7SR5* – Feeder and Transformer Protection Relays

SIEMENS
Ingenuity for life

Unrestricted © Siemens AG 2019
Page 2  12-13 SEP 2019
Alexander Erokhin / Siemens plc
7SR5* – Designed for Your Applications
7SR5* – Withdrawable Design

Full relay element can be withdrawn from the case, including communications
7SR5* – Common Features and Functions

- Case dimensions: 4U high, Size 6 or Size 12
- Combined 1A and 5A CT inputs with accuracy to provide SEF.
- Backlit 128 x 128 pixels LCD with text and graphical display capabilities, suitable for single line mimic diagrams
- 5 x menu navigation buttons and 2 Function Keys
- 27 x programmable tri-colour LEDs and 1 Protection Healthy LED
- USB front port and rear RS485 port
- 2 electrical (or 2 optical) Ethernet ports as standard
- IEC 60870-5-103, MODBUS-RTU, DNP 3.0
- IEC 61850 Edition 1 and 2 with HSR, PRP and RSTP operation
- Serial communications & IEC 61850 Ethernet operate simultaneously
- Threshold for Binary Inputs is configurable in the relay software
- IP rating: 54
### 7SR511 Feeder Protection Variants

#### Standard variants

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>7SR5110-1</td>
<td>Housing width 3/8 x 19(^\circ) (size 6), height 4U</td>
<td>8 binary inputs, 6 binary outputs (1 break, 2 c/o, 3 make)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 CT’s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication – USB, RS485, 2 x ethernet</td>
</tr>
<tr>
<td>7SR5110-2</td>
<td>Housing width 3/8 x 19(^\circ) (size 6), height 4U</td>
<td>13 binary inputs, 8 binary outputs (1 break, 2 c/o, 5 make)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 CT’s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication – USB, RS485, 2 x ethernet</td>
</tr>
<tr>
<td>7SR5110-7</td>
<td>Housing width 3/4 x 19(^\circ) (size 12), height 4U</td>
<td>38 binary inputs, 18 binary outputs (1 break, 2 c/o, 15 make)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 CT’s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication – USB, RS485, 2 x ethernet</td>
</tr>
<tr>
<td>7SR5111-1</td>
<td>Housing width 3/8 x 19(^\circ) (size 6), height 4U</td>
<td>9 binary inputs, 8 binary outputs (1 break, 2 c/o, 5 make)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 CT’s, 4 VT’s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication – USB, RS485, 2 x ethernet</td>
</tr>
<tr>
<td>7SR5111-2</td>
<td>Housing width 3/4 x 19(^\circ) (size 12), height 4U</td>
<td>14 binary inputs, 10 binary outputs (1 break, 2 c/o, 7 make)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 CT’s, 4 VT’s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication – USB, RS485, 2 x ethernet</td>
</tr>
<tr>
<td>7SR5111-7</td>
<td>Housing width 3/4 x 19(^\circ) (size 12), height 4U</td>
<td>39 binary inputs, 20 binary outputs (1 break, 2 c/o, 17 make)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 CT’s, 4 VT’s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication – USB, RS485, 2 x ethernet</td>
</tr>
</tbody>
</table>
Protection Functions - 7SR5110 Feeder Protection Non-Directional

Protection:

- **37/37G**: Undercurrent protection
- **46**: Negative sequence overcurrent protection
- **46BC**: Broken conductor detection
- **49**: Thermal overload protection
- **50/50N/50G**: Instantaneous overcurrent
- **50AFD**: Arc Flash Detection
- **50GS**: Instantaneous SEF - measured
- **50SOTF**: Switch onto fault
- **51/51N/51G**: Time delayed overcurrent
- **51CL**: Cold load overcurrent – phase
- **51GS**: Time delayed SEF – measured
- **87GH**: High-impedance REF protection

Supervision:

- **50BF**: CB failure protection
- **60CTS**: CT supervision
- **74CC**: Close-circuit supervision
- **74TC**: Trip – circuit supervision
- **81HB2**: Inrush current detection

Control & Plant:

- **52**: Circuit Breaker control
- **52**: CB Counters Trip & Delta Trip
- **52**: I2t Counter
- **79**: Automatic reclosing
- **86**: Lockout
Protection Functions - 7SR5111 Feeder Protection Directional

Additional Functionality:

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
<th>Code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>67</td>
<td>Directional overcurrent</td>
<td>59N</td>
<td>Neutral voltage displacement</td>
</tr>
<tr>
<td>67G/67N</td>
<td>Directional earth fault</td>
<td>60VTS</td>
<td>VT supervision</td>
</tr>
<tr>
<td>27/59</td>
<td>Under/Over Voltage</td>
<td>21FL</td>
<td>Fault locator</td>
</tr>
<tr>
<td>32</td>
<td>Directional Power</td>
<td>21LB</td>
<td>Load blinder</td>
</tr>
<tr>
<td>55</td>
<td>Power Factor</td>
<td>81U/O</td>
<td>Frequency protection</td>
</tr>
<tr>
<td>51V</td>
<td>Voltage dependent OC</td>
<td>78VS</td>
<td>Voltage vector shift</td>
</tr>
<tr>
<td>47</td>
<td>Sequence OV protection</td>
<td>81R</td>
<td>ROCOF</td>
</tr>
</tbody>
</table>
## 7SR54 Transformer Protection Variants

<table>
<thead>
<tr>
<th>Variant</th>
<th>Housing Width/Size</th>
<th>Binary Inputs</th>
<th>Binary Outputs</th>
<th>CTs</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>7SR5420-2A</td>
<td>3/4 x 19&quot; (size 12), 4U</td>
<td>16</td>
<td>8 (1 break, 2 c/o, 5 make)</td>
<td>8</td>
<td>USB, RS485, 2 x ethernet</td>
</tr>
<tr>
<td>7SR5421-1A</td>
<td>3/4 x 19&quot; (size 12), 4U</td>
<td>12</td>
<td>8 (1 break, 2 c/o, 5 make)</td>
<td>8</td>
<td>USB, RS485, 2 x ethernet</td>
</tr>
<tr>
<td>7SR5421-6A</td>
<td>3/4 x 19&quot; (size 12), 4U</td>
<td>37</td>
<td>18 (1 break, 2 c/o, 15 make)</td>
<td>8</td>
<td>USB, RS485, 2 x ethernet</td>
</tr>
<tr>
<td>7SR5430-3A</td>
<td>3/4 x 19&quot; (size 12), 4U</td>
<td>24</td>
<td>10 (1 break, 2 c/o, 7 make)</td>
<td>12</td>
<td>USB, RS485, 2 x ethernet</td>
</tr>
<tr>
<td>7SR5431-5A</td>
<td>3/4 x 19&quot; (size 12), 4U</td>
<td>35</td>
<td>16 (1 break, 2 c/o, 13 make)</td>
<td>12</td>
<td>USB, RS485, 2 x ethernet</td>
</tr>
</tbody>
</table>
Protection Functions - 7SR542 Transformer Protection
Two Winding

**Protection:**
- 24 Overexcitation protection
- 27 Undervoltage protection – 3 phase
- 27Vx Undervoltage protection – Vx
- 37 Undercurrent protection – phase
- 37G Undercurrent earth fault – measured
- 46 Negative sequence overcurrent protection
- 46BC Broken conductor detection
- 47 Sequence overvoltage protection
- 49 Thermal overload protection
- 87T-BD Transformer differential protection – biased
- 50 Instantaneous overcurrent – phase
- 87T-HS Transformer differential protection – highest
- 50G Instantaneous earth fault – measured
- 50N Instantaneous earth fault – calculated
- 51 Time delayed overcurrent – phase
- 51CL Time delayed cold load
- 51G Time delayed earth fault – measured
- 51N Time delayed earth fault – calculated
- 52 Circuit-breaker control
- 59 Overvoltage protection – 3 phase
- 59N Neutral voltage displacement
- 59Vx Overvoltage protection – Vx
- 81 Frequency protection – "f>" or "f<"
- 87GH Restricted earth fault protection
- 87T-BD HB5 Overfluxing detection

**Supervision:**
- 50BF Circuit-breaker failure protection – 3 pole
- 60CTS CT supervision
- 60VTS VT Supervision
- 74CC Close-circuit supervision
- 74TC Trip –circuit supervision
- 81HB2 Inrush current detection

**Control & Plant:**
- 52 Circuit Breaker control
- 52 CB Counters Trip & Delta Trip
- 52 I2I Counter
- 86 Lockout
Protection Functions - 7SR543 Transformer Protection
Three Winding

Protection:
24 Overexcitation protection
27 Undervoltage protection – 3 phase
27Vx Undervoltage protection – Vx
37 Undercurrent protection – phase
37G Undercurrent earth fault – measured
46 Negative sequence overcurrent protection
46BC Broken conductor detection
47 Sequence overvoltage protection
49 Thermal overload protection
87T-BD Transformer differential protection – biased
50 Instantaneous overcurrent – phase
87T-HS Transformer differential protection – highest
50G Instantaneous earth fault – measured
50N Instantaneous earth fault – calculated
51 Time delayed overcurrent – phase
51CL Time delayed cold load
51G Time delayed earth fault – measured
51N Time delayed earth fault – calculated
52 Circuit-breaker control
59 Overvoltage protection – 3 phase
59N Neutral voltage displacement
59Vx Overvoltage protection – Vx
81 Frequency protection – “f>” or “f<”
87GH Restricted earth fault protection –
87T-BD HB5 Overfluxing detection

Supervision:
50BF Circuit-breaker failure protection – 3 pole
60CTS CT supervision
60VTS VT Supervision
74CC Close-circuit supervision
74TC Trip –circuit supervision
81HB2 Inrush current detection

Control & Plant:
52 Circuit Breaker control
52 CB Counters Trip & Delta Trip
52 I2t Counter
86 Lockout

Unrestricted © Siemens AG 2019
Software – Reydisp Manager 2.0

Reydisp Manager 2 (RM2) is a PC based engineering tool that allows the user to:

- apply and interrogate settings
- create logic
- retrieve event, fault and waveform records
- undertake project management of multiple devices in same session

Curve Editor - to create Current & Voltage curves

For system configuration engineering of IEC61850 projects, the DIGSI 5 system configurator must also be installed.

Available to download (free of charge)
Reydisp Manager 2.0 – Data Storage

Fault Data Records

• 100 fault records with time/date of trip, measured quantities and type of fault

Event Records

• Up to 5000 events are stored and time stamped to 1ms resolution.

Waveform Records

• Up to 20 waveform records of 1, 2, 5 or 10 second durations
• Waveform sampling rate - 32 samples per cycle
• Waveforms contain all digital and analogue signals – to ensure comprehensive fault analysis
Reydisp Manager 2.0 – Mimic Creator

Mimic Control

The CB is controllable via the mimic interface

The Disconnectors and Earth Switches are also controllable

Mimic Display

The following can be displayed:

- CB position
- Basic ‘busbar/line’ connection
- Selected instruments
- Disconnector position
- Earth Switch position
- User-configurable primary connection between these plant items
- Up to 5 Mimic diagrams can be stored in the relay
7SR5* - Cyber Security

**Secured Communication**
- Secured channel between Reyrolle 5 and Reydisp Manager
- Mutual authentication

**Operational Security**
- Signed software/firmware
- ProductCERT – Vulnerability handling

**Role Based Access Control**
- Connection password authentication
- Local fascia access with User ID

**Configuration Change Management**
- Separation of Protection and Ethernet Communication firmware
- Patch management

**Future Readiness**
- Security monitoring & advanced logging
Contact Information

Alexander Erokhin
Regional Sales Manager
Siemens Protection Devices / Great Britain

North Farm Road
NE31 1LX Hebburn

Tel.: +44 191 401 5276
Fax.: +44 191 401 5575
Mobil: +44 780 882 2948

E-Mail:
alexander.erokhin@siemens.com

siemens.at/var