



DATA ACQUISITION SYSTEMS

MIDAS : Multi Input Data Acquisition System

Multi Input Data Acquisition System acronymed as MIDAS has been designed to cater the requirement of multi detector based tracer experiments. Typical application of such systems is in oil & Chemical industries, FCCU experiments and in gamma ray tomography experiments. A short lived radio isotope is injected in reactor column before start of the experiment. As the process starts, the radio activity moves along with the process fluid. NaI(Tl) detectors are mounted outside the column to detect the radio activity. As the radio activity comes near the detector, more number of gamma radiations fall on the detector, which results in more number of photon generation. Using the photo multiplier tubes (PMTs) these photons are converted to electrical energy.



Data acquisition system designed by Para Electronics (I) Pvt. Ltd. comprises of Preamplifier, spectroscopy amplifier, single channel analyzer & high voltage supply for each detector. The number of detectors will depend upon the user requirements. So far we have supplied 8, 10, 16 channel data acquisition systems. Flexibility in the design of this system enables the user to decide on the no. of channels, which can be expanded to 32 channels. The system can be modified as per the user requirements.

Typical NaI(Tl) detector is of size 1" dia x 1" thick mounted on 1" dia PMT, housed in Aluminum enclosure. The voltage divider resistors are integral part of the detectors. Each channel has one detector. High voltage supply is required for PMTs to convert photon into electrical energy. This high voltage supply can be provided on the detector side or in the control room. Data acquisition system is normally kept in a control room & cables run from control room to the detector. Cable length can be upto 60 mtrs. For cable length more than 20 mtrs,

The system is designed for NaI(Tl) and BGO detectors. For 12 or 14 pin detectors preamplifier is supplied at the detector end. For G1 type detectors, preamplifier is not required at the detector end. For such detectors cable length is restricted upto 20 mtrs only. For 12 or 14 pin detectors, cable length can be upto 60 mtrs.

The system is designed in a modular form. For each channel, a separate spectroscopy amplifier & single channel analyzer is available. A 12 slot NIM bin accommodates a power supply (+5V, $\pm 15V$), eight modules of spectroscopy amplifier & single channel analyzer for eight channel inputs and a common interface module to transfer eight SCA outputs to a counter unit. Thus for 16 channel data acquisition system, two such BINS will be provided. For 32 channel system, four BINS will be provided. Spectroscopy amplifier has a base line restorer circuit to take care of higher count rates. Single channel analyzer can operate in threshold or window mode depending upon the internal jumper setting. All SCA outputs are routed through back panel connectors to a common interface module from interface module, these outputs (TTL) are taken to a counter unit (MIDAS).



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Counter unit, takes care of all the channels i.e. for 32 channel system, counter unit will have 32 input channels. For control of this counter unit, PC based software will be provided. This counter unit can operate in online or offline mode. In online mode, the unit will be controlled by PC based software package. User can set the dwell time and number of events through this package. Once the acquisition starts, data for the selected channel will be transferred to PC after completion of each event. Data transfer will be through USB Communication. User can select any channel as per his requirement. Only selected channel will be active during data acquisition. In online mode, user will be able to see the data in graphical format. After completion of set events, data will be available in a text file. User can use this file for further processing. In offline mode 250 MB flash card will be provided for data storage. This flash card will store the data for selected channels in a file format. Offline mode is possible in applications where the dwell time is in seconds.

The pulse processing electronics front end circuits are fitted in modules. 8 such modules are housed in a 19" wide BIN. A common enclosure can accommodate more than 1 such BINs.

Software plays a very important role in the design of MIDAS system. Assembly level software handles the hardware. higher level Windows based software is provided for data acquisition control, data transfer and graphic presentation on PC. Data storage and retrieval are in built features of this software.

