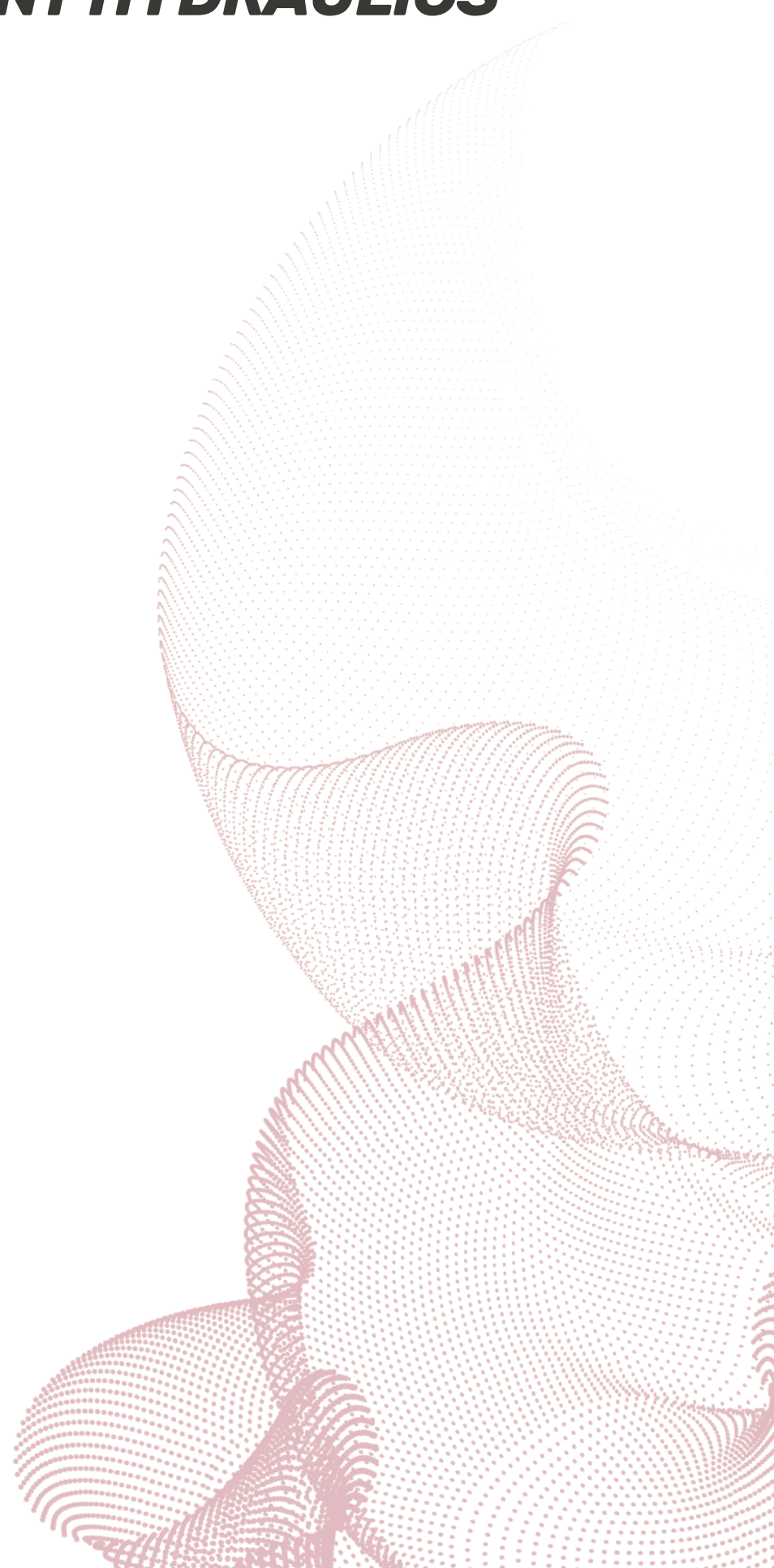


TRAINING SYSTEMS

TRANSPARENT HYDRAULICS

HRE
Automation



Taking advantage of its more than 40 years' experience in industrial automation and fluids, HRE Automation creates training equipment and systems, perfectly **adapted to the requirements of the current industrial needs.**

In continuous search of excellence in **training systems**, HRE Automation is a specialized supplier of technical equipment in the **industrial automation field.**

It offers:

- Practical equipment
- Pedagogical support (teachware)
- Personal attention

Teachers will easily achieve a high quality theoretical and a real base practical education; since the used equipment is technically the same students will handle at the working environment.

HRE
Automation

HRE Automation

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<http://www.hre.es>



TRANSPARENT HYDRAULICS – MINIFLUID SYSTEM

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Hydraulic power unit



Hydraulic power unit

Pump motor unit.

Ref. 1039106

Oil can

With special coloring.

Ref. 1506999

Hydraulic power unit with transparent tank, portable. It has an air intake to introduce bubbles inside the hydraulic circuit to allow visualization of the direction of oil circulation and its speed:

Features:

Electrically powered hydraulic unit, consisting of:

6 liters transparent tank **V= 6 l.**

Extra-silent gear pump, **Q= 1 l/min.**

Pressure relief valve. **P max: 10 bar.**

Pressure gauge: 0-16 bar.

0.09 Kw single-phase motor 220Vac, 50 Hz).

(optionally available 110Vac 60Hz).

Stop-Start switch.

Power cable, 3 meters length, with plug 16A.

3 quick fit couplings (**P + 2T**).

Tap for inserting bubbles into circulating oil circuit.

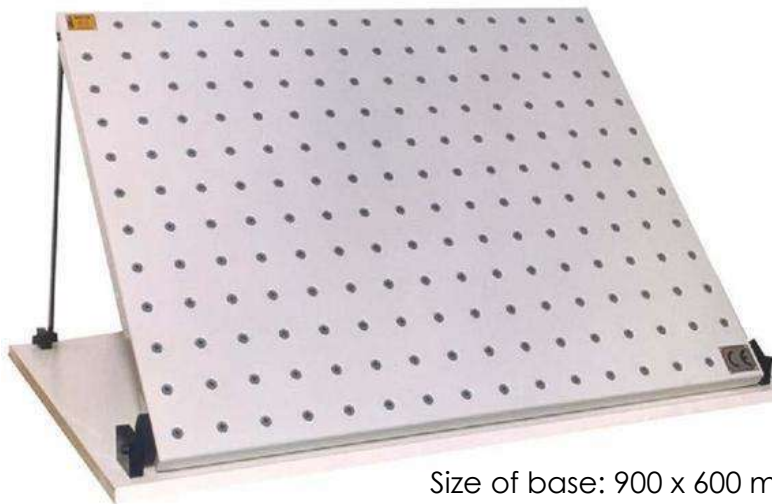
Oil can with special red coloring.

MINIFLUID Working panels

Simple / Double

Metal panel, fully plastic coated, different dimensions. With Ø5 mm bushes every 50mm (horizontally and vertically) for quick clamping of hydraulic components without any additional tool. Single or double panels, reclining or supported, on a wooden base covered with formica.

Reclining panel, dimensions 800 x 600



Size of base: 900 x 600 mm

Single panel, 800x600

One reclining panel.

Ref. 53950513

Double panel, 800x600

Two panels supported.

Ref. 53950514

Reclining panel with top vertical front, dimensions 900 x 1050



Size of base: 1050 x 590 mm

Single panel, 900x1050

One reclining panel.

Ref. 53952856

Double panel, 900x1050

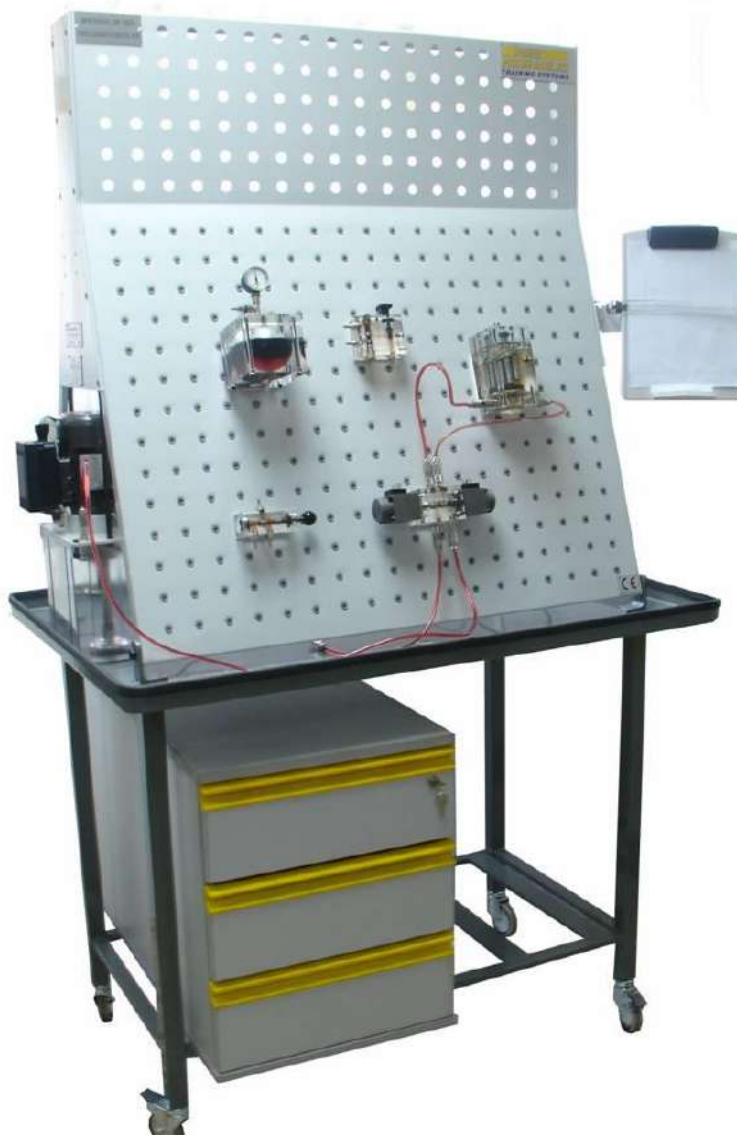
Two panels supported.

Ref. 53952855

MINIFLUID Training trolleys

PLA70-1 / PLA70-2

- Dimensions: 1100 mm x 800 x 1960 mm (high).
- Metal structure painted in dark grey color, RAL 7005, to guarantee a long useful life in perfect condition.
- Metal working panel of 950x1050 mm. With Ø5mm bushes every 50mm (horizontally and vertically) for clamping components (hydraulic and pneumatic's elements) without using any additional tool. Metal panel with Epoxi plastic paint covering, RAL 7035, to guarantee a long useful life in perfect condition. Upper frame for mounting electrical elements and other elements. **(Available with one panel PLA70-1 or with two panels PLA70-2).**
- Big fixed metal tray under the panels with 4 wheels, 2 of them are lockable.
- Paper holder for drawings at each working side.
- **Drawers' cabinet (optional).** Cabinet with three drawers for storing components, central locking with key and safety protection (a single drawer can be opened at the same time). Each drawer has a metal tray to fix the elements.
- Room for **silent compressor (optional, for pneumatic applications)**, 3 holes for support of the compressor feet. (optionally: possibility of locating a second drawers' cabinet in that place).



The trolley's reference does not include the drawers, the hydraulic power unit and the showed elements

Single trolley PLA70-1

Mobile structure with one working panel and one paper holder.

Ref. 53952007

Double trolley PLA70-2

Mobile structure with two working panels and two paper holders.

Ref. 53952008

Drawers' cabinet for trolleys PLA70

3 drawers with fixing trays and safety protection with central locking.

Ref. 13028045

MINIFLUID level 1

Ref. 53200642



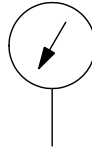
Double acting cylinder
 $\varnothing 20 \times \varnothing 10 \times 58$ mm.
 double-acting cylinder.
Ref. 13017827



Manually actuated 4/2 distributor
 Manually actuated, spring return.
Ref. 13017838



Pressure relief valve
 Ball valve. Direct control.
 Manual adjustment by rotary handle.
Ref. 13017830



3 connection divider with pressure gauge

0-12 bar pressure gauge
One female + two male's quick fit connectors.

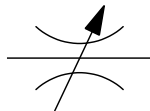
Ref. 13017841



Check valve

Seat check valve.

Ref. 13024984



Flow restrictor

Needle flow restrictor,
manual regulation.

Ref. 13017832



6 connection divider

6 male quick-fit self-sealing
connectors, size NW4.

Ref. 13018311



Set of hoses

6 NW4 x 520 mm length.
4 NW4 x 350 mm length.
With quick-fit self-sealing
female connectors.

Ref. 13018312



Oleo-Hydraulics Mini Fluid handbook

Theoretic and practice
handbook.

Ref. 01506993

Case for MINIFLUID level 1 set

Optional, not included



MINI FLUID Level 1 Case

With double wall for greater
resistance to shocks.

Die-cut foam for housing the
elements. 2 slide locks.

Measurements:

470x390x110 mm.

Components not included.

Ref. 01509080

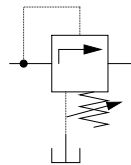
** All the material is made of methacrylate containing internally original industrial metal elements.*

** The quick couplings are of the Zero Leakage type, maintaining tightness at all times.*

** Each component is suitable for panels with Ø5mm sockets every 50mm (horizontally and vertically)*

MINIFLUID level 2

Ref. 53200643



Pressure relief valve

A sliding, 3-way. With damping. Manual adjustment by rotary handle.

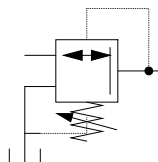
Ref. 13023495



Single-acting cylinder

Ø20 x Ø10 x 40 mm single-acting cylinder. Spring return.

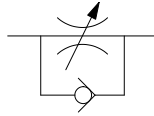
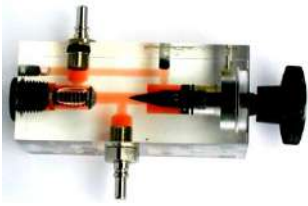
Ref. 13017828



Pressure reducing valve

Direct control, 3-way. Manual adjustment by rotary handle.

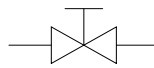
Ref. 13017831



Flow restrictor with by pass check valve

Needle throttling, regulation by rotary handle.

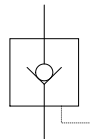
Ref. 13024983



Manual shut-off valve, 2 way

Rotary knob.

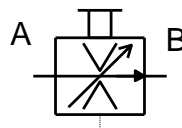
Ref. 13018362



Piloted one-way restrictor

Hydraulic pilot, direct control.

Ref. 13024987



Flow control valve with pressure compensation

Hydrostatic compensation, regulation by rotary handle.

Ref. 13019899



4 connection divider

With quick-fit self-sealing NW4 couplings, 3 male and 1 female.

Ref. 13018645



Set of 5 hoses

With quick-fit self-sealing couplings NW4 x 520mm.

Ref. 13018647

Case for MINIFLUID level 2 set

Optional, not included



MINI FLUID Level 2 Case

With double wall for greater resistance to shocks.

Die-cut foam for housing the elements. 2 slide locks.

Measurements:

470x390x110 mm.

Components not included.

Ref. 01509081

** All the material is made of methacrylate containing internally original industrial metal elements.*

** The quick couplings are of the Zero Leakage type, maintaining tightness at all times.*

** Each component is suitable for panels with Ø5mm sockets every 50mm (horizontally and vertically)*

MINIFLUID electrohydraulic set

Ref. 53200943



Power supply unit

110-220 VAC/24 VDC, I=5 A. Over load and short circuit protection

On/Off switch.

On/Off indication lamp.

Electronically stabilized.

Ø=4 mm electronic quick connectors.

Plastic box with printed transparent cover.

Ref. 23500965



Set of 2 limit switches, each with 1 NO contact + 1 NC contact

Transparent body.

Ø=4 mm female connectors.

Ref. 13019799





Control panel with timer

4 push buttons, 2 green, 1 red, 1 yellow, with 1 normally open + 1 normally closed contacts each.

1 switch with 1 normally open + 1 normally closed contacts.

1 connection / disconnection electronic timer, 0 to 6 second regulation.

4 spark suppressing diodes.

4 indicator lights, 2 green, 1 red and 1 yellow.

Ø=4 mm quick connectors.

Ref. 23500966



Relays module

3 relay unit with 4 switched contacts each.

On/Off light indicator on every relay solenoid.

Spark suppressing diode on every solenoid.

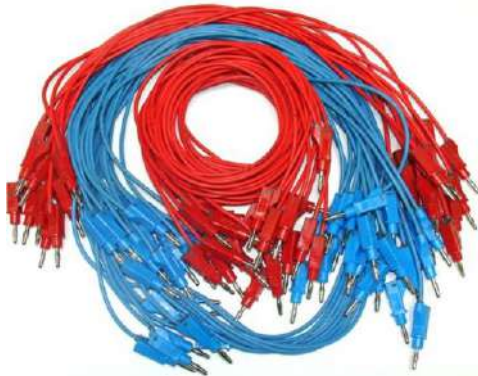
6 connection divider for + voltage.

6 connection divider for - voltage

Ø=4 mm quick connectors.

Plastic box printed transparent cover.

Ref. 23500968



Set of connection cables:

14 blue cables, 50 mm length
 14 red cables, 50 mm length
 8 blue cables, 150 mm length,
 8 red cables, 150 mm length.
 With $\varnothing 4$ mm male quick connectors.

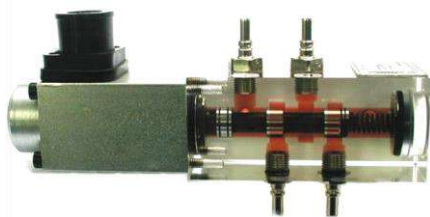
Ref. 23500081



**Set of connectors for solenoids.
 2 grey + 1 black**

Including solenoid 2P+G connector, on/off indicator lamp, cable and male $\varnothing=4$ mm quick connectors.

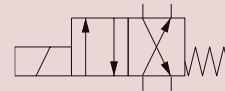
Ref.23500025



4/2 solenoid valve

24Vdc solenoid, spring return.

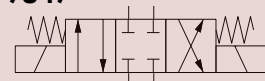
Ref. 13018798



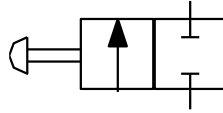
4/3 solenoid valve

24Vdc solenoids and spring centered. A, B, P and T closed in centered position.

Ref. 13019847



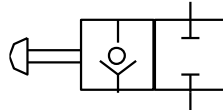
MINIFLUID complementary elements



2/2 valve

Manually operated 2/2 valve with drain, spring return.

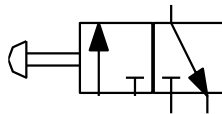
Ref.13026517



2/2 poppet valve

Manually operated 2/2 poppet valve, spring return.

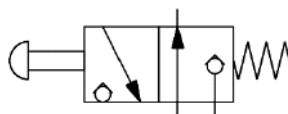
Ref.13026581



3/2 valve

Manually operated 3/2 valve, spring return.

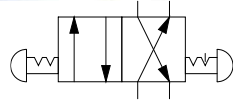
Ref.13026518



3/2 poppet valve

Manually operated 3/2 poppet valve, spring return.

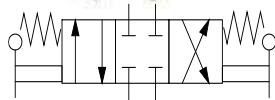
Ref.13017839



4/2 valve with mechanical detent

Manually operated on both sides with mechanical detent.

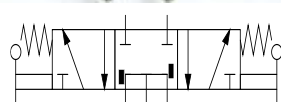
Ref.13022817



4/3 valve

Manually operated on both sides, spring-centring. Closed centres.

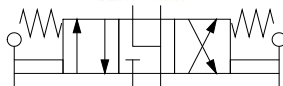
Ref.13022808



5/3 valve

Manually operated on both sides, spring-centring. A, B closed P, T1 and T2 linked in central position.

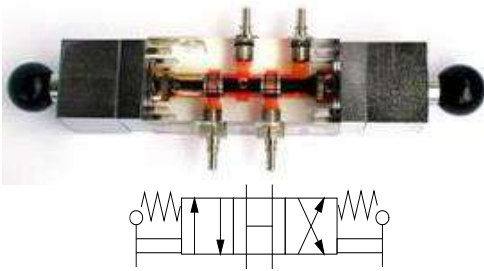
Ref.13023492



4/3 valve

Manually operated, spring-centring. In central position A, B and T are linked.

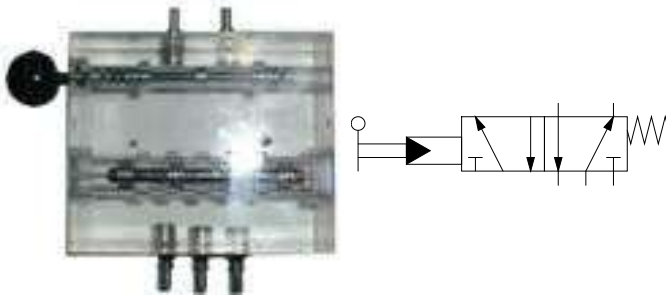
Ref.13025475



4/3 valve

Manually operated, spring-centring. In central position A, B, P and T are linked.

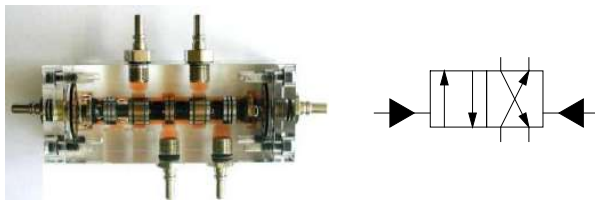
Ref.13025476



5/2 piloted valve

Manually operated, spring return.

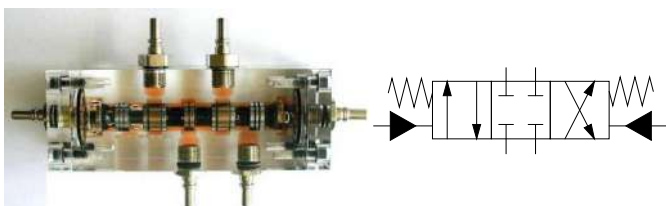
Ref.13026519



4/2 valve

Hydraulically operated on both sides.

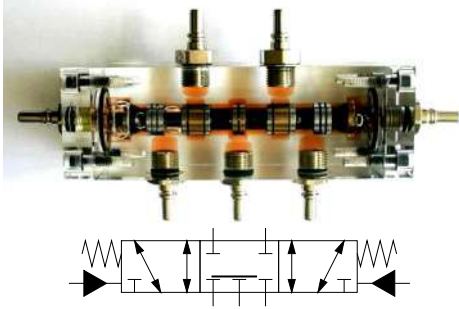
Ref.13018363



4/3 valve

Hydraulically operated on both sides, closed centres, spring-centring.

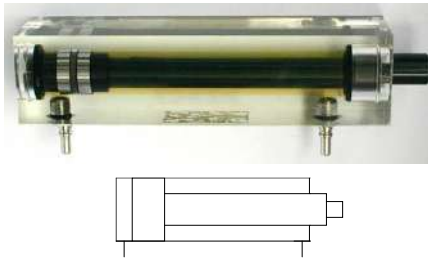
Ref.13023122



5/3 valve

Hydraulically operated on both sides, spring-centring. A, B closed P, T1 and T2 linked in central position.

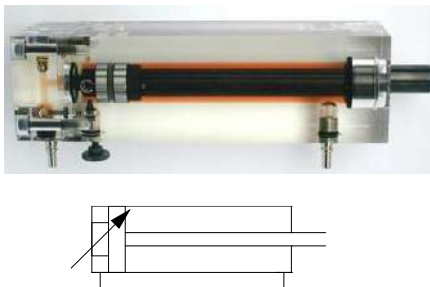
Ref.13024951



Differential cylinder

Double-acting differential cylinder $\varnothing 20 \times \varnothing 14 \times 100$ mm. stroke. Area ratio 2:1.

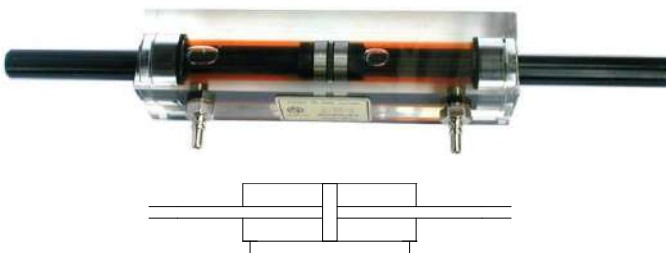
Ref.13026511



Double-acting cylinder with damping

Double-acting differential cylinder $\varnothing 20 \times \varnothing 14 \times 100$ mm. stroke. With recoil damping.

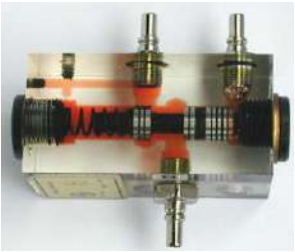
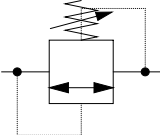
Ref.13026520




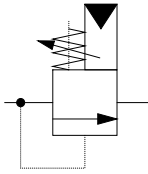
Double-rod cylinder

Double-acting cylinder, $\varnothing 14 \times \varnothing 20 \times \varnothing 14 \times 100$ mm. stroke.


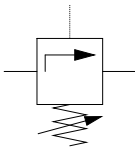
Ref.13025150


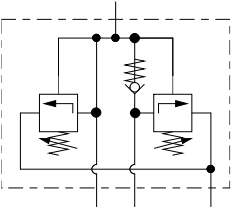
Differential valve
Pressure compensation.
 $\Delta P = 1,5\text{bar}$.
Ref.13017840

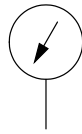
Pressure relief valve
Pilot operated.
Ref.13023153

Discharge valve
Set pressure adjustable by rotary handle.
Ref.13025502

High – low pressure circuit
Two working pressures adjustable by manual operation: two rotary handles.
Ref.13026500



Pressure gauge without box or scale 0...10 bar

Shows the working principle of the bourdon tube.

Ref.13018637



Bladder accumulator

Made in transparent methacrylate.

Ref.13024952



Diaphragm accumulator

Made in transparent methacrylate.

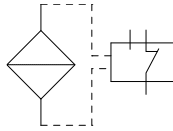
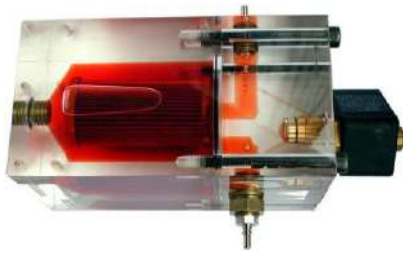
Ref.13024953



Piston accumulator

Made in transparent methacrylate.

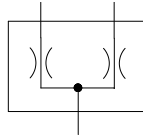
Ref.13024954



Pressure filter

Pressure filter with clogging indicator and switched contact.

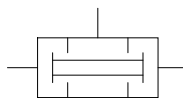
Ref.13026523



Flow divider

With three self-sealing male quick couplings.

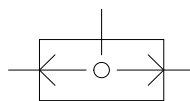
Ref.13026522



Simultaneity valve

AND function valve.


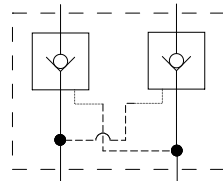
Ref.13066338



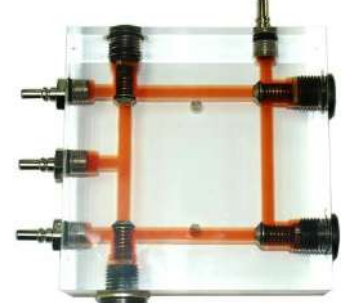
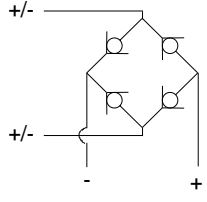
Circuit selector

Shuttle valve, OR function.

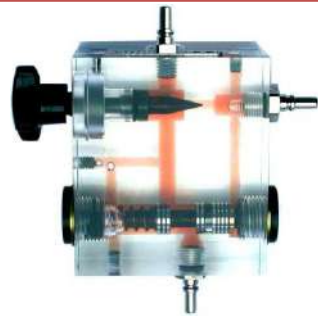
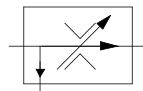
Ref.13017836


Piloted double one-way restrictor
With four self-sealing male quick couplings.
Ref.13024969

Rectifier module
Bridge rectifier with 4 check valves.
Ref.13024956

3 way flow control valve
Flow control valve with pressure compensation.
Ref.13023106



Pressure intensifier
Pressure ratio 2:1.
Ref.13026524

MINIFLUID rotary actuators



Internal gear motor

Bi-directional internal gear hydraulic rotary actuator with 7 and 6 lobes respectively.

Ref.13024965



External gear motor

Bi-directional external gear hydraulic rotary actuator with two 12 tooth gears and one shaft.

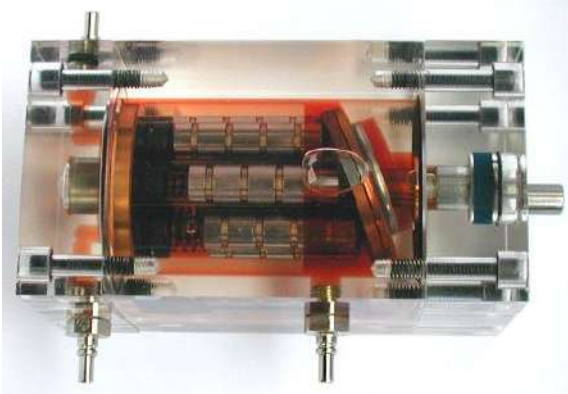
Ref.13024955



Vane motor

Bi-directional hydraulic rotary actuator with 8 vanes inside an eccentric rotor.

Ref.13026525



Axial piston motor

Bi-directional axial piston hydraulic rotary actuator with 7 pistons and drain.

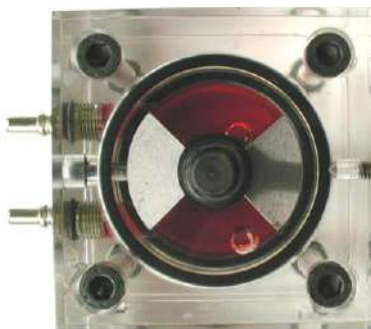
Ref.13026521



Rotary actuator rack and pinion type

Bi-directional mechanical-hydraulic rotary actuator from 0 to 360°. Rack-and-pinion turning cylinder with 12 teeth, double-acting $\varnothing 20 \times \varnothing 14 \times 100$ mm and drain.

Ref.13024973

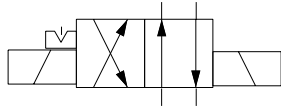


Rotary actuator

Bi-directional hydraulic rotary actuator. 180° rotation angle.

Ref.13024957

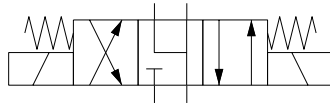
MINIFLUID complementary electro hydraulics



4/2 solenoid valve with mechanical interlocking

Actuated by 24Vdc solenoids on both sides.

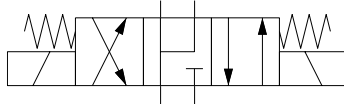
Ref.13022816



4/3 solenoid valve

Operated by 24 Vdc solenoids, spring-centring. In central position A and B to tank.

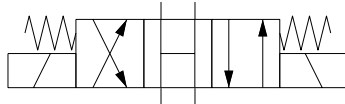
Ref.13024846



4/3 solenoid valve

Operated by 24 Vdc solenoids, spring-centring. In central position A, B and P are linked.

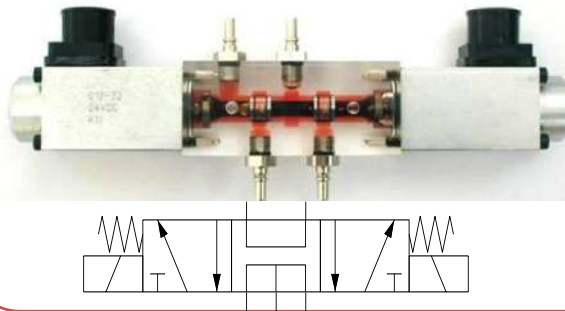
Ref.13026958



4/3 solenoid valve

Operated by 24 Vdc solenoids, spring-centring. In central position A, B, P and T are linked.

Ref.13026526



5/3 solenoid valve

Operated by 24 Vdc solenoids, spring-centring. In central position A and B linked, P to tank (T1 and T2).

Ref.13026513



Connector for solenoid.

Including solenoid 2P+G connector, on/off indicator lamp, cable and $\varnothing=4$ mm male connectors.

Ref.23500025(1)



Inductive proximity detector. Kit with 2 units

Both sensors over one plate with cable and $\varnothing=4$ mm male connectors.

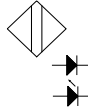
Ref.13019798



Capacitive proximity detector. Kit with 2 units

Both sensors over one plate with cable and $\varnothing=4$ mm male connectors.

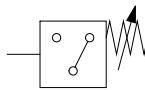
Ref.13024959



Photoelectric detector

Reflection photocell with transmitter/receiver in the same body. Output PNP or NPN.
 $\varnothing=4$ mm female connectors.

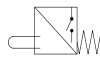
Ref.13024905



Pressure switch

With 1 NO contact + 1 NC contact, cable and $\varnothing=4$ mm male connectors.

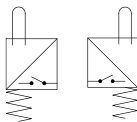
Ref.13026510



Limit switch

With 1 NO contact + 1 NC contact. Retractable roller actuated, transparent body.
 $\varnothing=4$ mm female connectors.

Ref.13024919



Set of 2 limit switches

Each with 1 NO contact + 1 NC contact, retractable roller actuated, cable and $\varnothing=4$ mm male connectors.

Ref. 13019799

MINIFLUID proportional hydraulics



Electronic control for proportional valves

Basic electronic control for two proportional solenoids I_{max}:0,8A. Current regulation by potentiometer and display by ammeter (one per coil). Possibility of introducing Dither signal to improve hysteresis.

Plastic box with printed transparent cover and $\varnothing=4$ mm female connectors.

Ref. 23500970



Set of 2 connectors with LED

Progressive lighting of the LED according to the current intensity. With cable and $\varnothing 4$ mm plugs.

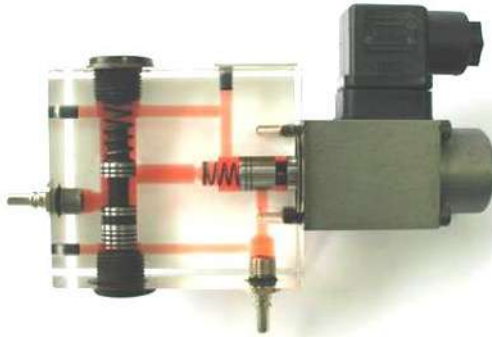
Ref.23500036



Proportional pressure relief valve

Direct command. Pressure regulation range from 0 to 10 bar.

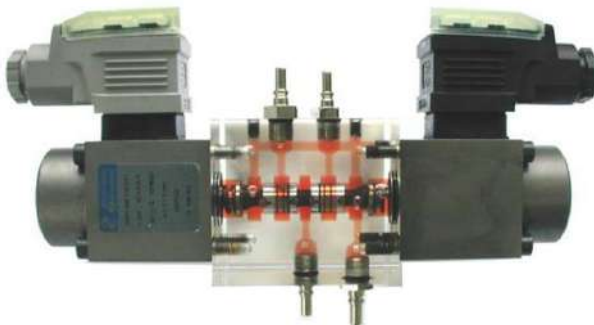
Ref.13021115



**2-way flow control
proportional valve with
pressure compensation**

Hydrostatic compensation,
flow regulation by
proportional solenoid.

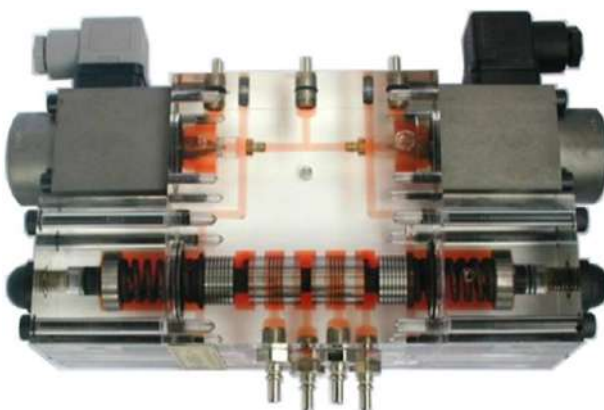
Ref.13026962



4/3 Proportional valve

Directly operated by 24Vdc
(0,8A) solenoids, spring -
centring. A, B and P linked in
central position.

Ref.13020532



**4/3 Proportional distributor
valve precontrolled.**

Indirectly operated, spring-
centring. A, B and P linked in
central position.

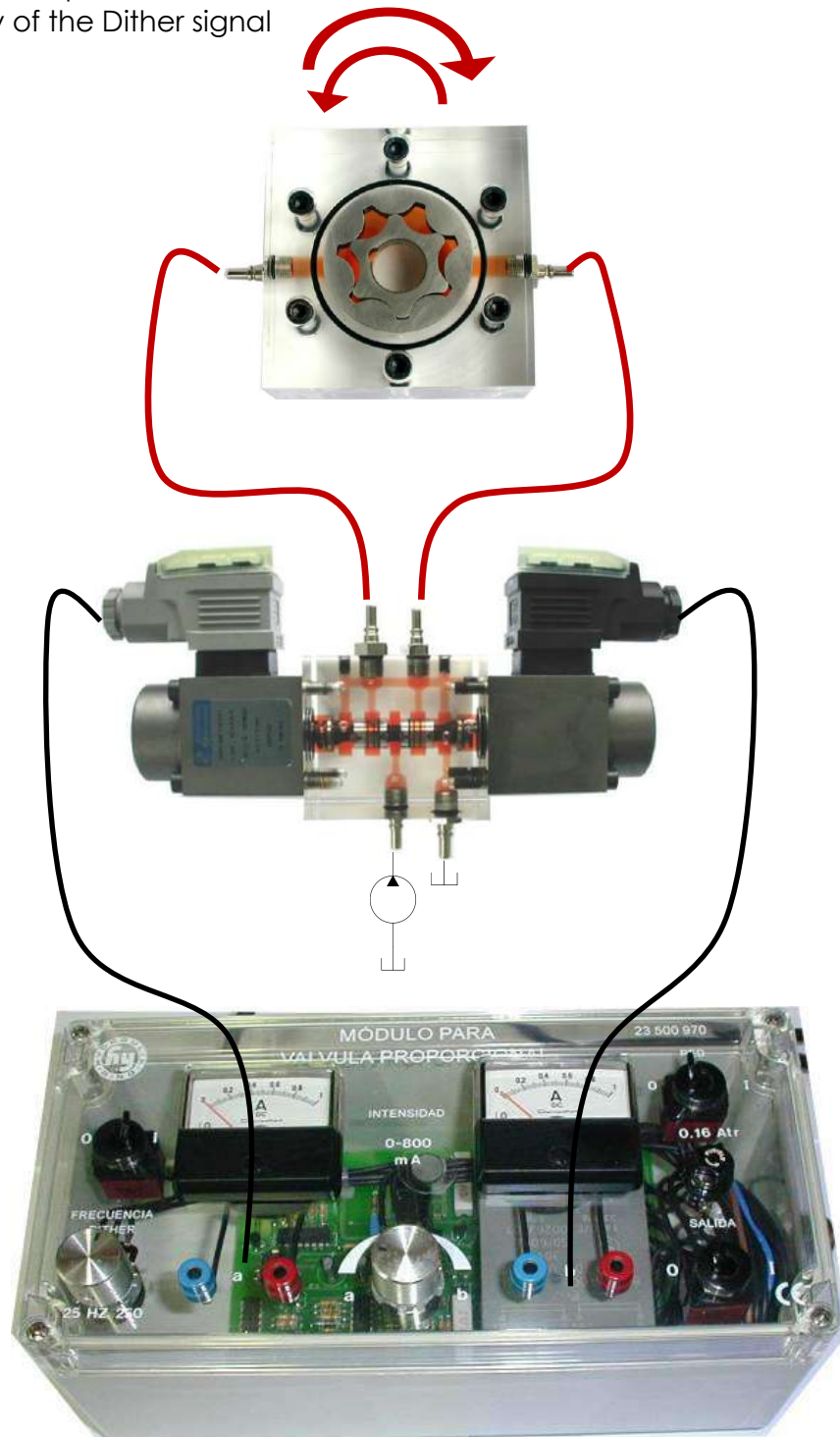
Ref.13020534

Example: MINIFLUID with Proportional Hydraulics

Motor drive

The assemblies with the different motors (see actuators sections 21-22) allow the student, apart from understanding the motor itself, to carry out an introductory study of the proportional and visualize the internal operation of the proportional valves:

- Both directions of rotation
- Different speeds
- Study of the Dither signal



Fluid physics - MINIFLUID elements



Restrictor model

The effect of narrowing a pipe on fluid flow and speed.

Ref.13021341



Pressure actuator

Reciprocating pump.

Ref.13018365



Viscosimeter

Demonstration of the different viscosities of hydraulic oil, lubrication oil and valvoline.

Ref.13015618



Pressure transmission

Model for studying pressure transmission and the relation between Power / Pressure / Surface area.

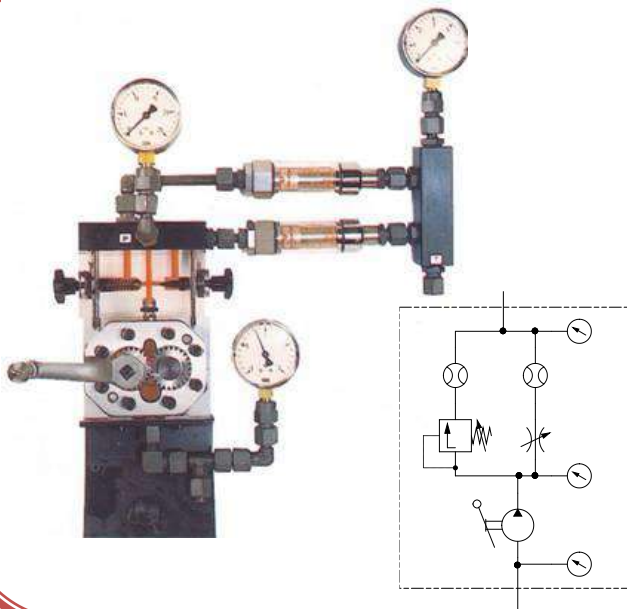
Ref.13025575



Cartesian plunger

Study of the Law of Floatation (Archimedes Theorem) and the transmission of pressure in all directions (Pascal Principle).

Ref.13024789



Pressure/Flow demonstration

Assembly to demonstrate the different effects which the use of a pressure relief valve or a restrictor valve has on the pressure and flow rates in a hydraulic circuit.

Ref.53950428

Rear projection - MINIFLUID accessories



Double hydraulic power unit

With two pumps, **2 x 1,5 l/min**
Specially designed for rear projection of transparent MINIFLUID elements

Ref.53201335

The MINIFLUID elements can be projected without the base plate on a projector, showing their internal behavior and the direction of the fluid



Command flow distribution panel

For rear projection of the transparent elements and circulation of the fluid through them.

The on/off button panel shown in the photo belongs to the upper motor pump group

Ref. 13022683



Hose set for rear projection

To work with the 2x1.5 l/min double hydraulic power unit and the command flow distributor panel shown above

Ref. 13023291

MINIFLUID compatibility with HLA hydraulic benches



Pressure reducer

For compatibility with **HLA hydraulic benches** (industrial "iron valves" NG06 – NG10) with **MINIFLUID transparent valves equipment**

Input pressure 0 - 64 bar

Output pressure 0 - 12 bar

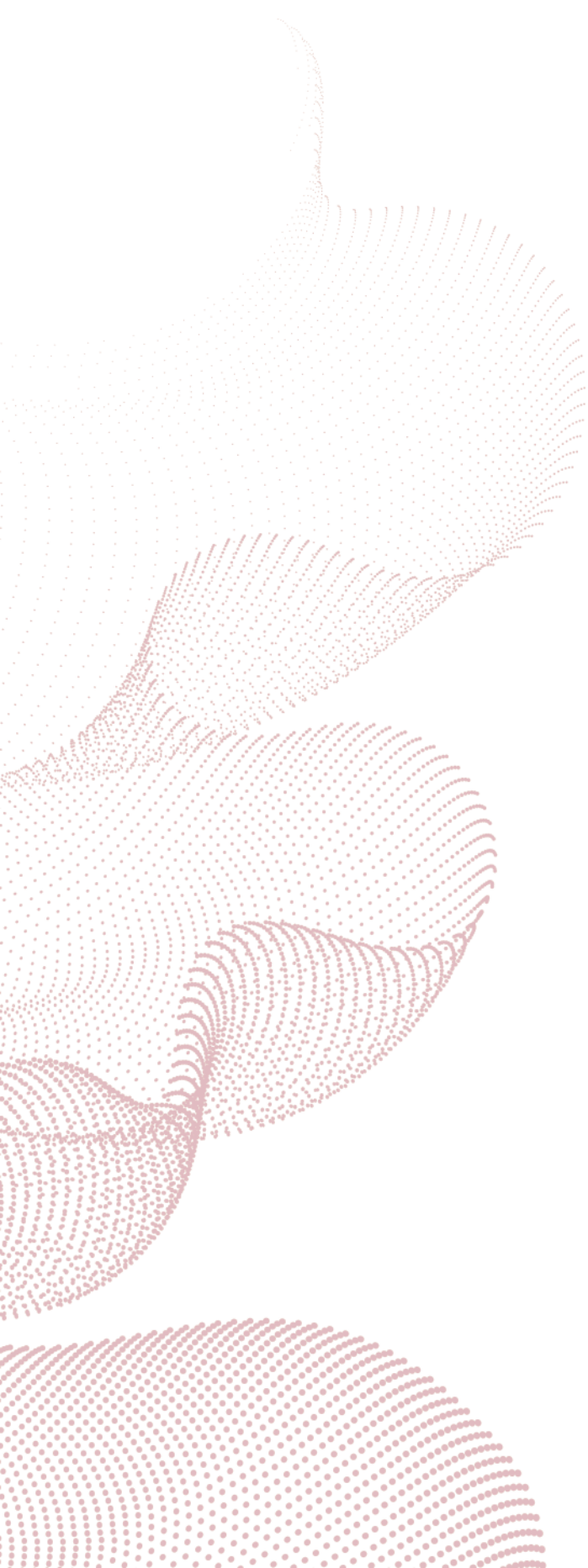
Ref.16100020



Hand pump

With external gears for connection to the tank (measuring glasses in HLA hydraulic benches) and flow generation by rotary lever

Ref.13023421



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