ULTRONICS ZTS16
Control Architecture

DEFINITIONS

Upstream spool / work port
This refers to the spool / work port that is metering oil from supply to the service.

Downstream spool / work port
This refers to the spool / work port that is metering oil from the service back to tank.

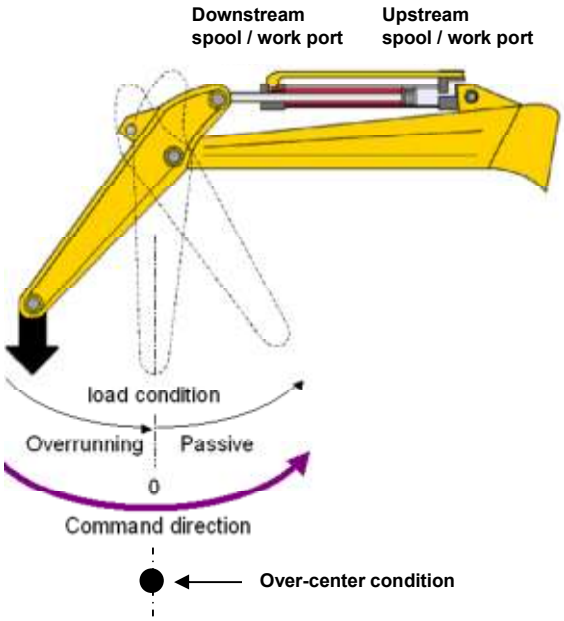
Passive flow condition
Passive flow requires supply pressure to push the flow.

Overrunning flow condition
Overrunning has a trapped or self-generated pressure that can be leveraged to cause flow.

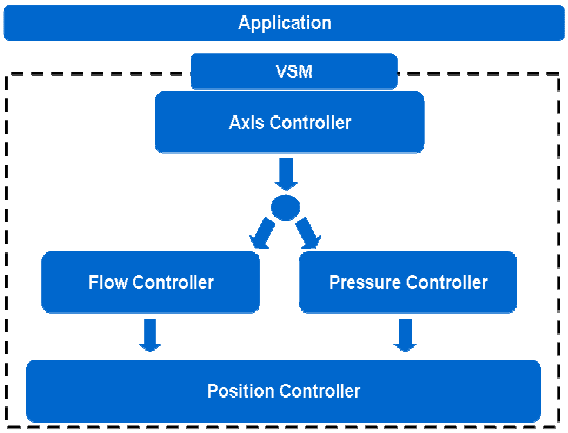
Over-center condition:
This exists when up-stream and down-stream locations are swapped without a change in direction of the actuator.

Typically this condition is due to the geometry and orientation of the actuator in relation to the load.

The diagram below shows the above definitions applied to an excavator arm application:

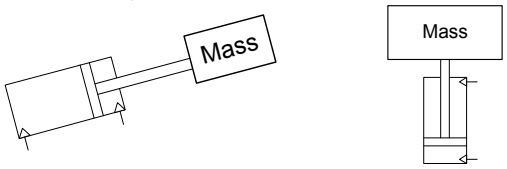


CONTROL ARCHITECTURE

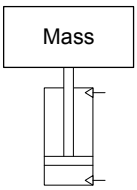


CONTROL MODES

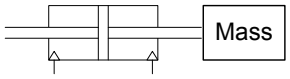
Universal Flow Control (UFC)
Used where it is necessary to control cylinders subject to gravity conditions during normal operations.



High Gravity Assist (HGA)
Used where the load presented *on* the cylinder is <u>always</u> significantly greater than any load created *by* the cylinder (e.g., running resistance due to seal friction).



Non Gravity Assist (NGA)
Used in situations where the load is inertial rather than generated by an external load e.g. slewing or swing services.



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CONTROL FEATURES

Load drop protection

- ZTS16 does not contain mechanical load drop check valves.
- Instead, the anti-fall back algorithm will not open service to pressure until predetermined margin is reached.

Float

- The float controller provides additional safety and control. It opens the spool to a small configurable orifice size and does not allow it to fully open until port pressure drops below a configurable limit.
- This prevents, for example, services from being dropped to the ground when they are still in the air and the float command is issued.

Shake

- The valve will superimpose a square wave on top of the flow demand to that service.
- Can be used to clear aggregate from bucket, perform ground compacting operations.
- Function can be linked to button on an Ultronics joystick.

Airbleed

- This function is designed to mitigate any air that is trapped in the pilot sections.
- It achieves this by cycling the spools in a square wave centered on zero.
- It is typically carried out after:

Training

- ***Valve training:*** A process where position control gains for the main stage spools are set adaptively.
- ***Application training:*** Used with variable displacement inlet to determine pump response based on supply line etc.

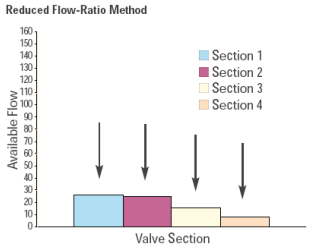
Soft Dig

- This allows users to set a maximum digging force (pressure) in order to avoid uprooting pipes etc.
- This feature is not limited to digging; can be applied to other services that have analogous functionality.

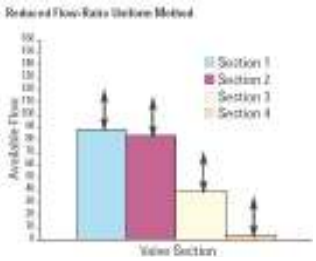
Flow Share

- Used when there is insufficient flow to satisfy all service requirements.
- Assume the full flow requirement to each valve section is defined as shown below:

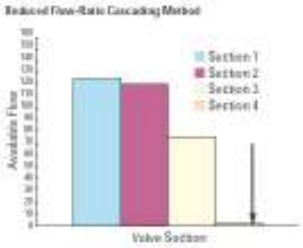
- ***Ratio***
  All non-priority flow demands reduced by the same relative amount; i.e., the same percentage.



- ***Uniform***
  Reduces all non-priority flow demands by the same actual amount.



- ***Cascade***
  Will reduce non-priority flow demands according to an assigned priority rating.



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