

# LPU-D

## Hydraulic Data for Double-Acting Operated Actuator



The LPU – (Local Power Unit) comprehends an integrated electro-hydraulic system for remote control of valves and actuators and is especially developed to be bulkhead mounted or mounted directly on valve actuators, primarily onboard ships.

The LPU-D version is used with double-acting actuators requiring hydraulic pressure for operation both for opening and closing the valve.

- Modular design in lightweight materials for safer and easier assembly and maintenance
- Main hydraulic block D acting as rack for the modular design
- Control block D being the heart of the hydraulic functionality
- Easy mounting and adjustment of feedback (DPI) from outside the LPU
- Automatic bleeder enabling free installation of the unit in all directions without the need for repositioning the bleeder
- Variable pump enabling easy speed adjustment for different actuator sizes (200 - 1500 ml/minute)
- Plug connection enabling safe work environment and ease of installation
- Safe oil filling from portable hand pump
- Safe hand pump functionality for safe operation without risk of draining oil out of the unit
- Option for low oil level switch warning (Elite)

## Description

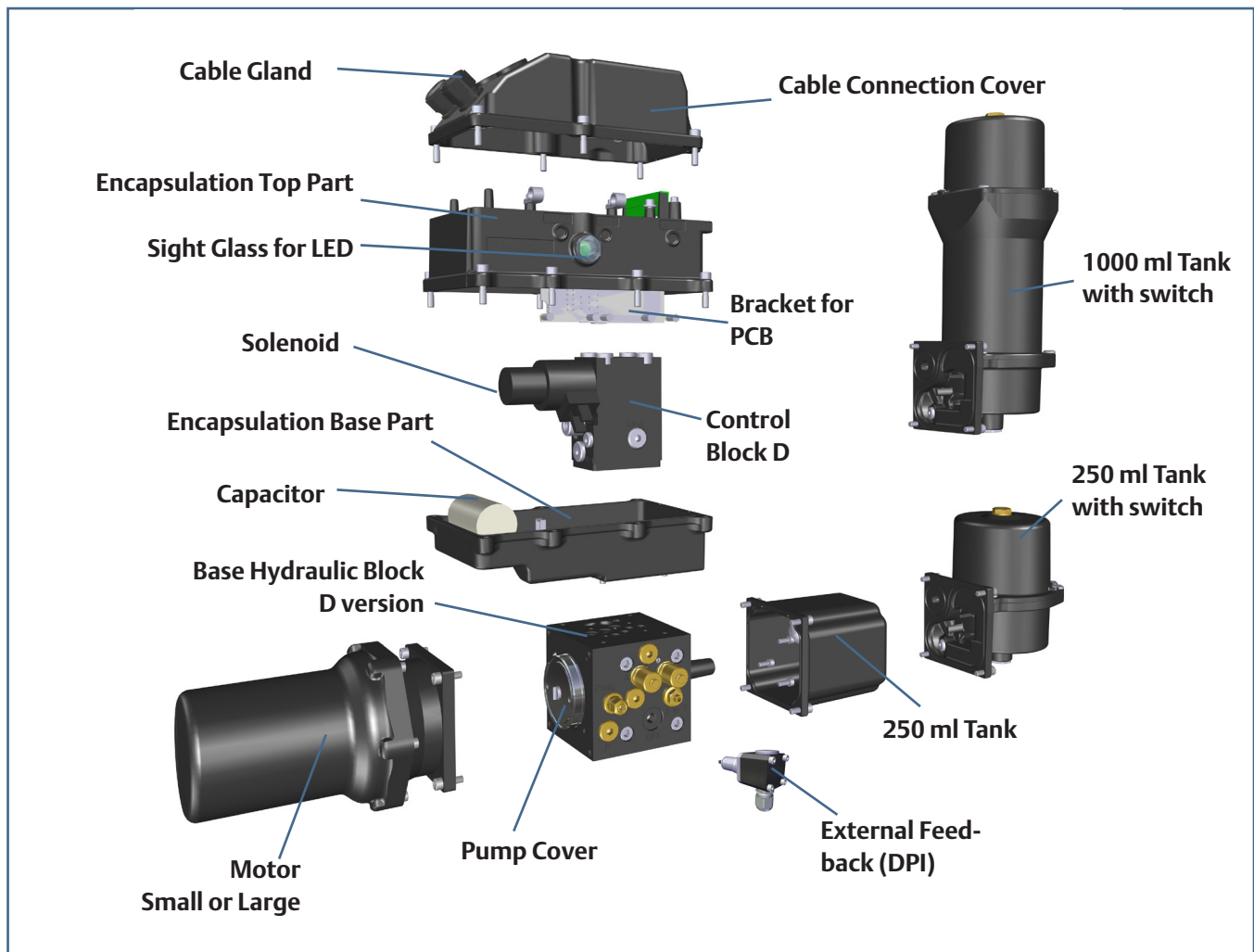
The LPU-D is designed for the control of double-acting actuators requiring hydraulic pressure for operation in both opening and closing the valve. The LPU-D can be mounted either directly on actuator or remotely on bulkhead.

In the modular design of the LPU the Base Hydraulic Block acts as the rack and the Control Block as the heart of the hydraulic function. For LPU-D these blocks are named Base Hydraulic Block D and Control Block D.

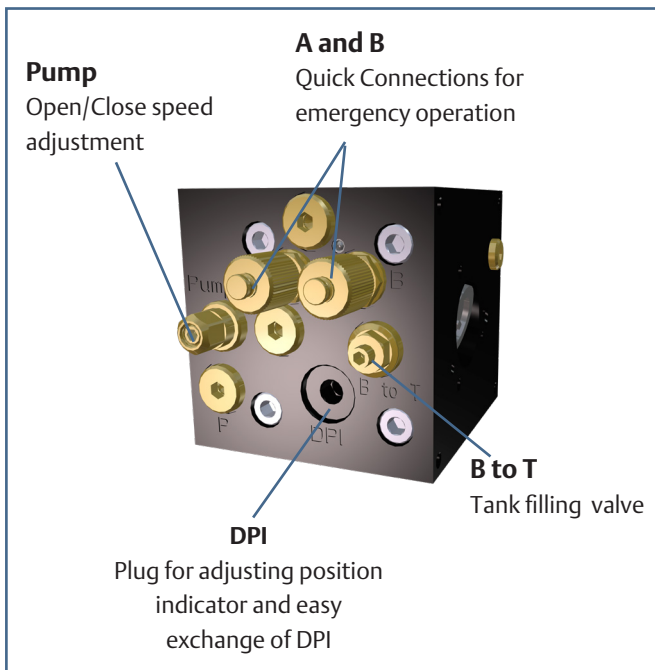
The LPU standard versions comes with several electrical alternatives with different levels of possibilities and functions, such as LPU Basic, Plus, Elite and P-NET.

For further information about the different versions, please see separate PDS.

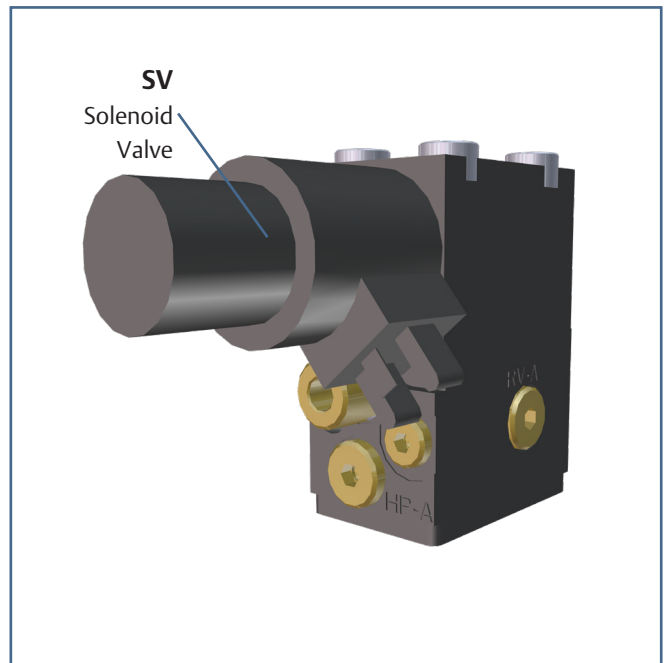
## LPU-D Modules Overview



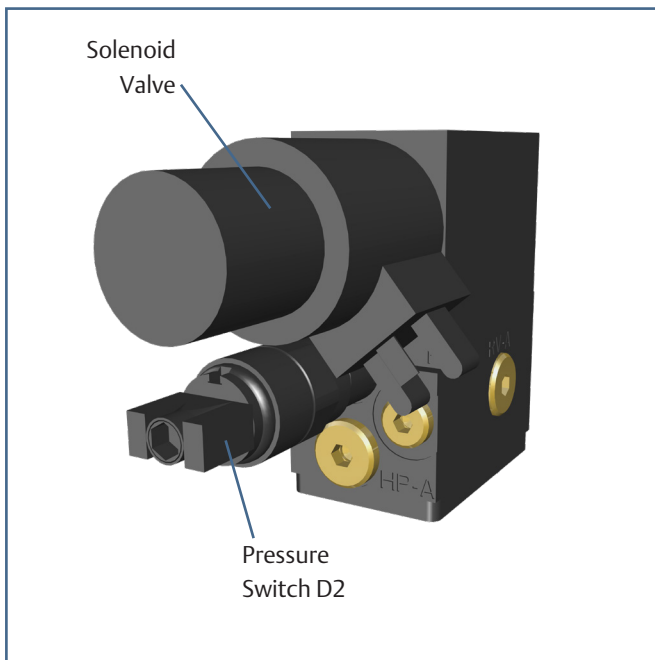
### Base Hydraulic Block D (D)



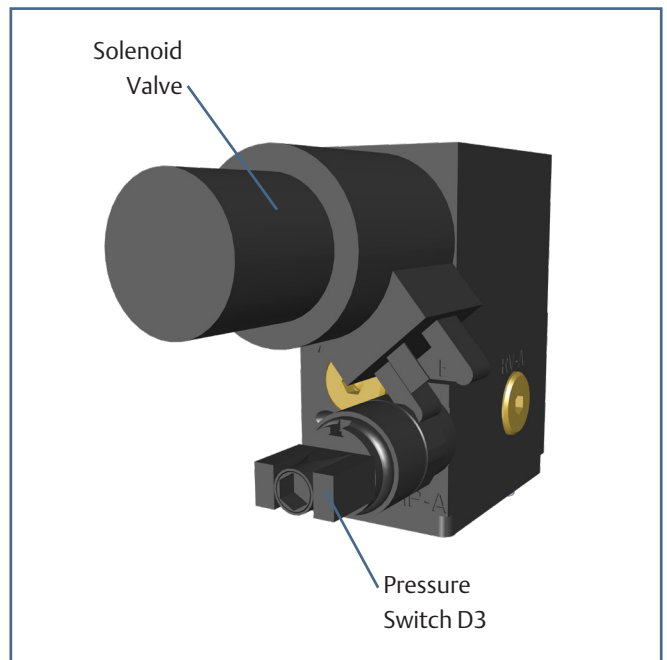
### Control Block D (D1)



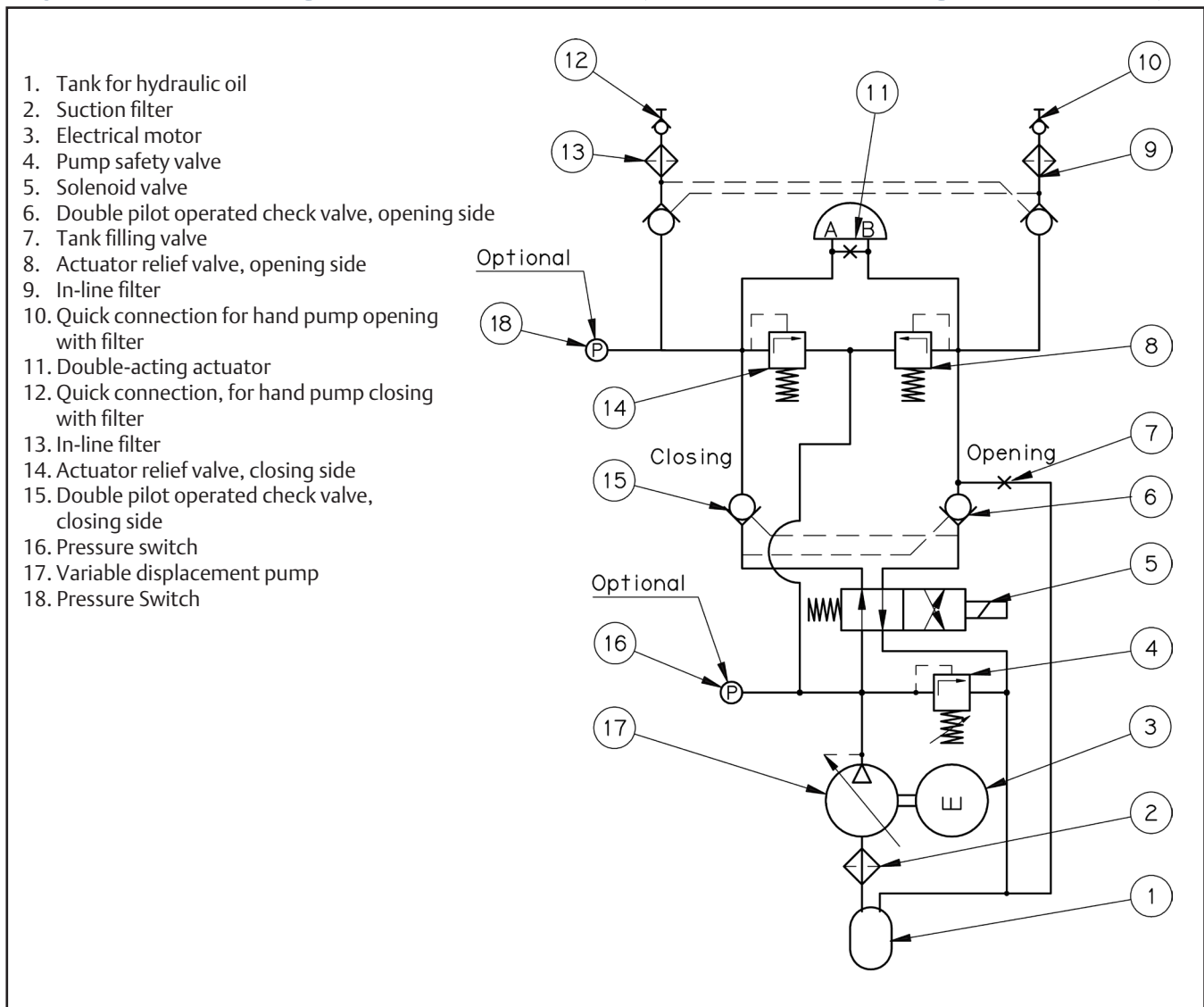
### Control Block D with Pressure Switch (D2) Elite



### Control Block D with Pressure Switch, Power Version (D3) (Spare Parts only)



## Hydraulic Diagram for LPU-D (double-acting actuator)



### Operation LPU-D

When the motor and solenoid valve are activated the oil is sucked from tank through the suction filter to the pump and pumped through the solenoid valve and the pilot operated check valve (6) to the actuator port B. This causes the actuator to open the valve. The oil from actuator port A flows back through the pilot operated check valve (15) (which is opened by the pressure in the B-line) and returns through the solenoid valve to the tank.

When the valve is fully open, the pressure rises to 150 bar, which causes the pump safety valve to open so that the oil flows back to tank. The motor and the solenoid valve are then de-energized.

The actuator is now hydraulically locked in position by the pilot operated check valves.

In case of a major rise in temperature, the pressure may rise. This will not cause any problems because of the actuator relief valve (8) and (14), which will open at approx. 225 bar.

Closing the valve follows exact the same procedure, except that the solenoid valve is not activated which causes the ports A and B to be reversed.

Pressure switch at A-line will ensure closed position of valve. If pressure at closing side for some reason should start dropping the LPU<sup>1</sup> may automatically restart to keep closing pressure up. This is especially useful for KC actuators.

When the motor is running the direction of oil-flow is solely determined by the activation of the solenoid valve.

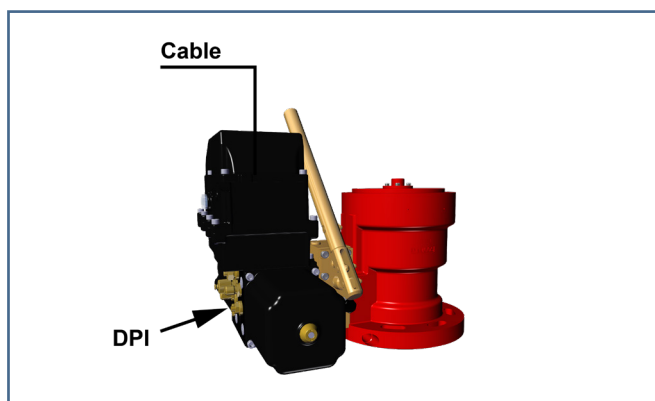
# Emergency Operation

## Options for Double Acting Actuators

### Direct Mounted LPU-D with Handpump

#### DPI Feedback

Direct mounted LPU (BA) with LPU handpump permanently mounted at actuator BRC or KC for emergency operation with DPI feedback. See below.



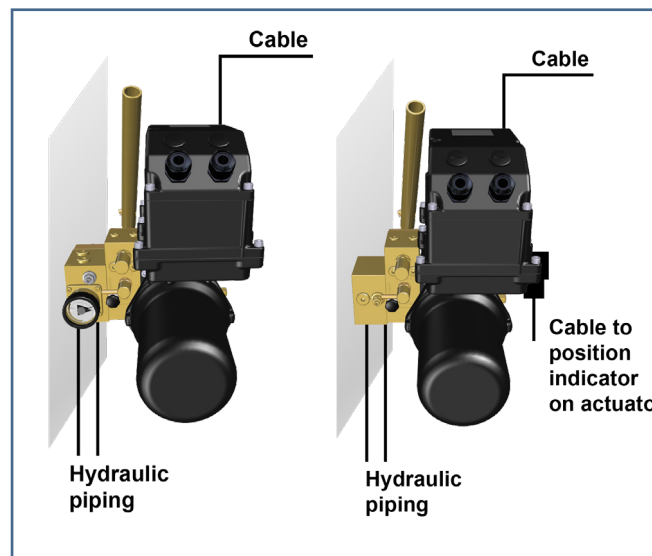
#### Note!

- Small BRC actuators (size 125 – 500 Nm) can alternatively be emergency operated by means of a manual key after opening the bypass valve manually.
- All LPU-D are equipped with quick connections for Emergency operation by Portable handpump.
- All Plus and Elite units can be locally operated by magnets whenever power to the unit is intact 230 VAC and 24 VDC.
- There is no option to have a separate Handpump bulkhead mounted (HP should always be mounted either with Actuator or with LPU).

For more information please read the Reference Manual!

### Bulkhead Mounted LPU with Handpump

The bulkhead mounted LPU (BB) and LPU handpump with pipe connection to actuator BRC or KC can be emergency operated with the below options.



*Bulkhead mounted LPU with HP and VPI feedback (left) and external (DPI) feedback at actuator (right).*

# Hydraulic Functions

## Control Block Function

### Background

The control block ensures proper remote and emergency functions for opening and closing of valve and especially the fail-set function.

### Solution

When activating motor and solenoid valve the actuator/valve will open. When valve is fully opened motor will be stopped and a few seconds later solenoid valve will be de-activated. When activating motor without activating solenoid valve the valve will close. When valve is fully closed motor will be stopped.

When motor is de-activated the valve will be kept in position by means of hydraulic lock.

When emergency opening or closing by handpump the oil will be pumped from handpump to actuator opening port and return oil from actuator will be led back to handpump tank so no oil is added to LPU system during emergency operation. When handpump is not activated any longer the position will be kept by means of hydraulic lock.

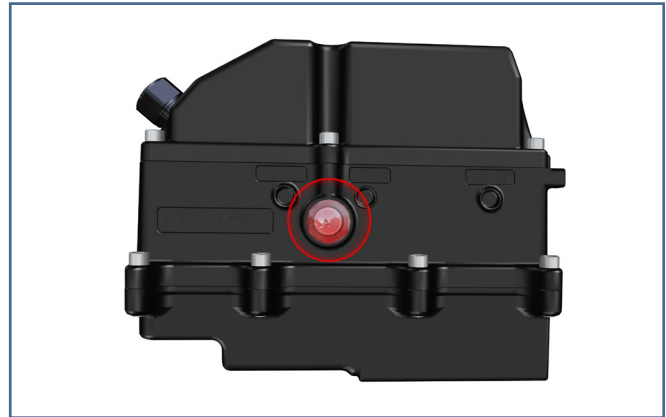
When closing valve after emergency opening this can be done in 2 ways: Turn portable handpump direction valve to close and pump to close or by remotely closing the valve.

Small BRC actuators can alternatively be emergency operated by means of handle to turn shaft directly after opening of by-pass valve.

### Benefits

- Remote operation by activating/deactivating motor and solenoid valve
- Emergency operating by use of firmly mounted handpump or portable handpump
- Remote control after handpump operation will automatically be engaged
- No risk of oil emptying due to wrong handling of emergency operation
- Possibility of pressure switch to ensure “keep-closed function”
- Release valves to avoid major pressure increase due to heating of oil

## Feedback Adjustment Function



### Background

It will be of advantage to adjust position feedback without opening the electrical compartment.

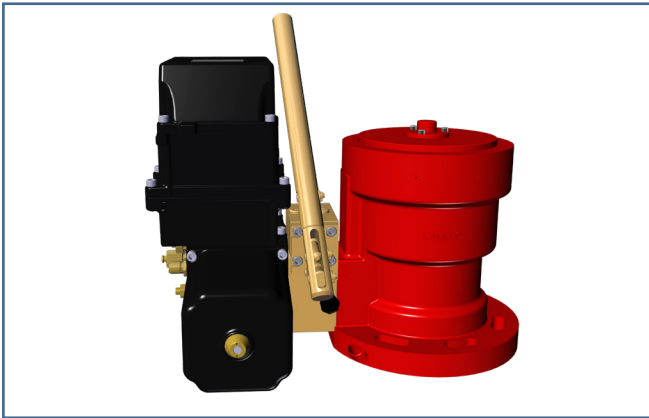
### Solution

Activating the ADJUST function (Plus and Elite) the internal LED will help adjusting position indicator by use of a combination of LED light and blinking. Position indicator can thus be adjusted to the right level.

### Benefits

- Easy adjustment of position indicator without opening cover of LPU

## Safe Handpump Function



### Background

The LPU is developed with several safety functions and equipment to secure a smooth and safe use at all times, following regulations and handling instructions.

A firmly mounted handpump is used for emergency operation. A portable handpump is used for emergency operation or filling of oil into LPU and Actuator.

### Solution

All LPUs are provided with quick connections for connection of a portable hand pump for emergency operation of the valve.

### Benefits

- Quick connections on front of the LPU for the portable handpump
- The firmly mounted HP-LPU can be used with all double-acting Damcos actuators such as BRC and KC actuators
- The firmly mounted handpump offers fast emergency operation without need of any other remote facilities
- Safe operating of handpump without risk of draining oil out of the unit
- Portable handpump can be used for filling of oil into LPU and Actuator

## Auto Bleeder Function



### Background

The bleeder function is necessary when oil is filled into the LPU and hence the position of the bleed valve was of utmost importance in earlier installations. Depending on orientation of the LPU the bleed valve was repositioned to the highest point involving extra steps at installation and service.

### Solution

For the new LPU the automatic bleeder function is redesigned and will enable free installation of the LPU in all directions without disassemble the bleeder. This will ease the installation and reduce the number of opening points and hence minimize the risk of introducing dirt into the system.

### Benefits

- No repositioning of the bleed valve due to automatic bleeder function - independent of installation orientation
- Reduced risk of introducing dirt into the system

# Operation Speed at Different Actuators

## Operation Speed

Operation speed is adjusted at valve in front of the LPU. Operating speed is only slightly dependent on valve torque and oil viscosity.

## Intermediate Positions

The LPU-D is mostly used for on/off uses, but intermediate positions will be possible as well. If intermediate position is requested the LPU-motor is simply stopped when the correct position is reached.

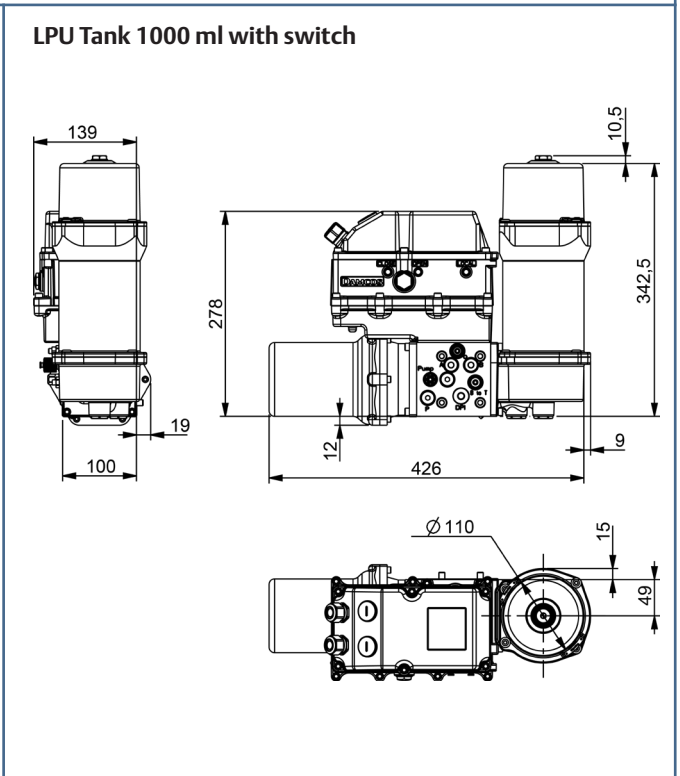
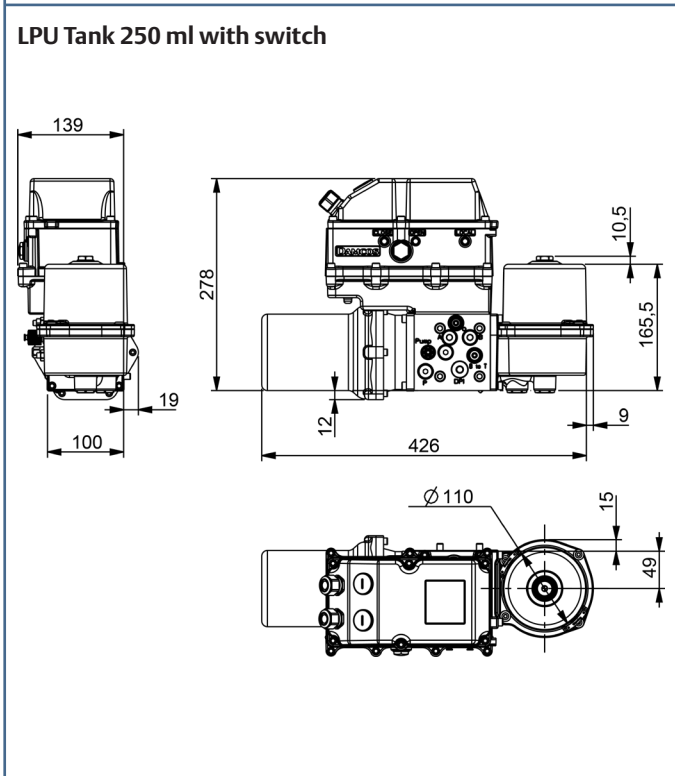
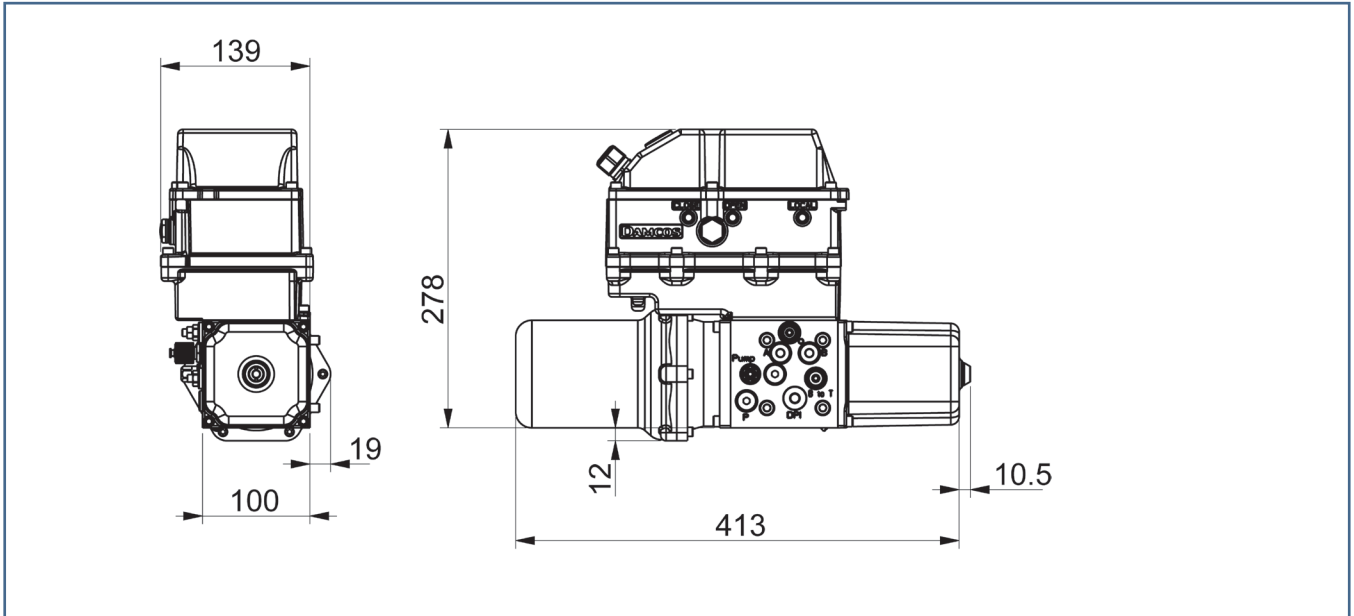
Approximate minimum operating time (seconds) for actuator equipped with LPU-D					
Actuator	Oil displacement (ml)	Small pump		Large pump	
		50 Hz	60 Hz	50 Hz	60 Hz
BRC 125	26	2	2	N/A	N/A
BRC 250	50	4	3	N/A	N/A
BRC 500	102	8	7	N/A	N/A
BRC 1000	209	17	14	N/A	N/A
BRC 2000	400	32	27	16	13
BRC 4000	800	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>	32	27
BRC 8000	1600	N/A	N/A	63	53
BRC 16000	3100	N/A	N/A	122	102
KC 65	21	2	1.5	N/A	N/A
KC 125	82	7	6	N/A	N/A
KC 250	428	34	29	17	14
KC 325	793	N/A	N/A	32	26
KC 400	1700	N/A	N/A	68	57
KC 600	3360	N/A	N/A	144	120

(1) BRC 4000 can be driven by small pump if it is mounted on a larger valve.



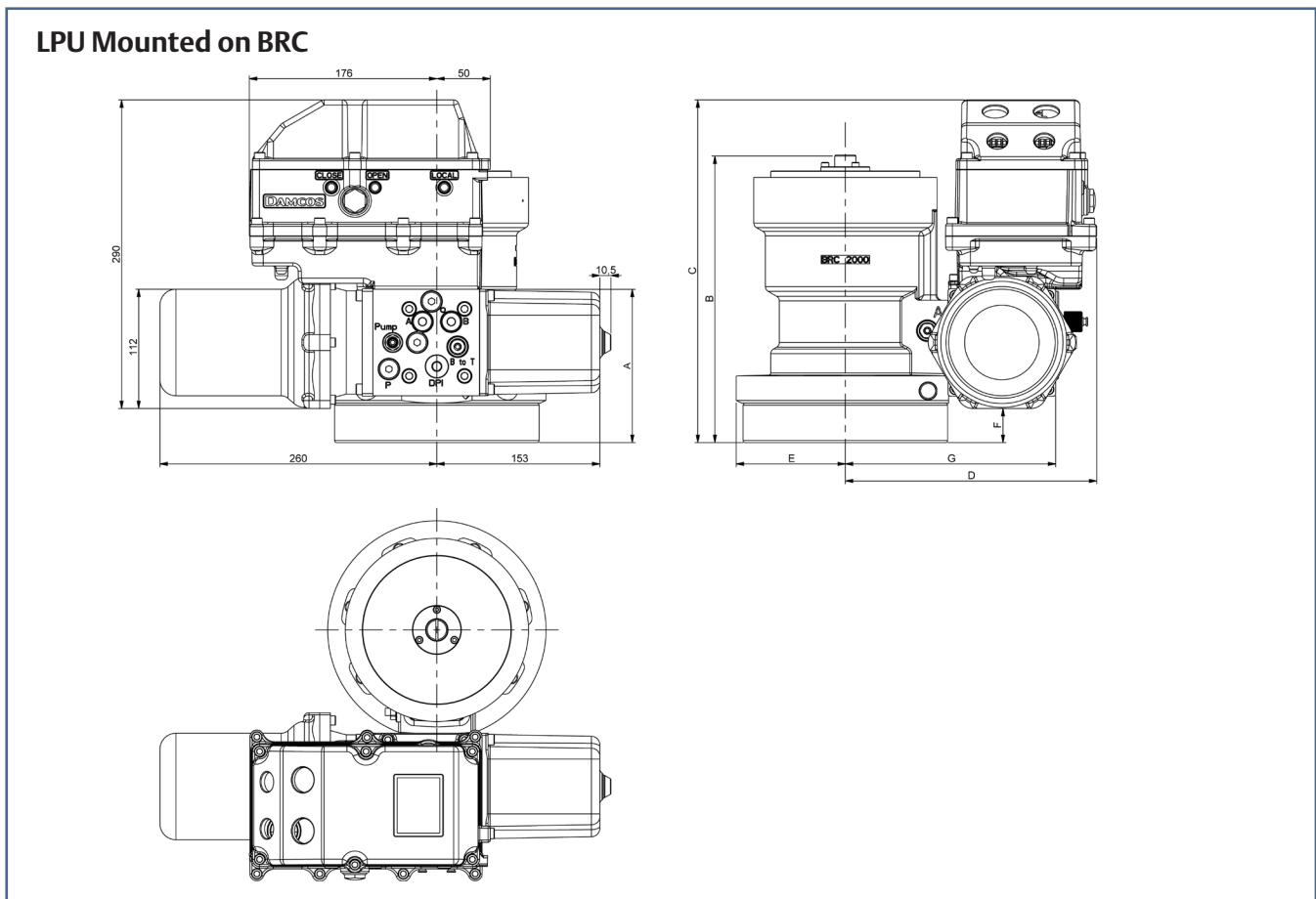
# Technical Data

## Main Dimensions



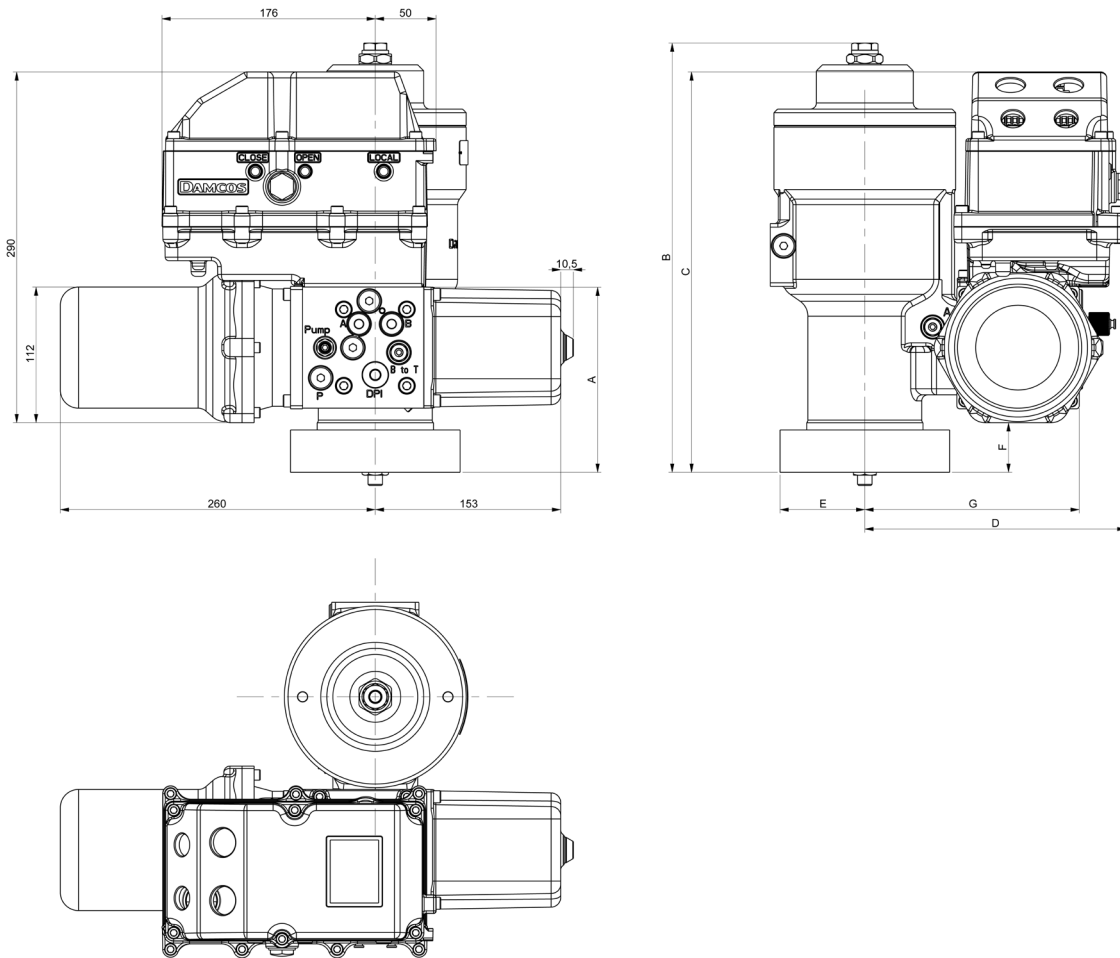
All dimensions in mm

## Mounting on Actuator - Dimensions



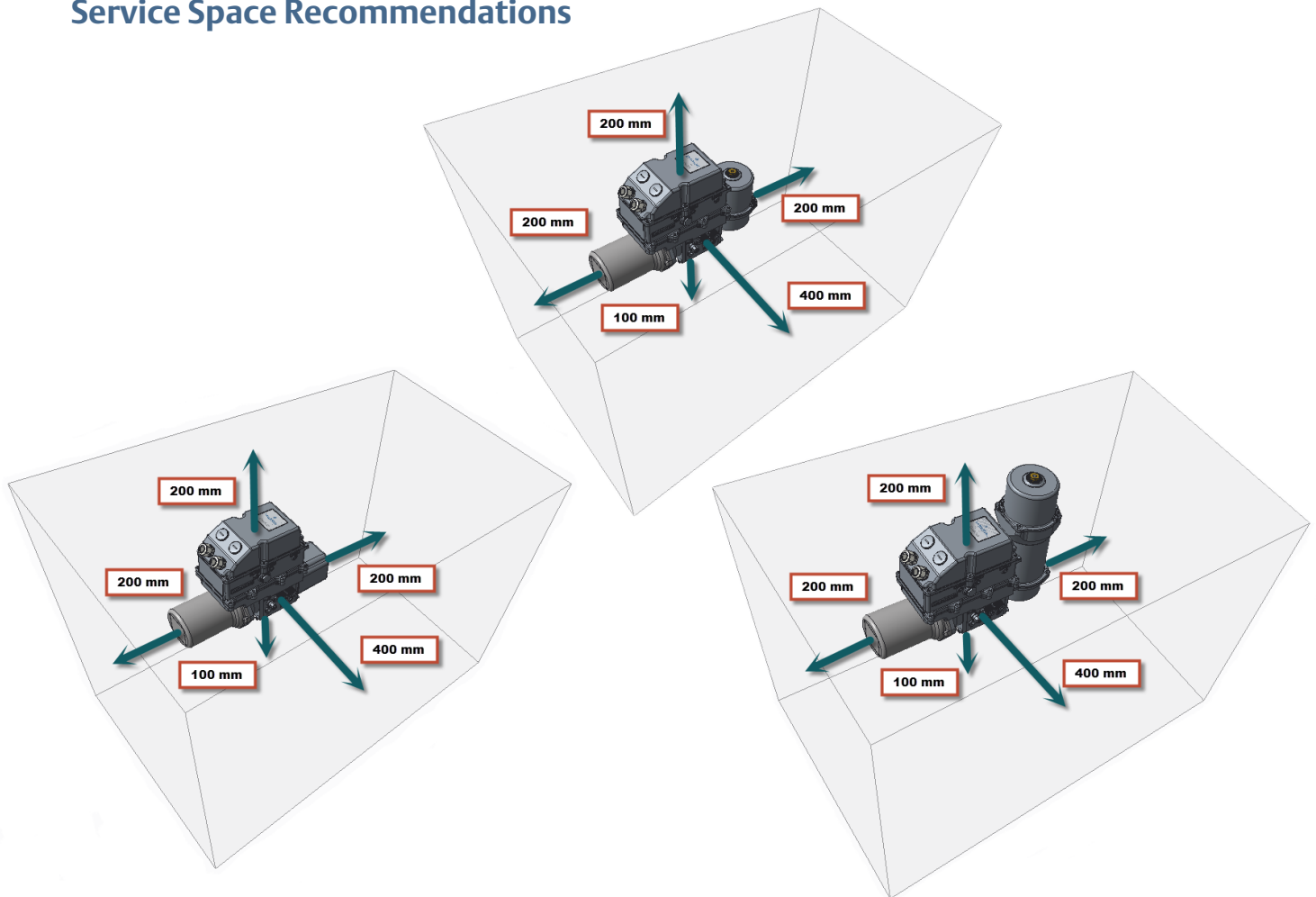
Dimension BRC Sizes							
Actuator	A	B	C	D	E	F	G
BRC 125	116.5	149.5	294.5	192	48	4.5	153.5
BRC 250	121	174.5	299	199	59	9	160.5
BRC 500	124.5	199	302.5	212	66	12.5	173.5
BRC 1000	133	229	311	224	80	21	185
BRC 2000	144	271	322	236	102.5	32	197.5
BRC 4000	153	319	331	264	150	41	225
BRC 8000	181.5	380	360	297	157	69.5	257.5
BRC 16000	203	470	381	320	178.5	91	280.5

**LPU Mounted on KC**



Dimension KC Sizes							
Actuator	A	B	C	D	E	F	G
KC 65	115.5	157	293	185.5	38	3.5	147
KC 125	123	202	300.5	187.5	45	11	149
KC 250	153	353	330.5	215.5	70	41	177
KC 325	176.5	478	353.5	241	102.5	64.5	202.5
KC 400	195.5	530	372.5	241	102.5	83.5	202.5
KC 600	274	612	451.5	283.5	115	162	245

## Service Space Recommendations



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