1. Introduction

The ef cienc of sludge treatment and water treatment in sewage plants depends heavil on optimal chemical dosing ratios and stable operation, conditions which cannot be achieved without the accurate and reliable monitoring and control of the sludge densit . Thus, highl reliable sludge-densit meters will become increasingl important in the future.

Measuring instruments of various t pes have alread been adopted as sludge-densit meters, including the ultrasonic wave t pe, the near-infrared light t pe, and the microwave t pe. Each has its own merits and demerits. The most variable factors are the effects of the sludge color, bubbles, and adherent sludge on measurement performance. Other points of difference include maintainabilit , price, restrictions on applicable densit ranges, and the abilit to produce output in real-time (continuousl). Overall, however, the state of the technolog is poor: most sludge-densit meters in use fail to satisf users and are riddled with unsolved problems.

Fortunatel , JFE Advantech has recentl developed the SD-40, a dual scattered-light sludge-densit meter without the usual aws of other models. With help from the properties of near-infrared light, the SD-40 produces stable measurements even when sludge bubbles, adheres to the device, and varies in color. The SD-40 measures sludge of low to high densities continuousl , in real time.

2. SD-40 Type Dual Scattered-Light Sludge-Density Meter

2.1 Product Outline

The SD-40 t pe dual scattered-light sludge-densit meter is con gured with multiple dual-wavelength light sources in a detecting module. These light sources allow the device to automaticall correct the efa bas029onticall3.9(v)el to the deThe 91

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scattered-light t pe (the new dual light t pe) and single scattered-light t pe (the conventional single light t pe). **Figure 3** compares the performance of the two measurement devices.

In the case of a moderatel bright sludge, both measurement devices showed good linearit and output measured densities that agreed well with the densities anal ed manuall . The moderatel bright sludge used in the e periment is appro imatel similar to general raw sludge, e cess sludge, return sludge, and thickened sludge.

Once a thickened sludge putre es, it darkens considerabl . This t pe of thickened sludge usuall corresponds to the ‘dark sludge’ classi ed separatel from digested sludge in sludge treatment facilities and the like. The dual scattered-light t pe had good linearit in sludge

3. Performance of Product

3.1 Performance Related to Changes in Sludge Color

The densities of three t pes of sludge of different colors (properties) were graduall adjusted in steps b adding clean water. The actual densities were determined at each stage b manual anal sis, and the measured densities were determined b of ine anal sis using a dual

measured b the SD-40 t pe dual scattered-light sludge-densit meter without the cleaning operation b ushing water. Onl a small amount of sludge adheres to the surface of the detecting part against which the sludge collides, when the detecting part is disposed in the sludge ow direction. The self-cleaning effect is thereb