

Authorised Specialists and Operators

manual

Installation and Operating Instructions

Series KSM - Series KSM-INOX / 309003-DE/UK-A

English



**KSM1840
KSM2740**



**KSM3640
KSM4540
KSM5440**



**KSM1840-INOX
KSM2740-INOX**



**KSM3640-INOX
KSM4540-INOX
KSM5440-INOX**

Declaration of Conformity

Manufacturer:

Ehrle GmbH

Address:

**Industriestraße 3
D – 89165 Dietenheim**

Product:

Stationary Hotwater High Pressure Cleaners

Series KSM (DE/UK)

Series KSM-INOX (DE/UK)

This product given below is in conformity with the European Directives:

Relevant EC Directives:

2000/14/EC

2006/42/EC

2011/65/EU

2014/30/EU

2004/108/EC

Applied harmonized standards:

EN 60335-1

EN 60335-2-79

EN 50581

EN 55014-1: 2006+A1: 2009+A2: 2011

EN 55014-2: 2015

EN 62233: 2008

EN IEC 61000-3-2: 2019-12

EN 61000-3-3: 2020-07

Conformity procedures applied:

2000/14/EC: Annex V

This product conforms to
the following directives:

**UK UK
CA NI**

CE

Dietenheim, 01.02.2025

Development

ppa.



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CEO

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1 User information

1.1 General



Allgemeine Information

For a comprehensive advice and information on the Stationary Coldwater High Pressure Cleaners of the Series KSM/KSM-INOX please contact the EHRLE Customer Service.

With the purchase of an EHRLE High Pressure Cleaner of the Series KSM/KSM-INOX you are the owner of a quality product, which is characterised by:

- user-friendliness,
- reliability,
- environmental friendliness.

These Installation and Operating Instructions are part of the Stationary Coldwater High Pressure Cleaners of the Series KSM/KSM-INOX and must be kept at the operating site and available at all times.

For the Stationary Coldwater High Pressure Cleaners of the Series KSM/KSM-INOX, the manual contains information on

- User information
- Safety
- Product information
- Installation
- Commissioning
- Operation
- Decommissioning
- Maintenance
- Troubleshooting
- Circuit diagrams
- Hydraulic diagrams.

1.2 System concept

The Stationary Coldwater High Pressure Cleaners of the Series KSM/KSM-INOX are designed for two separate operating levels with different access rights

- **Level 1 for authorised personnel** with access to
 - On/Off Rotary Switch on the front door (lockable with a padlock)
 - Cabinet interior for maintenance work (lockable doors)
 - Electrical control box for maintenance work (lockable door)
 - Display unit with touchscreen
- **Level 2 for operating personnel** with exclusive access to the On/Off Rotary Switch, when approved by authorised personnel, as well as to the display unit with touchscreen.



1.3 Terminology

In this manual the terminology listed below is replaced by the relevant short terms whenever possible:

- Stationary Coldwater High Pressure Cleaners - Series KSM/KSM-INOX High Pressure Cleaner or system
- Installation and Operating Instructions Manual
- High pressur nozzle HP-Nozzle
- High Pressur Hose HP-Hose

If a clear reference to a subject is required in the description parts, the terminology „Stationary Coldwater High Pressure Cleaners of Series KSM/KSM-INOX “ is used.

1.4 Meaning of the emphasis

The emphasis used in this manual have the following meanings:

WARNING

Warning precedes operating procedures, instructions, etc., which, if not strictly observed, could result in personal injury or loss of life. Warning precedes also, when device misuse could result in personal injury or loss of life.

CAUTION

Caution precedes operating procedures, instructions, etc., which, if not strictly observed, could result in damage to the high pressure cleaner. Caution precedes also, when device misuse could result in damage to the high pressure cleaner.



This symbol indicates additional information.

1.5 Meaning of the symbols

Symbol	Meaning
	WARNING Follow instructions. Non-observance or neglecting of prescribed instructions, incorrect operation or misuse of the system may endanger life and limb of persons.

Symbol	Meaning
	WARNING Danger of death due to electric shock. Switch off the system and disconnect it from the power supply before starting installation, maintenance and repair work. Protect the system from unconscious switching on. Touching live parts can lead to life-threatening injuries.
	WARNING Explosion hazard due to use of unauthorised cleaning agents. Never add liquids containing solvents such as paint thinners, petrol or similar to the high pressure jet. The spray mist of solvents is highly flammable, explosive and toxic Otherwise, life and limb of persons is in danger.
	WARNING Risk of burns and scalding When operating with a water temperature of up to 60 °C, the cleaning objects, the escaping hot water, surfaces of system parts, assemblies or components can become hot. Touching hot surfaces or hot water can lead to burns or scalds on the surface of the skin. Make sure that the surfaces and the water have cooled down before touching them. The hot water emerging from the trigger gun must not come into contact with the skin.
	WARNING Danger with heavy loads. A person is not allowed to lift and move loads more than 23 kg. Otherwise the health of persons may be endangered (e.g. overload of the spinal column, injuries from falling loads). For loads of more than 23 kg, use suitable lifting equipment (e.g. forklift truck, lift truck).
	CAUTION Observe instructions for installation, device adjustment, operation, maintenance and repair. Non-observance or neglecting prescribed instructions, incorrect operation or misuse of the system may result in damage to system parts, assemblies or components.

Symbol	Meaning
	General Information General additional information.
	Information on recycling. General information on recycling.
	Information on disposal. General information on the proper and environmentally friendly disposal of materials and consumables.
	Information on hearing protection. General information on hearing protection.
	Requires direct action
	Result after an action.
	Itemisation

1.6 Target group

These installation and operating instructions contain information and instructions for authorised, qualified and trained specialist personnel for the

- Operation
- Installation
- Maintenance.

1.7 Warranty and Liability

The Stationary Coldwater High Pressure Cleaners of Series KSM/KSM-INOX may only be used for its intended purpose.

Intended use includes:

- Operation only by personnel who
 - are authorized by the system operator
 - are instructed and trained on the system, or
 - have read and understood the information and instructions in these Installation and Operating Instructions in full and can thus ensure safe handling of the system.
- The information and instructions contained in this Installation and Operating Instructions must be observed.
- Installation, operation, maintenance, repair and adjustment of the system only by qualified, trained and authorized personnel. For installation, maintenance, repair and adjustment of the system, the relevant specialist personnel can be consulted and commissioned by the EHRLE Customer Service.
- If the safety and protective devices are faulty, the system must not be put into operation.
- The system may only be operated with fully functional safety and protective devices. In the event of functional failures during operation, the system must be taken out of operation immediately
- Faulty, insufficient or defective systems must not be put into operation. Before commissioning, carry out a visual inspection for faulty, defective or defective
 - system parts, assemblies or components
 - electrical cables
 - HP-Hoses.
- The system must be switched off immediately and taken out of operation if defects, faults or deficiencies occur on
 - system parts, assemblies or components
 - electrical cables
 - HP-Hoses.
- No constructive changes may be made to the system.
- The system may only be operated in the configuration certified by the manufacturer. Operation with subsequently installed modules, components or additional devices is not permitted and may endanger life and limb of persons or lead to damage to the system.
- Only original parts from the manufacturer or consumables approved by the manufacturer may be used for maintenance and repair work
- Only consumables approved by the manufacturer (engine oil, cleaning agents, etc.) may be used for the operation of the system.

Any warranty and liability claims for personal injury and damage to the system are void if the system is not used for its intended purpose.

1.8 Environmental protection



Note on recycling.

The packaging materials are recyclable. Please do not throw the packaging into the household waste, but recycle it.



Note on disposal.

Old appliances, assemblies or system parts contain valuable recyclable materials that should be sent for possible recovery.

The old appliances must not be disposed of together with unsorted municipal waste (household waste). The symbol with the crossed-out dustbin on the appliance indicates this obligation.

Therefore, please dispose of discarded devices, assemblies or parts properly via suitable collection systems.

Dispose of used materials in an appropriate and environmentally friendly manner. Observe the local regulations.

Old appliances, assemblies or system parts contain valuable recyclable materials that should be recycled.

According to environmental regulations, lubricants such as oils and greases must not get into the ground, water or sewer system.

Do not allow lubricants such as oils and greases to be released into the environment. Protect the soil and dispose of lubricants in an environmentally friendly manner.

Engine cleaning or underbody washing of all types of vehicles may only be carried out at washing stations equipped with oil separators in accordance with environmental regulations (environmental protection).

2 Safety

2.1 General safety information

Observe the respective national regulations of the legislator for liquid sprayers. Liquid sprayers must be inspected regularly and the result of the inspection must be recorded in writing.

Observe the relevant national regulations of the legislator on accident prevention.

Observe the safety data sheets and instructions of the cleaning agent manufacturers supplied with the detergents used.

Perform prescribed adjustment, maintenance and inspection work in due time (see Section 8, Maintenance).

Safety-relevant defects must be rectified immediately.

Observe all warning and information signs attached to the unit. Keep all signs on the device legible.

2.2 Duty of care for the plant operator

It is the duty of care of the plant operator to ensure that all safety regulations, instructions and information for comprehensive operation are observed and monitored by the maintenance personnel. The information and instructions contained in this Installation and Operating Instructions must be observed.

The plant operator must ensure:

- The system may only be operated in a technically perfect condition and in accordance with its intended purpose, with an awareness of safety and dangers, and in compliance with this manual.
- Take the system out of operation immediately or do not put it into operation under any circumstances if damage or destruction is found on the system, the fastening parts or the power supply or if safe operation cannot be guaranteed.
- If parts are damaged, incorrect operation or other defects, stop operation immediately or do not use the system. Immediately rectify any damage, incorrect operation or function and contact customer service if necessary.
- In order to carry out the maintenance tasks comprehensively, the maintenance personnel must be regularly trained and instructed in relation to occupational safety and environmental protection.
- The areas of responsibility, competences and monitoring of the maintenance personnel must be regulated by the plant operator.
- The currently applicable local accident prevention regulations, the local industrial safety regulations and other safety-related rules and regulations as well as the operating instructions must be observed.
- In addition to this manual, the generally applicable and local regulations for accident prevention and environmental protection must be made available and observed.

2.3 Access for persons to the system

The On/Off Rotary Switch on the front door, the cabinet doors and the electrical control box are lockable.

Keep the keys for the On/Off Rotary Switch, system doors and the electrical control box in a place that can only be accessed by authorised personnel.

The cabinet doors for access to the cabinet interior and the electrical control box must be kept locked.

Ensure that only authorised, qualified and trained personnel have access to the system.

2.4 Safety instructions for maintenance personnel

A cleaning operation may be required to carry out the maintenance work for functional testing.

For this purpose, the staff must wear the necessary Personal Protective Equipment (PPE). This includes waterproof protective suits, rubber boots, safety goggles, headgear, hearing protection if necessary, etc.

No cleaning work may be carried out in the presence of persons without sufficient protective clothing.

Before switching on, carry out a visual inspection of the system parts from the outside for damage (HP-Hose, electrical or mechanical parts). Systems with damaged parts, assemblies or components must not be put into operation.

The water jet leaving the trigger gun must not be directed at:

- persons
- animals
- live electrical installations (building mains connections, sockets, electrical wiring, etc.)
- live electrical installations, machines, devices, assemblies or components
- system, machinery or equipment in operation.

Under the influence of the high pressure jet, parts can be separated from the cleaning object and thrown away. Persons can be injured as a result.

Never aim the high pressure jet at fragile or loose objects.

Before cleaning the high pressure cleaner itself, take the system out of operation and disconnect it from the electrical mains connection. Secure the system against unintentional or unauthorised restarting (e.g. lock main switch, disconnect mains cable from power outlet, provide warning sign indicating work on the high pressure cleaner, etc.).

Never operate the system unattended.

The system is designed for a water temperature of up to 60 °C temperatures.

When operating with hot water, water-carrying parts (e.g. pump housing, non-insulated pipes, metal parts of the trigger gun and spray lance) and cleaning objects become hot and can cause burns if touched.

Before touching heated system parts, water-bearing parts or cleaning objects, wait until they have cooled down.

The hot water must not come into contact with the skin. Contact with hot water can cause scalding. After hot water operation, wait until the water has cooled down again.

Asbestos-containing and other materials containing substances hazardous to health must not be sprayed off.



Information on hearing protection

If the sound levels exceed the permissible values, the personnel and persons in the area of exposure must wear hearing protection.

The sound level for EHRLE high pressure cleaners under maximum load is 82 dB (A). A high sound level over a long period can cause hearing loss. If the noise produced by the application of the emerging high pressure jet to noise-enhancing objects exceeds the permissible values, the operating personnel and any persons affected must wear hearing protection.

Do not operate the system if electrical cables or other safety-relevant parts (unloader valve, HP-Hose, trigger gun, etc.) are defective.

Aerosols can be formed when using high pressure cleaners. An aerosol is a mixture of solid or liquid suspended particles in a gas. Inhaling aerosols can be harmful for your health.

Employers are obliged to perform a hazard assessment in order to define, depending on the surface to be cleaned and the environment, protective measures necessary to prevent inhalation of aerosols.

Respiratory protection masks of class FFP 2 or above are suitable for protection against aqueous aerosols.

The high pressure cleaners must not be set up and operated in rooms where there is a risk of fire or explosion.

Using high pressure cleaners in gas-stations or other hazardous area:

- refer to „Technical Rules for Flammable Liquids“ (TRGF)
- the relevant safety regulations must be observed.

Observe the local regulations regarding the installation and operation of the high-pressure cleaner.

The HP-Hose do not

- run over, pull excessively or twist
- pull over sharp edges
- repair.

Replace the defective HP-Hose with an HP-Hose approved by the manufacturer.

2.5 Accident prevention regulations

Observe the applicable national regulations of the legislator on accident prevention.

2.6 Lifting and moving loads

The Stationary Coldwater High Pressure Cleaners of the Series KSM/KSM-INOX weigh 250 kg to 810 kg (with packaging 275 kg to 835 kg). Components of the high pressure cleaners can have a weight of more than 23 kg.

Lifting and moving loads is permitted for one person up to 23 kg. If the load exceeds 23 kg use suitable lifting equipment (e.g. forklift, lift trucks).

Observe the international standard „ISO 11228-1 Ergonomie - Manuelles Handhaben von Lasten - Teil 1 Heben und Tragen 05/2003“.

2.7 Periodic inspections

The periodic inspections are listed in Section 8 (Maintenance).

2.8 System operator obligations

The plant operator must ensure that the safety-relevant parts of the liquid sprayer are checked for perfect condition before each start-up (safety valves, HP-Hose, trigger gun, electric cables etc.).

2.9 Manufacturer tests and certificates

Acceptance test of the high pressure cleaner (test report is part of the scope of delivery).

2.10 Guidelines for liquid sprayers

High pressure cleaners must be inspected by an expert in accordance with the „Guidelines for liquid sprayers“, if necessary or at least every 12 months. The result of the test must be recorded in writing.

In the appendix of this manual there is a test sheet (proof of customer service) to record the tests carried out.

EHRLE service technicians are experts and can be consulted and commissioned by EHRLE service for this prescribed inspection.

2.11 Safety regulations electrical connection

When working on electrically live parts:

- Observe accident prevention regulations DGUV V3 (previously BGV A3) and local regulations,
- use tools according to DIN EN 60900.

2.12 Design changes to the system

Design changes to the high pressure cleaner are not permitted.

When operating a system which has been modified or changed in design, the system will not be used for its intended purpose. If the system is not used for its intended purpose, no liability or warranty will be accepted (see Section 1.7, Warranty and Liability).

2.13 Safety devices

Safety devices serve to protect the user and must not be suspended or circumvented in their function.

The high pressure cleaner has the following safety devices:

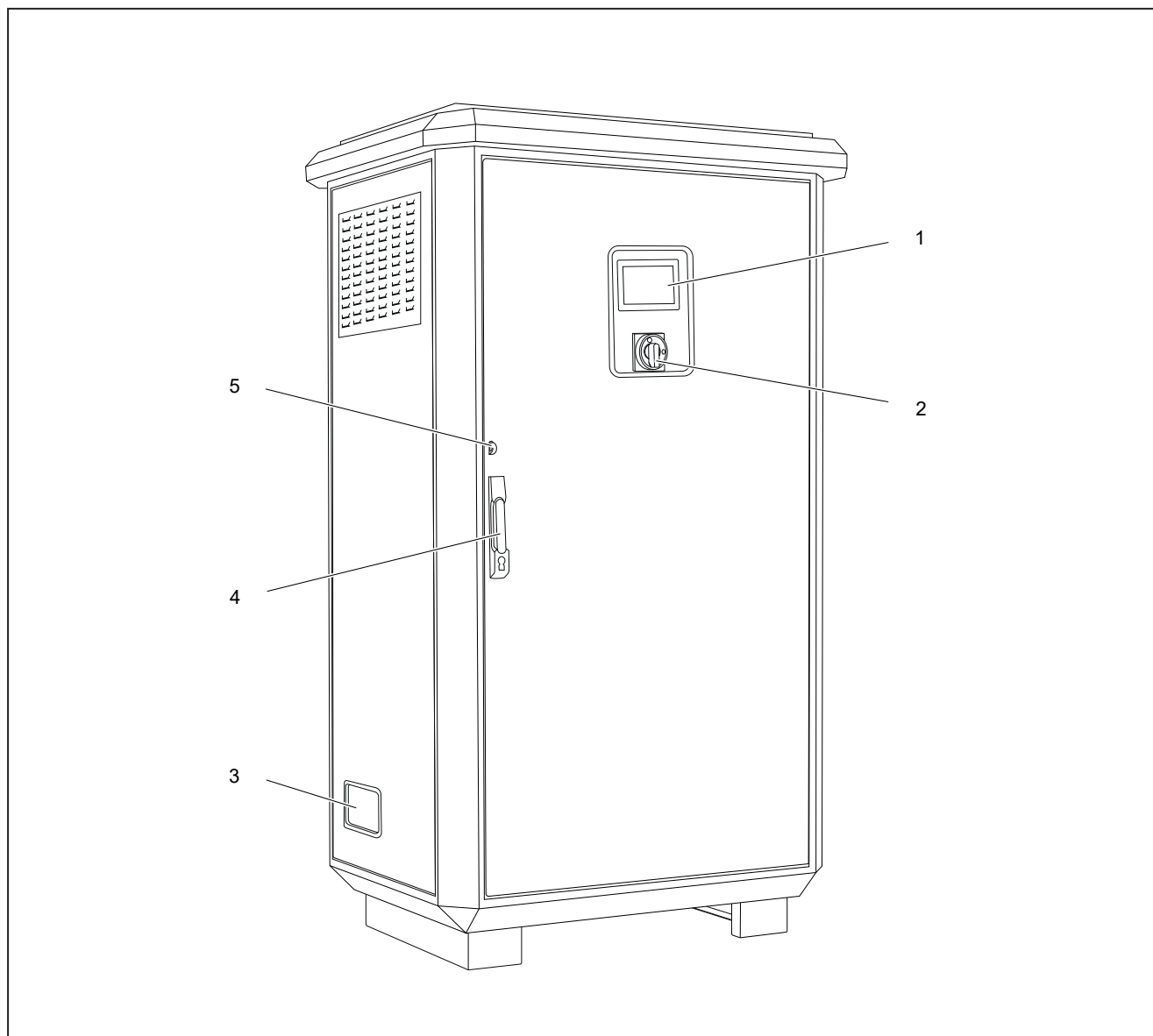
- Various pressure switches:
System functions are switched on or off (safety functions) based on type of construction and intended use.
- Low-water cut-off:
If the water level in the water tank is insufficient, the system does not switch on or switches off during operation.
- Unloader valve and non-return valve:
The first serves to adjust the operating pressure and the second valve keeps the pump head depressurised when the trigger gun is deactivated.
- Overload protection switch:
Releases when the pump current load is too high, the system is switched off.
- Leakage detection:
Switches the high-pressure cleaner off automatically after a leakage is detected
 - on the HP-Hose
 - with the trigger gun or
 - in the system.

3 Product description

3.1 System views

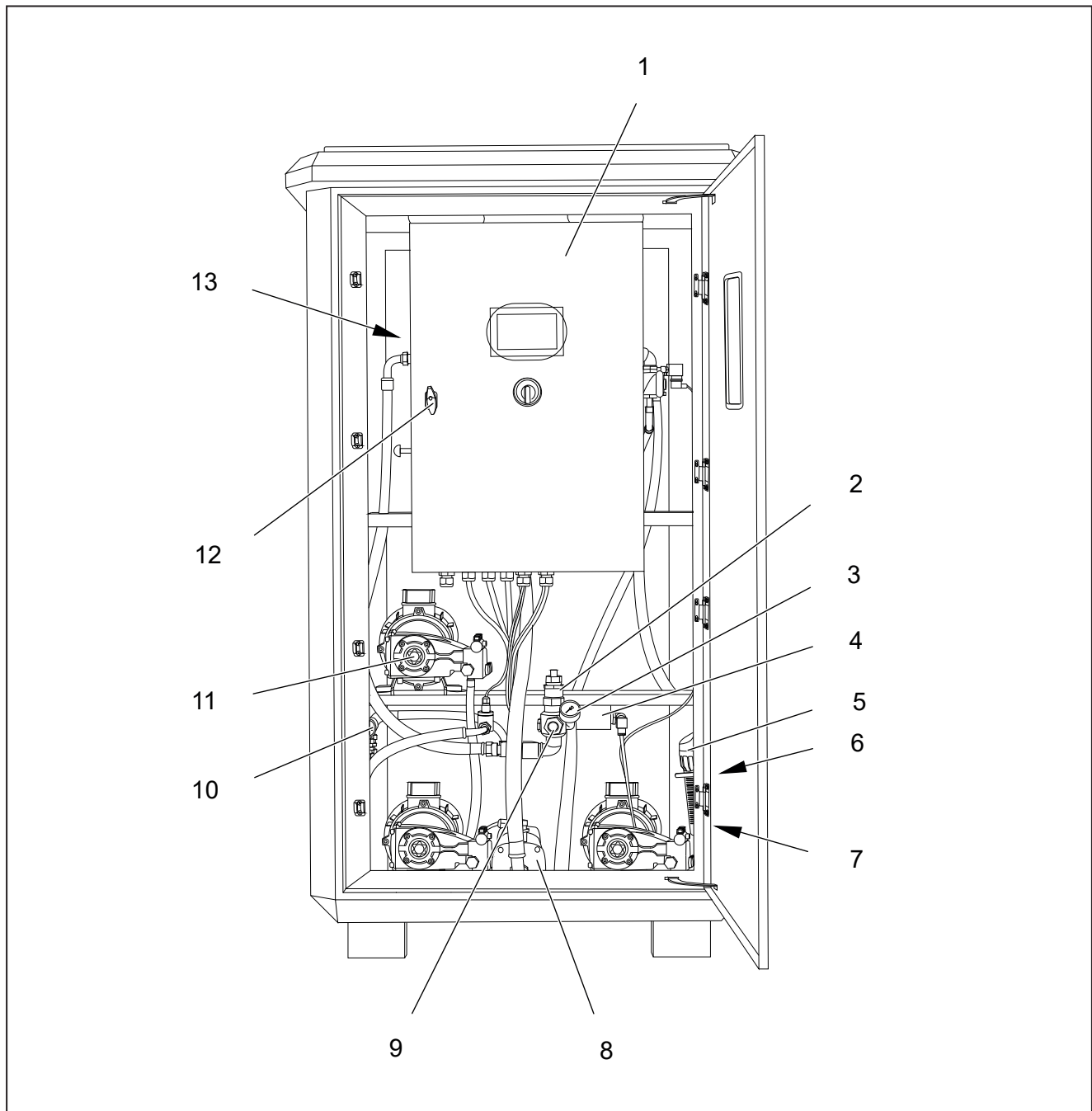
3.1.1 Series KSM/KSM-INOX (one door)

The following figures show general examples for the Stationary Coldwater High Pressure Cleaners of Series KSM/KSM-INOX (one door).



- | | | | |
|---|---|---|--------------------------|
| 1 | 7" Touchscreen | 4 | Door interlock with lock |
| 2 | On/Off Rotary Switch (lockable with padlock) | 5 | Padlock holder |
| 3 | Feedthrough for water hose, HP-Hose and power cable | | |

Fig. 3 - 1 Stationary Coldwater High Pressure Cleaners Series KSM/KSM-INOX (one door), total view

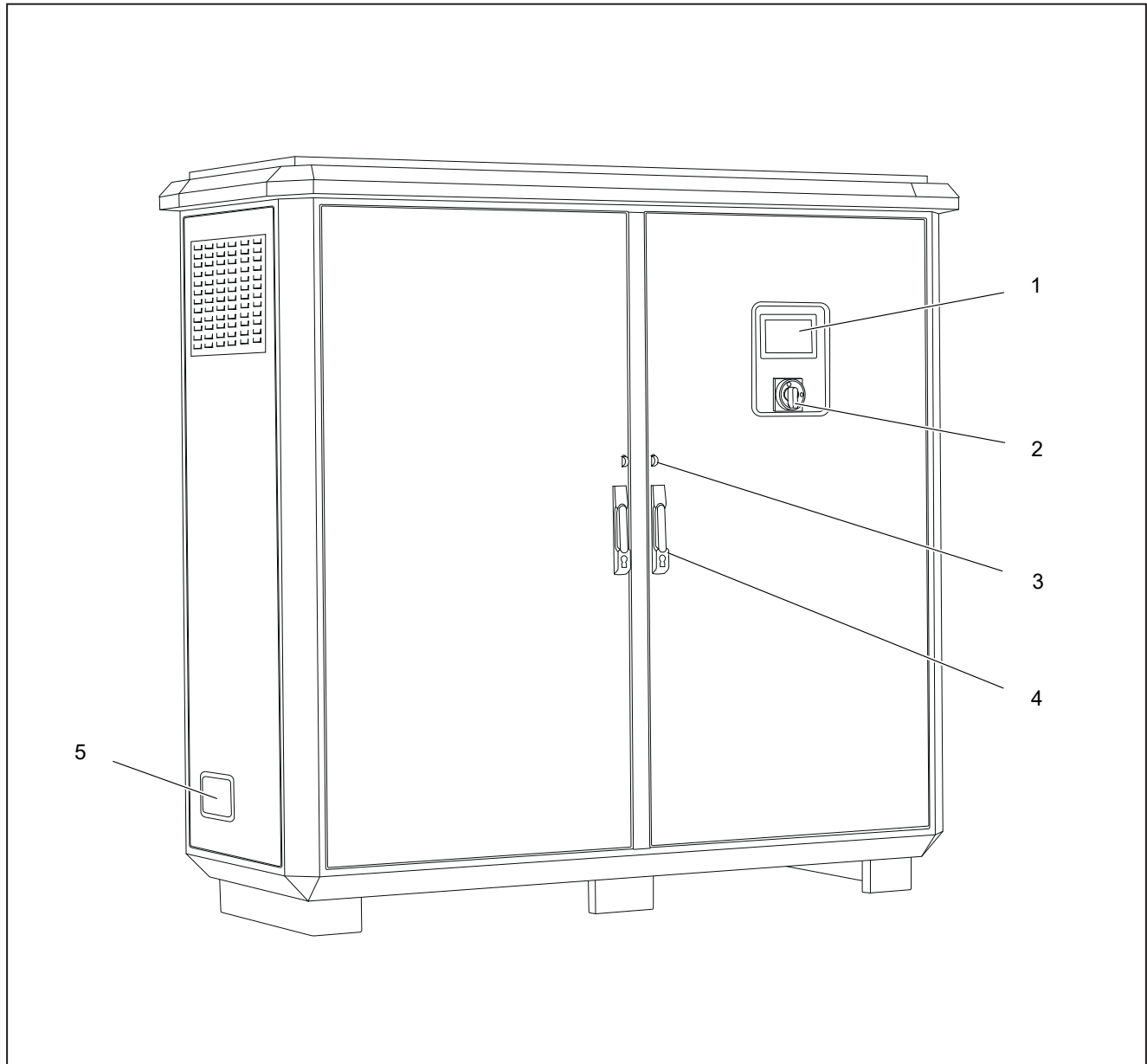


- | | | | |
|---|----------------------------------|----|---|
| 1 | Electrical control box | 8 | Booster pump |
| 2 | Unloader valve | 9 | HP-Hose connection |
| 3 | Pressure gauge (HP-Output) | 10 | Pressure gauge (water distributor pump input) |
| 4 | Collector block unit (HP-Output) | 11 | Pumps (quantity depends on expansion stage) |
| 5 | Filter | 12 | Lock (electrical control box) |
| 6 | Shut-off valve (water inlet) | 13 | Water tank 60 l (installation location behind electrical control box) |
| 7 | Hose connection water inlet | | |

Fig. 3 - 2 Stationary Coldwater High Pressure Cleaners Series KSM/KSM-INOX (one door), cabinet interior

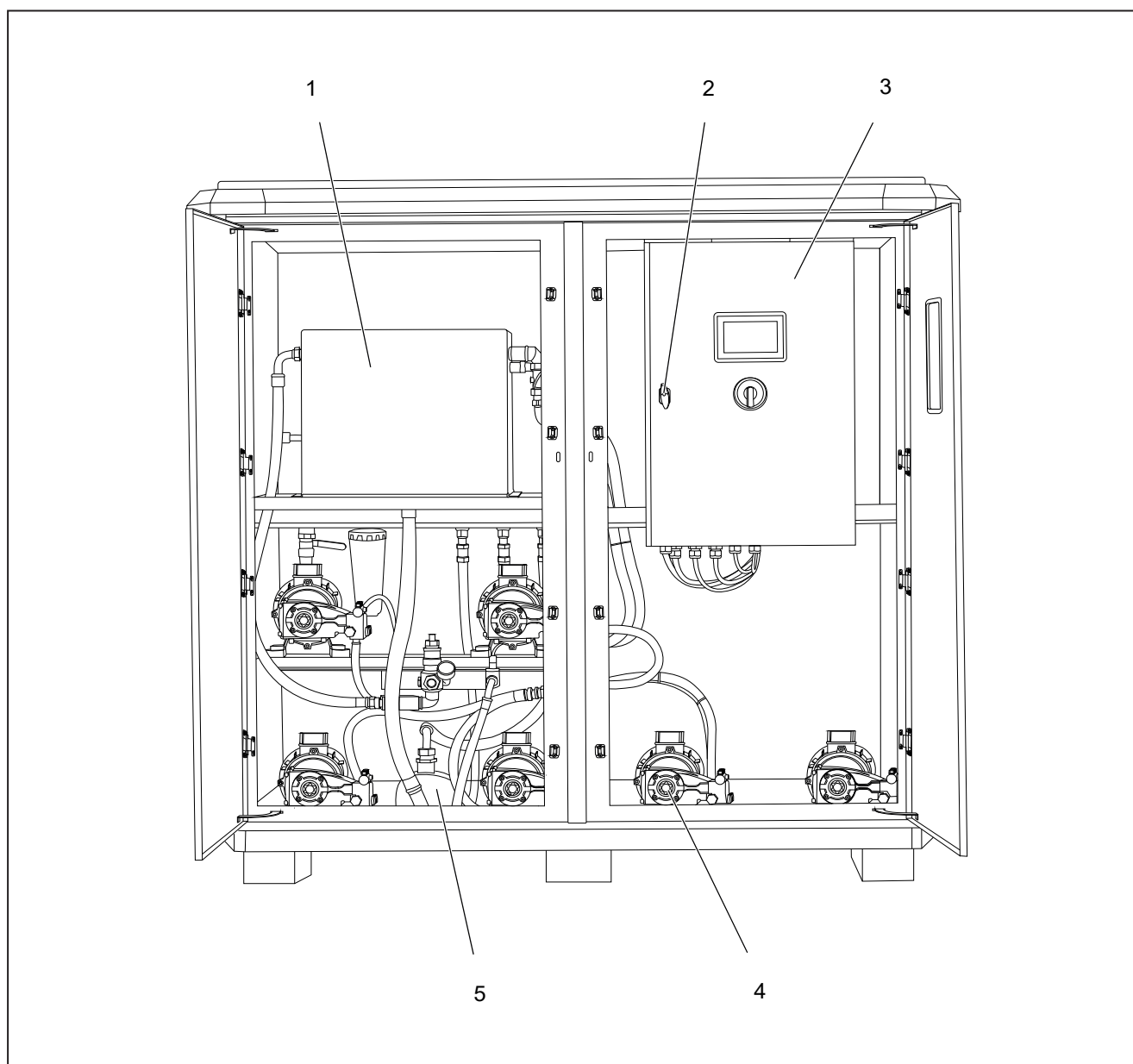
3.1.2 Series KSM/KSM-INOX (two-door)

The following figures show general examples for the Stationary Coldwater High Pressure Cleaners of Series KSM/KSM-INOX (two-door).



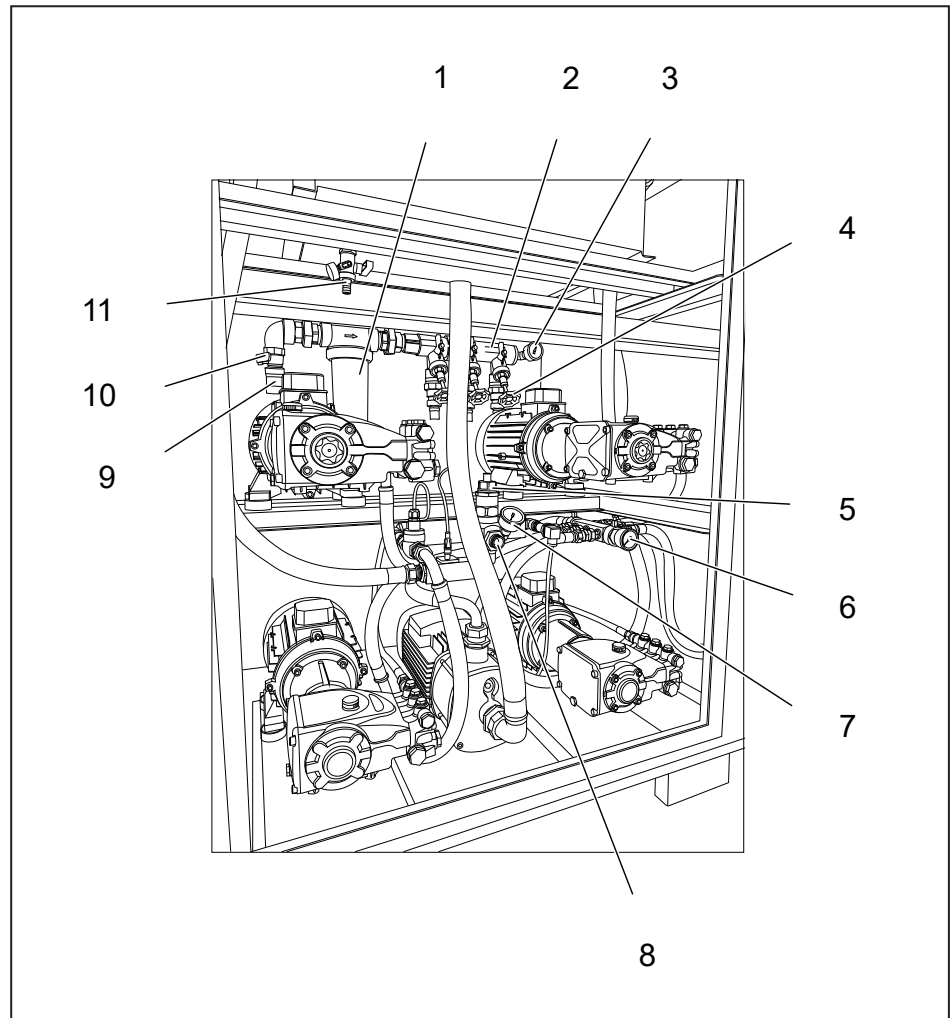
- | | | | |
|---|--|---|---|
| 1 | 7" Touchscreen | 4 | Door interlock with lock |
| 2 | On/Off Rotary Switch (lockable with padlock) | 5 | Feedthrough for water hose, HP-Hose and power cable |
| 3 | Padlock holder | | |

Fig. 3 - 3 Stationary Coldwater High Pressure Cleaners Series KSM/KSM-INOX (two-door), total view



- | | | | |
|---|-------------------------------|---|---|
| 1 | Water tank 60 l | 4 | Pumps (quantity depends on expansion stage) |
| 2 | Lock (electrical control box) | 5 | Booster pump |
| 3 | Electrical control box | | |

Fig. 3 - 4 Stationary Coldwater High Pressure Cleaners Series KSM/KSM-INOX (two-door), cabinet interior (general example)



- | | | | |
|---|-------------------------------------|----|--|
| 1 | Filter (water inlet) | 6 | Pressure gauge (water distribution pump input) |
| 2 | Water distribution (3-fold) | 7 | Pressure gauge (HP-Output) |
| 3 | Pressure gauge (water distribution) | 8 | HP-Hose connection |
| 4 | Shut-off valve (water distribution) | 9 | Hose connection water inlet |
| 5 | Unloader valve | 10 | Shut-off valve (water inlet) |
| | | 11 | Drain tap (water tank 60 l) |

Fig. 3 - 5 Stationary Coldwater High Pressure Cleaners Series KSM / KSM-INOX (two-door), detail view cabinet interior (general example)

3.2 Type plates

3.2.1 Series KSM

KSM1840

Type: KSM1840
1561-XX-B



Voltage	3/400-415V/ 50Hz
Operating pressure	30-180bar / 3-18MPa
Max. pressure	200bar / 20Mpa
Discharge capacity	900 - 1.800l/h
Nozzle size	2x 25050
Max. inlet temp.	80°C
Pump speed	1400rpm
Connected load	14,0kW / 25,5A
Electrical protection	3x32A slow



Serial No.: 10011010187204

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KSM2740

Type: KSM2740
1562-XX-B



Voltage	3/400-415V/ 50Hz
Operating pressure	30-180bar / 3-18MPa
Max. pressure	200bar / 20Mpa
Discharge capacity	900 - 2.700l/h
Nozzle size	3x 050
Max. inlet temp.	80°C
Pump speed	1400rpm
Connected load	21,0kW / 38A
Electrical protection	3x50A slow



Serial No.: 10011010189640 Bolt On-Unloader 25 bar Spring

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KSM3640

Type: KSM3640
1563-XX-B



Voltage	3/400-415V/ 50Hz
Operating pressure	30-180bar / 3-18MPa
Max. pressure	200bar / 20Mpa
Discharge capacity	900 - 3.600l/h
Nozzle size	4x 050
Max. inlet temp.	80°C
Pump speed	1400rpm
Connected load	27,0kW / 50A
Electrical protection	3x63A slow



Serial No.: 10011010187204

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KSM4540

Type: KSM4540
1564-XX-B



Voltage	3/400-415V/ 50Hz
Operating pressure	30-180bar / 3-18MPa
Max. pressure	200bar / 20Mpa
Discharge capacity	900 - 4.500l/h
Nozzle size	5x 050
Max. inlet temp.	80°C
Pump speed	1400rpm
Connected load	33,5kW / 60,5A
Electrical protection	3x80A slow



Serial No.: 10011010189650

EHRLE GmbH | Industriestraße 3 D-89165 Dietenheim
Tel.: 0 73 03 / 16 00-0 | Fax: 0 73 03 / 16 00-600

KSM5440

Type: KSM5440
1565-XX-B



Voltage	3/400-415V/ 50Hz
Operating pressure	30-180bar / 3-18MPa
Max. pressure	200bar / 20Mpa
Discharge capacity	900 - 5.400l/h
Nozzle size	6x 050
Max. inlet temp.	80°C
Pump speed	1400rpm
Connected load	40,0kW / 72,5A
Electrical protection	3x80A slow



Serial No.: 10011010189650

EHRLE GmbH | Industriestraße 3 D-89165 Dietenheim
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3.2.2 Series KSM-INOX

KSM1840-INOX

Type: KSM1840 INOX
156101-XX-B



Voltage	3/400-415V/ 50Hz
Operating pressure	30-180bar / 3-18MPa
Max. pressure	200bar / 20Mpa
Discharge capacity	900 - 1.800l/h
Nozzle size	2x 25050
Max. inlet temp.	80°C
Pump speed	1400rpm
Connected load	14,0kW / 25,5A
Electrical protection	3x32A slow



Serial No.: 10011010187204

EHRLE GmbH | Industriestraße 3 D-89165 Dietenheim
Tel.: 0 73 03 / 16 00-0 | Fax: 0 73 03 / 16 00-600

KSM2740-INOX

Type: KSM2740 INOX
156201-XX-B



Voltage	3/400-415V/ 50Hz
Operating pressure	30-180bar / 3-18MPa
Max. pressure	200bar / 20Mpa
Discharge capacity	900 - 2.700l/h
Nozzle size	3x 050
Max. inlet temp.	80°C
Pump speed	1400rpm
Connected load	21,0kW / 38A
Electrical protection	3x50A slow



Serial No.: 10011010189650 Bolt On-Unloader 25 bar Spring

EHRLE GmbH | Industriestraße 3 D-89165 Dietenheim
Tel.: 0 73 03 / 16 00-0 | Fax: 0 73 03 / 16 00-600

KSM3640-INOX

Type: KSM3640 INOX
156300-XX-B



Voltage	3/400-415V/ 50Hz
Operating pressure	30-180bar / 3-18MPa
Max. pressure	200bar / 20Mpa
Discharge capacity	900 - 3.600l/h
Nozzle size	4x 050
Max. inlet temp.	80°C
Pump speed	1400rpm
Connected load	27,0kW / 50A
Electrical protection	3x63A slow



Serial No.: 10011010189650

EHRLE GmbH | Industriestraße 3 D-89165 Dietenheim
Tel.: 0 73 03 / 16 00-0 | Fax: 0 73 03 / 16 00-600

KSM4540-INOX

Type: KSM4540 INOX
156400-XX-B



Voltage	3/400-415V/ 50Hz
Operating pressure	30-180bar / 3-18MPa
Max. pressure	200bar / 20Mpa
Discharge capacity	900 - 4.500l/h
Nozzle size	5x 050
Max. inlet temp.	80°C
Pump speed	1400rpm
Connected load	33,5kW / 60,5A
Electrical protection	3x80A slow



Serial No.: 10011010189650

EHRLE GmbH | Industriestraße 3 D-89165 Dietenheim
Tel.: 0 73 03 / 16 00-0 | Fax: 0 73 03 / 16 00-600

KSM5440-INOX

Type: KSM5440 INOX
156500-XX-B



Voltage	3/400-415V/ 50Hz
Operating pressure	30-180bar / 3-18MPa
Max. pressure	200bar / 20Mpa
Discharge capacity	900 - 5.400l/h
Nozzle size	6x 050
Max. inlet temp.	80°C
Pump speed	1400rpm
Connected load	40,0kW / 72,5A
Electrical protection	3x80A slow



Serial No.: 01011100089650

EHRLE GmbH | Industriestraße 3 D-89165 Dietenheim
Tel.: 0 73 03 / 16 00-0 | Fax: 0 73 03 / 16 00-600

3.3 Serial number

The serial number on the type plate uniquely identifies the product. It is required for Ehrle customer service.

Ser. Nr. _____

3.4 Technical data

3.4.1 KSM1840, KSM2740 (Standard/INOX)

Standard and INOX			
		KSM1840	KSM2740
Performance data			
Operating pressure	bar	30 - 180	30 - 180
	MPA	3 - 18	3 - 18
Max. operating over pressure (infinitely variable)	bar	200	200
	MPA	20	20
Discharge capacity	l/h	900 - 1800	900 - 2700
Pump speed	rpm	1400	1400
Recoil force trigger gun	N	51,5	51,5
Nozzle size	---	2 x 25050	3 x 050
Electrical connection			
Mains voltage	V	400	400
Phase	~	3	3
Mains frequency	Hz	50	50
Connected load	kW	14	21
Current (max.)	A	25,5	38
Main fuse (slow blowing)	A	3 x 32	3 x 50
Residual current circuit breaker (max. allowed residual current)	mA	30	30
Degree of protection	-	IPX4	IPX4

Tab. 3 - 1 Technical data KSM1840, KSM2740 (Standard/INOX)

Standard and INOX			
		KSM1840	KSM2740
Water connection			
Max. feed pressure	bar	5	5
	MPA	0,5	0,5
Max. feed temperature	° C	60	60
Feed volume	l/min	30	45
Weight and Dimensions			
Weight (with packaging)	kg	493 (508)	573 (588)
Length (with packaging)	mm	1130 (1290)	1130 (1290)
Width (with packaging)	mm	800 (1040)	800 (1040)
Height (with packaging)	mm	2090 (2100)	2090 (2100)

Tab. 3 - 1 Technical data KSM1840, KSM2740 (Standard/INOX)

3.4.2 KSM3640, KSM4540, KSM5440 (Standard/INOX)

Standard und INOX				
		KSM3640	KSM4540	KSM5440
Performance data				
Operating pressure	bar	30 - 180	30 - 180	30 - 180
	MPA	3 - 18	3 - 18	3 - 18
Max. operating over pressure (infinitely variable)	bar	200	200	200
	MPA	20	20	20
Discharge capacity	l/h	900 - 3600	900 - 4500	900 - 5400
Pump speed	rpm	1400	1400	1400
Recoil force trigger gun	N	51,5	51,5	51,5
Nozzle size	---	4 x 050	5 x 050	6 x 050

Tab. 3 - 2 Technical data KSM3640, KSM4540, KSM5440 (Standard/INOX)

Standard und INOX				
		KSM3640	KSM4540	KSM5440
Electrical connection				
Mains voltage	V	400	400	400
Phase	~	3	3	3
Mains frequency	Hz	50	50	50
Connected load	kW	27	33,5	40
Current (max.)	A	50	60,5	72,5
Main fuse (slow blowing)	A	3 x 63	3 x 80	3 x 80
Residual current circuit breaker (max. allowed residual current)	mA	30	30	30
Degree of protection	-	IPX4	IPX4	IPX4
Water connection				
Max. feed pressure	bar	5	5	5
	MPA	0,5	0,5	0,5
Max. feed temperature	° C	60	60	60
Feed volume	l/min	60	75	90
Weight and Dimensions				
Weight	kg	250	380	810
Length (with packaging)	mm	2130 (2290)	2130 (2290)	2130 (2290)
Width (with packaging)	mm	800 (1040)	800 (1040)	800 (1040)
Height (with packaging)	mm	2090 (2100)	2090 (2100)	2090 (2100)

Tab. 3 - 2 Technical data KSM3640, KSM4540, KSM5440 (Standard/INOX)

3.5 Selection of HP-Nozzles



General Information

For the selection of HP-Nozzles, see the information on the type plate (see section 3.2).

4 Installation



WARNING

Ensure correct device assembly.

For the installation of the high pressure cleaners, the personnel must have

- read this manual and understood, that error-free device assembly can be guaranteed, or
- specially trained and instructed on the respective system.

Otherwise, the life and limb of persons may be endangered.



WARNING

Danger with heavy loads.

The Stationary Coldwater High Pressure Cleaners of the Series KSM/KSM-INOX weigh 250 kg to 835 kg (with packaging 275 kg resp. 835 kg). Components of the high pressure cleaners can have a weight of more than 23 kg.

A person is not allowed to lift and move loads (e.g. devices, assemblies) more than 23 kg.

Otherwise the health of persons may be endangered (e.g. overload of the spinal column, injuries from falling loads).

For loads of more than 23 kg, use suitable lifting equipment (e.g. forklift, lift truck).



General Information

For detailed advice and information on the installation of the Stationary Coldwater High Pressure Cleaners of the Series KSM/KSM-INOX, please contact EHRLE customer service.

If required, EHRLE customer service can commission appropriately qualified personnel to carry out a wide range of installation work.

4.1 Selection of the operating location



WARNING

Select a suitable and permissible operating location for the system.

The local regulations concerning the installation and operation of the system must be observed.

The Stationary Hotwater High Pressure Cleaners must not be installed and operated in rooms or areas subject to fire or explosion hazards.

For use at petrol stations or similar hazardous areas, reference is made to the hazardous areas in accordance with the „Technical Rules for Flammable Liquids“ (TRGF).

Select a dry and operationally safe location for the system cabinet (dimensions for the installation location see Fig. 4 - 1 to Fig. 4 - 4). The site of use must have a water drainage system.

When selecting a location, take into account that the following plant components and the power supply must be easily accessible for operation, maintenance, repair and adjustment work (for dimensions see also Fig. 4 - 1 to Fig. 4 - 4):

- connections for system supply
 - supply voltage
 - water pipe
- the swivel area of all cabinet doors (front, rear) must be completely free
- washing station equipment such as trigger gun and high pressure hose

The building water connection (mains water supply) and the electrical connection (mains connection) for supplying the system must be designed for trouble-free constant continuous operation (see also section 3.4, Techn. Data).

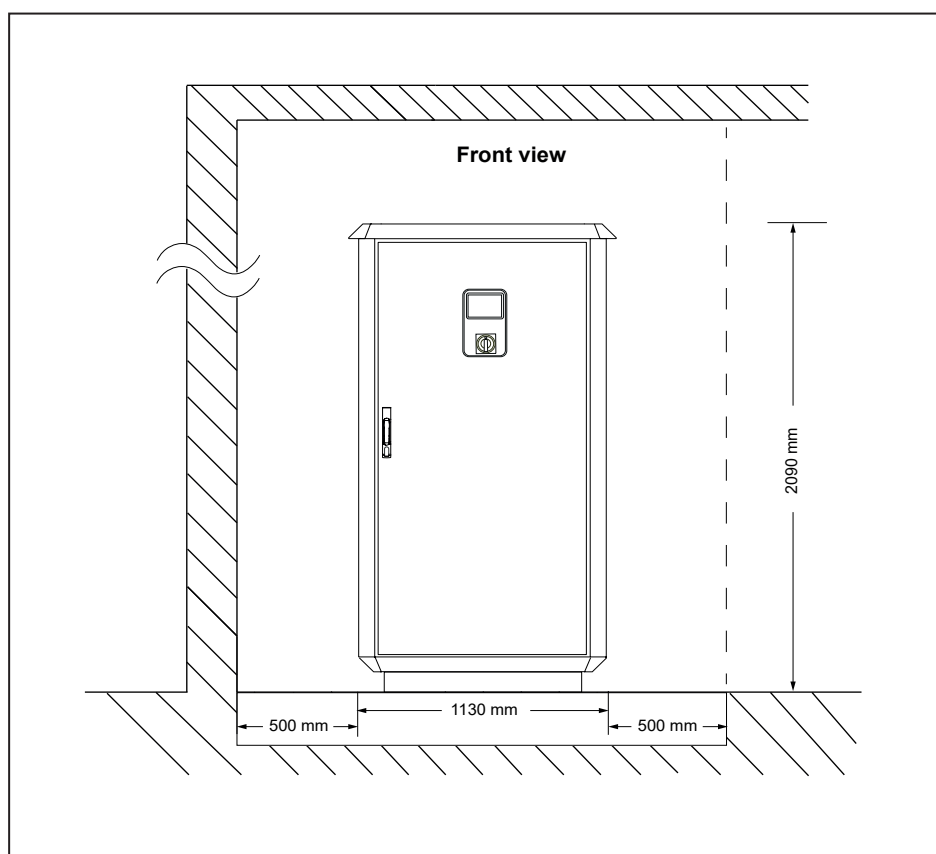


Fig. 4 - 1 Required dimensions for operating location (front view), example for Series KSM/KSM INOX (one door)

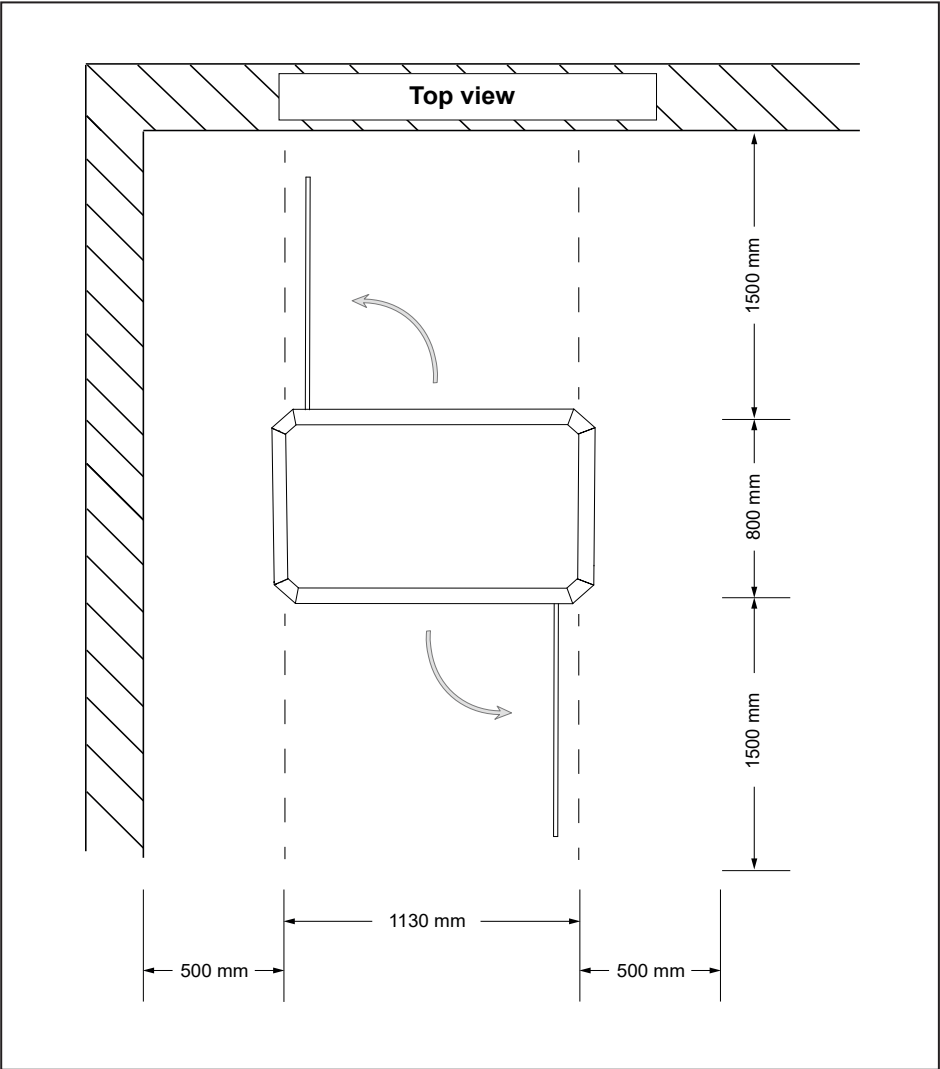


Fig. 4 - 2 Required dimensions for operating location (top view),
 example for Series KSM/KSM INOX (one door)

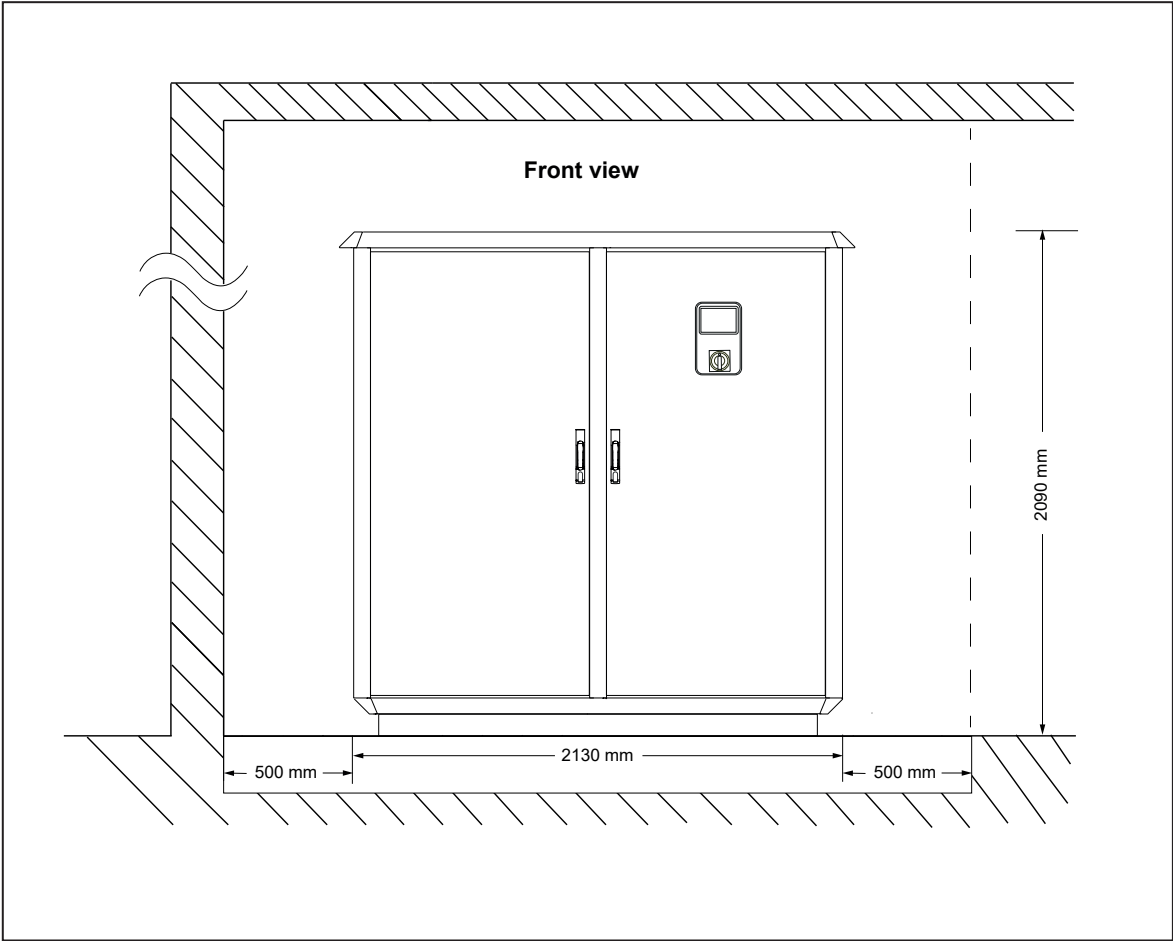


Fig. 4 - 3 Required dimensions for operating location (front view, example for Series KSM/KSM INOX (two-door))

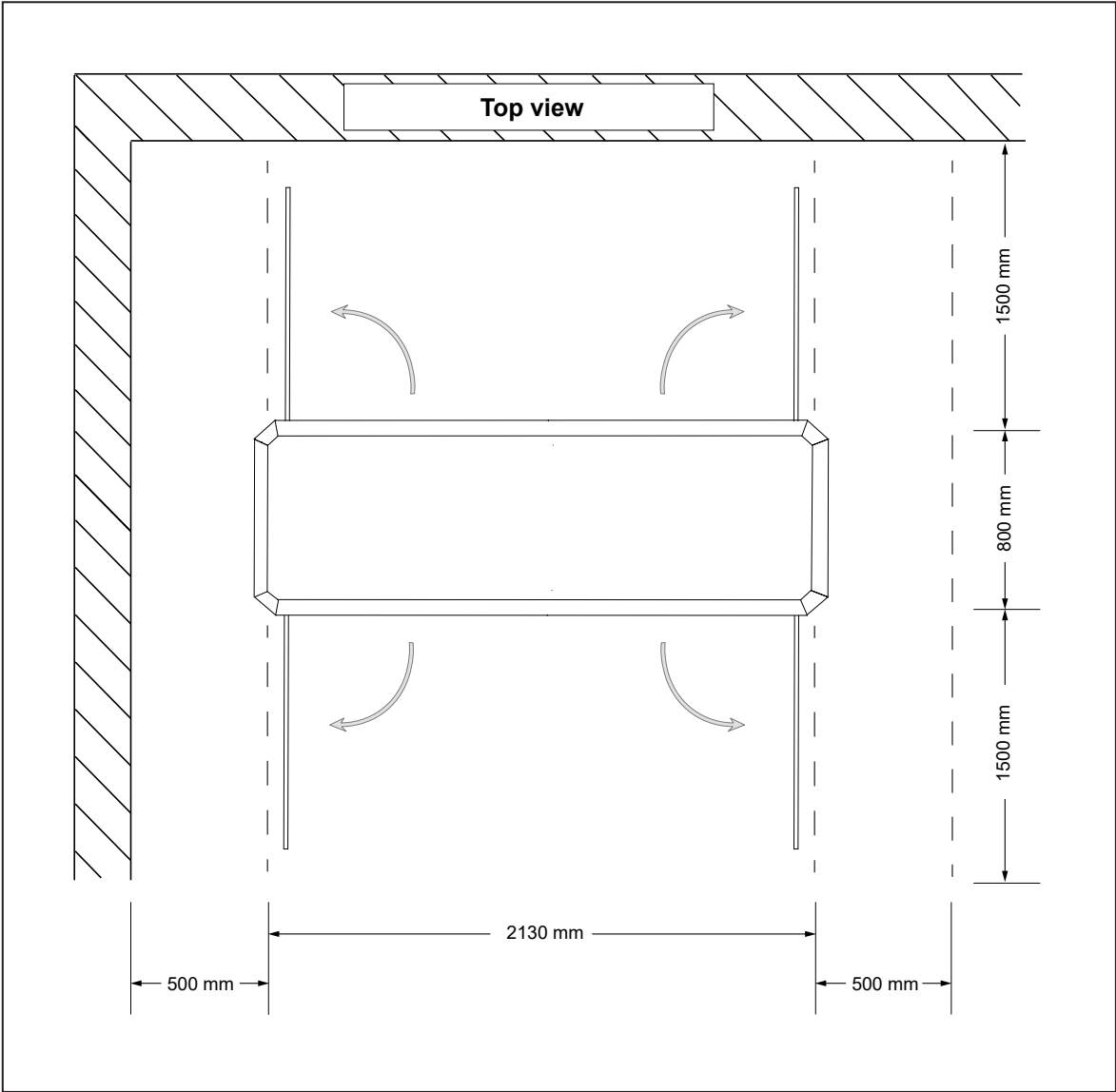


Fig. 4 - 4 Required dimensions for operating location (top view),
 example for Series KSM/KSM INOX (two-door)

4.2 Installation of the electrical connection



WARNING

Ensure proper installation of the electrical connection.

The electrical connection may only be carried out by qualified, trained and authorised electrical specialists.

Observe the IEC-regulations for electrical cable laying.

All live parts in the intended working area for cleaning work, e.g. equipment, cables, sockets etc. must be protected against water jets in accordance with safety regulations.

Only connect the system to voltage sources earthed in accordance with the safety regulations.

The connection plugs must not lie on the floor and must always be dry. Do not touch the connectors with wet hands.

Improper installation of the electrical connection can endanger life and limb of persons.



General Information

When installing the cabinet of Series KSM/KSM-INOX, the direction of rotation of the booster pump motors have to be observed.

Have the electrical connection carried out by qualified and trained electricians. Ensure compliance with the provisions of IEC 60364-1.

The electrical mains connection (building connection) for the supply voltage of the system must be designed for trouble-free constant operation (see Section 3.4, Technical Data).

The electrical mains connection of the building must correspond to the electrical values given on the type plate of the system (see Section 3.2, Type plates).

The following components of the building power supply must be installed at an easily accessible installation site:

- Building power supply on/off switch.
- Fuses or circuit breakers for the building power supply.

Install the electrical connections according to the system-specific circuit diagram (see Section 10, circuit diagrams).



WARNING

Danger of electric shock.

Do not connect the system to the building power supply until all installation work has been completed.

For connection to the building network, proceed according to the instructions in section 5, Commissioning.

Otherwise, the life and limb of persons may be endangered.

Do not connect the system to the mains supply (building connection) until starting with commissioning in accordance with the instructions in section 5.2, First switch-on after installation.

4.3 Establishing the water connection



CAUTION

Dirty water can damage the high pressure cleaner.

Only operate the high pressure cleaner with clear and unpolluted water.

The building water connection (tap water network) for the water supply of the high pressure cleaner must be designed for trouble-free constant operation (see Section 3.4, Technical Data).

The regulations of the relevant water supply company must be observed! According to EN 61 770, the system must not be directly connected to the public drinking water supply. However, according to DVGW (Deutscher Verband des Gas- und Wasserfaches - German Gas and Water Association), short-term connection is permissible if a backflow preventer with a pipe ventilator is installed in the supply line. Water after the backflow preventer is no longer considered drinking water.

An indirect connection to the public drinking water supply is also permissible by means of a free outlet. The water supply must comply with EN 61 770, e.g. by using a tank with a float valve. Direct connection to a pipe network not intended for drinking water supply is permissible.

The environmental, waste and water protection regulations must be observed by the system operator!

Equip the water connection of the tap water network with a shut-off valve.

Connect the high pressure cleaner to the water connection via a flexible pressure hose (at least 1") (see also hose connection water inlet Fig. 3 - 2 resp. Fig. 3 - 5).

4.4 Washbay equipment



CAUTION

Ensure that the high pressure hose is handled properly.

Do not

- run vehicles over the high pressure hose,
- pull it excessively, twist or bend it
- run it over sharp-edged objects.

Otherwise the high pressure hose may be damaged.



CAUTION

Ensure pressure-tight screw connection of the washing station equipment.

Leakage on screw connections of the trigger gun, pressure hose- or hose drum connection lead to increased wear and may damage system parts.

Rectify leakages immediately.



General Information

The washbay equipment is not included in the scope of delivery for the Stationary Coldwater High Pressure Cleaners Series KSM/KSM-INOX.

This offers almost unlimited possibilities to implement a system cabinet according to customer requirements with a tailor-made expansion stage for the respective application environment.

For comprehensive advice and information on Stationary Coldwater High Pressure Cleaners Series KSM/KSM-INOX optimised to customer requirements, EHRLE can be consulted at any time via customer service.

Observe the instructions and safety regulations in the manufacturer's operating instructions for installation and operation with the washbay equipment.

5 Commissioning



WARNING

Carry out initial commissioning professionally.

The measures for initial commissioning may only be carried out by qualified, trained and authorised personnel.

For the Stationary Coldwater High Pressure Cleaners Series KSM/KSM-INOX, the washbay equipment is not included in the scope of delivery from Ehrle.

For commissioning, it is assumed that the system operator has correctly and completely installed the application environment (washbay equipment, etc.) in accordance with the manufacturer's instructions.

The instructions and safety regulations in the manufacturer's installation and operating instructions for the washbay equipment must be observed.

5.1 Measures prior to commissioning

Proceed as follows before the initial commissioning:

- Check the oil level on the dipstick of the high pressure pump and top up to the „max.“ mark if necessary.

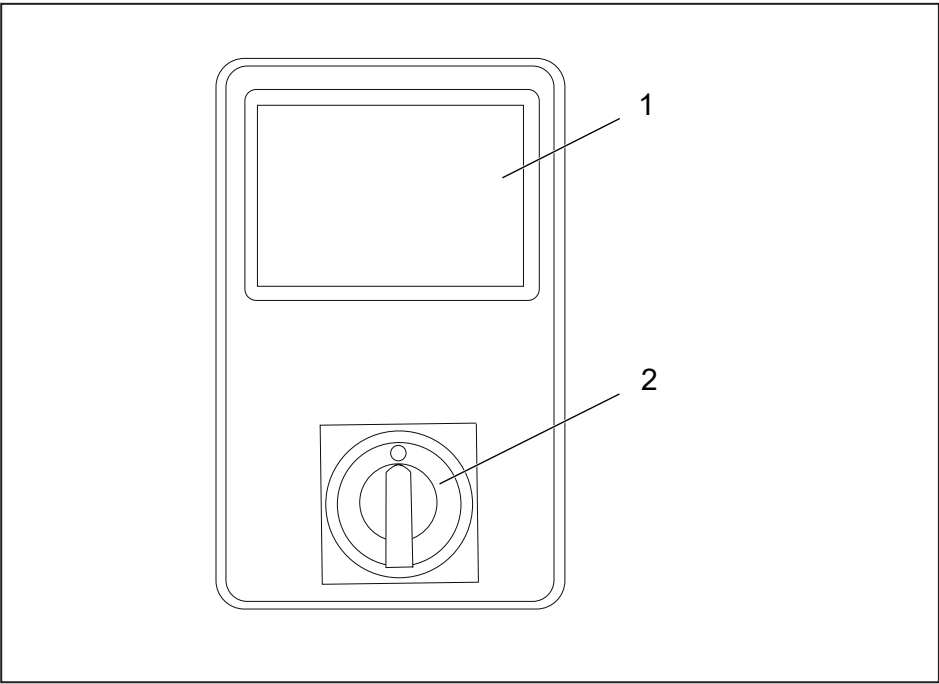
5.2 First switch-on after installation

For initial commissioning after installation, proceed as described in Section 6.

6 Operation

6.1 Touchscreen and On/Off switch (front door)

The following figure shows the Touchscreen and On/Off Rotary Switch on the front door.



- 1 7" Touchscreen
- 2 On/Off Rotary Switch (lockable)

Fig. 6 - 1 Touchscreen and On/Off Rotary Switch, front door

6.2 Notes on operation for specialist and operating personnel



WARNING
Ensure proper operation.

Operation and settings in the system cabinet may only be carried out by qualified, trained personnel authorised by the system operator.



WARNING
Ensure that the high pressure jet is used correctly.

The water jet coming out of the trigger gun must not be directed at persons or animals.

In the event of accidents (e.g. danger to persons, injured persons in the work area) or to prevent accidents, switch off the system (see Section 6.4, EMERGENCY STOP - Switching off in the event of danger).



WARNING

Danger of electric shock.

In the event of accidents (e.g. due to life-threatening voltages) involving persons or to prevent accidents, switch off the system (see Section 6.4, EMERGENCY STOP - Switching off in the event of danger).

The water jet emerging from the trigger gun must not be directed at live electrical components or systems (machines, devices, lines, sockets, etc.).

Before cleaning, disconnect the cleaning objects such as electrical systems, assemblies or components from the power supply.



WARNING

Risk of burns from hot surfaces or water.

During operation with water temperatures up to 60 °C, the surfaces of system parts, assemblies or components can become hot (e.g. non-insulated pipes, metal parts of the trigger gun and spray lance, heated water, etc.). Contact with hot surfaces or hot water can cause skin burns or scalding in persons.

Ensure that the system parts, assemblies or components as well as cleaning objects have cooled down before starting maintenance or repair work.

The design of the system distinguishes between two levels of access:

- **Level 1:**
Operating personnel to carry out cleaning work after the On/Off Rotary Switch has been unlocked by authorised personnel.
- **Level 2:**
Trained, qualified and by the system operator authorised personnel for installation, maintenance and adjustment work:
 - Access to the key for the lockable On/Off Rotary Switch on the front door (padlock).
 - Touch screen for displaying status information and interface for entering parameters.
 - Access to the setting and display elements inside the cabinet via lockable doors.
 - Access to the electrical control box interior via lockable door.

The following control and display elements are provided in the cabinet for the authorised personnel (see also Fig. 3 - 2 resp. Fig. 3 - 5):

- Unloader valve
- Shut-off valves
- Pressure gauges.

6.3 Measures for system operators before operation



WARNING

Perform measures by the system operator in a professional manner.

The measures for system operators prior to operation may only be carried out by authorised, trained and qualified personnel.

Before operation or at periodic intervals (see Section 8, Maintenance), proceed as follows for all system types:

- ▶ Check the oil level on the dipstick of the high pressure pump and top up to the „max.“ mark if necessary.

6.4 EMERGENCY STOP - switch-off in case of danger



WARNING

In case of electrical accidents, never directly touch persons exposed life-threatening voltages.

In the event of accidents with persons at life-threatening voltages, immediately switch off the supply voltage via mains switch on the front panel, or if possible, the supply voltage to the system via the circuit breaker at the building control box.

Never touch the exposed person who has been involved in an accident directly. First aiders are also endangered by electric shock if they touch the person directly, in wet areas or over wet objects.

In extreme emergencies, without touching the injured person, use a dry garment, wooden slat or other insulating material to separate the person and mains voltage.

In case of accidents with persons or for accident prevention during device operation, perform an EMERGENCY STOP switch-off as follows:

- ▶ Switch off the high pressure cleaner via On/Off Rotary Switch (2, Abb. 6 - 1).
- ▶ If necessary, if persons are still exposed to electric shock, switch off the supply voltage to the system via the circuit breaker at the building control box.
- ▶ If necessary, activate the trigger gun until the high pressure cleaner is depressurised.
- ▶ Close shut-off valve for water supply (water mains) if necessary.

6.5 System operation for operating personnel



General Information

The system operation by the operating personnel is limited to

- On/Off Rotary Switch on the front door
- ON/OFF button on the Touchscreen main menu.

For cleaning operation by the operating personnel, proceed as follows:

- ▶ If necessary, open the shut-off valve of the water pipe from the infrastructure.
- ▶ If necessary, switch on the supply voltage via the circuit breaker resp. main switch on the building control box.
- ▶ Prepare the washbay equipment (not included in the scope of delivery of Ehrle) for operation in accordance with the manufacturer's specifications. Observe the instructions and safety regulations in the manufacturer's operating instructions.
- ▶ Set the On/Off Rotary Switch (see 2, Fig. 6 - 1) on the front door to On.
- ▶ On the Touchscreen appears the main menu. Switch on the system via button On.



WARNING

Before activating, hold the trigger gun and the spray lance tightly.

After activation of the trigger gun the emerging water jet exerts a jerky recoil force (see also Fig. 6 - 2).

This may result in unintentional jerking away from the selected cleaning object or the trigger gun slipping out of the hand, endangering the life and limb of persons.

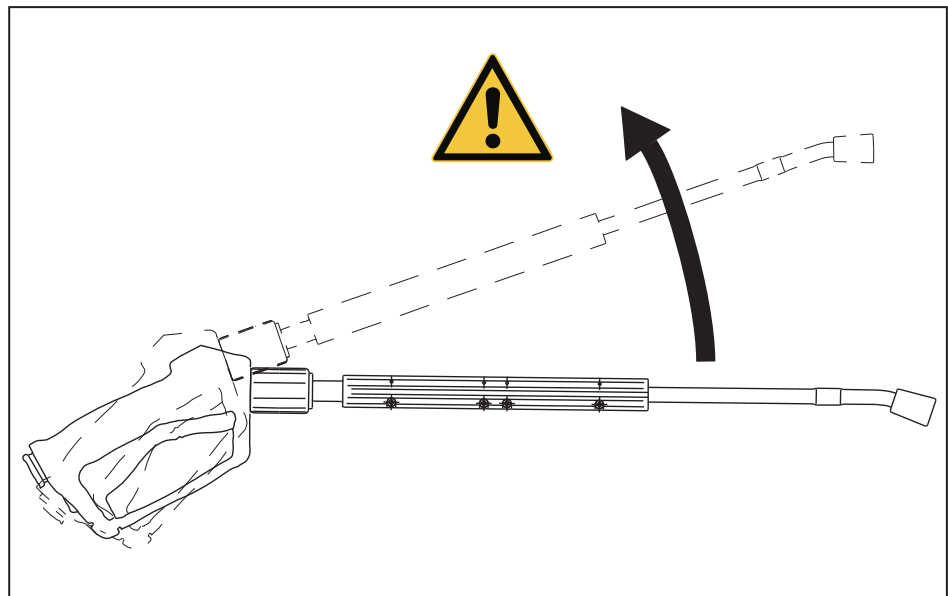


Fig. 6 - 2 Recoil force when switching on the trigger gun

- ▶ Activate the trigger gun according to the manufacturer's instructions. The high pressure cleaner starts. The pump first delivers air from the HP-Nozzle. After a short time, water then escapes.



General Information

If the trigger lever on the trigger gun is released, the high pressure cleaner switches into Stand-By mode (6 sec., adjustable via Touchscreen menu by authorised personnel, see section 6.7).

The time that the system remains in Standby mode can be set by authorised personnel to between 1 and 254 minutes (see Section 6.7).

- ▶ After completing the cleaning work, decommission the washbay equipment in accordance with the manufacturer's instructions in the associated operating instructions.
Observe the manufacturer`s safety regulations.
- ▶ Position the On/Off Rotary Switch on the front door to Off.

6.6 System setting and operation for skilled personnel



General Information

Only qualified personnel authorised by the system operator may make

- settings inside the cabinet
- enter parameters on the Touchscreen menus.

This requires access to the key for opening the cabinet door.

To commission the system, proceed as follows:

- ▶ If necessary, open the shut-off valve of the water pipe from the infrastructure.
- ▶ If necessary, switch on the system supply voltage via the circuit breaker resp. main switch on the building side.
- ▶ Inside the system cabinet open the water inlet shut-off valve (see Fig. 3 - 2 resp. Fig. 3 - 5).
- ▶ Only for two-door systems: open the water distribution shut-off valves (see Fig. 3 - 5).
- ▶ Check water pressure on the pressure gauge (water pressure pump input) (see Fig. 3 - 2 resp. Fig. 3 - 5).



WARNING

Before activating, hold the trigger gun and the spray lance tightly.

After activation of the trigger gun the emerging water jet exerts a jerky recoil force (see also Fig. 6 - 2).

This may result in unintentional jerking away from the selected cleaning object or the trigger gun slipping out of the hand, endangering the life and limb of persons.

- ▶ Prepare the washbay equipment (not included in the scope of delivery of Ehrle) for operation in accordance with the manufacturer's specifications. Observe the instructions and safety regulations in the manufacturer's operating instructions.
- ▶ Set the On/Off Rotary Switch (see 2, Fig. 6 - 1) on the front door to On. For operating the system on the Touchscreen see Section 6 - 7.
- ▶ Open the cabinet door to access the unloader valve (see Fig. 3 - 2 resp. Fig. 3 - 5).
- ▶ The unloader valve is set according to customer requirements. The setting requires an open-end spanner.
- ▶ Activate the trigger gun according to the manufacturer's instructions. The high pressure cleaner starts. The pump first delivers air from the HP-Nozzle. After a short time, water then escapes.
- ▶ Set the unloader valve inside the cabinet to the desired working pressure using an open-end spanner.
- ▶ The operating pressure can be read off the pressure gauge (see Fig. 3 - 2 resp. 3 - 5) while the trigger gun is activated. By turning the unloader valve clockwise, the operating pressure and water quantity on the high pressure pump will increase. Turning counterclockwise results in lower working pressure and reduced water quantity.



General Information

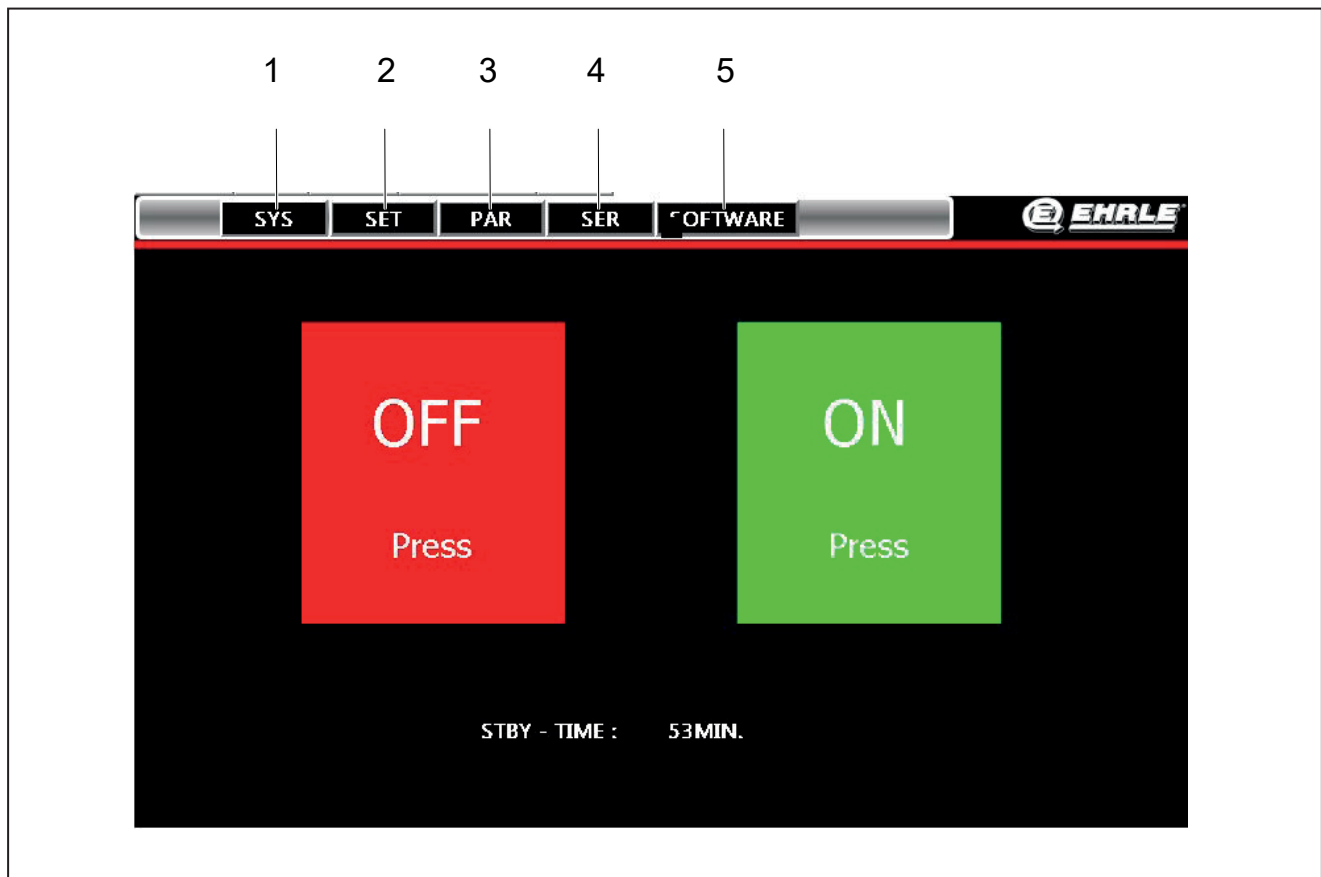
If the trigger lever on the trigger gun is released, the high pressure cleaner switches into Stand-By mode (6 sec., adjustable via Touchscreen menu by authorised personnel, see section 6.7).

The time that the system remains in Stand-By mode can be set by authorised personnel to between 1 and 254 minutes (see Section 6.7).

- ▶ If the trigger lever on the trigger gun is released, the high pressure cleaner switches to Stand-By mode (6 sec., adjustable via Touchscreen menu by authorised personnel, see section 6.7). The time that the system remains in Stand-By mode can be set by authorised personnel to between 1 and 254 minutes (see Section 6.7.2).
- ▶ After completing the cleaning work, decommission the washbay equipment in accordance with the manufacturer's instructions in the associated operating instructions. Observe the manufacturer's safety regulations.
- ▶ Position the On/Off Rotary Switch on the front door to Off. If necessary, lock the switch with a padlock.

6.7 Touchscreen user interface

After switching on the system using the On/Off Rotary Switch, the Main Menu appears on the touchscreen (see Fig. 6 - 3). The system can be switched on using the Touchscreen button ON.



- 1 Register SYS for displaying general system information in submenus
- 2 Register SET for setting and displaying system parameters
- 3 Register PAR for setting and displaying system parameters in submenus
- 4 Register SER for setting and displaying service-parameters in submenus
- 5 Register SOFTWARE for displaying information on the Software

Fig. 6 - 3 Main menu display window with the register in the menu bar

For the display windows and associated submenus, see as follows

- Sys with the submenus (Section 6.7.1)
 - GEN: General system overview (Section 6.7.1.1)
 - INF: Listing of system events (Section 6.7.1.2)
- SET: System settings (Section 6.7.2)
- PAR with submenus (Section 6.7.3)
 - LVLB: Display of water tank filling level (Section 6.7.3.1)
 - PSPMP: Status display for pressure range of all pumps (Section 6.7.3.2)
 - FLWSW: Flow switch off, status on flow switch (Section 6.7.3.3)

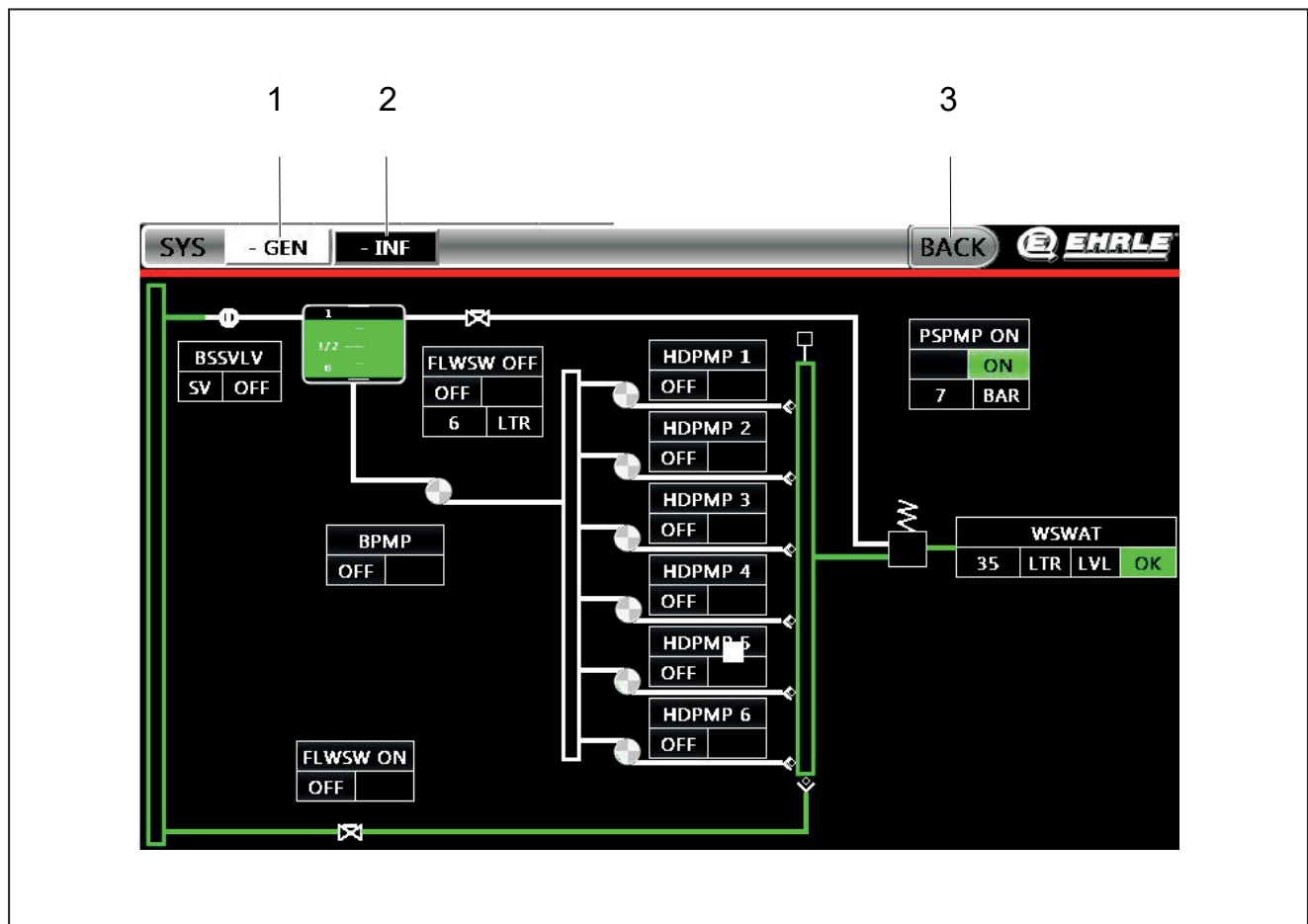
- SER with the submenus (Section 6.7.4)
 - OPH: Operating hours display (Section 6.7.4.1)
 - MPLC: Input/output status display on the PLC (Section 6.7.4.2)
 - CONTROL: Display of status and error code (Section 6.7.4.3)
- SOFTWARE (Section 6.7.5)

In the event of a system fault, a warning message appears on the Touchscreenn (Section 6.7.6)

6.7.1 System overview

6.7.1.1 Submenu GEN

This submenu window is used to display general system information.

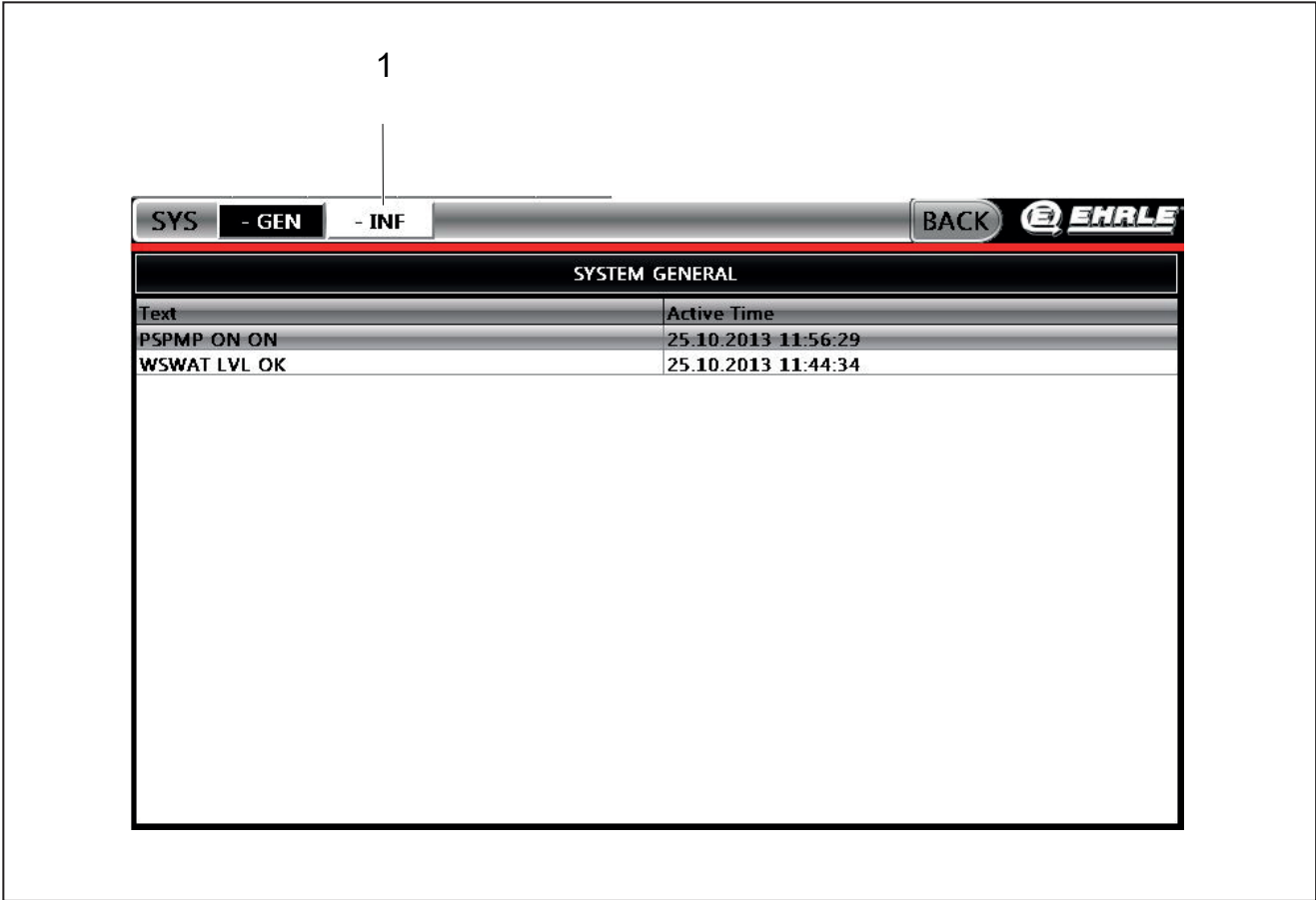


- 1 Register GEN for submenu general system overview
- 2 Register INF for submenu listing of system events
- 3 Touchscreen button BACK (return to main menu)

Fig. 6 - 4 Submenu GEN, general system overview

6.7.1.2 Submenu INF

System events for active components appear in this submenu window.



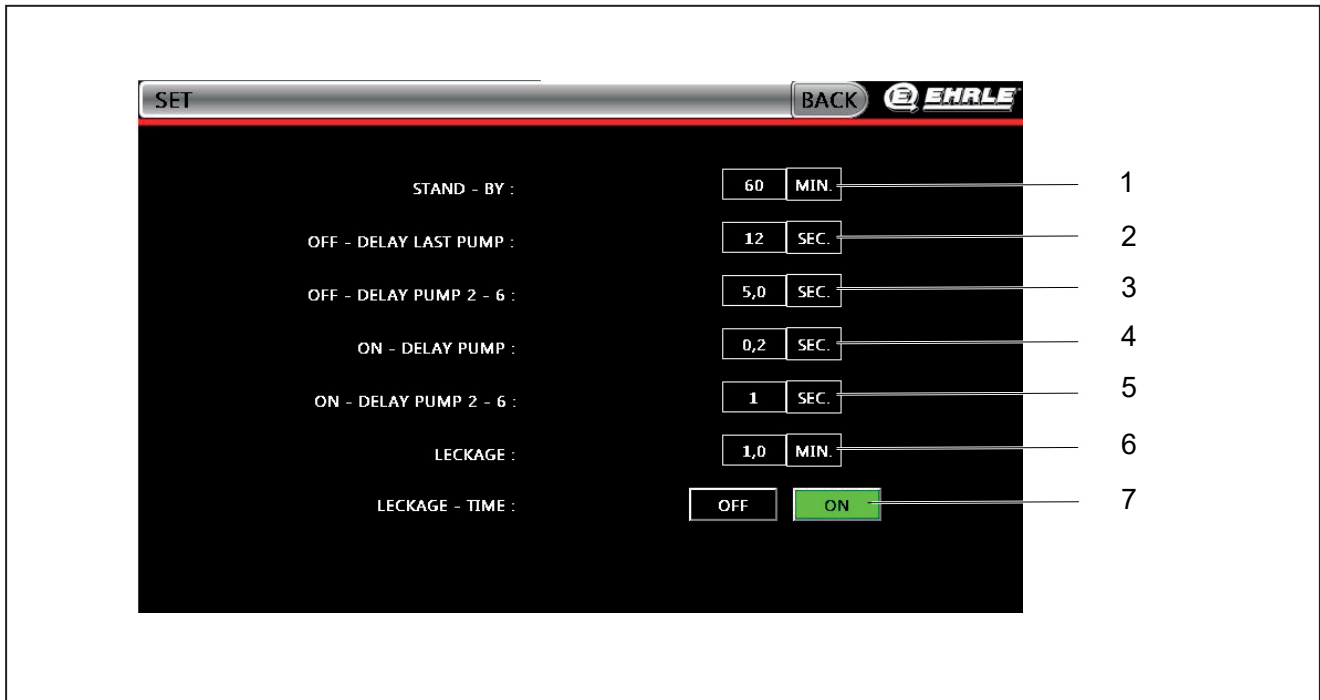
1 Register INF

Fig. 6 - 5 Submenu INF, listing of system events

6.7.2 System settings SET

System parameters can be set in this submenu window:

- Stand-By time
- Switch-on/switch-off delay for the pumps
- Activation of leakage monitoring.



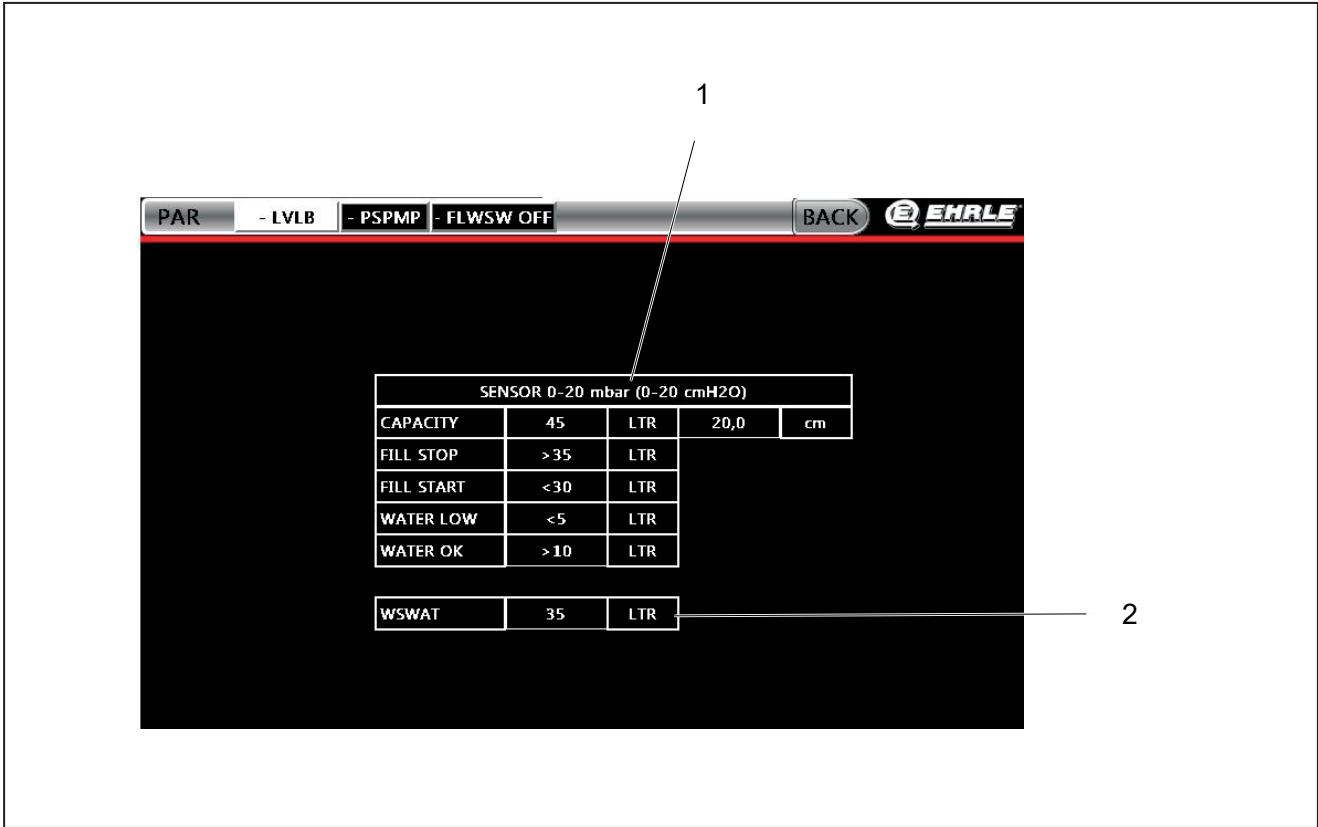
- 1 Stand-By - time (setting range 1-600 Min)
- 2 Off-delay last pump: switch-off delay last pump (setting range 5-120 Sec)
- 3 Off-delay pump 2-6: switch-off delay pump 2 - 6 (setting range 1-10 Sec)
- 4 On -delay pump 1 – switch-on delay pump 1 (setting range 0,1-10 Sec)
- 5 On-delay pump 1 -> 2 ...: switch-on delay pump 1 -> 2.. (setting range 1-10 Sec)
- 6 Leakage - Time: time for activation of the leakage detection (setting range 0,5-50 min)
- 7 Leakage Time: Leakage monitoring OFF/ON

Fig. 6 - 6 Submenu SET, entry fields for system parameters

6.7.3 Register PAR

6.7.3.1 Submenu LVLB

In this submenu window, parameters can be set for the fill level of the water tank.



- 1 Entry fields for water tank level parameters
- 2 Display of the current water quantity

Fig. 6 - 7 Submenu LVLB, settings for water tank filling level

6.7.3.2 Submenu PSPMP

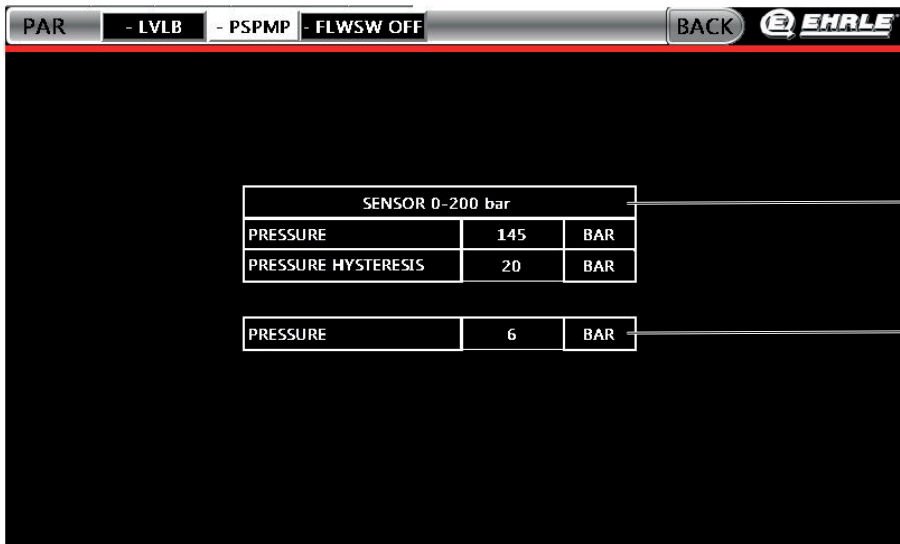
In this submenu window, parameters can be set for the pump pressure (depends on the nozzle size).



General Information

If the pump pressure is above the set pressure value, operation continues as normal.

If the pump pressure is lower than the set pressure value minus the hysteresis, then an additional pump is switched on after the set delay time.



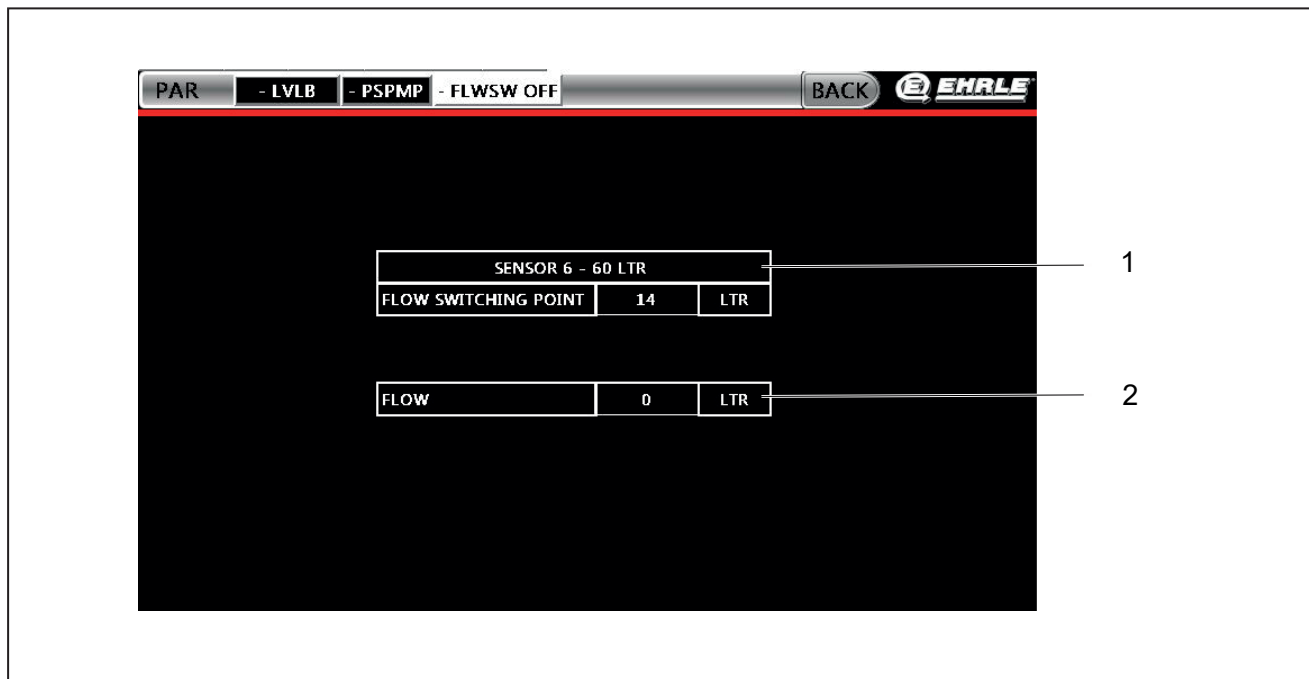
- 1 Entry fields for pressure switch parameters
Current display of the pressure range, pressure Ok for the number of pumps, differential pressure, set pressure value, when pump is switched on
- 2 Display of the pressure

Fig. 6 - 8 Submenu PSPMP, Setting for pump pressure

6.7.3.3 Submenu FLWSW

The switching point for the flow monitor is set or displayed in this submenu window.

If the flow rate (Flow) exceeds the set value, a pump is deactivated after the set delay.



- 1 Entry field for water flow setting
(here in the example, the value of the current water flow is reached, then pump switches off)
- 2 Display field for current water quantity

Fig. 6 - 9 Submenu FLWSW, Setting values and display of flow monitor status

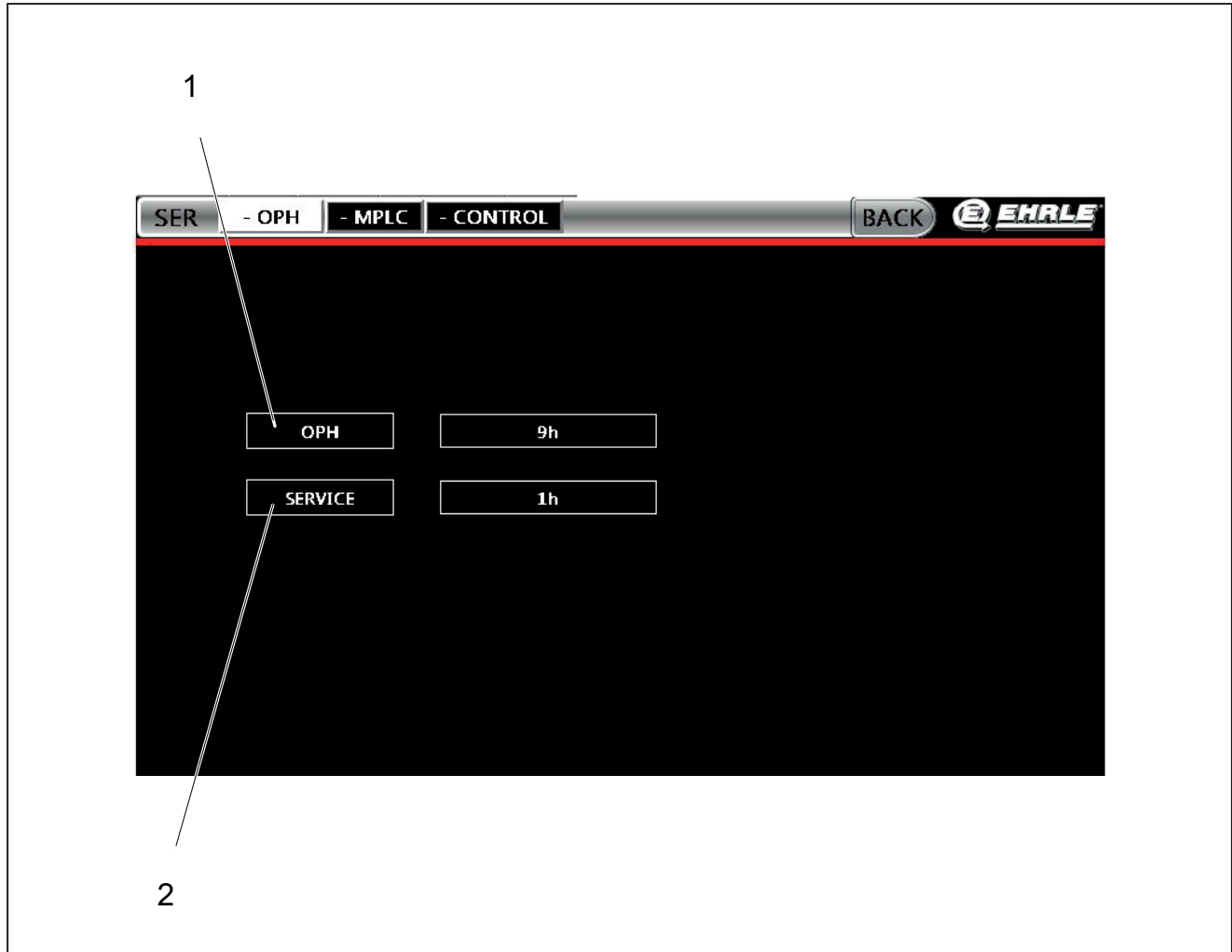
6.7.4 Register SER

Mit dem Register SER können folgende drei Untermenüs für die Anzeige von Informationen und Einstellungen aufgerufen werden:

- OPH: Operating hours display
- MPLC: Status of the PLC control signals
- CONTROL: Function controls

6.7.4.1 Submenu OPH

Submenu window for displaying the operating hours and reset function for the service interval.



- 1 Operating hours display
- 2 Touchscreen button for resetting the service interval after service has been carried out

Fig. 6 - 10 Submenu OPH, display of operating hours and reset function Service times

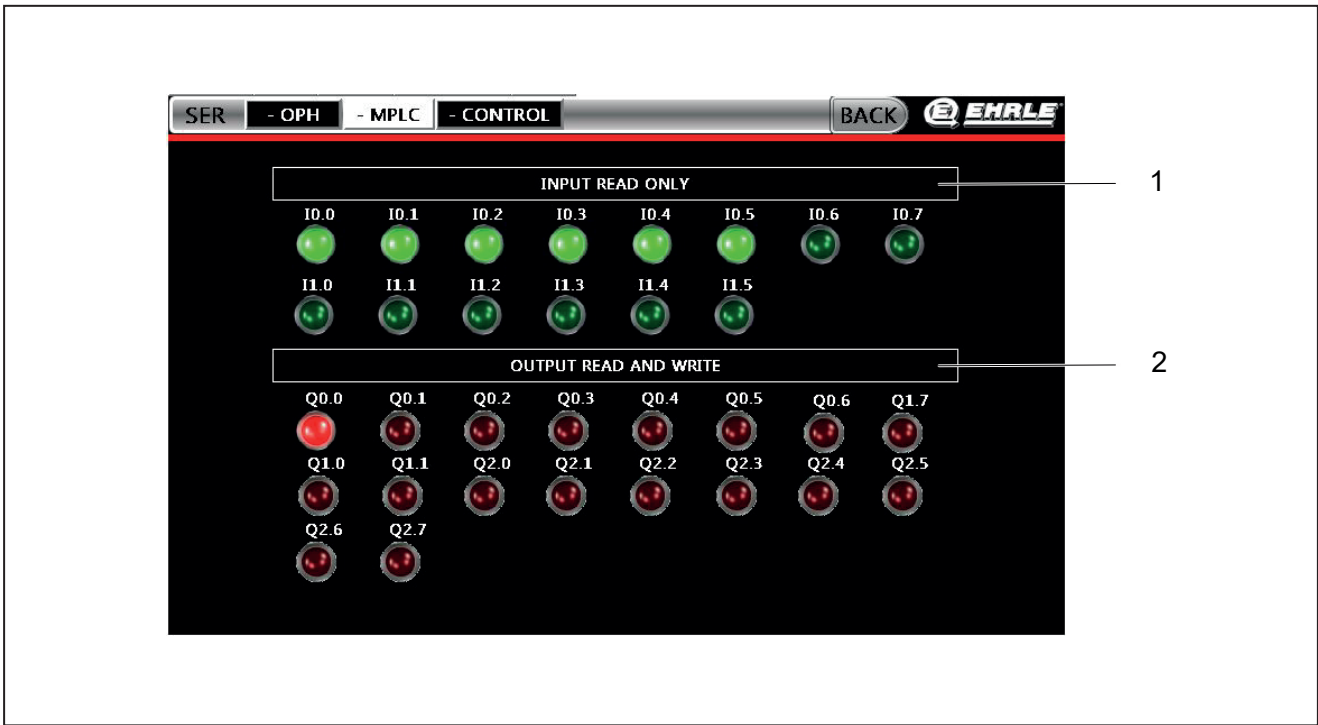
6.7.4.2 Submenu MPLC

Submenu window for displaying the status of the PLC signals.



General Information

When this submenu is accessed, the system operation is automatically terminated.



- 1 Status input signals (Input Read Only)
- 2 Status of the PLC output signals (Output Read and Write)

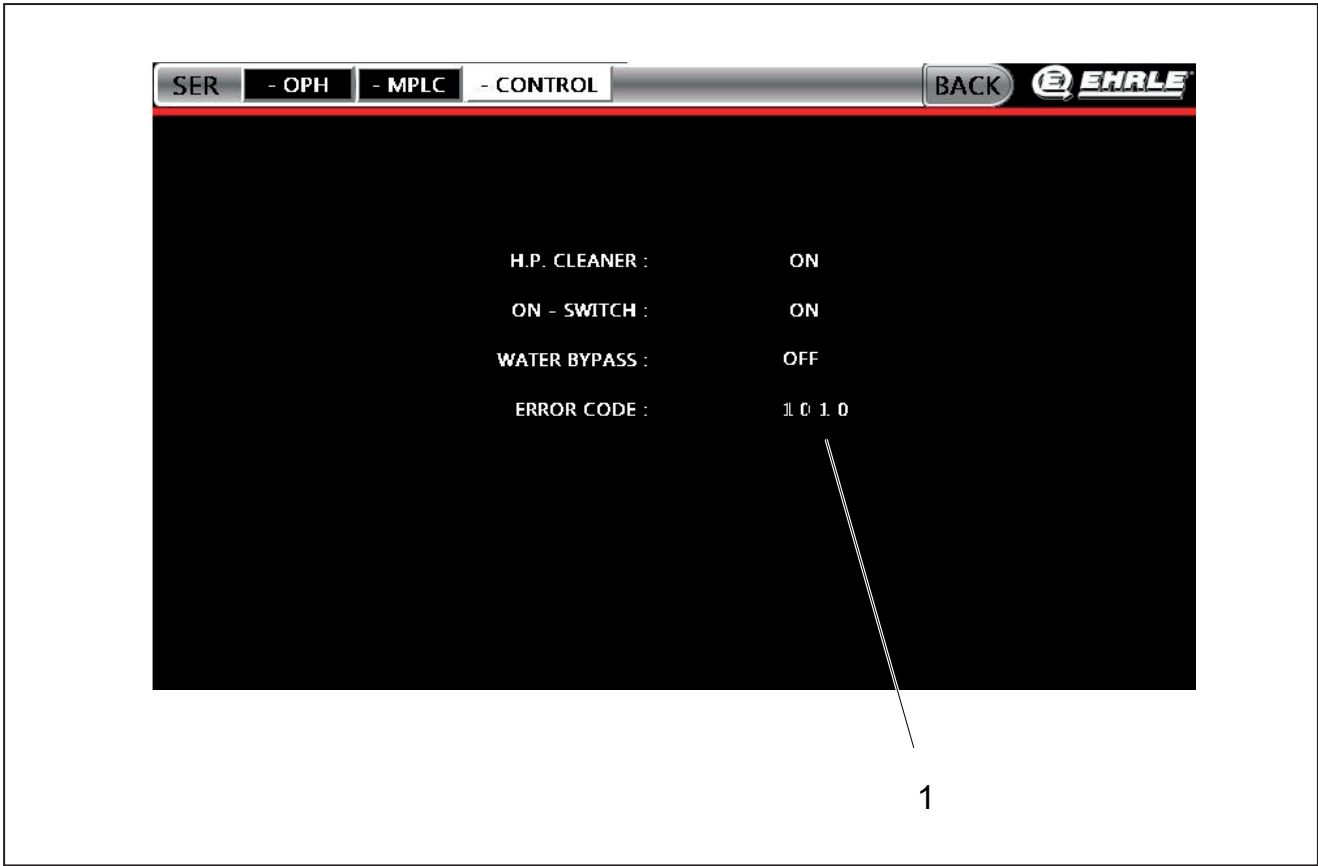
Fig. 6 - 11 Submenu MPLC, Status PLC input-/output signals

6.7.4.3 Submenu CONTROL

Submenu window for displaying the system status and error code display

Erro codes

System	0 - - - = Off	1 - - - = On
Flow monitor	- 0 - - = no water flows	- 1 - - = water flows
Pressure switch	- - 0 - = pressure ok	- - 1 - = pressure to low
Water meter Bypass	- - - 0 = no water	- - - 1 = water Bypass back



1 Error code display

Fig. 6 - 12 Submenu CONTROL, system status and error code display

6.7.5 Submenu window SOFTWARE

Information about the software is displayed in this menu window.

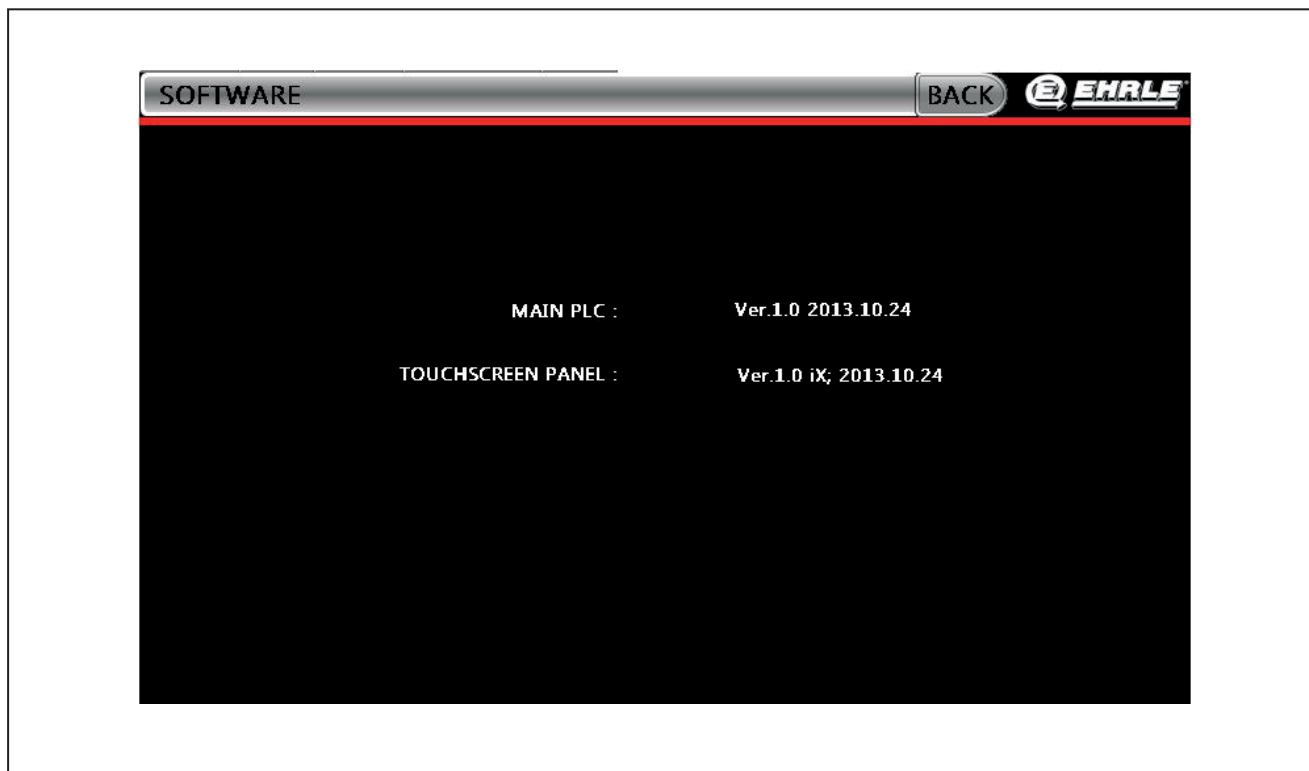


Fig. 6 - 13 Menu window SOFTWARE

6.7.6 Menu window with error display

If system faults occur, the following fault indicators may appear:

- Water Failure (see Fig. 6 - 14)
- Leakage
- Service
- Overtemperature
- Motor Overload

Carry out troubleshooting and, if necessary, fault rectification on the system

Once the fault has been rectified, switch the system off and on again using the On/Off Rotary Switch

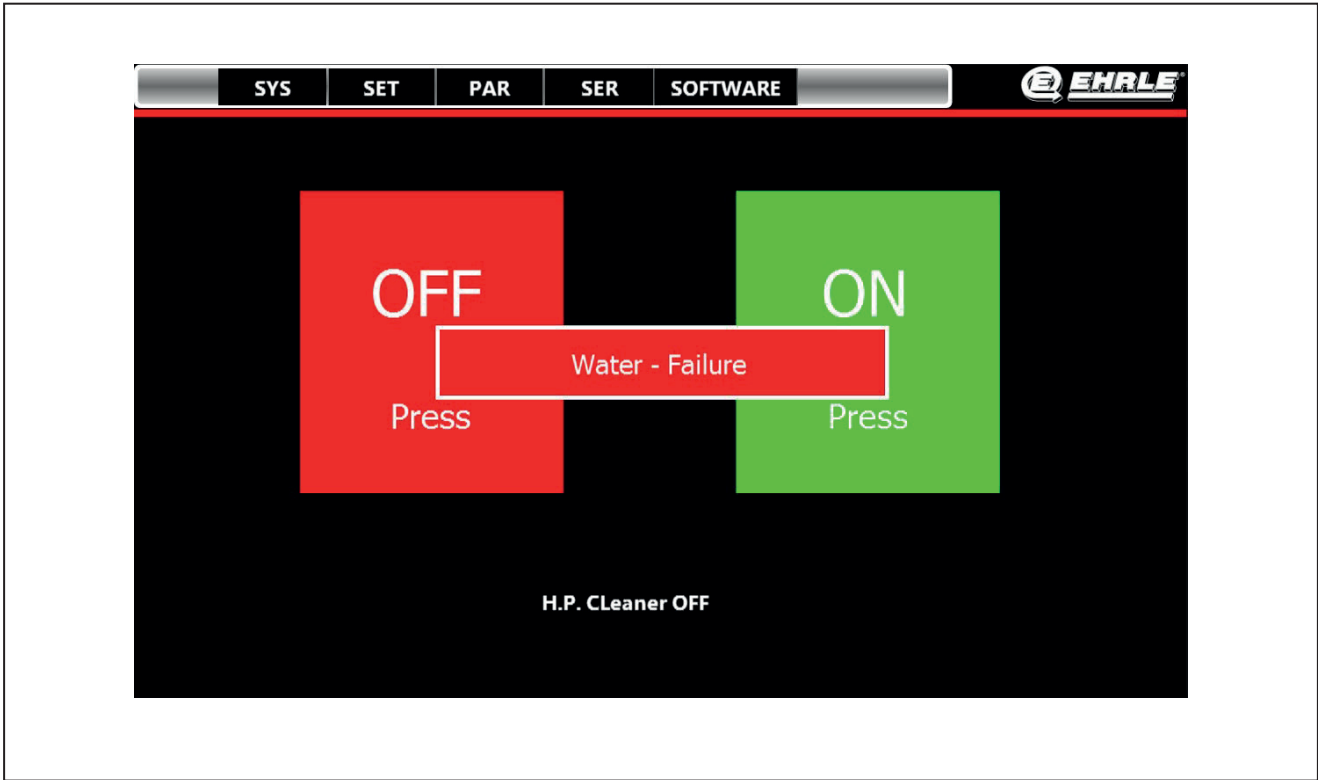


Fig. 6 - 14 Display of system fault (example for Water Failure fault)

7 Decommissioning

7.1 Temporary decommissioning

Decommission the washbay equipment (not included in the scope of delivery from Ehrle) in accordance with the manufacturer's instructions. Observe the instructions and safety regulations in the manufacturer's operating instructions.

After completion of cleaning works proceed as follows for a temporary decommissioning:

- ▶ Position the On/Off Rotary Switch on the front door to Off. If necessary, lock the switch with a padlock.
- ▶ If necessary, close the shut-off valve of the water pipe from the infrastructure.
- ▶ If necessary, switch off the system supply voltage via the circuit breaker resp. main switch on the building side.

7.2 Decommissioning for a longer period of time by authorised personnel

For decommissioning over a longer period:

- ▶ Decommission the system in accordance with Section 7.1.
- ▶ Close all shut-off valves inside the cabinet.
- ▶ Lock the cabinet doors with the key.
- ▶ Lock the On/Off Rotary Switch with a padlock.

After dismantling for storage over a longer period of time, store the system cabinet to a frost-protected location (refer also to Section 8.3.1, frost protection).

Store the washbay equipment and accessories (trigger gun, spray lance, HP-Hoses, etc.) in accordance with the manufacturer's operating instructions.

If necessary, store it in a frost-protected location.

8 Maintenance



WARNING

Carry out maintenance measures professionally.

Maintenance of the system may only be carried out by qualified, trained and authorised personnel.

Before carrying out any maintenance work, take the system out of operation. If necessary, switch off the On/Off Rotary Switch resp. the circuit breaker resp. main switch of the building control box.



General Information

For the Stationary Coldwater High Pressure Cleaners Series KSM/KSM-INOX, the washbay equipment is not included in the scope of delivery from Ehrle.

For the maintenance work the instructions and safety regulations in the manufacturer's installation and operating instructions of the washbay equipment must be observed.

8.1 General Information

The maintenance measures must be carried out professionally as well as regularly and mean for the system:

- Guarantee of operational safety.
- Achieving a long service life.
- Maintaining the performance.

8.2 EHRLE Maintenance and Inspection Contract

The company EHRLE offers with the sale of the system a maintenance contract or especially a safety inspection agreement. The maintenance contract includes:

- Maintenance and repair work
- Security inspection agreement.

The security inspection agreement includes the inspection according to:

- Guidelines for Liquid Sprayers (see section 2.10).

8.3 Maintenance work

Components which show increased wear or whose design duration has been exceeded or is exceeded before the next maintenance must be replaced as a precaution.

The following table contains the periodical maintenance work for the Stationary Coldwater High Pressure Cleaners of Series KSM/KSM-INOX.

Period	Component	Measure	Authorised personnel
Daily	Electrical plug and cables (inside system cabinet)	Check plugs and cables for damage. Replace damaged plugs and/or cables immediately by an authorized customer service/electrical specialist.	Customer Service/ Electrical Specialist
Weekly or after 40 operating hours.	Check the oil condition in the oil tank at the pump.	With poor oil quality (milky etc.), change the oil according to section 8.3.2.	Skilled worker (with access to cabinet interior)
	Check the oil level in the oil tank on the pump.	Check pump oil level, top up oil if necessary (see section 8.3.2).	Skilled worker (with access to cabinet interior)
	Water inlet filter	Check filter for dirt and clean if necessary.	Skilled worker (with access to cabinet interior)
Monthly or after 200 operating hours	High pressure pump	Check pump for leakage. If more than three drops per minute call customer service.	Skilled worker (with access to cabinet interior) resp. Customer Service
Every six months or after 1000 operating hours	High pressure pump	Change the oil according to section 8.3.2.	Skilled worker (with access to cabinet interior)
	Visual inspection inside and outside the system cabinet.	Clean contaminated units or areas.	Skilled worker (with access to cabinet interior)
	Function test	Check of the individual operating functions.	Skilled worker (with access to cabinet interior)
	Visual inspection of the HP-Hoses inside the system cabinet.	Visual inspection for damage, leaks or wear, replace HP-Hoses if necessary.	Customer Service
Annually	Safety check for the entire system.	Carry out a safety check in accordance with the respective national regulations of the legislator for liquid sprayers.	Qualified expert

Tab. 8 - 1 List of periodical maintenance work

8.3.1 Frost protection



General Information

For locations of Stationary Hotwater High Pressure Cleaners with environmental conditions below freezing point, EHRLE offers detailed advice.

For optimum protection, store the high pressure cleaner in a frost-protected area.

If the systems are exposed to temperatures below freezing point during decommissioning for a longer period of time (e.g. temporary storage in a warehouse), frost protection must be provided.

8.3.2 Oil change

Use the following type of oil to change the oil in the gear unit of the high pressure pump:

- Engine oil SAE 10W40.

To change the oil in the gearbox of the high pressure pump, proceed as follows:

- ▶ Remove the oil dipstick.
- ▶ Extract the oil (observe environmental protection when handling waste oil).
- ▶ Fill oil up to the „MAX“ mark on the oil dipstick.

9 Troubleshooting



WARNING

Carry out troubleshooting and rectification properly.

Troubleshooting of the system may only be carried out by qualified, trained and authorised personnel.

Before troubleshooting inside the cabinet, take the system out of operation and switch off the supply voltage from the building power supply (eg. circuit breaker).



General Information

For the Stationary Coldwater High Pressure Cleaners Series KSM/KSM-INOX, the washbay equipment is not included in the scope of delivery from Ehrle.

For troubleshooting procedure the instructions and safety regulations in the manufacturer's installation and operating instructions of the washbay equipment must be observed.

9.1 Troubleshooting table

For troubleshooting purposes, possible error causes are listed in the following table.

Clean the contaminated parts (filter, HP-Nozzle, etc.) to eliminate possible faults. Replace defective parts.

Error	Possible cause	Remedying	Authorised personnel
System cannot be switched on	Building supply circuit breaker has tripped.	Switch the circuit breaker on again.	Trained operator
	Check if power supply cable is defective.	Replace defective power supply cable.	Customer Service/ Electrical Specialist
	Circuit breaker trips again after repeated switching on.	If building power supply is OK, system defective; switch off the supply voltage from the building power supply (eg. circuit breaker).	Customer Service

Tab. 9 - 1 Troubleshooting table

Error	Possible cause	Remedying	Authorised personnel
System cannot be switched on (continued)	Water level in the water tank is too low.	Locate the cause of the low water level (water inlet blocked, too low or too low due to contamination, dirty filter in the water inlet, dirty filter etc.).	Skilled worker (with access to cabinet interior) / Customer Service.
	Motor of high pressure cleaner overheated.	Allow motor to cool down, set On/Off Rotary Switch to off; after motor cooling set switch to on.	Skilled worker (with access to cabinet interior).
	Circuit breaker has tripped or is defective, or fuse is defective	Set the On/Off Rotary Switch to off; switch off the supply voltage to the system via circuit breaker in the building control box. Open the electrical control box and check whether circuit breakers have tripped or are defective, if necessary, check whether fuses are defective (see also the associated circuit diagram in the appendix).	Skilled worker (with access to cabinet interior) / Customer Service.
	System control circuits or components defective.	Replace defective components.	Customer Service
System has switched off in Stand-By mode	Electronic control has switched off high pressure cleaner according to program.	Call up Stand-By mode on the Touchscreen. If the system switches off several times in Stand-By mode or no longer resumes Stand-By mode, inform Customer Service.	Skilled worker (with access to cabinet interior) / Customer Service.
No pressure build-up with high pressure cleaners	HP-Nozzle dirty or defective.	Refer to manufacturer's operating instructions of the washbay equipment.	-
	Filter in water inlet dirty.	Clean the filter.	Skilled worker (with access to cabinet interior).
	Water inflow volume is too low.	Ensure sufficient water inflow volume.	Skilled worker (with access to cabinet interior).
	One or more supply lines of the pump are clogged.	Remove the blockage in the supply line.	Skilled worker (with access to cabinet interior).

Tab. 9 - 1 Troubleshooting table



Error	Possible cause	Remedying	Authorised personnel
No pressure build-up with high pressure cleaners (continued)	One or more supply lines of the pump are leaking.	Replace leaking supply lines.	Customer Service
	Unloader valve is contaminated.	Clean the unloader valve.	Customer Service
	Unloader valve is defective.	Replace defective unloader valve.	Customer Service
	High pressure pump valves are dirty or defective.	Clean or replace valves.	Customer Service
	Cuffs of the high pressure pump are dirty or defective.	Clean or replace cuffs.	Customer Service

Tab. 9 - 1 Troubleshooting table

9.2 Replacement of components and parts

Replace the defective components and parts.
Only use spare parts recommended and approved by the manufacturer.



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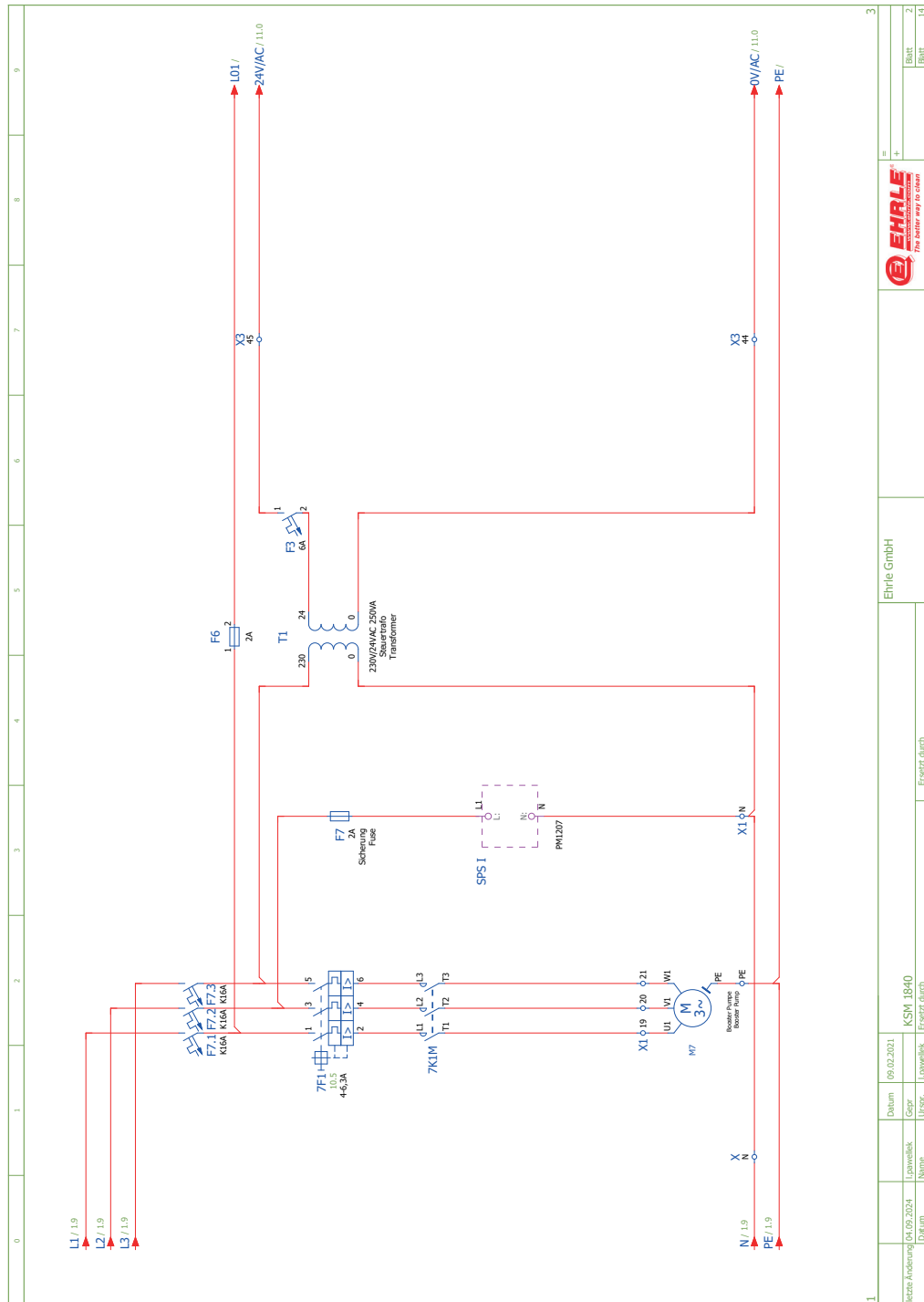


Fig. 10 - 3 KSM1840/KSM1840-INOX, Circuit diagram (Page 3 of 14)

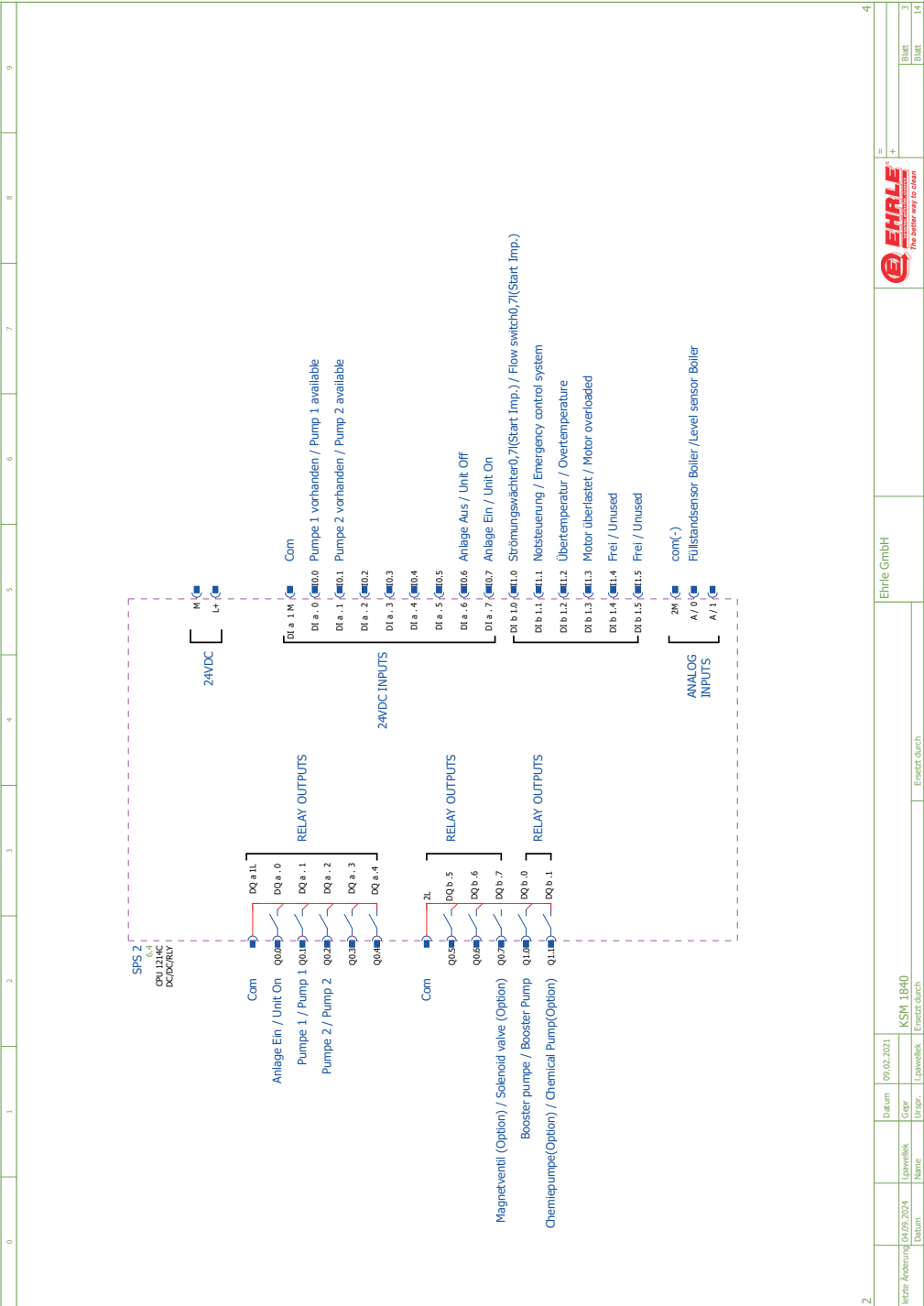


Fig. 10 - 4 KSM1840/KSM1840-INOX, Circuit diagram (Page 4 of 14))

[illegible]

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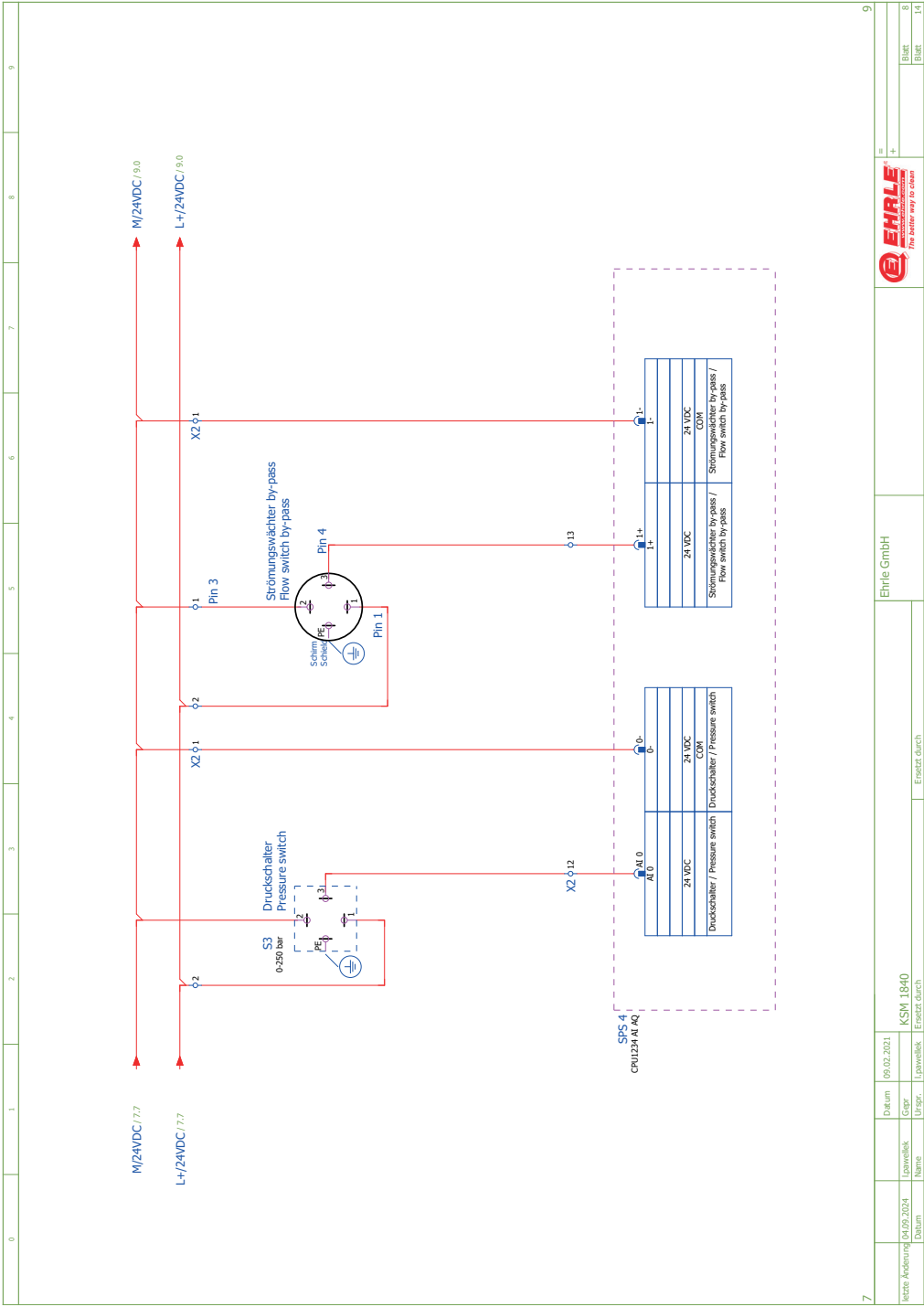


Fig. 10 - 9 KSM1840/KSM1840-INOX, Circuit diagram (Page 9 of 14)

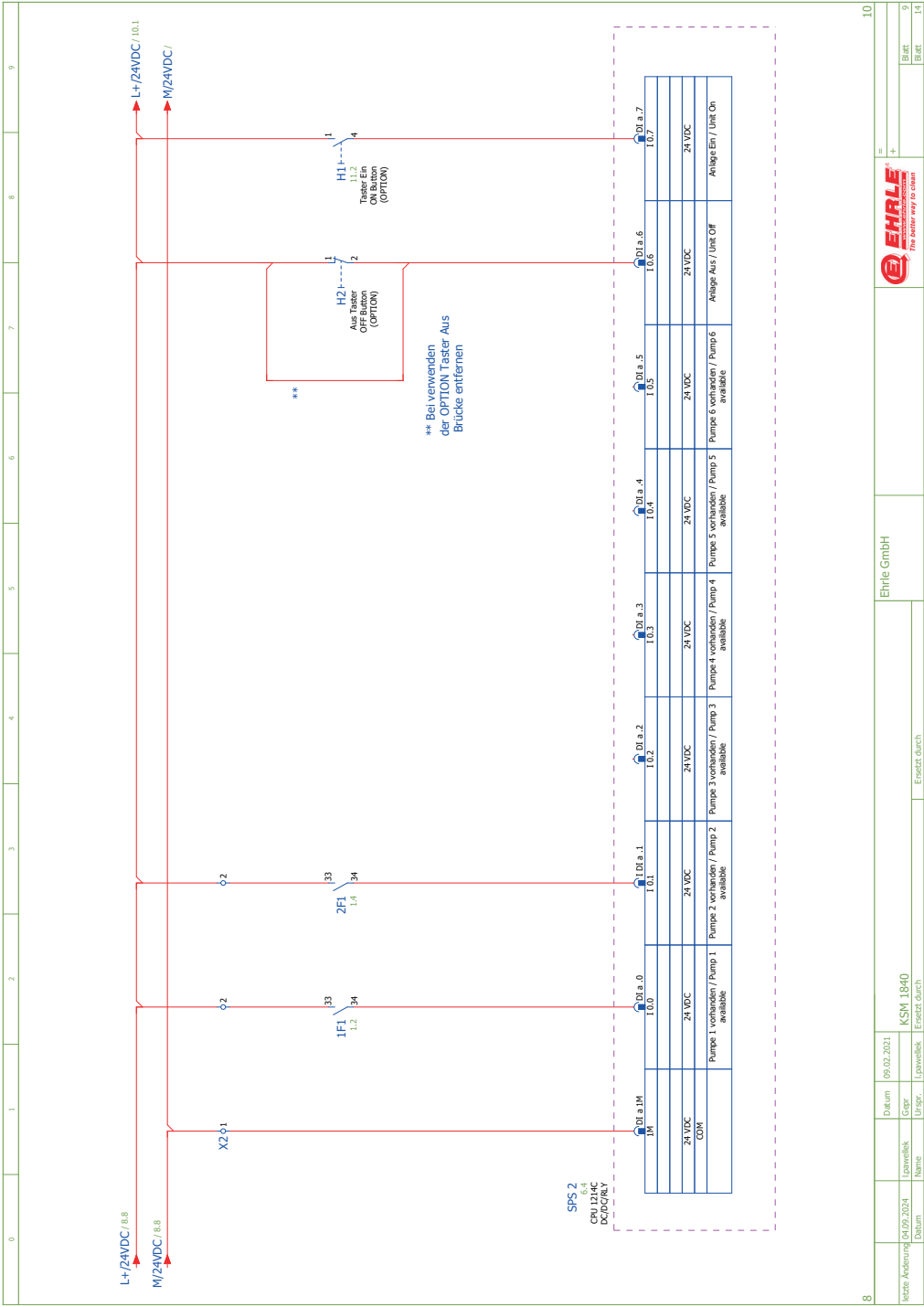


Fig. 10 - 10 KSM1840/KSM1840-INOX, Circuit diagram (Page 10 of 14)

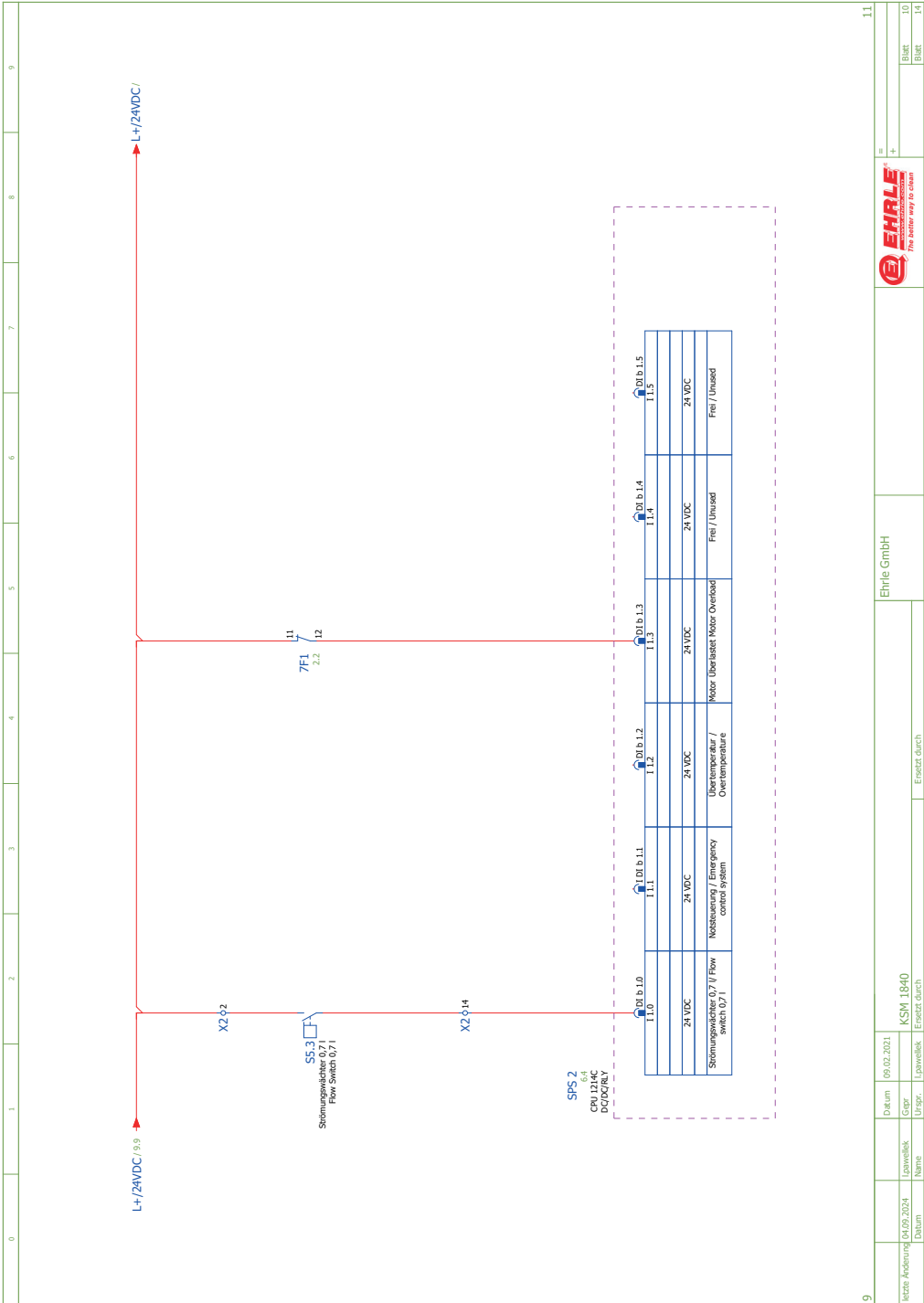


Fig. 10 - 11 KSM1840/KSM1840-INOX, Circuit diagram (Page 11 of 14)



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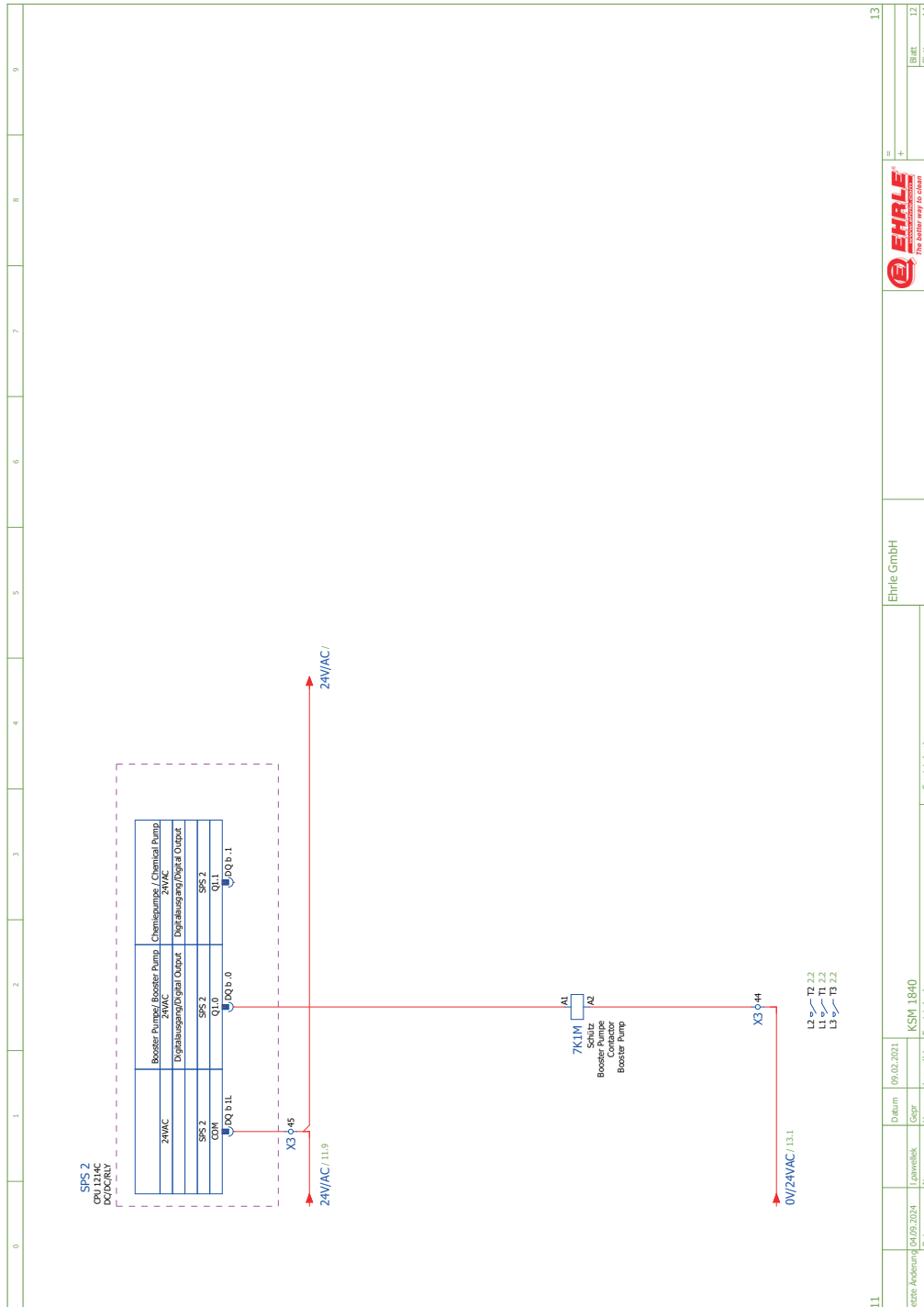


Fig. 10 - 13 KSM1840/KSM1840-INOX, Circuit diagram (Page 13 of 14)



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10.2 Series KSM2740/KSM2740-INOX

F26_001



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Projektbeschreibung
Zeichnungsnummer

KSM 2740

Hersteller (Firma)

Ehrle GmbH
Industriestraße 3
89165 Dietenheim

Projektname
Fabrikat
Typ

KSM 2740

Erstellt am
Bearbeitet am

18.10.2013
04.09.2024

Anzahl der Seiten

Werte Änderung	Datum	03.05.2016	Gezeichnet	Unger	Datum	18.10.2013	Gepr.	Unger	Revisiell	L	Erstellt durch	KSM 2740	Ehrle Reinigungstechnik GmbH	+	=	Blatt	0	Blatt	15
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Fig. 10 - 15 KSM2740/KSM2740-INOX, Circuit diagram (Page 1 of 15)

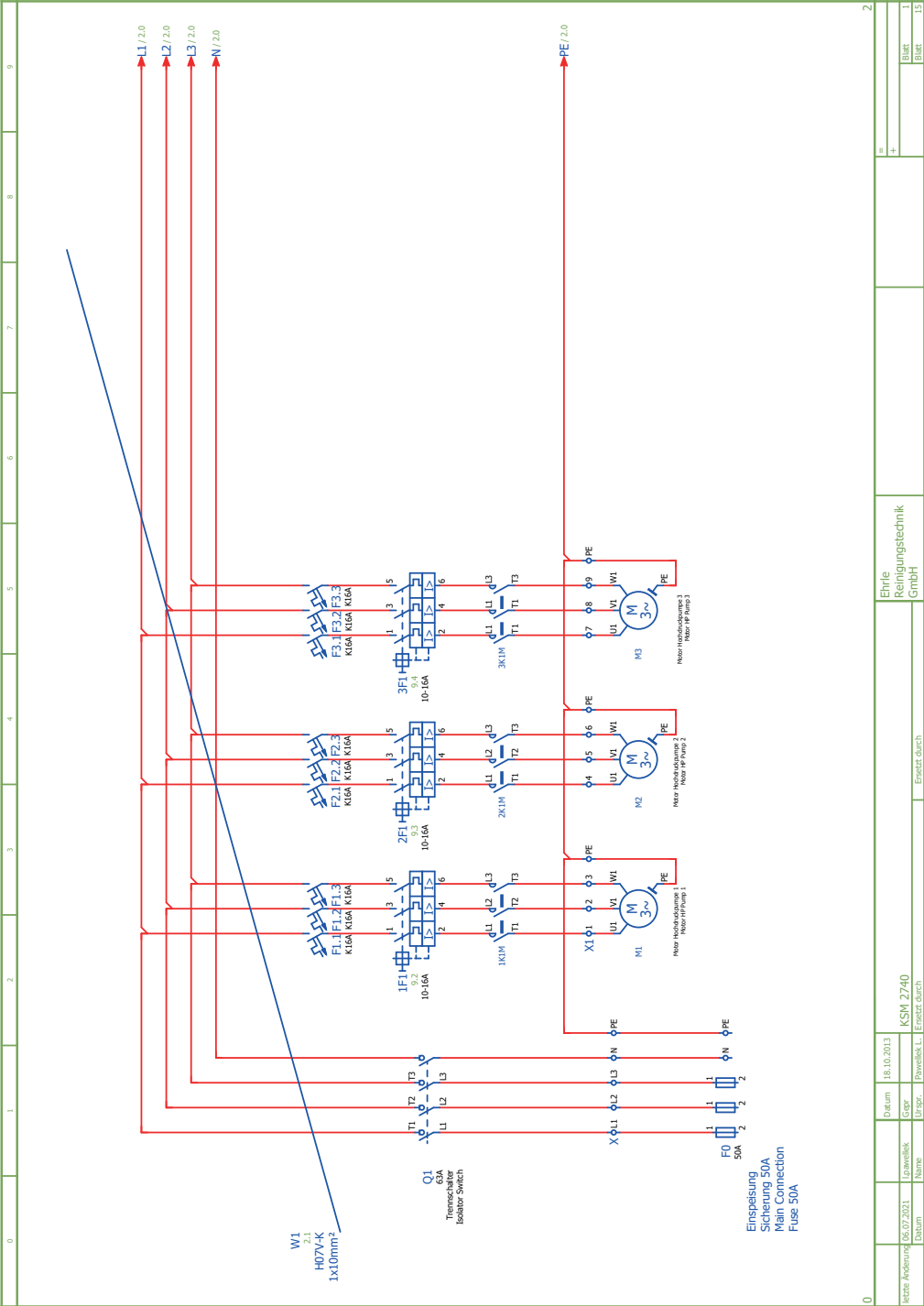


Fig. 10 - 16 KSM2740/KSM2740-INOX, Circuit diagram (Page 2 of 15)

[illegible]

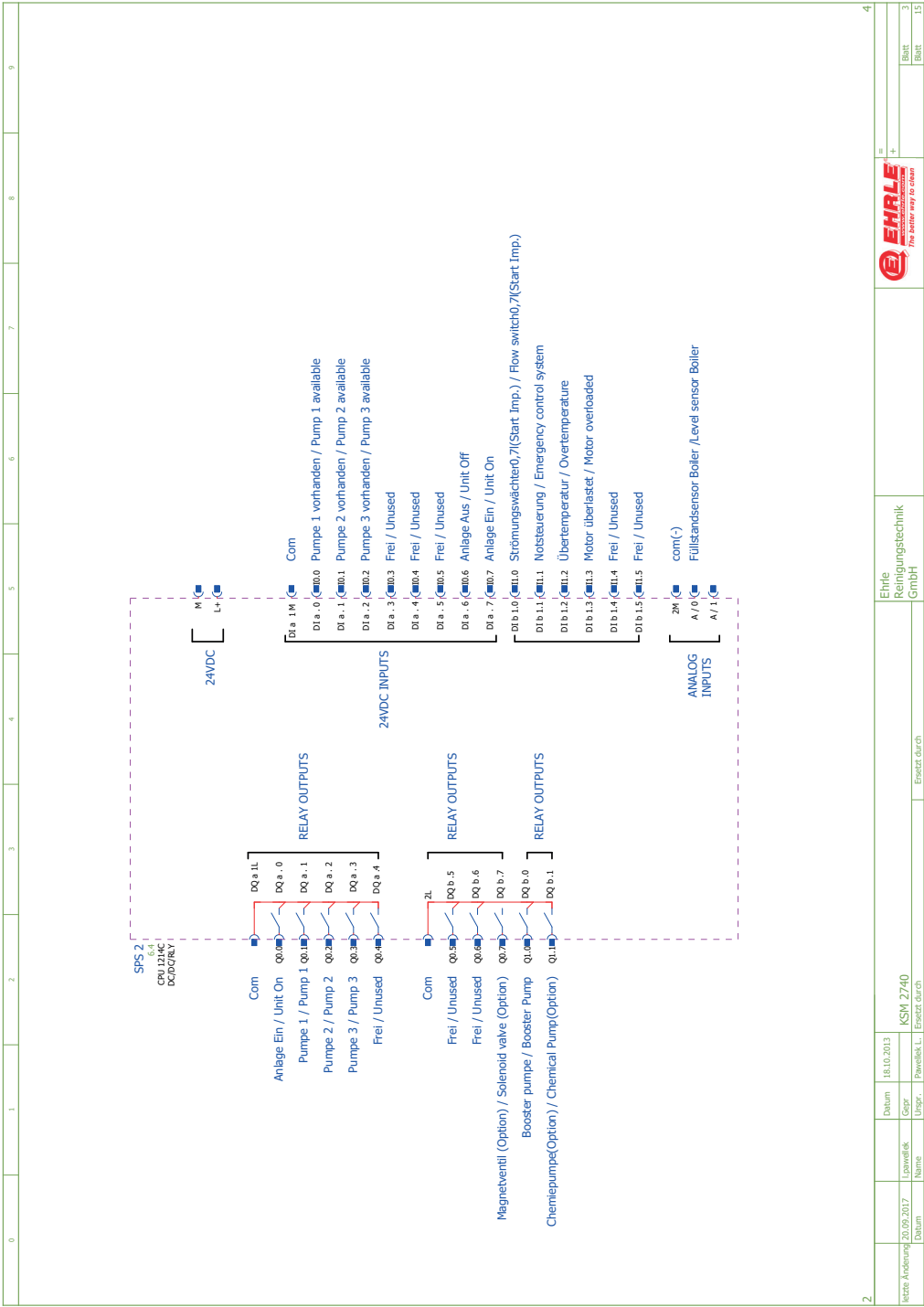


Fig. 10 - 18 KSM2740/KSM2740-INOX, Circuit diagram (Page 4 of 15)

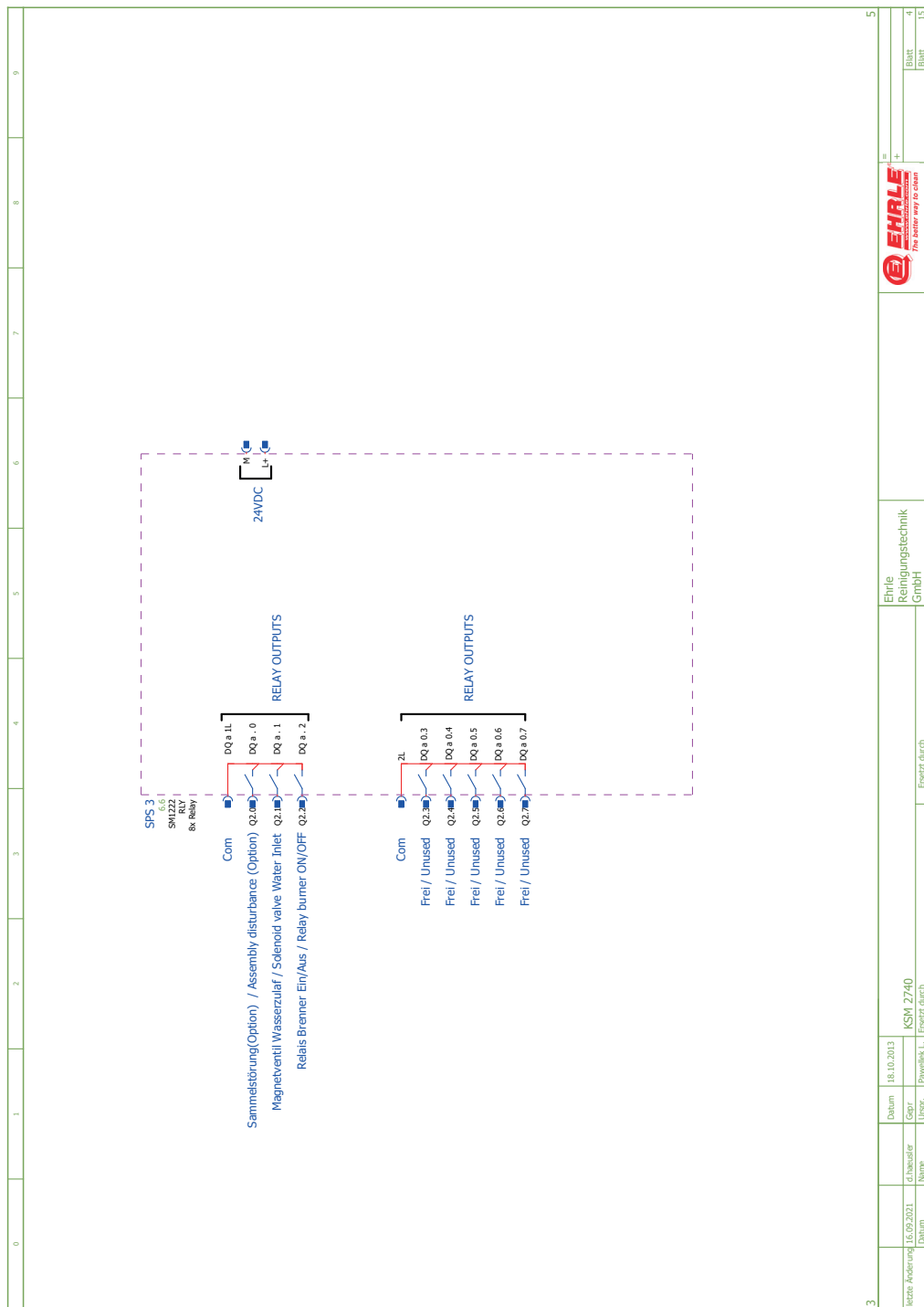


Fig. 10 - 19 KSM2740/KSM2740-INOX, Circuit diagram (Page 5 of 15)

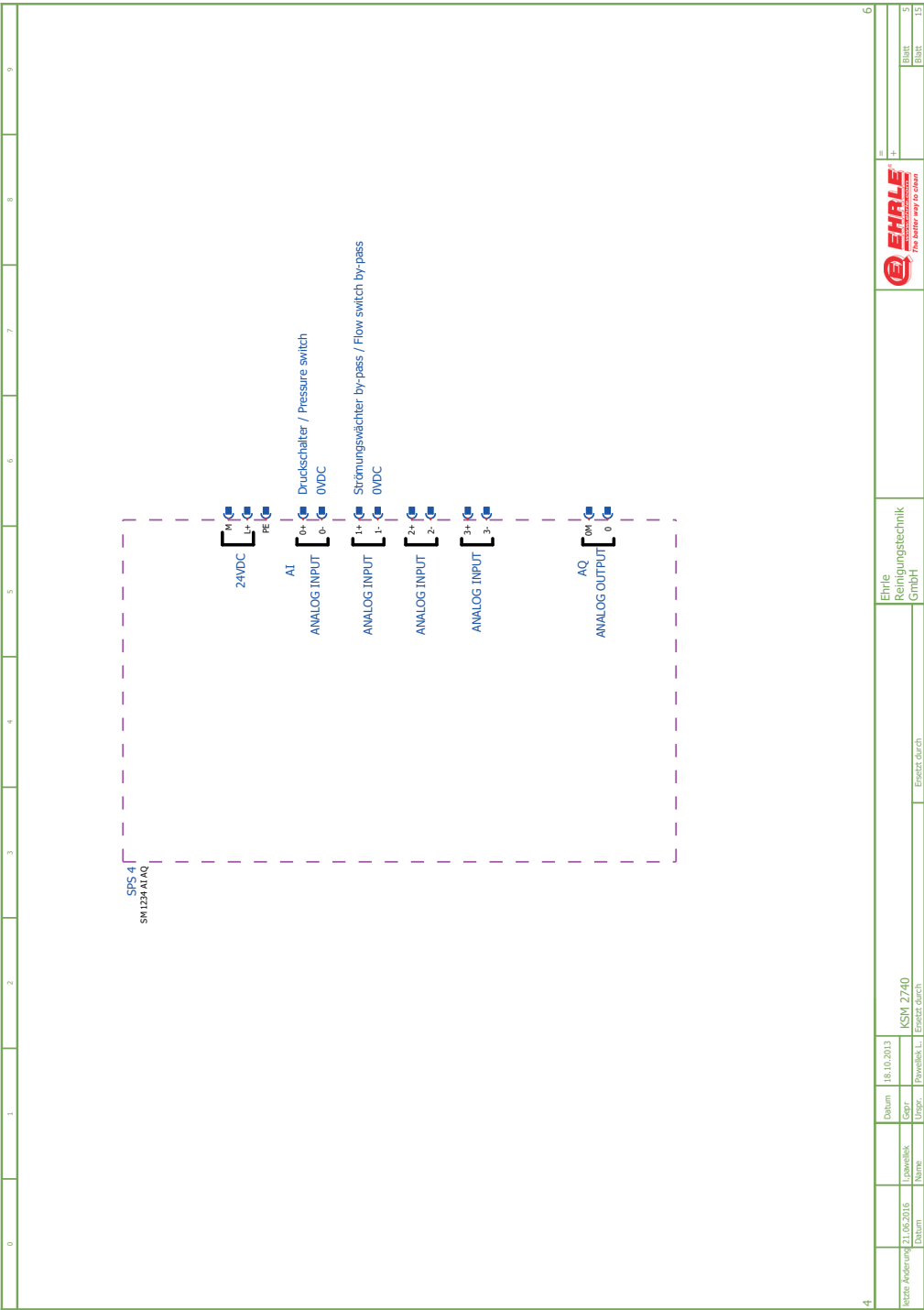


Fig. 10 - 20 KSM2740/KSM2740-INOX, Circuit diagram (Page 6 of 15)

[illegible]

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Diagram illustrating the electrical wiring for the SPS 4 CPU1234 AI AQ, showing connections to various sensors and power sources.

Power Sources:

- M/24VDC / 7.7
- L+/24VDC / 7.7
- M/24VDC / 9.0
- L+/24VDC / 9.0

Connections:

- Druckschalter (Pressure switch) S3 0-250 bar:** Connected to M/24VDC / 7.7 (Pin 2) and L+/24VDC / 7.7 (Pin 2). The switch output (Pin 3) is connected to the CPU1234 AI AQ (Pin 12).
- Strömungswächter (Flow switch) by-pass:** Connected to M/24VDC / 9.0 (Pin 1) and L+/24VDC / 9.0 (Pin 1). The switch output (Pin 2) is connected to the CPU1234 AI AQ (Pin 13).

Terminal Blocks:

- AI 0:** Connected to M/24VDC / 7.7 (Pin 2) and L+/24VDC / 7.7 (Pin 2). The output (Pin 12) is connected to the CPU1234 AI AQ (Pin 12).
- 0-:** Connected to M/24VDC / 9.0 (Pin 1) and L+/24VDC / 9.0 (Pin 1). The output (Pin 13) is connected to the CPU1234 AI AQ (Pin 13).

Legend:

Symbol	Description
AI 0	Druckschalter / Pressure switch
0-	Druckschalter / Pressure switch
1+	Strömungswächter by-pass / Flow switch by-pass
1-	Strömungswächter by-pass / Flow switch by-pass

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Electrical Wiring Diagram

Main Supply: L+/24VDC (9.3)

Branches:

- Branch 1:** X2 6.2 → S5.3 → Stromschalter 0.71 / Flow Switch 0.71
- Branch 2:** X2 6.14 → Terminal Block (1.0 to 1.14)
- Branch 3:** Central Junction (7Fe 1.1, 2.2, 3.2)

Terminal Block Connections:

Terminal	Component	Rating	Function
1.0	1.10	24 VDC	Stromschalter 0.71 / Flow switch 0.7.1
1.1	1.11	24 VDC	Motor warning / Emergency control of system
1.2	1.12	24 VDC	Über Temperatur / Overtemperature
1.3	1.13	24 VDC	Motor überlastet Motor Overload
1.4	1.14	24 VDC	Frei / Unused
1.5	1.15	24 VDC	Frei / Unused

Other Labels:

- SIFS 2
- CPU 121HC
- DC/DC/RLY

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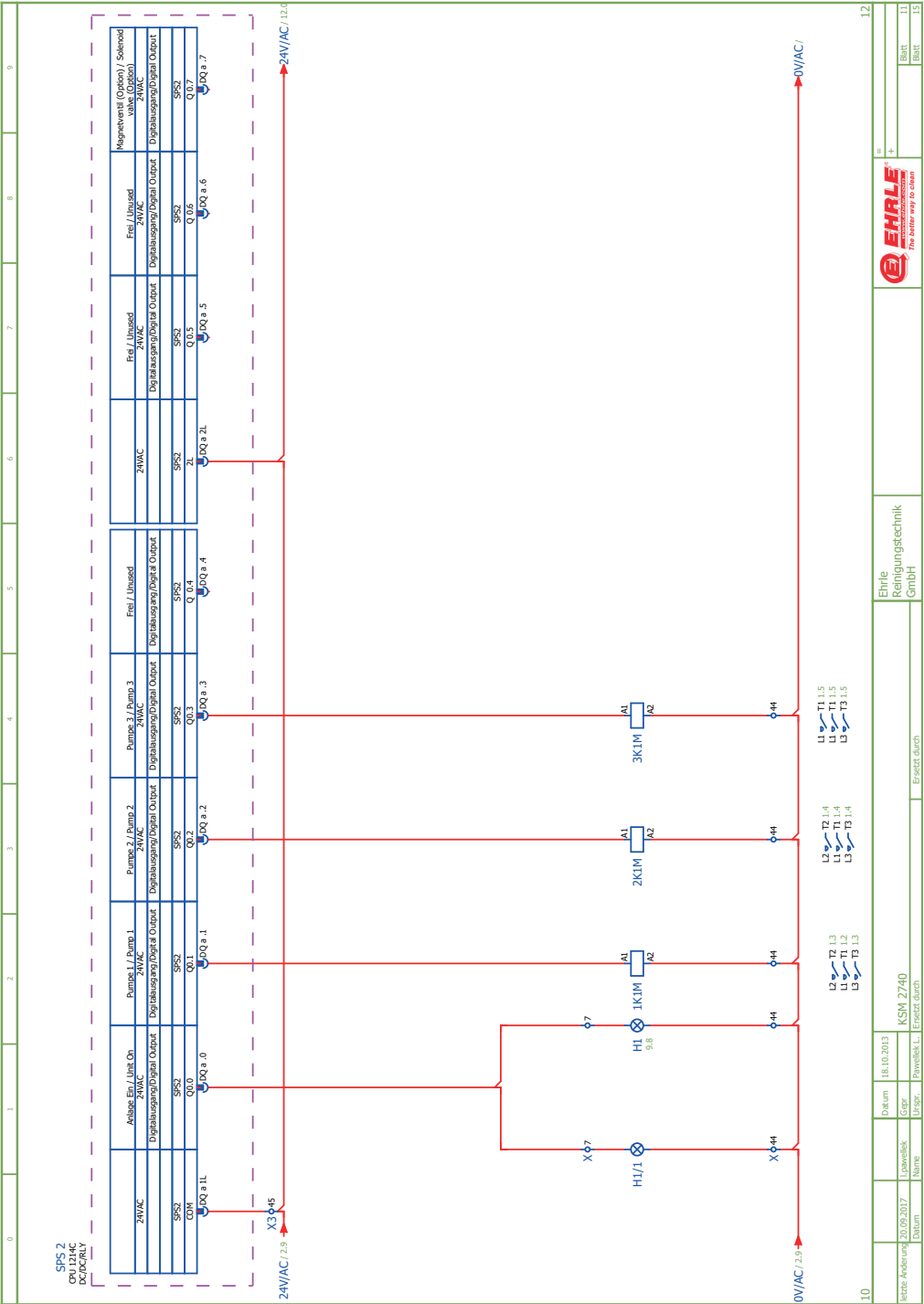


Fig. 10 - 26 KSM2740/KSM2740-INOX, Circuit diagram (Page 12 of 15)

SPS 2
CPU 1214C
DC/DC/RLY

24V AC	Booster Pump/ Booster Pump	Chemical Pump / Chemical Pump
Digital Output	Digital Output	Digital Output
SPS 2	SPS 2	SPS 2
0V	0V	0V
Q4 b 1L	Q4 b 0	Q4 b 1

7K1M
Contactor
Booster Pump
Booster Pump

24V/AC / 11.9
24V/AC /
0V/24V AC / 13.1

X3 945
X3 944
X3 943
X3 942
X3 941

12 2.2
13 2.2
14 2.2

Fig. 10 - 27 KSM2740/KSM2740-INOX, Circuit diagram (Page 13 of 15)



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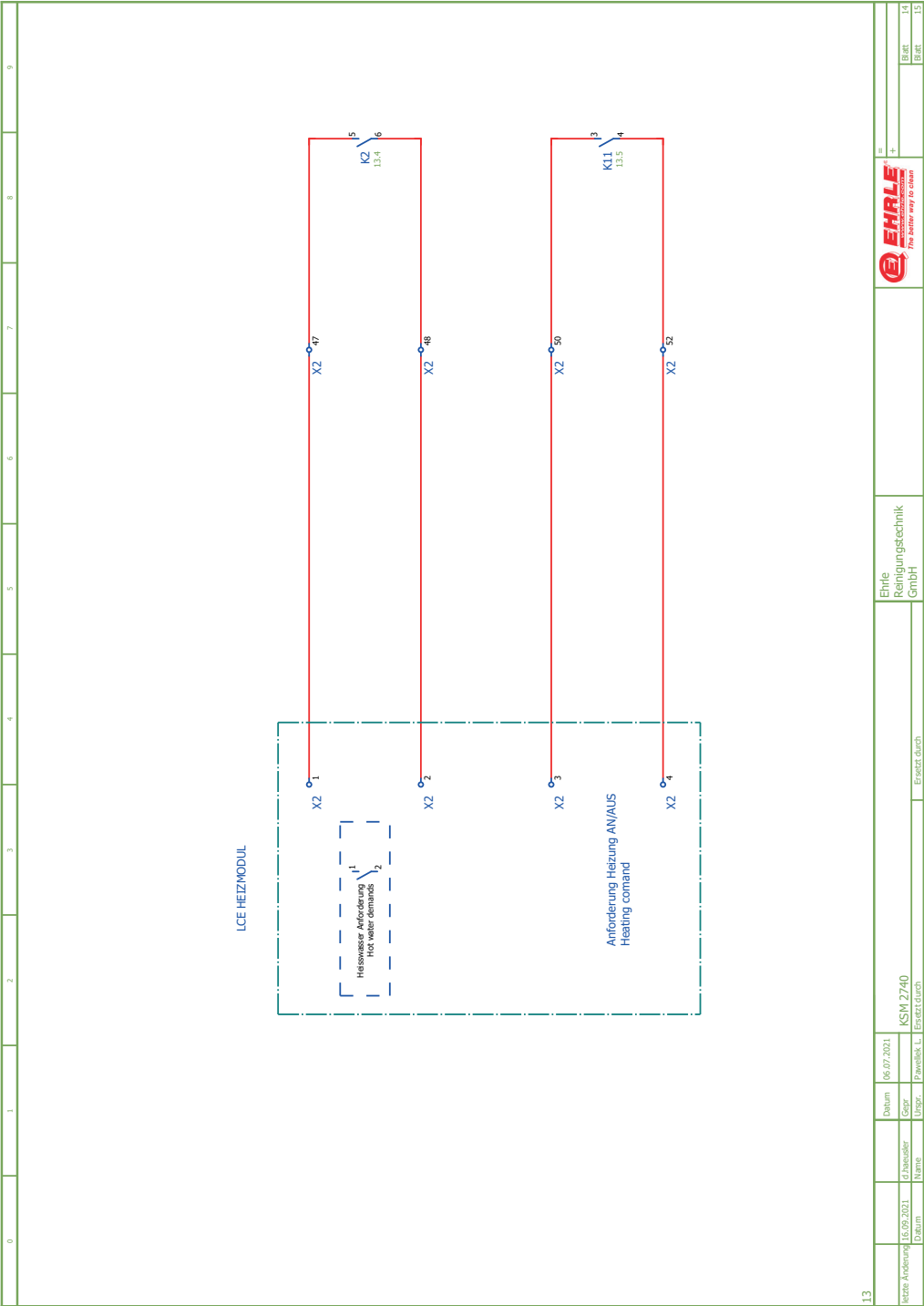


Fig. 10 - 29 KSM2740/KSM2740-INOX, Circuit diagram (Page 15 of 15)

10.3 Serie KSM3640/KSM3640-INOX

F26_001



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Projektbeschreibung
Zeichnungsnummer

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Hersteller (Firma)

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Industriestraße 3
89165 Dietenheim

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Erstellt am
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1

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Erstellt am
09.03.2018

Gepr.
09.03.2018

Datum
09.03.2018

Erstellt durch
Pawelok L.

Gepr.
Pawelok L.

Datum
09.03.2018

KSM 3640

Erstellt durch

Ehrle
Reinigungstechnik
GmbH

Erstellt durch

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Fig. 10 - 30 KSM3640/KSM3640-INOX, Circuit diagram (Page 1 of 14)

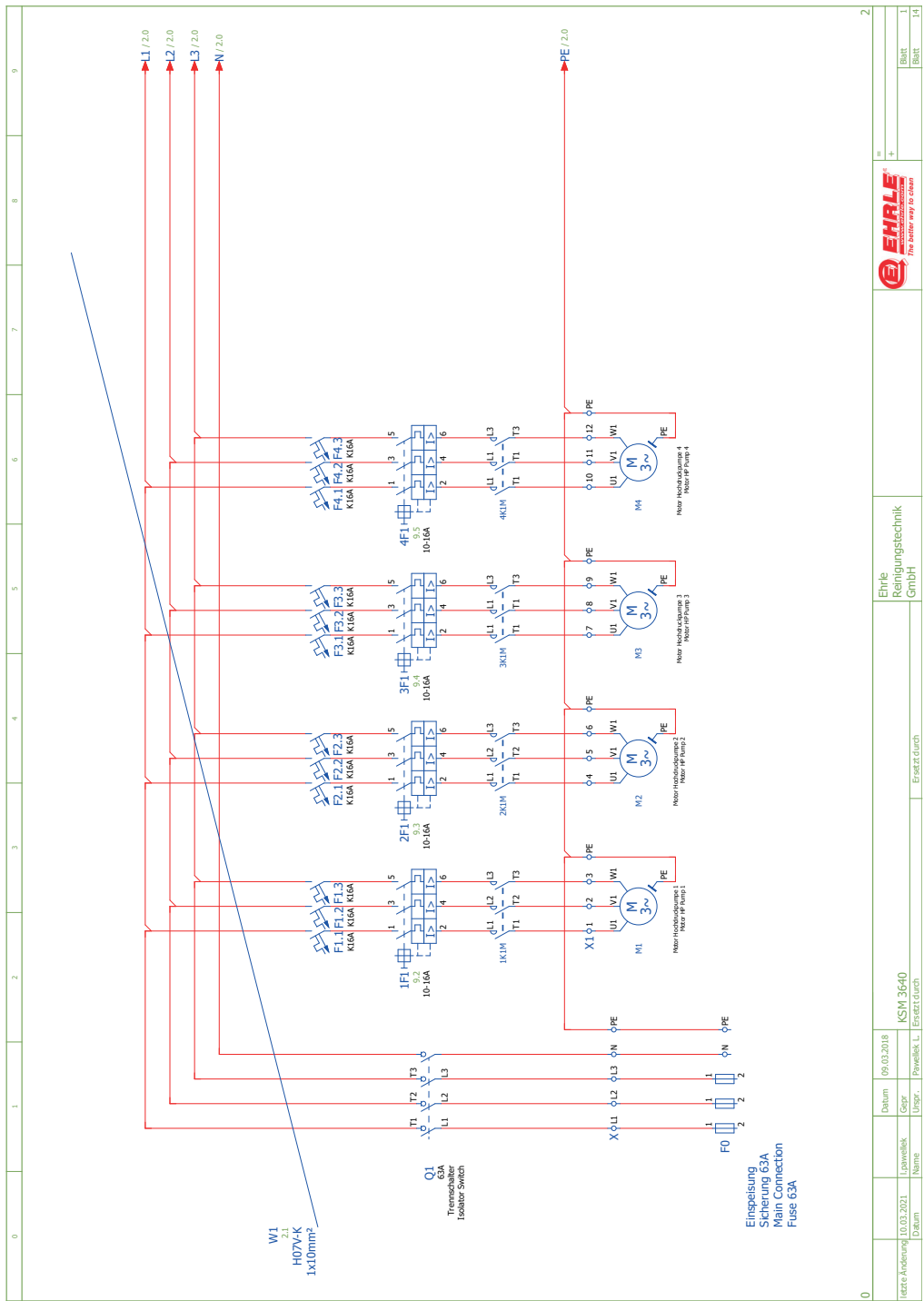


Fig. 10 - 31 KSM3640/KSM3640-INOX, Circuit diagram (Page 2 of 14)



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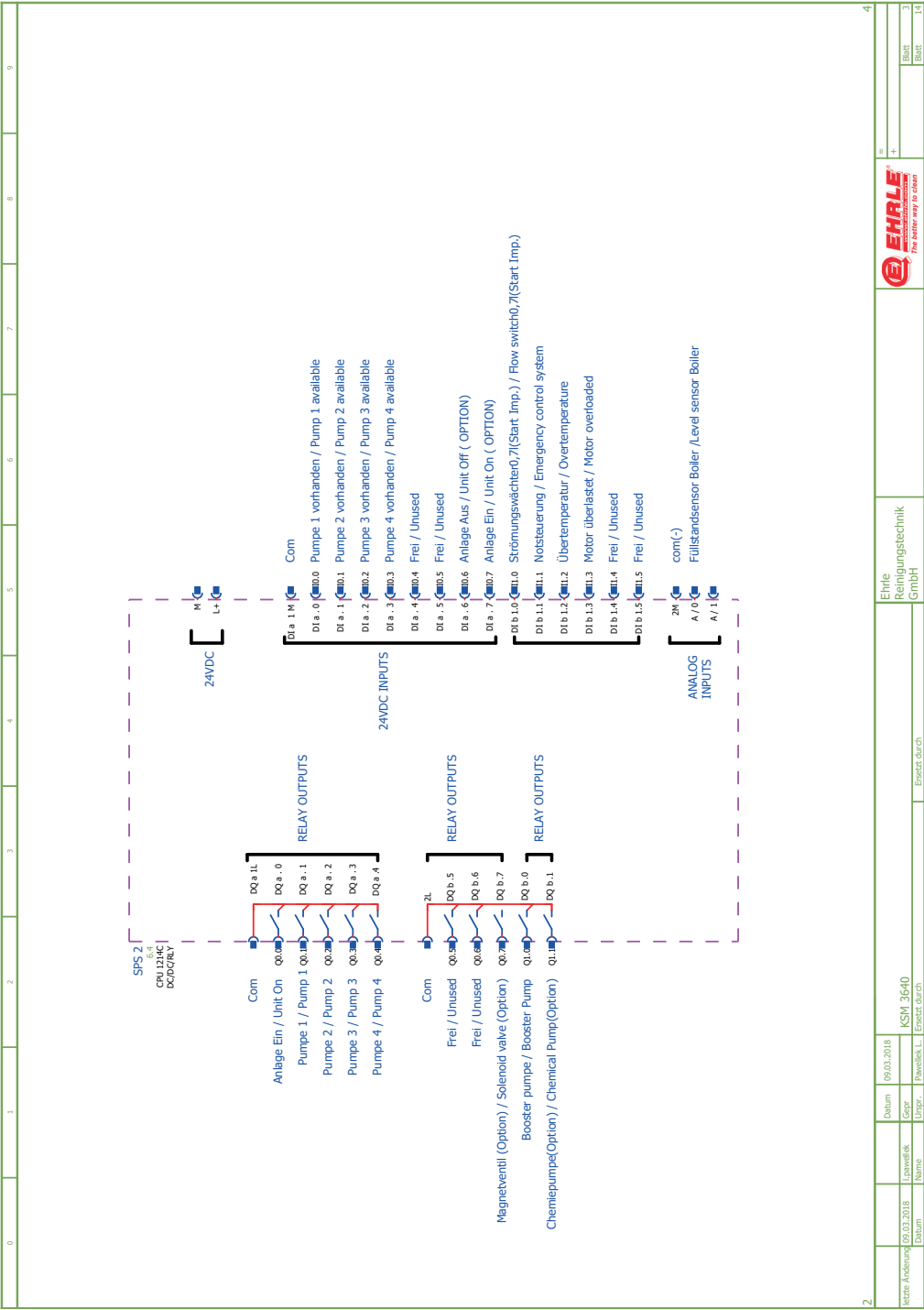


Fig. 10 - 33 KSM3640/KSM3640-INOX, Circuit diagram (Page 4 of 14)



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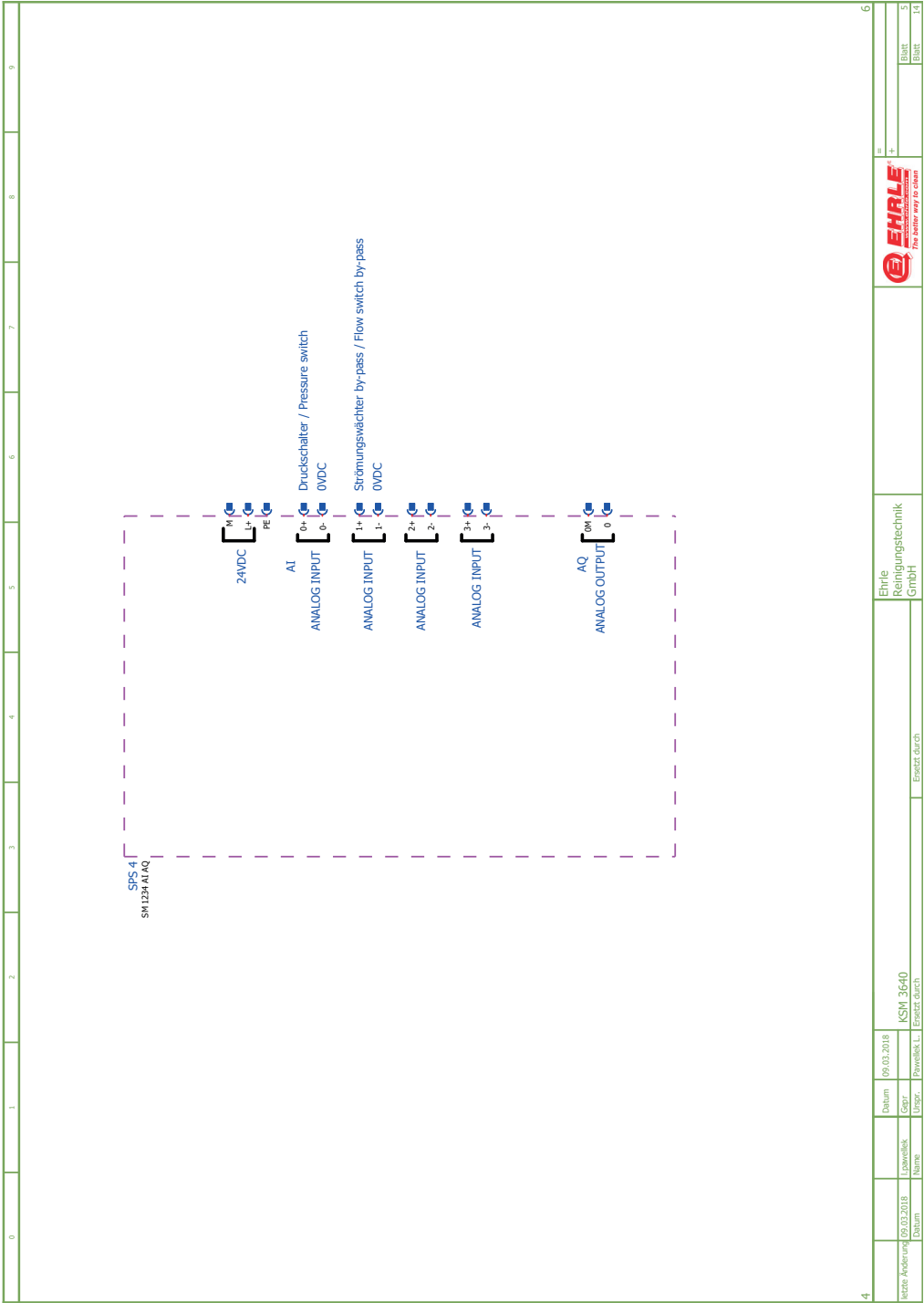


Fig. 10 - 35 KSM3640/KSM3640-INOX, Circuit diagram (Page 6 of 14)



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The diagram illustrates the electrical wiring for a boiler level sensor system. It includes a power supply section with M/24VDC and L+/24VDC lines. A pressure sensor S1 (0-20 mbar) is connected to a 'Füllstandsensor Boiler Level sensor Boiler' block. This block is connected to a 'SPS 2' (CPU 1214C-2 DC24V/0.5A) which has a terminal block with 24VDC, 0VDC, and SPS 1. The SPS 2 is connected to a 'Füllstandsensor Boiler Level sensor Boiler' block, which is connected to a 'Thermostat Warmwasser Boiler / Thermostat boiler' block. The thermostat block has terminals for 24VDC, 0VDC, and SPS 1. The diagram is labeled with various components and their connections.

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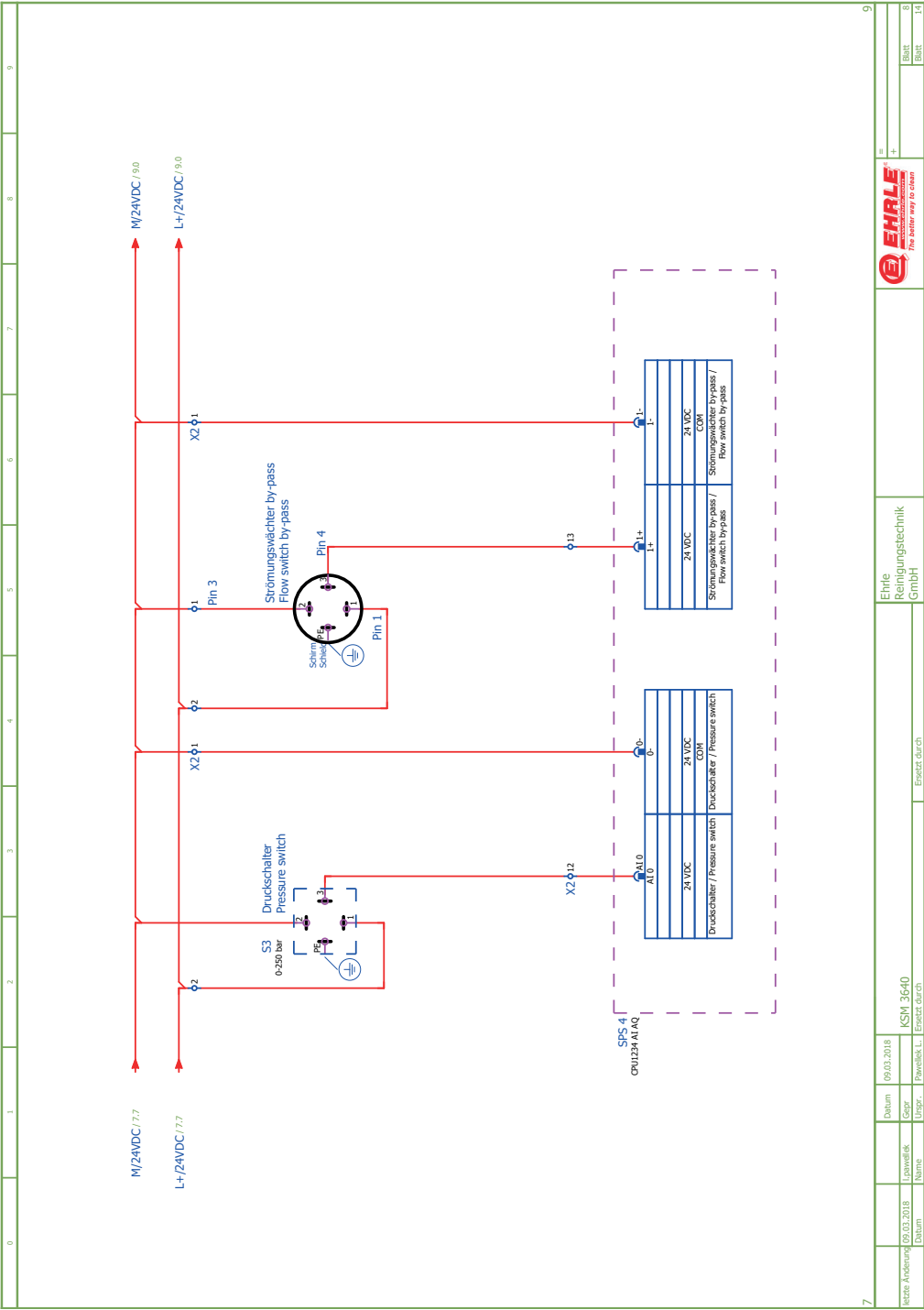


Fig. 10 - 38 KSM3640 / KSM3640-INOX, Circuit diagram (Page 9 of 14)

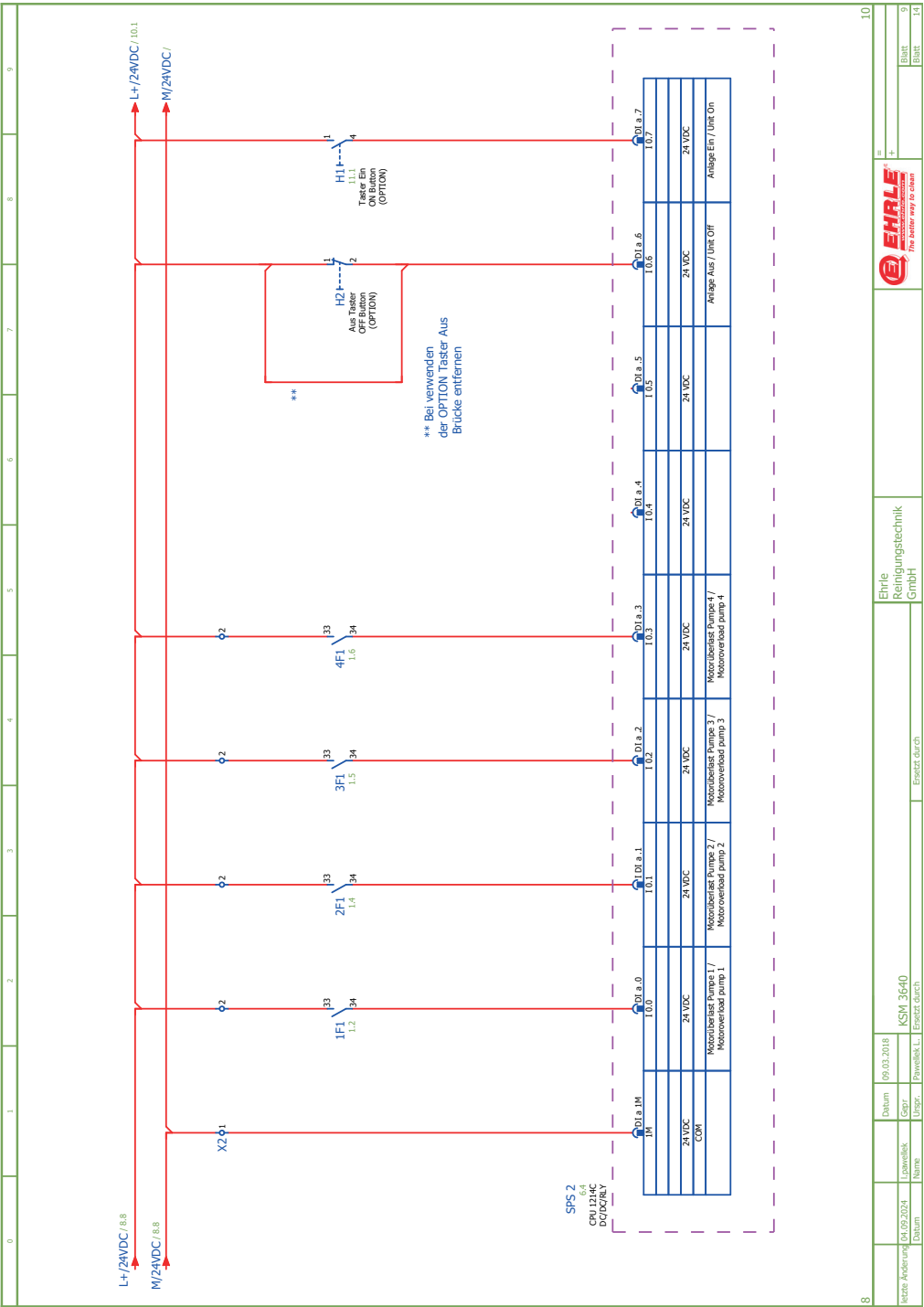


Fig. 10 - 39 KSM3640/KSM3640-INOX, Circuit diagram (Page 10 of 14)



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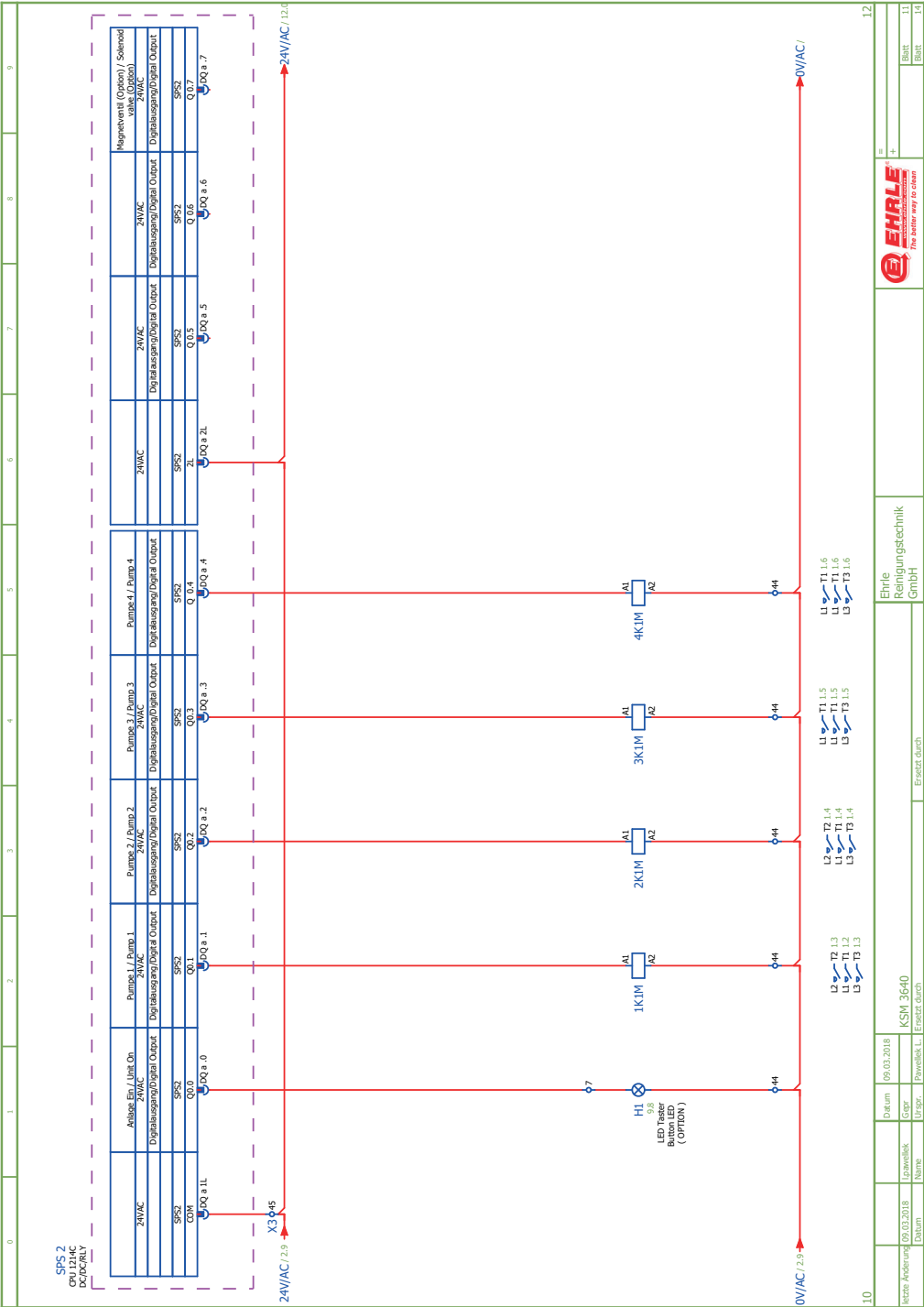


Fig. 10 - 41 KSM3640/KSM3640-INOX, Circuit diagram (Page 12 of 14)



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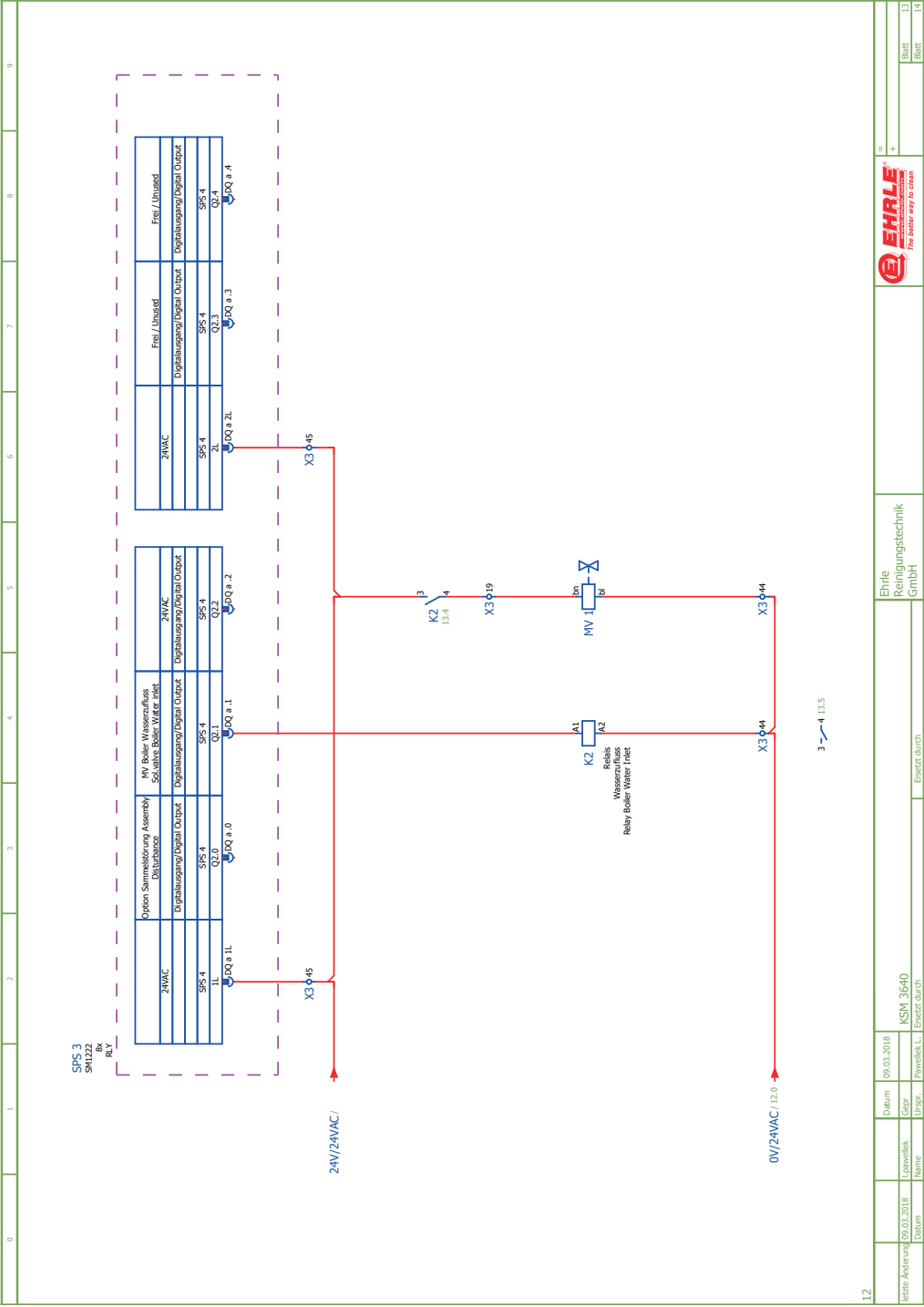


Fig. 10 - 43 KSM3640/KSM3640-INOX, Circuit diagram (Page 14 of 14)

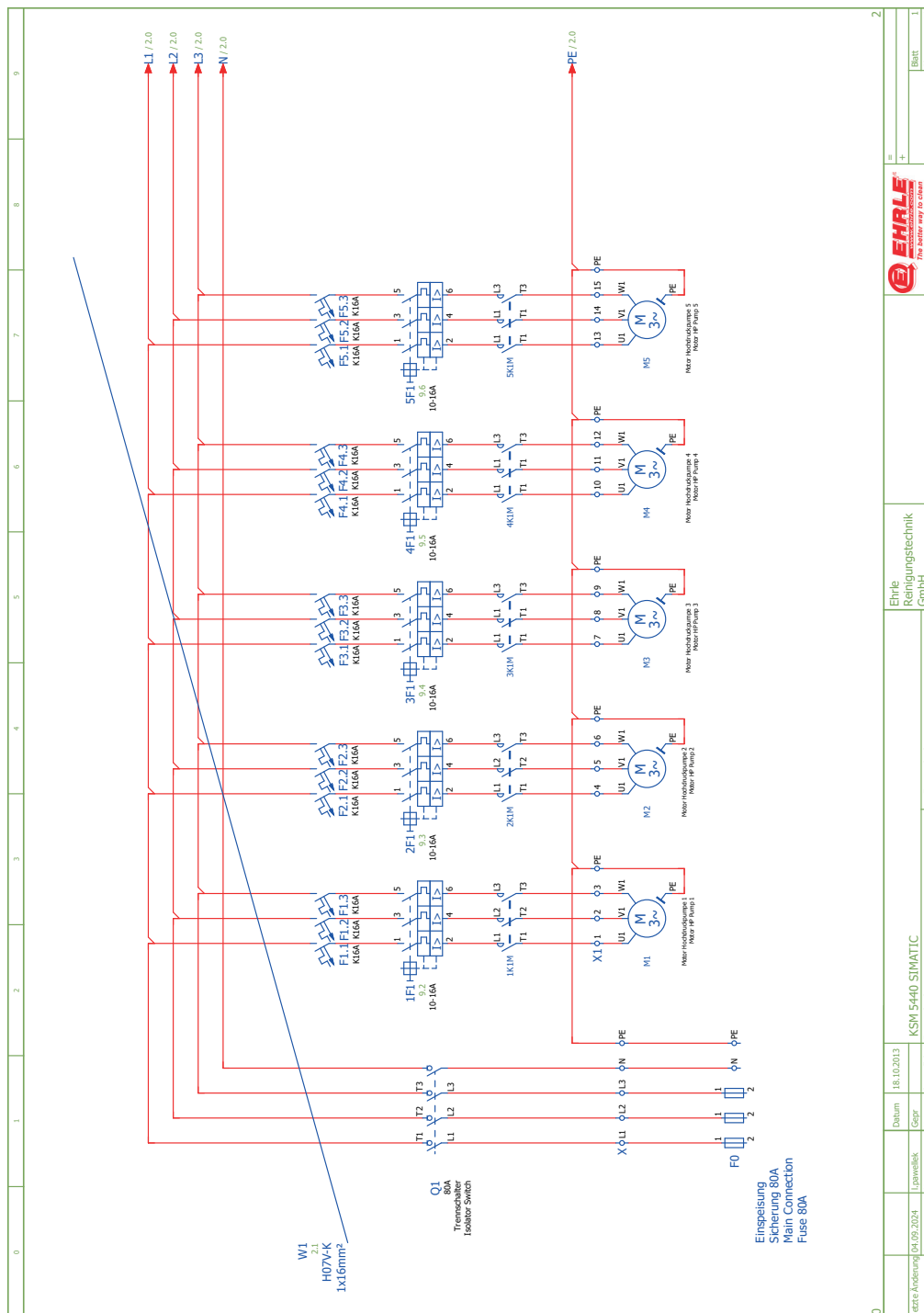


Fig. 10 - 45 KSM4540 / KSM4540-INOX, Circuit diagram (Page 2 of 14)

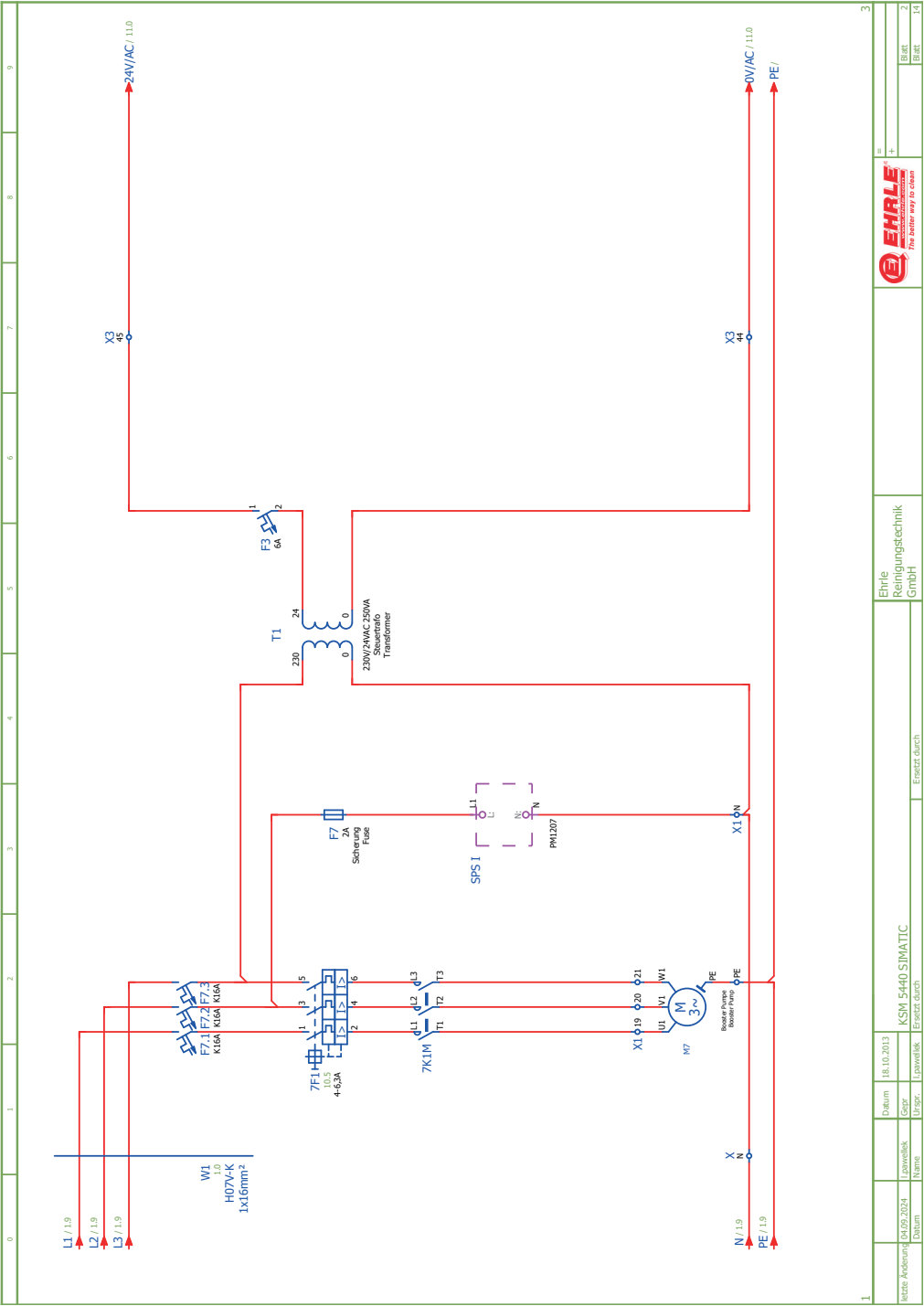


Fig. 10 - 46 KSM4540/KSM4540-INOX, Circuit diagram (Page 3 of 14)

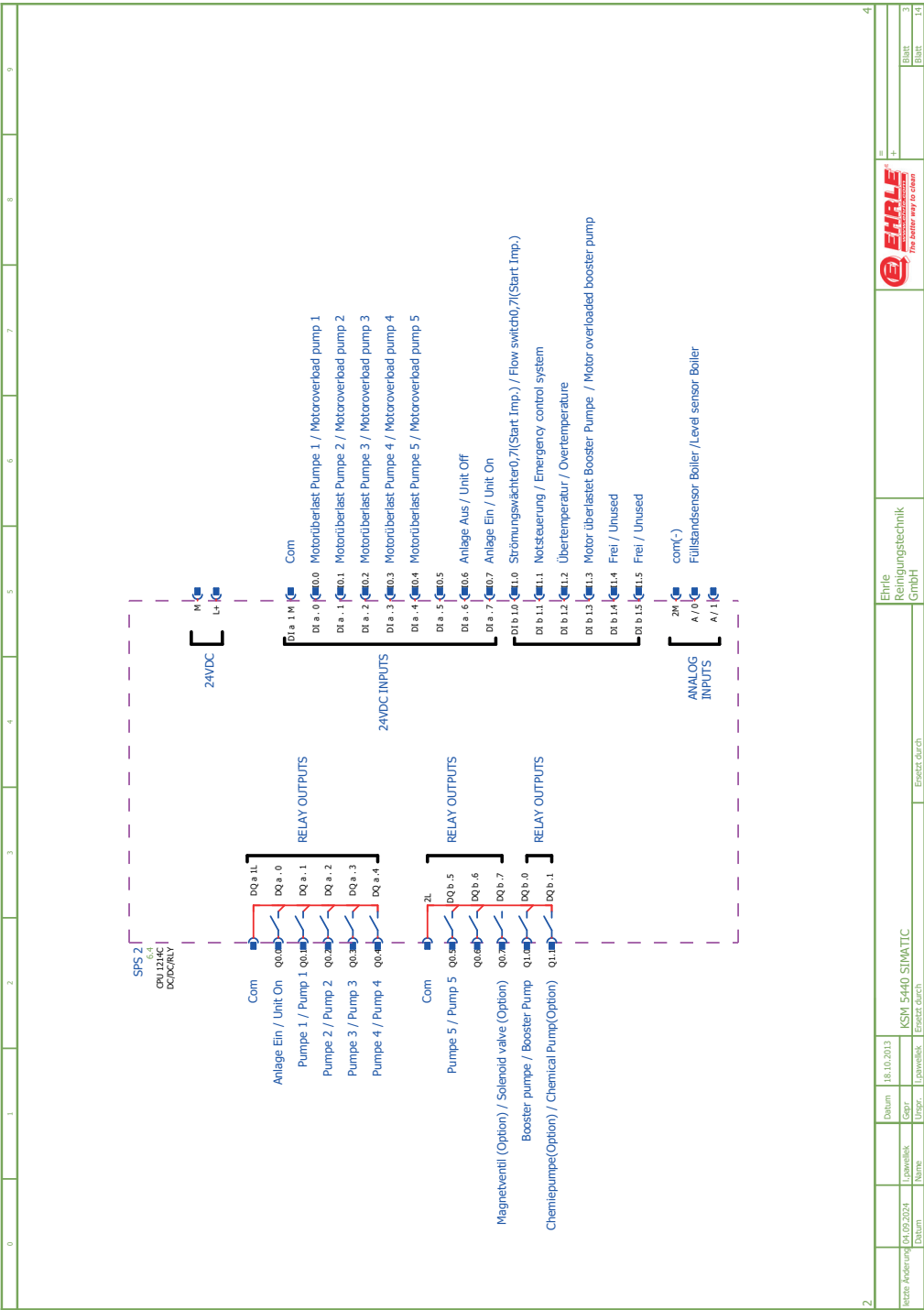


Fig. 10 - 47 KSM4540/KSM4540-INOX, Circuit diagram (Page 4 of 14)



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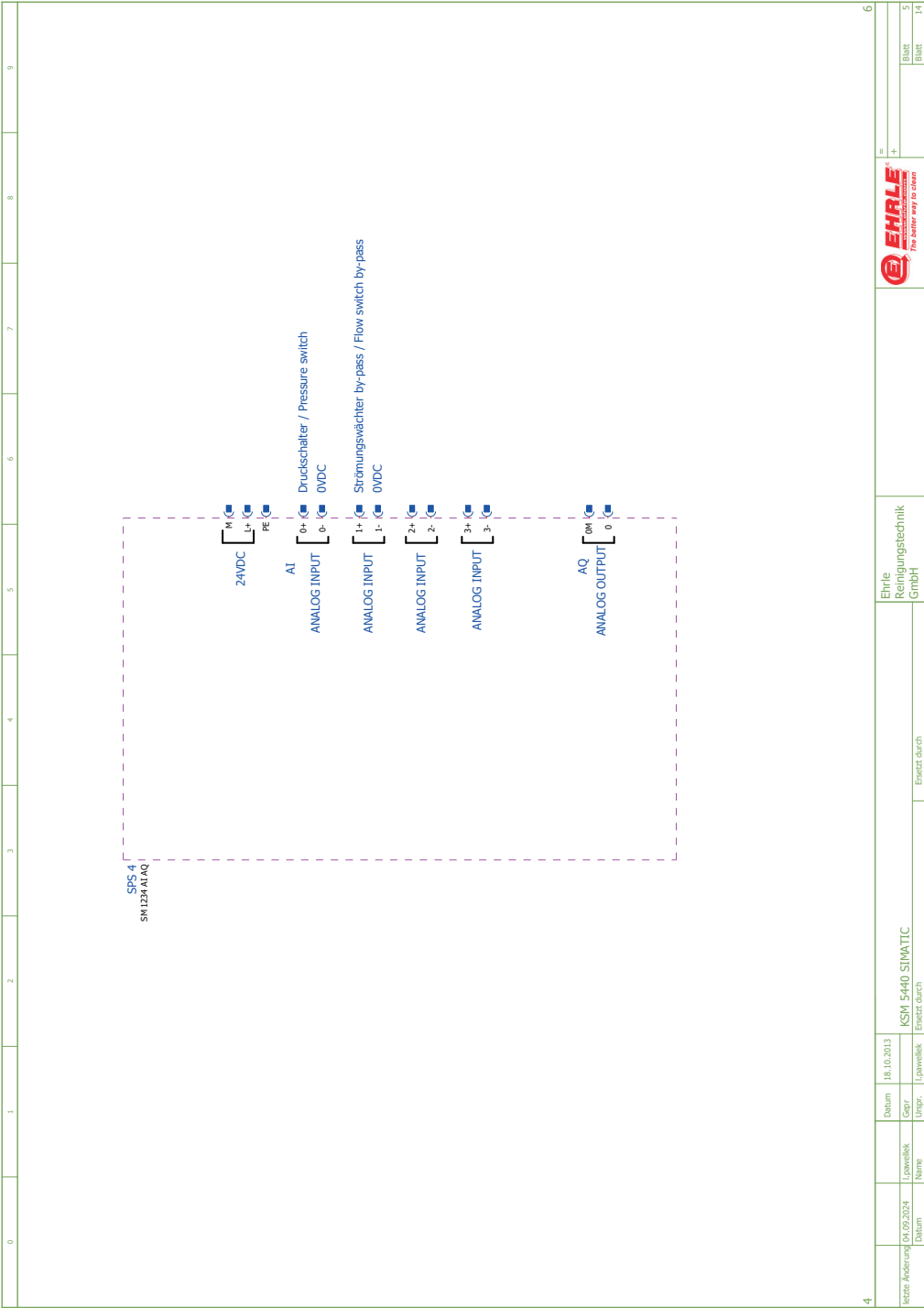


Fig. 10 - 49 KSM4540/KSM4540-INOX, Circuit diagram (Page 6 of 14)



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The diagram illustrates the electrical connections for a Siemens SPS 2 PLC system. It includes a power supply section with M/24VDC and L+/24VDC lines. A pressure sensor S1 (0-20 mbar) is connected to the PLC. The PLC is a Siemens SPS 2 CPU 1214C-2 DC/DC/RLY. The PLC has two 24VDC COM outputs: SPS 1 (Füllstandsensor Boiler Level sensor Boiler) and SPS 2 (Thermostat Warmwasser Boiler / Thermostat boiler). The SPS 1 output is connected to a 24VDC supply and a 24VDC COM output. The SPS 2 output is connected to a 24VDC supply and a 24VDC COM output. The diagram also shows a 24VDC supply and a 24VDC COM output.

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Diagram illustrating the wiring for the SPS 2 (CPU 1214C DC/DC/RLY) system, showing the connection of the power supply (L+/24VDC / 8.8, M/24VDC / 8.8) to the digital input modules (DI a.0 to DI a.7) and the digital output modules (DO a.0 to DO a.7).

The diagram shows the following connections:

- Power Supply:** L+/24VDC / 8.8 and M/24VDC / 8.8 are connected to the system.
- Digital Input Modules (DI a.0 to DI a.7):**
 - DI a.0: Motorüberlast Pumpe 1 / Motoroverload pump 1 (24 VDC COM)
 - DI a.1: Motorüberlast Pumpe 2 / Motoroverload pump 2 (24 VDC)
 - DI a.2: Motorüberlast Pumpe 3 / Motoroverload pump 3 (24 VDC)
 - DI a.3: Motorüberlast Pumpe 4 / Motoroverload pump 4 (24 VDC)
 - DI a.4: Motorüberlast Pumpe 5 / Motoroverload pump 5 (24 VDC)
 - DI a.5: (24 VDC)
 - DI a.6: (24 VDC)
 - DI a.7: (24 VDC)
- Digital Output Modules (DO a.0 to DO a.7):**
 - DO a.0: (24 VDC)
 - DO a.1: (24 VDC)
 - DO a.2: (24 VDC)
 - DO a.3: (24 VDC)
 - DO a.4: (24 VDC)
 - DO a.5: (24 VDC)
 - DO a.6: (24 VDC)
 - DO a.7: (24 VDC)
- Interfacing:**
 - DI a.0 to DI a.7 are connected to the digital input modules (DI a.0 to DI a.7).
 - DO a.0 to DO a.7 are connected to the digital output modules (DO a.0 to DO a.7).
 - DI a.0 to DI a.7 are connected to the digital input modules (DI a.0 to DI a.7).
 - DO a.0 to DO a.7 are connected to the digital output modules (DO a.0 to DO a.7).

Additional components and labels include:

- SPS 2:** CPU 1214C DC/DC/RLY
- DI a.0 to DI a.7:** Digital Input modules
- DO a.0 to DO a.7:** Digital Output modules
- Motorüberlast Pumpe 1 to 5:** Motoroverload pumps
- COM:** Common terminal
- 24 VDC:** Operating voltage
- 8.8:** Current rating
- 10.1:** Current rating
- 10.2:** Current rating
- 10.3:** Current rating
- 10.4:** Current rating
- 10.5:** Current rating
- 10.6:** Current rating
- 10.7:** Current rating
- 11.1:** Current rating
- 11.2:** Current rating
- 11.3:** Current rating
- 11.4:** Current rating
- 11.5:** Current rating
- 11.6:** Current rating
- 11.7:** Current rating
- 11.8:** Current rating
- 11.9:** Current rating
- 12.0:** Current rating
- 12.1:** Current rating
- 12.2:** Current rating
- 12.3:** Current rating
- 12.4:** Current rating
- 12.5:** Current rating
- 12.6:** Current rating
- 12.7:** Current rating
- 12.8:** Current rating
- 12.9:** Current rating
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- 28.5:** Current rating
- 28.6:** Current rating
- 28.7:** Current rating
- 28.8:** Current rating
- 28.9:** Current rating
- 29.0:** Current rating
- 29.1:** Current rating
- 29.2:** Current rating

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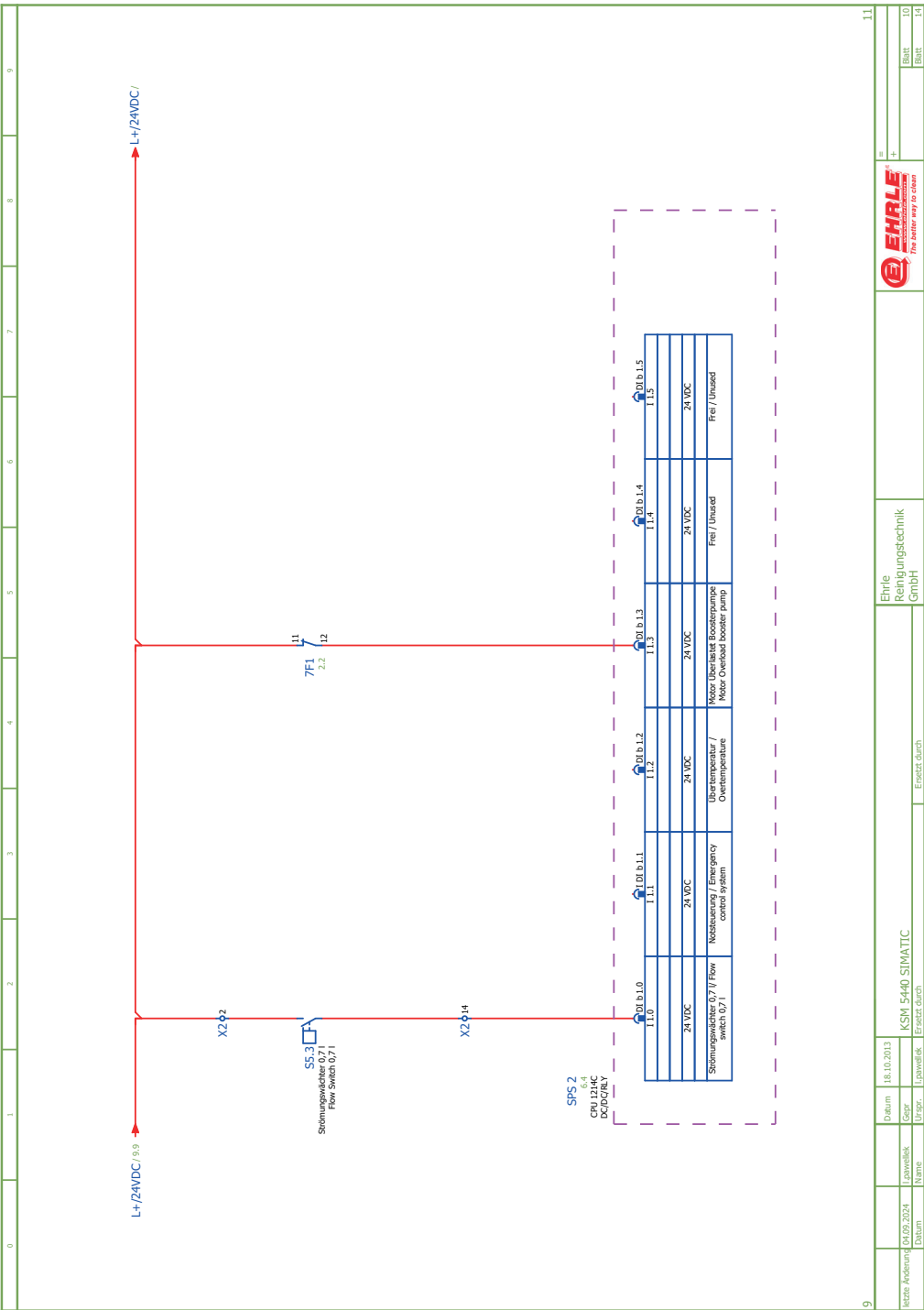


Fig. 10 - 54 KSM4540/KSM4540-INOX, Circuit diagram (Page 11 of 14)

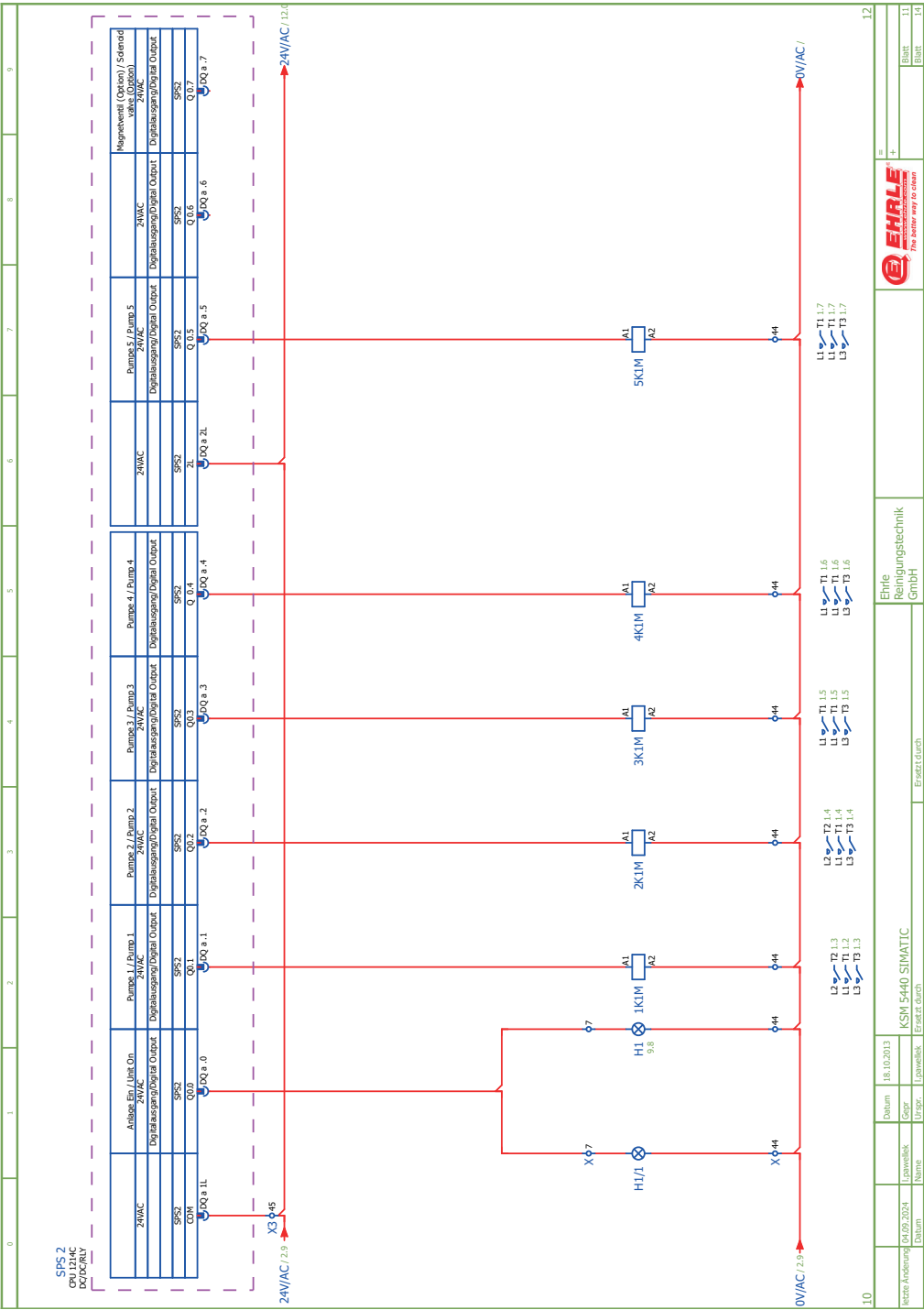


Fig. 10 - 55 KSM4540/KSM4540-INOX, Circuit diagram (Page 12 of 14))



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SPS 3
SM1222
8x
RL1

Option Sammelstation Assembly Disturbance

24VAC	MV Boiler Wasserzulauf Sol. Valve Boiler Water Inlet	24VAC	Frei / Unused
SPS-4	Digitalausgang/Digital Output	Digitalausgang/Digital Output	Digitalausgang/Digital Output
Q2.0	Q2.1	Q2.2	Q2.3
DO a.0	DO a.1	DO a.2	DO a.4

Wasserzulauf Relay Boiler Water Inlet

Relais K2

MV 1

MV 2

MV 3

24V/24VAC

0V/24VAC / 12.0V

Ehle Reinigungstechnik GmbH

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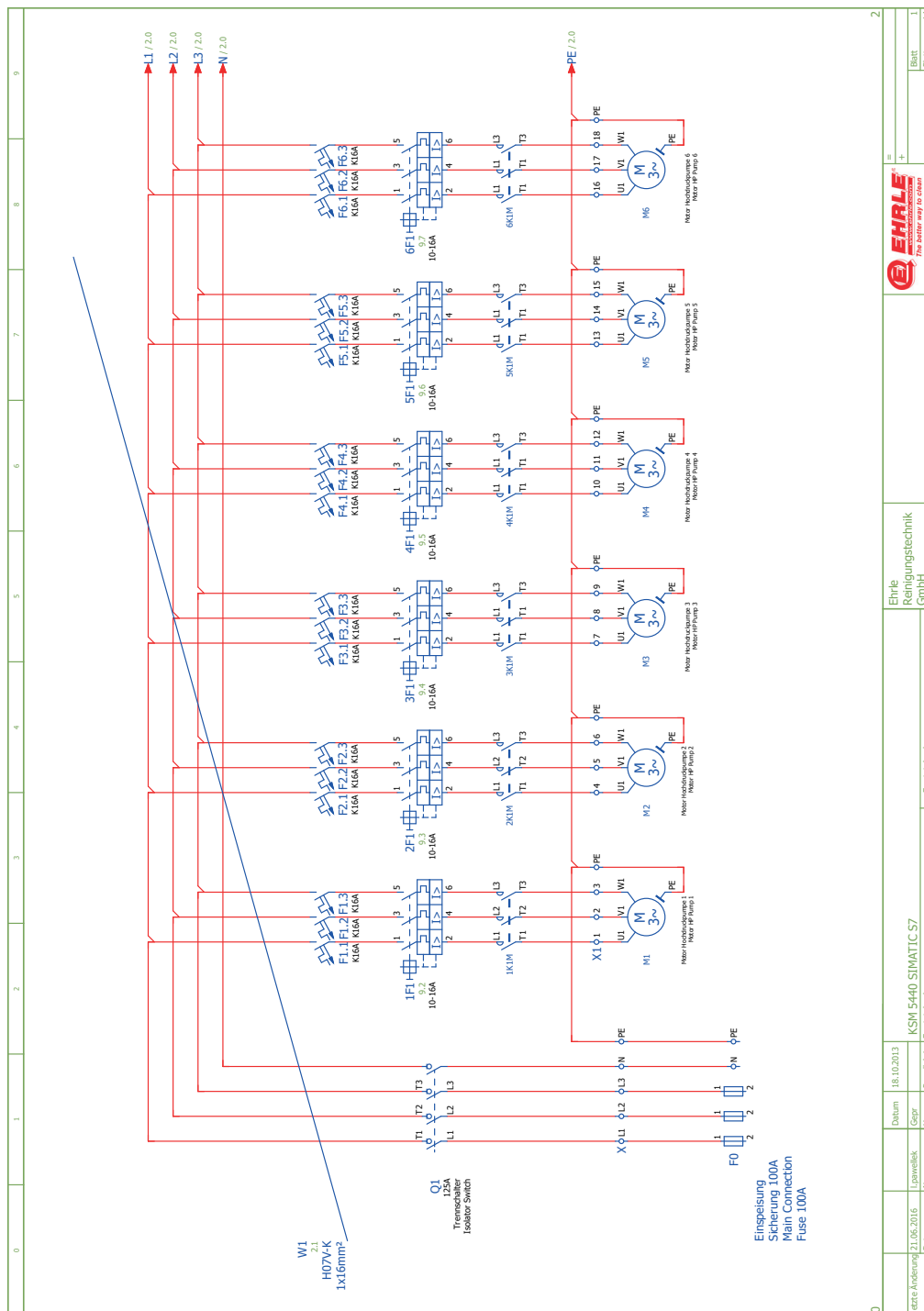


Fig. 10 - 59 KSM5440/KSM5440-INOX, Circuit diagram (Page 2 of 14)

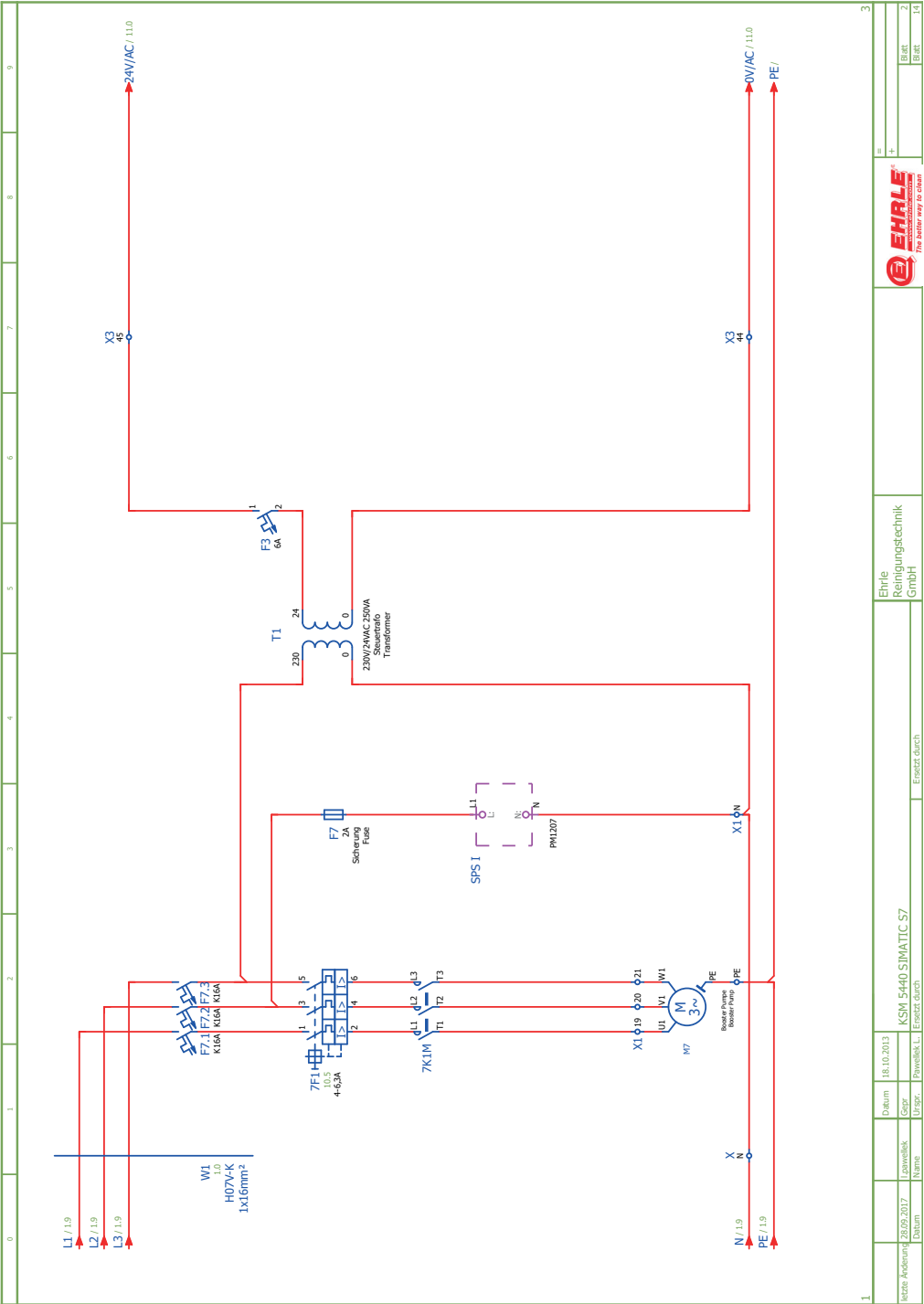


Fig. 10 - 60 KSM5440/KSM5440-INOX, Circuit diagram (Page 3 of 14)

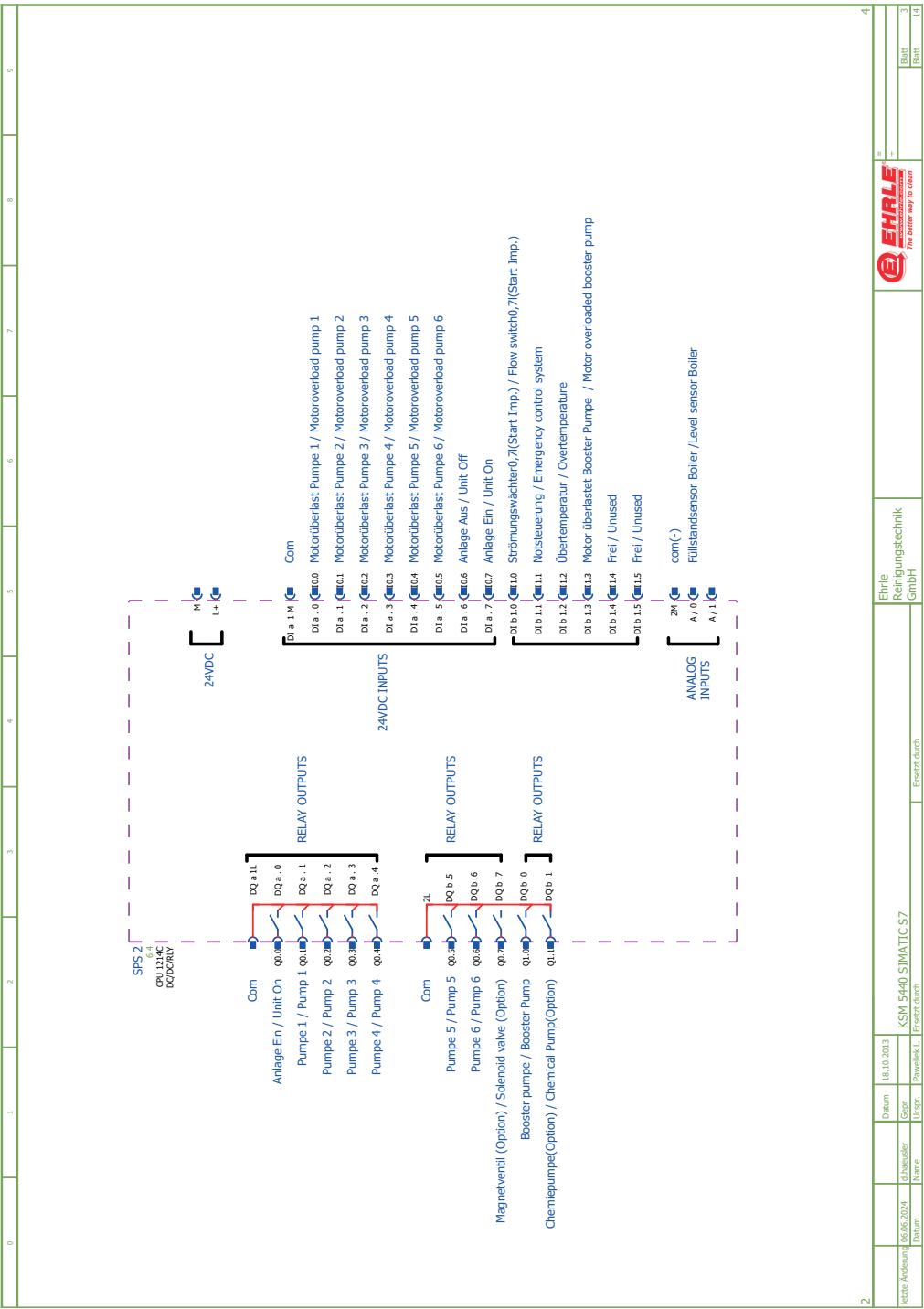


Fig. 10 - 61 KSM5440/KSM5440-INOX, Circuit diagram (Page 4 of 14)



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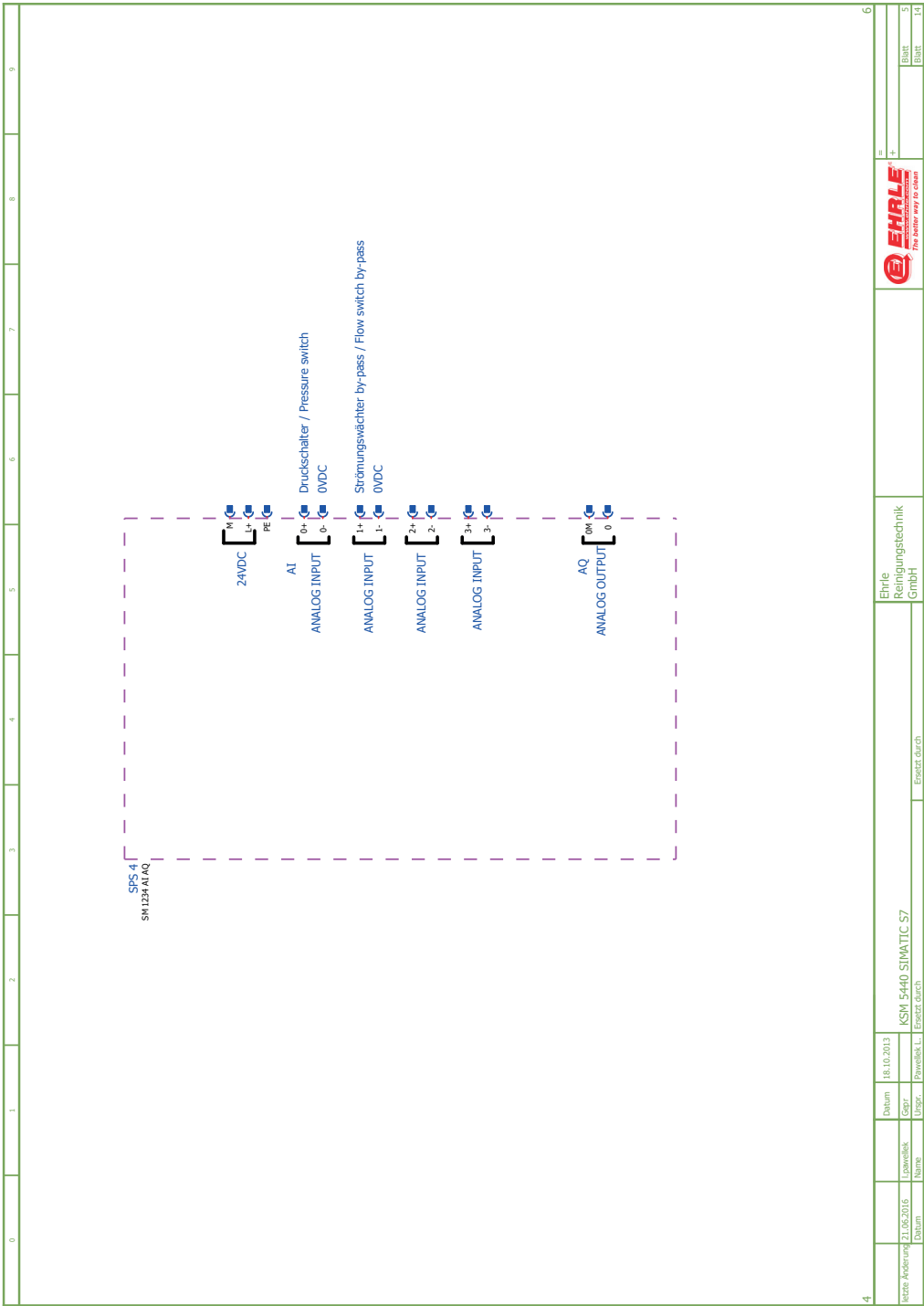


Fig. 10 - 63 KSM5440/KSM5440-INOX, Circuit diagram (Page 6 of 14)

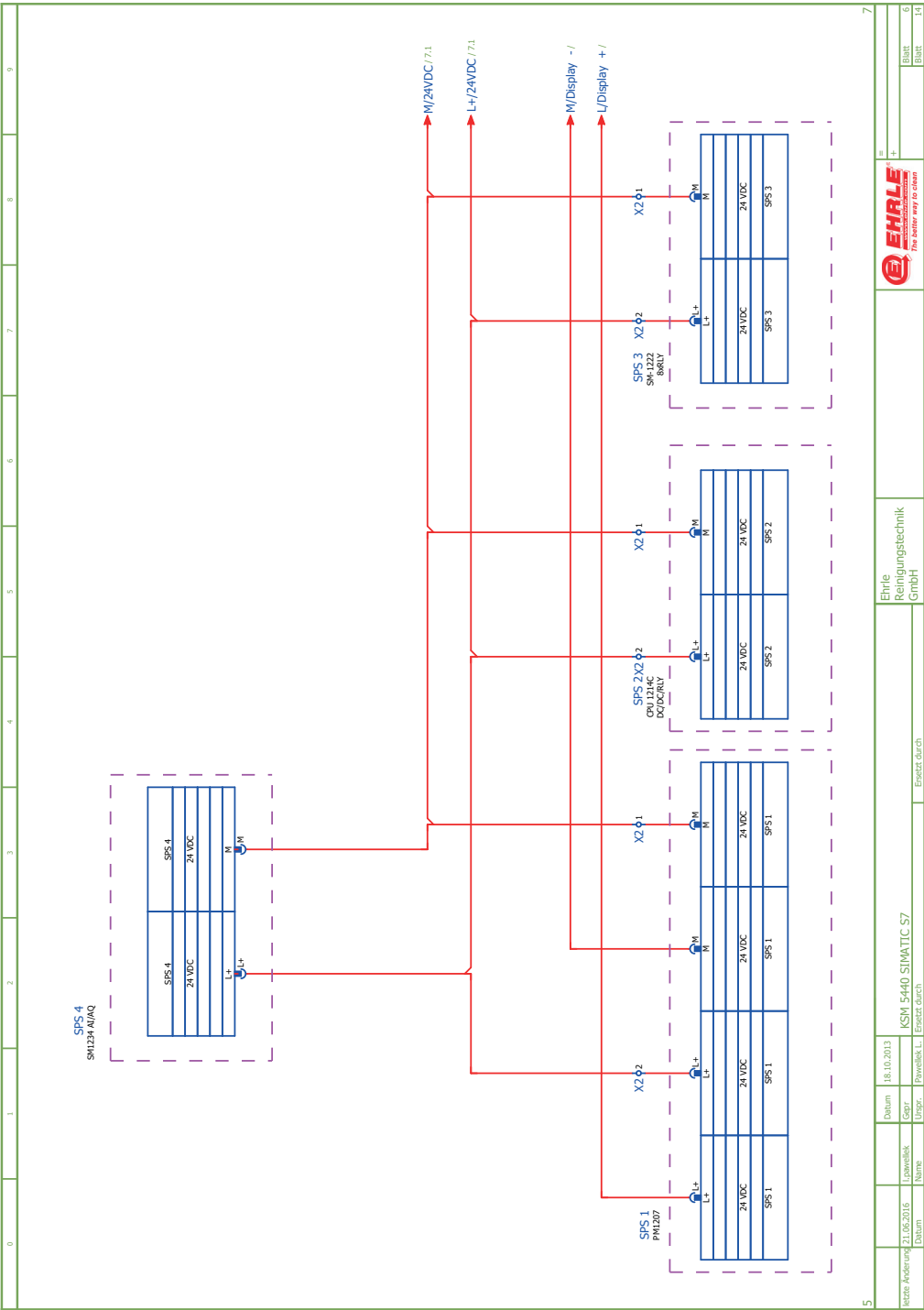


Fig. 10 - 64 KSM5440/KSM5440-INOX, Circuit diagram (Page 7 of 14)

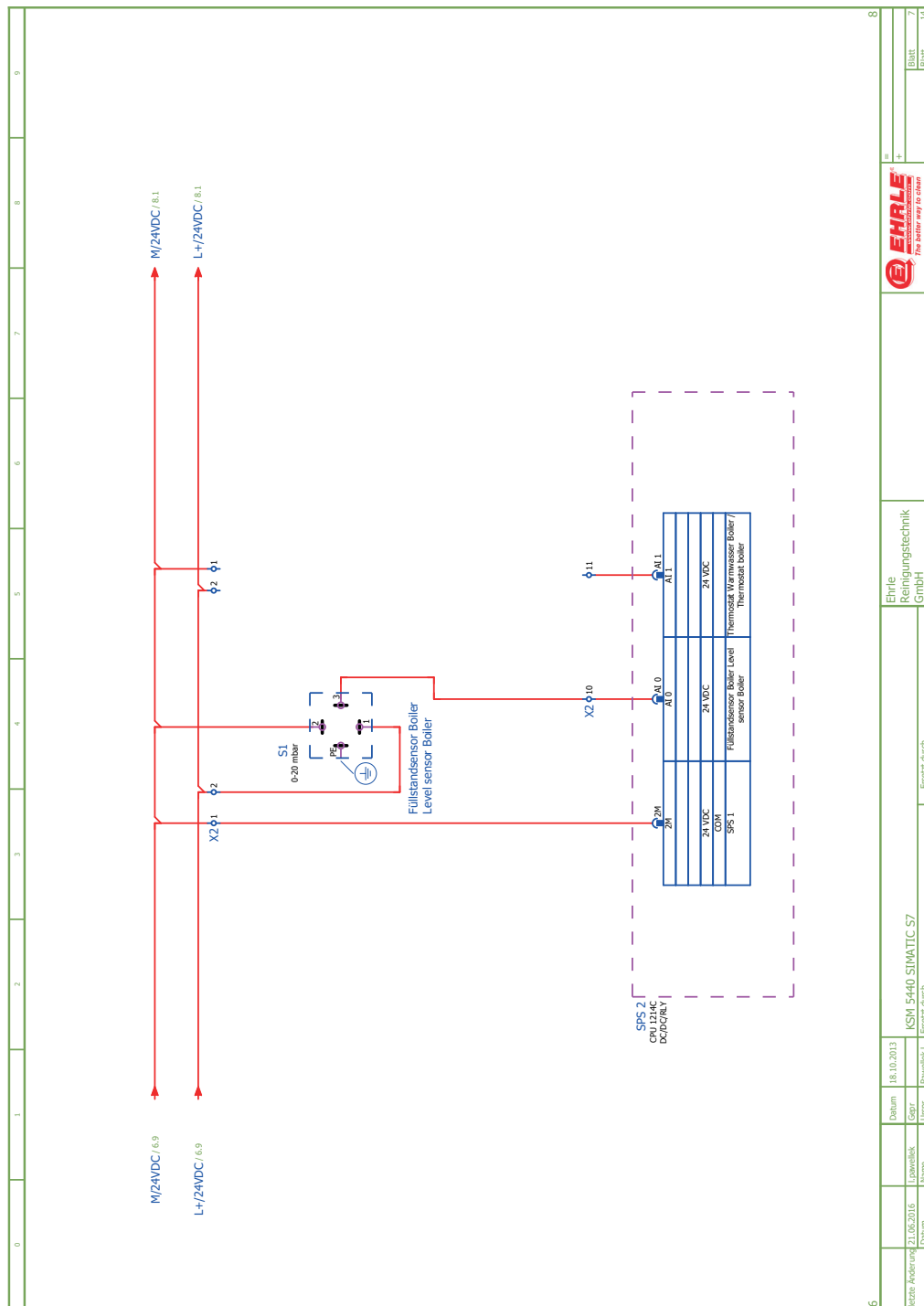
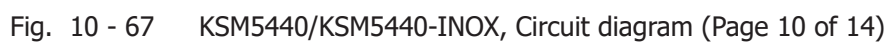


Fig. 10 - 65 KSM5440/KSM5440-INOX, Circuit diagram (Page 8 of 14)



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[illegible]

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[illegible]

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11 Hydraulic diagrams

11.1 Series KSM2740/KSM2740-INOX

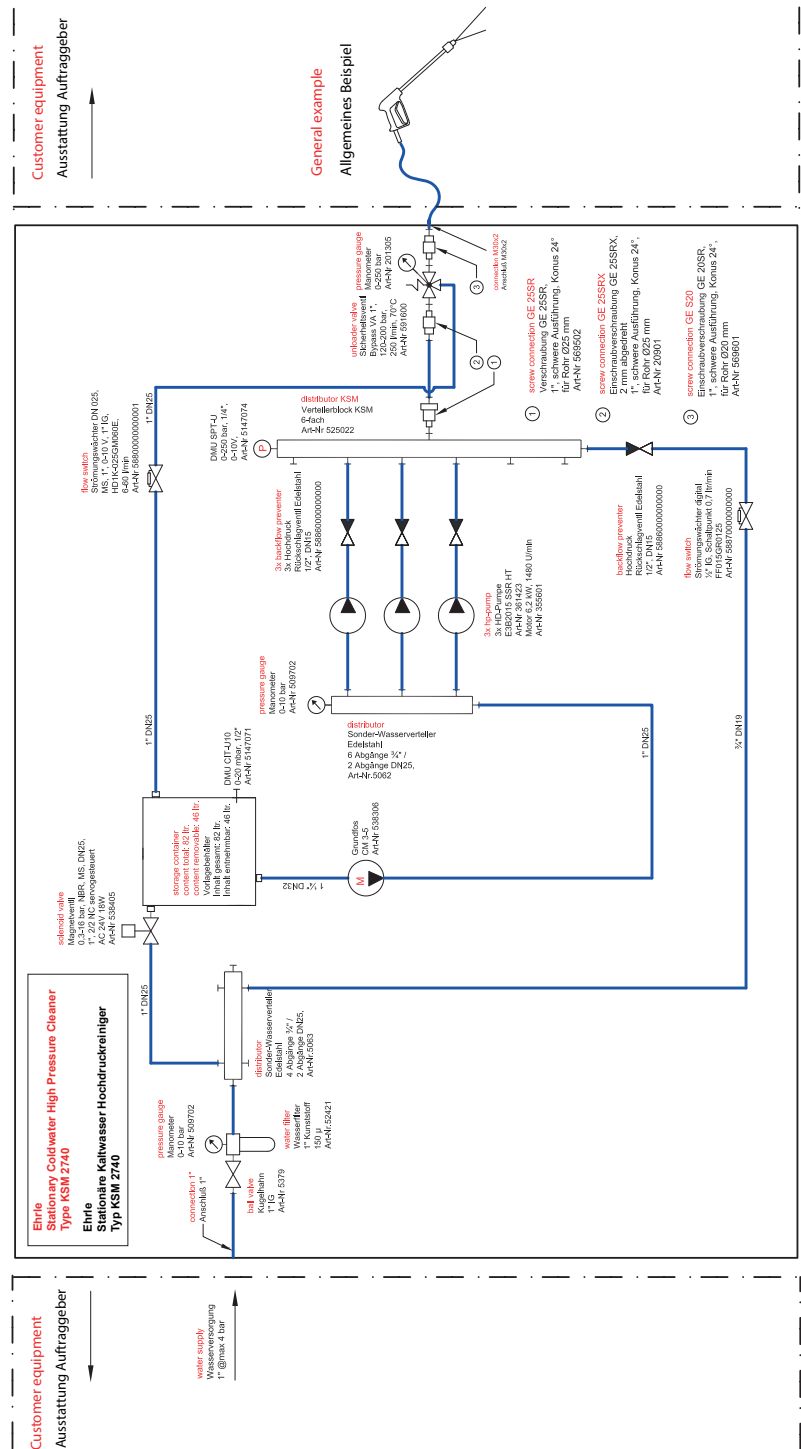


Fig. 11 - 1 KSM2740/KSM2740-INOX, Hydraulic diagram

11 Hydraulic diagrams



11.3 Series KSM5440/KSM5440-INOX

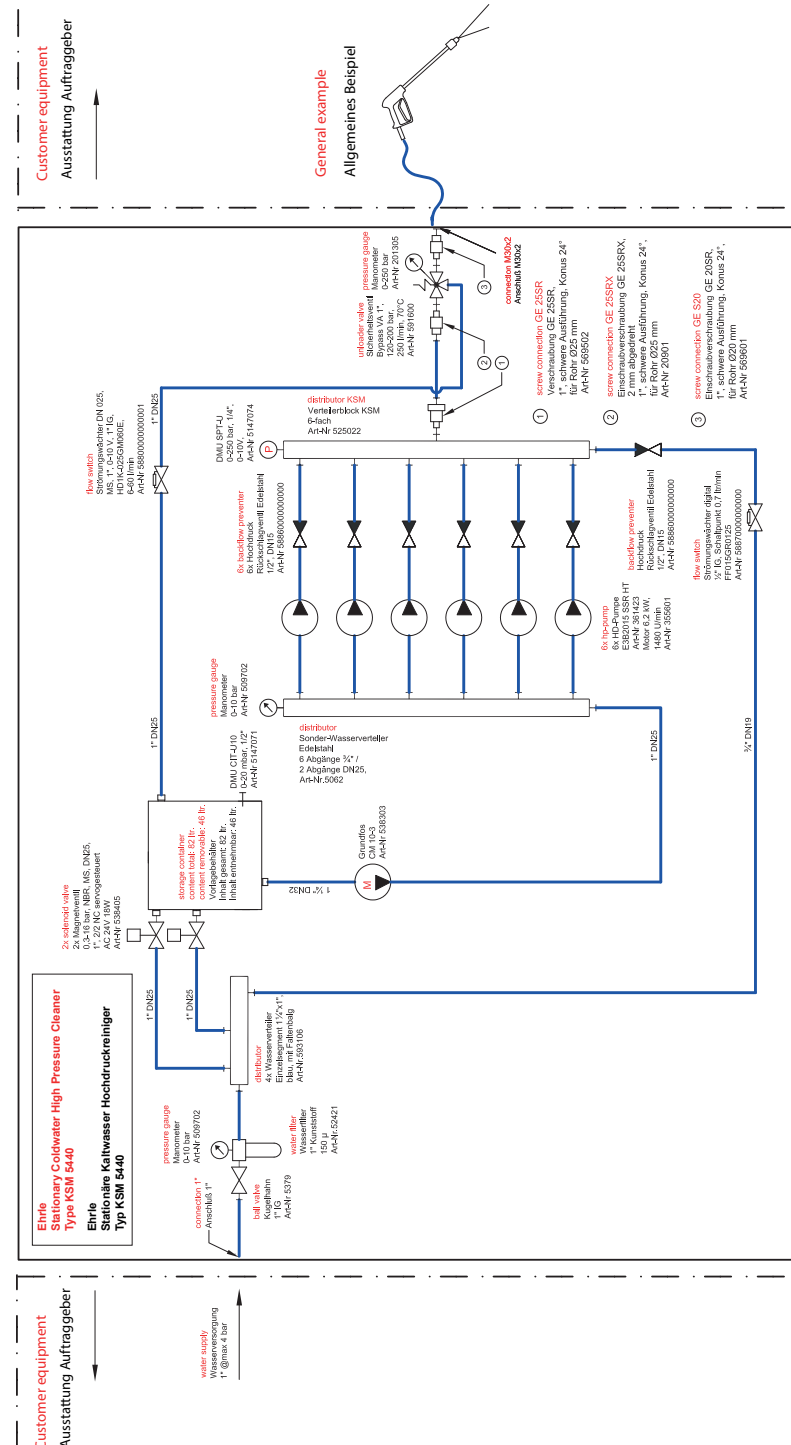


Fig. 11 - 3 KSM5440/KSM5440-INOX, Hydraulic diagram



12 General Notes

Proof of customer service

System type	Manufacture no.:	Commissioning on:
-------------	------------------	-------------------

Inspection carried out on:
Findings:

Signature:

Inspection carried out on:
Findings:

Signature:

Inspection carried out on:
Findings:

Signature:

Inspection carried out on:
Findings:

Signature:

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