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   Display Channel.............................................................. 9
   Display Gross Weight..................................................... 9
   Display Net Weight......................................................... 9
   Display Piece Count...................................................... 9
   Gross/Net Key Press (toggle mode).................................... 9
   Zero............................................................................ 9
   Display Tare.................................................................. 9
   Enter Tare (integer)........................................................ 9
   Acquire Tare (simulate tare key press)............................... 9
   Clear Tare.................................................................... 9
   Primary Units................................................................ 9
   Secondary Units.......................................................... 9
   Tertiary Units................................................................ 9
   Units Key Press (toggle units).......................................... 10
   Print Request.................................................................. 10
   Display Accumulator...................................................... 10
   Clear Accumulator......................................................... 10
   Push Weight to Accumulator.......................................... 10
   Return Gross as Integer............................................... 10
   Return Net as Integer.................................................... 10
   Return Tare as Integer.................................................. 10
   Return Piece Count....................................................... 10
   Return Current Display as Integer................................. 10
   Return Accumulator as Integer...................................... 10
   Return Rate of Change as Integer.................................. 10
   Return Peak as Integer................................................. 10
   Set Batching State........................................................ 10
   Batch Start.................................................................... 10

Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at www.ricelake.com/training or obtained by calling 715-234-9171 and asking for the training department.
About This Manual

This manual provides information needed to install and use the Rice Lake Weighing Systems Remote I/O Interface card. The Remote I/O Interface allows 520, 720i®, 820i®, and 920i® indicators to communicate with PLC® and SLC™ controllers using the Allen-Bradley® Remote I/O network. See the 520, 720i, 820i, or 920i Installation Manual for additional installation information and detailed descriptions of indicator functions.

1. Allen-Bradley®, PLC®, and SLC™ are trademarks of Allen-Bradley Company, Inc., a Rockwell International company.

1.0 Introduction

The Remote I/O Interface returns weight and status information from the 520, 720i, 820i, or 920i indicator to the PLC controller. The Remote I/O Interface also provides the PLC programmer with limited control of indicator functions. Indicator configuration and calibration cannot be performed through the Remote I/O Interface.

The Remote I/O Interface behaves as a node adapter device to the master PLC, appearing as a quarter rack of I/O. The PLC controller and Remote I/O Interface communicate using a quarter rack of data slots (4 slots with 8 bits of input, 8 bits of output per slot). Each pair of slots corresponds to a “module group”, one input and one output word. The Remote I/O Interface contains two module groups and therefore communicates two words of data.

The PLC controller sends commands to the indicator through the Remote I/O Interface by writing the commands to the output image table, and reads returned weight and status data from the input image table. These actions are referred to as discrete transfers. See Section 3.0 for information about using discrete transfer commands.

Block transfers are accomplished by sending a block write command followed by a block read command. Separate data files are set up for block commands. The length of these files depends on the length of the data being read or written. See Section 4.0 for information about using block transfer commands.
2.0 Installation

This section describes the procedures used to install the Remote I/O interface card into the 520, 720i, 820i, and 920i indicators; connect communications cables; select the termination resistance; and set the configuration DIP switches for the Remote I/O interface.

2.1 Installing the Remote I/O Interface

Use the following procedure to install the Remote I/O Interface card into 520, 720i, 820i, and 920i indicators.

1. Disconnect indicator from power source.

   *Warning* Disconnect power before removing indicator backplate. The 520, 720i, 820i, and 920i have no on/off switch. Before opening the unit, ensure the power cord is disconnected from the power outlet.

2. Open indicator enclosure. For indicator models with backplates, place indicator face-down on an antistatic work mat and remove screws that hold the backplate to the enclosure body.

   *Caution* Use a wrist strap to ground yourself and protect components from electrostatic discharge (ESD) when working inside the indicator enclosure.

3. Carefully align the option card connector with the option card slot on the indicator CPU board (or 920i expansion board). Press down to seat the option card in the CPU board connector.

4. Use the screws provided in the option kit to secure the other end of the option card to the threaded standoffs on the CPU board.

5. Set termination resistance (jumper JMP4) as described in Section 2.1.1 on page 3.

6. Wire the card to the network as described in Section 2.1.2 on page 3.

7. Set DIP switches as described in Section 2.2 on page 4.

8. Use cable ties to secure loose cables inside the enclosure.

9. For indicator models that include a backplate, position the backplate over the enclosure and reinstall the backplate screws. For the 820i and 920i desktop and universal models, use the torque pattern shown in Figure 2-1 to prevent distorting the backplate gasket. Torque screws to 15 in-lb (1.7 N-m).

10. Ensure no excess cable is left inside the enclosure and tighten cord grips.

11. Reconnect power to the indicator. The indicator automatically recognizes all installed option cards when the unit is powered on. No hardware-specific configuration is required to identify the newly-installed Remote I/O card to the system.

![Figure 2-1. 820i and 920i Enclosure Backplate.](image)

![Figure 2-2. Remote I/O Interface Card](image)
2.1.1 Termination Resistance

If the Remote I/O Interface is the last, or only, device attached to the PLC, the interface must provide a termination resistance. Use Table 2-1 to determine the appropriate termination resistance value and JMP4 jumper position for the network. If the Remote I/O Interface is not the last device in a chain, position the jumper on one pin only. Resistance values for the jumper positions are marked on the Remote I/O Interface card.

<table>
<thead>
<tr>
<th>Network Data Rate</th>
<th>Maximum Cable Length</th>
<th>Maximum Nodes</th>
<th>JMP4 Termination Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>57.6 Kbps</td>
<td>10 000 ft</td>
<td>16</td>
<td>150Ω</td>
</tr>
<tr>
<td>115.2 Kbps</td>
<td>5000 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>230.4 Kbps</td>
<td>2500 ft</td>
<td>32</td>
<td>82Ω</td>
</tr>
</tbody>
</table>

Table 2-1. JMP4 Jumper Positions and Termination Resistance Values

2.1.2 A-B Network Connections

Connections to the Allen-Bradley network are made at connector J2 on the Remote I/O Interface card (see Figure 2-2). Connectors 4–6 are tied to connectors 1–3 to allow daisy-chaining through the Remote I/O Interface.

Feed Allen-Bradley network cable through cord grip. Allow enough cable for routing along inside of enclosure to J2 connector on the Remote I/O Interface card. Connect Allen-Bradley network cables into connector J2 on the Remote I/O Interface card, then use cable ties to secure network cables to the cable tie mounts.

2.1.3 LED Status Indicator

A single LED on the Remote I/O card provides status information for troubleshooting (see Figure 2-2). Table 2-2 summarizes the function of the LED.

<table>
<thead>
<tr>
<th>LED</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Not initialized or not receiving valid frames</td>
</tr>
<tr>
<td>Pulsing</td>
<td>Communications established with Command 1's or timeout</td>
</tr>
<tr>
<td>(2Hz)</td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>Valid communications established with Command 2's</td>
</tr>
</tbody>
</table>

Table 2-2. Remote I/O Interface Status LED
2.2 DIP Switch Configuration

Two banks of DIP switches, SW1 and SW2, are used to configure the Remote I/O Interface for communication with the indicator and the network. Figure 2-3 shows the switch assignments for SW1 and SW2.

![Switch Assignments Diagram]

Starting Quarter
Switches SW1-1 and SW1-2 set the starting quarter (or group number) used by the Remote I/O Interface. Use Table 2-3 to select the correct switch settings.

<table>
<thead>
<tr>
<th>Starting Quarter</th>
<th>Group Number</th>
<th>SW1 Switch Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>0</td>
<td>CLOSED</td>
</tr>
<tr>
<td>2nd</td>
<td>2</td>
<td>OPEN</td>
</tr>
<tr>
<td>3rd</td>
<td>4</td>
<td>CLOSED</td>
</tr>
<tr>
<td>4th</td>
<td>6</td>
<td>OPEN</td>
</tr>
</tbody>
</table>

![Table 2-3. Starting Quarter]

Rack Address
Switches SW1-3 through SW1-8 are used to set the rack address of the Remote I/O Interface. Use Table on page 5 to select the correct switch settings for the rack address. Note that setting a switch OPEN acts as a logical “1” and that SW1-3 represents the least significant bit (LSB) of the rack address.

Network Data Rate
SW2-1 and SW2-2 set the data rate of the Allen-Bradley network. Use Table 2-4 to select the correct switch settings for the network.

<table>
<thead>
<tr>
<th>Remote I/O Data Rate</th>
<th>SW2 Switch Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>57.6 Kbps</td>
<td>CLOSED</td>
</tr>
<tr>
<td>115.2 Kbps</td>
<td>OPEN</td>
</tr>
<tr>
<td>230.4 Kbps</td>
<td>CLOSED</td>
</tr>
<tr>
<td></td>
<td>OPEN</td>
</tr>
</tbody>
</table>

![Table 2-4. Network Data Rate]

Last Rack
Set SW2-3 OPEN if the Remote I/O Interface link address includes the highest module group in this rack address.

Rack Size
At this time only a quarter rack size is supported. This option has been included for possible future expansion to include half rack support. Switch 2-4 is ignored.

Block Transfer
Set SW2-6 CLOSED to enable or OPEN to disable block transfer to the Remote I/O Interface. Setting this switch OPEN causes the Remote I/O Interface to ignore unsolicited block transfer requests from the PLC.
### 2.3 Decimal Point Handling

**Discrete Transfer**
Discrete transfer commands return no decimal point information to the PLC. For example, a value of 750.1 displayed on the indicator is returned to the PLC as 7501.

**Block Transfer**
Block transfer commands support decimal point information with no special handling.

<table>
<thead>
<tr>
<th>Rack Address</th>
<th>SW1 Switch Settings (LSB→MSB)</th>
<th>Rack Address</th>
<th>SW1 Switch Settings (LSB→MSB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>00</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
<tr>
<td>01</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
<tr>
<td>02</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>CLOSED</td>
</tr>
<tr>
<td>03</td>
<td>OPEN</td>
<td>OPEN</td>
<td>CLOSED</td>
</tr>
<tr>
<td>04</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>05</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>06</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>07</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>08</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
<tr>
<td>09</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
<tr>
<td>10</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>11</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>12</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>13</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>14</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>15</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>16</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
<tr>
<td>17</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
<tr>
<td>18</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>CLOSED</td>
</tr>
<tr>
<td>19</td>
<td>OPEN</td>
<td>OPEN</td>
<td>CLOSED</td>
</tr>
<tr>
<td>20</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>21</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>22</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>23</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>24</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>25</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>26</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>27</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>28</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>29</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>30</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>31</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
</tbody>
</table>

Table 2-5. SW1 Switch Settings for Remote I/O Interface Rack Address
3.0 Discrete Transfer Commands

Discrete commands are used by the PLC to send and receive data from the Remote I/O Interface. The PLC controller and Remote I/O Interface share a quarter rack of slot space, resulting in two 16-bit words for the output image table (used to write commands to the indicator) and two 16-bit words for the input image table (used to read data from the indicator).

NOTE: Data returned by discrete transfer commands is not valid when the indicator is in setup mode.

3.1 Output Image Table Format

To perform a discrete command, the PLC places two 16-bit words in the PLC output image table, which is sent by the scanner to the node adapter of the Remote I/O Interface. The Remote I/O Interface provides the contents of the output image table to the indicator for command processing.

The format of the output image table is shown in Table 3-1.

<table>
<thead>
<tr>
<th>Bit</th>
<th>15</th>
<th>14</th>
<th>13</th>
<th>12</th>
<th>11</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word 0</td>
<td>v15</td>
<td>v14</td>
<td>v13</td>
<td>v12</td>
<td>v11</td>
<td>v10</td>
<td>v09</td>
<td>v08</td>
<td>v07</td>
<td>v06</td>
<td>v05</td>
<td>v04</td>
<td>v03</td>
<td>v02</td>
<td>v01</td>
<td>v00</td>
</tr>
<tr>
<td>Word 1</td>
<td>p07</td>
<td>p06</td>
<td>p05</td>
<td>p04</td>
<td>p03</td>
<td>p02</td>
<td>p01</td>
<td>p00</td>
<td>c07</td>
<td>c06</td>
<td>c05</td>
<td>c04</td>
<td>c03</td>
<td>c02</td>
<td>c01</td>
<td>c00</td>
</tr>
</tbody>
</table>

Table 3-1. Output Image Table Format

where:
- \( v_{00} - v_{15} \) 16-bit unsigned integer value
- \( p_{00} - p_{07} \) Parameter value
- \( c_{00} - c_{07} \) Command number

These fields are described below:

**Value**

Word 0 of the output image table is used to pass value data on certain commands. This field should be used only when block transfer is disabled. For example, to enter a tare value, use word 0 to specify the tare value; the Enter Tare command number (12) is specified in bits 00 through 07 of word 1.

Values entered in this field are treated as unsigned integers. Possible values range from 0 to 65535.

**Parameter value**

To allow communication with a multi-scale indicator, the scale number is sent in the upper byte of word 1. A value of 0 represents the current scale. Certain commands require a parameter other than a scale number. These commands are noted in the table as requiring a slot number or other selection parameter.

**Command Number**

The number representing the indicator command is sent in the lower byte of word 1. Table 3-2 lists the remote commands that can be specified for 520i and 920i indicators on discrete write commands.

**NOTE:** A lockout feature that looks for any change in the image table data is incorporated into the indicator receive mechanism to prevent inundation by the same command. Repeated commands must be separated by any other valid command/parameter/value combination.

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Hex</th>
<th>Binary</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0x00</td>
<td>0000 0000</td>
<td>Return Status and Weight</td>
</tr>
<tr>
<td>1</td>
<td>0x01</td>
<td>0000 0001</td>
<td>Display Channel</td>
</tr>
<tr>
<td>2</td>
<td>0x02</td>
<td>0000 0010</td>
<td>Display Gross Weight</td>
</tr>
<tr>
<td>3</td>
<td>0x03</td>
<td>0000 0011</td>
<td>Display Net Weight</td>
</tr>
<tr>
<td>4</td>
<td>0x04</td>
<td>0000 0100</td>
<td>Display Piece Count</td>
</tr>
<tr>
<td>9</td>
<td>0x09</td>
<td>0000 1001</td>
<td>Gross/Net key press (toggle mode)</td>
</tr>
<tr>
<td>10</td>
<td>0x0A</td>
<td>0000 1010</td>
<td>Zero</td>
</tr>
<tr>
<td>11</td>
<td>0x0B</td>
<td>0000 1011</td>
<td>Display Tare</td>
</tr>
<tr>
<td>12</td>
<td>0x0C</td>
<td>0000 1100</td>
<td>Enter Tare (integer)</td>
</tr>
<tr>
<td>13</td>
<td>0x0D</td>
<td>0000 1101</td>
<td>Acquire Tare</td>
</tr>
</tbody>
</table>

Table 3-2. 520i/720i/820i/920i Remote Commands
<table>
<thead>
<tr>
<th>Decimal</th>
<th>Hex</th>
<th>Binary</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>0x0E</td>
<td>0000 1110</td>
<td>Clear Tare</td>
</tr>
<tr>
<td>16</td>
<td>0x10</td>
<td>0001 0000</td>
<td>Primary Units</td>
</tr>
<tr>
<td>17</td>
<td>0x11</td>
<td>0001 0001</td>
<td>Secondary Units</td>
</tr>
<tr>
<td>18</td>
<td>0x12</td>
<td>0001 0010</td>
<td>Tertiary Units</td>
</tr>
<tr>
<td>19</td>
<td>0x13</td>
<td>0001 0011</td>
<td>Units key press (toggle units)</td>
</tr>
<tr>
<td>20</td>
<td>0x14</td>
<td>0001 0100</td>
<td>Print Request</td>
</tr>
<tr>
<td>21</td>
<td>0x15</td>
<td>0001 0101</td>
<td>Display Accumulator</td>
</tr>
<tr>
<td>22</td>
<td>0x16</td>
<td>0001 0110</td>
<td>Clear Accumulator</td>
</tr>
<tr>
<td>23</td>
<td>0x17</td>
<td>0001 0111</td>
<td>Push Weight to Accumulator</td>
</tr>
<tr>
<td>32</td>
<td>0x20</td>
<td>0010 0000</td>
<td>Return Gross (integer)</td>
</tr>
<tr>
<td>33</td>
<td>0x21</td>
<td>0010 0001</td>
<td>Return Net (integer)</td>
</tr>
<tr>
<td>34</td>
<td>0x22</td>
<td>0010 0010</td>
<td>Return Tare (integer)</td>
</tr>
<tr>
<td>35</td>
<td>0x23</td>
<td>0010 0011</td>
<td>Return Piece Count</td>
</tr>
<tr>
<td>37</td>
<td>0x25</td>
<td>0010 0101</td>
<td>Return Current Display (integer)</td>
</tr>
<tr>
<td>38</td>
<td>0x26</td>
<td>0010 0110</td>
<td>Return Accumulator (integer)</td>
</tr>
<tr>
<td>39</td>
<td>0x27</td>
<td>0010 0111</td>
<td>Return Rate of Change (integer)</td>
</tr>
<tr>
<td>40</td>
<td>0x28</td>
<td>0010 1000</td>
<td>Return Peak (integer)</td>
</tr>
<tr>
<td>95</td>
<td>0x5F</td>
<td>0101 1111</td>
<td>Set Batching State</td>
</tr>
<tr>
<td>96</td>
<td>0x60</td>
<td>0110 0000</td>
<td>Batch Start</td>
</tr>
<tr>
<td>97</td>
<td>0x61</td>
<td>0110 0001</td>
<td>Batch Pause</td>
</tr>
<tr>
<td>98</td>
<td>0x62</td>
<td>0110 0010</td>
<td>Batch Reset</td>
</tr>
<tr>
<td>99</td>
<td>0x63</td>
<td>0110 0011</td>
<td>Batch Status</td>
</tr>
<tr>
<td>112</td>
<td>0x70</td>
<td>0110 0100</td>
<td>Lock Indicator Front Panel</td>
</tr>
<tr>
<td>113</td>
<td>0x71</td>
<td>0110 0101</td>
<td>Unlock Indicator Front Panel</td>
</tr>
<tr>
<td>114</td>
<td>0x72</td>
<td>0110 0110</td>
<td>Set Digital Input ON</td>
</tr>
<tr>
<td>115</td>
<td>0x73</td>
<td>0110 0111</td>
<td>Set Digital Input OFF</td>
</tr>
<tr>
<td>116</td>
<td>0x74</td>
<td>0110 1000</td>
<td>Read Digital Input Status</td>
</tr>
<tr>
<td>253</td>
<td>0xFD</td>
<td>1111 1101</td>
<td>No operation</td>
</tr>
<tr>
<td>254</td>
<td>0xFE</td>
<td>1111 1110</td>
<td>Reset Indicator</td>
</tr>
<tr>
<td>368</td>
<td>0x170</td>
<td>10111 0000</td>
<td>Set Register</td>
</tr>
<tr>
<td>402</td>
<td>0x192</td>
<td>11001 0010</td>
<td>Get Register</td>
</tr>
</tbody>
</table>

*Table 3-2. 520/720i/820i/920i Remote Commands (Continued)*
### 3.2 Input Image Table Format

In response to a discrete command, the Remote I/O Interface interface returns data and status information across the network as two 16-bit words. This information is read from the input image table by the PLC. The format of the input image table is shown in Table 3-3:

<table>
<thead>
<tr>
<th>Bit</th>
<th>15</th>
<th>14</th>
<th>13</th>
<th>12</th>
<th>11</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word 0</td>
<td>v15</td>
<td>v14</td>
<td>v13</td>
<td>v12</td>
<td>v11</td>
<td>v10</td>
<td>v09</td>
<td>v08</td>
<td>v07</td>
<td>v06</td>
<td>v05</td>
<td>v04</td>
<td>v03</td>
<td>v02</td>
<td>v01</td>
<td>v00</td>
</tr>
<tr>
<td>Word 1</td>
<td>s11</td>
<td>s10</td>
<td>s09</td>
<td>s08</td>
<td>s07</td>
<td>s06</td>
<td>s05</td>
<td>s04</td>
<td>s03</td>
<td>s02</td>
<td>s01</td>
<td>s00</td>
<td>v19</td>
<td>v18</td>
<td>v17</td>
<td>v16</td>
</tr>
</tbody>
</table>

Table 3-3. Input Image Table Format

where:

- \( v_{00} \text{--} v_{19} \) 20-bit unsigned integer
- \( s_{00} \text{--} s_{11} \) Status data

#### Value

Weight data is returned to the PLC using word 0 and bits 0 to 3 from word 1 of the input image table. The PLC can use just word 0 to read data in a 16-bit format, allowing unsigned values from 0 to 65,535 to be returned from the indicator. If larger numbers or greater precision is required, the PLC can piece together the additional four bits from word 1, resulting in a 20-bit unsigned value. This format allows the indicator to return unsigned values up to 1,048,575. Polarity is returned with status data. The weight data returned is the displayed weight after the command is executed unless the command specifies otherwise.

#### Status Data

Indicator status data is returned in bits 4–15 of word 1. Status data is listed in Table 3-4. Batch commands return batch status in place of bits 8–15 as listed in Table 3-5.

#### Channel Bits

Bits \( s_{01} \text{--} s_{03} \) of the indicator status data (Table 3-4) are used to represent the lower three bits of the scale channel number. For example, if a value of ‘001’ is returned in these bits, the scale channel number is 1, 9, 17 or 25.

<table>
<thead>
<tr>
<th>Word 1 Bit</th>
<th>Status Bit</th>
<th>Indicator Status Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>s00</td>
<td>Positive weight</td>
</tr>
<tr>
<td>05</td>
<td>s01</td>
<td>Lower three bits of scale number</td>
</tr>
<tr>
<td>06</td>
<td>s02</td>
<td>Gross</td>
</tr>
<tr>
<td>07</td>
<td>s03</td>
<td>Net</td>
</tr>
<tr>
<td>08</td>
<td>s04</td>
<td>No tare</td>
</tr>
<tr>
<td>09</td>
<td>s05</td>
<td>Tare acquired</td>
</tr>
<tr>
<td>10</td>
<td>s06</td>
<td>Primary units</td>
</tr>
<tr>
<td>11</td>
<td>s07</td>
<td>Standstill</td>
</tr>
<tr>
<td>12</td>
<td>s08</td>
<td>Weight invalid / Over-range</td>
</tr>
<tr>
<td>13</td>
<td>s09</td>
<td>Not zero</td>
</tr>
<tr>
<td>14</td>
<td>s10</td>
<td>Tare not entered</td>
</tr>
<tr>
<td>15</td>
<td>s11</td>
<td>Error</td>
</tr>
</tbody>
</table>

Table 3-4. Indicator Status Data Format

<table>
<thead>
<tr>
<th>Word 1 Bit</th>
<th>Status Bit</th>
<th>Batch Function Status Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>s04</td>
<td>Alarm OFF</td>
</tr>
<tr>
<td>09</td>
<td>s05</td>
<td>Batch not stopped</td>
</tr>
<tr>
<td>10</td>
<td>s06</td>
<td>Batch not running</td>
</tr>
<tr>
<td>11</td>
<td>s07</td>
<td>Batch not paused</td>
</tr>
<tr>
<td>12</td>
<td>s08</td>
<td>Digital input 1 OFF</td>
</tr>
<tr>
<td>13</td>
<td>s09</td>
<td>Digital input 2 OFF</td>
</tr>
<tr>
<td>14</td>
<td>s10</td>
<td>Digital input 3 OFF</td>
</tr>
<tr>
<td>15</td>
<td>s11</td>
<td>Digital input 4 OFF</td>
</tr>
</tbody>
</table>

Table 3-5. Batch Function Status Data Format
3.3 Discrete Command Descriptions

NOTE: For all commands that require a scale number, a value of 0 indicates the current scale. Unless otherwise specified, the indicator returns weight and status data for the specified scale.

Return Status and Current Weight
Command: 0, 0x00
Parameter: Scale number
Command 0 returns the status and weight of the specified scale in integer format, without changing the display.

Display Channel
Command: 1, 0x01
Parameter: Scale number
Command 1 causes the weight of the specified scale to be displayed and returned in its current mode and format. This command is valid for the 920i only.

Display Gross Weight
Command: 2, 0x02
Parameter: Scale number
Command 2 causes the gross weight of the specified scale to be displayed and returned.

Display Net Weight
Command: 3, 0x03
Parameter: Scale number
Command 3 causes the net weight of the specified scale to be displayed and returned.

Display Piece Count
Command: 4, 0x04
Parameter: Scale number
Command 4 causes the piece count on the specified scale to be displayed and returned. This command is valid only for the 520 indicator, and only if count mode is enabled.

Gross/Net Key Press (toggle mode)
Command: 9, 0x09
Parameter: Scale number
Command 9 toggles between gross and net mode (and count mode, if enabled). If a scale number other than 0 is specified, the action may not be evident until the specified scale is displayed.

Zero
Command: 10, 0x0A
Command 10 performs a zero action on the current scale.

Display Tare
Command: 11, 0x0B
Parameter: Scale number
Command 11 causes the tare weight on the specified scale to be displayed. If a scale number other than 0 is specified, the indicator first causes the specified scale to be displayed. The tare data continues being returned even if the display times out and returns to another mode, until another command is issued.

Enter Tare (integer)
Command: 12, 0x0C
Parameter: Scale number
Value: Tare weight
Command 12 enters a tare for the scale selected. Tare data must be in integer format. The indicator continues to return weight data in the current mode for the specified scale. This command is not valid if block transfer is enabled.

Acquire Tare (simulate tare key press)
Command: 13, 0x0D
Parameter: Scale number
Command 13 acquires a tare based on the weight currently on the specified scale. The indicator continues to return weight data in the current mode for the specified scale.

Clear Tare
Command: 14, 0x0E
Parameter: Scale number
Command 14 clears the tare for the specified scale. The indicator continues to return weight data in the current mode for the specified scale.

Primary Units
Command: 16, 0x10
Parameter: Scale number
Command 16 switches the current format of the specified scale to the primary units configured for that scale.

Secondary Units
Command: 17, 0x11
Parameter: Scale number
Command 17 switches the current format of the specified scale to the secondary units configured for that scale.

Tertiary Units
Command: 18, 0x12
Parameter: Scale number
Command 18 switches the current format of the specified scale to the tertiary units configured for that scale. This command is valid for the 920i only.
Units Key Press (toggle units)
Command: 19, 0x13
Parameter: Scale number
Command 19 toggles the current format of the specified scale to the next units configured for that scale, as available.

Print Request
Command: 20, 0x14
Parameter: Scale number
Command 20 causes the indicator to execute a print request using the current scale.

Display Accumulator
Command: 21, 0x15
Parameter: Scale number
Command 21 causes the value of the accumulator for the specified scale to be displayed and returned. This command is only valid if the accumulator for the specified scale is enabled.

Clear Accumulator
Command: 22, 0x16
Parameter: Scale number
Command 22 clears the value of the accumulator for the specified scale. This command is only valid if the accumulator for the specified scale is enabled.

Push Weight to Accumulator
Command: 23, 0x17
Parameter: Scale number
Command 23 adds the net weight on the specified scale to the value of the accumulator for the specified scale. The scale must return to net zero between accumulations. The indicator returns the accumulated weight data for the specified scale. This command is only valid if the accumulator for the specified scale is enabled.

Return Gross as Integer
Command: 32, 0x20
Parameter: Scale number
Command 32 returns the gross weight value for the specified scale as an integer.

Return Net as Integer
Command: 33, 0x21
Parameter: Scale number
Command 33 returns the net weight value for the specified scale as an integer.

Return Tare as Integer
Command: 34, 0x22
Parameter: Scale number
Command 34 returns the tare weight value for the specified scale as an integer.

Return Piece Count
Command: 35, 0x23
Parameter: Scale number
Command 35 returns the piece count value for the specified scale. This command is valid only for the 520 indicator, and only if count mode is enabled.

Return Current Display as Integer
Command: 37, 0x25
Parameter: Scale number
Command 37 returns the weight value for the specified scale as currently displayed. This may include gross, net, tare, piece count, or accumulator values, as enabled. On the 920i, the weight value is returned in the mode used to display a scale widget.

Return Accumulator as Integer
Command: 38, 0x26
Parameter: Scale number
Command 38 returns the accumulator value for the specified scale. This command is only valid if the accumulator for the specified scale is enabled.

Return Rate of Change as Integer
Command: 39, 0x27
Parameter: Scale number
Command 39 returns the current rate of change value for the specified scale. This command is valid only for the 720i, 820i, 920i.

Return Peak as Integer
Command: 40, 0x28
Parameter: Scale number
Command 40 returns the net peak value for the specified scale. This command is valid only for the 520 indicator, and only if the peak hold function is enabled.

Set Batching State
Command: 95, 0x5F
Parameter: State (0 = off; 1 = auto; 2 = manual)
Command 95 sets the batching (BATCHNG) parameter. Indicator status is returned with the current weight for the last scale specified.

Batch Start
Command: 96, 0x60
Parameter: Scale number
Command 96 starts a batch program from the current step after a stop, pause or reset. Batch status is returned with the current weight for the specified scale.
**Batch Pause**
Command: 97, 0x61
Parameter: Scale number
Command 97 pauses a batch program at the current step. Batch status is returned with the current weight for the specified scale.

**Batch Reset**
Command: 98, 0x62
Parameter: Scale number
Command 98 stops a batch program and resets it to the first batch step. Batch status is returned with the current weight for the specified scale.

**Batch Status**
Command: 99, 0x63
Parameter: Scale number
Command 99 returns the status of a batch. Batch status is returned with the current weight for the specified scale.

**Lock Front Panel of Indicator**
Command: 112, 0x70
Parameter: Scale number
Command 112 disables all the keys on the front panel of the indicator. Indicator status is returned with the current weight for the specified scale.

**Unlock Front Panel of Indicator**
Command: 113, 0x71
Parameter: Scale number
Command 113 re-enables all the keys on the front panel of the indicator. Indicator status is returned with the current weight for the specified scale.

**Set Digital Output ON**
Command: 114, 0x72
Parameter: Slot number
Value: Bit number
Command 114 sets the specified digital output ON (active). Use slot number 0 for onboard digital outputs. Indicator status is returned with the current weight for the last scale specified. This command is not valid if block transfer is enabled.

**Set Digital Output OFF**
Command: 115, 0x73
Parameter: Slot number
Value: Bit number
Command 115 sets the specified digital output OFF (inactive). Use slot number 0 for onboard digital outputs. Indicator status is returned with the current weight for the last scale specified. This command is not valid if block transfer is enabled.

**Read Digital I/O**
Command: 116, 0x74
Parameter: Slot Number and Shift (1 = low; 2 = high)
Command 116 returns the status of all digital I/O (digital inputs only, for the 520) for the slot specified in word 0.

Because word 0 only contains 16 bits, a shift is used to slide a "window" over the slot data to be returned. The high nibble of the parameter contains 1 to look at the low 16 bits of the slot (bits 1–16) or 2 to return the high 16 bits (bits 9–24). Use slot number 0 for onboard digital inputs. Indicator status is returned in the status area for the last scale specified.

**No Operation**
Command: 253, 0xFD
Parameter: Scale number
Command 253 provides a command to use between operations, as necessary, without causing the indicator to perform any action. Indicator status and weight data for the specified scale is still returned.

**Reset Indicator**
Command: 254, 0xFE
Parameter: None
Command 254 provides a command to remotely reset the indicator. No data is returned.

**Set Register**
Command: 368
Registers: 1 thru 256
Command 368 sets register value. 1 through 128 are integer and 129 through 256 are real. This command is only valid for the 720i PCE version.

**Get Register**
Command: 402
Registers: 1 thru 256
Command 402 returns register value. 1 through 128 are integer and 129 through 256 are real. This command is only valid for the 720i PCE version.
# 4.0 Block Transfer Commands

The Remote I/O Interface supports block transfer commands for the 520, 720i, 820i, and 920i indicators. These commands allow the PLC controller to exchange larger blocks of data with the indicator, such as 32-bit floating-point values and partial setpoint configuration.

**NOTE:** Weight data returned by block transfer commands is not valid when the indicator is in setup mode.

Table 4-1 shows the block write and block read commands supported by the Remote I/O Interface.

<table>
<thead>
<tr>
<th>Command Number</th>
<th>Command Name</th>
<th>Block Write Command Length</th>
<th>Block Read Command Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal</td>
<td>Hex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>268</td>
<td>0x10C Set Tare Value</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>288</td>
<td>0x120 Read Gross Weight</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>289</td>
<td>0x121 Read Net Weight</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>290</td>
<td>0x122 Read Tare Weight</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>291</td>
<td>0x123 Read Piece Count</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>293</td>
<td>0x125 Read Current Display</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>294</td>
<td>0x126 Read Accumulator</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>295</td>
<td>0x127 Read Rate of Change</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>296</td>
<td>0x128 Read Peak Value</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>302</td>
<td>0x12E Read Gross, Tare, Net</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>303</td>
<td>0x12F Read Multiple Weights</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>304</td>
<td>0x130 Set Setpoint Value</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>305</td>
<td>0x131 Set Setpoint Hysteresis</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>306</td>
<td>0x132 Set Setpoint Bandwidth</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>307</td>
<td>0x133 Set Setpoint Preact</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>319</td>
<td>0x13F Set Single Setpoint, All Values</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>320</td>
<td>0x140 Read Setpoint Value</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>321</td>
<td>0x141 Read Setpoint Hysteresis</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>322</td>
<td>0x142 Read Setpoint Bandwidth</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>323</td>
<td>0x143 Read Setpoint Preact</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>335</td>
<td>0x14F Read Single Setpoint, All Values</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>336</td>
<td>0x150 Set Multiple Setpoint Values</td>
<td>4–62</td>
<td>2</td>
</tr>
<tr>
<td>337</td>
<td>0x151 Read Multiple Setpoint Values</td>
<td>2</td>
<td>4–62</td>
</tr>
</tbody>
</table>

**NOTE:** Command lengths expressed as number of words. Number of words required for variable length commands depends on number of setpoints or scales specified.

Table 4-1. Block Transfer Commands
4.1 Block Write Command Format

The format for sending a block write command includes a minimum of two words. The first word always contains the command to be executed by the indicator. The second word contains one or more parameters necessary to execute the command, such as a scale number or setpoint number. If a command requires additional values, this data follows, generally as one or more 4-byte, single-precision floating-point numbers. Below is a general outline and example for setting up a data file for a block write command.

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
<th>Sample Data</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Command number (hex)</td>
<td>0x010c</td>
<td>Set Tare command</td>
</tr>
<tr>
<td>1</td>
<td>Parameter data (hex)</td>
<td>0x0000</td>
<td>Current scale</td>
</tr>
<tr>
<td>2</td>
<td>Value, MSW</td>
<td>125.0</td>
<td>Tare value</td>
</tr>
<tr>
<td>3</td>
<td>Value, LSW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 4-2. Block Write Command Format Example*

4.2 Block Read Command Format

Block read commands have a similar format. The first word echoes the command number. If the command fails or is not recognized, the negative of the command number is returned to signal the error. The second word contains a status of the indicator for the scale selected, or a batch status for setpoint commands. Data being returned to the PLC follows, as required by the command, generally as one or more 4-byte, single-precision floating-point numbers. Below is a general outline and example for setting up a data file for a block read command.

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
<th>Sample Data</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Command number</td>
<td>0x0151</td>
<td>Read Multiple Setpoints command</td>
</tr>
<tr>
<td>1</td>
<td>Status data</td>
<td>0x0b02</td>
<td>Batch status</td>
</tr>
<tr>
<td>2</td>
<td>First value, MSW</td>
<td>150.0</td>
<td>Setpoint 1 value</td>
</tr>
<tr>
<td>3</td>
<td>First value, LSW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Second value, MSW</td>
<td>225.0</td>
<td>Setpoint 2 value</td>
</tr>
<tr>
<td>5</td>
<td>Second value, LSW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 4-3. Block Read Command Format Example*
Status Data
Block command status bit definitions are shown in Table 4-4. Setpoint commands return the setpoint number in the low byte, batch status in the high byte of the status word (see Table 4-5).

Table 4-4. Block Command Status Data Format

<table>
<thead>
<tr>
<th>Word 1 Bit</th>
<th>Status Bit</th>
<th>Indicator Status Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 s00</td>
<td></td>
<td>Positive weight</td>
</tr>
<tr>
<td>01 s01</td>
<td></td>
<td>Negative weight</td>
</tr>
<tr>
<td>02 s02</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>03 s03</td>
<td></td>
<td>Scale number</td>
</tr>
<tr>
<td>04 s04</td>
<td></td>
<td>(NOTE: Value 0 represents scale #32)</td>
</tr>
<tr>
<td>05 s05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>06 s06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07 s07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08 s08</td>
<td></td>
<td>Gross</td>
</tr>
<tr>
<td>09 s09</td>
<td></td>
<td>Net</td>
</tr>
<tr>
<td>10 s10</td>
<td></td>
<td>Primary units</td>
</tr>
<tr>
<td>11 s11</td>
<td></td>
<td>Secondary/ other units</td>
</tr>
<tr>
<td>12 s12</td>
<td></td>
<td>Standstill</td>
</tr>
<tr>
<td>13 s13</td>
<td></td>
<td>In motion</td>
</tr>
<tr>
<td>14 s14</td>
<td></td>
<td>Weight invalid / Over-range</td>
</tr>
<tr>
<td>15 s15</td>
<td></td>
<td>Not zero</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Center of zero</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tare not entered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tare entered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No error</td>
</tr>
</tbody>
</table>

Table 4-5. Batch Function Status Data Format

<table>
<thead>
<tr>
<th>Word 1 Bit</th>
<th>Status Bit</th>
<th>Batch Function Status Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 s00</td>
<td></td>
<td>Setpoint number</td>
</tr>
<tr>
<td>01 s01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02 s02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03 s03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04 s04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05 s05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>06 s06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07 s07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08 s08</td>
<td></td>
<td>Alarm OFF</td>
</tr>
<tr>
<td>09 s09</td>
<td></td>
<td>Alarm ON</td>
</tr>
<tr>
<td>10 s10</td>
<td></td>
<td>Batch not stopped</td>
</tr>
<tr>
<td>11 s11</td>
<td></td>
<td>Batch stopped</td>
</tr>
<tr>
<td>12 s12</td>
<td></td>
<td>Batch not running</td>
</tr>
<tr>
<td>13 s13</td>
<td></td>
<td>Batch running</td>
</tr>
<tr>
<td>14 s14</td>
<td></td>
<td>Batch not paused</td>
</tr>
<tr>
<td>15 s15</td>
<td></td>
<td>Batch paused</td>
</tr>
</tbody>
</table>

(520) Error
(520) No error
4.3 Block Transfer Command Descriptions

**NOTE:** For all commands that require a scale number, a value of 0 indicates the current scale. Unless otherwise specified, the indicator returns weight and status data for the specified scale.

**Set Tare Value**
Command: 268, 0x10C
Block Write: 4 words
Parameter: Scale number
Value: Tare weight
Block Read: 4 words
Return Status: Selected scale
Return Value: Tare weight

Command 268 enters a tare for the scale selected in floating-point format. The indicator returns the tare weight as taken, or 0 for no tare.

**Read Gross Weight**
Command: 288, 0x120
Block Write: 2 words
Parameter: Scale number
Value: None
Block Read: 4 words
Return Status: Selected scale
Return Value: Gross weight

Command 288 returns the gross weight value for the specified scale in floating-point format.

**Read Net Weight**
Command: 289, 0x121
Block Write: 2 words
Parameter: Scale number
Value: None
Block Read: 4 words
Return Status: Selected scale
Return Value: Net weight

Command 289 returns the net weight value for the specified scale in floating-point format.

**Read Tare Weight**
Command: 290, 0x122
Block Write: 2 words
Parameter: Scale number
Value: None
Block Read: 4 words
Return Status: Selected scale
Return Value: Tare weight

Command 290 returns the tare weight value for the specified scale in floating-point format.

**Read Piece Count**
Command: 291, 0x123
Block Write: 2 words
Parameter: Scale number
Value: None
Block Read: 4 words
Return Status: Selected scale
Return Value: Count value

Command 291 returns the piece count value for the specified scale in floating-point format. This command is only valid for the 520, and only if count mode is enabled.

**Read Current Display**
Command: 293, 0x125
Block Write: 2 words
Parameter: Scale number
Value: None
Block Read: 4 words
Return Status: Selected scale
Return Value: Currently displayed weight

Command 293 returns the weight value for the specified scale as currently displayed in floating-point format. This may include gross, net, tare, piece count, or accumulator values, as enabled. On the 920i, the weight value is returned in the mode used to display a scale widget.

**Read Accumulator**
Command: 294, 0x126
Block Write: 2 words
Parameter: Scale number
Value: None
Block Read: 4 words
Return Status: Selected scale
Return Value: Accumulator value

Command 294 returns the accumulator value for the specified scale in floating-point format. This command is only valid if the accumulator for the specified scale is enabled.

**Read Rate of Change**
Command: 295, 0x127
Block Write: 2 words
Parameter: Scale number
Value: None
Block Read: 4 words
Return Status: Selected scale
Return Value: Rate of change value

Command 295 returns the current rate of change value for the specified scale in floating-point format. This command is only valid for the 920i.
Read Peak Value
Command: 296, 0x128
Block Write: 2 words
Parameter: Scale number
Value: None
Block Read: 4 words
Return Status: Selected scale
Return Value: Net peak weight

Command 296 returns the net peak value for the specified scale in floating-point format. This command is only valid for the 520, and only if the peak hold function is enabled.

Read Gross, Tare, Net
Command: 302, 0x12E
Block Write: 2 words
Parameter: Scale number
Value: None
Block Read: 8 words
Return Status: Selected scale
Return Value: Gross, tare, and net weights

Command 302 returns the gross, tare, and net weights on a single command. The structure of the command is as follows:

Word 0: Command number
Word 1: Scale number
Words 2–3: Gross weight
Words 4–5: Tare weight
Words 6–7: Net weight

Read Multiple Weights
Command: 303, 0x12F
Block Write: 4 words
Parameter: Weight type
Value: Bit-map of scales
Block Read: Variable, 4 words minimum
Return Status: Composite
Return Value: Weight for each scale requested

Command 303 returns the weights for up to 30 scales in floating-point format. The weights are returned in the mode specified by the parameter weight type, 0 for gross or 1 for net. Words 2 and 3 contain a bit map of the scales for which a weight should be returned; the least significant bit represents scale 1. Each 2-word value represents the weight for the next scale requested, if valid, beginning with scale 1. If a scale is not valid (scale does not exist), the bit is ignored. Status data returned is a composite of the scales requested, according to the following rules:

- Indicator status: If a bit is set for any of the scales requested, it is set in the composite.
- Scale number: The total number of scales in the composite is returned.

This command is valid only for 820i or 920i.

Set Setpoint Value
Command: 304, 0x130
Block Write: 4 words
Parameter: Setpoint number
Value: Target Value
Block Read: 2 words
Return Status: Batch
Return Value: None

Command 304 sets the target value for the specified setpoint in floating-point format. This command is only valid if the setpoint is enabled and requires a target value.

Set Setpoint Hysteresis
Command: 305, 0x131
Block Write: 4 words
Parameter: Setpoint number
Value: Hysteresis value
Block Read: 2 words
Return Status: Batch
Return Value: None

Command 305 sets the hysteresis value for the specified setpoint in floating-point format. This command is only valid if the setpoint is enabled and requires a hysteresis value.

Set Setpoint Bandwidth
Command: 306, 0x132
Block Write: 4 words
Parameter: Setpoint number
Value: Bandwidth value
Block Read: 2 words
Return Status: Batch
Return Value: None

Command 306 sets the bandwidth value for the specified setpoint in floating-point format. This command is only valid if the setpoint is enabled and requires a bandwidth value.

Set Setpoint Preact
Command: 307, 0x133
Block Write: 4 words
Parameter: Setpoint number
Value: Preact Value
Block Read: 2 words
Return Status: Batch
Return Value: None

Command 307 sets the preact value for the specified setpoint in floating-point format. This command is only valid if the setpoint is enabled and requires a preact value.
Set Single Setpoint, All Values
Command: 319, 0x13F
Block Write: 10 words

Parameter: Setpoint number
Value: Values as required

Block Read: 2 words
Return Status: Batch
Return Value: None

Command 319 sets the target, hysteresis/bandwidth and preact values for the specified setpoint in floating-point format. This command is only valid if the setpoint is enabled and requires a target value.

The structure of the block write command is as follows:
- Word 0: Command number
- Word 1: Setpoint number
- Word 2: Setpoint kind
- Word 3: Reserved/not used
- Words 4–5: Target value
- Words 6–7: Hysteresis or band value
- Words 8–9: Preact value

The value sent in words 6 and 7 is interpreted as hysteresis or band value based on the TRIP setting of the setpoint. If the setpoint requires neither a hysteresis nor a band value, this value is ignored and only the target value is set. The preact value is ignored if preact is not enabled for the setpoint.

Table 4-6 lists the values specified for the setpoint kind in word 2.

<table>
<thead>
<tr>
<th>Value (Hex)</th>
<th>Setpoint Kind</th>
<th>Supported for Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>OFF</td>
<td>√</td>
</tr>
<tr>
<td>0001</td>
<td>GROSS</td>
<td>√</td>
</tr>
<tr>
<td>0002</td>
<td>NET</td>
<td>√</td>
</tr>
<tr>
<td>0003</td>
<td>–GROSS (Negative gross)</td>
<td>√</td>
</tr>
<tr>
<td>0004</td>
<td>–NET (Negative net)</td>
<td>√</td>
</tr>
<tr>
<td>0005</td>
<td>ACCUM (Accumulator)</td>
<td>√</td>
</tr>
<tr>
<td>0006</td>
<td>ROC (Rate of change)</td>
<td>√</td>
</tr>
<tr>
<td>0007</td>
<td>+REL (Positive relative)</td>
<td>√</td>
</tr>
<tr>
<td>0008</td>
<td>–REL (Negative relative)</td>
<td>√</td>
</tr>
<tr>
<td>0009</td>
<td>%REL (Percent relative)</td>
<td>√</td>
</tr>
<tr>
<td>00A</td>
<td>RESREL (Result relative)</td>
<td>√</td>
</tr>
<tr>
<td>00B</td>
<td>PAUSE</td>
<td>√</td>
</tr>
<tr>
<td>00C</td>
<td>DELAY</td>
<td>√</td>
</tr>
<tr>
<td>00D</td>
<td>WAITSS (Wait for standstill)</td>
<td>√</td>
</tr>
<tr>
<td>00E</td>
<td>COUNTER</td>
<td>√</td>
</tr>
</tbody>
</table>

Table 4-6. Table nt Kind Values (Continued)

Read Setpoint Value
Command: 320, 0x140
Block Write: 2 words

Parameter: Setpoint number
Value: None

Block Read: 4 words
Return Status: Batch
Return Value: Target value

Command 320 returns the target value for the specified setpoint in floating-point format. This command is only valid if the setpoint is enabled and requires a target value.

Read Setpoint Hysteresis
Command: 321, 0x141
Block Write: 2 words

Parameter: Setpoint number
Value: None

Block Read: 4 words
Return Status: Batch
Return Value: Hysteresis value

Command 321 returns the hysteresis value for the specified setpoint in floating-point format. This command is only valid if the setpoint is enabled and requires a hysteresis value.
**Read Setpoint Bandwidth**  
Command: 322, 0x142  
Block Write: 2 words  
Parameter: Setpoint number  
Value: None  
Block Read: 4 words  
Return Status: Batch  
Return Value: Bandwidth value

Command 322 returns the bandwidth value for the specified setpoint in floating-point format. This command is only valid if the setpoint is enabled and requires a bandwidth value.

**Read Setpoint Preact**  
Command: 323, 0x143  
Block Write: 2 words  
Parameter: Setpoint number  
Value: None  
Block Read: 4 words  
Return Status: Batch  
Return Value: Preact value

Command 323 returns the preact value for the specified setpoint in floating-point format. This command is only valid if the setpoint is enabled and requires a preact value.

**Read Single Setpoint, All Values**  
Command: 335, 0x14F  
Block Write: 2 words  
Parameter: Setpoint number  
Value: None  
Block Read: 10 words  
Return Status: Batch  
Return Value: Values as available

Command 335 returns the target, hysteresis/bandwidth and preact values for the specified setpoint in floating-point format. This command is only valid if the setpoint is enabled and requires a target value.

The structure of the block read command is as follows:

- **Word 0:** Command number  
- **Word 1:** Setpoint number  
- **Word 2:** Setpoint kind  
- **Word 3:** Reserved/not used  
- **Words 4–5:** Target value  
- **Words 6–7:** Hysteresis or band value  
- **Words 8–9:** Preact value

The value returned in words 6 and 7 is either the hysteresis or band value, based on the TRIP setting of the setpoint. If the setpoint requires neither a hysteresis nor a band value, this value is set to 0. The preact value returned is set to 0 if preact is not enabled for the setpoint.

See Table 4-6 for a list of the setpoint kind values returned in word 2.

**Set Multiple Setpoint Values**  
Command: 336, 0x150  
Block Write: Variable, 4 words minimum  
Parameter: Setpoint range  
Value: Values as required  
Block Read: 2 words  
Return Status: Batch  
Return Value: None

Command 336 sets the target values for the specified range of setpoints in floating-point format. The first value sent is the target value for the setpoint number specified in the low byte of the parameter. The last value sent is the target value for the setpoint number specified in the high byte of the parameter. If a target value is not required for any setpoint, the value should be set to 0.0, but is actually ignored by the indicator. Up to 30 setpoints can be set at one time. The return status includes the setpoint number of the last setpoint set.

**Read Multiple Setpoint Values**  
Command: 337, 0x151  
Block Write: 2 words  
Parameter: Setpoint range  
Value: None  
Block Read: Variable, 4 words minimum  
Return Status: Batch  
Return Value: Values as available

Command 337 returns the target values for the specified range of setpoints in floating-point format. The first value returned is the target value for the setpoint number specified in the low byte of the parameter. The last value returned is the target value for the setpoint number specified in the high byte of the parameter. If a target value is not required for any setpoint, the value returned is 0.0. Up to 30 setpoints can be requested at one time. The return status includes the setpoint number of the last setpoint read.
5.0 Operation

The examples on the following pages provide PLC programming examples for using the Remote I/O Interface.

5.1 Test Program for Verifying Remote I/O Interface Operation

The programming example shown on the next page writes a series of discrete commands to the Remote I/O Interface and checks the status bits returned in the input image table to confirm completion of each command. This example assumes the Remote I/O scanner to be in slot #2, with the Remote I/O Interface at rack address 0, quarter 0.

NOTES:
- This program can be edited and used to test communications between the PLC and the Remote I/O Interface.
- The COMMAND WORD must be zeroed after checking the status bits to confirm that the command has been executed.
5.2 PLC Program for Converting 20-bit Values to Floating Integers

The following programming example converts a 20-bit value in the input image table to a floating integer value stored at location F8:5.
5.3 Using Block Transfer to Set and Read Setpoint Values

The following program example uses block transfer commands to write setpoint values to the 520, 820i, or 920i indicator (block write/block read command 335), then read the values for the setpoint (block write/block read command 319). See Section 4.0 for more information about the Set and Read Setpoint Value block transfer commands.
Floating point values used for the Set Setpoint Values parameters must be copied into separate words before issuing the command. Values returned on the Read Setpoint Values block read command must be converted back to floating point values. The following example shows these conversions for all four parameters on the Set and Read Setpoint Values commands.
6.0  Remote I/O Interface Card Specifications

Power Requirements

Option Card, DC Power:
  Supply voltage: 6 VDC, supplied by indicator bus
  Typical current draw: 137 mA
  Power consumption: 126 mW

Indicators, Typical AC Load:

<table>
<thead>
<tr>
<th>Card</th>
<th>Power (TRMS)</th>
<th>Current (TRMS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>520</td>
<td>2.0 W</td>
<td>65 mA</td>
</tr>
<tr>
<td>720i</td>
<td>1.1W</td>
<td>15 mA</td>
</tr>
<tr>
<td>820i</td>
<td>1.1W</td>
<td>15 mA</td>
</tr>
<tr>
<td>920i</td>
<td>1.1 W</td>
<td>15 mA</td>
</tr>
</tbody>
</table>

Communications Specifications

Allen-Bradley Remote I/O Network Communications:
  Twinaxial cable attachment to networks at 57.6, 115.2, or 230.4 Kbps
  Update rate is dependent on the configured baud rate and the number of network nodes. Maximum update rates are:
  520: up to 120 updates/sec
  720i: up to 960 updates/sec
  820i: up to 960 updates/sec
  920i: up to 960 updates/sec

Environmental Specifications

Temperature: $-10^\circ \text{C} \text{ to } +40^\circ \text{C}$ ($14^\circ \text{F} \text{ to } 104^\circ \text{F}$)
Remote I/O Interface Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for one year.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, “Protecting Your Components From Static Damage in Shipment,” available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

These warranties exclude all other warranties, expressed or implied, including without limitation warranties of merchantability or fitness for a particular purpose. Neither RLWS nor distributor will, in any event, be liable for incidental or consequential damages.

RLWS and Buyer agree that RLWS’ sole and exclusive liability hereunder is limited to repair or replacement of such goods. In accepting this warranty, the Buyer waives any and all other claims to warranty.

Should the seller be other than RLWS, the Buyer agrees to look only to the Seller for warranty claims.

No terms, conditions, understanding, or agreements purporting to modify the terms of this warranty shall have any legal effect unless made in writing and signed by a corporate officer of RLWS and the Buyer.
