DUTCH ENGINEERING

Workshop/Site Method Statement

Title:	Auma SQ (AM) ¼-Turn Electric Actuators fitting to C-Series
Reason for use:	Information
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- The Auma Part-Turn range is rated to 80C maximum thus DES Ltd supply a mounting kit in order to protect the actuator from any conducted or radiated heat that the valve can give out when under temperature. However this does not mean that when lagging the valve after installation, it can be lagged right up to the actuator. This will create a heat spike which will eventually 'cook' the electrics and thus hinder its operation and efficiency leading to the eventual breakdown.

- The common causes of valve failure usually compromises of four faults: incorrect setting of actuator mechanical stops & electrical limits; or valve stem being driven into valve; or ball being reversed so that unlapped side of ball paired with lapped seat.

- DES Ltd is providing this report as a guide to handling the valve and actuator packages when installing and commissioning them on site.

- Please note: **Clockwise to close; Counter Clockwise to open.** Mogas Ball Valves have a 96^{o} travel, allowing an extra 3^{o} of travel either side of open or closed. This is to allow thermal expansion of the stem under temperature.

Actuator Installation:

- Ideally the valve actuator packages supplied by DES Ltd will be Factory Acceptance Tested at the DES Ltd workshop, and thus will have the appropriate Mechanical and Electrical limits set.
- When the DES Ltd actuators are removed for welding & PWHT, please mark the bracket and actuator so that when the actuator is re-installed, if the marks line up, no electrical or mechanical limit adjustment is required. The only point that **Mogas** and **DES Ltd** stress when welding is to leave the valve open. This will allow the free movement of air/heat in the line otherwise the ball in the closed position will act as a barrier and allow the heat to build up around the ball and hence conduct through the stem. Further to this, do not insulate or wrap the thermocouples around the entire valve.
- Where ever possible, try and fit site supplied actuators to the valves in workshop as opposed to in line. It is easier to check to see if the valve is fully open (smooth bore) or fully closed.

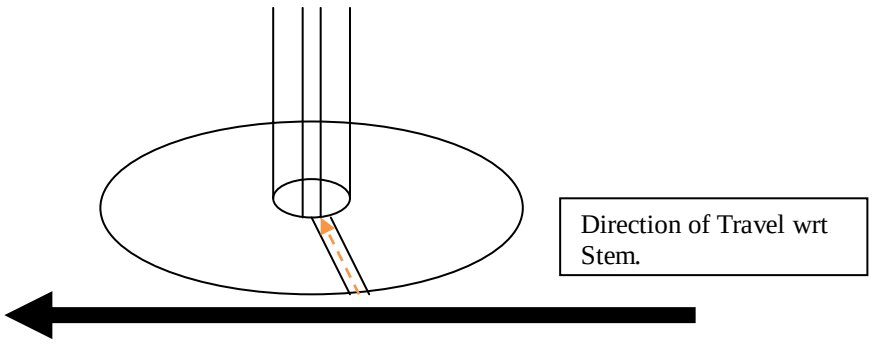
Workshop/In line Mechanical Stop Installation:

1. Set valve to fully open position. This is your reference point to establish the fully open stop.

Attach Mounting Bracket (adaptor plate) and Stem Adaptor (stem coupling). Please do not tighten bolts as you may need the initial play later to help line up the bolt holes for the actuator.

2. Before attaching actuator, please ensure that the actuator is fully open (rotate counter clockwise fully).
3. Attach the actuator to the mounting bracket ensuring that a slide fit has occurred between the male insert of adaptor (coupling) and the female connection of the gearbox/actuator drive bush. If you cannot achieve a slide fit, **DO NOT FORCE THE ACTUATOR** on to the coupling. This will potentially cause the stem to be pushed in and thus rolling the ball off the seat (guaranteed leakage). Please use emery cloth or any other means necessary to ensure a slide fit.
4. Once the actuator has been successfully placed on to the valve, this is where all the nuts & bolts need to be tightened. Please note that all fittings should come with Norlock or other type of shake-proof washers, if not please inform DES Ltd or supply own. This helps to secure actuator to the valve, especially under any continuous vibration which may cause the actuator to shake loose.
5. When adjusting the closed/open stops on the Auma SQ, there are two Cap Head Screws located within two M20 screwed covers below the handwheel. The left hand stop will allow you to adjust the open position of the valve. The right hand stop adjusts the closed position.
6. Setting the open stop on the Auma SQ, the valve should be fully open, however make sure that the stop is unwound slightly to allow for an extra **½ turn** allowance for the actuator stops (if applicable). If the ball of the valve has encroached into the flow path (look up the bore of valve) cycle the Auma SQ until full bore and then set the open stop by 'feathering' in the Cap Head screw until it touches the Auma SQ quadrant.
   If the stops are being set when the valve is installed in-line, there are scribe lines on valve stem and gland flange. On the C-Series range, the scribe line in the closed position will be pointing downstream in line with the flow and will be in line (roughly) with the scribe line on the flange. In the open position, the scribe line will be perpendicular to the flow. (Remember: Clockwise to Close, etc…)
   To set the open stop, please cycle the valve so that the scribe line on the stem just over travels the scribe line on the flange (by ½-width of scribe line), then set the Auma SQ Mechanical Stop.
7. To set the closed stop, wind the Auma SQ clockwise from the open stop and over-travel by ½-width of scribe line, that is where closed stop is. (See below diagram) then set gearbox/actuator Mechanical Stop.

Please note: There is an allowance for a 5% Over/Under Travel in the Mogas design. However the above ensures that you are well within tolerance.



Workshop/In line Electrical Set-up:

1. It is recommended that the Auma SQ Part-turn actuators should work on electrical limits. The casing and then the indicator plate need to be removed from the top of the Auma control unit which hosts the torque dials and electrical limits. Since the actuator is in the fully closed position from the above set-up, the closed electrical limit will be set up 1st.
   Double check to insure that the valve is at the mechanical stop (resistance is starting to build on the handwheel when rotating clockwise) but do not over-force the stop.
2. DES Ltd recommend rotating the Auma Handwheel counter clockwise by ½ a turn (no more) so that the Auma is backed off the 'closed' mechanical stops. The closed electrical limit spindle (spindle A in the Auma Handbook) is pressed down using a screw driver and rotated in the direction of the arrow (which should be clockwise) and thus observe the pointer B. While a ratchet is felt and heard, the pointer B moves 90 degrees every time. When the pointer is 90 degrees from mark C, continue more slowly. When the pointer B has reached the mark C, stop turning and release the setting spindle. If you have inadvertently overridden the tripping point, continue turning the setting spindle in the same direction and repeat above. Once the pointer has been set, rotate the Auma Handwheel and thus the valve counter clockwise by 6 – 8 turns so that the actuator is backed of its electrical limit. Rotate the Handwheel counterclockwise until the pointer moves to mark C, hopefully this pointer moves before the torque switches are engaged, open limit is set. If the torque switches engage before the pointer moves to mark C, then we need to re-set the Electrical limits. This is done by rotating the Handwheel clockwise until it engages with the mechanical stops and backing off these stops counter clockwise by an extra ¼ a turn. Then the above has to be repeated. In DES Ltd experience, only ½ a turn are required to set the electrical limits, no more.
3. With respect to the open stop, the actuator needs to be rotated counter clockwise until it hits the open mechanical stop. DES Ltd recommend rotating the Auma Handwheel clockwise by ½ a turn (no more) so that the Auma is backed off the mechanical stop. The closed electrical limit spindle (spindle D in the Auma Handbook) is pressed down using a screw driver and rotated in the direction of the arrow (which should be counterclockwise) and thus observe the pointer E. While a ratchet is felt and heard, the pointer E moves 90 degrees every time. When the pointer is 90 degrees from mark F, continue more slowly. When the pointer E has reached the mark F, stop turning and release the setting spindle. If you have inadvertently overridden the tripping point, continue turning the setting spindle in the same direction and repeat above. Once the pointer has been set, rotate the Auma Handwheel and thus the valve counterclockwise by 6 – 8 turns so that the actuator is backed of its electrical limit. Rotate the Handwheel clockwise until the pointer moves to mark F, hopefully this pointer moves before the torque switches are engaged, closed limit is set. If the torque switches engage before the pointer moves to mark F, then we need to re-set the Electrical limits. This is done by rotating the Handwheel clockwise until it engages with the mechanical stops and backing off these stops counter clockwise by an extra ¼ a turn. Then the above has to be repeated. In my experience, only ½ a turn are required to set the electrical limits, no more.
4. Then the torque setting needs to be set next. Even though the actuator is set to go out on limits, the torques are set so that the actuator does not exceed the mast limitation. The Maximum Torque Figures as per the differential pressure across each type of C-Series is as follows:

C-Series Model	C-Series Mast Limitation Torques	Differential Pressure	Auma Part-Turn Model Max Torques	SQ Torque Setting
Gen-X 600#	686Nm max	Up to 34 Barg 35 – 69 Barg	SQ07 = 300Nm SQ10 = 600Nm	100% (300Nm) 83% (500Nm)
Gen-X 1500#	2,000Nm Max	Up to 50 Barg 50 – 165 Barg 165 – 240 Barg	SQ10 = 600Nm SQ12 = 1,200Nm SQ14 = 1,800Nm (<36s Op Speed)	100% (600Nm) 100% (1,200Nm) 83% (1,500Nm)
SC-3PC 2500#	3,456Nm Max	Up to 138 Barg 138 – 225 Barg	SQ14 = 1,800Nm (<36s Op Speed) SQ14 = 2,400Nm (>36s Op Speed)	100% (1,800Nm) 100% (2,400Nm)
C-Series (TBC)	TBC		TBC	TBC

5. When electrically cycling the valve open and closed, it would do well to check the actual valve stops as well to double check that there is no significant under or over-travel. So when cycling the valve open and closed electrically, check that the scribe line on the stem just passes the scribe line on the flange by ½-width of scribe line (see schematic above).
   If the scribe line on the valve stem in either open or closed as gone past more than the ½-width of a scribe line, return to step 2 and instead of backing of ½ a turn, back off ¼ a turn instead.
   If the scribe line on the valve stem in either open or closed has NOT gone past the ½-width of a scribe line, return to step 2 and instead of backing of ½ a turn, back off ¾ turn instead.