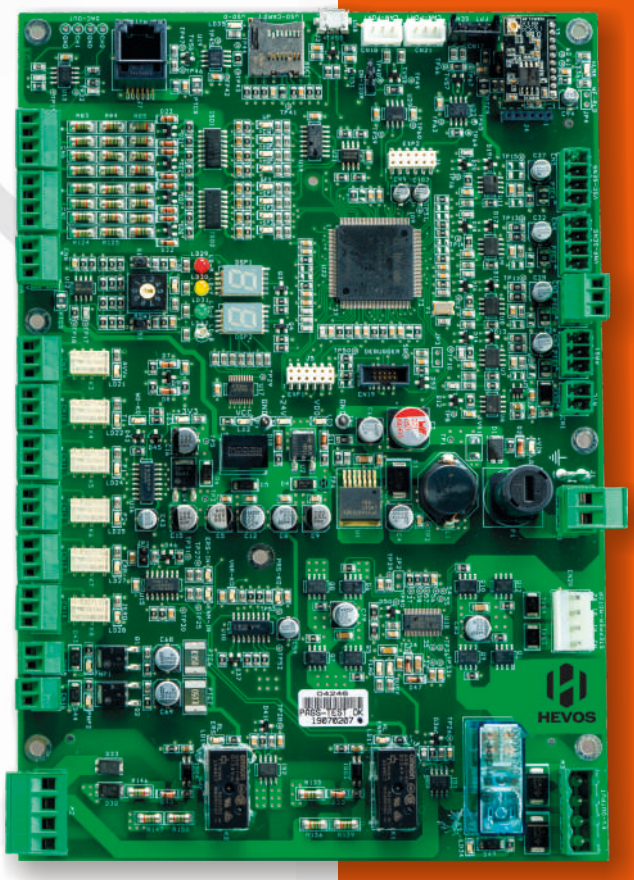
HEVOS

OPERATING INSTRUCTIONS ELECTRONIC VALVE UNITS

HEVOS HE100 - HE250 - HE650 and SCH001 board



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FIRST INSTALLATION: SAFETY WARNINGS

1. The power supply voltage of the board must be 24VDC rectified and stabilized.
2. Verify that the sequence of signals from and to the control panel, indicated in the manual instruction have been correctly applied (OPERATING CYCLE DIAGRAM), in particular:
   a. UP: ERS coils supply advance compared to motor pump starting
   b. UP: ERS coil shut-off delay compared to motor pump stop
   c. DOWN: ERS+ENR coil shut-off delay compared to the end of stroke
   d. Wait the shut-off and shut-on of RDY ready signal before to start a new stroke and to supply the coils
   e. Do not accidentally feed the ERS coil to the rise of the RDY signal
3. Manage the ON-OFF motor phases only with the AVV and SFY board signals

N.B. special attention for installers

4. Verify that the slowing distance has been set equal to each plane (check the position of the slowing magnets or the encoder settings for slowing-down distance).
5. The distances of magnets (or the encoder settings) must be higher than the values of the slowing space set in the parameters P208/P308 of the control board, otherwise they are not compatible and result in abrupt stops (similar to the mechanical system with the screw to adjust the slowing sweetness set too much sweet).
6. In case of problems or abrupt stops, unless installation mechanical problem, it's possible that the previous points 1—>5 have not been respected.
7. Only after the installation works properly, you can activate P112=1 the **SELF-LEARN MODE**. This parameter has the function to automatically optimize the stopping space.
   ⚠ To perform the **diagnosis** of movement problems the **SELF-LEARN MODE** function must be disabled by imposing p112=0, to avoid influences on movements due to the compensation logic.
8. ⚠ For **emergency downward** in case of a power failure, the control board and the coils must always remain powered by an uninterruptible power supply of adequate power for the entire duration of the stroke.

0 INTRODUCTION

This manual is an integral part of the product therefore must be kept for the lasting in operation of the unit, in a place accessible and known by the installation, use and maintenance personnel.
The herewith instructions aim to permit the positive and safe execution of the installation operations, starting up, working, control, maintenance and possible repair of the unit.
If any situation or event, not specified in the following pages, should occur, please refer to our Technical Department. For any request of general technical information or spare parts, please quote the identification data of the unit.

WARNING - IMPORTANT

In case of non-compliance with this manual, HEVOS declines all responsibility, in particular for not compliance with prescriptions, indications and procedures indicated in this manual with regard to installation and passenger's security relating to:

- RDY, AVV and ERR signals;
- Motor-pump switching on/off;
- Soft stop sequences.

WARNING

The control panel, when receiving the FAULT signal from the SCH001 board (ERR=ON and/or RDY=OFF outputs), shall NOT send any signal to the valve and/or motor/pump.
Under FAULT the motor/pump unit shall NOT be activated.

1 GENERAL INFORMATION

The Hevos HE valves unit is a component designed for use in lifting systems such as elevators and goods lifts.
The function of the valve unit is to control the speed of the cabin and to represent the stop element, downward.
It is forbidden the commissioning of the valve unit as part of a lifting system that has not been declared in conformity with local regulations.
The room where the unit is installed must be ventilated, free from dust and moisture.

1.1 Warnings for the performance of the work

These operating instructions report some symbols, which correspond to important safety measures:

This symbol warns that not observing the related instruction involves a risk of damage to the unit or to the system;

This symbol warns that not observing the related instruction involves an electric shock risk;

1.2 Inspection on delivery

On delivery, check that the material has not been damaged during transportation from the production plant; check that the packing is undamaged and that you have all the necessary and / or required accessories; also check the correspondence of data on delivery and identification plates with those of the expected material.
In the event of faults, defects, or deficiencies, promptly notify our Technical Department.

1.3 Storage

Waiting for the installation, the group must be stored away from the elements (can be especially damaged by water, humidity and sun) and in a stable position.
The temperature of the storage location should be between 0 and + 50 ° C (32 and 122 °F).

1.4 Disposing

The device must be disposed according to the applicable regulations.

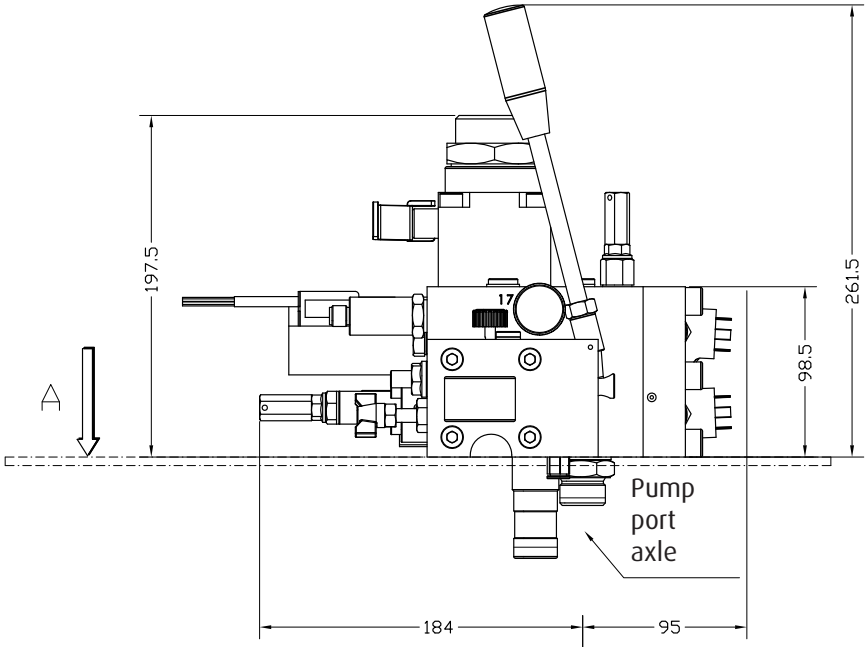
1.5 Directives and technical standards considered

The group is designed in accordance with the Technical Standards listed below:

Standard – Directive	Title
2014/33/UE	Lift Directive
EN 81-20:2014	Safety rules for the construction and installation of lifts
EN 81-50:2014	Design rules, calculations, examinations, and tests of the lift components
2006/42/CE	Machinery Directive
2014/35/UE	Low Voltage Directive
2014/30/UE	Electromagnetic compatibility Directive
EN 12015:2014	Electromagnetic compatibility - Emission
EN 12016:2016	Electromagnetic compatibility - Immunity
EN 60068-2-6	Vibration Environmental testing - Part 2: Tests - Test Fc: Vibration
EN 60068-2-14	Temperature Environmental testing - Part 14: Tests - Test N. Change of temperature
EN 60068-2-27	Shock Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
EN 60664-1: 2007	Insulation coordination of equipment within low-voltage systems
2011/65/EU	RoHS 2 Directive – on the restriction of the use of certain hazardous substances in electrical and electronic equipment

2 DIAGRAMS AND ASSEMBLY

2.1 HE100 valve group dimensions



Dimensions in mm

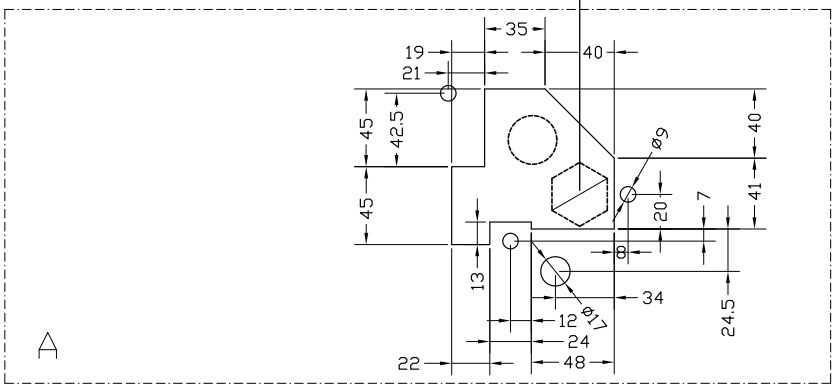
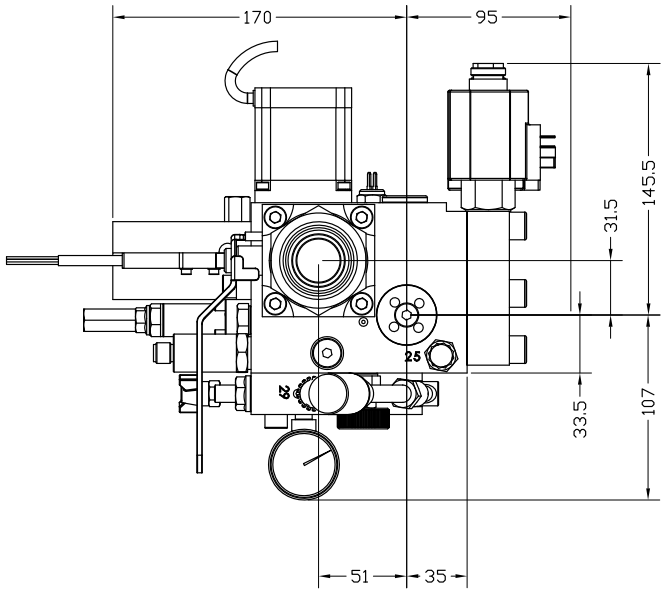
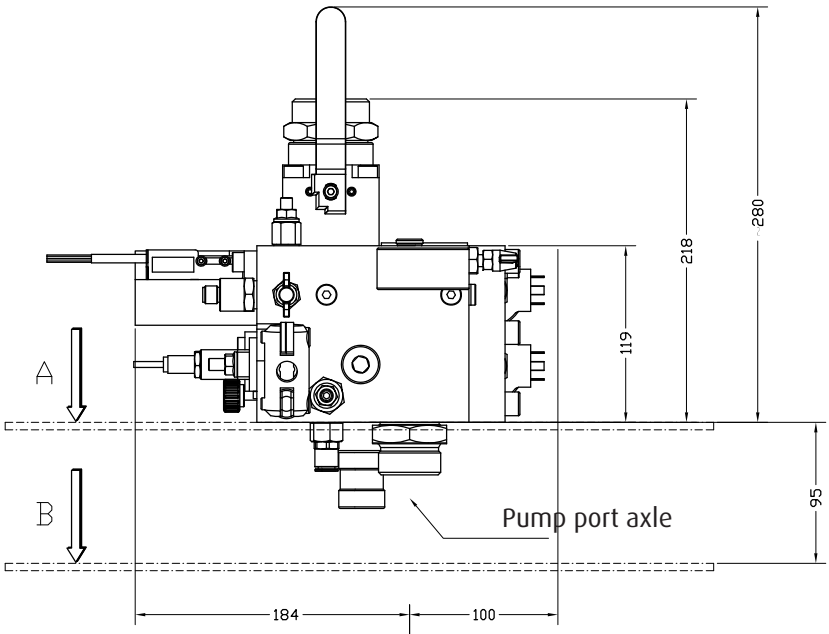


Plate mounting hole/shape pattern



Weight 10 Kg

2.2 HE250 valve group dimensions



Dimensions in mm

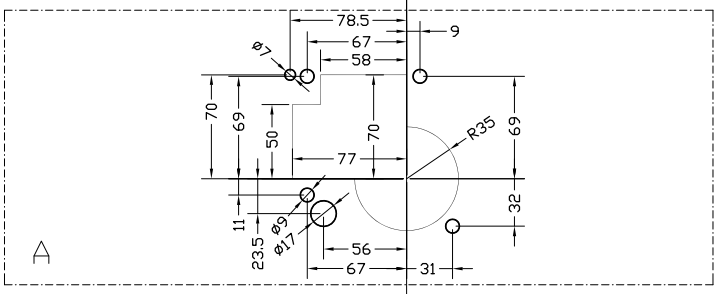
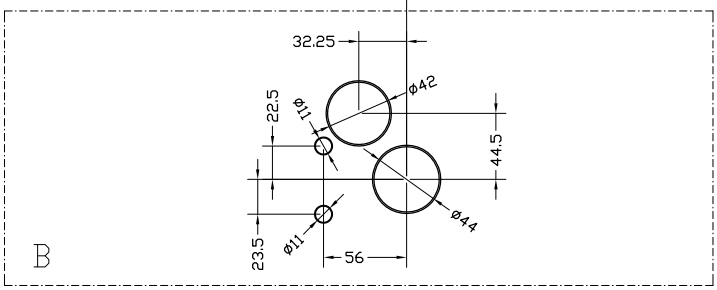
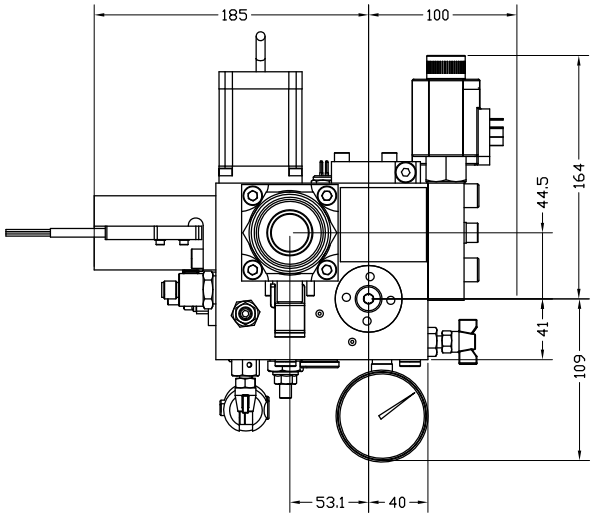


Plate mounting hole/shape pattern

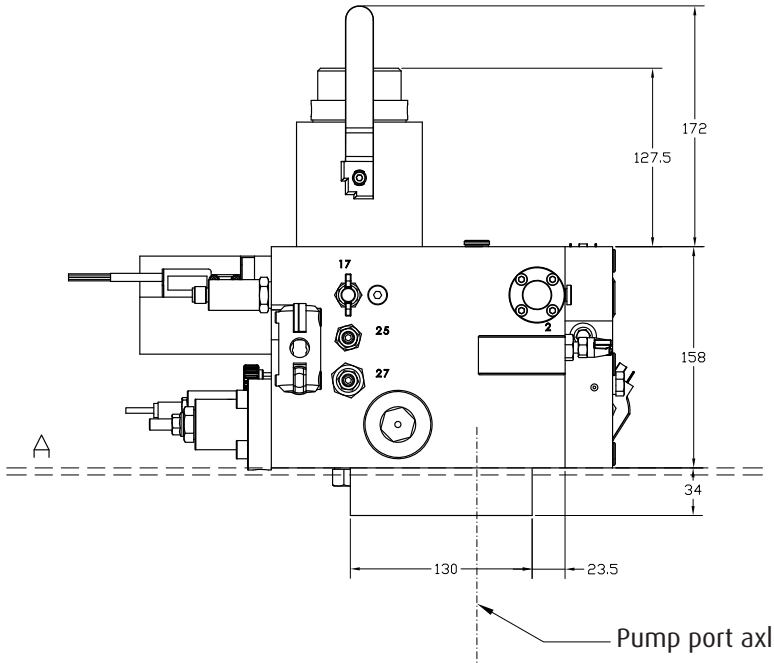


Pump tube mounting hole pattern



Weight 13 Kg

2.3 HE650 valve group dimensions



Dimensions in mm

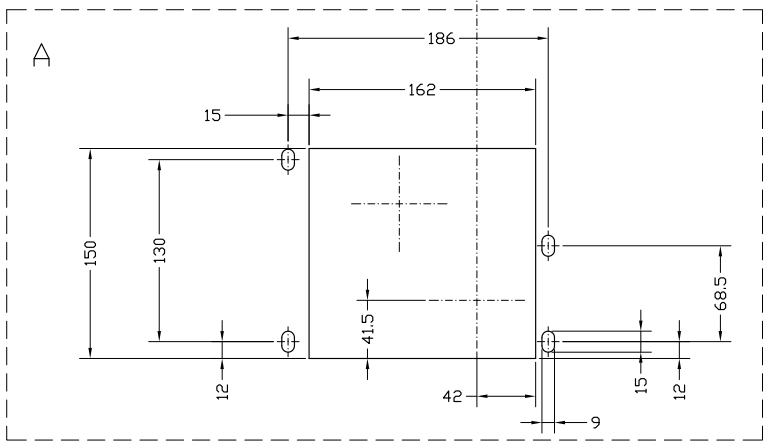
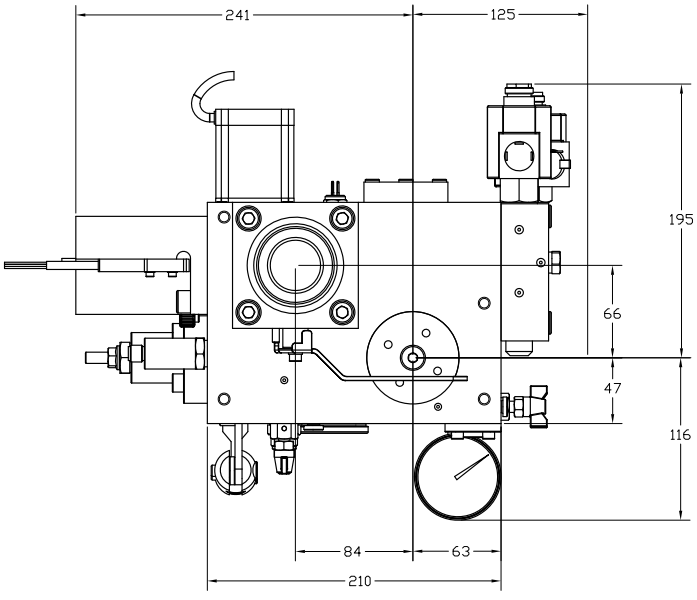
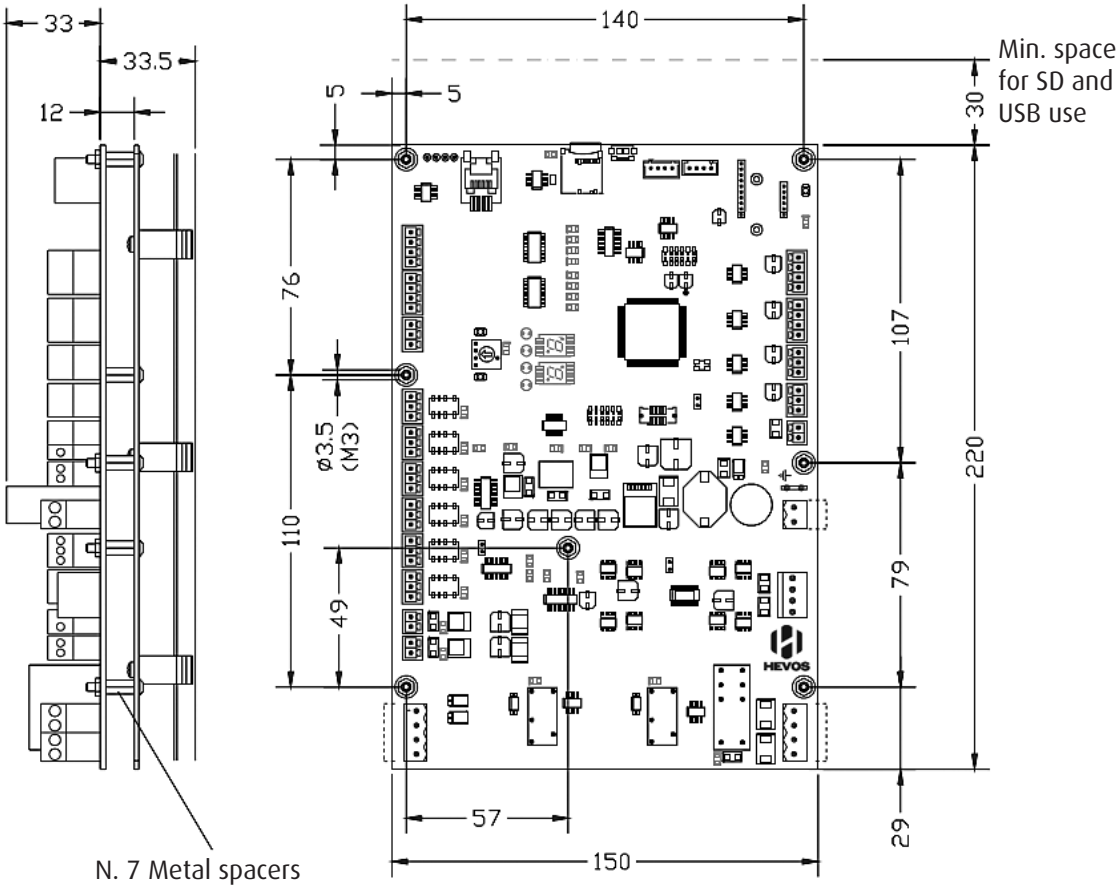


Plate mounting hole/shape pattern

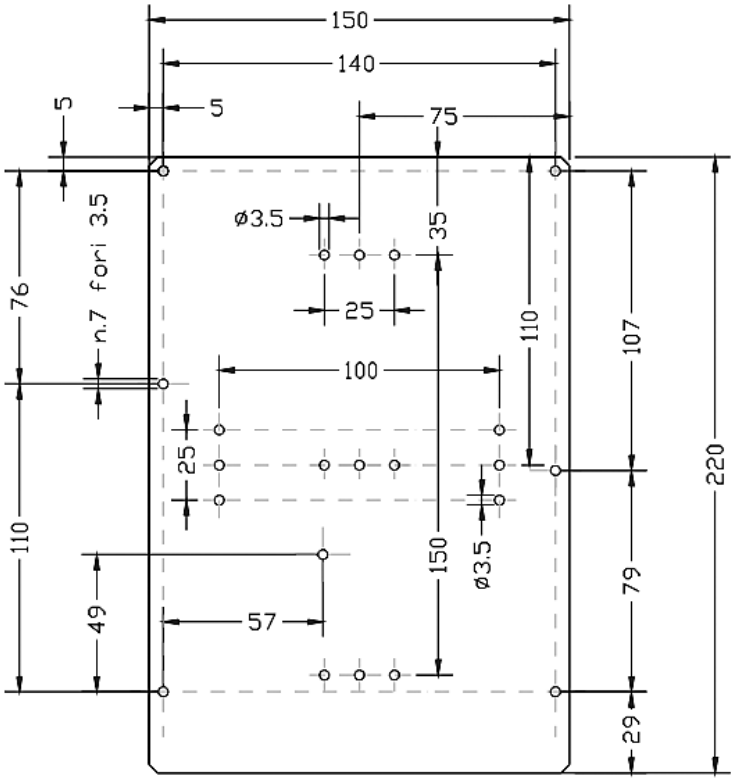


Weight 21 Kg

2.4 SCH001 control board dimensions



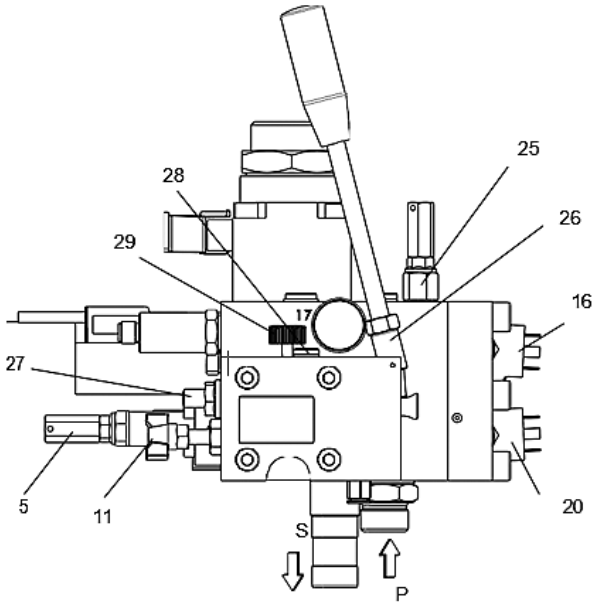
Board fixing metal
plate 1.5 mm
for DIN 35 bracket

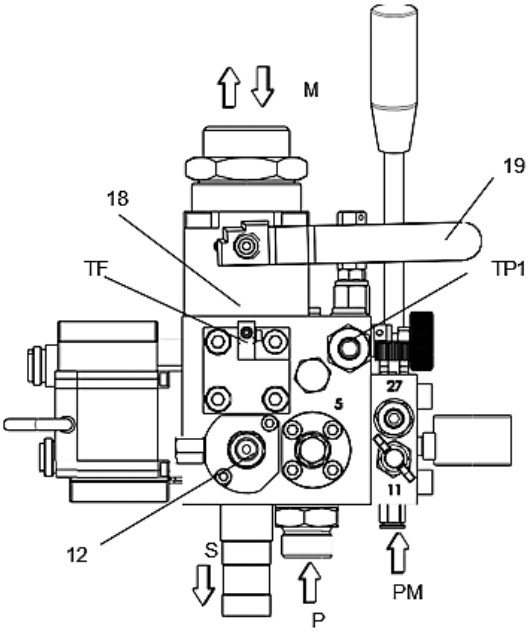


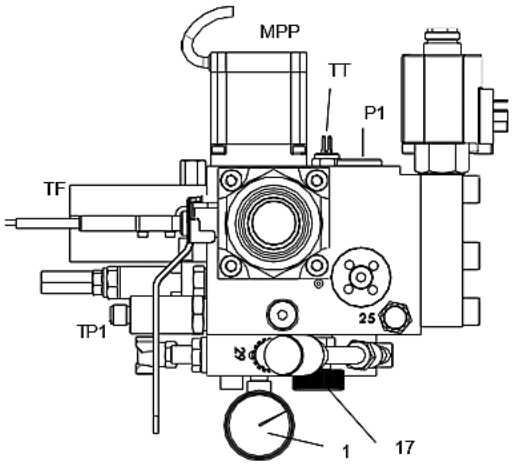
3 DIAGRAMS AND ADJUSTMENTS

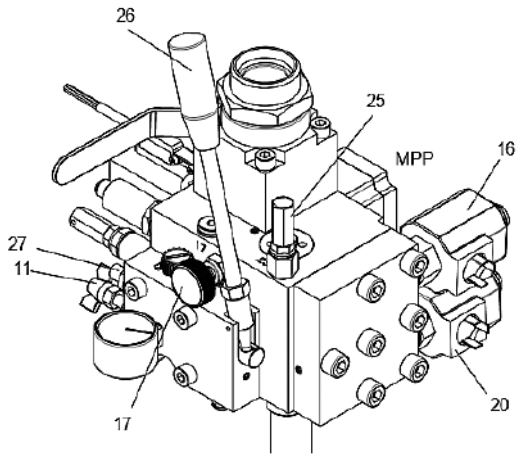
3.1 HE100 VALVE

3.1.1 HE100 main components









MAIN COMPONENTS

1 Pressure gauge
11 Pressure gauge shut-off valve
5 Maximum pressure valve adjusting screw
- clockwise increase (+) - anticlockwise decrease (-)
12 VSC valve zero contact
16 ENR solenoid valve (unblock VNR valve)
17 Emergency manual lowering (counterclockwise rotation)
18 Filter
19 Ball valve
20 ERS solenoid valve (unblock VSR valve)
25 Emergency manual lowering minimum pressure (minimum lowering pressure adjustment)
- clockwise increase (+) - anticlockwise decrease (-)
26 Hand pump
27 Hand pump maximum pressure valve
- clockwise increase (+) - anticlockwise decrease (-)
28 Hand pump non-return valve
29 Hand pump air-release screw

TF Flow meter
TP1 Pressure meter
TT Temperature meter
MPP VSC valve command Stepper motor

M Cylinder port
P Pump port
S Tank port
PM Hand pump input port
(P1) Auxiliary micro-levelling port

OPERATING LIMITS	**METRIC**	**USA**
- Max operating pressure:	70 bar	1015 psi
- Min operating pressure:	10 bar	145 psi
- Flow:	8 - 100 l/min	2 - 27 gpm
- Temperature limit:	5 - 70 °C	41 - 158 °F
- Viscosity:	14 - 290 cSt	

3.1.2 HE100 hydraulic diagram

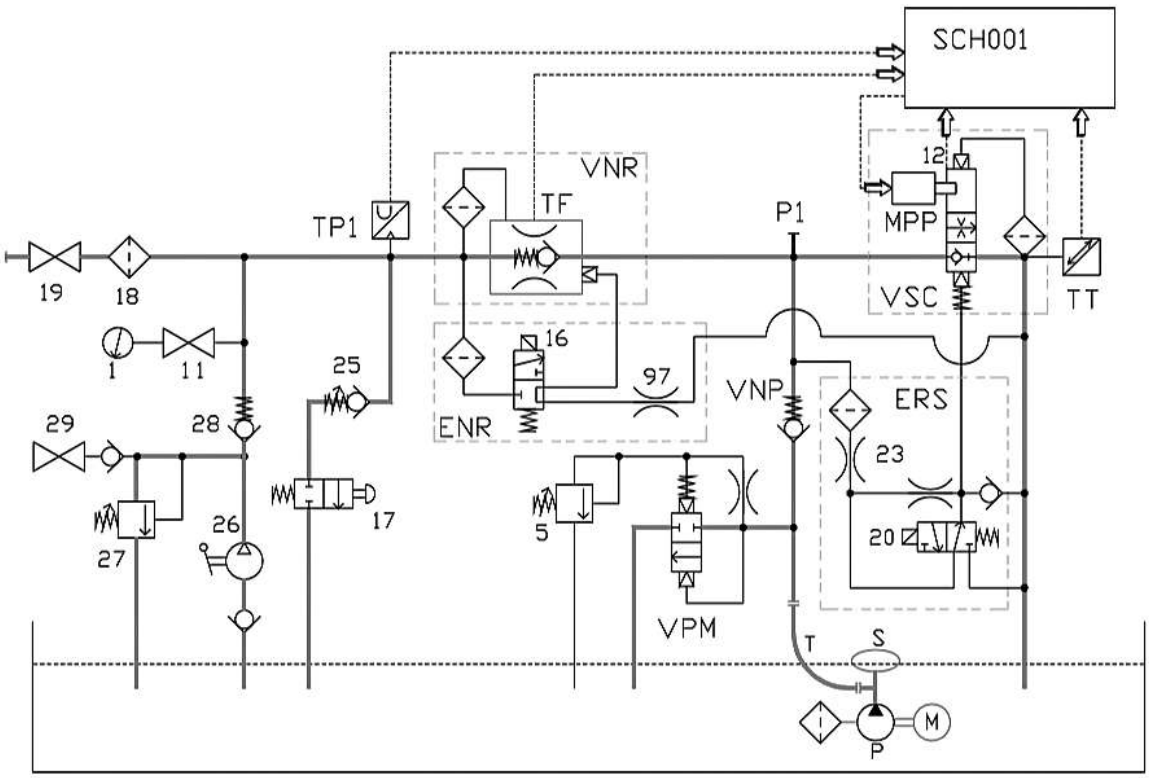
LEGEND

1 Pressure gauge
11 Pressure gauge cut-out cock
5 Maximum pressure valve adjusting screw - clockwise increases (+) - anticlockwise decreases (-)
12 VSC valve zero contact
16 ENR solenoid valve (unblock VNR valve)
17 Emergency manual lowering (anticlockwise rotation)
18 Filter
19 Ball valve
20 ERS solenoid valve (unblock VSR valve)
23 VSC valve block control throttle
25 Emergency manual lowering minimum pressure (minimum lowering pressure adjustment) - clockwise increase (+) - anticlockwise decrease (-)
26 Hand pump
27 Hand pump maximum pressure valve - clockwise increase (+) - anticlockwise decrease (-)
28 Hand pump non-return valve
29 Hand pump air-release screw
97 VNR valve block control throttle

TF Flow meter
TP1 Pressure meter
TT Temperature meter
ENR VNR valve unblock solenoid valve
ERS VSC valve unblock solenoid valve
MPP VSC valve command Stepper motor
VNP Pump no return valve
VNR No return and downstroke safety valve
VPM Pump maximum pressure valve
VSC Flow control valve
P1 Auxiliary micro-levelling port

OTHER PUMP UNIT COMPONENTS

M Pump motor
P Pump
S Pump silencer
T Flexible pump connection pipe



3.1.3 HE100 valve functional diagram

LEGEND

1 Pressure gauge
2 Pressure gauge cut-out cock
5 Maximum pressure valve adjusting screw
- clockwise increase (+) - anticlockwise decrease (-)
12 VSC valve zero contact
16 ENR solenoid valve (unblock VNR valve)
17 Emergency manual lowering (anticlockwise rotation)
18 Filter
19 Ball valve
20 ERS solenoid valve (unblock VSR valve)
23 VSC valve block control throttle
25 Emergency manual lowering minimum pressure (minimum lowering pressure adjustment)
- clockwise increase (+) - anticlockwise decrease (-)
26 Hand pump
27 Hand pump maximum pressure valve
- clockwise increase (+) - anticlockwise decrease (-)
28 Hand pump non-return valve
29 Hand pump air-release screw
97 VNR valve block control throttle

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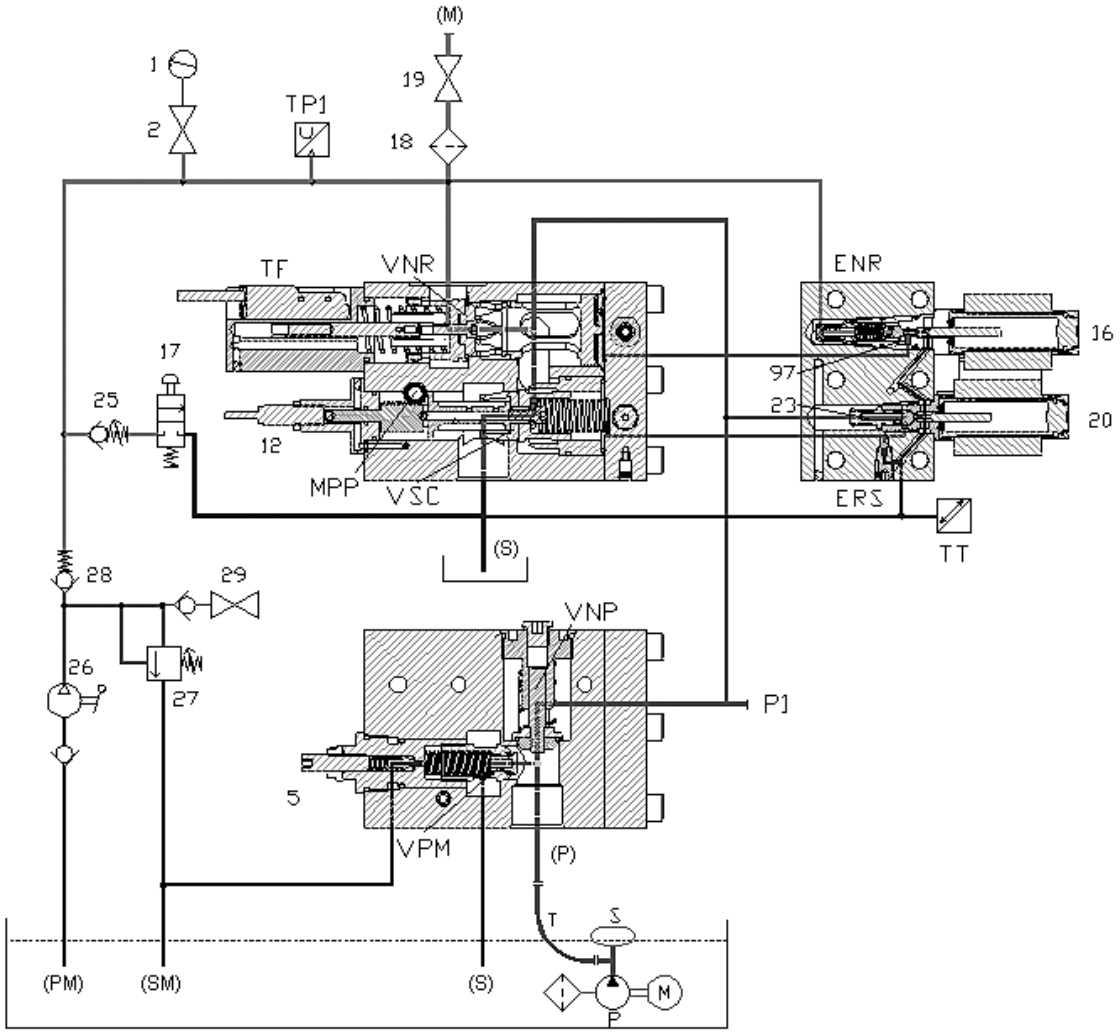
ERS VSC valve unblock solenoid valve
MPP VSC valve command Stepper motor
VNP Pump no return valve
VNR No return and downstroke safety valve
VPM Pump maximum pressure valve
VSC Flow control valve
P1 Auxiliary micro-levelling port
(M) Cylinder port
(P) Pump port
(S) Tank port
(PM) Hand pump input port
(SM) Maximum pressure valves draining

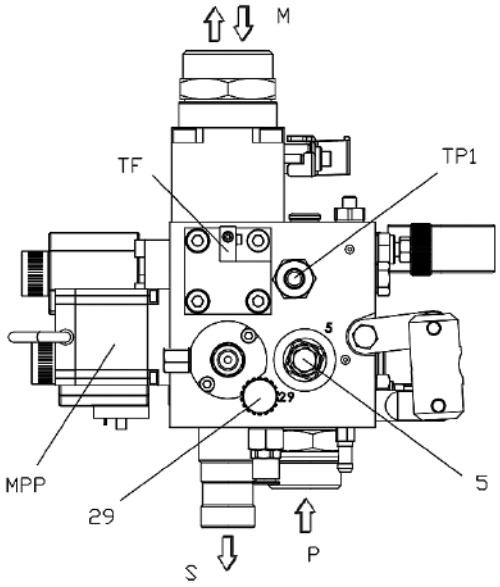
OTHER PUMP UNIT COMPONENTS

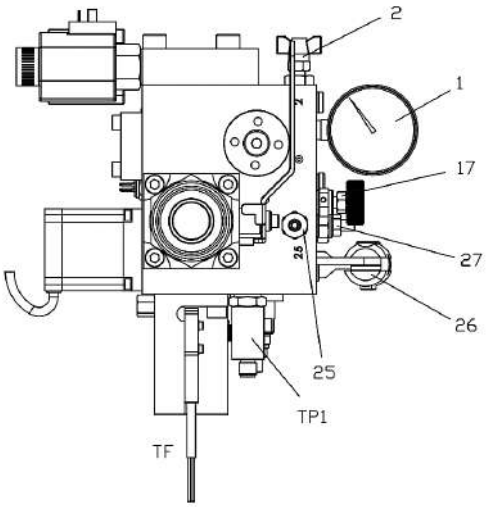
M Pump motor
P Pump
S Pump silencer
T Flexible pump connection pipe

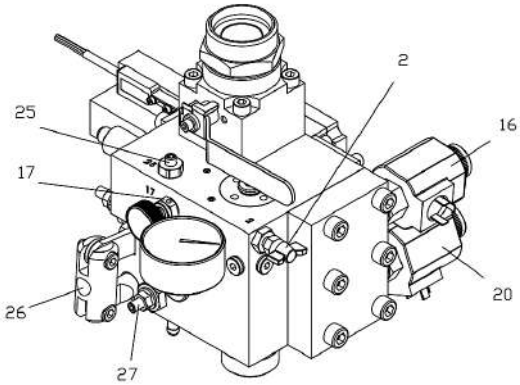


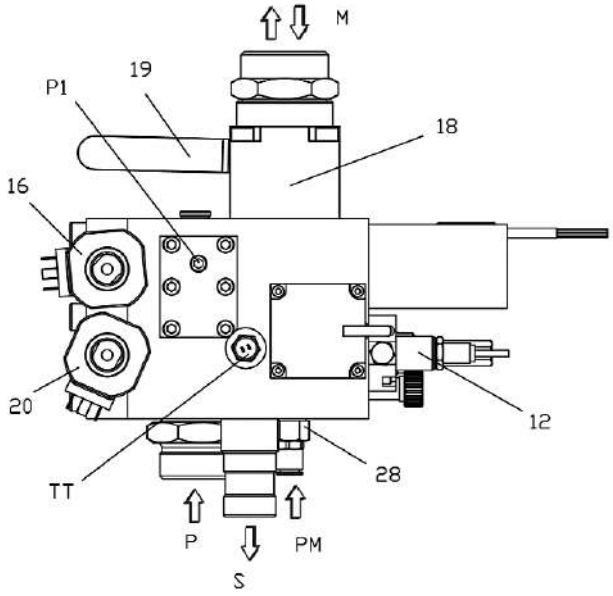
3.2 HE250 VALVE

3.2.1 HE250 main components









MAIN COMPONENTS

1 Pressure gauge
2 Pressure gauge cut-out cock
5 Maximum pressure valve adjusting screw
- clockwise increase (+) - anticlockwise decrease (-)
12 VSC valve zero contact
16 ENR solenoid valve (unblock VNR valve)
17 Emergency manual lowering (anticlockwise rotation)
18 Filter
19 Ball valve
20 ERS solenoid valve (unblock VSR valve)
23 VSC valve block control throttle
25 Emergency manual lowering minimum pressure (minimum lowering pressure adjustment)
- clockwise increase (+) - anticlockwise decrease (-)
26 Hand pump
27 Hand pump maximum pressure valve
- clockwise increase (+) - anticlockwise decrease (-)
28 Hand pump non-return valve
29 Hand pump air-release screw

TF Flow meter
TP1 Pressure meter
TT Temperature meter
MPP VSC valve command Stepper motor

M Cylinder port
P Pump port
S Tank port
PM Hand pump input port
(P1) Auxiliary micro-levelling port

OPERATING LIMITS	**METRIC**	**USA**
- Max operating pressure:	50 bar	725 psi
- Min operating pressure:	10 bar	145 psi
- Flow:	20 - 250 l/min	3 - 65 gpm
- Temperature limit:	5 - 70 °C	50 - 140 °F
- Viscosity: 14 - 290 cSt		

3.2.2 HE250 hydraulic diagram

LEGEND

1 Pressure gauge
2 Pressure gauge cut-out cock
5 Maximum pressure valve adjusting screw - clockwise increase (+) - anticlockwise decrease (-)
12 VSC valve zero contact
16 ENR solenoid valve (unblock VNR valve)
17 Emergency manual lowering (anticlockwise rotation)
18 Filter
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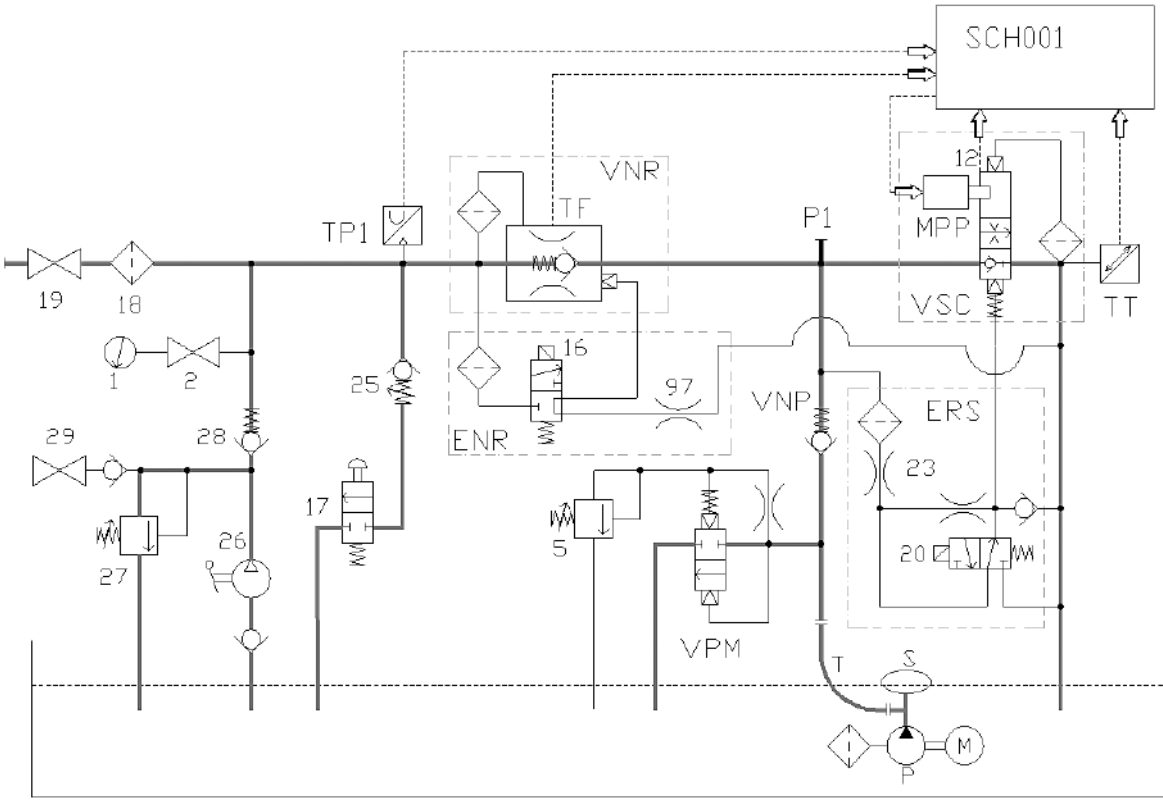
VNR No return and downstroke safety valve
VPM Pump maximum pressure valve
VSC Flow control valve
P1 Auxiliary micro-levelling port

OTHER PUMP UNIT COMPONENTS

M Pump motor
P Pump
S Pump silencer
T Flexible pump connection pipe



3.2.3 HE250 valve functional diagram

LEGEND

1 Pressure gauge
2 Pressure gauge cut-out cock
5 Maximum pressure valve adjusting screw
- clockwise increase (+) - anticlockwise decrease (-)
12 VSC valve zero contact
16 ENR solenoid valve (unblock VNR valve)
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18 Filter
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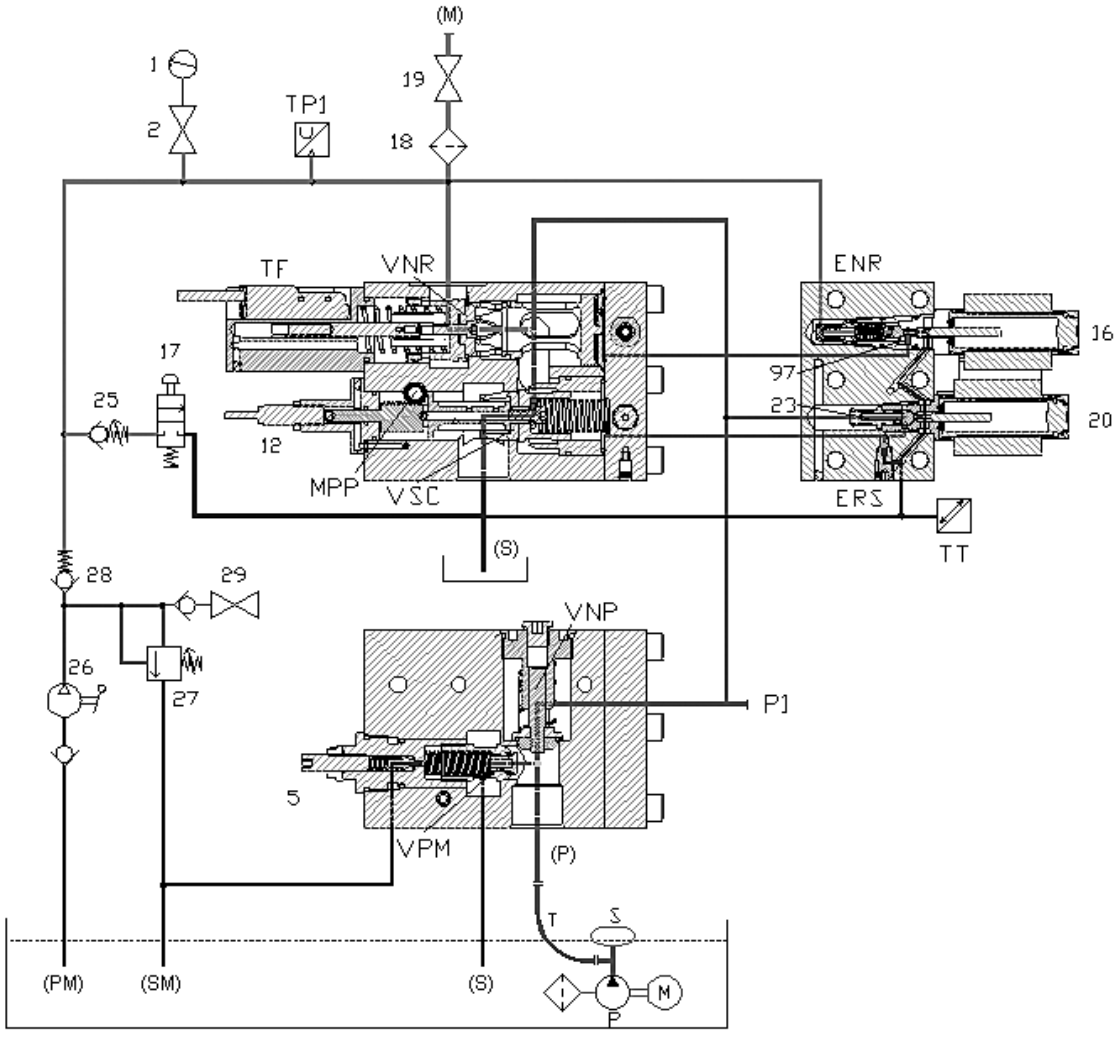
ENR VNR valve unblock solenoid valve
ERS VSC valve unblock solenoid valve
MPP VSC valve command Stepper motor
VNP Pump no return valve
VNR No return and downstroke safety valve
VPM Pump maximum pressure valve
VSC Flow control valve
P1 Auxiliary micro-levelling port
(M) Cylinder port
(P) Pump port
(S) Tank port
(PM) Hand pump input port
(SM) Maximum pressure valves draining

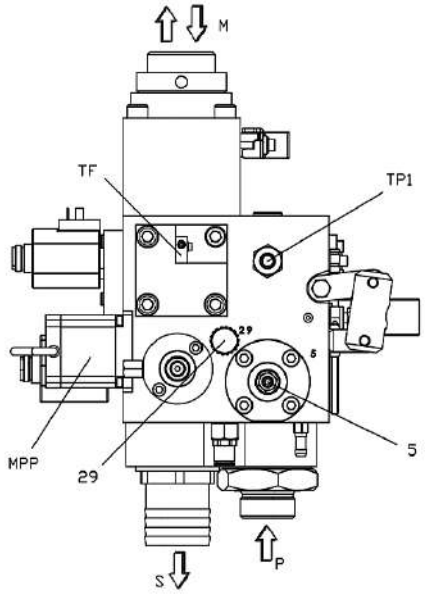
OTHER PUMP UNIT COMPONENTS

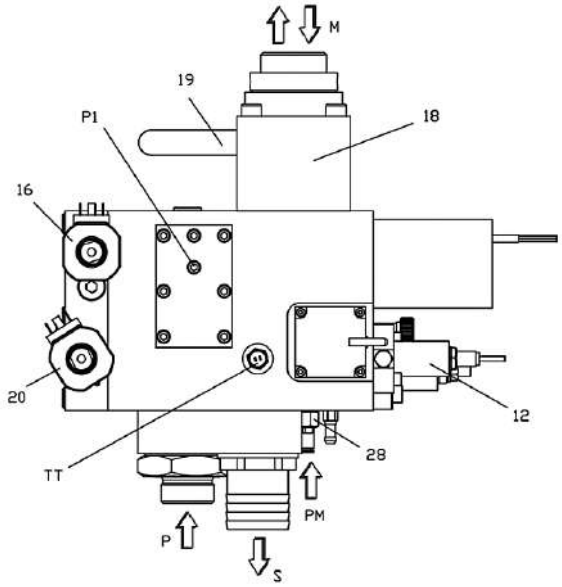
M Pump motor
P Pump
S Pump silencer
T Flexible pump connection pipe

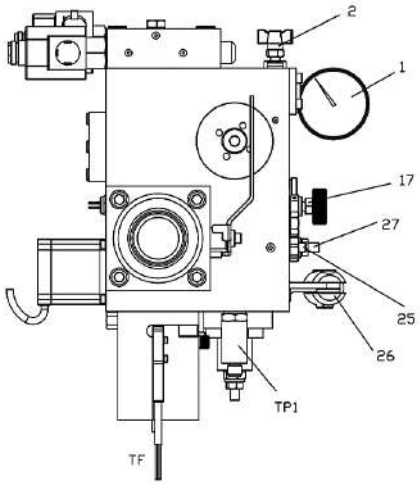


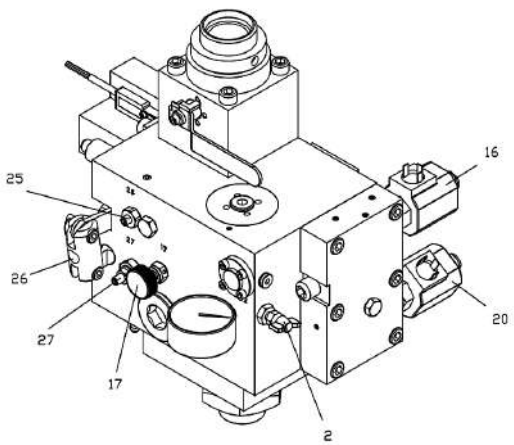
3.3 H650 VALVE

3.3.1 HE650 main components









MAIN COMPONENTS

1 Pressure gauge
2 Pressure gauge shut-off valve
5 Maximum pressure valve adjusting screw
- clockwise increase (+) - anticlockwise decrease (-)
12 VSC valve zero contact
16 ENR solenoid valve (unblock VNR valve)
17 Emergency manual lowering (counterclockwise rotation)
18 Filter
19 Ball valve
20 ERS solenoid valve (unblock VSR valve)
25 Emergency manual lowering minimum pressure (minimum lowering pressure adjustment)
- clockwise increase (+) - anticlockwise decrease (-)
26 Hand pump
27 Hand pump maximum pressure valve
- clockwise increase (+) - anticlockwise decrease (-)
28 Hand pump non-return valve
29 Hand pump air-release screw

TF Flow meter
TP1 Pressure meter
TT Temperature meter
MPP VSC valve command Stepper motor

M Cylinder port
P Pump port
S Tank port
PM Hand pump input port
(P1) Auxiliary micro-levelling port

OPERATING LIMITS	**METRIC**	**USA**
- Max operating pressure:	45 bar	625 psi
- Min operating pressure:	10 bar	145 psi
- Flow:	250-700 l/min	65-185 gpm
- Temperature limit:	5 - 70 °C	50 - 150 °F
- Viscosity: 14 - 290 cSt		

3.3.2 HE650 hydraulic diagram

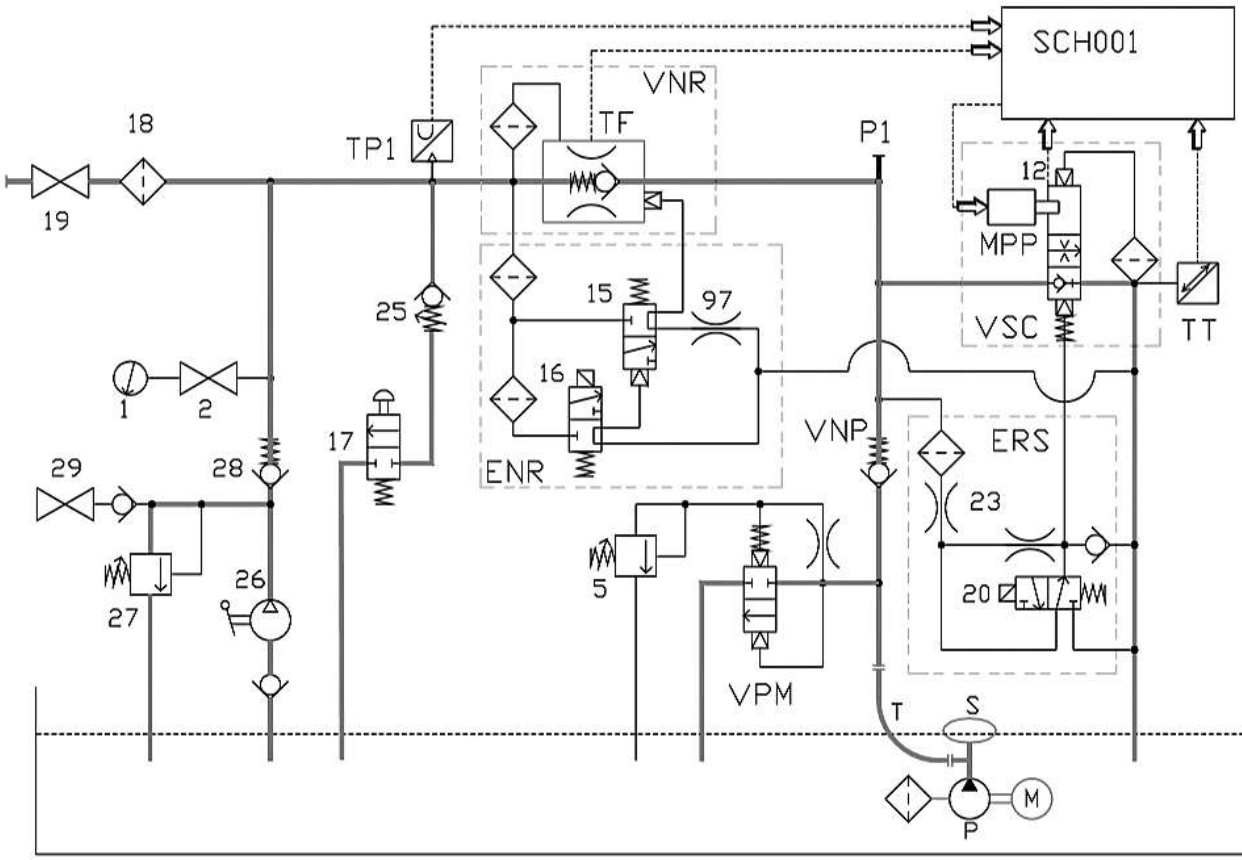
LEGEND

1 Pressure gauge
2 Pressure gauge cut-out cock
5 Maximum pressure valve adjusting screw
- clockwise increase (+)
- anticlockwise decrease (-)
12 VSC valve zero contact
15 ENR pilot valve
16 ENR solenoid valve (unblock VNR valve)
17 Emergency manual lowering (anticlockwise rotation)
18 Filter
19 Ball valve
20 ERS solenoid valve (unblock VSR valve)
23 VSC valve block control throttle
25 Emergency manual lowering minimum pressure (minimum lowering pressure adjustment)
- clockwise increase (+)
- anticlockwise decrease (-)
26 Hand pump
27 Hand pump maximum pressure valve
- clockwise increase (+)
- anticlockwise decrease (-)
28 Hand pump non-return valve
29 Hand pump air-release screw
97 VNR valve block control throttle

TF Flow meter
TP1 Pressure meter
TT Temperature meter
ENR VNR valve unblock solenoid valve
ERS VSC valve unblock solenoid valve
MPP VSC valve command Stepper motor
VNP Pump no return valve
VNR No return and downstroke safety valve
VPM Pump maximum pressure valve
VSC Flow control valve
P1 Auxiliary micro-levelling port

OTHER PUMP UNIT COMPONENTS

M Pump motor
P Pump
S Pump silencer
T Flexible pump connection pipe



3.3.3 HE650 valve functional diagram

LEGEND

1 Pressure gauge
2 Pressure gauge cut-out cock
5 Maximum pressure valve adjusting screw
- clockwise increase (+) - anticlockwise decrease (-)
12 VSC valve zero contact
15 ENR pilot valve
16 ENR solenoid valve (unblock VNR valve)
17 Emergency manual lowering (anticlockwise rotation)
18 Filter
19 Ball valve
20 ERS solenoid valve (unblock VSR valve)
23 VSC valve block control throttle
25 Emergency manual lowering minimum pressure (minimum lowering pressure adjustment)
- clockwise increase (+) - anticlockwise decrease (-)
26 Hand pump
27 Hand pump maximum pressure valve
- clockwise increase (+) - anticlockwise decrease (-)
28 Hand pump non-return valve
29 Hand pump air-release screw
97 VNR valve block control throttle

TF Flow meter
TP1 Pressure meter
TT Temperature meter
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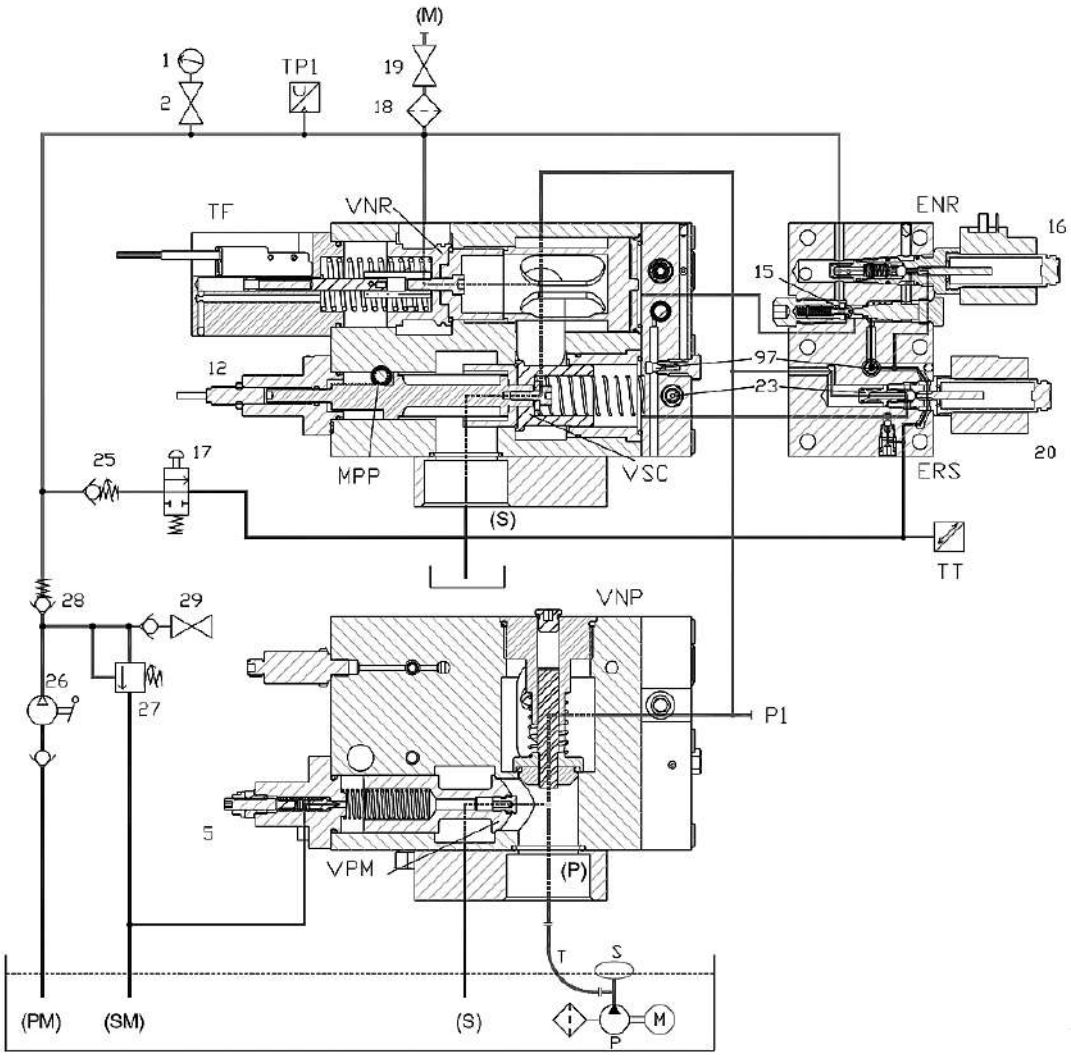


4 CONTROL PANEL: REQUIREMENTS

The purpose of this chapter is to give some basic indications to prepare an electric panel suitable for HEVOS HE systems, formed by the HE valve groups and the electronic control board SCH001.
For further information on procedures, risks, technical data, etc... please refer to the specific chapters of the Instruction Manual.

4.1 Generality

The HE system allows to obtain the highest stopping accuracy and the shortest possible running time, within the limits of the set speed parameters, thanks to the Soft-Stop operation type in upward and downward and through the exchange signals with the switchboard.

4.2 Operation

1. The HE system receives the movement signals from the control panel via OPTO-ISOLATED DIGITAL INPUT with operating voltage 20 - 60 VDC - 100 mA (CN6 and CN7, see Instruction Manual) and the input -V (CN8).
   You can also use the specific output voltage +24V generated by the SCH001 board (CN8), making a jumper between 0V and -V, to return the signals through contacts in the switchboard.
2. The SCH001 control board transmits the status of the HE system to the control panel via RELAY EXCHANGE OUTPUTS with capacity of 1A-48VDC/0.25A-250VAC.
3. The HE system **works exclusively at 24 VDC** and the emergency descent, of automatic type, must be managed completely at 24 VDC, executing the same sequences of normal operation (see Instruction Manual). The battery shall provide 24 VDC and 200 W for the duration of the stroke.
4. The control panel shall not initiate the operation **if the ERR signal is active or the RDY signal** of the SCH001 control board is not active. This prevents uncontrolled movements while programming the SCH001 control board or during a blocking error of itself. When the **ERR** signal is not active and the **RDY** signal is active, the control panel can start the manoeuvre.
   For some types of errors, the control board will attempt an automatic reset with cycles every 3s for 20 times during which the **ERR** signal will be lowered while keeping **RDY** not active. If the cause is still present **ERR** will be activated again.
   The RDY signal is deactivated when the programming selector is not in position 0 or when the system is not in the condition to perform the manoeuvre (e.g. when it is in error).
5. The HE system requires a start delay for the motor in upward starting phase and in motor shutdown.
   Both the power supply delays shall be managed via the SCH001 control board AVV signal, which switches-ON to start the motor initially and switches-OFF again at the end to switch off the engine.

⚠ For safety reasons and to prevent uncontrolled movement of the cabin, in the absence of the **RDY** signal and if it does not come from AVV-signal, the motor starting shall be strictly prohibited.

⚠ AVV output shall be placed in series with the auxiliaries of the motor main contactors to ensure safe starting.

When the motor is started (direct start, star/delta or soft starter) the SCH001 control board expects a signal at the SFY input that allows to minimize the start time of the cabin and indicates the beginning of the upward starting phase (see diagram electrical connections)

6. **UPWARD**: at the UP-direction signal, energize 24VDC the **ERS** solenoid valve from the switchboard, ensuring a **delay in deactivation at the arrival contact**. Deactivation must take place at least 2s after that the UP signal lowering or otherwise not before the **RDY** contact (output) moves OFF.
   The **RDY** contact remains OFF for a time of 1 to 5s, during which ON is active when the solenoid valves are actually deactivated by the panel.
7. **DOWNWARD**: At the DW direction signal, power 24VDC the 2 **ERS+ENR** solenoid valves from the switchboard with a delay in shutdown to the arrival contact. The shutdown delay can be managed in the same way as the **ERS** solenoid valve and described in the uphill run. In case of shutdown without power delays of **ERS** and **ERN** solenoid valves (ex: Maintenance Mode stop) the system records the abnormal situation by reporting errors (e.g. W-Er12 and Er05) which auto-reset after 1-2 s.
8. The HE system is certified as part of a UCM safety device against uncontrolled downhill cab movement.

Note: In the switchboard, the two contactors with activation verification shall prevent uphill movements by interrupting the power supply to the motor/pump assembly. The HE group is normally closed and is not capable of preventing upward movement in case of unwanted motor starting.

4.3 Differences and similarities with traditional hydraulic panel

4.3.1 Analogies

a) The management of the digital input signals of the SCH001 board does not involve any particular specifications, as they follow the traditional operating phases:
   - upward (UP), till the floor contact;
   - downward (DW), till the floor contact;
   - high speed (HSP), till the slowdown contact;
   - maintenance (MSP), under inspection condition.

b) The **overload signal** of the pressure switch is represented by the P2 output contact of the board SCH001 managed by parameter 108.

c) The maximum temperature signal of the fluid is represented by the T1 output contact of the SCH001 board managed by parameter 105.

Both P2 and T1 contacts are signals way to the control panel and they are not able to independently block the operation of the system.

4.3.2 Differences

a) In the absence of switching of the SCH001 control board's RDY output contact ON, **the operation of elevator shall be prevented**.

For safety reasons and to prevent unintended car movement, the motor starting in the absence of the RDY signal shall be strictly prohibited and if AVV is not controlled

AVV shall be placed in series with the auxiliaries of a motor remote-switch to ensure safe starting.

b) The **management of the engine** both in departure and in arrival, must be bound to the contact of output AVV of the SCH001 control board, that turns ON after a certain time from the ascent of the UP signal and turns OFF after a certain time that the UP signal has fallen, like in the operation of Soft-uphill stop.

The early departure of the engine with respect to the approval of the AVV output contact of the SCH001 board, leads to a sudden and high-speed uphill movement.

The motor-on in direct-starting, the star-delta exchange or the end of the soft-starter ramp, must be indicated by the digital SFY input to the SCH001 board, and the same signal must fall at the end, after the motor has stopped.

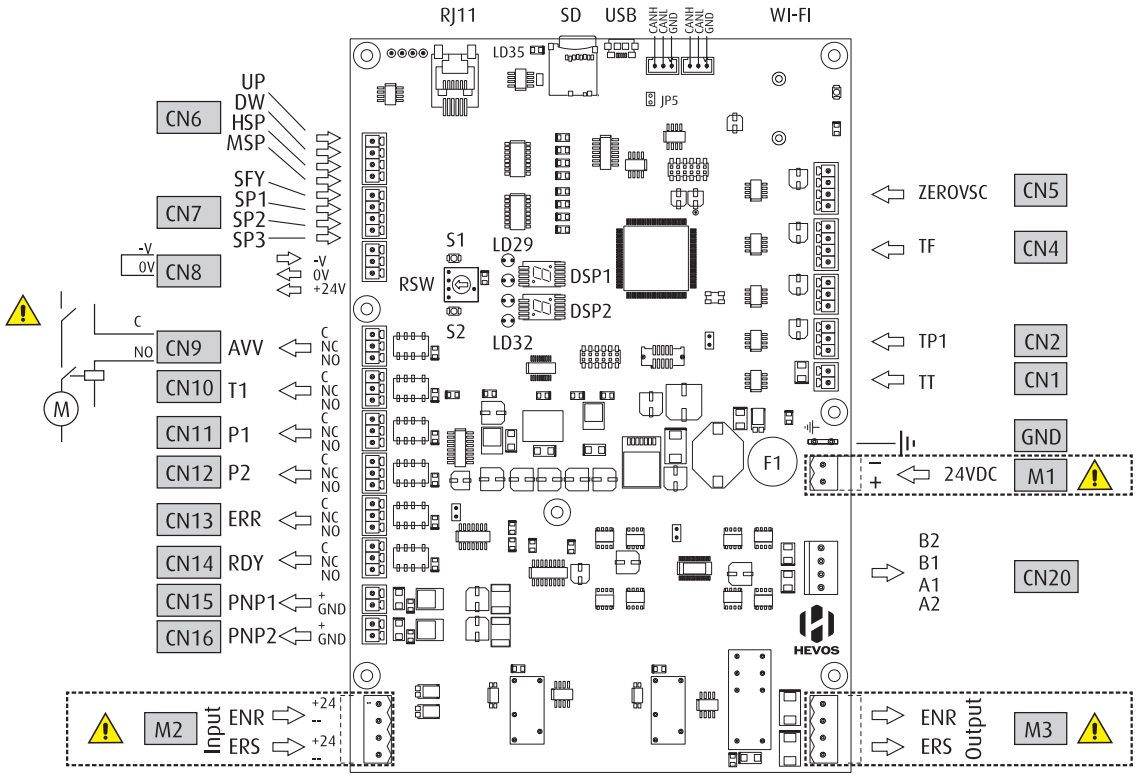
c) The management of the solenoid valves foresees their activation together with the UP signals for upward travel (ERS solenoid valve) and DW for downward travel (ERS and ERN solenoid valves), while their deactivation must take place after at least 2s that the UP or DW signals have fallen or otherwise not before the RDY output contact moves OFF.

The RDY contact remains OFF for a time of 1 to 5s, during which ON is active if the solenoid valves are actually deactivated by the switchboard.

4.3.3 Diagnostic features

To verify the realization of control panel logic and to test the connections it is possible to use the simulation mode of the control board (refer to section 9.1).

4.4 Control board SCH001 connections and main components



ATTENTION: Reversing the polarity on the **24VDC stabilized power supply**, or inversion of M2 and M3 connectors, will irreparably damage the board!

Use of 24VDC supply only rectified, could generate control board malfunction.

Failure to comply with the connection between the AVV signal and the control of the motor contactor can cause safety problems!

INPUT POWER

M1 Input Voltage 24-30 VDC stabilized
- Max input power 25 W
- Consumption 24VDC:
  200mA, 300 mA with connected data entry device

F1 Fuse 5A-T

M2 Solenoid valve ENR 24-30 VDC 35 W input
Solenoid valve ERS 24-30 VDC 35 W input

LD29	Red LED	ON = Error condition
LD30	Yellow LED	CAN operating
LD31	Green LED	ON = Normal condition
LD32	Blue LED	ON = Wi-Fi module activated
LD35	Orange LED	ON = SD memory activated

OPTO-ISOLATED DIGITAL INPUT

CN6 UP Upward command input
DW Downward command input
HSP Upward high-speed command input
(Downward also when Par. 453 = 0)
MSP Maintenance and V2 speed command (Par. 205 e 305)
combined with high speed command when Par.454=1

CN7 SFY Motor Pump ON signal
SP1 V3 Speed (together high-speed command input)
SP2 V4 Speed (together high-speed command input)
SP3 Downward high-speed command input (when Par. 453 = 1)

CN8 -V Digital input negative common
0V Bridge with -V negative for dry contacts
+24V Voltage for dry contacts utilization max 100 mA

SWITCHING RELAY OUTPUT 1A-48VDC / 0.25A-250VAC

CN9 AVV Motor Pump starting

CN10 T1 TMAX-TMIN (Par.105-110) temperature range exit:
> Par.105 always active,
< Par. 110 during waiting command only active.

CN11 P1 PMAX-PMIN pressure range exit, (Par.106-107)
always active if Par.457 =1 otherwise during waiting command only active if Par. 457=0

CN12 P2 Overload PS pressure limit overcoming,
(Par.108) during waiting command only active.

CN13 ERR Error condition

CN14 RDY Ready condition

DIGITAL OUTPUT V = 24 VDC - 500mA - PNP type

CN15 PNP1 Valve monitoring signal

CN16 PNP2

OTHER

M3 ENR solenoid valve connection
ERS solenoid valve connection

RSW Working selector with 10 position

S1-S2 Confirmation keys

RJ11 Hand terminal connection

SD Micro SD 2-16 GB FAT32

CN20 Stepper motor connection

USB Micro-USB PC direct connection

CAN CAN net connection

Wi-Fi Wi-Fi net connection module

ZERO VSC, TF, TP1, TT, sensor input

DSP1-2 digit signalling display

4.5 RSW selector position

RSW SELECTOR POSITION	DISP 1-2	CONFIRMATION BUTTON	DISP 1-2
0 NORMAL WORKING CONDITION	(00)(**)	/	
1 HAND TERMINAL PARAMETER MODIFICATION	(*)	/	
2 WI-FI NET PARAMETER MODIFICATION (**)	(UF)	/	
3 DROP TEST CONDITION	(FC)	S1	(FP)(***)
4 UCM TEST	(UC)	S1	(UP)(***)
5 SD-CARD PARAMETERS READING	(IC)	S2	
6 PNP1 SIGNAL TEST	©-)	S1/S2	(Cu)(Cd)(***)
7 SD-CARD PARAMETERS AND RECORD WRITING	(oC)	S1/S2	
8 MAXIMUM PRESSURE VALVE TEST CONDITION	(PP)	S1	(HP)(***)
9 LAST ERROR NUMBER DISPLAY	(- -)	S1=RESET	

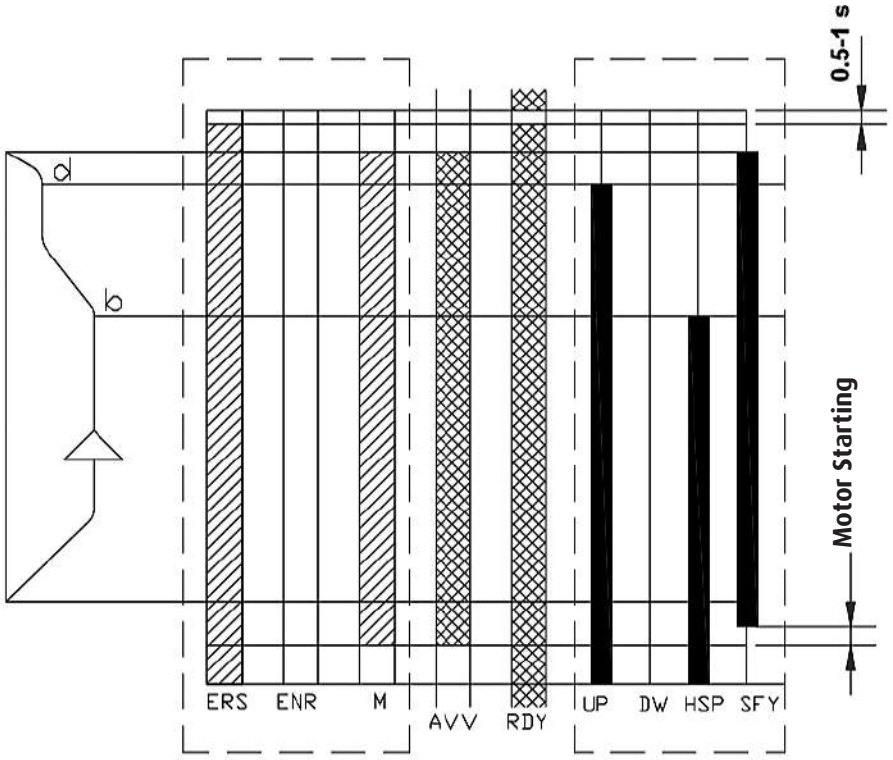
With the selector in a position other than 0, the Ready signal (Pos.CN14) is normally deactivated and reactivated temporary during the execution of a specific command.

The Red LED near the RSW selector shows the position of the selector itself. The always-on LED corresponds to position 0, while it executes a flash sequence corresponding to the number of other selected positions.

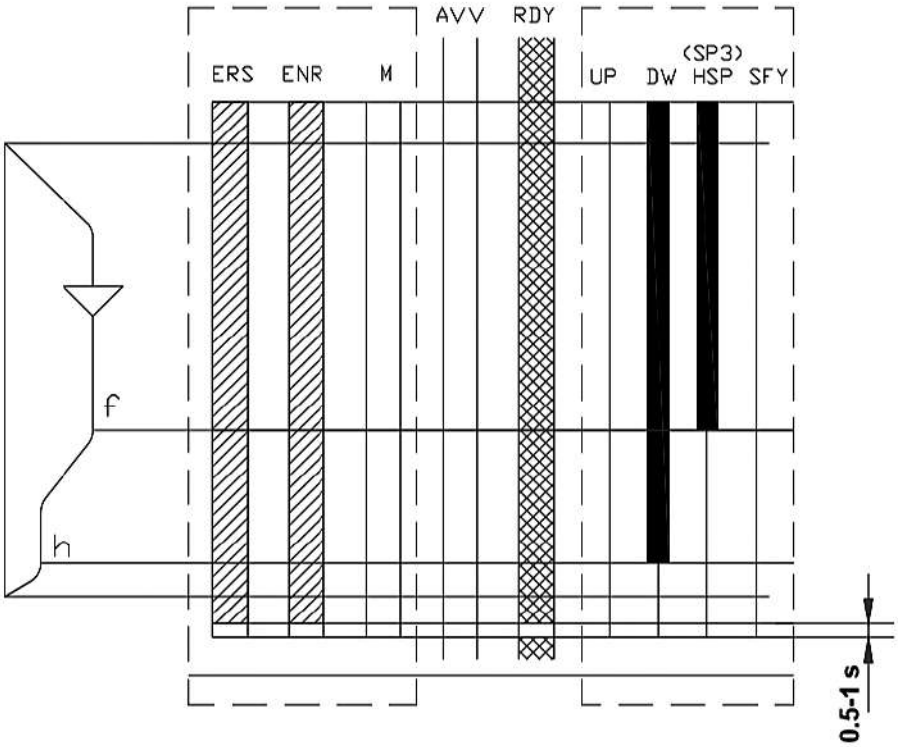
(*) Sensor pressure value display.
(**) The DSP1-2 display turns off after 10 s in the absence manoeuvres.
(***) Switching the RSW selector in 0 position and pressing the S1 button the command is deleted.
The command is cancelled if it is not executed within 15 seconds.

4.6 Working cycle diagram

- Upward working cycle diagram



- Downward working cycle diagram



SCH001 input ON

SCH001 Output ON

Device command ON

M - Motor input
ENR - ENR solenoid valve input
ERS – ERS solenoid valve input

b - Upward deceleration contact
d - Upward stopping contact
f - Downward deceleration contact
h - Downward stopping contact

4.7 Installation and tuning: quick guide

4.7.1 Generality and references

We hereby provide a quick summary included the logic of operations, activities, and installation phases of a HEVOS valve group with the relative SCH001 electronic board.
For details on procedures, risks, technical data, etc... please refer to the specific chapters of the Instruction Manual.

4.7.2 Essential connections to the control board

(refer to section 4.4)

For the system operation is necessary:

1. Connect to the board all the cables on the valve following the reference number shown;
2. Power the electronic control board with 24VDC-25W stabilized and straightened voltage and link the ground connector;

⚠ The +/- polarity reversing on the power supply involves burning the board

3. Supply power 2x (24V-35W) for ENR and ERS coils from the panel to the M2 connector and connect the board to the coils by the M3 connector;

⚠ Reverse polarity on M2 or M2 with M3 causes the burning of the board

4. Connect the RDY signal output "ready to manoeuvre" from the board to the control panel (output), as a necessary condition to perform any operation;
5. Connect the ERR signal output of "error" from the board to the control panel (output), whose absence is necessary condition to perform any operation;
6. Manage the motor starting and the shutdown through the AVV signal of the control board (output);

⚠ For safety reasons and to prevent uncontrolled movement of the cab, the starting of the engine in the absence of the RDY signal shall be strictly prevented and if it is not controlled by AVV

⚠ AVV shall be placed in series with the auxiliaries of a contactor to ensure safe starting.

7. Connect from the panel board to the control board a start confirmation signal via SFY (input), which indicates to the board the start of the upward stroke;

4.7.3 Switching on and checking the status of the electronic board

(refer to section 5.2)

If the electrical connections of the sensors are correct, when the board is switched on after a few moments, the display will show the characters "00" until after a few seconds they will turn off.
Furthermore, the **RDY** relay of terminal **CN14** will be activated to signal that the board is able to execute the commands from the control panel.
If one of the sensors is not correctly connected to the terminals **CN1-CN2-CN4-CN5**, the board will be in the error state with the **RDY** relay **OFF** and the **ERR** relay **ON**. The display will alternately show "Er" and the error code. After 20 attempts to restore the state, the board will fix itself in the error state. Refer to the error code table to verify the faulty connection and then reset the error status with **RSW** = 9 and **S1**.

4.7.4 Verification of the acquisition of signals RDY ERR AVV to the control panel

(refer to section 4.4, 4.17, 5.2)

To verify that the electrical cabinet correctly detects the signals from the fundamental relays of the board, the **CN5** connector can be removed to induce the error status.
In this situation, the **RDY** relay remains OFF while the **ERR** relay cycles ON and OFF for 20 times and then stays ON. Once the **CN5** connector has been restored, the status of **RDY** on is restored (possibly resetting the error with RSW = 9 and S1).
To verify the acquisition of the **AVV** signal you can, in the error free state, momentarily move the **CN9** connector to the position of the **CN14** connector to activate the output.

4.7.5 Introduction of the fundamental parameters of the system
(refer to section 4.5, 5.1)

By the HEVOS App or keypad introduce the characteristic parameters of the system that you are configuring to determine the speed and acceleration of manoeuvres:
- P101: piston diameter
- P102: pump flow
- P103: roping Ratio
- P104: pistons number
- P109: pistons stages number (telescopic cylinder only)

4.7.6 Speed and ramp settings
(refer to section 4.4, 5.1)

With HEVOS App or keypad always, it is possible to set the value manually:

	UPWARD	DOWNWARD
Acceleration	P202	P302
High speed	P204	P304
Deceleration	P208	P308
Low speed	P212=0,040÷0,080 m/s	P312=0,040÷0,080 m/s

In addition, it's possible to make an automatic evaluation and compilation of the same values based on the characteristics of the installation confirming the value 1 in the parameter P115.

These operations should make it easy to perform the first operation; the values of the individual parameters can always be modified in a second time to better adapt them to the characteristics of the installation.

4.7.7 Calibration of the deceleration spaces
(refer to section 4.5, 4.12, 4.13, 5.1)

For a correct operation of the travels and a precise stop at the floor it is advisable to always have a low speed phase, even if minimum.

The physical slow-speed distance you set from the floor to start the slow-down (magnet position or encoder altitude) must be greater or equal than the set values in the P208 and P308 parameters.

The position of the retarding and stopping magnets shall be precisely the same as each plane for the correct operation of the valve logic and for maximum comfort.

The low speed phases are indicated on the display with "u4" going up and "d4" going down. If these phases are not present, act on the deceleration parameters P208 in ascent and P308 in descent, reducing them until the low speed phases appear.

4.7.8 Procedure for filling the valve group or checking the maximum pressure valve
(refer to section 4.5, 5.1, 4.16)

By positioning the RSW selector in position 8 and pressing the S1 button, the board prepares, showing "HP" on the display, to perform an upward manoeuvre with a slow intake of the flow which favours the filling of the group. The same procedure is used, with the ball valve closed towards the piston, to check the intervention of the maximum pressure valve.

At the end of the procedures, reposition the selector RSW in position 0.

4.7.9 MAINTENANCE mode: execution of operations
(refer to section 4.4)

During maintenance movements with the **MSP** signal in connector **CN6**, if the stop is commanded by interrupting the movement operation signals (interrupting the operating signals of the **CN6** terminal, turning off the motor- pump group if upward direction and at the same time interrupting the signals of the solenoid valves in terminal M2), a stop will be abruptly produced, and error code 12 will be stored in the error history without other consequences.
After such a stop, to perform another travel, you must wait for the **RDY** signal to return, which certifies the reclosing of the **VSC** and **VNR** valves.

4.7.10 STANDARD mode: execution of operations
(refer to section 4.4, 4.13)

The execution of a standard uphill or downhill operation is necessarily bound by the sequence of signals described in paragraph 4.6.

4.7.11 Overload and oil temperature contacts
(refer to section 4.4, 4.5, 5.1)

The overload signal, which replaces the traditional pressure switch, is represented by the output contact P2(**CN12**) of the SCH001 board managed by parameter **P108**. The maximum fluid temperature signal is represented by the output contact T1(**CN10**) of the SCH001 board managed by parameter **P105**, factory set at 60 °C.

Both contacts are signals to the switchboard (output) and they can't block the operation of the plant autonomously.

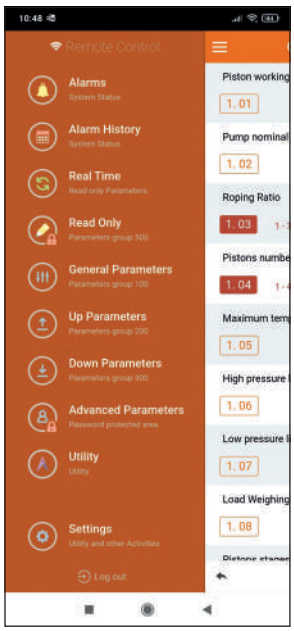
4.7.12 Execution of test and emergency procedures
(refer to section 4.4, 4.5, 4.15, 4)

Check the intervention of the rupture valve on the piston.
Check the manual ascent and descent procedures.
If provided, test the descent with maximum travel of the system in the event of an automatic emergency manoeuvre with batteries that power the board and the solenoid valves.

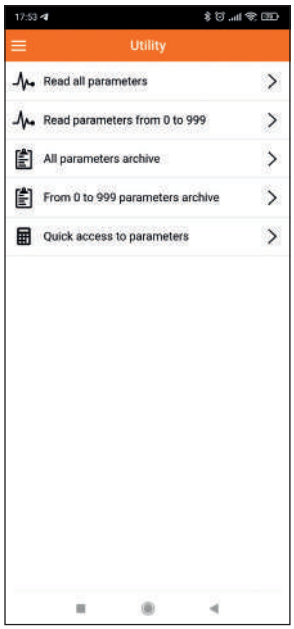
4.8 Control board configuration with App and Wi-Fi device connection (optional)

To using a Wi-Fi device for managing parameters, you must download and install the HEVOS application available on Apple Store or Google Play Store.
Switches the RSW selector in the position 2, the display shows **[UF]**
- Wait until the LD32 blue light is fixed ON.
- Search on your device and connect to the Wi-Fi with the name of the corresponding network identifier (ex. 16187901) that usually is the same of the valve unit serial number.
- Switch the application and when the login key is required, enter the name of Wi-Fi network (ex.16187901).

With the **RSW selector in the position number 2 you can change the parameters** with the RSW selector in others position, you can only view the parameters until the blue light remains fixed.
If the RSW selector is not in the position number 2, the Wi-Fi blue light and the Wi-Fi network fall when there is no connection for more than one minute.
However, remember to return to the position 0 of the switch RSW.
To modify the parameters, where it is allowed via APP, put the RSW=2 selector, select the parameter that do you want to change, enter the new value and press "Sync" to confirm.
Follows the main functions available in the app:



Alarms: errors/reports of the active installation at the reading time.
Alarms Historical: History of system errors/reports
Real time: Real-time temperature, flow, pressure, zero MPP sensor and flow meter reading.
Read Only: this function collects all the parameters of the group 500 available in read-only.
General Parameters: function that allows to read and write the specific parameters of the system (group 100), such as e.g. pump and piston diameter.
Up Parameters: group 200 parameters, can be read and written to change the upward performance.
Down Parameters: group 300 parameters that can be read and written to change the downward performance.
Advanced Parameters: this password-protected area collects groups parameters 400, 700 and 800. They are advanced technical parameters to be modified only under indication of Service.
Utility: Allows you to read, archive and send to Service the parameters and ascent and descent recordings (see the following screen).



The "Utility" designed to be a useful diagnostic tool for the valve group. The included functions are the following:

Read all parameters: with the RSW selector in position 2 it allows to acquire all the parameters and recordings the last upward and downward stroke. The process takes about 4 minutes. It is recommended to keep the smartphone close to the board so as not to lose the connection.

Read parameters from 0 to 999: with the RSW selector in position 2 it allows to acquire only the parameters of the valve group but not the adjustments of the strokes. The process takes about 30s. It is recommended to keep the smartphone close to the board so as not to lose the connection.

All parameters archive: contains all the files acquired with the function "*Read all parameters*" identified with the installation number and the acquisition date. The "*Send Data to Hevos"* button, under each file stored, allows you to send it, through a data network, directly to the Service if necessary.

From 0 to 999 parameters archive: contains all the files acquired with the function "*Reading parameters from 0 to 999*" identified with the plant number and the acquisition date. The "*Send Data to Hevos*" button, under each file stored, allows you to send it, through a data network, directly to the Service if necessary.

Quick access to parameter: password protected field that allows you to read and edit any parameter. This function is to be used only under indication of Service.

4.9 Control board configuration with keypad (optional)

- With 24V power on the board, connect the appropriate cable to the RJ11 connector on the electronic board
- Move inside the MENU following the indications shown in DISPLAY with the buttons: SET, ENT, UP, DOWN
- Move the RSW selector to position 1 if you want to change and save the parameters

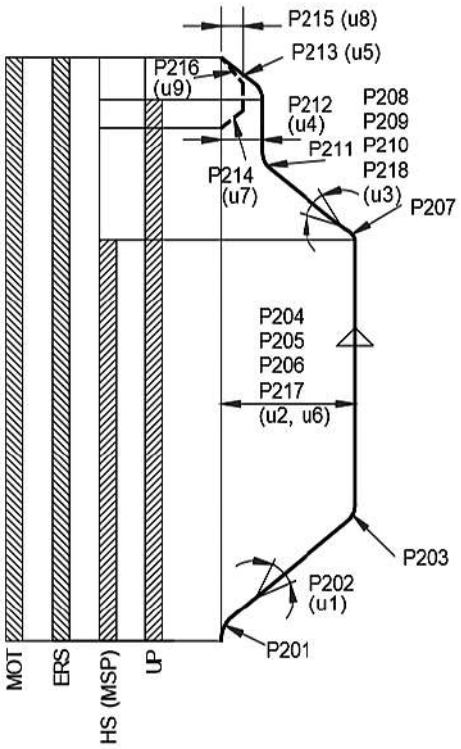
If the selector is not on value 1, the parameter will not be saved, so the change will not become operational

Once a value has been changed, exit the parameter and re-enter to verify the modify.

Always remember to stay in position 0 of the selector at the end of the parameter change.

4.10 Working cycles parameters

P2 UPWARD PARAMETERS



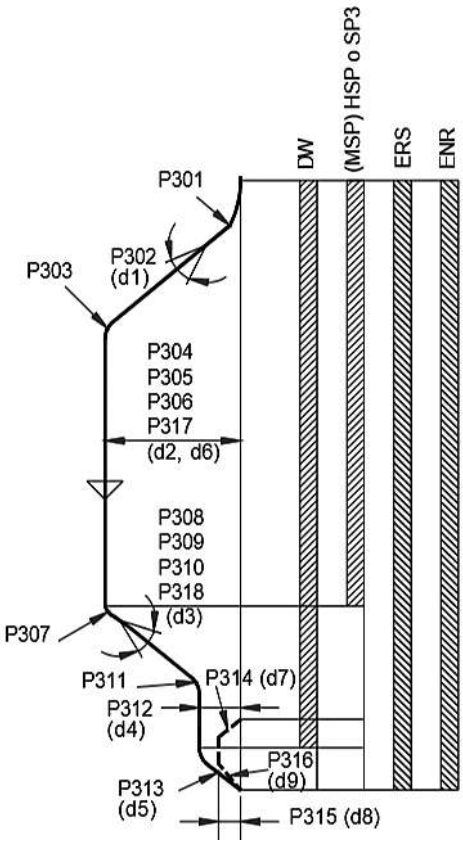
P201 Upward initial acceleration change rate
P202 Upward acceleration distance (m, ft)
P203 Upward final acceleration change rate
P204 Upward high speed (m/s, fpm)
P205 Second upward high speed (maintenance) (m/s, fpm)
P206 Third upward high speed (m/s, fpm)
P207 Upward initial deceleration change rate
P208 Upward deceleration distance (m, ft)
P209 Second upward deceleration distance (m, ft)
P210 Third upward deceleration distance (m, ft)
P211 Upward final deceleration change rate
P212 Upward low speed (m/s, fpm)
P213 Upward stopping distance (m)
P214 Upward levelling acceleration distance (m, ft)
P215 Upward levelling speed (m/s, fpm)
P216 Upward levelling stopping distance (m, ft)
P217 Fourth upward high speed (m/s, fpm)
P218 Fourth upward deceleration distance (m, ft)
(uX) Display on DSP during phase execution

(1) For the re-levelling signals, please refer to the working cycle diagram section 4.6

UP Upward command input
DW Downward command input
HSP Upward high-speed command input (Downward also when Par. 453 = 0)
MSP Maintenance and V2 speed command
combined with high speed command when Par.454=1
SP3 Downward high-speed command input (when Par. 453 = 1)
MOT Motor pump input (corresponding to AVV output relay)
ENR Solenoid valve ENR input
ERS Solenoid valve ERS input

(For signal and device management see section WORKING 4.6)

P3 DOWNWARD PARAMETERS



P301 Downward initial acceleration change rate
P302 Downward acceleration distance (m, ft)
P303 Downward final acceleration change rate
P304 Downward high speed (m/s, fpm)
P305 Second downward high speed (maintenance) (m/s, fpm)
P306 Third downward high speed (m/s, fpm)
P307 Downward initial deceleration change rate
P308 Downward deceleration distance (m, ft)
P309 Second downward deceleration distance (m, ft)
P310 Third downward deceleration distance (m, ft)
P311 Downward final deceleration change rate
P312 Downward low speed (m/s, fpm)
P313 Downward stopping distance (m)
P314 Downward levelling acceleration distance (m, ft)
P315 Downward levelling speed (m/s, fpm)
P316 Downward levelling stopping distance (m, ft)
P317 Fourth downward high speed (m/s, fpm)
P318 Fourth downward deceleration distance (m, ft)
(dX) Display on DSP during phase execution

(1) For the re-levelling signals,
please refer to the working cycle diagram section 4.6

4.11 Signal and speed parameters combination

			Upward starting combination					
			1.1	**1.2.1**	**1.2.2.1**	**1.2.2.2**	**1.2.3**	**1.2.4**
Advan. Param.	P453		0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1
	P454		0 or 1	0 or 1	0	1	0 or 1	0 or 1
Digital Input / Priority Level	UP	1	1	1	1	1	1	1
	DW	2	0	0	0	0	0	0
	HSP	6	0	1	0	1	1	1
	MSP	3	0	0	1	1	0	0
	SP1	4	0	0	0	0	1	0
	SP2	5	0	0	0	0	0	1
	SP3	7	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1
Cycle param.	Accel.		P214	P202	P202	P202	P202	P202
	Speed		P215	P204	P205	P205	P206	P217
	Deceler		P216	P208	P209	P209	P210	P218

1.1 Upward levelling
1.2.1 Normal Upward (first) Cycle
1.2.2.1 Maintenance (inspection) Upward (second) Cycle without deceleration to low speed
1.2.2.2 Maintenance (inspection) Upward (second) Cycle with deceleration to low speed
1.2.3 Third Upward Cycle
1.2.4 Fourth Upward Cycle

Note: the reference upward speeds are in any case limited, during the operations, at the value corresponding to the nominal flow rate of the pump set in Par. 102, increased of the percentage value set in Par.233.

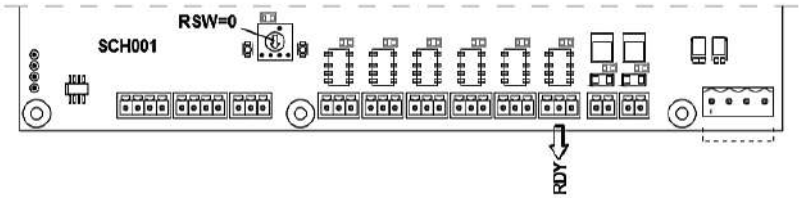
			Downward starting combination					
			2.1	**2.2.1**	**2.2.2.1**	**2.2.2.2**	**2.2.3**	**2.3.4**
Advan. Param.	P453		0 or 1	0 | 1	0 or 1	0 | 1	0 | 1	0 | 1
	P454		0 or 1	0 or 1	0	1	0 or 1	0 or 1
Digital Input / Priority Level	UP	1	0	0	0	0	0	0
	DW	2	1	1	1	1	1	1
	HSP	6	0	1 | 0	0	1 | 0	1 | 0	1 | 0
	MSP	3	0	0	1	1	0	0
	SP1	4	0	0	0	0	1	0
	SP2	5	0	0	0	0	0	1
	SP3	7	0	0 | 1	0	0 | 1	0 | 1	0 | 1
Cycle param.	Accel.		P314	P302	P302	P302	P302	P302
	Speed		P315	P304	P305	P305	P306	P317
	Deceler		P316	P308	P309	P309	P310	P318

2.1 Downward levelling
2.2.1 Normal Downward (first) Cycle
2.2.2.1 Maintenance (inspection) Downward (second) Cycle without deceleration to low speed
2.2.2.2 Maintenance (inspection) Downward (second) Cycle with deceleration to low speed
2.3.3 Third Downward Cycle
2.3.4 Fourth Downward Cycle

Note: Simultaneous activation of SP1 and SP2 digital inputs, for 3 seconds, allows you to send a Reset Errors command to the board.
Note: the reference upward speeds are in any case limited, during the operations, at the value corresponding to the nominal flow rate of the pump set in Par. 102, increased of the percentage value set in Par.233.

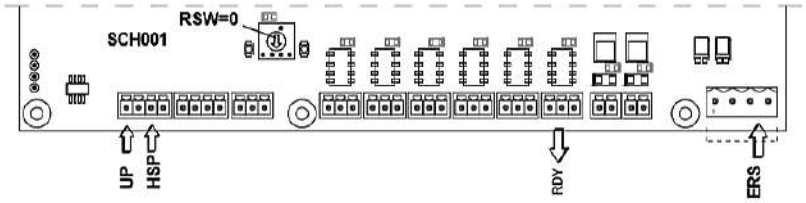
4.12 Upward working cycle

UPWARD 1/8 - STATIONARY (DSP=00 or OFF)



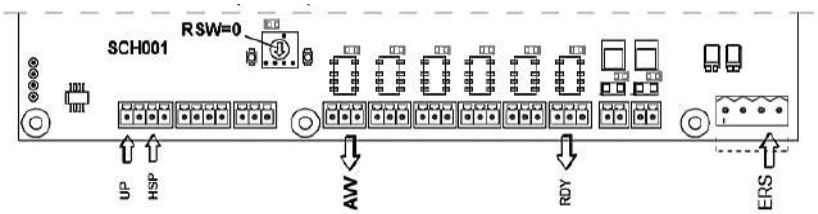
Ready signal RDY from board to control panel waiting for commands.

UPWARD 2/8 – STARTING REQUEST (DSP=u0)



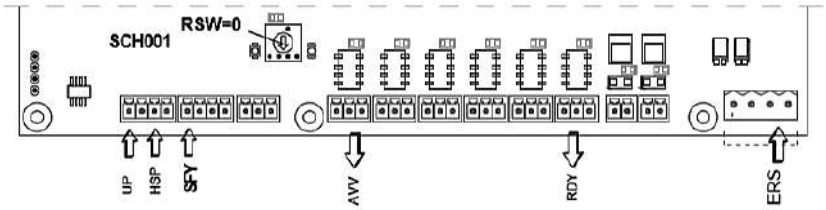
Activation of Upward UP and high speed HSP command input and power supply the solenoid valve ERS.
The HSP high speed command can be replaced by MSP maintenance command (P454=0) or work together to signals MSP (P454=1), SP1 o SP2 to determine different values of high-speed set in the corresponding parameters.

UPWARD 3/8 - MOTOR INPUT CONSENT (DSP=u0)



The board commutes the AVV output to give consent for motor pump starting.
In this phase, the pump oil flow is discharged in the tank at low pressure to allow a proper motor starting and avoid hit in the cabin caused by pump direct flow to piston.

UPWARD 4/8 – MOTOR STARTING COMPLETED AND CABIN ACCELERATION (DSP=u1)

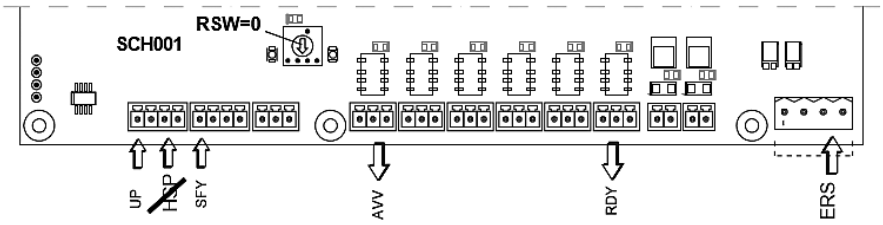


Once finished the motor starting (direct, star-delta or soft starter) the control panel must return a signal to SFY board input.
If the SFY signal is not available, it is useful to adjust the parameter P403 which sets the valve pre-starting time, after which, however, the valve unit executes the starting phase.
The starting phase provides for the load taking, with a small movement of the cabin, and the execution of the acceleration curve according to corresponding parameters setting: P201, P202, P203.

UPWARD 5/8 – HIGH SPEED (DSP=u2, u6)

The speed obtained corresponds to the parameter connected to the used high-speed signal (P204 or P205, P206, P217).
In case the speed selected in the parameter corresponds to an oil flow higher than the real pump flow rate, however the valve unit adapts its operation to the real maxim speed.

UPWARD 6/8 - DECELERATION (DSP=u3)

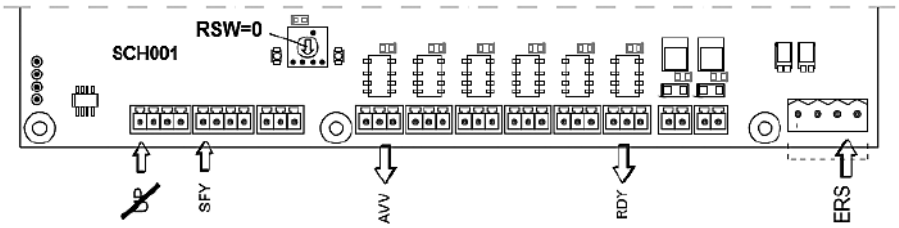


Upon arrival to the deceleration contact in the elevator shaft, turn off the high speed HSP signal and the valve unit executes the deceleration curve set up in the parameters P207, P208 (209,210,218) and P211 to obtain the low speed value corresponding to P212 parameter.

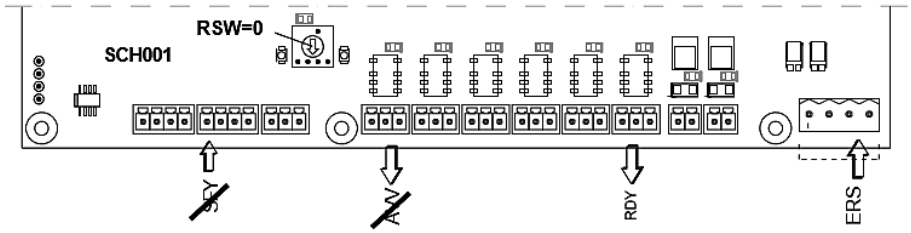
UPWARD 7/8 – LOW SPEED (DSP=u4)

The duration of low speed phase depends on the difference between the space from the contacts of deceleration and stopping in the shaft and the deceleration distance programmed in the parameters.
When the parameter P 456 = 1, during the deceleration and low speed phases, it is calculated the distance travelled until the stop contact that allows to run the next deceleration with a minimum low residual distance set in the P458 parameter.
The calculation is reset when the board is off.

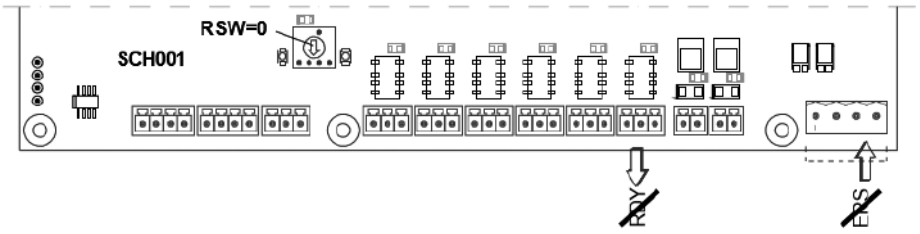
UPWARD 8/8 - STOP (DSP=u5)



Upon arrival to the stopping contact in the shaft, the upward UP signal must turn off. If the Soft-Stop parameter P232 = 1, the valve unit executes the stopping curve set up in the parameter P213.



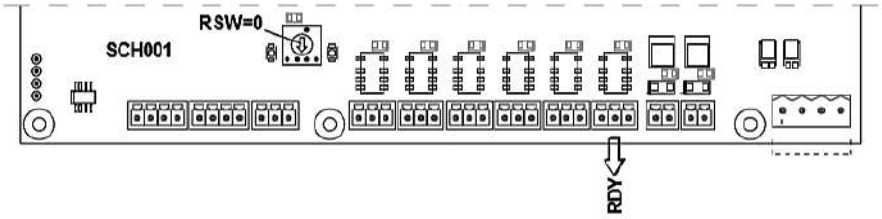
If during the starting phase it has not been used the AVV motor contact activation, delay the stop of the motor of 1.5 s, otherwise when the signal AVV turns off, stop the motor (and then the input signal SFY). Anyway, do not delay the stopping of the motor more than 2 s from the arrival to the stopping contact in the shaft.



Subsequently the shutdown of the RDY board signal also remove the ERS solenoid input. The RDY board signal is active again after about 0.5 s, when the valve unit will be ready for the next travel. However, remove the ERS solenoid input after 2 s from the arrival to the stopping contact in the shaft

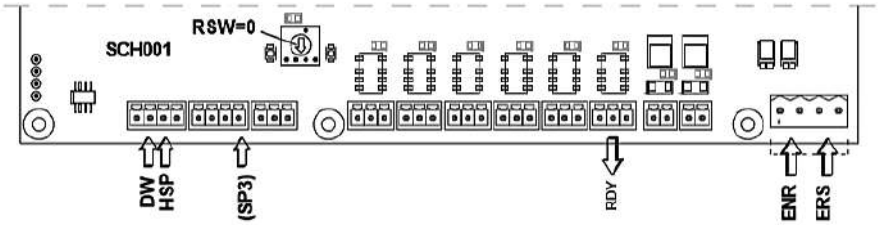
4.13 Downward working cycles

DOWNWARD 1/7 - STATIONARY (DSP=00 or OFF)



Ready signal RDY from board to control panel waiting for commands.

DOWNWARD 2/7 – STARTING REQUEST (DSP=d0)



Activation of Downward DW and high speed HSP (or SP3 if the parameter P453=1) command input and power supply of the solenoid valves ENR and ERS. The HSP (or SP3) high speed command can be replaced by MSP maintenance command (P454=0) or work together to signals MSP (P454=1), SP1 or SP2 to determine different values of high-speed set in the corresponding parameters.

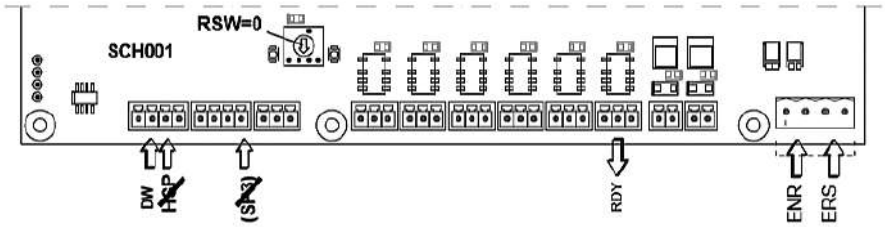
DOWNWARD 3/7 - ACCELERATION (DISP=d1)

This phase provides the execution of the acceleration curve according to corresponding parameters setting: P301, P302, P303.

DOWNWARD 4/7 – HIGH SPEED (DISP=d2, d6)

The speed obtained corresponds to the parameter connected to the used high speed signal (P304 or P305, P306, P317).

DOWNWARD 5/7 – DECELERATION (DSP=d3)

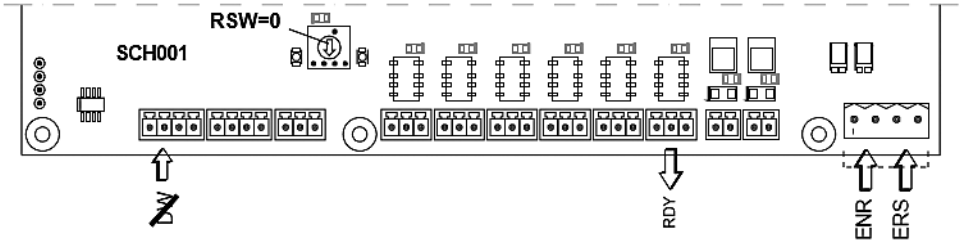


Upon arrival to the deceleration contact in the shaft, turn off the high speed HSP signal (or the SP3 signal if the parameter P453=1) and the valve unit executes the deceleration curve set up in the parameters P307, P308 (309,310,318) and P311 to obtain the low speed value corresponding to P312 parameter.

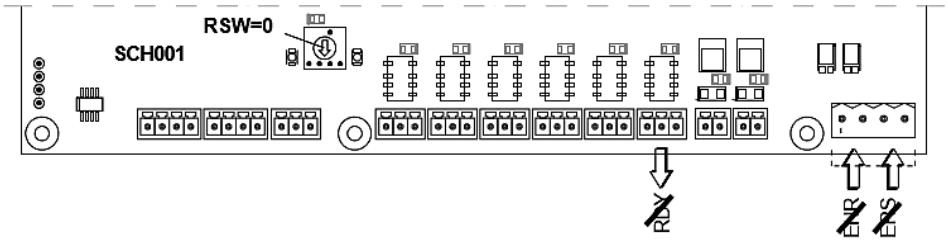
DOWNWARD 6/7 – LOW SPEED (DSP=d4)

The duration of low speed phase depends on the difference between the space from the contacts of deceleration and stopping in the shaft and the deceleration distance programmed in the parameters.
When the parameter P 456 = 1, during the deceleration and low speed phases, it is calculated the distance travelled until the stop contact that allows to run the next deceleration with a minimum low residual distance set in the P459 parameter.
The calculation is reset when the board is off.

DOWNWARD 7/7 - STOP (DSP=d5)



Upon arrival to the stopping contact in the shaft, the downward DW signal must turn off.



Subsequently the shutdown of the RDY board signal also remove the ERN and ERS solenoid inputs.
The RDY board signal is active again after about 0.5 s, when the valve unit will be ready for the next travel.
However, remove the ENR and ERS solenoid inputs after 2 s from the arrival to the stopping contact in the shaft.

4.14 Levelling

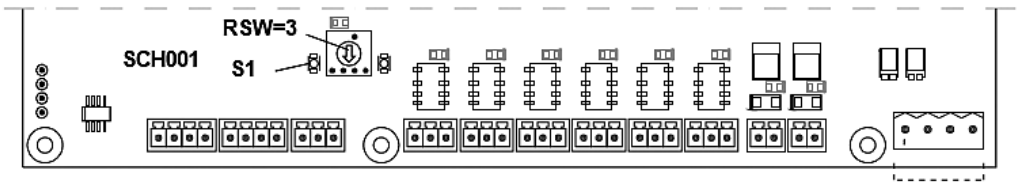
- UPWARD LEVELLING (DSP=u7, u8, u9)

Levelling operations follow the sequence indicated in the normal upward cycle but without the use of the HSP high speed signal. The parameters P214, P215 e P216 define the acceleration distance, the movement speed, and the stopping distance. Always use AVV contact for the motor management.

- DOWNWARD LEVELLING (DSP=d7, d8, d9)

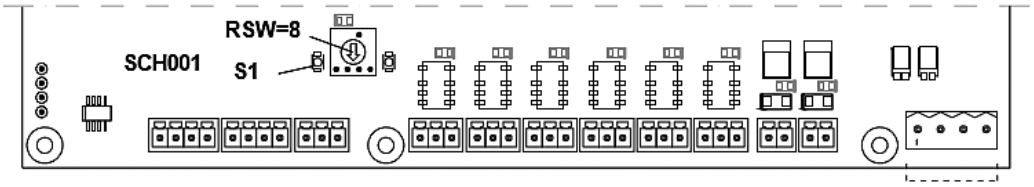
Levelling operations follow the sequence indicated in the normal downward cycle but without the use of the HSP high speed signal (or SP3 if the parameter P453 = 1). The parameters P314, P315 e P316 define the acceleration distance, the movement speed and the stopping distance.

4.15 Rupture valve test (DSP=FC, FP)



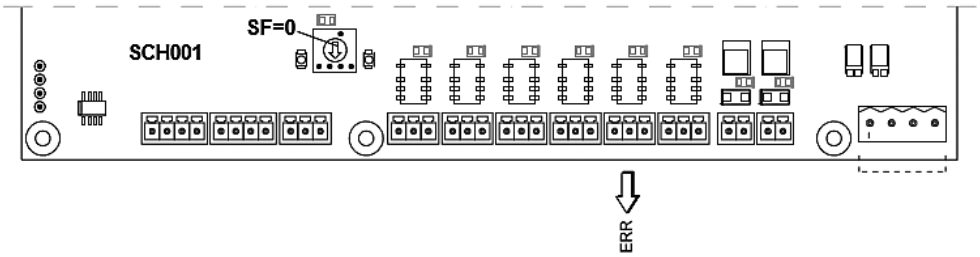
Block the system to exclude the possibility of travel.
Set the working selector RSW = 3 (DSP=FC) and then press S1 button until appear FP on display.
This prepares the valve unit to execute the next descent with increased speed to verify the intervention of the rupture valve of the piston, as required by point 6.3.8 of the 81-20 standard.
Go upward, with nominal load uniformly distributed in the cabin, on a high floor then run a normal downstroke (see the point DOWNWARD 2/7 in the present instruction), the increase of speed compared to the normal speed is defined by parameter P422.
During drop test the value of reached maximum speed is stored in parameter P556.
At the end of the downward manoeuvre the board no longer provide the signal RDY if not performing a new drop test by pressing the button S1 as described above, or a normal manoeuvre setting the selector RSW = 0.
Note: As an alternative to the use of RSW switch, you can activate the test condition setting parameter 705 to the value 1. At the end of the test the value of the parameter returns automatically to 0.

4.16 Maximum pressure valve test (DSP=PP, HP)



Block the system to exclude the possibility of travel. Set the working selector RSW = 8 (DSP= PP) and then press S1 button until appear HP on display. This prepares the valve unit to execute the next upward working cycle with a progressive pressure starting and without flow error condition. Close the ball valve.
Run a normal up stroke (see the point UPWARD 2/8 in the present instruction), it will be progressive and it will take more time than usual (at least 10 s). At the end of the upward manoeuvre the board no longer provide the signal RDY if not performing a new maximum pressure test, by pressing the button S1 as described above, or a normal manoeuvre setting the selector RSW = 0.
Note: as an alternative to the use of RSW switch, you can activate the test condition setting parameter 704 to the value 1. At the end of the test the value of the parameter returns automatically to 0.

4.17 Error condition



Any operation shall be prevented if the error signal on the ERR relay is active. For error handling see the section “Parameters and errors codes”. You can force on the error condition the signal ERR by disconnected the CN5 connector. This allows to verify the block of the control panel to the switching-on of the error signal ERR.
At the end of the test remember to reconnect CN5 to reactivate the normal error condition.

5 PARAMETERS AND ERROR CODES OF HEVOS HE VALVE GROUP

5.1 Parameters

The parameters of the series P1, P2, P3, P5 and P6 have free access, while those of series P4, P7 and P8 need the setting password. The P5 and P6 parameters (errors history) are read-only.

Modifying parameters affects the SCH001 board only with the position of the RSW selector = 1 with keypad and RSW=2 with APP

Parameter Nr Desc. Hand	Large Description	Unit	Setting Range		Default value	Note
P1 Base Par.	**BASE PARAMETERS**		**Min**	**Max**		
101 Piston Dia	Piston working diameter	mm	5	999	80	
102 Pump Flow	Pump nominal flow	lt/min	1	1000	100	
103 Tackle X:1	X:1 Roping Ratio		1	4	2	
104 Pist.	Pistons number		1	4	1	
105 TMAX limit	Maximum temperature limit	°C	10	80	60	> P110
106 PMAX limit	High pressure limit	bar	1	200	45	> P107
107 PMIN limit	Low pressure limit	bar	0	200	10	< P106
108 PS overload	Overload pressure limit	bar	0,1	200	30,0	
109 Pist. Stages	Pistons stages number		1,000	4	1,000	
110 TMIN limit	Low temperature limit	°C	0,0	80	4,0	
111 Cabin Load	Cabin nominal load		0,000	200000	600,000	
112 SP Recovery	Space recovery as 456 1 and 2=Activation - Mapping correction Max 1 and 3 = Activation		0,0	3	0,0	
113 CAN Offset	Base value for CAN addresses: 0=1360 (0x550) (—> P479)		0,000	99999999	0,000	
114 CAN panel	CAN address with control panel connection (—> P480)		0,0	99999999	0,0	
115 Compile Ins.	Parameters compile of speed and installation ramp		0	99999999	0	
199 User password	User Password		0	99999999	0	

Parameter Nr Desc. Hand	Large Description	Unit	Setting Range		Default value	Note
P2 Upward Par.	**UPWARD PARAMETERS**		**Min**	**Max**		
201 %AccStart U	Upward initial acceleration change rate	%	1	100	50	
202 Acc Dist U	Upward acceleration distance	m	0,000	10,000	1,500	
203 %Acc End U	Upward final acceleration change rate	%	1	100	100	
204 HighSpeedU1	Upward high speed	m/s	0,000	2,000	0,600	
205 HighSpeedU2	Second upward high speed (maintenance)	m/s	0,000	2,000	0,300	< P204
206 HighSpeedU3	Third upward high speed	m/s	0,000	2,000	0,200	< P204
207 %DecStart U	Upward initial deceleration change rate	%	1	100	50	
208 Dec Dist U1	Upward deceleration distance	m	0,000	10,000	0,400	
209 Dec Dist U2	Second upward deceleration distance	m	0,000	10,000	0,400	
210 Dec Dist U3	Third upward deceleration distance	m	0,000	10,000	0,400	
211 %Dec End U	Upward final deceleration change rate	%	1	100	50	
212 Low Speed U	Upward low speed	m/s	0,000	0,300	0,050	< P204, P205

Parameter Nr Desc. Hand	Large Description	Unit	Setting Range		Default value	Note
P2 Upward Par.	UPWARD PARAMETERS		Min	Max		
213 Stop Dist U	Upward stopping distance	m	0,000	10,000	0,010	
214 Acc Dist UR	Upward levelling acceleration distance	m	0,000	10,000	0,010	
215 RelevSpeedU	Upward levelling speed	m/s	0,000	0,300	0,050	< P204, P205
216 Stop DistUR	Upward levelling stopping distance	m	0,000	10,000	0,020	
217 High Speed U4	Fourth upward high speed	m/s	0,000	2,000	0,259	< P204
218 Dec Dist U4	Fourth upward deceleration distance	m	0,000	10,000	0,300	
220 % End Asc S	Final stop ascent change percentage	%	0,000	100,000	100,000	
222 Asc space S4	Fourth ascent acceleration space (used for intermediate floor)	m	0,000	10,000	0,300	
230 S/N Single Ph	Single-phase motor setting = 1		0	1	0	
231 S/N VVVF S	upward setting with VVVF = 1, with micro-levelling = 2, hybrid with VVVF=3		0	3	0	
232 S/N SoftS S	Soft stop setting, if = 1 soft stop phase running		0	1	1	
233 Extra Vel S	Maximum nominal speed increment		0	20	8	
235 MinFluxMap	Minimum litres of mapping for upward start		1	2000	100	

Parameter Nr Desc. Hand	Large Description	Unit	Setting Range		Default value	Note
P3 Downward Par	DOWNWARD PARAMETERS		Min	Max		
301 %AccStart D	Downward initial acceleration change rate	%	1	100	50	
302 Acc Dist D	Downward acceleration distance	m	0,000	10,000	1,500	
303 %Acc End D	Downward final acceleration change rate	%	1	100	100	
304 HighSpeedD1	Downward high speed	m/s	0,000	2,000	0,600	
305 HighSpeedD2	Second downward high speed (maintenance)	m/s	0,000	2,000	0,300	< P304
306 HighSpeedD3	Third downward high speed	m/s	0,000	2,000	0,200	< P304
307 %DecStart D	Downward initial deceleration change rate	%	1	100	50	
308 Dec Dist D1	Downward deceleration distance	m	0,000	10,000	0,400	
309 Dec Dist D2	Second downward deceleration distance	m	0,000	10,000	0,400	
310 Dec Dist D3	Third downward deceleration distance	m	0,000	10,000	0,400	
311 %Dec End D	Downward final deceleration change rate	%	1	100	50	
312 Low Speed D	Downward low speed	m/s	0,000	0,300	0,050	< P304, P305
313 Stop Dist D	Downward stopping distance	m	0,000	10,000	0,010	
314 Acc Dist DR	Downward levelling acceleration distance	m	0,000	10,000	0,010	
315 RelevSpeedD	Downward levelling speed	m/s	0,000	0,300	0,050	< P304, P305
316 Stop DistDR	Downward levelling stopping distance	m	0,000	10,000	0,020	
317 HighSpeedD4	Fourth downward high speed	m/s	0,000	2,000	0,259	< P304
318 Dec Dist D4	Fourth downward deceleration distance	m	0,000	10,000	0,300	
319 MinSpeedERS	ENR stop minimum speed	m/s	0,000	0,300	0,010	

Parameter Nr Desc. Hand	Large Description	Unit	Setting Range		Default value	Note
P3 Downward Par	DOWNWARD PARAMETERS		Min	Max		
320 % End Asc D	Final stop ascent change percentage	%	0,000	100,000	100,000	
321 LimitPressD	Pressure to limit downhill speed- if >0 activated	bar	0,000	200,000	0,000	
322 Ascspace D4	Fourth ascent acceleration space (used for intermediate floor)	m	0,000	10,000	0,300	
323 Test Pause	ERS relay test pause	s/1000	0,000	99999999	200,000	
324 %MaxDiffLt	Maximum litre displacement percentage with target	%	0,000	99999999	25,000	

Parameter Nr Desc. Hand	Large Description	Unit	Setting Range		Default value	Note
P5	VIEW PARAMETERS		Min	Max		
501 MPP step	MPP position	step	0	23000		
502 Temperature	Temperature sensor	°C	0	99999999		
509 Speed	Cabin speed	m/s	0	2		
510 Flow sensor	Flow sensor value		0	10000		
511 Flow	Flow meter	l/min	0	999		
512 Pressure	Pressure sensor	bar	0,0	999,0		
513 OnOffI zero	STEPPER zero sensor		0	1		
514 OnOffI ENRI	ENR solenoid valve consumption OK		0	1		
515 OnOffI ERSI	ERS solenoid valve consumption OK		0	1		
516 OnOffI ENRV	ENR downward solenoid valve input		0	1		
517 OnOffI ERSV	ERS discharge solenoid valve input		0	1		
518 ENRI Value	ENR solenoid valve value		0	99999999		
519 ERSI Value	ERS solenoid valve value consumption		0	99999999		
521 OnOffI UP	Upward command input		0	1		
522 OnOffI DOWN	Downward command input		0	1		
523 OnOffI HS	High speed command input		0	1		
524 OnOffI MAN	Maintenance command input		0	1		
525 OnOffI DHS	Downward high speed optional command input		0	1		
526 OnOffI PWM	Motor pump started input		0	1		
527 OnOffI HS1	Auxiliary speed 1 command input		0	1		
528 OnOffI HS2	Auxiliary speed 2 command input		0	1		
531 OnOffO ERR	Error relay output		0	1		
532 OnOffO RDY	Ready relay output		0	1		
533 OnOffO PWM	Motor pump relay output		0	1		
534 OnOffO T1	TMAX-PMIN temperature T1 relay		0	1		
535 OnOffO P1	PMAX-PMIN pressure P1 relay output		0	1		
536 OnOffO P2	Overload pressure P2 relay output		0	1		
537 OnOffO ENR	ENR solenoid valve switching on		0	1		
538 OnOffO ERS	ERS solenoid valve switching on		0	1		
541 OnOffO PNP1	PNP1 transistor output		0	1		

Parameter Nr Desc. Hand	Large Description	Unit	Setting Range		Default value	Note
P5	VIEW PARAMETERS		Min	Max		
542 OnOff0 PNP2	PNP2 transistor output		0	1		
545 UrelCyclesN	Up levelling cycles number		0	99999999		
546 UpCyclesNum	Up working cycles number		0	99999999		
547 DrelCyclesN	Down levelling cycles number		0	99999999		
548 DwCyclesNum	Down working cycles number		0	99999999		
551 Input	14 bit input view		0	16383		
552 Output	14 bit output view		0	16383		
553 Sensor FL	Flow sensor value		0	10000		
554 A3 Phase	A3 test phase		0	1000		
555 A3 PhaseErr	A3 test error phase		0	1000		
556 MaxSpd SVT	Max speed during safety valve drop test	m/s	0	2		
567 Step IS AM	Upward VSC opening STEP position	step	0	20000		
568 Step ID AM	Downward VSC opening STEP position	step	0	20000		
569 Mach Time	Machine time (minutes)	min	0	33554431		
571 VNR closed	VNR valve closed		0	1		
572 Active Node	Multi-Valve system active CAN nodes		0	99999999		
580 A3 TimeTest	Time between A3 tests (minutes)	min	0	33554431		
596 Vers Boot	Bootloader version.		0	99999999		
597 SoftW Vers	Software version		0	99999999		
598 Board SN	Board SN		0	99999999		
599 Board Vers	Board Version		0	99999999		

5.2 Errors

The errors are stored in parameters from P600 (most recent error) to P679 (oldest error) in which appears the error code and the machine time spent, in minutes, from the event that caused it.
Parameters from P680 to P699 store the last commands (from newest to oldest), performed with the P7 series parameters or performed with the RSW selector.
P1 to P9 visualizations are diagnostic signals upon completion of the work cycle.
The **error status is displayed** on DSP display as follows:
EA = Warning error not blocking the manoeuvre: the relay ERR does not turn on and the error message disappears at the first manoeuvre.
Er = Generic blocking error, for which an automatic RESET is attempted every 5s for 20 times
Er* = Generic error blocking the manoeuvre without automatic reset.
E- = It appears on the Master board for a generic error on a Slave board, on which it will be displayed and stored the type.

Num	ERROR Description	Cause / Corrective Action
E1	See Error 25, which also takes into consideration the malfunction on a Slave board	Error reset after problem solution
E2	See Error 26, which also takes into consideration the malfunction on a Slave board	Error reset after problem solution
E3	See Error 29	Error reset after problem solution
E4	Error 27, which also considers the malfunction on a Slave board. The relevant benchmark to manage the error is reported in P411.	Error reset after problem solution

Num	ERROR Description	Cause / Corrective Action
01	(Er) Auxiliary power absence	Check control board voltage supply
02	(EA) High temperature limit TMAX	Check the P105 parameter value and the fluid working temperature
03	(EA) Low temperature limit TMIN	Check the P110 parameter value and the fluid working temperature
04	(Er) At rest pressure meter error	Check pressure sensor TP1
05	(Er) At rest flow meter error	Check connection of the sensor TF or contact HEVOS for the sensor reset procedure
06	(EA) Pressure in a disabled node in Multi-valve system	Close the shut-off valve group excluded from the operation and unload the pressure
07	(EA) Too low pressure during the manoeuvre	Check system sliding or heat the oil
08	(Er) Stepper driver already busy	Try restarting the board
09	(Er) Solenoid valve supplies are inverted	Check both solenoid valves connection from the control panel
10	(Er*) ERS solenoid valve already active without relay activation	Try restarting the board
11	(Er) Not properly activated ERS solenoid valve	Check ERS solenoid valve coil
12	(Er) Solenoid valves interrupted during stopping	Check the sequence and timing required by the panel in accordance with the requirements expressed by the operating cycle diagram after the fall of the signal Up or Down (see 4.6)
13	(Er*) ENR solenoid valve already active without relay activation	Try restarting the board
14	(Er) Not properly activated ENR solenoid valve	Check ENR solenoid valve coil
15	(Er) Lack conditions of manoeuvre	Check the presence of Up and Down signals inconsistent with the manoeuvre (eg. Up when the manoeuvre is downhill, or Up rises during the stop)
16	(Er) In starting movement flow meter error	Check if there are impediments to the flow
17	(Er) At the working anomaly of a solenoid valve	Check input voltage on ERS and ERN solenoid valves during operation
18	(Er) VSC zero sensor at rest in position incorrect (ON)	With P513 verify the activation and deactivation of the VSC Zero Valve Sensor 12: Must be 1 at rest and switch immediately to 0 at start of movement (after motor ignition, during upward). If you do not respect the sequence, contact HEVOS for the sensor reset procedure
19	(E3) A3 test not properly terminated when P497 >0	Repeat A3 functional test
20	(EA) VSC zero sensor present in the MPP return phase	Contact HEVOS
21	(EA) VSC zero sensor not present during the stop phase MPP	Contact HEVOS
22	(Er) Excessive delay between upward stop and RDY signal OFF (P891)	Reduce upward stopping distance or increase low speed in upward direction
23	(Er) Excessive delay between downward stop and RDY signal OFF (P892)	Reduce upward stopping distance or increase low speed in downward direction
24	(Er) At rest temperature meter error	Check the connection (sensor side and control board), the cable integrity and in case of permanence of the error replace the sensor

Num	ERROR Description	Cause / Corrective Action
25	(E1) Sequence PNP1 monitoring signal Error1 if P464=0	With P513 verify the activation and deactivation of the VSC Zero Valve Sensor 12: Must be 1 at rest and switch immediately to 0 at start of movement (after motor ignition, during upward). If you do not respect the sequence, contact HEVOS for the sensor reset procedure
26	(E2) Sequence PNP1 monitoring signal Error2 if P464=0	With P513 verify the activation and deactivation of the VSC Zero Valve Sensor 12: Must be 1 at rest and switch immediately to 0 at start of movement (after motor ignition, during upward). If you do not respect the sequence, contact HEVOS for the sensor reset procedure
27	(E4) Leakage valve error	1. Valve leak check: 1.1 through the control panel perform an UCM (A3) test to verify the presence of any leaks of the involved valve (there may be dirt that blocks the piston and does not guarantee the sealing) 1.2 it is possible to manually test the seal of the VSC main valve only, by manually pressing the ENR coil pin for a few seconds and verifying that the lift does not move. **ATTENTION**: Manually pressing the ERS coil pin is useless and does NOT allow you to test the seal of the other valve! 2. reduce the value of low downward speed (P312) 3. contact HEVOS to modify the control calibration (P411)
28	(E5) VSC valve movement error in relay test phase	Try restarting the board
29	(Er) Monitoring software checksum error	Try to reload the software
30	(Er) Solenoid valves always supplied	Check the connection circuit and the control panel logic for the solenoid valve control (ON/OFF)
31	(Er) Solenoid valves not powered at start up	Check the voltage of ERS and ERN solenoid valves during the starting phase
32	(EA) During reading/writing SD absence	Insert SD-CARD and check orange LED LD35 lighting
33	(EA) Reading SD error	Check SD CARD content
34	(EA) Writing SD error	Check SD CARD formatting
35	(Er) Reading EEPROM error	Try restarting the control board
36	(Er) Writing EEPROM error	Try restarting the control board
37	(EA) WiFi error	Wi-Fi module is not installed or defective
38	(Er) MPP driver undervoltage	Check voltage supply control board
39	(Er) MPP driver overcurrent	Check voltage supply control board
40	(Er) MPP starting anomaly	MPP or ERS valve or zero sensor problem (pos. 12), contact HEVOS
41	(Er) SE_SIM or SE_PLC parameter without deck temperature in manoeuvre	Contact HEVOS
42	(Er) MPP step loss	Contact HEVOS
43	(Er) MPP temperature warning	Contact HEVOS
44	(Er) MPP overtemperature	Contact HEVOS
45	(Er) MPP bad control in upward stop	Decrease the P208 parameter in slowdown upward to perform low speed
46	(Er) MPP bad control in downward stop	Decrease the P308 parameter in slowdown downward to perform low speed

Num	ERROR Description	Cause / Corrective Action
47	(Er*) CAN error in Multi-valve system	Check connection and setting CAN parameters in multi-valve system
48	(Er) Error for Slave error status active	Reported on the Master control board. Check error status on the slave board
49	(Er) CAN error with the control panel system	Check connection and setting CAN parameters
50	(Er) Checksum error	Try to reload the software
51	(Er) Hardware error	Try to reload the software
52	(Er) Zero division error	Try to reload the software
53	(EA) Flow error during upward stopping	Contact HEVOS
54	(Er*) System exception	Try to reload the control board
55	(EA) Active zero MPP sensor in operation	Contact HEVOS
56	(EA) Flow error during the starting phase	Verify motor ignition delay
57	(Er) Generic error in MPP status	Contact HEVOS
58	(Er) Parameter setting error 488=1	Contact HEVOS
59	(EA) Notice if P482 P477 with CAN or if P477>1 without CAN	Contact HEVOS
60	(EA) Warning if SFY signal arrives before at AVV signal	Verify the compliance with the sequence and timing requested by the control panel in accordance with the requirements expressed by the Working cycle diagram (see 4.6). The error could result from the fact that the switchboard sends an SFY signal to the board, before it sends the AVV signal of request starting motor.
61	(EA) Warning if the SFY signal falls early before the AVV signal	Verify the compliance with the sequence and timing requested by the control panel in accordance with the requirements expressed by the Working cycle diagram (see 4.6). The error could result from the fact that the control panel manages the motor delay with timers instead of with the AVV signal: change the control logic of the switchboard or delay the stop of the motor-pump.
62	(EA) Warning if motor shuts down before stopping procedure	Verify the compliance with the sequence and timing requested by the control panel in accordance with the requirements expressed by the Working cycle diagram (see 4.6). The error could result from the fact that the control panel manages the motor delay with timers instead of with the AVV signal: change the control logic of the switchboard or delay the stop of the motor-pump.
63	(EA) The meter reaches saturation level on descent P436	If there are no other errors decrease the rate of descent
64	(EA) If MPP exceeds maximum steps P402	If there are no other errors decrease the rate of descent
65	(EA) If control is limited by downward MPP mapping	Contact HEVOS
66	(EA) If the control is limited by the minimum downward pressure P321	If the parameter P321=0 the limit results from the parameter P107. If no other errors are present, increase P321 or P107

5.3 Advanced diagnostics

Advanced tools can be accessed using the HEVOS Service. It is necessary to acquire data relating to the latest upward/downward strokes and the entire set of parameters and then share this information with HEVOS, using one of the following channels.

5.3.1 Saving parameters and recordings from APP

Connect the app to the control board via Wi-Fi, then access the menu UTILITY>Read all parameters. This will start an automatic download process described by a progress bar that will require 3-5min for completion. At the end, disconnect the Wi-Fi of the device from the board and connect to a network data access, then on the app to the menu UTILITY>All parameters archive>, choose the file of interest related to the current installation, then via the button "Send to HEVOS", you can share data with the HEVOS server.

The activity does not generate any ALERT message to the HEVOS Support Service, therefore it's necessary to contact the technical assistance service (service@hevos.it) too, so the related analysis activity can be started with your service partner.

5.3.2 Saving parameters and SD-card recording

Before saving the parameters via SD CARD you should run upward and downward, then insert a Micro SD from 2 to 16 GB already formatted FAT 32.
Switch the **RSW selector to position 7**, the display will indicate **[oc]** and turn on (ON) the Yellow LED LD35.
Saving Records:
Press the **S1 or S2 button** once, the display will indicate [Up] after ascent run or [Sd] after a descent or [SP] if no movement has been made, and the Yellow LED will start flashing (ON-OFF) until the recording is completed on the SD card.
If present in memory will be saved both the recording of the ascent and the descent.
On SD card will be saved 2 or 3 files for each save:

1. PARAMETERS file, with PAR extension, identified with the number on the valve label corresponding to the network identification (P499), followed by 8 digits relating to the machine time (e.g.: 16187901_03701235.PAR).
2. PARAMETERS file, with PAR extension and short name, consisting of only the number of valves on the label (e.g.: 16187901.PAR)
3. CURVES file, with extension UPR or RUP (upward), DWR or RDW (downward) depending on the last movement and identified with the valve number and the machine time as for PAR files of type 1 (e.g.: 16187901_03701235.DWR).

Remember to return to the 0 RSW selector position when saving is complete.
Send the created files to service@hevos.it via email to start the analysis with your technical support partner.

5.3.3 Loading parameters from SD-card

To load the parameters via SD CARD you have to insert a Micro SD 2 to 16 GB, formatted FAT 32.
The card must contain a file named with the number on the valve label corresponding to the network identifier, with extension PAR (e.g. 16187901.PAR) with the data to read.
- Switch the RSW selector to position 5, the display will indicate [Ic] and turn on (ON) the Yellow LED LD35.
- Then once press the S2 button and the Yellow LED will start flashing (ON-OFF) until the parameters are read from the SD card.
- Then the display will display [00] and the Yellow LED will turn off (OFF) and the Green LED will flash (ON-OFF-ON).

After the display will display [Ic] and will turn on again (ON) the Yellow LED
Remember to return to the 0 RSW selector position

5.3.4 Software update procedure

Before updating the board software, it is appropriate to save the current working parameters (see 5.3.2).
- For the software update must be present on Micro SD CARD the FIRMWARE.DAT file to install.
- Insert the SD CARD into the SD slot.
- Disconnect and reconnect the M1 power connector.
- After feeding the board's M1 power connector, the DISP1-2 "rotates" for 8s and, during this time, hold down the S1 button until [FI] appears on the DSP1-2.
- Then once press the S2 button to confirm the update command.
- At the end of the update on the DISP1-2 appears [oh].
- Remove the SD CARD from the SD slot
- Disconnect and reconnect the M1 power connector.

6 PROTECTION AGAINST UNINTENDED CAR MOVEMENT (UCM)

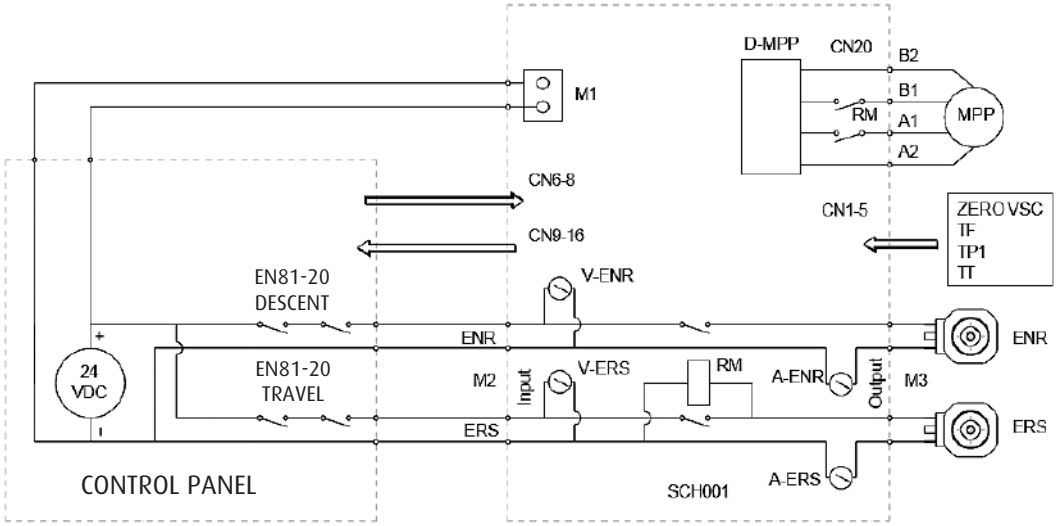
6.1 Introduction

The valve unit is a part of the protective device against the unintended car movement, with the door not locked up or with the door of the cabin open, as requested by section 5.6.7 of the EN 81.20 standard.
The device must detect the unintended car movement, cause it to stop, and keep it still.
The valve group is the stop element, downhill, provided as a subsystem in point 5.8.1 of the standard EN 81.50.
The protection against uncontrolled movement must act, uphill, interrupting the electrical supply of the motor-pump, while, in descent, HEVOS involve the use of a system formed by two electrically controlled valves (ENR solenoid valves and ERS) operating in series, and participating in the normal operation of the lift, that realize a safety hydraulic flow block.
It is must expect, for this type of device, a self-monitoring by the electrical panel, according to section 5.6.7.3 of EN 81.20. To run the self-control of redundant descent devices, the electrical panel can operate in two strategies:

- Functional mode, operating periodically, automatically, the two valves for leaks (see 6.4)
- Control mode, based on the monitoring signal PNP1 provided from the group board (see 6.6).

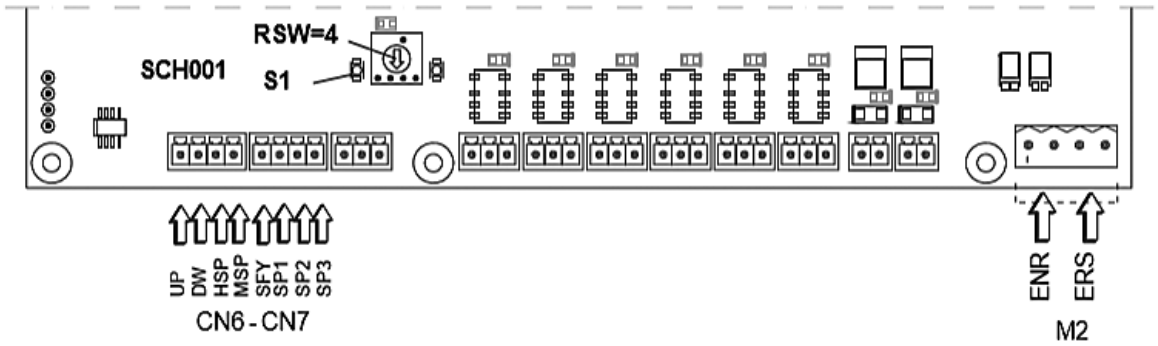
When the circuit required in section 5.6.7.7 of the EN 81-20 identifies unintended car movements doors open, it must activate the stop element, interrupting any signal and command to the valve group. In particular, must be disconnected, on SCH001 electronic board, the inputs of ENR solenoid valves and ERS on the M2 terminal block, and in any case, we have to stop the input signals to the board, the CN6-7 connector.
The device must be actuated (interruption of the input signals) before the cab moves away 200 mm from the floor. There shall be a test of the device in accordance with section 6.3.13 of the standard EN81-20.
When the device is activated or self-control redundancy has indicated a fault element device arrest, as required in section 5.6.7.9 of EN81-20 standard, it release or the lift recovery must be checked by a competent person.

6.2 Scheme of operation signals and controls



M1	BOARD INPUT CONNECTION
M2	SOLENOID VALVES INPUT CONNECTION
M3	SOLENOID VALVES CONNECTION
V-ENR	ENR INPUT CONTROL
V-ERS	ERS INPUT CONTROL
A-ENR	ENR CURRENT CONTROL
A-ERS	ERS CURRENT CONTROL
ENR	VNR VALVE UNBLOCK SOLENOID VALVE
ERS	VSC VALVE UNBLOCK SOLENOID VALVE
MPP	VSC VALVE COMMAND STEPPER MOTOR
D-MPP	STEPPER MOTOR CONTROL DRIVER
RM	STEPPER MOTOR CONNECTION RELAY
A1-A2	STEPPER MOTOR A PHASE
B1-B2	STEPPER MOTOR B PHASE
CN6-8	BOARD SIGNALS INPUT CONNECTIONS
CN9-16	BOARD SIGNALS OUTPUT CONNECTIONS
EN81-20	DOWNWARD COMMAND DEVICES
EN81-20	TRAVEL UPWARD AND DOWNWARD COMMAND DEVICE
ZERO VSC	VSC VALVE POSITION SENSOR
TF	VNR FLOW SENSOR
TP1	PRESSURE SENSOR
TT	TEMPERATURE SENSOR

6.3 Device test against uncontrolled movement (DSP=UC, UP)



It describes a procedure to verify the conformity of the device in accordance with Section 6.3.13 of the EN81-20. Before proceeding verify, however, on the manual of the electrical panel, the operations necessary for the tests.
Usually the system has to be predisposed to exclude the possibility of calls and open the electric chain safeties at the level of the floor doors (for the system doors must be open even if physically closed).
So, the cabin must move up out of the door zone and stop responding for intervention of the safety circuit.
Setting on the electronic board SCH001 the switch RSW = 4 (DSP = UC) and pressing the S1 button until UP appears on the display, the valve group is ready to perform the next cycle of ascent or descent with nominal speed, even during the respective levelling manoeuvres.

6.3.1 Ascent with empty car, and positioned in the upper part of the pit

Open, manually, the emergency lowering valve, pulling down the cabin until the intervention of levelling uphill.
When the levelling intervenes, the system will start uphill at nominal speed and the switch intended to detect the unintended movement must act by stopping the cab.
Check that the stop position of the cab complies with the requirements reported in section 5.6.7.5 of EN 81-20.

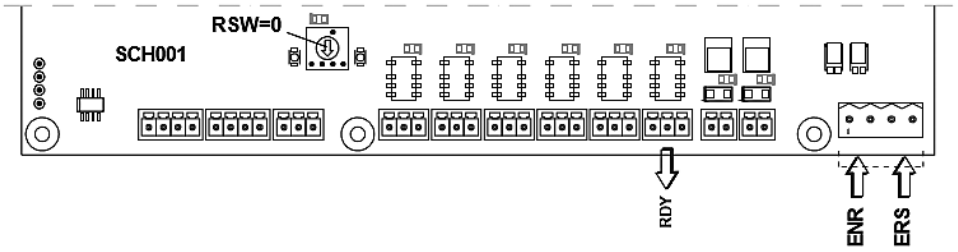
6.3.2 Descent with a full load in the cabin, and the cabin located at the bottom of the compartment

Using the hand pump, moving uphill the installation, until the start of the downhill levelling.
When the levelling intervenes, the plant will start descending at nominal speed and the switch purpose of identifying the uncontrolled movement must act by stopping the cabin.
The device must operate the stop element, it must interrupt the signals to the valve group during the descent, before the cabin moves away from 200 mm from the floor.
In particular, to activate the stop element, the device must disconnect, on SCH001 board, the inputs of the ENR solenoid valves and ERS on the M2 terminal board, and in any case the input signals to the board have to be exclude, the CN6-7 connectors.
Check that the stop position of the cab complies with the requirements in section 5.6.7.5 of EN 81-20.
At the end of each manoeuvre, performed during the test, the board no longer provides the RDY signal, if not setting up a new test, by pressing the S1 button again, or a normal operation changing the switch RSW = 0.
At the end of the test, restore normal system operation.
For the verification of the monitoring function of the protective equipment refer to the following points, depending on the type of self-control expected in the electrical panel.

6.4 Self-control of type of functional redundancy

An automatic test is expected to check the seal of the hydraulic valves that participate in the cab stop, at least once in 24 hours, and surely it happens if it is run when the car is automatically sent to the bottom floor.
The sequence involves the activation of the solenoid ENR for a time of 5-10s and, after a pause time between 5 and 10s, the solenoid activation ERS for 5-10s.
If, during the self-test detects an abnormal lowering of the cabin, it must be taken out of service.
It is advisable, in case of levelling, to repeat again once the test before putting the system out.
The control panel, or the specific devices must have the possibility to easily perform the proof test and verification of the monitoring system.

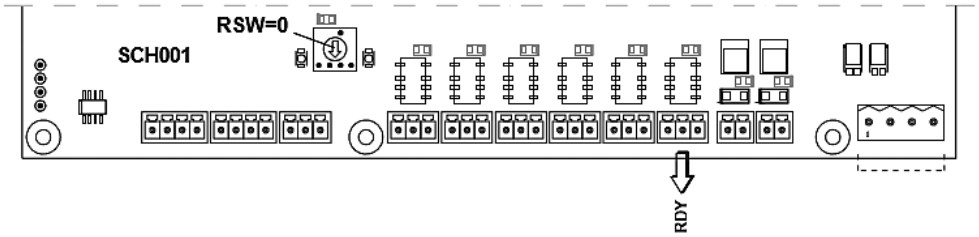
Signals involved:



Ready signal RDY from the board to the electrical panel waiting for commands.
ENR activation solenoid valve VNR release.
ERS activation of the VSC solenoid valve release.
Section 6.4 describes the functional self-control cycle redundancy downhill.
Section 6.5 describes the verification of self-monitoring provided for in section 6.3.13 of the standard EN81-20.

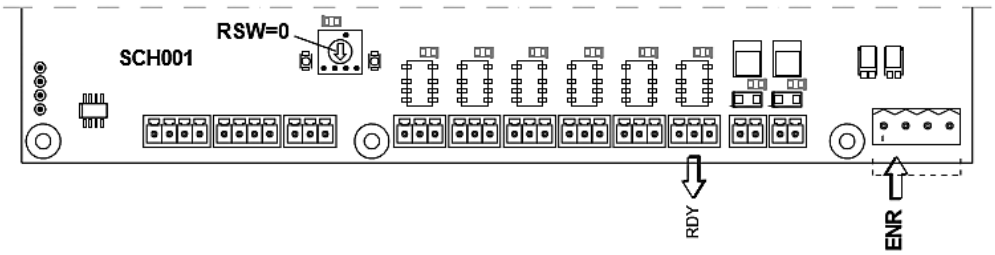
The sequence is described in detail below:

- 1/4 - SIGNAL WAITING (DSP= 00)



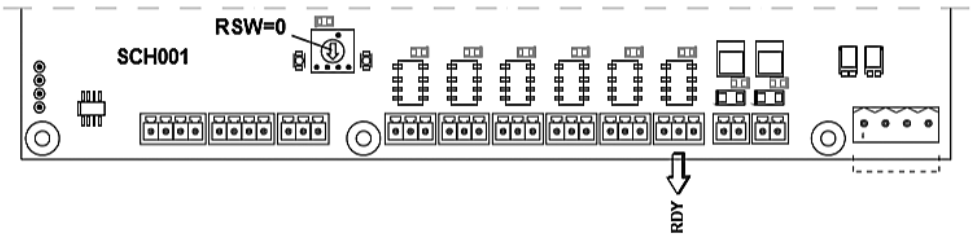
Ready signal RDY from the board to the electrical panel waiting for commands.

- 2/4 - ACTIVATION VALVE ENR (DSP= A1)



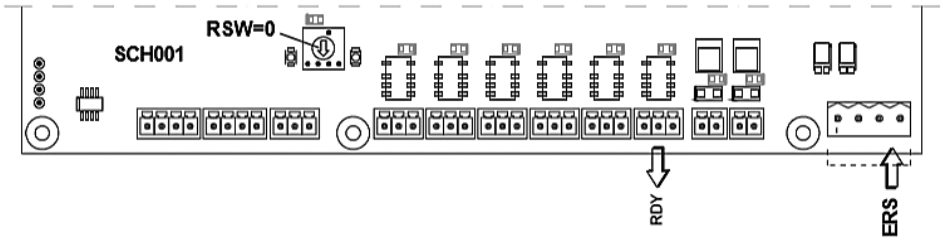
Power input of only solenoid valve ENR.
The electronic board detects the necessary conditions and activates the output solenoid ENR, which controls the valve VRN.
The board goes in error (error code = 19, DSP = E3) in one of the following situations:
- Incorrect coil power absorption of ENR solenoid valve
- Valve position VSC not on Zero
- Power input ENR Solenoid valve for more than 12s.

- 3/4 - SIGNAL WAITING (DSP= A2)



Ready signal RDY from the board to the electrical panel waiting for commands or ERS valve activation. The board goes in error (error code = 19, DSP = E3) if the waiting time signals exceeds 12s.

– 4/4 - ACTIVATION VALVE ERS (DSP= A3)



Power input of only solenoid valve ERS.
The electronic board detects the necessary conditions and activates the output solenoid ERS, which controls the valve VSC.
The board goes in error (error code = 19, DSP = E3) in one of the following situations:
– Incorrect coil power absorption of ERS solenoid valve
– Valve position VNR not on Zero
– Lack of VSC valve opening feedback.
– Power input ERS Solenoid valve for more than 12s.

6.5 Verification of functional self-control

Before proceeding, check the operations to be performed in the instruction manual of the control panel, to perform a verification test of the descent valves.

6.5.1 Check of the VSC valve sealing

Perform the test as indicated on the instructions of the control panel.
When solenoid valve ENR activated, on DSP of the board, appears the indication A1.
During the solenoid ENR activation, activate the manual emergency device until the intervention of the levelling.
If at the end of the levelling, the control panel repeats the test with the solenoid activation ENR (DSP = A1), cause, as previously, a new levelling.
The control panel must, at this point, lock the elevator and request service for its release.

6.5.2 Check of the VNR valve sealing

Perform the test as indicated on the instructions of the control panel.
When solenoid valve ENR activated, on DSP of the board, appears the indication A1.
Wait the end of the activation of the solenoid valve and the ENR and the following pause time when it appears on the board, the indication A2.
When solenoid valve ERS activated, on DSP of the board, appears the indication A3.
During the solenoid ERS activation, activate the manual emergency device until the intervention of the levelling.
If at the end of the releveling, the control panel repeats the test with the solenoid activation ERS (DSP = A3), and this cause, as previously, a new releveling, then the control panel must, at this point, lock the elevator and an Assistance Service intervention is required for its release.

6.6 Self-control of monitoring PNP1 signal

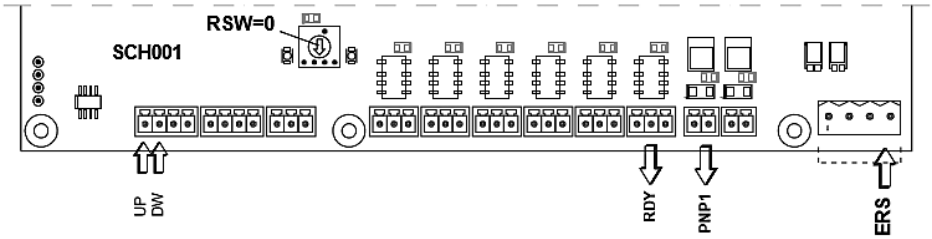
An automatic control of PNP1 monitoring signal can be performed, alternatively or in addition to the functional control of the downhill redundancy (point 6.4), to check, for each manoeuvre, including levelling, the correct sequence of opening and closing of the valves hydraulic participating at the block of the cabin.
The monitoring must be carried by controlling the timing of PNP1 signal following a change of state of the switching signal, corresponding, on the electronic board SCH001, to the entrance solenoid ERS + the UP or DOWN signal.

The control panel must be able to detect two different errors:

Error 1: When the manoeuvre signal switches from high to low level, the PNP1 signal switches to the high state within a time from 0.1s to 1s.
If the deadlines are not met an alarm to manage, as required by the standard, to be generated.

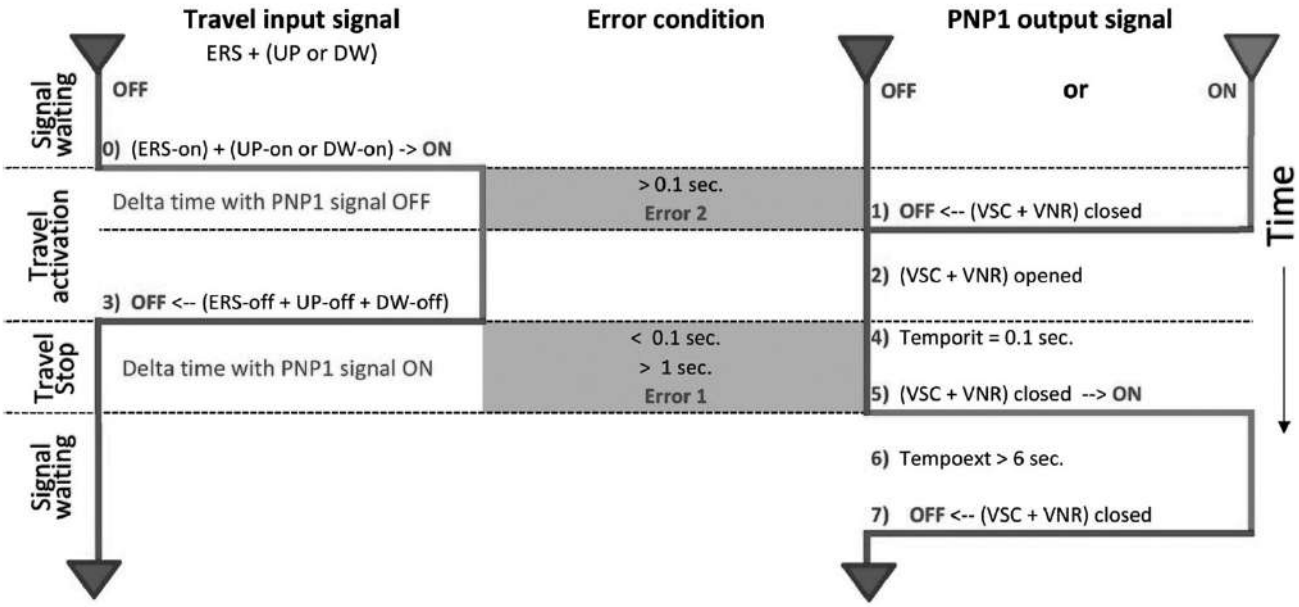
Error 2: When the manoeuvre signal goes from low to high level, the PNP1 signal switches to the low state within 0.1s.
If the deadlines are not met an alarm to manage, as required by the standard, to be generated.

Signals involved:



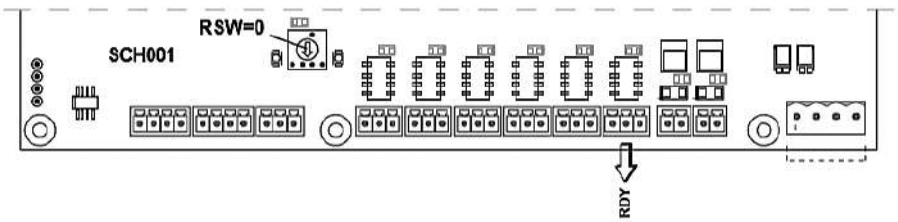
Ready signal RDY from the board to the waiting control panel commands.
Section 6.7 describes the monitoring of PNP1 signal check cycle.
Section 6.8 describes the verification of self-monitoring provided for in section 6.3.13 of the standard EN81-20.

6.7 Control of the cycle of monitoring PNP1 signal



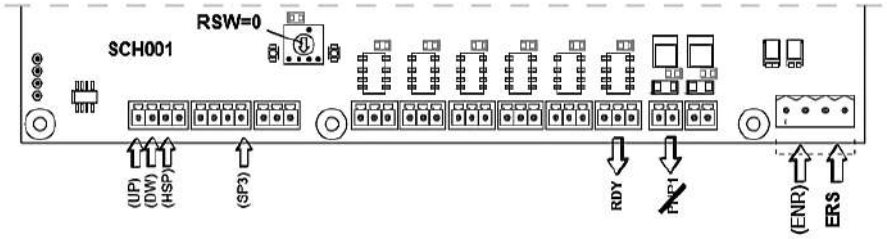
1. At the start of the manoeuvre, when the INPUT (ERS+UP) or (ERS+DOWN) are activated if within 0.1s there is no PNP1=OFF to indicate that the VSC and VNR valves are closed, it generates Error2 (E2).
2. At the end of the operation, when the INPUT (ERS+UP) or (ERS+DOWN) are deactivated, in an interval between 0,1 e1s the valves VSC and VNR with PNP1=ON signal must be closed, otherwise Error1 (E1) will be generated.
3. In any case after 6s from end of operation, the PNP1 signal will be deactivated (OFF).

– 1/3 - SIGNAL WAITING (DSP= 00)



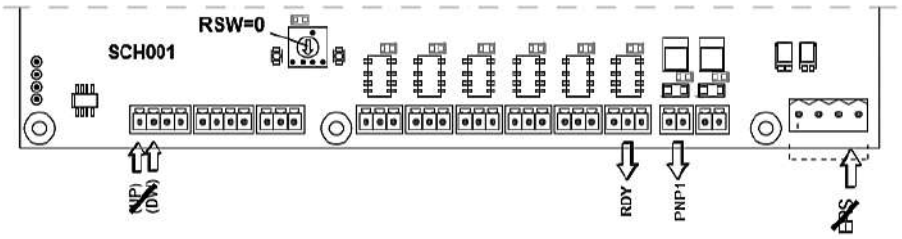
Ready signal RDY from the board to the control panel waiting for commands

– 2/3 - OPERATION ACTIVATION (DSP= 00)



The signals in parentheses are used together or alternatively as in normal manoeuvres.

– 3/3 - OPERATION STOP (DSP= 00)



6.8 Verification of the supervisory function of monitoring PNP1 signal

PNP1 error detection and panel reaction can be verified by blocking the always low or always high PNP1 signal.

6.8.1 Check always-ON signal

– Turn the selector RSW=6 (DSP=C-) and press S1 until appears on the display Cu(P461=1).
– Perform a manoeuvre in any direction.
– At the operation start, the control system shall indicate an Error2 state corresponding to the PNP1 signal (E2).
– Reset the error on the control panel, to restart the elevator

6.8.2 Check always-OFF signal

– Turn the selector RSW=6 (DSP=C-) and press S2 until Cd (P461=2) appears on the display.
– Perform a manoeuvre in any direction.
– At the end of the manoeuvre, the control system shall indicate an Error1 state corresponding to the PNP1 signal (E1).
– Reset the control panel error and restart the elevator

6.8.3 Assessment of normal operation

At the end of the previous test manoeuvres, set the selector RSW=0 which corresponds to the normal operating condition.
Perform a new manoeuvre in any direction to verify that no error corresponding to the PNP1 signal appears.

7 EMERGENCY MANOEUVRES

7.1 Emergency descent: Downward movement of the cabin

The automatic emergency descent, in the event of a power failure, must use the devices of the valve unit working during the normal descent manoeuvre, powered by a battery 24 VDC and 200 W the entire stroke duration.
For the manually downhill manoeuvre, operate the red emergency knob (n. 17), in an anticlockwise direction, up to a level where the passengers can get out of the cabin.
The regulation of the screw n. 25 determines the residual pressure of the piston manual lowering. Turn clockwise to increase pressure, counterclockwise decreases.
To check the minimum pressure adjustment:
- turn on the tap of the gauge cut, position n. 11-HE100, n. 2- HE250/650
- close the main tap position n. 19 and
- turn the knob n. 17.

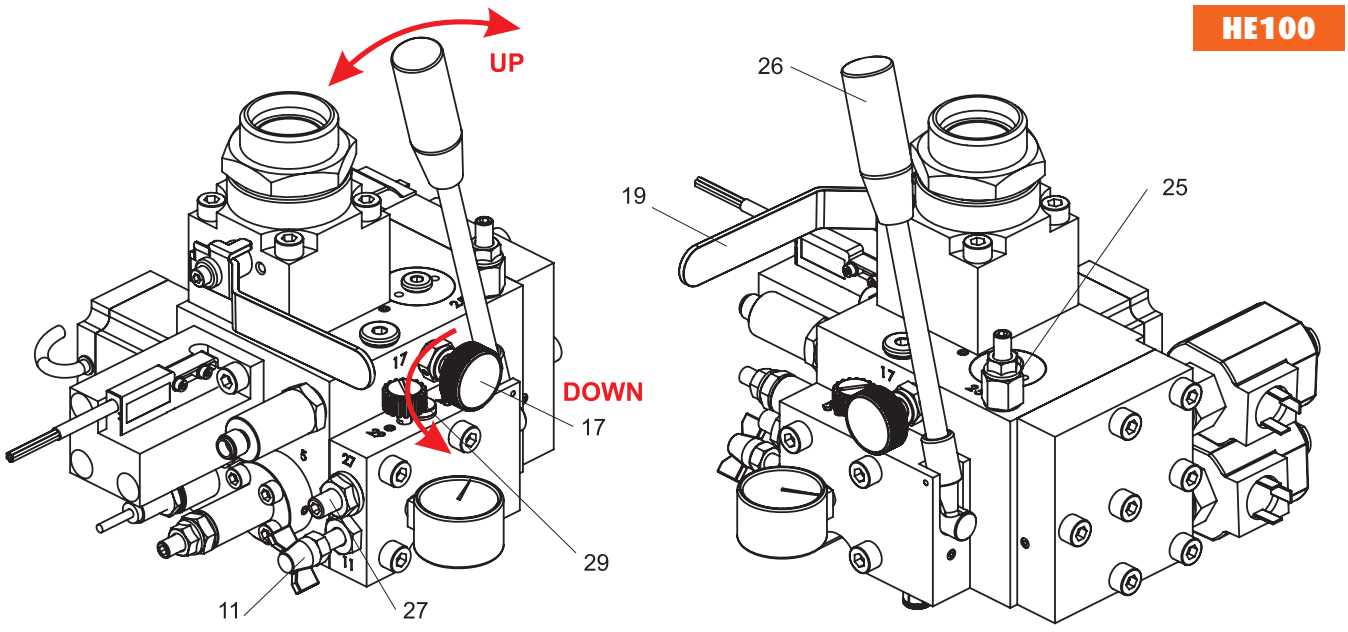
The gauge should show 5-6 bars (70-90 psi), otherwise open the tap n. 19, adjust the screw n. 25, and then test again.
At the end remember to close the gauge exclusion tap.

7.2 Emergency ascent: Upward movement of the cabin

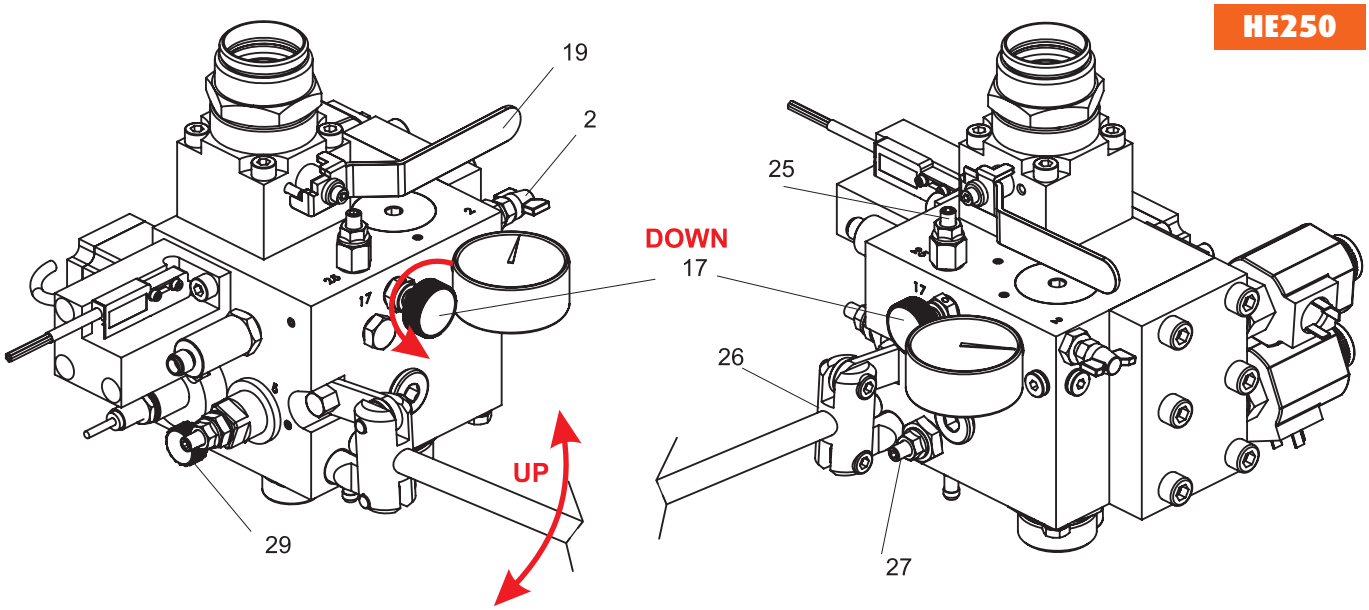
The displacement of the cabin upwards is possible by acting on the hand pump 26, through the appropriate actuating lever.
If the hand pump is not triggered and is not able of sucking the oil:
- Check that the suction tube under the valve is completely oil immersed.
- Unscrew one turn the vent screw n. 29 and pump until oil comes out from the same screw
- tighten the vent screw.

The hand pump is equipped with an overpressure valve which limits the maximum pressure.
The screw n. 27 allows you to adjust the maximum pressure which, normally, must not exceed 2.3 times the maximum static pressure.
Turn clockwise to increase pressure, counterclockwise to decrease.
To test the pressure relief valve:
- turn on the tap of the pressure gauge, n. 11-HE100, n. 2-HE250/650
- turn off the main shut-off valve position n. 19 and
- operate the hand pump (pos. n. 26) until the pressure continues to increase.

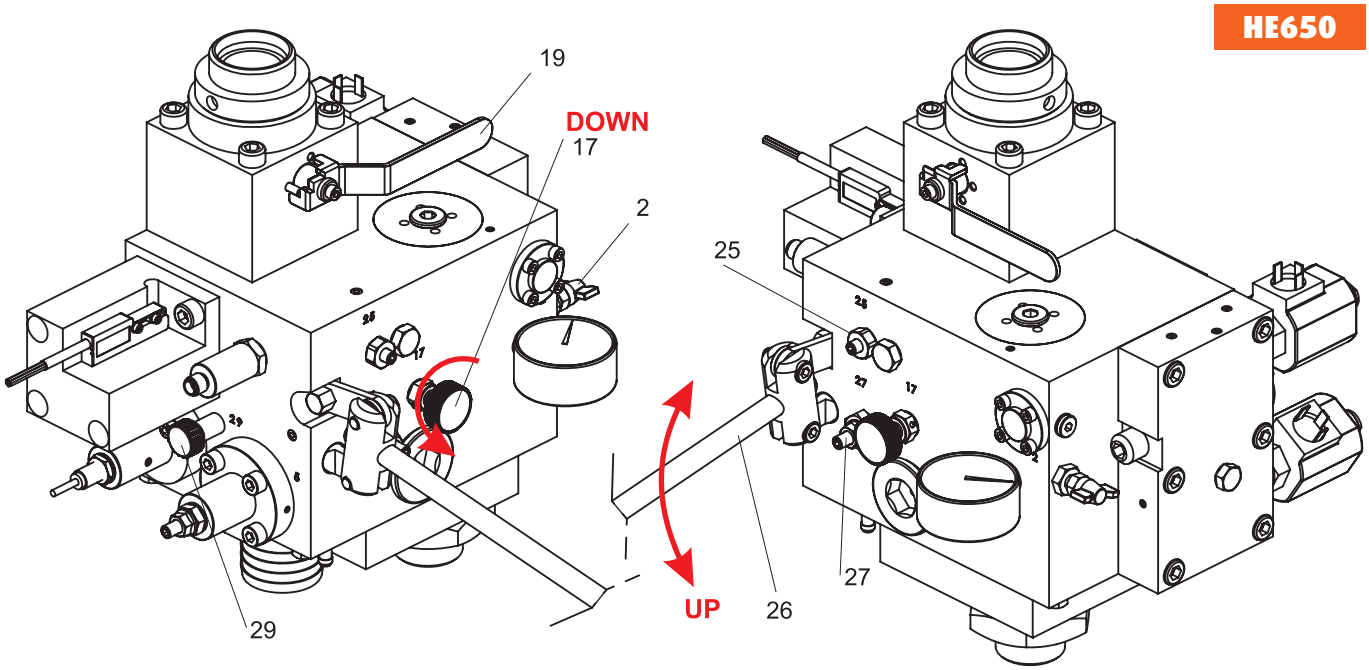
The gauge should show the pressure defined by installation specifications. Otherwise, release the pressure by turning the button n. 17, adjust the screw n. 27 and then test again.
At end remember to close the pressure gauge tap.



HE250



HE650



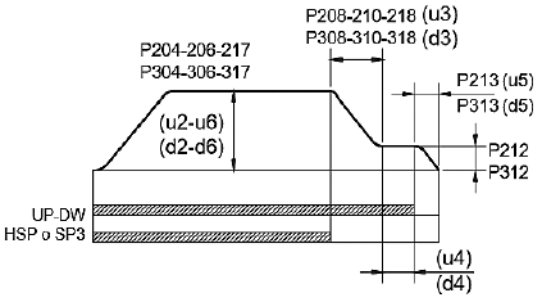
8 AUTOMATIC REDUCTION OF TRAVEL TIMES

To complete the installation of the system, an advanced "eco" function can be activated to reduce the travel times, allows to increase the performance of the machine and during the ascent, in the presence of a motor-pump constant speed, to reduce power consumption and oil heating.
For HEVOS HE valve group the reduction of travel times is realized in two modes:
- automatic reduction of upward and downward levelling space
- reduction of starting time and maximum obtainable upward speed

8.1 Self-learn mode: recovery levelling space

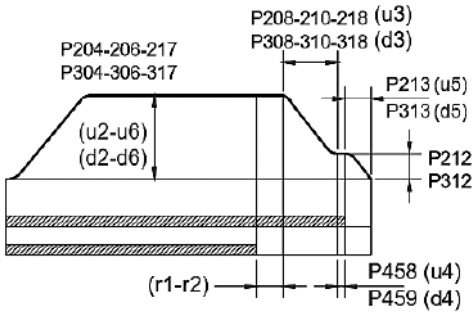
The automatic recovery of low speed levelling spaces is activated by setting the P112 = 1 (Self-learn mode).
So, at the first up and down stroke, the system calculates the value of the levelling space, and if the space is different from the minimum provided by P458 for up stroke, and Par. 459 for downstroke, it implements a deceleration space correction to respect the value provided in the parameter.
The self-learning system is reset every time is turned off the control board or the operating parameters are modified (speed or space).

1.A Normal stroke with "short" deceleration

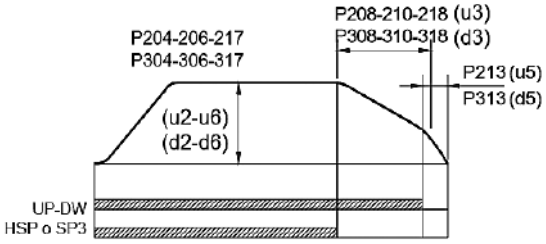


P112 = 1

1.B Deceleration delay r1 or r2

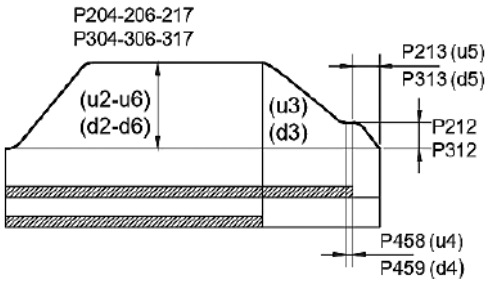


2.A Normal stroke with "long" deceleration



P112 = 1

2.B Deceleration correction



⚠ The physical distance of slowdown start that you have set from the floor to start the slowdown (magnet position or encoder altitude) must be adequately bigger than the values set in the parameters P458 and P459. Physical distances must also be equal for all floors.

⚠ To perform system setup or diagnostic functions remember to disable the **SELF-LEARN MODE** (P112=0).

8.2 Reduction of starting time and maximum upward speed

The reduction of the total up stroke time reduces the consumption and oil heating.
The synchronization between the output contact AVV and digital input SFY of the electronic board, allows you to start the engine when the VSC valve, which controls the discharge of the oil coming from the pump is open and begin to close the VSC soon as the engine is started, reducing to a minimum the engine operation during the “dead” times, this also occurs during stoppage of the engine in the soft-stop.
Once started the engine, to optimize the starting time of equipment, the system prepares the closing of the valve to the mapped VSC position, depending on the pressure in the circuit and on the value of the nominal flow of the pump (Par. 102) and, from that moment, starts the taking in charge of the cabin.
When a minimum flow to piston is detected, the system gets in control to implement the acceleration prescribed in the corresponding parameters. However, setting a short acceleration space, it allows to reduce the acceleration time and therefore the dissipation during this phase.

9 SPECIAL APPLICATIONS

9.1 Simulation mode

The SCH001 board configuration for use in simulation mode was designed to test the connections with the control panel.
In order for the SCH001 control board to be configured to work in this mode, appropriate parameters have to be installed in it and you have to put an electric jumper in the CN1 connector (TT) and corresponding in the connector CN8.
With reference to the drawing of the board (see 4.4):
- Feed the M1 connector, with a voltage 24VDC stabilized, and connect the pin GND to ground.
- Connect the input connector M2 of electro-valves with a voltage 24VDC.
- The CN1 sensor input is not considered and the temperature is fixed to 22.4°C.
- The CN2 sensor input is not considered and the pressure is fixed to 14.8bar.
- The CN4 input of the measuring sensor related to the valve VNR is not considered.
- The CN5 input of the position of the VSC-valve is not considered.
- The current absorption of the electro-valves on the output M3 is not considered.
- The Wi-Fi module is usable.

The electronic board SCH001 accept the signals UP-DOWN-HSP-MSP-SFY-SP2-SP3 coming from the main board, and react with a cycle parameterized with pre-defined duration times for each phase.
If the step-to-step motor is connected, it will perform some movements that simulate those executed during the speed control in a real installation.

The signals from the main board to the control board can be:

1. Digital signals in parallel, using the input connectors CN6 and CN7 and using the positive +24VDC. In this case must be set **P114** =0 (restart the electronic board after the setting).
2. Serial signals, using the CAN bus connection (see 9.3.2).
   As default setting the parameter **P113** = 0 (indicate the starting offset for the addresses dedicated to SCH001 board) it corresponds to 1360(0x550).
   In this case set the parameter **P114** = 49 (0x31=0x581-0x550) corresponding to the identifier 0x581 of the main board node.
   Don't modify the 49th address for specify the main control board node (restart the electronic board after the setting).

The signals coming back from the electronic board SCH001 to the main control board are supplied by:

1. Commutation of CN9(AVV), CN10(T1), CN11(P1), CN12(P2), CN13(ERR), CN14(RDY) relays and activation of the voltage exit CN15(PNP1) and CN16(PNP2).
2. The relays signal and the voltage outputs are replicated also by CAN bus connection, in case of parameter **P114** = 49.

A CAN connection cable is supplied and it has to be adapted to the main control board connector, considering this colour code for the cables:
- green = GND,
- brown = CanL,
- white = CanH to adapt to the control panel connector.

When the CAN connection is correctly done, the led LD30 with orange colour is fixed.
If the connection is not established, the led LD30 flashes quickly and the display shows "Er" with error code 49. If there isn't any error, the control board display DSP1-DSP2 shows "Si". If there isn't any error, the display DSP1-DSP2 shows "Er".
Refer to the user manual of the HE valve, to verify the type of error and to reset the status.
In simulation configuration, the errors signals don't auto-reset; this consent to evaluate the errors.

The connection to the input M2 of the electro-valves must be executed with a connection to M2 pin, managed by the main control board, as during normal function. Only in this case it is possible to simulate both, the functional self-check test of the redundancy and the self-check test of the monitoring PNP1 signal.

There is an alternative method with connections always powered to 24VDC to the M2 terminal (P488=1) not recommended for activation of which you must contact the Assistance Service (service@hevos.it).

It is possible to test all the outputs of the electronic board SCH001 in sequence, in order to verify their detection from the main electronic board.
Press the push button S1 on the electronic board, the display will show “CC”, instead of “Si”
Then an automatic sequence starts, during which all relays with connectors from CN9 to CN14 will be activated and the voltage outputs CN15 and CN16 will be activated at once for 4 second after a delay of 4 seconds.
The AVV, T1, P1, P2, ERR, RDY, PNP1, PNP2 signals are replicated also by the CAN bus connection in case of parameter set to P480 = 49.

ATTENTION:

Disconnecting the jumper to the connector CN1(TT), the electronic board SCH001 shift to standard-mode and it is possible to evaluate the faults signals related to the sensors, if not connected.
The board in simulation mode **cannot be freely used in normal mode**, it is mandatory to set specific parameters (supplied on request) in order to use the board in standard-mode, otherwise the fault 41 appear when you start the manoeuvre.

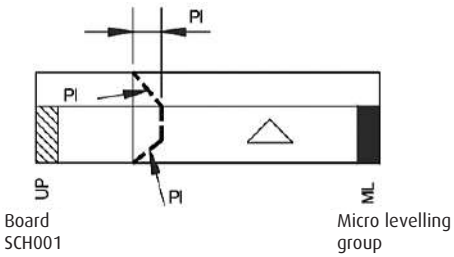
9.2 External micro levelling group operation

HE valves unit can work setting the parameter P231 = 2 with an auxiliary micro levelling group that operates during up stroke to recover the floor level without starting the main motor.
In this condition the valve unit remains passive and the flow rate that comes from the pump results always directed to the piston.

The differences with respect to the normal working regard exclusively the up stroke micro levelling operation and they are:
1. During up stroke activate the input UP and power the micro levelling motor
2. The maximum pressure test command is not executed
3. The UCM test command during up stroke is not executed
4. During the up stroke, the monitoring signal PNP1 it is not managed and remains at level 0
5. The output contact AVV (motor-pump management) it is active
6. During the micro levelling up stroke, the solenoid valve ERS input must not be powered

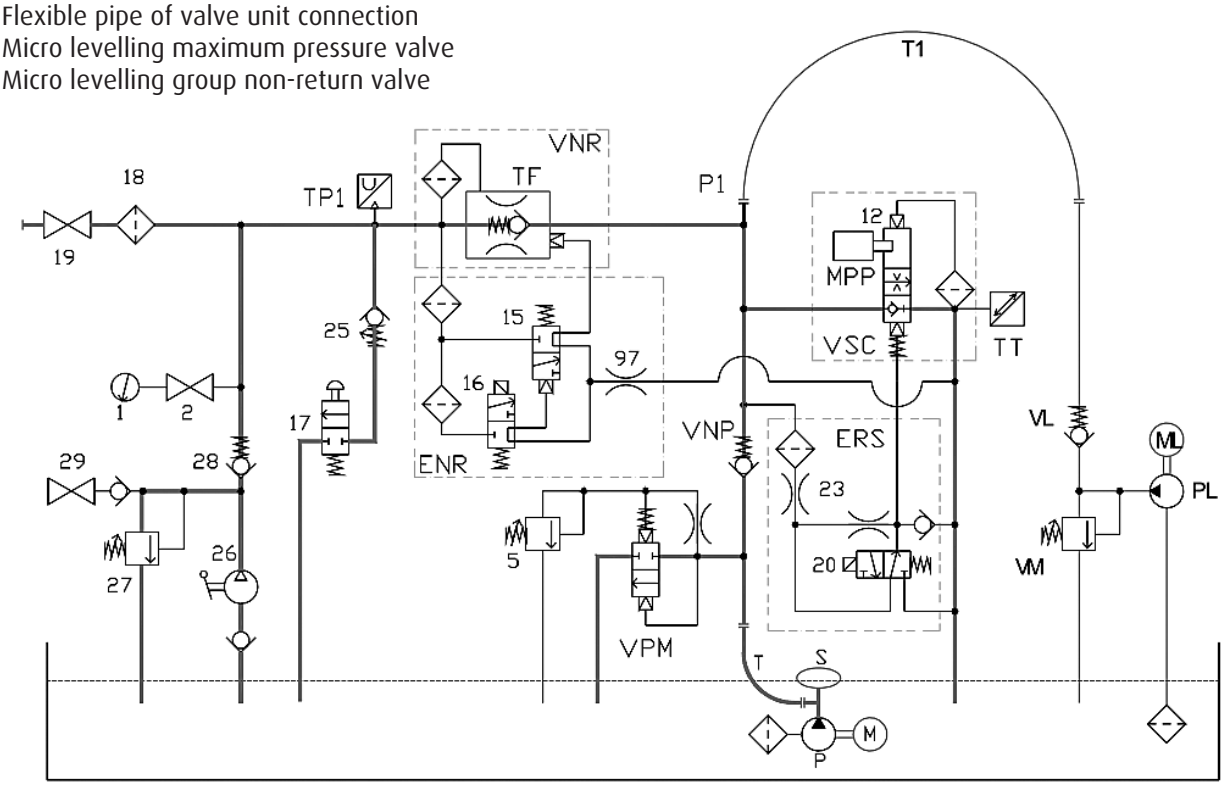
During the uphill functioning on the display of the SCH001 board appears “AL”.

Note: the stopping distance depends exclusively on the cabin speed during the upward movement and it is normally different from the one executed during a normal stroke under control of the valve unit.
It is suggested, during the stop with micro levelling the usage of specific stopping contacts.
For the connection of the auxiliary group contact the Technical Office.



UP UP signal to board SCH001
ML Micro levelling motor pump power supply
PI Speed depending on the micro levelling group

ML Micro levelling motor pump
PL Micro levelling pump
T1 Flexible pipe of valve unit connection
VM Micro levelling maximum pressure valve
VL Micro levelling group non-return valve



9.3 Communication between the lift's control panel and the SCH001 board via CAN bus

9.3.1 Management of operating signals between control panel and SCH001 board (multi-valve system too)

1. Each device connected to the CAN bus constitutes a node with its own address.
2. In communication, only the control SCH001 board of the pump unit (or one of the boards, in the case of the multi-valve system) will act as the master node, while the control panel will be a slave node.
3. The only one SCH001 control board (or each board, in the case of the multi-valve system) will must provide "physically" to the control panel:
   - the status of each AVV relay, for starting and maintaining the power supply of each motor of the system, that is to command the closing of at least one contactor of each individual motor and its opening when the state of the AVV relay changes (also during the manoeuvre);
   - the status of the ERR relay or the cumulative ERR signal, in the case of the multi-valve system (the cumulative ERR signal is obtained from the series of all NC contacts of the ERR relays of the various boards or from the parallel of all NO contacts of the ERR relays of the various boards).

⚠ Note: the SCH001 board does not provide the status of the motor thermal protection and therefore the specific input of the control panel must be connected directly to the wires of the motor thermistors (if there are several motors, as a series of all the protections).

4. The master SCH001 board will receive from the panel, via CAN line, the digital signals:
   - UP, upward signal;
   - DW, downward signal;
   - HSP, upward high-speed signal, during Downward also when Par. 453 = 0;
   - MSP, maintenance and speed signal V2;
   - SFY, pump motor started signal;
   - SP1, speed V3 (combined with the high-speed signal);
   - SP2, speed V4 (combined with the high-speed signal);
   - SP3, downward high-speed signal (when Par. 453 = 1);

   which, in case of multi-valve systems, will then be transmitted to the slave boards via CAN bus by the master.

⚠ In the multi-valve system, the control panel must ensure that SFY = 1 only when all the motors have started, that is when the contactors of each motor are all closed due to direct start-up or when the motor start-up phases are completed in case of soft starter or star delta starting, while the SFY signal must go to zero when the motor(s) is(are) stopped.

5. The SCH001 board will transmit the status to the control panel via CAN line of the relays:
   - T1 (cumulative state, in the case of multi-valve system): oil temperature range exit;
   - P1 (cumulative state, in the case of multi-valve system): min e max pressure range exit;
   - P2 (cumulative state, in the case of multi-valve system): overload pressure overcoming;
   - RDY (cumulative state, in the case of multi-valve system);
   - AVV (it was valid only in the case of a single system, no multi-valve) of the voltage;
   - PNP1 (cumulative state, in the case of multi-valve system);
   - PNP2 (it was valid only in the case of a single system, no multi-valve);
   - ERR (cumulative state, in the case of multi-valve system, valid only if CAN communication is working).
6. To avoid conflicts between the various devices interconnected by CAN bus, it is required that:
   - a range of 96 consecutive addresses (for example 0x550-0x5AF) is reserved for the SCH001 board (or boards, in the case of the multi-valve system). These addresses cannot in any way be used by devices normally connected by CAN bus to the control panel because they are exclusively for use with the SCH001 board (or boards, in the case of the multi-valve system);
   - the 2nd address of the range (for example 0x551) is the transmission ID of the "control panel node";
   - The 50th address of the range (for example 0x581) is the identifier in reception of the "control panel node".

9.3.2 Parameters setting of SCH001 board

1. Parameter P113 = basic value for CAN addresses (offset).
   With default value = 0, a basic address of 0x550 (1360) is assumed automatically.
2. Parameter P114 = relative address of the control panel node.
   With default value = 0, the SCH001 board does not recognize operating signals transmitted via the CAN line.
   With the used value = 49, the SCH001 board recognizes the operating signals transmitted via CAN line.

9.3.3 Communication protocol between lift control panel and pump unit

1. The CAN bus speed will be 125-kbit/s, with standard 11 bit identifier.
2. Every 100 ms, the SCH001 board (master node) will transmit to the lift control panel as a two-byte "packet" following:
   - a first byte equal to 0x61, to communicate the beginning of the transmission;
   - a second byte with the status of the SCH001 board, the status of the AVV, T1, P1, P2, RDY relay and voltage output PNP1, according to the following format:

MSB							LSB
ERR	PNP2	AVV	T1	P1	P2	RDY	PNP1

   with the convention:
   - 0 = relay de-energized, PNP1, PNP2 = low logic level;
   - 1= relay energized, PNP1, PNP2 = high logic level.

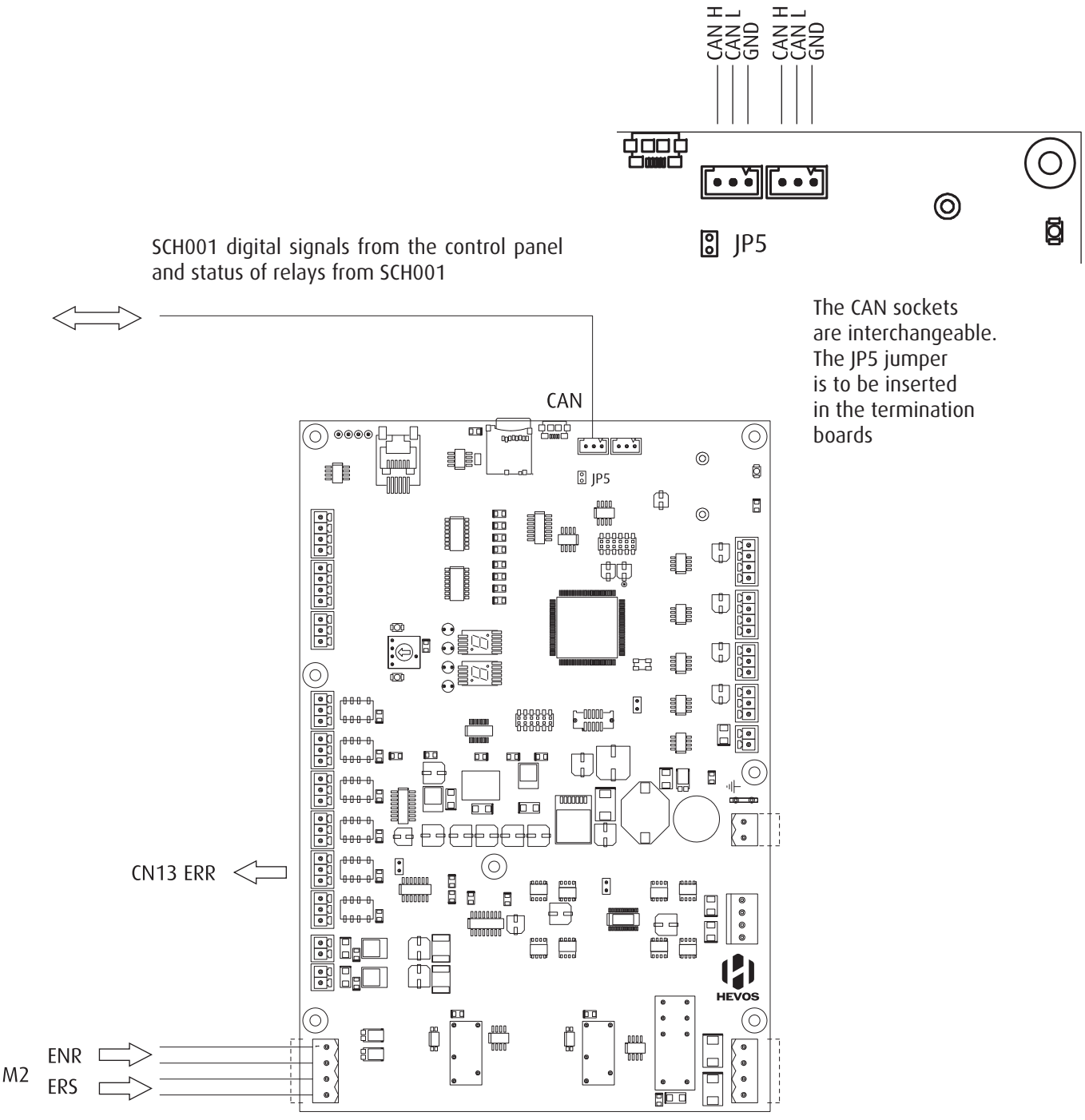
   Note: the status of the AVV relay and of voltage output PNP2 are valid only in the case of single system, not multi-valve.
3. Upon receipt of the above-mentioned package, the lift control panel will reply to the SCH001 board with a four byte "package" as follows:
   - a first byte equal to 0x68, to communicate the beginning of the transmission;
   - a second byte with the status of the digital signals UP, DW, HSP, MSP, SFY, SP1, SP2, SP3 according to the following format:

MSB							LSB
SP3	SP2	SP1	SFY	MSP	HSP	DW	UP

   with the convention:
   - 0= command absent;
   - 1= command present;
   - a third byte which represents the number of the floor to which the cabin is located and which is updated each time the deceleration magnet is encountered (0 = lowest floor);
   - a fourth byte which represents the number of the floor to which the cabin will have to arrive at the end of the manoeuvre (0 = lowest floor).
4. The lift control panel must supply the movement commands (UP, DW, HSP, MSP, SFY, SP1, SP2, SP3 = 1) only when the SCH001 board is not in error (ERR relay).
5. The control panel must constantly monitor the RDY signal and behave towards the SCH001 board as follows:
   - provide movement commands, when RDY = 1;
   - remove the movement commands, setting them to zero, when RDY = 0.
6. The lift control panel must go into error due to communication timeout, if it does not receive any information from the SCH001 board within 10 s. The aforementioned timeout must be activated or deactivated using the specific commands specified below:
   - 0x52 enables timeout. When the command is executed, the control panel will reply with 0x65;
   - 0x5A disables the timeout. When the command is executed, the control panel will reply with 0x6B.

   It should be noted that at the switching on of the control panel the aforementioned timeout must be enabled and the situation will remain in that state up to the contrary command.

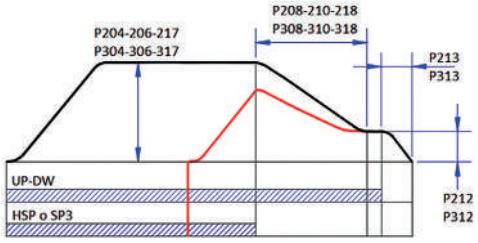
9.3.4 SCH001 board connection



9.4 Intermediate floor management

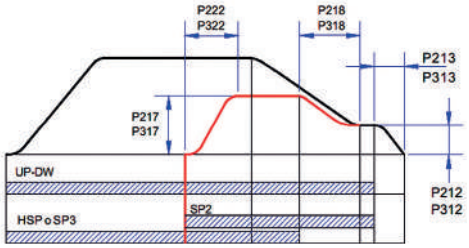
In case of a "short" intermediate floor, compared to the usual stops the situations provided are:

1. Starting from a plane at a distance sufficiently greater than the expected slowdown distance (standard operation). With parameter P455=0 and the use of the HSP input.



In this case, at the slowdown contact, is performed a deceleration space equal to the parameter set for normal stroke which however considers the speed reached in that moment, operating if provided (P456 = 1), also the corrections of the usual slowdown and low speed spaces.

2. Presence of specific slowdown contacts.
With the parameter P455=2 and the use of the HSP input.

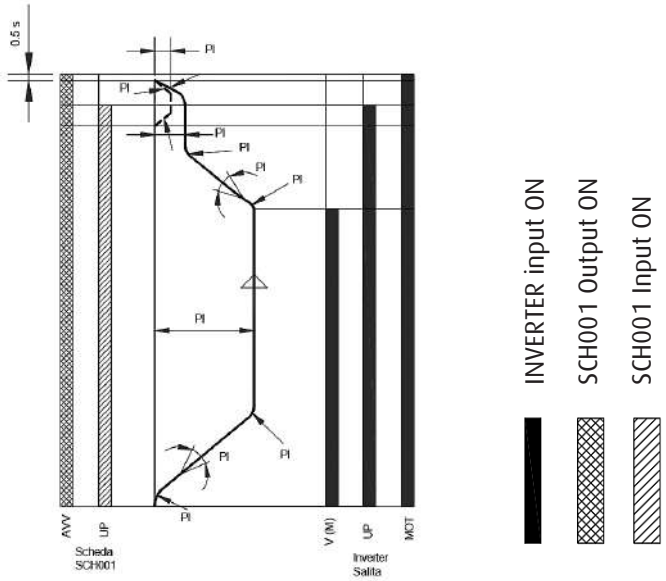


In this case, the HEVOS system uses the SP2 input and the HSP input (high speed) together with the direction control (UP, DW) operating, if provided (P456=1) also the corrections of the slowdown and low speed spaces.

9.5 HEVOS HE operation with the VVVF unit

The HEVOS HE valve unit can work in conjunction with a VVVF drive, dedicated for the hydraulics systems, which works upward for adjust the cabin speed, by setting the parameter P231 = 1.
In this condition the valve unit remains passive throughout the up stroke and the flow coming from the pump is always addressed to the piston.
The substantial differences compared to normal operation concerned solely with the up phase and they are:

1. During the up stroke, the single input recognized by the board is UP
2. The relief valve test command is not executed
3. The upward UCM test command is not executed
4. During the up stroke, the PNP1 monitoring signal is not operated and remains at level 0
5. The output contact AVV (motor-pump management) is activated for to manage the motor stopping
6. During the up stroke is not used the ERS solenoid



AVV Motor activation contact from SCH001 board to the control panel
UP Upward signal to SCH001 board and to VVVF drive input
V High speed signal to VVVF drive input
M Inspection signal to VVVF drive input
MOT Motor-pump power supply managed by the VVVF drive and controlled by the up stroke contactor
PI Parameters generally set on VVVF drive (see specific VVVF manual)

Note: During the up stroke travel the Display of SCH001 shows "**ir**".

For further information on inverter logic, ask for the dedicated manual.

9.6 Multi-valve schemes and adjustments

9.6.1 Description

The board SCH001 can use more HE valves groups acting in parallel, to increase performance in terms of speed of the plant, in a hierarchical system with a principal board (MASTER) and up to 7 SLAVES boards, connected by a CAN communication network.

The characteristics of the multi-valve system are the following:
- minimizing signal connections with the Slaves boards,
- automatic sharing of the operating parameters, from the Master to the Slaves (P712=1),
- automatic setting of the plant test commands, from the Master to the Slaves,
- possibility to exclude, in the system operation, one or more tabs and the related groups, with the lowest performance decay.

Requirements for the operation of the Multi-valve system are:
- the nominal flow rate of the pump of each group has to be the same,
- separate management for each of the motor connected to its own pump,
- management of error output ERR of all the boards to also report hardware problems to the control panel,
- separate management from the control panel of the solenoid inputs ENR and ERS.

All the parameters that define the speed, the space and the general operating characteristics, have the values related to those of the entire system it is connected to the multi-valve system, while the value of the parameter P102 defines the rated flow of the pump of the individual HE groups.

A series of specific parameters allow the configuration of the multi-valve system:
- Par. 475 (normally = 0) defines the hierarchy of the corresponding board (Master = 1, Slaves = 2)
- Par. 476 defines the address of the CAN node (1 to 127) of the corresponding board
- Par. 477 defines the total number of Slaves in the Multi-specific valves system (1 to 7)
- Par. 478 defines the active status (1) or inactive (0) of the corresponding board
- Par. 482 defines the total number of Slaves provided in the Multi-valve system

N.B.: in case of error, on a board, on the master one will appear the word “E-” and on the display of the board concerned will appear the words “Er” (error code).

For troubleshooting, refer to the specific section.
In case of deactivation of a Slaves group, the system allows to keep the slowdown spaces, the low speed and stopping distances.
The RESET of the errors on the Slaves boards can also be done directly from the Master board, even operating remotely.
For more information on multi valve logic, please refer to the dedicated documentation.

9.6.2 Hydraulic scheme

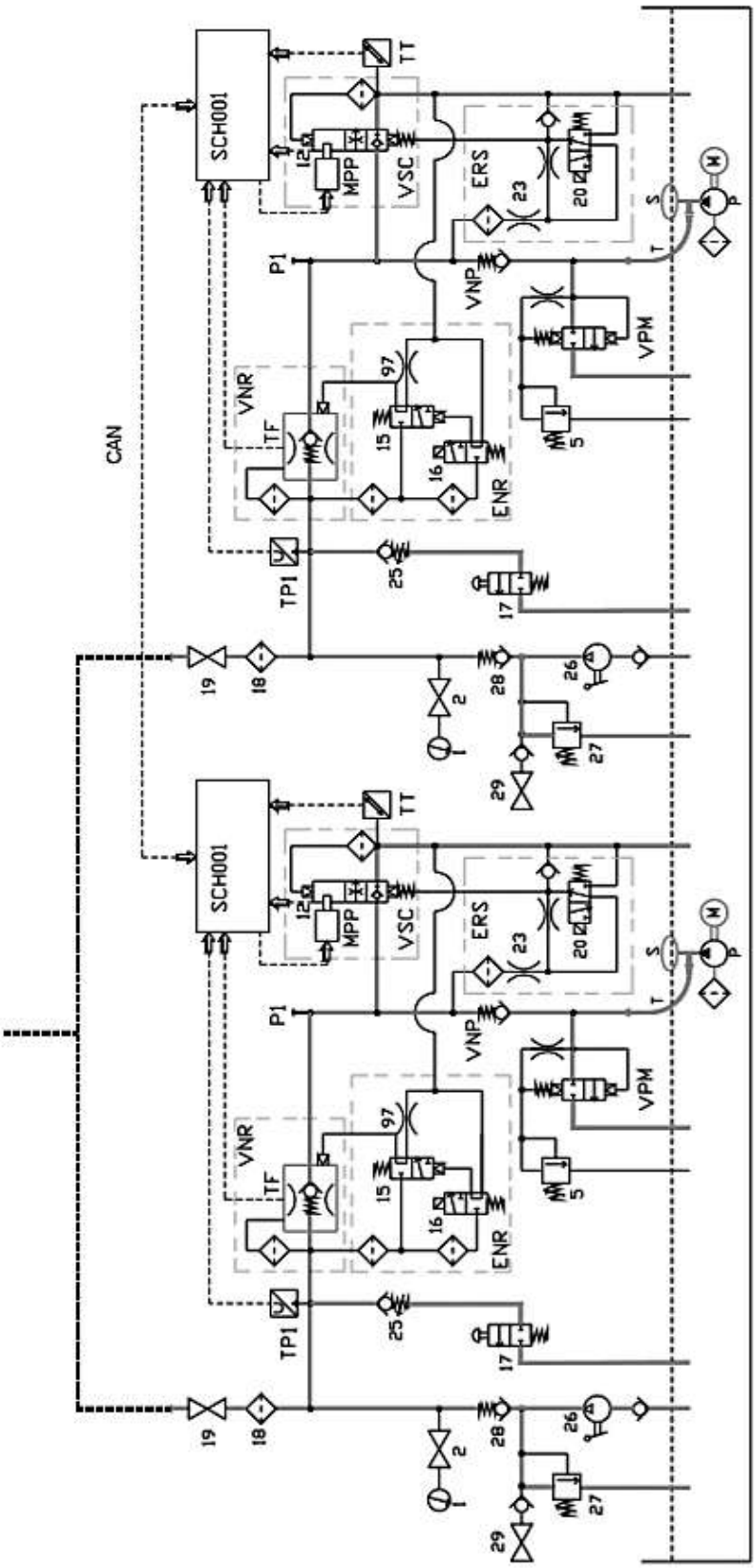
LEGEND

1 Pressure gauge
2 Pressure gauge cut-out cock
5 Maximum pressure valve adjusting screw
- clockwise increases (+)
- anticlockwise decreases (-)
12 VSC valve zero contact
15 ENR pilot valve
16 ENR solenoid valve (unblock VNR valve)
17 Emergency manual lowering
– anticlockwise rotation
18 Filter
19 Ball valve
20 ERS solenoid valve (unblock VSR valve)
23 VSC valve block control throttle
25 Emergency manual lowering minimum pressure
- clockwise increases (+)
- anticlockwise decreases (-)
26 Hand pump
27 Hand pump maximum pressure valve
- clockwise increases (+)
- anticlockwise decreases (-)
28 Hand pump non-return valve
29 Hand pump air-release
97 VNR valve block control throttle

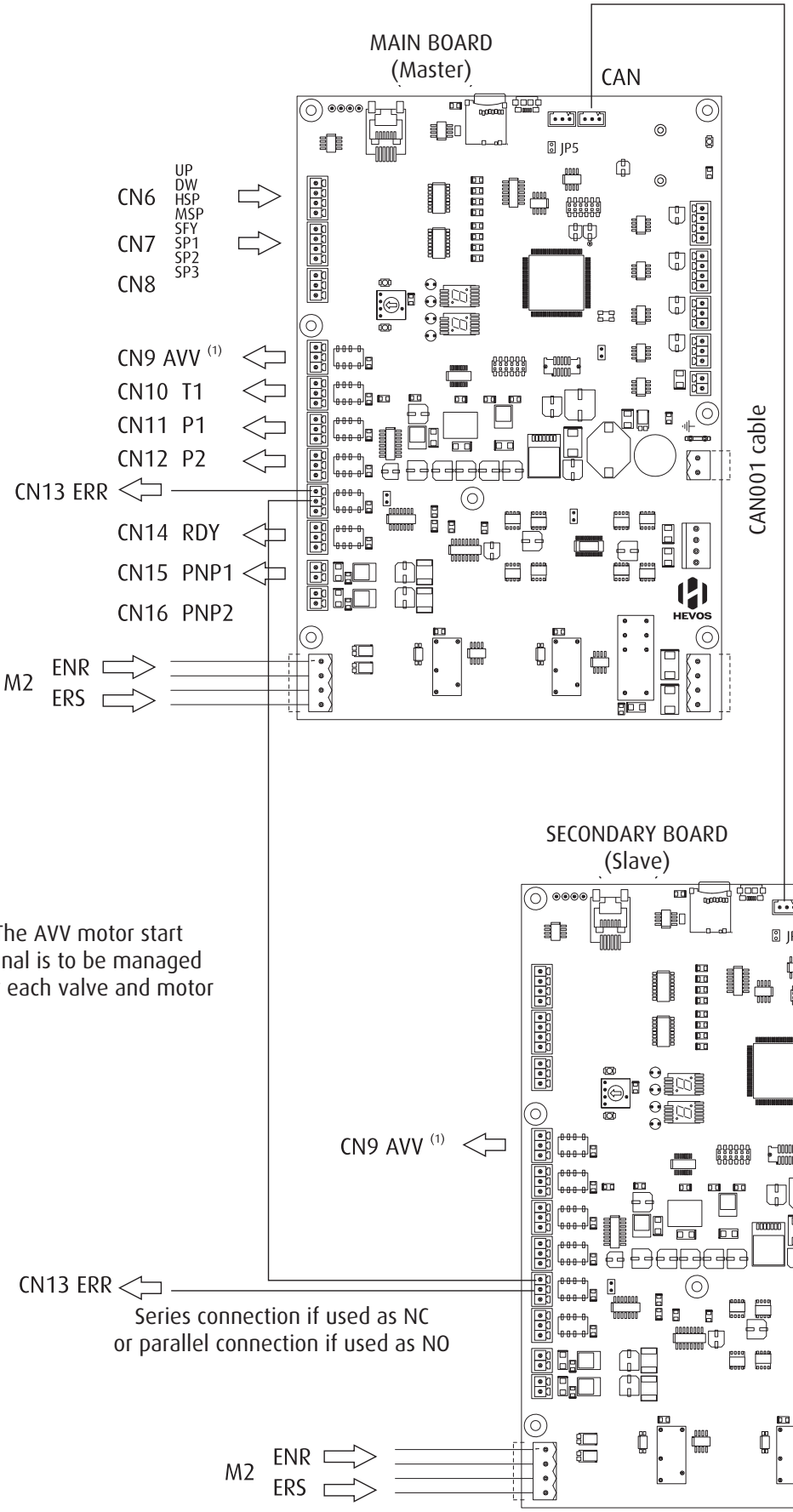
TF Flow meter
TP1 Pressure meter
TT Temperature meter
ENR VNR valve unblock solenoid valve
ERS VSC valve unblock solenoid valve
MPP VSC valve command stepper motor
VNP Pump non-return valve
VNR Non-return and downstroke safety valve
VPM Pump maximum pressure valve
VSC Flow control valve
P1 Auxiliary micro levelling port
CAN Signal communication line and configuration

OTHER PUMP UNIT COMPONENTS

M Pump motor
P Volumetric pumps with three screws
S Pump silencer
T Flexible pump connection pipe



9.6.3 Master-slave connections



CAN sockets can be interchangeable

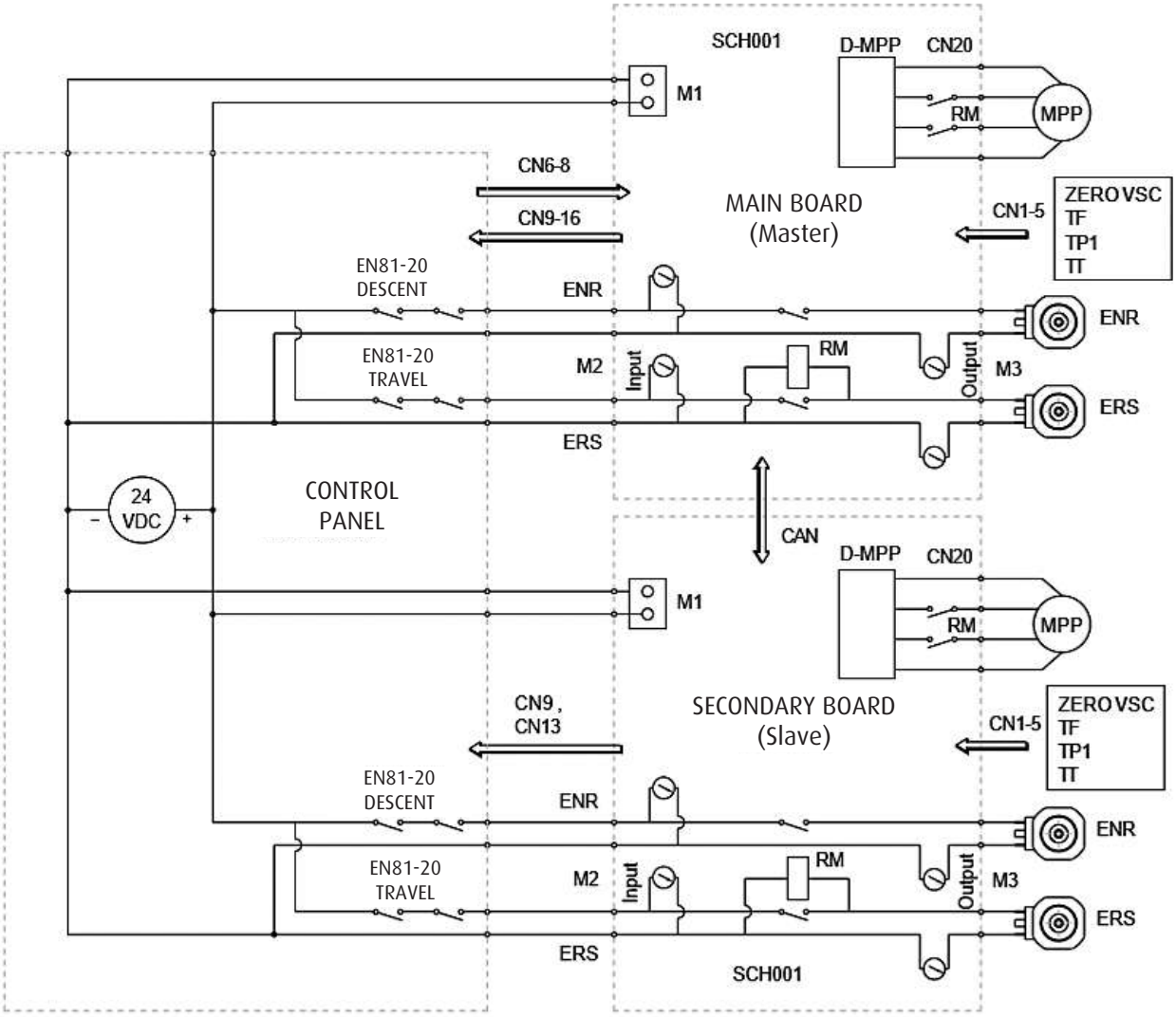
The jumper JP5 is to be inserted in both terminator boards, while it is to be let free in those intermediate

The connections to the valve unknit device and the power supply of the board are the same as those of the single valve unit

Up to 7 slave group can be managed in cascade

[1] The AVV motor start signal is to be managed for each valve and motor

9.6.4 Working diagram of control devices



M1 BOARD POWER TERMINAL BLOCK
M2 SOLENOID VALVES POWER TERMINAL BLOCK
M3 SOLENOID VALVES CONNECTION

ENR VNR VALVE UNBLOCK SOLENOID VALVE
ERS VSC VALVE UNBLOCK SOLENOID VALVE

ZERO VSC VSC VALVE ZERO SENSOR
TF VNR VALVE FLOW SENSOR
TP1 PRESSURE SENSOR
TT TEMPERATURE SENSOR

MPP STEPPER MOTOR VSC VALVE CONTROL
D-MPP DRIVER STEPPER MOTOR CONTROL DRIVER
RM STEPPER MOTOR CONNECTION RELAY

CN1-5 BOARD SENSORS CONNECTION CONNECTORS
CN6-8 BOARD SIGNAL INPUT CONNECTIONS
CN9-16 BOARD SIGNAL OUTPUT CONNECTIONS
CN20 STEPPER MOTOR CONNECTOR
CAN COMMUNICATION LINE AND SIGNALS CONFIGURATION

EN81-20 DESCENT DOWNWARD COMMAND DEVICES
EN81-20 TRAVEL UPWARD AND DOWNWARD COMMAND DEVICES

10 MAINTENANCE, SPARE PARTS AND TYPE CERTIFICATE

10.1 HEVOS HE valve group maintenance

Observe the following maintenance schedule and periodic checks

	Operation	Installation	Month	Annual	10 years	Activity description
1	SCH001 BOARD ERROR STORAGE	X	2			1. Check the list of errors through the terminal or Wi-Fi device. Using terminal, you need access to read parameters from P600 to P679 indicate that, from newest to oldest, the error code and the machine-time of storing. Via Wi-Fi device, it reads through the access to the specific section of its application. However, it is possible to reset the fault history through command P702.
2	GROUP AND GAUGE SHUT-OFF VALVE		6			Close the shut-off valve (19) and open the manometer shut off valve (11-HE100; 2-HE650). Release all pressure by manually adjusting the knob (17). Check that the level of pressure on the pressure gauge is next to zero (equal to the valve setting 25), then, after one minute, re-open the valve (19)
3	VALVES LEAKAGES	X	2	X		With oil at room temperature close the ball valve (19) and open the manometer shut off valve (2). Verify that the pressure indicated on the pressure gauge does not drop more than 4 bar in 5 minutes.
4	EXTERNAL LEAKAGES	X	2			If there are traces of oil outside the group, check the tightness of the adjustment screws (5, 25, 27) and the vent plug (29). Check also the drain of the seals of the group under the MPP motor.
5	WORKING PRESSURES	X		X		Proceed, after installation, the recognition, up and down, the static and dynamic pressure. Periodically check that the pressure values are unchanged
6	OVERPRESSURE VALVE CALIBRATION	X		X		Execute the maximum pressure test, as shown in the “Operation valve group”, to verify that the calibration value corresponds to that expected. The calibration of the maximum pressure value is determined by the adjustment (5) of the valve group.
7	CONTROL OF MANUAL LOWERING	X		X		Execute a test of the cabin downward displacement and a verification of the minimum operating pressure adjust (25), as provided in the “emergency maneuvers.”
8	HAND PUMP CHECKING	X		X		Execute a test of the cab moving upward and a check of pressure relief valve (27), as provided in the “emergency maneuvers.”
9	MOTOR PROTECTION CHECKING	X	6			The double pressure test allows you to check the integrity of all the entities under normal pressure. Use the hand pump valve group to reach a value gradually double pressure than the static maximum expected in the system.
10	OIL CHECKING	X		X		Check that the oil level with the cabin top floor, is in the tank, above the minimum mark on the dipstick. Make sure the color of the oil is not changed and that it does not present a strange smell.

11	MOTOR PROTECTION CHECKING	X	6			If present, disconnect one of the ends of the motor protection series and verify that the motor protection device is intervened.
12	FILTERS	X		X		Check the filters status of the solenoid valves and of the main tap according to the drawing.
13	FLEXIBLE HOSE	X		X		Check the hose not leaking or deformation on the outside and on the fittings and it is visible the test marking (manufacturer, date and test pressure).
14	FLEXIBLE HOSE REPLACEMENT				X	If not specified by the manufacturer of the hose, necessary to replace, within a period of 10 years from its installation.
15	GROUP REVIEW				X	The revision of the valve unit provides for the replacement of the seals on the valves and filters. After a review performed all the first installation tests.
16	PLATES AND DIAGRAMS	X		X		Verify that the group's identification number plate is in the correct position and legible. Also check the instructions of the emergency maneuvers, the oil plate, the wiring diagrams of the picture and the hydraulic diagram of the control unit.

10.2 Spare parts: solenoid valve filters and shut-off valve

For major servicing on the valves, please, don't open the valve or dismount the stepper motor or sensors, without prior contact and reference to HEVOS Service!

10.2.1 Electronic board

It is possible to change the electronic board if damaged without changing the valve, but each valve model (HE100/ HE250/ HE650) require a specific configuration and settings

ATTENTION: It is not allowed to use an electronic board (even as spare-part) configured for a valve model, on another valve size. This could cause major malfunctions or even safety issues!

In case you have an electronic board for a valve size and you want to replace a damaged one of another valve size, an appropriate board setup procedure has to be performed. Please, contact and refer to HEVOS Service.

10.2.2 HE100 valve group

DRAWING 1 A - filters and solenoid valves

ATTENTION: all filters are normally under pressure!

18 - Flow filter
- code DSG02316200

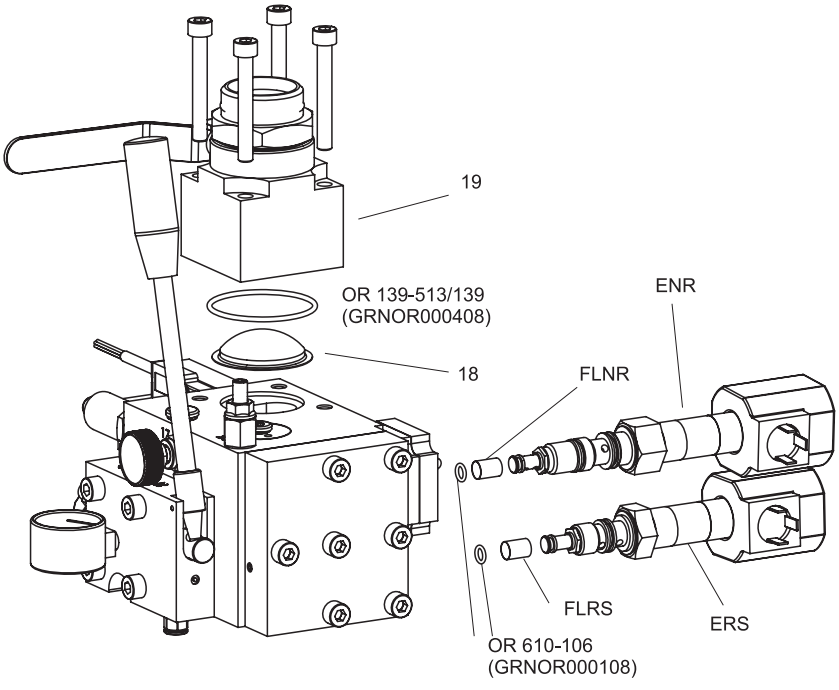
19 - Exclusion shut-off valve unit

OR - 610-106
- code GRNOR000108

FLNR - Solenoid valve ENR filter
- code DSG09903201

FLRS - Solenoid valve ERS filter
- code DSG09903201

OR - 139-513/139
- code GRNOR000408



10.2.3 HE250 valve group

DRAWING 1 B – filters and solenoid valves

ATTENTION: all filters are normally under pressure!

18 - Flow Filter
- code DSG02316200

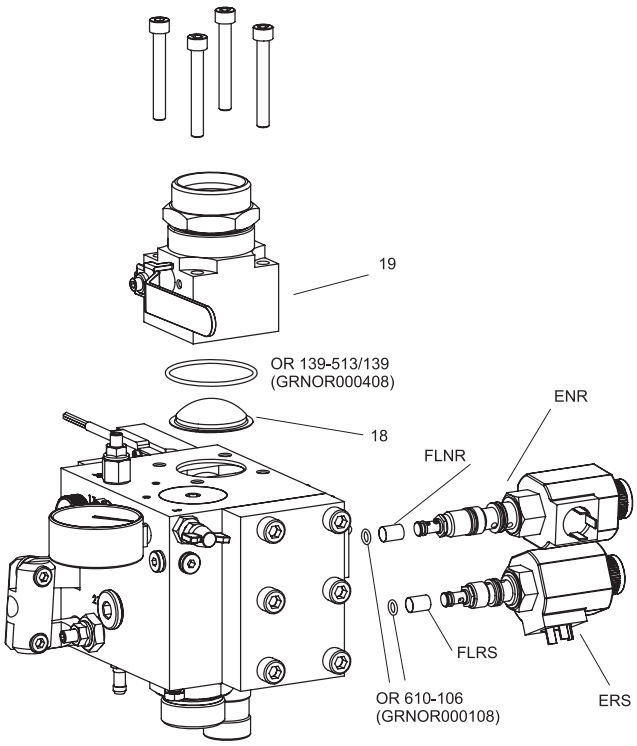
19 - Exclusion tap valve group

OR - 610-106
- code GRNOR000108

FLNR - Solenoid valve ENR filter
- code DSG09903201

FLRS - Solenoid valve ERS filter
- code DSG09903201

OR - 139-513/139
- code GRNOR000408



10.2.4 HE650 valve group

DRAWING 1 C – filters and solenoid valves

ATTENTION: all filters are normally under pressure!

18 - Flow Filter
- code DSG02316200

19 - Exclusion tap valve group

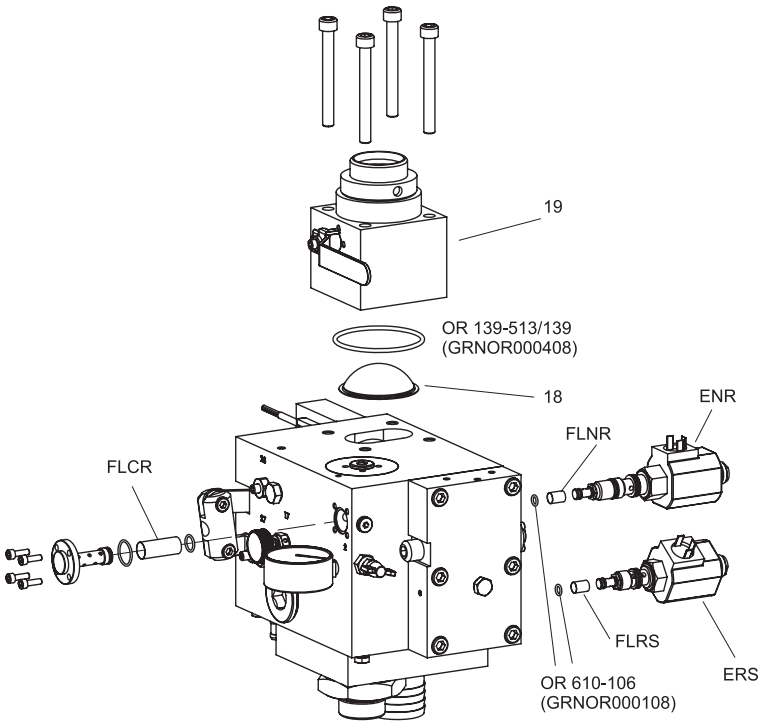
OR - 610-106
- code GRNOR000108

FLNR - Solenoid valve ENR filter
- code DSG09903201

FLRS - Solenoid valve ERS filter
- code DSG09903201

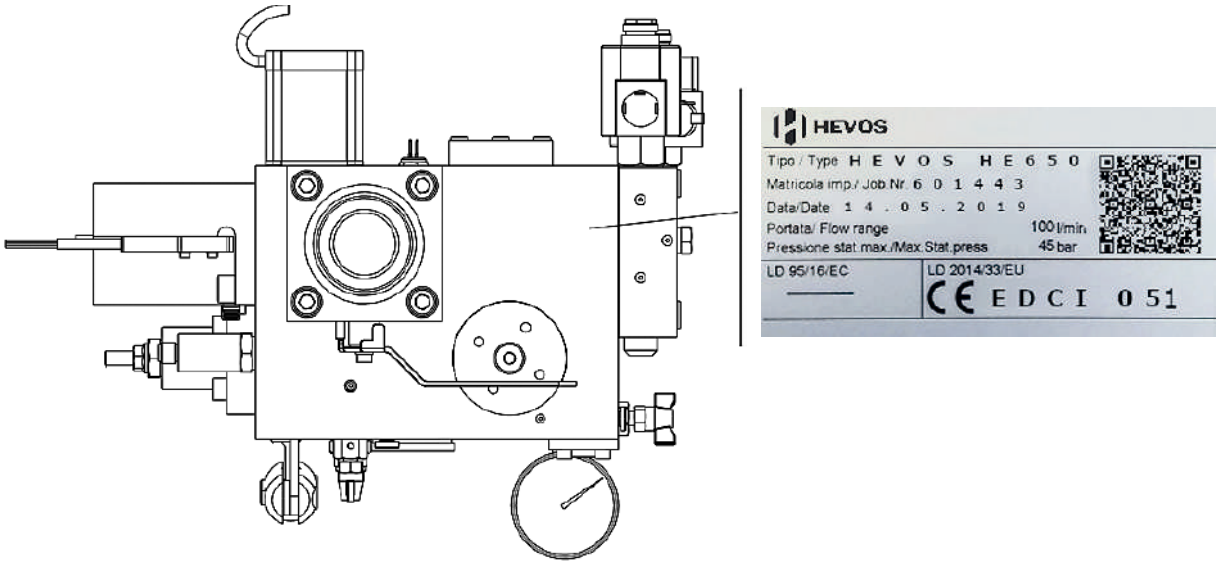
FLCR - Pilot valve ENR circuit filter
- code DSG09903207

OR - 139-513/139
- code GRNOR000408



10.3 Identification and traceability

On the valve group is applied a label showing the name and address of HEVOS company, the serial number, type/model of the valve and the certification data in addition to a QR code.
HEVOS keeps a database containing the list of Customer, Customer Order Reference, serial number which allows traceability with historical sampling archives and manufacture of components.



The QR TAG content is shown in the following table:

Pos.	Field content	type	Max lenght		Sample content
1	Type and component model	CHAR	40		HEVOS HE650
2	Not used	CHAR	2		
3	Not used	CHAR	2		
4	Sales Reference	CHAR	35		ALKO14000
5	Serial number	CHAR	18		801234
6	Not used	CHAR	10		- - -
7	Maker	CHAR	30		HEVOS
8	Postal code	CHAR	10		24121
9	City	CHAR	30		Bergamo (BG)
10	Country code	CHAR	5		IT
11	Not used	CHAR	30		- - -
12	Not used	CHAR	10		- - -
13	Not used	CHAR	30		- - -
14	Not used	CHAR	5		- - -

10.4 EU-TYPE CERTIFICATE (EXAMPLE)

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Italia

CERTIFICATO DI ESAME UE DI TIPO

EU TYPE EXAMINATION CERTIFICATE

Direttiva Ascensori 2014/33/UE, all. IV-A, mod. B
Lift Directive 2014/33/UE, Ann. IV-A, mod. B

Certificato N.: *Certificate No.:*	**EDCI 050**
Nome ed indirizzo del titolare: *Name and Address of the certificate holder:*	HEVOS S.r.l. Via Torquato Tasso 109 24121 Bergamo (BG) Italy
Data della domanda: *Date of submission:*	11/06/2020
Nome ed indirizzo del fabbricante: *Name and address of manufacturer:*	HEVOS S.r.l. Via Torquato Tasso 109 24121 Bergamo (BG) Italy
Prodotto, Tipo: *Product, Type:*	Dispositivo idraulico, parte di un sistema contro il movimento incontrollato della cabina a porte aperte *Hydraulic device, part of a system to prevent uncontrolled movement of the car with open doors* HEVOS HE250 (20-250 l/min)
Norme di riferimento: *Reference rules:*	EN 81-20:2014 EN 81-50:2014
Laboratorio di prova: *Test Laboratory:*	TÜV Italia S.r.l. Via Carducci, 125 20099 - Sesto San Giovanni (MI)
Numero rapporto di prova: *Number of test report:*	BUD200703-01-722229942
Esito *Result*	Il dispositivo esaminato, se collegato a un idoneo dispositivo di individuazione e interruzione e installato e utilizzato secondo le istruzioni del Fabbricante, è conforme alle disposizioni della Direttiva. *The device examined, if connected to an appropriate detection/interruption device, installed and used according to the Manufacturer's instructions, is in compliance with the provisions of the Directive*

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO
PRD N° 081B
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

TÜV Italia Srl Industrie Service 09 48 Notified Body

Luogo, data *Place, date:*
Sesto San Giovanni, 29/08/2020

Alberto Carelli
TUV Italia S.r.l.
Organismo notificato No. 0948
Notified Body, Identification No. 0948

Il presente certificato è valido solo se accompagnato dal pertinente allegato.
This certificate is valid only if accompanied by the pertinent annex.

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