PRINCIPLES OF TRANSDUCER DEVICES AND COMPONENTS

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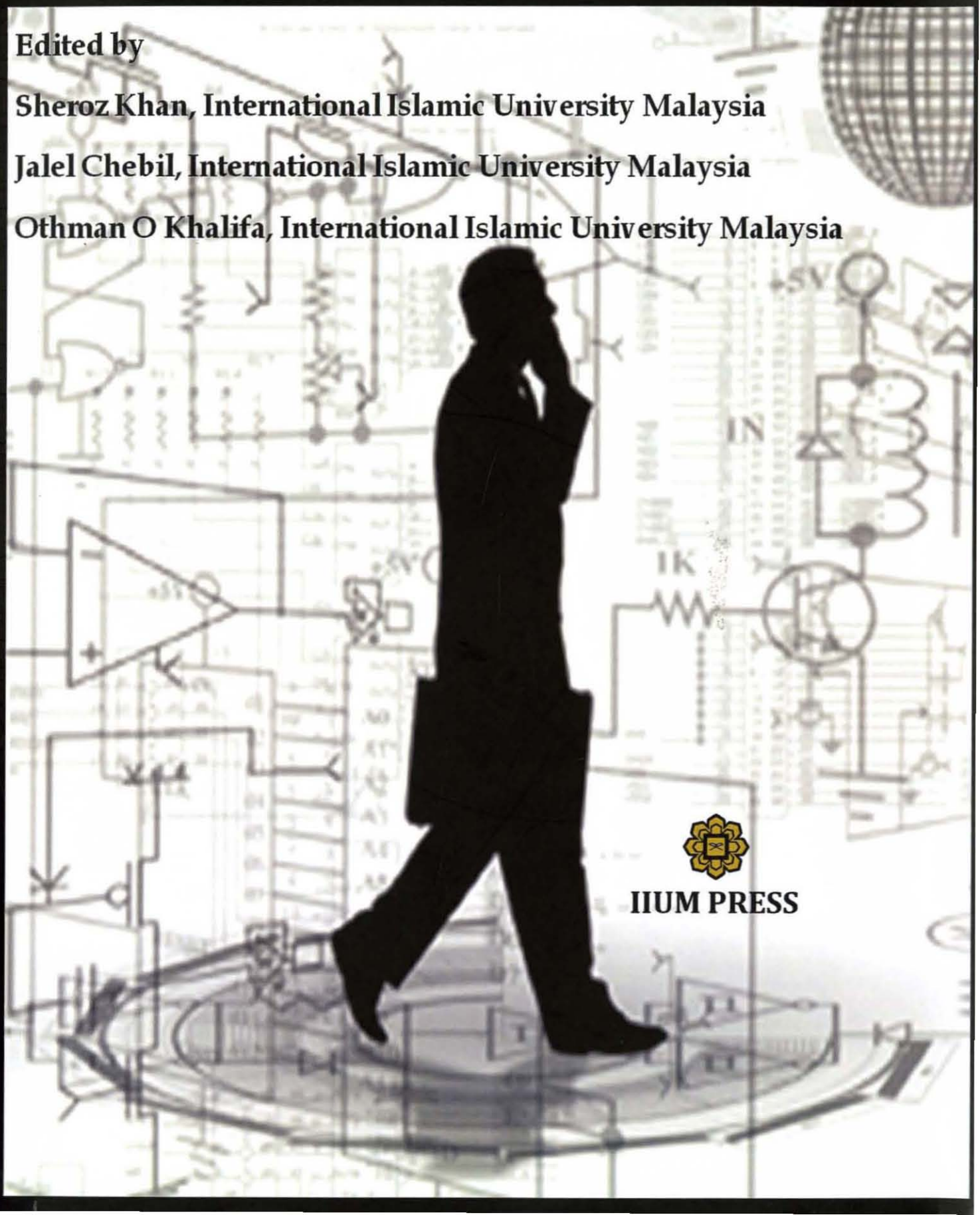

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Chapter 6

CONTACT TYPE AND NONCONTACT TYPES GAS FLOW MEASURING SENSORS

RUMANA TASNIM, ATIKA ARSHAD, NAZMUS SAQUIB, SHEROZ KHAN, MUSSE MOHAMOD

6.0 INTRODUCTION

Gas flow measurement is required in numerous applications; particularly in oil, and gas, nuclear energy, chemical processing industries including food, pharmaceutical industry and in agricultural sectors. Gas flow occurs in heat exchangers, steam generators, chemical reactors, oil transportation and other process equipment items. Hence the importance of measuring an accurate flow rate of gases in pipelines has been ever-increasing in the industrialized regions. Generally any type of gas flow measurement processes requires gross measurements at some points while more accurate measurements at some other points. As the industry develops it undergoes changes for more comfortable user friendly way of gas flow measurement with improved accuracy. This is coupled with research activities catching demands for exploring alternative non-contact means of electronic measurement, thus putting into research more of an accurate and reliable measurement rather than just measurement. On top of this more customers' awareness is stressing for reliable and robust transducers requiring minimum operation cost with least possibility of industry shutting down just for maintenance reasons, causing loss in revenues.

6.1 GAS FLOW MEASURMENT

Flow meters and sensors are capable of measuring both gas and liquid flows in the wide range of controlling applications. Flow can be defined in different ways, for instance; mass, volume, laminar, turbulent. The total amount of a substance flowing (mass flow) is generally the one of concern. However while the density of fluid is kept constant, a volume flow measurement technique is certainly the uncomplicated one to perform. Some generalized technologies are applicable for both gas and liquid flow; some are particularly specific to the measurand. The flow rate can be obtained by measuring the velocity of a fluid in a pipe or other structure and then multiplying by the known cross-sectional area at the measurement point.