Masoneilan® Products

12400 Series
Digital Level Transmitter/Controller

SIL2 Capability
Ease of Use
Seamless Integration
The Masoneilan* 12400 Series Digital Level Transmitter/Controller from GE Oil & Gas marks a significant evolution in process control. The SIL2-capable 12400 Series advanced design reduces complexity, saving you time and money, and delivering precise performance.
Overview

With a combination of features such as smart filtering, HART® communication protocol compatibility and an optional 4-20 mA analog output signal, GE’s Masoneilan 12400 Series transmitter/controller offers exceptional process control for a wide range of applications - even severe service. Easy to install and operate, it is the first torque tube-type level instrument that integrates level transmitter and switch functions in a single device. Plus, the 12400 Series transmitter/controller is engineered for optimum efficiency, upgradeability and reliability making it a cost-effective investment for the long term.

The Masoneilan 12400 Series instrument is a two-wire, loop-powered level transmitter with HART® Communication that operates according to the fully proven buoyancy and torque tube principles. A change in liquid level varies the net weight of the displacer (2), increasing or decreasing the load on the torque tube (4) by an amount directly proportional to the change in liquid level. The resulting rotation of the torque rod (6) and attached magnets (7) modifies the magnetic field surrounding a non-contact sensor (8), producing an analog signal proportional to the level in the vessel. This analog signal is converted into an error-free digital signal that is processed by the on-board micro-controller. After processing, the digital result is converted to a 4-20 mA analog output signal.

This sensing method is non-contacting and frictionless, and it provides total isolation between the sensed motion and sensor output.

Sketch showing the arrangement of the different parts.
In black: torque tube, arm and displacer
In red: mechanism and displacer chambers
In blue: instrument head
1 - Displacer chamber
2 - Displacer
3 - Torque arm
4 - Torque tube
5 - Torque tube housing
6 - Torque rod
7 - Magnets
8 - Non-contact sensor
Key Benefits

Ease of Use

While the Masoneilan 12400 series transmitter/controller offers powerful measurement functionality, it delivers efficiency for simplified ownership and operations.

Easy Installation
Local and remote installation are available via three explosion-proof pushbuttons or the HART® communication protocol, and the 12400 Series transmitter can be calibrated with or without fluid, including fluid with an unknown specific gravity.

Simple Operation
The 12400 Series instrument offers automated configuration, calibration and diagnostic functions as well as an easy-to-read, seven-language LCD display.

Interoperability
Field data integration is seamless across multiple communication platforms: GE’s Masoneilan ValVue® software, Device Description (DD) and Device Type Manager (DTM), any HART®-compatible handheld and ValVue® software plug-in and snap-on.

User-friendly instrument health summary
Key Benefits

**Cost-Effective**

The 12400 Series instrument saves money, time and other valuable resources through its advanced functionality, reliability and scalability.

**Streamlined Functionality**
This is the first level instrument to offer integrated level transmitter, controller and switch functions in a single device eliminating the need for additional switches.

**Durability for Long-Term Service**
The accurate, non-contact sensor provides reduced wear and reliable performance, and the rugged construction protects from weather and harsh elements.

**Cost-Saving Upgradeability**
Field upgradeable flash firmware for future updates.

**Advanced Process Control Performance**

With a range of outstanding features in a durable, flexible package, the 12400 Series meets many of the industry’s most demanding application requirements.

**Compliance**
The 12400 Series is SIL2-capable (Transmitter function only) and holds full hazardous areas certifications including ATEX, IECEx, FM and FMc (Factory Mutual Canada).

**Severe Service Capability**
The instrument withstands high temperature, high pressure and demanding NACE applications.

**Flexibility**
The instrument meets most installation requirements and accommodates most process structures through top, side or bottom connections and full horizontal plane rotation.

**Accuracy**
Smart filtering reduces unwanted oscillations without changing response speeds, and the frictionless sensor offers 0.1 percent measurement resolution.

**Stability**
Inside a chamber, surface turbulence and foam do not impede the displacer, and process fluid agitation does not affect measurement.

**Reliable Data**
Continuous recording and recent data is stored in non-volatile memory for dependable access in the event of power failure.
Seamless Integration

Control System

Third Party Asset Management

ValVue Suite

Open Technologies
- eDDL
- DTM
- Plug-In Application
- Snap-On Application
- Conventional I/O
- Wireless

Field Calibrators with HART®
- GE’s DPI620 Series Calibrator
- HART® Handheld Communicator
- GE’s Masoneilan Valscope-PRO®
- GE’s Masoneilan ValVue® standalone

GE Oil & Gas
Open Technology

The 12400 Series digital level instruments can be integrated with a broad range of controllers, control systems and software available in the industry.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Integration Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low compliance voltage (10 VDC)</td>
<td>For legacy system, low impedance circuitry, and Masoneilan VECTOR® (loop-powered wireless HART® adaptor)</td>
</tr>
<tr>
<td>Built-In Analog and Discrete signals</td>
<td>For non-HART® systems and to meet specific industry requirements where digital communications is not approved</td>
</tr>
<tr>
<td>HART®, wired or wireless compliant</td>
<td>Integration flexibility of device calibration and diagnostic, and level variables</td>
</tr>
<tr>
<td>eDDL compliant</td>
<td>Interface that Integrates with eDDL hosts, software, portable calibrators</td>
</tr>
<tr>
<td>DTM compliant</td>
<td>Integrates with FDT capable hosts</td>
</tr>
<tr>
<td>Asset management compliant</td>
<td>Integrates with plant management software</td>
</tr>
</tbody>
</table>
SIL 2 Capability for Enhanced Safety

The 12400 Series transmitter, SIL2-certified in accordance with IEC61508 per EXIDA, is suitable for use in safety instrumented functions.

**Complete Safety Function: From Displacer Up to Analog Output Signal**

The safety function of the 12400 Series transmitter is not limited to the instrument head but also includes all measurement components.

The FMEDA analysis results include the entire transmitter from displacer through the torque tube, the sensor, and the electronics up to the 4-20 mA output signal. In contrast, other available devices limit their analysis to the instrument head only.

Including all measurement components in the safety function means a higher diagnostic coverage and a Safe Failure Fraction greater than 90 percent.

**Enhanced Diagnostic Coverage**

The 12400 Series instrument has been enhanced with a new sensor bias sub-assembly to enable a better diagnostic coverage of internal and user faults. Following in the footsteps of many other innovations that have made GE’s Masoneilan product line a technology leader, this new patented solution improves the diagnostic analysis on all components between the sensor and the torque rod. In case of failure caused by a loose part or human error, the spring arm will force the sensor to go into the repeatable failsafe position.

This is particularly useful in detecting the main faults that are often human errors during the coupling procedure. For instance, the wrong coupling or a loose coupling between the sensor mechanism and the torque rod can occur when the work is done by untrained people. These errors are now fully detected and diagnosed, and they will generate a HART fault message and could even activate one of the two optional switches.
Electrical Implementation

Each discrete contact is configurable for normal open or closed action and with several possible triggers.

Case Sketch
General Data

Instrument

User Interface:
- Handheld Communicator
- Pushbuttons operation with digital display
- ValVue software
- ValVue AMS* snap-on
- ValVue PRM* plug-in
- DTM though any FDT/DTM compatible host

Level Transmitter/Controller:
- Level or interface level measurement
- Specific gravity measurement and display (only with the displacer fully immersed)
- Zero and span digital calibration:
  - independent zero and span adjustment
  - current loop range independent from zero/span calibration (can be changed at any time without zero/span re-calibration)
- manual or automatic calculation for reduced span and zero shift for interface service
- Self-tuning for smart filtering
- Selectable low and high level alarms
- Low or high failsafe output signal immediately activated in case of a failure detection
- Continuous self-diagnostic with bargraph
- Continuous data record: number of fillings, low level time, high level time, working time
- Configuration check: analysis of 12400 data base to avoid bad mounting, out of range use
- Storage and display of alarms that have appeared
- Output current generator for loop check

Level Controller:
- P, I, D ... advanced control
- Remote setpoint and controller output
- Low and high controller alarms (absolute and deviations)
- Process trend through ValVue software suite

Level Switches:
- Two built-in solid state switches: 1 A - 30 VDC max
- Configurable: low and high level alarms, fault or reset occurred, instrument in failsafe...

Second 4-20 mA Analog Output:
- Second level variable measurement, useful to connect a local level indicator

Action:
- Direct or reverse via software

Output Signal Filtering:
- First order filtering of output signal with adjustable time constant
- Smart filtering of contactless sensor output signal, to eliminate noise before digital signal processing

Software and Hardware Locks:
- Software lock for pushbuttons
- Hardware jumper lock for full protection against parameter change
General Data

Operating Limits

Ambient Temperature Limits:
• Standard Operating range: -40°C to +80°C (-40°F to +176°F)
• Extended Operating range: -50°C to +85°C (-58°F to +185°F)
  - For devices installed in hazardous area, temperature limits depend on the marking.
  - LCD display may not be readable below -15°C (+5°F)
  - Beyond standard operating range, performance may be affected
    by the temperature shift.
• Storage and transportation: -50°C to +93°C (-58°F to +200°F)
• Ambient temperature shift: ±0.028% /°C of full span (zero and span, over extended temperature range)

Process Temperature Limits:
• -210°C to +450°C (-350°F to +850°F)
For temperature higher than +150°C (+302°F) or lower than -100°C (-150°F), an extension is required between the case and the torque tube. Note: See diagram page 12 and approval certificates.

Specific Gravity Range:
• 0.15 to 1.4 with a standard displacer
• Lower and higher specific gravities with special displacers (consult your local sales contact)

Electric Characteristics Following NAMUR NE 43:
• Normal output signal: 3.8 to 20.5 mA
• Low failsafe output signal (< 3.6 mA)
• High failsafe output signal (> 21 mA)

Supply Voltage:
• U min = 10 VDC
• U max = 30 VDC (intrinsic safety)
• U max = 40 VDC for AO_1
  30 VDC for AO_2 (flameproof envelope)

Supply Voltage Influence:
• 0.1 μAV

Performance Specifications

<table>
<thead>
<tr>
<th></th>
<th>Instrument Head Alone</th>
<th>Instrument Head with Torque Tube S/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy (full span)</td>
<td>±0.1%</td>
<td>±0.5% on request ±0.25%</td>
</tr>
<tr>
<td>Hysteresis + Dead Zone (full span)</td>
<td>±0.1%</td>
<td>±0.3%</td>
</tr>
<tr>
<td>Repeatability (full span)</td>
<td>±0.1%</td>
<td>±0.2%</td>
</tr>
</tbody>
</table>

Performance at room temperature with standard displacer and specific gravity from 0.15 to 1.4 (or special displacer with equivalent sensor angle variation) within standard operating temperature range.

Electromagnetic Compatibility

Compliance with EMC Directive 2004/108/EC, including NF EN 61000-6-2, NF EN 61326-1, NF EN 61326-3-1, NF EN 61000-6-4 and NF EN 55022 standards.

Over-voltage Protection (at 25°C / 77°F)

• 10 kW for 8/20 μs pulse wave form
• 1.5 kW for 10/1000 μs pulse wave form
Numbering System  Series Identification 12abc - de

### Pressure Envelope Characteristics

- **Rating**
  - ANSI class 150 to 2500
  - PN 10 to PN 420

- **Ranges**
  - 356, 610, 813, 1219, 1524, 1829, 2134, 2438, 3048mm (14", 24", 32", 48", 60", 72", 96", 120")
  - Other ranges on request

### Temperature Limits

![Temperature Limits Diagram]

**Notes:**

1. Above 260°C (500°F), torque tube must be in Inconel.
2. 12402, 12406, 12407 and 12409 models only, for stainless steel version, can be used between +400°C (+750°F) and +450°C (+850°F).
3. For devices installed in hazardous location, temperature limits depend on the marking. See page 13 for complete information.
Hazardous Location Protection

ATEX & IECEx Approvals (94/9/EC Directive)

Explosion proof
• II 2 G/D
  Ex d IIC T6, T5 or T4 Gb
  Ex tb IIC T85°C, T100°C or T135°C Db IP66/IP67

Intrinsic safety
• II 1 G/D
  Ex ia IIC T6, T5 or T4 Ga
  Ex ia IIC T85°C, T100°C or T135°C Da
  IP 66/67

FM and FMc Approvals (Factory Mutual and Factory Mutual Canada)

Explosion proof
• Class I ; Division 1 & 2
  Groups B, C, D
  T6 or T5

Dust-ignition proof
• Class II & III ; Division 1 & 2
  Groups E, F, G
  T6 or T5

Intrinsically safe
• Class I, II, III ; Division 1 & 2
  Groups A, B, C, D, E, F, G
  T6, T5 or T4

Non-incendive
• Class I, II, III ; Division 2
  Groups A, B, C, D, F, G
  T6 or T5

Other approvals:
• CU TR (Russia, Belarus and Kazakhstan)
• JIS (Japan)
• KOSHA (Korea)
• CCOE (India)
• Inmetro (Brazil)
• NEPSI (China)
• IA (South Africa)
• CRN (Canada)

Enclosure Rating

• IP 66 / IP 67
• NEMA 4X - 6P
Mounting

In case of internal mounting, the instrument has no displacer chamber; the mechanism chamber flange is bolted directly on the vessel flange.

In case of liquid turbulence, it is recommended that the displacer is isolated with a damping chamber to prevent oscillations.

In case of external mounting, the instrument is connected to the vessel either with flanges or with screwed or welded connections. The instrument is constructed so that the mid-range level reference on the displacer chamber coincides with the normal level in the vessel. It is recommended that shut-off valves be inserted between the level connections and the vessel, with a drain valve on the lower part of the level.

<table>
<thead>
<tr>
<th>Model</th>
<th>Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>12400</td>
<td>BW, SW or Screwed NPT - 1 1/2&quot; and 2&quot; - DN 40 and DN 50</td>
</tr>
<tr>
<td>12401</td>
<td>Flanged - 1 1/2&quot; and 2&quot; - DN 40 and DN 50</td>
</tr>
<tr>
<td>12409</td>
<td>BW, SW or Screwed NPT - 1 1/2&quot; and 2&quot; - DN 40 and DN 50</td>
</tr>
<tr>
<td>12402</td>
<td>Flanged - 1 1/2&quot; and 2&quot; - DN 40 and DN 50</td>
</tr>
<tr>
<td>12405</td>
<td>BW, SW or Screwed NPT - 1 1/2&quot; and 2&quot; - DN 40 and DN 50</td>
</tr>
<tr>
<td>12408</td>
<td>Flanged - 1 1/2&quot; and 2&quot; - DN 40 and DN 50</td>
</tr>
<tr>
<td>12406</td>
<td>BW, SW or Screwed NPT - 1 1/2&quot; and 2&quot; - DN 40 and DN 50</td>
</tr>
<tr>
<td>12407</td>
<td>Flanged - 1 1/2&quot; and 2&quot; - DN 40 and DN 50</td>
</tr>
<tr>
<td>12403</td>
<td>Flanged - 3&quot; and 4&quot; - DN 80 and DN 10</td>
</tr>
<tr>
<td>12404</td>
<td>Flanged - 4&quot; - DN 100</td>
</tr>
</tbody>
</table>

Flanges:
- Class flanges -- according to EN 1759-1 and ASME B16-5 standards
- PN flanges -- according to NF EN 1092-1 or DIN standards
- Other standards and dimensions, please consult your local GE sales contact
### Orientation

**Models: 12402, 12405, 12406, 12407, 12408 & 12409**

**Left hand instrument mounting**

**Right hand instrument mounting**

Note: Unless otherwise specified, the case will be position 1 left-mounted.

### Weight (lbs)

#### Models: ANSI 600 and PN 100

<table>
<thead>
<tr>
<th>Model</th>
<th>356mm</th>
<th>610mm</th>
<th>813mm</th>
<th>1219mm</th>
<th>1524mm</th>
<th>1829mm</th>
<th>2134mm</th>
<th>2438mm</th>
<th>3048mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>12400</td>
<td>79</td>
<td>90</td>
<td>90</td>
<td>101</td>
<td>108</td>
<td>117</td>
<td>123</td>
<td>130</td>
<td>146</td>
</tr>
<tr>
<td>12401</td>
<td>90</td>
<td>101</td>
<td>101</td>
<td>112</td>
<td>119</td>
<td>128</td>
<td>135</td>
<td>141</td>
<td>157</td>
</tr>
<tr>
<td>12409</td>
<td>112</td>
<td>123</td>
<td>123</td>
<td>135</td>
<td>141</td>
<td>150</td>
<td>157</td>
<td>163</td>
<td>179</td>
</tr>
<tr>
<td>12402</td>
<td>121</td>
<td>132</td>
<td>132</td>
<td>143</td>
<td>150</td>
<td>159</td>
<td>165</td>
<td>172</td>
<td>187</td>
</tr>
<tr>
<td>12405</td>
<td>110</td>
<td>121</td>
<td>121</td>
<td>132</td>
<td>139</td>
<td>148</td>
<td>154</td>
<td>161</td>
<td>176</td>
</tr>
<tr>
<td>12408</td>
<td>119</td>
<td>130</td>
<td>130</td>
<td>141</td>
<td>148</td>
<td>157</td>
<td>163</td>
<td>170</td>
<td>185</td>
</tr>
<tr>
<td>12406</td>
<td>110</td>
<td>121</td>
<td>121</td>
<td>132</td>
<td>139</td>
<td>148</td>
<td>154</td>
<td>161</td>
<td>176</td>
</tr>
<tr>
<td>12407</td>
<td>121</td>
<td>132</td>
<td>132</td>
<td>143</td>
<td>150</td>
<td>159</td>
<td>165</td>
<td>172</td>
<td>187</td>
</tr>
<tr>
<td>12403</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>12404</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
</tr>
</tbody>
</table>

### Weight (kg)

#### Models: ANSI 600 and PN 100

<table>
<thead>
<tr>
<th>Model</th>
<th>356mm</th>
<th>610mm</th>
<th>813mm</th>
<th>1219mm</th>
<th>1524mm</th>
<th>1829mm</th>
<th>2134mm</th>
<th>2438mm</th>
<th>3048mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>12400</td>
<td>36</td>
<td>41</td>
<td>41</td>
<td>46</td>
<td>49</td>
<td>53</td>
<td>56</td>
<td>59</td>
<td>66</td>
</tr>
<tr>
<td>12401</td>
<td>41</td>
<td>46</td>
<td>46</td>
<td>51</td>
<td>54</td>
<td>58</td>
<td>61</td>
<td>64</td>
<td>71</td>
</tr>
<tr>
<td>12409</td>
<td>51</td>
<td>56</td>
<td>56</td>
<td>61</td>
<td>64</td>
<td>68</td>
<td>71</td>
<td>74</td>
<td>81</td>
</tr>
<tr>
<td>12402</td>
<td>55</td>
<td>60</td>
<td>60</td>
<td>65</td>
<td>68</td>
<td>72</td>
<td>75</td>
<td>78</td>
<td>85</td>
</tr>
<tr>
<td>12405</td>
<td>50</td>
<td>55</td>
<td>55</td>
<td>60</td>
<td>63</td>
<td>67</td>
<td>70</td>
<td>73</td>
<td>80</td>
</tr>
<tr>
<td>12408</td>
<td>54</td>
<td>59</td>
<td>59</td>
<td>64</td>
<td>67</td>
<td>71</td>
<td>74</td>
<td>77</td>
<td>84</td>
</tr>
<tr>
<td>12406</td>
<td>50</td>
<td>55</td>
<td>55</td>
<td>60</td>
<td>63</td>
<td>67</td>
<td>70</td>
<td>73</td>
<td>80</td>
</tr>
<tr>
<td>12407</td>
<td>55</td>
<td>60</td>
<td>60</td>
<td>65</td>
<td>68</td>
<td>72</td>
<td>75</td>
<td>78</td>
<td>85</td>
</tr>
<tr>
<td>12403</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>12404</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>
Materials of Construction

1 Displacer chamber
2 Mechanism chamber
3 Mechanism chamber upper flange
4 Displacer
5 Displacer hanger
6 Extension rod
7 Torque arm
8 Torque tube housing
9 Torque tube
10 Torque tube flanges
11 Torque tube knife
12 Torque rod
13 Studs
14 Nuts
15 Torque tube flanges
16 Instrument case
17 Instrument cover
# Materials of Construction

## Standard Constructions

<table>
<thead>
<tr>
<th>Description</th>
<th>Carbon Steel</th>
<th>Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Displacer chamber (tube)</td>
<td>ASTM A 106 Gr B (300/600 lbs) / 1.0425 EN 10216-2</td>
<td>ASTM A 312 Ty 316 / 1.4401 EN</td>
</tr>
<tr>
<td>2 Mechanism chamber</td>
<td>ASTM A 216 Gr WCC / 1.0625 EN 10213-2</td>
<td>ASTM A 351 Gr CF8M / 1.4408 EN 10213</td>
</tr>
<tr>
<td>3 Mechanism chamber upper flange</td>
<td>Flanged: ASTM A 216 Gr WCC / 1.0625 EN 10213-2</td>
<td>Flanged: ASTM A 351 Gr CF8M / 1.4408 EN 10213 Others: ASTM A 105 / 1.0481 EN 10273</td>
</tr>
<tr>
<td>4 Displacer</td>
<td>ASTM A 312 Ty 316L</td>
<td>ASTM A 312 Ty 316L</td>
</tr>
<tr>
<td>5 Displacer hanger</td>
<td>ASTM A 240 Ty 316L</td>
<td>ASTM A 240 Ty 316L</td>
</tr>
<tr>
<td>6 Extension rod</td>
<td>ASTM A 479 Ty 316L</td>
<td>ASTM A 479 Ty 316L</td>
</tr>
<tr>
<td>7 Torque arm</td>
<td>ASTM A 479 Ty 316L</td>
<td>ASTM A 479 Ty 316L</td>
</tr>
<tr>
<td>8 Torque tube</td>
<td>Inconel 600</td>
<td>Inconel 600</td>
</tr>
<tr>
<td>9 Torque tube housing</td>
<td>ASTM A 106 Gr B / 1.0425 EN</td>
<td>ASTM A 312 Ty 316 / 1.4404 EN</td>
</tr>
<tr>
<td>10 Torque tube flanges (mechanism chamber and instrument sides)</td>
<td>ASTM A 105 / 1.0481 EN 10273</td>
<td>1.4401 EN 10272</td>
</tr>
<tr>
<td>11 Torque tube knife</td>
<td>ASTM A 479 Ty 316L</td>
<td>ASTM A 479 Ty 316L</td>
</tr>
<tr>
<td>12 Torque rod</td>
<td>Inconel 600</td>
<td>Inconel 600</td>
</tr>
<tr>
<td>13 Gaskets (torque tube, flanges)</td>
<td>AISI 316L + Graphite</td>
<td>AISI 316L + Graphite</td>
</tr>
<tr>
<td>14 Studs</td>
<td>ASTM A 193 Gr B7 / 1.7225 EN 10269 zinc bichromate plated</td>
<td>ASTM A 193 Gr B8 Cl. 2</td>
</tr>
<tr>
<td>15 Nuts</td>
<td>ASTM A 194 Gr 2H zinc bichromate plated</td>
<td>ASTM A 194 Gr 8</td>
</tr>
<tr>
<td>16 Instrument case</td>
<td>Anodized cast aluminium, with epoxy painting</td>
<td>Anodized cast aluminium, with epoxy painting</td>
</tr>
<tr>
<td>17 Instrument cover</td>
<td>Anodized cast aluminium, with epoxy painting</td>
<td>Anodized cast aluminium, with epoxy painting</td>
</tr>
</tbody>
</table>

Note: Many other materials are available as option: alloy steels, K-Monel, Hastelloy... Please consult GE.

## "NACE" Constructions (exposed and non exposed bolting)

<table>
<thead>
<tr>
<th>Description</th>
<th>Carbon Steel</th>
<th>Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Displacer chamber (tube)</td>
<td>ASTM A 106 Gr B (300/600 lbs) / 1.0425 EN 10216-2</td>
<td>ASTM A 312 Ty 316 / 1.4401 EN</td>
</tr>
<tr>
<td>2 Mechanism chamber</td>
<td>ASTM A 216 Gr WCC / 1.0625 EN 10213-2</td>
<td>ASTM A 351 Gr CF8M / 1.4408 EN 10213</td>
</tr>
<tr>
<td>3 Mechanism chamber upper flange</td>
<td>Flanged: ASTM A 216 Gr WCC / 1.0625 EN 10213-2</td>
<td>Flanged: ASTM A 351 Gr CF8M / 1.4408 EN 10213 Others: ASTM A 105 / 1.0481 EN 10273</td>
</tr>
<tr>
<td>4 Displacer</td>
<td>ASTM A 312 Ty 316L</td>
<td>ASTM A 312 Ty 316L</td>
</tr>
<tr>
<td>5 Displacer hanger</td>
<td>ASTM A 240 Ty 316L</td>
<td>ASTM A 240 Ty 316L</td>
</tr>
<tr>
<td>6 Extension rod</td>
<td>ASTM A 479 Ty 316L</td>
<td>ASTM A 479 Ty 316L</td>
</tr>
<tr>
<td>7 Torque arm</td>
<td>ASTM A 479 Ty 316L</td>
<td>ASTM A 479 Ty 316L</td>
</tr>
<tr>
<td>8 Torque tube</td>
<td>Inconel 600</td>
<td>Inconel 600</td>
</tr>
<tr>
<td>9 Torque tube housing</td>
<td>ASTM A 106 Gr B / 1.0425 EN</td>
<td>ASTM A 312 Ty 316 / 1.4404 EN</td>
</tr>
<tr>
<td>10 Torque tube flanges (mechanism chamber and instrument sides)</td>
<td>ASTM A 105 / 1.0481 EN 10273</td>
<td>1.4401 EN 10272</td>
</tr>
<tr>
<td>11 Torque tube knife</td>
<td>ASTM A 479 Ty 316L</td>
<td>ASTM A 479 Ty 316L</td>
</tr>
<tr>
<td>12 Torque rod</td>
<td>Inconel 600</td>
<td>Inconel 600</td>
</tr>
<tr>
<td>13 Gaskets (torque tube, flanges)</td>
<td>AISI 316L + Graphite</td>
<td>AISI 316L + Graphite</td>
</tr>
<tr>
<td>14 Studs</td>
<td>Exposed: ASTM A 193 Gr B7M electroless nickel plated</td>
<td>Exposed: ASTM A 193 Gr B8M Cl 2</td>
</tr>
<tr>
<td>15 Nuts</td>
<td>Exposed: ASTM A 194 Gr 2HM electroless nickel plated</td>
<td>Non exposed: ASTM A 193 Gr B8M Cl 2</td>
</tr>
<tr>
<td>16 Instrument case</td>
<td>Anodized cast aluminium, with epoxy painting</td>
<td>Anodized cast aluminium, with epoxy painting</td>
</tr>
<tr>
<td>17 Instrument cover</td>
<td>Anodized cast aluminium, with epoxy painting</td>
<td>Anodized cast aluminium, with epoxy painting</td>
</tr>
</tbody>
</table>

Note: Standard materials and processes are in accordance with the requirements of NACE specification MR0103. Applications requiring compliance to MR0175-2003 or ISO 15156 must be reviewed by GE.
**Dimensions / mm (inches)**

Models: 12400, 12401, 12409, 12402, 12405 & 12408, ANSI 300-600 and PN 50-100

### 12400

<table>
<thead>
<tr>
<th>RANGE</th>
<th>12400</th>
<th>12401</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>inch</td>
<td>mm</td>
</tr>
<tr>
<td>FF</td>
<td>FR</td>
<td>MR</td>
</tr>
<tr>
<td>569</td>
<td>22</td>
<td>239</td>
</tr>
<tr>
<td>823</td>
<td>32</td>
<td>366</td>
</tr>
<tr>
<td>1026</td>
<td>40</td>
<td>467</td>
</tr>
<tr>
<td>1432</td>
<td>56</td>
<td>670</td>
</tr>
<tr>
<td>1737</td>
<td>68</td>
<td>823</td>
</tr>
<tr>
<td>2042</td>
<td>80</td>
<td>975</td>
</tr>
<tr>
<td>2347</td>
<td>92</td>
<td>1128</td>
</tr>
<tr>
<td>2652</td>
<td>104</td>
<td>1280</td>
</tr>
<tr>
<td>3261</td>
<td>128</td>
<td>1585</td>
</tr>
</tbody>
</table>

### 12401

<table>
<thead>
<tr>
<th>RANGE</th>
<th>12401</th>
<th>12402</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>inch</td>
<td>mm</td>
</tr>
<tr>
<td>FF</td>
<td>MR</td>
<td>FF</td>
</tr>
<tr>
<td>569</td>
<td>22</td>
<td>239</td>
</tr>
<tr>
<td>823</td>
<td>32</td>
<td>366</td>
</tr>
<tr>
<td>1026</td>
<td>40</td>
<td>467</td>
</tr>
<tr>
<td>1432</td>
<td>56</td>
<td>670</td>
</tr>
<tr>
<td>1737</td>
<td>68</td>
<td>823</td>
</tr>
<tr>
<td>2042</td>
<td>80</td>
<td>975</td>
</tr>
<tr>
<td>2347</td>
<td>92</td>
<td>1128</td>
</tr>
<tr>
<td>2652</td>
<td>104</td>
<td>1280</td>
</tr>
<tr>
<td>3261</td>
<td>128</td>
<td>1585</td>
</tr>
</tbody>
</table>

### 12409

<table>
<thead>
<tr>
<th>RANGE</th>
<th>12409</th>
<th>12402</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>inch</td>
<td>mm</td>
</tr>
<tr>
<td>FF</td>
<td>MR</td>
<td>FF</td>
</tr>
<tr>
<td>356</td>
<td>14</td>
<td>178</td>
</tr>
<tr>
<td>610</td>
<td>24</td>
<td>305</td>
</tr>
<tr>
<td>813</td>
<td>32</td>
<td>406</td>
</tr>
<tr>
<td>1219</td>
<td>48</td>
<td>610</td>
</tr>
<tr>
<td>1524</td>
<td>60</td>
<td>762</td>
</tr>
<tr>
<td>1829</td>
<td>72</td>
<td>914</td>
</tr>
<tr>
<td>2134</td>
<td>84</td>
<td>1067</td>
</tr>
<tr>
<td>2438</td>
<td>96</td>
<td>1219</td>
</tr>
<tr>
<td>3048</td>
<td>120</td>
<td>1524</td>
</tr>
</tbody>
</table>

### 12405

<table>
<thead>
<tr>
<th>RANGE</th>
<th>12405</th>
<th>12408</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>inch</td>
<td>mm</td>
</tr>
<tr>
<td>FF</td>
<td>MR</td>
<td>FF</td>
</tr>
<tr>
<td>508</td>
<td>20</td>
<td>178</td>
</tr>
<tr>
<td>763</td>
<td>30</td>
<td>305</td>
</tr>
<tr>
<td>966</td>
<td>38</td>
<td>406</td>
</tr>
<tr>
<td>1372</td>
<td>54</td>
<td>610</td>
</tr>
<tr>
<td>1677</td>
<td>66</td>
<td>762</td>
</tr>
<tr>
<td>1982</td>
<td>78</td>
<td>914</td>
</tr>
<tr>
<td>2286</td>
<td>90</td>
<td>1067</td>
</tr>
<tr>
<td>2591</td>
<td>102</td>
<td>1219</td>
</tr>
<tr>
<td>3201</td>
<td>126</td>
<td>1524</td>
</tr>
</tbody>
</table>

### 12408

<table>
<thead>
<tr>
<th>RANGE</th>
<th>12408</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>inch</td>
</tr>
<tr>
<td>FF</td>
<td>MR</td>
</tr>
<tr>
<td>559</td>
<td>22</td>
</tr>
<tr>
<td>813</td>
<td>32</td>
</tr>
<tr>
<td>1016</td>
<td>40</td>
</tr>
<tr>
<td>1219</td>
<td>48</td>
</tr>
<tr>
<td>1422</td>
<td>56</td>
</tr>
<tr>
<td>1777</td>
<td>68</td>
</tr>
<tr>
<td>2032</td>
<td>80</td>
</tr>
<tr>
<td>2337</td>
<td>92</td>
</tr>
<tr>
<td>2642</td>
<td>104</td>
</tr>
<tr>
<td>2951</td>
<td>128</td>
</tr>
</tbody>
</table>

For ratings higher than ANSI 600 and PN 100, please consult your local GE sales contact.
Masoneilan 12400 Series Digital Level Transmitter/Controller

Dimensions / mm (inches)

Models: 12406, 12407, 12403 & 12404, ANSI 150-600 and PN 50-100

For ratings higher than ANSI 600 and PN 100, please consult your local GE sales contact.
DIRECT SALES OFFICE LOCATIONS

AUSTRALIA
Brisbane:
Phone: +61-7-3001-4319
Fax: +61-7-3001-4399
Perth:
Phone: +61-8-6595-7018
Fax: +61 8 6595-7299
Melbourne:
Phone: +61-3-8807-6002
Fax: +61-3-8807-6577

BELGIUM
Phone: +32-2-344-0970
Fax: +32-2-344-1123

BRAZIL
Phone: +55-11-2146-3600
Fax: +55-11-2146-3610

CHINA
Phone: +86-10-5689-3600
Fax: +86-10-5689-3800

FRANCE
Courbevoie
Phone: +33-1-4904-9000
Fax: +33-1-4904-9010

GERMANY
Ratingen
Phone: +49-2102-108-0
Fax: +49-2102-108-111

INDIA
Mumbai
Phone: +91-22-8354790
Fax: +91-22-8354791
New Delhi
Phone: +91-11-2-6164175
Fax: +91-11-5-1659635

ITALY
Phone: +39-081-7892-111
Fax: +39-081-7892-208

JAPAN
Chiba
Phone: +81-43-297-9222
Fax: +81-43-299-1115

KOREA
Phone: +82-2-2274-0748
Fax: +82-2-2274-0794

MALAYSIA
Phone: +60-3-2161-0322
Fax: +60-3-2163-6312

MEXICO
Phone: +52-55-3640-5060

THE NETHERLANDS
Phone: +31-15-3808666
Fax: +31-18-1641438

RUSSIA
Veliky Novgorod
Phone: +7-8162-55-7898
Fax: +7-8162-55-7921
Moscow
Phone: +7 495-585-1276
Fax: +7 495-585-1279

SAUDI ARABIA
Phone: +966-3-341-0278
Fax: +966-3-341-7624

SINGAPORE
Phone: +65-6861-6100
Fax: +65-6861-7172

SOUTH AFRICA
Phone: +27-11-452-1550
Fax: +27-11-452-6542

SOUTH & CENTRAL AMERICA AND THE CARIBBEAN
Phone: +55-12-2134-1201
Fax: +55-12-2134-1238

SPAIN
Phone: +34-93-652-6430
Fax: +34-93-652-6444

UNITED ARAB EMIRATES
Phone: +971-4-8991-777
Fax: +971-4-8991-778

UNITED KINGDOM
Wooburn Green
Phone: +44-1628-536300
Fax: +44-1628-536319

UNITED STATES
Massachusetts
Phone: +1-508-586-4600
Fax: +1-508-627-8971
Corpus Christi, Texas
Phone: +1-361-881-8182
Fax: +1-361-881-8246
Deer Park, Texas
Phone: +1-281-884-1000
Fax: +1-281-884-1010
Houston, Texas
Phone: +1-281-671-1640
Fax: +1-281-671-1735

* Masoneilan, VICTOR, ValScope-PRO, ValveVue and Druck are registered trademarks of the General Electric Company.
Other company names and product names used in this document are the registered trademarks or trademarks of their respective owners.
© 2014 General Electric Company. All rights reserved.

GEA19663A 08/2014
(Formerly Masoneilan CU 12400)