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Technical Note – BREEAM - DCS in Leak detection (WAT03)

Version 1.2, July 2020

Foreword

This Technical Note has been written by Chris Ward, Director and daily user of DCS on behalf of Utility Metering Solutions Limited. Its scope is to provide a fair and impartial reflection of the capabilities of the system, related particularly to the requirements of assessment credits within BREEAM section WAT03. It is intended to be assistive, impartial and supportive in nature, without endorsement, recommendation, or verification of compliance – with any conclusions on both the suitability of this Technical Note as evidence, and the DCS as a WAT03 compliant system, to be drawn by the BREEAM assessor.

Introduction / Overview

The Coherent DCS (Data Collection System) monitors and stores all meter readings on a half hourly basis. DCS is equipped with a number of flexible reporting tools to provide the user with detailed consumption information and flexible alarm reports. DCS is particularly helpful on large estates such as universities where plant rooms are not visited on a regular basis and audible alarms may be missed.

Alarm levels can be set for a new building based on the type of building, the occupancy and the amount of facilities using water. As actual usage data is collected alarm levels can be adjusted to actual building usage. Because of changes to a buildings use over time and because of seasonal changes, alarm levels can be set to reflect expected usage changes such as University end of term.

All these changes can be made easily and remotely, without the need to visit site or plant rooms.

The reporting/alarm system is based on half hourly data and the reporting frequency can be set half hourly, daily or weekly and so alarm reports will not be triggered by transient consumption spikes. Both the maximum level and the period that the maximum level has been continuously exceeded can be set and easily adjusted.

Alarm reports are automatically generated and sent to any number of appointed people on the report circulation list.

In addition to alarm reports DCS will provide half hourly consumption data and graphs which can be used to compare meter flow rates over set periods, providing year to year, season to season or term to term comparison.

The alarm reports have been used to identify significant plant room leaks allowing remedial action to be taken

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Verbatim Requirements WAT03:

One credit

A leak detection system which is capable of detecting a major water leak on the mains water supply within the building and between the building and the utilities water meter. The leak detection system is:

a. Audible when activated
b. Activated when the flow of water passing through the water meter/data logger is at a flow rate above a pre-set maximum for a pre-set period of time
c. Able to identify different flow and therefore leakage rates, e.g. continuous, high and/or low level, over set time periods
d. Programmable to suit the owner/occupiers' water consumption criteria
e. Where applicable, designed to avoid false alarms caused by normal operation of large water-consuming plant such as chillers.

One credit

One of the following types of flow control device is fitted to each WC area/facility to ensure water is supplied only when needed (and therefore prevent minor water leaks):

a. A time controller i.e. an automatic time switch device to switch off the water supply after a predetermined interval
b. A programmed time controller i.e. an automatic time switch device to switch water on and/or off at predetermined times.
c. A volume controller i.e. an automatic control device to turn off the water supply once the maximum preset volume is reached.
d. A presence detector and controller i.e. an automatic device detecting occupancy or movement in an area to switch water on and turn it off when the presence is removed.
e. A central control unit i.e. a dedicated computer-based control unit for an overall managed water control system, utilising some or all of the types of control elements listed above.

BREEAM requirement	DCS role
Activated when the flow of water passing through the water meter/data logger is at a flow rate above a pre-set maximum for a pre-set period of time.	Whilst not a BMS in the truest sense, the strength of DCS as a readily CSV-programmable tool, as well as providing a wide variety of customisable reporting templates, enables the user to define expected consumption (or flow) tolerances and provide alarms either by exception once breached (half-hourly total), or by way of regular update. The "Daily Limit Report" has to-date identified a number of significant user leaks, bringing about remedial action and saving significant cost in loss, collateral damage and repair, both under normal usage patterns and periods of downtime in which usage is expected to be zero. This is exemplified by the

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	consumption chart below (1), which was covered by an alarm report and duly corrected once maintenance teams informed.
Able to identify different flow and therefore leakage rates, e.g. continuous, high and/or low level, over set time periods. Programmable to suit the owner/occupiers' water consumption criteria.	The completed CSV template with allowable tolerance levels is uploaded to the system, with a separate row for each asset to be included within the report. For leak conditions, assets of widely varying scale can be managed within a single "multi-alarming" report, each with its own alarm conditions, which makes them user friendly and not too numerous to de-sensitise the recipient user to potential problems. The levels stated in the CSV are then automatically and continually cross-referenced with half hourly, ranging up to monthly data totals (period defined by the user), as communicated by each meter asset to the DCS system – in so doing identifying different flow rates (given appropriate registers are set up on the meter). Within the report, all levels are stated at their current level next to their defined limit, with alarm condition instances coloured red for clarity. Tolerances can be assigned according to user requirements, but for leak protection, are typically defined using a flat multiplier of "business as usual" levels, taking into account as much data as is available for the given asset and system. This is easily deduced by cross referencing half-hourly data charts, for which time frames can be flexibly adapted or entirely interchanged with a second tariff to cover seasonality and periods of change. Tolerances will be based on the total consumption within a half hour up to monthly period, and so for a high level alarm designed to detect leaks (which are sustained in nature), a level of 130% sustained across a half-hour period is an arbitrary but reasonable starting point – with regular patterns around any spikes typically enough to restore observed levels to within-tolerance levels. Estimates can be easily honed by tweaking the CSV file to achieve appropriate sensitivity, account for variability in consumption, a history of false positive readings (limit too low), or observation of too large a gap between expected and the high level. Where performance is the key focal point rather than leak detection, expected (low) or target (high) performance levels can be applied to consumption data, and similarly alarmed as described above. Charts will clearly show the target level for ease of comparison and analysis, as depicted below (2). Levels can be user assigned via CSV template import, and based on strategic objectives, past trends or averages.
Where applicable, designed to avoid false alarms caused	Whilst the reading frame for a tolerance breach is based on half-hourly totals or longer, the current reporting frame (ie notification

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by normal operation of large water-consuming plant such as chillers.	to user) is daily. A recent development allows the user to define where the 24hr reading frame starts, ie an 8am to 8am window will position the customer to identify and respond to an overnight leak on arrival at the office at 9am. A close relationship with Coherent Research and the flexible nature of the software means that should a closer to real-time reporting frequency be required, a revised report could be developed to alert the user within half an hour of the tolerance breach. Once the alarm is raised, the user can use their discretion based around known local usage, consumption patterns against normal conditions (if sustained over time) and interact with maintenance services accordingly. Whilst this does rely on experience of the user, the resulting process is human managed, and therefore sensitive to faults as they occur in a semi-automated and appropriate manner – reducing false alarms, automatic lock-outs and other reliability issues based on arbitrary system controls faced when using a fully automated BMS. Reports can be set up as “private” or “public”, depending on the need for multiple users and potential modifications. Any DCS report, and therefore alarm subscriptions can be managed within the DCS system to automatically notify the correct people, by .pdf attached email, at the correct time of day. It is also possible to build in a time offset, which means the reading frame is shifted to generate the report a definable period after the event. This is useful to allow transient blips, whether due to system connectivity, communications or short-term surges in usage, to pass or be self-rectified before the report is created. This can be used effectively to balance frequency and sensitivity of report (where time may allow autonomous restoration to expected patterns, and to limit the number of false positives), but also allow the establishment of clearly identifiable, diagnosable trends in the half-hourly data chart before a course of action is taken. Of course this must be balanced against the immediacy of certain fault alarms, such as in the case of leakage where expediency is important.

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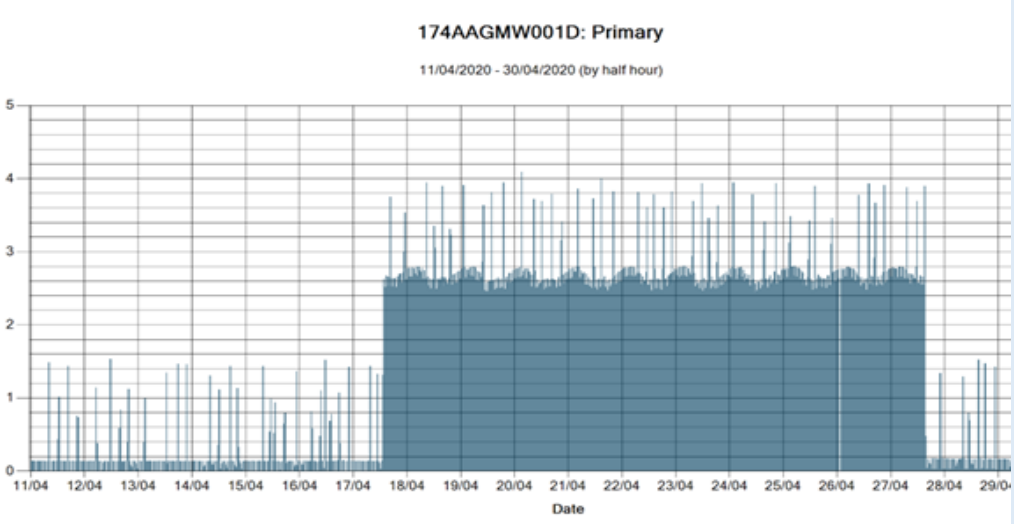
(1) Consumption chart – business as usual, fault condition, and restoration to business as usual



(2) Historical Comparison Report showing past (target) vs present performance