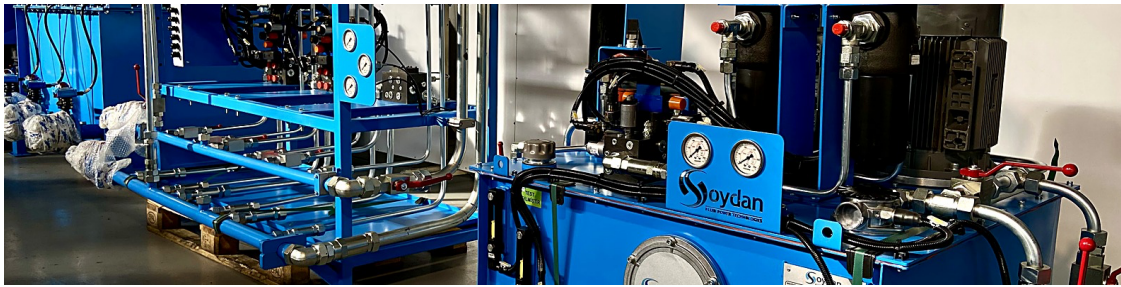


Soydan Fluid Power Technologies A.Ş.

Product Operating & Maintenance Manuals

Hydraulic Power Units · Hydraulic Cylinders (Hydrocyl)



Part A — Hydraulic Power Units



Part B — Hydraulic Cylinders · Hydrocyl

About this documentation set

This set brings together the general Operating & Maintenance manuals for the two Soydan Fluid Power product lines. Each part is a complete, self-contained manual with its own cover, contents and section numbering:

Part A — Hydraulic Power Units

Safe transport, installation, commissioning, operation, maintenance and troubleshooting of Soydan hydraulic power units and assemblies (reservoir, motor-pump, manifolds, accumulators, filtration, cooling, instrumentation).

Part B — Hydraulic Cylinders (Hydrocyl)

Safe transport, installation, commissioning, operation, maintenance and troubleshooting of Hydrocyl mill-type (welded) and tie-rod hydraulic cylinders, including piston-rod care and end-position cushioning.

NOTICE

Always keep the order-specific documentation

Every Soydan unit and Hydrocyl cylinder is built to a customer order. Keep the order-specific documentation (technical specification / data sheet, hydraulic diagram, component or spare-parts list and assembly drawing) together with the relevant part of this set; where the two differ, the order-specific documentation prevails.

Contact

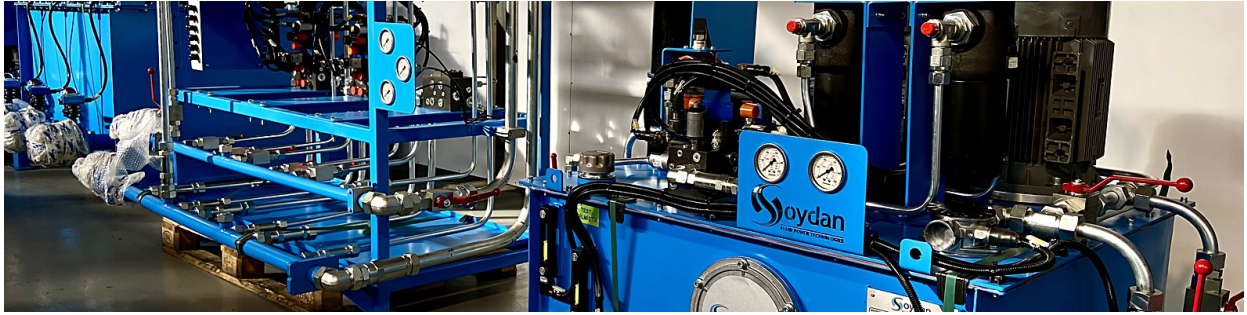
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Hydraulic Power Unit

Operating & Maintenance Manual

General instructions for Soydan hydraulic power units and assemblies



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Fluid Power Technologies

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Important — please read before use

This manual gives general information on the safe and correct transport, installation, commissioning, operation, maintenance, disassembly and troubleshooting of hydraulic power units (HPUs) and hydraulic assemblies manufactured by Soydan.

- Read this manual — and in particular Chapter 2, “Safety” — thoroughly before working with the unit.
- Every Soydan HPU is built to a customer order. Always keep the order-specific documentation (technical specification, hydraulic diagram, component list and assembly drawing) to hand alongside this manual; where the two differ, the order-specific documentation prevails.
- Throughout this manual the term “hydraulic power unit” (HPU) is used for both power units and hydraulic assemblies unless a distinction is stated.
- The photographs and drawings show representative Soydan units and components; the unit supplied may differ.

NOTICE

Partly completed machinery

A hydraulic power unit is partly completed machinery in terms of EC Machinery Directive 2006/42/EC. It is not a ready-to-use machine and may only be put into service once it has been integrated into a machine or system that fully complies with the Directive. This manual does not replace the operating instructions for the complete machine.

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1 About this manual

This manual contains important information for working safely and correctly with Soydan hydraulic power units. It applies generally to the HPUs and hydraulic assemblies that Soydan develops and manufactures to customer specifications.

- Keep this manual and the order-specific documentation together and readily accessible to everyone who works on the unit.
- Always pass on this manual together with the order-specific documentation when the unit is handed to a third party.

1.1 Related documents

- The operating instructions for the complete machine or system into which the HPU is installed.
- The documentation of the built-on components (pumps, motor, valves, filters, accumulator, instruments, cooler).
- The applicable legal and accident-prevention regulations and environmental-protection rules for your country and workplace.

2 Safety

The HPU is designed and built in line with the recognised rules of the technology. Even so, there is a risk of injury or damage to property if the following instructions are not observed. Because the HPU interacts with the complete machine, its installation can create additional hazards — in particular mechanical movements produced by the drives (cylinders, motors). The machine manufacturer must carry out an independent risk assessment and prepare operating instructions for the complete machine.

NOTICE

These instructions are no substitute for the operating instructions of the complete machine.

2.1 Intended use

- The HPU is a drive system for hydraulic machines and is intended exclusively for integration into a machine or system, or for assembly with other components to form one.
- It may be commissioned only once it has been integrated into the machine/system for which it is designed and that machine/system fully complies with EC Machinery Directive 2006/42/EC.
- Operate the unit only within the operating conditions and performance limits given on the nameplate and in the technical specification.
- The HPU is a work appliance for industrial use and is not designed for private use. Intended use includes having fully read and understood this manual, especially this chapter.

2.2 Improper use

Any use other than that described under “Intended use” is improper. Improper use, incorrect installation or handling voids the warranty and may cause injury or damage.

2.3 Qualification of personnel

Assembly, commissioning, service (maintenance, inspection, repair) and disassembly require a basic knowledge of mechanics, electrics and hydraulics. These activities may only be carried out by qualified technical personnel, or by instructed persons under qualified supervision. Qualified personnel can recognise hazards and take appropriate measures thanks to their training and experience, and observe the rules relevant to the work.

2.4 Signal words used in this manual

Safety instructions are introduced by a signal word that indicates the degree of hazard:

Signal word	Meaning
DANGER	Imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to equipment.
NOTICE	Information which, if disregarded, may result in machine malfunction or damage.

2.5 General safety instructions

- Observe the accident-prevention and environmental-protection regulations for your country and workplace.
- Keep the oil manufacturer's safety data sheet to hand and observe the information in it.
- Only persons authorised by the operator may enter the immediate vicinity of the unit, including during standstill.
- Only authorised personnel may adjust the components, and only within the intended use.
- Persons working on the unit must not be under the influence of alcohol, drugs or medication that affects their reactions.
- Provide sufficient stability and observe the load-bearing capacity of the foundation, attachment devices and transport equipment. Use only the designated attachment points. Do not place objects on the unit.
- Never remove or damage lead seals fitted to factory-set valves.

WARNING

Hot surfaces, high-pressure oil and oil mist

During operation the unit — and especially the valve solenoids — can become hot enough to cause burns; wear heat-proof gloves/clothing.

In the event of a leak, never let any part of the body contact the oil jet and never try to seal a leak with a cloth — high-pressure oil can penetrate the skin. Depressurise first.

Oil mist and oily surfaces create fire and slip hazards; keep ignition sources away and clean spills promptly.

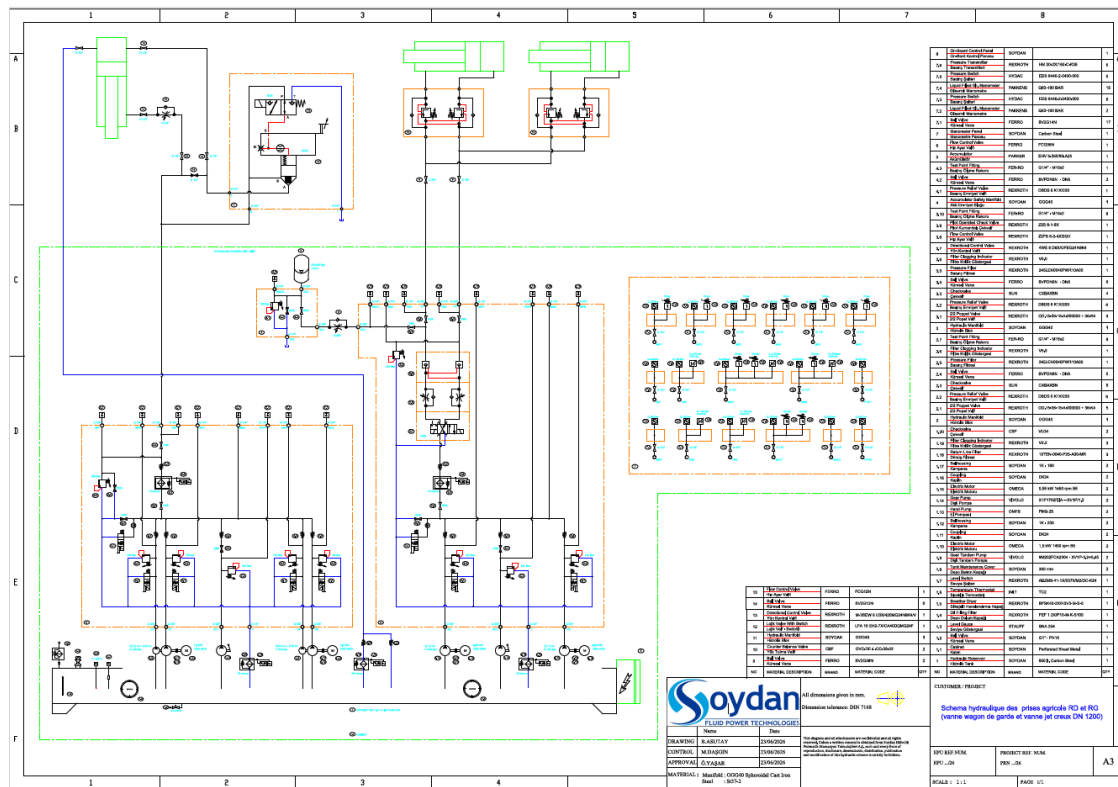
2.6 Obligations of the operator

The operator must train personnel regularly in: the use of this manual and the legal rules; the intended use and operation of the unit; the site safety instructions; and what to do in an emergency.

3 Scope of delivery

In addition to the unit itself, the scope of delivery includes general and order-specific documentation:

Document	Power unit	Assembly
Technical specification	included	included
Hydraulic diagram	included	possible data sheet
Component list to the hydraulic diagram	included	possible data sheet
Assembly drawing	included	possible data sheet
Declaration of Incorporation (2006/42/EC)	included	—
Operating & maintenance manual (this document)	included	included



4 Product description

Soydan hydraulic power units are drive systems built to customer specification for installation into machinery. For the exact description of your unit refer to the order-specific documentation: technical specification, hydraulic diagram, component list and assembly drawing.

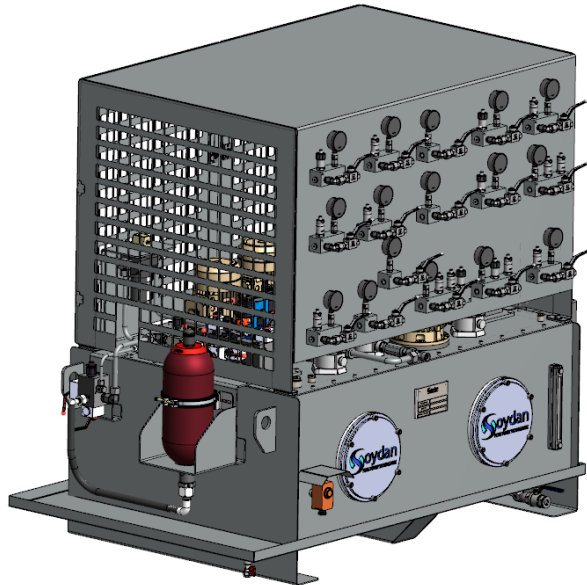
4.1 Main components

In accordance with this manual, a Soydan HPU consists at least of:

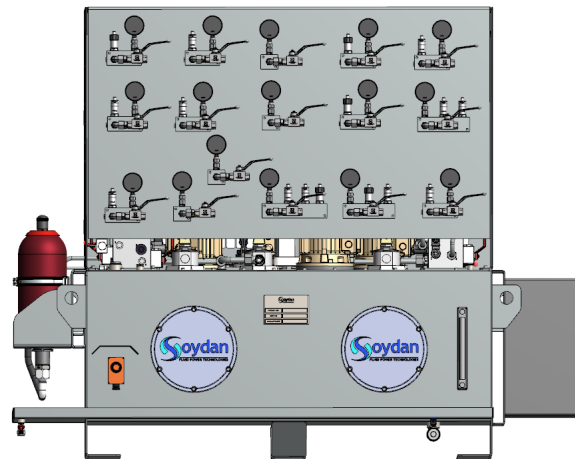
- Steel reservoir (tank) with filler-breather, level gauge and drain.
- Electric motor and pump (single, tandem or multiple).
- Pump pressure-limiting / relief device.
- Manifold block(s), piping, hose assemblies and fittings.

Depending on the order, the unit may also include:

- Hydraulic control (directional, flow, check, counter-balance, logic and proportional valves).
- Hydraulic accumulator with separate N₂ pre-charge and an accumulator safety block.
- Additional safety devices to prevent inadmissible pressures.
- Instrumentation for level, temperature, pressure and filter contamination.
- Filtration (suction, return-line and/or pressure filters with clogging indicators) and cooling (oil/air or oil/water heat exchanger).
- Manometer panel, hand pump and an on-board control panel.

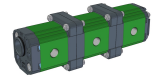


Typical Soydan HPU — overview



Front elevation — manometer panel, tank & nameplate

The table below lists the principal components. The actual makes and models fitted to your unit are given in the order-specific component list.

Component	Description	Example
Reservoir (tank)	Carbon-steel oil reservoir with filler-breather, level gauge, drain and maintenance covers.	<i>in-house / see list</i>
Electric motor	IEC low-voltage motor, foot or flange (B5) mounted, sized to the duty.	
Pump	Gear, tandem or multiple pump driven by the motor.	
Control valves	Directional, relief, check, flow and logic valves on a machined GGG40 manifold block.	
Accumulator	Bladder accumulator with N ₂ pre-charge and a safety block for relief and depressurisation.	
Filters	Suction, return-line and/or pressure filters, with visual/electrical clogging indicators.	

Component	Description	Example
Level & filler	Visual level/temperature gauge and filler-breather with air-drying element.	
Instruments	Liquid-filled pressure gauges, pressure switches/transmitters, level and temperature switches.	
Hand pump	Emergency / manual hand pump, where fitted.	

4.2 Product identification

The unit is identified by its nameplate, the order-specific documentation and the delivery note. The nameplate is fixed to the reservoir (see the front-elevation view above) and typically states: model and serial number, year of manufacture, motor rating (kW / rpm / voltage), maximum working pressure, reservoir volume, recommended fluid and weight. Always quote the model and serial number when contacting Soydan.

5 Transport and storage

- Observe the transport instructions on the packaging.
- Observe the ambient conditions in Chapter 15 during transport and storage.
- If the packaging is opened for inspection, re-seal it to its original condition; wherever possible leave it in place until directly before assembly.

5.1 Transporting the unit

WARNING

Danger to life from a tipping, falling or uncontrolled unit

Check the weight and the position of the centre of gravity before lifting.

Lift and secure the unit only at the designated attachment points / forklift channels — never at the piping, hoses, manifolds, motor or accumulator.

Observe the load-bearing capacity of the attachment devices, lifting gear and floor conveyors, and keep unauthorised persons out of the hazard zone.

Centre of gravity and attachment points

The centre of gravity is generally marked on the packaging and given on the assembly drawing. Attachment points are welded or screwed lugs/eyebolts for lifting or holding down. After a period in service they may be worn — check them before re-use, screw eyebolts fully home, and replace or clearly mark any that are unfit.

Manual handling and forklift transport

- For manual lifting, assess the load realistically, use lifting aids and correct technique (risk of injury from overloading / poor posture).
- When using a forklift, protect the paintwork at the contact surface, keep a stable centre of gravity, secure the unit against tilting and ensure the built-on components do not foul the forks or lifting gear.

5.2 Storing the unit

- Store in a dry, clean, frost-free place within the ambient conditions of Chapter 15.
- Keep all ports closed with their plugs and protect machined/steel surfaces against corrosion.

NOTICE

Soydan delivers hydraulic power units without an oil filling; from factory testing there may still be oil residues in the unit. Re-preserve the unit after any inspection.

6 Assembly and installation

6.1 Unpacking

Before installation, check the unit for visible transport damage (cracks, missing seals/screws/covers). Report any damage. Keep the attachment points for later transport.

6.2 Mechanical mounting

- Place the unit level on a stable foundation able to bear its full (oil-filled) weight.
- Leave sufficient access for operation, filter changes, oil changes and instrument reading, and enough clearance around the cooler/cabinet for ventilation.

6.3 Connecting the hydraulic system

CAUTION

Cleanliness and blanking plugs

Ensure absolute cleanliness — foreign bodies such as weld beads or swarf in the lines will damage the unit.

Before connecting, remove all plastic blanking plugs and replace them with pressure-resistant fittings/flanges; hydraulic fluid may escape if plugs are left in.

- Connect the ports according to the marking on the hydraulic diagram; tighten fittings to specification and support the piping.
- Flush new pipework before putting the system into service (see 7.1).

6.4 Connecting the cooling water (if fitted)

For units with an oil/water heat exchanger, connect the cooling water according to the diagram and observe the required flow rate and pressure.

6.5 Connecting the electrical system

- Electrical connection must be carried out by a qualified electrician, in accordance with the machine manufacturer's instructions.
- Connect the motor per its nameplate and check the direction of rotation (see 7.1).
- Connect the sensors (level, temperature, pressure, filter clogging) to the machine control as shown in the diagram.

7 Commissioning

Commissioning may not take place until it has been determined that the machine into which the HPU is installed complies with all relevant directives. Observe the operating instructions of the complete machine — commissioning activates machine functions and can produce mechanical movements (cylinders, motors).

DANGER

Commissioning activates machine functions

Ensure that all safety devices are present and active before commissioning.

CAUTION

Do not run the unit dry

Never commission the unit without oil or with insufficient oil, or damage will result. Ensure the tank, suction and working lines and the components are filled with the specified oil and remain filled during operation.

7.1 First commissioning

Before commissioning

- Ensure the line system is in good, work-safe condition.
- Open the taps in the cooling-water and suction lines (where present).
- Open the pressure-gauge air relief (turn from “Closed” to “Open”) to prevent measuring errors.
- Set the electrical level- and temperature-monitoring devices (where present) as required for operation.

Valve settings

- Set pressure-relief and flow-control valves to their lowest setting.
- Bring directional valves to the basic position; do not energise proportional valves to the command value.
- Do not change sealed valves or valves with a fixed factory setting (see the circuit diagram / component list).

WARNING

Pressure tapping points are live

Measuring couplings can be operated under pressure. Before connecting a measuring hose to a coupling, make sure the other end is already connected to a pressure-tight gauge/transducer.

Do not dismantle hexagon-bolt measuring connections until the connected circuit has been depressurised.

Accumulator

- Where an accumulator is fitted, keep its documentation with the unit; comply with the local inspection rules before and during operation.
- On the oil side the unit must be sealed, bled and depressurised; charge the accumulator to the pre-set gas pressure given in the circuit diagram.
- Use nitrogen only (Class 4.0 purest; N₂ 99.99 vol.-%). Label the accumulator with the pre-charge pressure and note it in the circuit diagram for later comparison.

Filling the hydraulic system

- Fill with the specified oil, ensuring absolute cleanliness; if the unit is contaminated after transport/storage, clean the filter inlets first.
- Do not remove the filter screens at the filler neck. New oil is often dirtier than the required class — fill through a fine-filter unit where possible.
- Fill the pump housing with oil before starting (see the pump data sheet), and observe the minimum/maximum fluid levels.

NOTICE

Cleanliness target

General industrial systems require an oil cleanliness class of about 20/18/15 to ISO 4406; systems with servo or high-quality control valves require a higher class, e.g. 19/16/13. Observe the cleanliness requirement on the component data sheets.

Start-up

1. Start the electric motor in inching (jog) mode and check the direction of rotation against the arrow.
2. Flush the system until the target cleanliness class is reached; take oil samples downstream of the return-line filter.
3. Operate the directional valves and extend/retract the actuators several times; repeat the bleeding. Bleeding is complete when there is no oil foam in the tank, no jerky movement and no abnormal noise.
4. Operate at low pressure until the unit is fully bled, then increase the load in steps.
5. Check the fluid level and top up if necessary; monitor the operating temperature as it settles.
6. Check all connections for tightness, seal any leaks, and re-check tightness after a few hours.

The most frequent commissioning errors

- The fluid level / tank is not checked; the system is filled with unfiltered oil.
- Pressure-relief valves set too close to the working pressure; pump pressure controllers set at or above the relief valve.
- Abnormal pump noise ignored (cavitation, leaky suction line, too much air in the oil).
- Switching hysteresis of pressure switches not considered.
- Pump / motor housing not filled with oil before starting; settings not documented; uninvolved personnel near the machine.

7.2 Re-commissioning after extended standstill

- Check the oil level, the accumulator gas pre-charge and the tightness of the components and line system.

- Perform the switch-on procedure with increased caution and bleed the system.
- Observe the operating instructions of the machine manufacturer.

8 Operation

As partly completed machinery, the HPU is operated by way of the complete machine — refer to the machine manufacturer's operating instructions for how to run it, and to the hydraulic diagram (or a hydraulics specialist) for the functional logic. During operation, keep the pressure gauges, oil level and oil temperature under observation and stop the unit if readings leave the normal range.

9 Maintenance

Define maintenance tasks and intervals according to the components fitted and the operating conditions (pressures, temperatures, ambient conditions, duty cycle, shift operation) — refer also to the machine manufacturer's instructions. Within this framework, carry out a regular visual inspection for illegible labels/warning signs, leaks, loose or missing parts, and signs of external force. The intervals below are a starting point for a Central-European climate and normal metal-industry loading.

9.1 Maintenance schedule

Interval	Task
Each shift / 8 h	Check oil level; oil temperature; filter clogging indicators; visible leaks; abnormal noise.
Weekly	Compare pressure-gauge readings against the commissioning baseline; check hose condition.
Every 6 months	Check pressure settings; piping, fittings and welds; tank and steelwork (external); clean cooler / heat-exchanger; verify lead seals are intact.
Annually	Oil analysis by a laboratory; check accumulator gas pre-charge; comprehensive inspection of all components.
As indicated	Replace filter element when the clogging indicator trips; change the oil according to the analysis result.
NOTICE	Trend monitoring Record inspection results. A gradual temperature rise or shortening filter-change intervals indicate wear of pumps, control edges or seals, or ageing oil — inspect all components. A sudden high temperature rise is an alarm signal and requires immediate inspection.

9.2 Cleaning and care

CAUTION	Do not damage seals or surfaces Ensure absolute cleanliness when working on the unit; penetrating dirt and liquids cause faults. Never use solvents or aggressive detergents, which attack and age the seals. Do not use a high-pressure cleaner; cover all openings and check that seals and electrical connectors are firmly fitted before cleaning.
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9.3 Inspection, maintenance and repair

Oil level (every 8 h)

The oil level changes during operation with cylinder movement and accumulator charging; judge it over a complete working cycle. It must neither exceed the upper mark nor fall below the lower mark. Below the minimum there is a risk of pump cavitation; above the maximum, suspect thermal expansion or water ingress (e.g. a leaking oil/water cooler). An oil loss always means a leak — find and remedy the cause before topping up.

Oil temperature (every 8 h)

Check the oil temperature each shift. A rise can be caused by a faulty heat exchanger or changed cooling conditions, incorrect pressure-valve settings, a worn pump, higher ambient temperature or a changed load. Determine and rectify the cause of any inadmissible rise.

Filter clogging indicator (every 8 h)

Check the filter contamination each shift. When the admissible differential pressure is exceeded, the indicator gives an optical (red pin) or electrical signal. Check the indicator after the operating temperature is reached (cold-start check); if it trips, replace the element by the end of the shift at the latest. If replacement intervals become shorter, identify and remedy the source of the extra dirt. Dispose of used elements per the applicable regulations.

Pressure settings (every 6 months)

Check the pressure values every six months, or sooner if the drive behaviour changes (longer cycle times, poorer end-product quality). Record the values. Lead seals on factory-set valves (e.g. accumulator safety valves) show the setting has not been altered — if a seal is defective, contact Soydan.

Oil maintenance (annually)

Have an oil analysis carried out at least once a year by a suitable laboratory to the oil manufacturer's specification; depending on the result, filter, dehydrate or change the oil. Do not use recycled oil. When changing the oil, drain the tank, lines and actuators completely and bleed the system after refilling as at first filling.

Hydraulic accumulators**WARNING****Accumulators store energy and pressurised gas**

Never weld, solder or machine an accumulator. Use nitrogen only — air or oxygen creates an explosion risk.

Before discharging the nitrogen, open the doors/windows of the room (risk of suffocation) and beware of excessive pressure and of super-cooling / cold burns; wear thermal gloves.

Before dismantling, depressurise the accumulator completely on both the oil and the gas side. Observe the statutory accumulator inspections.

Check the gas pre-charge periodically against the value in the circuit diagram, using only approved testing/filling equipment, and select the filling pressure for the gas temperature.

Hoses, piping, cooler, tank

- Hose assemblies and compensators need constant monitoring — replace on damage to the outer layer, signs of overheating/embrittlement, deformation, leaks, a loose fitting, or when the service life is exceeded.
- Piping (every 6 months): inspect for corrosion, cracks and leaks. Re-tighten a leaking fitting once and record it; if it still leaks, renew the seal or replace the pipe section. Investigate cracks/leaks at welds and repair professionally.
- Heat exchanger: clean water-side filters at least every 6 months; keep oil/air cooler lamellae free of contamination.
- Tanks and steelwork (external, every 6 months): inspect for leaks, cracks, corrosion and dents. An internal tank inspection is done when the oil is changed.

DANGER**Confined space — walk-in tanks**

There is a risk of suffocation inside a tank. Before entry, open all manholes/access openings and ensure sufficient breathable air, using forced ventilation if necessary. The inspector must be harnessed and secured by a second person outside the tank, use a lamp suitable for explosive atmospheres, and follow the confined-space procedure.

9.4 Spare and wear parts**WARNING****Use only the specified spare parts**

Parts that do not comply with the component list may cause mechanical hazards or malfunction. Use only components listed in the order-specific documentation, and only new seals with the required media resistance.

Sealing material can differ despite an identical appearance — always check the material number.

When ordering spare parts, quote: the model and serial number from the nameplate; the material code of the component from the component list; and the required quantity. Send spare-part orders to Soydan in writing.

10 Decommissioning

Provide a collecting tank large enough for the total oil volume (tank, line system and actuators). Observe the instructions for the complete machine, then:

1. Switch off the electrical supply and secure it against being switched on again (lock off / short-circuit the supply side).
2. Switch off and secure the hydraulic pressure supply.
3. Depressurise the accumulator on the oil side.
4. Drain the oil into the collecting tank, ensuring the lines and actuators drain completely; bleed if necessary.

11 Disassembly

Only disassemble as far as necessary; reassemble professionally at the intended place.

DANGER

Depressurise, de-energise and stabilise before disassembly

If the system is not depressurised, high-pressure oil will escape; if it is not de-energised, there is a risk of electric shock.

A full unit shifts its centre of gravity as the oil moves — drain the oil (Chapter 10) and ensure stability before loosening any fixings.

Only use intended, checked attachment points.

Carry out the assembly steps of Chapter 6 in reverse order. Despite prior draining, some residual oil will seep out — close all line outlets with suitable plugs. After disassembly, observe Chapter 5 for safe transport.

12 Disposal

Careless disposal pollutes the environment. Dispose of the unit and its components in accordance with the national and company regulations, and dispose of the oil according to the current safety data sheet. Segregate metals, seals and electronic parts for recycling where required.

13 Extension and conversion

You are responsible for any extension or conversion of the product. Altering the unit as supplied changes its condition; the Declaration of Incorporation and any statements made by Soydan then become invalid. Contact Soydan before extending or converting the unit.

14 Troubleshooting

DANGER

Troubleshooting can expose you to hazards

Only troubleshoot with the safety equipment active. If you must deactivate it to trace a fault, take extra precautions and, where possible, run the machine in set-up mode with reduced performance.

Work systematically — random disassembly and readjustment can hide the original cause. Have the hydraulic and electrical diagrams and the component list to hand, and establish whether the unit was working correctly before the fault and whether anything in the system was changed. The tables below list common faults, their possible causes in the HPU, and remedies; they are an aid and not exhaustive — you will often also need to look at the control and connection technology.

A — Excessive / abnormal noise

Area	Possible cause	Remedy
Drive	Coupling misaligned, loose or defective; pump/motor fastening loose; pump or motor defective; wrong direction of rotation.	Align, tighten or exchange the coupling; tighten to spec; replace pump/motor; swap the electrical connections.

Area	Possible cause	Remedy
Suction	Oil level too low; breather contaminated; suction tap only partly open, plugged or not tight; suction filter plugged.	Remedy the oil loss and top up; clean/replace the breather; open the tap fully; clean and seal the suction line; clean/replace the filter.
Pump / oil	Pump seals or pump defective; oil viscosity too high (too cold); oil foams (too much air).	Replace seals/pump; warm the unit or use a lower viscosity class; find and remedy the air ingress.

B — Insufficient power, torque or pressure

Area	Possible cause	Remedy
Valves	Pressure setting too low; directional-valve spool not switching (e.g. no current to solenoid).	Correct the setting per the diagram; check the plug connection and solenoid current.
Lines / other	Pressure loss from undersized piping/hoses; total flow/load leakage too high.	Fit larger nominal widths; review the hydraulic design with Soydan.

C — Pump switches on/off too frequently (accumulator circuits)

Area	Possible cause	Remedy
Accumulator	Accumulator tap closed; gas pre-charge incorrect; pressure-switch settings do not match the requirement.	Check the control-block spool position, the gas pre-charge and the switch settings against the circuit diagram.

D — Oil temperature too high

Area	Possible cause	Remedy
Pump / valves	Fixed-displacement pump at partial load; pressure valve set too low so flow returns to tank via the relief valve.	Review the hydraulic design with Soydan; correct the valve settings per the diagram.
Cooling	Too much oil / poor ventilation; cooler fault (low water flow, high inlet temperature, fouled lamellae).	Check the tank level; provide forced ventilation; check the coolant against the technical specification and clean the cooler.

E — Contaminated oil

Area	Possible cause	Remedy
Particulate	Dirt from insufficiently cleaned parts during installation/filling/repair; ingress via piston rods or breather; component abrasion.	Determine and rectify the cause; flush the system.
Water	Oil/water cooler leak; pressure surges on the cooling-water side.	Check water quality and replace the cooler if necessary; fit the solenoid water-lock valve in the supply line only.

15 Technical data

The technical data for your unit are given on the nameplate and in the order-specific technical specification. The ranges below are typical for Soydan HPUs and are provided for orientation only — always confirm the actual values from your documentation.

Parameter	Typical range (confirm on nameplate / specification)
Reservoir	Carbon steel, approx. 60 – 1000 L (larger on request)
Working pressure	Per order; commonly up to 250 – 350 bar
Drive	IEC low-voltage motor, rating and voltage per order
Hydraulic fluid	Mineral oil HLP (ISO VG 32 / 46 / 68) per the specification
Cleanliness target	ISO 4406 20/18/15 (higher, e.g. 19/16/13, for servo/proportional systems)
Filtration	Suction / return / pressure, per the hydraulic diagram
Cooling	Oil/air or oil/water heat exchanger, where fitted
Ambient conditions	Per the specification (typical +5 ... +40 °C, non-condensing)

16 Contact and service

For spare parts, service and technical support, contact Soydan quoting the model and serial number of your unit:

Soydan Hidrolik Pnömatik Otomasyon

Fluid Power Technologies

- **Türkiye (works):** AOSB, 10039 Sk. No: 21/1, Çiğli, İzmir, Türkiye · Tel +90 232 502 4774
- **United Kingdom:** 566 Chiswick High Road, London, UK · Tel +44 (0) 208 899 6000
- **Web:** www.soydanhidrolik.com · **E-mail:** info@soydanhidrolik.com

17 Glossary

Assembly — Two or more components/assemblies pre-assembled into a suitable form.

Attachment point — Welded or screwed lug/eyebolt used to lift or secure the unit during transport.

Component — Any part with a (partial) function in the system — e.g. valves, filters, cylinders, fittings.

Decommissioning — Preparing the unit for an extended standstill, with the option of re-commissioning or disassembly.

Drive (actuator) — Component converting hydraulic energy into mechanical movement — e.g. hydraulic cylinders and motors.

Hydraulic accumulator — Gas-pressure store — bladder, diaphragm or piston type.

Hydraulic assembly — E.g. valve stand, accumulator station, drive-motor pump unit, filtration/cooling circulation station.

Hydraulic power unit (HPU) — The drive system for a hydraulic machine; partly completed machinery under 2006/42/EC. The drives are not part of the HPU.

Hydraulic fluid — The oil used in the hydraulic system.

Cleanliness class — Oil contamination level to ISO 4406 (e.g. 20/18/15).



HYDROCYL

A Soydan Hidrolik Brand

Hydraulic Cylinders

Operating & Maintenance Manual

General instructions for Hydrocyl mill-type (welded) and tie-rod hydraulic cylinders



Bore up to Ø1000 mm · Stroke up to 12 m · Pressure up to 400 bar

Soydan Fluid Power Technologies A.Ş.

Hydrocyl · ERS Hidrolik — AOSB, İzmir, Türkiye

www.hydrocyl.com · info@soydanhidrolik.com

Document **HC-CYL-OM-EN** · Edition 2026-07 · Rev. 01 · English (original)

Important — please read before use

This manual gives general information on the safe and correct transport, storage, installation, commissioning, operation, maintenance, disassembly and troubleshooting of Hydrocyl hydraulic cylinders (mill-type / welded and tie-rod designs).

- Read this manual — and in particular Chapter 2, “Safety”, and Chapter 3, “Avoiding damage” — thoroughly before handling the cylinder.
- Every Hydrocyl cylinder is built to a customer order. Always keep the order-specific documentation (data sheet, installation drawing and spare-parts list) to hand alongside this manual; where the two differ, the order-specific documentation prevails.
- The photographs and the cutaway drawing show representative Hydrocyl cylinders; the cylinder supplied may differ.

NOTICE

The cylinder is a component — not a ready-to-use machine

Under EU Directive 2006/42/EC and DIN EN ISO 4413, a hydraulic cylinder is a component intended exclusively for integration into a machine or system, and may only be commissioned once that machine/system fully complies with the applicable directives. Under the Pressure Equipment Directive 2014/68/EU (Article 1 §j) the cylinder is classed as hydraulic controlling equipment, not as a pressure vessel. This manual does not replace the operating instructions of the complete machine.

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1 About this manual

This manual applies to Hydrocyl hydraulic cylinders in the mill-type (welded, heavy-duty) and tie-rod designs. It is intended for system manufacturers, assemblers, operators, service engineers and machine end-users, and contains important information for working safely and correctly with the cylinder.

- Read this manual completely before working with the cylinder, and keep it — together with the order-specific documentation — accessible to everyone who works on the unit.
- Always pass on this manual together with the order-specific documentation when the cylinder is handed to a third party.

1.1 Related documents

- The operating instructions of the complete machine or system into which the cylinder is installed.
- The order-specific documentation: data sheet, installation drawing and spare-parts list.
- The documentation and safety data sheet of the hydraulic fluid used.
- The applicable legal and accident-prevention regulations and environmental-protection rules for your country and workplace.

2 Safety

The cylinder is manufactured according to the generally accepted codes of practice. Even so, there is a risk of injury or damage if this chapter and the safety instructions are not observed. Because the cylinder is installed in a machine/system, risks can arise from its operation that can only be detected and minimised by a risk assessment of the complete machine/system.

2.1 Intended use

- The cylinder is a hydraulic component that converts hydraulic energy into a linear movement. It is not ready for use and is intended exclusively for integration into a machine or system (EU Directive 2006/42/EC, DIN EN ISO 4413).
- It may be commissioned only once it has been integrated into the machine/system for which it is designed and that machine/system complies with the applicable directives.
- Under the Pressure Equipment Directive 2014/68/EU (Article 1 §j) the cylinder is hydraulic controlling equipment, not a pressure vessel — the decisive design criteria are rigidity and stability against static and dynamic loads.
- Operate the cylinder only within the technical data, performance limits and operating/environmental conditions given on the nameplate and in the data sheet. Professional use only.

2.2 Improper use

Any use other than the intended use is improper and inadmissible; Soydan/Hydrocyl accepts no liability for damage arising from it. Improper use includes operating the cylinder:

- at higher operating pressures than specified in the data sheet and/or installation drawing;
- with hydraulic fluids not corresponding to the data-sheet specification;
- with operating and environmental conditions deviating from the specification.

NOTICE

The hydraulic cylinder must not be used as a guide element in the machine/system.

2.3 Qualification of personnel

Assembly, commissioning, service and disassembly require basic knowledge of mechanics, electrics and hydraulics; for transport, additional knowledge of lifting gear and attachment devices is required. These activities may only be carried out by qualified experts, or by instructed persons under the direction and supervision of an expert, who can recognise hazards and apply the appropriate safety measures.

2.4 Signal words used in this manual

Signal word	Meaning
DANGER	Dangerous situation which, if not avoided, will cause death or serious injury.
WARNING	Dangerous situation which, if not avoided, may cause death or serious injury.
CAUTION	Dangerous situation which, if not avoided, may cause minor or moderate injury or damage to equipment.
NOTICE	Information which, if disregarded, may result in damage to the product or the environment.

2.5 General safety instructions

- Observe the accident-prevention and environmental-protection regulations for your country and workplace.
- Use only cylinders in technically perfect condition, and only accessories and spare parts approved by the manufacturer.
- Observe all notes on the product and keep the warning signs legible.
- Persons working on the cylinder must not be under the influence of alcohol, drugs or medication that affects their reactions.
- Comply with the technical data and environmental conditions in the product documentation, and keep the fluid manufacturer's safety data sheet to hand.

2.6 Product- and technology-dependent safety instructions

WARNING	Pressurised cylinder, and leakage of hydraulic fluid / oil mist Severe injury when working on machines/systems that have not been stopped. Make sure the cylinder has been completely depressurised before any work. Leaking high-pressure fluid can penetrate the skin and cause fire, explosion and environmental hazards. Switch the machine off (emergency-off), identify and remedy the leak, and never try to stop or seal a leak or the oil jet with a cloth. Avoid direct contact; wear PPE; keep ignition sources away. During welding on the machine/system, make sure the earth (return) current is not led through the hydraulic cylinder.
CAUTION	Hot surfaces During or after operation, surface temperatures may exceed 60 °C (140 °F). Only touch the cylinder with protective gloves, or let it cool down first, and observe the machine manufacturer's protective measures.

2.7 Personal protective equipment

During operation, maintenance, installation and removal, always wear: protective gloves, ear protection, safety shoes, safety goggles and a protective helmet.

2.8 Obligations of the machine end-user

- Ensure the cylinder and its components are used only as intended (see 2.1).
- Instruct the operating personnel regularly in all items of this manual and make sure they are observed.
- Put up an easily visible "Warning: hot surface" sign at the place of installation.

3 Avoiding damage to property and the product

NOTICE	Improper handling Operate the cylinder only as intended (see 2.1). Do not hit function-relevant areas (piston-rod surface, mounting faces) or attachment parts (e.g. a position-measurement system), and protect attached components and electrical connections against mechanical loads and impacts. Never use the cylinder as a handle or step, do not place it on its attachment parts, and do not place objects on it.
---------------	--

NOTICE

Contamination, cleaning and fluid

Ensure absolute cleanliness during assembly/disassembly — welding beads or metal chips in the lines cause wear and malfunction. Keep the piston rod clean and use residue-free industrial wipes; only clean the cylinder with the hydraulic connections closed.

Use only industrial sealants that do not contaminate the system, and only hydraulic fluids meeting the required specification and cleanliness class.

Do not mix hydraulic fluids of different makes/types; check fluid, component and seal compatibility. Do not use aggressive or highly flammable cleaners, high-pressure washers, or compressed air at seals, bearings, piston rods or the safety vent.

Bind and remove leaked fluid with an oil-binding agent, place a collecting pan under the cylinder when filling/draining, and observe the fluid safety data sheet.

4 Scope of delivery

The scope of delivery comprises the hydraulic cylinder including the accessories ordered and confirmed in the order confirmation. The line connections are closed with blanking plugs or flange covers, which serve exclusively as protection against contamination during transport. In addition to the delivery note, further documents are supplied on request or in the event of deviations from the standard.

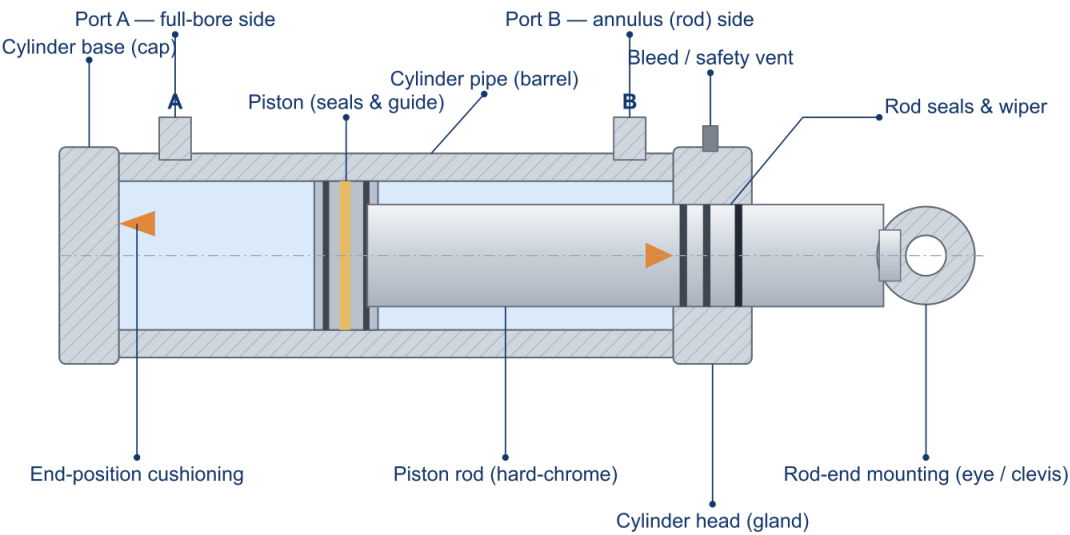
5 Product information

5.1 Performance description

A hydraulic cylinder converts hydraulic energy into a linear movement. The drive force is determined by the hydraulic pressure acting on the piston (full-bore) area or the annulus (rod-side) area of the cylinder.

5.2 Component overview

Hydrocyl builds two constructions: mill-type cylinders (welded head and base — robust, for iron & steel, presses and heavy industry) and tie-rod cylinders (head and base clamped by tie rods). The main and functional parts are shown below.



Principal parts of a double-acting Hydrocyl cylinder (representative cutaway).

Mounting is selected to suit the application. Common types:

Mounting type	Description
Foot (MS2)	Side-mounted feet; fix with an additional fitting strip to reduce shear on the screws.
Flange (front / rear)	Rectangular or round flange at the head or base for axial loads.

Mounting type	Description
Clevis / eye (fixed)	Rear clevis or eye for a single pivot axis.
Spherical eye	Self-aligning rod- or base-eye that accommodates small misalignment.
Trunnion	Central or end trunnions allowing the cylinder to swivel about a transverse axis.

5.3 Product identification

The cylinder is identified by its nameplate (fixed to the cylinder pipe or head), the order-specific documentation and the delivery note. The nameplate typically states: manufacturer (Hydrocyl / Soydan), material and serial number, type designation, coded date of production, maximum rated pressure, weight, ambient-temperature range, CE / UKCA marking and a QR code; order-dependent fields may include the customer order/serial number. Always quote the material number and serial number when contacting Hydrocyl.

6 Transport and storage

6.1 Transporting the cylinder

WARNING	Falling cylinder or components Use lifting gear (load stands, lifting slings) that can safely bear the weight, and always use several attachment devices and points. Do not stand or walk under a lifted load; wear your PPE (see 2.7).
CAUTION	Rolling / tilting and uncontrolled rod extension Observe the lifting capacity of the gear, ensure a stable centre of gravity, and secure the cylinder against rolling, falling and tilting. Transport the cylinder only in the horizontal position — in its original packaging or on wooden prisms — so that no forces act on attachment parts (subplates, piping, measuring coupling, proximity switch). Leave the blanking plugs in the line connections during transport.
- Fasten lifting gear so that it is free during lifting and does not rest against attachments (risk of damage to coated / primed parts — Hydrocyl recommends lifting slings). - Read the cylinder weight off the nameplate (or the packing list / installation drawing / data sheet). Due to tolerances, expect a weight approx. 10 % higher than stated when lifting. - When using a forklift, keep a stable centre of gravity and lift only as far off the floor as necessary.	
NOTICE	Hydrocyl cylinders are supplied without an oil filling as standard; from final testing there may still be oil residues in the cylinder.

6.2 Storing the cylinder

Cylinders are supplied with a protective primer and top-coat finish to the order specification. Fit diameters, sealing faces, sensors, measuring couplings, bearings and grease nipples are not painted — they are protected by corrosion-protection oil. Internally, the cylinder is preserved by the oil film remaining after factory testing.

Storage condition	Requirement
Temperature	–20 °C to +50 °C
Relative humidity (no condensation)	max. 65 %
UV protection / condensation / ozone	protected from UV; no condensation or ozone sources nearby

Storage for more than six months

- Coat the surface and all unprotected parts (fit surfaces, mechanical interfaces) with corrosion-protection oil; protect spherical bearings and fit surfaces from humidity.
- Since deformation of seals cannot be ruled out over long storage, arrange for the seals to be replaced, and completely empty a cylinder stored with corrosion oil before commissioning.
- Inspect the cylinder at least once a year (external condition/rust, fluid oxidation, bearing lubrication). Extend and retract the rod a few centimetres yearly to prevent the seals bonding, and rotate the cylinder 90° every six weeks unless it is stored vertically.

- For filled cylinders, connect a line from the rod-side port and keep the cylinder out of direct sunlight and away from heat sources (a temperature rise raises the internal pressure).

7 Assembly

7.1 Unpacking

Remove the packaging, check the delivery for completeness against the delivery documents, carry out a visual inspection for transport damage, and dispose of the packaging according to national/company regulations.

7.2 Installation conditions

Cleanliness

- Install the cylinder and all other parts free from dirt; make sure the installation surfaces and the hydraulic lines are clean.
- Before installation, clean the lines and connection surfaces of dirt, scale and chips; use residue-free wipes; ensure welded pipes are bare inside and flushed.

Fastening

- Design the mounting surfaces so that torsion of the cylinder is avoided in the installed condition, and so that unwanted lateral / radial loads during operation are avoided.
- Fasten the cylinder so the load acts axially on its centre line; observe stroke length, loads and mounting to avoid bending and buckling in every stroke position (DIN EN ISO 4413).
- Make sure the piston rod is not damaged during installation, and that the spherical bearing, trunnion, foot and flange brackets can accommodate the forces that occur.
- With spherical/plain bearings, do not damage the bolt or bearing when installing (cool the bolt if necessary); use only the genuine bolts with accessories such as clevis brackets, and limit swivel/tilt angles on the customer side.
- Use fittings with a soft seal at the screw-in stud (pipe thread DIN EN 228-1, metric thread DIN ISO 261). Sealants such as hemp are not admissible. Connect line "A" (piston / full-bore side) and "B" (annulus / rod side) correctly.

7.3 Assembling the cylinder

CAUTION

Unintended motion during installation

Risk of crushing. Keep the cylinder in a stable, secured position until it is fixedly mounted, and take care during installation. Screw connection elements (swivel heads, etc.) to the stop — do not use them to set installation differences. Remove the protective plugs only when establishing the corresponding connection.

Tie-rod cylinder with foot mounting (MS2)

- If necessary, loosen the throttle valve of the adjustable end-position cushioning and/or the measuring coupling before installation, using a suitable wrench.
- Fasten the cylinder at the foot mounting in the machine/system using the mounting screws.
- Re-install the throttle valve and/or measuring coupling in the intended (as-supplied) position with a torque wrench, observing the tightening torques below.

Component	Piston Ø (mm)	Torque M _a (Nm, ±5 %)	Wrench (SW)
Throttle valve of the cushioning (both sides)	25 ... 63	4.5	7
Throttle valve of the cushioning (both sides)	80 ... 200	20	7
Measuring coupling (both sides)	25 ... 63	18	17
Measuring coupling (both sides)	80 ... 200	40	17

Torque values are typical for cushioning throttle valves and measuring couplings — confirm against your order-specific data sheet.

Establish the hydraulic connection according to the hydraulic circuit diagram, and connect any proximity switches / position-measurement systems to the power supply according to the electrical circuit diagram.

8 Commissioning

8.1 First commissioning

Before commissioning

- Check the machine/system for leak-tightness and the safe condition of the electric and hydraulic lines.
- Make sure all flange screws and fittings of the line connections are tightened to the stop.

Flushing the machine / system

NOTICE

When flushing the machine/system, the cylinder must be disconnected — otherwise it is permanently damaged by dirt particles. Exclude the cylinder from the flushing procedure. The fluid filled must not exceed cleanliness class 20/18/15 to ISO 4406(c); observe the cleanliness class specified for the system components (e.g. valves).

Filling and bleeding the cylinder

Fill and bleed the cylinder in several switching processes (retraction/extension) and, if fitted, through the measuring coupling. Operate only at low pressure until bleeding is complete, and watch the tank level.

Starting from a retracted cylinder in the horizontal position:

1. Place a suitable collecting tank to catch the fluid escaping during bleeding.
2. Open the bleed screw on the piston-rod side (at the cylinder head) of the depressurised cylinder; if a measuring coupling is fitted, connect a hose and bleed through it.
3. Set the hydraulic system so the pressure at the cylinder does not exceed 5 bar, then switch the system on.
4. Switch the control so the cylinder retracts at very low velocity — the annulus (rod) side fills and the air exits via the bleed port or measuring coupling.
5. When the fluid exits free of bubbles the cylinder is sufficiently bled (true only if the bleed point is at the highest point). Switch off and close the bleed screw.
6. Bleed the base side in the same way. The cylinder is then ready for operation.

NOTICE

Different bleed designs

Depending on the design the bleed point is a safety vent, an internal-hexagon bleed screw, a bleed screw with check valve, or a measuring coupling. In each case: open, fill until fluid exits without bubbles, then close in an oil-tight manner with a hexagon wrench (for the measuring coupling, re-fit the end cap).

8.2 Setting the end-position cushioning

WARNING

Throttle valve flying out

Danger to life. Do not screw out the complete throttle valve — set the cushioning only by adjusting the throttle bolt.

Full damping is achieved only when the throttle valve is closed; always comply with the data sheet. Cylinders are supplied with the highest cushioning effect (throttle bolt screwed in to the stop). Screwing the bolt out increases the velocity in the cushioning zone — allow for the higher end-stop velocity.

- Locked throttle bolt: screw the bolt out with a hexagon wrench until the desired damping is achieved (the bolt cannot be screwed fully out).
- Countered throttle bolt: loosen the lock nut, screw the bolt out to the desired damping, then re-tighten the lock nut to position it.

8.3 Proximity switch

Inductive proximity switches are used for reliable end-position control. They are high-pressure resistant up to 500 bar, contactless and wear-free, and are set at the factory (the lock nut is sealed). Versions with a proximity switch are equipped on both sides.

NOTICE

The switching distance must not be adjusted — adjusting the proximity switch will invalidate the warranty claim.

8.4 Re-commissioning after standstill

When re-commissioning, observe the first-commissioning information above. After a standstill, check the piston-rod protective oil film and that the rod was kept retracted (see 10.4.1).

9 Operation

As a component, the cylinder is operated by way of the complete machine — refer to the machine manufacturer's operating instructions, and to the data sheet and order-specific documentation for the operating parameters and function. During operation, watch for fluid leaks, abnormal noise and rising surface temperature, and stop the machine if these occur.

10 Maintenance and repair

To DIN 31051, maintenance covers inspection, servicing and repair. Hydrocyl cylinders require little maintenance, but it is indispensable. Experience shows that around 70 % of faults in hydraulic systems are caused indirectly by the hydraulic fluid — so the primary task is to keep the fluid within its condition and cleanliness class and to prevent any foreign substance entering the circuit.

10.1 Cleaning and care

- Ensure absolute cleanliness in all work; clean the external environment with residue-free wipes before loosening fittings and components.
- Close all openings with suitable blanking plugs to prevent dirt entering the hydraulic system.

10.2 Inspection

Document the inspection results, so that service intervals can be adjusted to the actual operating conditions and faults recognised early by comparing recorded values.

10.3 Maintenance schedule

Interval	Task
Regularly / each shift	Check for fluid leaks at the line connections, cylinder head and base; listen for abnormal noise; check the piston-rod surface for interference marks and mechanical damage, and the coating for damage.
Weekly / monthly	Check the protective oil film on the piston rod — weekly in high humidity, outdoor or strongly varying conditions; monthly in moderate conditions.
Per lubricant maker	Re-lubricate spherical/plain bearings that require maintenance, via the grease nipple/hole.
As required	Replace wear parts (seals, guide bands/sockets) when leakage appears at the rod or head; re-set the end-position cushioning if the damping no longer complies.

NOTICE

Interference marking on the piston rod

Interference (traverse) marks on the piston-rod running surface may indicate a contaminated hydraulic system or inadmissible lateral loads on the cylinder — determine and remedy the cause. Leakage at the piston rod or cylinder head indicates that the wear parts need to be exchanged.

10.4 Maintenance

10.4.1 Piston-rod maintenance

To prevent corrosion, keep the piston rod retracted during standstill periods. With fluids such as HFD-R (phosphoric-acid ester), HFA (oil-water emulsion) or HFC (water-glycol), the rod must always be covered by a compatible protective oil film. Preventative maintenance — before first commissioning and after standstill:

1. Work in a dry environment where possible; use fresh water to remove all salt, sand and machining residues from the rod — do not use steam cleaners or high-pressure water jets.
2. Let the rod dry completely (the work needs a clean, dry rod).
3. Soak a residue-free wipe with low-viscosity corrosion-protection oil and apply it to the entire piston rod.

After contact with chemicals, carry out an immediate maintenance cycle as fast as possible: remove all chemical residues with a suitable cleaning agent, then repeat the preventative steps.

10.4.2 Spherical bearings requiring maintenance

Re-lubricate periodically via the grease nipple or lubrication hole, using a standard anti-corrosion, pressure-resistant lubricant. Coordinate the lubricant and the intervals with the lubricant manufacturer.

10.5 Replacing wear parts

Wear parts are the seals, guide belts and guide sockets; they are excluded from the warranty. Order seal kits from Hydrocyl, quoting the material and serial number.

NOTICE

Opening the hydraulic cylinder will invalidate the warranty claim. Reseal and repair are best carried out by Hydrocyl or under its guidance.

10.6 Repair

Hydrocyl offers a resealing and repair service for its cylinders. Send an inquiry to Hydrocyl / Soydan (see Chapter 17).

10.7 Spare parts

NOTICE

Use only the specified spare parts

Parts not complying with the spare-parts list may cause malfunction. Use only components listed in the order-specific documentation and only new seals with the required media resistance; as sealing material can differ despite an identical appearance, always check the material number.

When ordering spare parts, quote the material and serial number of the cylinder (nameplate) and the item number of the component from the spare-parts list.

11 Decommissioning

WARNING

Flying parts / oil leakage

Make sure the cylinder has been depressurised, depressurise any hydro-pneumatic accumulators on the oil side, and unload the cylinder from external forces. For safety, do not loosen any lines or connections while the machine/system is under pressure.

1. Unload the cylinder, switch off pumps and electric motors and secure the machine/system against restarting.
2. Provide a collecting tank large enough for the total fluid volume, drain the fluid into it and ensure the lines and actuators drain completely; bleed if necessary.
3. Seal the line connections with plugs / flange covers and prepare the cylinder for storage (see 6.2).

12 Disassembly and replacement

Meet the general conditions of Chapter 11 first. For disassembly:

- Drain the fluid from the installed cylinder as far as possible; it can be completely drained once removed.
- Disassemble the cylinder head — pull the head off the pipe, let the remaining fluid run out, and pull the piston rod out (using lifting slings if necessary) onto stable, soft, clean blocks that prevent it rolling.
- If required, remove the lock between the cylinder eye and the piston rod, and plug the key bore.
- Thoroughly clean the head, piston rod, rod thread, cylinder eyes and protective cover of all residue — every dirt particle can damage the seal during reassembly.

NOTICE

Opening the hydraulic cylinder will invalidate the warranty claim — where possible, return the cylinder to Hydrocyl for reseal / repair.

13 Disposal

Careless disposal pollutes the environment. Dispose of the cylinder and its components in accordance with the national and company regulations, paying particular attention to components with fluid residues. Dispose of the hydraulic fluid according to its safety data sheet, and dispose of electric/electronic components (position-measurement systems, proximity switches) per the country-specific provisions.

14 Extension and modification

You are responsible for any extension or modification of the cylinder. Changing the product as supplied invalidates the statements and declarations made by Hydrocyl. Contact Hydrocyl before extending or modifying the cylinder (see Chapter 17).

15 Troubleshooting

NOTICE

Only replace the components listed in the spare-parts list, with new, tested components of original-equipment quality. Opening the cylinder invalidates the warranty. After remedying a fault, remove its cause as well — after wear caused by contamination, flush the machine/system and change the fluid.

Fault	Possible cause	Remedy
Stick-slip effect (jerky motion)	Air in the cylinder; seals worn; radial forces on the piston rod.	Bleed the cylinder (8.1); exchange the seals (10.5); check the installation for lateral loads (7.2).
Leakage at the piston rod	Rod seal / wiper worn; radial forces on the rod.	Exchange the seals (10.5); check the installation (7.2).
Leakage at the line connections	Fittings loose; seals worn.	Tighten the fittings to the specified torque; exchange the seals.
No / hard damping into the end position	End-position cushioning setting does not comply.	Re-set the adjustable end-position cushioning (8.2).
Slow / weak / creeping motion	Internal leakage past the piston seal; insufficient supply pressure or flow.	Exchange the piston seals; check the system pressure/flow and the hydraulic circuit.
Corrosion / pitting on the piston rod	Protective oil film not maintained; aggressive environment.	Maintain the protective film (10.4.1); consider an upgraded rod coating for the duty.

16 Technical data

The technical data for your cylinder are given on the nameplate and in the order-specific data sheet. The table below is the general Hydrocyl envelope, for orientation.

Parameter	Hydrocyl range (confirm on the data sheet)
Construction	Mill-type (welded, heavy-duty) and tie-rod designs
Standards	ISO 6020-1, ISO 6020-2 (CETOP) and ISO 6022; welded to ISO 3834-2; 100 % tested to ISO 10100
Bore	up to Ø 1000 mm
Stroke	up to 12 m
Nominal pressure	up to 400 bar (test pressure per standard)
Piston-rod coating	Hard chrome · induction-hardened chrome · nickel-chrome duplex · HVOF / Ceramax (project basis)

Parameter	Hydrocyl range (confirm on the data sheet)
Hydraulic fluid	Mineral oil HLP (ISO VG 32 / 46 / 68); HFA / HFC / HFD on request
Cleanliness class	ISO 4406 20/18/15 or cleaner
Mountings	Foot, flange, clevis/eye, spherical eye, trunnion
Options	Adjustable end-position cushioning, proximity switches, position sensing, ATEX / IECEx

17 Contact and service

For spare parts, resealing, repair and technical support, contact Hydrocyl quoting the material number and serial number of your cylinder:

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Soydan Fluid Power Technologies A.Ş. · ERS Hidrolik Silindir

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18 Glossary

Mill-type cylinder — Heavy-duty cylinder with a welded head and base, for iron & steel, presses and heavy industry.

Tie-rod cylinder — Cylinder whose head and base are clamped to the pipe by tie rods.

Full-bore (piston) side — The chamber on the base side; pressure here acts on the full piston area (port A).

Annulus (rod) side — The chamber on the rod side; pressure here acts on the piston area minus the rod area (port B).

End-position cushioning — Throttled damping of the piston near the stroke ends to reduce end-stop impact.

Gland (cylinder head) — The rod-side closure carrying the rod seal, wiper and guide.

Cleanliness class — Fluid contamination level to ISO 4406 (e.g. 20/18/15).