SEV

Servo Electronic Valve

for Hydraulic Elevators

System Information
## Handbook
No. SEV05-01

CSA ®B44.1
C   US
ASME-A17.1

ISO 9001

CE | TÜV NORD

Caution

Only experienced and qualified elevator mechanics are permitted to install and adjust elevator control valves and controllers.

Every Blain control valve is subjected to strict quality standards from production, adjustment and testing, to final shipment.

In case of questions this handbook will provide assistance. Should there nevertheless be remaining problems please contact our technical department, stating the P-number, which is engraved in the SEV casting.

Technical Servicing

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The SEV Servo Electronic Valve is being supplied to a limited number of customers on condition that the customer is familiar with and understands the SEV handbook describing the installation and operation of the SEV and has the facility to transfer to Blain, Germany through modem, the on-line or stored data of the specific installation, should servicing be necessary.

Contents

SEV Card

PC Control and Monitoring

Charts

S E V

Description

The Blain Servo Electronic Valve (SEV) is controlled by closed loop digital electronics, providing consistent acceleration and deceleration of hydraulic elevators largely independent of load and oil temperature. An electronic card regulates the performance of the car via variable-flow solenoid valves. The elevator operation can be monitored, recorded and adjusted by a laptop computer either on site or remotely through the modem connection. Optionaly, the electronic card can be used to change data. Additional intermediate speeds for maintenance runs can also be programmed.

SEV Technical Data	Metrisch	USA
Flow Range 1":	40 - 180 lpm	10 - 48 gpm
Flow Range 1½":	181 - 430 lpm	47 - 114 gpm
Flow Range 2":	431 - 580 lpm	115 - 153 gpm
Flow Range 2½":	<12 bar - 1000 lpm / >12 bar - 1200 lpm	<170 psi - 260 gpm / >170 psi - 317 gpm
Pressure Range 1" - 2":	9 - 70 bar	130 - 1000 psi
Pressure Range 2½":	9 - 47 bar	130 - 675 psi
Burst Pressure 1" - 2":	400 bar	5750 psi
Burst Pressure 2½":	240 bar	3400 psi
Electr. Card Supply:	24 V DC 2 A	
Electr. Card Weight:	0,5 kg	1.1 lbs

Oil Viscosity: 25-60 cSt. at 40°C (104°F).   Max. Oil Temperature: 70°C (158°F)
Operation oil temperature range: 10°C-60°C (50°F-140°F), for oil VGA46: 250cSt.-20 cSt.
Optimal oil temperature range: 25°C-55°C (77°F-131°F), for oil VGA46: 100cSt.-24 cSt.
Ambient temperature range: 0°C-70°C (32°F-158°F)

SEV 1"

133/5,24"
123/4,84"
215/8,46"
203,5/8,01"
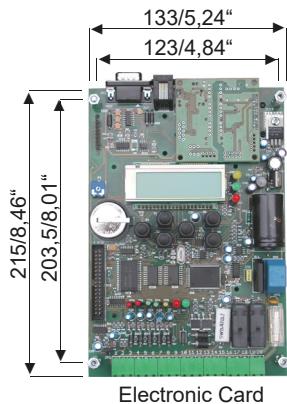
Electronic Card

SEV 1 ½" - 2"

SEV Valve Dimensions
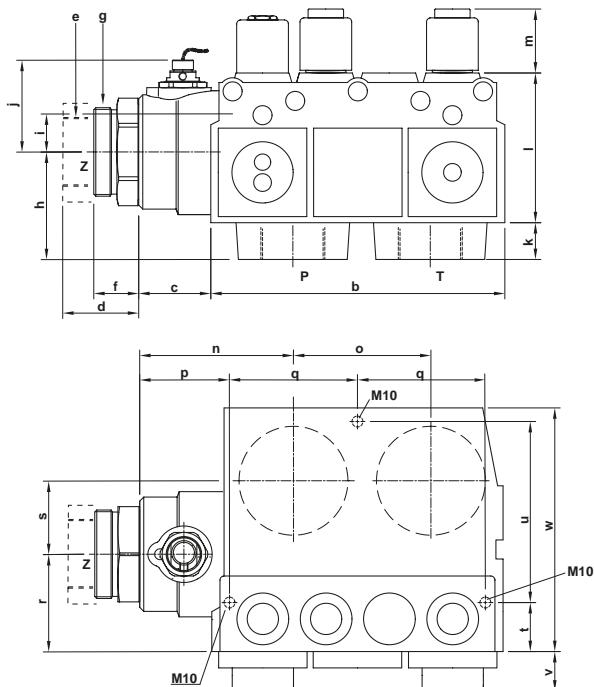
SEV with BV Ball Valve
Standard

BV 1"

BV 1½" - 2" - 2½"
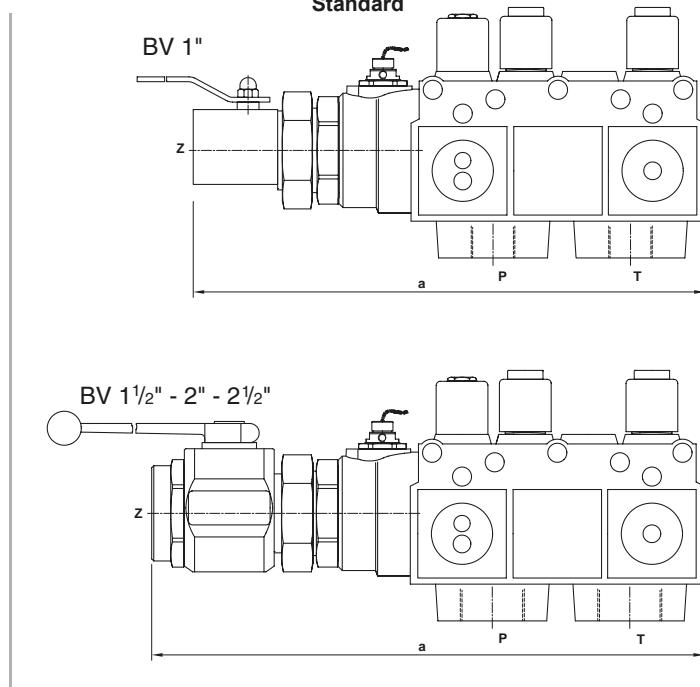
SEV		a	b	c	d*	e*	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	Weight / Gewicht SEV	BV
1"	mm	376	216	53			33	M 65x2	79	28	67,5	27	110	47	113	101	66	94	71,5	54	36	133	29	179	11 kg	1,7 kg
	inch	14,8	8,5	2,1			1,3		3,1	1,1	2,66	1,06	4,33	1,85	4,45	4,0	2,6	3,7	2,8	2,13	1,42	5,24	1,14	7,0	24 lbs	3,7 lbs
1 ½"	mm	406	216	53			33	M 65x2	79	28	67,5	27	110	47	113	101	66	94	71,5	54	36	133	29	179	11 kg	2,5 kg
	inch	16	8,5	2,1			1,3		3,1	1,1	2,66	1,06	4,33	1,85	4,45	4,0	2,6	3,7	2,8	2,13	1,42	5,24	1,14	7,0	24 lbs	5,5 lbs
2"	mm	406	216	53	55	G / NPT 2"	33	M 78x2	79	28	67,5	27	110	47	113	101	66	94	71,5	54	36	133	29	179	11 kg	2,5 kg
	inch	16	8,5	2,1	2,17		1,3		3,1	1,1	2,66	1,06	4,33	1,85	4,45	4,0	2,6	3,7	2,8	2,13	1,42	5,24	1,14	7,0	24 lbs	5,5 lbs
2 ½"	mm	558	278	86	78	G / NPT 2 ½"	55	M 78x2	103	37,5	88	37	139	47	159	130	115	105	75	65	34	151	29	198	16 kg	5 kg
	inch	21,97	10,94	3,39	3,07		2,17		4,06	1,48	3,46	1,46	5,47	1,85	6,26	5,12	4,53	4,13	2,95	2,56	1,34	5,94	1,14	7,8	35 lbs	16 lbs

* Standard measurements - variations possible.

S E V

Valve Cross Section

EN ISO 9001

Pilot Pressure Chambers
UC Bypass Pilot Chamber
XC Down Valve Pilot Chamber
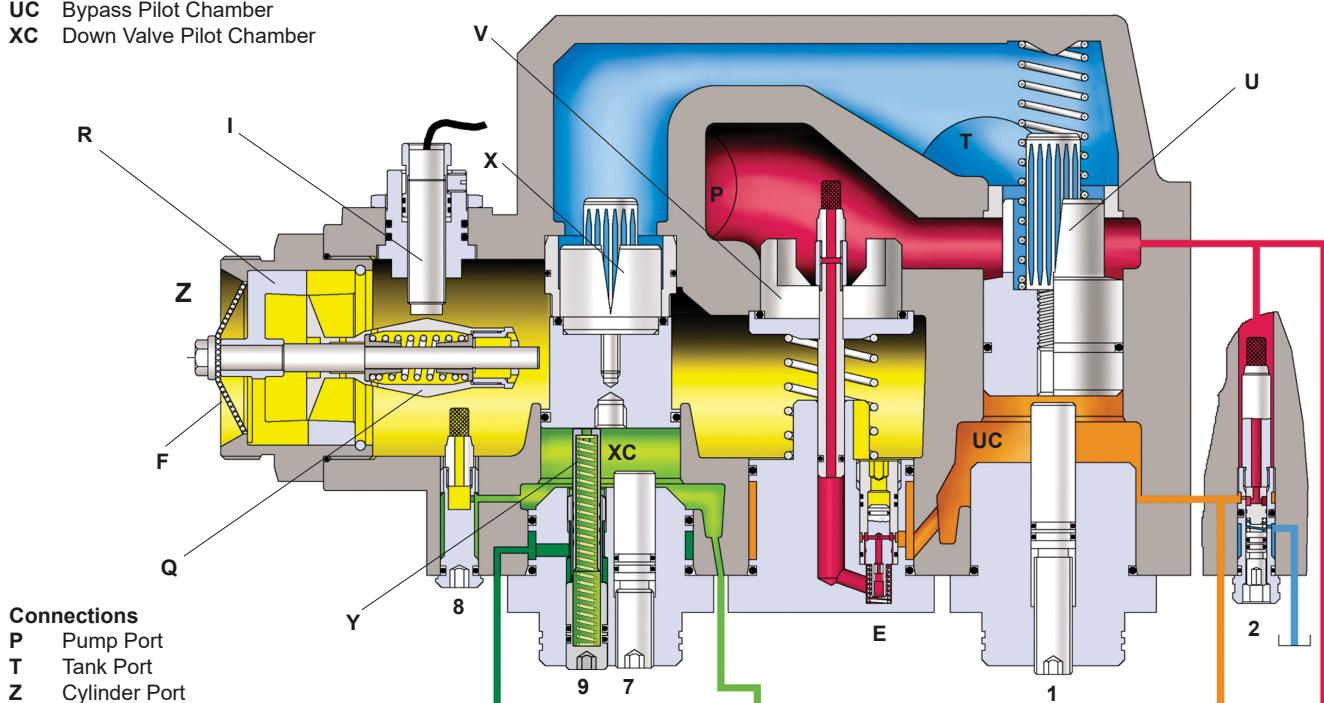
Connections
P Pump Port
T Tank Port
Z Cylinder Port

Pressures
Pump
Servo Up Pilot Pressure
Tank
Cylinder
Servo Down Pilot Pressure
Emergency Down

Horizontal Sections

Vertical Section
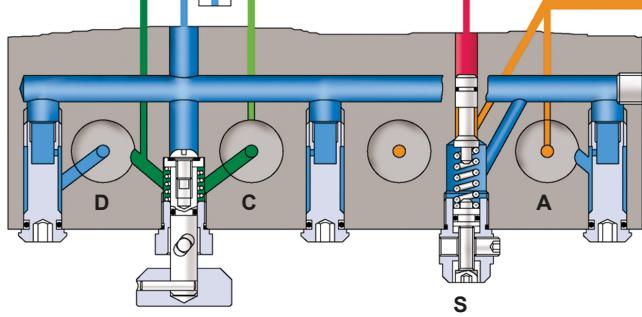
Control Elements
A Solenoid Up
C Solenoid Down
D Solenoid Down Stop
E Early-Start Valve
F Servo Filter
H Manual Lowering
I Flow Sensor
Q Flow Spool (patented)
R Flow Ring
S Relief Valve
U By Pass Valve
V Check Valve
X Down Valve
Y Emergency Down Valve
2 Pilot Orifice Up
8 Pilot Orifice Down

Adjustments UP
1 Bypass
AT Up Trim (page 16)

Adjustments DOWN
7 Full Speed Limit
9 Emergency Down Speed
CT Down Trim (page 16)

S E V   Hydraulic Circuit

See valve cross section (page 4)
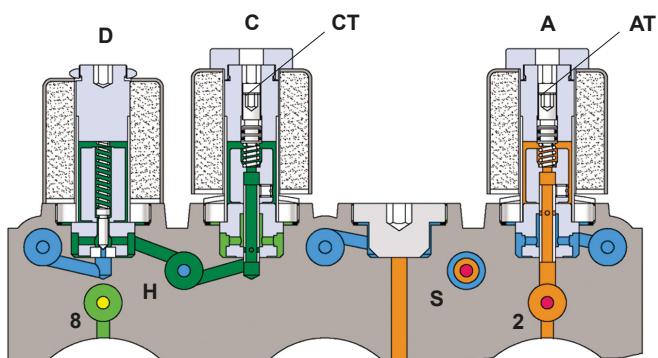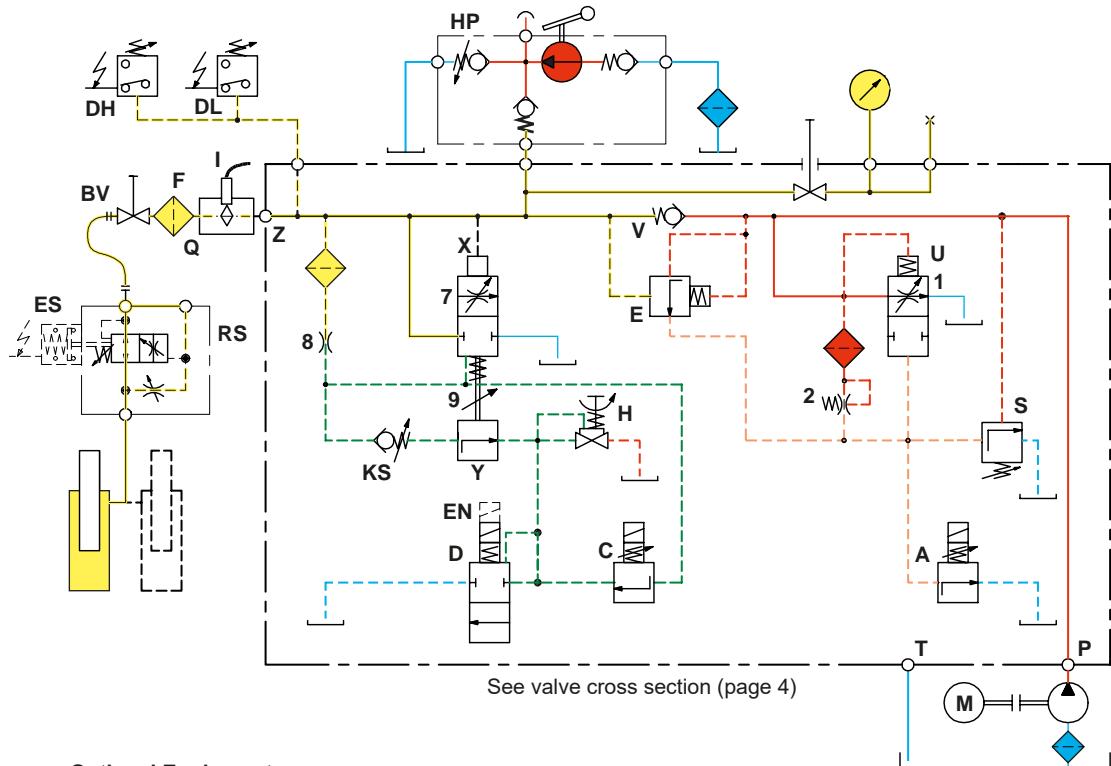
Optional Equipment

E N	Emergency Power Solenoid	**RS**	Pipe Rupture Valve
KS	Slack Rope Valve	**ES**	Pipe Rupture Valve Switch
BV	Main Shut-Off Valve	**D H**	High Pressure Switch
HP	Hand Pump	**DL**	Low Pressure Switch
M	Motor		

Valve Operation

Up Operation

With an UP signal, the pump motor is energised simultaneously with the start of the electronic card UP program. Oil flows through orifice **2** into the bypass pilot chamber **UC**. Solenoid **A** (normally open) is energised from the card and partially closes, reducing the volume of pilot oil flowing out from the bypass pilot chamber.

The bypass spool **U** (normally open), begins to close as pressure increases in the bypass pilot chamber. As the bypass valve **U** closes, the check valve **V** begins to open as a steadily increasing volume of oil flows into the elevator cylinder, displacing the flow spool **Q**.

The inductive flow sensor **I**, measures the increasing displacement of the flow spool. This value is compared in the card with the target flow value, which prescribes the acceleration, full speed, deceleration and levelling speed of the car.

Correction of the measured flow rate is made by varying the power from the card to solenoid **A**, controlling the position of the bypass valve through pilot pressure in chamber **UC**.

The comparison and correction of the measured flow to target flow values, continue throughout the complete UP operation of the elevator.

Down Operation   (Caution: Voltage at solenoid D comes directly from the elevator controller, not from the SEV card)

With a DOWN signal, solenoid **D** (normally closed), is energised and opens, whilst simultaneously the electronic card DOWN program is started. Solenoid **C**, (normally closed) is energised from the card and partially opens, allowing oil entering through fixed orifice **8**, to escape from the down valve pilot chamber **XC**, through solenoid valve **D**, which is fully open, back to tank.

The down valve **X** (normally closed), begins to open as pressure decreases in the down valve pilot chamber. As the down valve opens, a steadily increasing volume of oil flows from the elevator cylinder into the tank, displacing the flow spool **Q.**

The inductive sensor **I** measures the increasing displacement of the flow spool, this value being compared in the card with the set value of target flow. Correction of the measured flow rate is made by variation of power from the card to the solenoid **C**, controlling the position of the down valve through pilot pressure in chamber **XC**.

The comparison and correction of the measured flow to target flow values, continue throughout the complete DOWN operation of the elevator.

Inspection Speeds

Besides full speed and levelling speed, optional inspection (middle) speeds are included in the electronic card software. Up and down inspection speeds can be independently adjusted in the range of 0.05 to 0.60 m/s.

Only experienced and qualified technicians may install elevator control equipment.

Check the following:

1) The flow lpm on the dataplate of the valve complies with the flow rate of the pump (±10 %).
2) The minimum and maximum static pressures on the valve dataplate agree with those of the elevator (±10 %).
3) The electrical supply to the SEV card is 24 VDC / 18 VAC and 50 VA.
4) The star delta timer is set to between 0,3 and 0,4 secs.
5) The flow Ring R, Bypass Valve U and Down Valve X are correct using Chart A at rear of the handbook.
6) The flow sensor is adjusted between 4,8 and 5,3 mA (see page 16).

Installation of the SEV Valve onto the Power Unit

For a compact and time saving installation as well as easier servicing and protection of the flow meter, cylinder connection **Z** of the SEV is fitted with the Blain Ball valve G1", 1 1/2", 2" or 2 1/2".

Installation of the SEV Card into the Controller

The SEV Card can be connected into any standard type hydraulic elevator controller.
The power to solenoid valves A and C is supplied from the card. Power to solenoid **D** is directly from the main controller.
Page 8, shows the detailed wiring diagram for connecting the SEV card to the elevator controller.

Installation of Deceleration Switches in the Elevator Shaft

Slow-down (deceleration) and stop switches should be set according to the following recommendations.

Recommended Switch Positions and Levelling Speeds

Metric

Travel speed	Decel.switch before floor	Levelling speeds	Stop switch before floor
m/sec	cm	cm/sec	cm
0,3	25	6	1,0
0,4	45	6	1,0
0,5	60	6	1,0
0,6	75	6	1,0
0,7	95	7	1,5
0,8	110	7	1,5
0,9	130	8	2,0
1,0	145	8	2,0

USA

Travel speed	Decel.switch before floor	Levelling speeds	Stop switch before floor
ft/min	inches	ft/min	inches
60	10	12	0,4
80	17	12	0,4
100	24	12	0,4
120	30	12	0,4
140	37	14	0,6
160	43	14	0,6
180	51	16	0,8
200	57	16	0,8

Depending on customers priorities, for travelling time or stopping accuracy, the recommended values for levelling speeds may be modified, i.e   For faster floor to floor times; faster levelling speeds,
For more accurate floor stops; slower levelling speeds.

Installation of Modem connection (optional)

To take advantage of remote monitoring of the elevator operation, the corresponding telephone modem connection to the card must be installed (see page 30).

S E V

Wiring of Electronic Card

EN ISO 9001

Elevator Controller

Laptop Modem

SEV Card

Display contrast

Power for D coil

24V = alternative

10

L9
L8
L7
L6
L5
L4
L3

L0
L1
L2

Card Internal Relay (page 15)

S1b S1a S2 S3 S4 S5

4   5   6   7   8

R1

brown
black
blue

+
24V=18V~
-

Power supply (external)
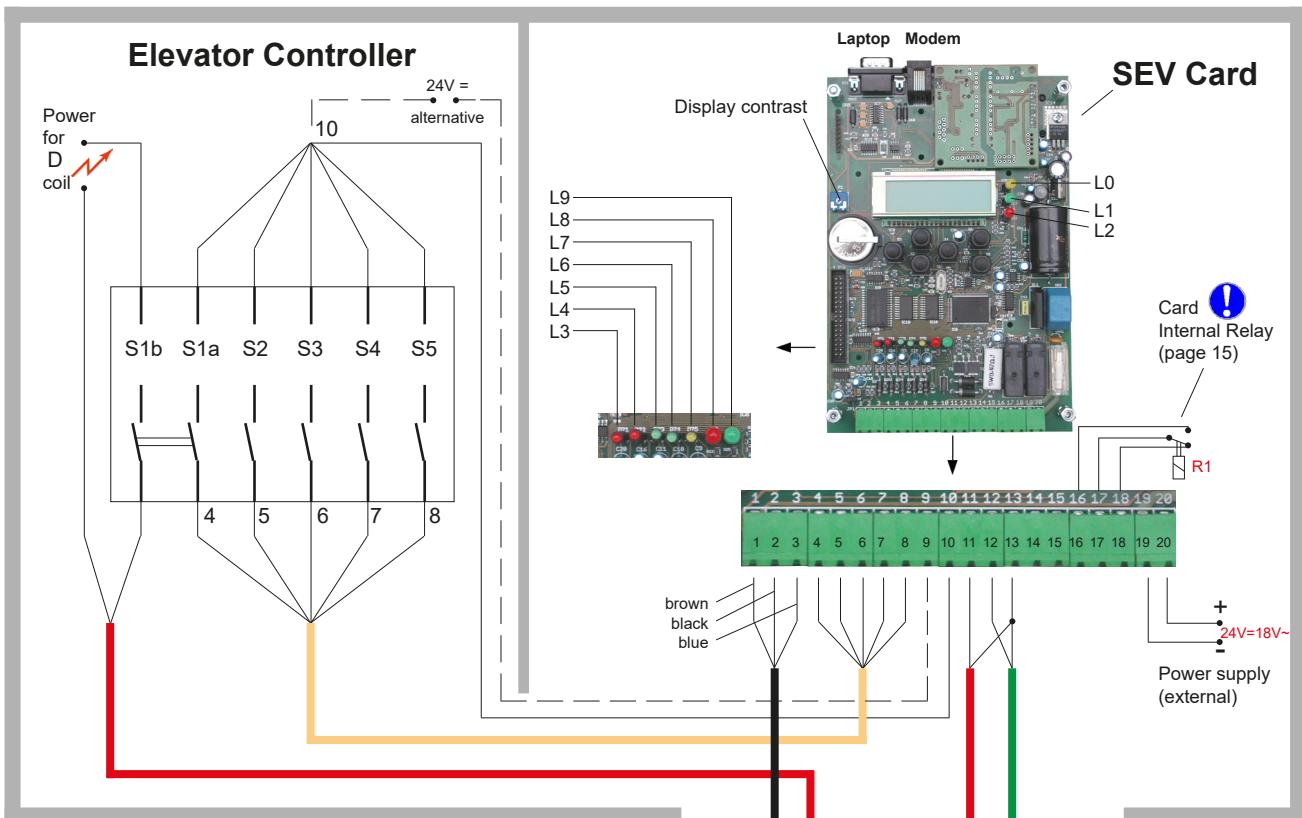
Optional Voltages for D-Coil; **DC**: 12V, 24V, 42V, 48V, 80V, 110V, 196V
AC: 24V, 42V, 110V, 230V

Connections

Laptop/PC - Connection (RS232 - Laplink)
Modem - Connection (RJ12)

√ PIN 1   Sensor (+), brown wire
√ PIN 2   Sensor (signal), black wire
√ PIN 3   Sensor (-), blue wire
√ PIN 4   Switch: Down Levelling (S1a)
√ PIN 5   Switch: Down Full Speed (S2)
√ PIN 6   Switch: Up Full Speed (S3)
√ PIN 7   Switch: Up Levelling (S4)
√ PIN 8   Switch: Inspection (S5)
  PIN 9   Ground for alternative supply
√ PIN 10   +24 VDC Supply output (**NO** input)
√ PIN 11   Down Coil (+)
√ PIN 12   Up Coil (+)
√ PIN 13   Coils common(-)
  PIN 14   not used
  PIN 15   not used
* PIN 16   Relais 1 Internal Fault (n.o.)
  PIN 17   Relais 1 Internal Fault common
* PIN 18   Relais 1 Internal Fault (n.c.)
√ PIN 19   Supply Voltage Ground
√ PIN 20   Supply Voltage 24VDC/18VAC

√ Connections to be made by customer

* 16   closed if OK - open if fault
* 18   open if OK - closed if fault

Controller Relays

S 1a : Down Levelling (D)
S 1b : Down Levelling (D)
S 2 : Down Full Speed (C)
S 3 : Up Full Speed (B)
S 4 : UP Levelling (A)
S 5 : Inspection

Indicators

L0 : Power
L1 : Processor
L2 : Error
L3 : Down Levelling (D) active
L4 : Down Full Speed (C) active
L5 : Up Full Speed (B) active
L6 : UP Levelling (A) active
L7 : Inspection active
L8 : Solenoid (C) active
L9 : Solenoid (A) active
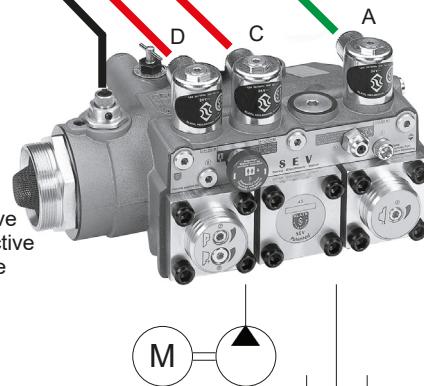
R 1 : Internal Fault Relay (see page 18)
A   : Solenoid (A)
C   : Solenoid (C)
D   : Solenoid (D)

D   C   A

M

Solenoid C Solenoid D
S2 S5 S1a S1b

Inspection
Inspection
Inspection

Motor

S5 S4 S3
Solenoid A
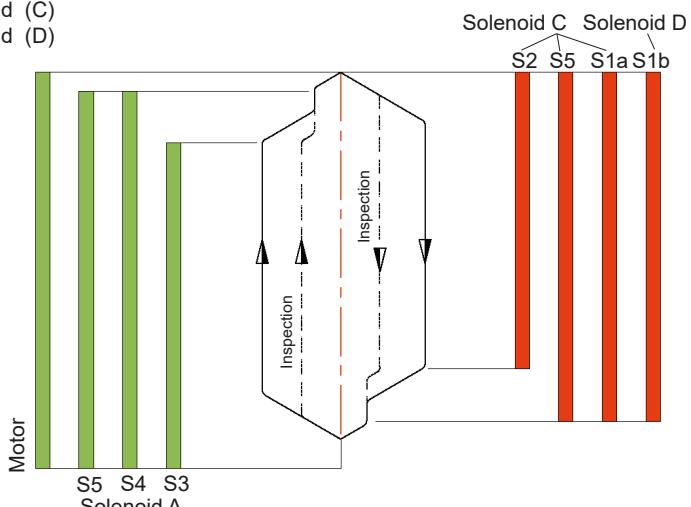
Electrical Travel Sequence:

Inspection; Up Travel: S3 + S4 + S5 (Serving Solenoid A)
Down Travel: S1 + S2 + S5 (Serving Solenoid C)

S E V

SEV Card Description

After the SEV valve and the card have been correctly installed and the shaft switches positioned as recommended, turn on the electrical power to the card, 24 VDC (50VA). Alternatively, 18VAC may be used as supply power.

The yellow and the green LEDs next to the display will illuminate and the display will alternate between "System standby" and the "Software version" which is presently on the card (see page 11).

The SEV Card

The laptop/PC connection (com port RS232) and the telephone line connection (RJ12)

System Resting
--- system OK --

The illuminated display communi-cates online data of the elevator.

| 12:00:00 | 01/01/06 |
| System standby |
| - all right - |

The four button group is for selecting the menu and for changing data.

The yellow LED will illuminate if the card has power.

The green LED will illuminate if the processor is ready.

The Error LED will illuminate if an error has occurred. (see page 14)

The Escape button is to exit a menu within the program, or to reset after an error status.

Two of the input LEDs will illuminate when a call signal - full speed - is received from the elevator controller. For relevelling or levelling just one LED will illuminate.

The Enter button is to confirm new data that has been entered into the SEV program.

One of the output LEDs will illuminate to show which solenoid (C or A) is energised.

The card should receive either an up call (full speed or levelling) or a down call (full speed or levelling) at a time, otherwise it goes into an error mode, so that the elevator cannot start.

To check whether the input signals from the elevator controller are correctly set, observe the illuminated LEDs on the card.
If no output LED is on, no power will be sent to the solenoid.

up full speed

up levelling speed

down full speed

down levelling speed
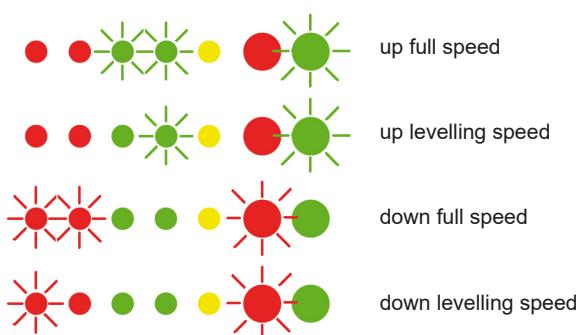
In case, the elevator travels at inspection speed, the yellow LED goes on additionally.

S E V

Initial Operations

The SEV valve is already factory adjusted and tested according to customers technical data. Unless pressure and flow-rate ranges are modified the user may not need to perform any of the following initial operations.

Initial Operations

Once installed correctly by the customer, the system is ready for operation.

1. UP

When an up call is given, the car may delay a few seconds whilst the pilot pressure chamber **UC** fills with oil.

Adjustment 1 - Bypass
With: - no load in the car
     - disconnect the SEV card (no power to coil A)
     - turn the pump on
Turn adjustment **1** 'in' until the car barely moves, then half a turn 'out' so that the car stands.

Adjustment S - Relief Valve
With: - connect the SEV card
     - close the ball valve on the SEV valve cylinder outlet and open the manual lowering briefly to release pressure
     - place an up call
The pressure gauge will reach and remain at the relief pressure setting. If an adjustment of the relief valve is necessary loose the side lock screw and make the adjustment. For each 1/4 turn of the relief valve screw, the pressure setting changes by approx. 6 bar (90 psi).
Open the manual lowering briefly and place a second up call. Observe the new relief pressure setting. Repeat the procedure as necessary. Finally, tighten the side lock screw on the relief valve.

H Manual Lowering
S Relief Valve
2 Adjusted and factory sealed
1 Bypass
7 Down Fast Speed Limit
9 Manual lowering speed adjustment
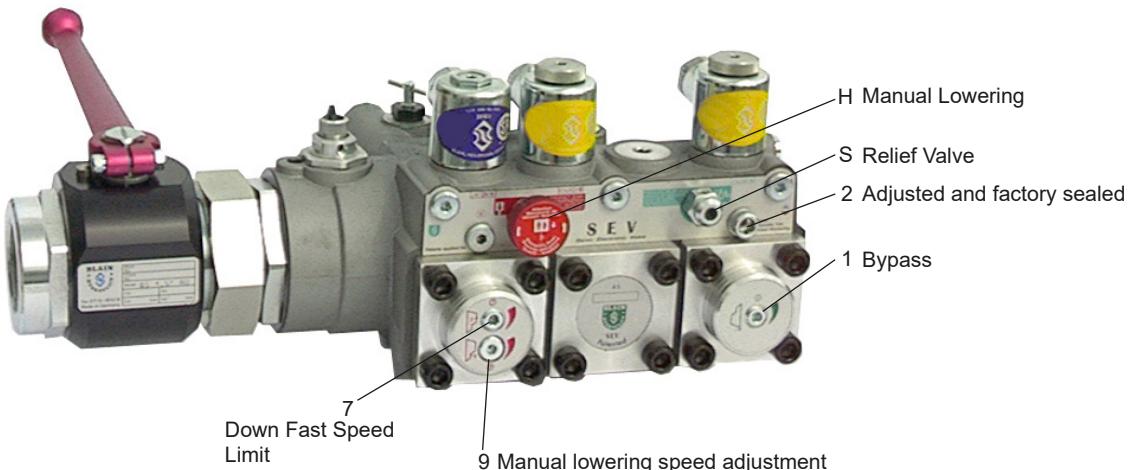
2. DOWN

Adjustment 7 - Down Fast Speed Limit
In case the technical data programmed into the card was not correct, to avoid a possible overspeed of the car on the initial down run, with no load in the car, screw adjustment 7 all the way in (clockwise), then 4 turns back out. This will ensure a maximum down speed lower than the contract down speed. Back out No **7** one turn on the following each down run until contract speed is reached.
For fine tuning, as the elevator reaches the full speed, No **7** can be turned in until the vibration of the down valve is felt, then turn No **7** half a turn out.

Adjustment 9 - Emergency Down Speed
With: - no load in the car
     - turn No **9** in until it is 5mm away from the flange face
     - open the manual lowering **H**
Turn No **9** out until the speed of 3cm/s (6 ft/m) is reached.
The elevator travels at the speed of adjustment No **9** as the manual lowering knob is opened or when the **D** coil is energised.
Setting of the levelling speed should be between 5 and 7 cm/sec (10 and 14 ft/min).

🛈 Adjustment **9** is the lowest speed, that can be controlled by the electronic card therefore, it should be adjusted lower than the levelling speed.

S E V

SEV Card

Access to the card

Card Display

BLAIN
BLAIN
HYDRAULICS
SEV-Card X.XX

12:00:00   01/01/08
System standby
- all right -

Enter Password
_ _ _ _
ESC=No   ENTER=Ok

Esc   **Enter**

To gain access to the menu press **Enter** and input the following code: 1111 (factory setting)

Enter

Menu Display

↕ MAIN MENU
▷ Language
Speed teach
Travel data

Device Data
Log book
System clock
Trim
Settings

to change position use
up and down buttons

To cancel or to go back to the previous menu press **Esc** button.

To confirm press **Enter** button.

Shows the present curser position.

Select Language

Menü Display

↕ MAIN MENU
▷ Language
Speed teach
Travel data

Device Data
Log book
System clock
Trim
Settings

Enter

Esc

↕ Language
ENGLISH
ESC=No   ENTER=Yes

↕ Language
DEUTSCH
ESC=No   ENTER=Yes

Enter

Enter

save
changes?
Yes = ENTER

to select language use
up and down buttons

Enter

The selected language will be accepted.

Esc

The selected language will not be taken .
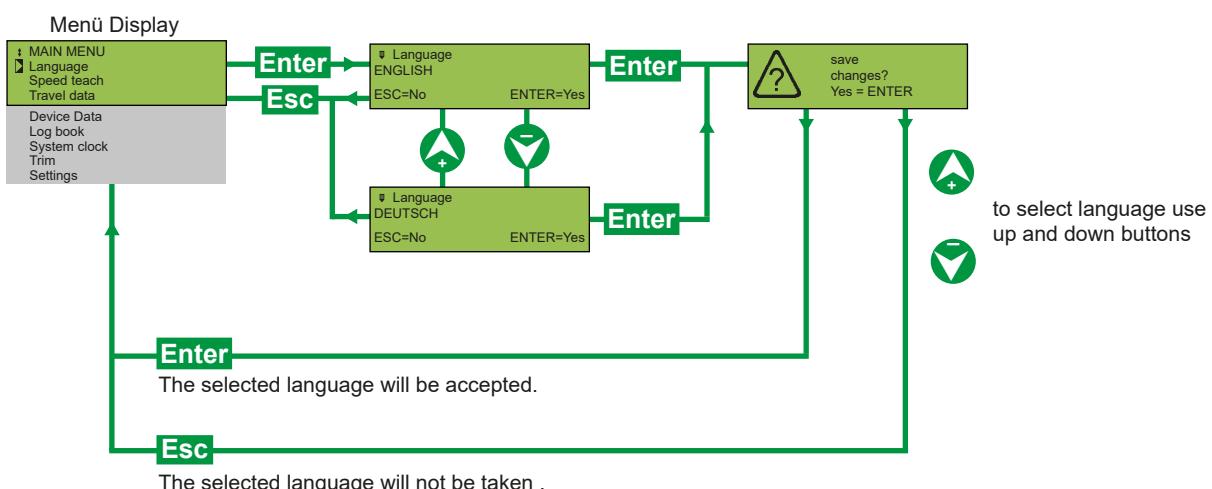
S E V

Changing Speeds
(factory adjusted and tested)

During a change of travel parameters, persons should not travel in the elevator until satisfactory operation is assured.

Menu Display

Travel param. display

```
↕ MAIN MENU
▶ Language
  Speed teach
▶ Travel data
  Device Data
  Log book
  System clock
  Trim
  Settings
```

Enter

```
↕ TRAVEL DATA
▶ Up Travel
  Down Travel
  Inspection speed
  Dither adjustment
  Gain
  Load factory sett.
```

or
or
or
or
or
or

to change position use up and down buttons

Esc
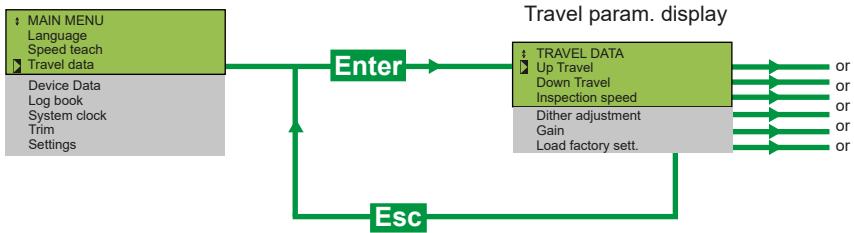
Changing up, down and inspection speeds
(assuming cylinder-pump data is correct, page 15)

Travel param. display

```
↕ TRAVEL DATA
▶ Up Travel
  Down Travel
  Inspection speed
  Dither adjustment
  Gain
  Load factory sett.
```

Enter

Enter   **Esc**   **Esc**

```
⚠
  Save
  Changes..?
  No        Yes
```

```
▶ INSPECTION SPEED
▶ Insp. up    0,30 m/s
  Insp. dw    0,30 m/s
```

Enter

or or

```
↕ DOWN TRAVEL
▶ Accel. time    2.5 s
  Fast speed   0.50 m/s
  Decel. time    2.5 s
  Slow speed  0.05 m/s
```

②

Enter

or or or or

```
↕ UP TRAVEL
▶ Accel. time    2.5 s
  Fast speed   0.50 m/s
  Decel. time    2.5 s
  Slow speed  0.05 m/s
  Stop           60%
```

①

Enter

or or or or or

Example

```
⇪ Accel. time        [s]
▶ 2.5            Apply
  Range:        1.0..7.9
  ESC=No  ENTER= App.
```

Enter

Enter

Esc

---

① Up maximum speed limited by pump output.

② Down maximum speed limited by down flow guide **X** and/or flow ring **R**.

Acceleration Time: Is the time taken for the elevator to reach approximately 90% of fast speed.

Deceleration Time: Is the time taken for the elevator to reduce 90% of the fast speed.

Recommended acceleration and deceleration times are 2.5 s.

Leveling (Slow Speed)

Initially, slow speeds can be set to approximately 1/10 of the fast speed.

Set higher slow speeds for quicker floor to floor times. Set lower slow speeds for more accurate stops.

Slow speed however should not normally be less than 0,05 m/s (10 ft/min).

Up Soft Stop

Soft Stop should normally be set between 60-70%.
100% produces a hard stop, 30% produces a very soft stop.

Inspection Speeds if employed, can be changed. Their accelerations and decelerations however are the same as with up and down full speed. It is also possibel to use the inspection speed as a third elevator speed.

**How to change accel. time**
from 2.5 s to 1.8 s

```
⇪ Accel. time        [s]
▶ 2.5            Apply
  Range:        1.0..7.9
  ESC = No  ENTER = App.
```

Cursor position

1 time

```
⇪ Accel. time        [s]
▶ 1.5            Apply
  Range:        1.0..7.9
  ESC = No  ENTER = App.
```

Move the Cursor right

```
⇪ Accel. time        [s]
  1.5            Apply
  Range:        1.0..7.9
  ESC = No  ENTER = App.
```

3 times

```
⇪ Accel. time        [s]
  1.8            Apply
  Range:        1.0..7.9
  ESC = No  ENTER = App.
```

Enter   To confirm

S E V
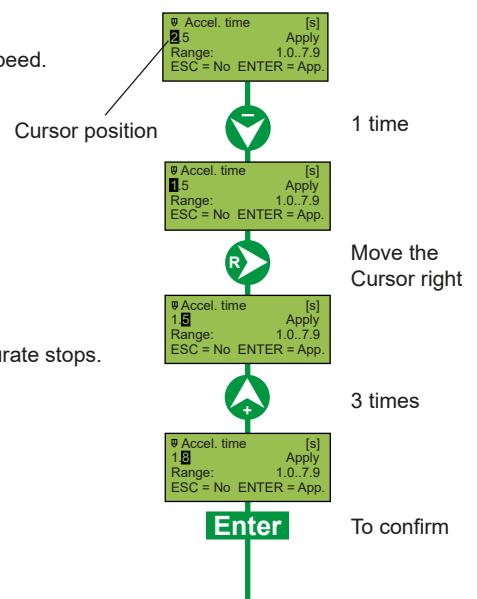
Changing Gain Values, Dither Values and Reset
(factory adjusted and tested)

Dither Values

Dither valve could be adjusted between 200 and 550 in order to prevent stiction friction of the valve elemets

Travel param. display



```
TRAVEL DATA
Up Travel
Down Travel
Inspection
Dither adjustment
Gain
Load factory sett.
```

Enter

```
DITHER ADJUSTMENT
Dither ampl. up        450
Dither ampl. down      350
```

Enter   **Enter**

Esc   **Esc**   **Esc**

Esc

```
Dither ampl. up    [ ]
0450            Apply
Range          0..999
ESC = No  ENTER = App.
```

```
Dither ampl. down  [ ]
0350            Apply
Range          0..999
ESC = No  ENTER = App.
```

Enter   **Esc**

```
Save
Changes..?
No        Yes
```
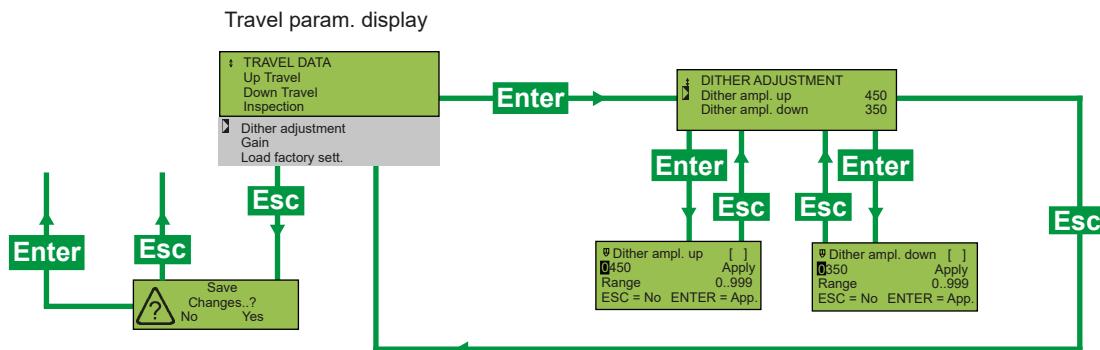
Gain Values

Influence closed loop performance. Gain is normally between 5 (weaker response) and 10 (stronger response).

Travel param. display

```
TRAVEL DATA
Up Travel
Down Travel
Inspection
Dither adjustment
Gain
Load factory sett.
```

Enter

```
GAIN
Gain up            8
Gain down          8
```

Enter   **Enter**

Esc   **Esc**   **Esc**

Esc

```
Gain up          [ ]
08              Apply
Range            1..16
ESC = No  ENTER = App.
```

```
Gain down        [ ]
07              Apply
Range            1..16
ESC = No  ENTER = App.
```

Enter   **Esc**

```
Save
Changes..?
No        Yes
```
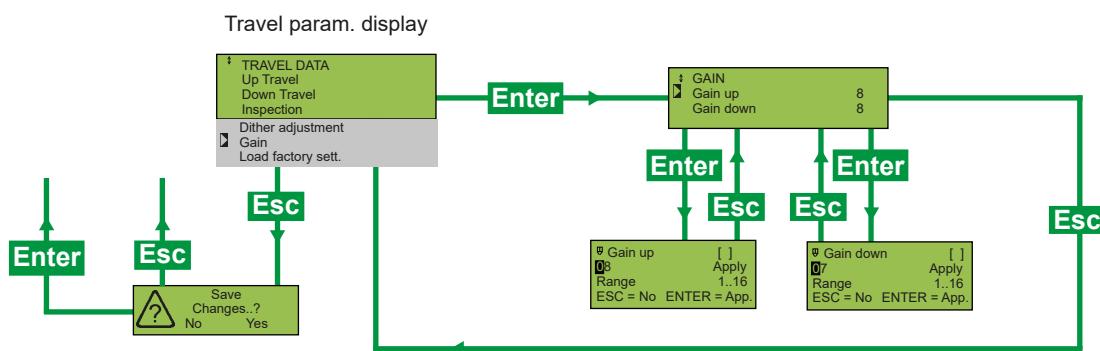
(Reset) Load factory setting

Returns all travel parameters to factory set values.

Travel param. display

```
TRAVEL DATA
Up Travel
Down Travel
Inspection
Dither adjustment
Gain
Load factory sett.
```

Enter

```
EXECUTE?
No        Yes
```

Esc   **Enter**

The changes will not be taken .

Enter   **Esc**

```
Save
Changes..?
No        Yes
```

All values will be set to factory settings .
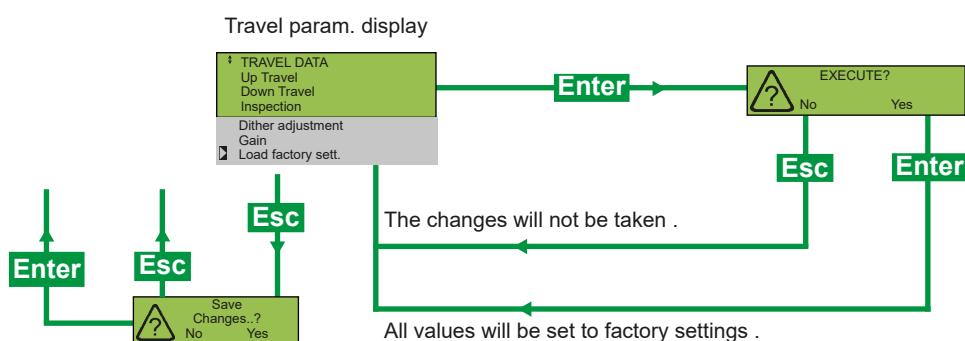
# Teach Speed
(factory adjusted and tested)

Some factors which can not be influenced, e.g. variations in flow meter or sensor tolerances, may result in differences between the programmed speed and the actual speed of the car. These differences can be eliminated by calibrating.
A tachometer will be necessary for calibration.
After changing of the sensor or the SEV-Card, the system is to be calibrated again.

Full speed

In order to calibrate the full-speed, the elevator must carry out a complete trip, i.e. the status of the slow speed must be reached.
Because the calibration always takes place for the last ridden direction of the elevator, the teach speed procedure is executed directly after the trip.
Procedure: Perform a complete run -> observe the maximum full speed reached -> input the observed speed into the card
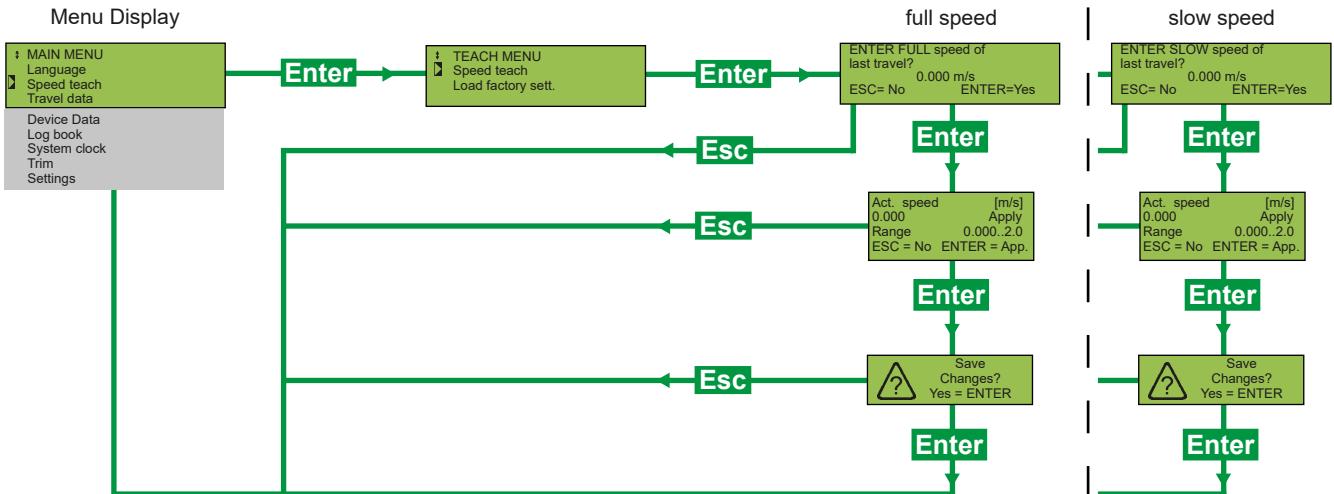
In case that the car speed does not agree with the indicated speed on the card, a repetition of the calibrating process can be necessary.

Levelling speed

In order to calibrate the levelling speed, the elevator has to travel only with levelling speed into the direction of calibration.
**NO full-trip should be driven**. After the trip, proceed like described at full speed.
Procedure: Perform a levelling run -> observe the levelling speed of the last 3s-> input the observed speed into the card
To run at levelling speed: In up direction disconnect the input 6 on the card.
                             In down direction disconnect the input 5 on the card.

No complete trip

To calibrate full speeed, the elevator should carry out a complete trip. When there has been no travel performed, the following message appears on the display:
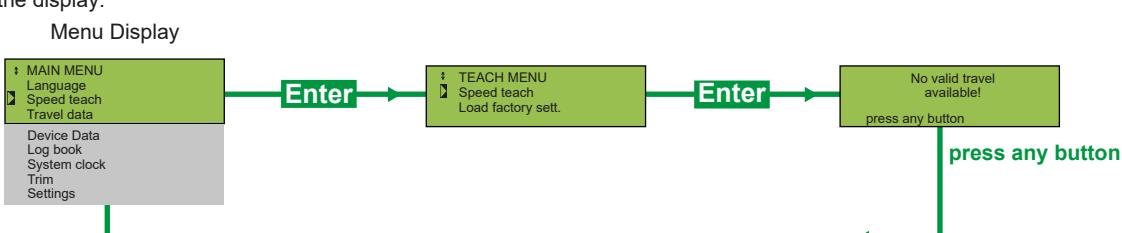
Factory reset

When speed teach function is not correctly carried out by the customer, the factory settings can be retrieved. In this case, all teachings by the customer will be replaced by the factory settings. This function should be used for the same SEV-block and the ring size.

The new sensor table will be taken.

S E V
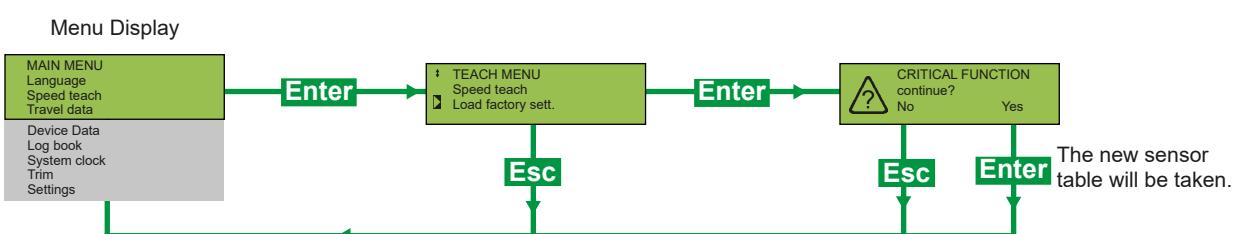
Changing Device Data
(factory adjusted and tested)

EN ISO 9001

Menu Display

Example

MAIN MENU
Language
Speed teach
Travel data

Device Data
Log book
System clock
Trim
Settings

Enter

DEVICE DATA
Device data dialog
Load factory sett.

Esc

Enter

Piston type
Standard Cylinder

ESC = No ENTER = App.

Esc — **Enter**

Cylinder ø   [mm]
070   Apply
Range: 10...999
ESC = No ENTER = App.

Esc — **Enter**

Suspens. ratio
1:2

ESC = No ENTER = App.

to change item use
up and down buttons

Esc — **Enter**

No. of cylinder   [ ]
1   Apply
Range: 1..9
ESC = No ENTER = App.

Esc — **Enter**

Eff. pis. ø   [mm]
049.4   Apply
Range: 10.0..999.9
ESC = No ENTER = App.

Esc — **Enter** ①

Pump empty   [l/min]
0120   Apply
Range: 5..1400
ESC = No ENTER = App.

Esc — **Enter**

Pump loaded   [l/min]
0113   Apply
Range: 5..1400
ESC = No ENTER = App.

Esc — **Enter**

v max   empty   [m/s]
1.04   Apply
Range: 0.05..1.60
ESC = No ENTER = App.

Esc — **Enter**

V max   loaded   [m/s]
0.98   Apply
Range: 0.05..1.60
ESC = No ENTER = App.

Esc — **Enter** ②

Speed mode
Const. speed

ESC = No ENTER = App.

Esc — **Enter**

Press. min.   [bar]
020   Apply
Range: 5..999
ESC = No ENTER = App.

Esc — **Enter**

Press. max.   [bar]
040   Apply
Range: 5..999
ESC= No   ENTER = App.

Esc — **Enter**

Bypass valve   [ ]
6   Apply
Range: 0..9
ESC = No ENTER = App.

Esc — **Enter**

Down valve   [ ]
6   Apply
Range: 0..9
ESC = No ENTER = App.

Esc — **Enter**

Flow Ring   [ ]
6   Apply
Range: 0..9
ESC = No ENTER = App.

Esc — **Enter**

Switch dist.   [cm]
055   Apply
Range: 0..999
ESC= No   ENTER = App.

Enter

Save Changes?

ESC=No   ENTER=Yes

Esc

Enter

ESC -   changed values will not be saved.

ENTER - changed values will be saved.

① **Pump Data Input**
Use pump manufacturers flow tables, employing the elevator systems static pressures under empty and loaded conditions.

② **Selection: Constant or Maximum Up Speed**

Maximum 'UP Speed' (Speed depends on pressure)
Depending on the pump performance, the SEV tries to reach the maximum possible speed. To provide a consistent levelling time the SEV will self correct the deceleration of the car.
Constant 'UP Speed' (Speed is independent on pressure) (Factory setting)
SEV tries to reach the given target speed.

S E V

Sensor and Solenoid Trims
(factory adjusted and tested)

EN ISO 9001

Vertical Sensor Trim

If the sensor mA value under static condition is not between 4,8 and 5,3 mA, close the ball valve and open manual lowering, slacken the lock screw on the sensor and turn the knurled sensor-head in or out until the value is between 4,8 and 5,3 mA. Re-tighten the lock screw.

Do not adjust under 4.5 mA, otherwise the sensor may press against the flow spool.

Menu Display

↕ MAIN MENU	
Language	
Speed teach	
Travel data	
Device Data	
Log book	
System clock	
▷ Trim	
Settings	

Sensor Display

Enter

⬆ TRIM	Solenoid
◉ Sensor	Setp 0
↕ 4.90 mA	Act 0.00A
(261)	

Dot indicates correct sensor setting

Esc

Enter

⬆ TRIM	Solenoid
◉ Sensor	Setp 0
↕ 5.45 mA	Act 0.00A
(290)	

Sensor value too high, turn the sensor in.

⬆ TRIM	Solenoid
◉ Sensor	Setp 0
⬇ 4.38 mA	Act 0.00A
(233)	

Sensor value too low, turn the sensor out.

Sensor Head

Sensor lock screw (3mm socket Key)

Radial Sensor Trim

To adjust the sensor radially the up and down leveling speeds should both be programmed to the same value (eg:10 cm/sec).

Loosen the bushing lock nut, not the lock screw, without turning the sensor bushing.

Bushing lock nut 32 mm (1 1/4") spanner

Sensor bushing 19 mm spanner (3/4")

Operate the elevator to run at up leveling and down leveling speeds. Measuring with a tacho or stop watch.

If the down leveling speed is different from the up leveling speed, rotate the bushing by 15° and re-measure the leveling speeds.

If up speed is faster than down speed - turn clockwise

If down speed is faster than up speed - turn counterclockwise

Repeat the process of rotating the bushing in clockwise or anti-clockwise as required to set the up and down leveling speeds to be practically the same. Re-tighten the bushing lock nut.
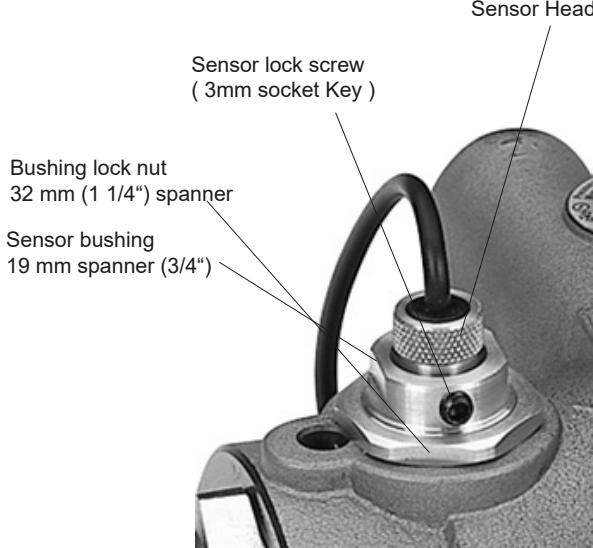
Solenoids A and C, Trim
(already factory adjusted)

Solenoids A and C

Solenoid trim is useful to produce a quicker and smoother initial movement of the car away from the floor.

The electrical Current Value display shows the representative value of the UP solenoid (A) or DOWN solenoid (C) during an UP or DOWN travel.

The value should be between 2000 and 2100 during levelling.

To alter the value, turn the trim screw in and out during levelling.

Do not turn more than 10° at a time, observe the result and carry on if necessary.

Turn clockwise - to increase value.

Turn counter clockwise - to decrease value.

Trim screws AT and CT (3 mm socket key)

Menu Display

↕ MAIN MENU	
Language	
Speed teach	
Travel data	
Device Data	
Log book	
System clock	
▷ Trim	
Settings	

Sensor Display

Enter

⬆ TRIM	Solenoid
◉ Sensor	Setp 2000
↕ 6.33 mA	Act 1.00A
(338)	

Esc

Enter
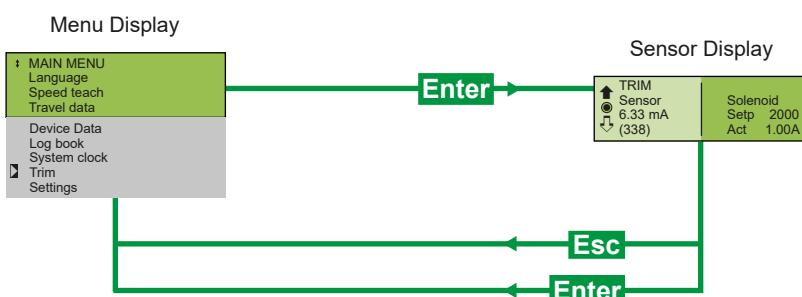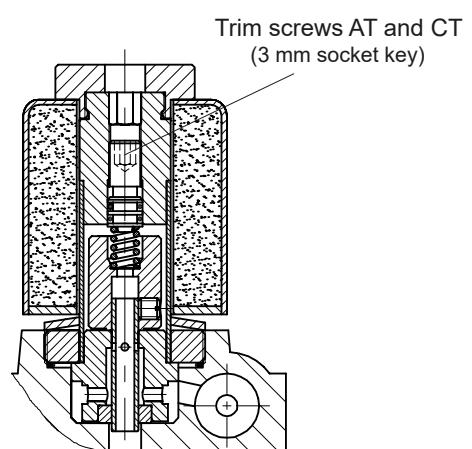
Counter (Log book)

Shows operational time of the elevator, the number of runs and the number of "Error" runs.

Menu Display

MAIN MENU	
Language	
Speed teach	
Travel data	
Device data	
Log book	
System clock	
Trim	
Settings	

Enter →

LOG BOOK	
Ops hours	0.00 h
Total runs	0
Error runs	0

Esc
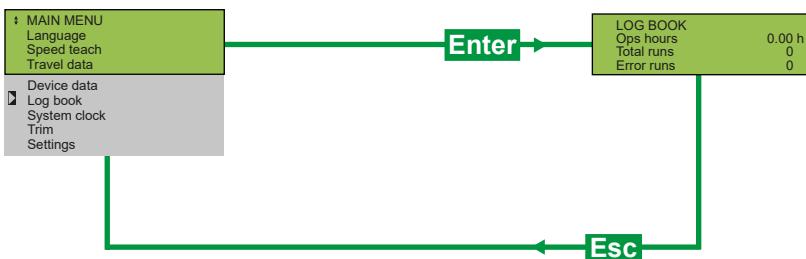
System Clock

To set local date and time

Menu Display

MAIN MENU	
Language	
Speed teach	
Travel data	
Device Data	
Log book	
System clock	
Trim	
Settings	

Enter →

Date	11/26/08
	change?
ESC = No	ENTER = Yes

Esc →

Time	16:40:00
	change?
ESC = No	ENTER = Yes

Esc

Enter ↓

Contoller's date	
03/20/08	
ESC = No	ENTER = Yes

Enter

Enter ↓

Contoller's time	
16:40:00	
ESC = No	ENTER = Yes

Enter **Esc**
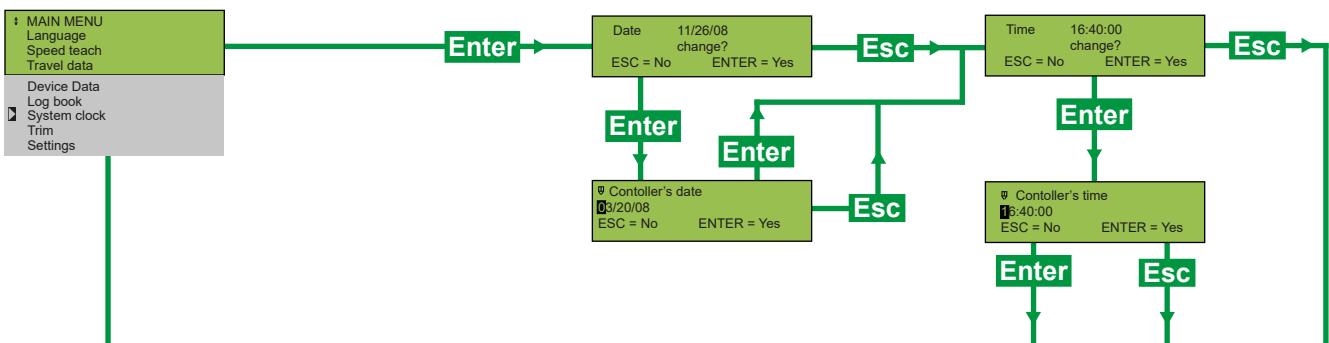
Password User

To set the User Password

Menu Display

MAIN MENU	
Language	
Speed teach	
Travel data	
Device Data	
Log book	
System clock	
Trim	
Settings	

Enter →

SETTINGS	
Firmware-Vers.	1.08
Syspar-Vers.	0.75
Cali.-Vers	0.41
Par.-Vers	1.03
Password User	

Enter →

Password User	[ ]
111	Apply
Range	0..9999
Esc = NO	ENTER = App.

Enter **Esc**

Esc ↓

?	Save Changes..?
	No Yes

Esc **Enter**
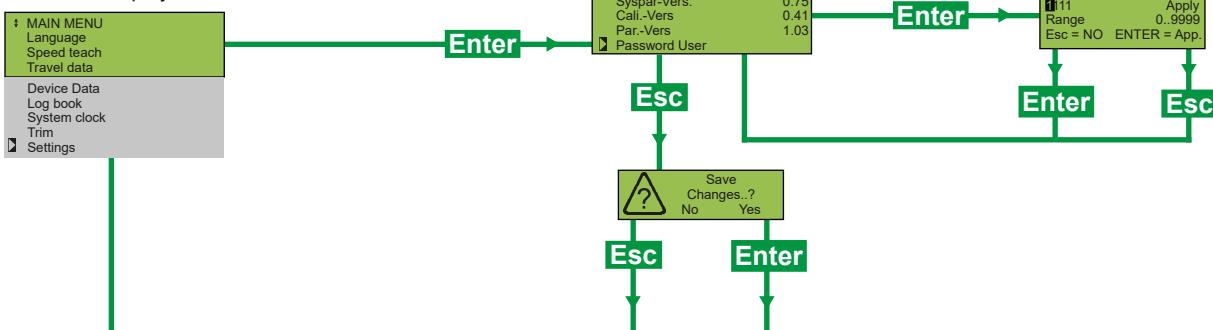
Important

If there is a major fault interrupting the normal operation of the SEV card when travelling between floors, power to Solenoids **A** or **C** is automatically interrupted.

During upwards travel the motor and during downwards travel solenoid D (down levelling), remain energised unless the SEV relay R1 is employed to signal otherwise.

Card Relay R1 - Evacuation of passengers
When the internal relay R1 switches over due to a major operational fault, the resulting signal must be tapped from pins 18, 19 and 20, and employed within the main controller to initiate emergency functions including switching off the pump drive, energising solenoid D to lower the car at levelling speed to the next lower floor and warning an emergency service.

The following faults are signalled by illuminating the red LED labelled as **Error**. At the same time, the card display indicates the nature of the fault as follows:

Major Faults

1	**Coil defect**	A or C coil disconnected or short circuited.
2	**Sensor defect**	Sensor disconnected, damaged or mis-adjusted.

Elevator stops.
Relay R1 switches over.

After the fault has been corrected, errors 1-2 must be cancelled by pressing **Reset/Esc** button on SEV Card. If the elevator is modem connected (see page 29) the errors can be cancelled by clicking the **Reset/Esc** button on the Main Display.

Minor Faults

3	**Supply Voltage**	Power supply to the card less than 17 V. Elevator operation continues at inspection speed.
4	**Sensor feedback**	The value of the sensor does not change within 8 seconds of the start signal.
5	**Sensor overflow**	The value of the sensor exceeds its defined maximum value.
6	**Level. too long**	Duration of up or down levelling speed is excessive.
7	**Overtravel**	Elevator overtravels the floor level.

Elevator continues to operate.
Relay R1 does not switch.

Errors 3-7 do not have influence on the operation of the elevator.

As long as the power supply to the SEV card is maintained, errors will be saved and the red LED will remain illuminated. The error indication can be cancelled one after the other in reversed order of occurrence (last error first) by pressing **Reset/Esc** button on SEV card.

If the red Error LED is blinking (not permanent illuminating), disconnect the power supply to the card for a few seconds. In case the card cannot still be re-activated, please contact Blain Hydraulics.

S E V

S E V

Main Display & Travel Graph Display

Laptop Displays

A laptop is not necessary for the operation or adjustment of the SEV system, however it is of distinct advantage for setting up the parameters of the elevator and for preventative maintenance.
A CD containing the PC software is delivered with the SEV.

Main Display

Upon starting the program, the following MAIN DISPLAY panel appears on the PC screen.
The main display shows all the (calculated) data for the control of the elevator travel as well as online information from the SEV card.
Changes of ride characteristics are easily made by clicking on the appropriate boxes.
The "variable" section is protected by a password. From "Authorization" pull down menu the password can be input and access to the variable section can be gained. The standard password is, as shown, 2004.

Main Display

protected

unprotected
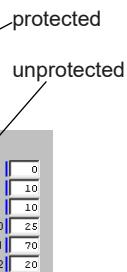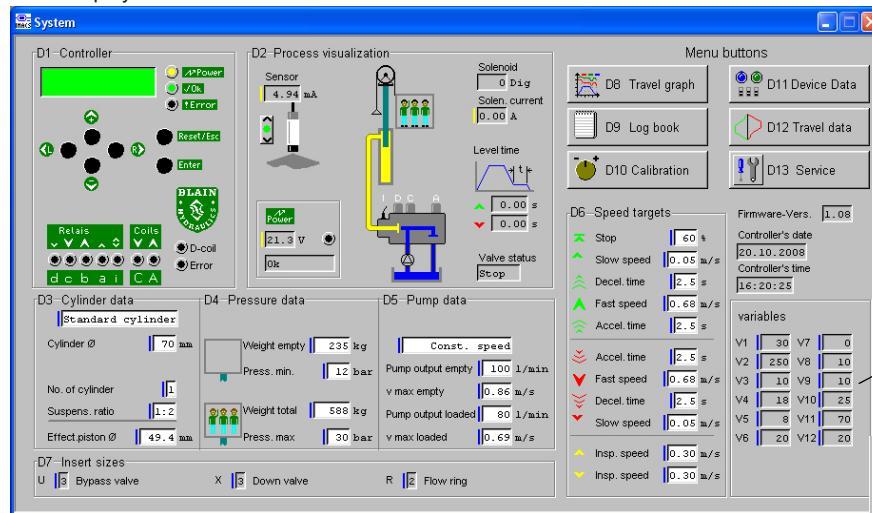
Travelgraph Display

Travelgraphs can be observed though the travel graph display. To open the travelgraph display select [D8 Travel graph] on the Main Display. [X] closes the t ravelgraph display.

To switch between Record and Playback Mode

To show or hide the record panel
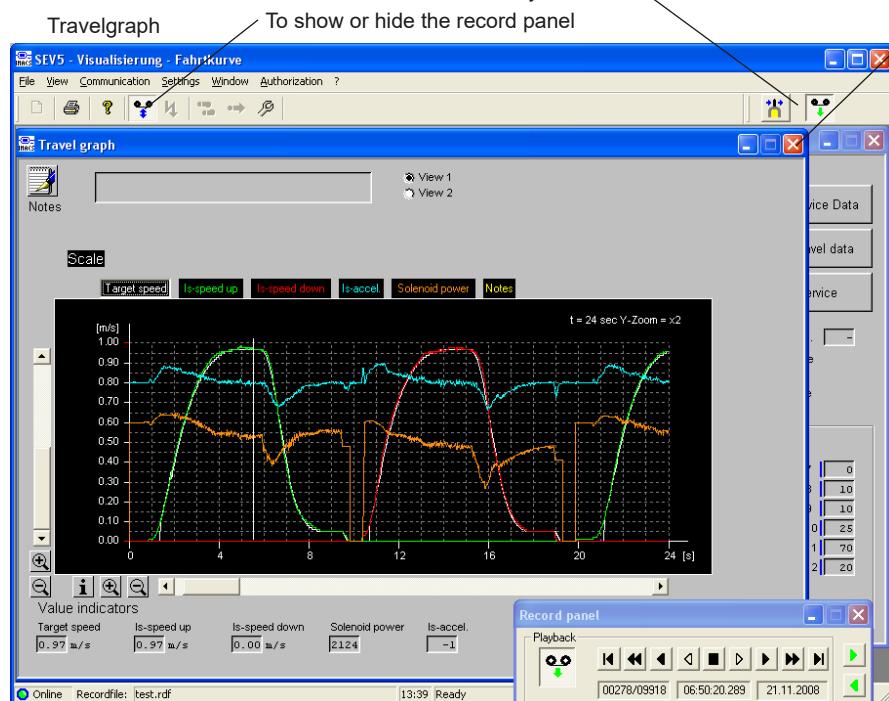
Return to Main Display

Travelgraph

Record Mode

Playback Mode.

Record Panel

The Record Panel is used to switch between the Record Mode, in which travelgraphes are recorded, and the Playback Mode, in which recorded travelgraphes can be retrieved for evaluation. Alternatively, mode switching can be done by the buttons on the toolbar.

The Main Display of the SEV shows seven data fields, D1 to D7 and six menu buttons, D8 to D13.
SEV-card data can only be modified in ONLINE Mode,
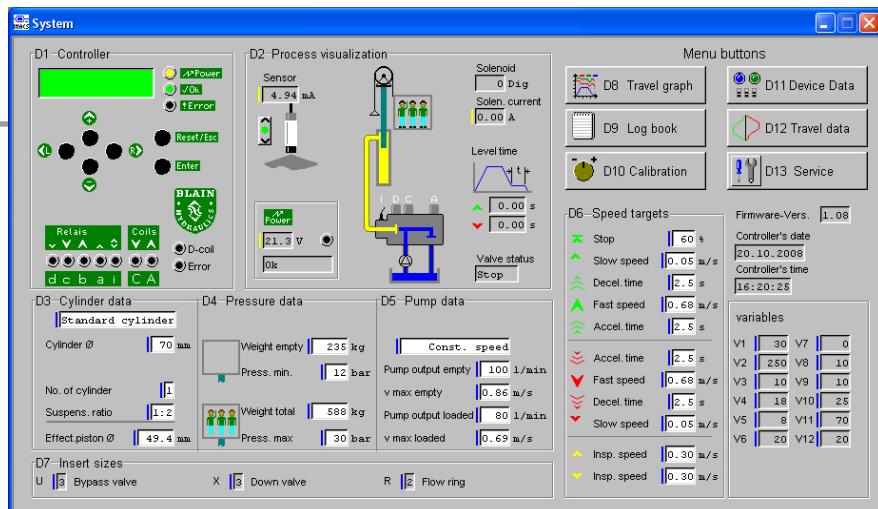
D3 to D6

To change values in a white box, click on the box with the mouse.
A sub-window will appear. Enter the new value in the sub-window as illustrated on the next page.

D1 **SEV-Card Data**, displays a replica of the SEV card, communicating the direct online status of the SEV CARD.

D2 The process visualization includes the following five indicators:

D2.1 Sensor Value
The feedback signal from the flow-sensor is displayed in mA.
The green point confirm correct sensor trimming.
The yellow arrows shows the direction of trimming correction.
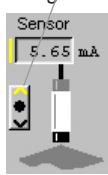
Sensor Trimming Guide
(see page 16)

D2.2 Cylinder System Graphic
illustrates which system has been entered into Cylinder Data (D3)
(see page 22).
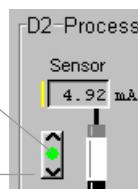
D2.3 Solenoid Power
The control current to the solenoid is displayed in digits and Amps.
The normal operating range is between 1.2 A and 2.5 A.
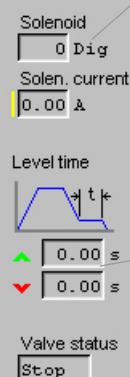
D2.4 Servocard Power
The voltage supply to the card should not exceed 27 V DC, and during elevator operation not fall below 17 V DC.
The LED illuminates should the voltage be too low.

D2.5 Levelling Time (t)
The levelling time of the last up and down travels are displayed.
Ideally, the time should be kept between 0.5 and 1.0 seconds.

S E V

Switch into ONLINE Mode

D3 Cylinder Data Input

Select the cylinder type with the mouse and confirm.

Type in the piston size in mm and confirm.

Type in the number of cylinders size in mm and confirm.

Select the suspension ratio with the mouse and confirm.
e.g. 1:2

D4 Pressure Data Input
Either weight in kg or pressure in bar can be used as input data.

Type in the empty weight of the car in kg or the empty pressure in bar and confirm.

Empty is car without load

Type in the full weight of the car in kg or the max. pressure in bar and confirm.

Full is car plus payload

D6 Speed targets

↗	Stop	60	%
↑	Slow speed	0.05	m/s
↟	Decel. time	2.5	s
↑	Fast speed	0.68	m/s
↟	Accel. time	2.5	s
↡	Accel. time	2.5	s
↓	Fast speed	0.68	m/s
↡	Decel. time	2.5	s
↓	Slow speed	0.05	m/s
↑	Insp. speed	0.30	m/s
↓	Insp. speed	0.30	m/s

D7 Insert sizes
The Bypass Valve,Down Valve and Flow Ring are internal parts of the SEV installed at the factory. Alterations to system values may required changes of their sizes. Check that correct sizes have been installed.

D3 Cylinder data
Standard cylinder	
Cylinder Ø	70 mm
No. of cylinder	1
Suspens. ratio	1:2
Effect.piston Ø	49.4 mm

D4 Pressure data
Weight empty	235 kg
Press. min.	12 bar
Weight total	588 kg
Press. max	30 bar

D5 Pump data
Const. speed	
Pump output empty	100 l/min
v max empty	0.86 m/s
Pump output loaded	80 l/min
v max loaded	0.69 m/s

D7 Insert sizes
U	3 Bypass valve	X	3 Down valve	R	2 Flow ring

D5 Pump Data Input Maximum or Constant Speed
Use pump manufacturers flow tables, employing the elevator system's static pressures under empty and loaded conditions.

Type in lpm for the empty car and confirm.

Type in lpm for the fully loaded car and confirm.

D6 Target Speed Input
Acceleration and Deceleration times recommended are 2.5 seconds, which will be the time the car takes to complete 90% of the fast speed.

FAST UP speed is determined by the data in D5.
FAST DOWN speed can be selected independently.

SLOW UP (UP Levelling) and SLOW DOWN would normally be set to between 0,05 and 0,07m/s.

Keyboard
1. Type in the required Target Speed

Mouse / Keyboard
2. Confirm

Each Target speed has its own data input window and each can be individually changed.

⚠ Incorrect input value of pump output empty may change the insert sizes in section D7.

Maximum 'UP Speed' (Speed depends on pressure)
Depending on the pump performance, the SEV tries to reach the maximum possible speed. To provide a consistent levelling time the SEV will self correct the deceleration of the car.
Constant 'UP Speed' (Speed is independent on pressure) (Factory setting)
SEV tries to reach a given fix target speed.

S E V

Travelgraph
Record Mode (Online)

The Travelgraph D8 in Online mode displays the travel status of the elevator. To file the graphs, see next page.
Traced curves are displayed in different colours for ease of identification.

⦿ View 1
○ View 2   Use the radio buttons to switch between view1 und view2.

Note pad
allows addition of notes stored with travelgraphs

Note-flag

Vertical axis selection

View 1

Record (online) button
The Record Mode is activated when the D8
Travelgraph Menu Button is selected.

Solenoid Power

Actual travel - down direction

Target

Actual travel - up direction

acceleration

Vertical zoom   Vertical zoom   Cursor

View 2
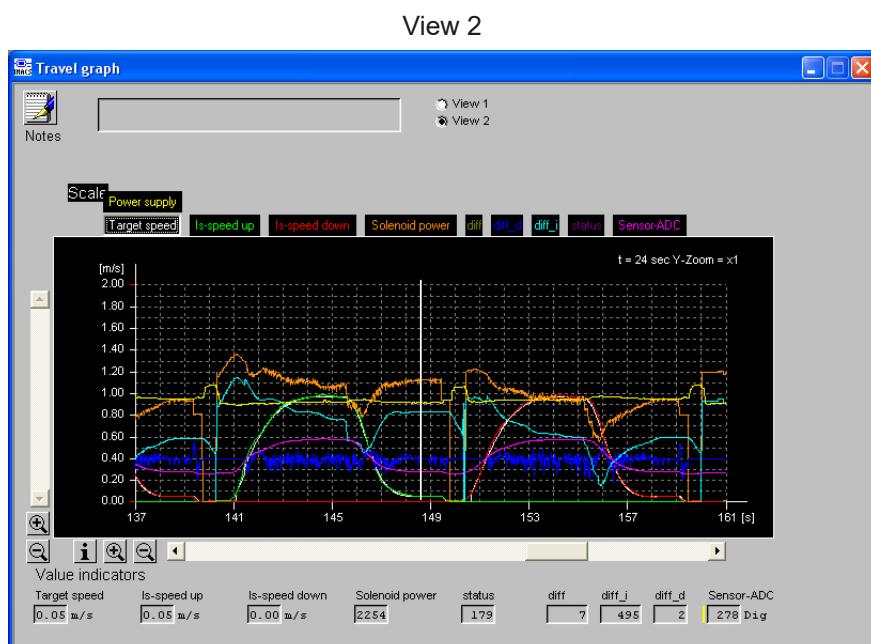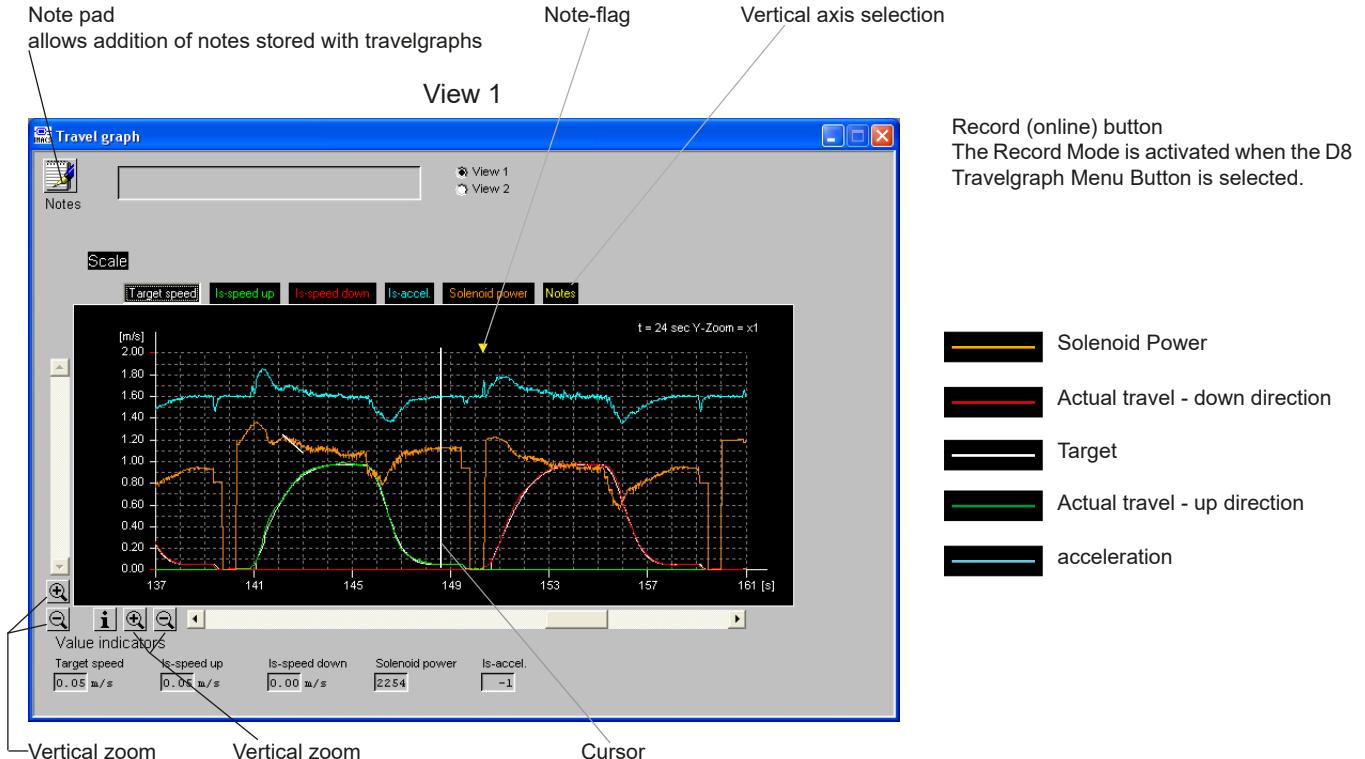
Status, diff, diff_i, diff_d and Sensor-ADC
are internal values that are necessary for
the PID-Controller.

To Save Travelgraphs

Open Pull Down Menu "File" and then goto "Save".

"save" overwrites the travel graph under the present file name.
"Save as" asks for a new file name.
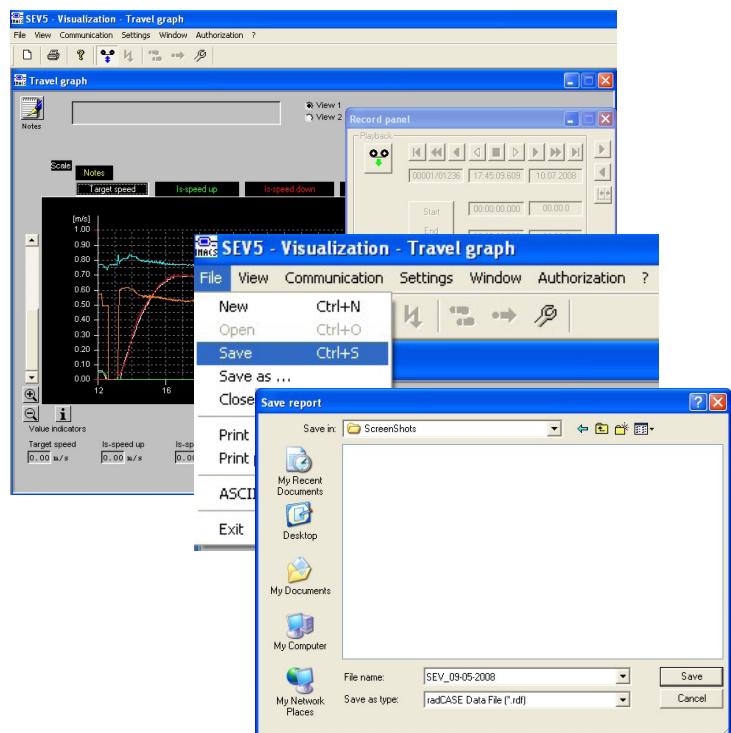

To Review and Save Travelgraphs

To review travel graphs recorded in the Online Mode click to
Playback Mode and use the cursor to scroll.
To save these graphs refer to **"To Save Travelgraphs"**.

To Review Saved Graphs

Click [Playback] on Online Panel.

Goto Pull Down Menu and then goto „open".

Select the file you want review e.g. travel1.
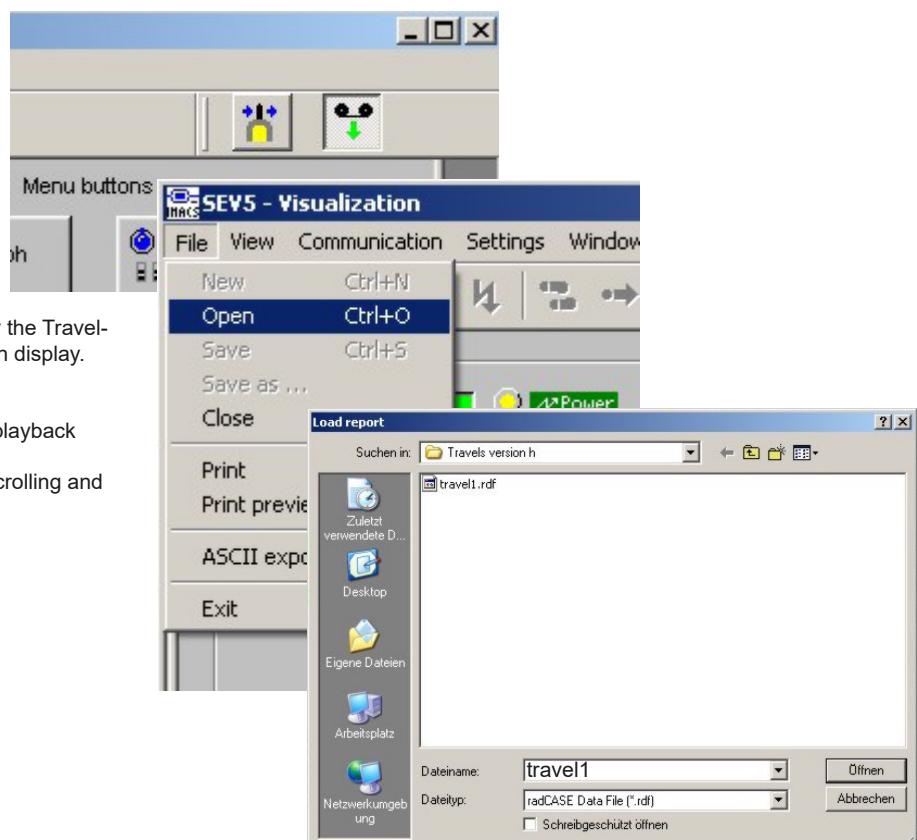
The selected graph will appear confirmed by the Travel-
graph Name at the bottom of the Travelgraph display.

The cursor stays at the left of the screen in playback
mode.
To learn more about the use of the cursor, scrolling and
zooming see page 25 and 26.

Playback, Horizontal Scrolling and Zooming

To view an recorded graph, click on the Playback Button. To open the record panel, click on the button 👀 . The Record Panel will display buttons to shift the cursor.

Zoom in

Zoom out

Record Panel Buttons

20ms   200ms

2s per click

Start postion

End postion

Horizontal zoom buttons   Playback Button   Values of the current Cursor position.   Cursor Shift Buttons
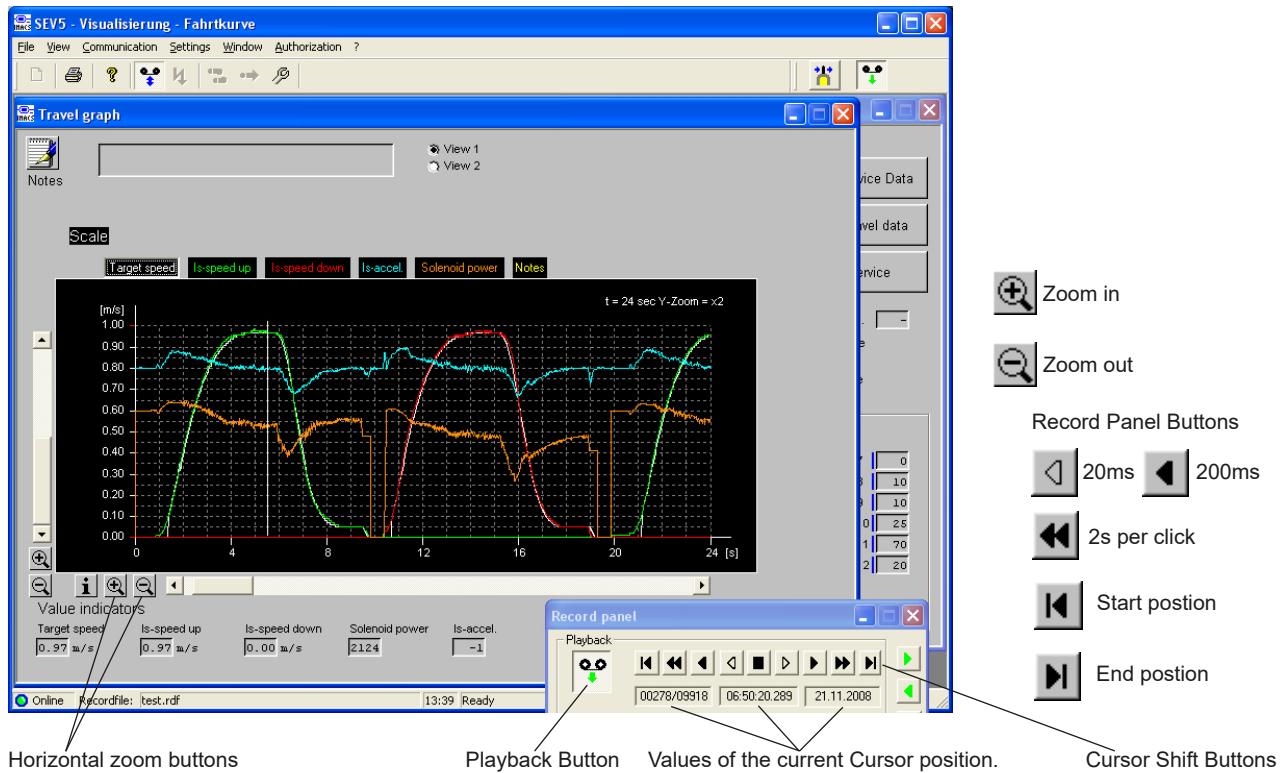
In Playback Mode, recorded data can be reviewed and scrolled in either direction using the cursor shift buttons located on the Record Panel. Zooming is also available through horizontal zoom buttons.

Vertical Scrolling and Zooming

The vertical axis can be scrolled to bring a specific trace point to the middle of the screen for reviewing.
To scroll the vertical axis click the UP or DOWN directional arrow on the left of the display. ooming can be performed through vertikal zooming buttons.

Cursor

Vertical scroll bar

Vertical zoom buttons provide 4 stages of magnification

The value indicators show values at the cursor position.

online button   file name   Scroll bar indicates the position of playback

S E V
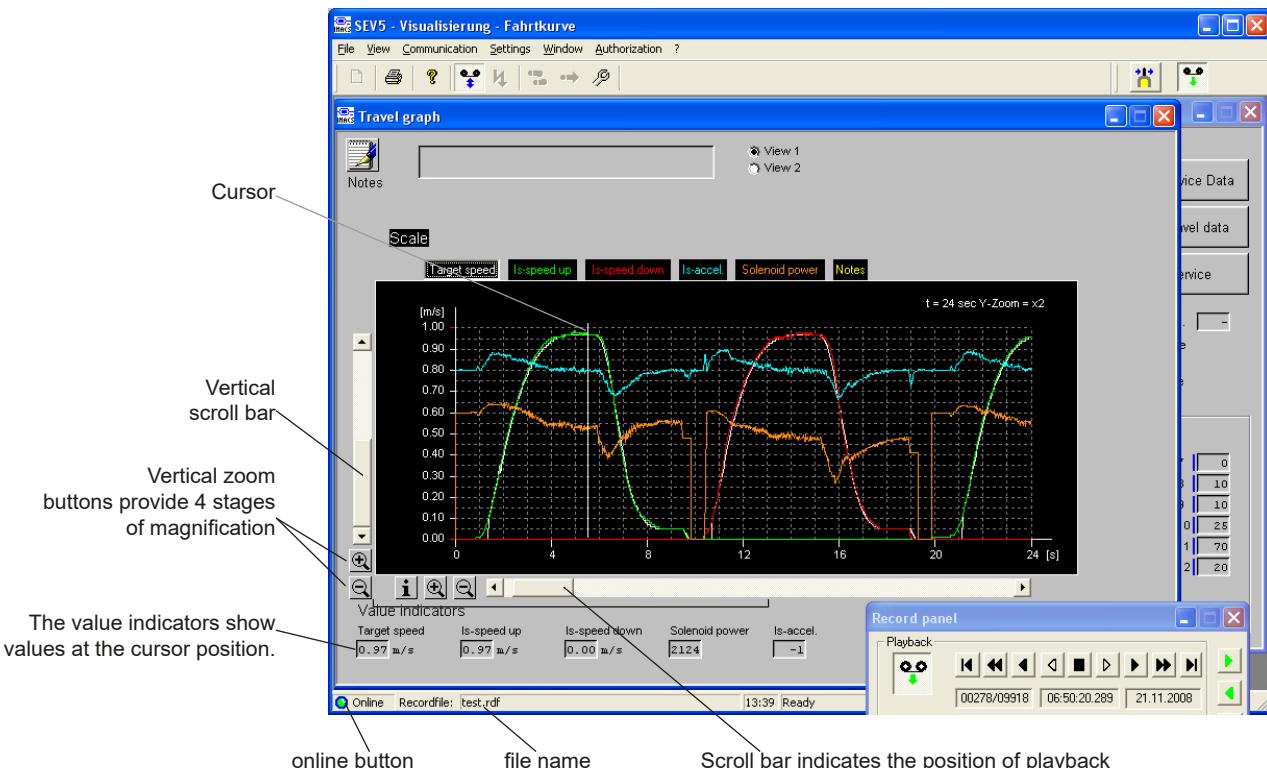
Travelgraph
Cursor, Focus and Zoom

EN ISO 9001

Examples

Graph zoom for review ⊕   Normal viewing   Graph zoom for scrolling ⊖

Time Base	Seconds 0 - 1 ,2 ,6 ,12 ,	Seconds 24	Seconds 0 - 60, 120, 360	Minutes 0 - 12 ,24 ,60	Hours 0 - 12 ,24 ,48	Days 0 - 6 , 12.
Cursor Shift ◁ ▷ 20 ms		◀ ▶ 200ms		◀◀ ▶▶ 2s		◀ ▶ Start and End position
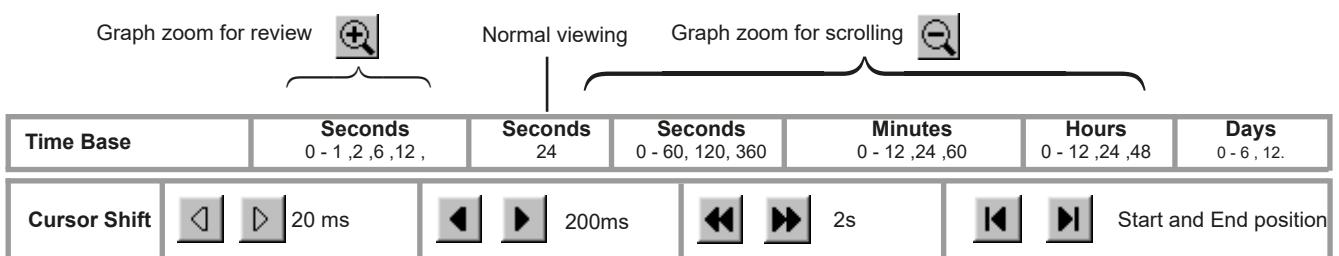
Focusing on values

Example A Assume the position to review is off the screen to the left. (time base 24s).

Click 👀

Click ◀◀ until the review section appears on the left of the screen.

Click ◀ until the Cursor is within one grid of the required values.

Click ⊕ Zoom (in) to 2 second time base if necessary.

Click ◁ moving the cursor exactly onto the values to review.

Read the required information from the value indicators.

Faster Scrolling
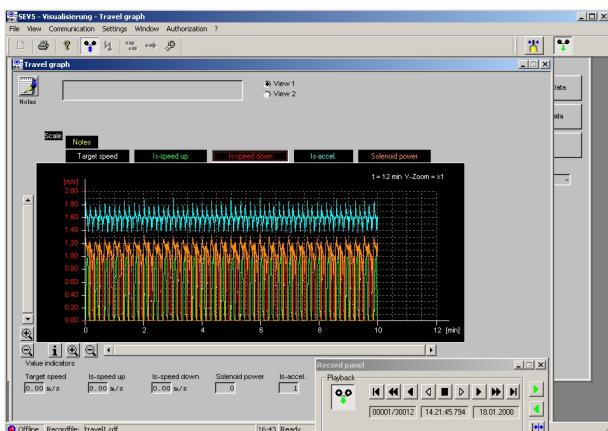
Example B Assume the position to review is approximately 20 runs earlier.

Click 👀

Click ⊖ Zoom (out) to 12 minute time base for faster scrolling (zoom out).

Click ◀◀ or ▶▶ until the values appear on the left of the screen.

Click ⊕ Zoom (in) to 24 second time base.
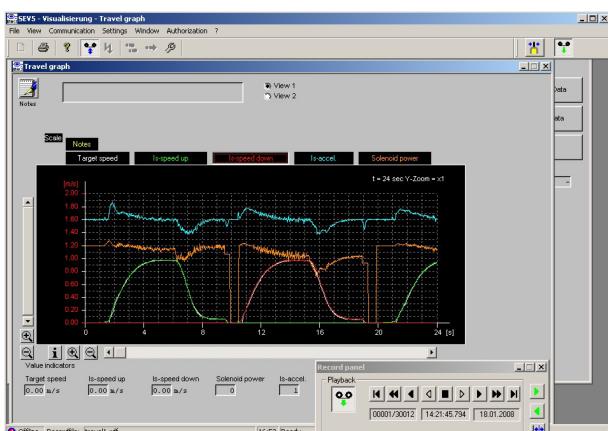
Click ◀ or ▶ until the Cursor is within 1 grid of the values.

Click ⊕ Zoom (in) to 2 second time base if necessary (zoom in).

Click ◁ or ▷ moving the cursor exactly onto the values for review.

Read the required information from the value indicators.

S E V

Solenoid Trimming
Solenoids A and C (factory adjusted and tested)

EN ISO 9001

Assuming that friction in the guide rails or cylinder packing is not causing slip-stick situation, a smooth initial movement of the car away from the floor depends upon the solenoid trim screw adjustments AT (UP) and CT (DOWN).

UP
Solenoid A (Adjustment AT)

Using a 3 mm socket key.
Open the travelgraph. Select the solenoid power as the vertical axis, using 0 - 4000 scale.

a. Signal the car to travel at levelling speed.

b. Turn AT so that the orange solenoid trace runs at 2100 on the graph whilst the car is up levelling.
Turning 'in' (clockwise) raises the graph trace, 'out' lowers the trace.

c. Return the car to the lower floor level and place a normal full up call to the next floor.
The orange trace will start and should remain around 2400 units for 0,5 to 1,5 seconds during which time the car will start upwards.

d. As the car starts upwards, the orange trace should peak around 2500-2700 as the car approaches full speed. At full speed, the trace will decrease to about 2100. Re-adjust AT if necessary so that the solenoid trace peaks around 2500-2700 as the car accelerates upwards.

Down
Solenoid C (Adjustment CT)

e. Signal the car to travel at levelling speed.

f. Turn CT so that the orange trace runs at 2100 on the graph whilst the car is down levelling.
Turning 'in' (clockwise) raises the graph trace, 'out' lowers the trace.

g. Return the car to the upper floor level and place a normal full down speed call to the next floor.
The orange trace will start 2400 units for less than 0,5 seconds during which time the car will start downwards.

h. As the car starts downwards, the orange trace should peak around 2500-2700 as the car approaches full speed. At full speed, the trace will decrease to about 2100. Readjust CT if necessary that the solenoid trace peaks around 2500-2700 as the car accelerates downwards.
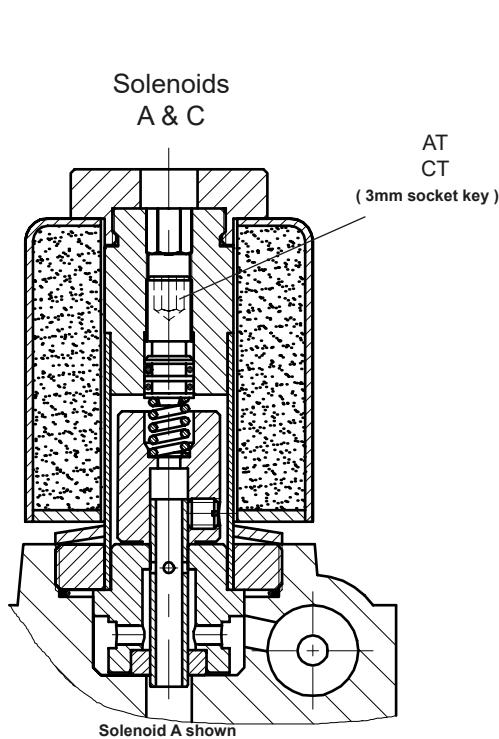
Pre-Adjustment
Orange trace during levelling should be adjusted to 2100

Final Adjustment
Orange trace peak during acceleration should be between 2500-2700

Solenoids
A & C

AT
CT
(3mm socket key)

Travelgraph D8

Solenoid A shown

S E V

EN ISO 9001
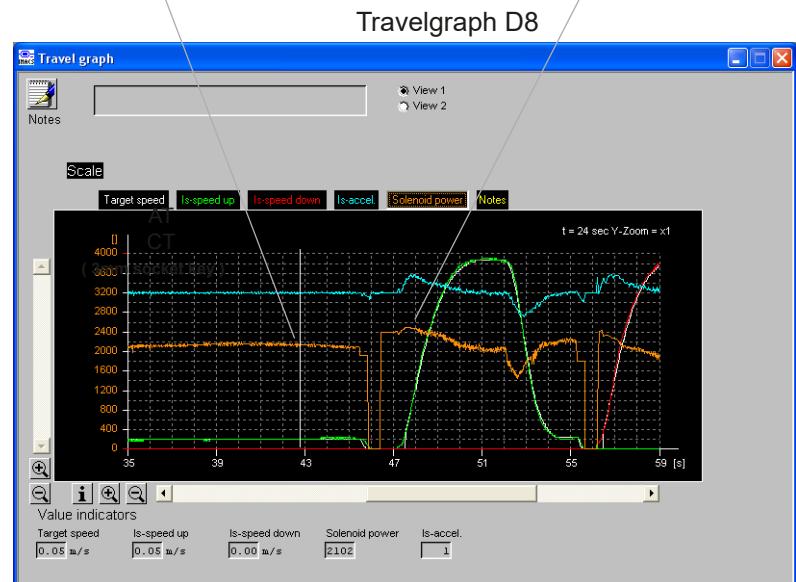
D9 SEV Logbook

The SEV Logbook stores operating time, number of operations and error runs.
By accessing the system by a PC or through a modem the operational status of the elevator can be observed.

Card ID Number
A Serial number that allows
Blain Hydraulics GmbH
to identify owner and factory setting
of the SEV.

Total runs
Number of runs in one direction
(floor to floor)

Error Runs
Travel runs that have been
identified as having an ER-
ROR.

Operational Hours
Displays the actual travel
time.

Clock and Date of faulty runs

Log book

| Device ID | 1234567890 |

Faulty runs

	Date	Time	Error status
Total runs	8	21.11.2008	13:17:37	00-0001
Error runs	1	--.--.----	--:--:--	00-0000
Ops hours	0.02 h	--.--.----	--:--:--	00-0000
		--.--.----	--:--:--	00-0000
		--.--.----	--:--:--	00-0000

D10 Calibration

Dither is a high frequency oscillation superinposed on the solenoid power to improve response sensitivity of the valve. Too high dither ampli-
tute may transfer noise to the car. Too low, may result in sluggish target tracking.

Calibration

▲	Dither ampl.up	400
	Gain up	6
▼	Dither ampl.dw	250
	Gain down	7

Dither Amplitude of the Solenoids A and
C. The value should be between 200-550.
When the value is too high, vibrations may
be felt in the car.

Gain value of the controller:
Factor is between 5 to 10.
Values too high cause oscillation.
Values too low may result in high
tracking error.
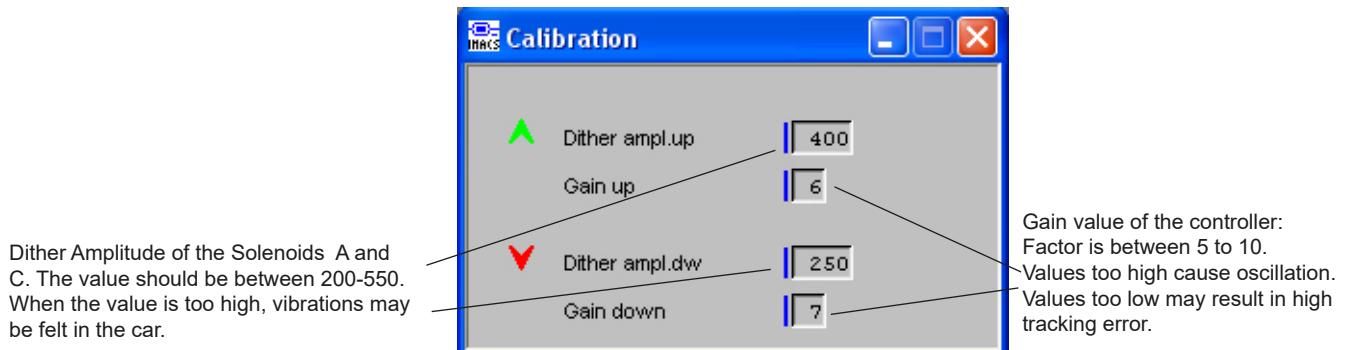
D11 Device Data, D12 Travel Data and D13 Service

Complete Device Data D11 and Travel Data D12 can be alternatively changed by using corresponding buttons.
The Service button D13 is only accesssible by Blain Hydraulics GmbH.

Remote Monitoring

To ensure that an SEV valve can be efficiently installed and serviced, the information stored in the SEV card or the current status of the elevator may be verified remotely by Blain Hydraulics or other servicing centre. Remote monitoring can be performed by means of an internal modem, which can be supplied with the card (optional), or an external modem can be used optionally. The information includes a number of graphs of the last normal and faulty runs that are imperative to the efficient diagnostics or preventative maintenance.

Alternatively, saved files of travel-graphs may be mailed to the servicing centre for diagnosing.
e-Mail adress: info@blain.de

Printing a Travelgraph

Display the section of graph to be printed using the zoom function if necessary. Click on File menu and select "Print". Follow the instructions for your printer. To check the outlook of the print, "Print preview" option can be used.
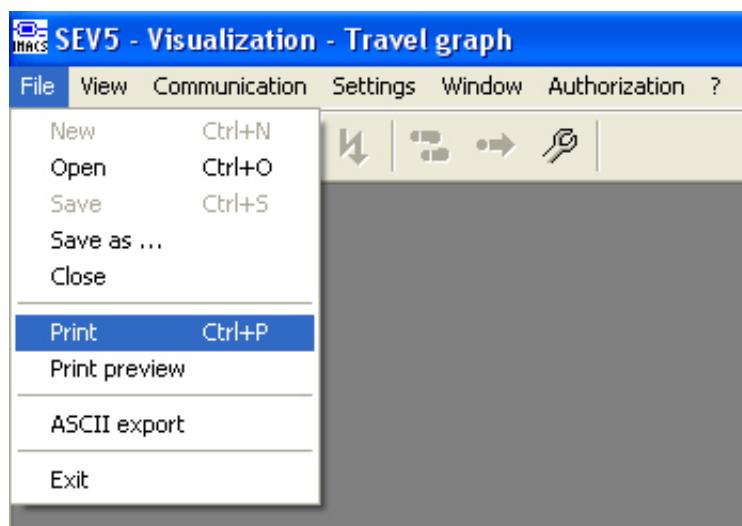
Transmission of Travelgraph through e-Mail

The performance of the elevator can be saved in the form of travelgraphs (see File Saving, page 24) and transmitted via e-Mail from the elevator site to a servicing company anywhere world wide.
For every travelgraph, 4 files (see below) are needed. If the transmission capacity is excessive (depending on the e-Mail provider), or to reduce transmission time, compress the files, e.g. through "WinZip".

EN ISO 9001
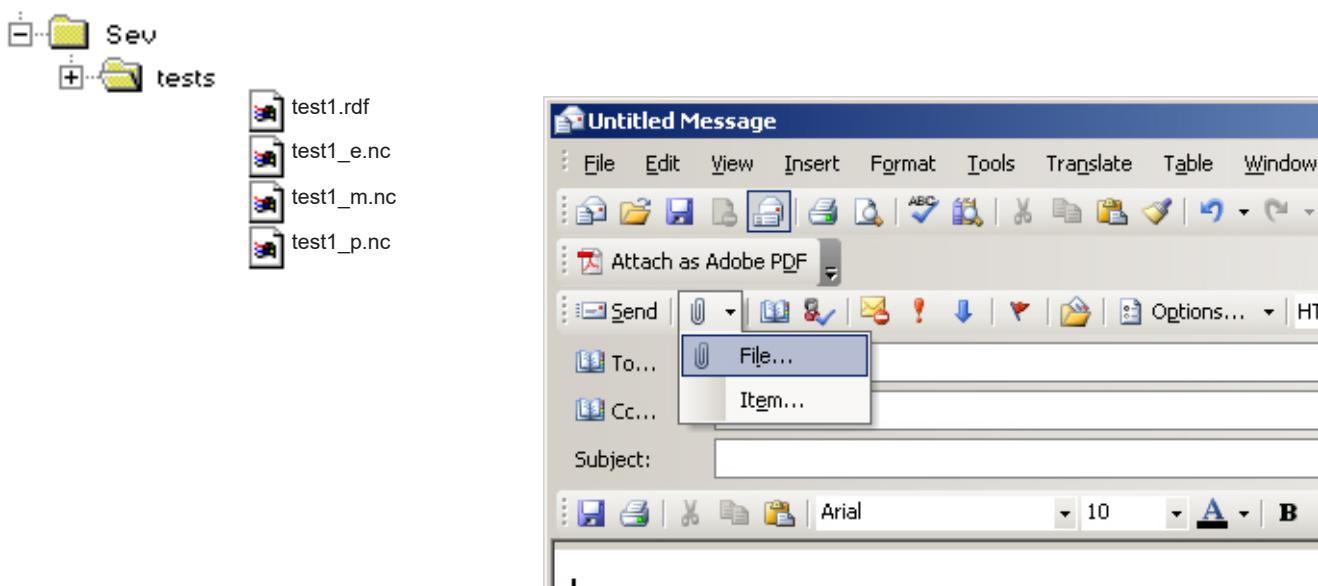
Monitoring connection

Preconditions: The SEV card at the elevator site is modem connected. The PC at the monitoring center is equipped with the SEV program and modem connected via the correct COM port.

Select serial communication port

Select SEV [Main Display]
Click on [Settings] and select [Port selection]
Select the correct COM Port and click OK button.

(1)

(2)

(3)

(4)

(5)

Calling from the monitoring site

From the Main Display menu click on [Communication] and select [Modem communication]. (1)
Modem Controller window appears. (2)
Click on [Telephonenumber] button, select the required name (ex. Test, Tel. no. 2) and confirm by clicking OK. Adding, changing or deleting telephone numbers can be performed by clicking on appropriate buttons. (3)
Click on [Call] button.
Communication protocol appears in the side box indicating [CONNEC] (4)
Insert the user password in the Password window (5)
The default password is: 12345678
Upon successful connection, the [OFFLINE] box will display [ONLINE] and [CONNEC] will become [CONNECT]. (6)
Click on [OK] and close the Modem Controller window. After 15 seconds the system data from the SEV card is shown. The online button turn from red (Offline) into green (Online).

(7)

(6)

Call back function

Select [Callback] button.
Click on [Callback number] and insert the telephone number.
Click on [OK].
As the SEV card is connected it will call you back to save you from telephone costs. (7)

Closing modem connection

To close the modem connection click on [Communication], select [Modem connection] and click on [Hang up] button.

S E V

Selection Charts - Valve Inserts
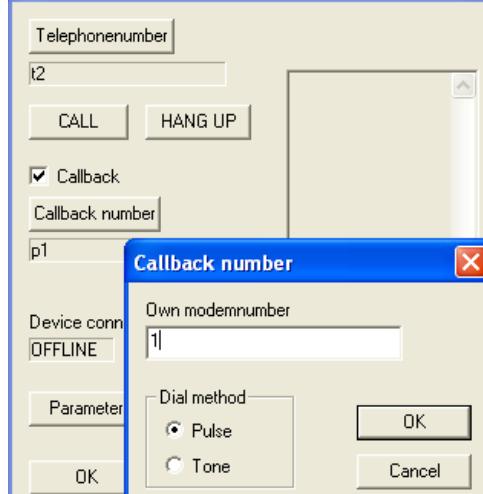
Data required when ordering:

Pump Output Car empty	lpm..................gpm
Pump Output Car loaded	lpm..................gpm
Static Pressure Car empty	bar..................psi
Static Pressure Car loaded	bar..................psi
Up Speed	m/s..................fpm
Down Speed	m/s..................fpm
D coil volts	..................|..................

Flow Ring R Selection

① lpm ②	① US gpm ②	Ring No.	P, T & Z2
40 - 75	10 - 20	R1	1" G
76 - 110	20 - 29	R2	1" G
111 - 180	29 - 47	R3	1" G
181 - 270	47 - 70	R4	1 1/2" G
271 - 430	71 - 112	R5	1 1/2" G
431 - 580	112 - 151	R6	2" G
581 - 1200	151 - 312	R7	2 1/2" G

Overlap ①Flows 20% below these values are acceptable.
②Flows 10% above these values are acceptable.

Bypass Spool U and Down Spool X Selection
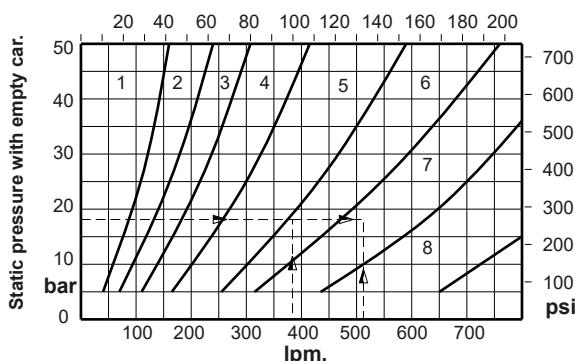
Example:
Required flow up 380 lpm   (99 gpm)
Required flow down 510 lpm   (133 gpm)
Static Empty Car Pressure. 18 bar   (260 psi)

Selected Bypass Valve U, size 6
Selected Down Valve X, size 7

* Overlap for valve sizes should not exceed 15%.

Valve Data-plate

Valve Connections
Flow Ring
Bypass Valve
Down Valve
Software Version

SEV   1.5   R5.   U4.   X5   v x.xx

Example

BLAIN
HYDRAULICS

Blain No.	SEV P46 A00
Client No.	ABC 123
Model	1.5 R5 U5 X6 v1.xx
l/m	313	bar	13-28	min
l/m		max	bar		max

Fax. 0 71 31 - 48 52 16
Made in Germany
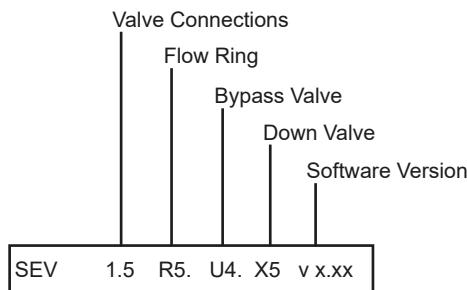
Available Options
(same as with EV 100)

EN - Emergency Power Coil: Battery lowering in case of power failure. (D coil double wound)

KS - Slack Rope Valve: Prevents excessive slack rope condition in 2:1 systems.

HP - Hand Pump: To raise car manually.

DH - Pressure Switches: Signals hydraulic pressure above the normal operating pressure.

DL - Pressure Switches: Signals hydraulic pressure below the normal operating pressure.

S E V

Flow - Pressure Chart
(US and Metric)

Pressure bar

0   5   10   15   20   25   30   35   40   45   50   55   60   65

lpm   gpm

Pressure psi

100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950

Load lbs · Load kg

- 10⁵/₈ (4.50 gpf) Ø 270 (57,3 l/mtr.)
- 9¹/₂ (3.64 gpf) Ø 241 (45,7 l/mtr.)
- 9 (3.30 gpf) Ø 229 (41,2 l/mtr.)
- 8¹/₂ (2.95 gpf) Ø 216 (36,7 l/mtr.)
- 8 (2.60 gpf) Ø 203 (32,4 l/mtr.)
- 7¹/₂ (2.29 gpf) Ø 191 (28,7 l/mtr.)
- 7 (1.99 gpf) Ø 178 (24,9 l/mtr.)
- 6¹/₂ (1.73 gpf) Ø 165 (21,4 l/mtr.)
- 6 (1.47 gpf) Ø 152 (18,2 l/mtr.)
- 5⁷/₁₆ (1.21 gpf) Ø 138 (14,9 l/mtr.)
- 5 (1.02 gpf) Ø 127 (12,7 l/mtr.)
- 4³/₈ (0.78 gpf) Ø 111 (9,68 l/mtr.)
- 4 (0.65 gpf) Ø 101,6 (8,11 l/mtr.)
- 3¹/₂ (0.50 gpf) Ø 88,9 (6,21 l/mtr.)
- 3 (0.37 gpf) Ø 76,2 (4,56 l/mtr.)
- 2³/₄ (0.31 gpf) Ø 69,9 (3,84 l/mtr.)
- 2¹/₂ (0.26 gpf) Ø 63,5 (3,17 l/mtr.)
- 2 (0.16 gpf) Ø 50,8 (2,03 l/mtr.)

Ram Speed ft/min

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190

Ram Speed meters/sec

0   0,1   0,2   0,3   0,4   0,5   0,6   0,7   0,8   0,9   1,0

Flow - Pressure Tables (US)

Ram Ø • Area • Speed • Flow

ft/min		10	20	30	40	50	60	70	80	90	100	110	120	140	160	180	200
Ø inch	in²	US gpm															
1,4	1,5	0,8	1,6	2,4	3,2	4,0	4,8	5,6	6,4	7,2	8,0	8,8	9,6	11,2	12,8	14,4	16,0
1,6	2,0	1,0	2,1	3,1	4,2	5,2	6,3	7,3	8,4	9,4	10,5	11,5	12,5	14,6	16,7	18,8	20,9
1,8	2,5	1,3	2,6	4,0	5,3	6,6	7,9	9,3	10,6	11,9	13,2	14,6	15,9	18,5	21,2	23,8	26,5
2,0	3,1	1,6	3,3	4,9	6,5	8,2	9,8	11,4	13,1	14,7	16,3	18,0	19,6	22,9	26,1	29,4	32,7
2,2	3,8	2,0	4,0	5,9	7,9	9,9	11,9	13,8	15,8	17,8	19,8	21,7	23,7	27,7	31,6	35,6	39,5
2½	4,9	2,6	5,1	7,7	10,2	12,8	15,3	17,9	20,4	23,0	25,5	28,1	30,6	35,7	40,8	45,9	51,0
2,6	5,3	2,8	5,5	8,3	11,0	13,8	16,6	19,3	22,1	24,8	27,6	30,4	33,1	38,6	44,2	49,7	55,2
2¾	5,9	3,1	6,2	9,3	12,4	15,4	18,5	21,6	24,7	27,8	30,9	34,0	37,1	43,2	49,4	55,6	61,8
3,0	7,1	3,7	7,3	11,0	14,7	18,4	22,0	25,7	29,4	33,1	36,7	40,4	44,1	51,4	58,8	66,1	73,5
3,2	8,0	4,2	8,4	12,5	16,7	20,9	25,1	29,3	33,4	37,6	41,8	46,0	50,2	58,5	66,9	75,3	83,6
3½	9,6	5,0	10,0	15,0	20,0	25,0	30,0	35,0	40,0	45,0	50,0	55,0	60,0	70,0	80,0	90,0	100,0
3,6	10,2	5,3	10,6	15,9	21,2	26,5	31,7	37,0	42,3	47,6	52,9	58,2	63,5	74,1	84,7	95,2	105,8
3,8	11,3	5,9	11,8	17,7	23,6	29,5	35,4	41,3	47,2	53,1	59,0	64,9	70,7	82,5	94,3	106,1	117,9
4,0	12,6	6,5	13,1	19,6	26,1	32,7	39,2	45,7	52,3	58,8	65,3	71,9	78,4	91,5	104,5	117,6	130,7
4,2	13,9	7,2	14,4	21,6	28,8	36,0	43,2	50,4	57,6	64,8	72,0	79,2	86,4	100,8	115,2	129,6	144,0
4⅜	15,0	7,8	15,6	23,4	31,3	39,1	46,9	54,7	62,5	70,3	78,1	86,0	93,8	109,4	125,0	140,7	156,3
4½	15,9	8,3	16,5	24,8	33,1	41,3	49,6	57,9	66,1	74,4	82,7	90,9	99,2	115,8	132,3	148,8	165,4
4,8	18,1	9,4	18,8	28,2	37,6	47,0	56,4	65,8	75,3	84,7	94,1	103,5	112,9	131,7	150,5	169,3	188,1
5,0	19,6	10,2	20,4	30,6	40,8	51,0	61,2	71,5	81,7	91,9	102,1	112,3	122,5	142,9	163,3	183,7	204,1
5 7/16	23,2	12,1	24,1	36,2	48,3	60,4	72,4	84,5	96,6	108,6	120,7	132,8	144,9	169,0	193,1	217,3	241,4
5½	23,8	12,4	24,7	37,1	49,4	61,8	74,1	86,5	98,8	111,2	123,5	135,9	148,2	172,9	197,6	222,3	247,0
6,0	28,3	14,7	29,4	44,1	58,8	73,5	88,2	102,9	117,6	132,3	147,0	161,7	176,4	205,8	235,2	264,6	294,0
6½	33,2	17,3	34,5	51,8	69,0	86,3	103,5	120,8	138,0	155,3	172,5	189,8	207,0	241,5	276,0	310,5	345,0
6,8	36,3	18,9	37,8	56,6	75,5	94,4	113,3	132,2	151,0	169,9	188,8	207,7	226,6	264,3	302,1	339,8	377,6
7,0	38,5	20,0	40,0	60,0	80,0	100,0	120,0	140,0	160,1	180,1	200,1	220,1	240,1	280,1	320,1	360,1	400,1
7½	44,2	23,0	45,9	68,9	91,9	114,8	137,8	160,8	183,7	206,7	229,7	252,6	275,6	321,5	367,5	413,4	459,3
8,0	50,3	26,1	52,3	78,4	104,5	130,7	156,8	182,9	209,0	235,2	261,3	287,4	313,6	365,8	418,1	470,4	522,6
8½	56,7	29,5	59,0	88,5	118,0	147,5	177,0	206,5	236,0	265,5	295,0	324,5	354,0	413,0	472,0	531,0	590,0
8,8	60,8	31,6	63,2	94,9	126,5	158,1	189,7	221,3	252,9	284,6	316,2	347,8	379,4	442,7	505,9	569,1	632,4
9½	70,9	36,8	73,7	110,5	147,4	184,2	221,1	257,9	294,8	331,6	368,5	405,3	442,2	515,9	589,6	663,3	737,0
10⅝	88,7	46,1	92,2	138,3	184,4	230,5	276,6	322,6	368,7	414,8	460,9	507,0	553,1	645,3	737,5	829,7	921,9
11,2	98,5	51,2	102,4	153,6	204,9	256,1	307,3	358,5	409,7	460,9	512,2	563,4	614,6	717,0	819,5	921,9	1024,3
12,0	113,1	58,8	117,6	176,4	235,2	294,0	352,8	411,6	470,4	529,1	587,9	646,7	705,5	823,1	940,7	1058,3	1175,9

Ram Ø • Area • Load • Pressure

lbs		1100	1650	2200	3300	4400	5500	6600	7700	8800	10000	11000	13200	15400	17600	19800	22000
Ø inch	in²	psi															
1,4	1,5	714,6	1071,9	1429,1	2143,7	2858,3	3572,9	4287,4	5002,0	5716,6	6496,1	7145,7	8574,9	10004,0	11433,2	12862,3	14291,5
1,6	2,0	547,1	820,6	1094,2	1641,3	2188,4	2735,5	3282,6	3829,7	4376,8	4973,6	5471,0	6565,1	7659,3	8753,5	9847,7	10941,9
1,8	2,5	432,3	648,4	864,5	1296,8	1729,1	2161,4	2593,6	3025,9	3458,2	3929,8	4322,7	5187,3	6051,2	6916,4	7780,9	8645,5
2,0	3,1	350,1	525,2	700,3	1050,4	1400,6	1750,7	2100,8	2451,0	2801,1	3183,1	3501,4	4201,7	4902,0	5602,3	6302,5	7002,8
2,2	3,8	289,4	434,1	578,7	868,1	1157,5	1446,9	1736,2	2025,6	2315,0	2630,7	2893,7	3472,5	4051,2	4630,0	5208,7	5787,5
2½	4,9	224,1	336,1	448,2	672,3	896,4	1120,5	1344,5	1568,6	1792,7	2037,2	2240,9	2689,1	3137,3	3585,4	4033,6	4481,8
2,6	5,3	207,2	310,8	414,4	621,6	828,7	1035,9	1243,1	1450,3	1657,5	1883,5	2071,8	2486,2	2900,6	3314,9	3729,3	4143,7
2¾	5,9	185,2	277,8	370,4	555,6	740,8	926,0	1111,2	1296,4	1481,6	1683,6	1852,0	2222,4	2592,8	2963,2	3333,6	3704,0
3,0	7,1	155,6	233,4	311,2	466,9	622,5	778,1	933,7	1089,3	1244,9	1414,7	1556,2	1867,4	2178,7	2489,9	2801,1	3112,4
3,2	8,0	136,8	205,2	273,5	410,3	547,1	683,9	820,6	957,4	1094,2	1243,4	1367,7	1641,3	1914,8	2188,4	2461,9	2735,5
3½	9,6	114,3	171,5	228,7	343,0	457,3	571,7	686,0	800,3	914,7	1039,4	1143,3	1372,0	1600,6	1829,3	2058,0	2286,6
3,6	10,2	108,1	162,1	216,1	324,2	432,3	540,3	648,4	756,5	864,5	982,4	1080,7	1296,8	1513,0	1729,1	1945,2	2161,4
3,8	11,3	97,0	145,5	194,0	291,0	388,0	485,0	582,0	678,9	775,9	881,7	969,9	1163,9	1357,9	1551,9	1745,9	1939,8
4,0	12,6	87,5	131,3	175,1	262,6	350,1	437,7	525,2	612,7	700,3	795,8	875,4	1050,4	1225,5	1400,6	1575,6	1750,7
4,2	13,9	79,4	119,1	158,8	238,2	317,6	397,0	476,4	555,8	635,2	721,8	794,0	952,8	1111,6	1270,4	1429,1	1587,9
4⅜	15,0	73,2	109,8	146,3	219,5	292,7	365,9	439,0	512,2	585,4	665,2	731,7	878,1	1024,4	1170,8	1317,1	1463,4
4½	15,9	69,2	103,7	138,3	207,5	276,7	345,8	415,0	484,1	553,3	628,8	691,6	830,0	968,3	1106,6	1244,9	1383,3
4,8	18,1	60,8	91,2	121,6	182,4	243,2	303,9	364,7	425,5	486,3	552,6	607,9	729,5	851,0	972,6	1094,2	1215,8
5,0	19,6	56,0	84,0	112,0	168,1	224,1	280,1	336,1	392,2	448,2	509,3	560,2	672,3	784,3	896,4	1008,4	1120,5
5 7/16	23,2	47,4	71,1	94,7	142,1	189,5	236,9	284,2	331,6	379,0	430,6	473,7	568,4	663,2	757,9	852,7	947,4
5½	23,8	46,3	69,4	92,6	138,9	185,2	231,5	277,8	324,1	370,4	420,9	463,0	555,6	648,2	740,8	833,4	926,0
6,0	28,3	38,9	58,4	77,8	116,7	155,6	194,5	233,4	272,3	311,2	353,7	389,0	466,9	544,7	622,5	700,3	778,1
6½	33,2	33,1	49,7	66,3	99,4	132,6	165,7	198,9	232,0	265,2	301,4	331,5	397,8	464,1	530,4	596,7	663,0
6,8	36,3	30,3	45,4	60,6	90,9	121,2	151,4	181,7	212,0	242,3	275,4	302,9	363,5	424,0	484,6	545,2	605,8
7,0	38,5	28,6	42,9	57,2	85,7	114,3	142,9	171,5	200,1	228,7	259,8	285,8	343,0	400,2	457,3	514,5	571,7
7½	44,2	24,9	37,3	49,8	74,7	99,6	124,5	149,4	174,3	199,2	226,4	249,0	298,8	348,6	398,4	448,2	498,0
8,0	50,3	21,9	32,8	43,8	65,7	87,5	109,4	131,3	153,2	175,1	198,9	218,8	262,6	306,4	350,1	393,9	437,7
8½	56,7	19,4	29,1	38,8	58,2	77,5	96,9	116,3	135,7	155,1	176,2	193,8	232,6	271,4	310,2	348,9	387,7
8,8	60,8	18,1	27,1	36,2	54,3	72,3	90,4	108,5	126,6	144,7	164,4	180,9	217,0	253,2	289,4	325,5	361,7
9½	70,9	15,5	23,3	31,0	46,6	62,1	77,6	93,1	108,6	124,1	141,1	155,2	186,2	217,3	248,3	279,3	310,4
10⅝	88,7	12,4	18,6	24,8	37,2	49,6	62,0	74,4	86,8	99,3	112,8	124,1	148,9	173,7	198,5	223,3	248,1
11,2	98,5	11,2	16,7	22,3	33,5	44,7	55,8	67,0	78,2	89,3	101,5	111,7	134,0	156,3	178,6	201,0	223,3
12,0	113,1	9,7	14,6	19,5	29,2	38,9	48,6	58,4	68,1	77,8	88,4	97,3	116,7	136,2	155,6	175,1	194,5

Flow - Pressure Tables (Metric)

S E V

Ram Ø • Area • Speed • Flow

m/sec.		0,05	0,10	0,15	0,20	0,25	0,30	0,35	0,40	0,45	0,50	0,55	0,60	0,70	0,80	0,90	1,00
Ø mm	cm²								l/min.								
35	9,6	2,9	5,8	8,7	11,5	14	17	20	23	26	29	32	35	40	46	52	58
40	12,6	3,8	7,5	11,3	15,1	19	23	26	30	34	38	41	45	53	60	68	75
45	15,9	4,8	9,5	14,3	19,1	24	29	33	38	43	48	52	57	67	76	86	95
50	19,6	5,9	11,8	17,7	23,6	29	35	41	47	53	59	65	71	82	94	106	118
55	23,8	7,1	14,3	21,4	28,5	36	43	50	57	64	71	78	86	100	114	128	143
60	28,3	8,5	17,0	25,4	33,9	42	51	59	68	76	85	93	102	119	136	153	170
65	33,2	10,0	19,9	29,9	39,8	50	60	70	80	90	100	110	119	139	159	179	199
70	38,5	11,5	23,1	34,6	46,2	58	69	81	92	104	115	127	139	162	185	208	231
75	44,2	13,3	26,5	39,8	53,0	66	80	93	106	119	133	146	159	186	212	239	265
80	50,3	15,1	30,2	45,2	60,3	75	90	106	121	136	151	166	181	211	241	271	302
85	56,7	17,0	34,0	51,1	68,1	85	102	119	136	153	170	187	204	238	272	306	340
90	63,6	19,1	38,2	57,3	76,3	95	115	134	153	172	191	210	229	267	305	344	382
95	70,9	21,3	42,5	63,8	85,1	106	128	149	170	191	213	234	255	298	340	383	425
100	78,5	23,6	47,1	70,7	94,2	118	141	165	188	212	236	259	283	330	377	424	471
105	86,6	26,0	52,0	77,9	103,9	130	156	182	208	234	260	286	312	364	416	468	520
110	95,0	28,5	57,0	85,5	114,0	143	171	200	228	257	285	314	342	399	456	513	570
115	103,9	31,2	62,3	93,5	124,6	156	187	218	249	280	312	343	374	436	499	561	623
120	113,1	33,9	67,9	101,8	135,7	170	204	238	271	305	339	373	407	475	543	611	679
125	122,7	36,8	73,6	110,4	147,3	184	221	258	295	331	368	405	442	515	589	663	736
130	132,7	39,8	79,6	119,5	159,3	199	239	279	319	358	398	438	478	557	637	717	796
140	153,9	46,2	92,4	138,5	184,7	231	277	323	369	416	462	508	554	647	739	831	924
150	176,7	53,0	106,0	159,0	212,1	265	318	371	424	477	530	583	636	742	848	954	1060
160	201,1	60,3	120,6	181,0	241,3	302	362	422	483	543	603	664	724	844	965	1086	1206
170	227,0	68,1	136,2	204,3	272,4	340	409	477	545	613	681	749	817	953	1090	1226	1362
180	254,5	76,3	152,7	229,0	305,4	382	458	534	611	687	763	840	916	1069	1221	1374	1527
190	283,5	85,1	170,1	255,2	340,2	425	510	595	680	766	851	936	1021	1191	1361	1531	1701
200	314,2	94,2	188,5	282,7	377,0	471	565	660	754	848	942	1037	1131	1319	1508	1696	1885
210	346,4	103,9	207,8	311,7	415,6	520	623	727	831	935	1039	1143	1247	1455	1663	1870	2078
220	380,1	114,0	228,1	342,1	456,2	570	684	798	912	1026	1140	1254	1368	1597	1825	2053	2281
240	452,4	135,7	271,4	407,2	542,9	679	814	950	1086	1221	1357	1493	1629	1900	2171	2443	2714
260	530,9	159,3	318,6	477,8	637,1	796	956	1115	1274	1434	1593	1752	1911	2230	2548	2867	3186
280	615,8	184,7	369,5	554,2	738,9	924	1108	1293	1478	1663	1847	2032	2217	2586	2956	3325	3695
300	706,9	212,1	424,1	636,2	848,2	1060	1272	1484	1696	1909	2121	2333	2545	2969	3393	3817	4241

Ram Ø • Area • Load • Pressure

kg		500	750	1000	1500	2000	2500	3000	3500	4000	4500	5000	6000	7000	8000	9000	10000
Ø mm	cm²								bar								
35	9,6	51	76	102	153	204	255	306	357	408	459	510	612	714	816	918	1020
40	12,6	39	59	78	117	156	195	234	273	312	351	390	468	546	625	703	781
45	15,9	31	46	62	93	123	154	185	216	247	278	308	370	432	493	555	617
50	19,6	25	38	50	75	100	125	150	175	200	225	250	300	350	400	450	500
55	23,8	21	31	41	62	83	103	124	145	165	186	206	248	289	330	372	413
60	28,3	17	26	35	52	69	87	104	121	139	156	173	208	243	278	312	347
65	33,2	15	22	30	44	59	74	89	103	118	133	148	177	207	237	266	296
70	38,5	13	19	26	38	51	64	76	89	102	115	127	153	178	204	229	255
75	44,2	11	17	22	33	44	56	67	78	89	100	111	133	155	178	200	222
80	50,3	9,8	15	20	29	39	49	59	68	78	88	98	117	137	156	176	195
85	56,7	8,6	13	17	26	35	43	52	61	69	78	86	104	121	138	156	173
90	63,6	7,7	12	15	23	31	39	46	54	62	69	77	93	108	123	139	154
95	70,9	6,9	10	14	21	28	35	42	48	55	62	69	83	97	111	125	138
100	78,5	6,2	9,4	13	19	25	31	38	44	50	56	62	75	87	100	112	125
105	86,6	5,7	8,5	11	17	23	28	34	40	45	51	57	68	79	91	102	113
110	95,0	5,2	7,7	10	16	21	26	31	36	41	47	52	62	72	83	93	103
115	103,9	4,7	7,1	9,4	14	19	24	28	33	38	43	47	57	66	76	85	94
120	113,1	4,3	6,5	8,7	13	17	22	26	30	35	39	43	52	61	69	78	87
125	122,7	4,0	6,0	8,0	12	16	20	24	28	32	36	40	48	56	64	72	80
130	132,7	3,7	5,5	7,4	11	15	19	22	26	30	33	37	44	52	59	67	74
140	153,9	3,2	4,8	6,4	9,6	13	16	19	22	26	29	32	38	45	51	57	64
150	176,7	2,8	4,2	5,6	8,3	11	14	17	19	22	25	28	33	39	44	50	56
160	201,1	2,4	3,7	4,9	7,3	9,8	12	15	17	20	22	24	29	34	39	44	49
170	227,0	2,2	3,2	4,3	6,5	8,6	11	13	15	17	19	22	26	30	35	39	43
180	254,5	1,9	2,9	3,9	5,8	7,7	9,6	12	14	15	17	19	23	27	31	35	39
190	283,5	1,7	2,6	3,5	5,2	6,9	8,6	10	12	14	16	17	21	24	28	31	35
200	314,2	1,6	2,3	3,1	4,7	6,2	7,8	9,4	11	13	14	16	19	22	25	28	31
210	346,4	1,4	2,1	2,8	4,2	5,7	7,1	8,5	9,9	11	13	14	17	20	23	26	28
220	380,1	1,3	1,9	2,6	3,9	5,2	6,5	7,7	9,0	10,3	12	13	16	18	21	23	26
240	452,4	1,1	1,6	2,2	3,3	4,3	5,4	6,5	7,6	8,7	9,8	11	13	15	17	20	22
260	530,9	0,9	1,4	1,8	2,8	3,7	4,6	5,5	6,5	7,4	8,3	9,2	11	13	15	17	19
280	615,8	0,8	1,2	1,6	2,4	3,2	4,0	4,8	5,6	6,4	7,2	8,0	9,6	11	13	14	16
300	706,9	0,7	1,0	1,4	2,1	2,8	3,5	4,2	4,9	5,6	6,2	6,9	8,3	9,7	11	13	14