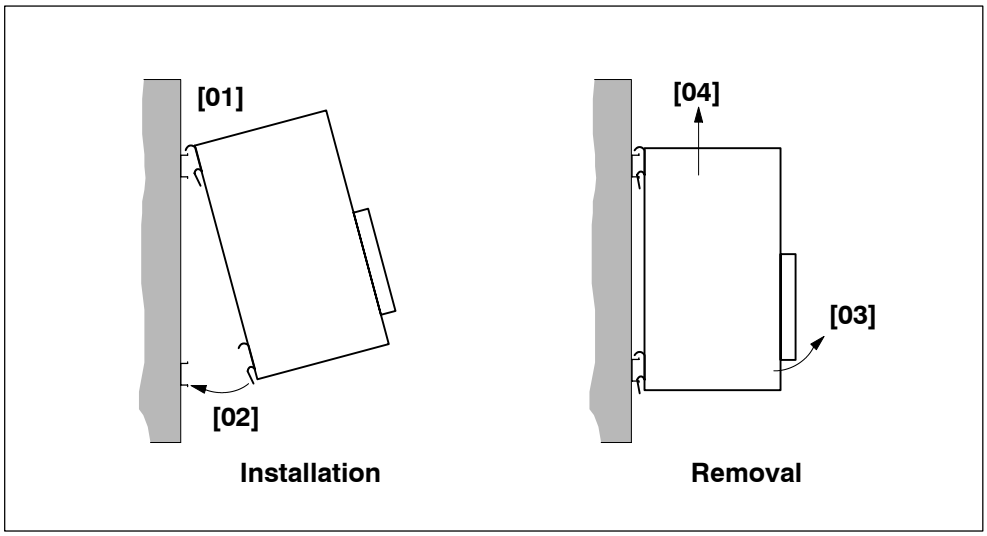
[01] Engage the upper hanger of the timer into the upper mounting rail.

[02] Use light pressure to slip the timer into the lower mounting rail.

Removal

[03] Carefully pull and tilt the bottom of the timer forward.

[04] Lift the slightly tilted timer out of the mounting rail in an upward direction.

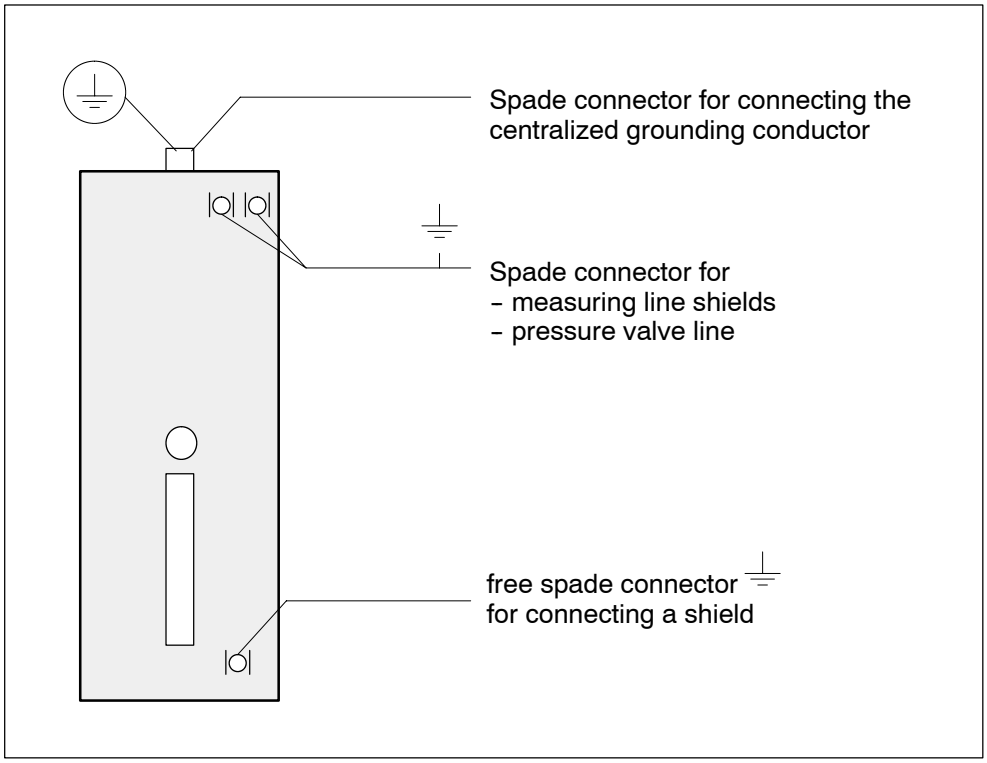


2.2.4 Grounding and Shielding

The timer housing must be grounded. Use the 6.3 mm spade connector on the top of the timer housing for connecting the grounding conductor.

The grounding conductor wire size must comply with VDE 0113, but must have a cross sectional area of at least 1.5 mm^2.

The housing of the timer is the common point for the shield conductors of the individual cables.



2.2.5 Suppression of Radio Frequency Noise

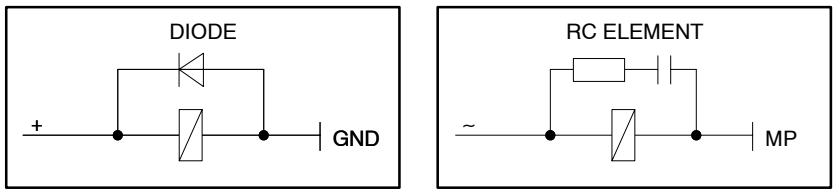
Means of noise suppression are required to prevent radiation of RF noise. Such noise is caused by transients peaks, which are transmitted by the power supply line.

Noise should be neutralized at the source. If this is not practical, the noise suppression devices must be placed as close as possible to the source.

All inductive devices such as valves, solenoids and other switching elements (or their connecting wires), which are situated in the vicinity of the timer require noise suppression.

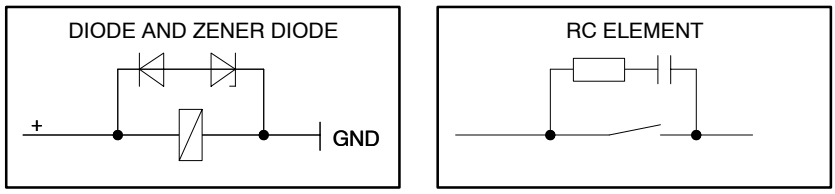
Because of inherent vibrations of the machine, the mounting of all noise suppression devices must be resistant to fracture.

Examples of noise suppression



Diode, suitable for small DC relays

RC element for AC relays and AC motors



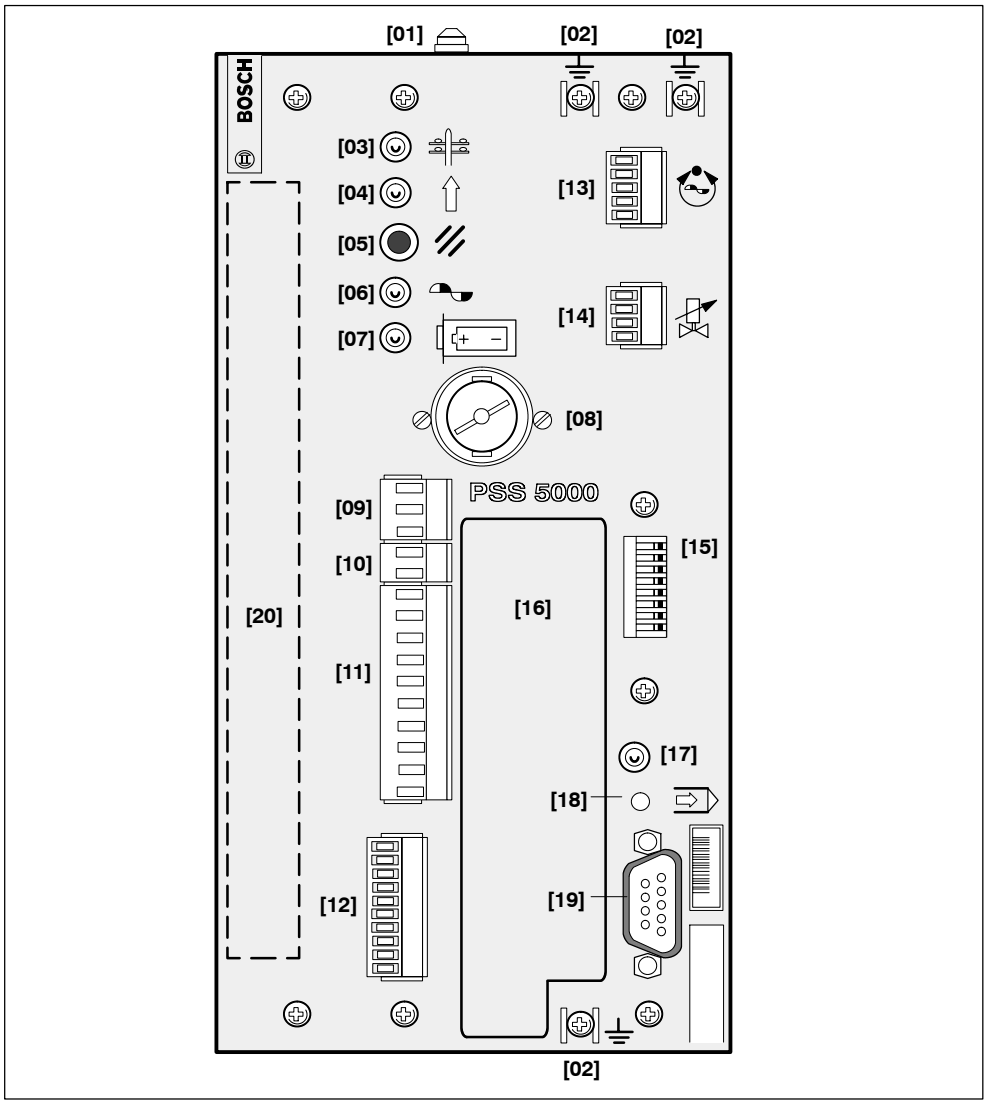
DI-ZD attenuation element for large DC contactors and defined drop-out times

RC element for spark quenching of inductive loads

	Resistor	Capacitor	Diode
24VDC	–	–	1 N 5060/ZL 12
48VDC	–	–	1 N 5060/ZL 22
110VAC	220Ω 1W	0.5 μF 400/600V	
220VAC	220Ω 5W	0.1 μF 500V	
440VAC	220Ω 5W	0.1 μF 1000V	

This table serves only as an example. The actual component values depend on the specific load conditions.

2.2.6 Module front panel



[01] Top of housing, spade connector for grounding connector

[02] Spade connector for cable shielding

[03] Line LED, connected to +24 VDC supply voltage for weld timer electronics (without I/O supply)

[04] Ready LED, timer ready, turns off in case of:
- Internal fault such as dead battery
- Schedule fault, such as no current

[05] Reset push button, clears pending fault messages, returns timer to ready state.

[06] Firing LED, Control signal for thyristor unit active

[07] Battery fault LED, backup battery voltage too low

[08] Battery compartment; use only batteries with Bosch P/N 1070914446.

[09] Plug-in terminal - main switch trip (HSA),
floating toggle

[10] Plug-in terminal - welding transformer primary voltage feedback (UPR) for functions Weld without command, half wave monitoring.

[11] Plug-in terminal - thyristor unit
- synchronizing voltage
- control thyristor unit
- monitor thyristor unit ...

[12] Plug-in terminal - power supply
- +24 V supply of internal power supply unit
- STOP jumper
- +24 V I/O

[13] Connector for measuring system,
e.g. with constant current control (KSR)
Connection for sensor

[14] Connector for analog output,
e.g. with control of a proportional pressure valve

[15] DIL switch, to set up address of programming interface

[16] Slot for PROFIBUS Module (FIELD BUS)
(programming interface)

[17] LED red, timer processor not in operating mode:
The timer stopped processing commands. The control is in boot mode. New operating software (firmware) may be loaded. This LED may turn on briefly during power up. Should the LED come on during normal operation (welding operation will not be possible), cycle power to the control. If the LED should turn on again unexpectedly, then the operating software is lost. Using a utility program from a PC, reload software over the V24 interface.

[18] Recessed key from operating mode to boot mode.
Pressing this key turns the system to boot mode. You should only turn to boot mode, for loading a new operating program (firmware).

ATTENTION!

This key may only be operated by authorized personnel.
Never operate this key during a welding operation.
Program execution will be stopped and all outputs set to zero.

[19] A 9 pin D shell plug, V24 interface

[20] Elements of type specific I/O system,
e.g. 24 V discrete, sensor/actuator bus
(see type specific information for details).

2.2.7 Mating Plugs for non-specific type I/O system

Included in timer shipment :

[09]	HSA, X7	3 pin (5mm)	P/N 1070 913967
[10]	UPR, X6	2 pin (5mm)	P/N 1070 914564
[11]	PSL, X5	10 pin (5mm)	P/N 1070 913813
[12]	INT, X4	10 pin (3.5mm)	P/N 1070 916714
[13]	Measur. system, X3	5 pin (3.5mm)	P/N 1070 916910
[14]	Pressure control, X2	4 pin (3.5mm)	P/N 1070 916908

Not included in shipment are:

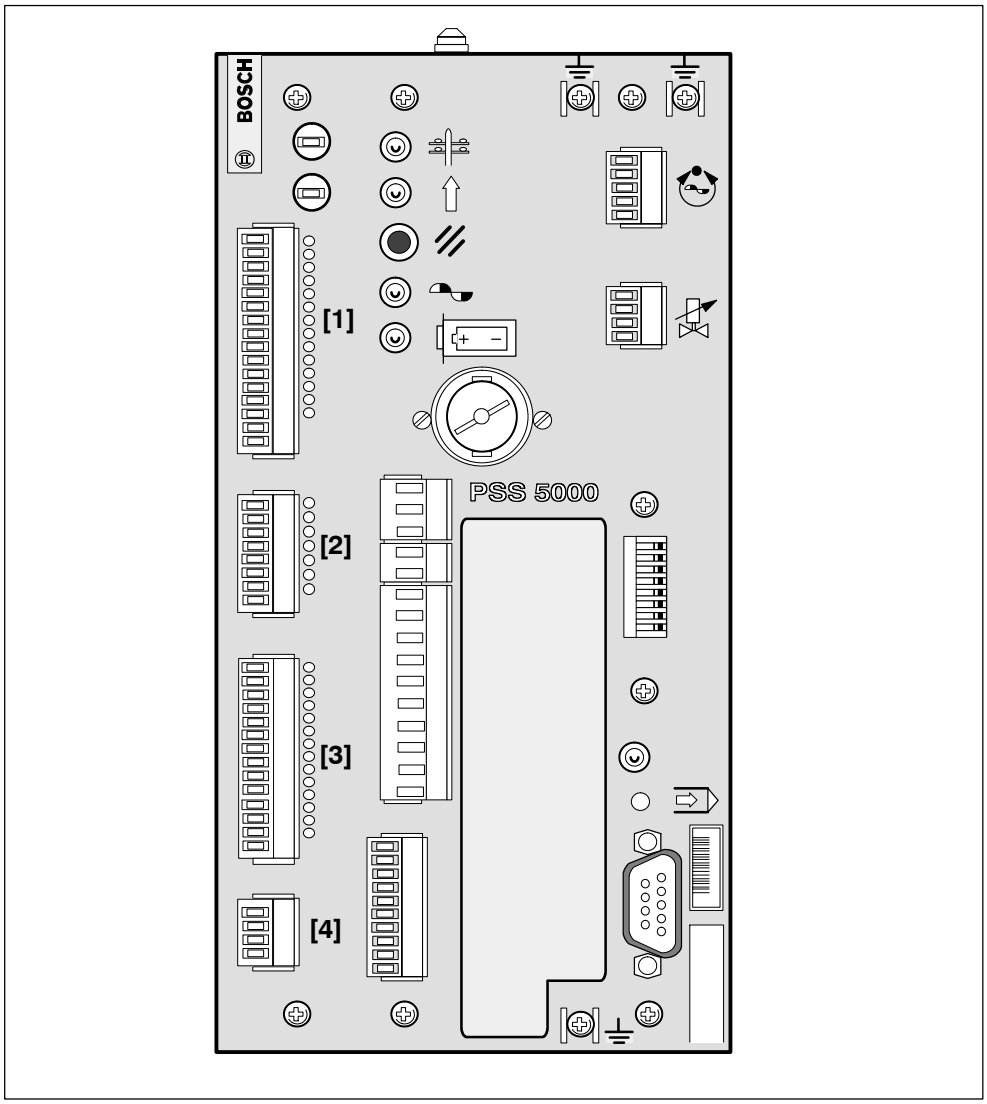
[19]	V24, X1	9 pin female D shell connector	P/N 1070 912981
		9 pin female D shell connector housing	P/N 1070 313723

NOTE:

Information on mating plugs for type specific I/O systems is included in the type specific information!

	V24 cables	for connecting PC to PSS5000, length 1.5 meter	P/N 1070 066749

2.2.8 Front panel of the PSS 5100.100B



[1] Input connectors (3.5 mm spacing)

[2] Input connectors (3.5 mm spacing)

[3] Output connectors (3.5 mm spacing)

[4] Connector for external 24 VDC power supply (jumper if internal supply is used) (3.5 mm spacing)

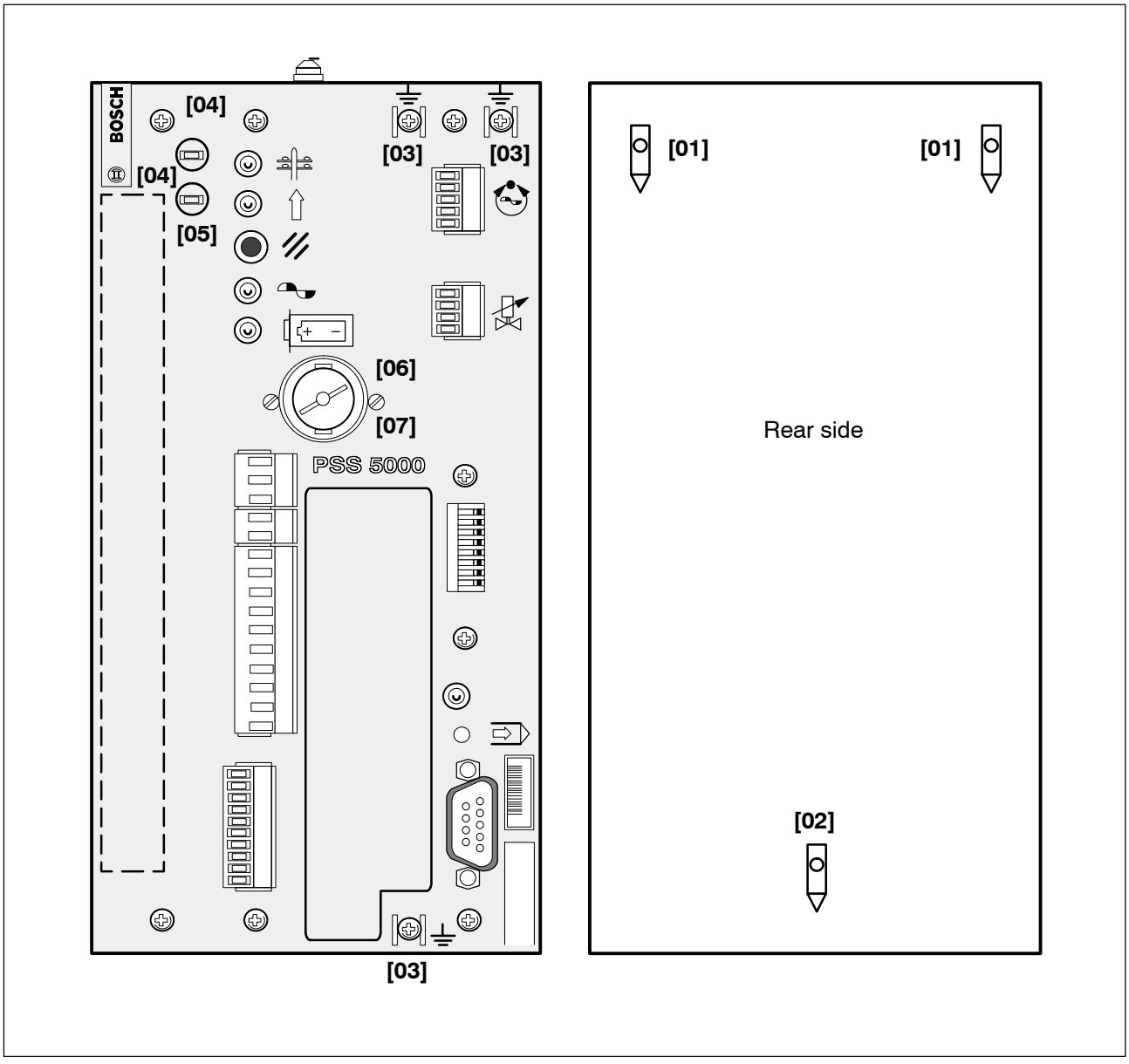
For the terminal assignment, see the Wiring diagram of the PSS 5100.100B section.

2.2.9 Mating Plugs for type specific I/O system PSS 5100.100B

Included in shipment:

[01]	Inputs, X11	16 pin (3.5mm)	P/N 1070 916795
[02]	Inputs, X10	8 pin (3.5mm)	P/N 1070 916553
[03]	Outputs, X9	14 pin (3.5mm)	P/N 1070 916914
[04]	Power supply, X8	4 pin (3.5mm)	P/N 1070 916908

2.2.10 Replacement parts, front and rear for non-specific type I/O systems



[01] Hanger top

[02] Hanger bottom

[03] Spade connector, grounding

[04] Fuse (1 x for output A0,m 1 x for outputs A1 through A12)

[05] Fuse holder

[06] Battery

[07] Battery compartment with cover

2.2.11 Replacement parts (for non-specific type I/O system) PSS 5000

[01]	Hanger top	2 pce.	P/N 1070 917431
[02]	Hanger bottom		P/N 1070 075622
[03]	Spade connector	6.3 x 0.8 mm	P/N 1070 912816
[04]	Fuse, M 1.6 A	Type 5 x 20, 2 pce.	P/N 1070 900844
[05]	Fuse holder with cover	Type 5 x 20 FAB	P/N 1070 910588
[06]	Battery		P/N 1070 914446
[07]	Battery compartment		P/N 1070 917004

2.3.0 Wiring of the PSS 5100.100B

NOTE:

Electromagnetically activated switching and positioning devices require noise suppression (see section on noise suppression).

See the table on Conductors and Conductor Lengths about choosing cables and cable lengths.

Cable shielding is to be connected single ended to the ground connections of the terminal strips. If this is not possible, they must be connected to the specially marked ground connections of the PSS5000. For this purpose, a yellow/green stranded wire of 0.75 mm^2 cross sectional area and approx. 100 mm in length must be connected and run with strain relief towards the outside. The end has to be terminated with a spade lug of 6.3 x 0.8 mm, which is connected to the appropriately marked grounding terminal.

Inputs

A supply voltage of 24 VDC is present at the terminal strips, to provide power to the inputs X10 and X11.

Outputs

A common 0 Volt return for the connection of outputs A0 and A1–12 is provided on the terminal strip.

The outputs A0 and A1–12 are individually fused:
- M 1.6 A fuse for output A 0
- M 1.6 A fuses for outputs A1–12.

I/O voltage range

The following applies to all input and output voltages:
- 24 VDC +20% –15%
- ripple ≤ 5%
- load: solenoid valve output up to 1A (A0).
  other signal outputs 0.1 A each (A1 through A12).

Operating voltage Int 03/03

The following applies to the operating voltage at inputs Int 02 and 03:
- 24 VDC +20% –15%
- ripple ≤ 5%
- load: typically 0.5 A, making current ≤ 1A.

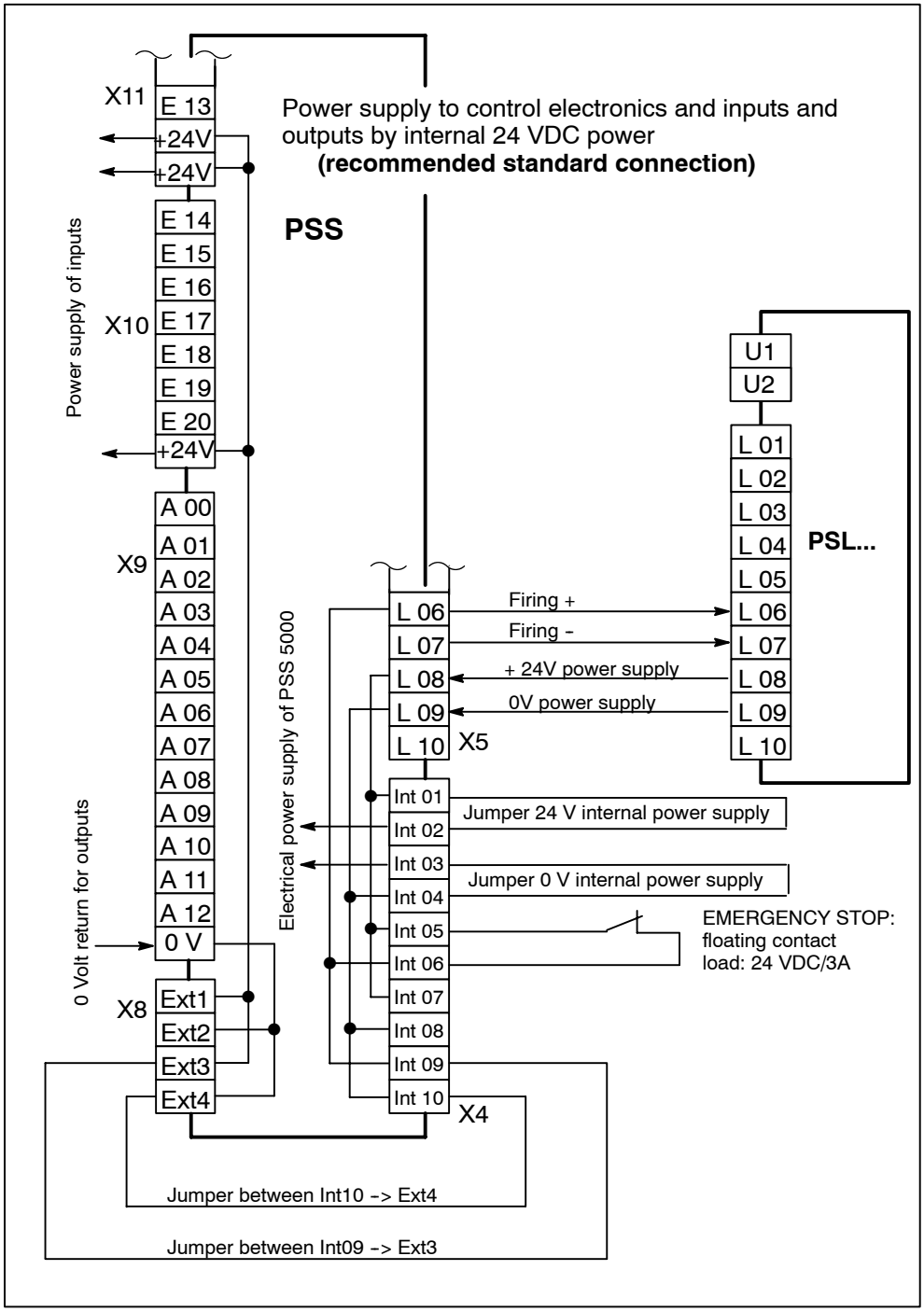
NOTE:

For determining the power supply rating, sum up the individual loads required.

2.3.1 Internal 24 VDC Power and E-Stop

The PSS5000 can be powered with internal 24 VDC power (using a PSL power supply). Several jumpers have to be positioned to enable the internal power supply (see wiring diagram).

A **floating contact** to be connected to Int 05 – 06 is provided for the **emergency stop function**, when used with an **internal power supply**. Opening of this contact interrupts the **firing** and **power to the inputs and outputs.**

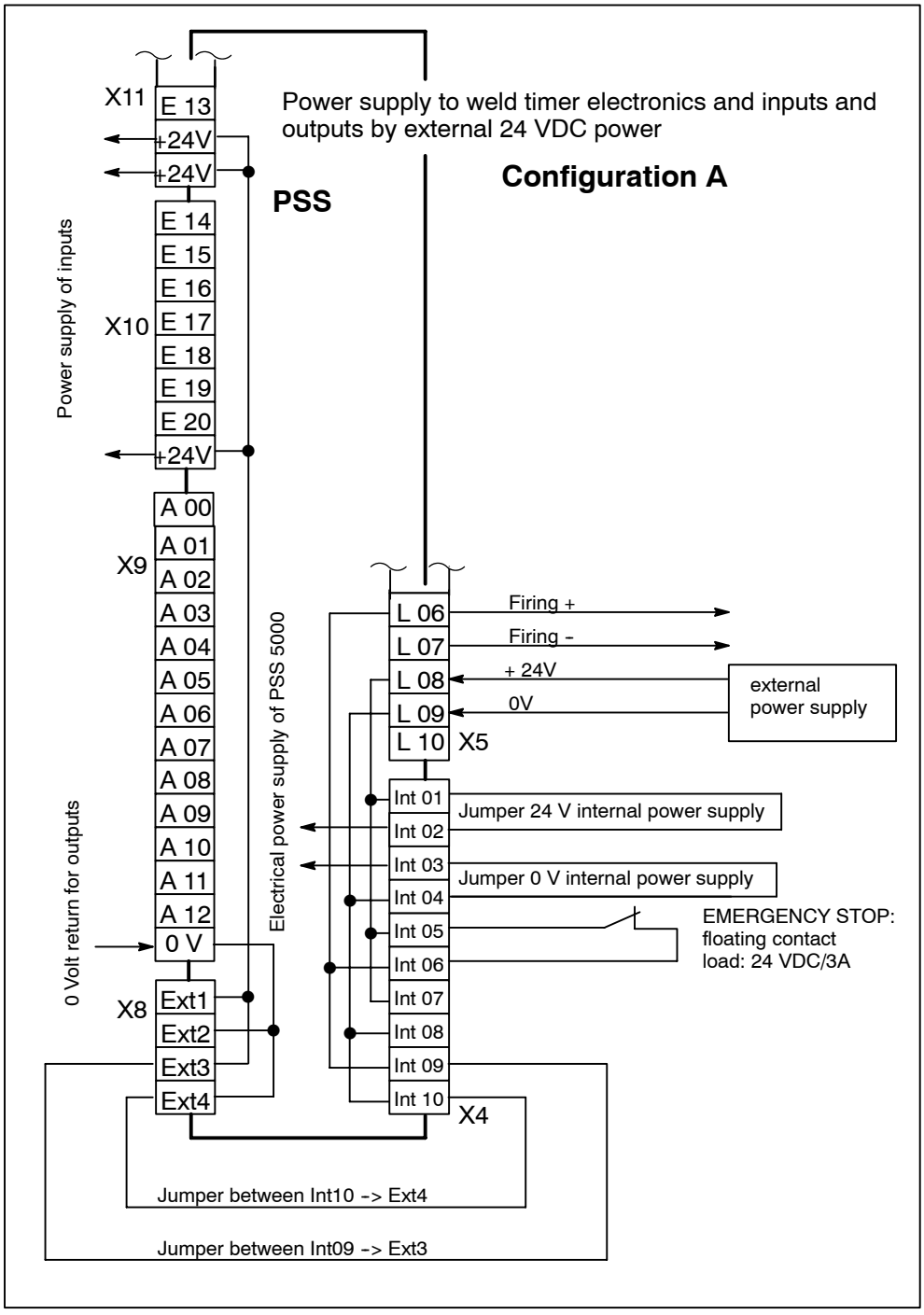


2.3.2 External 24 VDC Power and E-Stop

The PSS5000 can be powered with an external 24 VDC power supply. There are several possible configurations (A, B, C and D) when using an external power supply. Different provisions in securing the E-Stop function must be made, depending on the configuration used.

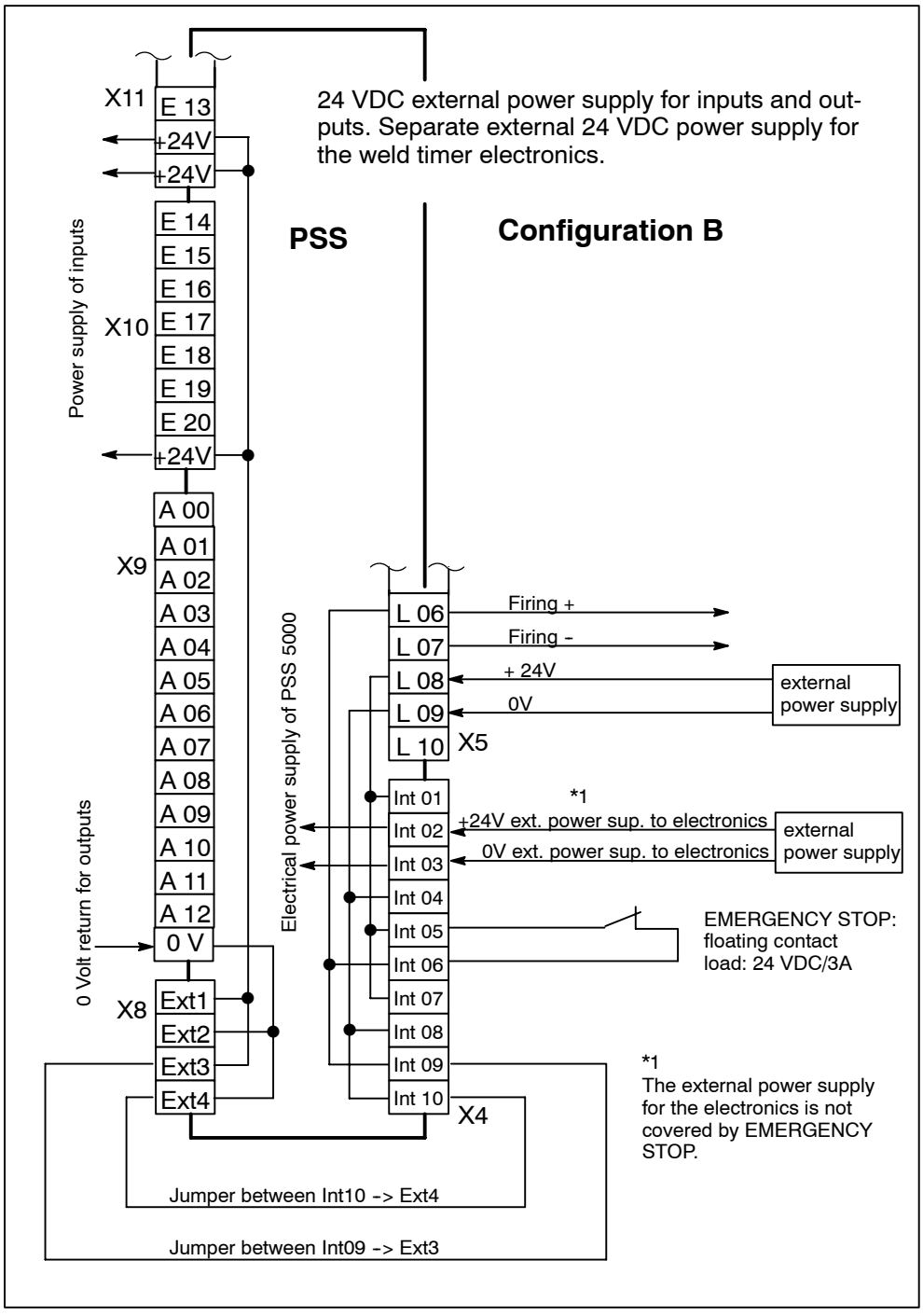
An external voltage source has to deliver a current of 2 Amperes. The maximum allowable ripple must be 5% or less.

When using an **external power supply**, the **E-Stop function** is secured by a **floating contact** to be connected to Int 05-06. Opening of this contact interrupts the **firing** and the **power supply to the inputs and outputs.**



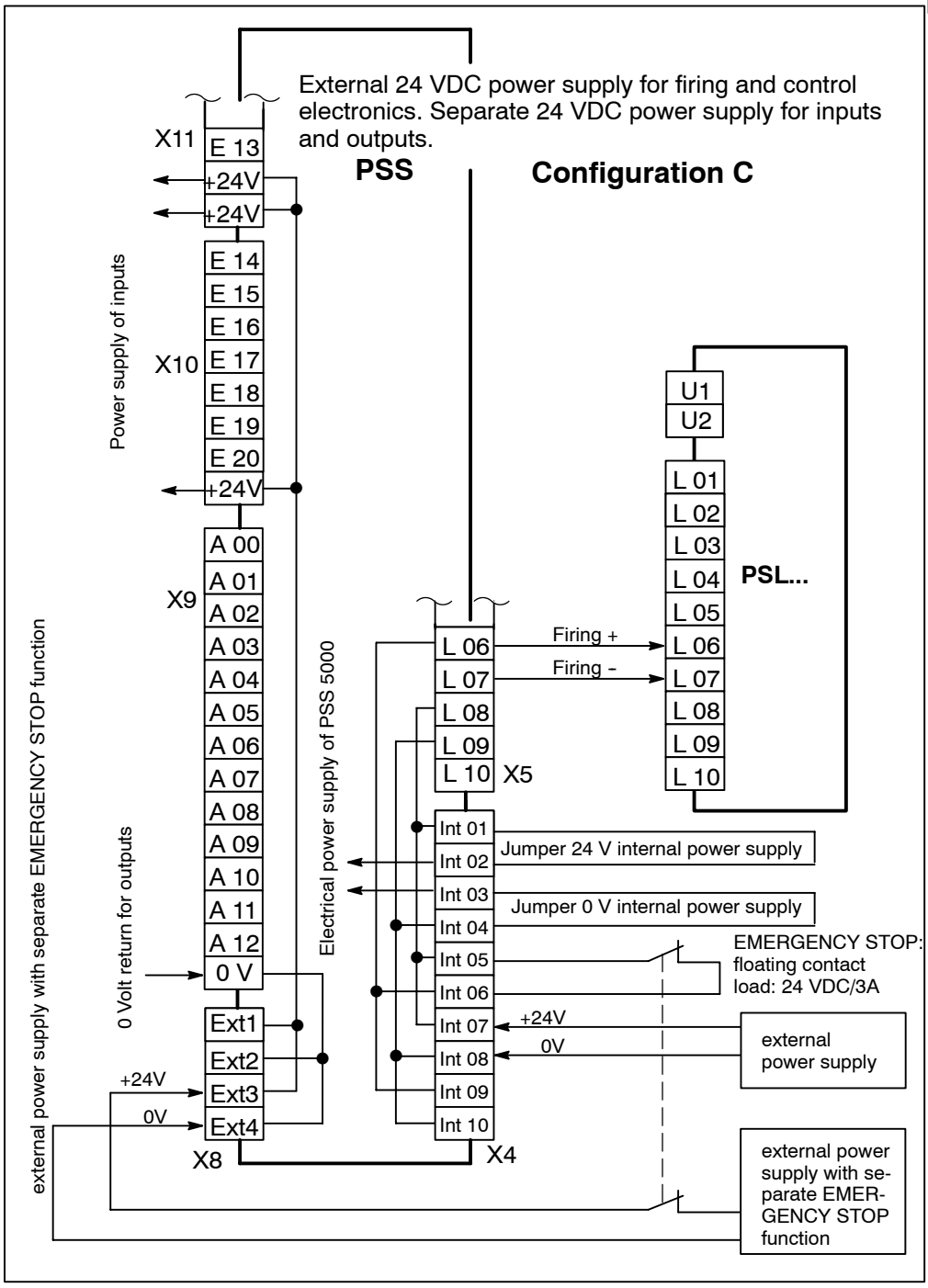
When using an **external power supply** for inputs and outputs and for firing, according to configuration B, the **E-stop function** is secured by a **floating contact** to be connected to Int 05-06. Opening of this contact interrupts the **firing** and the **voltage supply to the inputs and outputs.**

The weld timer electronics is supplied by a separate, external power supply without **E-stop function.** This external voltage source is loaded with a current of typically 0.5 A, making current ≤ 1 A (ripple ≤ 5%, tolerance +20%, -15%).

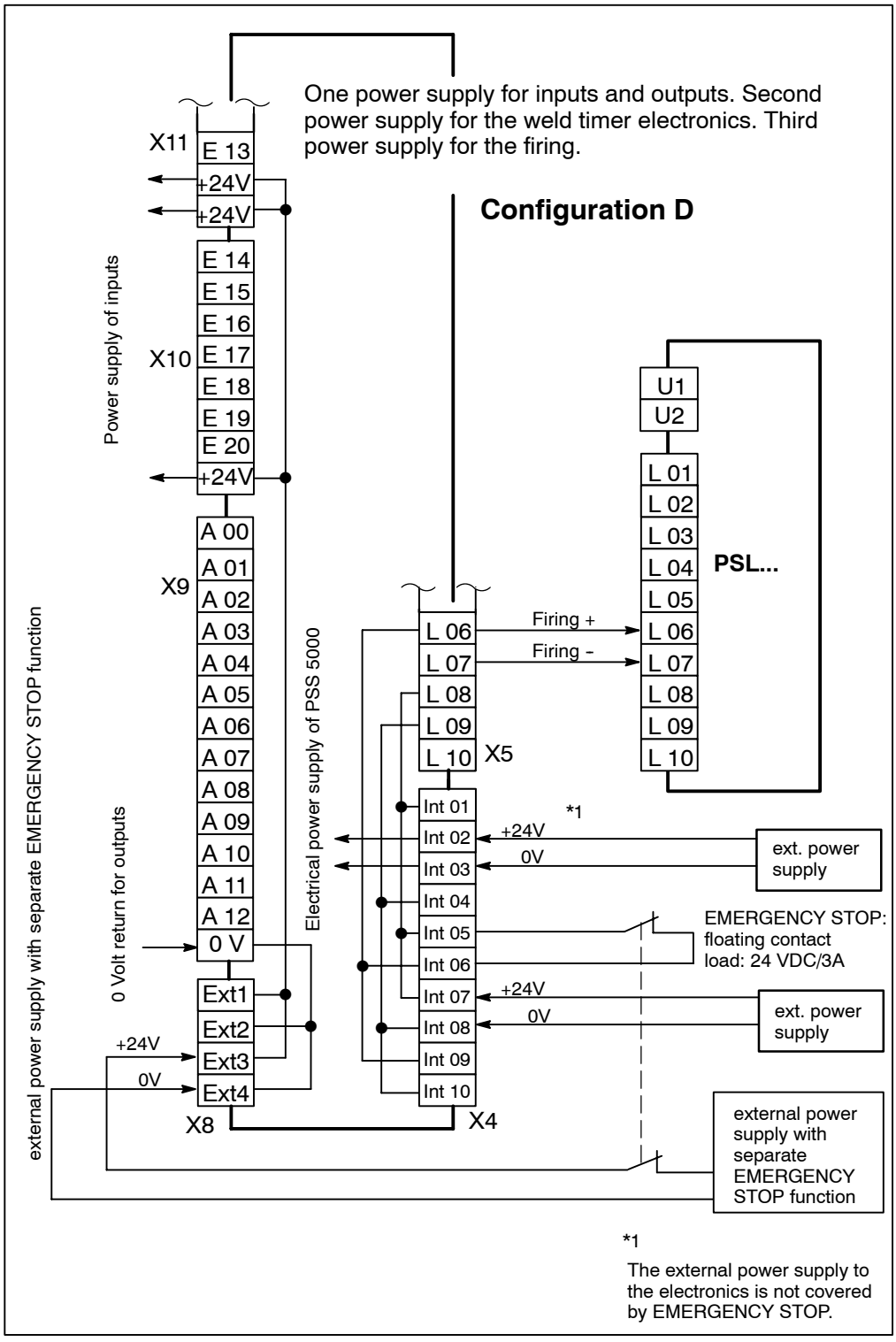


When using an **external power supply** for **inputs and outputs**, according to configuration C, the **floating contact** connected to Int 05 – 06 will interrupt only the **firing**. Additional provisions must be made to secure the **E-Stop function** for **inputs and outputs**, by using an **external auxiliary E-Stop contact** in the feeder line to the external power supply at connector X8.

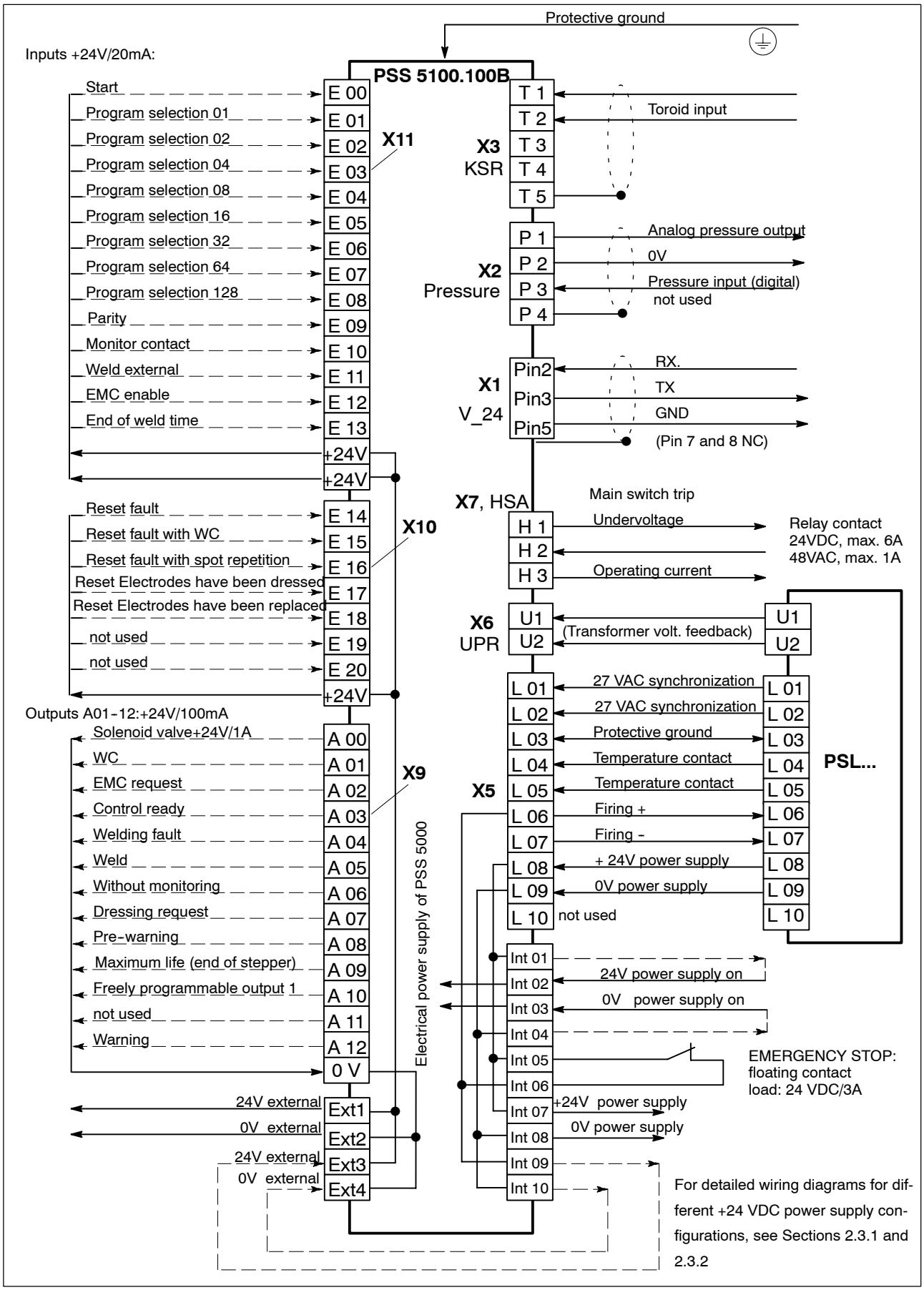
2



When using an **external power supply** for **inputs and outputs**, according to configuration D, the **floating contact** connected to Int 05 – 06 will interrupt only the **firing**. Additional provisions must be made to secure the **E-Stop function** for the **inputs and outputs**, using an **external auxiliary E-Stop contact** in the feeder line to the external power supply.



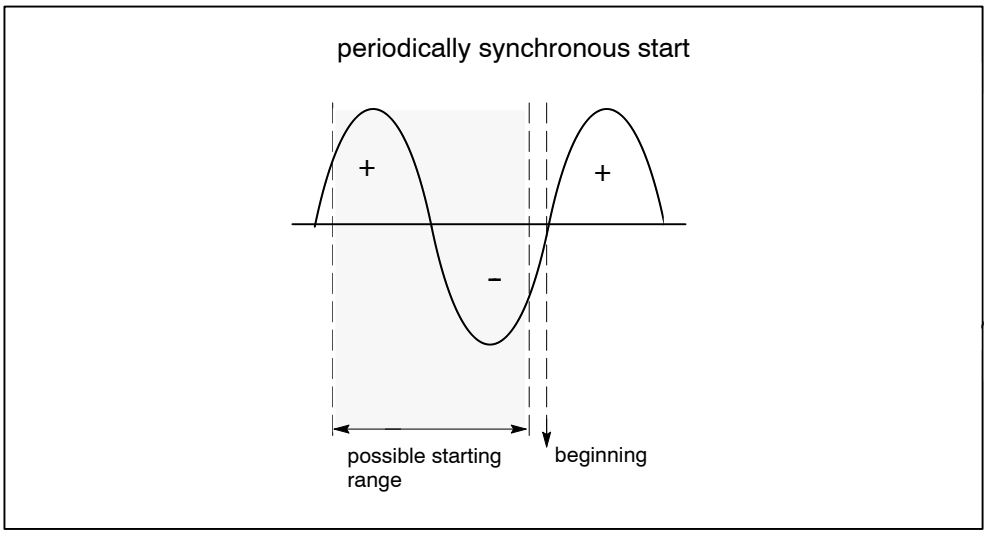
2

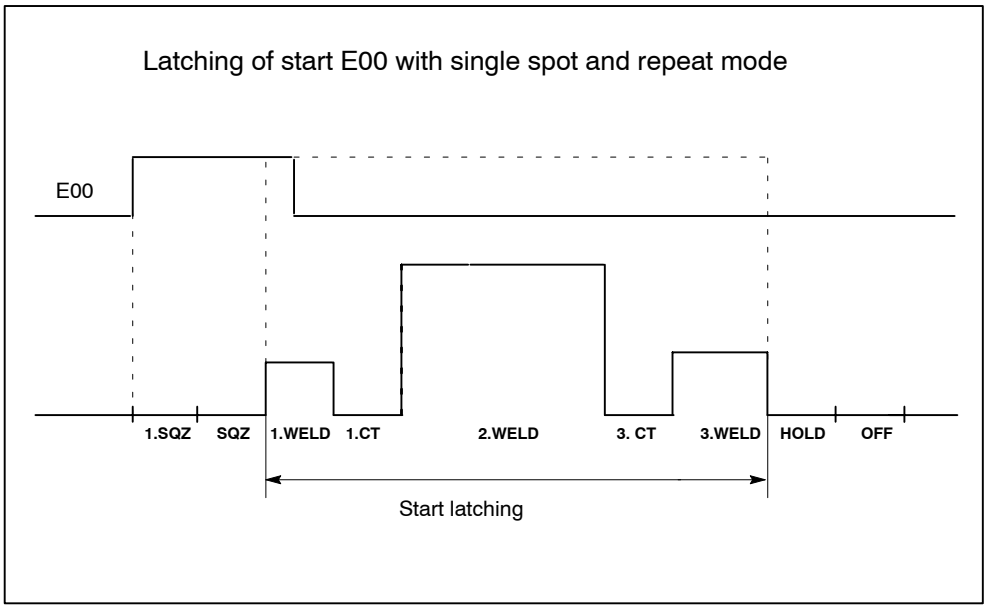

Protective ground
Inputs +24V/20mA:
PSS 5100.100B
Start
Program selection 01
Program selection 02
Program selection 04
Program selection 08
Program selection 16
Program selection 32
Program selection 64
Program selection 128
Parity
Monitor contact
Weld external
EMC enable
End of weld time
E 00
E 01
E 02
E 03
E 04
E 05
E 06
E 07
E 08
E 09
E 10
E 11
E 12
E 13
+24V
+24V
X11
Reset fault
Reset fault with WC
Reset fault with spot repetition
Reset Electrodes have been dressed
Reset Electrodes have been replaced
not used
not used
E 14
E 15
E 16
E 17
E 18
E 19
E 20
+24V
X10
Outputs A01-12:+24V/100mA
Solenoid valve+24V/1A
WC
EMC request
Control ready
Welding fault
Weld
Without monitoring
Dressing request
Pre-warning
Maximum life (end of stepper)
Freely programmable output 1
not used
Warning
A 00
A 01
A 02
A 03
A 04
A 05
A 06
A 07
A 08
A 09
A 10
A 11
A 12
0 V
X9
24V external
0V external
24V external
0V external
Ext1
Ext2
Ext3
Ext4
Electrical power supply of PSS 5000
X3
KSR
T 1
T 2
T 3
T 4
T 5
Toroid input
X2
Pressure
P 1
P 2
P 3
P 4
Analog pressure output
0V
Pressure input (digital)
not used
X1
V_24
Pin2
Pin3
Pin5
RX.
TX
GND
(Pin 7 and 8 NC)
X7, HSA
H 1
H 2
H 3
Main switch trip
Undervoltage
Operating current
Relay contact
24VDC, max. 6A
48VAC, max. 1A
X6
UPR
U1
U2
(Transformer volt. feedback)
X5
L 01
L 02
L 03
L 04
L 05
L 06
L 07
L 08
L 09
L 10
27 VAC synchronization
27 VAC synchronization
Protective ground
Temperature contact
Temperature contact
Firing +
Firing -
+ 24V power supply
0V power supply
not used
PSL...
Int 01
Int 02
Int 03
Int 04
Int 05
Int 06
Int 07
Int 08
Int 09
Int 10
24V power supply on
0V power supply on
EMERGENCY STOP:
floating contact
load: 24 VDC/3A
+24V power supply
0V power supply
For detailed wiring diagrams for different +24 VDC power supply configurations, see Sections 2.3.1 and 2.3.2

2.3.3 General wiring instructions - PSS 5100.100B for example

Start E00

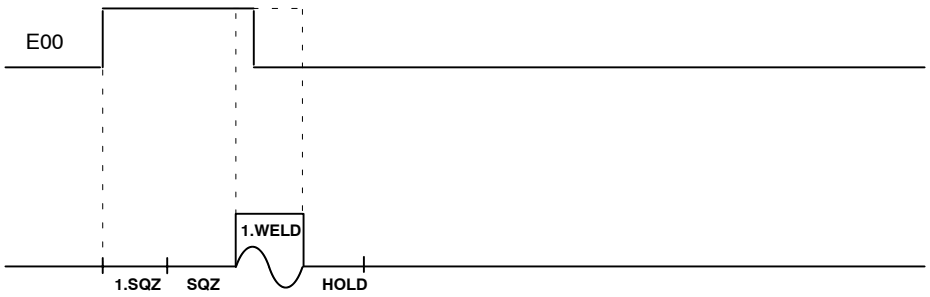
When input E00 is activated, the weld timer is started synchronously (with the first subsequent positive half-wave), and output A00 (solenoid valve) is activated with +24VDC. Together with the start, the selected program number, which had been active bounce-free at the moment the start was initiated, is interlocked. The start signal also triggers off the pre-squeeze time. The start can be cleared again during 1.SQZ and SQZ, and the program run can be interrupted. Latching of the program execution only starts with 1.WELD.



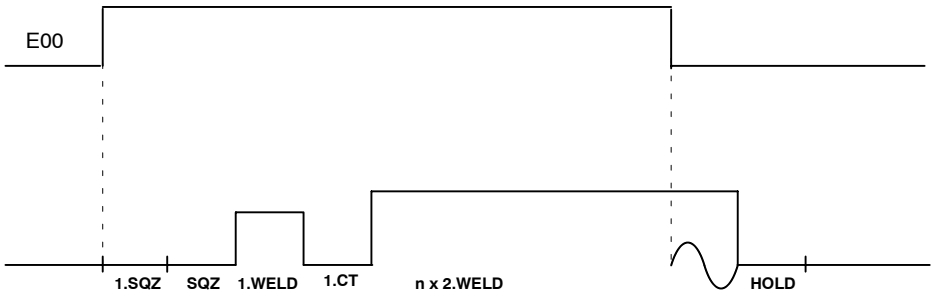


2

Start E00 in seam mode (end during 1.WELD)



Start E00 in seam mode (end during 2.WELD)

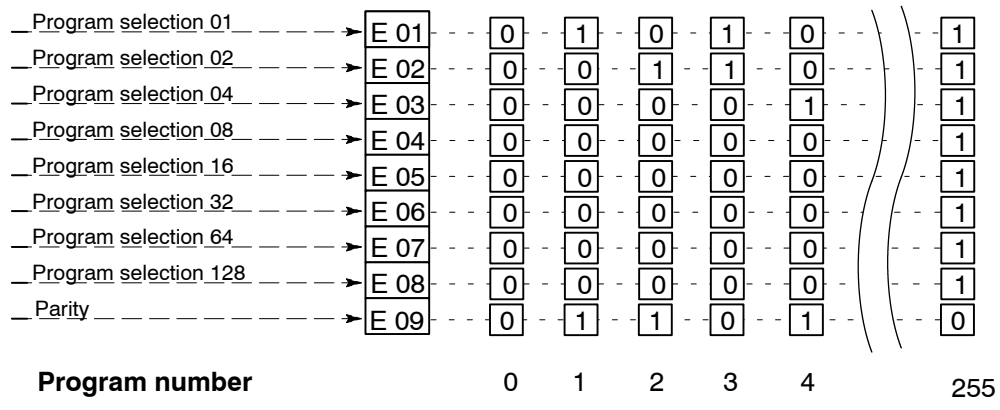


Program selection E01 - 09

Parameters for a total of 256 welding programs can be defined for the welding timer. The binary program selection is accomplished by asserting +24 VDC on inputs E01 – 09. Program selection is generally made automatically through communication with the robot control.

Program selection may be accompanied by parity bit E09, which results in an even/odd horizontal checksum when added to the program number (software selection: parity off/even/odd).

Program selection: Example of even parity



The desired program number must be available bounce-free prior to the start signal.

Selection of the program number will energize the analog pressure output with the programmed pressure value.

NOTE:

The parity type (off, on, odd) is programmed in the Basic-Setup, I/O Parameters Section

NOTE:

*If program number 0 is selected, and if +24VDC are asserted on input E18 (Reset Electrodes have been replaced), the counters of **all electrodes** will be reset.*
*If a program number between 1-255 is selected and +24VDC are asserted on input E18 (Reset Electrodes have been replaced), only the counters of the **electrode assigned to this program** will be reset.*

Monitor contact E10

When 1.SQZ has elapsed, input E10, Monitor contact, is scanned. The **<monitor contact>** signal reports to the welding timer, that the electrodes are closed. Presence of the 24 VDC signal to input E10 starts the squeeze time.

ATTENTION!

If Monitor contact is connected to 24 VDC, the squeeze times must be selected long enough to permit optimal contact of the part to be welded.

Weld/No weld external E11

Input E11 allows to disable the firing of the welding timer as for example during set-up operations.

The programmed internal weld setting has priority over the signal present at E11. This programming is valid for the entire timer, i.e. for all 256 programs, or for a single program.
If weld has been deactivated at E11, the time sequence of the program will remain identical to the sequence with activated firing. However, no welds are performed.

No weld = Input is 0 Volt or open
Weld = Input at +24 VDC

NOTE:

If monitoring has been activated, the timer will signal "No weld external" and "No current" after each schedule without current.

EMC enable E12

The line load limitation control (EMC) assures, that the number of timers, which may weld simultaneously in a given area, does not exceed the capacity of the supply line.

If no line load limitation control is used, this input should be connected to +24 VDC.

The **EMC enable** signal is scanned for +24VDC at the end of SQZ. If this condition is met, the welding cycle is performed without delay.

End of weld time E13

By asserting a +24 VDC signal to the input, it is possible by means of an external intervention to force a synchronized termination of the welding process true to the cycle (the weld time will stop with the next negative half-wave). Then HOLD is started.

The **<End of weld time>** signal clears the *freely Programmable Output* A10.

Reset fault E14 - 16

Resetting of a fault is required, whenever a fault prevents any further welding sequences.

Pending faults are reset by

- software BOS-5000
- using the green key on the front panel of the PSS5000 or
- sending a 24 VDC signal to one of the inputs E14 - 16.

E14 - Reset Fault

A momentary +24 VDC signal to input E14 resets the displayed fault. The cause of the fault must be cleared first. The weld complete contact (WC) will not be output, the welding timer is put into ready state.

E15 - Reset Fault with weld complete contact

A momentary +24 VDC signal to input E15 resets the displayed fault. The cause of the fault must be cleared first. The **<weld complete contact>** (WC) signal will be output by pending start, the welding timer is put into ready state.

E16 - Reset Fault with spot repetition

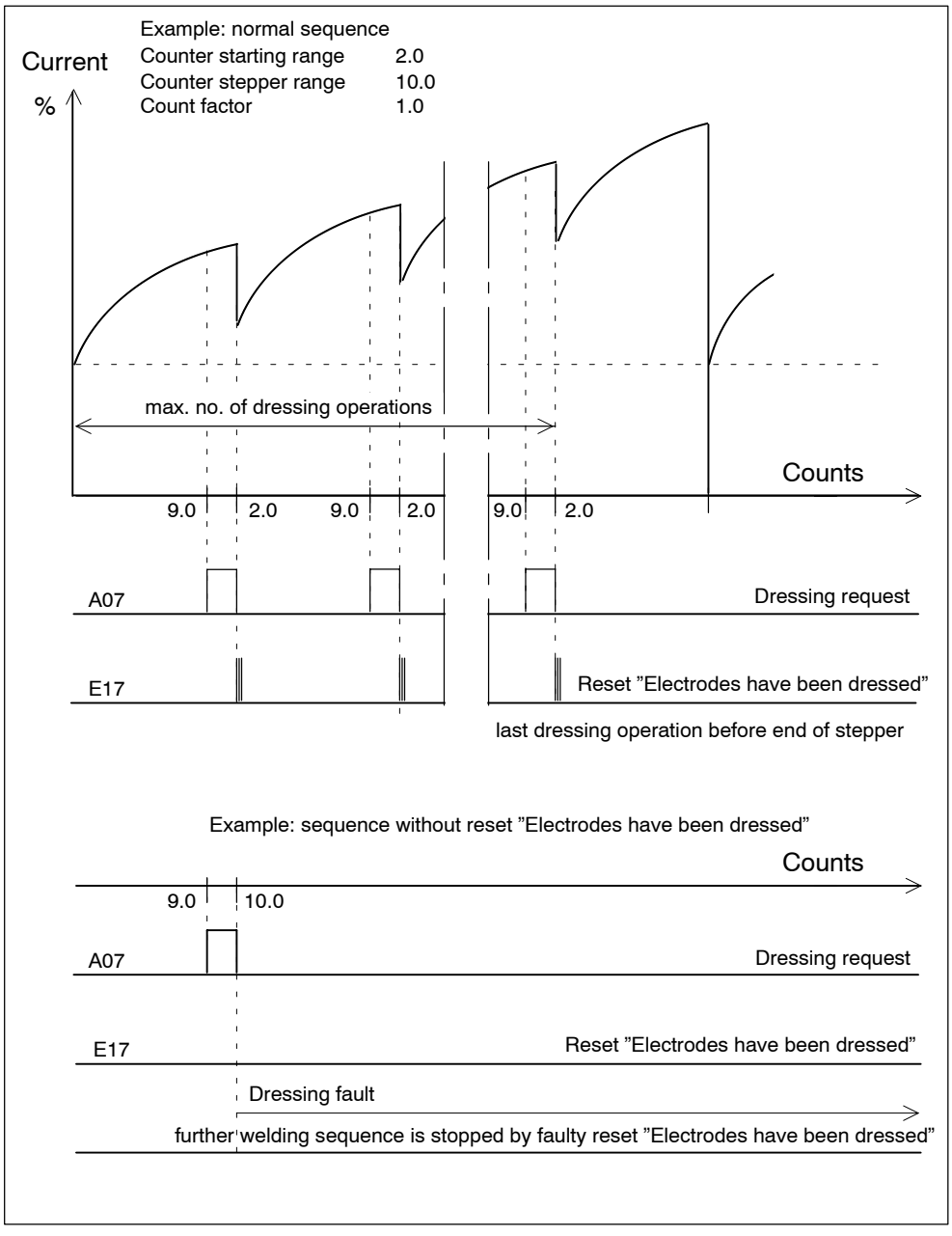
A momentary +24 VDC signal to input E16 resets the displayed fault. The cause of the fault must be cleared first. By pending start, the welding timer is put into ready state and will repeat welding this spot.

WARNING!

If a start signal is pending while resetting a fault, the PSS5000 starts immediately with the program sequence. This may result in dangerous machine movements. Always make sure in advance that nobody is in the dangerous range of the welding gun or the robot.

Reset “Electrodes have been dressed” E17

Spot welds are programmed in stepper operation, which require a dressing of the electrodes in one or several operating cycles. The output A07 signals that dressing is required. This output signal will be reset and turned off as soon as a +24 VDC signal at input E17 reports the completed dressing operation.



NOTE:

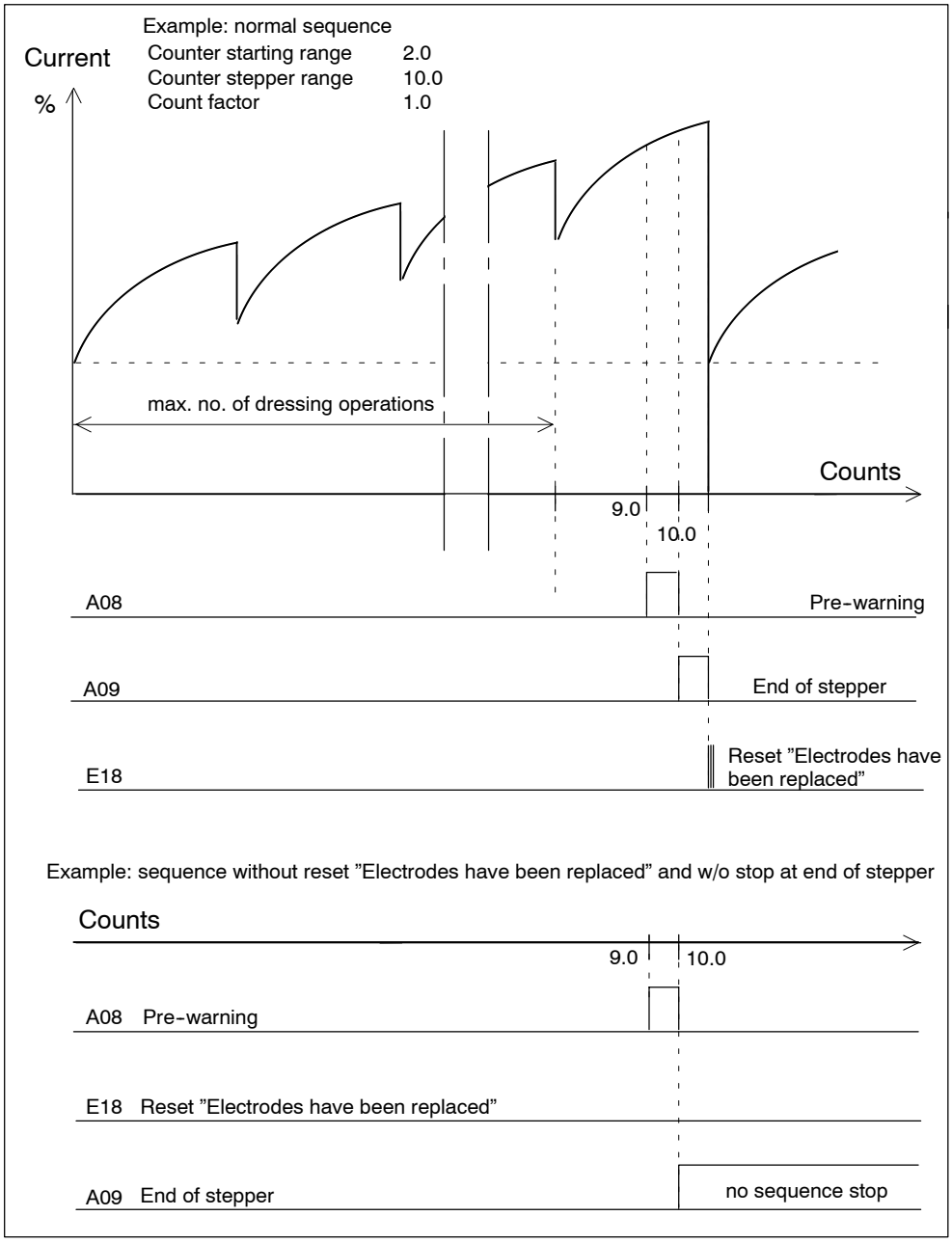
If stepper number 0 is selected at inputs E01 – E08 and +24VDC are asserted on input E17 (Electrodes have been dressed), all dress counters are incremented by 1 and all wear counters are reset.
If an electrode number 1 – 31 is selected at inputs E01 – E08 and +24VDC are asserted on input E17 (Electrodes have been dressed), the selected dress counter is incremented by 1 and the wear counter is reset.

Reset “Electrodes have been replaced” E18

Output A09 signals reaching the programmed End of Stepper. Any further programmed welding operations can be disabled through appropriate programming in the basic settings (see Global electrode parameter setting section). The signal at output A09 is canceled as soon as a +24 VDC signal at input E18 signals, and thus acknowledges, that the electrodes have been replaced.

NOTE:

The response of the weld timer (stop or continued operation) to the reaching of the max. number of welds is programmed in the basic settings, Global Stepper-Setup settings section.



NOTE:

If stepper number 0 is selected at inputs E01 – E08 and +24VDC are asserted on input E18 (Electrodes have been replaced), ***all dress counters*** *and* ***all wear counters*** *are reset.*
If an electrode number 1 – 31 is selected at inputs E01 – E08 and +24VDC are asserted on input E18 (Electrodes have been replaced), the dress counter and the wear counter of this electrode are reset.

Solenoid valve A00

A 24 VDC signal at output A0 serves to energize a solenoid valve. The output is fused by a miniature glass fuse.

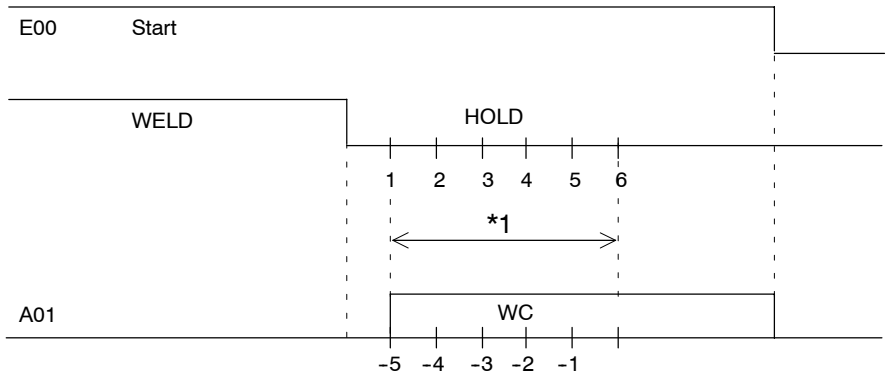
The output signal carries +24 VDC before the beginning of 1.SQZ until the end of HOLD time. From OFF time onward, the output carries a 0V signal. In repeat mode, the 0V signal is only available for the duration of OFF time.

Weld complete contact A01 (WC)

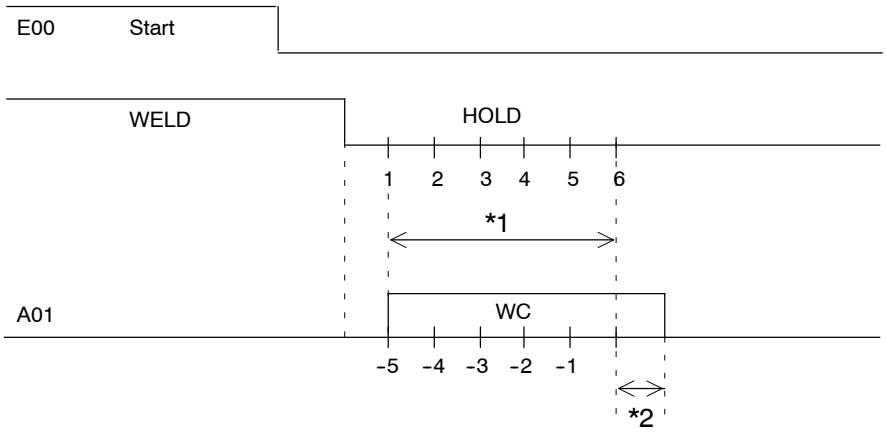
If the welding operation of a single spot is properly completed by the end of the last weld time, output A01 is set +24 VDC for as long as the **<Start>** signal is true, or for a programmed number of mains cycles if the **<Start>** signal is not true. This signal serves as an acknowledgement for peripheral devices (e.g. robot control). The **<weld complete contact>** signal takes effect after each weld in single spot mode. In repeat and seam mode, output A01 carries +24 VDC to signal a faultless weld after the end of repeat mode, or at the end of the seam.

Example for programming the weld complete contact (WC)

HOLD = 6 cycles with true start and single spot mode



HOLD = 6 cycles with no start and single spot, repeat or seam mode



*1: possible time range for programming ”WC start”

*2: Duration of WC signal after the end of HOLD time with no start = 1 cycle

The beginning of the WC signal can be programmed between 0 – 10 cycles prior to the end of HOLD time.

NOTE:

The maximally programmable value for the beginning of WC is:
number of HOLD time cycles less 1 cycle.

Output of the **<weld complete contact>** signal in the event of a welding fault can be prevented by appropriate programming in the *Basic-Setup*, menu item *I/O Parameters.*

EMC request A02

This output is set 24 VDC one cycle before the end of squeeze time until the end of weld time. This signal **<EMC request>** is used to request line load limitation which, depending on the current load on the supply line, will enable or inhibit the requesting weld timer for this time period with the signal **<EMC enable>**.

Control ready A03

The signal **<Control ready>** reports the ready state to the welding timer. In parallel, the green LED ⇑ is lighted. This output is canceled in the event of a fault, e.g.

- no internal +24 VDC supply
- E-STOP circuit open,
- recognition of a welding fault that has been defined as a fault in the *Fault Allocation* in the *Basic-Setup* menu,
- main switch trip by weld without command (weld without command: the weld timer recognizes a current flow in the welding circuit for which no command was given),
  a battery fault that has been defined as a fault in the *Fault Allocation* in the *Basic-Setup* menu.

NOTE:

The programming terminals signals the cause of the fault in the Timer-Status-Message window. Detailed information is displayed by calling up diagnostics for I/O's or timer diagnostics.

When the cause of the fault has been cleared, the ready state is restored by asserting a +24 VDC signal on inputs E14, E15 or E16.

Welding fault A04

In case of a failure, this output will be set to +24 VDC, whenever the failure was defined as a fault from the Basic–Setup in the menu Fault Allocation. If the fault is spot–related, any further welding operations are disabled, until a signal is set at one of the inputs E14 –16 **<Reset Fault>**, or **<Reset fault with weld complete contact WC>** or **<Reset Fault with spot repetition>**.

In case of a failure, output A04 is activated with

- single spot mode: after welding the spot. Welding of more spots is not possible wIthout fault reset.
- repeat mode: after the end of the spot which was recognized as a defective weld. Welding of more spots in repeat mode is not possible without fault reset.
- seam mode: after the end of the seam. Welding of more seams is not possible without fault reset.

NOTE:

A failure is defined as a fault in the Fault Allocation feature in the Basic–Setup menu.

Fault code	Description
84	Battery fault (no effect on A04) **[1]**
86	Data Restore active (no effect on A04) **[1]**
96	Electrode stuck (currently not used)
97	DEC measurement circuit fault (currently not used)
1001	Current measurement circuit open
1002	Current measurement circuit shorted
1003	No voltage 1st half-wave
1004	Primary voltage measurement fault
1010	No current (standard mode)
1011	No current 1. WLD (mixed mode)
1012	No current 2. WLD (mixed mode)
1013	No current 3. WLD (mixed mode)
1020	Low current (standard mode)
1021	Low current 1. WLD (mixed mode)
1022	Low current 2. WLD (mixed mode)
1023	Low current 3. WLD (mixed mode)
1030	High current (standard mode)
1031	High current 1. WLD (mixed mode)
1032	High current 2. WLD (mixed mode)
1033	High current 3. WLD (mixed mode)
1040	Series of welds below lower threshold point (standard mode)
1041	Series of welds below lower threshold point 1.WLD (mixed mode)
1042	Series of welds below lower threshold point 2.WLD (mixed mode)
1043	Series of welds below lower threshold point 3.WLD (mixed mode)
1050	Current measurement range exceeded (standard mode)
1051	Current measurement range exceeded 1. WLD (mixed mode)
1052	Current measurement range exceeded 2. WLD (mixed mode)
1053	Current measurement range exceeded 3. WLD (mixed mode)
1060	Weld time too short (standard mode)
1061	Weld time too short 1. WLD (mixed mode)
1062	Weld time too short 2. WLD (mixed mode)
1063	Weld time too short 3. WLD (mixed mode)
1070	Weld time too long (standard mode)
1071	Weld time too long 1. WLD (mixed mode)
1072	Weld time too long 2. WLD (mixed mode)
1073	Weld time too long 3. WLD (mixed mode)

[1] The definition of this event as a **fault** will clear the Ready state of the weld timer. No further sequence will be possible.

Weld

A05

When firing has been activated by the **<Weld external>** signal on input E11, this output carries a +24 VDC signal for acknowledgement.

Weld (A05: +24VDC): Firing is active for all programs of the weld timer.

No weld (A05: 0VDC): Firing has been deactivated for all programs of the weld timer.

NOTE:

In addition to intput E11, firing is activated and deactivated by making a selection in the programming of the Basic-Setup, Sequence-Setup option. With this option, firing can be activated or deactivated for all programs of a welding control (all timers) or for individual programs (additionally for a program).

Firing settings

For all timers		Program-related firing	Program-related sequence
Weld external	Weld internal		
off	off	off	Sequence **without** welding current
off	off	on	Sequence **without** welding current
off	on	off	Sequence **without** welding current
off	on	on	Sequence **without** welding current
on	off	off	Sequence **without** welding current
on	off	on	Sequence **without** welding current
on	on	off	Sequence **without** welding current **[1]**
on	on	on	Sequence **with** welding current

[1] Caution: Program-related firing may be active for other programs

NOTE:

When firing has been deactivated internally or externally for all timers, output A05 carries a 0V signal and a timer status message is displayed at the programming terminal.

NOTE:

When firing has been deactivated internally for specific programs, output A05 will carry a 0V signal level only after the start signal has been given.

Weld monitoring A06

This output when set to +24VDC reports that current and time monitoring of the last activated program was stopped. It is activated after the end of the last weld time and cleared by the next start.

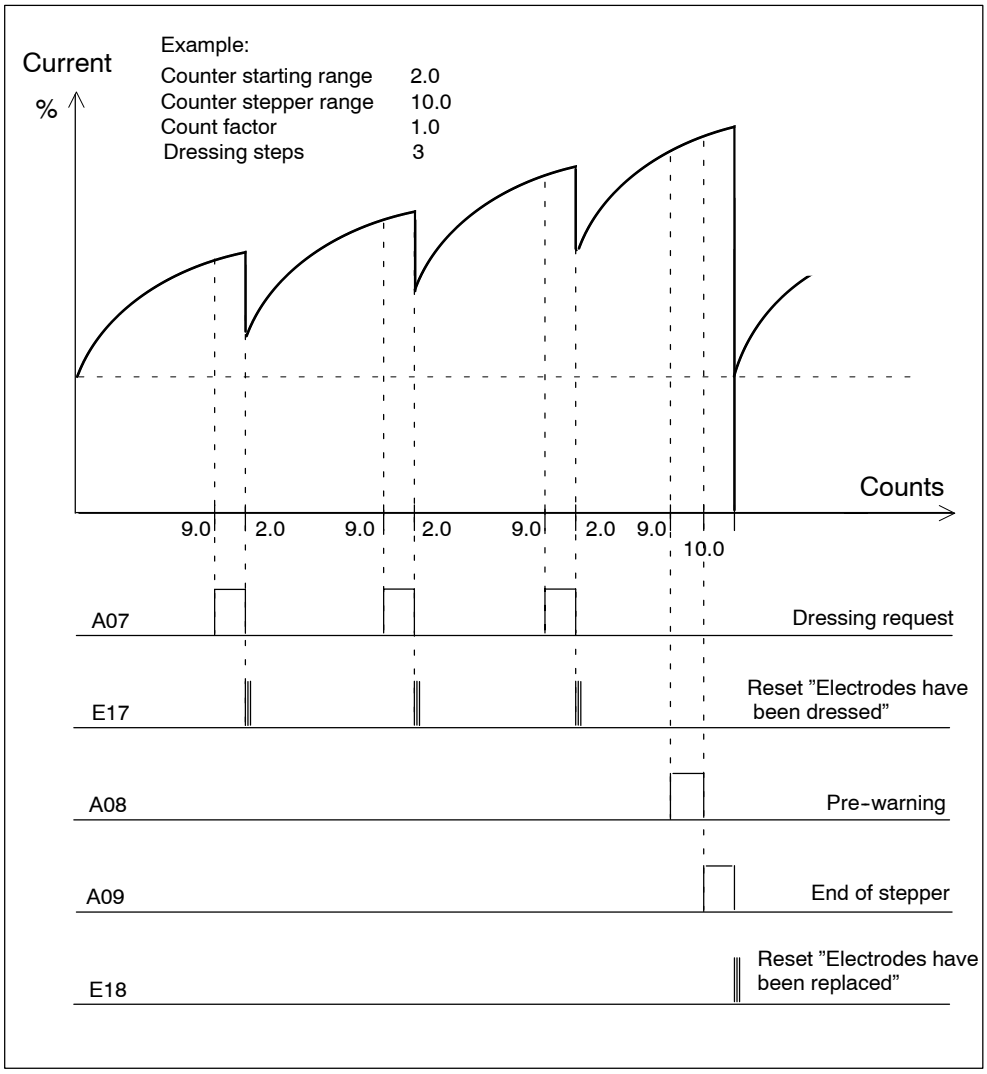
Monitoring			
Current monitoring	Time monitoring	Monitoring **stopped** for all timers	Monitoring function and display on A06
off	off	on	on : **without** monitoring
off	off	off	on : **without** monitoring
off	on	on	on : **without** monitoring
off	on	off	off : **with** monitoring
on	off	on	on : **without** monitoring
on	off	off	off : **with** monitoring
on	on	on	on : **without** monitoring
on	on	off	off : **with** monitoring

NOTE:

Monitoring stopped is activated and deactivated for all timers (for all programs of the selected timer) in the Basic-Setup, in the menu Sequence- Setup.
Current monitoring is activated and deactivated for specific programs with the Welding Parameters option in the Current-Monitoring window.
Time monitoring is turned On or Off for specific programs with the Welding Parameters option in the Time Monitoring window.

Dressing request A07

For electrode maintenance, the Dressing Request signal (electrode tip dressing) is activated. Output A07 signals with a +24VDC signal that dressing is required. The signal will be reset and turned off as soon as input E17 reports the completed dressing operation.



Pre-warning A08

The +24 VDC signal **<Pre-warning>** is set when a count factor is reached, which is programmed into the welding operation. It signals that the maximum life (End of Stepper) for the electrode will soon be reached. The signal at this output will be reset and turned off as soon as the maximum life (End of Stepper) is reached.

NOTE:

Programming of the counts is accomplished in the Welding-Parameters menu in the Stepper... window.

Together with the programmed counts in pre-warning, the dressing request is output in the stepper range, indicating that dressing will soon be required.

Maximum Life (End of Stepper) A09

Reaching of the programmed maximum life (End of Stepper) is reported by a +24 VDC signal at output A09. Any further welding operations may be disabled by appropriate programming. The signal at this output will be reset and turned off as soon as a +24 VDC signals at input E18 reports the completed electrode change.

NOTE:

Stop at End of Stepper Yes/No is programmed in the Basic-Setup in the Global Stepper Setup window.

Freely Programmable Output A10

Each welding program can be associated with a freely programmable digital output. This output can have a maximum of three programmable On and Off times during the welding operation. This can be used to control for example an additional solenoid valve or other peripheral devices.

The timing of the *freely Programmable Output* is started with the begin of SQZ and forced to stop with the end of HOLD, at the latest (output is cleared), even if any further times have been programmed.
The signal **<End of weld time>** on E13 has the same effect. It also serves to force timing of the freely programmable output to stop and clears output A10.

NOTE:

The freely Programmable Output is programmed in the Welding-Parameters menu in the Freely Programmable Output window.

Warning A12

In case of a failure, this output will be set to +24 VDC, whenever the failure was defined as a Warning from the Basic–Setup in the menu Fault Allocation. The welding sequence is not stopped. If the fault is spot–related, the output is reset by a +24 VDC signal at one of the inputs E14 –16 **<Reset Fault>**, or **<Reset fault with weld complete contact WC>** or **<Reset Fault with spot repetition>** or by the next start.

NOTE:

A failure is defined as a warning in the Fault Allocation feature in the Basic-Setup menu.

Fault code	Description
84	Battery fault (no effect on A12) **[1]**
86	Data Restore active (no effect on A12) **[1]**
96	Electrode stuck (currently not used)
97	DEC measurement circuit fault (currently not used)
1001	Current measurement circuit open
1002	Current measurement circuit shorted
1003	No voltage 1st half-wave
1004	Primary voltage measurement fault
1010	No current (standard mode)
1011	No current 1. WLD (mixed mode)
1012	No current 2. WLD (mixed mode)
1013	No current 3. WLD (mixed mode)
1020	Low current (standard mode)
1021	Low current 1. WLD (mixed mode)
1022	Low current 2. WLD (mixed mode)
1023	Low current 3. WLD (mixed mode)
1030	High current (standard mode)
1031	High current 1. WLD (mixed mode)
1032	High current 2. WLD (mixed mode)
1033	High current 3. WLD (mixed mode)
1040	Series of welds below lower threshold point (standard mode)
1041	Series of welds below lower threshold point 1.WLD (mixed mode)
1042	Series of welds below lower threshold point 2.WLD (mixed mode)
1043	Series of welds below lower threshold point 3.WLD (mixed mode)
1050	Current measurement range exceeded (standard mode)
1051	Current measurement range exceeded 1. WLD (mixed mode)
1052	Current measurement range exceeded 2. WLD (mixed mode)
1053	Current measurement range exceeded 3. WLD (mixed mode)
1060	Weld time too short (standard mode)
1061	Weld time too short 1. WLD (mixed mode)
1062	Weld time too short 2. WLD (mixed mode)
1063	Weld time too short 3. WLD (mixed mode)
1070	Weld time too long (standard mode)
1071	Weld time too long 1. WLD (mixed mode)
1072	Weld time too long 2. WLD (mixed mode)
1073	Weld time too long 3. WLD (mixed mode)

[1] The definition of this event as a **warning** has no effect on the Ready state of the weld timer or the welding sequence.

2.3.4 Connection of the KSR sensor (Toroid) X3

The KSR sensor is inserted in the secondary circuit of the welding unit. Installation must be made in such a way, where the sensor is protected from mechanical damage by the part as well as be shielded against splashing of weld material.

As the actual installation is concerned, remember that improper placement of the KSR sensor may lead to measuring faults.

In order to keep these faults as small as possible, the following cautions must be observed:

- The current carrying conductors must be run through the KSR sensor as straight and as centrally oriented as possible. The sensor should be mounted as far away from current carrying bus bars and high current carrying conductors in order to prevent noise effects of external fields.
- No metal parts, which can be magnetized should be used to mount the KSR sensor. Copper and brass are to be preferred.
- To be able to asses possible measuring fault, calibration measurements should be made in each case, using a suitable current module.
- The maximum cable length between the KSR sensor and the PSS5000 is 100 meter. This limit must not be exceeded.
- The shield must be connected to the plug located at the PSS5000 to T5 of terminal X3, if the connection between the KSR sensor and the PSS5000 is made in one single cable length. The shield at the sensor end is left unconnected.
- The electrical connections should made, follow the suggestions shown below.

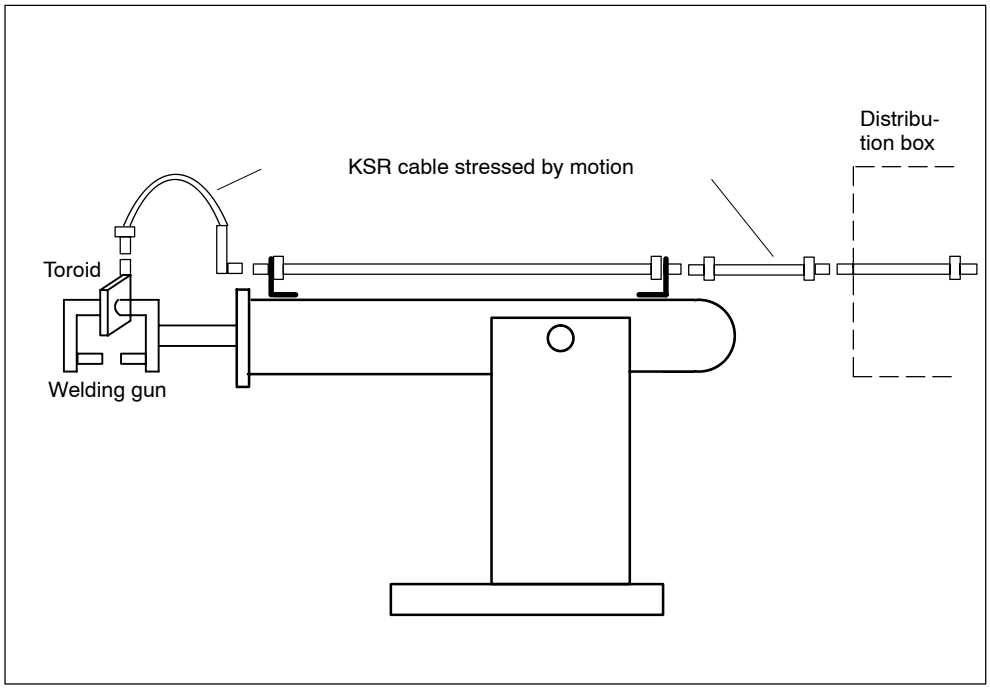
The KSR cable value (ohmic resistance of KSR sensor, cable and connector) is measured by a measuring circuit test during the last half–wave of SQZ.

The measuring circuit test is evaluated for the following events:

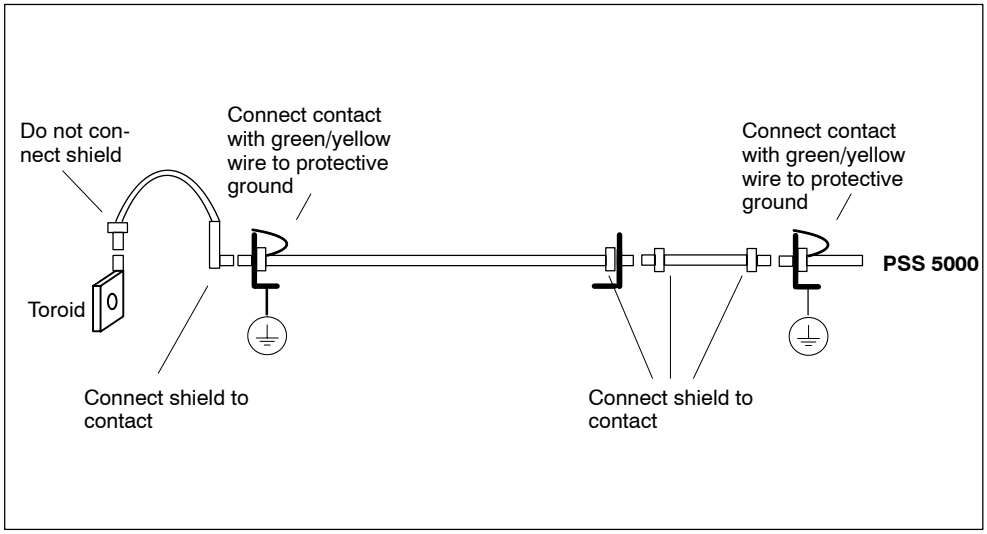
- ohmic resistance less than 7 = *Measuring circuit shorted.*
- ohmic resistance between 12 and 950 = *Measuring circuit o.k.*
- ohmic resistance higher than 1100 = *Measuring circuit open.*

Measuring circuit values in the intermediate ranges lead to an ambiguous evaluation of the measurement.

In the use of KSR sensors with robots or similar devices, certain cable segments are subject to severe mechanical stress. It is recommended to run the cable in several individual segments with plug type connections. The following figure illustrates this principle.



If the cable is divided into several segments, shielding connections must be made as shown in the following figure.



2.3.5 Connection of the Analog Pressure Output X2 (0 ... +9.9 VDC)

The plug at the analog pressure output should be connected according to the wiring diagram. Cable type and maximum conductor length can be found in the Table Conductors and Cable Lengths.

The shield must be connected to the plug located at the PSS5000 at P4 to terminal X2, if the connection between the pressure regulating valve and the PSS5000 is made in one single cable length. Pin 3 (pressure input) is not used. The shield ending at the pressure regulating valve is left unconnected.

Depending on the programming, a voltage of 0...+9.9VDC is available at the analog pressure output if the program number is selected and the welding operation has been completed.

NOTE:

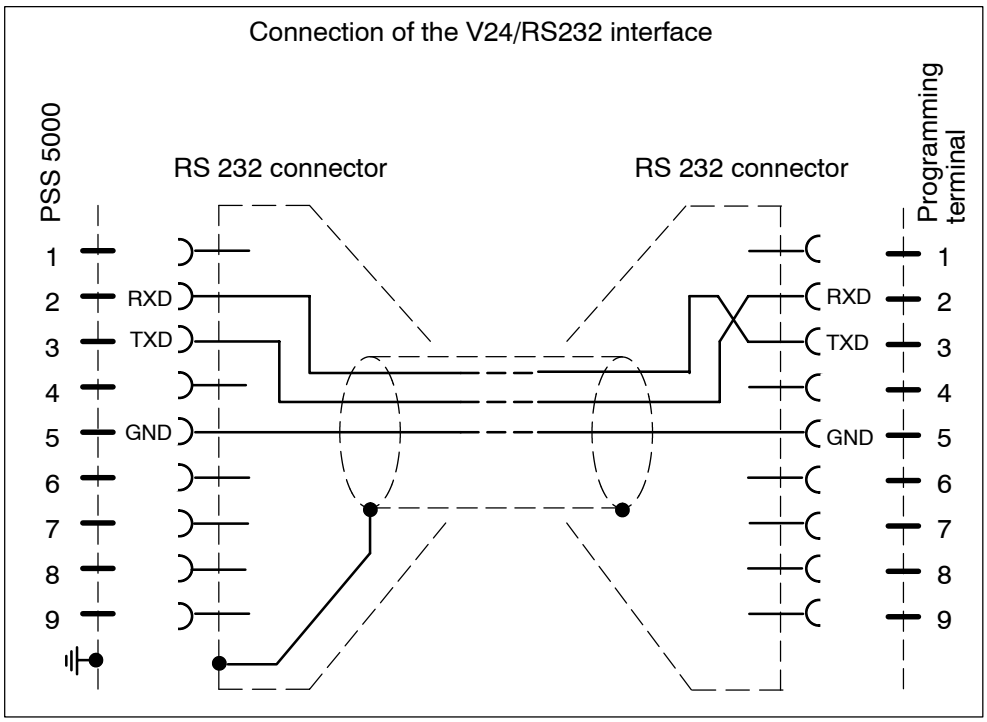
The pressure parameters are programmed in the Basic-Setup in the Electrode-Setup menu. The pressure profile and pressure stepping are accomplished by programming the welding parameters, Pressure and Pressure Stepper options.

2.3.6 Connection of V24 interface X1

The plug at the V24 interface should be connected according to the wiring diagram. Cable type and maximum conductor length can be found in the Table Conductors and Cable Lengths.

A yellow/green stranded cable of 0.75 mm^2 cross sectional area and 100 mm in length must be connected to the shield and run with strain relief towards the outside. The end has to be terminated with a spade lug of 6.3 x 0.8 mm, which is connected to the appropriately marked grounding terminal.

When using a metal housing, the spade connectors need not be grounded.



Part number of a finished cable: 1070 066 749 Length approx. 1.5 meters

2.3.7 Connection of main switch trip X7

The main switch trip is required for the function "Weld without command". In the welding timer is a floating contact (toggle) which opens by undervoltage conditions and closes during working current.

2.3.8 Connection of the voltage feedback X6

The voltage feedback transformer reports the actual voltage value for KUR operation. The feedback transformer also serves to recognize the fault "Weld without command".

NOTE:

The parameters for the feedback voltage are set in the Basic-Setup, Thyristor-Unit-Setup option (ratio between mains phase/phase secondary voltage, example: 380 V : : 24 V = 15.833).

2.3.9 Connection of the temperature contact to terminal strip X5

Weighting by the weld timer of the function of the temperature contact in the thyristor unit (open or closed with overtemperature) can be selected (programmed).

NOTE:

Programming of the temperature contact as an NCC or NOC is accomplished in the Basic-Setup, Thyristor-Unit-Setup.

2.3.10 Conductors and Cable Lengths

Inputs E0 to E20, X10, X11	unshielded cable, VDE 0281, 0812, e.g. Ölflex	0.5 sq.mm up to 100 m
Outputs A01 to A12 (+24 V / 0.1 A) output A00 (+24 V / 1.0 A), X9	as above as above	0.5 sq.mm up to 100 m 0.5 sq.mm up to 30 m 1.0 sq.mm up to 50 m 1.5 sq.mm up to 100 m (Voltage drop = max. 10%)
KSR, X3	shielded cable, e.g. 2x2x0.75 sq.mm LiYCY, corresponding to BOSCH part number 1070 913494	0.75 sq.mm up to 100 m
Analog pressure output, X2	shielded cable, e.g. NFL 13 (Metrofunk) 2x0.5 sq.mm or LiYCY	0.5 sq.mm up to 50 m 0.75 sq.mm up to 100 m
V 24, X1	shielded cable, e.g. 3x2x0.2 sq.mm LifYCY (Metrofunk) max. capacitance 2.5 nF	min. 0.2 sq.mm up to 20 m
Connections between PSS 5000 and thyristor unit X5, X6, Main switch trip X7	unshielded cable, VDE 0281, 0812 e.g. Ölflex	0.75 sq.mm up to 10 m 1.5 sq.mm up to 75 m
Profibus DP and FMS, X51	Part no. solid 1070 917202 Part no. flexible cable 1070 917201	cf. 3., profibus module – bitrate/maximum segment length
Power supply X4, X8	unshielded cable, VDE 0281, 0812 e.g. Ölflex	

2.4.0 Changing Batteries

NOTE:

Data buffering is assured for about 30 hours, without internal or external 24 VDC supply voltage and after removing the battery.

A PSS5000 3.6 V Lithium battery is installed to provide data backup power. This battery supplies the RAM memory and the internal clock in the power down state. Battery life is 2 years.

If the battery voltage drops so far, that data buffering is no longer assured, the welding timer will sense this state. The reaction to this event depends on the *Fault Allocation* in the menu *Basic Setup.*

- If a low battery is defined as a fault, the control prevents the next start and the Ready message turns off. The welding operation can resume after changing the battery and resetting the fault.
- If a low battery is defined as warning, the control will issue the appropriate message, but welding operations will not be disabled.

To change the battery, first remove the cover to the battery compartment with CCW motion and remove the old battery. Then insert the new battery, while observing the correct polarity (see illustration on front cover).

NOTE:

To prevent loss of data, a bi-annual battery change is recommended as part of preventive maintenance procedures.

Lithium-Battery BOSCH Bestellnr. 1070 914 446

ATTENTION!

To prevent environmental harm, observe the currently valid disposal regulations for batteries in effect.

ATTENTION!

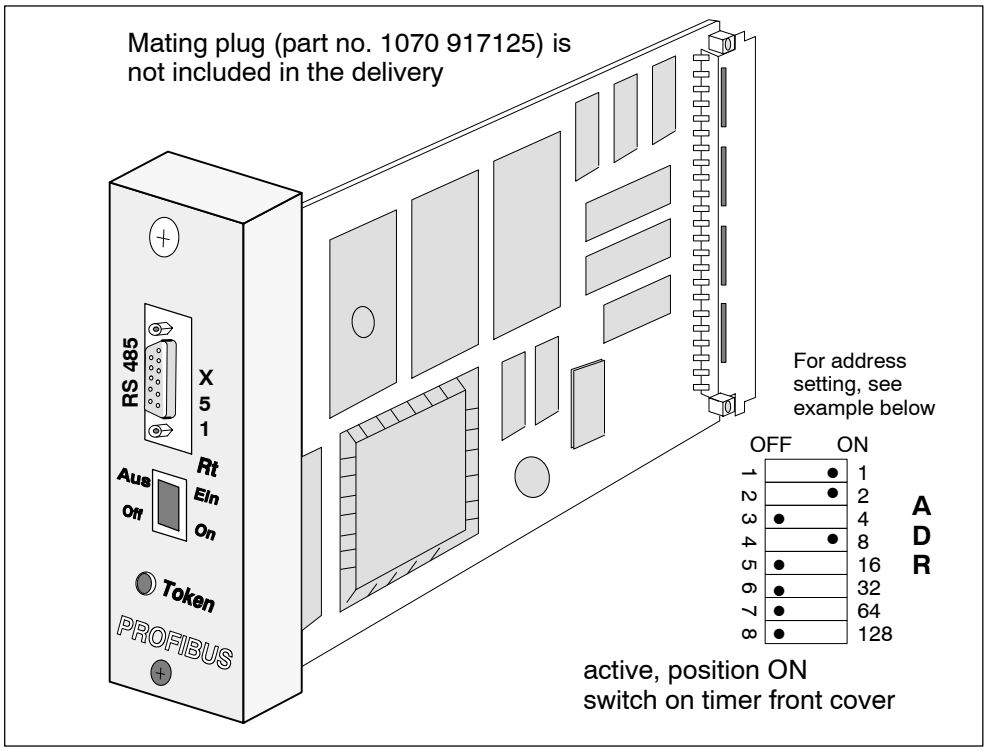
Danger of explosion: Never expose the battery to temperatures above 85°C. Do not attempt to charge, solder or incinerate the battery. Do not short circuit or disassemble the battery.

2.5.0 Profibus module (Option)

This module requires no set-up. The address for the timer in the BUS system is set from switch [15] ADR on the front cover of the timer. A maximum of **125** timers can be linked to and addressed by a bus (if suitable repeaters and bus modules are used). Using the currently available interface module CP5412A2, a maximum of 62 timers can be linked.

ATTENTION!

Insert and remove the module only with the power turned off (Only the upper screw is used to hold the module in the timer).



RT (termination resistor)

- ON the termination resistor for the PROFIBUS is enabled.
- OFF the termination resistor for the PROFIBUS is disabled.
  (see bus connections on next page)

Address selection from Switch ADR on the timer front panel

The user address is binary coded.

The numbers (1-128) on the right side indicate the decimal weight of a particular switch.

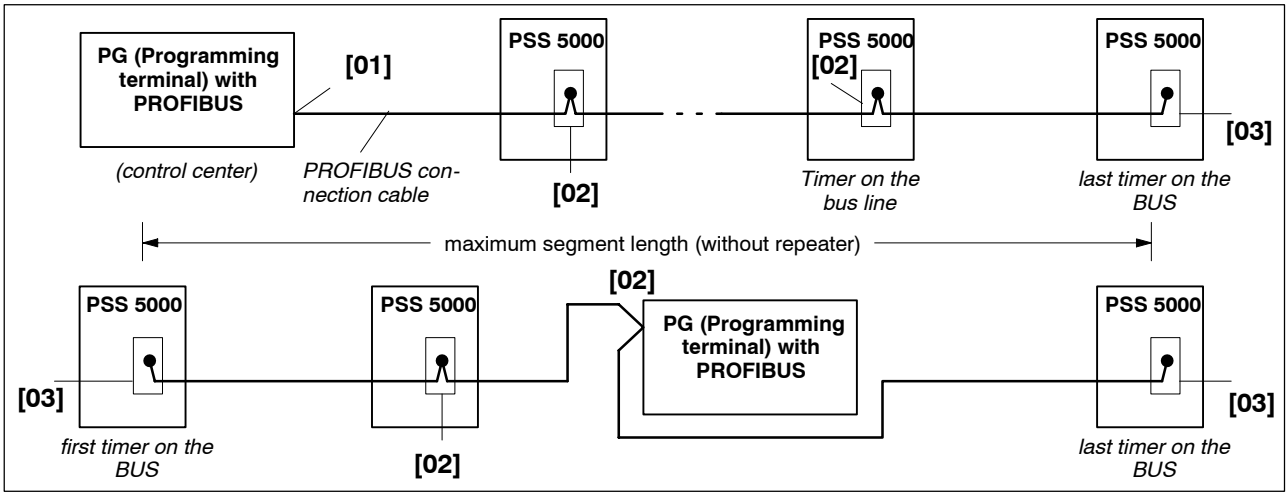
Example for address 11

11 - next lower (or equal) weight is 8, switch ON
11 - 8 = 3 - next lower (or equal) weight is 2, switch ON
3 - 2 = 1 - next lower (or equal) weight is 1, switch ON
all other switches must be set to OFF.

Reading an address setting

Add the decimal weight of all switches which are set to ON.

2.5.1 Example for Setting Up a BUS System



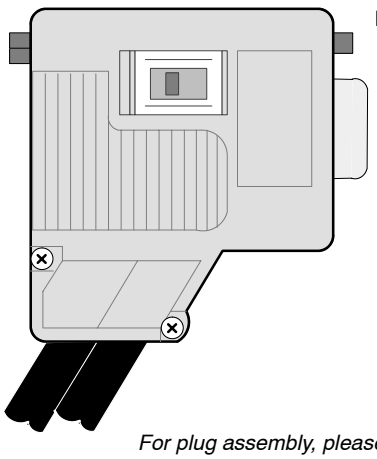
[01] Cable start. Connection via plug with termination resistor enabled.

[02] BUS connector, with termination resistor disabled. Switch Rt on the BUS interface module in the PSS 5000/PG is to be set to OFF.

[03] Two possibilities:
- Resistor inside BUS connector to ON, Termination resistor Rt on the interface module to OFF (recommended setting).

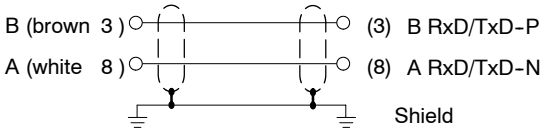
A maximum of 32 users drops (timers, PCs or other devices) may be connected to the total length stated below. Repeaters must be used whenever it should become necessary to connect additional devices, or extend the cable length. (See Repeater application)

2.5.2 PROFIBUS Connector



BUS connector part no. 1070 917125

BUS cable assignment



BUS cable designation

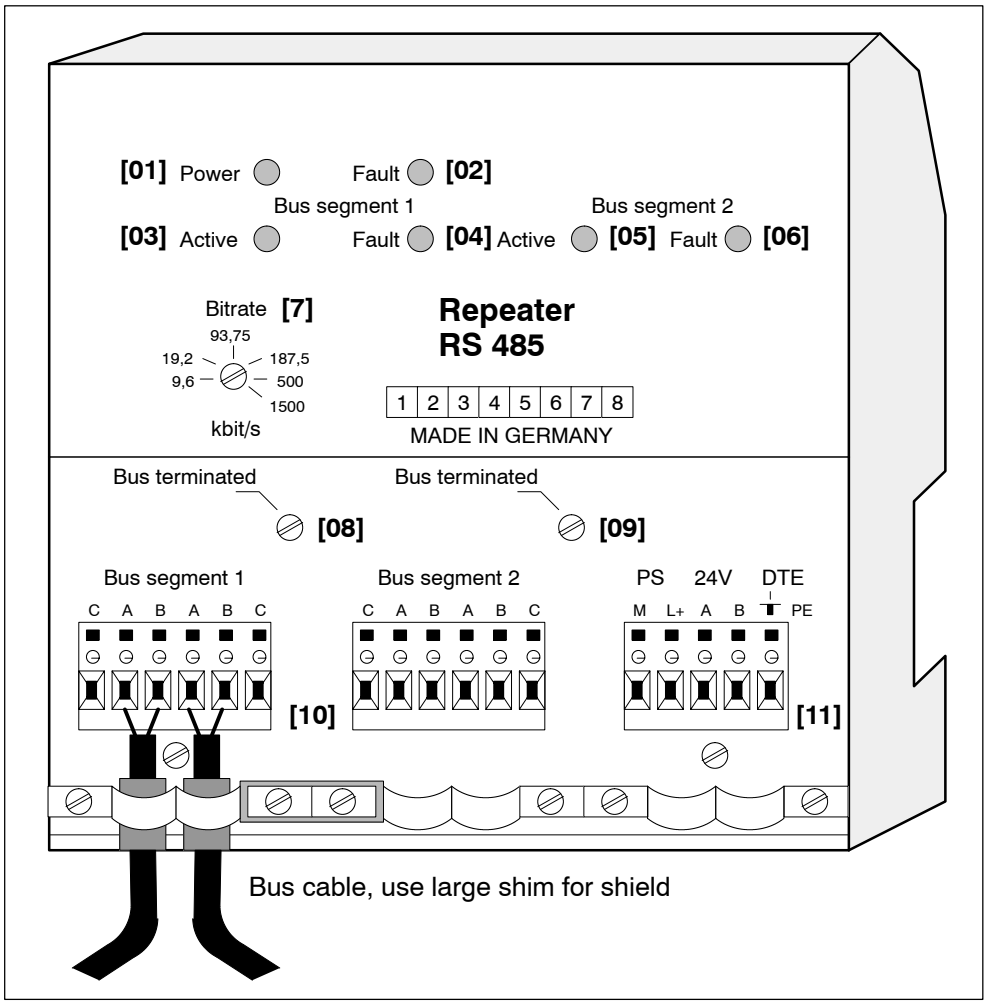
solid	part no. 917202
flexible	part no. 917201

For plug assembly, please note the instructions contained in the package!

Bit rate/maximum segment length (in meters)

Bit rate	**Solid or flexible cable for** PROFIBUS DP and FMS
1500 k	200
500 k	400
187.5 k	1000
93.75 k	1200

2.5.3 The Repeater, P/N 1070 917203 (IP65) and 1070 917204 (IP20)



[01] Green LED, supply voltage is On

[02] Red LED, Fault in repeater

[03] Green LED, Receiving on bus segment 1 (sporadically)

[04] Red LED, Fault in bus segment 1

[05] Same as [03] for bus segment 2

[06] Same as [04] for bus segment 2

[07] Bit rate setting, transfer in KBits/Sec, must be identical for all drops.

[08] BUS termination resistor On/Off for segment 1

[09] Same as [08] for bus segment 2

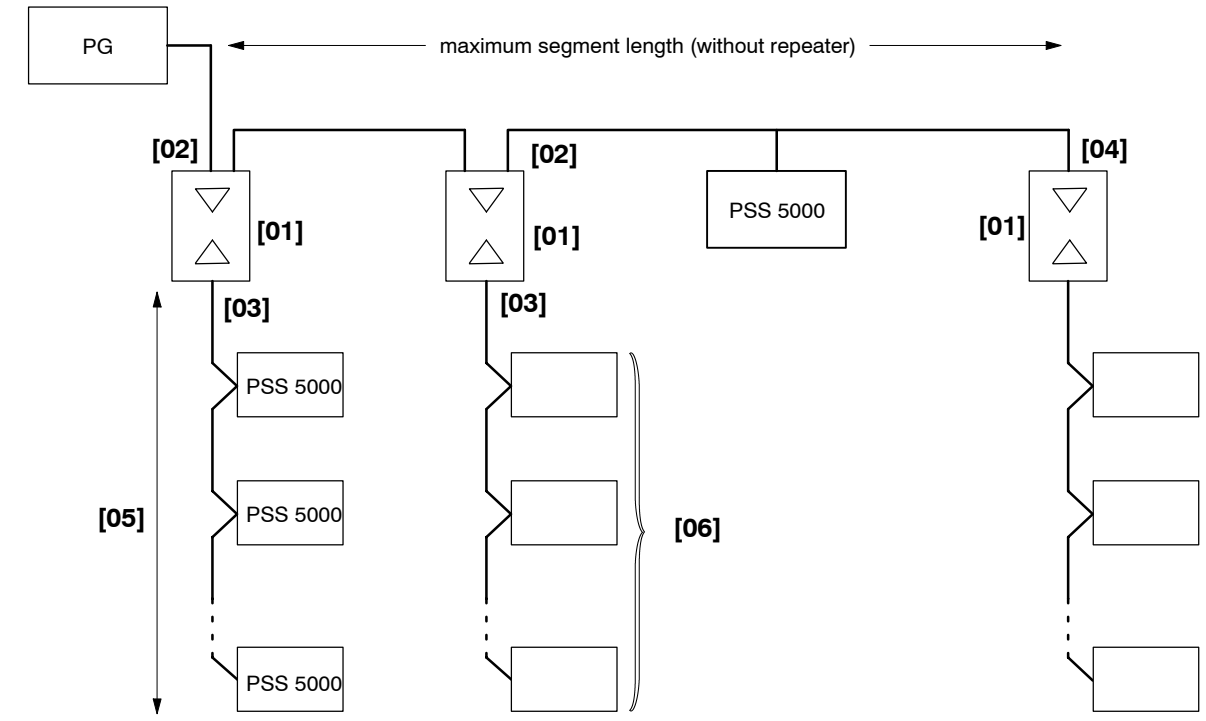
[10] Terminal strips for bus connection. Please note the allocation of signal conductors (color code) to terminals A and B. Identical conductors always go to the same terminal.

[11] Terminal for supply line connection +24 VDC
M = 0V connection, L+ = +24 VDC

NOTE:

Observe the installation instructions included with the device.

2.5.4 Repeater Application



Repeaters connected in parallel

[01] A maximum of 32 drops on one segment (programming terminal, Repeater, PSS 5000)

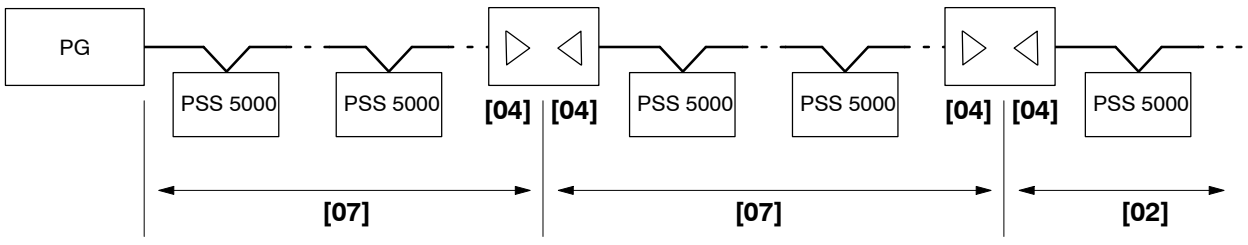
[02] Interconnections on bus segment 1 (daisy chained), termination resistor disabled

[03] Interconnections on bus segment 2 (cable start), termination resistor enabled

[04] Interconnections on bus segment 1 (cable end), termination resistor enabled

[05] maximum segment length* between repeater and last timer

[06] Max. 32 drops (timers) including repeater



Repeaters connected in series

[07] maximum segment length between 2 repeaters

No more than **3** repeaters may be connected in series in a single branch

***** See Table Bitrate/Max. Segment Length for the maximum length for each segment.

Contents

3.1.0 Overview

3.1.1 Performance data

- Up to 256 separate welding programs can be programmed
- Operation with 3 weld times, the 2. can run as impulse or slope
- Freely programmable outputs
- A 10 step analog pressure profile
- Three different control modes to select from (PHA, KUR, KSR).
- Selectable weld current and/or weld time monitoring
- Universal electrode care concept with starting range, stepper, dressing.

3.1.2 Expandability

- Modular hardware construction permits use of customer specific I/O modules, field bus cards, etc,
- EMC conformity (IEC 1138)
- Up-grade ability for integration with future feedback systems.
- Software can easily be adapted to customer requirements.

3.1.3 Serviceability

- the Weld timer does no longer have to be opened for maintenance operations:

  Automatic internal battery check, battery changing without interruption of process.

  All required fuses can be changed from the front panel.

3.2.0 Welding Process

3.2.1 Welding programs

256 welding programs allow for input of specific welding information for up to 256 welding tasks. Each spot weld in fact could be assigned to a different program, if necessary.

3.2.2 Setup of basic Sequence Parameters

The basic setup of sequence parameters is done in two sections.

In the first section you can make basic settings of parameters which will affect all programs of a weld timer. In the second section you can make basic settings of parameters for a selected program.

Example: Programming the basic parameters for the welding parameters control mode Standard or Mixed.

4.17 Sequence-Setup - Wheel arch 53

Timer-Name: **Wheel arch 53**

Program-No.:

For all Programs:

Start-Inhibit:	**On**	**Off**	**Control stopped:**	**On**	**Off**
Weld/No weld:	**On**	**Off**	**Monitoring stopped:**	**On**	**Off**
Max. Welding Time:	**Cyl.**		**Max. repeat welds:**		

additionally for this Program:

Start-Inhibit:	**On**	**Off**	**Regulation:**	**Std**	**MIX**
Stepper-Number:			**Monitoring:**	**Std**	**MIX**
Weld/No weld:	**On**	**Off**	**Spot-Repetition:**	**On**	**Off**

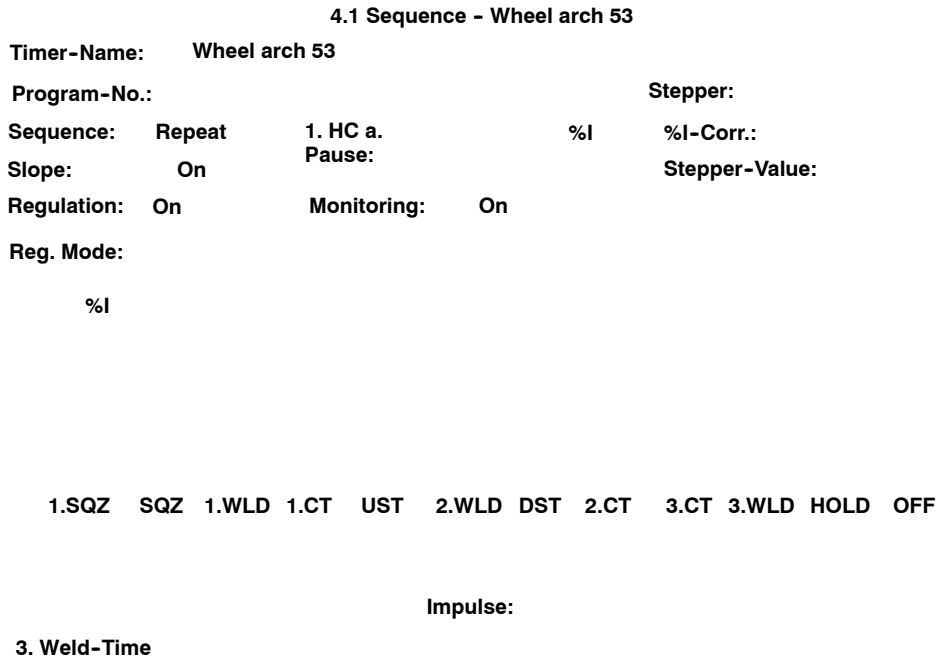
Sequence:	**SIngle**	**Repeat**	**Seam**
Start-Inhibit:			**On / Off**

3.2.3 Welding operation

The welding operation consists basically of three weld times:

- 1. Current block with specific weld parameters, e.g. individual control mode.
- 2. Current block with specific weld parameters, e.g. individual control mode, pulse operation and selectable up and down slope.
- 3. Current block with specific weld parameters, individual control mode.

Example: Programming of welding parameters (with control parameters for mixed operation).



Because of the many ways in which the welding parameters can be changed, the timer is also capable of handling future tasks with newer and more critical sheet metal types.

The welding operation can be adapted to a large degree to the various applications, e.g. current blocks 1 and 3 can be disabled if not required.

3.2.4 Process control

For controlling the welding processes, one of three operating modes can be selected:

- The constant current control mode **KSR**, can be programmed in kilo Ampere and regulates the welding current to the commanded value.

  The constant current control has a large operating range from .5 to 250 kA with programming resolution in 10 Amp steps (the internal accuracy is greater). The operating range has complete reversibility and is also effective in up and down slopes.

  It works according to the well known KSR principle, but with measurement of both half waves when using intermittent control. To be recommended in jobs where an electrode pair is used for welding.

- The constant voltage control mode **KUR**, can be programmed by scale divisions (%I).

  It is also referred to as line voltage compensation, and should be used if the KSR mode can not be used. The primary voltage of the welding transformer with this patented method is regulated in a way where the welding current remains constant in the event of line voltage fluctuations .

- The phase control mode **PHA**, can be programmed by scale divisions (%I).

  It is intended as an emergency measure, in the absence of current or voltage sensors, and with the current state of the art (KSR and KUR) it should serve as a standby mode to be used during malfunctions.

  Programming range from 0.0 to 100.0 scale divisions (%I)

Operating modes PHA, KSR and KUR can be selected from the control without any additional effort.

A current sensor toroid is required for KSR operation. A voltage sensor (transformer for the primary voltage of the welding transformer) is required for KUR operation.

3.3.0 Assigning Weld Current and Control Functions to Current Blocks

3.3.1 Standard Operation

The current blocks 1,2 and 3 are treated identically in the PHA, KSR or KUR modes.

Treatment is basically done as is customary today with weld timers.

3.3.2 Mixed Operation

Each of the 3 current blocks by itself can be operated in the PHA, KSR or KUR mode. Selection can be made at will. Mixed operation makes sense in certain welding tasks as for example press fits and coatings.

3.3.3 Scaling functions

For AC, DC and inverter frequency equipment in KSR mode, a scale value can be used for the elimination of component variations (e.g. variations of toroid).

In this way the weld timer becomes a welding current meter and the measured current values become comparable.

This scaling functions in the framework of quality assurance serves to accurately reproduce documented current values (ISO 9000).

In can be done by the user on location, and must be repeated after changing components.

3.3.4 Monitoring

The monitor functions are stand–alone functions, which are not coupled to absolute commanded values, but which allow programming of tolerance bands in percent.

Monitoring in this way becomes ”true” monitoring. When monitoring a welding task is becomes possible to make specific entries for the target parameters. Any change in the programmed values does not affect these settings.

Current monitoring

The monitor value with a +/– tolerance band can be programmed as desired. It is possible to specify a tighter tolerance band in addition.

Actual values are checked within the tolerance bands. Any deviation may result in an appropriate message, possible stopping of the timer (quality assurance) or a repeat of the spot, depending on the fault and the basic settings.

The effective value of the entire current profile (1., 2. and 3. current block including cool times) is measured and monitored when in standard mode.

This is a simple and effective method of monitoring. The current profile is being reduced to a representative value, at which the amount of data to be processed is small.

In mixed mode the effective value of each current block is measured and monitored individually. This results in greater transparency of the individual current blocks, the amount of data to be processed is larger.

Example: Separate programming of current monitoring in mixed operation, for each of the 3 current blocks.

4.3 Current-Monitoring - Offline 110B

Timer-Name:	**Offline 110**		**%I-Corr.:**			**Actual -> Command**		
Program-No.:			**Stepper-Value:**			**Stepper:**		
		1. Weld-Time		**2. Weld-Time**			**3. Weld-Time**	
Current-Monitoring:		**On**	**Off**	**On**	**Off**		**On**	**Off**
		Set.:	**Act.:**	**Set.:**	**Act.:**		**Set.:**	**Act.:**
Upper Tolerance Band:								
Lower Tolerance Band:								
Conitional Tol.- Band:								
Repeat factor:								
Basis-Reference-Current:			**7.95 kA**		**13.75 kA**			**7.95 kA**
Middle PHA:			**25.5 %I**		**42.5 %I**			**25.5 %I**
Actual -> Command								

3

Time monitoring

The programmed time for the entire current profile (1., 2. and 3. current block) is monitored within tolerance limits when in standard mode.

In mixed mode the programmed time for of each current block is measured and monitored individually. This results in greater transparency of the individual current blocks, the amount of data to be processed is larger.

One purpose of time monitoring is to check the programmed time within limits which seem practical for the welding task at hand. Another purpose is for quality assurance.

The current value is being displayed and can after a quality inspection be accepted as a programmed target value.

Example: Separate programming of time monitoring in mixed operation, for each of the 3 current blocks.

4.4 Time -Monitoring - Offline 110B

Timer-Name: **Offline 110** **Actual -> Command**

Program-No.: **Stepper:**

	1. Weld-Time		2. Weld-Time		3. Weld-Time	
Time-Monitoring:	**On**		**On**		**On**	
	Off		**Off**		**Off**	
	Set.:	**Act.:**	**Set.:**	**Act.:**	**Set.:**	**Act.:**
Tolerance:		**Cyl.**		**Cyl.**		**Cyl.**
Reference Time:		**7.0 Cyl.**		**10.0 Cyl.**		**9.0 Cyl.**

Actual -> Command

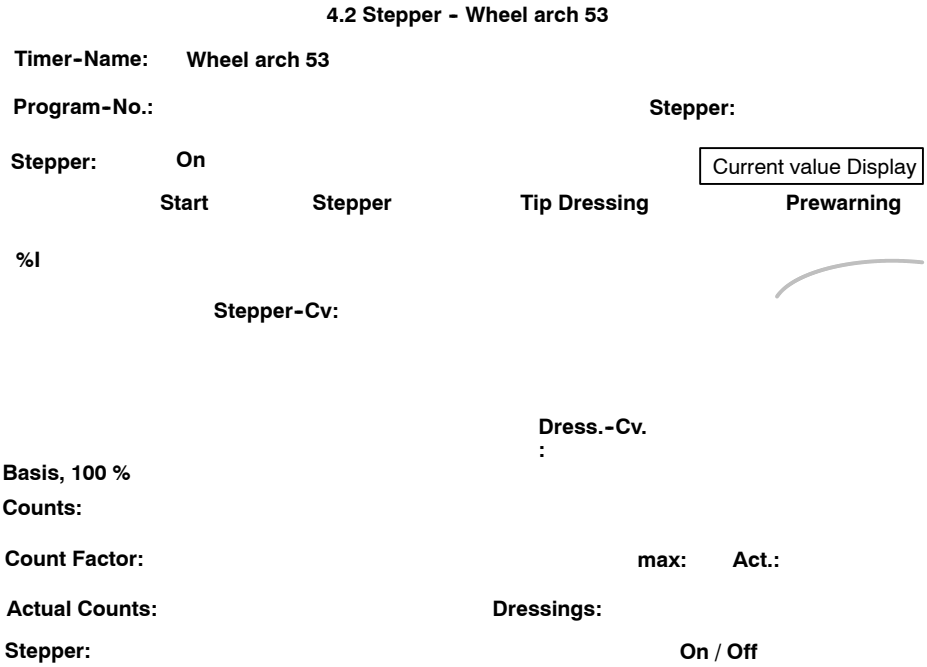
3.3.5 Stepper function

The stepper function works with linear interpolation and programming of the stepper curve, using ten possible curve types.

A total stepper value with stepper counter and wear factor is calculated for each welding task.

Small current increments allow changing of current values without welding splashes. The programming of the stepper function requires only three parameters and a curve type: starting value, end value and the stepping value. Even differing welding tasks in mixed production can be handled without difficulties.

Example: Programming of stepper function.



The correction of the penetrating effect especially with galvanized material is possible (specific starting condition with new electrode).

Example: Programming of stepper curve.

4.14 Stepper-Curves - Wheel arch 53

Timer-Name: **Wheel arch 53** **WT-Curve -> PC** **PC-Curve -> WT**

Curve Number: **Wheel arch type 64711**

%I Change:

Count Value:

I Change in %

Count in %

%I Change:

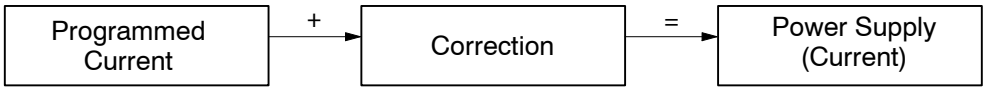
3.3.6 Electrode Management

The weld timer offers electrode management with universal tip dress treatment. Different dressing methods such as counter dressing or form dressing can applied.

Because of global electrode parameter entry, a maximum stepping value can be programmed to cause a stop. In this way no program can be started which uses this electrode.

By programming correction factors for current and pressure, it permits further so set limits within which the user can make changes to the parameters without having to change the program.

Example :



Example: Programming of global electrode parameters.

4.13 global Stepper-Setup - offline 1

Timer-Name: **offline1**

Stop at end of Stepper: **Yes** **No**

Max %I-Correction:

Min %I-Correction:

Max Pressure-Correction:

Min Pressure-Correction:

Stop at end of Stepper: **YES** / **NO**

Example: Correction-Setting for electrode

3.10 Correction-Setting, Electrode-No.: 1

Timer-Name:

Wheel arch 1701

Current:

Pressure:

OK Cancel Select Step. Help

These functions additionally have electrode-related parameters for limit values, inverter operation and values for controlling pressure regulating valves.

Example: Electrode-Setup

4.16 Stepper-Setup - Wheel arch 1701

Timer-Name: Wheel arch 1701

Program-No.: Stepper:

Limit

%I-Limitation: %I Upper Current Limit:

%I-Prewarning: %I Toroid Sensitivity:

Scaling Turns ratio

1. Halfcycle Limit: %I Current Range:

Invertor

Pressure

Max. Pres.: Coversion-Factor:

%I-Limitation:

3.3.7 Pressure control

An analog output voltage between 0 and 10 Volt or 0 and 20 mA is available to control the pressure valve in the function pressure stepper. In units of measurement are kN.

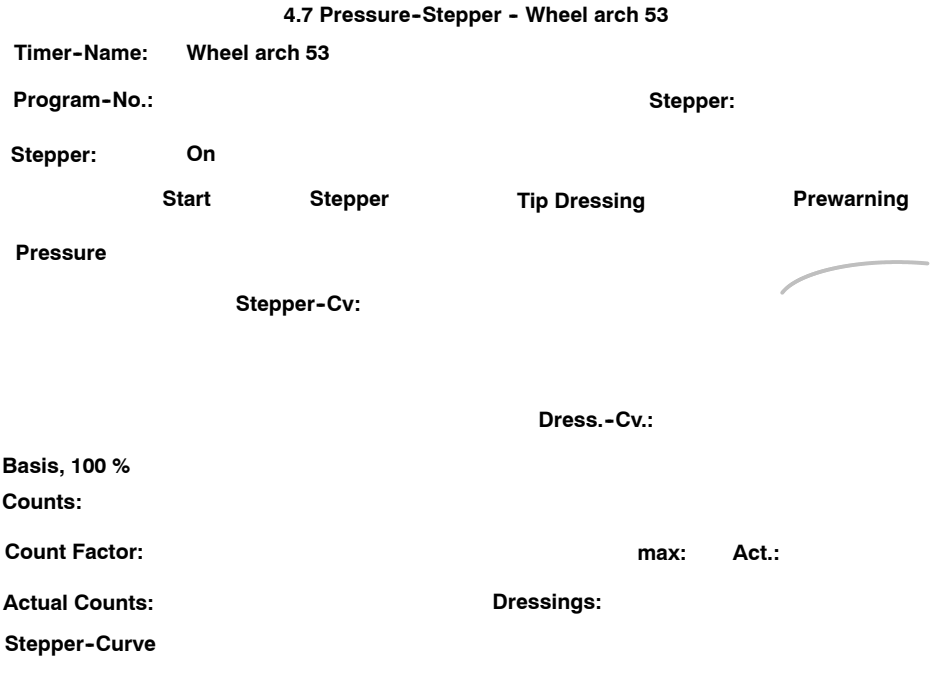
In addition to the a basic pressure, a pressure profile of 10 steps can be programmed for each welding operation.

Optional pressure monitoring can be provided over an additional input (1 bit) or an analog input.

In this way there will be pressure values available, comparable to the stepper function, to support quality management.

This application could be feasible especially for critical welding tasks.

Example: Programming of pressure stepper.

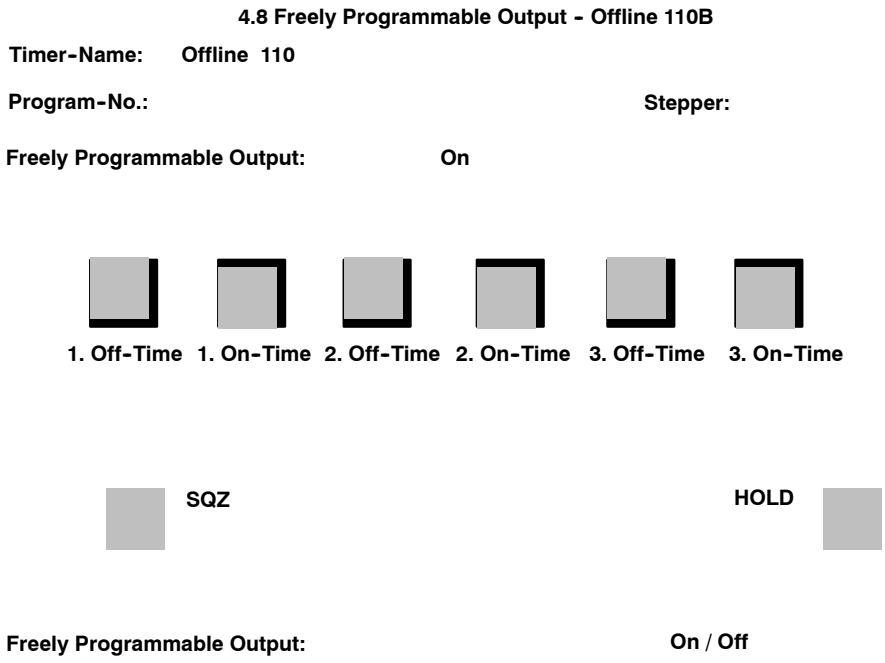


3.3.8 Programmable Outputs

Up to three outputs can be programmed with On and Off times in relation to the timing of the welding operation. These can be used to drive external functions.

Such application would be advantageous especially with complex welding tasks, as for an additional pressure increase for example.

Example: Freely Programmable Outputs.



3.4.0 Interface with OEM Equipment

- Works in conjunction with all Bosch power supply types and with Bosch inverters.
- Discrete inputs and outputs at standard 24 VDC or serially over sensor/actuator bus (e.g. Profibus DP).
- Programming over internal V24 interface and/or Field bus (e.g. Profibus).
- Open data access (according to DIN 19245 Part 2), the same open object directory over all communication interfaces.
- Simple interfacing of OEM equipment.

3.4.1 I/O field connections

All discrete inputs and outputs have an optical status indicator and are protected by miniature glass fuses which are accessible from the outside.

Most I/O tasks can be accomplished over the V24/Field bus as for example:

- Reset counter
- Reset fault
- Selection and start of welding program
- Spot selection etc.

3.4.2 Programming interface

The weld timer has an open communication concept structured according to DIN 19245 Part 2 (Profibus). This provides unified data access to all control parameters by index numbers. Those index numbers are assigned in an open weld timer profile, which is accessible to the user.

The control has two equivalent programming connections:

- V24 interface
- Field bus interface (Profibus)

All required programming and diagnostic tasks can be done from the PC.

The comfortable programming of the weld timer is either done under MS windows with an operating program from Bosch or over the open communication with open weld timer profile.

The detailed diagnostic functions which are available can be called from there. They give information about the following items: :

- Current weld timer status
- Current operating status
- Status of last spot weld
- Protocol of timer fault messages with date and time stamp
- Protocol of welding fault messages with date and time stamp, etc.

The above mentioned interfaces can also be used to connect a customer provided process display terminal in order to show the various weld process data.

The V24 interface can also be used for storing the firmware in FLASH EPROM's. In the event of firmware updates it will not be necessary to exchange or open the weld timer.

3.4.3 Data Backup

Data backup in RAM memory with battery is good for at least 2 years and data backup without battery for about 2 days. The state of the battery is being monitored.

The battery can be changed from the outside during operation.

3.4.4 Harmonics Filter

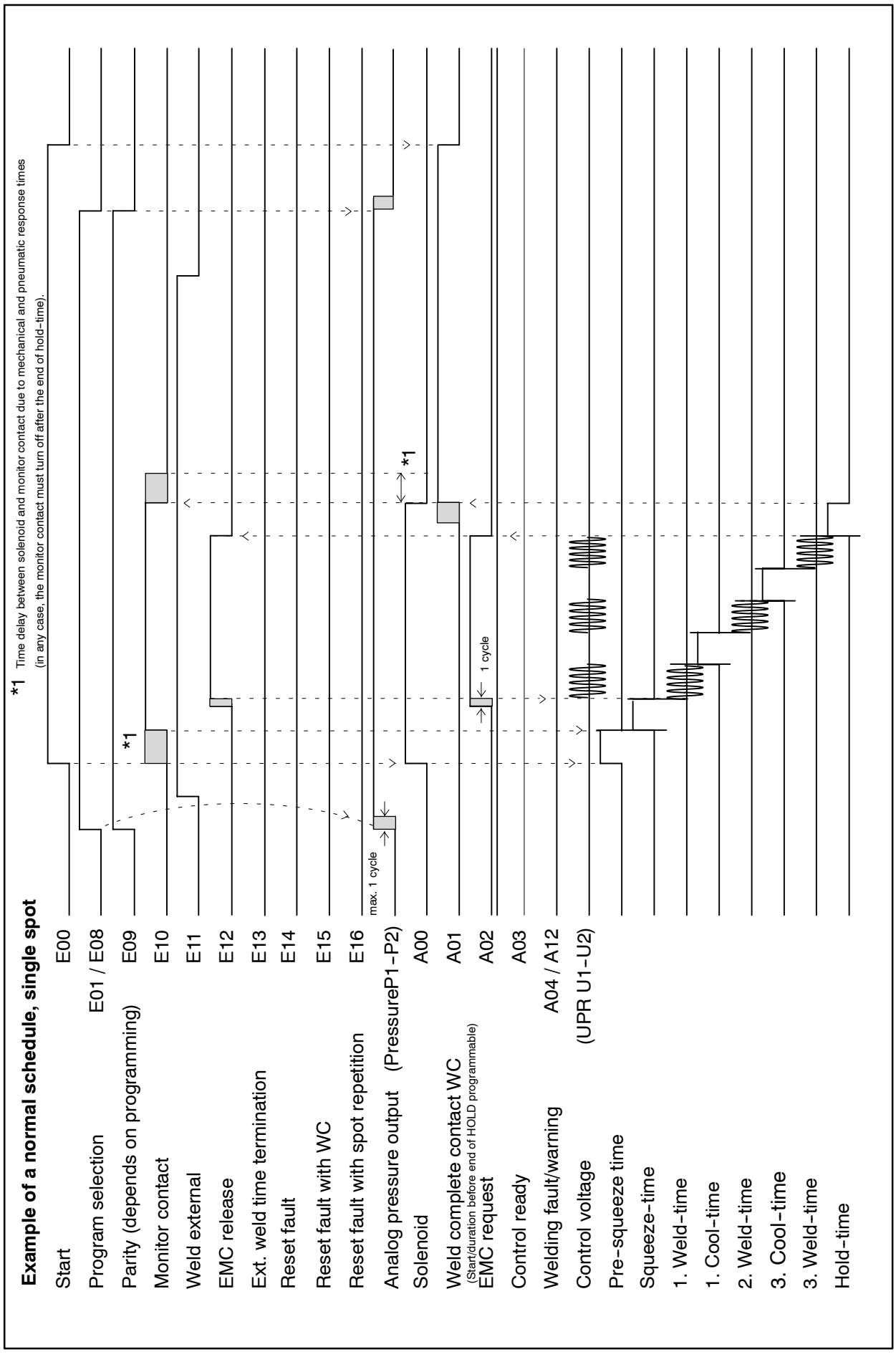
A filter in the weld timer suppresses the harmonics in the supply lines, as they are typically generated in DC and inverter frequency systems.

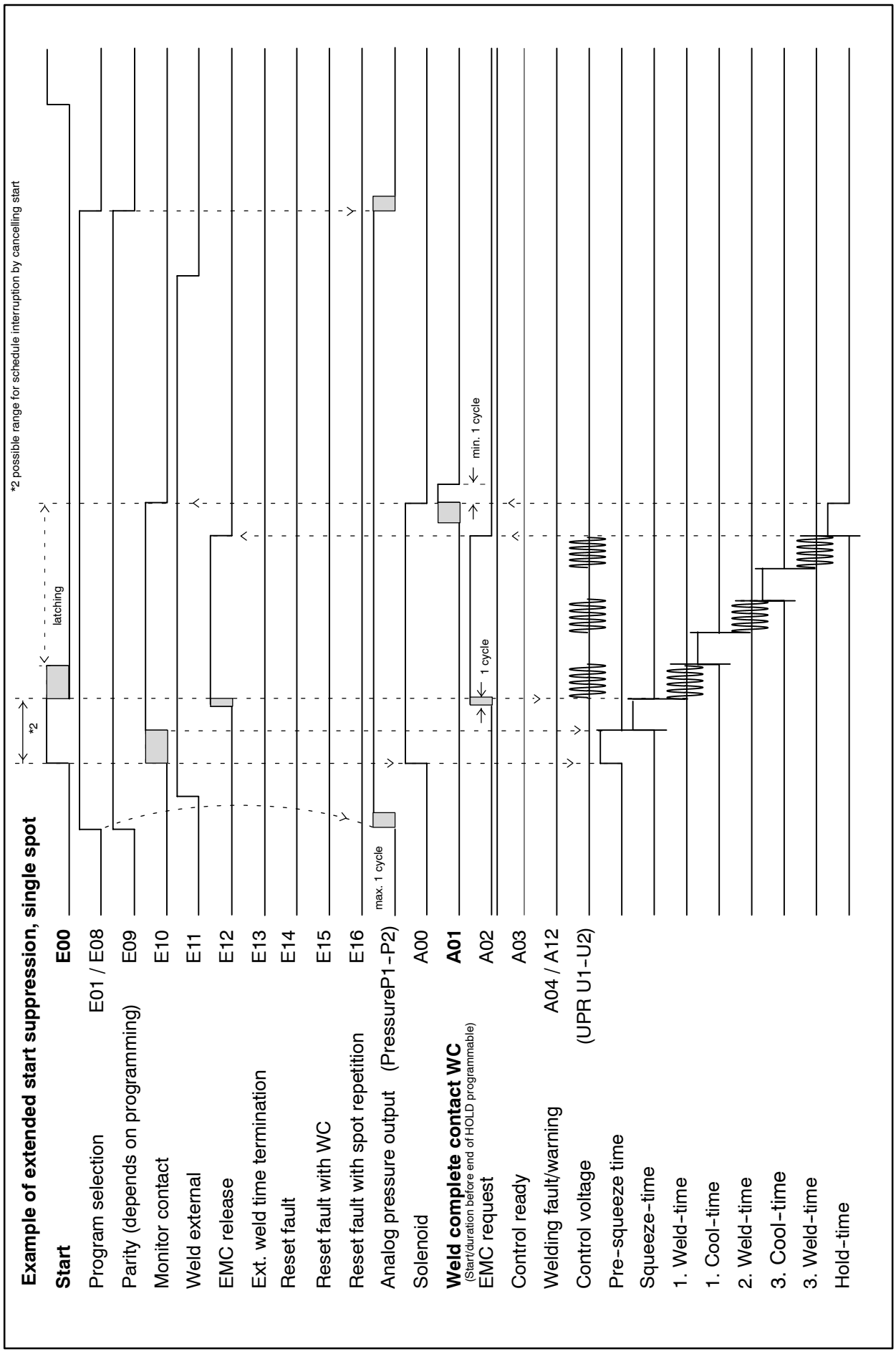
The most important functions are to reduce current fluctuations and supply line phase deformations.

3.4.5 Interfacing with the Welding Process

- Automatic 50/60 Hz detection and monitoring of phase synchronization.
- Main switch trip by weld without command.
- Automatic selection of current measurement range (5/25/100/250 kA).
- Internal calibration of current measuring circuit.
- Adaptable control of welding process with parameter entry for type of power output (DC, AC or inverter) and sensitivity of current sensor.

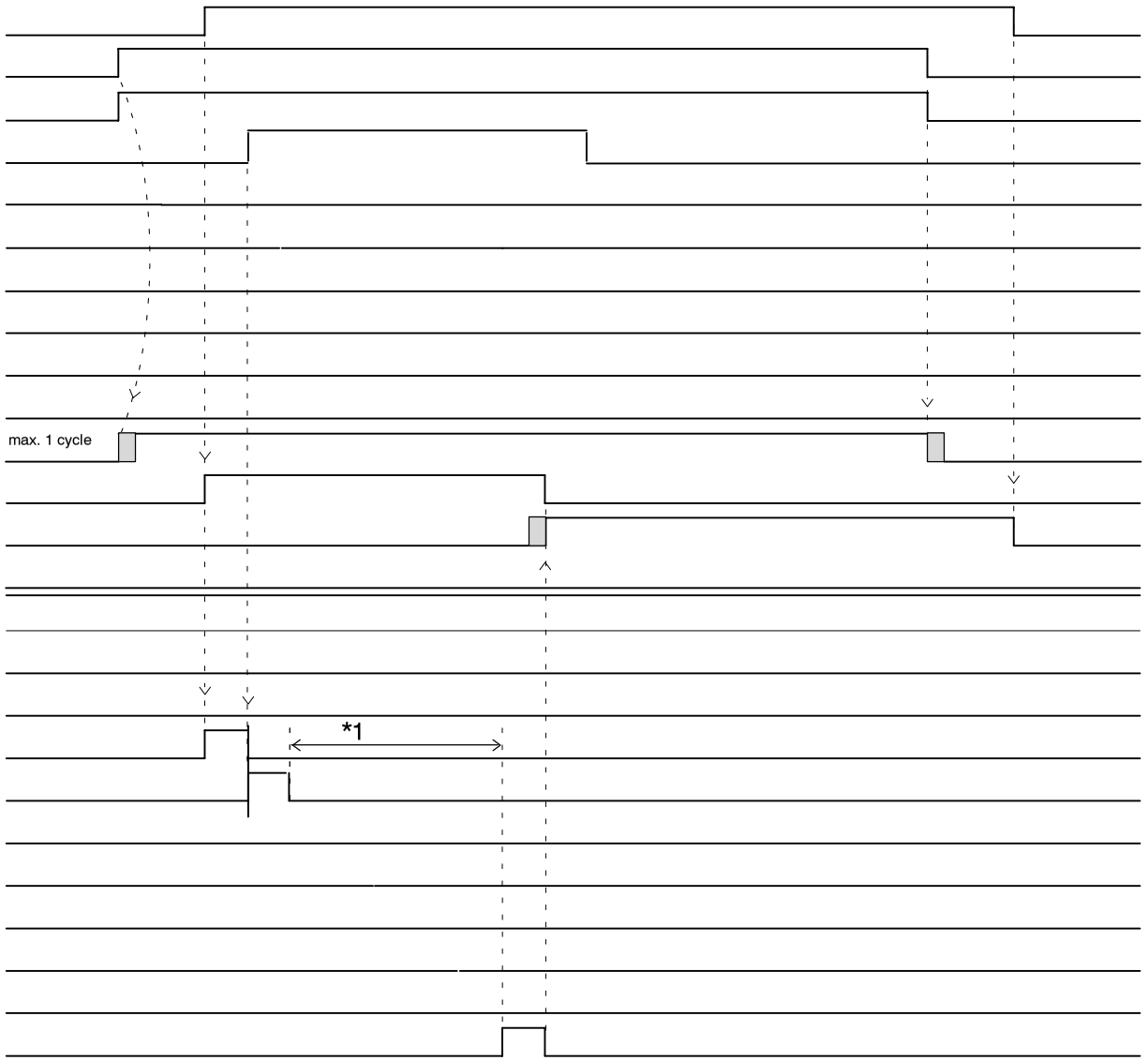
Contents

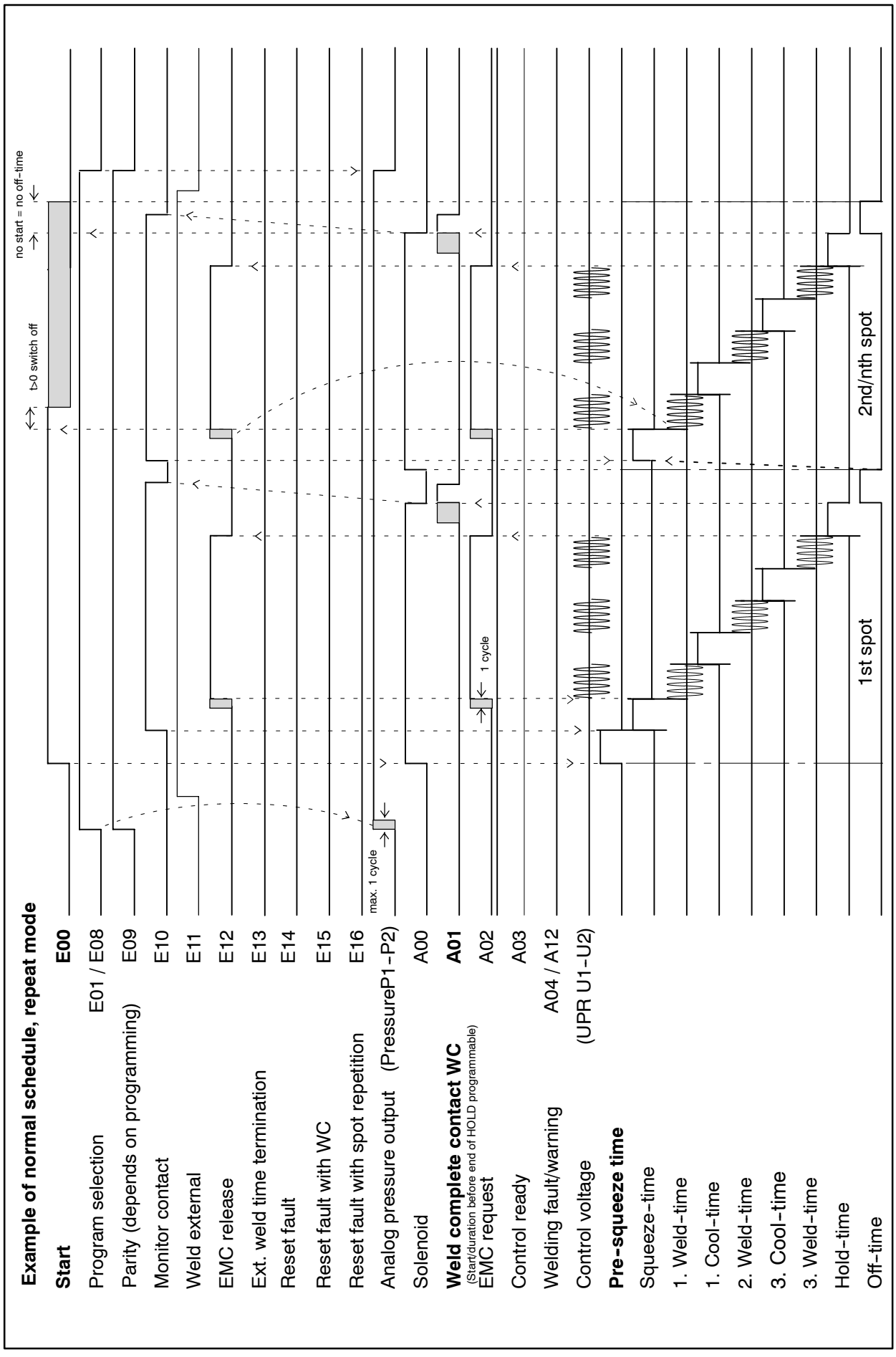

Example of a normal schedule, single spot
*1 Time delay between solenoid and monitor contact due to mechanical and pneumatic response times (in any case, the monitor contact must turn off after the end of hold-time).
Start E00
Program selection E01 / E08
Parity (depends on programming) E09
Monitor contact E10
Weld external E11
EMC release E12
Ext. weld time termination E13
Reset fault E14
Reset fault with WC E15
Reset fault with spot repetition E16
Analog pressure output (PressureP1-P2) A00
Solenoid A01
Weld complete contact WC A02
(Start/duration before end of HOLD programmable)
EMC request A03
Control ready A04 / A12
Welding fault/warning
Control voltage (UPR U1-U2)
Pre-squeeze time
Squeeze-time
1. Weld-time
1. Cool-time
2. Weld-time
3. Cool-time
3. Weld-time
Hold-time
*1
max. 1 cycle
*1
1 cycle

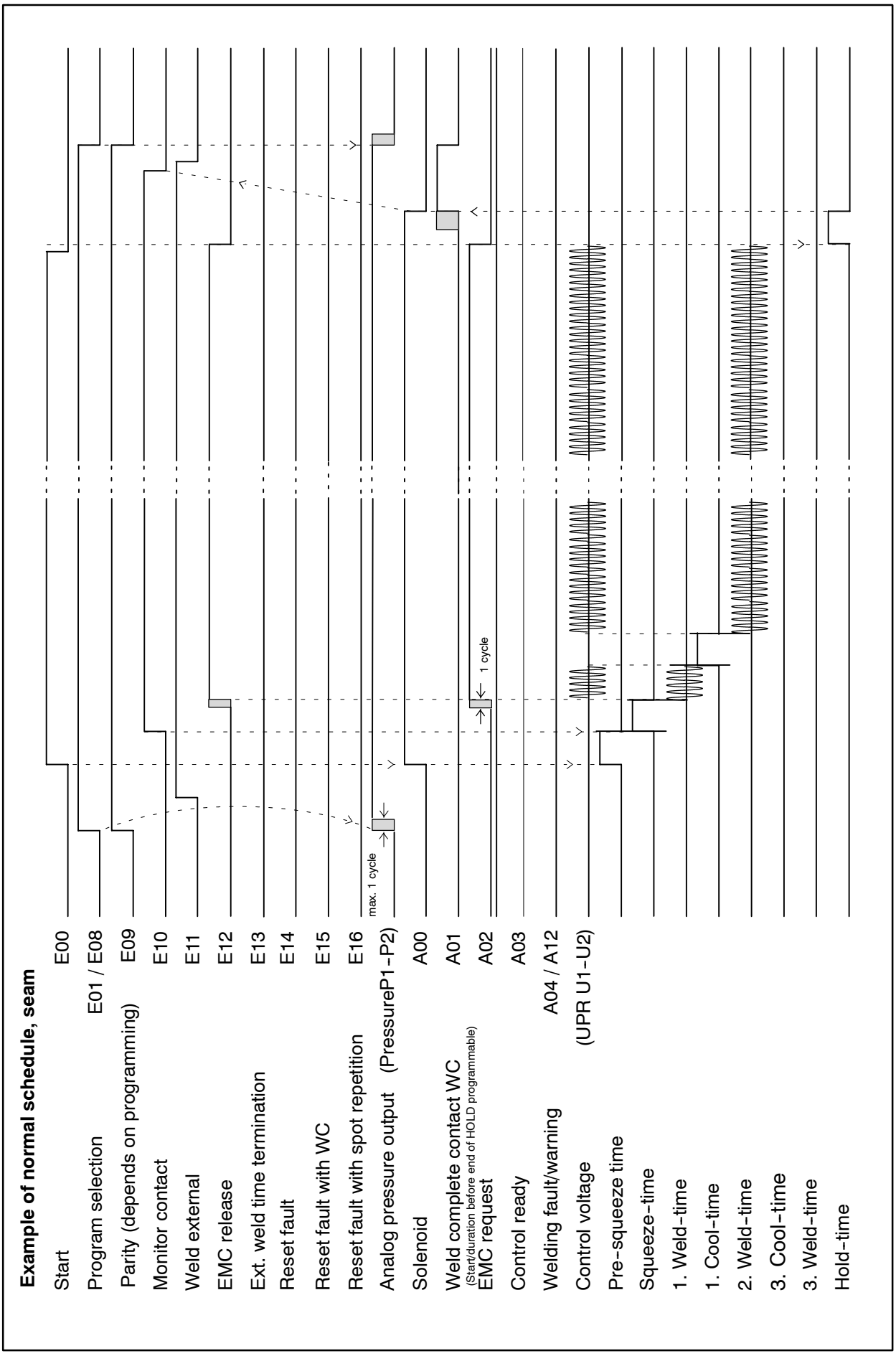

Example of extended start suppression, single spot
*2 possible range for schedule interruption by cancelling start
*2
latching
max. 1 cycle
1 cycle
min. 1 cycle
Start
E00
Program selection
E01 / E08
Parity (depends on programming)
E09
Monitor contact
E10
Weld external
E11
EMC release
E12
Ext. weld time termination
E13
Reset fault
E14
Reset fault with WC
E15
Reset fault with spot repetition
E16
Analog pressure output (PressureP1-P2)
Solenoid
A00
Weld complete contact WC
(Start/duration before end of HOLD programmable)
A01
EMC request
A02
Control ready
A03
Welding fault/warning
A04 / A12
Control voltage
(UPR U1-U2)
Pre-squeeze time
Squeeze-time
1. Weld-time
1. Cool-time
2. Weld-time
3. Cool-time
3. Weld-time
Hold-time

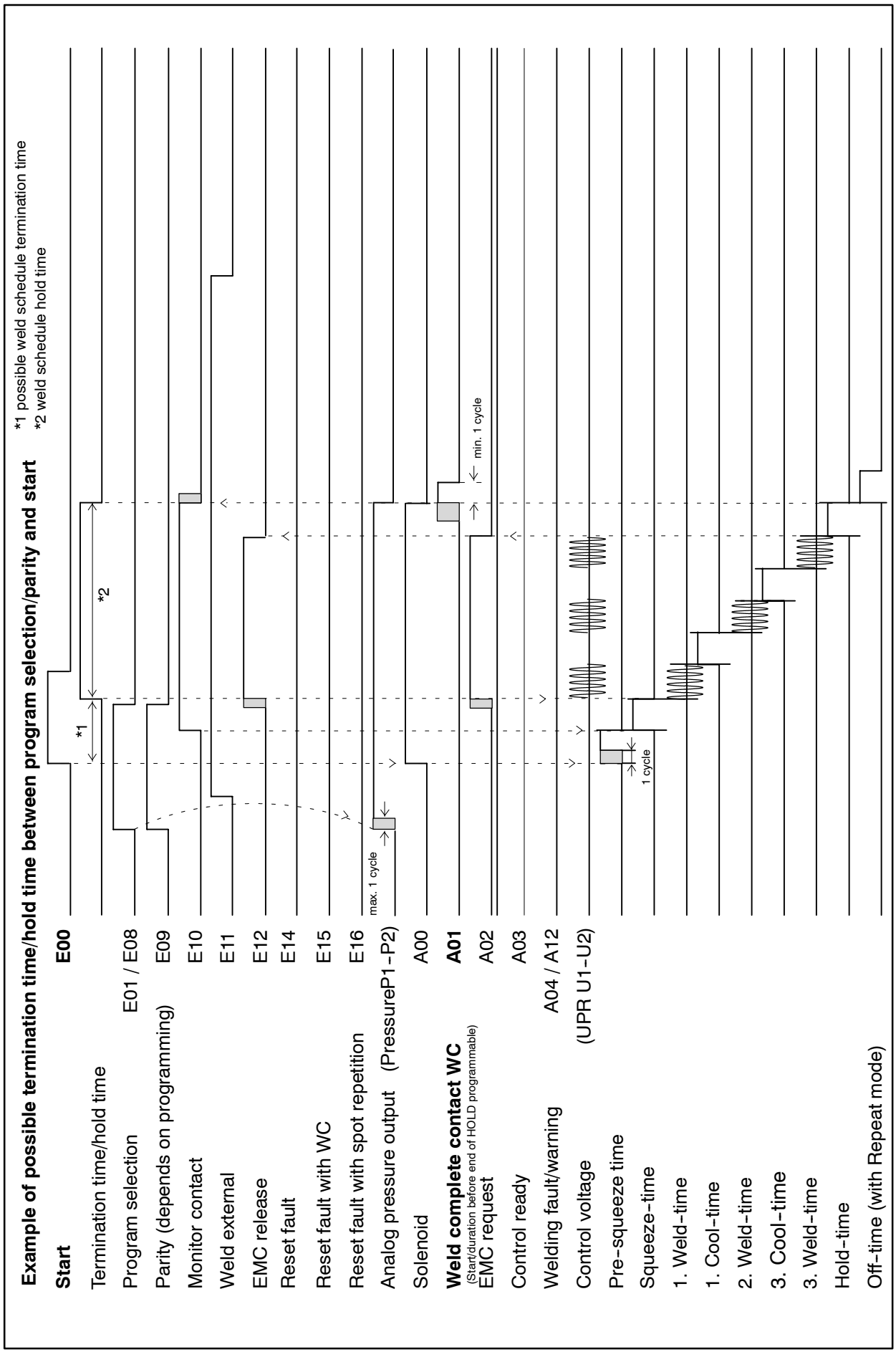
Example of no weld schedule, single spot

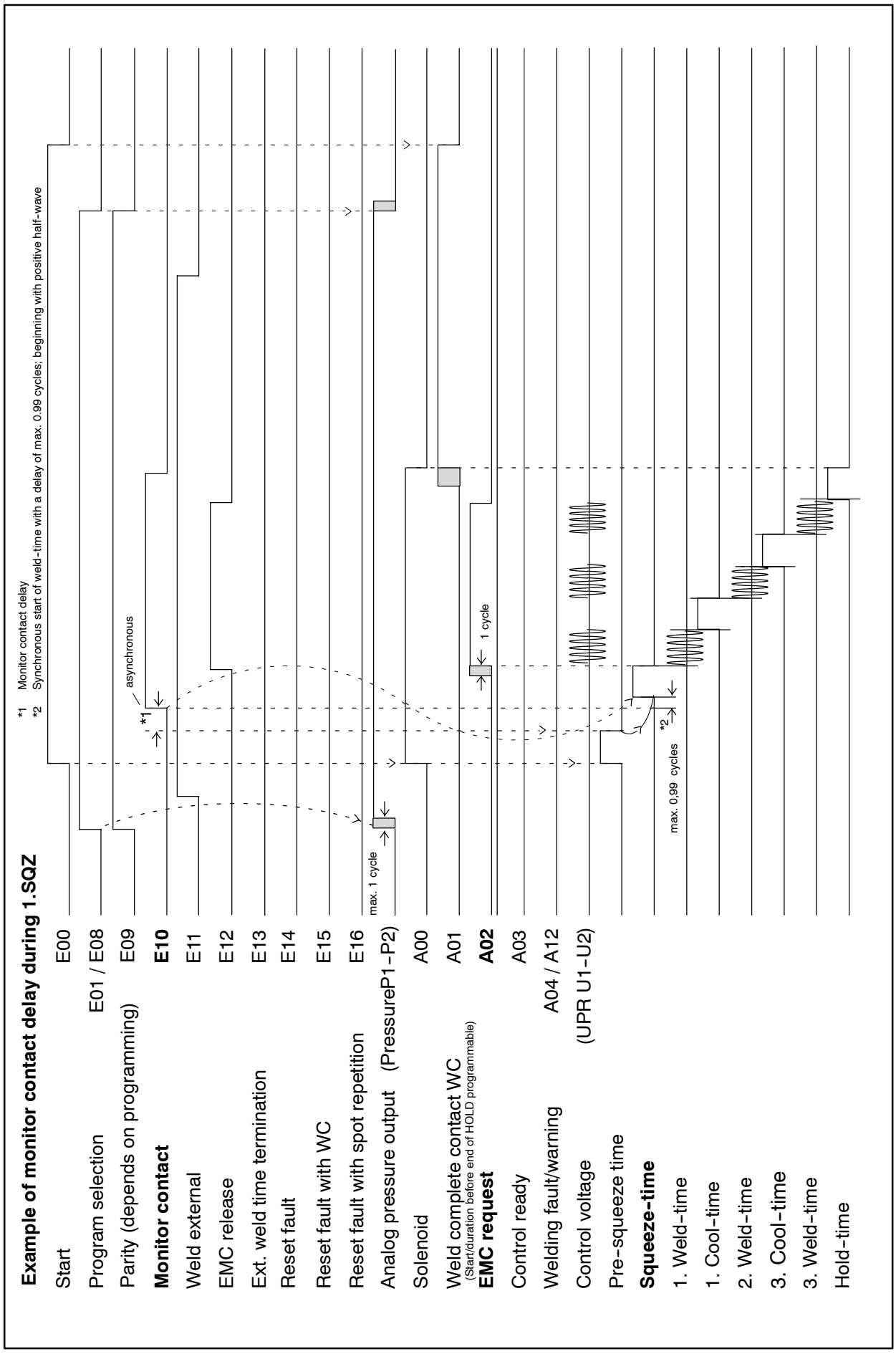
*1 The time between the squeeze-time and the hold-time corresponds to the total time of 1. weld-time, 1. cool-time, 2. weld-time, 3. cool-time and 3. weld time. The schedule is performed without welding current.



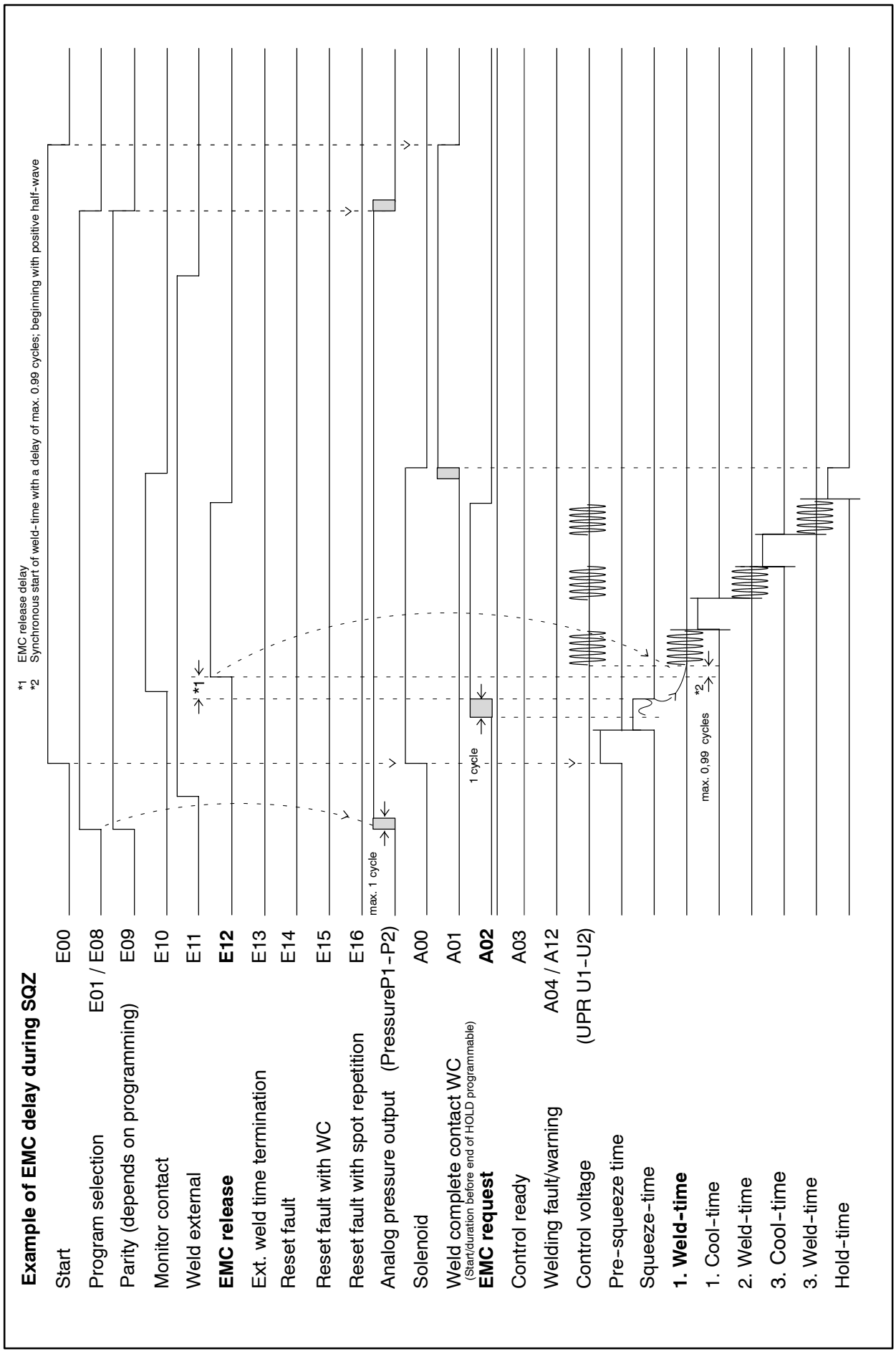

Example of normal schedule, repeat mode
Start
E00
Program selection
E01 / E08
Parity (depends on programming)
E09
Monitor contact
E10
Weld external
E11
EMC release
E12
Ext. weld time termination
E13
Reset fault
E14
Reset fault with WC
E15
Reset fault with spot repetition
E16
Analog pressure output (PressureP1-P2)
Solenoid
A00
Weld complete contact WC
A01
(Start/duration before end of HOLD programmable)
EMC request
A02
Control ready
A03
Welding fault/warning
A04 / A12
Control voltage
(UPR U1-U2)
Pre-squeeze time
Squeeze-time
1. Weld-time
1. Cool-time
2. Weld-time
3. Cool-time
3. Weld-time
Hold-time
Off-time
t>0 switch off
no start = no off-time
max. 1 cycle
1 cycle
1st spot
2nd/nth spot


Example of normal schedule, seam
Start E00
Program selection E01 / E08
Parity (depends on programming) E09
Monitor contact E10
Weld external E11
EMC release E12
Ext. weld time termination E13
Reset fault E14
Reset fault with WC E15
Reset fault with spot repetition E16
Analog pressure output (PressureP1-P2)
Solenoid A00
Weld complete contact WC A01
(Start/duration before end of HOLD programmable)
EMC request A02
Control ready A03
Welding fault/warning A04 / A12
Control voltage (UPR U1-U2)
Pre-squeeze time
Squeeze-time
1. Weld-time
1. Cool-time
2. Weld-time
3. Cool-time
3. Weld-time
Hold-time
max. 1 cycle
1 cycle

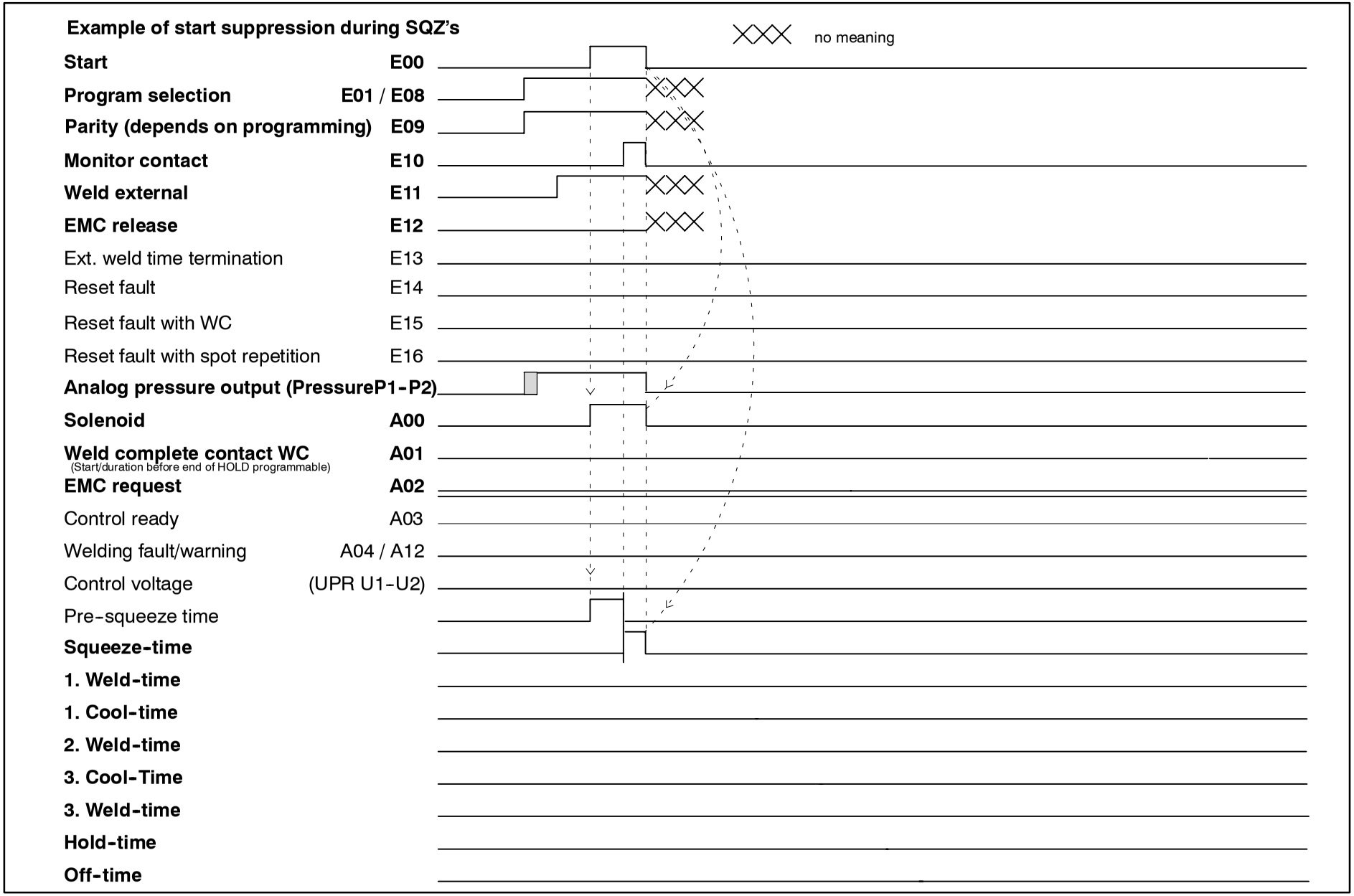

Example of possible termination time/hold time between program selection/parity and start
*1 possible weld schedule termination time
*2 weld schedule hold time
Start
E00
Termination time/hold time
*1
*2
Program selection
E01 / E08
Parity (depends on programming)
E09
Monitor contact
E10
Weld external
E11
EMC release
E12
Reset fault
E14
Reset fault with WC
E15
Reset fault with spot repetition
E16
max. 1 cycle
Analog pressure output (PressureP1-P2)
Solenoid
A00
Weld complete contact WC
A01
(Start/duration before end of HOLD programmable)
min. 1 cycle
EMC request
A02
Control ready
A03
Welding fault/warning
A04 / A12
Control voltage
(UPR U1-U2)
Pre-squeeze time
1 cycle
Squeeze-time
1. Weld-time
1. Cool-time
2. Weld-time
3. Cool-time
3. Weld-time
Hold-time
Off-time (with Repeat mode)


Example of monitor contact delay during 1.SQZ
*1 Monitor contact delay
*2 Synchronous start of weld-time with a delay of max. 0.99 cycles; beginning with positive half-wave
Start E00
Program selection E01 / E08
Parity (depends on programming) E09
Monitor contact E10
Weld external E11
EMC release E12
Ext. weld time termination E13
Reset fault E14
Reset fault with WC E15
Reset fault with spot repetition E16
Analog pressure output (PressureP1-P2)
Solenoid A00
Weld complete contact WC A01
(Start/duration before end of HOLD programmable)
EMC request A02
Control ready A03
Welding fault/warning A04 / A12
Control voltage (UPR U1-U2)
Pre-squeeze time
Squeeze-time
1. Weld-time
1. Cool-time
2. Weld-time
3. Cool-time
3. Weld-time
Hold-time
asynchronous
*1
max. 1 cycle
1 cycle
max. 0,99 cycles
*2

4


Example of EMC delay during SQZ
*1 EMC release delay
*2 Synchronous start of weld-time with a delay of max. 0.99 cycles; beginning with positive half-wave
Start
E00
Program selection
E01 / E08
Parity (depends on programming)
E09
Monitor contact
E10
Weld external
E11
EMC release
E12
Ext. weld time termination
E13
Reset fault
E14
Reset fault with WC
E15
Reset fault with spot repetition
E16
Analog pressure output (PressureP1-P2)
Solenoid
A00
Weld complete contact WC
(Start/duration before end of HOLD programmable)
A01
EMC request
A02
Control ready
A03
Welding fault/warning
A04 / A12
Control voltage
(UPR U1-U2)
Pre-squeeze time
Squeeze-time
1. Weld-time
1. Cool-time
2. Weld-time
3. Cool-time
3. Weld-time
Hold-time
max. 1 cycle
1 cycle
max. 0,99 cycles
*1
*2

Example of start suppression during SQZ's



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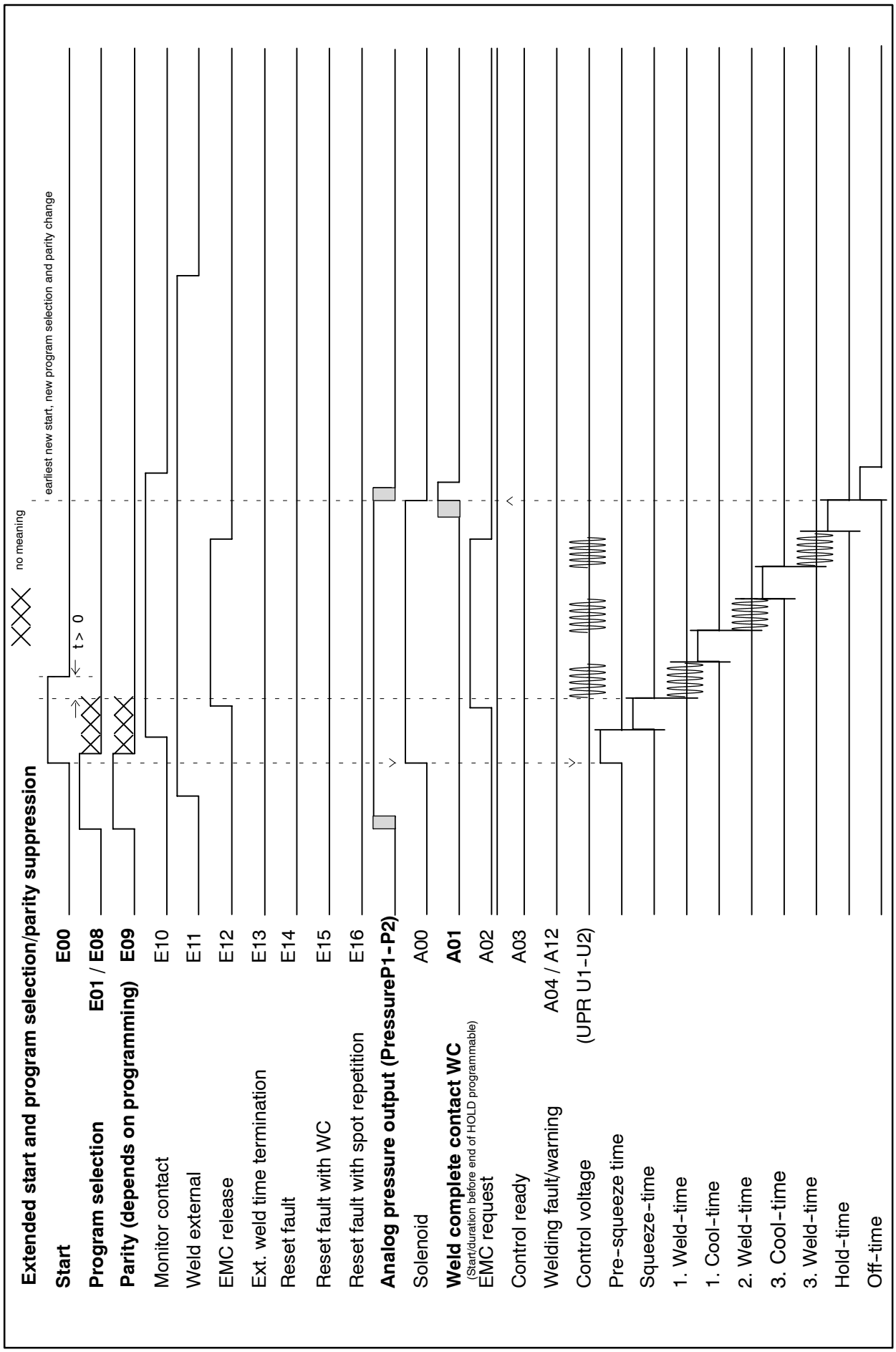
Extended start and program selection/parity suppression
Start
E00
Program selection
E01 / E08
Parity (depends on programming)
E09
Monitor contact
E10
Weld external
E11
EMC release
E12
Ext. weld time termination
E13
Reset fault
E14
Reset fault with WC
E15
Reset fault with spot repetition
E16
Analog pressure output (PressureP1-P2)
Solenoid
A00
Weld complete contact WC
(Start/duration before end of HOLD programmable)
A01
EMC request
A02
Control ready
A03
Welding fault/warning
A04 / A12
Control voltage
(UPR U1-U2)
Pre-squeeze time
Squeeze-time
1. Weld-time
1. Cool-time
2. Weld-time
3. Cool-time
3. Weld-time
Hold-time
Off-time
t > 0
no meaning
earliest new start, new program selection and parity change

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