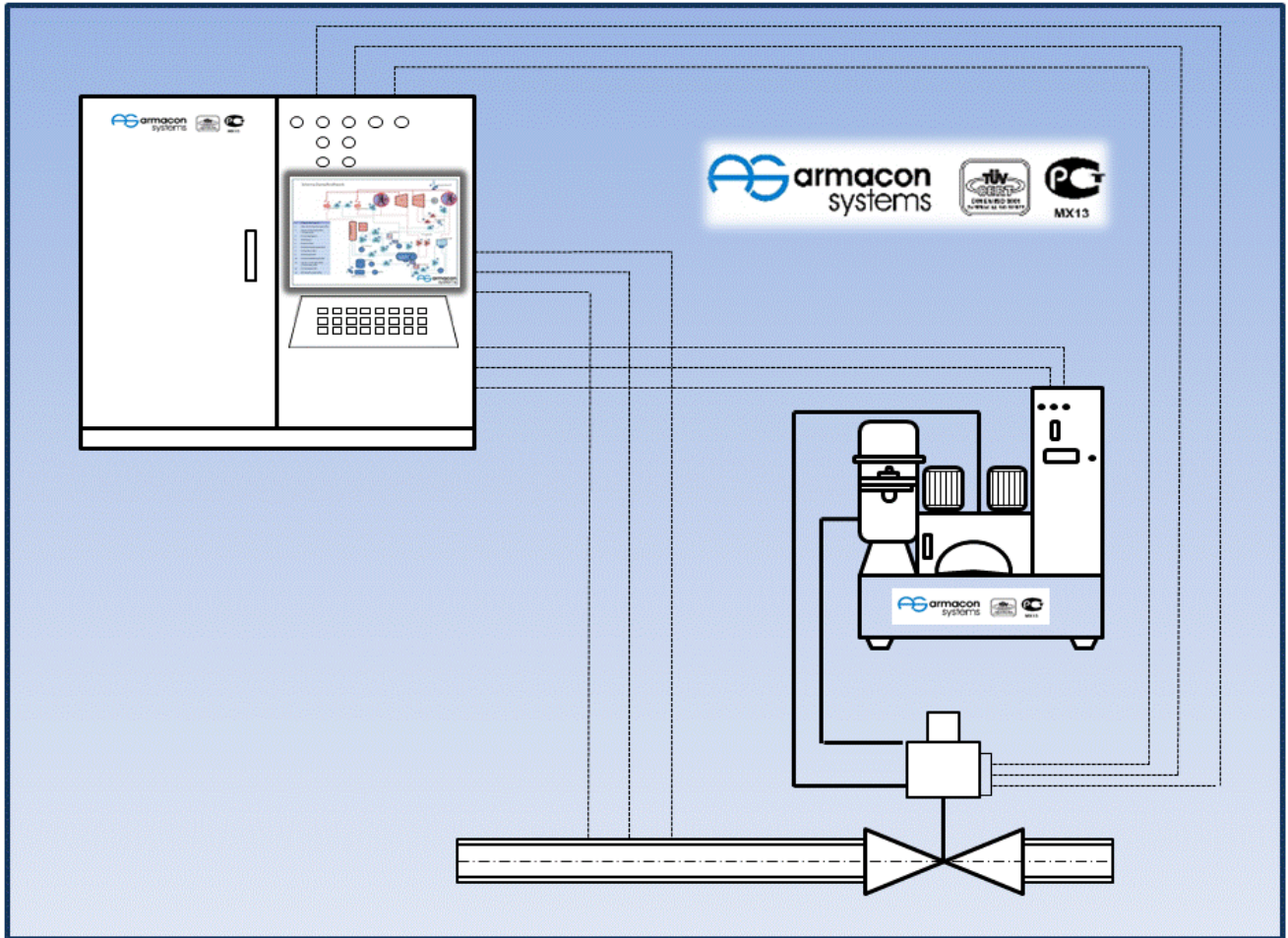


# control systems



Hydraulic

Pneumatic

Electric



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**Bankverbindung**

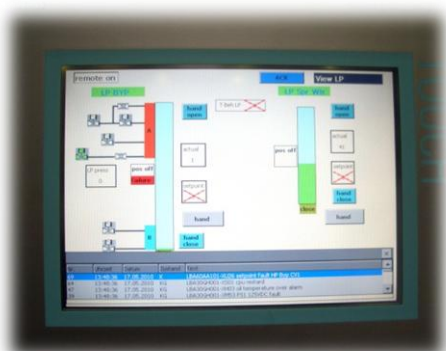
Volksbank Börde-Bernburg eG  
BLZ 810 690 52,  
Kto-Nr. 7324928  
BIC GENODEF1WZL  
IBAN DE 66 8106 9052 000 732 4928

**Geschäftsführerin**

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**Handelsregister**

AG Magdeburg HRB 14479  
USt.-Id.Nr.: DE 237919303  
St.-Nr.: 102/105/12921



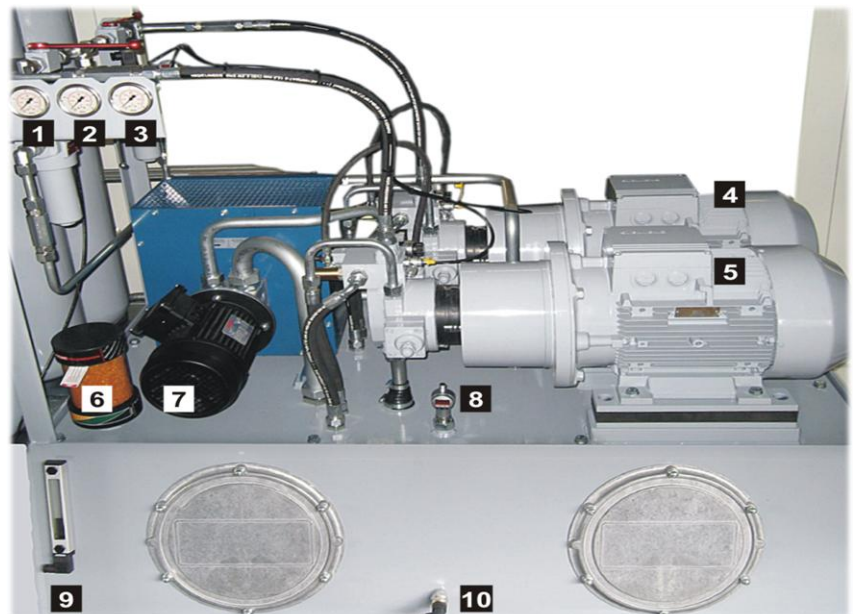
## Operation



The hydraulic aggregate feeds to the hydraulic cylinders on the HP/LP bypass valves and the hydraulic cylinders on the corresponding spray water control valves.

The aggregate provides the following features:

- 2 strokes on-off when pump is failing
- Fast opening/closing in less than 3 seconds
- Blocking when control voltage is lost



Pos.	KKS Number	Component
1	10/20LBA30 CP010	pressure indicator LBA30 BB001-003
2	10/20LBA30 CP008	pressure indicator LBA30AP002
3	10/20LBA30 CP006	pressure indicator LBA30AP002
4	10/20LBA30 AP001-M001	motor hydraulic pump 1
5	10/20LBA30 AP002-M001	motor hydraulic pump 2
6	10/20LBA30 AT101	filter
7	10/20LBA30 P003-M001	motor hydraulic cooler
8	10/20LBA30 CL001	Liquid level transmitter
9	10/20LBA30 CL101	oil level indicator
10	10/20LBA30 CT101	temperature indicator

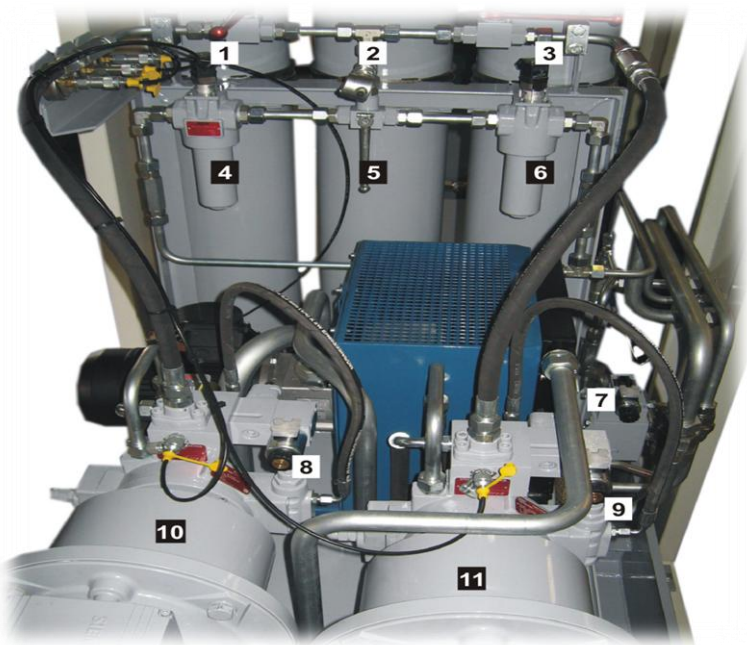
## Pressure generation

2 redundant radial piston pumps are available for the generation of system pressure. One of these 2 pumps will run continuously in an ordinary operating mode holding a steady system pressure on 260 bar. The special capacity of these radial piston pumps is the independent regulation of the flow rate, minimizing heat generation.

- The system pressure of 260 bar is controlled by pressure limitation valves (LBA30AS001), (LBA30AS003).
- The pressure limitation valves (LBA30AS002);(LBA30AS004) were adjusted at 280 bar to protect the pumps from overpressure.
- Valves (LBA30AA710), (LBA30AA711) assure low pressure start-up of the pumps as well as the unburden of the pumps in case flow of oil is not required over an extended amount of time (e.g. full storage, all pistons in coincidence position)
- The pumps are switched over automatically in case:
  - the high thermal load switch for the pump engine is triggered.
  - pressure is not generated (e.g. pump out of order).
  - Furthermore the pumps can be switched over manually.



*General shutdown of the pumps will occur at minimal oil level as a pipeline crack may be likely.*



Pos.	KKS Number	Component
1	10/20LBA30 CP004	D-Pressure switch filter
2	10/20LBA30 CP007	
3	10/20LBA30 CP005	D-Pressure switch filter
4	10/20LBA30 AT002	oil filter
5	10/20LBA30 AA720	3/2 way ball valve
6	10/20LBA30 AT001	oil filter
7	10/20LBA30 AA709	valve accumulator
8	10/20LBA30 AA710	valve load relieving pump 1
9	10/20LBA30 AA711	valve load relieving pump 2
10	10/20LBA30 AP001-M001	motor hydraulic pump 1
11	10/20LBA30 AP002-M001	motor hydraulic pump 2

Pos.	KKS Number	Component
1	10/20LBX30 BB001	bladder accumulator 1
2	10/20LBX30 BB002	bladder accumulator 2
3	10/20LBX30 BB003	bladder accumulator 3
4	10/20LBA30 AS001	pressure limitation valve
5	10/20LBA30 CP003	pressure transmitter



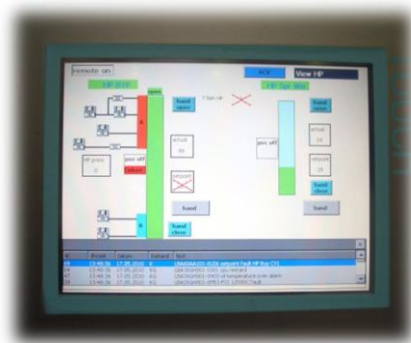
## Monitoring

The following monitoring signals are generated for the hydraulic medium (oil):

- systemic pressure – pressure sensor (LBA30CP001)
- oil level – level sensor (LBA30CL001)
- oil temperature – temperature sensor (LBA30CT001)
- filter dirty – differential pressure sensor (LBA30CP004), (LBA30CP005)
- The signal 'oil temperature' controls the oil-air-heat exchanger.
- The signal 'filter dirty' indicates when a filter replacement is necessary.



*The filter can be replaced in operating mode after a manual switch over to the redundant filter using the 3/2 way ball valve (0070).*



### Standard operation



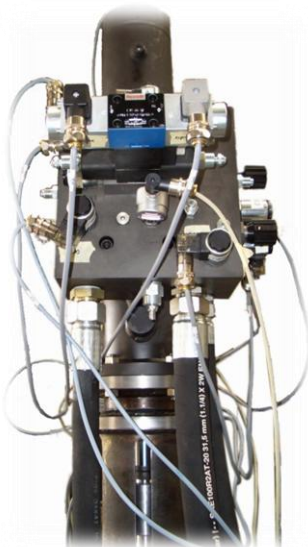
Because of the independent flow rate regulation the maximum flow capacity is available for both, charging the accumulators as well as the ordinary operating mode via the proportional valves when a pump is turned on.

The accumulators are charging until the operating pressure of 260 bar is reached. The charging status is monitored by the pressure sensors (LBA30CP002). In ordinary operating mode the pilot valve (LBA30AA709) is energised so that the cartridge valve (LBA30AA700) is closed.

The non return valve (0165) inhibits discharge of the accumulators. Should both pumps fail, the oil accumulator battery will deliver the energy necessary for 2 on-off strokes.

In this case the valve (LBA30AA709) is de-energised, releasing the cartridge valve (LBA30AA700) and the flow of oil from the accumulator. The normal positioning of the hydraulic cylinders will be carried out by the proportional valves of the respective control blocks.

### Fast open / fast close



The energy required for the fast open / fast close function is released when the cartridge valves (LBA30AA700) are opened.

The fast open / fast close function of the spray water control valves will be carried out through the proportional valve by target of set points 4 mA or 20 mA.

The hydraulic cylinders of the LP/HP bypass will fast-extend or fast-retract through triggering of the respective valves on the hydraulic blocks.

The speed is controlled by the throttling valve (LBA30AS006).