

## Title (en)

Three-channel commanding and supervision apparatus for turbo machine-actuating valves.

## Title (de)

Dreikanalige Ansteuerungs- und Überwachungseinrichtung für Stellventile von Turbomaschinen.

## Title (fr)

Dispositif de commande et de surveillance à trois canaux pour soupape de positionnement de turbomachines.

## Publication

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## Application

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## Priority

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- DE 3340925 A 19831111

## Abstract (en)

1. Control and monitoring device for turbo-engine control valves, more particularly for industrial turbines of high availability, such as compressor drive turbines, having at least one servo piston cylinder system (servomotor SM) for adjusting the control valve and at least one electro-hydraulic transducer (SV) for producing a hydraulic correcting variable for the servo piston cylinder system as a function of an electrical correcting variable (i) of the turbine control loop, which variable is fed to the electrical input of the electro-hydraulic transducer (SV), characterised by the following features : the pressure side and the drain side of the servo piston cylinder system (SM) are connected to the hydraulic output lines (L1, L2, L3) of in each case one electro-hydraulic transducer (SV; SV1, SV2, SV3) by means of at least three channels (K1, K2, K3) ; of the electro-hydraulic transducers (SV1, SV2, SV3), of which there are at least three, during normal operation only one, that is, the one of the conducting, electrically and hydraulically active channel, is connected to the servo piston cylinder system (SM) by way of its output lines and into the output lines (L1, L2, L3) of all the electro-hydraulic transducers (SV1, SV2, SV3) there are connected shut-off valves (AV1, AV2, AV3) of a blocking device (VE), by means of which the connection to the servo piston cylinder system (SM) may be shut off in the case of those hydraulic output lines of the electro-hydraulic transducers which belong to a channel which has just stopped conducting, but which runs electrically in synchronism with the channel (K1, K2 or K3) which has just become active ; the actual value of the servo piston position is queried by means of at least three mechanical-electrical transducers (W1, W2, W3) acting as the first displacement transducers (W), the output signals of which may be fed correspondingly through multiple channels (K10, K20, K30) in each case to the first inputs (e11, e12, e13) of at least three electrical components (RG; RG1, RG2, RG3) in the form of comparators and/or servo amplifiers, in which case the electrical variable of the rated value XSoll of the turbine control loop, which variable corresponds to the desired valve position, is fed to the second inputs (e12, e22, e32) of the components and the correcting variables, which are obtained by the rated actual value subtraction, are passed on correspondingly through multiple channels to the electrical inputs (SV1, SV2, SV3) of the electro-hydraulic transducers (SV; SV1, SV2, SV3) and in which case an error signal B, which is transmitted by the first displacement transducers (W), is used for the purpose of indicating the faulty displacement measurement in the relevant channel ; the valve plunger position of the electro-hydraulic transducers (SV; SV1, SV2, SV3) is queried by means of a further mechanical-electrical transducer (W10, W20, W30) in each case, acting as the second displacement transducer of the control loop, in order to check whether the relevant valve plunger occupies that position which is analogous to the electrical correcting variable of its electro-hydraulic transducer, an error signal C of the second displacement transducer being used for the purpose of indicating a faulty electro-hydraulic transducer (SV) in the relevant channel (K1, K2 or K3) ; by means of a non-equivalence monitoring circuit for monitoring the actual value signals (B, C) of the first and second displacement transducers (W; W10, W20, W30) all of the channels (K1 to K3), of which there are at least three, are monitored for functioning errors, whereby in the event of inadmissible deviations of the actual value signals of a channel a signal (B or C) may be generated and in the event of the deviation, which has been determined, in an active or conducting channel there may be an automatic change-over to a healthy channel through activation of the same.

## Abstract (de)

Bei einer Regeleinrichtung für Stellventile von Turbomaschinen, insbesondere für Industrieturbinen hoher Verfügbarkeit wird das Kraftkolben-Zylinder-System (SM) des Turbinenstellventils dreikanalig über drei hydraulische Leitungspaare (L1, L2, L3) angesteuert, wobei in jedes der Leitungspaare ein elektro-hydraulischer Umformer (SV; SV1, SV2, SV3), insbesondere ein sogenanntes Servoventil, und zwischen den elektro-hydraulischen Umformern (SV) und dem Servomotor (SM) sowohl in die Drucköl-Zulaufleitung (P) als auch in die Ablaufleitung, welche das hydraulische Leitungspaar bilden, Absperrventile (AV; AV1, AV2, AV3) eingeschaltet sind. Letztere sind insbesondere als sogenannte Cartridge-Ventile (2/2-Wege-Sitz-Ventile) ausgeführt und gehören zum hydraulischen Verblocksystem. Mittels Weggebern (W bzw. W10, W20, W30) am Servomotor und an den Servoventilen wird die Funktion der drei Kanäle (K1, K2, K3) überwacht. Ist ein Kanal gestört, so erfolgt stoßfreie Umschaltung auf einen zweiten Kanal und hydraulische Blockade des fehlerbehafteten Kanals. Sind 2 Kanäle gestört, erfolgt der sogenannte hydraulische freeze-in, d.h. eine temporäre vollständige hydraulische Blockade, bei der aber noch eine manuelle Umschaltung auf den letzten Reservekanal und eine Beseitigung der Fehler in den blockierten Kanälen möglich ist.

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