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18. Abstract <p>The first result consists in the establishment of the scientific and technological basics of the Input/Output Procedure, the key feature of which is the new and innovative IOC-Algorithm. He enables the automatic calculation of the expected yield of the collector loop resp. the solar system by means of a very compact simulation model. Using daily values of measured and expected yield, a target/actual-value comparison provides an automatic in-situ yield-rating. Actual measurements are used as well as parameters, which are known from the system-planning-phase as e.g. collector performance and heat-exchanger coefficients. The Input/Output Procedure comprises two parts: the one being the Input/Output-Controller itself, including both the herein implemented and continuously executed IOC-Algorithm as well as the connected Input/Output-sensors; the other part being the set of IOC-Rules describing the different steps to be followed for integrating the IOC-procedure into the whole realisation process of a solar system, starting with the first contact investor/architect up to the continuous system supervision.</p> <p>The second result consists in the RESOL-Input/Output-Controller, which is the first commercially available ‚Stand-Alone-IOC-device‘. The development of a decentralised web-based IOC-Unit for use in central building control/automation systems started.</p> <p>During the project, a total of 13 different solar thermal systems were equipped with IOC-Test-devices. The validation exercise against measured data as well as TRNSYS-Simulations confirm results of the theoretical analysis of the overall uncertainty of the procedure, which was determined to about $\pm 7\%$. This accuracy is twice as high as estimated within the initial project proposal. At a tolerance level of 20 % for the target/actual-value comparison, a solar-loop failure can be detected with a probability of 99 %. Within the draft-document of VDI 2169 „function-control“ („Funktionskontrolle“) the Input/Output-Procedure has been introduced and established as a procedure for automated in-situ solar yield rating („Ertrags-Bewertung“).</p> <p>The positive project results provide a new starting point for positive thinking and optimism regarding the quality of solar thermal systems. Operational failures and breakdowns can now be detected with minimal cost and they can be rapidly repaired subsequently. The solar-thermal industry sector is offered the huge chance of a substantial gain in technological confidence regarding potential investors, and on the supply-side the challenge of quality-marketing of reliably operating solar systems.</p> <p>Beyond these results, there is the potential to apply this concept of energetic target/actual-value comparison for controlling and ensuring the efficiency of conventional energy supply systems.</p>	
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