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Wed-Af-Po3.16-02 [20]: Design and Development of a New Control Architecture for Elliptically Polarizing Undulator at Taiwan Photon Source

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In the phase-II beamlines project of the Taiwan Photon Source (TPS), the insertion device (ID) of elliptically polarized undulator (EPU) called EPU66 and EPU168 will be installed in 2020. The new control system for EPU is based on the Experimental Physics and Industrial Control System (EPICS), and Ethernet Control Automation Technology (EtherCAT) framework. The EPU control elements include: motors with optical absolute encoders for gap and phase control, corrector magnets power supply control for trimming coil, interlock safety system for automatically stopped motion by using the encoders, limit switches, tilt sensors, and emergency buttons. All control functionality coordinate by the fan-less embedded computer with three Ethernet ports is developed. User interface for operators and beamline users are included to help them to operate the system, such as gap/phase control and on-the fly experimental. Reliable operation of the EPU is important to users of beamlines. The most unpredictable fault is due to a soft error in optical absolute encoders. There are several protection solutions to avoid faults, e.g. by increasing the distance of the encoder from the beam center, by a lead shield cover and finally by adopting an auxiliary position sensing device to cross check the position and perform the necessary procedure. Efforts to improve operational reliability of the EPU controls will be discussed. Features and benefits of EPU66 and EPU168 control system will be summarized in this report.

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