ACCESSORIES

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## ACCESSORIES PART NUMBERING

With the exception of EMI filters, RF filters, and LR series line reactors, each accessory part number begins with GS, followed by the AC Drive rating, and then the relevant accessory code. Following the accessory code, you will find a description code when applicable. The diagram below shows the accessory part numbering system.

### GS - 22P0 - LR - 3PH

- **Description Code** (optional)
  - 1PH: Single phase
  - 3PH: Three phase
  - ENC: Enclosure
  - Blank: For reactor, blank = 3-phase

- **Accessory Code**
  - BR: Braking resistor
  - BZL: Bezel
  - CBL: Cable
  - DBU: Dynamic Brake Unit
  - EDRV: Ethernet board
  - FB: Feedback board
  - FKIT: Fuse Kit
  - FUSE: Replacement fuses for FKIT
  - KPD: Keypad
  - LR: Line reactor (legacy)
  - RS: Recommended Standard

- **Horsepower Rating**
  - Example: 2P0 = 2.0 hp
  - 7P5 = 7.5 hp
  - 010 = 10 hp

- **Voltage Rating**
  - 1: 115V
  - 2: 230V
  - 4: 460V
  - 5: 575V

### Series
- GS: All GS and DURApulse Series Drives
- GS1: GS1 Series
- GS2: GS2 Series
- GS3: DURApulse Series
- LR: Newer line reactor series

## LINE REACTORS

Input line reactors protect the AC drive from transient overvoltage conditions typically caused by utility capacitor switching. Input line reactors also reduce the harmonics associated with AC drives, and are recommended for all installations.

Output line (load) reactors protect the motor insulation against AC drive short circuits and IGBT reflective wave damage, and also allow the motor to run cooler by “smoothing” the motor current waveform. They are recommended for operating “non-inverter-duty” motors, and for any motors when the length of wiring between the AC drive and motor exceeds 75 feet.

There are two types of AutomationDirect line reactors that can be used with GS1 AC Drives; the original GS series reactors (legacy) and the newer LR series reactors.

LR series reactors have universal mounting feet with multiple mounting slots, and they can replace most reactors using the existing mounting holes. Use four bolts to mount the reactors to the mounting panel.
# Line Reactor Specifications – LR Series

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Rated Amps</th>
<th>Impedance</th>
<th>Inductance</th>
<th>Watt Loss</th>
<th>System Voltage</th>
<th>Phase – Use</th>
<th>GS1 Drive Model</th>
<th>Drive HP</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR-10P2-1PH **</td>
<td>5.8</td>
<td>1.58 mH</td>
<td>8.0</td>
<td>120</td>
<td></td>
<td>1 – In</td>
<td>GS1-10P2</td>
<td>0.25</td>
</tr>
<tr>
<td>LR-10P5-1PH **</td>
<td>9.8</td>
<td>0.93 mH</td>
<td>11.7</td>
<td></td>
<td></td>
<td>1 – In</td>
<td>GS1-10P5</td>
<td>0.5</td>
</tr>
<tr>
<td>LR-20P5-1PH **</td>
<td>4.9</td>
<td>3.74 mH</td>
<td>11.2</td>
<td>240</td>
<td></td>
<td>3 – Out</td>
<td>GS1-20P2</td>
<td>0.25</td>
</tr>
<tr>
<td>LR-20P5</td>
<td>2.4</td>
<td>4.2 mH</td>
<td>7</td>
<td>208/240</td>
<td></td>
<td>3 – I/O</td>
<td>GS1-10P5</td>
<td>0.5</td>
</tr>
<tr>
<td>LR-21P0-1PH **</td>
<td>8</td>
<td>2.29 mH</td>
<td>15.9</td>
<td>240</td>
<td>1 – In</td>
<td>GS1-21P0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>LR-21P0</td>
<td>4.6</td>
<td>2.46 mH</td>
<td>11</td>
<td>208/240</td>
<td>3 – I/O</td>
<td>GS1-20P2</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>LR-22P0-1PH **</td>
<td>12</td>
<td>1.53 mH</td>
<td>24.3</td>
<td>240</td>
<td>1 – In</td>
<td>GS1-22P0</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

* Use (side of drive): In = input only; Out = output only; I/O = input or output.
** Single phase line reactors should NOT be installed on the output side of the AC drive.

<table>
<thead>
<tr>
<th>Part Number (repeated)</th>
<th>Wire Range</th>
<th>Terminal Torque</th>
<th>Fasteners</th>
<th>Temperature Range</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR-10P2-1PH</td>
<td>#12–#18 AWG</td>
<td>10 lb-in</td>
<td>#6-32x5/16in flathead screw</td>
<td>-40 – 110 °F [-40 – 40 °C]</td>
<td>NEMA: open IP00 no corrosive gases</td>
</tr>
<tr>
<td>LR-10P5-1PH</td>
<td>#12–#18 AWG</td>
<td>10 lb-in</td>
<td>#6-32x5/16in flathead screw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR-20P5</td>
<td>#12–#18 AWG</td>
<td>10 lb-in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR-21P0-1PH</td>
<td>#12–#18 AWG</td>
<td>10 lb-in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR-21P0</td>
<td>#12–#18 AWG</td>
<td>10 lb-in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR-22P0-1PH</td>
<td>#12–#18 AWG</td>
<td>20 lb-in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR-22P0</td>
<td>#12–#18 AWG</td>
<td>10 lb-in</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

# Line Reactor Specifications – Legacy GS Series (do not use for new installations)

## 115V Single Phase Input Line Reactors *

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Rated Amps</th>
<th>Impedance</th>
<th>Inductance</th>
<th>Watt Loss</th>
<th>GS1 Drive Model and Side / Phase / Volts</th>
<th>Drive hp</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS-10P2-LR</td>
<td>18</td>
<td>3%</td>
<td>0.80 mH</td>
<td>19</td>
<td>GS1-10P2 (input) / 1ph / 115V</td>
<td>0.25</td>
</tr>
<tr>
<td>GS-10P5-LR</td>
<td>25</td>
<td>3%</td>
<td>0.50 mH</td>
<td>23</td>
<td>GS1-10P5 (input) / 1ph / 115V</td>
<td>0.5</td>
</tr>
</tbody>
</table>

*NOTE: Single phase line reactors should NOT be installed on the output side of the AC drive.

## 230V Single Phase Input Line Reactors *

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Rated Amps</th>
<th>Impedance</th>
<th>Inductance</th>
<th>Watt Loss</th>
<th>GS1 Drive Model and Side / Phase / Volts</th>
<th>Drive hp</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS-20P5-LR-1PH</td>
<td>8</td>
<td>3%</td>
<td>6.50 mH</td>
<td>13</td>
<td>GS1-20P5 (input) / 1ph / 230V</td>
<td>0.5</td>
</tr>
<tr>
<td>GS-21P0-LR-1PH</td>
<td>12</td>
<td>3%</td>
<td>6.50 mH</td>
<td>13</td>
<td>GS1-21P0 (input) / 1ph / 230V</td>
<td>1</td>
</tr>
</tbody>
</table>

*NOTE: Single phase line reactors should NOT be installed on the output side of the AC drive.

## 230V Three Phase Input / Output Line Reactors

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Rated Amps</th>
<th>Impedance</th>
<th>Inductance</th>
<th>Watt Loss</th>
<th>GS1 Drive Model and Side / Phase / Volts</th>
<th>Drive hp</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS-20P5-LR-3PH</td>
<td>4</td>
<td>3%</td>
<td>6.50 mH</td>
<td>13</td>
<td>GS1-20P5 (output) / 3ph / 230V GS1-20P5 (in/out) / 3ph / 230V</td>
<td>0.5</td>
</tr>
<tr>
<td>GS-21P0-LR-3PH</td>
<td>4</td>
<td>3%</td>
<td>3.00 mH</td>
<td>7</td>
<td>GS1-21P0 (in/out) / 3ph / 230V</td>
<td>1</td>
</tr>
<tr>
<td>GS-22P0-LR-3PH</td>
<td>8</td>
<td>3%</td>
<td>1.50 mH</td>
<td>11</td>
<td>GS1-22P0 (in/out) / 3ph / 230V</td>
<td>2</td>
</tr>
</tbody>
</table>
### Line Reactor Dimensions – LR Series

**LR-10P2-1PH, LR-10P5-1PH, LR-20P5-1PH, LR-21P0-1PH**

*(Units = inches [mm]*)

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.

![LR Reactor Dimensions Diagram]

<table>
<thead>
<tr>
<th>Measurement</th>
<th>[mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.18</td>
<td>106.2</td>
</tr>
<tr>
<td>3.75</td>
<td>95.3</td>
</tr>
<tr>
<td>3.75</td>
<td>95.3</td>
</tr>
<tr>
<td>4.00</td>
<td>101.6</td>
</tr>
<tr>
<td>3.05</td>
<td>77.5</td>
</tr>
<tr>
<td>2.00</td>
<td>50.8</td>
</tr>
<tr>
<td>1.44</td>
<td>36.6</td>
</tr>
<tr>
<td>2.00</td>
<td>50.8</td>
</tr>
<tr>
<td>1.44</td>
<td>36.6</td>
</tr>
<tr>
<td>1.64</td>
<td>41.7</td>
</tr>
<tr>
<td>0.88</td>
<td>22.4</td>
</tr>
<tr>
<td>0.31</td>
<td>7.9</td>
</tr>
<tr>
<td>4X Ø0.25</td>
<td>Ø6.4</td>
</tr>
</tbody>
</table>
**LINE REACTOR DIMENSIONS – LR SERIES (CONTINUED)**

**LR-22P0-1PH**

*(UNITS = INCHES [MM]*)

Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.
LINE REACTOR DIMENSIONS – LR SERIES (CONTINUED)

**LR-20P5, LR-21P0, LR-22P0**  
*(UNITS = INCHES [MM])*  
Mounting feet with multiple mounting slots allow replacement of most other reactors using existing mounting holes. Use four bolts to mount the LR reactors.
**Line Reactor Dimensions – Legacy GS Series (not for new installations)**

AC Line Reactor Dimensions

<table>
<thead>
<tr>
<th>Part Number</th>
<th>H</th>
<th>W</th>
<th>D</th>
<th>Mtg. D</th>
<th>Mtg. W</th>
<th>Mtg Slot Hole Size</th>
<th>Weight (lb/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS-10P2-LR</td>
<td>4.80 [121.9]</td>
<td>6.00 [152.4]</td>
<td>3.30 [83.8]</td>
<td>2.09 [53.1]</td>
<td>2.00 [50.8]</td>
<td>0.28 x 0.63 [7.1 x 16.0]</td>
<td>7 [3.2]</td>
</tr>
<tr>
<td>GS-10P5-LR</td>
<td>5.70 [144.8]</td>
<td>6.00 [152.4]</td>
<td>3.09 [78.5]</td>
<td>3.00 [76.2]</td>
<td>3.00 [76.2]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS-20P5-LR-1PH</td>
<td>3.40 [86.4]</td>
<td>4.40 [111.8]</td>
<td>2.83 [71.9]</td>
<td>1.77 [45.0]</td>
<td>1.44 [36.6]</td>
<td></td>
<td>2.80 [1.3]</td>
</tr>
<tr>
<td>GS-21P0-LR-1PH</td>
<td>2.00 [50.8]</td>
<td>2.00 [50.8]</td>
<td>2.00 [50.8]</td>
<td>2.80 [1.3]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS-21P0-LR-3PH</td>
<td>2.00 [50.8]</td>
<td>2.00 [50.8]</td>
<td>2.00 [50.8]</td>
<td>2.80 [1.3]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS-22P0-LR-3PH</td>
<td>2.00 [50.8]</td>
<td>2.00 [50.8]</td>
<td>2.00 [50.8]</td>
<td>2.80 [1.3]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**LINE Reactor APPLICATIONS and CONNECTIONS**

**INPUT Side of AC Drive**

When installed on the input side of the AC Drive, line reactors will reduce line notching, and limit current and voltage spikes and surges from the incoming line. The line reactors will also reduce harmonic distortion from the AC Drive onto the line. Units are installed in front of the AC Drive as shown.

**OUTPUT Side of AC Drive**

When installed on the output side of the AC Drive, line (load) reactors protect the drive from short circuits at the load. Voltage and current waveforms from the drive are enhanced, reducing motor overheating and noise emissions.

---

- Single-phase line reactors should NOT be installed on the output of the AC Drive. Use only three-phase reactors on drive outputs, and only for three-phase motors.

- If installing a line reactor on the output side of the drive, especially with motor lead lengths in excess of 75 feet, lower the drive PWM output carrier frequency to 4kHz in order to protect the line reactor from excess heating and possible damage.
**Line Reactor Applications and Connections (continued)**

**Multiple AC Drives**

Individual line reactors are recommended when installing multiple AC Drives on the same power line. Individual line reactors eliminate cross-talk between multiple drives, and provide isolated protection for each drive for its own specific load.

![Diagram of multiple AC Drives with line reactors]

**Multiple Motors**

A single output (load) reactor can be used for multiple motors on the same AC Drive, but only if the motors operate simultaneously. Size the reactor based upon the total horsepower of all the motors, and select a reactor with a current rating greater than the sum of the motor full-load currents. Overload relays are recommended for use in multi-motor applications.

![Diagram of multiple motors with a single output reactor]

A single reactor should be used with multiple motors ONLY when the motors will operate simultaneously from a single AC drive. OVERLOAD RELAYS are recommended for use in multiple motor applications.
LINE REACTOR APPLICATIONS AND CONNECTIONS (CONTINUED)

SINGLE-PHASE APPLICATIONS

Some of the line reactors are listed for use with single-phase input power. Follow the connection diagram shown below. Make sure that terminals B1 and B2, if present, are properly insulated before any connections are made.

![Connection Diagram]

*GS series 1-phase reactors include a B-phase winding.
*LR series 1-phase reactors do not include a B-phase winding.

**Warning:** Ensure that you properly insulate terminals B1 and B2 before making any connections to single-phase power.
RF Filter

RF Filter Part #: RF220X00A
RF Filters are used to reduce the radio frequency interference or noise on the input or output side of the drive. RF Filter RF220X00A can be used with all GS model drives.

RF Filter Dimensions

Units: inches [mm]

RF Filter Wiring
Wind each wire four times around the core. The RF filter should be located as close as possible to the output side of the drive.
Fuses and Fuse Kits

Short-circuit and ground fault protection devices are essential to prevent costly damage to your AC Drive application equipment. Fuse kits are available from AutomationDirect for 115V and 230V GS1 AC Drives.

**Warning:** The fuse kits provide protection only for the semiconductor components inside the AC drive. Motor branch circuit overcurrent protection should be separately provided per applicable local codes.

The following fuse kits consist of one fuse block and fuses sized to match each GS1 Series AC Drive. Replacement fuses are also available, and their part numbers are listed in the table below.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Drive Model / Phase</th>
<th>Fuse Block</th>
<th>Wire Size</th>
<th>Wire Connector Torque</th>
<th>Fuse Rating</th>
<th>Replacement Fuses</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS-10P2-FKIT-1P*</td>
<td>GS1-10P2 / 1</td>
<td>2 pole</td>
<td>Al/Cu</td>
<td>#2-14</td>
<td>20 lb-in</td>
<td>A3T</td>
</tr>
<tr>
<td>GS-10P5-FKIT-1P*</td>
<td>GS1-10P5 / 1</td>
<td>2 pole</td>
<td>2 pole</td>
<td>300V@20A</td>
<td>200 kA</td>
<td>GS-10P5-FUSE-1P</td>
</tr>
<tr>
<td>GS-20P2-FKIT-3P</td>
<td>GS1-20P2 / 3</td>
<td>3 pole</td>
<td>1 pole</td>
<td>300V@15A</td>
<td>200 kA</td>
<td>GS-20P2-FUSE-3P</td>
</tr>
<tr>
<td>GS-20P5-FKIT-1P</td>
<td>GS1-20P5 / 1</td>
<td>2 pole</td>
<td>3 pole</td>
<td>300V@20A</td>
<td>200 kA</td>
<td>GS-20P5-FUSE-1P</td>
</tr>
<tr>
<td>GS-21P0-FKIT-1P</td>
<td>GS1-21P0 / 1</td>
<td>2 pole</td>
<td>3 pole</td>
<td>300V@20A</td>
<td>200 kA</td>
<td>GS-21P0-FUSE-1P</td>
</tr>
<tr>
<td>GS-21P0-FKIT-3P</td>
<td>GS1-21P0 / 3</td>
<td>3 pole</td>
<td>1 pole</td>
<td>300V@20A</td>
<td>200 kA</td>
<td>GS-21P0-FUSE-3P</td>
</tr>
<tr>
<td>GS-22P0-FKIT-3P</td>
<td>GS1-22P0 / 3</td>
<td>3 pole</td>
<td>3 pole</td>
<td>300V@20A</td>
<td>200 kA</td>
<td>GS-22P0-FUSE-3P</td>
</tr>
</tbody>
</table>

**Short Circuit Current Rating (SCCR) = 200 kA**

* Single-phase fuse kits contain a 2-pole fuseblock. Per NEC 240.22, fusing is correct only for the hot leg of a source; not for an intentionally grounded source conductor. The hot leg of a grounded 115VAC supply is the only supply line that should be fused.

**Fuse Block Dimensions**

**Fuse Block Single-Phase 115VAC Wiring**

**Warning:** The single-phase fuse kits contain a 2-pole fuse block. Per NEC 240.22, fusing is correct only for the hot leg of a source; not for an intentionally grounded source conductor. The hot leg of a grounded 115VAC supply is the only supply line that should be fused.
ETHERNET INTERFACE

<table>
<thead>
<tr>
<th>GS-EDRV(xxx) Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
</tr>
<tr>
<td>GS-EDRV</td>
</tr>
<tr>
<td>GS-EDRV100</td>
</tr>
</tbody>
</table>

Can be used with all GS and DURAPULSE AC drives.

GS-EDRV(xxx) Ethernet Interfaces provide low-cost, high-performance Ethernet links between control systems and any GS/DURAPULSE series AC Drives. With the appropriate cable connections and, if needed, Ethernet switches or hubs, the GS-EDRV(xxx) allows you to communicate with your AC drives over qualified Ethernet networks.

The control systems can be any of the following:

- DL205 CPU, DL405 CPU, or a WinPLC, with the appropriate Ethernet Remote Master module (H2-ERM or H4-ERM).
- A Productivity3000 CPU using the onboard Ethernet port.
- A PC running Entivity’s ThinknDo software, a PC using a custom device driver that was developed using our Ethernet SDK, or a PC running KEPDirect EBC or OPC Server.
- Any independent I/O controller with a Modbus TCP/IP driver.

The control function is performed by one of the control systems mentioned above. The I/O mapping function is performed by an H2(4)-ERM module (purchased separately). The H2(4)-ERM module is configured with the ERM Workbench Utility which is part of the DirectSOFT PLC programming software.

The functions of the GS-EDRV(xxx) interface are as follows:

- process input signals from the AC drive
- format these signals to conform to the Ethernet standard
- transmit converted signals to the control system
- receive and translate output signals from the control system
- distribute the output signals to the appropriate drive
- DIN-rail mounting
- built-in web browser allows users to configure and control the drive from any web browser via the IP address of the GS-EDRV(xxx).

The GS-EDRV(xxx) requires an external 24 VDC power supply.

The GS series drives have a provision for shutting down control or power to the drive in the event of a communications time-out. This function can be set up through the drive parameter group 9.

Refer to the “GS Series AC Drive Ethernet Interface User Manual” or www.AutomationDirect.com for detailed information.
ZIPLink™ Cables for RS-485 Modbus RTU

ZIPLink communication cables make it very easy to set up RS-485 Modbus RTU control of a single GS1 AC drive from a DirectLOGIC DL06 or D2-260 PLC.

In addition to these GS-specific cables, the ZIPLink product line also includes other components which can be useful for Modbus wiring. Refer to Ch5 “GS1 Modbus Communications” for more information.
GS Drive Configuration Software

Software Functions

GSoft is the optional configuration software for the AutomationDirect GS family of drives. It allows you to connect a personal computer to GS1 drives via RS-485, and perform a variety of functions:

- Upload/download drive configurations
- Create new drive configurations using Quick Start, Detailed, or Schematic Views
- Edit drive configurations
- Archive/store multiple drive configurations on your PC
- Trend drive operation parameters
- Tune the drive PID loop (PID not applicable for GS1 drives)
- View real time key operating parameters
- Start/Stop drive and switch directions, provided drive is set up for remote operation
- View drive faults
- Print a schematic representation of the drive configuration
- Print a tabular report of the current drive configuration

GSoft includes an integral help file with software instructions.

System Requirements

GSoft will run on PCs that meet the following requirements:

- Windows 95, 98, Me, NT, 2000, XP, Vista (32-bit), and 7 (32-bit)
- Internet Explorer 4.0 or higher (for HTML help support)
- 24 MB of available memory
- 8MB hard drive space
- Available RS-232 serial port

Configuration Cable

USB-485M serial adapter cable (sold separately)