User Manual – iL10 Flange (UCM/A3 Valve)

Certified by Lift Instituut

EN ISO 9001

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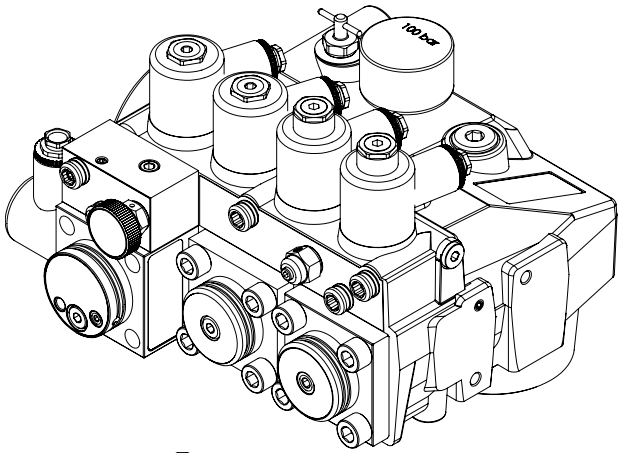
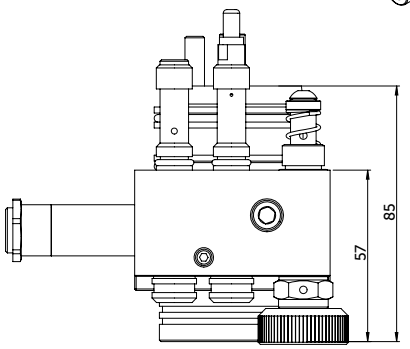
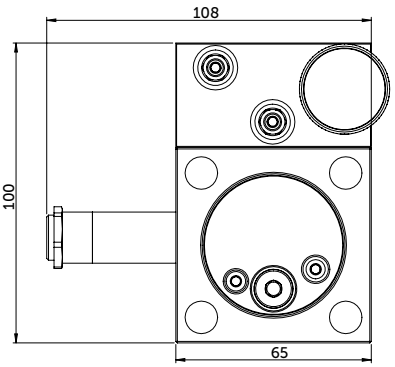
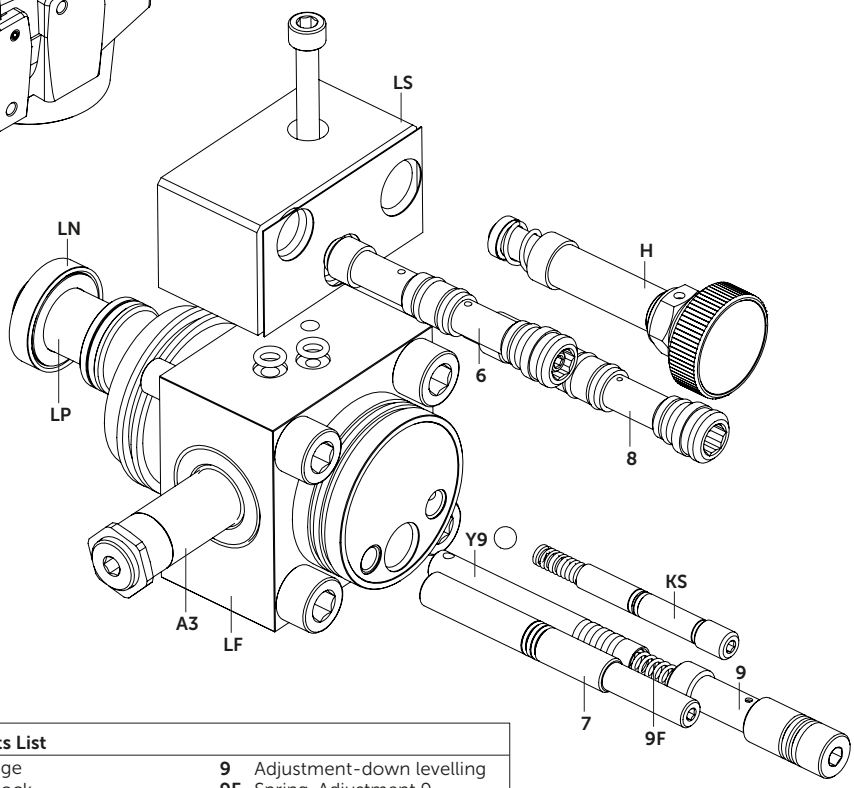
Warning: Only qualified personnel should adjust or service valves. Unauthorised manipulation may result in injury, loss of life or damage to equipment. Prior to servicing internal parts, ensure that the electrical power is switched off, ball valve is closed and residual pressure in the valve is reduced to zero. Very high pressure spikes could result in deformation and oil splashing, this could cause serious injuries.

iL10 Description: The **iL10** flange is a solenoid operated lock valve designed as a safety option against Unintended Car Movement (UCM) for hydraulic elevators. It includes all standard EV valve adjustments as well as a self-closing manual lowering valve. Its purpose is to provide additional safety to lock the down piston **X** at its closed position via a lock piston **LP** in case of UCM situation or while the lift is stationary. Down movement of the lift is only possible by energizing down solenoid coil **D** on the control valve and the solenoid coil **A3** on the **iL10** flange. The **iL10** can be mounted on any Blain **EV**, **SEV** and **EV4** type valves at the size of **1", 1.5"** and **2"**. The existing Blain valves are easily upgradable to satisfy UCM safety by the replacement of the typical EV down flange with the **iL10**.









No.	Parts List		
LF	Flange	**9**	Adjustment-down levelling
LS	S-Block	**9F**	Spring-Adjustment 9
LP	Lock piston	**A3**	iL10 solenoid
LN	Lock piston nut	**H**	Manual lowering
6	Adjustment-down accel.	**Y9**	Levelling valve
7	Adjustment-down speed	**KS**	Slack rope valve
8	Adjustment-down decel.		

Technical Data:		**1" iL10**	**1½" iL10**	**2"iL10**
Flow Range max.:	l/min	200	400	800
Operating Pressure min./max.:	bar	11-80	11-80	11-80
Burst Pressure:	bar	>450	>450	>450
Operating viscosity range:	15 cSt. to 300 cSt. (~9°C to 70°C for ISO VG 46)			
Weight:	1.2 kg			
Max. Oil Temperature:	70°C (158°F)			
Coil voltage ~ (IP 68):	24 V/1.8 A, 42 V/1.0 A, 110 V/0.43 A, 230 V/0.18 A, 50/60 Hz.			
Coil voltage = (IP 68):	12 V/2.0 A, 24 V/1.1 A, 42 V/0.5 A, 48 V/0.6 A, 80 V/0.3 A, 110 V/0.25 A, 196 V/0.14 A.			

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BLAIN HYDRAULICS GmbH

Designer and Manufacturer of the highest quality control valves & safety components for hydraulic elevators

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Rest Position: When **iL10** is at stand-by, the solenoid **A3** de-energized and the down piston **X** is kept closed by the cylinder pressure, **9F** spring and the lock piston **LP**, preventing flow from cylinder to the tank.

Up Travel: During up travel with the pump running, oil flows through the check valve **V** and out through the port **Z** to the main cylinder. Solenoid **A3**, **C** and **D** coils are not energized.

Down Travel: For the car to have a down travel, the **A3** coil of **iL10** should be energized approximately **0.5s** earlier than the main control valve (e.g. EV100). When **A3** and the down coils (D & C) are energized lock piston **LP** and the down piston **X** open allowing the flow of oil from cylinder to the tank (from **Z** to **T**).

As the elevator reaches the stop switch, first the down coil **D** of main control valve (for ex. EV100) is de-energized. About **0.5s** later, the coil A3 is de-energized on the **iL10** valve. In this way, the down piston **X** in the main control valve closes first and the lock piston **LP** in **iL10** locks the down piston **X** at its closed position.

Attention: Not de-energizing the A3 coil might cause internal leakage and sinking of the elevator.

Pressure drop: iL10 does not cause extra pressure loss in the hydraulic system.

Emergency down: The emergency manual lowering **H** on the **iL10** is operated to bring the car down in emergency. The down speed of the car is determined by the setting of adjustment **9** on the **iL10**. **H** is a self-closing valve and when it is open, oil from the cylinder flows back to the tank through the main control valve. There is no extra tank return line needed.

The slack rope valve **KS** prevents the sinking of the ram when the manual lowering **H** is operated at a 2:1 roped elevator to prevent a tangled rope condition.

Control valve adjustment: iL10 valve functions effectively provided that the down travel adjustments on the main control valve are done acceptable. Too long, unacceptable deceleration time may cause stopping distance to be longer than expected. The main control valve is adjusted similar to the EV type valves.

Adjustments

Down Travel: When solenoids **C**, **D** and **A3** are energised, the car will accelerate downwards according to the setting of the adjustments:-

6. Down Acceleration: ‚In' (clockwise) provides a softer down acceleration, ‚out' (c-clockwise) a quicker acceleration.

7. Down Speed: With solenoids **C**, **D** and **A3** energised, the full down speed of the car is according to the setting of adjustment **7**. ‚In' (clockwise) provides a slower down speed, ‚out' (c-clockwise) a faster down speed.

8. Down Deceleration: When solenoid **C** is de-energised whilst solenoid **D** and **A3** remain energised, the car will decelerate according to the setting of adjustment **8**. ‚In' (clockwise) provides a softer deceleration, ‚out' (c-clockwise) a quicker deceleration.

Attention: Do not close all the way in! Closing adjustment 8 completely (clockwise) may cause the car to fall on the buffers.

9. Down Levelling: With solenoid **C** de-energised and solenoid **D** and **A3** energised, the car will proceed at its down levelling speed according to the setting of adjustment **9**. ‚In' (clockwise) provides a slower, ‚out' (c-clockwise) a faster down levelling speed.

Down Stop: When solenoid **D** is de-energised with solenoid **C** remaining de-energised, the car will stop according to the setting of adjustment **8**. After **0.5s** solenoid **A3** should be de-energized.

Manual Down Speed. When the Manual Lowering Knob **H** is opened, the elevator travels down with levelling speed according to the adjustment **9**.

Slack Rope Valve KS: The **KS** is adjusted with a 3 mm allan key by turning the screw **KS** 'in' for higher pressure and 'out' for lower pressure. With **K** turned all the way 'in', then half a turn back out, the unloaded car should descend when Manual Lowering **H** is opened. Should the car not descend, **K** must be backed off until the car just begins to descend, then backed off a further half turn to ensure that with cold oil, the car can be lowered as required.

Functional test

In order to check the functionality of the **iL10** flange, firstly adjust the main control valve so that the elevator will have a comfortable down ride with acceptable deceleration time. To test the **UCM** function, de-energize the coil **A3** (on the **iL10** flange) while the elevator is travelling down. After waiting 1s de-energize **D & C** coils on the control valve as well. The elevator should stop within 800mm down travel.

Attention: Not de-energizing the D coil might cause internal leakage and sinking of the elevator.

Status of lift	Power supply to coil A3	Power supply to coil D	Power supply to coil C
Up travel and relevelling	power off		
Down travel	power on		power on
Down relevelling			power off
Stop with door closed	power off		
Unintended up travel with open doors	motor off once the movement sensor gets triggered		
Unintended down travel with open door	power off once the movement sensor gets triggered	power off 1s after de-energizing A3	
Emergency lowering	power on		power off
Emergency manual lowering	manual actuation		
Hand pump operation	power off		

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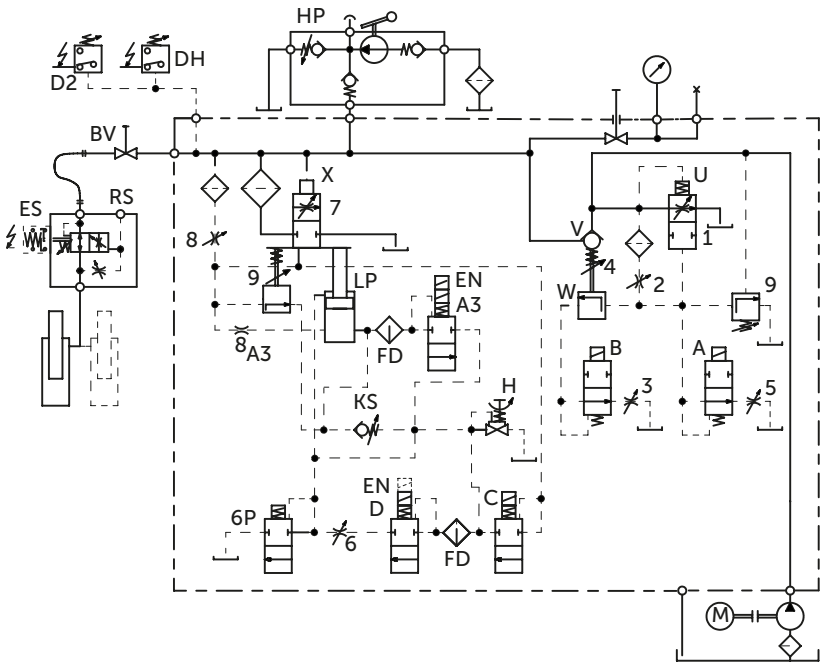
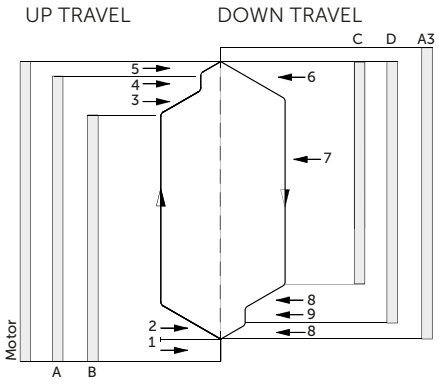
Hydraulic Circuit

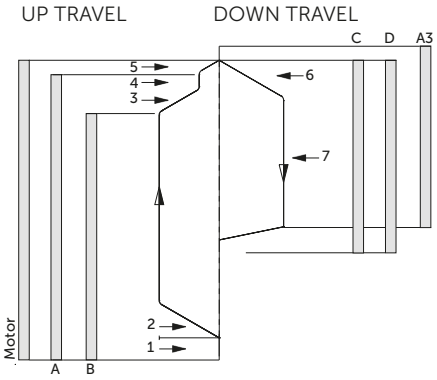


Electrical Sequence

Normal Travel



UCM Case



Maintenance

Regular servicing of the **iL10** is not necessary. Inspection of the **iL10** is recommended at least once a year. If internal leakage has been detected check the parts '**DS**' & '**DN**' under the solenoids **D** and **A3** first, then inspect the O-rings at **V**, **X** and lastly at **H**. Clean solenoid filters **FD** of "A3" and "D".

Control Elements

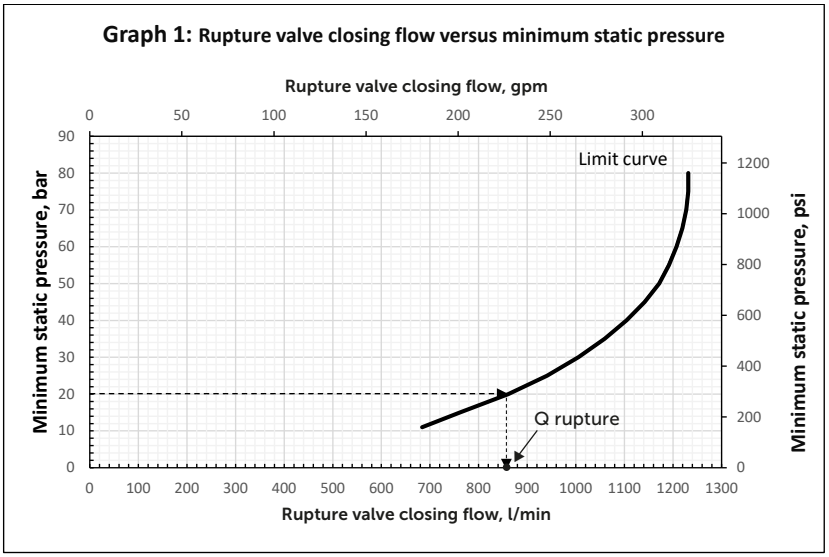
- **C** Solenoid (Down Deceleration)
- **D** Solenoid (Down Stop)
- **A3** Solenoid (UCM)
- **H** Manual Lowering
- **X** Full Speed Valve (Down)
- **LP** Lock Piston
- **KS** Slack Rope Valve

Adjustments DOWN

- **6** Down Acceleration
- **7** Down Full Speed
- **8** Down Deceleration
- **9** Down Levelling Speed

Determining the maximum allowable speed of elevator

Graph 1 shows a limit curve for rupture valve setting. Closing flow of rupture valve should always stay on the left side of the limit curve. In case of a UCM condition, the limit curve assures the stopping distance to be ≤ 800mm with a properly adjusted control valve. In order to obtain the closing flow of rupture valve use the minimum static pressure of the elevator.



Graph 1: Limit curve for maximum closing flow of rupture valve with varying minimum pressure

After finding the closing flow of the rupture valve from **Graph 1**, the maximum allowable nominal speed of the elevator can be calculated by using "**Equation A**" as:-

$$v_{\max\_nom} = (21.22\ x\ \frac{Q_{rupture}}{D^2} - 0.30)\ x\ \frac{n}{m}$$ → Equation A

$v_{\max\_nom}$: Maximum nominal speed of the elevator in m/s

$Q_{rupture}$: Rupture valve closing flow in l/min, taken from Graph 1

D : Ram diameter [mm]

n : suspension ratio (eg. 1:1→ n=1, 2:1 → n=2)

m : Number of cylinders

Example: Finding maximum nominal speed of an elevator having 120mm ram, direct suspension (n=1), with 2 cylinders (m=2) at minimum pressure of 20bar.

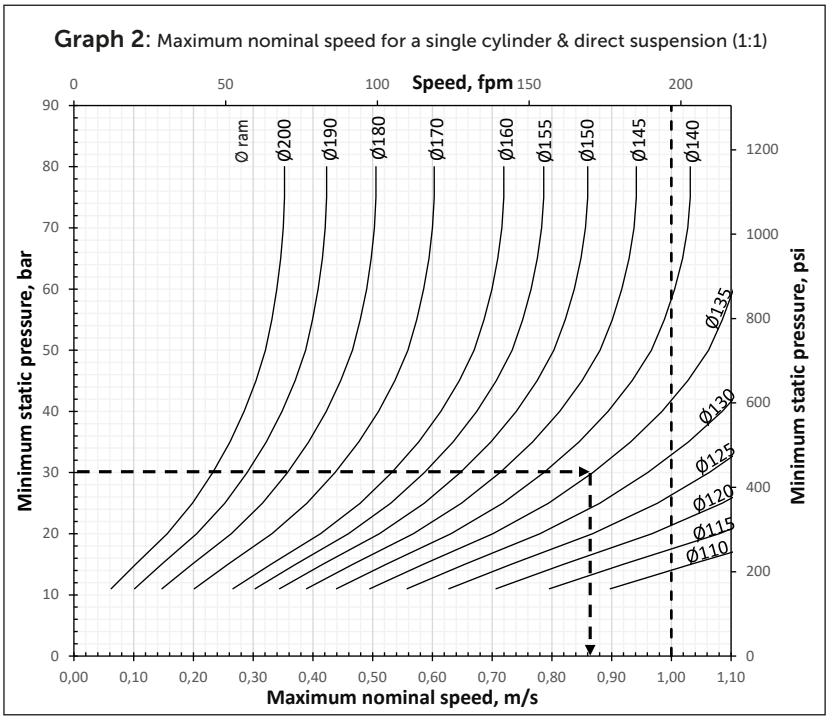
From **Graph 1** rupture valve closing flow can be found as 860 l/min at 20 bar. By applying Equation A maximum nominal speed of the elevator can be;

$$v_{\max\_nom} = \left(21.22\ x\ \frac{860}{120^2} - 0.30\right) x\ \frac{1}{2} = 0.48\ m/s$$

Make sure that down nominal speed of the elevator is smaller than the calculated speed and the rupture valve closing flow is set properly.

Alternatively, **Graph 2** can be used for obtaining the maximum allowable speed of the elevator directly for a single cylinder & direct suspension (1:1). The minimum static pressure should be applied while using the graph. If cylinder ram diameter is smaller than 110mm elevator speed can be taken as 1.0 m/s for a single cylinder with all suspension ratios.

If application has more than 1 cylinder or/and suspension is indirect, like 2:1, the speed reading should be multiplied by the suspension ratio and divided by the number of cylinders. Examples are given below.



Graph 2: Maximum nominal speed for a single cylinder & direct suspension (1:1)

Attention: Graph 2 is given for a single cylinder and direct suspension (1:1). When it is an indirect application (ex. 2:1→ n=2) with **m** number of cylinders, the speed reading should be multiplied by **n/m**. Nominal speed of the elevator cannot be bigger than 1.0 m/s. If ram diameter is smaller than 110mm and there are more than 1 cylinder **Graph 1** and **Equation A** should be used for maximum allowable speed calculation.

Example 1: Finding maximum allowable elevator speed for a 1:1 (direct suspension), 135mm ram diameter (single cylinder) at minimum static pressure of 30bar.

Using the 135mm ram curve, for minimum pressure of 30 bar nominal elevator speed can be found as ~0.87 m/s. That is, elevator speed can be maximum set to 0.87m/s.

Example 2: 2:1 suspension (n=2), 4 cylinders (m=4), ram diameter is 135mm at minimum static pressure of 30bar.
Using the 135mm curve, for minimum pressure of 30 bar nominal elevator speed can be found as ~0.87 m/s. This should be multiplied by 2/4, which gives 0.435 m/s, which is the maximum nominal speed for the elevator.