Protostars form from cold dense cores dominated by molecular gas and dust, showing excess continuum and rich spectra beyond 100 μm that are best observed by Herschel Space Observatory. Molecular emission reveals the properties of the surrounding gas and the underlying physical processes that govern the early stage of star formation. The CO in Protostars (COPS) Herschel program observes 27 embedded protostars with SPIRE, including several dominant molecular species, such as CO, 13CO, H2O, and HCO+. The COPS dataset covers a unique wavelength range, allowing us to investigate the early stage of star formation across a large sample of sources. We detect CO rotational lines from $J_{up} = 4$ to 36, 13CO lines from $J_{up} = 5$ to 10, and six H2O lines, along with [N II] and [C I]. We have created an uniformly calibrated dataset with the data from Dust, Ice, and Gas In Time (DIGIT) Herschel Key Program and archival photometry, in which we characterize each source by its spectral energy distribution and evolutionary class. With an automatic line fitting pipeline, we detect 323 lines from 25 sources from which we successfully extracted 1D spectra, and 3068 lines from 27 sources observed in all spatial pixels of SPIRE. We analyze the correlations of the line strengths of every line pair from all lines detected with two methods from ASURV package, Spearman’s $\rho$, which test whether the line strengths relation can be described by a monotonic function, and the Kendall z-value, which quantifies the similarity of the ordering of the line strengths of two lines. The distribution of correlations shows a systematic tendency coinciding with the wavelength coverages of the instruments, suggesting that the correlations should only be compared within the lines observed by each module. Within each module, the correlations of two CO line pairs show high correlations, which decrease as the difference of the upper $J$-level of the two CO lines increases. The smooth gradients of the distribution of correlations hint that the temperature and density of CO gas are continuously varying throughout the embedding envelope. If all CO gas in the envelope shares a same temperature or density, the correlations would be strong for two CO lines originating from two very different $J$-levels. We find no obvious clustering in the distribution of correlations, while a group of CO lines could have shown particularly strong correlations if their properties were dominated by a same physical process.