PGS ICT820 J1939 ISSUE 1

SAE J1939 TECHNICAL INFORMATION

DEVICE PROFILE FOR PENNY AND GILES ICT820

Prepared by: D Searle

Approved by: J Witts
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2 Change History

<table>
<thead>
<tr>
<th>Issue</th>
<th>Date</th>
<th>Change</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28/01/13</td>
<td>Original</td>
<td>D. Searle</td>
</tr>
</tbody>
</table>
3 PGNs

3.1 PGN_PG 65400 ICT820 Position PGICT820P

This parameter group is used to transmit position, limit flags, error status and access state information about the ICT820 sensor.

Transmission Repetition Rate: 10ms / 20ms / 30ms / 40ms / 50ms / 60ms / 70ms / 80ms / 90ms / 100mS (configurable)
Data Length: 4
Extended Data Page: 0
Data Page: 0
PDU Format: 255
PDU Specific: 120 PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 65400 (0x00FF78)

<table>
<thead>
<tr>
<th>Start Position</th>
<th>Length</th>
<th>Parameter Name</th>
<th>SPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>2 bytes</td>
<td>Position</td>
<td>1</td>
</tr>
<tr>
<td>3.1</td>
<td>1 bit</td>
<td>High Error Flag</td>
<td>4</td>
</tr>
<tr>
<td>3.2</td>
<td>1 bit</td>
<td>High Warning Flag</td>
<td>5</td>
</tr>
<tr>
<td>3.3</td>
<td>1 bit</td>
<td>Low Warning Flag</td>
<td>6</td>
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<tr>
<td>3.4</td>
<td>1 bit</td>
<td>Low Error Flag</td>
<td>7</td>
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<tr>
<td>4.1</td>
<td>2 bits</td>
<td>Sensor Error Status</td>
<td>8</td>
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<tr>
<td>4.3</td>
<td>2 bits</td>
<td>EEPROM Error Status</td>
<td>3</td>
</tr>
<tr>
<td>4.5</td>
<td>2 bits</td>
<td>Access State</td>
<td>20</td>
</tr>
</tbody>
</table>
### 3.2 PGN_PG 65416 ICT820 Temperature PGICT820T

This parameter group is used to transmit the current temperature of the ICT820 sensor.

- **Transmission Repetition Rate:** 1 s
- **Data Length:** 2
- **Extended Data Page:** 0
- **Data Page:** 0
- **PDU Format:** 255
- **PDU Specific:** 136
- **Parameter Group Number:** 65416 (0x00FF88)

<table>
<thead>
<tr>
<th>Start Position</th>
<th>Length</th>
<th>Parameter Name</th>
<th>SPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>2 bytes</td>
<td>Current Temperature</td>
<td>2</td>
</tr>
</tbody>
</table>

### 3.3 PGN_PG 65432 ICT820 Serial Number PGICT820SN

This parameter group is used to transmit the serial number of the ICT820 sensor.

- **Transmission Repetition Rate:** On request
- **Data Length:** 4
- **Extended Data Page:** 0
- **Data Page:** 0
- **PDU Format:** 255
- **PDU Specific:** 152
- **Parameter Group Number:** 65432 (0x00FF98)

<table>
<thead>
<tr>
<th>Start Position</th>
<th>Length</th>
<th>Parameter Name</th>
<th>SPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>4 bytes</td>
<td>Serial Number</td>
<td>9</td>
</tr>
</tbody>
</table>
3.4 PGN_PG 65480 ICT820 Command Acknowledge PGICT820CA

This parameter group is used to transmit an acknowledge message from the ICT820 sensor on successful receipt and processing of a command message.

Transmission Repetition Rate: On request
Data Length: 1
Extended Data Page: 0
Data Page: 0
PDU Format: 255
PDU Specific: 200
Default Priority: 3
Parameter Group Number: 65480 (0x00FFC8)

<table>
<thead>
<tr>
<th>Start Position</th>
<th>Length</th>
<th>Parameter Name</th>
<th>SPN</th>
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</thead>
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<tr>
<td>1</td>
<td>1 byte</td>
<td>Acknowledged PDU Specific</td>
<td>19</td>
</tr>
</tbody>
</table>

3.5 PGN_PG 65496 ICT820 Max & Min Temperatures PGICT820MMT

This parameter group is used to transmit information about the maximum and minimum temperatures the ICT820 sensor has operated under.

Transmission Repetition Rate: On request
Data Length: 4
Extended Data Page: 0
Data Page: 0
PDU Format: 255
PDU Specific: 216
Default Priority: 3
Parameter Group Number: 65496 (0x00FFD8)

<table>
<thead>
<tr>
<th>Start Position</th>
<th>Length</th>
<th>Parameter Name</th>
<th>SPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>2 bytes</td>
<td>Minimum Temperature</td>
<td>11</td>
</tr>
<tr>
<td>3-4</td>
<td>2 bytes</td>
<td>Maximum Temperature</td>
<td>10</td>
</tr>
</tbody>
</table>
3.6 **PGN_PG 65408**  **ICT820 Set Start End Points**  **PGICT820SSEP**

This parameter group is transmitted to the ICT820 sensor to configure the start and end points.

Receipt of this command message is only processed by the ICT820 sensor if the Access State (SPN 20) equals 1 (Unlocked). The ICT820 sensor can be unlocked by sending PGN_PG 65422.

If Start Or End Position Selection (SPN 21) is equal to 0 (Start Position) the current mechanical position of the ICT820 sensor will be stored and used to represent the 0 Position output (SPN 1).

If Start Or End Position Selection (SPN 21) is equal to 1 (End Position) the current mechanical position of the ICT820 sensor will be stored and used to represent the 8191 Position output (SPN 1).

Changes to the start and end points are reflected in the Position output (SPN 1) immediately. To save the setting permanently into EEPROM, PGICT820SC (PGN 65411) must be received by the device.

Transmission Repetition Rate: As required
Data Length: 1
Extended Data Page: 0
Data Page: 0
PDU Format: 255
PDU Specific: 128

PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 65408 (0x00FF80)

<table>
<thead>
<tr>
<th>Start Position</th>
<th>Length</th>
<th>Parameter Name</th>
<th>SPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 byte</td>
<td>Start Or End Position Selection</td>
<td>21</td>
</tr>
</tbody>
</table>
3.7  **PGN_PG 65411   ICT820 Save Configuration   PGICT820SC**

This parameter group is transmitted to the ICT820 sensor to permanently store any configured attributes to EEPROM.

Receipt of this command message is only processed by the ICT820 sensor if the Access State (SPN 20) equals 1 (Unlocked). The ICT820 sensor can be unlocked by sending PGN_PG 65422.

Transmission Repetition Rate:  As required
Data Length:     0
Extended Data Page:  0
Data Page:     0
PDU Format:  255
PDU Specific:  131
Default Priority:  3
Parameter Group Number:  65411 (0x00FF83)
3.8  **PGN_PG 65412  ICT820 Set Limit Thresholds  PGICT820SLT**

This parameter group is transmitted to the ICT820 sensor to configure the limit thresholds.

Receipt of this command message is only processed by the ICT820 sensor if the Access State (SPN 20) equals 1 (Unlocked). The ICT820 sensor can be unlocked by sending PGN_PG 65422.

If Position output (SPN 1) is less than Low Error Threshold (SPN 22) then Low Error Flag (SPN 7) will be set to 1.

If Position output (SPN 1) is less than Low Warning Threshold (SPN 23) then Low Warning Flag (SPN 6) will be set to 1.

If Position output (SPN 1) is greater than High Warning Threshold (SPN 24) then High Warning Flag (SPN 5) will be set to 1.

If Position output (SPN 1) is greater than High Error Threshold (SPN 25) then High Error Flag (SPN 4) will be set to 1.

Changes to the limit thresholds are reflected in the limit flags (SPN 4-7) immediately. To save the setting permanently into EEPROM, PGICT820SC (PGN 65411) must be received by the device.

Transmission Repetition Rate:  As required  
Data Length:  8  
Extended Data Page:  0  
Data Page:  0  
PDU Format:  255  
PDU Specific:  132  
PGN Supporting Information:  
Default Priority:  3  
Parameter Group Number:  65412 (0x00FF84)

<table>
<thead>
<tr>
<th>Start Position</th>
<th>Length</th>
<th>Parameter Name</th>
<th>SPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>2 bytes</td>
<td>Low Error Threshold</td>
<td>22</td>
</tr>
<tr>
<td>3-4</td>
<td>2 bytes</td>
<td>Low Warning Threshold</td>
<td>23</td>
</tr>
<tr>
<td>5-6</td>
<td>2 bytes</td>
<td>High Warning Threshold</td>
<td>24</td>
</tr>
<tr>
<td>7-8</td>
<td>2 bytes</td>
<td>High Error Threshold</td>
<td>25</td>
</tr>
</tbody>
</table>
3.9 \textit{PGN\_PG 65413} \quad \textit{ICT820 Set Baud Rate} \quad \textit{PGICT820SBR}

This parameter group is transmitted to the ICT820 sensor to configure the baud rate.

Receipt of this command message is only processed by the ICT820 sensor if the Access State (SPN 20) equals 1 (Unlocked). The ICT820 sensor can be unlocked by sending PGN\_PG 65422.

Selectable options for the baud rate are defined in Baud Rate Selection - SPN 26.

Changes to the baud rate are not reflected immediately. To reflect baud rate changes the new baud rate must be saved permanently into EEPROM by sending PGICT820SC (PGN 65411), then power cycling the ICT820.

Transmission Repetition Rate: As required  
Data Length: 1  
Extended Data Page: 0  
Data Page: 0  
PDU Format: 255  
PDU Specific: 133  
Default Priority: 3  
Parameter Group Number: 65413 (0x00FF85)

\begin{tabular}{|c|c|c|c|}
\hline
Start Position & Length & Parameter Name & SPN \\
\hline
1 & 1 byte & Baud Rate Selection & 26 \\
\hline
\end{tabular}
3.10 PGN_PG 65414  ICT820 Set Frame Rate  PGICT820SFR

This parameter group is transmitted to the ICT820 sensor to configure the frame rate of PGICT820P (PGN 65400) message.

Receipt of this command message is only processed by the ICT820 sensor if the Access State (SPN 20) equals 1 (Unlocked). The ICT820 sensor can be unlocked by sending PGN_PG 65422.

Selectable options for the frame rate are defined in Frame Rate Selection - SPN 27.

Changes to the frame rate are reflected in the transmission rate of PGICT820P (PGN 65400) immediately. To save the setting permanently into EEPROM, PGICT820SC (PGN 65411) must be received by the device.

Transmission Repetition Rate:  As required
Data Length:  1
Extended Data Page:  0
Data Page:  0
PDU Format:  255
PDU Specific:  134
Default Priority:  3
Parameter Group Number:  65414 (0xFF86)

Start Position  Length  Parameter Name  SPN
1  1 byte  Frame Rate Selection  27
3.11 PGN_PG 65419 ICT820 Request Serial Number PGICT820RSN

When this parameter group is transmitted to the ICT820 sensor, the sensor will reply with PGICT820SN (PGN 65432) message.

Transmission Repetition Rate: As required
Data Length: 0
Extended Data Page: 0
Data Page: 0
PDU Format: 255
PDU Specific: 139
Default Priority: 3
Parameter Group Number: 65419 (0x00FF8B)

PGN Supporting Information:
3.12 PGN_PG 65422 ICT820 Set Access State PGICT820SAS

This parameter group is transmitted to the ICT820 sensor to set the required access state, either locked or unlocked.

If Access Passcode (SPN 28) contains the word 'Customer' in Ascii code:

```
Byte 0:  0x43  'C'
Byte 1:  0x75  'u'
Byte 2:  0x73  's'
Byte 3:  0x74  't'
Byte 4:  0x6F  'o'
Byte 5:  0x6D  'm'
Byte 6:  0x65  'e'
Byte 7:  0x72  'r'
```

Then the device will be unlocked and Access State (SPN 20) will equal 1 (Unlocked).

If Access Passcode (SPN 28) contains any other code, then the device will be locked and Access State (SPN20) will equal 0 (Locked).

Transmission Repetition Rate: As required
Data Length: 8
Extended Data Page: 0
Data Page: 0
PDU Format: 255
PDU Specific: 142 PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 65422 (0x00FF8E)

<table>
<thead>
<tr>
<th>Start Position</th>
<th>Length</th>
<th>Parameter Name</th>
<th>SPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-8</td>
<td>8 bytes</td>
<td>Access Passcode</td>
<td>28</td>
</tr>
</tbody>
</table>
**3.13 PGN_PG 65426  ICT820 Set Node ID  PGICT820SNI**

This parameter group is transmitted to the ICT820 sensor to configure the node.

Receipt of this command message is only processed by the ICT820 sensor if the Access State (SPN 20) equals 1 (Unlocked). The ICT820 sensor can be unlocked by sending PGN_PG 65422.

Changes to the node id are reflected immediately. To save the setting permanently into EEPROM, PGICT820SC (PGN 65411) must be received by the device.

**Transmission Repetition Rate:** As required  
**Data Length:** 1  
**Extended Data Page:** 0  
**Data Page:** 0  
**PDU Format:** 255  
**PDU Specific:** 146  
**Parameter Group Number:** 65426 (0x00FF92)

<table>
<thead>
<tr>
<th>Start Position</th>
<th>Length</th>
<th>Parameter Name</th>
<th>SPN</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>1 byte</td>
<td>Node ID Selection</td>
<td>29</td>
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</table>

**3.14 PGN_PG 65429  ICT820 Request Max & Min Temperatures  PGICT820RMMT**

When this parameter group is transmitted to the ICT820 sensor, the sensor will reply with PGICT820RMNT (PGN 65496) message.

**Transmission Repetition Rate:** As required  
**Data Length:** 0  
**Extended Data Page:** 0  
**Data Page:** 0  
**PDU Format:** 255  
**PDU Specific:** 149  
**Parameter Group Number:** 65429 (0x00FF95)
4 SPNs

4.1 SPN_PG 1 Position

ICT820 Linear Position output.

Data Length: 2 bytes
Resolution: (Start Position – End Position)* / 8192 per bit, 0 offset
Data Range: 0 to 8191 counts
Type: Measured
Supporting Information:
PGN reference: 65400

NOTE:* The Start and End Positions are those set using PGNICT820SSEP.

4.2 SPN_PG 2 Current Temperature

Current temperature of the ICT820 core.

Data Length: 2 bytes
Resolution: 1°C / bit, 0 offset
Data Range: -32768 to 32767 °C
Type: Measured
Supporting Information:
PGN reference: 65416

4.3 SPN_PG 3 EEPROM Error Status

ICT820 EEPROM error status signal which indicates the status of the onboard EEPROM memory.

00 – EEPROM data status unknown
01 – EEPROM data OK
10 – EEPROM data default data
11 – EEPROM data integrity error

Data Length: 2 bits
Resolution: 4 states / 2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65400
4.4  **SPN_PG 4 High Error Flag**

ICT820 high error status flag. This flag is set when the position output is equal to or greater than the high error threshold (99% of stroke by default).

0 – Limit threshold not reached
1 – Limit threshold reached

Data Length: 1 bit  
Resolution: 2 states / 1 bit, 0 offset  
Data Range: 0 to 1  
Type: Status  
Supporting Information:  
PGN reference: 65400

---

4.5  **SPN_PG 5 High Warning Flag**

ICT820 high warning status flag. This flag is set when the position output is equal to or greater than the high warning threshold (97% of stroke by default).

0 – Limit threshold not reached
1 – Limit threshold reached

Data Length: 1 bit  
Resolution: 2 states / 1 bit, 0 offset  
Data Range: 0 to 1  
Type: Status  
Supporting Information:  
PGN reference: 65400

---

4.6  **SPN_PG 6 Low Warning Flag**

ICT820 low warning status flag. This flag is set when the position output is equal to or greater than the low warning threshold (3% of stroke by default).

0 – Limit threshold not reached
1 – Limit threshold reached

Data Length: 1 bit  
Resolution: 2 states / 1 bit, 0 offset  
Data Range: 0 to 1  
Type: Status  
Supporting Information:  
PGN reference: 65400
4.7 **SPN_PG 7 Low Error Flag**

ICT820 low error status flag. This flag is set when the position output is equal to or greater than the low error threshold (1% of stroke by default).

0 – Limit threshold not reached
1 – Limit threshold reached

Data Length: 1 bit
Resolution: 2 states / 1 bit, 0 offset
Data Range: 0 to 1
Type: Status
Supporting Information:
PGN reference: 65400

4.8 **SPN_PG 8 Sensor Error Status**

ICT820 sensor error status signal which indicates the status of the device.

00 – Sensor OK
01 – Sensor coil short circuit
10 – Sensor coil open circuit
11 – Sensor unknown error

Data Length: 2 bits
Resolution: 4 states / 2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65400

4.9 **SPN_PG 9 Serial Number**

The unique device serial number.

Data Length: 4 bytes
Resolution: n/a, 0 offset
Data Range: 0 - 4294967295
Type: Status
Supporting Information:
PGN reference: 65432
4.10 SPN_PG 10 Maximum Temperature

Maximum temperature the ICT820 core has reached.

Data Length: 2 bytes  
Resolution: 1°C / bit, 0 offset  
Data Range: -32768 to 32767 °C  
Type: Measured  
Supporting Information:  
PGN reference: 65496

4.11 SPN_PG 11 Minimum Temperature

Minimum temperature the ICT820 core has reached.

Data Length: 2 bytes  
Resolution: 1°C / bit, 0 offset  
Data Range: -32768 to 32767 °C  
Type: Measured  
Supporting Information:  
PGN reference: 65496

4.12 SPN_PG 19 Acknowledged PDU Specific

The PDU that is acknowledged.

Data Length: 1 byte  
Resolution: n/a, 0 offset  
Data Range: 0 - 255  
Type: Status  
Supporting Information:  
PGN reference: 65480
4.13 SPN_PG 20 Access State

ICT820 access status indicator. The access state can be set using PGNICT820SAS message.

00 – Device Locked
01 – Device Unlocked
10 – Reserved
11 – Reserved

Data Length: 2 bits
Resolution: 4 states / 2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65400

4.14 SPN_PG 21 Start Or End Position Selection

Selection of the Start Position or End Position setting.

0x00 – Set the Start Position
0x01 – Set the End Position

Data Length: 1 byte
Resolution: n/a, 0 offset
Data Range: 0 - 255
Type: Status
Supporting Information:
PGN reference: 65408

4.15 SPN_PG 22 Low Error Threshold

Low Error Threshold set point. The default is 82, approximately 1% of stroke.

Data Length: 2 bytes
Resolution: (Start Position – End Position)* / 8192 per bit, 0 offset
Data Range: 0 to 8191 counts
Type: Status
Supporting Information:
PGN reference: 65412

NOTE:* The Start and End Positions are those set using PGNICT820SSEP.
4.16 SPN_PG 23 Low Warning Threshold

Low Warning Threshold set point. The default is 246, approximately 3% of stroke.

- Data Length: 2 bytes
- Resolution: (Start Position – End Position)* / 8192 per bit, 0 offset
- Data Range: 0 to 8191 counts
- Type: Status
- Supporting Information:
- PGN reference: 65412

NOTE:* The Start and End Positions are those set using PGNICT820SSEP.

4.17 SPN_PG 24 High Warning Threshold

High Warning Threshold set point. The default is 7945, approximately 97% of stroke.

- Data Length: 2 bytes
- Resolution: (Start Position – End Position)* / 8192 per bit, 0 offset
- Data Range: 0 to 8191 counts
- Type: Status
- Supporting Information:
- PGN reference: 65412

NOTE:* The Start and End Positions are those set using PGNICT820SSEP.

4.18 SPN_PG 25 High Error Threshold

High Error Threshold set point. The default is 8109, approximately 99% of stroke.

- Data Length: 2 bytes
- Resolution: (Start Position – End Position)* / 8192 per bit, 0 offset
- Data Range: 0 to 8191 counts
- Type: Status
- Supporting Information:
- PGN reference: 65412

NOTE:* The Start and End Positions are those set using PGNICT820SSEP.
### 4.19 SPN_PG 26 Baud Rate Selection

Baud Rate selection byte.

0x00 – 50Kbs
0x01 – 125Kbs
0x02 – 250Kbs
0x03 – 500Kbs
0x04 – 1Mbs

Data Length: 1 byte
Resolution: n/a, 0 offset
Data Range: 0 - 255
Type: Status

Operational Range: 0 - 4

Supporting Information:
PGN reference:  65413

### 4.20 SPN_PG 27 Frame Rate Selection

Frame Rate selection byte.

0x00 – 100mS
0x01 – 10mS
0x02 – 20mS
0x03 – 30mS
0x04 – 40mS
0x05 – 50mS
0x06 – 60mS
0x07 – 70mS
0x08 – 80mS
0x09 – 90mS

Data Length: 1 byte
Resolution: n/a, 0 offset
Data Range: 0 - 255
Type: Status

Operational Range: 0 - 9

Supporting Information:
PGN reference:  65414
4.21 SPN_PG 28 Access Passcode

If this Access Passcode contains the word 'Customer' in Ascii code when received by the ICT820 device then the device will be unlocked and Access State (SPN 20) will equal 1 (Unlocked). Any other passcode will lock the device and Access State (SPN 20) will equal 0 (Locked).

Byte 0: 0x43 'C'
Byte 1: 0x75 'u'
Byte 2: 0x73 's'
Byte 3: 0x74 't'
Byte 4: 0x6F 'o'
Byte 5: 0x6D 'm'
Byte 6: 0x65 'e'
Byte 7: 0x72 'r'

Data Length: 4 bytes
Resolution: n/a, 0 offset
Data Range: 0 - 4294967295
Operational Range: same as data range
Type: Status
Supporting Information:
PGN reference: 65422

4.22 SPN_PG 29 Node ID Selection

Node ID selection byte.

Data Length: 1 byte
Resolution: n/a, 0 offset
Data Range: 0 - 255
Operational Range: 1 - 127
Type: Status
Supporting Information:
PGN reference: 65426