NM 830 & DISCOVERY NM 630

GE Healthcare

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A mandatory component of this drawing set is the GE Healthcare Pre Installation manual. Failure to reference the Pre Installation manual will result in incomplete documentation required for site design and preparation.

Pre Installation documents for GE Healthcare products can be accessed on the web at: www.gehealthcare.com/siteplanning

Typical

GE Healthcare

NM 830 & DISCOVERY NM 630

FINAL STUDY

A

12/Feb/2019

Initial release per PIM revision 6

REV DATE MODIFICATIONS

01 - C1 - Cover Sheet
02 - C2 - Disclaimer - Site Readiness
03 - A1 - General Notes
04 - A2 - Equipment Layout
05 - A3 - Equipment Details
06 - S1 - Structural Notes
07 - S2 - Structural Layout
08 - S3 - Structural Details
09 - M1 - HVAC
10 - E1 - Electrical Notes
11 - E2 - Electrical Layout
12 - E3 - Electrical Elevations-Interconnects
13 - E4 - Power Requirements

Drawn by

Verified by

Concession

S.O. (GON)

PIM Manual

Rev

PMM

RET

-

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5491539-1EN

6

Format

Scale

File Name

Date

Sheet

A3

1/4"=1'-0"

EN-NUC-TYP-DISCOVERY_NM_630-830-WEB.DWG

12/Feb/2019

01/13

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GENERAL SPECIFICATIONS

- GE is not responsible for the installation of developers and associated equipment, lighting, cassette trays and protective screens or derivatives not mentioned in the order.
- The final study contains recommendations for the location of GE equipment and associated devices, electrical wiring and room arrangements. When preparing the study, every effort has been made to consider every aspect of the actual equipment expected to be installed.
- The layout of the equipment offered by GE, the dimensions given for the premises, the details provided for the pre-installation work and electrical power supply are given according to the information noted during on-site study and the wishes expressed by the customer.
- The room dimensions used to create the equipment layout may originate from a previous layout and may not be accurate as they may not have been verified on site. GE cannot take any responsibility for errors due to lack of information.
- Dimensions apply to finished surfaces of the room.
- Actual configuration may differ from options presented in some typical views or tables.
- If this set of final drawings has been approved by the customer, any subsequent modification of the site must be subject to further investigation by GE about the feasibility of installing the equipment. Any reservations must be noted.
- The layout layout indicates the placement and interconnection of the indicated equipment components. There may be local requirements that could impact the placement of these components. It remains the customer's responsibility to ensure that the site and final equipment placement complies with all applicable local requirements.
- All work required to install GE equipment must be carried out in compliance with the building regulations and the safety standards of legal force in the country concerned.
- These drawings are not to be used for actual construction purposes. The company cannot take responsibility for any damage resulting therefrom.

CUSTOMER RESPONSIBILITIES

- It is the responsibility of the customer to prepare the site in accordance with the specifications stated in the final study. A detailed site readiness checklist is provided by GE. It is the responsibility of the customer to ensure all requirements are fulfilled and that the site conforms to all specifications defined in the checklist and final study. The GE Project Manager of Installation (PMI) will work in cooperation with the customer to follow up and ensure that actions in the checklist are complete, and if necessary, will aid in the rescheduling of the delivery and installation date.
- Prior to installation, a structural engineer of record must ensure that the floor and ceiling is designed in such a way that the loads of the installed system can be securely borne and transferred. The layout of additional structural elements, dimensioning and the selection of appropriate installation methods are the sole responsibility of the structural engineer. Execution of load bearing structures supporting equipment on the ceiling, floor or walls are the customer’s responsibility.

RADIO-PROTECTION

- Suitable radiological protection must be determined by a qualified radiological physicist in conformance with local regulations. GE does not take responsibility for the specification or provision of radio-protection.
RADIOACTIVE ISOTOPES

Since the Discovery NM 630 involves the use of radioactive isotopes, compliance with Nuclear Regulatory Commission regulations, or similar regulatory requirements (depending on the country), must be adhered to and all permissions obtained well in advance. It is recommended that regulatory compliance is arranged early in the site planning process.

It is essential that all preparations are completed so that required source materials can be obtained prior to installation, including calibration sources. Take into consideration that these sources may have fairly long delivery lead times, yet may also have a short half life, so that it may not be advisable to store them over long periods of time.

**RADIOACTIVE ISOTOPES FOR SYSTEM CALIBRATION**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>Isotopes to be used at site are available for installation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic calibration</td>
<td>Tc-99m will be available during installation</td>
</tr>
<tr>
<td>Co-57 (Rectangular Flood Source)</td>
<td></td>
</tr>
<tr>
<td>Tm-170</td>
<td></td>
</tr>
<tr>
<td>Pb-214</td>
<td></td>
</tr>
<tr>
<td>Mn-54</td>
<td></td>
</tr>
<tr>
<td>Xe-133 (inhalation gas)</td>
<td></td>
</tr>
</tbody>
</table>

**ENVIRONMENT**

**MAGNETIC FIELD SPECIFICATIONS**
In order to avoid interference on the system, the static field limits from the surrounding environment must be less than 1 Gauss in both the scan and the operator rooms.

**VIBRATION SPECIFICATIONS**
The system components are sensitive to vibration in the frequency range of 0.5 to 20 Hz, depending on the amplitude of the vibration. It is the customer’s responsibility to contract a vibration consultant or qualified engineer to verify that these specifications are met and implement an appropriate solution.

To minimize vibrations, the system must be installed on a solid floor, as far as possible from vibration sources (parking lots, roadways, heliports, elevators, hospital power plants... etc).

The maximum steady state vibration transmitted through the floor should not exceed 0.001 m/s² RMS maximum single frequency above ambient baseline from 0.5 to 80 Hz (measured in any 1 hour during a normal operating period).

The behavioral characteristics must be such that any measurable transient disturbance must also be minimized to less than 0.01 m/s² peak-to-peak.

**ACOUSTIC SPECIFICATIONS**
It is less than 70 dBA measured at a distance of one meter from the nearest gantry surface, in any direction.

It is recommended that the wall and ceiling surface is of a sound damping material so that the noise is not reverberated and amplified.
The GE HPI Technical Support Group is an additional resource that can provide answers for general GE product siting questions and can be reached at (877)-305-9677 or mail to: HPITechCOE@ge.com

For Accessory Sales: (866) 281-7545 Options 1, 2, 1, 2 or mail to: gehaccessorysales@ge.com

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>MAX HEAT OUTPUT (btu)</th>
<th>WEIGHT (lbs)</th>
<th>MAX HEAT OUTPUT (W)</th>
<th>WEIGHT (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1</td>
<td>Gantry</td>
<td>4500</td>
<td>4828</td>
<td>1320</td>
<td>2190</td>
</tr>
<tr>
<td>A 2</td>
<td>Patient table</td>
<td>682</td>
<td>794</td>
<td>200</td>
<td>360</td>
</tr>
<tr>
<td>A 3</td>
<td>Operators Console on cart</td>
<td>256</td>
<td>-</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td>A 4</td>
<td>Collimator Cart</td>
<td>-</td>
<td>718</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A 5</td>
<td>6kVA UPS</td>
<td>1245</td>
<td>106</td>
<td>365</td>
<td>48</td>
</tr>
<tr>
<td>B/D 6</td>
<td>Main Disconnect Panel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>B/D 7</td>
<td>UPS Disconnect Panel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>C 8</td>
<td>Shelf</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>C 9</td>
<td>Counter top w sink, base and wall cabinets</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>C 10</td>
<td>Minimum opening for equipment delivery is 56 in. w x 82 in. h, contingent on a 99 in. corridor width</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>C 11</td>
<td>Optional wall protection from collimator cart</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Exam room height

Finished floor to slab height: TBD
Recommended finished ceiling height: 8'-9"
DELIVERY

THE CUSTOMER/CONTRACTOR SHOULD:

- Provide an area adjacent to the installation site for delivery and unloading of the GE equipment.
- Ensure that the dimensions of all doors, corridors, ceiling heights are sufficient to accommodate the movement of GE equipment from the delivery area into the definitive installation room.
- Ensure that access routes for equipment will accommodate the weights of the equipment and any transportation, lifting and rigging equipment.
- Ensure that all necessary arrangements for stopping and unloading on public or private property not belonging to the customer have been made.

<table>
<thead>
<tr>
<th>CRATED DIMENSIONS OF DELIVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EQUIPMENT</strong></td>
</tr>
<tr>
<td>NM GANTRY WITH DETECTORS MOUNTED</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>NM GANTRY WITHOUT THE DETECTORS</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>TABLE</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
STRUCTURAL NOTES

- All units that are wall mounted or wall supported are to be provided with supports where necessary. Wall supports are to be supplied and installed by the customer or his contractors. See plan and detail sheets for suggested locations and mounting hole locations.

- Floor slabs on which equipment is to be installed must be level to specifications. (If not specified elsewhere on this sheet the floor levelness should be 1/8 in. [3 mm] in 10 ft. [3.05 m].)

- Dimensions are to finished surfaces of room.

- For seismic regions ensure supports span three members.

- Customers contractor must provide all penetrations in post tension floors.

- Customers contractor must provide and install any non-standard anchoring. Documents for standard anchoring methods are included with GE equipment drawings for geographic areas that require such documentation.

- Customers contractor must provide and install hardware for "through the floor" anchoring and/or any bracing under access floors. This contractor must also provide floor drilling that cannot be completed because of an obstruction encountered while drilling by the GE installer such as rebar etc.

- It is the customer's responsibility to perform any floor or wall penetrations that may be required. The customer is also responsible for ensuring that no subsurface utilities (e.g., electrical or any other form of wiring, conduits, piping, duct work or structural supports (i.e., post tension cables or rebar)) will interfere or come in contact with subsurface penetration operations (e.g., drilling and installation of anchors/screws) performed during the installation process. To ensure worker safety, GE installers will perform surface penetration operations only after the customer's validation and completion of the "GE surface penetration permit"
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gantry baseplate</td>
</tr>
<tr>
<td>2</td>
<td>Table Anchor plate</td>
</tr>
<tr>
<td>3</td>
<td>Collimator exchange plate</td>
</tr>
<tr>
<td>4</td>
<td>Swing plate</td>
</tr>
</tbody>
</table>

(GE SUPPLIED / CONTRACTOR INSTALLED)
ANCHORING TO THE FLOOR

MAIN ANCHORING POINT
SHOP DRAWING
ALTERNATIVE ANCHORING POINT

LOADING DISTRIBUTION TO THE FLOOR

Gantry rear pads
2.45 kN load per pad Ø83 [3.3 in]

Gantry front pads
8.29 kN load per pad Ø83 [3.3 in] pad
Load 3.53 kN distributed on 2 wheels + pivot

Center of gravity

SCALE 1:25

FLOOR SPECIFICATIONS

- Floor leveling area: 512 cm [201.6 in] x 374 cm [147.2 in] (covering the entire planned area of table and gantry surface).
- Slope: within 30 mm [1.18 in] over 4300 mm [160 in] (for further information refer to PIM).
- Flatness: the surface must be smooth, with deviations of no more than 5 mm [0.195 in] between depressions and high spots in any 1500 mm [59 in] throughout the room or system installation area.
- Floor surface: a single poured surface.
- Floor strength: in order to enable mounting of the system floor anchors, concrete floors must have a minimum cube strength of f'c=4350 psi. (30 MPa) at 28 days (curing time) for 25/30 concrete
- Floor thickness: the system’s floor anchors are designed for use only on concrete floors that meet the minimal 140 mm [5.5 in] concrete floor requirements.
- The selected anchoring method must have a pulling tensile force of 19.7 kN on each of the anchors bolting the NM gantry to the floor.

SCALE 1:25

NOT TO SCALE

GANTRY ANCHORING

HILTI-HSL-3 M10/40 anchor
Torque: 35 Nm

Anchor bolt
Leveling screw
Nut
Anchor washer
Gantry stationary base
Leveling pad

Gantry rear pads
2.45 kN load per pad Ø83 [3.3 in]

Gantry front pads
8.29 kN load per pad Ø83 [3.3 in] pad
Load 3.53 kN distributed on 2 wheels + pivot

Center of gravity

Gantry weight: 21.48 kN
(with HEGP collimators mounted)
Table weight: 3.53 kN
TEMPERATURE AND HUMIDITY SPECIFICATIONS

IN-USE CONDITIONS

<table>
<thead>
<tr>
<th>ROOM</th>
<th>DESCRIPTION</th>
<th>HEAT DISSIPATION (kW)</th>
<th>HEAT DISSIPATION (BTU/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam Room</td>
<td></td>
<td>MAX</td>
<td>MAX</td>
</tr>
<tr>
<td>Gantry</td>
<td></td>
<td>1.32</td>
<td>4500</td>
</tr>
<tr>
<td>Patient table</td>
<td></td>
<td>0.20</td>
<td>682</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>0'1 1/2&quot;</td>
<td>5182</td>
</tr>
<tr>
<td>Exam/Control Room</td>
<td>NM acquisition station</td>
<td>0.08</td>
<td>256</td>
</tr>
<tr>
<td></td>
<td>Xeleris Workstation</td>
<td>0.08</td>
<td>256</td>
</tr>
<tr>
<td></td>
<td>8kva UPS</td>
<td>0.44</td>
<td>1500</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>0.59</td>
<td>2012</td>
</tr>
</tbody>
</table>

STORAGE CONDITIONS

<table>
<thead>
<tr>
<th>ROOM</th>
<th>DESCRIPTION</th>
<th>Temperature</th>
<th>Relative Humidity</th>
<th>Humidity gradient</th>
<th>Air pressure</th>
<th>Storage longer than 12 months is not recommended.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>+4°C [+40°F] to +27°C [+80°F]</td>
<td>20% to 60%</td>
<td>≤ 5% /h</td>
<td>700 hPa to 1060 hPa</td>
<td></td>
</tr>
</tbody>
</table>

AIR RENEWAL

According to local standards.

NOTE

In case of using air conditioning systems that have a risk of water leakage it is recommended not to install it above electric equipment or to take measures to protect the equipment from dropping water.

HEAT DISSIPATION
**ELECTRICAL NOTES**

1. All wires specified shall be copper stranded, flexible, thermo-plastic, color coded, cut 10 foot long at outlet boxes, duct termination points or stubbed conduit ends. All conductors, power, signal and ground, must be run in a conduit or duct system. Electrical contractor shall ring out and tag all wires at both ends. Wire runs must be continuous copper stranded and free from splices.
   1.1. Aluminum or solid wires are not allowed.
   2. Wire sizes given are for use of equipment. Larger sizes may be required by local codes.
   3. It is recommended that all wires be color coded, as required in accordance with national and local electrical codes.
   4. Conduit sizes shall be verified by the architect, electrical engineer or contractor, in accordance with local or national codes.
   5. Convenience outlets are not illustrated. Their number and location are to be specified by others. Locate at least one convenience outlet close to the system control, the power distribution unit and one on each wall of the procedure room. Use hospital approved outlet or equivalent.
   6. General room illumination is not illustrated. Caution should be taken to avoid excessive heat from overhead spotlights. Damage can occur to ceiling mounting components and wiring if high wattage bulbs are used. Recommend low wattage bulbs no higher than 75 watts and use dimmer controls (except mr). Do not mount lights directly above areas where ceiling mounted accessories will be parked.
   7. Routing of cable ductwork, conduits, etc., must run direct as possible otherwise may result in the need for greater than standard cable lengths (refer to the interconnection diagram for maximum usable lengths point to point).
   8. Conduit turns to have large, sweeping bends with minimum radius in accordance with national and local electrical codes.
   9. A special grounding system is required in all procedure rooms by some national and local codes. It is recommended in areas where patients might be examined or treated under present, future, or emergency conditions. Consult the governing electrical code and confer with appropriate customer administrative personnel to determine the areas requiring this type of grounding system.
   10. The maximum point to point distances illustrated on this drawing must not be exceeded.
   11. Physical connection of primary power to GE equipment is to be made by customers electrical contractor with the supervision of a GE representative. The GE representative would be required to identify the physical connection location, and insure proper handling of GE equipment.
   12. GEHC conducts power audits to verify quality of power being delivered to the system. The customer's electrical contractor is required to be available to support this activity.

**CONNECTIVITY REQUIREMENTS**

Broadband Connections are necessary during the installation process and going forward to ensure full support from the Engineering Teams for the customers system. Maximum performance and availability for the customers system is maintained and closely monitored during the lifetime of the system. Proactive and reactive maintenance is available utilising the wide range of digital tools using the connectivity solutions listed below:

- Site-to-Site VPN/GE Solution
- Site-to-Site VPN/Customer Solution
- Connection through Dedicated Service Network
- Internet Access - connectivity for InSite 2.0

The requirements for these connectivity solutions are explained in the broadband solutions catalogue (separate document).
**Additional Conduit Runs**

*(Contractor Supplied and Installed)*

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Qty</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Phase power</td>
<td>UPS Main disconnect</td>
<td>1</td>
<td>As req'd</td>
</tr>
<tr>
<td>UPS</td>
<td>Main disconnect</td>
<td>1</td>
<td>As req'd</td>
</tr>
</tbody>
</table>

- **1** 30 amp, 208V Disconnect (gantry hardwired)
- **2** 30 amp, 208V Disconnect
- **3** 4" x 4" x 4" box and coverplate
- **4** 6" x 6" x 4" box and coverplate
- **5** Suitable bushing & locknuts
- **6** Conduit must be cut flush with finished floor
- **7** 2" cnd below floor
- **8** 3/4" cnd below floor
- **9** 4" cnd below floor

Network outlet
**INTERCONNECTIONS**

- Patient Table
- NM HOST (Wall mounted, Control room)
- Gantry
- PDB or Junction Box
- EMO

* 19 m [62.3 ft] cable available as a spare part

**CABLE MANAGEMENT**

**CONDUIT IN THE FLOOR**

NOT TO SCALE
POWER REQUIREMENTS

<table>
<thead>
<tr>
<th>POWER SUPPLY</th>
<th>TWO-PHASE/ONE PHASE+ N 173-250 V AC ±10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQUENCIES</td>
<td>50/60 Hz ± 3 Hz</td>
</tr>
<tr>
<td>MAXIMUM POWER DEMAND</td>
<td>6 kVA</td>
</tr>
<tr>
<td>CONTINUOUS (AVERAGE) POWER DEMAND</td>
<td>3 kVA</td>
</tr>
</tbody>
</table>

- Line supply should come into a Main Disconnect Panel (MDP) containing the protective units and controls. The section of the supply cable should be calculated in accordance with its length and the maximum permissible voltage drops, equal to 2.9% max. of regulation for feeder size.
- There must be discrimination between supply cable protective material at the beginning of the installation (main low-voltage transformer side) and the protective devices in the MDP.

SUPPLY CHARACTERISTICS

- Power input must be separate from any others which may generate transients (elevators, air conditioning, radiology rooms equipped with high speed film changers ...)
- All equipment (lighting, power outlets, etc...) installed with GE system components must be powered separately.
- Phase imbalance 2% maximum.
- Maximum voltage regulation at full load = 6% (including line impedance)
- Transients must be less than 1500 V peak (on a 230 V line). A record of power input disturbances over a continuous one-week period (prior to delivery) enables determination of the frequency and degree of these disturbances and can be used to ascertain the need to provide line conditioning equipment.

GROUND SYSTEM

- Equipotential: The equipotential link will be by means of an equipotential bar. This equipotential bar should be connected to the protective earth conductors in the ducts of the non GE cableways and to additional equipotential connections linking up all the conducting units in the rooms where GE system units are located.

CABLES

- Power and cable installation must comply with the distribution diagram below.
- All cables must be isolated and flexible, cable color codes must comply with standards for electrical installation.
- The cables from signaling and remote control (Y, SEO, I ...) will go to MDP with a pigtail length of 3.5 m, and will be connected during installation. Each conductor will be identified and isolated (screw connector).

CABLEWAYS

The general rules for laying cableways should meet the conditions laid down in current standards and regulations, with regard to:
- Protecting cables against water (cableways should be waterproof)
- Protecting cables against abnormal temperatures (proximity to heating pipes or ducts)
- Protecting cables against temperature shocks
- Replacing cables (cableways should be large enough for cables to be replaced)
- Metal cableways should be grounded

FEEDER TABLE

<table>
<thead>
<tr>
<th>MIN. FEEDER WIRE SIZE, AWG OR MCM (mm²)/VAC</th>
<th>MINIMUM FEEDER WIRE LENGTH - ft (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 (15)</td>
<td>100 (30.5)</td>
</tr>
<tr>
<td>100 (30.5)</td>
<td>150 (46)</td>
</tr>
<tr>
<td>200 (64)</td>
<td>250 (76)</td>
</tr>
<tr>
<td>208 VAC</td>
<td>10 (6)</td>
</tr>
<tr>
<td></td>
<td>8 (8)</td>
</tr>
<tr>
<td></td>
<td>6 (17)</td>
</tr>
<tr>
<td></td>
<td>4 (24)</td>
</tr>
<tr>
<td></td>
<td>3 (14)</td>
</tr>
</tbody>
</table>

GENERAL NOTES

In all cases qualified personnel must verify that the feeder (at the point of take-off) and the run to the GE system meet all the requirements stated in the PIM

For a single unit installation, the minimum transformer size is 8 kVA, with 2.4% rated regulation at unity power factor. Maximum allowable total source regulation is 6%

A 8 AWG (8 mm²) Grounding conductor will run from the equipment back to the power source/main grounding point and always travel in the same conduit with the feeders

Notes:
(1) Cable with a usable length of 12m (39.37 ft) is delivered with the system.