FORUM™ B + V Oil Tools

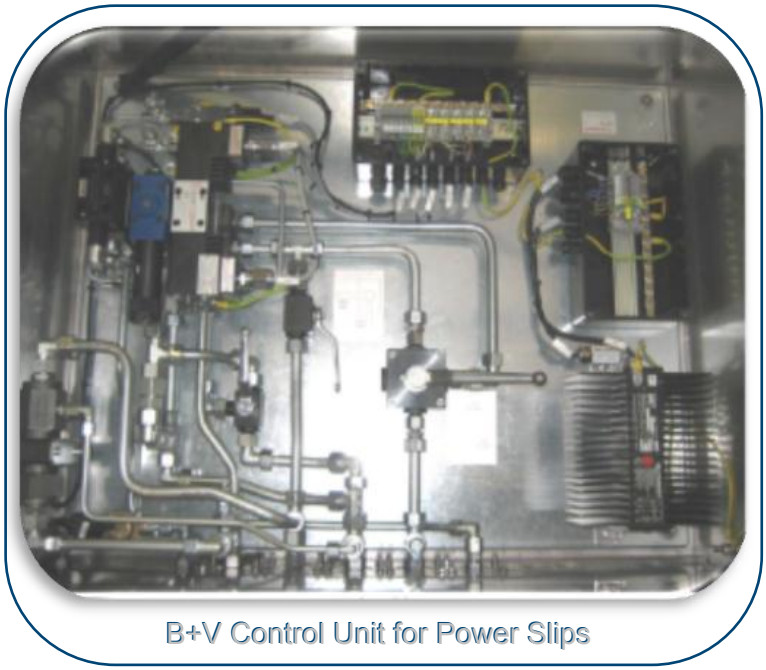
Third Party Operating Instructions • Pipe-Handling-Equipment • Rig Floor Equipment

Control Unit

PN 757109

Control Unit for Power Slips

Operating Instructions
Original Operating Instructions



B+V Control Unit for Power Slips

Forum B + V Oil Tools GmbH

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Revision history

Version	Date	Author	Changes
01	2016-11	Forum B+V, MH	Update released - Third Party document

Document Approval

Version	Author	Eng. Check	Appoval Check
01	Third Party 11/2016	Forum B + V Oil Tools MH 11/2016	Forum B + V Oil Tools MH 11/2016

A. Basic Information

This operating manual refers to the Control Unit for Power Slips from Forum B + V Oil Tools for use on oil drilling platforms and rigs.

The permissible range of application is specified in the technical data.

This manual covers several different Forum B + V Oil Tools models from the Control Unit type series that are all common in use and operation. Most assembly, disassembly, and inspection procedures are the same for all models. However, where there are differences, they are called out separately within the manual.

When installed in potentially explosive atmospheres, the instructions that follow the Ex symbol must be followed. Personal injury and/or equipment damage may occur if these instructions are not followed.

This operating manual contains all information on safe and proper operation of the Control Unit. Observance of these instructions is the prerequisite for safe operation.

In addition it is necessary to observe all applicable national and local regulations, e.g. accident prevention regulations and environmental regulations as well as the company's own internal safety regulations.

For installation, maintenance and repair work and proper training of the operating personnel Forum B + V Oil Tools recommends requesting service from Forum B + V Oil Tools itself.

I Intended Use

Generally the Forum B + V Oil Tools Control Unit are designed to send operational tasks (like opening and closing for elevators or set and raise slip for Power Slips) remotely to the B+V Pipe Handling Equipment.

The content of delivery for the Control Unit covers all necessary items for installation

In addition to observing all instructions in this operating manual, intended use also includes observing all prescribed assembly, disassembly, startup, operating, repair and maintenance work at the specified intervals as well as all safety precautions.

The operation of the Control Unit are allowed for their intended use only. Additionally the intended use covers the compliance and observance of all procedures and safety notes of this manual as well as performing all necessary maintenance work in the given intervals.

INFO

Improper use of the machine releases Forum B + V Oil Tools from any liability for personal injury or property damage resulting therefrom.

II Improper Use

The Control Unit are intended exclusively send operational tasks remotely to the Forum Pipe Handling Equipment.

Always observe the specifications in chapter „Technical Data" in this manual.

The following is specifically prohibited:

- Every use of the Control Unit for Power Slips which is not intended.

Moreover operation of the Control Unit is prohibited under the following conditions:

- When the machine is used for applications other than intended.
- When the hydraulic or pneumatic equipment is not installed properly.
- When the machine or parts thereof are damaged or when the additional equipment is not installed properly.
- When protective or safety equipment is damaged, unusable, improperly installed or not present.
- When the Control Unit are not operating properly.
- When humans or foreign objects or personnel are located in the hazard area of the Control Unit.
- When conversions or modifications have been performed without previous, written approval by Forum B + V Oil Tools.
- When tools not approved by Forum B + V Oil Tools are used.
- When the prescribed maintenance intervals have been exceeded.
- When replacement parts not approved by Forum B + V Oil Tools are used.
- When repair or service work has been performed on the machine by companies not authorized by Forum B + V Oil Tools.
- Observe also the chapter "Warranty and Liability"

III Warranty and Liability

Liability

The technical information, data and instructions for operation contained in this operating manual correspond to the status at the time of print and are provided according to the best of our knowledge in consideration of our previous experience and know-how.

We reserve all rights to make technical modifications within the scope of technical development of the Control Unit for Power Slips treated in this operating manual. Claims or entitlements cannot be deduced or derived from information, illustrations and descriptions in this operating manual.

Forum B + V Oil Tools is liable for all warranty obligations made within the scope of the contract for any faults or omissions on our part, excluding further claims. Claims for damages suffered are excluded regardless of the legal grounds.

Translations are complete according to best knowledge. We cannot assume any liability for translation errors, even when the translation was accomplished at our order. Only the original text is binding.

The descriptions and illustrations do not necessarily reflect the scope of delivery or any parts orders. The drawings and illustrations are not to scale.

Warranty

Forum B + V Oil Tools general terms of purchase and delivery apply. Purchasers recognize these conditions on the day the contract is signed at the latest.

The terms and duration of Forum B + V Oil Tools warranty are specified in the sales documents as well as the order confirmation. These will be submitted to the operating company as information at the time the contract is signed at the latest.

The manufacturer assumes no warranty whatsoever for damage or interruptions in operation resulting from failure to observe the operating instructions.

The operating manual is to be supplemented by the operating company with operating instructions based on existing national regulations on accident and environmental protection, including information on supervisory and reporting obligations taking into consideration operating peculiarities, e.g. in regard to work organization.

Warranty claims, complaints within the scope of the guarantee and liability for personal injury and property damage are excluded, when such result from any of the following causes:

- Any use other then intended;
- Improper installation, operation, maintenance or repair;
- Operation with defective safety equipment or improperly attached or non-operational safety or protective equipment or devices;
- Failure to observe the instructions in the operating manual regarding safe conduct;
- Impermissible structural modifications;
- Use of replacement parts not approved by Forum B + V Oil Tools ;
- Normal wear or insufficient inspection of components subject to wear;
- External effects or force majeure.
- Greasing the Control Unit for Power Slips with other greases as recommended by Forum B + V Oil Tools

INFO

Any structural modification to the machine by the operating company requires previous written approval by Forum B + V Oil Tools. Failure to obtain such approval voids the warranty as well as the declaration of conformity and releases Forum B + V Oil Tools from any product liability.

Following modifications or installation of optional equipment all safety equipment must be reinstalled and checked by the operator for proper function.

IV Obligations of the Operating Company

Planning and Checking Safety Measures

The obligation of the operating company to due diligence includes planning safety measures and supervising their observance.

All personnel performing work on or with the Control Unit must be trained by the operating company for the work performed on the Control Unit.

The personnel must have read and understood the operating manual.

Minimizing Risk of Injury

The following principles apply to minimize the risk of injury:

- Ensure that work on the Control Unit is performed only by qualified personnel.
- The personnel must be authorized for such work by the operating company.
- The personnel must wear the prescribed protective equipment.
- Procedures, competencies and responsibilities must be clearly defined and established in the area of the Control Unit. Proper behaviour in the event of a malfunction must be clear for everyone. The personnel must be given regular training.
- All WARNING signs and information on the Control Unit must be complete and easily legible. For this purpose WARNING signs and information are to be cleaned regularly and replaced as required.

Trouble-free Operation

The following principles apply for trouble-free operation:

- Keep the complete operating manual at the location where the Control Unit is in operation where it is easily accessible for everyone and in an easily legible condition.
- Use the Control Unit exclusively for its intended purpose.
- Use the Control Unit only when it is in a perfect operating state.
- Before starting work, check to ensure that it is in a safe operating state and functioning properly.

Requirements for Operator

Basic knowledge of safe handling and use of the Control Unit includes knowledge of the general safety precautions.

Ensure that the Control Unit for Power Slips is operated only in compliance with the general safety precautions and other instructions in this manual.

Training

The operating company is obligated to organize and hold regular training to ensure that all personnel involved with transporting, installing, operating and/or servicing the Control Unit is familiar with the required procedures and safety precautions.

Minimum Qualifications

All work on the machine requires special knowledge and qualifications on the part of the operating personnel.

All personnel working on Control Unit must have the following qualifications:

- Personal suitability for the work performed.
- Suitable qualifications for the work performed.
- Familiarity with the safety equipment and its function.
- Familiarity with this operating manual–particularly the safety precautions–and all chapters relevant for the work to be performed.
- Familiarity with the elementary instructions on operating safety and accident prevention.

In general all employees must have one of the following minimum qualifications:

- Technical training for independent work on the Control Unit for Power Slips.
- Sufficient qualifications for working on the Control Unit for Power Slips under supervision and at the instructions of a trained specialist.

User Groups

This operating manual is subdivided into the following user groups:

Personnel	Qualifications
Operation	Sufficiently trained in Functional procedures on the machine Operating procedures
	Knowledge: Competency and responsibility in regard to the work to be performed Behaviour in emergencies
Service	Sound knowledge of Mechanics Hydraulics Electrical engineering
	Authorizations (according to standards of safety engineering): Starting up machines Grounding machines Marking of machines
	Sound knowledge of installation and operation of the Control Unit for Power Slips.

V Conformity

The Control Unit satisfies all requirements in applicable directives and standards. A sample of the EC Declaration of Conformity is given in the appendix.

INFO

This operating manual is a part of the technical documentation for the Control Unit for Power Slips.
The EC Declaration of Conformity is delivered together with the Control Unit.
Keep these instructions and the associated documents for later use.

VI Contact Forum B + V Oil Tools worldwide

In the event of problems that cannot be solved with the aid of this manual, please contact one of the following addresses.

Forum B + V Oil Tools GmbH	Forum Drilling Sales Headquarters
Hermann-Blohm-Straße 2	10344 Sam Houston Park Drive, Suite 300
20457 Hamburg	Houston TX 77064
Federal Republic of Germany	USA
fon: +49 40 37 02 26 855	fon: +1 71 33 51 79 00
fax: +49 40-37 02 26 896	
oiltools@f-e-t.com	oiltools@f-e-t.com
www.blohmvoss-oiltools.com	www.f-e-t.com

Forum Energy Technologies Regional Drilling Offices

Drilling Service
6535Guhn Road
Houston TX 77040
USA
fon: +1 71 36 09 98
08 – 24 hour hotline

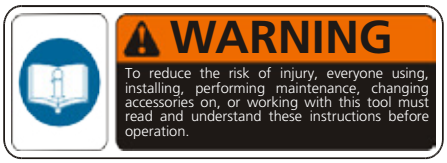
Unit 7, Murcar Industrial Estate
Denmore Road
Bridge of Don Aberdeen
AB23 8JW UK
fon: +44 12 24 70 78 00

Drilling Regional Office
No 51 Benoi Road #06-00
Liang Huat Industrial Complex,
Singapore 629908
fon: +65 64 65 48 50
Out of hours +65 91 38 98 12
fax: +65 64 65 48 51

Oilfields Supply Center
Building B-45
Jebel Ali Free Zone Dubai
UAE
fon: +97 14 88 35 266

SAFETY INSTRUCTIONS

for Control Units [Elevator/Power Slips]



OUR goal is to produce tools that help you work safely and efficiently.
The most important safety device for this tool is YOU.
YOUR good judgement is the best protection against injury.

Maintenance Hazards

⚠ **Always remember** to shut down all rig supply and get in safe condition before starting maintenance work on the control units.

⚠ **Always plan** maintenace on a regular basis. Note and file checks as shown in inspection/check table.

Operation Hazards

⚠ **Practice safety** at all times when operating/ maintaining the control unit. Always wear your personal protective equipment (PPE e.g. gloves, hard hat, eye protection,…)

⚠ **Never** operate the control units open. All Flaps and locks must be closed and secured for operation.

⚠ **Keep in mind** that the control unit is purchased and designed as a separate supporting tool.

Therefore make sure that a proper Interlock system is installed and in operation.

⚠ **Inter Lock** control setting

Elevator		Power Slip		Control
Holds weight Doors closed	+	**Weightless** Slips UP	→	**1. Doors locked** **2. Slips enabled**
Weightless Doors closed	+	**Holds weight** Slips DOWN	→	**1. Doors enabled** **2. Slips locked**
Weightless Doors open	+	**Holds weight** Slips DOWN	→	**1. Doors enabled** **2. Slips locked**
Holds weight Doors closed	+	**Weightless** Slips DOWN	→	**1. Doors locked** **2. Slips enabled**

Inspection / Check table

Task / Interval	Daily	Monthly	2 Year
1. Visual check for damages	☑	☑	☑
2. Visual check for leakage and hose condition	!	!	!
3. Check fastener , couplings and screws for corrosion	☑	☑	☑
4. Perform a function test and display check	☑	☑	☑
5. Visual check for leakage inside control unit	☒	!	!
6. Check all cable connections	☒	!	!
7. Full Inspection [see below]	☒	☒	!

☑ Necessary ☒ Not necessary ! Safety task!
Take out of service and repair!

Full Inspection

- Check all Component condition and function
- Replace bad/worn components
- Perform a 100% pressure test (hydraulic devices) for 5 minutes and check for leakage
- Check all connections for proper installation

⚠ **NOTE** Rig operations may have different time schedules, replace hose and cable after 5 years at latest. Double check with rig superintendent.

⚠ **Mandatory** The locking cannot be unset/overwritten by giving a control unit command.

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DO NOT DISCARD - GIVE TO OPERATOR

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Assembly/ Installation Instruction for Hydraulic Control Unit 1509-04/1

Client: Forum B+V Oil Tools, 20422 Hamburg

Change History:

Revision	Changes	Date / Name
A	First edition	29.09.2015 / Herbers
B	Client name changed	15.10.2015 / Schulte

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1. DECLARATION OF INCORPORATION

Declaration of incorporation according to

- Machinery Directive 2006/42/EC

Willmann Steuerungstechnik GmbH
Karl-Friedrich-Benz-Straße 2-4
D-49377 Vechta
Tel. +49 (0) 4441 / 9304 – 0
Fax +49 (0) 4441 / 9304 – 44

hereby declares that the following product:

Hydraulic Control Unit

Modell- No. / Drawing- No. 1509-04/1

complies with the provisions of above Directive – including its amendments valid on the date when this declaration is issued. Please note that this is "partly completed machinery" in the understanding of the Machinery Directive. Commissioning of this product is prohibited until the entire machine or facility into which this product is to be fitted, or of which it is supposed to be a component, corresponds with the regulations of all relevant guidelines.

The following harmonized standards have been applied:

- DIN EN ISO 4413:2010 : Hydraulic fluid power - General rules and safety requirements for systems and their components
- DIN EN 60204-1:2010 : Safety of machinery – Electrical equipment of machines – Part 1 General Requirements
- DIN EN ISO 12100: 2010 : Safety of machinery – General principles for design –Risk assessment and risk reduction

The manufacturer commits himself to transmit the special documents of the partly completed machinery electronically to the national authorities on request. Special technical information after appendix VII part B, belonging to the machine, were provided. The division leader with above mentioned address is authorized for the documentation.

Vechta, 26th October 2016

.....
Project Engineer in charge

WILLMANN
Steuerungstechnik GmbH
Postfach 1525 - 49364 Vechta
Karl-Fried.-Benz-Str. 2-4 - 49377 Vechta
Tel.:04441/93040- Fax: 04441/9304-44

i.A.
.....
Documentation and control unit checked

.....
Stamp

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3. Introduction / Disclaimer of Warranty

This documentation describes the in the Declaration of conformity named machinery and explains best practices in machine handling, from initial delivery to final disposal of the equipment.
The instructions contained in this documentation must be studied thoroughly and considered when operating the unit. Thus you ensure an endangerment-free and smooth function as well as a long operating life expectancy.

This documentation is intended for use by professionally qualified and competent staff and provides instructions for the correct use of the product. The manual ***cannot*** replace a fitter's professional competence.

The manufacturer waives any liability claim if:

- the control unit is used inappropriately
- assembly and installation are carried out by non-professional or non-qualified staff,
- faulty assembly and installation are obvious,
- defects are caused by the electrical or hydraulic supply,
- faulty or deficient maintenance is obvious,
- non-approved intervention and changes have been performed,
- operational instructions have been neglected,
- spare parts other than originals and those not determined for the control unit have been applied,
- the control unit is overstrained by capacities, loads, working conditions or control times which it is not specified for.

Competent person: Any person having at their disposal sufficient knowledge in this special field due to their educational and technical training as well as their technical experience.

Improper use that is non-compliant with the intended purpose and wrong choice of the product (as well as accessories) may result in serious personal injury and material damage. This documentation, annexes thereto, technical catalogues and any further information provided by the manufacturer are determined to provide the professionally competent user (or technical staff) with additional data. The user should be capable of assessing or analyzing any issues in applying the product, since the choice of the product and accessories is within their responsibility.
Principally, any safety instructions imposed by the guideline and mentioned herein must be borne in mind and complied with while operating the device.

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4. General Safety Instructions

Explanation of symbols:

This sign marks a generally important notice in the documentation.
Please observe this notice to avoid bodily harm and/or material damage.

This sign marks a safety notice in the documentation, Please, always observe regulations to avoid bodily harm and/or material damage!
In problematic cases, please turn to maintenance staff or the manufacturer.

This sign marks an important notice because of the installation inside an explosion-hazardous area.

4.1 Notices

For components posing a special additional hazard, safety instructions have been attached to the hydraulic plant.
These instructions must be kept clearly visible and legible.
The user of the hydraulic unit must have been instructed by the operator.
Any bridging, decommissioning or alteration of the safety installation is prohibited!
Regular safety checks must be coordinated with maintenance staff.
Their execution must be documented.

Excess pressure in the hydraulic system may lead to the bursting of hydraulic components, subsequently resulting in most serious personal injury and material damage. Do not, in any way nor arbitrarily, increase the default maximum operational pressure.
(see “Setting Operational Values”)

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4.2 Kinds of Hazards When Operating a Hydraulic unit

When applying hydraulic power units, the user is exposed to certain hazards. These are described in the following and must be borne in mind.

• *Mechanical hazard*	- by unguarded *moving* machine parts (extending piston etc.) - by parts with dangerous surfaces
• *Electrical hazard*	- dangerous electrocution due to voltages or currents dangerous for humans
• *Hazardous materials*	- contact with liquids (poisonous, flammable)
• *Fire and/or explosion hazards*	- fire hazards through liquids - ignition sources in environments with fire and explosion hazards - oxidizing materials (hydraulic oil)
• *Thermal hazards*	- contact with hot media (hot hydraulic oil ...) - contact with frigid media (accumulators ...)
• *Physical impact*	- noise (pump, motor ...) - vibration, vibrating the entire body or parts of the body
• *Strain by the work environment*	- air-conditioning (temperature, speed of air flow) - ventilation (oil cooler ...)
• *Physical strain* *degree of hard labor*	- by deficiencies in ergonomic design (valve blocks etc.)

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4.3 Safety Instructions

NOTICE

Note the Following Safety Instructions:

- Do not manipulate any valves, connection pieces, accessory elements or any other components of the power unit applied: ***even simple loosening of a valve may cause free fall or a reduction of loads***
- Any installation, assembly, maintenance and disassembly of the control unit and of accessories must be carried out by strictly complying with safety regulations: ***there must not be any pressure within the oil-dynamic circuit at any time, i.e. loads need to be lowered, pumps have to be switched off and accumulators must be emptied***
- Do not remove covers when the hydraulic unit is running!
- Rotating or live parts are dangerous. Fatal or severe injuries and substantial material damage can occur if the required covers are removed.
- All covers which are designed to prevent active or rotating parts from being touched, or which are necessary to ensure correct air guidance and thus effective cooling, must be installed prior to start-up.
- Firstly de-energize the control unit if any covers need to be removed.

- The surfaces of the unit can reach high temperatures, which can lead to burns if touched.

Caution: Electrical Components

- When executing any works on the hydraulic control unit, heater and any other electrical components must be separated from power supply – disconnection and connection must be executed by competent professional staff – when connecting the control unit with the electrical power supply, all required safety precautions must be taken (fusing, emergency OFF, relays etc.)
- Any other, non-electrical motion drives (pneumatic, hydraulic, mechanical etc.) must be disconnected from their respective supply system, i.e. they must be put into such a state that they are unable to take in any energy thus being incapacitated to produce any movement
- Use protective equipment
- Work in cleanest possible conditions
- Work in safest possible conditions
- Use appropriate and clean instruments, tools and work benches

Hydraulic Liquid

It is possible that hydraulic fluid leaks or squirts from the system. Due to possible high temperatures and pressure there is the danger of life-threatening burns as well as cuts (high pressure). Presence in the environment of the hydraulic unit is only permitted wearing respective protective gear! Hydraulic fluid may be health-hazardous. Contact with skin and eyes can lead to serious injuries. The protection and safety regulations imposed by the manufacturer of hydraulic fluid and included in the technical and toxicological product specification must unconditionally be complied with. Hydraulic fluid must be collected in a collection tank and it's leaking to the environment, also in cases of malfunction or leakiness of the hydraulic unit, must be prevented at all cost. Therefore, suitable measures have to be taken at the site of installation. Dispose of used oil safely, pursuant to environmental regulations in your country.

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5. Technical Specifications

NOTICE

The type plate on the unit is attached to the base plate inside the control box. Each unit has an individual Serial.-No. Substantial individual devices are labeled with the manufacturer's type plates.

Modell- No. / Drawing- No.: 1509-04/1
Serial- No.: 14036/3
X- Code : J9X1QX

Intended purpose:
The hydraulic control unit is exclusively used for the operation of power slips in intermittent operation.

Dimensions:	Length:	approx. 800 mm	
	Width:	approx. 800 mm	
	Height:	approx. 300 mm	
	Weight:	approx. 100 kg	
Design data:	Ambient:	Air Temperature:	0 °C to +55 °C
		Humidity:	max. 80 %
		Altitude	max. 500 m above sea level
Electrical connection:	Solenoid voltage:	24V DC	
	Pressure switch:	up to 250V (1,0 A)	
Hydraulic parameters:	Volume flow:	max. 136 l/min.	
	Working pressure:	up to 190 bar	
	max. permitted pressure:	220 bar	
	Max. allowed oil temperature:	80 °C	
	Pressure liquid:	HLP Iso VG46 or IsoVG32 (contact manufacturer, if another liquid will be used)	

NOTICE

control unit with ATEX permission
for use in Zone 1, IIC, T3 hazardous area

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6. ATEX- Designation

The Designation according to ATEX- Directive 94/9/EC takes place as follows:

CE  II 3G c IIB T3 x

- CE- marking (only with reference to the ATEX guideline!!)
  - Marking of the equipment for the Ex- range ()
    - Equipment Group (II)
      - Equipment Category (3)
        - For explosive mixtures of air and combustible gases, mists or vapors (G)
          - applied ignition enclosure: constructional safety (c)
            - Gas group (IIB, includes IIA)
              - Temperature class (T3; < 200°C)
                - Take care of additional informations in the installation instructions (x)

The allocation from equipment category to the danger zone can be inferred from the following table.

equipment category	Avoidance of effective ignition sources	Security level	Useable in danger zone	Presence of combustible atmosphere
3	in normal operation	Normal	2 (if G) 22 (if D)	Infrequently and short-term
2	also at usual operational disturbances	High	1, 2 (if G) 21, 22 (if D)	occasional
1	also at rare operational disturbances	Very high	0, 1, 2 (if G) 20, 21, 22 (if D)	for a long time, constantly or frequently

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7. Transport and Storage

7.1 Transport

Use lashing straps

During transport the control box has to be closed. No additional loads should be added.
If necessary, use suitable rated transport materials such as lashing straps (EN 12195-2), dollys, wood pallets and secure the box sufficiently.

Suspended Transport

Use suitable means of conveyance for transport and during installation. If several items of transport material are used for fastening, two straps must be able to carry the whole load.
Secure lifting materials to make sure they cannot slip!

Remove any transport locks before start-up and either keep them in a safe place or unlock them. You can then use them again for transporting further items or you can apply them again.
The machines are packed in different ways depending on how they are transported and their size.

Comply with the images shown on the packaging. Their meaning is as follows:

					
Up	Fragile goods	Protect against moisture	Protect against heat	Center of gravity	Attach here

Pay attention to possible transport damages and, if this is the case, have them attested!

7.2 Storage

Storing outdoors

If possible, choose a dry storage location which is safe from flooding and free from vibrations. Repair any damage to the packaging before putting the equipment in storage in so far as this is necessary to ensure proper storage conditions.
Position machines, devices and crates on pallets, wooden beams or foundations that guarantee protection against ground dampness. Prevent the equipment from sinking into the ground and also make sure that the circulation of air underneath the equipment is not impeded.
Covers or tarpaulins used to protect the equipment against the weather must not make contact with the surfaces of the stored equipment. Ensure adequate air circulation by positioning wooden spacer blocks between the equipment and such covers.

CAUTION
Under extreme climatic conditions, e.g., saline and/or dusty atmospheres, risk of frost, suitable precautions are to be taken.

Storing indoors

The storage rooms must be dry, free from dust, frost and vibrations and well ventilated. They must also provide protection against extreme weather conditions.

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8. Installation and Commissioning

8.1 General Indications

Faultless functioning of the hydraulic unit supplied by us implies compliance with the operational and maintenance instructions. Please read these instructions carefully and follow each single step. Only this allows us to guarantee that the control unit will function as desired. Our Hydraulic Units are manufactured and tested with greatest possible care. Nonetheless, if any cause for complaint possibly arises at one point, we would like you to note the following:

- The box is designed for ambient conditions mentioned in chapter 5.
- Check if you have followed all instructions for commissioning.
- Do not disassemble any components by yourselves; otherwise you will lose any warranty claim.
- Inform the manufacturer.

The increased danger within highly combustible ranges requires the particularly careful attention of the specified references! All persons should be informed in detail over the dangers in the Ex- range and trained accordingly!

8.2 Unpacking the Shipment

Please take the delivery note from the packaging. Carefully unpack the supplied control unit. Take care that no plugs or cables are damaged. The control units are principally shipped out to you without any media. Check completeness of the delivery comparing it with the delivery note. Check for possible transportation damage and, if this is the case, have them attested!

8.3 Installation of the control unit

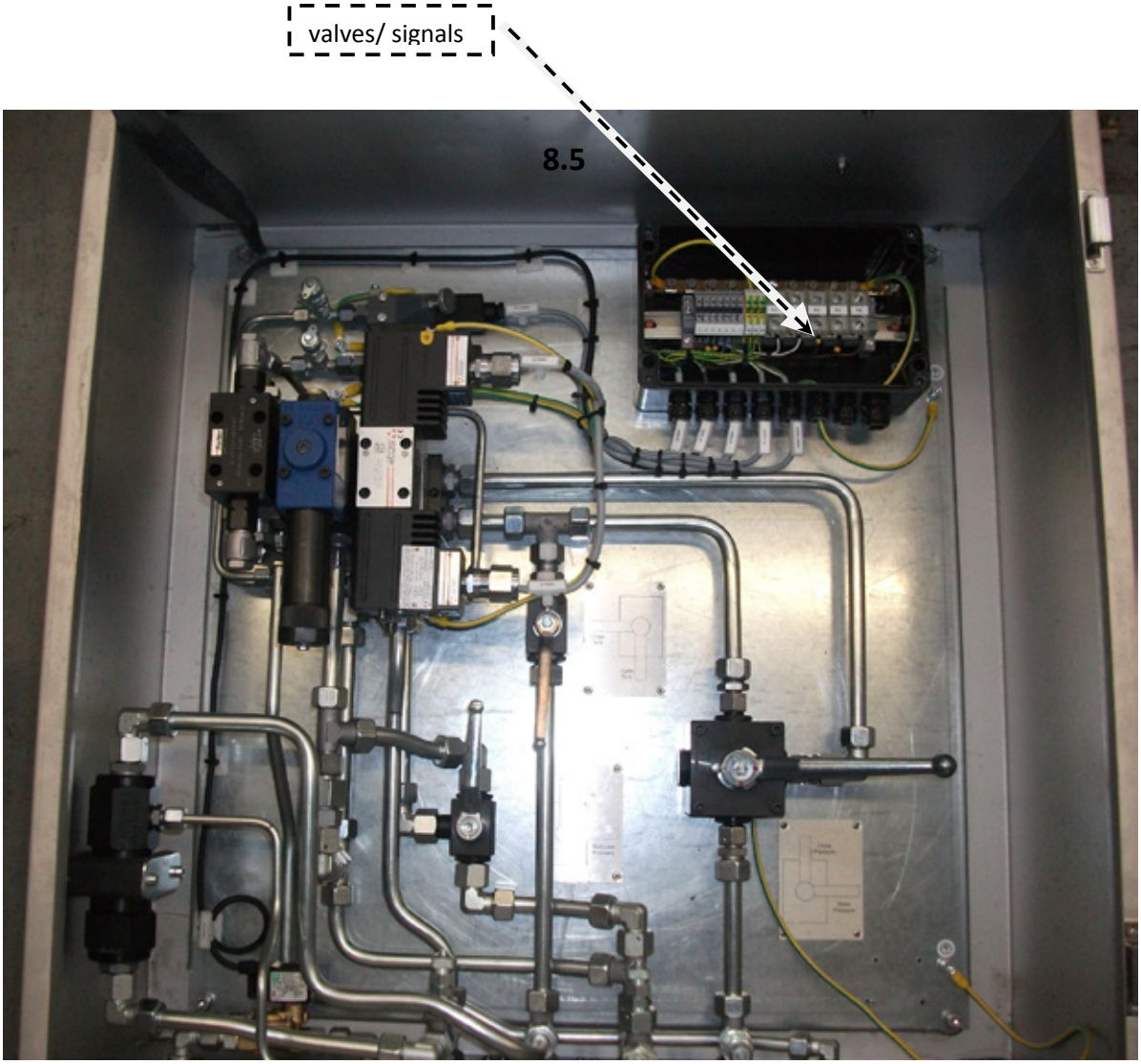
Install the control unit at the projected site. It should sufficiently be ventilated since there will be a high degree of heat development while operating the unit. Note the installation position as marked. At the installation site, care must be taken that any hydraulic oil is prevented from entering into the environment, i.e. suitable means for collecting hydraulic oil, should it leak, must be provided for. The control box itself has no drip tray. Affix the box only at the drill holes or by means of holding devices designed for this purpose.

- Explosion-proof machines may only be used in suitable areas and as prescribed by the responsible supervisory body. They are responsible for determining the hazard level of each area (division into zones). Please inform yourself in detail!
- Local regulations for installation, operation and maintenance of the unit in hazardous areas must be observed!
- The machine temperature class specified on the rating plate must be equal to or greater than the temperature class of any combustible gases that may develop.
- This machine is not suitable for hybrid explosive environments. Usage in atmospheres where there is a risk of explosion caused by dust is prohibited!

8.4 Connection of Electrical Components

The electrical connection of the terminal box (valves/ signals) must principally be carried out by professional staff. For wiring refer to drawing no. 1111-14/1/EP. Please note, by all means, the operational voltages indicated in the item list or respectively marked on type plates.

With explosion-proofed machines the short-time duty is to be limited to the absolutely necessary minimum. In particular it has to be paid attention to the surface temperatures! This should be below 100 °C, but may in no case exceed 135 °C!



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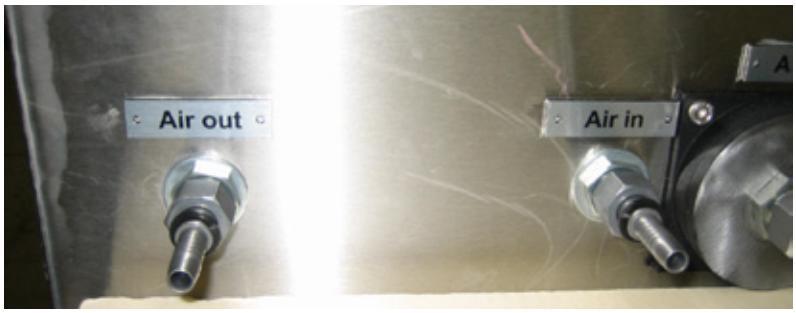
Connection of Supply and Consumer

The individual consumer connections are marked at the connecting plate.



greasing system

hydraulic connections

cable entries

The individual hydraulic connections are partly secure against interchange because of different quick coupling-connections. Take care at mounting them. Occasionally some drops of oil can leak out, make you available therefore appropriate cloths for cleaning.

Connect your lines to the relevant hydraulic connections; supply (P and T) and consumer (A+B); before operation of the unit.

Take care, by all means, of the admissible pressure for screw fittings, pipes and tubes. For admissible values, please refer to the HANSA-FLEX – Screw Fitting Catalogue. Usually all components are able to work with at least 250 bar.

Please, maintain extreme cleanliness during assembly! Impurities may also lead to malfunctioning of especially safety-relevant hydraulic components.

Apart from that, a respectively qualified person has to determine on site if the consumers for this special case of application must particularly be safeguarded against uncontrolled movement.

Refer to chapter 9 of this document for further information.

8.6 First Commissioning

The first commissioning must be carried out by the plant constructor (general contractor). Only he can assess any potential risks and take appropriate protective measures!

This chapter is not intended for end users!

8.6.1 Setting Operational Values

Check if any adjustable valves (pressure and flow valves) are set to their lowest, i.e. all adjusting spindles must be turned out to their limits. **Valves preset by the manufacturer must not be re-adjusted without consultation. Correct setting of these valves is safety-relevant.**

Check the complete and correct installation again. Only if you are sure that no hazardous movement is produced, switch on the unit. Check all lines and devices for leak-tightness.

Pressure
Now slowly turn in the spindle of the pressure control valve of the highest value first. Observe the adjustment on the pressure gauge. Please refer to the circuit diagram for the maximum permissible pressure. Lock the adjusted value by fixing the spindle with a locknut. Further valves must be locked following the same principle. **Default pressure control valves preset by the manufacturer must not be re-adjusted without consultation.**

Speed of Consumers
Turn the spindles of throttle valves in until the desired speed has been achieved. Lock the adjusted value by fixing the spindle with a locknut. Note that hydraulic cylinders are (usually) regulated in the process, i.e. the leaving oil flow is being throttled. This results in a pressure transmission, whereby the side of the piston rod is charged with a higher pressure than the system pressure! The consumers applied must be designed to bear that pressure! Now check-switch the individual functions several times, check tightness again and the noise behavior of the unit.

Pressure Switches
The unit is prepared with the following pressure switches:

Signal	signal of switching point	value / setting
S6	slips are up	230 bar
S3	slips are set (down)	230 bar

During commissioning, the following parameters need to be checked:

- All parts of the unit for visible leakage
- Noise development
- Housing temperature e.g. of the valves

8.6.2 Further Hydraulic Components

Accumulators, proportional valves, manometric switches, coolers and other valves not mentioned must principally be set by professional fitters and have therefore not been listed here.

Please do not hesitate to contact our special department if you have further queries.

8.7 Commissioning at site

Check the complete and correct installation again. Only if you are sure that no hazardous movement is produced, switch on the unit. Check all lines and devices for leak-tightness. **Valves may not be re-adjusted without consultation of the plant constructor. Correct setting of these valves is safety-relevant.**

8.8 The Most Common Errors during Commissioning

Apart from maintenance, commissioning is extremely crucial for the service life and functional safety of a hydraulic-unit. Therefore, errors during commissioning have to be avoided to the maximum possible.

- A check of the fluid tank is neglected
- The operational fluid is filled without being filtered
- The installation is not checked prior to commissioning
  (subsequent modification with fluid loss!)
- Parts of the plant are not ventilated
- Pressure control valves are set too close above the operational pressure
  (the blow-down pressure difference is not complied with)
- Pressure controls of hydraulic-pumps are set higher than or as high as the pressure control valve
- Abnormal pump noise is neglected (cavitations, leaking suction line, too much air in the operational fluid)
- Transverse load on cylinder rods is neglected (fault in assembly)
- Cylinders are not ventilated (tightness damage) or pressure transmission has not been considered (damage on the piston rod side due to inadmissible high pressure)
- Limit switches are set too narrowly
- The switching hysteresis of manometric switches is neglected during adjustment
- Hydro-pump and hydro-motor housings are not filled with operational fluid prior to commissioning
- Adjustments are not documented
- Adjustment spindles are not secured or sealed

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9. Operation and Dismounting of the power unit

9.1 Machine Operation

The unit is supplied without electrical control. The procedure for starting, stopping and driving individual movements is described in the guidance of the control manufacturer. For further information refer to that documentation.

Deviations from normal operation e.g. increased power consumption, temperatures or vibrations, unusual noises or odors, tripping of monitoring devices, etc. indicate that the unit is not functioning properly. This can cause faults which can result in eventual or immediate death, severe injury or material damage. Immediately inform the supervisor. If you are in doubt, immediately switch off the unit, being sure to observe the system-specific safety conditions.

9.2 Stoppages

If the unit remains out of service for an extended period of time (> 6 month), it should be started up refering to the instructions in the " Commissioning " section (chapter 8.7) before restarting.

If the unit is not to be used for a period in excess of 12 months, suitable anticorrosion, mothballing, packaging and drying measures must be taken. For further information please contact the manufacturer.

9.3 Emergency operation

No emergency operation is intended.

9.4 Dismounting and Disposal

A disassembly of the hydraulic unit must be done by competent personnel only. Make sure that no hydraulic oil or contaminated construction units can get into the environment.

Machines must be disposed of carefully taking into account national and local regulations in the normal recycling process or by returning the machines to the manufacturer.

The following must be taken into account when disposing of a machine:

- Oil and grease in accordance with the directive on used oil.
  No mixing with solvents, cleaner solvents or paint residues
- For the purposes of recycling, the components must be separated into:
  - scrap iron
  - aluminum
  - non-ferrous heavy metal
  - electronic scrap
  - plastic (polyamide, glass-fiber reinforced polyamide, polypropylene)

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11. Certificate according to DIN EN ISO 9001:2008

Certificate

GL Systems Certification

GL Systems Certification herewith certifies that the company

WILLMANN Steuerungstechnik GmbH
Karl-Friedrich-Benz-Straße 2-4, D-49377 Vechta

A service of the HANSA-FLEX Group

relevant for

hydraulic plant and machine construction and steel construction for hydraulic engineering with focus on power packs and sale of components / spare parts. The area of application includes the following fields of activity:

- ***sheduling / consulting***
- ***project planning***
- ***assembly***
- ***bringing into service / installation***
- ***training***
- ***repairing***

has established and maintains a Management System.

GL Systems Certification confirms that the Management System of the above mentioned company has been assessed and found to be in accordance with the requirements of the following standard:

ISO 9001:2008

The validity of this certificate is subject to the company applying and maintaining its Management System in accordance with the standard indicated. This will be monitored by GL Systems Certification.

The certificate is valid from November 22, 2013 until November 21, 2016

GL Systems Certification Hub Germany

Jasmin Kugel

Certificate no. **QS-168/04HH**

This certificate is valid only in connection with certificate no. QS-168HH

DAkkS
Deutsche
Akkreditierungsstelle
D-ZM-16026-01-02

Germanischer Lloyd SE, Competence Centre Systems Certification, Brooktorkai 18, D-20457 Hamburg

12. Assembly Drawing

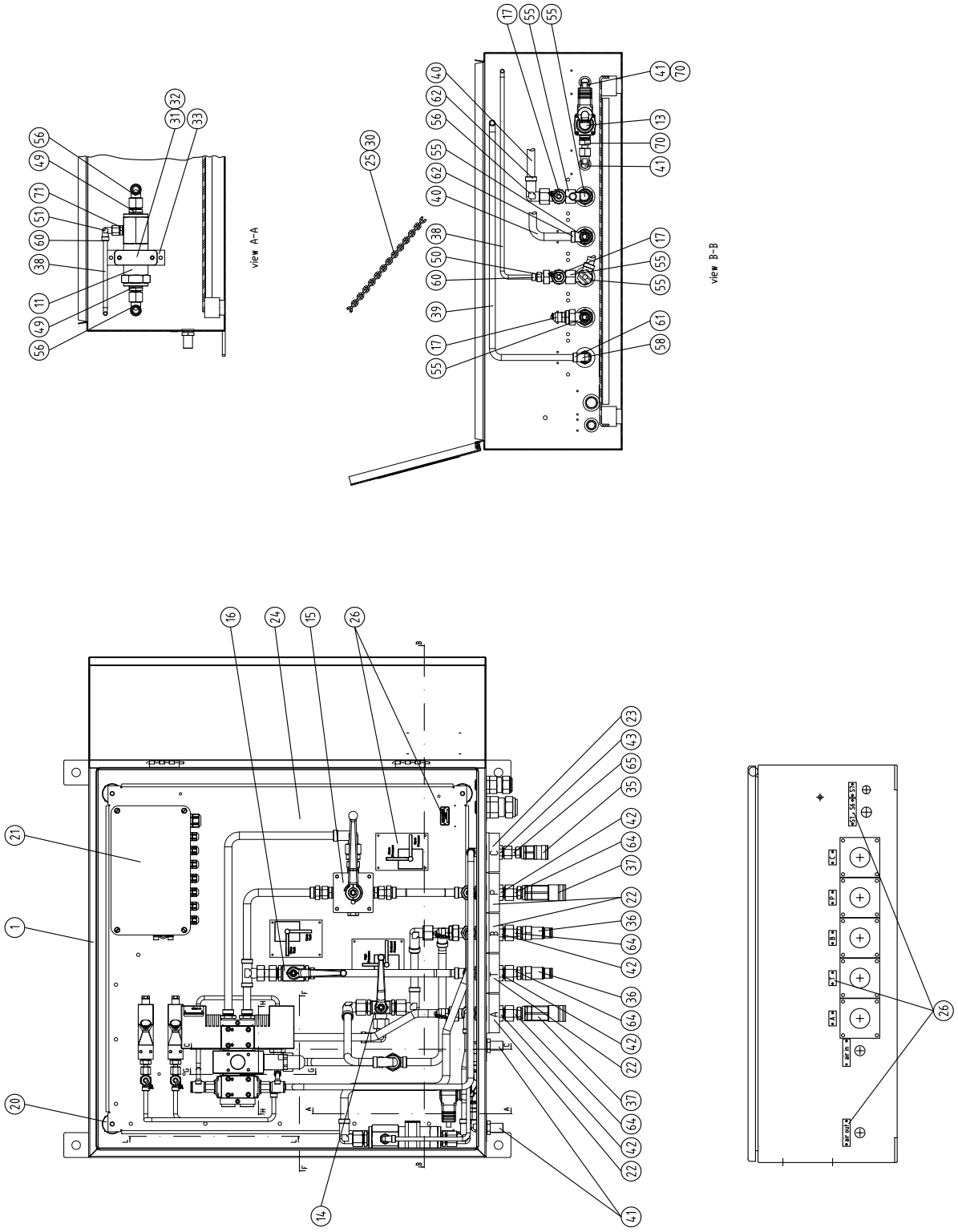


Fig. 1: Assembly Drawing 1

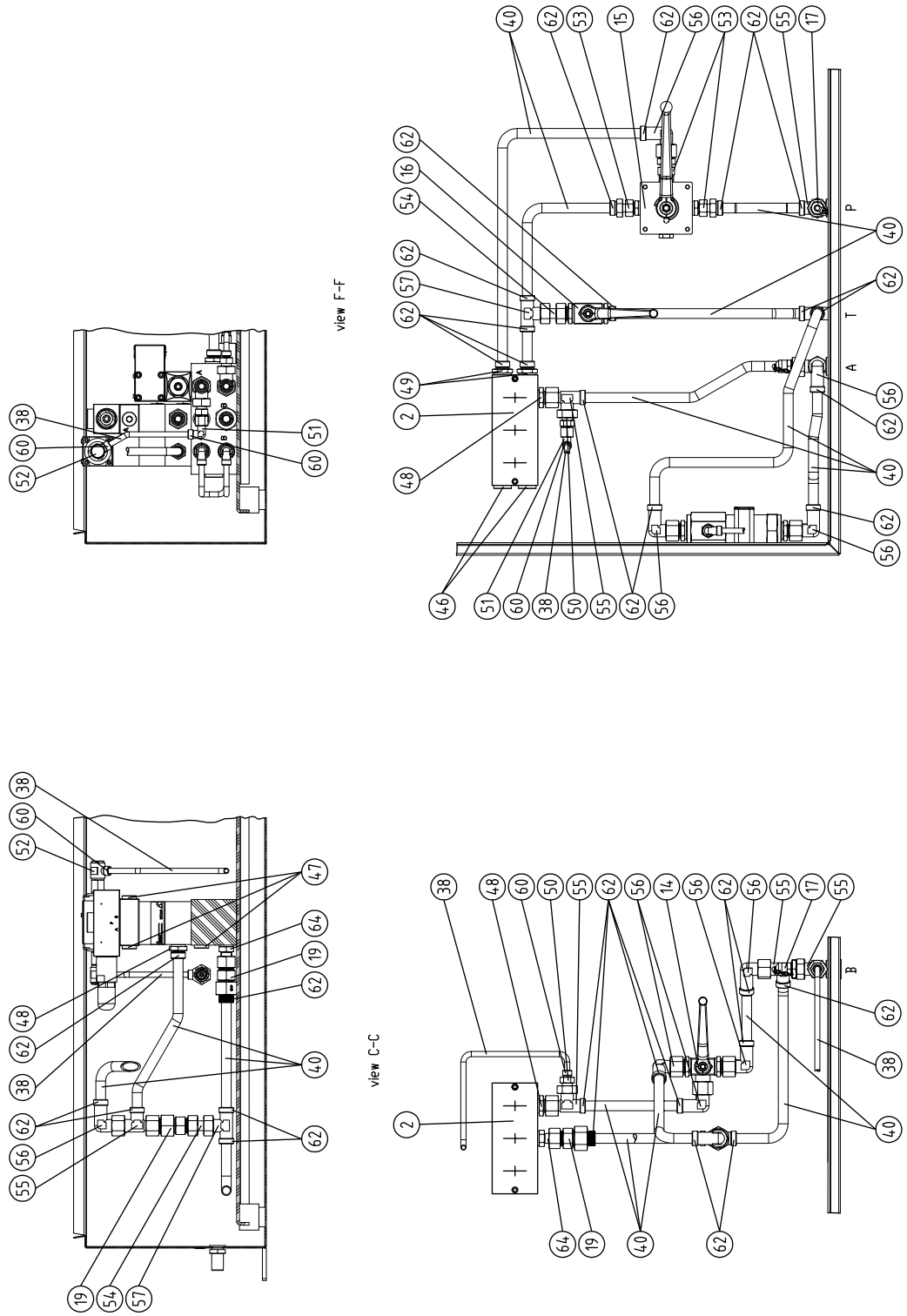


Fig. 2: Assembly Drawing 2

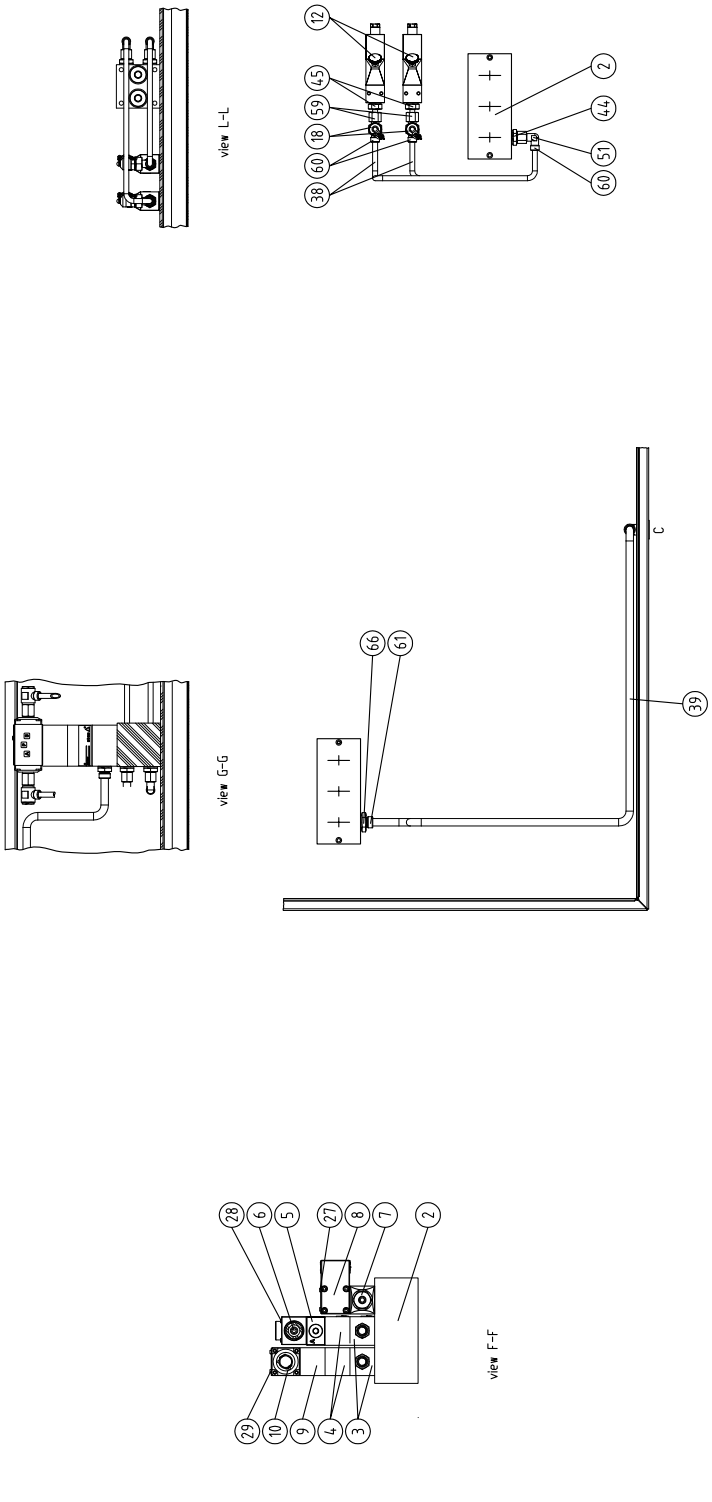
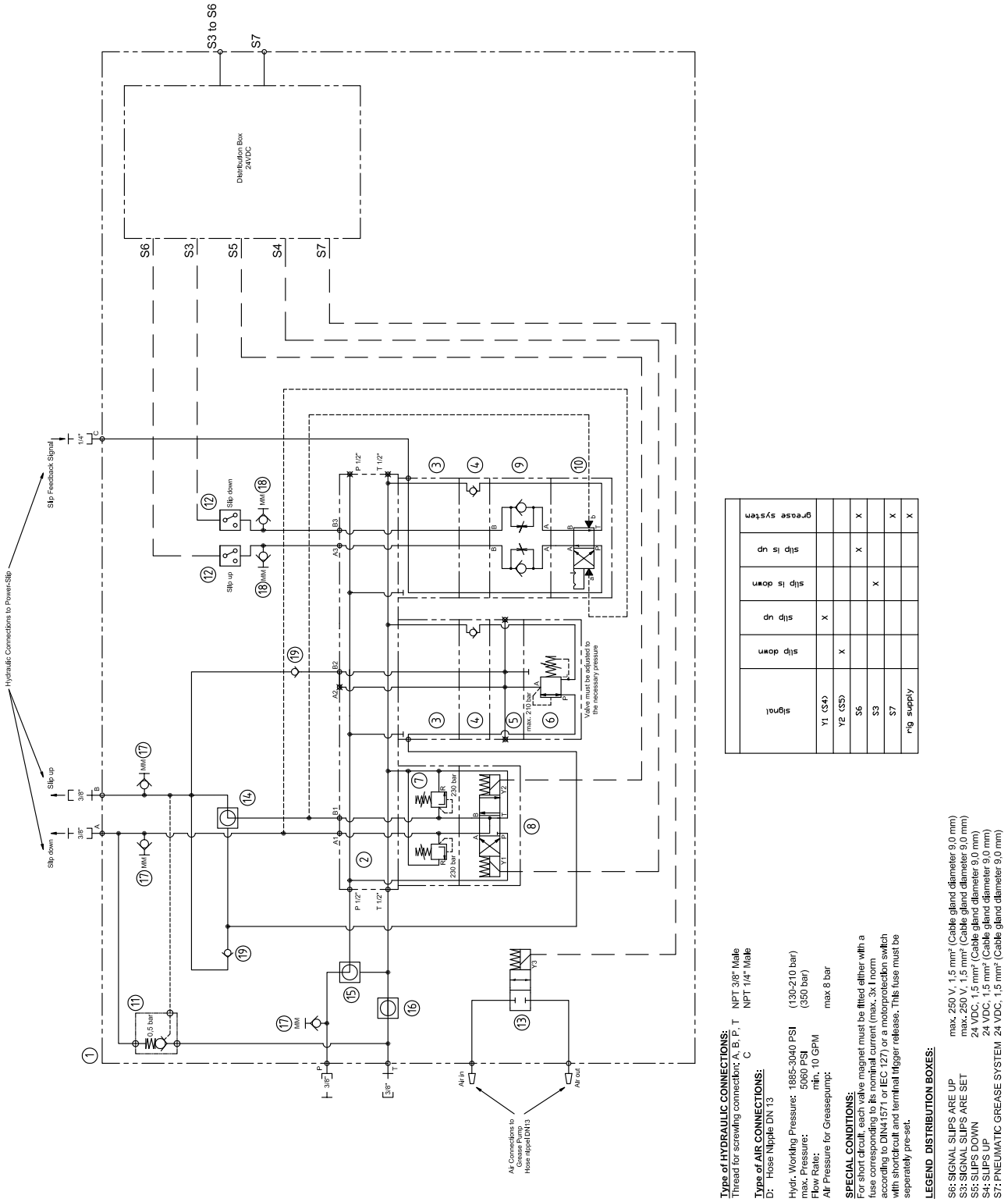


Fig. 3: Assembly Drawing 3

13. Hydraulic diagram



signal	slip down	slip up	slip is down	slip is up	grease system
Y1 (S4)		x			
Y2 (S5)	x				
S6				x	x
S3			x		
S7					x
rig supply					x

Type of HYDRAULIC CONNECTIONS:
Thread for screwing connection; A, B, P, T NPT 3/8" Male
C NPT 1/4" Male

Type of AIR CONNECTIONS:
D: Hose Nipple DN 13

Hydr. Working Pressure: 1885-3040 PSI (130-210 bar)
max. Pressure: 5060 PSI (350 bar)
Flow Rate: min. 10 GPM
Air Pressure for Greasepump: max 8 bar

SPECIAL CONDITIONS:
For short circuit, each valve magnet must be fitted either with a fuse corresponding to its nominal current (max. 3x I norm according to DIN41571 or IEC 127) or a motorprotection switch with shortcircuit and terminal trigger release. This fuse must be seperately pre-set.

LEGEND DISTRIBUTION BOXES:

S6: SIGNAL SLIPS ARE UP max. 250 V, 1,5 mm² (Cable gland diameter 9,0 mm)
S3: SIGNAL SLIPS ARE SET max. 250 V, 1,5 mm² (Cable gland diameter 9,0 mm)
S5: SLIPS DOWN 24 VDC, 1,5 mm² (Cable gland diameter 9,0 mm)
S4: SLIPS UP 24 VDC, 1,5 mm² (Cable gland diameter 9,0 mm)
S7: PNEUMATIC GREASE SYSTEM 24 VDC, 1,5 mm² (Cable gland diameter 9,0 mm)

Fig. 4: Hydraulic Drawing

14. Electric diagram

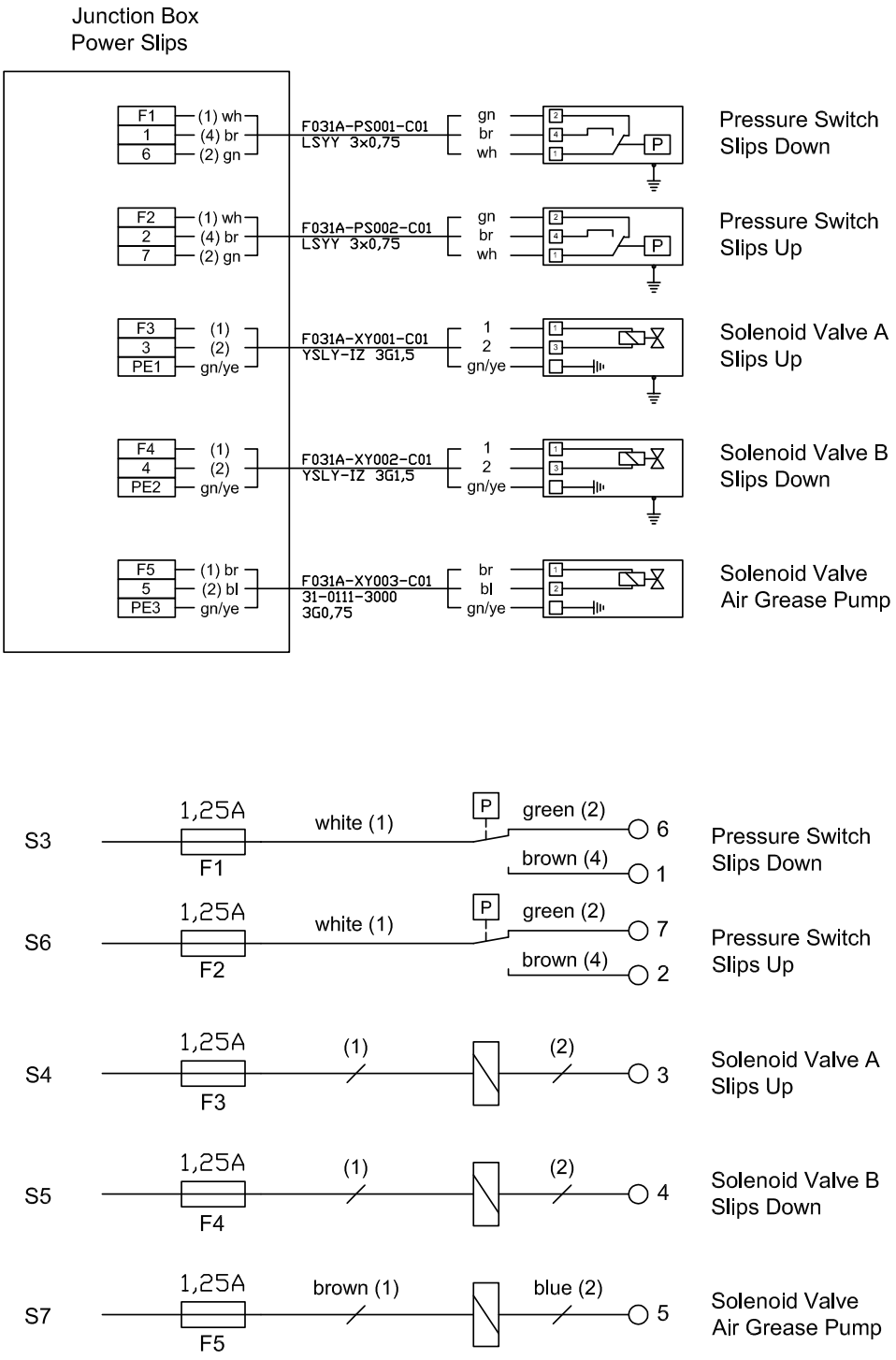


Fig. 5: Electric Drawing

Part list

Pos.	Qty.	P/N	Description
1	1	757107-10	Control Box
2	1	757107-11	Mounting Subplate 3x NG6
3	2	757107-12	Inducting Plate NG6
4	2	757107-13	Check Valve NG6
5	1	757107-14	Intermediate Plate AB NG6
6	1	757107-15	Pressure Reducing Valve NG6
7	1	757107-16	Pressure Relief Valve NG6
8	1	755362	4/3 Way Valve, explosion proof (EEx eII T
9	1	757220	Throttle Check Valve;
10	1	757107-17	Hydr. Operated Valve NG6
11	1	757107-18	Non-Return Valve Cone Locking
12	2	675074	Pressure Switch
13	1	755105-2	Pneum. 2/2 Way Valve, electrical operated
14	1	757107-19	3-Way Ball Valve, Block Design
15	1	757107-20	3-Way Ball Valve, Block Design
16	1	757107-21	2-Way Ball Valve, Block Design
17	3	757107-22	Test Coupling
18	2	755361	Pressure Coupling
19	2	757107-23	Check Valve
20	4	757107-24	Rubber Damper
21	1	757107-25	Junction Box
22	4	757107-26	Pipe Penetration
23	1	757107-27	Pipe Penetration
24	1	757107-28	Mounting Plate
25	1,5	757107-29	Chain
26	1	757109-1	Set of Name Plates
27	1	757107-31	Allen Screw Set
28	1	757107-32	Allen Screw Set
29	1	757107-33	Allen Screw Set
30	1,5	757107-34	Heat Shrink Hose
31	1	757107-35	Tube Clamp Light
32	1	757107-36	Cover Plate
33	1	757107-37	Screw Plate
34	1	612965	Coupling, Flat Face, male;(replaces 61296
35	1	612966	Coupling, Flat Face, female;(replaces 612
36	4	612936	Coupling, Flat Face, male;(replaces 61293
37	4	612937	Coupling, Flat Face, female;(replaces 612
38	1,5	757107-38	Hydraulic Pipe
39	1	757107-39	Hydraulic Pipe
40	2,2	774710	Hydraulic pipe
41	2	757107-40	Bulkhead Connector Stud 90°
42	4	790188	Bulkhead Fitting straight
43	1	757107-41	Bulkhead Connector Stud
44	2	757107-42	Connector M/M
45	2	613946	straight connection;(replaces 645111)
46	2	645094	Locking screw
47	3	645092	Locking screw
48	3	757107-43	Connector M/M
49	4	790170	Straight Connection
50	3	790132	Reducing fitting
51	4	774510	Adjustable 45° Connector
52	2	757107-44	Banjo Fitting FF 90°
53	3	757107-45	Connector Stud
54	2	757107-46	Swivel Connector
55	10	790166	Adjustable direction fitting, L shaped
56	9	790168	90 degree Street Elbow
57	2	790190	Socket
58	1	757107-47	Connector Stud 90°
59	2	757107-48	Connector Stud T
60	10	757107-49	Union Nut FM
61	2	757107-50	Union Nut FM
62	28	757107-51	Union Nut FM
63	2	612951-1	Swage Nippel
64	5	757107-52	Connector M/S
65	1	757107-53	Connector M/S
66	5	757107-54	Connector M/M
67	1	757107-55	Connector M/M
68	4	755107-2	Thread Adapter NPT 3/8"
69	1	757107-56	Connector M/S
70	2	757107-57	Connector M/S
71	1	757107-58	Connector M/M

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15. Documents of the installed components

For the production of the aforementioned hydraulic unit following main components with own documentation were installed.

To comply with the regulations and ensure the function of the power unit the respective guidance's are to be considered in every detail!
Adjustments and exchange of the components may be done only by trained technical personnel!

manufacturer	description
Atos	Explosion-Proof on/off and proportional valves - Electrical connections
Atos	Technical data Explosion proof solenoid valves
Buschjost	Brief Operating Instructions for solenoid valves
Buschjost	Operating Instructions for valve solenoids
Buschjost	EC- Type- Examination Certificate
Rose	Operation manual Explosion protected junction boxes
Rose	EC- Type- Examination Certificate
Stahl	Operating Instructions Fuse-base 8560
Suco	Operating Instructions Diaphragm-/ Piston Pressure Switch Series 0165
Suco	EC- Declaration of conformity / Type- Examination Certificate

Our goal is to become the leading provider of mission critical oilfield products and related services in terms of customer satisfaction, safety and financial performance.

Our experienced management team and employees are dedicated to solving our customers' problems. We invest in long term relationships and cooperate on product development with our clients, we consider them our partners.

OUR CORE VALUES

Integrity: In everything we do, in every interaction, both internally and externally, we strive to operate with the upmost integrity and mutual respect.

Long-term view: We are building our company for the long-term, a company that we can be proud of.

Open communication: We believe partnerships with our customers and co-workers must be based on trust, professionalism and transparency.

Customer focused: Our products enhance our customer's performance and we listen to their needs and work with them to solve their challenges.

Good place to work: We are committed to creating a workplace that fosters innovation, teamwork and pride. Every team member is integral to our success and is treated equally and fairly.

No one gets hurt: The safety of our employees and customers is our first priority coupled with a healthy respect for the environment.

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