



HxGN EAM Alert Management

Version 12.3
November 2025



Copyright

Copyright © 2025-2026 Hexagon AB and/or its subsidiaries and affiliates. All Rights Reserved.

This computer program, including software, icons, graphic symbols, documentation, file formats, and audio-visual displays; may be used only as pursuant to applicable software license agreement; contains confidential and proprietary information of Intergraph Corporation or a Hexagon Group Company and/or third parties which is protected by patent, trademark, copyright law, trade secret law, and international treaty, and may not be provided or otherwise made available without proper authorization from Hexagon AB and/or its subsidiaries and affiliates.

U.S. Government Restricted Rights Legend

Use, duplication, or disclosure by the government is subject to restrictions as set forth below. For civilian agencies: This was developed at private expense and is "restricted computer software" submitted with restricted rights in accordance with subparagraphs (a) through (d) of the Commercial Computer Software - Restricted Rights clause at 52.227-19 of the Federal Acquisition Regulations ("FAR") and its successors, and is unpublished and all rights are reserved under the copyright laws of the United States. For units of the Department of Defense ("DoD"): This is "commercial computer software" as defined at DFARS 252.227-7014 and the rights of the Government are as specified at DFARS 227.7202-3.

Unpublished - rights reserved under the copyright laws of the United States.

Intergraph Corporation, Hexagon's Asset Lifecycle Intelligence Division
305 Intergraph Way
Madison, AL 35758

Documentation

Documentation shall mean, whether in electronic or printed form, User's Guides, Installation Guides, Reference Guides, Administrator's Guides, Customization Guides, Programmer's Guides, Configuration Guides and Help Guides delivered with a particular software product.

Other Documentation

Other Documentation shall mean, whether in electronic or printed form and delivered with software or on Intergraph Smart® Support, SharePoint, box.net, or the Hexagon documentation web site, any documentation related to work processes, workflows, and best practices that is provided by Hexagon as guidance for using a software product.

Terms of Use

- a. Use of a software product and Documentation is subject to the End User License Agreement ("EULA") delivered with the software product unless the Licensee has a valid signed license for this software product with Intergraph Corporation, Hexagon's Asset Lifecycle Intelligence Division ("Hexagon"), a Hexagon Group Company. If the Licensee has a valid signed license for this software product with Hexagon, the valid signed license shall take precedence and govern the use of this software product and Documentation. Subject to the terms contained within the applicable license agreement, Hexagon gives Licensee permission to print a reasonable number of copies of the Documentation as defined in the applicable license agreement and delivered with the software product for Licensee's internal, non-commercial use. The Documentation may not be printed for resale or redistribution.
- b. For use of Documentation or Other Documentation where end user does not receive a EULA or does not have a valid license agreement with Hexagon, Hexagon grants the Licensee a non-exclusive license to use the Documentation or Other Documentation for Licensee's internal non-commercial use. Hexagon gives Licensee permission to print a reasonable number of copies of Other Documentation for Licensee's internal, non-commercial use. The Other Documentation may not be printed for resale or redistribution. This license contained in this subsection b) may be terminated at any time and for any reason by Hexagon by giving written notice to Licensee.

Disclaimer of Warranties

Except for any express warranties as may be stated in the EULA or separate license or separate terms and conditions, Hexagon disclaims any and all express or implied warranties including, but not limited to the implied warranties of merchantability and fitness for a particular purpose and nothing stated in, or implied by, this document or its contents shall be considered or deemed a modification or amendment of such disclaimer. Hexagon believes the information in this publication is accurate as of its publication date.

The information and the software discussed in this document are subject to change without notice and are subject to applicable technical product descriptions. Hexagon is not responsible for any error that may appear in this document.

The software, Documentation and Other Documentation discussed in this document are furnished under a license and may be used or copied only in accordance with the terms of this license. THE USER OF THE SOFTWARE IS EXPECTED TO MAKE THE FINAL EVALUATION AS TO THE USEFULNESS OF THE SOFTWARE IN HIS OWN ENVIRONMENT.

Hexagon is not responsible for the accuracy of delivered data including, but not limited to, catalog, reference and symbol data. Users should verify for themselves that the data is accurate and suitable for their project work.

Limitation of Damages

IN NO EVENT WILL HEXAGON BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL INCIDENTAL, SPECIAL, OR PUNITIVE DAMAGES, INCLUDING BUT NOT LIMITED TO, LOSS OF USE OR PRODUCTION, LOSS OF REVENUE OR PROFIT, LOSS OF DATA, OR CLAIMS OF THIRD PARTIES, EVEN IF HEXAGON HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

UNDER NO CIRCUMSTANCES SHALL HEXAGON'S LIABILITY EXCEED THE AMOUNT THAT HEXAGON HAS BEEN PAID BY LICENSEE UNDER THIS AGREEMENT AT THE TIME THE CLAIM IS MADE. EXCEPT WHERE PROHIBITED BY APPLICABLE LAW, NO CLAIM, REGARDLESS OF FORM, ARISING OUT OF OR IN CONNECTION WITH THE SUBJECT MATTER OF THIS DOCUMENT MAY BE BROUGHT BY LICENSEE MORE THAN TWO (2) YEARS AFTER THE EVENT GIVING RISE TO THE CAUSE OF ACTION HAS OCCURRED.

IF UNDER THE LAW RULED APPLICABLE ANY PART OF THIS SECTION IS INVALID, THEN HEXAGON LIMITS ITS LIABILITY TO THE MAXIMUM EXTENT ALLOWED BY SAID LAW.

Export Controls

Intergraph Corporation, Hexagon's Asset Lifecycle Intelligence division ("Hexagon"), and a Hexagon Group Company's software products and any third-party Software Products obtained from Hexagon, its subsidiaries, or distributors (including any Documentation, Other Documentation or technical data related to these products) are subject to the export control laws and regulations of the United States. Diversion contrary to U.S. law is prohibited. These Software Products, and the direct product thereof, must not be exported or re-exported, directly or indirectly (including via remote access) under the following circumstances:

- a. To Cuba, Iran, North Korea, Syria or the Crimean, "Donetsk People's Republic", "Luhansk People's Republic", or Sevastopol regions of Ukraine, or any national of these countries.
- b. To any person or entity listed on any U.S. government denial list, including but not limited to, the U.S. Department of Commerce Denied Persons, Entities, and Unverified Lists, <http://www.bis.doc.gov/complianceand enforcement/liststocheck.htm>, the U.S. Department of Treasury Specially Designated Nationals List. Visit www.export.gov for more information or follow this link for the screening tool: <https://legacy.export.gov/csl-search>.
- c. To any entity when Licensee knows, or has reason to know, the end use of the Software Product is related to the design, development, production, or use of missiles, chemical, biological, or nuclear weapons, or other un-safeguarded or sensitive nuclear uses.
- d. To any entity when Licensee knows, or has reason to know, that an illegal reshipment will take place.

Any questions regarding export/re-export of relevant Hexagon software product, customized software, Technical Data and/or third-party software obtained from Hexagon, its subsidiaries or distributors, should be addressed to Hexagon's Export Compliance Department, 305 Intergraph Way, Madison, Alabama 35758 USA or at exportcompliance@intergraph.com. Customer shall hold harmless and indemnify Hexagon and a Hexagon Group Company for any causes of action, claims, costs, expenses and/or damages resulting to Hexagon or a Hexagon Group Company from a breach by Customer.

Trademarks

Intergraph®, the Intergraph logo®, Intergraph Smart®, SmartPlant®, SmartMarine, SmartSketch®, SmartPlant Cloud®, PDS®, FrameWorks®, I-Route, I-Export, ISOGEN®, SPOOLGEN, SupportManager®, SupportModeler®, SAPPHIRE®, TANK, PV Elite®, CADWorx®, CADWorx DraftPro®, GTSTRUDL®, CAESAR II®, and HxGN SDx® are trademarks or registered trademarks of Intergraph Corporation or its affiliates, parents, subsidiaries. Hexagon and the Hexagon logo are registered trademarks of Hexagon AB or its subsidiaries. Other brands and product names are trademarks of their respective owners.

The following are trademarks and service marks owned by Intergraph Corporation d/b/a Hexagon or its subsidiaries worldwide: hexagonppm.com/trademarks.

About this brief

This brief provides conceptual information on the alert management functionality in the HxGN EAM application. It includes general information about the screens. This brief is intended to supplement the documentation of this feature. It is not comprehensive and may not include all the details about this functionality.

Overview

Alert management in HxGN EAM searches the database for specific data and, when found, will alert the user of the existence of such data. The search for this data is based on a user-defined grid. A Dataspy can also be created for this user-defined grid to fine tune the search, and to only select a subset of this data. The selected data is then used to send an e-mail alert, create a work order, create a work order pick ticket, create a flex python event record, or generate PM/Maintenance Pattern work orders.

Alert management functionality allows users to define custom alerts of their own, however, HxGN EAM is delivered with several pre-configured alerts. See “Understanding pre-delivered alerts.”

Setting up alert management

To set up an alert, perform the following tasks:

1. Define a grid to query data in the system.
2. If the alert is designed to send an e-mail, define the e-mail template.
3. Set up the alert on the Alert Management screen.

Defining grids | Grid Designer screen

A grid is a select statement that you would run on a database. It defines the columns you are looking for, the tables from which these columns are derived and the conditions that must be satisfied to show the data. The reason it is called a grid is because after running the select the result looks like a grid consisting of rows and columns like you would see in Excel.

The Grid Designer screen has the following important attributes:

1. **Grid Name** – Must be 6 characters exactly and the second character must be a 'U'. Unless the Grid Type is 'Tab' in which case it must be 3 characters starting with 'X'.
2. **Grid Type** – Make sure you select 'Alert Management' if this grid will be used on the Alert Management screen. Otherwise select 'List View' for a stand-alone grid that you can apply to the HxGN EAM menu, or select 'Tab' if this grid will be a new tab on an existing HxGN EAM screen.
3. **Parent Screen** – Only required if you selected 'Tab' for the grid type.
4. **From Clause** – List the tables that you want to select data from. Obviously one table is the minimum, but if you need to join multiple tables together you can specify them all here in this field.
5. **Select Clause** – List the columns you would like to include. You can leave this blank initially and define the columns on the Fields tab of this screen later. Columns for a list view or a tab type of grid can be displayed in the grid and can be used by the Dataspy for filtering and sorting. On alert management grids the same holds true, but there the columns can also be used as 'parameters' to:
 - a) Populate the e-mail message content or subject.
 - b) Determine the e-mail recipient

- indirectly if you include an Employee, User, Contact (from the Call Center) or Supplier code (E-mail Messenger will substitute the code with the associated e-mail address automatically) or
 - directly by including a column with the e-mail address.
- c) Populate work order attributes like Type, Status, Description, etc.
6. **WHERE Clause** – List all conditions that apply. Typical conditions that you would find in the where clause of a select statement, like `act_event = evt_code` or `evt_rstatus = 'R'`, are all applicable here. Additionally, you can make use of (substitution) parameters. Feel free to define these parameters yourself. Some examples:
- a) If this is a tab on the work order screen and you want certain data that pertains to the selected work order to show you must add a line to the where clause like `'and xxx_event = :WOnbr'`. On this line `:WOnbr` is the parameter that during execution of the grid should be replaced with the selected work order number. Some additional setup is required for this on the Parameters tab.
 - b) If this is an alert management grid searching for a temperature value and you do not want to hard code the temperature because you want the grid to be usable for alerts in all regions of the country, then you could add a line to the where clause like `'and xxx_temperature > :TempThreshold'`. On this line `:TempThreshold` is the parameter that can be assigned a value on the alert (on the Grid Parameters tab) and that will be used during the execution of the grid.
- Note:** For alert management grids there is a system parameter called `:parameter.alert`. During execution of the grid this parameter will always hold the Alert code. A very handy parameter indeed, if you need to join to the alert history for some reason.

Designing a grid should be done by IT experts that are well versed in SQL. Often, for more complicated select statements, it is best to write the select statement in a dedicated tool, like SQL*Plus or equivalent, and execute it in that tool and then, once the select statement works as intended, cut and paste the results into Grid Designer.

Defining fields

The Fields tab holds the details of all columns included in the grid. It has the following important attributes:

1. **Field** – In its simplest form this is the name of a database column, like `evt_code`, `evt_desc` from the `r5events` table or `obj_code`, `obj_desc` from `r5objects`. But you can also create columns yourself. A few examples:
 - a) (`'Dummy'`) – This column is a fixed string and will always return `'Dummy'`.
 - b) (`evt_code || '-' || evt_desc`) will concatenate the work order number and description separated by a dash.
 - c) `CASE WHEN evt_type = 'BR' THEN 'Breakdown' ELSE 'No Breakdown' END` will identify a breakdown work order as such and will identify all others as `'No Breakdown'`. You can rewrite this same example but instead of `'BR'` in the condition you could use `:WOType`. So rather than hard coding the work order type you can now select it as a parameter on the alert.

Note: The use of () around the field name is usually not required, but SQL allows it and you will notice that it 'relaxes' the constraints on this tab a little bit so you are more likely able to edit the field name and to change the Data Type after insert.

2. **Field Label** – This will be the column header in the grid. Spaces are allowed here.
3. **Alias** – The alias does not allow spaces. If the alias does not meet the requirements, the system may replace it automatically with a system assigned alias. Do not use reserved SQL words, like from and group because, even though these will be accepted on this screen, you will not be able to activate the grid later. The recommended approach here is that you use the same value as for the field label, but without the spaces. That way the alias will be easy to recognize later, when you configure the alert.
4. **Data Type** – For most fields the data type is automatically selected. But for user defined fields it may still be necessary to pick a value here. In update mode this field is often protected. You may prevent that by using () around the field. See note above.
5. **Grid Key** – One field must be the key. You cannot activate the grid without at least one field selected as the key. Make a logical choice here, but in the end which one you pick does not appear to be very important.

Defining parameters for grids

The Parameters tab is automatically populated with every parameter you referenced in the where clause on the record view or in any of the fields on the Fields tab.

1. **Parameter** – Parameters are always preceded by a colon, but here you will notice it is not included. Any system parameters that you used are flagged as such and do not require further action. But all user defined parameters for the grid must be completed here. So, select that user defined parameter for update and then specify Data Type and possibly the Parent Grid Field.
2. **Data Type** – Identify the selected parameter as a string, a number or a date.
3. **Parent Grid Field** – Only required if the grid is a tab on an existing screen. In that case usually the header key field is a parameter in the where clause. Earlier we gave the example of a tab on the Work Orders screen and used the following: 'and xxx_event = :WOnbr'. For this parameter WOnbr use the lookup on this field to see all options and pick Work Order (e.evt_code). Note that the options in the lookup differ depending on the Parent Screen selected on the Record View of the Grid Designer screen.

Defining validation for grids

After the setup of the grid is complete use the Validation tab to validate and activate the grid. First click the **Create Default Dataspy** button. If you get any errors the setup is incorrect and your SQL statement is not valid. Usually the error message can help you troubleshoot the issue. If no errors are found you still must activate the grid before it can be used, so click the **Activate** check box and then **Save**.

Step one is now complete. A grid is defined that can be used on alert management.

Creating e-mail templates | E-mail Templates screen

Setting up an e-mail template is only necessary if you intend to send e-mails with the alert. Otherwise feel free to skip this step. You likely already use this screen for e-mail notifications, but it does not hurt to refresh your knowledge of the following important attributes:

1. **Push Notification** - Select this check box if this template is used to send out push notifications to users on the mobile app. Alert management does not support push notifications, unless you hard code the user code of the recipient in the **Recipients** field. For further details see the section Limitations on Push Notifications below.
2. **E-mail** – Select this check box if this template is used to send out an e-mail.
3. **Recipients** – Recipient of the e-mail. You can specify an e-mail address here which is the easiest option and works well if there is only one person to receive the e-mail. If you have multiple recipients, then specify all addresses separated by a semi-colon (;). Alternatively have a grid field determine the recipient. The grid may have a field in which the employee, user, contact or supplier is returned. Or the grid may have a field with an actual e-mail address. For both these scenarios use a mail parameter in the Recipients field. Mail parameters you can use are %1, %2, %3 etc. until %15.
Note: Mapping the grid columns to these parameters is described later in this brief.
4. **Subject** – Specify the subject line of the e-mail. Optionally use one or more of the mail parameters.
For example: Temperature of the equipment is greater than %2 degrees.
5. **Body** - Specify the main text of the e-mail. Optionally use one or more of the mail parameters.
For example: Dear %1,
The temperature of asset %3 with description %4 is now at %5 degrees.
Please take appropriate action etc.
6. **Report** – Select the report you would like to attach to the e-mail. Report attachments require that mail parameter 15 holds the user code and other mail parameters may also be required to supply the selection criteria for any of the report parameters, e.g. the work order number if you want to attach the work order form.

Note: To send e-mails from alerts, the mail driver (MAIL) must be running and the install parameter SMTPSERV must reference a valid e-mail server.

Managing alerts | Alert Management screen

Before we dive into the detailed setup of the alert, lets explain the process that the alert management driver follows when an alert is due for processing.

This process includes the following steps:

1. Run the Before SQL logic, if available. This function was originally designed to prepare data for the next step. Think of a scenario where data comes from all over the place. This pre-process can collect that data, manipulate it and then store it in a temporary table for example. This temporary table can then be used by the user defined grid.

2. Run the grid. This includes:
 - Filtering data based on the selected Dataspy.
 - Filtering data based on the Min/Max definition. Note that when you preview the grid this filter is not applied, meaning only the Dataspy filtering is visible at that time.
 - Create the alert for each record in the filter.
3. Run the After SQL logic, if available. This function was originally designed to clean-up data if necessary. To remove records from the temporary table from step 1 for example.

Important: Steps 1-3 above are executed in sequence, but are not “aware” of each other. They can use each other’s data, however, the After SQL for example, does not know inherently which alerts were created. The only way the After SQL becomes aware of this is if you write specific logic in the After SQL to locate it.

Creating alerts

The Alert Management screen has the following important attributes:

1. **Grid Name** – Select the user defined grid that was configured for this alert.
2. **Dataspy** – Select the Dataspy you want to use for this alert. Initially after activating the user defined grid there is only one Dataspy called ‘All Records’. Even if you do not want to use that you must select it, if no others are available. Once the alert is created you can click on the **Preview Grid** button. This will open a popup on which you can see the results of the Dataspy and here you can also create new Dataspies. Then after you return from this popup, you can use the Dataspy of your choice instead.
Note: When you change the Dataspy on an existing alert, or if you use the same Dataspy but you removed some fields from its layout, the system may ask for confirmation if it finds that any of the fields that are used to construct the e-mail or create the work order are now missing for the Dataspy layout. You will be able to continue, but you must redo the mapping for these fields before you activate the alert.
3. **Grid Key Field 1** – The value of this key field is stored in the alert history when an alert is created for a record. For example, if you alert the person assigned to a work order that the work should have been started, the work order number seems an obvious choice here. The key field is not only for information purposes, it is also used by the delay feature. If the alert runs every hour, you may not want to send an e-mail every hour. More on delay later.
4. **Grid Key Field 2** – Optional extra key field. Serves the same purpose as the first key field.
Note: Both key fields hold up to 200 characters. Feel free to make your own key, for example by concatenating certain fields in your user defined grid. We have used that ourselves in one of our pre-delivered base alerts. The Work Order Status Escalation Alert has a key field that concatenates the work order number and the Employee Code (evt_code||’-’||per_code).

In the Min/Max Definition section you can activate an additional filter on a numeric field.

5. **Use Min/Max** – Select this check box to use this capability, so the other fields in this section will become available.
6. **Min Value** – The lower threshold. The value you specify is included in the selection.

7. **Max Value** – The upper threshold. The value you specify is included in the selection.
8. **Trigger within Min/Max Values** – This check box controls whether the alert is raised when the value falls between the minimum and the maximum or when it falls outside. If selected, the system will raise the alert if the value falls between the minimum and the maximum. Otherwise, if unselected, the value must be equal to or less than the minimum or must be equal to or greater than the maximum.
9. **Min/Max Value Field** – Select one of the numerical fields from your grid to use for this filter test. The field must be present in the layout of your Dataspy.

Select the alert type:

10. **Work Order** – Alert will create a work order for each record in the grid. This will require additional setup on the Work Order Alerts tab of this screen.
11. **E-mail** – Alert will send an e-mail for each record in the grid. This will require additional setup on the E-mail Alerts tab of this screen. This brief assumes that the Extended Mail Driver (MAIL) is set to active on the Job Setup screen and that any other required setup for e-mail in HxGN EAM is in place.
12. **Generate WOs** – Alert will release PM Schedule and Maintenance Pattern work orders automatically. Alerts of this type have specific requirements and cannot be combined with any of the other types. For a detailed explanation of these, see the *HxGN EAM Auto-Generating WOs* brief.
13. **WO Pick Ticket** – Alert will create a work order activity pick ticket for each record in the grid. This will require additional setup on the WO Pick Ticket Alerts tab of this screen. See the “Create Work Order Pick Tickets” section in this document for more details.
14. **Flex Python** – Alert will create a flex python event record for each record in the grid. This will require additional setup on the Flex Python Alerts tab of this screen. See the “Defining Flex Python Alert Type” section in this document for more details.

When all setup is completed you can activate the alert:

15. **Active** – Select to activate.
16. **Frequency** – Decide how often you want to run the alert. The smallest interval is specified in minutes, the longest in months. Make a sensible choice here balancing the need for the alert on one hand and considering the load on the system and the receiver of the alert on the other hand. Nobody wants an e-mail about the same overdue work order every 5 minutes.
17. **Next Evaluation Date** – Specify the date and time you first want to run this alert. The system will automatically update this value after every run of the alert. Make sure Alert Management (ALRT) is set to active on the Job Setup screen. After you click the **Preview Grid** button and the system displays the alert grid, you can change this value to the current data and time by clicking **Schedule Now**. Note that this button is only available if the alert is active already.
18. **Last Evaluation Date** – Shows the last date and time the alert ran.
19. **Last Alert Date** – Shows the last date and time that an alert was raised.

Defining SQL statements for alerts

The Before SQL and After SQL tabs can both contain a SQL statement that will be executed at the time the alert job is running the alert. The Before SQL process runs before the alert management job runs the grid and creates alerts for each record in that grid. Then, after the alerts are raised, the After SQL runs.

Note: The Before SQL and After SQL logic are not aware of the situation in the grid, and therefore do not know which alerts will be raised (Before SQL) or have been raised (After SQL).

Both the Before SQL and After SQL tabs have the following important attributes:

1. **SQL Statement** – You can configure the SQL statements like you do on the Flex Business Rules screen, but since alerts are not 'event' driven and therefore there is no insert or update event triggering the action, these do not need to be tied to a specific record. In other words, no need for the :rowid parameter in the **WHERE** clause.
2. **Active** – If selected, the Before or After SQL Statement will be processed when the Alert Management Job is running the alert. If unselected obviously it will not. Note that ones you specify a value in **SQL Statement**, you cannot empty this field anymore. This check box is then the only method to deactivate the logic.
3. **Execute when Previewing Grid** – Select this check box if you want to run the logic when you click on the **Preview Grid** button on the record view. Note that it must also be active for this to work. Only select this check box if the logic is required to make the grid show correct results. For any other situation this should be unselected.

If an error is encountered in the SQL Statement, the system will raise this error on the screen if you clicked the **Preview Grid** button and both **Active** and **Execute when Previewing Grid** check boxes are selected. Errors in the Before SQL will stop processing the alert grid if **Abort on Failure** is selected which is the default. If the alert management job was running and found the error, then the error would show in the history of the alert on the History tab.

Viewing parameters for grids

The Grid Parameters tab automatically displays the parameters used when the grid was designed. These parameters could be used in the WHERE clause or in any field in the grid.

Important: Specify values for these parameters accordingly. Empty parameters in the **WHERE** clause will likely cause no records to be returned.

Creating work order alerts

On the Work Order Alerts tab you configure the work order that will be created by the alert. Map data from the grid to the work order fields.

Note: This tab is only used to set up data if the alert type is **Work Order**.

The tab has the following important attributes:

1. **Standard WO** – The easiest way to generate the work order is by using a standard work order template. All work orders created by the alert will use this template. If you prefer to use a different template depending on the grid data, you can also leave this field blank and include the reference to the Standard WO in your grid. In the latter case you do need to use the **Additional Field Mapping** button to map the Standard WO to the relevant grid field.
Note: If Standard WO is mapped to a grid field this value takes precedence. Otherwise, if no mapping exists or if the mapped grid field's value is blank, the system will use the value you selected in **Standard WO**.
2. **Work Order Org.** – Specify the organization for which the work order will be created. Like the Standard WO, you can also use a grid field to determine the organization and in that case the system will follow the same preferences, i.e. use the mapped grid field first if there is a value, otherwise revert to this field.
Note: The permissions to create a work order in the selected organization is verified against the R5 user, since that is the user that 'runs' the alert management job.
3. **Equipment** – Select the grid field that holds the equipment. If the alert needs to create a work order you must have a column with the equipment number in your grid.
4. **Equipment Org. Field** – Select the grid field that holds the equipment organization. If the alert needs to create a work order you must have a column with the equipment organization code in your grid.
5. **Description** – Specify the work order description. Apart from plain text you can also make use of parameters and fill these with values from the grid. If the alert creates work orders for equipment where the temperature is higher than the maximum, you may want to include some of these numbers in the work order description. For Example: Equipment temperature is currently %1 above the maximum of %2. After saving this you can click on the **Parameters** popup icon in the field and map these to the desired grid fields. The Parameters popup is used in a variety of places and always has a similar set of fields:
 - a) **Parameter** – Specify the parameter number. In our current example you would create 2 records. One for parameter 1 and one for parameter 2. A maximum of 15 parameters is available for this purpose.
 - b) **Grid Field** – Select the grid field that will be substituted for the parameter. For parameter 1 select the grid field that holds the temperature difference between the current temperature of the equipment and the maximum and for parameter 2 select the maximum. Obviously, you must pre-plan your grid and include these fields during the grid design.
 - c) **Value** – Rather than a grid field you can also map the parameter to a fixed value.
 - d) **Report Parameter Line Number** – Only relevant for e-mail alerts. Not used here.
6. **Comments** – Specify the work order comment. Like the **Description**, you can use parameters in the comment as well.
7. **Include Nonconformities** – If selected the system will include new observation records for open nonconformities attached to the equipment or any of its children.
8. **Due Nonconformities Only** – If selected the system will limit the included nonconformities to those where the next inspection date is specified and has been reached.

Mapping additional fields for work order alerts

Additional Field Mapping – Click this button to ‘fine tune’ your work order. Select a work order field on this popup and then associate the grid field you want to populate the work order field. For example, if your grid has a field that determines priority conditionally (CASE statement), you can use that to dynamically populate the priority for each created work order through the alert.

Use the delay feature to prevent creating too many work orders for the same reason. If the alert searches for equipment with a condition score of 2 or below and creates an alert for that equipment, it may not be realistic to assume that tomorrow this issue will be fixed, and therefore it makes no sense to create another work order for the same issue and equipment again.

9. **Delay Between** – Select the time you want the alert to skip after the creation of a work order before it creates a new one. The Grid Key 1 and 2 fields selected on the record view of the alert are important here. Whenever an alert is created the system will also create an alert history record with the values of both grid key fields copied into that history record, as well as the date and time of the alert. With those three fields the system can tell the last time the alert was raised for that key combination and can then determine if enough time has passed to raise a new alert for the same key combination or if it should suppress the alert. For work order alerts it makes a lot of sense to use the equipment number and equipment organization for Grid Key 1 and 2. But this is not a requirement.

Hint: Another way to handle delay is in your grid. A grid can use any table accessible, and therefore also the alert history table. By joining the history table with the work order table, you can see that the work order that was created by the same alert is not yet closed and therefore no new work order should be created. Here is an example select statement. Note the NOT EXISTS in the **WHERE** clause.

```
SELECT
    Equipment,
    Equipment Org,
    Any other fields
FROM table XYZ
WHERE something = something
AND NOT EXISTS
    (SELECT 'x' from r5alerthistory, r5events
     WHERE alh_entitycode = evt_object           -- Grid Key 1
     AND   alh_entityorg = evt_object_org        -- Grid Key 2
     AND   alh_alert = :parameter.alert         -- Current running alert
     AND   alh_rstatus = 'S'                    -- History record status
     AND   alh_rtype = 'WA'                    -- History record alert type
                                                WA = Work Order
     AND   alh_resultcode = evt_code            -- Work order number created
     AND   evt_rstatus <> 'C')                  -- Work order (system) status
```

Creating email alerts

On the E-mail Alerts tab you configure the e-mail that will be sent by the alert and as such you only need to setup data here if the alert type is **E-mail**. On this tab you select an e-mail template and then map data from the grid to the parameters used in that template.

The tab has the following important attributes:

1. **E-mail Template** – Select the e-mail template you want to use for this alert.
2. **Delay Between** – The delay feature behaves like described on the Work Order Alerts tab above.

The **Create Parameters** button will launch Parameters popup which is used in a variety of places and always has a similar set of fields as described earlier. Some specifics apply for e-mail however:

- a) **Parameter** – Parameters can be used in the e-mail template in the recipient line, the subject line and the e-mail body. If your e-mail includes a report attachment some of these 25 parameters must be used to support running the report. See later **Report Parameter Line Number** in this section for details on report parameters.
- b) **Recipient** – Select this check box if the parameter is used to fill in the e-mail recipient and if the selected **Grid Field** or specified **Value** for this parameter does not contain an actual e-mail address, but an Employee, User, Contact (from the Call Center) or Supplier code instead. The system will then perform the extra effort and try and find the e-mail address associated to any of these codes.
- c) **Grid Field** – See above.
- d) **Value** – See above.
- e) **Report Parameter Line Number** – If a report is attached to this e-mail make sure that the relevant report parameters are populated as well. The report parameter number does not have to coincide with, i.e. be the same as, the **Parameter** number that you specified.

The easiest way to determine the needed parameters is as follows:

- a. Run the report manually with the parameters you want specified. Mostly you will include reports with context that is relevant to the e-mail, rather than printing all record. So, an e-mail about a work order could include the report for that specific work order, same for a purchase order, requisition, etc. Basically, run the report as you would like to see it.
- b. Determine which parameters you had to specify for the proper result.
- c. Determine the line number for each of these parameters on the Parameters tab of the Reports screen.
- d. Design your grid to include these parameters or, if there is no difference in the values from one grid record to another, opt to specify the value one time in the **Value** field.
- e. Specify a **Parameter** number on this popup, associate the **Grid Field** or **Value** and then specify the line number of the report parameter in **Report Parameter Line Number**. For example, specify 2 for the work order number if the attached report is WZJOBQ, because parameter SEL_JOB for this report is on line number 2.
- f. Repeat this for each parameter you want to pass to the report. Note that you can use any of these report parameters in your e-mail as well, meaning the fact that you fill in this field does not mean the parameter cannot be used in the e-mail subject line or body for example.

Defining exceptions for alerts

On the record view of the Alert Management screen is a hidden field called **Exception Entity**. The default for this field is the equipment entity, but you can select any other entity as required. With that set you can identify certain records of that entity on the Exceptions tab that are 'exceptions to the rule'. Meaning the delay and min/max rules. For example, if the alert is configured to send an e-mail when the temperature of a piece of equipment is below 5 or above 100 degrees with a set delay of 1 day, then for a specific more critical piece of equipment you can specify an exception that this is 20 or 80 degrees with a delay of 1 hour.

The tab has the following important attributes:

1. **Grid Key 1** – Select the code for which you want to make the exception. By default, this lookup shows equipment numbers, but that depends on the selected exception entity.
2. **Grid Key 2** – Some entities, like equipment for example, include the organization in the key as well. This is not a lookup, but you can specify the value manually.

If both grid key 1 and 2 values match the values the grid returns, the exception will be made.

The remaining fields on this tab, the delay between alerts and the min and max value fields, behave as described above.

Defining generate WO alert types

The Generate WO tab is used to release PM and MP work orders. For a detailed explanation of the tab, see the *HxGN EAM Auto-Generating WOs* brief.

Defining Flex Python Alert Types

The Flex Python Alerts tab allows the administrator to configure how flex python event records will be created from the alert user defined grid. The alert user defined grid should contain records that meet the intended criteria for which a python script should be executed. The fields provided on the Flex Python Alerts tab provide a means to map data into the fields in the flex python events table.

The Flex Python Alerts tab has the following fields:

1. **Delay Between** – See Creating Work Order Alerts section for details.
2. **Python Executable Document** – Specify the EAM document code that defines the python executable script that should be run for each alert grid record (i.e. the administrator might do this if they intend to create a separate alert for each python script that they wish to execute). The lookup will display all 'in-service' documents where Python Script Type = Executable and the user has the document's organization in their organization list. This field AND Python Executable Document Grid Field cannot be populated together. However, one of them should be populated for python scripts to be executed. There is no controlling organization for this lookup.

3. **Python Executable Document Grid Field** – Select the alert user defined grid field that contains the EAM document code that defines the python executable script that should be run for each alert grid record (i.e. the administrator might do this if they intend to create 1 flex python alert that can execute a different python script for each record in the alert grid). The lookup will contain all the alert grid fields. Of course, the administrator must create the user defined grid query to contain the appropriate python script document.
4. **Parameter 1 – Parameter 10** – Select the alert grid field that contains data you wish to pass into the flex python executable framework API that will be used during the execution of the python script. For example, if the purpose of the python script is to take equipment data and create a work order, you will want to select the equipment code and equipment org. from the alert user defined grid into Parameter 1 and Parameter 2, respectively, because these values are necessary to create the work order. Of course, you could also map the remaining equipment related data for creating a work order in this way (i.e. description, department, etc), or the python script itself can query this information from database.

Notes:

- This tab is only used to set up data if the alert type is **Flex Python** on the record view.
- Records in the flex python events table are processed into the flex python execution framework API by the Flex Python job within EAM.
- Parameter 1 – Parameter 10:
 - The administrator can manually enter a value that is NOT in the lookup. This will essentially be a hardcoded value that will be used to create all python event records from the alert.
 - These fields are 4000 characters in the database and can pass this number of characters to the python event records.
- See the [Python Studio and Flex Python Scripting Brief](#) for more details on configuring and using this functionality.

Understanding pre-delivered alerts

Power Factor

This alert compares the measured Power Factor with a desired Power Factor.

Power factor (PF) is the ratio of the real power to apparent power and represents how much real power electrical equipment utilizes. It is a measure of how effectively electrical power is being used. Since a utility is paid based on energy consumed (kWh) and the reactive component of current does not register on a kilowatt-hour meter, many utilities impose a power factor penalty or peak demand (kVA) billing element for commercial and industrial customers to receive income for the total power they are required to deliver to a given customer. These charges differ from utility to utility and are expensive.

The most common methods are:

- Measuring reactive kilovolt-amp hours (kVAh) for customers with peak demand over x kW in addition measure kilowatt-hours (kWh). Interval meters record these values every 15 minutes.
- The kilowatt-hours and reactive kilovolt-amp hours are totaled for the month and a single calculation is performed to provide an average value of power factor for that billing period. A power factor adjustment of 0.06% is charged for each percentage point below x (0.85 to .95). Similarly, a credit is provided for each percentage point above x (not all utilities offer a credit).
- Some utility companies charge for demand using kVA instead of kW. The monthly bill is calculated by multiplying the demand by a demand rate (\$/kVA)

Power Factor ideally is 100% but this is most often not achievable. You should strive for close to 100% however, but you also must deal with the equipment and its inherent capabilities. Some equipment, due to changes overtime, simply cannot achieve 100%.

Benefits: Depending on your situation, 12% to 25% energy expense reduction is not uncommon.

Alert Parameters

Parameter	Description
DefaultPowerFactor	Used if the Desired Power Factor on the equipment is empty. This should also be a number (percentage) between 0 and 100.
HistoryDays	Number of past days before the current date/time over which to calculate the average value of the measured Power Factor.
SampleSize	Minimum number of measurements required for the calculation.
DefaultRecipient	Used if the Performance Manager on the equipment is empty.

Peak Demand

This alert compares the measured Peak Demand with a maximum set for the billing period.

Electric utility rates for industrial and commercial facilities are composed of at least two components.

- One is the “energy rate” or the kilowatt-hour charge, which is related to the fuel that is expended in producing and delivering that energy.
- The second is the “demand rate”, the kilowatt, or kVA demand charge. This usually related to the capital investment that must be made to build the generation, transmission, and distribution facilities necessary to provide the electrical energy to the consumer.

Demand charges (rates x consumption above x kWh) are reset monthly and are based on the highest rate at which electricity is consumed during periods that are peak-utility-service hours.

Demand charges are measured in kilowatts and, depending on the utility service provider, the highest consumption rate is measured in 15- or 30-minute intervals during peak hours. Demand charges form a significant portion of a company's monthly electric bill.

The Peak Demand Alert will monitor interval consumption. The Alert will inform the user of approaching or exceeded established or experienced peak demand consumption during the month.

Benefits: Enable peak load management strategies that lower a facility's demand during times when the peak demand is measured. Proactive peak load awareness.

Since this alert manages peak demand in the billing period, and the billing period has a start and an end date, the system will, when the end of the billing period is reached, update the equipment and set the new start date for the new billing period based on the billing frequency. Therefore, make sure you specify **Start Billing Period** and **Bill Every** for every equipment before you include them in the alert.

Alert Parameters

Parameter	Description
HistoryMinutes	Number of past minutes before the current date/time for which to include energy measurements.
DefaultRecipient	Used if the Performance Manager on the equipment is empty.

Phase Imbalance

This alert calculates the effect of a measured phase imbalance.

The Phase Imbalance Alert will monitor power quality. The Alert will inform the user of energy quality, efficiency, and potential asset performance degradation due to unequal line (phase) voltage.

Phase Imbalance is attributable to 3 primary causes:

- Poor wiring connections or contactor contacts
- Internal motor winding problems on motor driven equipment (e.g. HVAC air handlers)
- Utility provider or facility electrical problems.

Phase Imbalance exceeding 2% adversely impacts asset performance (capacity, availability, and efficiency) due to exponentially increasing heat within the asset.

Alert Parameters

Parameter	Description
Commodity	The commodity representing electricity to determine the utility rate.
EfficiencyLossAt1	Efficiency Loss at 1% Voltage Imbalance (Default is 2%)
EfficiencyLossAt2	Efficiency Loss at 2% Voltage Imbalance (Default is 5%)
EfficiencyLossAt3	Efficiency Loss at 3% Voltage Imbalance (Default is 10%)
EfficiencyLossAt4	Efficiency Loss at 4% Voltage Imbalance (Default is 18%)
EfficiencyLossAt5	Efficiency Loss at 5% Voltage Imbalance (Default is 25%)
HistoryDays	Number of past days before the current date/time over which to calculate the average value of the measured Power Factor.
SampleSize	Minimum number of measurements required for the calculation.
DefaultRecipient	Used if the Performance Manager on the equipment is empty.

Note: Default Efficiency Loss percentages based on source: Nema-MG1.

Load Electricity Data

Administrative alert that populates electricity data based on standard feeds of electricity meters into alert data.

This alert reads all records in r5alertdataobj where ado_udfchar34 = 'ILON'. These electricity records will then be inserted into the r5electricitydata table based on the mapping described below.

The alert will also read all r5electricitydata where **Complete** is '-' and **Date Recorded** is greater than or equal to the system date – the HistoryDays parameter and will update the following columns for this record:

- INTERVAL
- COMPLETE

ENERGY_KWH

Mapping r5alertdataobj record to electricity data

Destination Field	Source Field	Comments
OBJECT	ADO_OBJ	
OBJECT_ORG	ADO_OBJ	
DATE RECORDED	ADO_UDFDATE01	
INTERVAL		This is the difference in minutes between this record and the previous record for the same equipment. This number must be rounded to whole minutes.
COMPLETE		If the calculated interval matches the Electric Sub-meter Interval on the equipment set complete to '+', otherwise complete is set to '-'.
EQUIPMENT ON		If CURRENTA_A is greater than or equal to the Electric Usage Threshold on the equipment set Equipment On to '+', otherwise Equipment On is set to '-'.
VOLTAGEAB_V	ADO_UDFNUM01	
VOLTAGEBC_V	ADO_UDFNUM02	
VOLTAGECA_V	ADO_UDFNUM03	
VOLTAGE_IMBALANCE		Calculate as follows: Determine highest of VoltageAB_V, VoltageBC_V and VoltageCA_V Determine lowest of VoltageAB_V, VoltageBC_V and VoltageCA_V

Destination Field	Source Field	Comments
		Determine average of VoltageAB_V, VoltageBC_V and VoltageCA_V Difference between highest and lowest Voltage Imbalance = Difference / Average * 100 Leave blank if any of the three voltage fields are blank or the average is 0 (zero).
VOLTAGEAN_V	ADO_UDFNUM07	
VOLTAGEBN_V	ADO_UDFNUM08	
VOLTAGECN_V	ADO_UDFNUM09	
CURRENTA_A	ADO_UDFNUM04	
CURRENTB_A	ADO_UDFNUM05	
CURRENTC_A	ADO_UDFNUM06	
CURRENTNEUTRAL_A	ADO_UDFNUM12	
FREQUENCY_HZ	ADO_UDFNUM15	
POWERFACTOR_PCT		ADO_UDFNUM13 * 100
ENERGYTOTAL_KWH	ADO_UDFNUM16	
ENERGY_KWH		<p>ENERGY_KWH = the difference between ENERGYTOTAL_KWH of this (current) measurement and the previous measurement for the same equipment providing the difference between current and previous measurement is consistent with the Electricity Meter Interval of the equipment, i.e. Complete is '+'.</p> <p>ENERGYTOTAL_KWH may roll over. So it is possible that the current measurement is lower than the previous. If this is true than use the following simple logic to determine actual difference:</p> <p>Determine number of digits before the decimal comma on the previous measurement. If previous measurement was 99749.6 this is 5 digits.</p> <p>To determine the max meter value plus 1 append as many zeroes behind 1 as there are digits. That would be 100000.</p> <p>Subtract the previous measurement from this number. Top = 100000 - 99749.6 = 250.4</p>

Destination Field	Source Field	Comments
		ENERGY_KWH = ENERGYTOTAL_KWH of the current measurement + Top. Leave this field blank if complete = '-'
ENERGYTOTAL APPARENT_VAH	ADO_UDFNUM14	
ENERGYTOTAL REACTIVE_VARH	ADO_UDFNUM11	
POWER_W	ADO_UDFNUM10	Peak Demand. Expressed in Watts.
POWERAPPARENT_VA	ADO_UDFNUM17	
POWERREACTIVE_VAR	ADO_UDFNUM18	
THDVOLTA_PCT	ADO_UDFNUM19	
THDVOLTB_PCT	ADO_UDFNUM20	
THDVOLTC_PCT	ADO_UDFNUM21	
THDCURRENTA_PCT	ADO_UDFNUM22	
THDCURRENTB_PCT	ADO_UDFNUM23	
THDCURRENTC_PCT	ADO_UDFNUM24	

Alert Parameters

Parameter	Description
HistoryDays	Number of past days before the current date/time for which to process and reprocess electricity data.
DeleteAlertData	Switch that determines if alert data should be deleted after it is copied to the electricity data table.
DefaultRecipient	Responsible person and recipient of the email.

Load Actual Consumption Data for Electricity

Administrative alert that populates actual consumption per day based on electricity data loaded by the Load Electricity Data alert.

Alert reads all records in r5electricitydata where

- The **Date Recorded** is greater than or equal to the system date – the parameter HistoryDays.
- **Complete** is selected ('+')
- The associated equipment has a design consumption record that matches
 - The Commodity code parameter and
 - The Daily- or HourlyDesignUOM alert parameter and
 - Where the **Date Recorded** is between the design consumption from date and to date.

For the selected r5electricitydata the alert will create summary records per day, i.e. all selected electricity records are grouped together by equipment and by day resulting in one actual consumption record per equipment per day.

These summary records will be inserted into r5objactualconsumption if they do not exist yet. If they do exist an update will be performed. For details on the insert or update see below table.

Not all summary records will be inserted or updated. Insert or update only happens if there are enough records to “trust” the numbers. As follows:

- Determine **Electric Sub-Meter Interval** for the equipment
 - Expected Records = Minutes per day / **Electric Sub-meter Interval**
 - Actual Records = Count selected records for this equipment for this day that satisfy above selection criteria
 - Actual Records / Expected Records * 100 must be greater or equal to the value of the parameter MinimumPercentage. If this is true, the insert or update will be executed. Otherwise the system will not insert or update the actual consumption for that equipment for that day.
- Note: The parameter MinimumPercentage must be greater than or equal to 0 (zero) and less than or equal to 100. If outside this range the system will use the default value.

Mapping electricity data to actual consumption

Destination Field	Source Field	Comments
OAC_OBJECT	OBJECT	
OAC_OBJECT_ORG	OBJECT_ORG	
OAC_COMMODITY	Parameter Commodity	Convert the parameter value to upper case.
OAC_DATE	Date Recorded	Remove the time component.
OAC_USAGE		If the design usage matches the DailyUsageUOM then determine usage as follows: Determine Electric Sub-meter Interval for the equipment

Destination Field	Source Field	Comments
		<p>Expected Records = 1440 / Electric Sub-meter Interval</p> <p>On = Count records where Equipment_On = '+'</p> <p>Usage = On / Expected Records</p> <p>If the design usage matches the HourlyUsageUOM then determine usage by following the same steps as for the daily UOM but add one more step as follows:</p> <p>Usage = Usage * 24</p>
OAC_ACTUALCONSUMPTION		Actual consumption is the sum of ENERGY_KWH
OAC_DESIGNUSAGEUOM		Copy from associated design consumption record for this equipment, commodity and date.
OAC_UPDATED	System Date	Remove time component
OAC_LOADFACTOR		<p>Copy from associated design consumption record for this equipment, commodity and date. If no value is found default to 100. Do not include this field in updates.</p> <p>Note: The update exclusion is to support users updating the Loadfactor manually, without the system then overwriting this manual entry later when the alert runs again.</p>

Alert Parameters

Parameter	Description
Commodity	Commodity code for which to create actual consumption records.
DailyDesignUOM	Design usage UOM for design consumption records representing a daily consumption.
HourlyDesignUOM	Design usage UOM for design consumption records representing a hourly consumption.
HistoryDays	Number of past days before the current date/time for which to process and reprocess electricity data.

Parameter	Description
MinimumPercentage	Percentage of daily expected records that must be present and complete for the system to create actual consumption records.
DefaultRecipient	Responsible person and recipient of the email.

Utility Invoice Audit

The Utility Invoice Audit Alert will inform the user of identified billing problems and anomalies warranting attention prior to authorization for payment.

The alert will search for and process non-purchase order invoices with status UA10 (system status is U). UA10 is a status code that should be added to the list of status codes for entity NIST. The description for UA10 is recommended to say, 'Ready for Audit'. Other description values are obviously possible and depend on your preference. After processing if the invoice passes or fails a new status will be assigned. The defaults are UA20 for fail and UA30 for pass.

The alert will search for the following conditions and report accordingly on the selected invoices:

- No conversion rate found between commodity UOM and the utility bill record. For example, when the bill is recorded in BTU and the commodity is presented in kWh a conversion value needs to be available.
- Overlaps or Gaps between billing periods start dates and end dates.
- No weather normalization data available for present. When comparing billing periods, it is always better to remove the weather-related load. Without weather data the comparisons are still executed but they may be influenced by weather. A hotter July than last year therefore explains the difference. With the weather normalization we try to compare apples to apples.
- Difference between the previous billing period (last month) Average Daily Consumption and the current billing cycle Average Daily Consumption is reported if over a certain percentage or absolute dollar value.
- Difference between the previous billing period Rate and the current billing cycle Rate is reported if over a certain percentage or absolute dollar value.
- Difference between the previous billing period Average Demand and the Peak Demand listed on the current bill is reported if over a certain percentage or absolute value.
- Difference between the Billed consumption versus the Measured Difference is reported if over a certain percentage or absolute value. Obviously, this condition can only be reported on if the consumption is sub-metered.
- Difference between the current billing cycle Average Daily Consumption and the last year Average Daily Consumption over the same period is reported if over a certain percentage or absolute dollar value.
- Difference between the current billing cycle Rate and the last year Average Rate over the same period is reported if over a certain percentage or absolute dollar value.
- Difference between the Peak Demand listed on the current bill last year Average Demand over the same period is reported if over a certain percentage or absolute value.

- Difference between the measured Peak Demand and the invoiced Peak Demand over the billing period is reported if over a certain percentage or absolute value.

Benefits derived from this alert:

- Audits: Identifies billing problems warranting immediate attention prior to payments and alerts notify the user of missing bills.
- Benchmarking: Helps identify where to focus energy management efforts and enables setting realistic energy management goals.
- Load Factor Analysis: Identifies meter or billing problems, informs user whether they should focus on reducing energy or demand and may help identify buildings or operations that are leaving their equipment on during off hours.
- Weather Normalization: Removes variation due to changes in weather in year to year comparisons thereby giving a true picture of increases or decreases in energy usage and allows accurate tracking of savings due to energy conservation projects.
- Peak Demand Analysis: Informs user whether they should focus on process and control modifications.

Alert Parameters

Parameter	Description
InputStatus	Invoice input status.
OutputStatusFail	Invoice output status when audit fails.
OutputStatusPass	Invoice output status when audit passes.
NormalizeWeather	Switch that controls weather normalization. YES means weather is normalized, else do not normalize weather.
PreviousPeriodCons	Consumption difference threshold, expressed in monetary value, above which the audit will fail.
PreviousPeriodConsPct	Consumption Percentage threshold above which the audit will fail.
PreviousPeriodRate	Rate difference threshold above which the audit will fail.
PreviousPeriodRatePct	Rate Percentage difference threshold above which the audit will fail.
PeakDemandPct	Peak Demand Percentage difference threshold above which the audit will fail.
SubmeteredCons	Consumption difference with a sub-meter threshold, expressed in monetary value, above which the audit will fail.
SubmeteredConsPct	Consumption Percentage threshold above which the audit will fail.
LastYearCons	Consumption difference threshold, expressed in monetary value, above which the audit will fail.
LastYearConsPct	Consumption Percentage threshold above which the audit will fail.

Parameter	Description
LastYearRate	Rate difference threshold above which the audit will fail.
LastYearRatePct	Rate Percentage difference threshold above which the audit will fail.
DefaultRecipient	Responsible person and recipient of the email.

Missing Utility Invoices

The Missing Invoices Alert will inform the user of missing utility bills. The Utility Billing process is error prone and inefficient from the Utility reading the Customer meter and processing consumption data and bill preparation, to submission and ultimately Customer processing for payment. Missing Bill identification is critical to a comprehensive energy management program in performing billing audits, identifying performance anomalies and associated conservation and demand reduction opportunities (absent advanced metering capabilities and energy intelligence).

Benefits:

- Improved cash flow
- Energy Audit enablement
- Energy Mgt. enablement
- Late payment penalty avoidance

Alert Parameters

Parameter	Description
HistoryMonths	Number of past months before the current date/time over which to calculate the average days between invoices.
SampleSize	Minimum number of invoices required for the calculation.
DefaultRecipient	Used if the Performance Manager on the equipment is empty.

Warranty Expiration Date

This alert compares the system date with the warranty threshold and creates an alert based on established conditions.

The warranty data must be defined as follows:

- Warranty document has:
 - Warranty Type equal to Equipment

- Renewal Alert Email specified
- Warranty Equipment relationship has:
 - Threshold is not blank
 - Expiration Date is not blank
 - Active is checked

This alert has no parameters and requires setup of a Dataspy.

Warranty Expiration Usage

This alert compares the last value specified for a meter reading with the warranty threshold and creates an alert based on established conditions.

The warranty data must be defined as described above for the Warranty Expiration Date alert, with the following exceptions:

- Threshold is replaced with Threshold UOM
- Expiration Date is replaced with Expiration Usage

This alert has no parameters and requires setup of a Dataspy.

Work Order Calculated Priority

This is an administrative alert that populates the Calculated Priority of the work order. The system determines and updates the Calculated Priority for work orders where System Status is “Released” and where Preserve Calculated Priority is not selected as follows:

- Determine the Criticality Factor = Weight (see System Codes entity “OBCR”) of the Criticality of the Equipment of the work order. If none found or if the Criticality is blank use 1 (one).
- Determine the WO Type Factor = Weight (see System Codes entity “JBTP”) of the Type of the work order. If none found use 1 (one).

Note: The Weight field may be hidden. Use Screen Designer to make it optional.

- Determine the work order Age in weeks = (System Date – work order Due Date) / 7
 - If the Due Date is blank use the Sched. Start Date.
 - Determine the Age Factor = Weight (see System Codes entity “CPDW”) of the age in weeks (due/overdue) of the work order. The system will select the highest integer value defined as a user code that is still below or equal to the calculated age of the work order and that does have a Weight filled in. If none found use 1 (one).
- Calculated Priority = Criticality Factor * WO Type Factor * Age Factor

System reverses the Calculated Priority as follows:

- Update selected work orders and set Calculated Priority is value of the parameter Maximum Priority – Calculated Priority + 1.
- If Calculated Priority is less than 1 set it equal to 1.

Alert Parameters

Parameter	Description
Maximum Priority	The maximum value that the alert will assign to the Calculated Priority. If Maximum Priority is blank the system will use 100.
DefaultRecipient	Responsible person and recipient of the email.

Work Order Status Escalation

This alert calculates the time elapsed since the last status change of the work order and, based on that time, will escalate the work order by notifying (e-mail) one or more employees. This alert does require the following configuration of EAM screens:

- Service Problem Codes: User Defined Number 05 is used to record the SLA time allowed before escalation is required.
Define this value in minutes, hours or days. Once you decide for a unit of measure, make sure you use that same UOM on all service codes. The alert is not designed to convert each service problem code individually.
- Employees: User Defined Field 30 is used to record the escalation level. Level 1 could be used to associate line managers, Level 2 for the higher up regional managers, etc. There is no constraint on how many levels are configured here. There is also no constraint on the identification of the levels. Level 1, Level 2 is merely an example.

Alert Parameters

Parameter	Description
EscalationLevel	Used to select relevant Employees.
SLADefaultTime	If no SLA time (=reaction time) is defined on the Service Problem Code or if no Service Problem Code is associated to the work order the system will use this value.
SLAOverdueFrom	Minimum amount of time the SLA (work order response) is overdue
SLAOverdueTo	Maximum amount of time the SLA (work order response) is overdue
TimeExpressedIn	Determines the elapsed time is in Days, Hours or Minutes.
DepartmentMatch	Indicates whether the Department of the work order and the employee should match.
EmailLanguage	To determine the descriptions included in the alert.

Case Task Ready to Start

This alert determines a case task can /should be started and will notify the assigned person or other selected personnel.

The case data must be defined as follows:

- Case system status is 'Requested' or 'Open'.
- **Started** on the task is unselected.
- **Start Date** on the task is blank.
- Grid field EmailRecipient is not blank.
- If alert parameter ReadyToStartOnly is YES only select tasks where Ready to Start is selected. Otherwise include both selected and unselected.
- If alert parameter NotifyReadyToStartOnly is YES only select tasks where Notify Ready to Start is selected. Otherwise include both selected and unselected.

Alert Parameters

Parameter	Description
ReadyToStartOnly	Used to select only those task that are flagged Ready to Start.
NotifyReadyToStartOnly	Used to select only those task that are flagged Notify Ready to Start.
EmailCaseResponsible	Indicates whether this person should receive the email.
EmailCasePreparedBy	Indicates whether this person should receive the email.
EmailCaseAssignedTo	Indicates whether this person should receive the email.
EmailTaskResponsible	Indicates whether this person should receive the email.
EmailTaskAssignedTo	Indicates whether this person should receive the email.
EmailLanguage	To determine the descriptions included in the alert.

Case Task Overdue Start

This alert determines a case task is not started yet, but should have been, and will notify the assigned person or other selected personnel.

Alert Parameters are the same as above for the alert Case Task Ready to Start alert.

Create Work Order for Nonconformities Due Repair

This alert creates a repair work order for selected nonconformities based on the recommended repair date approaching. The system also creates a new observation for the nonconformity and will attach this observation to the repair work order.

Alert Parameters

Parameter	Description
TypeHasStandardWO	The Nonconformity Type of the selected nonconformity must have a Standard WO associated.
LeadTime	Number of days before the Recommended Repair Date on which the work order must be created.
EmailLanguage	To determine the language of descriptions included in the alert.
DefaultRecipient	User code of the email recipient.

Generate Fixed/Variable PM Work Orders

Alert will release PM Schedule work orders automatically. For a detailed explanation of these, see the *HxGN EAM Auto-Generating WOs brief*.

Generate Duplicate PM Work Orders

Alert will release PM Schedule work orders automatically. For a detailed explanation of these, see the *HxGN EAM Auto-Generating WOs brief*.

Generate Non-Duplicate MP Work Orders

Alert will release Maintenance Pattern work orders automatically. For a detailed explanation of these, see the *HxGN EAM Auto-Generating WOs brief*.

Generate Duplicate MP Work Orders

Alert will release Maintenance Pattern work orders automatically. For a detailed explanation of these, see the *HxGN EAM Auto-Generating WOs brief*.

Create Work Order Pick Tickets

This alert evaluates work order activities in the associated grid based on the activity Start Date for the creation of a pick ticket. A new Alert Type checkbox called "WO Pick Ticket" has been created added to the Alerts screen to identify such alerts. The system delivered Alert is 00020 – Create WO Pick Tickets.

Alert Parameters

Parameter	Description
CreateThroughDays	Number of days from the system date that pick tickets will be created. Default is 14.
WOOrg	The work order organization for which pick tickets will be created.

The system delivered grid associated to this alert is BAL020 – Create WO Pick Tickets. It will consider the same WO activities that the WO-Activity field displays on the Pick Ticket screen, except:

- 'Completed' work orders are NOT considered (i.e. Status must be a system status of 'Released').
- Work order cannot have Type = MEC.
- If Department Security is enabled, the R5 user will be verified for permissions versus the 'logged-in' user as the R5 user initiates the job that executes the alerts.
- Activity must have a material list (containing parts), associated.
- Activity cannot already have a pick ticket whose Status <> Rejected.
- Activity Start Date must be <= system date + alert grid parameter Create Through Days.

A new tab called WO Pick Ticket Alerts has been added to the Alerts screen. This tab is available when the WO Pick Ticket checkbox on the alert record view is selected and is used to specify the pick ticket data that will be used when the alert creates pick tickets. The fields are:

- Status: The status for which the pick ticket will be created. System statuses of Unfinished, Awaiting Approval, and Approved are available for selection.
- Store: The pick ticket store will be the Default Store value for the work order department. If no Default Store value is defined for the work order department, the store value in this field will be used when creating the pick ticket.
- Default Description: The pick ticket description will come from the value in this field if specified. If it is blank, the work order description will be used.
- Additional Field Mappings (button): The popup displayed when clicking this button allows the administrator to 'map' alert grid fields (i.e. work order & activity related) to pick ticket fields to be populated as pick tickets are created from these grid records.

Notes:

- Creating the pick ticket is a 3-step process for the alert job. First, the header is created in an Unfinished status. Second, parts are added to the pick ticket. And third, the header status is updated from Unfinished to <value selected in the Status field on the WO Pick Ticket Alerts tab for Alerts>. Therefore, the R5 user must have status authorizations to initially create the pick ticket in the system default status for Unfinished and they must have authorizations to then change the status from the default Unfinished status to <value selected in the Status field on the WO Pick Ticket Alerts tab for Alerts>.
- Pick ticket Originator will always be the R5 user.

- Pick ticket Date Required will be the value based on a field mapping (i.e. using Additional Field Mappings popup) if defined. If a field mapping does NOT exist for Date Required, then the system will use activity Start Date.

Additional considerations

Grid designer parameters

Grid Designer allows the use of parameters as described above. Apart from the user created parameters the following system parameters are available:

:MP5DFLTORG	Default organization
:MP5GROUP	User group
:MP5ORG	Organization
:MP5USER	User code
:parameter.alert	Alert code
:parameter.deptsec	Department security ON or OFF
:parameter.gridname	Grid code
:parameter.language	Language code
:parameter.r5organization	Organization
:parameter.r5user	User code
:parameter.r5usergroup	User group
:parameter.storesec	Store security ON of OFF
:parameter.userfunction	Function code

Language-independent descriptions in the grid

To include a language independent descriptions in your grid you can call database function r5o7.o7get_desc on Oracle and dbo.r5o7_o7get_desc on SQL Server. The function requires the following inputs:

1. Language code
2. Entity code
3. Primary key of record
4. System Codes – Code for the Status, Type or Codes Entity
5. You can leave this field blank.

Some examples:

- WO description: r5o7.o7get_desc(:parameter.language,'EVNT',evt_code,"")
- Object description: r5o7.o7get_desc(:parameter.language,'OBJ',obj_code||'#'||obj_org,"")
- WO status: r5o7.o7get_desc(:parameter.language,'UCOD',evt_status,'EVST',")
- WO priority: r5o7.o7get_desc(:parameter.language,'UCOD',evt_priority,'JBPR',")
- Trade: r5o7.o7get_desc(:parameter.language,'TRAD',act_trade,"")

In SQL Server use null instead of "".

Hosted environment limitations

Hosted environments have restricted access to the database which introduces certain limitations. These constraints can typically be addressed in self-hosted environments due to direct database access.

Grid designer limitations

FROM Clause Restrictions:

The **FROM Clause** field in the grid designer benefits from simple queries and does not support the use of complex constructs

- Supported
 - Simple references including:
 - Selecting several columns from a table (e.g. r5objects)
 - Joins to additional tables (e.g. r5events JOIN r5activities)
- Not Supported
 - Complex constructs including:
 - Subqueries (**SELECT obj_code AS equipment FROM r5objects**)
 - Complex Joins (**r5events LEFT OUTER JOIN r5activities ON evt_code = act_event**)

Utilizing complex constructs will raise an error message indicating they are too complex. Self-hosted environments have a work around by creating a view in the database and then referencing the view in the **FROM Clause**.

Note: Hosted environments can still create Views using the **Views** screen but not directly in the database.

Alert management limitations

Alert management offers both hosted and self-hosted environments a Before and After SQL capability similar to the Flex Business Rules screen capabilities. Both allow the definition of customer specific business logic through SQL code that executes when required.

Limitation on SQL Length:

- SQL scripts are limited to 4,000 characters
- To exceed this limit:
 - Self-hosted customers have the option to create a database procedure in the database and call it from the Before or After SQL tabs.
 - Hosted customers need to divert to other solutions, like splitting the logic into smaller pieces, which may not always be possible.

Push notifications limitations

Push notifications can only be sent to the user of the mobile device. The recipient must always be a user, so if an employee code is used, this employee must have a user associated. The user must also be marked as a mobile user, i.e. the Mobile check box on the User Setup screen is selected. If no user is found for the recipient, the push notification cannot be sent.

Unless you hard code the recipient in the e-mail template, push notifications can only be sent based on mail notification setup for the following tables and columns. For these tables and columns there is no need to configure the **Recipients** field on the e-mail template and no need to configure any parameters on the notification setup.

Table name	Column name	Description
R5EVENT	EVT_PERSON	Work Orders – Assigned To
R5ACTSCHEDULES	ACS_RESPONSIBLE	Work order Schedule Labor – Employee
R5OBJECTS	OBJ_PERSON	Assets/Systems/Positions – Assigned To
R5ASSETINVENTORYPARAMS	AIP_PERSON	Asset Inventory Parameters – Assigned To
R5ASSETINVENTORYPARAMS	AIP_USER	Asset Inventory Parameters – Created By
R5TRANSACTIONS	TRA_AUTH	Physical Inventory – Approved By
R5TRANSACTIONS	TRA_PERS	Physical Inventory – Assigned To
R5OPERATORCHECKLISTS	OCK_CREATEDBY	Operator Checklist – Created By
R5OPERATORCHECKLISTS	OCK_PERFORMEDBY	Operator Checklist – Performed By
R5OPERATORCHECKLISTS	OCK_CREATEDBY	Operator Checklist – Reviewed By
R5DOCKRECEIPTS	DCK_RECEIVER	PO Receipt – Received By