MADE IN GERMANY
Solingen

TÜVRheinland ZERTIFIZIERT
Management System ISO 9001:2015
www.tuv.com
Zertifikat-Registrier-Nr. 01 100 060010

HIBC APPROVED SOLUTION PROVIDER

ÖSTLING MARKINGSYSTEMS

GS1 Germany | Solution Partner Östling Marking Systems GmbH

ELECTROLYTIC MARKING SYSTEM

EU PULSE

CE

OPERATING MANUAL

Date	Rev	Responsible person	Description
03.12.2020	1.0.0		

This document was written in the technical documentation of the company ½STLING Marking Systems GmbH.

Service address and hotline

Address

½STLING Marking Systems GmbH
Brosshauser Straße 27
42697 Solingen, Germany

Contact / Hotline

Tel.: +49 (0) 212 2696 – 0
Fax: +49 (0) 212 2696 – 199
E-Mail: info@ostling.com

Service hours

Service hours

Mo.-Thur. from 8:30 to 16:30 Fr. from 8:30 to 14:00

For faster processing of your service requests, please always have the exact designation of the system used and the corresponding serial number ready for us! The serial numbers can be found on the type plates on the back of the EU control unit.

If additional support, e.g. 24-hour hotline or weekend service, is required by the ½STLING service team, this can be offered via an additional service contract to be concluded. Please contact our service team for this.

.

Table of Contents

EU DECLARATION OF CONFORMITY

1. EU Declaration of Conformity

2.

according **Annex IV of Directive 2014/35/EU**
Annex IV of Directive 2014/30/EU
Annex VI of Directive 2011/65/EU

We,

½STLING Marking Systems GmbH
(Name of supplier)
Brosshauser Straße 27
42697 SOLINGEN GERMANY
(address)

declare under their sole responsibility that the

Electrolytic marking system
Type: EU PULSE
(General designation, function, model, type, serial number, trade name)

in the version supplied by us complies with the relevant regulations

- **Directive 2014/35/EU of 26.02.2014 (Low Voltage Directive)**
- **Directive 2014/30/EU dated 26.02.2014 (EMC Directive)1**
- **Directive 2011/65/EU of 08.06.2011 (RoHS Directive)**

The following standard(s) and other technical specifications were used as a basis for conformity:
EN ISO 12100:2010
EN 60204-1:2018
EN 61558-2-6:2009 (marking circuit)
EN 55011:2009+A1:2010, group 1, class B
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 61326-1:2013
EN IEC 63000:2018
(Title and/or number and date of issue of the standard(s) and other technical specifications)

(Place and date of issue) (Name, Function) (Signature)

3. Graduated Warnings

Warnings are marked in this manual by a symbol with a sign word in the margin. The warnings shown in bold letters and highlighted by a frame line.

Warnings are hierarchically graded:

DANGER **The signal word DANGER is used when warning of an imminent** danger.

The possible consequences may be death or serious injury (personal injury).

WARNING **The signal word WARNING is used when warning of a possible** danger.

The possible consequences could be death or serious injury (personal injury).

CAUTION **The signal word Caution is used when warning of a possible** dangerous situation.

The possible consequences could be minor injuries (personal injury), damage to property or environmental damage.

ATTENTION **The signal word Attention is used to warn of** damage to property **or the environment.**

The possible consequences of non-observance could be damage to property or the environment.

General description of the EU PULSE electrolytic marking system

GENERAL DESCRIPTION

CAUTION Observe the following notes

Only sufficiently qualified and instructed persons may work on or with the electrolytic marking system!

Read the operating instructions carefully!

Figure 3 - 1 Front and rear of the electrolytic marking system

3.1. Technical data

Type:	**EU PULSE**
Year of manufacture:	**2020**
Width:	**300 mm**
Depth:	**260 mm**
Height with housing feet without foldedout tilt feet:	**170 mm**
Height with housing feet and folded-out tilt feet:	**200 mm**
Mass:	**13 kg**
Rated voltage:	**1/N/PE AC 230 V 50 Hz**
Full load current:	**2,3 A**
Recommended fuse protection on the mains side:	**10 – 16 A**
Recommended cross-section of the mains connection cable:	**1,5 mmÝ**
Recommended mains connection cable:	**H07BQ-F 3G1,5; 2 m**
Potential equalization line:	**≥ 2,5 m**
Ambient air temperature:	**5 ℃ bis 40 ℃**
Ambient relative humidity:	**10% bis 90 %, Operation only in nonconstructed, non-virgin state**
Storage temperature:	**-25 ℃ bis 55 ℃; as well as for a short time, not longer than 24 hours, up to 70 ℃**
Protection class:	**IP54**

Table 3 – 1 technical data

3.2. Electrolytic marking system function

The electrolytic marking system type EU PULSE, hereinafter also referred to as EU PULSE, is a system for industrial marking of metallic surfaces.All

electrically conductive metals can be marked. An electrolytic marking is an oxidation of the material surface.

No paint or other external materials are applied to the surface. Therefore, the application is particularly suitable for areas where paint marking is not appropriate.

The control unit serves both as a current source and as a trigger for the current. In order to obtain an electrolytic marking, in addition to the EU PULSE electrolytic control unit, a line network, a marking head, an appropriate electrolyte and a template are required..

In order to transfer an exact image of the stencil to the workpiece, the stencil must be positi-oned on the material at the desired position. The workpiece must be directly or indirectly connected to the EU PULSE. Now the marking head, which is wetted with electrolyte, is pressed onto the template. The circuit is closed and marking takes place.

Depending on the control of the current flow, the surface is oxidized to a maximum depth of 10 Èm.

The marking is permanently applied to the workpiece and can only be undone by removing the material surface..

3.3. Overview of the main components

The electrolytic marking system mainly consists of the following components:

- Marking control unit
  - Main connection cable
  - Marking control line
  - Pump control line (option)
- Marking head
  - Handle (option)
  - Graphite block
  - Marking felt
  - Line network
  - Marking cassette (option)
- Marking template

consumables

- Marking electrolyte and
- Neutralizing liquid (Neutralyt)
- Base plate
- Foot switch (option)
- Elektrolyte pump (option)
- Positioning stand (option)
  - Pneumatic maintenance unit
  - Pneumatic control unit
  - Rack
  - Carriage
- Electrolyte

3.3.1. Marker control

Front

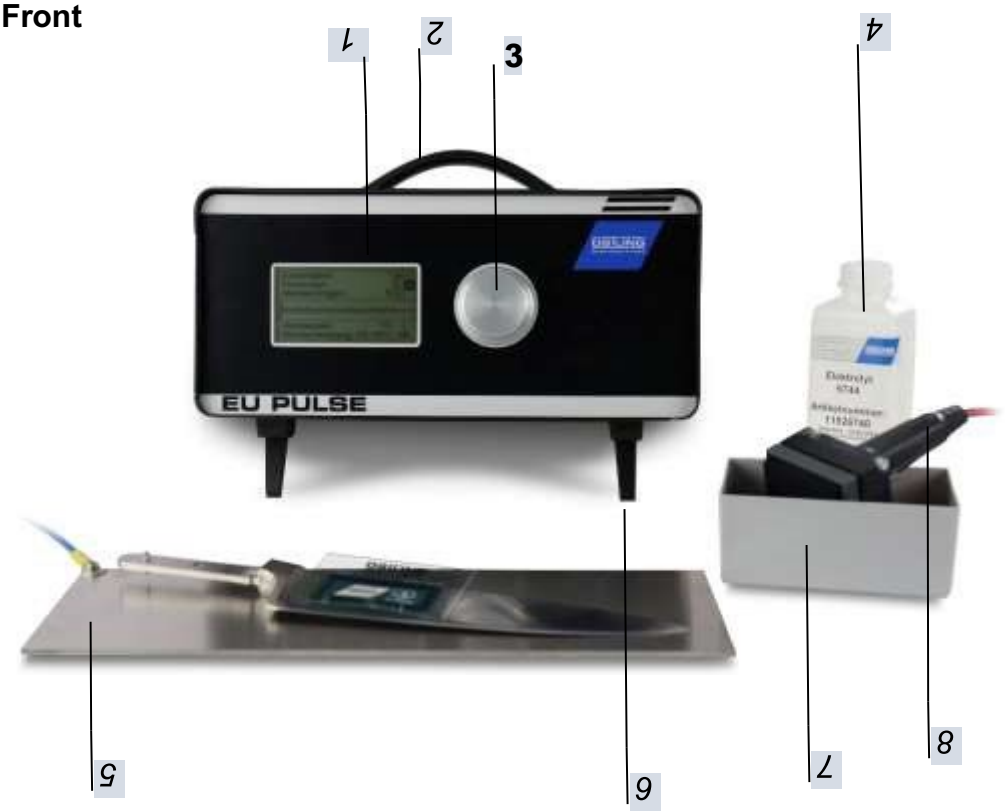


Figure 3-2 Overview front panel

Pos.	Designation	Function
1	Screen	Display oft he settings

2	Carrying	Handle for handling the EU PULSE
3	Rotary switch	With 16 detents and touch functions for setting the parameters electrolyte
4	Elektrolyte	For passivating or cleaning the marker
5	Base plate	Marking pad
6	Housing feet with fold-out tilt feet	Ergonomic set-up
7	Container	For electrolyte
8	Marking head	Tool for marking the product

Figure 3-2 Overview front panel

back

Figure 3-3 Overview rear side

Pos.	Designation	Function	
1	Fuse holder F1	Fuse F 630 mA	
2	Switch green	Mains disconnection switch on and off	Light up = ON

3	Connection socket X1	Marking head connection;locable,can be loaded up to 200 A (red connection cable)
4	Connector X2	Connection base plate;lockable, loadable; loadble up to 200 A (blue connection cable)
5	D-Sub-Socket 25-pin X3	Multi-Purpose Input/Output • Input for PLC & external sensors • Output for solenoid valve and pump control
6	Connector socket X4	Controlled mains connection for pump
7	Connector socket X5	Mains connection

Table 3-3 Overview back side

3.3.2. Elektrolytes / Neutralytes

In the course of its many years of existence, ½stling Marking Systems GmbH has developed various electrolytes for a wide range of applications and materials. Electrolytes are a slightly acidic to neutral salt solution.

Neutralytes serve both as a cleaner of the marking and as a passivator. Depending on the electrolyte, an appropriate neutralyte must be used.

Overview electrolytes and neutralytes

Elektrolytenumber	Electrolyte use
332	for marking hard metals
676	for marking tool steels and ball bearings
67/10/3	for marking all bright steels susceptible to corrosion
6744	for marking of chrome steels
70	for marking chrome steel 14%
71	for marking chemically nickel-plated materials
72	for marking of chrome steels. 18/8, VA
75	for marking chrome plated surfaces
77	Knife steel, tool steel
SP1	Stainless steel
SP4	Stainles steel
115	for marking black oxidized (burnished) materials
119	for marking of steam tempered materials
DE 20	for deep marking of steel with dark background
DE 40	for deep marking of non-ferrous metals
Neutralytenumber	Usage
N2	Nonferrous metals
N3	Stencil cleaner
N8	Ferrous metals

Table 3-4 Overview Elektrolyte und Neutralyte

The electrolytes DE 20, DE 40, DE 90 are deep marking electrolytes and can be processed with direct current. The 67/6 and 67/10/3 electrolytes are low in corrosion and do not necessarily have to be neutralized.

3.3.3. Marking felt and line network

Black marking felt 44F

Black marking felt 44F from ½stling has a high conductivity. If this marking felt is used, it is possible to work with a lower marking power. It serves as an electrolyte reservoir and is ideal for black marking.

White marking felt 34/F

White marking felt from the company ½stling has a high resistance. This marking felt is ideal for depth markings. Like marking felt 44F, this also serves as an electrolyte reservoir.

Conductive net (fine)

The ½stling conductive net is only required in conjunction with black marking felt 44F.

Conductive net serves as a protection to prevent a negative from burning into the marking felt. It also serves for better current distribution.

3.3.4. Marking heads and marking template

Depending on the application, ½stling Marking Systems GmbH has different shapes and sizes of marking heads in stock for you.

The marking heads can be equipped with an external pump unit.

Structure of the marking head

1. **Line set wirth handle**
2. **Marking head**
3. **Marking felt**
4. **Conductive net**
5. **Cassette**

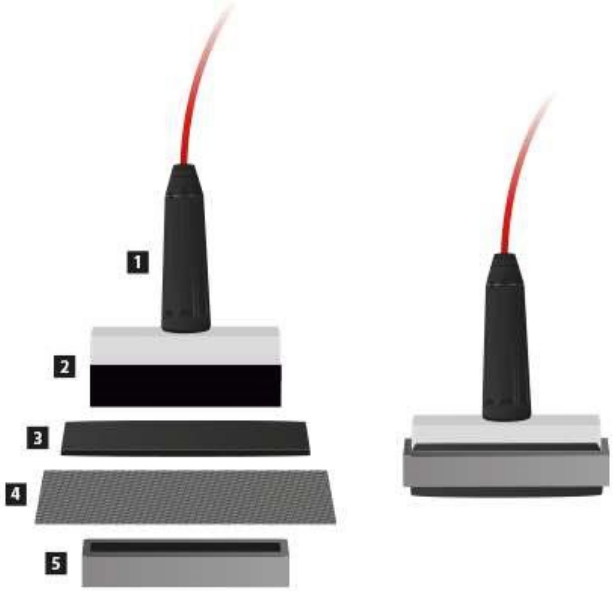
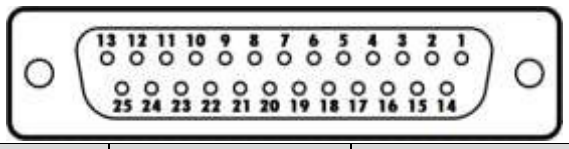


Figure 3-4 Structure and Marking head

3.4. Overview of the connections

All connections meet the water and dust protection class IP54 when plugged in. When not plugged in or when not in use, cover caps may have to be used.

3.4.1. 25-pin D-SUB socket



Pin	Designation	Description
1	Out1	Pump: high level for the duration of the pump time
2	Out2	Lock: low level for the duration of marking
3	Out3	Solenoid valve: high level for the duration of marking
4	Out4	Marking ready: 100ms high level when marking ready
5	Out5	ACK: 100ms high level to confirm a command
6	Out6	Error: high level in case of error - present until error message is acknowledged
7	Out7	MPO0: for future use
8	Out8	MPO1: for future use

9 & 10	24V input	as the inputs are galvanically isolated, 24V must be provided
11	Not documented	
12 & 13	24V output – 1A fused	can be bridged to pin 9 & 10, if no external 24V are available
14	In1	Foot switch and start signal: Edge change low high starts marking
15	In2	Stop: edge change low high: stops marking
16	In3	Pump: high level switches on the pump relay
17	In4	Sensor1 - marking head top: high level indicates correct positioning of marking head top
18	In5	Sensor2 - Marking head down: high level indicates correct positioning of marking head down
19	In6	Sensor3 - workpiece detection: high level indicates correct positioning of the workpiece
20	In7	MPI0: for future use
21	In8	MPI1: for future use
22 & 23	GND extern	external reference potential for 24V supply Pin 9&10
24 & 25	GND intern	must be bridged to pin 22 & 23 if internal 24V pin 12 & 13 are used

Table 3-5 Pin assignment DSUB 25-pin

3.4.2. Mini-USB

The USB mini A/B socket supports the USB On-The-Go (OTG) specification. The device can be operated either as a host (A) or as a device (B). The operating mode is determined via the ID pin.

Pin	Bezeichnung
1	+5V

2	Data-
3	Data+
4	ID: GND → Host-Modus / open → Device-Modus
5	GND

Table 3-6 pin assignment Mini-USB

In host mode, only the MSC class (Mass Storage Device Class) is supported. The 5 V are then provided by the device. The connected memory must be FAT32 formatted. The parameter files must be stored in the root directory. Parameter files are also stored by the device in the root directory.

In device mode, the device logs on to the host as a CDC class (Communication Device Class). A virtual COM port is installed and a COM port number is assigned. Communication with the controller can now take place via a terminal program, for example.

3.4.3. Marking head & Base plate

Marking head	Output voltage max. AC 25V PELV
Base plate	Can be grounded externally if necessary

3.4.4. Mains connection

supply AC 230 V 50/60Hz

3.4.5. Pump

The input voltage of AC 230 V is passed on to the pump output via a solidstate relay. The relay is activated via the control unit (see chapter "Operating the EU PULSE") or via an external signal at the DSUB 25-pin connector.

3.5. Rated data Electrical connection

WARNING Electrical hazards

Electrical body currents can kill or seriously injure you

The connection is made by means of a mains connection cable with a shock-proof plug.
The mains voltage must be within the voltage range specified on the type plate!
An appropriate electrical fuse must be provided on the mains side!

The electrolytic marking system is connected to the mains supply with the mains connection cable and the shockproof plug.

Rated voltage U_N	**1/N/PE AC 230 V 50/60 Hz**
Full load current I_N	**2,3 A**
Recommended fuse protection on the mains side	**10 – 16 A**
Recommended cross-section of the mains connection cable	**1,5 mmÝ**
Recommended mains connection cable	**H07BQ-F 3G1,5; 2 m**
Potential equalization line	**≥ 2,5 m**

Table 3-7 Electrical connection

4. SECURITY

4.1. Intended use

The EU PULSE electrolytic marking system is a system for industrial marking of metallic surfaces by means of: • color change of the surface

- **removing the surface (deep)**
- **structuring of surfaces (roughening) passivation of surfaces consisting of:**
- **steel, stainless steel**
- **aluminum**
- **titan**
- **brass**
- **copper**
- **materials coated with zinc with marking electrolytes and the corresponding marking felt and conductive net approved by ½stling.**

The Electrolytic marking system may only be used

- **be used as intended in compliance with the specified limit values**
- **be operated in dry indoor areas**
- **may only be cleaned with a damp soft cloth**

4.1.1. Physical ambient and operating conditions

Ambient limits	min.	max.	
Ambient air temperature	5 °C	40 °C	
Relative humidity of the environment	10%	90 %, operation only in non-condensed, non-icing condition	
Altitude	--	2000 m over NHN	
Installation site (pollution)	Use only in dry indoor areas (pollution degree 2, defined in EN 61010-1:2010)		
Storage temperature	-25 °C	55 °C	as well as for a short time, not longer than 24 hours, up to 70 °C
Protection class	IP54		

Table 4-8 Physical ambient and operating conditions

4.2. Missapplications

DANGER Electrical hazards

Electric current can kill or seriously injure you.

The electrolytic marking system may only be operated with closed covers!

WARNING Dangers due to modifications and retrofitting.

The possible consequences may include death, serious or minor injuries (personal injury), property damage or environmental damage.

Do not carry out any retrofitting with equipment parts or operating resources from other manufacturers before you have consulted the manufacturer, in particular with regard to the suitability of these parts! Modifications or conversions without the prior written consent of the manufacturer will result in the loss of any warranty!

CAUTION Danger due to misuse of the electrolytic marking system

The consequences of improper use may include personal injury, property damage or environmental damage.

Only use the electrolytic marking system as intended, in particular within the specified limits!

The operator alone is liable for any damage resulting from improper use of the EU PULSE!

and/or

CAUTION Danger of burns due to strong heating of the marking head the workpiece

Depending on the materials used, the marking head, the size of the workpiece, the marking head and/or the workpiece can heat up strongly and persons can burn their hands.

Use suitable hand protection!

CAUTION Eye and/or skin injuries

Persons may injure their eyes and/or skin when using the electrolytes.

Use suitable eye protection!

Use suitable hand protection!

With respect to reasonably foreseeable misapplications, note the following:

The electrolytic marking system:

- **may only be used in accordance with its intended purpose and in compliance with the specified limit values**
- **must not be used in potentially explosive atmospheres.**

Materials other than those described in the intended use may not be used or may only be used with the prior consent of ½STLING Marking Systems GmbH, see table Overview of electrolytes and neutrals

4.3. Residual risks

The

CAUTION Residual risks exist

consequences of misuse or incorrect operation can be injuries as well as damage to property and the environment.

Read and observe these operating instructions!

Only adequately qualified and instructed persons may work on or with the EU PULSE!

Observe the warning notes!

The EU PULSE is designed and built in accordance with the basic safety requirements of the EU Low Voltage Directive.

4.4. Stability

The

CAUTION EU PULSE not set up safely

consequences of an EU PULSE which has not been set up safely can be material damage!

Set up the EU PULSE properly!

The installation is usually carried out by sufficiently qualified and instructed personnel!

Observe the warning notices!!

The proper installation of the EU PULSE is carried out by sufficiently qualified and instructed persons at its place of operation.

Designation	approx. mass / kg
EU PULSE	13

Table 4-9 Dimensions table

4.5. Transport, Acceptance und Storage

4.5.1. Transport

The EU PULSE is to be packed in an appropriate, stable cardboard box.

The following pictograms shall be placed on the carton:

- This side up
- Protect from moisture
- Caution fragile
- Do not stack

For transport by truck, the EU PULSE must be secured on the loading area.

When transporting several EU PULSE units, they must not be stacked.

The design of the transport packaging depends on the contractual regulations and the destination.

For overseas transport, all components must be packed seaworthy.

Designation	approx. mass / kg
EU PULSE	13

Table 4-10 Dimensions table

The design of the transport packaging depends on the contractual regulations and the destination.

For overseas transport, the EU PULSE must be packed seaworthy.

4.5.2. Acceptance

▶ NOTICE

Transport damage, completeness

The EU PULSE may have been damaged during transport.

Check the EU PULSE for transport damage and for completeness!

Report any transport damage found to the carrier and the manufacturer immediately!

4.5.3. Storage

If the EU PULSE is not put into operation immediately after delivery, it must be stored carefully in a protected place.

The minimum and maximum storage temperature is:

- **min.: -25 ™**
- **max.: 55 ™, ≤ 24 h max. 70 ™**

4.6. Emission sound pressure level at workplaces

The A-weighted emission sound pressure level is less than 70 dB(A) in all operating modes).

4.7. Safety devices

DANGER Electrical hazards

Electric current can kill or seriously injure you.

The EU PULSE may only be operated with closed covers!

The electrolytic marking system is equipped with:

- **several covers**
- **warning sign**

4.7.1. Covers

The covers prevent live or moving parts from being reached and can only be opened with tools

Only qualified electricians are allowed to open the screwed covers.

4.7.2. Warning sign

Warning sign (according to EN ISO 7010) on the EU PULSE indicates residual dangers:

Warning sign	Meaning	Where?
	Warning of hot surface	• Side heat sink • Base plate • Base plate • Workpiece

Table 4-11 Warning sign

4.8. Emergency, extinguishing agents

When

CAUTION Carbon dioxide CO2

using a carbon dioxide extinguisher, there is a risk of suffocation for persons.

Do not use a carbon dioxide extinguisher in poorly ventilated rooms!

In case of emergency, immediately turn off the power disconnect switch or pull out the power plug!

In case of fire of the EU PULSE, extinguish with

- **Water or**
- **Powder or**
- **Carbon dioxide**

Extinguishing medium Water (wall hydrant)

When using a wall hydrant, the minimum distance must be five meters.

Powder extinguishing agent

When using a powder extinguisher, the minimum distance must be one meter!

Carbon dioxide CO2

When using a carbon dioxide extinguisher, the minimum distance must be one meter.

5. Assembly, Mounting and Connection

5.1. Assembly and Mounting

The

WARNING Improper assembly and installation

consequences of improper assembly and installation could be injury, machine or workpiece damage.

Assembly and installation must be carried out by adequately qualified and instructed personnel!

WARNING Electrical voltage

Electrical body currents can kill or seriously injure you.

The unit is connected to the mains via a mains connection cable with a shock-proof plug.
The mains voltage must be within the voltage range indicated on the type plate!
An appropriate electrical fuse must be provided on the mains side!

The assembly, installation and commissioning consist o:

- **Installation of the EU PULSE by a qualified specialist at its place of operation on a level, stable work surface**
- **if necessary, fold out the tilt feet**
- **Visual inspection of the EU PULSE**
- **Connection of the EU PULSE to the electrical power supply by means of a power cord**
- **Connect all relevant cables and lay them properly**
- **Commissioning of the EU PULSE by authorized and qualified personnel**

- **Functional test and trial oft the EU PULSE by authorized and qualified personnel**

Dimensions of the EU PULSE

Dimension	approx. dimensions/mm
Width	300
Depth	260
Height with housing feet without folded-out tilt feet	170
Height with housing feet and folded-out tilt feet	200

Table 5-12 Dimensions EU PULSE

Space requirement for EU PULSE and operator

Dimensions	approx. dimensions/mm
Width	310
Depth	1260
Height	220

Tabelle 5-13 Abmessungen Platzbedarf fïr EU PULSE und Bediener

Dimensions

Designation	approx. mass / kg
EU PULSE	13

Table 5-14 Masstable

5.2. Making the electrical connection

WARNING Electrical voltage

Electrical body currents could kill or seriously injure you.

The connections must be made by a sufficiently qualified and instructed person.
The supply voltage must correspond to the nominal voltage indicated on the type plate!

CAUTION Cable routing

Persons could receive an electric shock if the lines are damaged.

Lay the cables so that they are protected against mechanical damage!

Carry out the electrical connection:

Lay and connect the power supply cable properly

Nominal voltage U_N	**1/N/PE AC 230 V 50/60 Hz**
Full load current I_N	**2,3 A**
Recommended fuse protection on the mains side	**10 – 16 A**
Recommended cross-section of the mains connection cable	**1,5 mmÝ**
Recommended mains connection cable	**H07BQ-F 3G1,5; 2 m**
Potential equalization line	**≥ 2,5 m**

Table 5-15 Electrical connection

5.3. Operating modes

The electrolytic marking system has the following operating modes in particular:

- **Edit parameter files**
- **Automatic mode (marking, "work")**

All safety devices are active.

5.4. Reduction of noise and vibration

To reduce noise and vibration, the fold-out tilt feet are equipped with antislip pads made of rubber-like material.

6. Operating Personnel and Workplaces

6.1. Operating Personnel

Only adequately qualified and instructed persons may work on the electrolytic marking system

DANGER Electrical hazards

Electric current can kill or seriously injure you.

The EU PULSE may only be operated with closed covers!

death,

WARNING Dangers due to insufficiently qualified and instructed personnel put third parties at risk. The possible consequences can be serious injury, property damage or environmental damage..

Only sufficiently qualified and instructed personnel may work on or with the EU PULSE!
Keep unauthorized persons away!
Only qualified and instructed personnel may perform maintenance and servicing work!

Repairs and troubleshooting may only be performed by qualified and instructed personnel

The

WARNING Aging, external influences, changes

possible consequences may include death, serious or minor injuries, damage to property or environmental damage.

Always check the EU PULSE for safety before starting work and only operate it if it is in perfect condition!

Have any safety deficiencies rectified immediately by an authorized specialist!

Operate the EU PULSE only with closed covers!

WARNING Repair and maintenance work

Improper repair and maintenance could result in death, serious or minor injury, property damage or environmental damage.

Only qualified and instructed specialists may perform maintenance work! Only the manufacturer, a customer service authorized by the manufacturer or, with the manufacturer's prior consent, an authorized specialist may perform maintenance work.

To shut down the EU PULSE safely, pull out the mains plug!

Immediately after completion of the repair and maintenance work, reassemble all protective and safety devices and check their function!

The

WARNING Troubleshooting and fault rectification

consequences of improper troubleshooting could be death, serious or minor injuries, property damage or environmental damage.

Only qualified and instructed personnel may carry out troubleshooting!

the piece

CAUTION Risk of burns due to strong heating of the marking head and/or work-

Depending on the materials used, the marking head, and the size of the workpiece, the marking head and/or the workpiece may heat up strongly and persons may burn their fingers.

Use suitable hand protection!

CAUTION Eye and/or skin injuries

Persons may injure their eyes and/or skin when using the electrolytes.

Use suitable eye protection

Use suitable hand protection

6.1.1. Operator

The operator is a qualified professional.

Tasks of the operator:

- **Carry out visual inspection**
- **Connect / disconnect the power supply cable on the rear side at the connection plug X5**
- **Plug in / unplug the mains plug of the 230 V supply**

- **Switch the mains isolator switch on / off**
- **If necessary, replace fuse (1 x F 630 mA)**
- **Connect / remove the connection cable of the marking head to the connection socket X1**
- **Connect / remove the connecting cable of the base plate to the connecting socket X2**
- **Connect / remove the connection cable Multi-Purpose Input/Output to the D-Sub socket**
- **25-pin X3 connect / remove**
- **Connect / remove the connection cable of the pump to the connection socket X4**
- **Create / change parameter files at the rotary switch**
- **Mark workpiece**
- **Eliminate malfunctions in the daily operating sequence**
- **External cleaning with a soft damp cleaning cloth with the EU PULSE safely shut down**

6.1.2. Maintenance personnel

The maintenance personnel consists of authorized and qualified specialists.

The maintenance personnel

Maintain the

- **Electrical and**
- **mechanical**

Components of the EU PULSE

6.1.3. Maintenance personnel

All work beyond maintenance, such asInbetriebnahme

- **commissioning,**
- **maintenance work**
- **repairs,**
- **troubleshooting and fault rectification, are not described in the operating instructions and the technical documents and may only be carried out by the manufacturer or a specialist.**

6.2. Description of the workplaces

purpose

CAUTION Work areas on the EU PULSE which are not intended for this or which have not been maintained

The possible consequences may include injury to persons, damage to property or damage to the environment.

Clean the work areas on the EU PULSE regularly!

Keep the work areas on the EU PULSE free of objects that are not or no longer needed!

The EU PULSE has several workplaces:

Work-station	Workstation area	Workstation designation	Task
1	Rear	connections	Connect / disconnect mains cable to X5 Switch mains disconnector on / off
			Replace fuses if necessary
			Replace fuses if necessary (1 x F 630 mA)

			Connect / disconnect marking head connection cable to X1
			Connect / remove connection cable base plate to X2
			Connect / remove connection cable MultiPurpose In-put/Output to X3
			Connect / remove pump connection cable to X4
2	Front side	settings	Create / change parameter files at the rotary switch
3	Marking range	Marking	Prepare base plate, workpiece, template for marking connect
			Prepare marking head for marking

Table 6-16 Workstations

Overview of workstaions

Workplace AP1

Figure 6-5 Overview workstation AP1

Workplace AP2 and AP3

Figure 6-6 Overview workplaces AP2 and AP3

7. OPERATING THE EU PULSE

DANGER Electrical hazards

Electric current can kill or seriously injure you

The EU PULSE may only be operated with closed covers!

WARNING Dangers due to insufficiently qualified and instructed personnel

Personnel who are not sufficiently qualified and instructed are endangered or put third parties at risk. The possible consequences can be death, serious injury, property damage or environmental damage.

Only sufficiently qualified and instructed personnel may work on or with the EU PULSE!

Keep unauthorized persons away!
Only qualified and instructed personnel may perform maintenance and servicing work!

Repairs and troubleshooting may only be performed by qualified and instructed personnel.

WARNING Aging, external influences, changes

The possible consequences may include death, serious or minor injuries, damage to property or environmental damage.

Always check the EU PULSE for safety before starting work and only operate it if it is in perfect condition!
Have any safety deficiencies rectified immediately by an authorized specialist!

Operate the EU PULSE only with closed covers!

WARNING Troubleshooting and fault rectification

The consequences of improper troubleshooting could be death, serious or minor injury, property damage or environmental damage.

Only qualified and instructed specialists may perform troubleshooting!

The

WARNING Repair and maintenance work

consequences of improper repair and maintenance could be death, serious or minor injuries, property damage or environmental damage.

Only qualified and instructed specialists may perform maintenance work! Only the manufacturer, a customer service authorized by the manufacturer or, with the manufacturer's prior consent, an authorized specialist may perform maintenance work.

To shut down the EU PULSE safely, pull out the mains plug! Immediately after completing the repair and maintenance work, reassemble all protective and safety devices and check their function!

CAUTION Spare parts

Consequences of using unsuitable spare parts can be property damage.

Spare parts must meet the technical requirements of the manufacturer! Only use original spare parts from the manufacturer!

and/or

CAUTION Danger of burns due to strong heating of the marking head the workpiece.

Depending on the materials used, the marking head, the size of the workpiece, the marking head and/or the workpiece can heat up strongly and persons can burn their hands.

Use suitable hand protection!

CAUTION Eye and/or skin injuries

Persons may injure their eyes and/or skin when using the electrolytes.

Use suitable eye protection!

Use suitable hand protection!

The

CAUTION Contaminated workplaces

possible consequences may be minor injuries (personal injury), property damage or environmental damage.

Clean the EU PULSE regularly!

7.1. Overview EU PULSE

Figure 7-7 Overview Frontsite

Pos.	Designation	Function
1	Screen	Display of settings
2	Carrying handle for	handling the EU PULSE
3	Rotary switch	with 16 detents and touch functions for setting the parameters
4	Electrolyte	for passivating or cleaning the mar-marking
5	Base plate	Marking pad
6	Housing feet with fold-out tilt feet	Ergonomic setup
7	Container	for electrolyte
8	Marking head	Tool for marking the product

Table 7-17 Overview Frontsite

Figure 7-8 Overview rear side

Pos.	Designation	Function	
1	Fuse holder F1	Fuse F 630 mA	
2	Switch green	Mains disconnection switch for switching on and off	Lights up = ON
3	Connection socket X1	Connection marking head; lockable, can be loaded up to 200 A (red connection cable)	
4	Connector X2	Connection base plate; lockable, loadable up to 200 A (blue connection cable)	
5	D-Sub female connector 25pin X3	Multi-Purpose Input/Output • Inputs for PLC & external sensors • Outputs for solenoid valve and pump pen control	
6	Connector socket X4	controlled mains connection for pump	
7	Connector X5	Mains connection	

Table 7-18 Overview rear side

7.2. Switching on

Only adequately qualified and instructed personnel may work on the EU PULSE..

1. **connect the power supply cable**
2. **switch on the mains isolating switch**

7.3. Marking

All EU PULSE settings are made by turning and pressing the rotary switch (pos. 3) on the front panel.

The setting is displayed on the screen.

7.3.1. Preparations

The mains cable is connected to the control unit through socket X5. The red wire is connected to the control unit by the X1 terminal. The blue wire is connected to the control unit at terminal X2. The red wire is connected to the marking head. The blue wire is connected to the contact plate.

The template is clamped on the marking head or placed directly on the workpiece to be marked. The electrolyte is poured into the container. The marking head is soaked in the container so that the marking felt can be soaked with electrolyte.

7.3.2. Marking procedure

1. **Press lightly with the moistened marking head (B) on the template lying on the workpiece (A) to be marked.**
2. **the metal ions migrate from the anode (A) to the cathode (B) due to the contact of the marking head (B) with the workpiece (A)**
3. **the metal ions migrate from the anode (A) to the cathode (B) due to the electrolyte.Due to the electrolyte, a chemical reaction of the metal ions takes place: The metal ions oxidize.**
4. **the polarity changes: (A) becomes the cathode and (B) becomes the anode. The metal ions, which are oxidized by the electrolyte, move back towards (A**
5. **After the oxidized metal ions have returned to their original position, they solidify in the material (A).**
6. **oxidized metal ions**

7. zero passage
8. metal ions

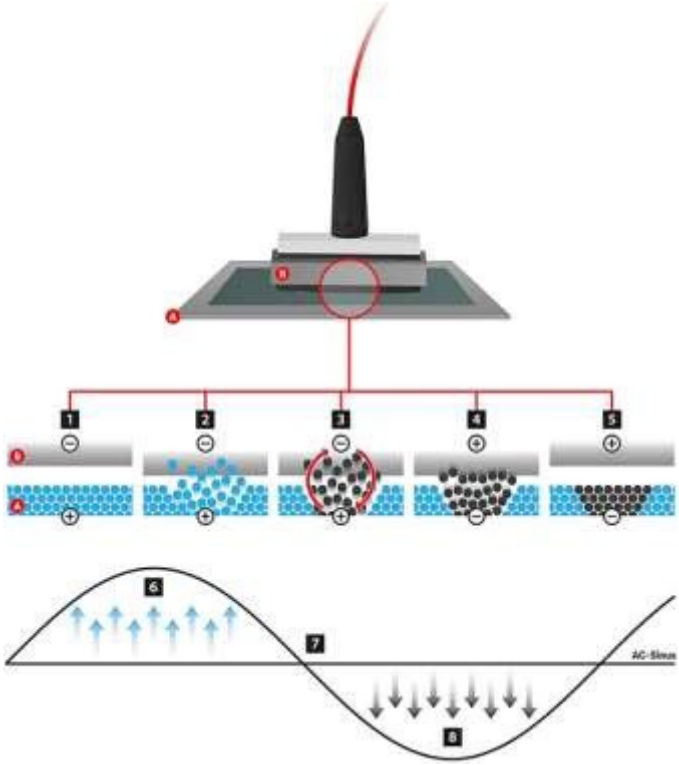


Figure 7-9 Marking process

7.3.3. Post-processing of the marking

After marking, the marking must be cleaned with a suitable neutralyte.

A suitable neutralizing agent can be found in the table "Overview of electrolytes and neutralizing agents".

The purpose of neutralization is to passivate the marking. In addition to passivation, salt residues are also removed from the marker, which can promote post-oxidation.

The Neutralyt can be removed with a cloth.

7.4. Marking settings

7.4.1. Basics

The transformer supplies a sinusoidal AC voltage with an amplitude of +/25 V and a frequency corresponding to the input frequency/mains frequency. This is usually 50 Hz. This corresponds to a periode duration of 20 ms.

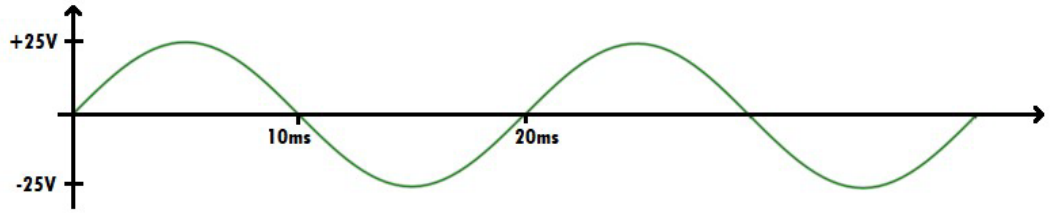


Figure 7-10 Sinusoidal voltage (sine) with50 Hz and 25 V Amplitude

To control the marking power, the sine is cut on or off. The power can be adjusted independently per half period (half wave).

7.4.2. Phase angle control

In phase angle control, the half-wave is controlled after a defined delay time after the zero crossing and is blocked again with the following zero crossing. The marking power here corresponds to the control time. For a half-wave duration of 10 ms (50 Hz), a marking power of e.g. 40 % corresponds to a delay time of 6 ms and a conduction time of 4 ms.

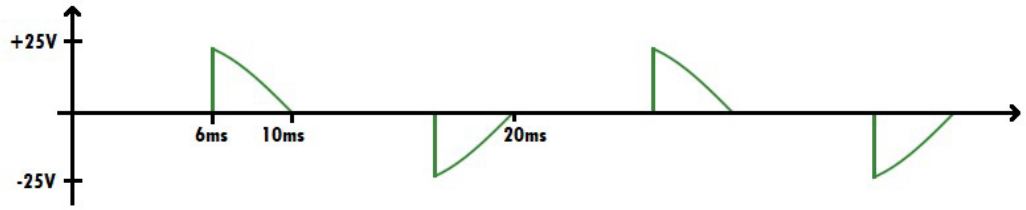


Figure 7-11 Phase angle at 50 Hz and marking power 40 %

Since a voltage is always present at the moment of switching - at a marking power of 50 %, switching takes place at the peak value - a correspondingly large current also flows immediately. Depending on the material, these current peaks are absolutely necessary for marking, but they also generate a lot of heat, which stresses the stencil and can have an unfavorable effect on the marking result.

7.4.3. Phase section

With the phase section, the half-wave is switched in zero crossing and blocked again after a defined duration. With a half-wave duration of 10 ms (50 Hz), a marking power of e.g. 40 % corresponds to a drive-through time of 4 ms, followed by a blocking time of 6 ms.

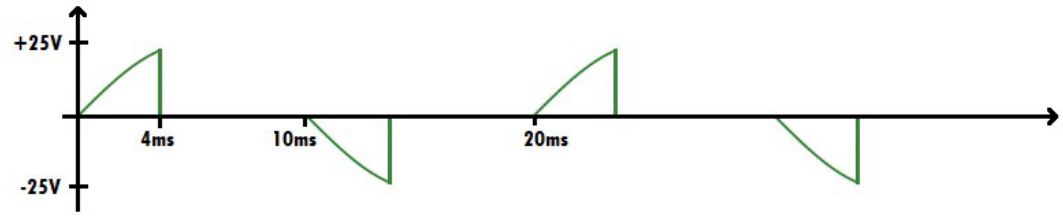


Figure 7-12 Phase section at 50 Hz and marking power 40 %

With the phase section, the marking current increases continuously with the voltage up to the maximum. With this method, the temperature rise can be better controlled and it is gentler on the stencil. However, depending on the material and pattern, the quality of the marking may be reduced.

7.4.4. Phase-angle and intercept - peak-current marking

A combination of phase angle and phase cut is the peak current marking. Here the high peak current of the phase angle is used, but the duration of the current flow through the phase angle is reduced. This allows the marking power to be reduced, resulting in less heat generation.

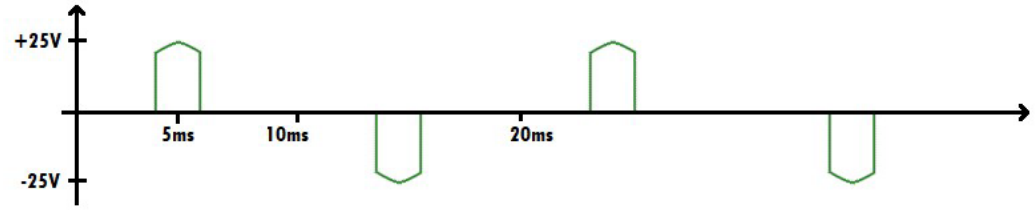


Figure 7-13 Phase angle and phase cut at 50Hz and marking power 20%

The phase is cut symmetrically around the center of the half-wave. A marking power of e.g. 20 % (2 ms at 50 Hz) corresponds to a cut 1 ms before and a section 1 ms after the maximum of the half-wave.

7.4.5. Pulsing

To give the stencil some time to cool down between the current peaks, the marking can be pulsed. Here, a marking section is followed by a short pause before the marking starts again.

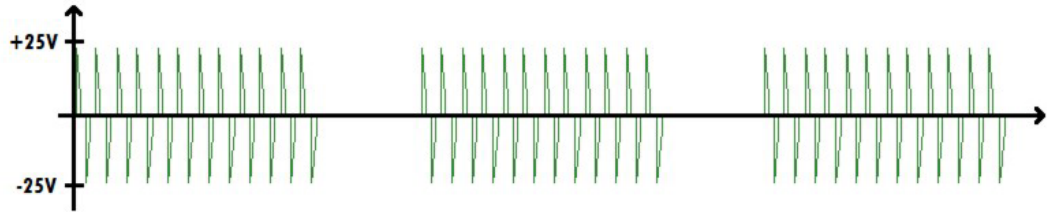


Figure 7-14 Phase gating with pause

7.4.6. Mikropulsing

Micropulsing offers another possibility to reduce the temperature during the marking process. Here, the marking is not directly interrupted, but individual pulses, i.e. one positive and one negative half-wave each, are omitted. The pulse-to-pause ratio indicates how many pulses are transmitted and how many are skipped. In the following example, a ratio of 3:2 is set. Three pulses are followed by a pause of two pulses.

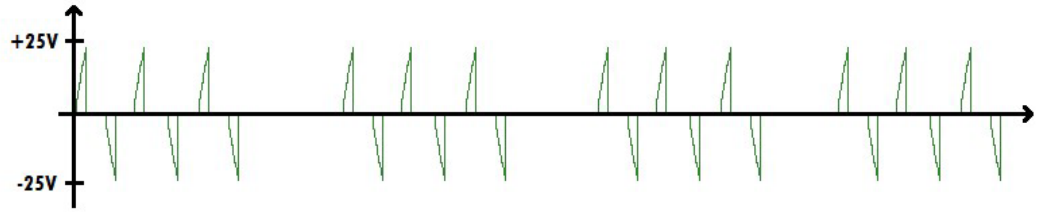


Figure 7-15 Phase section with micropulses 3:2

Experiments have also shown that the loss of quality in the phase section can be compensated by adjusted micropulsing.

7.4.7. Positive or negative Pulses

The EU PULSE also has the option of switching through only the positive or negative half-waves. Depending on the material and application (black marking, depth marking, cleaning, polishing), this can have additional positive effects.

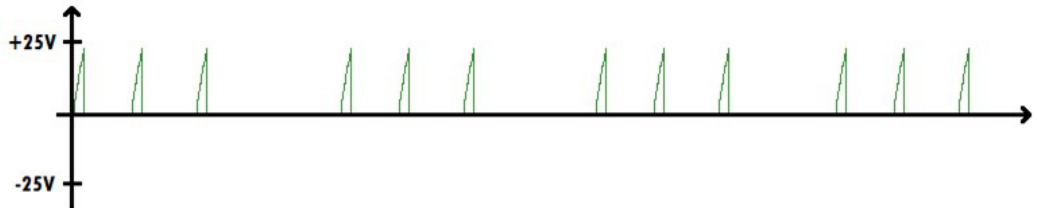


Figure 7-16 positive section with micropulses 3:2

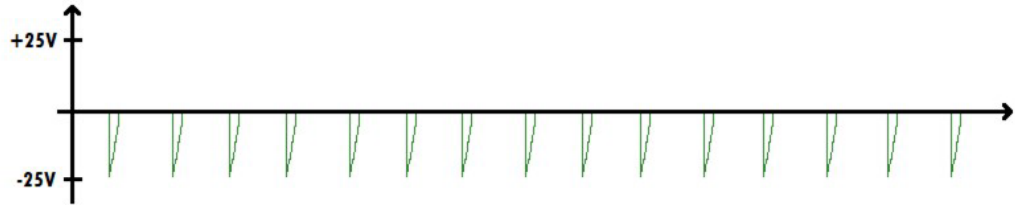


Figure 7-17 negative section

7.4.8. Combination of the different methods

Each method has different advantages and disadvantages and different effects, depending on the material and application. In order to obtain the maximum benefit, the control allows up to five different marking sections with a total duration of 20 second

7.5. Main screen

[1]Name of the currently loaded parameter file.

[2]Name of the electrolyte belonging to the parameter file.

[3]Counter for daily markers. This can be corrected or reset in the marker settings.

[4]Symbol for automatic mode. The unit waits for marking release by external sensors. The solenoid valve is activated.

[5]Symbol for activated pump.

[6]Symbol for the current repeat mode of the loaded parameter file:

once 1× endless

[7]Symbol for activated micropulse mode.

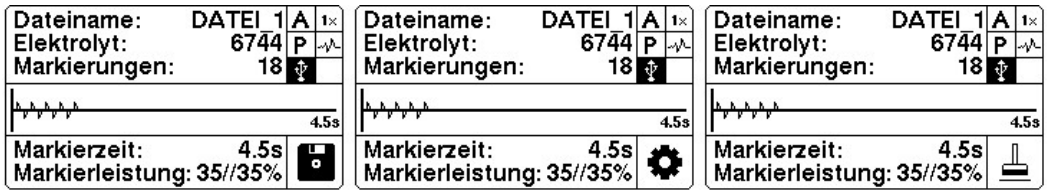
[8]Symbol for the status of the USB connection. Host or Device or Disconnected

[9]Preview of the loaded parameter file. Also shows the number of marking sections and the total marking time.

[10] Duration of the marking time for the current section.

[11] Marking power for the current section as a percentage of the total power. Divided into positive and negative half-wave.

[12] Menu symbol. Menu can be selected by turning the knob. The corresponding menu is called up by pressing.

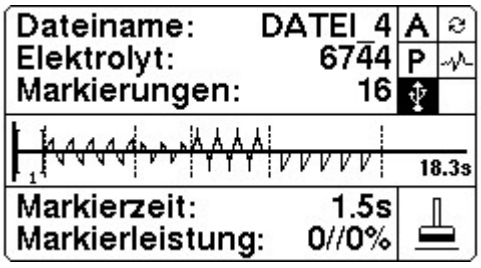


In the figure on the left, the file menu is selected. In the middle the settings and on the right the menu for the marking parameters..

7.6. Parameter preview

The parameter preview should give as much information as possible about the set parameters within the possibilities of the display resolution of 240 x 128 pixels.

A maximum of 5 different marking sections can be set. The maximum marking time is 20 seconds. The marking sections are switched through by turning the rotary switch.



Section 1

Marking type positive: off

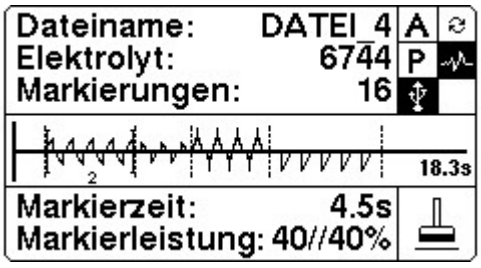
Marking power positive: 0

Marking type negative: off

Marking power negative: 0

Micropulses: off

Marking time: 1.5 seconds



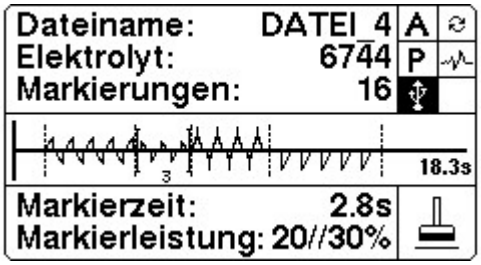
Section 2

Marking type positive: phase section

Marking power positive: 40

Marking type negative: phase section

Marking power negative: 40



Micropulses: on

Marking time: 4.5 seconds

Section 3

Marking type positive: phase angle

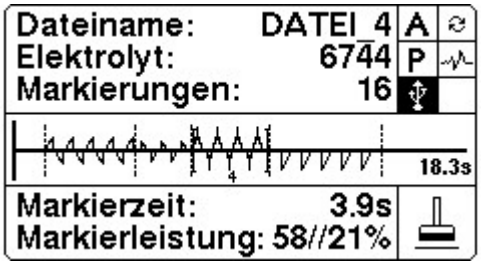
Marking power positive: 20

Marking type negative: phase angle

Marking power negative: 30

Micropulses: off

Marking time: 2.8 seconds



Section 4

Marking mode positive: peak current

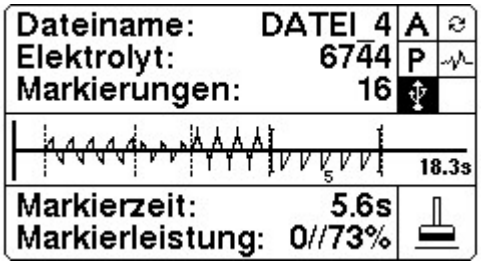
Marking power positive: 58

Marking mode negative: peak current

Marking power negative: 21

Micropulses: off

Marking time: 3.9 seconds



Section 5

Marking type positive: off

Marking power positive: 0

Marking type negative: phase angle

Marking power negative: 73

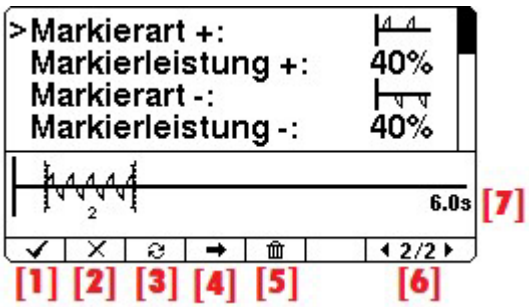
Micropulses: off

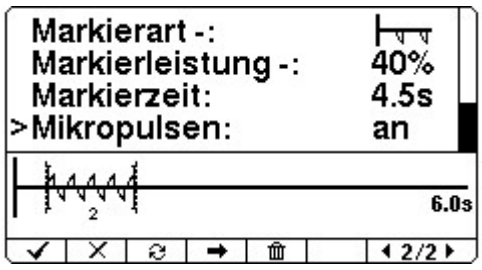
Marking time: 5.6 seconds

Press the rotary switch to access the parameter settings of the current section.

7.7. Parameter-menu

The two marking parameters "Marking type" and "Marking power" are set separately for each positive and negative half-wave. The "Marking time" and the "Micropulse" mode are set for the respective marking section.





[1] Exit menu and save changes.

[2] Exit menu and discard changes.

[3] Repeat mode: once 1× or endless

[4] Add further marking section

[5] delete current marking section

[6] scroll through the marking sections

[7] Total marking time in seconds

Overview of the marking type - Marking type + phase section

- Phase section
- Phase section
- Phase approach and phase section - Peak current marking
- Pause

Overview of marking type - marking type - phase section

- Phase section
- Phase section
- Phase angle and phase section - Peak current marking
- Pause

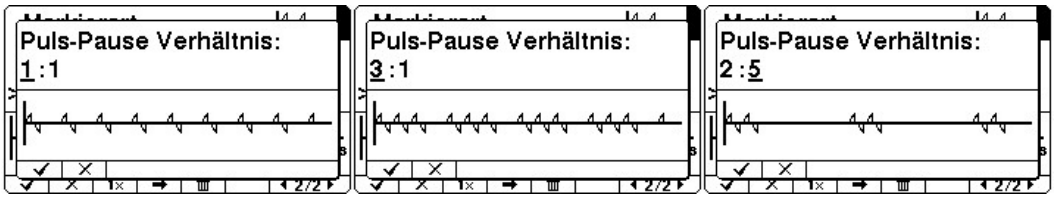
7.7.1. Marking power

The marking power can be adjusted continuously from 5 % - 95 %. The % refers to the maximum transformer power. In the case of the "Pause" marking mode, the marking power is 0 %.

7.7.2. Marking time

The accumulated marking time of all sections cannot exceed 20.0 seconds. The shortest section time is 0.5 seconds. If there is only one section, a marking time of "infinite" - can also be set.

7.7.3. Micropulses



One pulse corresponds to one positive and one negative half-wave (20 ms at 50 Hz).

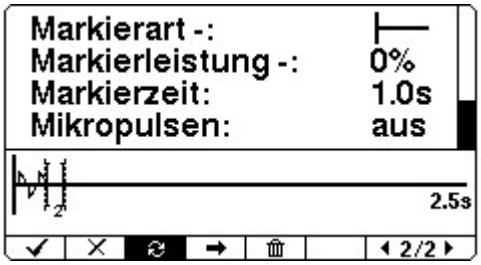
A pause corresponds to the omission of one positive and one negative half-wave each (20 ms at 50 Hz).

The first value indicates the number of pulses, the second value the number of pauses. The pulse to pause ratio can be greater than or less than 1.

The maximum ratio is 5:5 (100 ms pulse, 100 ms pause).

7.7.4. Repeat mode

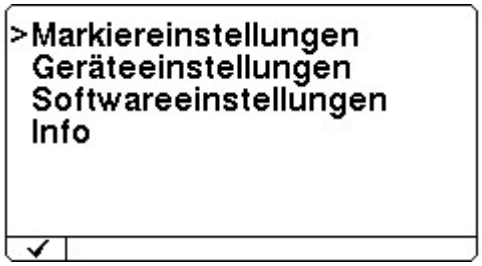
It is possible to repeat a set marking pattern once 1× or endless. By pressing the rotary knob it is possible to switch between the modes.



If you want to set a pulse mode, you define a marker section followed by a pause and switch to the endless mode.

Here in the example a phase angle with a duration of 1.5 seconds followed by a pause of 1 second was set.

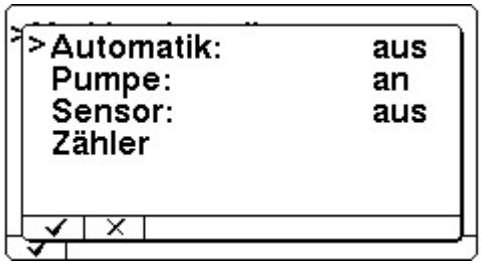
7.8. Settingsmenu



The general settings menu contains the submenus for marker settings, device settings and software settings.

The item Info contains general device information

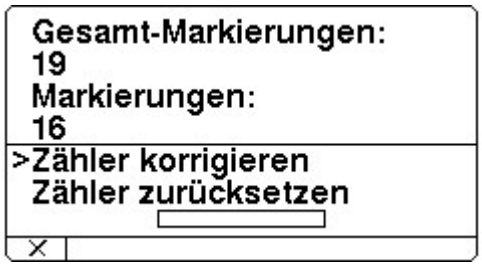
7.8.1. Marker settings



In automatic mode, the solenoid valve is switched when a marker is started. The marking starts only when an external sensor has given the signal "Marking head down". No new marking can be triggered as long as the signal "Marking head up" has not been given.

A pump time of 0.5 to 5.0 seconds or continuous operation can be set for the pump. If the automatic mode is switched on, continuous operation means that the pump switches on with the device. If the auto-matic mode is off, the pump is only in operation for the duration of the marking.

The sensor enables external position detection of the workpiece (optically, magnetically or by triggering a contact). If this option is switched on, the marking starts only after the sensor has been released.



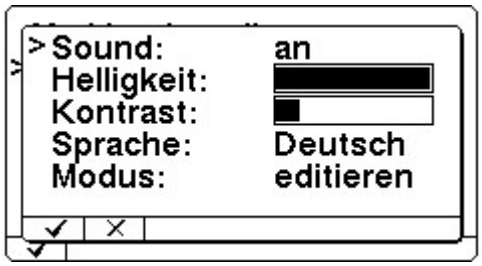
In the counter settings, the total markings of the device are displayed first. These are stored unchangeably in the

EEPROM.

Below this is the "day counter". This can be used, for example, to track the markings of a shift. If there is an incor-
rect marking, this counter can be corrected step by step. To do this, keep the rotary knob pressed for about 2 seconds.

The day counter can also be reset here.

7.8.2. Device settings

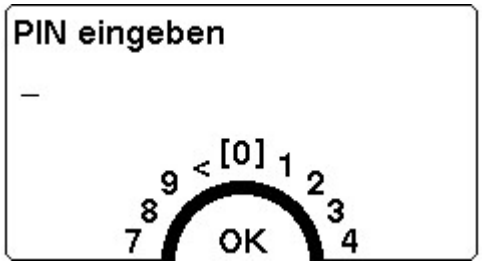


Here the sound can be switched on or off and the display brightness and contrast can be adjusted.

The menu language can be switched between German, English and Japanese.

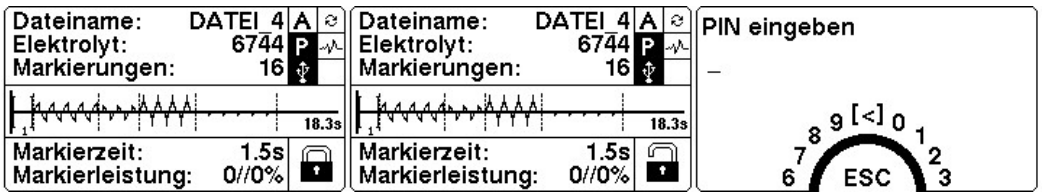
The menu language can be switched between German, English and Japanese.

If the operating mode is changed from "edit" to "work", the menus Marking parameters (see chapter "Parameter menu") and Settings (see chapter "Settings menu") are provided with a 3 - 4 digit PIN. This is defined directly after setting the working mode.



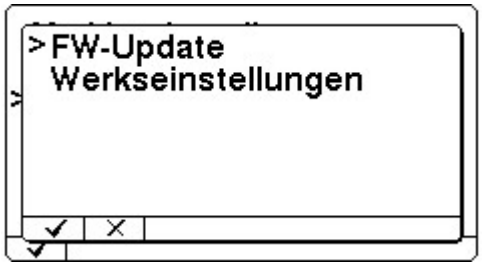
By turning the rotary knob, it is possible to rotate through the digits 0 - 9. By pressing briefly, the digit is set. By keeping it pressed for about 2 seconds, the PIN is stored.

The "<" character removes the last digit. By keeping pressed on the "<"-character (ESC) the process can be aborted.



In automatic mode, only parameter files can be loaded and the marking mode can be started. To leave the working mode, the previously set PIN must be entered after pressing the "Unlock" symbol. Now the device is temporarily back in editing mode and parameter settings can be changed or, for example, the counter can be corrected. To leave the working mode permanently, it must be changed again in the device menu (see chapter "Settings menu").

7.8.3. Software settings



Via the item Firmware Update you can start the bootloader and update the firmware via USB. More details can be found in the chapter "Firmware Update".

With the item Factory settings a standard configuration is loaded. The day counter is reset. The saved parameter files are not affected.

In addition to the factory reset, there is also a hard reset. This can be performed by pressing and holding the rotary switch before switching on the device. The hard reset also deletes the internal memory. The device is reset to the delivery state.

7.8.4. Info

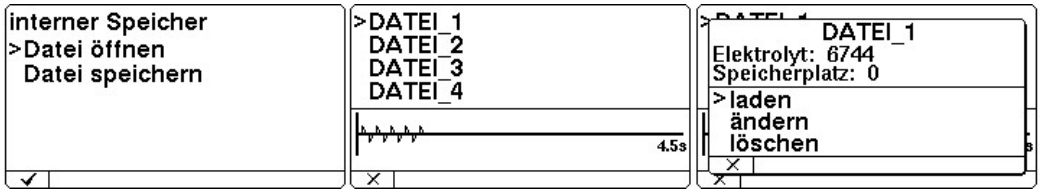
The info window contains the type designation, the firmware version, the mains frequency measured after the start of the device, the temperature of the internal heat sink, as well as the measured 24 V voltage, which is output to the D-SUB at pins 12 & 13.

The window is closed again by pressing the rotary switch.

7.9. File-Menu

The device has an internal EEPROM memory with 32 storage locations for parameter files.

These are displayed in alphabetical order via the "Open file" menu.

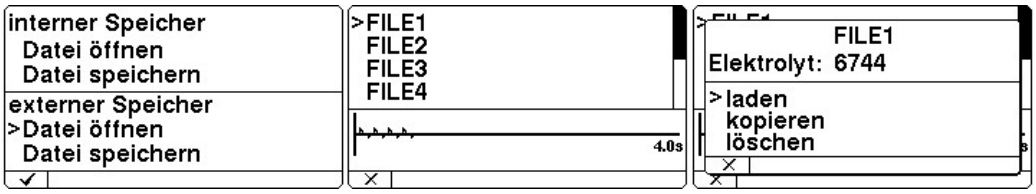


I A preview of each file appears in the lower area of the file browser.

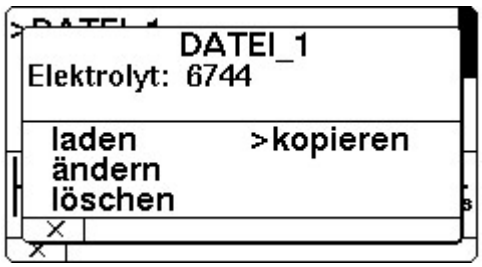
Pressing the rotary switch takes you to the selection menu. In addition to the electrolyte to be used, this also contains the information on which memory location the file is stored.

The selected file can now be loaded, changed or deleted.

If a FAT32 formatted USB memory is connected via a mini USB-B to USBA adapter, the file menu expands to include the external memory.



In the file selection menu there is now the possibility to copy the selected file from the external mass storage to the internal EEPROM. In this way, a new parameter file can be imported relatively quickly on several devices. If the file name already exists in the internal memory, the user is prompted to enter a new name. Editing the files on the external memory is not possible.



Conversely, it is possible to copy a parameter file from the internal to the external memory when the mass memory is plugged in. Again, an existing file name must be renamed.

7.10. Marking mode

The marking mode can be started by the following actions:

- holding down the rotary switch for about 2 seconds
- operating the optional foot switch

- a start signal to input 1
- a start command via the USB interface

In marking mode, the display illumination is ORANGE by switching over.

If possibly set sensors have released the marking, the set marking pattern is run. A progress bar with the step width 1 pixel/100 ms shows the current position.

If a marking time has been set, the marking time counter counts down the section.

The marking mode is ended by the following actions:

- Marking time expired
- renewed actuation of the rotary or foot switch
- Stop signal on input
- Stop command via USB interface
- Error due to tripped circuit breaker
- Error due to triggered temperature monitoring

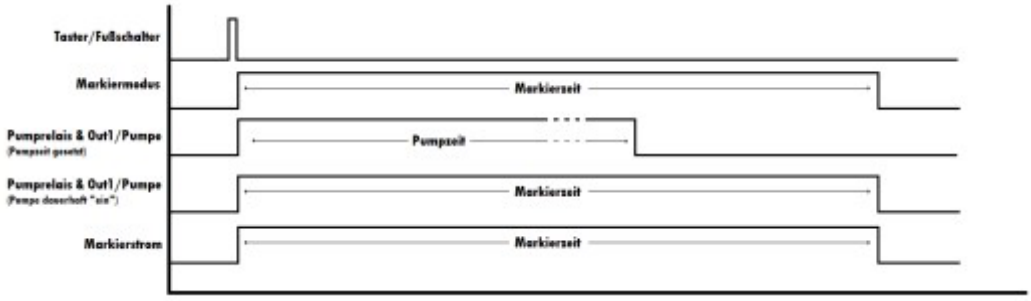
After leaving the marking mode, the marking counter is incremented by one digit.

See also chapter "Timings". Verlassen des Markierbetriebs wird der Markierzûhler um eine Stelle erh±ht.

Siehe hierzu auch Kapitel „Timings“.

7.11. Timings

7.11.1. Manual marking mode (automatic = out)



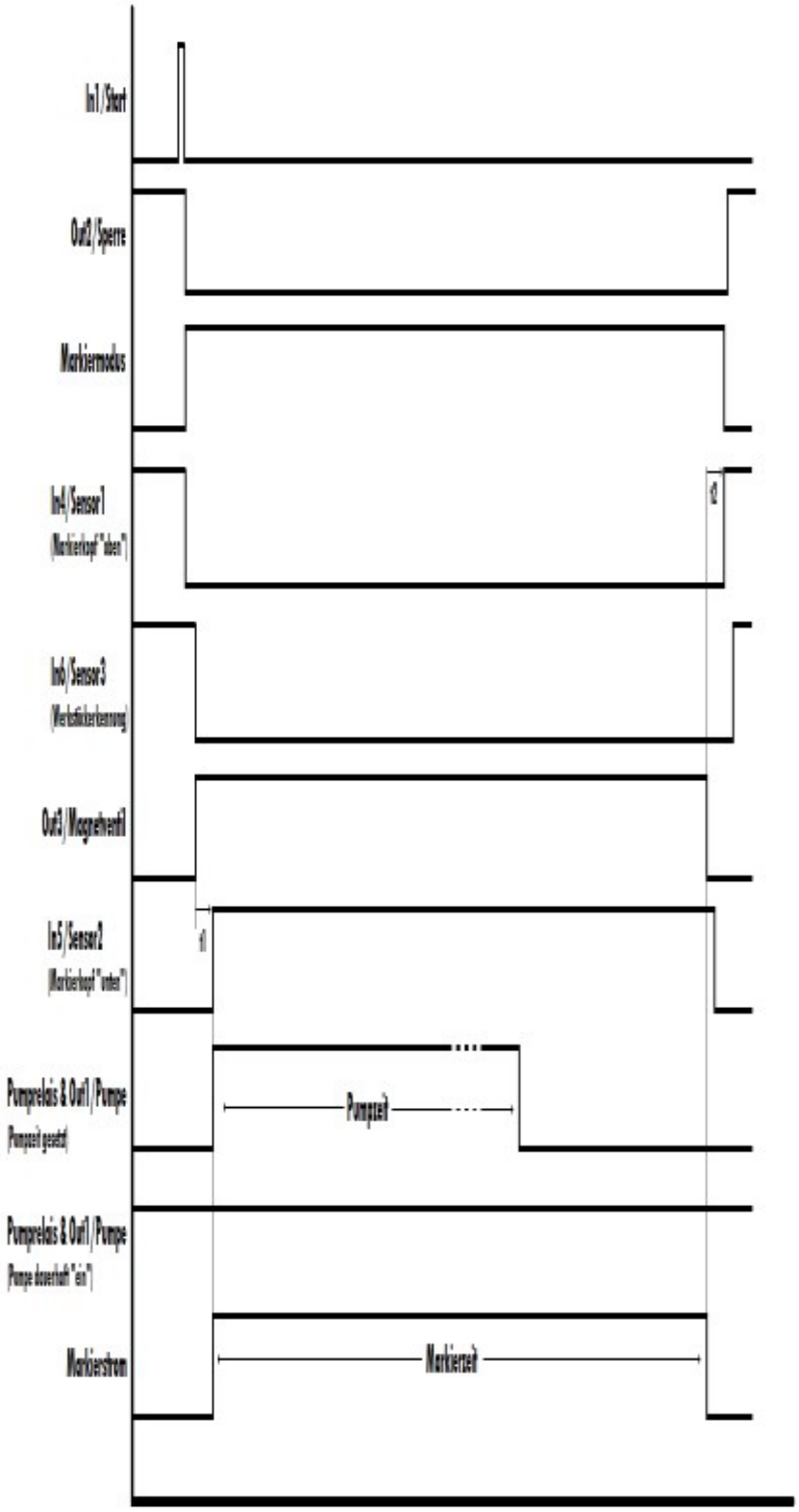
Pressing the foot switch or keeping the rotary switch pressed starts the marking mode. Since no sensor feedback is waited for in manual mode, the marking time runs immediately. If a pump time has been set, this also runs from the start of the marking time. If the pump was switched on permanently, the pump runs for the entire duration of the marking.

7.11.2. Automated marking process with workpiecerecognition (automatic & sensor = on)

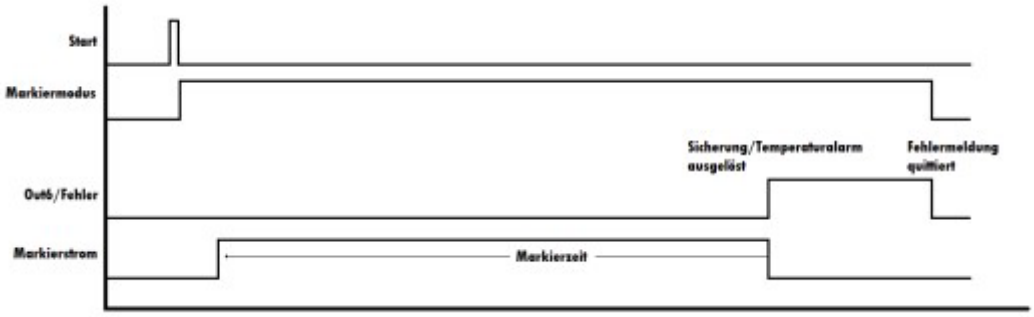
If the automatic mode has been set, the marking mode can also be started by a high level at In1/Start. When the marking mode is started, the lock is also set. In order for the marking process to start, it must be ensured that the marking head is up (In4/Sensor1). If the workpiece recognition was also switched on, a signal at In6/Sensor3 must also confirm the correct positioning of the workpiece. If the sensor signals are present, the output Out3/solenoid valve is switched and the marking stamp is lowered. If the marking head is in position (In5/Sensor2), the marking time starts. If a pump time has been set, this also now runs down. If the pump has been switched to continuous operation, it starts in automatic mode as soon as the unit is switched on. When the marking time has elapsed, the solenoid valve is switched off and the marking head is raised again. When the initial position has been reached again, the lock is released and the marking mode is terminated.

t1: Lowering duration of the marking head
t2: Lifting duration of the marking plunger

MALFUNCTIONS



7.11.3. Error case



If the circuit breaker trips during marking or the heat sink temperature exceeds a preset threshold, the marking process is aborted, the Out3/Fault output is set and a corresponding error message is output. The marking mode is terminated after acknowledging the error message by pressing the rotary switch.

7.12. USB-Mass storage

In host mode the EU PULSE supports the MSC mode (Mass Storage Device Class). The 5 V voltage is provided by the host.

7.12.1. USB-Stick

Parameter files can be loaded from and stored on a connected USB stick. The stick must be FAT32 formatted and should not exceed a capacity of 4 GB. The stick must be connected via a mini-USB OTG A/B adapter. The ID pin (4) must be connected to GND.

1	+5V
2	Data-
3	Data+
4	ID: GND → Hostmode / open → Device-mode
5	GND

Table 7-19 Pin assignment Mini-USB A/B

7.12.2. Parameter files

The parameter files must be stored in the root directory. A file name must not contain any special characters and must not exceed a length of 10 characters. These are text files with the file extension ".txt".

The parameter file is structured as follows:

Header	File name	Electro-lyte	section 1	section 2	Section 3	section 4	section 5

Header - The header identifies the text file as a valid parameter file. It has the value "EUv2-PF".

Filename - name of the parameter file. Maximum length 10 characters. No special characters.

Electrolyte - name of the electrolyte to be used. Maximum length 8 characters. No special characters.

Section 1 - 5 - The marking sections are defined as follows:

MZ	MA	ML_pos	MP	ML_neg	Options

MZ/Marking time - The value corresponds to the marking time in 100ms steps. Valid range of values from 0 (off) to 200 (20 seconds).

MA/Marking type - This parameter always has two digits from 11 to 44. The first digit is the marking type for the positive half-wave, the second digit for the negative half-wave. 1 = section, 2 = gating, 3= peak current, 4 = pause.

ML_pos/Marking power positive - Specifies the marking power for the positive half-wave in 1% steps. Valid range of values from 5 to 95%.

MP/Micropulses - This parameter always has two digits from 00 to 55. The first digit indicates the number of pulses, the second digit indicates the number of pauses. 00 means micropulses is off.

ML_neg/Marking power negative - Specifies the marking power for the negative half-wave in 1% steps. Valid value range from 5 to 95 %.

Options - In the first marking section, this field contains the number of marking sections used. Valid value range 0 to 5 %. In the second marking section, this field contains the set repeat mode. 0 = 1x, 1 = endless. For the remaining sections, this field must be 0.

All fields are separated by a ";".

Sample file:

EUv2-PF;File1;6744;40;22;25;23;21;1;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;

File name: File1

Electrolyte: 6744

Marking time: 4 seconds

Marking type: positive & negative gate

Marking power: 25% positive, 21% negative

Micropulses: 2:3

Repeat mode: 1x

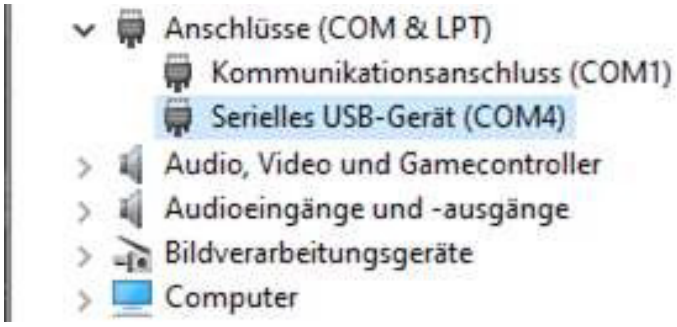
Number of sections: 1

7.13. Firmware Update

The firmware is provided as a DFU file (DFU: Device Firmware Update) and can be updated with the program "EU-PULSE-FWupdate.exe" via USB.

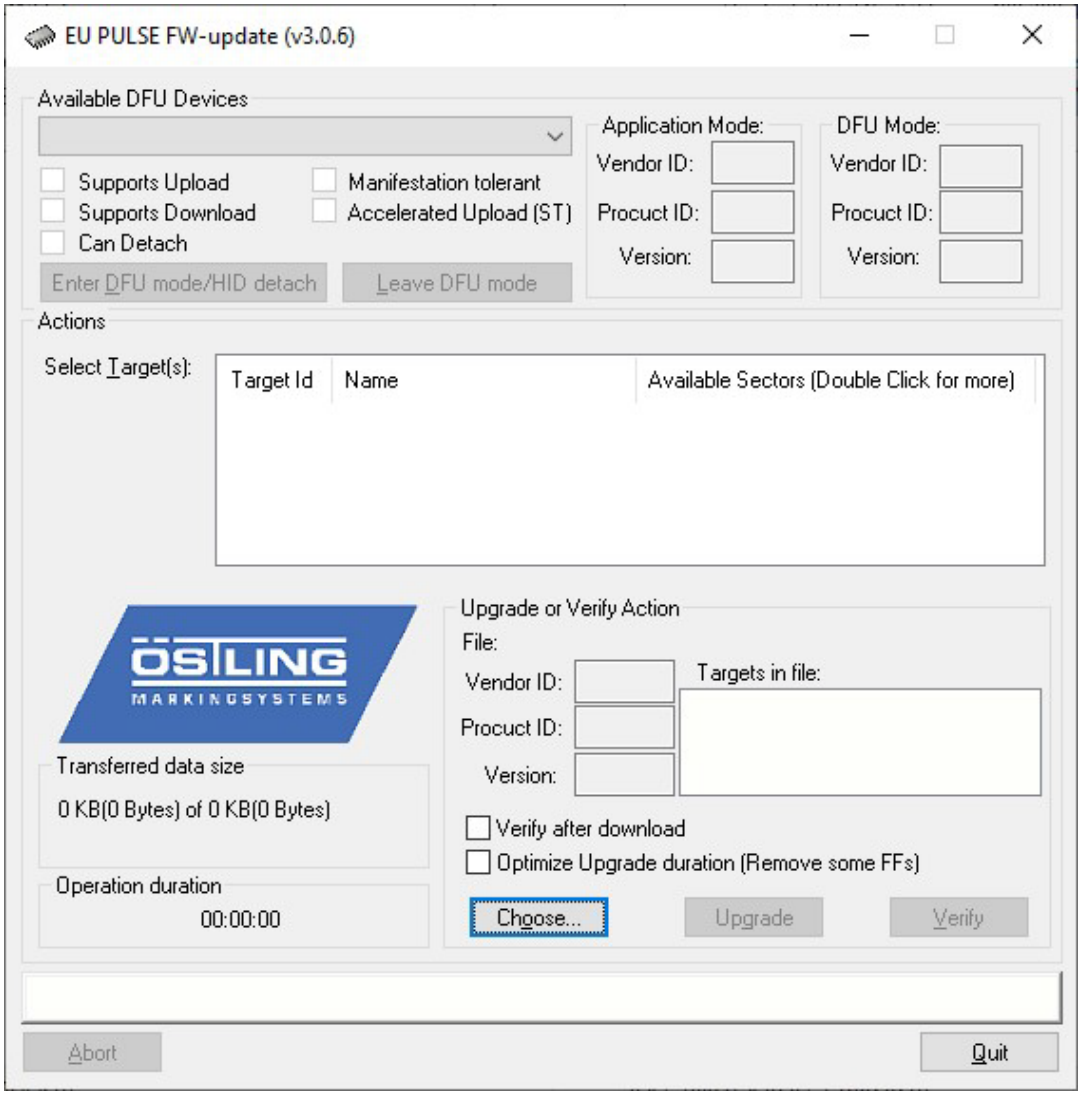
Procedure:

1.) First, the EU PULSE is connected to the PC via USB. By default, the EU PULSE is recognized as a "serial USB device" by the PC and a free COM port is assigned to it accordingly.

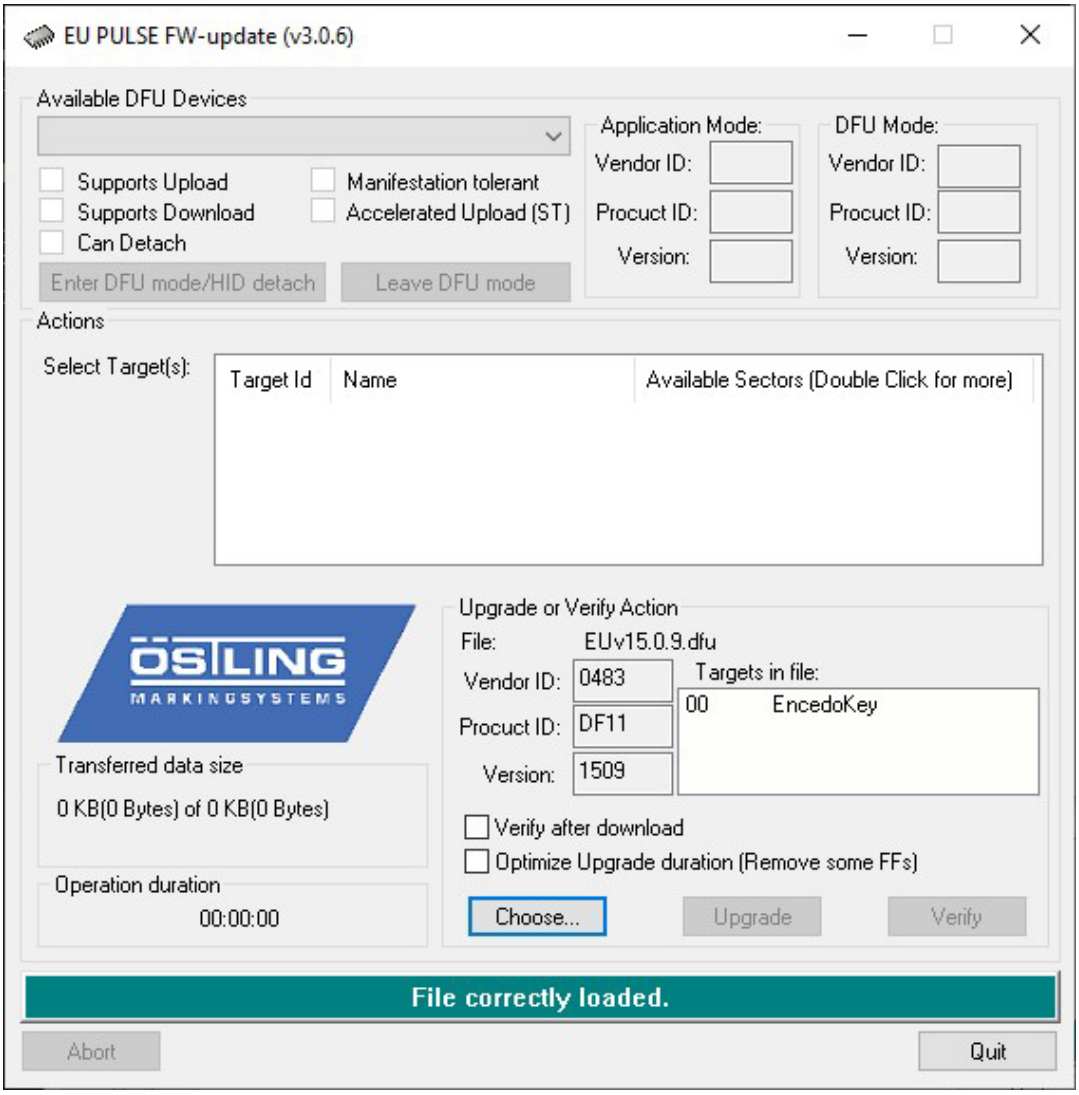


2.) Now the software "EU-PULSE-FWupdate.exe" is started.

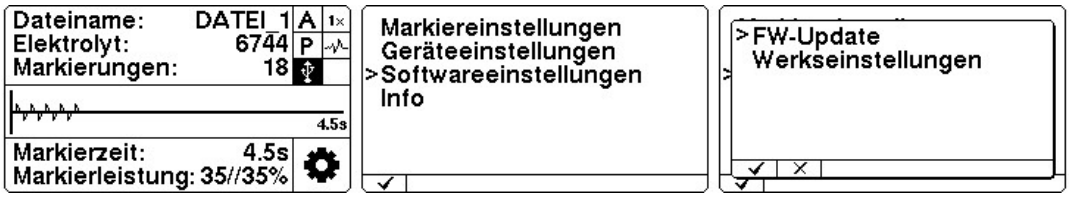
MALFUNCTIONS



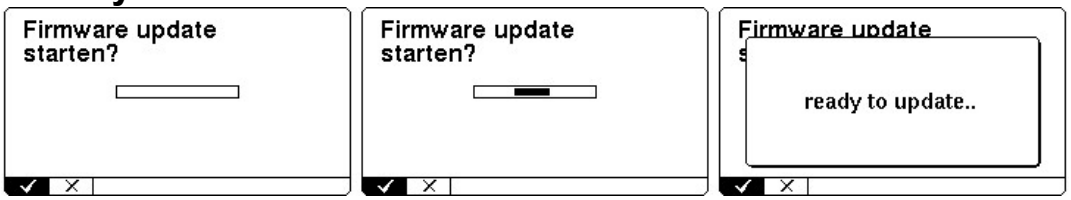
The "Choose" button is used to select the current DFU file from the local storage medium.



3.) Next, the EU PULSE must be set to DFU mode. To do this, open the "Software settings" in the "Settings" and select the item "FW update".

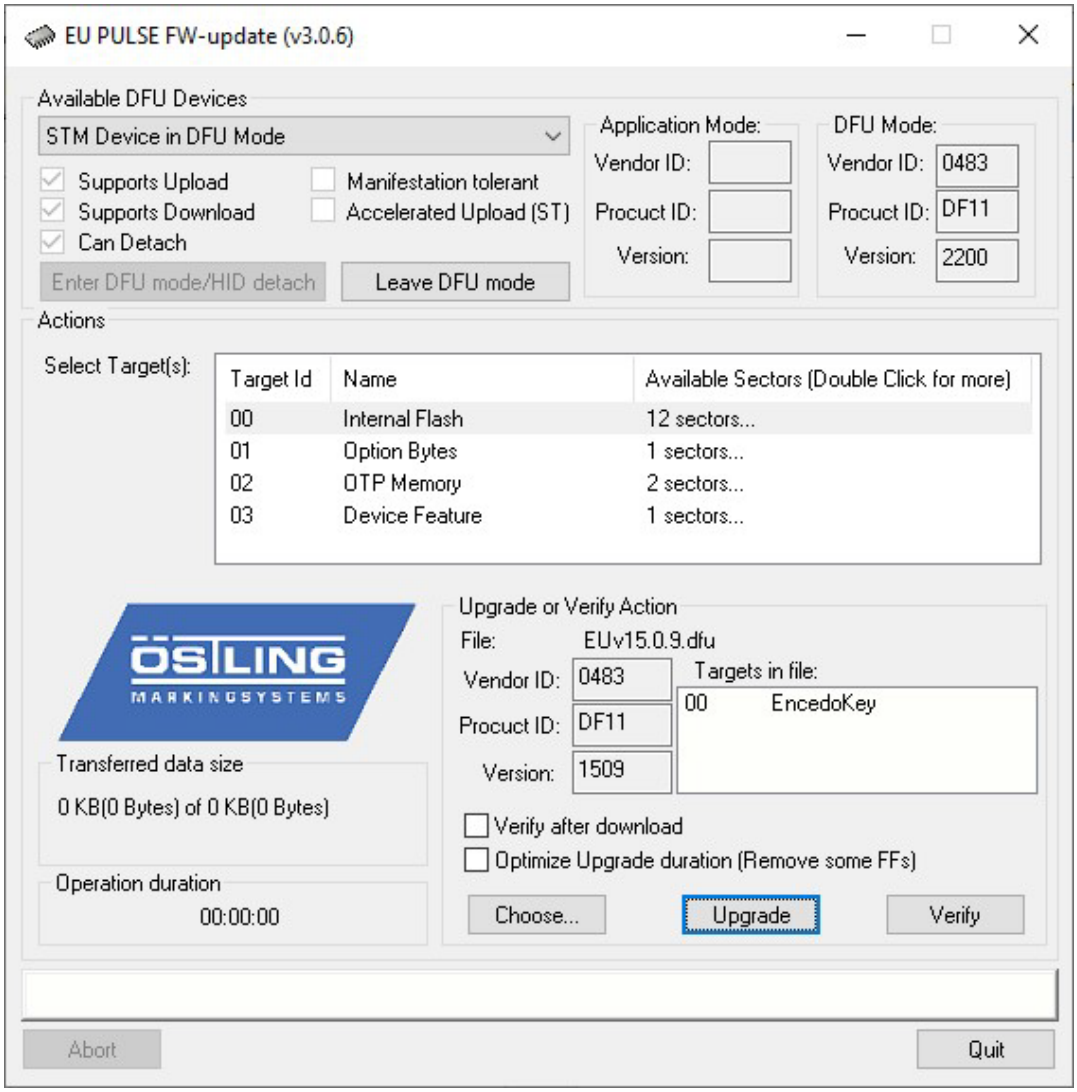


In the following window, the selection must be confirmed by holding down the rotary switch for about 2 seconds.

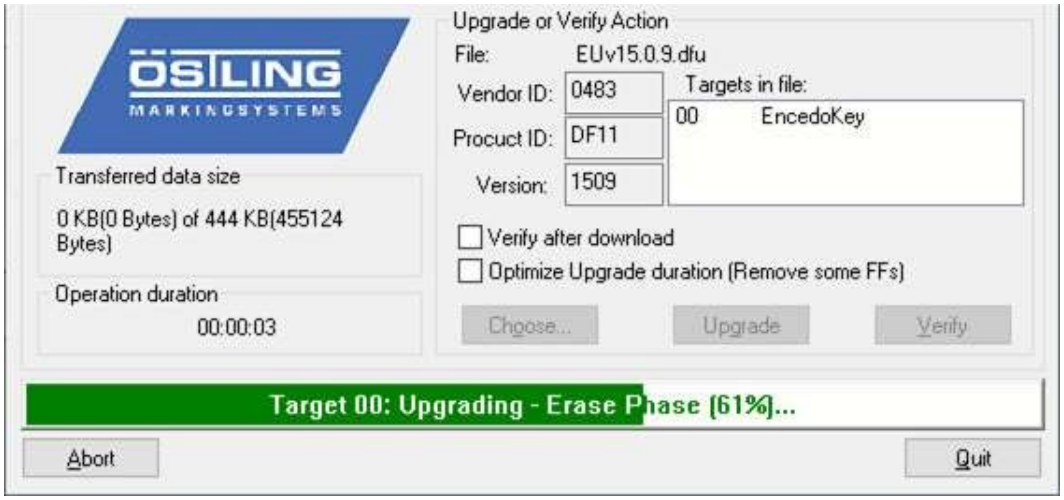


The EU PULSE is now recognized in the PC's device manager as an "STM Device in DFU Mode".

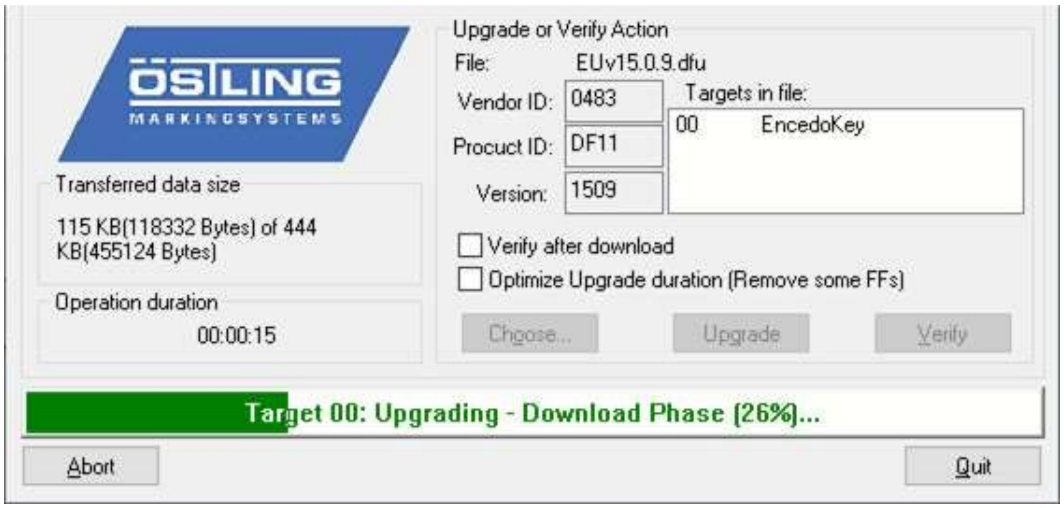
When the EU PULSE is rebooted into DFU mode, it is listed in the Update program under "Available DFU Devices". The "Upgrade" button is now enabled.



After clicking the "Upgrade" button, the upgrade process is started. First, the "Erase Phase" begins. This erases the flash memory of the processor..

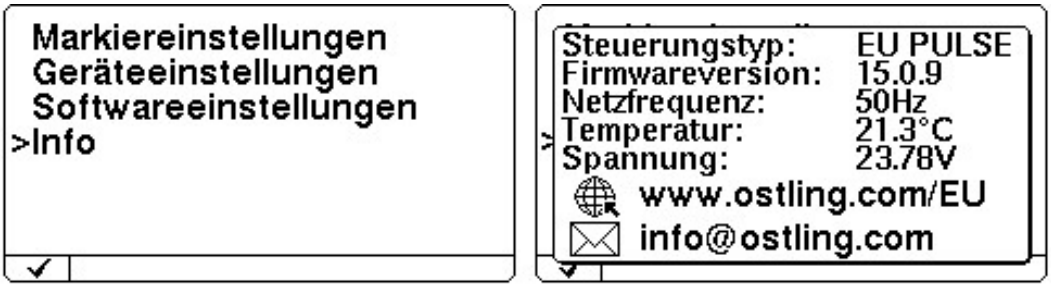


After that, the new firmware is installed in the "Download Phase".



If everything went through without errors, the firmware was successfully updated.

5.) Now the EU PULSE can be restarted by switching it off and on again. The USB cable can be removed. In the "Settings" under the item "Info" the installed firmware version can be checked again.



7.14. Switch off

1. **switch off the mains disconnecting device**
2. **disconnect the power supply cable**

7.15. External cleaning of the electrolytic marking system.

Observe the following for external cleaning:

- **clean only with a damp soft cloth**
- **do not clean with abrasive cleaning agents**
- **do not clean with a high-pressure cleaner or water jet**
- **nicht do not immerse under water**

Both the marking head and the stencil must be cleaned under lukewarm water after the marking processes have been completed.

If different electrolytes are used, cleaning should also take place between each electrolyte change. We recommend storing the stencils in a dust-protected place.

Malfunctions

CAUTION EU PULSE not shut down safely

The operator could be seriously injured by an EU PULSE which has not been safely shut down.

When eliminating faults, shut down the EU PULSE safely by pulling out the mains plug!
Maintenance work may only be carried out by adequately qualified and trained personnel!

Repairs and troubleshooting may only be carried out by

ÖSTLING Marking Systems GmbH or an authorized customer service or, with the prior consent of ÖSTLING Marking Systems GmbH, by an authorized and qualified specialist!

Observe the warnings and safety instructions!

Use suitable hand protection!

Use suitable eye protection!

Malfunctions may occur during daily operation.

All work beyond fault clearance, such as

Maintenance

Maintenance, e.g. internal cleaning of the EU PULSE may only be carried out by

- **sufficiently qualified and instructed personnel or**
- **by the manufacturer or**
- **after prior approval by a customer service representative commissioned by the manufacturer.**

Maintenance work

Repair work is not described in these operating instructions and may only be carried out by the manufacturer or qualified and instructed specialists.

7.16. Fault table

Malfunction	Possible causes	Remedy	Who
EU PULSE does not start	Power supply line not connected	Connecting the power supply cable	Operator
	Power disconnect switch not switched on	Switch on mains disconnector	
Internal temperature monitoring	Marking current too high	Allow device to cool down	Operator
	Marking duration too long		

Table 8-20 Fault table

8. Maintenance and spare parts

The

WARNING Maintenance work

consequences of improper maintenance could be death, serious or minor injuries, property damage or environmental damage.

Only adequately qualified and instructed specialists may perform maintenance work!

Carry out maintenance work regularly!

Safely shut down the EU PULSE by pulling out the mains plug!

Immediately after completing the maintenance work, reassemble all protective and safety devices and check their function!

The

WARNING Spare parts

consequences of using unsuitable spare parts could be serious injuries, damage to property or the environment.

Spare parts must meet the technical requirements of the manufacturer!

Only use original spare parts!

CAUTION Improper cleaning

Improper cleaning could impair functions of the system, especially safety functions.

Never clean the EU PULSE with a steam jet!

Do not use flammable, slightly gassing or corrosive liquids or aerosols for cleaning!

8.1. Maintenance plan

The maintenance staff consists of authorized and qualified professionals.

WHAT?	WHEN?	WHO?
Visual inspection of the EU PULSE	before each start-up	Operator
External cleaning of the EU PULSE	after use	Operator
Internal cleaning	yearly	Qualified person

Table 9-21 Maintenance schedule

8.2. Relevant spare parts and consumables

WARNING Spare parts

The use of unsuitable spare parts could result in serious injuries, damage to property or environmental damage

Spare parts must meet the technical requirements of the manufacturer!

Use only original spare parts!

To ensure safe operation, only original spare parts may be used..

It is recommended to keep the following spare parts in stock:

- **Marking head**
- **Cable set**

It is recommended to keep the following consumables in stock:

- **Electrolyte**
- **Neutralyte**
- **Marking felt**
- **If black marking felt 44f is used: Line mesh**
- **Spare stencil**

9. repair of the EU PULSE

WARNING Repair work

The consequences of improper repair could be death, serious injury, property damage or environmental damage.

Repair work may only be carried out by ÖSTLING Marking Systems GmbH or qualified and instructed specialists!
Disconnect the mains plug from the socket and secure against reconnection!
Immediately after completion of the maintenance work, reassemble all protective and safety devices and check their function!

Repair work must not be carried out by the operator.

9.1. Error list

Repairs, troubleshooting and correction of faults may only be carried out by

½STLING Marking Systems GmbH , an authorized customer service or after previous agreement of ½STLING Marking Systems GmbH by an authorized and qualified specialist.

Error	Possible causes	Troubleshooting
Circuit breaker	Short circuit graphite <-> base plate	Open the device and reset the automatic circuit breaker
Electrical faults	• Damaged lines • Broken wire • Electrical components defective	Electrician
Mechanical faults	• Abrasion • Malfunction • Incorrect operation • Mechanical damage	Specialist

Table 10-22 Error list

10. Decommissioning, Dismantling and disposal

Electric

DANGER Electrical Power

current can kill or seriously injure you.

For decommissioning or disassembly, pull the power plug out of the socket!

10.1. Decommissioning

To decommission the EU PULSE, pull the mains plug out of the socket.

10.2. Disassembly

The EU PULSE must be dismantled when it is safely shut down.

The disassembly is to be carried out by qualified personnel or a specialcompany is to be commissioned.

10.3. Disposal

CAUTION Improper disposal of the EU PULSE

Improper disposal of the device could cause environmental damage.

Scrap the components of the EU PULSE properly or recycle them correctly!

At the end of its service life, the EU PULSE must be properly disassembled into electrical or electronic components, metal parts, plastic parts, etc. The waste materials must then be recycled.

The waste materials must then be recycled or disposed of.

If necessary, a special disposal company must be commissioned with the disassembly and disposal.

The EU PULSE must be disposed of in accordance with the applicable laws and regulations of the country concerned.

11. List of illustrations

LIST OF TABLES

12. List of tables

13. Index

INDEX

INDEX

INDEX

INDEX

INDEX

14. Notes