



SMITH
FLOW CONTROL LTD

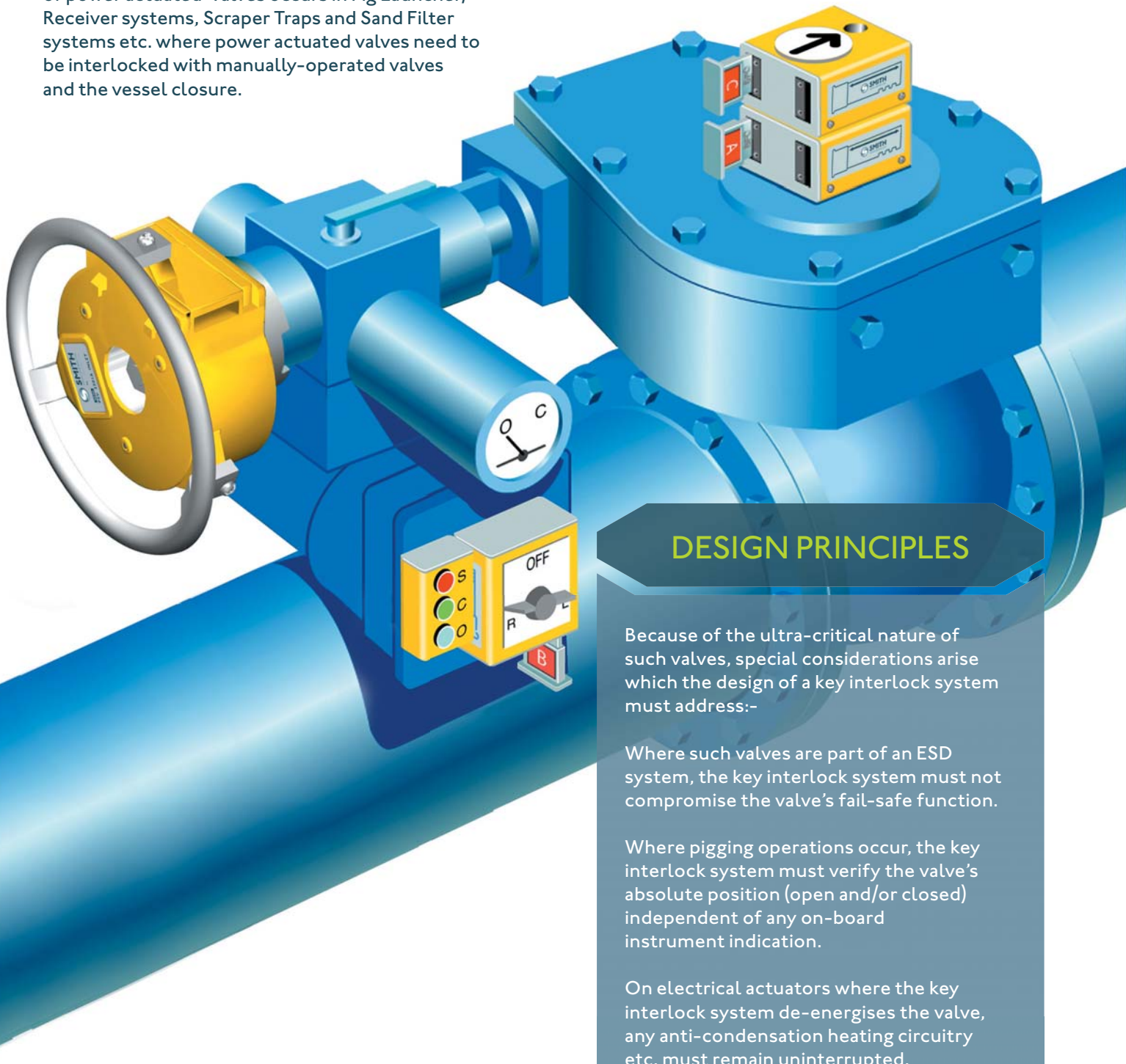
SFC KEY INTERLOCKS & PROCESS MANAGEMENT SYSTEMS



INTERLOCK DEVICES FOR ACTUATED (MOV) VALVES

ACTUATED VALVES

The most common requirement for key interlocking of power actuated-valves occurs in Pig Launcher/ Receiver systems, Scraper Traps and Sand Filter systems etc. where power actuated valves need to be interlocked with manually-operated valves and the vessel closure.



DESIGN PRINCIPLES

Because of the ultra-critical nature of such valves, special considerations arise which the design of a key interlock system must address:-

Where such valves are part of an ESD system, the key interlock system must not compromise the valve's fail-safe function.

Where pigging operations occur, the key interlock system must verify the valve's absolute position (open and/or closed) independent of any on-board instrument indication.

On electrical actuators where the key interlock system de-energises the valve, any anti-condensation heating circuitry etc. must remain uninterrupted.

Where actuators are equipped with a manual override facility, the key interlock system must permit operation of the valve in both modes (or in a combination of both modes - e.g. in the event of a power failure) while maintaining the integrity of the key sequence at all times.

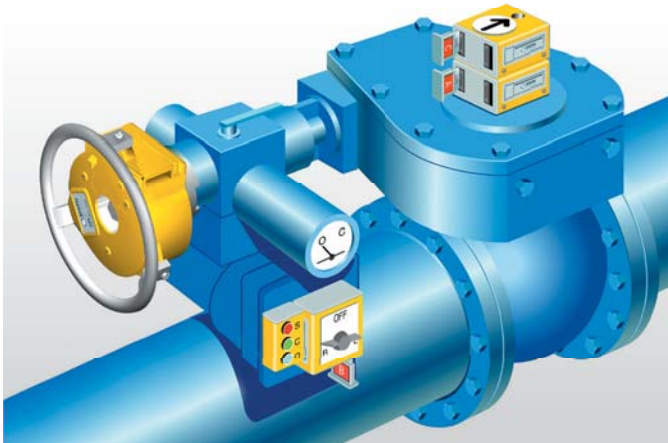
EQUIPMENT STATUS:- VALVE OPEN

'SLU' Switch Unit Locked in 'REMOTE'.
'HWL' Handwheel Drive Locked 'OFF'.
'A' Key in Control Room.

TO CLOSE VALVE:

- 1 'A' Key into 'AKE' positional indicator unit.
'B' Key is removed from 'AKE' - 'A' Key trapped.
- 2 'B' Key into 'SLU' Switch Unit to unlock.
'SLU' Unit switched to 'LOCAL' ('B' & 'C' Keys trapped).
Operate button to close valve.
- 3 'SLU' Unit now switched to 'OFF' - 'C' Key is removed.
'SLU' Unit locked in 'OFF' position trapping 'B' Key.
- 4 'C' Key into 'AKE' Unit - remove 'D' Key trapping
'C' Key. 'D' Key is then directed towards continuation
of the procedure.

NB The 'D' Key will not release unless the valve has completed its full stroke to the CLOSED position.



HYDRAULIC & PNEUMATIC ACTUATORS

A range of comparable designs are also available for spring return and non-return hydraulic actuators and for spring-return pneumatic actuators.

SFC's range of special process products also includes needle valve locks, temperature and pressure sensing locks and a range of signalling options to meet most process operating requirements.

ACTUATORS FOR GATE VALVES

These same key sequencing principles can be applied effectively to the management of motorised gate valves.

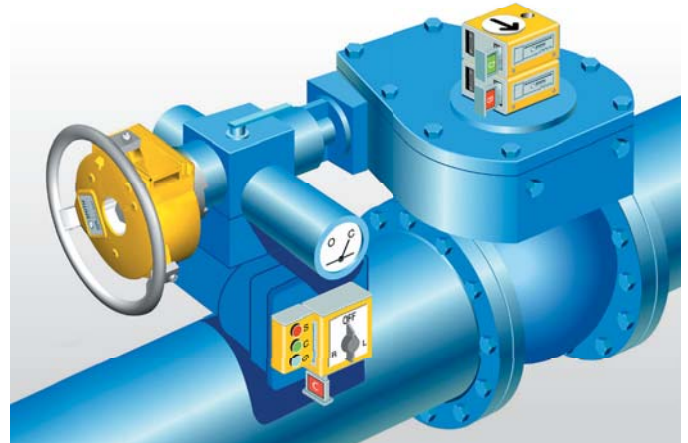
EQUIPMENT STATUS:- VALVE CLOSED

'SLU' Switch Unit Locked 'OFF'.
'HWL' Handwheel Drive Locked 'OFF'.
'D' Key in Control Room.

TO OPEN VALVE:

- 1 'D' Key into 'AKE' positional indicator unit.
'C' Key is removed from 'AKE' - 'D' Key trapped.
- 2 'C' Key into 'SLU' Switch Unit to unlock.
'SLU' Unit switched to 'LOCAL' ('B' & 'C' Keys trapped).
Operate button to open valve.
- 3 'SLU' Unit now switched to 'REMOTE' - 'B' Key is removed.
'SLU' Unit locked in 'REMOTE' position trapping 'C' Key.
- 4 'B' Key into 'AKE' Unit - remove 'A' Key trapping
'B' Key. 'A' Key is then directed towards continuation
of the procedure.

NB The 'A' Key will not release unless the valve has completed its full stroke to the OPEN position.



POWER FAILURE MODE

In the event of a power failure at anytime during either of the above procedures, it is essential the integrity of the key sequence is maintained if the valve is operated manually.

This is achieved simply by locking the 'SLU' Unit in the 'OFF' position thereby releasing the 'C' Key. (Even if power is restored, with the 'C' Key free, the valve/actuator will remain disabled).

The 'C' Key is inserted into the freewheeling 'HWL' handwheel assembly - this lock functions on a 'declutching' principle. With the 'C' Key trapped, the 'HWL' drive mechanism may be engaged thereby enabling the valve to be operated.

While the 'C' Key can be removed from the 'HWL' assembly at any time, it has to be exchanged through the 'AKE' unit to secure the continuation key (e.g. the 'A' or 'D' Keys in the above examples) - these keys will only release provided the valve has completed its full stroke.