



**KIKUSUI**

Part No. IB033874  
Dec 2019

# Communication Interface Manual

---

TOS93 Series Electrical Safety Analyzer

**TOS9300**

**TOS9301**

**TOS9302**

**TOS9303**

**TOS9303LC**

# Contents

|  |           |                               |           |
|--|-----------|-------------------------------|-----------|
| <b>Command List.....</b>   | <b>8</b>  | CALC:SCAL:OFFS:AUTO .....     | 72        |
| <b>Introduction.....</b>   | <b>32</b> | CALC:ACW Command .....        | 73        |
| <b>Setup.....</b>  | <b>35</b> | CALC:ACW:SCAL.....            | 73        |
| Installing the VISA Library.....                                     | 35        | CALC:ACW:SCAL:OFFS.....       | 74        |
| Setting Up the Interface.....  | 36        | CALC:ACW:SCAL:OFFS:IMAG.....  | 74        |
| RS232C .....   | 37        | CALC:DCW Command.....         | 75        |
| USB .....  | 39        | CALC:DCW:SCAL .....           | 75        |
| LAN.....   | 41        | CALC:DCW:SCAL:OFFS.....       | 76        |
| Accessing and Operating the Product<br>from a Web Browser (LAN)..... | 45        | CALC:EC Command.....          | 77        |
| <b>About Commands.....</b>   | <b>52</b> | CALC:EC:SCAL.....             | 77        |
| Command Hierarchy.....   | 52        | CALC:EC:SCAL:OFFS .....       | 77        |
| Command Syntax .....   | 53        | CALC:EC:DC:SCAL.....          | 78        |
| Parameters .....   | 56        | CALC:EC:DC:SCAL:OFFS .....    | 78        |
| <b>IEEE 488.2 common commands</b>                                    | <b>60</b> | CALC:IR Command .....         | 79        |
| *CLS .....   | 60        | CALC:IR:SCAL .....            | 79        |
| *ESE .....   | 60        | CALC:IR:SCAL:OFFS.....        | 79        |
| *ESR.....  | 61        | CALC:MET Command.....         | 80        |
| *IDN .....   | 61        | CALC:MET:SCAL.....            | 80        |
| *OPC.....  | 62        | CALC:MET:SCAL:OFFS .....      | 80        |
| *OPT .....   | 62        | CALC:PAT Command .....        | 81        |
| *PSC.....  | 63        | CALC:PAT:SCAL.....            | 81        |
| *RCL .....   | 63        | CALC:PAT:SCAL:OFFS .....      | 81        |
| *RST .....   | 64        | CALC:PAT:SCAL:CONV .....      | 82        |
| *SAV .....   | 67        | CALC:PAT:SCAL:CONV:VOLT ..... | 82        |
| *SRE.....  | 67        | CALC:PCC Command.....         | 83        |
| *STB .....   | 68        | CALC:PCC:SCAL .....           | 83        |
| *TRG.....  | 68        | CALC:PCC:SCAL:OFFS.....       | 83        |
| *TST.....  | 69        | CALC:PCC:SCAL:CONV.....       | 84        |
| *WAI.....  | 69        | CALC:PCC:SCAL:CONV:VOLT.....  | 84        |
| <b>ABORt Command .....</b>   | <b>70</b> | CALC:TC Command.....          | 85        |
| ABOR.....  | 70        | CALC:TC:SCAL .....            | 85        |
| ABOR:ACQ.....  | 71        | CALC:TC:SCAL:OFFS .....       | 85        |
| ABOR:TEST .....  | 71        | CALC:TC:SCAL:CONV.....        | 86        |
| <b>CALCulate Command.....</b>  | <b>72</b> | CALC:TC:SCAL:CONV:VOLT.....   | 86        |
|  |           | <b>Display Command .....</b>  | <b>87</b> |
|  |           | DISP:ACW:CURR:PHOL.....       | 87        |
|  |           | DISP:DCW:CURR:PHOL.....       | 88        |
|  |           | DISP:EC:AC:CURR:PHOL .....    | 89        |
|  |           | DISP:EC:DC:CURR:PHOL .....    | 90        |
|  |           | DISP:IR:RES:PHOL.....         | 91        |

|   |            |                                |            |
|---|------------|--------------------------------|------------|
| DISP:PAT:CURR:PHOL .....                | 92         | RES:COUN .....                 | 120        |
| DISP:PCC:CURR:PHOL .....                | 93         | RES:REM .....                  | 121        |
| DISP:TC:CURR:PHOL .....                 | 94         |                                |            |
| <b>HCOPy Command.....</b>               | <b>95</b>  | <b>ROUTe Command .....</b>     | <b>123</b> |
| HCOP:SDUM:DATA .....                    | 95         | ROUT:ACW:TERM .....            | 123        |
|   |            | ROUT:ACW:TERM:CCH .....        | 124        |
|   |            | ROUT:CAT .....                 | 125        |
| <b>INITiate Command .....</b>           | <b>96</b>  | ROUT:DCW:TERM .....            | 126        |
| INIT:ACQ .....                          | 96         | ROUT:DCW:TERM:CCH .....        | 127        |
| INIT:TEST .....                         | 96         | ROUT:IR:TERM .....             | 128        |
|   |            | ROUT:IR:TERM:CCH .....         | 129        |
| <b>MEASure/READ/FETCh Command</b>       |            |                                |            |
| <b>97</b>                               |            | <b>SENS:ACW Command .....</b>  | <b>130</b> |
| FETC/ READ/ MEAS .....                  | 97         | SENS:ACW:CURR:FILT:HPAS .....  | 130        |
| FETC:CIM/ READ:CIM/ MEAS:CIM .....      | 98         | SENS:ACW:CURR:FILT:LPAS .....  | 131        |
| FETC:CRE/ READ:CRE/ MEAS:CRE .....      | 99         | SENS:ACW:CURR:FILT:TYPE .....  | 132        |
| F E T C : C U R R / R E A D : C U R R / |            | SENS:ACW:CURR:MODE .....       | 133        |
| MEAS:CURR .....                         | 100        | SENS:ACW:JUDG .....            | 134        |
| FETC:ETIM/ READ:ETIM/ MEAS:ETIM ..      |            | SENS:ACW:JUDG:LOW .....        | 135        |
| 101                                     |            | SENS:ACW:JUDG:LOW:STAT .....   | 135        |
| FETC:RES/ READ:RES/ MEAS:RES .....      | 102        | SENS:ACW:TERM:GRO .....        | 136        |
| FETC:VOLT/ READ:VOLT/ MEAS:VOLT ..      |            | SENS:ACW:VOLT:MODE .....       | 137        |
| 103                                     |            |                                |            |
| <b>OUTPut Command.....</b>              | <b>104</b> | <b>SENSe:DCW Command .....</b> | <b>138</b> |
| OUTP .....                              | 104        | SENS:DCW:CURR:FILT:HPAS .....  | 138        |
| OUTP:110P .....                         | 105        | SENS:DCW:CURR:FILT:LPAS .....  | 139        |
| OUTP:110P:POL .....                     | 105        | SENS:DCW:CURR:FILT:TYPE .....  | 140        |
|   |            | SENS:DCW:JUDG .....            | 141        |
|   |            | SENS:DCW:JUDG:DEL .....        | 142        |
| <b>PROGram Command.....</b>             | <b>106</b> | SENS:DCW:JUDG:DEL:AUTO .....   | 142        |
| PROG .....                              | 106        | SENS:DCW:JUDG:LOW .....        | 143        |
| PROG:CRE .....                          | 107        | SENS:DCW:JUDG:LOW:STAT .....   | 143        |
| PROG:DEL .....                          | 108        | SENS:DCW:TERM:GRO .....        | 144        |
| PROG:INT:TIM .....                      | 109        | SENS:DCW:VOLT:MODE .....       | 145        |
| PROG:FAIL:COU .....                     | 110        |                                |            |
| PROG:LIST .....                         | 111        | <b>SENSe:EC Command .....</b>  | <b>146</b> |
| PROG:REN .....                          | 112        | SENS:EC[AC] Command .....      | 146        |
| PROG:SAVE .....                         | 113        | SENS:EC:JUDG .....             | 146        |
| PROG:STEP<n>:<prog_item> .....          | 114        | SENS:EC:JUDG:STAT .....        | 147        |
| PROG:STEPS:COUN .....                   | 116        | SENS:EC:JUDG:LOW .....         | 148        |
|   |            | SENS:EC:JUDG:LOW:STAT .....    | 148        |
|   |            | SENS:EC:JUDG:TYPE .....        | 149        |
| <b>RESult command.....</b>              | <b>117</b> | SENS:EC:JUDG:VOLT .....        | 150        |
| RES:FORM .....                          | 117        | SENS:EC:JUDG:VOLT:STAT .....   | 150        |
| RES .....                               | 118        |                                |            |

|                                   |     |
|-----------------------------------|-----|
| SENS:EC:JUDG:VOLT:LOW .....       | 151 |
| SENS:EC:JUDG:VOLT:LOW:STAT ....   | 151 |
| SENS:EC:TERM:CCH .....            | 152 |
| SENS:EC:TERM:WIRE .....           | 153 |
| SENS:EC:DC Command .....          | 154 |
| SENS:EC:DC:JUDG .....             | 154 |
| SENS:EC:DC:JUDG:STAT .....        | 154 |
| SENS:EC:DC:JUDG:LOW .....         | 155 |
| SENS:EC:DC:JUDG:LOW:STAT .....    | 155 |
| SENS:EC:DC:JUDG:TYPE .....        | 156 |
| SENS:EC:DC:JUDG:VOLT .....        | 157 |
| SENS:EC:DC:JUDG:VOLT:STAT .....   | 157 |
| SENS:EC:DC:JUDG:VOLT:LOW .....    | 158 |
| SENS:EC:DC:JUDG:VOLT:LOW:STAT ... | 158 |
| SENS:EC:DC:TERM:CCH .....         | 159 |
| SENS:EC:DC:TERM:WIRE .....        | 160 |

### **SENSe:IR Command ..... 161**

|                                   |     |
|-----------------------------------|-----|
| SENS:IR:CURR:FILT:LPAS:STAT ..... | 161 |
| SENS:IR:JUDG .....                | 162 |
| SENS:IR:JUDG:STAT .....           | 162 |
| SENS:IR:JUDG:CURR .....           | 163 |
| SENS:IR:JUDG:CURR:STAT .....      | 163 |
| SENS:IR:JUDG:CURR:LOW .....       | 164 |
| SENS:IR:JUDG:CURR:LOW:STAT ...    | 164 |
| SENS:IR:JUDG:DEL .....            | 165 |
| SENS:IR:JUDG:DEL:AUTO .....       | 165 |
| SENS:IR:JUDG:LOW .....            | 166 |
| SENS:IR:JUDG:LOW:STAT .....       | 166 |
| SENS:IR:JUDG:TYPE .....           | 167 |
| SENS:IR:TERM:GRO .....            | 168 |

### **SENSe:MET Command ..... 169**

|                          |     |
|--------------------------|-----|
| SENS:MET:CURR:MODE ..... | 169 |
| SENS:MET:NETW .....      | 170 |
| SENS:MET:RANG .....      | 171 |
| SENS:MET:RANG:AUTO ..... | 172 |
| SENS:MET:SELV .....      | 173 |
| SENS:MET:SELV:STAT ..... | 173 |
| SENS:MET:TERM .....      | 174 |

### **SENSe:PAT Command ..... 175**

|                     |     |
|---------------------|-----|
| SENS:PAT:BAND ..... | 175 |
|---------------------|-----|

|                              |     |
|------------------------------|-----|
| SENS:PAT:COND .....          | 176 |
| SENS:PAT:COND:FAUL .....     | 176 |
| SENS:PAT:CURR:MODE .....     | 177 |
| SENS:PAT:JUDG .....          | 178 |
| SENS:PAT:JUDG:STAT .....     | 178 |
| SENS:PAT:JUDG:DEL .....      | 179 |
| SENS:PAT:JUDG:DEL:STAT ..... | 179 |
| SENS:PAT:JUDG:LOW .....      | 180 |
| SENS:PAT:JUDG:LOW:STAT ..... | 180 |
| SENS:PAT:NETW .....          | 181 |
| SENS:PAT:NETW:PROB .....     | 182 |
| SENS:PAT:PROB:A .....        | 183 |
| SENS:PAT:RANG:AUTO .....     | 184 |
| SENS:PAT:TIM .....           | 185 |
| SENS:PAT:TIM:STAT .....      | 185 |

### **SENSe:PCC Command ..... 186**

|                              |     |
|------------------------------|-----|
| SENS:PCC:BAND .....          | 186 |
| SENS:PCC:COND .....          | 187 |
| SENS:PCC:COND:FAUL .....     | 188 |
| SENS:PCC:CURR:MODE .....     | 189 |
| SENS:PCC:JUDG .....          | 190 |
| SENS:PCC:JUDG:STAT .....     | 190 |
| SENS:PCC:JUDG:DEL .....      | 191 |
| SENS:PCC:JUDG:DEL:STAT ..... | 191 |
| SENS:PCC:JUDG:LOW .....      | 192 |
| SENS:PCC:JUDG:LOW:STAT ..... | 192 |
| SENS:PCC:NETW .....          | 193 |
| SENS:PCC:RANG:AUTO .....     | 194 |
| SENS:PCC:TIM .....           | 195 |
| SENS:PCC:TIM:STAT .....      | 195 |

### **SENSe:TC Command ..... 196**

|                             |     |
|-----------------------------|-----|
| SENS:TC:BAND .....          | 196 |
| SENS:TC:COND .....          | 197 |
| SENS:TC:COND:FAUL .....     | 197 |
| SENS:TC:CURR:MODE .....     | 198 |
| SENS:TC:JUDG .....          | 199 |
| SENS:TC:JUDG:STAT .....     | 199 |
| SENS:TC:JUDG:DEL .....      | 200 |
| SENS:TC:JUDG:DEL:STAT ..... | 200 |
| SENS:TC:JUDG:LOW .....      | 201 |
| SENS:TC:JUDG:LOW:STAT ..... | 201 |
| SENS:TC:NETW .....          | 202 |

|                                    |            |                                    |            |
|------------------------------------|------------|------------------------------------|------------|
| SENS:TC:NETW:PROB .....            | 203        | EC:DC:CURR:PROT .....              | 229        |
| SENS:TC:NETW:PROB:A .....          | 203        | EC:DC:CURR:SWE:FALL:TIM .....      | 230        |
| SENS:TC:RANG:AUTO .....            | 204        | EC:DC:CURR:SWE:FALL:TIM:STAT ..... | 230        |
| SENS:TC:TIM .....                  | 205        | EC:DC:CURR:SWE:TIM .....           | 231        |
| SENS:TC:TIM:STAT .....             | 205        | EC:DC:CURR:TIM .....               | 232        |
| <b>[SOURce:] command.....</b>      | <b>206</b> | EC:DC:CURR:TIM:STAT .....          | 232        |
| FUNC.....                          | 206        | <b>[SOURce:]IR command .....</b>   | <b>233</b> |
| <b>[SOURce:]ACW Command .....</b>  | <b>207</b> | IR:TERM:POL.....                   | 233        |
| ACW:VOLT .....                     | 207        | IR:VOLT .....                      | 234        |
| ACW:VOLT:FREQ.....                 | 208        | IR:VOLT:DISC:INT:STAT .....        | 235        |
| ACW:VOLT:PROT.....                 | 209        | IR:VOLT:DISC:TIM.....              | 236        |
| ACW:VOLT:STAR .....                | 210        | IR:VOLT:PROT .....                 | 237        |
| ACW:VOLT:STAR:STAT .....           | 210        | IR:VOLT:RANG .....                 | 238        |
| ACW:VOLT:SWE:FALL:TIM .....        | 211        | IR:VOLT:STAR .....                 | 239        |
| ACW:VOLT:SWE:FALL:TIM:STAT .....   | 211        | IR:VOLT:STAR:STAT .....            | 239        |
| ACW:VOLT:SWE:TIM .....             | 212        | IR:VOLT:SWE:TIM .....              | 240        |
| ACW:VOLT:TIM .....                 | 213        | IR:VOLT:TIM .....                  | 241        |
| ACW:VOLT:TIM:STAT .....            | 213        | IR:VOLT:TIM:STAT .....             | 241        |
| <b>[SOURce:]DCW Command .....</b>  | <b>214</b> | <b>[SOURce:]PATient Command ..</b> | <b>242</b> |
| DCW:VOLT .....                     | 214        | PAT:110P:OUTP.....                 | 242        |
| DCW:VOLT:DISC:INT:STAT .....       | 215        | PAT:110P:POL .....                 | 242        |
| DCW:VOLT:DISC:TIM.....             | 216        | PAT:POL.....                       | 243        |
| DCW:VOLT:PROT.....                 | 217        | <b>[SOURce:]PCC Command .....</b>  | <b>244</b> |
| DCW:VOLT:STAR .....                | 218        | PCC:POL.....                       | 244        |
| DCW:VOLT:STAR:STAT.....            | 218        | <b>[SOURce:]TC Command .....</b>   | <b>245</b> |
| DCW:VOLT:SWE:FALL:TIM.....         | 219        | TC:110P:OUTP.....                  | 245        |
| DCW:VOLT:SWE:FALL:TIM:STAT .....   | 219        | TC:110P:POL.....                   | 245        |
| DCW:VOLT:SWE:TIM .....             | 220        | TC:POL.....                        | 246        |
| DCW:VOLT:TIM .....                 | 221        | <b>STATus Command .....</b>        | <b>247</b> |
| DCW:VOLT:TIM:STAT .....            | 221        | Status Report Structure .....      | 247        |
| <b>[SOURce:]EC Command .....</b>   | <b>222</b> | Architecture.....                  | 248        |
| EC:AC:CURR .....                   | 222        | Status byte register.....          | 249        |
| EC:AC:CURR:PROT .....              | 223        | Event status register.....         | 250        |
| EC:AC:CURR:SWE:FALL:TIM.....       | 224        | OPERation status register .....    | 251        |
| EC:AC:CURR:SWE:FALL:TIM:STAT ..... | 224        | STAT:OPER .....                    | 252        |
| EC:AC:CURR:SWE:TIM .....           | 225        | STAT:OPER:COND.....                | 252        |
| EC:AC:CURR:TIM .....               | 226        | STAT:OPER:ENAB .....               | 252        |
| EC:AC:CURR:TIM:STAT.....           | 226        | STAT:OPER:NTR.....                 | 253        |
| EC:CURR:FREQ .....                 | 227        | STAT:OPER:PTR.....                 | 253        |
| EC:DC:CURR .....                   | 228        |                                    |            |

|  |     |
|--|-----|
| OPERation:PROTeCting Status Register . |     |
| 254                                    |     |
| STAT:OPER:PROT .....                   | 255 |
| STAT:OPER:PROT:COND .....              | 255 |
| STAT:OPER:PROT:ENAB .....              | 255 |
| STAT:OPER:PROT:NTR .....               | 256 |
| STAT:OPER:PROT:PTR .....               | 256 |
| OPERation:TESTing Status Register      | 257 |
| STAT:OPER:TEST .....                   | 258 |
| STAT:OPER:TEST:COND .....              | 258 |
| STAT:OPER:TEST:ENAB .....              | 258 |
| STAT:OPER:TEST:NTR .....               | 259 |
| STAT:OPER:TEST:PTR .....               | 259 |
| QUEStionable status register .....     | 260 |
| STAT:QUES .....                        | 261 |
| STAT:QUES:COND .....                   | 261 |
| STAT:QUES:ENAB .....                   | 261 |
| STAT:QUES:NTR .....                    | 262 |
| STAT:QUES:PTR .....                    | 262 |
| Preset status .....                    | 263 |
| STAT:PRES .....                        | 263 |

## SYSTem Command..... 264

|                                 |     |
|---------------------------------|-----|
| SYST:BEEP .....                 | 264 |
| SYST:BEEP:KEY .....             | 265 |
| SYST:BEEP:PROT .....            | 266 |
| SYST:BEEP:SCPI .....            | 267 |
| SYST:COMM:PROT:WDOG .....       | 268 |
| SYST:COMM:PROT:WDOG:DEL .....   | 268 |
| SYST:COMM:RLST .....            | 269 |
| SYST:DATE .....                 | 270 |
| SYST:ERR .....                  | 271 |
| SYST:ERR:COUN .....             | 272 |
| SYST:KLOC .....                 | 273 |
| SYST:KLOC:LEV .....             | 274 |
| SYST:PASS .....                 | 275 |
| SYST:PASS:CDIS .....            | 275 |
| SYST:PASS:NEW .....             | 276 |
| SYST:PASS:STAT .....            | 277 |
| SYST:LOC/ SYST:REM/ SYST:RWL .. | 278 |
| SYST:SEC:IMM .....              | 279 |
| SYST:SSAV .....                 | 280 |
| SYST:SSAV:DEL .....             | 281 |

|                     |     |
|---------------------|-----|
| SYST:TIME .....     | 282 |
| SYST:TIME:ADJ ..... | 283 |
| SYST:TZON .....     | 284 |
| SYST:TZON:CAT ..... | 284 |
| SYST:VERS .....     | 285 |

## SYSTem:CONFIgure Command ....

### 286

|                                 |     |
|---------------------------------|-----|
| SYST:CONF:BEEP:VOL .....        | 286 |
| SYST:CONF:BEEP:VOL:PASS .....   | 287 |
| SYST:CONF:CAL:DUE:CONT .....    | 288 |
| SYST:CONF:CAL:PROT:STAT .....   | 289 |
| SYST:CONF:DACT:STAT .....       | 290 |
| SYST:CONF:FMOD:STAT .....       | 291 |
| SYST:CONF:MOM:STAT .....        | 292 |
| SYST:CONF:PHOL .....            | 293 |
| SYST:CONF:PON:STAT .....        | 294 |
| SYST:CONF:SIO:JUDG:STAT .....   | 295 |
| SYST:CONF:SLPR:STAT .....       | 296 |
| SYST:CONF:SOUT:FAIL:LOW:STAT .. | 297 |
| SYST:CONF:SOUT:FAIL:UPP:STAT .. | 298 |
| SYST:CONF:SOUT:HVON:STAT .....  | 299 |
| SYST:CONF:SOUT:PASS:STAT .....  | 300 |
| SYST:CONF:SOUT:PON:STAT .....   | 301 |
| SYST:CONF:SOUT:PROT:STAT .....  | 302 |
| SYST:CONF:SOUT:READ:STAT .....  | 303 |
| SYST:CONF:SOUT:TEST:STAT .....  | 304 |

## TRIGger Command..... 305

|                      |     |
|----------------------|-----|
| TRIG:TEST .....      | 305 |
| TRIG:TEST:SOUR ..... | 305 |

## Tutorial..... 306

|  |     |
|--|-----|
| Withstanding voltage and insulation resistance test settings ..... | 306 |
| Earth continuity test (EC) settings .....                          | 311 |
| Leakage current test settings .....                                | 314 |
| Trigger Subsystem .....  | 318 |
| Executing tests .....  | 319 |
| Configuring and executing auto tests ..                            | 322 |
| Querying measured values .....                                     | 327 |
| Querying test results .....  | 329 |
| Waiting for Operation Complete .....                               | 332 |
| Status Monitoring .....  | 333 |

|  |            |
|--|------------|
| Error Checking.....  | 335        |
| When using commands on a PLC<br>(sequencer, controller)..... | 336        |
| Visual Basic 2017 .....                                      | 337        |
| <b>Appendix .....</b>  | <b>341</b> |
| List of Errors .....   | 341        |
| <b>Command processing time .....</b>                         | <b>345</b> |
| <b>Legacy Commands.....</b>                                  | <b>346</b> |

# Command List

## IEEE 488.2 common commands

### \*CLS

Clears all event registers including the status byte, event status, and error queue.

### \*ESE

Sets the event status enable register that is counted by the event summary bit (ESB) of the status byte.

### \*ESR

Queries the event status register.

### \*IDN

Queries the model name and firmware version of the product.

### \*OPC

Sets the OPC bit (bit 0) of the event status register when all the commands that are in standby have been processed.

### \*OPT

Queries the options that are installed in the product.

### \*PSC

Sets whether the event status enable register and service request enable register are cleared when the POWER switch is turned on.

### \*RCL

Recalls memory content.

### \*RST

Resets the panel settings (see the table below).

### \*SAV

Saves the panel settings to the setup memory.

### \*SRE

Sets the service request enable register.

### \*STB

Queries the contents of the status byte register and the MSS (master summary status) message.

## **\*TRG**

Trigger command.

## **\*TST**

Executes a self-test.

## **\*WAI**

Prevents the device from executing subsequent commands until all operations that are in standby have completed.

## **ABORt Command**

---

### **ABOR**

Aborts measurements, tests, and other operations in all trigger subsystems (ACQuire, TEST).

### **ABOR:ACQ**

Aborts measurement operations.

### **ABOR:TEST**

Stops the ongoing test. Clears the protection/ fail mode.

## **CALCulate Command**

---

### **CALC:SCAL:OFFS:AUTO**

Sets whether to automatically set the offset before testing.

### **CALC:ACW:SCAL**

Sets whether to offset the current running through the stray capacitance in AC withstanding voltage tests.

### **CALC:ACW:SCAL:OFFS**

Sets the real part of the offset current in AC withstanding voltage tests.

### **CALC:ACW:SCAL:OFFS:IMAG**

Sets the imaginary part of the offset current in AC withstanding voltage tests.

### **CALC:DCW:SCAL**

Sets whether to offset the current running through the stray capacitance in DC withstanding voltage tests.

### **CALC:DCW:SCAL:OFFS**

Sets the offset current for DC withstanding voltage tests.

## **CALC:EC:SCAL**

Sets whether to offset the voltage drop caused by the contact resistance in earth continuity tests (AC).

## **CALC:EC:SCAL:OFFS**

Sets the offset resistance for earth continuity tests (AC).

## **CALC:EC:DC:SCAL**

Sets whether to offset the voltage drop caused by the contact resistance in earth continuity tests (DC).

## **CALC:EC:DC:SCAL:OFFS**

Sets the offset resistance for earth continuity tests (DC).

## **CALC:IR:SCAL**

Sets whether to offset the resistance applied to the stray capacitance in insulation resistance tests.

## **CALC:IR:SCAL:OFFS**

Sets the offset resistance for insulation resistance tests.

## **CALC:MET:SCAL**

Sets whether to offset the current in meter mode.

## **CALC:MET:SCAL:OFFS**

Sets the offset current for meter mode.

## **CALC:PAT:SCAL**

Sets whether to offset the current in patient leakage current tests.

## **CALC:PAT:SCAL:OFFS**

Sets the offset current for patient leakage current tests.

## **CALC:PAT:SCAL:CONV**

Sets whether to convert the current with the specified voltage in patient leakage current tests.

## **CALC:PAT:SCAL:CONV:VOLT**

Sets the conversion voltage for patient leakage current tests.

## **CALC:PCC:SCAL**

Sets whether to offset the current in protective conductor current tests.

## **CALC:PCC:SCAL:OFFS**

Sets the offset current for protective conductor current tests.

### **CALC:PCC:SCAL:CONV**

Sets whether to convert the current with the specified voltage in protective conductor current tests.

### **CALC:PCC:SCAL:CONV:VOLT**

Sets the conversion voltage for protective conductor current tests.

### **CALC:TC:SCAL**

Sets whether to offset the current in touch current tests.

### **CALC:TC:SCAL:OFFS**

Sets the offset current for touch current tests.

### **CALC:TC:SCAL:CONV**

Sets whether to convert the current with the specified voltage in touch current tests.

### **CALC:TC:SCAL:CONV:VOLT**

Sets the conversion voltage for touch current tests.

## **Display Command**

---

### **DISP:ACW:CURR:PHOL**

Displays the maximum current measurement from the start of the test in AC withstanding voltage tests.

### **DISP:DCW:CURR:PHOL**

Displays the maximum current measurement from the start of the test in DC withstanding voltage tests.

### **DISP:EC:AC:CURR:PHOL**

Displays the maximum resistance measurement from the start of the test in earth continuity tests (AC).

### **DISP:EC:DC:CURR:PHOL**

Displays the maximum resistance measurement from the start of the test in earth continuity tests (DC).

### **DISP:IR:RES:PHOL**

Displays the minimum resistance measurement from the start of the test in insulation resistance tests.

### **DISP:PAT:CURR:PHOL**

Displays the maximum current measurement from the start of the test in patient leakage current tests.

## **DISP:PCC:CURR:PHOL**

Displays the maximum current measurement from the start of the test in protective conductor current tests.

## **DISP:TC:CURR:PHOL**

Displays the maximum current measurement from the start of the test in touch current tests.

## **HCOPy Command**

---

### **HCOP:SDUM:DATA**

Retrieves the screen capture of the present screen.

## **INITiate Command**

---

### **INIT:ACQ**

Starts a new measurement.

### **INIT:TEST**

Starts the test trigger function.

## **MEASure/READ/FETCh Command**

---

### **FETC/ READ/ MEAS**

Queries the measurement data (current, real part of the current, imaginary part of the current, voltage, resistance, elapsed time).

### **FETC:CIM/ READ:CIM/ MEAS:CIM**

Queries the imaginary part of the current .

### **FETC:CRE/ READ:CRE/ MEAS:CRE**

Queries the real part of the current.

### **FETC:CURR/ READ:CURR/ MEAS:CURR**

Queries the current.

### **FETC:ETIM/ READ:ETIM/ MEAS:ETIM**

Queries the test time.

### **FETC:RES/ READ:RES/ MEAS:RES**

Queries the resistance.

### **FETC:VOLT/ READ:VOLT/ MEAS:VOLT**

Queries the voltage.

## OUTPut Command

---

### OUTP

Sets whether to output the temporary voltage in leakage current (TC/PCC/Patient) tests.

### OUTP:110P

Sets whether to output the voltage applied from the 110% terminal to the AC LINE IN inlet in meter tests.

### OUTP:110P:POL

Sets the polarity of the voltage applied from the 110 % terminal in meter tests.

## PROGram Command

---

### PROG

Sets the program to be edited.

### PROG:CRE

Creates a new program.

### PROG:DEL

Deletes a program.

### PROG:INT:TIM

Sets the step interval time.

### PROG:FAIL:COUT

Sets the operation to be executed when a fail judgment occurs.

### PROG:LIST

Queries stored programs.

### PROG:REN

Changes the name of the selected program.

### PROG:SAVE

Saves the selected program.

### PROG:STEP<n>:<prog\_item>

Sets the test condition indicated by <prog-item> to step n of the selected program.

### PROG:STEPS:COUN

Sets the number of steps of the selected program.

## RESult command

---

### RES:FORM

Sets the response format to use when test results are queried.

### RES

Queries the previous test result.

### RES:COUN

Queries the number of test results stored in the product.

### RES:REM

Queries the oldest test result.

## ROUTe Command

---

### ROUT:ACW:TERM

Sets the connection of each channel of the scanner in AC withstanding voltage tests.

### ROUT:ACW:TERM:CCH

Sets the continuity check for the test leads connected to the scanner and the EUT in AC withstanding voltage tests.

### ROUT:CAT

Queries the available scanner channels.

### ROUT:DCW:TERM

Sets the connection of each channel of the scanner in DC withstanding voltage tests.

### ROUT:DCW:TERM:CCH

Sets the continuity check for the test leads connected to the scanner and the EUT in DC withstanding voltage tests.

### ROUT:IR:TERM

Sets the connection of each channel of the scanner in insulation resistance tests.

### ROUT:IR:TERM:CCH

Sets the continuity check for the test leads connected to the scanner and the EUT in insulation resistance tests.

## **SENS:ACW Command**

---

### **SENS:ACW:CURR:FILT:HPAS**

Sets the high-pass filter for AC withstanding voltage tests.

### **SENS:ACW:CURR:FILT:LPAS**

Sets the low-pass filter for AC withstanding voltage tests.

### **SENS:ACW:CURR:FILT:TYPE**

Sets the filter type for AC withstanding voltage tests.

### **SENS:ACW:CURR:MODE**

Sets the current measurement mode in AC withstanding voltage tests.

### **SENS:ACW:JUDG**

Sets the reference current for upper limit judgment in AC withstanding voltage tests.

### **SENS:ACW:JUDG:LOW**

Sets the reference current for the lower limit judgment in AC withstanding voltage tests.

### **SENS:ACW:JUDG:LOW:STAT**

Sets whether to judge with the lower limit in AC withstanding voltage tests.

### **SENS:ACW:TERM:GRO**

Sets whether to measure by including or excluding the current running through the stray capacitance in AC withstanding voltage tests.

### **SENS:ACW:VOLT:MODE**

Sets the voltage measurement mode in AC withstanding voltage tests.

## **SENSe:DCW Command**

---

### **SENS:DCW:CURR:FILT:HPAS**

Sets the high-pass filter for DC withstanding voltage tests.

### **SENS:DCW:CURR:FILT:LPAS**

Sets the low-pass filter for DC withstanding voltage tests.

### **SENS:DCW:CURR:FILT:TYPE**

Sets the filter type for DC withstanding voltage tests.

### **SENS:DCW:JUDG**

Sets the reference current for upper limit judgment in DC withstanding voltage tests.

## **SENS:DCW:JUDG:DEL**

Sets the delay time until starting upper limit judgment in DC withstanding voltage tests.

## **SENS:DCW:JUDG:DEL:AUTO**

Sets whether to make the judgment delay automatic in DC withstanding voltage tests.

## **SENS:DCW:JUDG:LOW**

Sets the reference current for the lower limit judgment in DC withstanding voltage tests.

## **SENS:DCW:JUDG:LOW:STAT**

Sets whether to judge with the lower limit in DC withstanding voltage tests.

## **SENS:DCW:TERM:GRO**

Sets whether to measure by including or excluding the current running through the stray capacitance in DC withstanding voltage tests.

## **SENS:DCW:VOLT:MODE**

Sets the voltage measurement mode in DC withstanding voltage tests.

## **SENSe:EC Command**

### **SENS:EC:JUDG**

Sets the reference resistance for upper limit judgment in earth continuity tests (AC).

### **SENS:EC:JUDG:STAT**

Sets whether to judge with the upper resistance limit in earth continuity tests (AC).

### **SENS:EC:JUDG:LOW**

Sets the reference resistance for lower limit judgment in earth continuity tests (AC).

### **SENS:EC:JUDG:LOW:STAT**

Sets whether to judge with the lower resistance limit in earth continuity tests (AC).

### **SENS:EC:JUDG:TYPE**

Sets whether to use resistance or voltage to make upper limit judgment and lower limit judgment in earth continuity tests (AC).

### **SENS:EC:JUDG:VOLT**

Sets the reference voltage for upper limit judgment in earth continuity tests (AC).

### **SENS:EC:JUDG:VOLT:STAT**

Sets whether to judge with the upper voltage limit in earth continuity tests (AC).

### **SENS:EC:JUDG:VOLT:LOW**

Sets the reference voltage for lower limit judgment in earth continuity tests (AC).

### **SENS:EC:JUDG:VOLT:LOW:STAT**

Sets whether to judge with the lower voltage limit in earth continuity tests (AC).

### **SENS:EC:TERM:CCH**

Sets the contact check for the test leads and the EUT in earth continuity tests (AC).

### **SENS:EC:TERM:WIRE**

Sets the test lead wiring method in earth continuity tests (AC).

### **SENS:EC:DC:JUDG**

Sets the reference resistance for upper limit judgment in earth continuity tests (DC).

### **SENS:EC:DC:JUDG:STAT**

Sets whether to judge with the upper resistance limit in earth continuity tests (DC).

### **SENS:EC:DC:JUDG:LOW**

Sets the reference resistance for lower limit judgment in earth continuity tests (DC).

### **SENS:EC:DC:JUDG:LOW:STAT**

Sets whether to judge with the lower resistance limit in earth continuity tests (DC).

### **SENS:EC:DC:JUDG:TYPE**

Sets whether to use resistance or voltage to make upper limit judgment and lower limit judgment in earth continuity tests (DC).

### **SENS:EC:DC:JUDG:VOLT**

Sets the reference voltage for upper limit judgment in earth continuity tests (DC).

### **SENS:EC:DC:JUDG:VOLT:STAT**

Sets whether to judge with the upper voltage limit in earth continuity tests (DC).

### **SENS:EC:DC:JUDG:VOLT:LOW**

Sets the reference voltage for lower limit judgment in earth continuity tests (DC).

### **SENS:EC:DC:JUDG:VOLT:LOW:STAT**

Sets whether to judge with the lower voltage limit in earth continuity tests (DC).

### **SENS:EC:DC:TERM:CCH**

Sets the continuity check for the test leads and the EUT in earth continuity tests (DC).

### **SENS:EC:DC:TERM:WIRE**

Sets the test lead wiring method in earth continuity tests (DC).

## **SENSe:IR Command**

### **SENS:IR:CURR:FILT:LPAS:STAT**

Enables or disables the low-pass filter for insulation resistance tests.

### **SENS:IR:JUDG**

Sets the reference resistance for upper limit judgment in insulation resistance tests.

### **SENS:IR:JUDG:STAT**

Sets whether to judge with the upper resistance limit in insulation resistance tests.

### **SENS:IR:JUDG:CURR**

Sets the reference current for upper limit judgment in insulation resistance tests.

### **SENS:IR:JUDG:CURR:STAT**

Sets whether to judge with the upper current limit in insulation resistance tests.

### **SENS:IR:JUDG:CURR:LOW**

Sets the reference current for lower limit judgment in insulation resistance tests.

### **SENS:IR:JUDG:CURR:LOW:STAT**

Sets whether to judge with the lower current limit in insulation resistance tests.

### **SENS:IR:JUDG:DEL**

Sets the time until starting upper limit judgment.

### **SENS:IR:JUDG:DEL:AUTO**

Sets whether to make the judgment delay automatic.

### **SENS:IR:JUDG:LOW**

Sets the reference resistance for lower limit judgment in insulation resistance tests.

### **SENS:IR:JUDG:LOW:STAT**

Sets whether to judge with the lower resistance limit in insulation resistance tests.

### **SENS:IR:JUDG:TYPE**

Sets whether to use resistance or current to make upper limit judgment and lower limit judgment in insulation resistance tests.

### **SENS:IR:TERM:GRO**

Sets whether to measure by including or excluding the current running through the stray capacitance in insulation resistance tests.

## **SENSe:MET Command**

---

### **SENS:MET:CURR:MODE**

Sets the current measurement mode in meter mode.

### **SENS:MET:NETW**

Sets the measurement circuit network to use in meter mode.

### **SENS:MET:RANG**

Sets the meter mode measurement range.

### **SENS:MET:RANG:AUTO**

Sets whether to set the meter mode measurement range to auto.

### **SENS:MET:SELV**

Sets the SELV voltage of meter mode.

### **SENS:MET:SELV:STAT**

Sets whether the SELV voltage is used.

### **SENS:MET:TERM**

Sets the touch mode of meter mode.

## **SENSe:PAT Command**

---

### **SENS:PAT:BAND**

Sets whether to expand the band of the internal voltmeter of this product in patient leakage current tests.

### **SENS:PAT:COND**

Sets the single fault condition for patient leakage current tests.

### **SENS:PAT:COND:FAUL**

Sets the disconnected condition at fault for patient leakage current tests.

### **SENS:PAT:CURR:MODE**

Sets the current measurement mode in patient leakage current tests.

### **SENS:PAT:JUDG**

Sets the reference current for upper limit judgment in patient leakage current tests.

### **SENS:PAT:JUDG:STAT**

Sets whether to judge with the upper current limit in patient leakage current tests.

## **SENS:PAT:JUDG:DEL**

Sets the time until starting judgments in patient leakage current tests.

## **SENS:PAT:JUDG:DEL:STAT**

Sets whether to set the judgment delay in patient leakage current tests.

## **SENS:PAT:JUDG:LOW**

Sets the reference current for lower limit judgment in patient leakage current tests.

## **SENS:PAT:JUDG:LOW:STAT**

Sets whether to judge with the lower current limit in patient leakage current tests.

## **SENS:PAT:NETW**

Sets the measurement circuit network that is compatible with the patient leakage current test standard.

## **SENS:PAT:NETW:PROB**

Sets the B terminal probe connection destination for patient leakage current tests.

## **SENS:PAT:PROB:A**

Queries the A terminal probe connection destination in patient leakage current tests.

## **SENS:PAT:RANG:AUTO**

Sets the measurement range for patient leakage current tests.

## **SENS:PAT:TIM**

Sets the test time for patient leakage current tests.

## **SENS:PAT:TIM:STAT**

Sets whether to set the test time in patient leakage current tests.

## **SENSe:PCC Command**

---

### **SENS:PCC:BAND**

Sets whether to expand the band of the internal voltmeter of this product in protective conductor current tests.

### **SENS:PCC:COND**

Sets the single fault mode for protective conductor current tests.

### **SENS:PCC:COND:FAUL**

Queries the disconnected condition at fault for protective conductor current tests.

### **SENS:PCC:CURR:MODE**

Sets the current measurement mode in protective conductor current tests.

### **SENS:PCC:JUDG**

Sets the reference current for upper limit judgment in protective conductor current tests.

### **SENS:PCC:JUDG:STAT**

Sets whether to judge with the upper current limit in protective conductor current tests.

### **SENS:PCC:JUDG:DEL**

Sets the time until starting judgments in protective conductor current tests.

### **SENS:PCC:JUDG:DEL:STAT**

Sets whether to set the judgment delay in protective conductor current tests.

### **SENS:PCC:JUDG:LOW**

Sets the reference current for lower limit judgment in protective conductor current tests.

### **SENS:PCC:JUDG:LOW:STAT**

Sets whether to judge with the lower current limit in protective conductor current tests.

### **SENS:PCC:NETW**

Sets the measurement circuit network to use in protective conductor current tests.

### **SENS:PCC:RANG:AUTO**

Sets the measurement range for protective conductor current tests.

### **SENS:PCC:TIM**

Sets the test time for protective conductor current tests.

### **SENS:PCC:TIM:STAT**

Sets whether to set the test time in protective conductor current tests.

## **SENSe:TC Command**

### **SENS:TC:BAND**

Sets whether to expand the band of the internal voltmeter of this product in touch current tests.

### **SENS:TC:COND**

Sets the single fault condition for touch current tests.

### **SENS:TC:COND:FAUL**

Sets the disconnected condition at fault for touch current tests.

## **SENS:TC:CURR:MODE**

Sets the current measurement mode in touch current tests.

## **SENS:TC:JUDG**

Sets the reference current for upper limit judgment in touch current tests.

## **SENS:TC:JUDG:STAT**

Sets whether to judge with the upper current limit in touch current tests.

## **SENS:TC:JUDG:DEL**

Set the time until starting judgments in touch current tests.

## **SENS:TC:JUDG:DEL:STAT**

Sets whether to set the judgment delay in touch current tests.

## **SENS:TC:JUDG:LOW**

Sets the reference current for lower limit judgment in touch current tests.

## **SENS:TC:JUDG:LOW:STAT**

Sets whether to judge with the lower current limit in touch current tests.

## **SENS:TC:NETW**

Sets the measurement circuit network to use in touch current tests.

## **SENS:TC:NETW:PROB**

Sets the B terminal probe connection destination for touch current tests.

## **SENS:TC:NETW:PROB:A**

Queries the A terminal probe connection destination in touch current tests.

## **SENS:TC:RANG:AUTO**

Sets the measurement range for touch current tests.

## **SENS:TC:TIM**

Sets the test time for touch current tests.

## **SENS:TC:TIM:STAT**

Sets whether to set the test time in touch current tests.

## **[SOURce:] command**

---

### **FUNC**

Set the test mode.

## [SOURce:]ACW Command

---

### ACW:VOLT

Sets the test voltage for AC withstanding voltage tests.

### ACW:VOLT:FREQ

Sets the test voltage frequency for AC withstanding voltage tests.

### ACW:VOLT:PROT

Sets the limit voltage for AC withstanding voltage tests.

### ACW:VOLT:STAR

Sets the start voltage as a percentage for AC withstanding voltage tests.

### ACW:VOLT:STAR:STAT

Sets whether to set the start voltage for AC withstanding voltage tests.

### ACW:VOLT:SWE:FALL:TIM

Sets the voltage fall time for AC withstanding voltage tests.

### ACW:VOLT:SWE:FALL:TIM:STAT

Sets whether to set the voltage fall time for AC withstanding voltage tests.

### ACW:VOLT:SWE:TIM

Sets the voltage rise time for AC withstanding voltage tests.

### ACW:VOLT:TIM

Sets the test time for AC withstanding voltage tests.

### ACW:VOLT:TIM:STAT

Sets whether to set the test time for AC withstanding voltage tests.

## [SOURce:]DCW Command

---

### DCW:VOLT

Sets the test voltage for DC withstanding voltage tests.

### DCW:VOLT:DISC:INT:STAT

Sets whether to discharge when interlock is activated in DC withstanding voltage tests.

### DCW:VOLT:DISC:TIM

Sets the discharge time for DC withstanding voltage tests.

## **DCW:VOLT:PROT**

Sets the limit voltage for DC withstanding voltage tests.

## **DCW:VOLT:STAR**

Sets the start voltage as a percentage for DC withstanding voltage tests.

## **DCW:VOLT:STAR:STAT**

Sets whether to set the start voltage for DC withstanding voltage tests.

## **DCW:VOLT:SWE:FALL:TIM**

Sets the voltage fall time for DC withstanding voltage tests.

## **DCW:VOLT:SWE:FALL:TIM:STAT**

Sets whether to set the voltage fall time for DC withstanding voltage tests.

## **DCW:VOLT:SWE:TIM**

Sets the voltage rise time for DC withstanding voltage tests.

## **DCW:VOLT:TIM**

Sets the test time for DC withstanding voltage tests.

## **DCW:VOLT:TIM:STAT**

Sets whether to set the test time for DC withstanding voltage tests.

## **[SOURce:]EC Command**

---

## **EC:AC:CURR**

Sets the test current for earth continuity tests (AC).

## **EC:AC:CURR:PROT**

Sets the limit current for earth continuity tests (AC).

## **EC:AC:CURR:SWE:FALL:TIM**

Sets the current fall time for earth continuity tests (AC).

## **EC:AC:CURR:SWE:FALL:TIM:STAT**

Sets whether to set the current fall time for earth continuity tests (AC).

## **EC:AC:CURR:SWE:TIM**

Sets the current rise time for earth continuity tests (AC).

## **EC:AC:CURR:TIM**

Sets the test time for earth continuity tests (AC).

### **EC:AC:CURR:TIM:STAT**

Sets whether to set the test time for earth continuity tests (AC).

### **EC:CURR:FREQ**

Sets the test current frequency for earth continuity tests (AC).

### **EC:DC:CURR**

Sets the test current for earth continuity tests (DC).

### **EC:DC:CURR:PROT**

Sets the limit current for earth continuity tests (DC).

### **EC:DC:CURR:SWE:FALL:TIM**

Sets the current fall time for earth continuity tests (DC).

### **EC:DC:CURR:SWE:FALL:TIM:STAT**

Sets whether to set the current fall time for earth continuity tests (DC).

### **EC:DC:CURR:SWE:TIM**

Sets the current rise time for earth continuity tests (DC).

### **EC:DC:CURR:TIM**

Sets the test time for earth continuity tests (DC).

### **EC:DC:CURR:TIM:STAT**

Sets whether to set the test time for earth continuity tests (DC).

## **[SOURce:]IR command**

### **IR:TERM:POL**

Queries the polarity of the power supplied to the output terminals in insulation resistance tests.

### **IR:VOLT**

Sets the test voltage for insulation resistance tests.

### **IR:VOLT:DISC:INT:STAT**

Sets whether to discharge when interlock is activated in insulation resistance tests.

### **IR:VOLT:DISC:TIM**

Sets the discharge time for insulation resistance tests.

### **IR:VOLT:PROT**

Sets the limit voltage for insulation resistance tests.

## **IR:VOLT:RANG**

Sets the output voltage range for insulation resistance tests.

## **IR:VOLT:STAR**

Sets the start voltage as a percentage for insulation resistance tests.

## **IR:VOLT:STAR:STAT**

Sets whether to set the start voltage for insulation resistance tests.

## **IR:VOLT:SWE:TIM**

Sets the voltage rise time for insulation resistance tests.

## **IR:VOLT:TIM**

Sets the test time for insulation resistance tests.

## **IR:VOLT:TIM:STAT**

Sets whether to set the test time for insulation resistance tests.

## **[SOURce:]PATient Command**

---

### **PAT:110P:OUTP**

Sets whether to apply the voltage applied from the 110% terminal to the AC LINE IN inlet in patient leakage current tests.

### **PAT:110P:POL**

Sets the polarity of the voltage applied from the 110% terminal in patient leakage current tests.

### **PAT:POL**

Sets the polarity of the power supply line supplied to the EUT for patient leakage current tests.

## **[SOURce:]PCC Command**

---

### **PCC:POL**

Sets the polarity of the power supply line for protective conductor current tests.

## **[SOURce:]TC Command**

---

### **TC:110P:OUTP**

Sets whether to apply the voltage applied from the 110% terminal to the AC LINE IN inlet in touch current tests.

## **TC:110P:POL**

Sets the polarity of the voltage applied from the 110% terminal in touch current tests.

## **TC:POL**

Sets the polarity of the power supply line supplied to the EUT for touch current tests.

## **STATus Command**

---

### **STAT:OPER**

Queries the event of the OPERation status register.

### **STAT:OPER:COND**

Queries the condition of the OPERation status register.

### **STAT:OPER:ENAB**

Sets the enable register of the OPERation status register.

### **STAT:OPER:NTR**

Sets the negative transition filter of the OPERation status register.

### **STAT:OPER:PTR**

Sets the positive transition filter of the OPERation status register.

### **STAT:OPER:PROT**

Queries the event of the OPERation:PROTeCting status register.

### **STAT:OPER:PROT:COND**

Queries the condition of the OPERation:PROTeCting status register.

### **STAT:OPER:PROT:ENAB**

Sets the enable register of the OPERation:PROTeCting status register.

### **STAT:OPER:PROT:NTR**

Sets the negative transition filter of the OPERation:PROTeCting status register.

### **STAT:OPER:PROT:PTR**

Sets the positive transition filter of the OPERation:PROTeCting status register.

### **STAT:OPER:TEST**

Queries the event of the OPERation:TESTing status register.

### **STAT:OPER:TEST:COND**

Queries the condition of the OPERation:TESTing status register.

## **STAT:OPER:TEST:ENAB**

Sets the enable register of the OPERATION:TESTing status register.

## **STAT:OPER:TEST:NTR**

Sets the negative transition filter of the OPERATION:TESTing status register.

## **STAT:OPER:TEST:PTR**

Sets the positive transition filter of the OPERATION:TESTing status register.

## **STAT:QUES**

Queries the event of the QUESTIONable status register.

## **STAT:QUES:COND**

Queries the condition of the QUESTIONable status register.

## **STAT:QUES:ENAB**

Sets the enable register of the QUESTIONable status register.

## **STAT:QUES:NTR**

Sets the negative transition filter of the QUESTIONable status register.

## **STAT:QUES:PTR**

Sets the positive transition filter of the QUESTIONable status register.

## **STAT:PRES**

Resets the ENABLE, PTRansition, and NTRansition filter registers of all status registers (including sub registers) to their default values.

## **SYSTEM Command**

---

### **SYST:BEEP**

Turns all buzzers on and off.

### **SYST:BEEP:KEY**

Turns on or off the buzzer that sounds when an invalid key is pressed.

### **SYST:BEEP:PROT**

Turns on or off the buzzer that sounds when a protection function is activated.

### **SYST:BEEP:SCPI**

Turns on or off the buzzer that sounds when an SCPI error occurs.

### **SYST:COMM:PROT:WDOG**

Enables or disables the communication monitoring (WATCHDOG) timer.

## **SYST:COMM:PROT:WDOG:DEL**

Sets the delay time of the communication monitoring (WATCHDOG) timer.

## **SYST:COMM:RLST**

Switches the TOS93 to local or remote mode.

## **SYST:DATE**

Sets the date.

## **SYST:ERR**

Reads the oldest error information or event information from the error queue.

## **SYST:ERR:COUN**

Returns the number of unread errors in the error queue.

## **SYST:KLOC**

Sets or releases panel control lock.

## **SYST:KLOC:LEV**

Sets the panel control lock level.

## **SYST:PASS**

Enables a password-protected command.

## **SYST:PASS:CDIS**

Disables the password-protected command.

## **SYST:PASS:NEW**

Sets the password.

## **SYST:PASS:STAT**

Queries the enabled/disabled state of the password-protected command.

## **SYST:LOC/ SYST:REM/ SYST:RWL**

This is an old style command.

## **SYST:SEC:IMM**

Sanitizes all contents stored in memory and initializes the panel settings to their factory default conditions.

## **SYST:SSAV**

Enables or disables the screen saver.

## **SYST:SSAV:DEL**

Sets the time until the screen saver starts.

## **SYST:TIME**

Sets the time.

## **SYST:TIME:ADJ**

Automatically synchronizes the system clock using the NTP server on the network.

## **SYST:TZON**

Sets the time zone of the system clock.

## **SYST:TZON:CAT**

Queries the time zone IDs that can be used.

## **SYST:VERS**

Queries the version of the SCPI specifications that the product complies with.

## **SYSTEM:CONFigure Command**

### **SYST:CONF:BEEP:VOL**

Sets the volume level of the buzzer that is sounded when a FAIL judgment occurs.

### **SYST:CONF:BEEP:VOL:PASS**

Sets the volume level of the buzzer that is sounded when a PASS judgment occurs.

### **SYST:CONF:CAL:DUE:CONT**

Sets the calibration period.

### **SYST:CONF:CAL:PROT:STAT**

Sets whether to activate the protection function and switch to protection mode when the calibration period is expired.

### **SYST:CONF:DACT:STAT**

Enables or disables the double action function.

### **SYST:CONF:FMOD:STAT**

Enables or disables the fail mode.

### **SYST:CONF:MOM:STAT**

Enables/disables momentary.

### **SYST:CONF:PHOL**

Sets the length of time that a PASS judgment result will be held.

### **SYST:CONF:PON:STAT**

Sets the condition panel setting state when the POWER switch is turned on.

### **SYST:CONF:SIO:JUDG:STAT**

Turns on or off the judgment result output at STEP END of the SIGNAL I/O connector.

### **SYST:CONF:SLPR:STAT**

Enables/disables the start long function.

### **SYST:CONF:SOUT:FAIL:LOW:STAT**

Sets whether to output a signal from the STATUS OUT connector during "L-FAIL."

### **SYST:CONF:SOUT:FAIL:UPP:STAT**

Sets whether to output a signal from the STATUS OUT connector during "U-FAIL."

### **SYST:CONF:SOUT:HVON:STAT**

Sets whether to output a signal from the STATUS OUT connector while voltage is residing or while a test is in progress.

### **SYST:CONF:SOUT:PASS:STAT**

Sets whether to output a signal from the STATUS OUT connector during "PASS."

### **SYST:CONF:SOUT:PON:STAT**

Sets whether to output a signal from the STATUS OUT connector while the POWER switch is turned on.

### **SYST:CONF:SOUT:PROT:STAT**

Sets whether to output a signal from the STATUS OUT connector during protection mode.

### **SYST:CONF:SOUT:READ:STAT**

Sets whether to output a signal from the STATUS OUT connector during "READY."

### **SYST:CONF:SOUT:TEST:STAT**

Sets whether to output a signal from the STATUS OUT connector while the test voltage is at the set value.

## **TRIGger Command**

### **TRIG:TEST**

Executes a software trigger on the TEST trigger subsystem.

### **TRIG:TEST:SOUR**

Sets the condition (trigger source) for actually starting the test after the TEST trigger subsystem receives an INIT:TEST.

# Introduction

The TOS9300 Series Communication Interface Manual explains the settings that are used to control the TOS9300 series remotely through the following interfaces and the available commands.

- RS232C interface
- USB interface
- LAN interface

When the product is operating under remote control, REMOTE appears on the front panel display. To switch the product back to local mode from the front panel, press LOCAL.

For the safety precautions, installation, operation, and specifications of the product, read the accompanying TOS9300 Series User's Manual.

## ■ Reading environment

This manual is in PDF format. The following environments are recommended for reading this manual.

PDF Reader: Adobe Reader

## ■ Intended readers

This manual is written for readers with sufficient basic knowledge of how to control measuring instruments using a PC.

Familiarize yourself with the syntax of the SCPI commands that are used with the product before you use them.

## ■ Structure of the manual

This manual consists of the following sections.

- Overview
- Setup
- Message Overview
- Commands
- Tutorial
- Appendix

## ■ Trademarks

Microsoft Windows is a trademark of Microsoft Corporation in the United States and/or other countries.

All other company and product names used in this guide are trademarks or registered trademarks of their respective owners.

## ■ Firmware version of the product to which this manual applies

This manual applies to products with firmware versions 1.1x.

## ■ Measuring instrument interface standards

This product complies with the following standards.

- IEEE Std 488.2-1992 IEEE Standard Codes, Formats, Protocols, and Common Commands For Use With IEEE Std 488.1-1987
- IEEE Std 488.1-1987 IEEE Standard Digital Interface for Programmable Instrumentation
- Standard Commands for Programmable Instruments (SCPI) version 1999.0
- Universal Serial Bus Specification Rev 2.0
- Universal Serial Bus Test and Measurement Class Specification (USBTMC) Rev 1.0
- Universal Serial Bus Test and Measurement Class, Subclass USB488 Specification (USBTMC-USB488) Rev 1.0
- TCP/IP Instrument Protocol Specification VXI-11 Rev 1.0 1995
- TCP/IP-IEEE488.2 Interface Specification VXI-11.3 Draft 0.3 1995
- 1.5 LXI Device Specification 2016
- LXI HiSLIP Extended Function Rev 1.01
- IVI-6.1 IVI High-Speed LAN Instrument Protocol (HiSLIP) Rev 1.0
- VPP-4.3 The VISA Library 2015 Rev 5.5

## ■ Copyright

The contents of this manual may not be reproduced, in whole or in part, without the prior consent of the copyright holder.

The specifications of this product and the contents of this manual are subject to change without prior notice.

Copyright©2018 KIKUSUI ELECTRONICS Corp.

# Setup

## Installing the VISA Library

VISA (Virtual Instrument Software Architecture) was developed by the IVI Foundation. It is the standard specification for measurement instrument connection software.

To use the VISA library (VISA COM) with the I/O library, the VISA library must be installed on the controller (Windows).

You have to install one of the following VISA libraries (driver software that is implemented according to the VISA specifications).

- NI-VISA by National Instruments Corporation (Ver. 5.1.1 or later)
- Keysight VISA (Keysight IO Libraries Suite 16.0 or later) by Keysight Technologies
- KI-VISA Ver. 5.0.4 or later

—Note—

- Depending on the interface, you may not be able to use your VISA library if it is an older version than that specified.
- Do not install multiple VISA libraries on the same PC. Doing so may cause errors.

## Setting Up the Interface

---

The product is standard equipped with RS232C, USB, and LAN interfaces.

There is no need to switch interfaces. All interfaces can be used simultaneously. Each interface can be turned off using CONFIG settings.

RS232C

USB

LAN

Accessing and Operating the Product from a Web Browser (LAN)

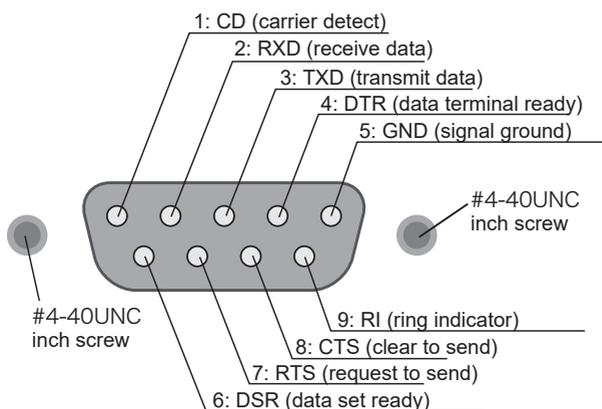
## RS232C

### ■ RS232C connection

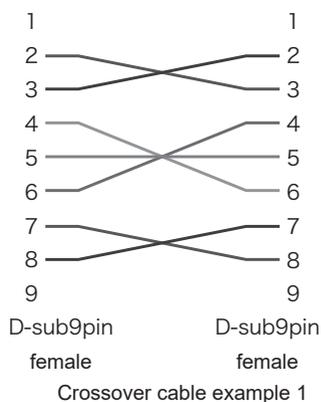
The RS232C port on the product side is D-sub 9-pin. Check that the product and your PC are off, and then connect them.

For the RS232C cable, use a D-sub, 9-pin, female-to-female AT crossover cable.

The following figure shows the connector pinout when you are facing the rear panel.



Viewing the front panel



## ■ Protocol

The RS232C protocol is shown in the following table.

The underlined value is the factory default value.

| Parameter               | Value  |
|-------------------------|--|
| Baudrate: Baud rate     | 9 600 bps/ <u>19 200 bps</u> / 38 400 bps/ 57 600 bps/ 115 200 bps |
| Data: Data length       | 8 bit (fixed)  |
| Stop: Stop bits         | 1 bit (fixed)  |
| Parity: Parity          | None (fixed)   |
| Flow Ctrl: Flow control | CTS/RTS, none  |

## ■ RS232C settings

For details, see the user's manual.

- 1 Press SYSTEM > Interface.**
- 2 Press Modify, and use the rotary knob to select the parameter you want to change.**
- 3 Press Edit, and then use the numeric keypad or the rotary knob to select the appropriate value.**  
Press ENTER to continue setting other parameters.
- 4 Press Apply.**  
A confirmation screen appears.
- 5 Press ENTER.**  
To cancel, use the rotary knob to select NO, and then press ENTER.

## ■ Break signal

The break signal is used as a substitute for the IEEE488.1 dcl/sdc (Device Clear, Selected Device Clear) message.

—Note—

To use the RS232C interface, a "SYST:COMM:RLST REM" command must be sent to set the product to remote mode. To use remote programming, send "SYST:COMM:RLST REM" at the beginning of the program.

## USB

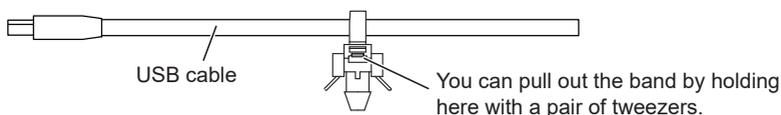
To use the USB interface to control the product, a device driver that supports the USB Test & Measurement class (USBTMC) must be installed on the controller. The USBTMC driver is installed automatically by the VISA library.

### ■ USB connection

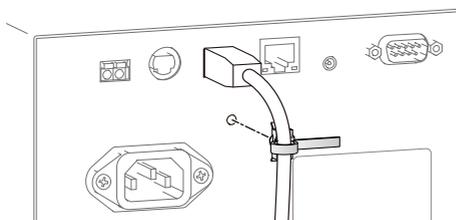
Connect the product to a PC using a USB cable. To prevent the USB cable from coming loose unexpectedly, fix the cable to the product using a cable tie.

#### 1 Use the included cable tie to gently tie the cables as shown below.

The cable tie can be reused. Do not cut the extraneous portion of the tie.



#### 2 Attach the tip of the cable tie to the product as shown below.



#### 3 Firmly tighten the cable tie so that the USB cables do not come loose.

### ■ Service request

The product is equipped with service request and serial polling functions.

## ■ USB function

Complies with USB specification 2.0

Complies with USBTMC specification 1.0 and USBTMC-USB488 specification 1.0

Baud rate: 480 Mbps maximum (high speed)

VID (vendor ID)

0x0B3E

PID (product ID)

0x104F

## LAN

---

To use the LAN interface to control the product, middleware that supports the SCPI-Telnet, VXI-11, HiSLIP, or SCPI-RAW protocol is required. The middleware is installed automatically by the VISA library.

The LAN interface board has a Web browser interface (Web Browser Interface). You can configure the LAN interface settings from your PC's Web browser.

For information on topics such as connecting to your corporate LAN, your IP address, your host name, and security, contact your network administrator.

If you are using a host name (a Bonjour host name), you have to install Apple Bonjour.

### ■ LAN connection

Use a standard LAN cable (category 5 and straight) to connect the product to a network hub or router.

## ■ LAN settings

Normally, set “IP Address Method” to “Automatic” (factory default setting).

To set the IP address manually, set IP Address Method to Static, and then set the IP address.

For details, see the user’s manual.

- 1 Press SYSTEM > Interface.**
- 2 Press Modify, and use the rotary knob to select the parameter you want to change.**
- 3 Press Edit, and then use the numeric keypad or the rotary knob to select the appropriate value.**  
Press ENTER to continue setting other parameters.
- 4 Press Apply.**  
A confirmation screen appears.
- 5 Press ENTER.**  
The LAN interface restarts, and the settings are applied. To cancel, use the rotary knob to select NO, and then press ENTER.

### WARNING

**Possible damage to the equipment and electric shock. The LAN interface can be accessed from anywhere on the network that the product is connected to. Change the security settings if necessary. The security settings that you can apply are: password protection and IP address access control.**

### —Note—

To use the LAN interface, a “SYST:COMM:RLST REM” command must be sent to set the product to remote mode. To use remote programming, send “SYST:COMM:RLST REM” at the beginning of the program.

## ■ Service request

The product is equipped with service request and serial polling functions.

## ■ LAN function

Complies with LXI 1.5 Core 2016

Complies with the SCPI-Telnet, VXI-11, HiSLIP, and SCPI-RAW protocols

Baud rate: 100 Mbps maximum (auto negotiation)

AUTO MDIX

From your Web browser, you can:

Instrument information, network information, display of VISA resource information, checking the connected TOS9300, remote control from browser, changing network settings, license information, password setting

## ■ Restarting the LAN interface

You can use the SYSTEM settings to restart the LAN interface. Even if you restart the LAN interface, the settings that you have specified do not change. This operation does not affect the product's panel settings.

**1** Press **SYSTEM > Interface**.

**2** Press **Modify**.

**3** Press **Apply**.  
A confirmation screen appears.

**4** Press **ENTER**.  
The LAN interface restarts.

## ■ Resetting or Initializing the LAN interface

You can use the SYSTEM settings to reset or initialize the LAN settings.

When reset or initialized, network settings are changed as follows.

The items with an X mark are returned to their default values.

| Reset | default values, resetting to | Parameter                              | Default value  |
|-------|------------------------------|--|--|
| X     | X                            | IP Address Assignment                  | Auto   |
|       | X                            | DNS Server Assignment                  | 0.0.0.0  |
|       | X                            | WINS Server Assignment                 | 0.0.0.0  |
|       | X                            | Desired Hostname                       | Model name and serial number   |
|       | X                            | Desired Description                    | KIKUSUI XXXX Electrical Safety Analyzer (XXXX is the model name) and serial number |
| X     | X                            | Enable Dynamic DNS                     | Enable   |
| X     | X                            | Enable mDNS                            | Enable   |
| X     | X                            | Enable NetBIOS Over TCP/IP             | Enable   |
| X     | X                            | Password for the Web browser interface | Not set  |

### Resetting

- 1 Press SYSTEM > Interface.**
- 2 Press Modify > LAN Reset.**  
A confirmation screen appears.
- 3 Press ENTER.**  
The LAN interface settings are reset.

### Returning to factory default settings (Initializing)

- 1 Press SYSTEM > Interface.**
- 2 Press Modify > Default.**  
A confirmation screen appears.
- 3 Press ENTER.**  
The LAN interface settings are returned to their factory default settings.

## Accessing and Operating the Product from a Web Browser (LAN)

---

You can configure the LAN interface settings from your PC's Web browser. Use the latest browser version.

The website URL is the IP address with `http://` added in front of it.

Use SYSTEM settings to check the IP address, and enter the URL directly in the browser's address bar.

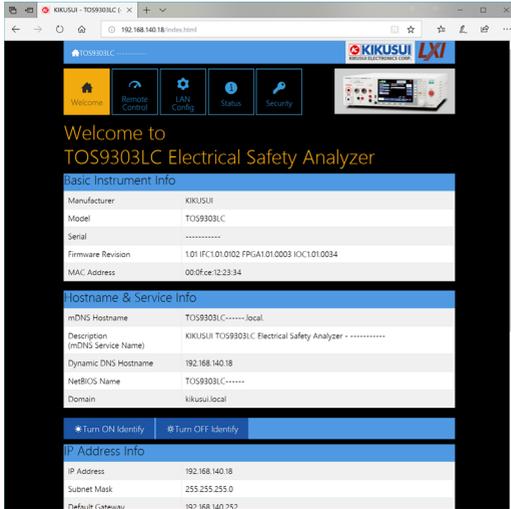
If a VISA library is in use, a function for searching the VXI-11 measurement instrument with the application supplied by the vendor (National Instruments NI-MAX, Keysight Connection Expert, Kikusui KI-VISA Instrument Explorer, or the like) is available. You can open the Web browser interface by simply searching for the instrument and clicking the Web link that appears in the search result.

Example: When the IP address is 169.254.7.8

`http://169.254.7.8`

## ■ WELCOME page

When you connect to the Web browser interface, a WELCOME page appears first. This page shows the measuring instrument information, network information, and VISA resource (I/O resource) information. Click the navigation menu to go to another page.



Turn ON Identify: “LXI Web Identify” appears in the front panel display of the connected TOS93. This allows you to identify the connected TOS93.

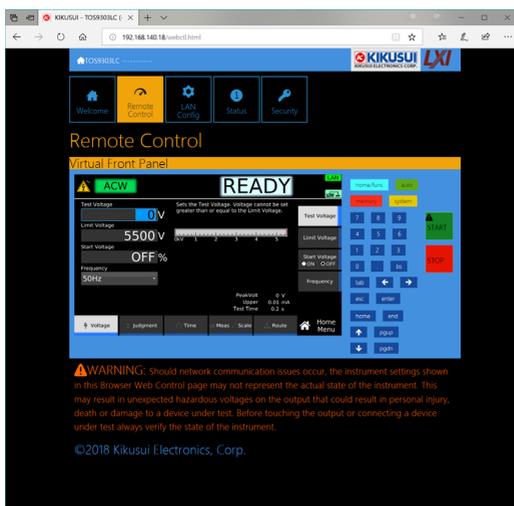
Turn OFF Identify: The displayed “LXI Web Identify” disappears.

## Remote Control page

You can remotely control the TOS93 from a browser. The various buttons have the same functions as those on the front panel of the TOS93.

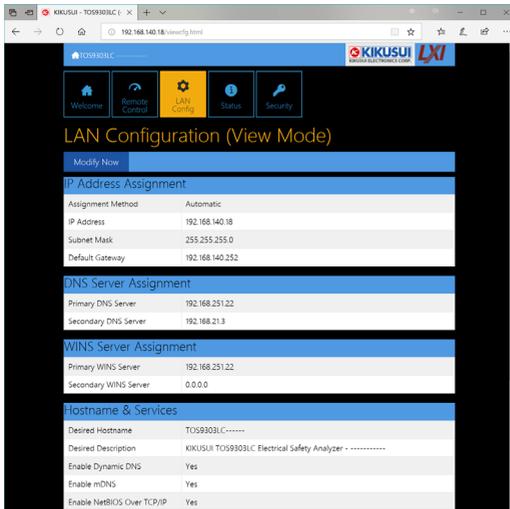
If you control the TOS93 from the Remote Control page, display updating slows down, but this does not affect the actual operation.

If you turn off the TOS93 while the Remote Control page is displayed, the settings will not be saved. To save the settings, close the browser, and then turn off the power.



## ■ LAN Configuration page

You can display (View Mode) and change (Modify Mode) the network settings.



### Navigation (View Mode)

Modify Now: Changes to the network setting edit screen (Modify Mode).

### Navigation (Modify Mode)

Undo: Returns the edited contents to the state before editing.

Apply: Applies the edited contents.

Reset: Resets the network settings.

Default: Returns the network settings to the factory default settings.

Back to View Mode: Changes to the network setting view screen (View Mode).

### IP Address Assignment

You can set the IP address. You can choose between automatic assignment and assignment of a fixed address.

In the case of automatic assignment of IP address, we recommend using the DHCP server function using a router as far as possible.

If the DHCP server function is not used, it takes about 60 seconds until determination that address assignment with DHCP has failed. Then, an address between 169.254.0.0 to 169.254.255.255 is assigned by link local address (Auto-IP).

## DNS Server Assignment

Sets the address of the DNS server.

## WINS Server Assignment

Sets the address of the WINS server.

## Hostname & Services

You can set the host name and so on. If you set the host name, you can use it in place of the IP address to access the LAN interface. Normally, we recommend that you select “Enable Dynamic DNS”, “Enable mDNS”, and “Enable NetBIOS Over TCP/IP”.

If you leave the Hostname and Description boxes empty and click “Apply,” the host name will be created from the model name and serial number.

## TCP Ports (View Mode)

The number of the TCP port in use is displayed. You cannot change the port number.

## Reset and factory default settings

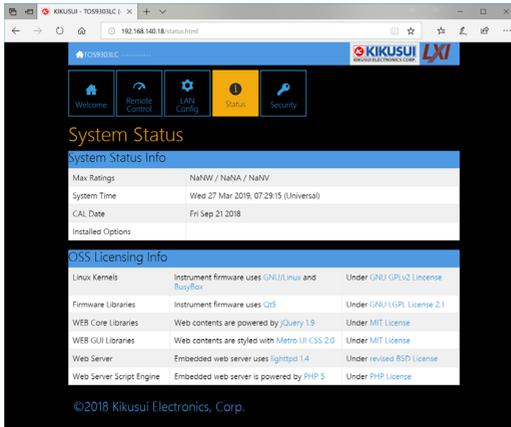
If you click Reset or Default, network settings are changed as follows.

The items with an X mark are returned to their default values.

| Reset | Default | Item                       | Default value  |
|-------|---------|----------------------------|--|
| X     | X       | IP Address Assignment      | Automatic  |
| X     | X       | DNS Server Assignment      | 0.0.0.0  |
| X     | X       | WINS Server Assignment     | 0.0.0.0  |
|       | X       | Desired Hostname           | Model name and serial number   |
|       | X       | Desired Description        | KIKUSUI XXXX Electrical Safety Analyzer (XXXX is the model name) and serial number |
| X     | X       | Enable Dynamic DNS         | Enable   |
| X     | X       | Enable mDNS                | Enable   |
| X     | X       | Enable NetBIOS Over TCP/IP | Enable   |

## ■ System Status page

This page shows the system information and the license information of the open-source software.



The screenshot shows a web browser window displaying the 'System Status' page of a Kikusui device. The browser address bar shows '192.168.140.18/status.html'. The page has a dark theme and a navigation menu with icons for Welcome, Remote Control, LAN Config, Status (highlighted), and Security. The main content is divided into two sections: 'System Status Info' and 'OSS Licensing Info'.

**System Status Info**

|                   |                                      |
|-------------------|--------------------------------------|
| Max Ratings       | NaNW / NaNVA / NaNV                  |
| System Time       | Wed 27 Mar 2019 07:29:15 (Universal) |
| CAL Date          | Fri Sep 21 2018                      |
| Installed Options |                                      |

**OSS Licensing Info**

|                          |  |                            |
|--------------------------|--|----------------------------|
| Linux Kernels            | Instrument firmware uses GNU/Linux and Busybox | Under GNU GPLv2 License    |
| Firmware Libraries       | Instrument firmware uses Qt5                   | Under GNU LGPL License 2.1 |
| WEB Core Libraries       | Web contents are powered by jQuery 1.9         | Under MIT License          |
| WEB GUI Libraries        | Web contents are styled with Metro UI CSS 2.0  | Under MIT License          |
| Web Server               | Embedded web server uses lighttpd 1.4          | Under revised BSD License  |
| Web Server Script Engine | Embedded web server is powered by PHP 5        | Under PHP License          |

©2018 Kikusui Electronics, Corp.

## ■ Password Security page

You can set and change the password for the Web browser interface here.



When a password has been set, that password is required in order to use the following functions.

- Remote control from Remote Control page
- Editing of LAN Configuration page
- Changing/deleting the password

### Set New Password

Enter the password (4 to 15 characters).

You can use alphanumeric characters, hyphens, and underscores for the password.

### Changing or deleting the password

After the password has been set, the screen for changing the password appears when you enter the password.

To change the password, enter the present password in “Current Password”, enter the new password in “New Password” and “Confirm Password”, and then click “Apply”.

To disable password protection, enter the present password in “Current Password”, leave “New Password” and “Confirm Password” blank, and click “Apply”.

### If you forget the password

If you forget the password, reset the LAN interface setting in the SYSTEM settings or initialize the product to its factory default settings.

# About Commands

The information that is transferred between the controller (PC) and the device (TOS93 series) is referred to as messages.

This product uses the SCPI language for these messages.

The messages that the PC sends to the product are commands. The messages that the product sends to the PC are responses.

## Command Hierarchy

SCPI is an ASCII-based command language that was designed for test and measuring equipment. The command structure is composed of the common roots and nodes that are the building blocks of the SCPI subsystem. A command consists of a program header, parameters, and punctuation marks.

The following table uses the SOURce subsystem as an example to explain the hierarchy.

| Program header | Parameter   | Node level |
|----------------|-------------|------------|
| [SOUR]         |             | Root node  |
| :DCW           |             | 2nd level  |
| :VOLT          |             | 3rd level  |
| :STAR          | <boolean>   | 4th level  |
| :IR            |             | 2nd level  |
| :VOLT          |             | 3rd level  |
| :RANG          | <character> | 4th level  |
| :STAR          | <character> | 4th level  |

A colon (:) separates a higher node from a lower node.

## Command Syntax

---

In this manual, SCPI commands are expressed in the following format.

```
[SOURce:] [ACW:] VOLTage[:LEVel] [:IMMediate] [:AMPLitude] <numeric>
```

SCPI commands are also available in the short form. In the short form, the lower-case characters in SCPI commands are omitted.

SCPI commands can be sent either in the long form or short form. Because SCPI commands are not case-sensitive, VOLT, Volt, and volt are all acceptable as short form notations. In the long form, VOLTAGE, Voltage, and voltage are all acceptable.

- A space separates a program header and its parameters.
- Multiple parameters are separated by commas.
- Multiple commands are separated by semicolons (compound command).

```
VOLTage:START:LEVel 50PCT;STATE ON
```

In the second command, VOLTage:START: is omitted. This is possible because that path is set to VOLTage:START by the first command (VOLTage:START:LEVel).

This compound command is equivalent to entering the following commands.

```
VOLTage:START:LEVel 50PCT
```

```
VOLTage:START:STATE ON
```

If you specify a node that is not defined in the current path, an error will occur.

By using colons and semicolons, you can concatenate commands of different sub-systems.

```
SOURce:FUNCTion ACW;:SENSe:CURRent:SECondary PHOLd
```

There are two root nodes in this compound command: SOURce and SENSe.

When the second command or later begins with a colon, the path that was specified by the previous command is cleared.

- The maximum length of a command that you can transmit on a single line is 512 bytes.

## ■ Special symbols

The special symbols that are used in this manual for the SCPI command syntax are explained below.

- Characters and numbers enclosed by { and } and delimited by “|” indicate that one of the delimited items is to be selected.  
Do not include the { and } symbols in the actual program.
- <> denotes program data.  
Do not include the < and > symbols in the actual program.
- [ ] denotes optional data.  
When optional data is not sent with the program, the default value is applied.  
Do not include the [ and ] symbols in the actual program.

## ■ Query

You can query the device settings and status.

To make a query, append a question mark to the end of the program header section.

If the query has parameters, insert a space after the question mark, and then write the parameters.

```
VOLTage? MIN
```

## Response

This is the response to a query. It is a message always sent from the device to the PC. It conveys device status or measured value to the PC.

—Note—

If you want to send two queries on separate lines, send the second query after you have received the response to the first one.

## ■ Program terminator

All commands must be terminated with a valid terminator.

The terminator for reception and transmission is either LF (line feed, ASCII 0x0A) or EOI (end of identify, USB only).

When you terminate a command string, the path is reset to the root level.

—Note—

CR (ASCII 0x0D) is not a terminator.

## ■ Common Commands

There are commands that are common to the IEEE488.2 and SCPI standards for functions such as resetting devices and performing self-diagnoses. These common commands start with an asterisk (“\*”). These commands may have one or multiple parameters.

## Parameters

---

The SCPI parameter format is derived from the program parameter format that is defined in IEEE 488.2.

The program data expression format that the this product uses is shown below.

### ■ Non-numeric parameters

#### String data (String)

String data is used when a series of ASCII characters (20H to 7EH) are requested. Enclose strings in single ( ' ') or double quotation ( " ") marks. The opening and closing quotation marks must match (you cannot mix single and double quotation marks).

```
PROGram:CREate "/BASIC/My test program"
```

If you want to include a quotation mark as part of the string, enter consecutive quotation marks (with no characters between them).

#### Character data (Character)

Character data is used when only a limited number of values are available for a program setting. Responses are returned in short form.

```
TRIGger:TEST:SOURce {IMMediate|BUS|EXTernal|ONCE}
```

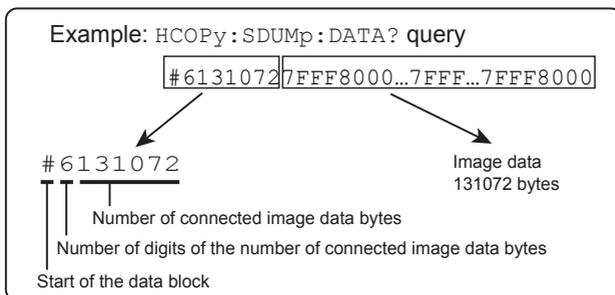
#### Boolean data (Boolean)

Boolean data is used to express a condition of 1 or 0, or ON or OFF. Responses are returned as 1 or 0.

```
SYSTem:BEEPer {ON|OFF|1|0}
```

## Block data (block)

Arbitrary block data that starts with #.



## ■ Numeric parameters

### NR1

Represents an integer value.

Details are given in the “IEEE 488.2 Standard Digital Interface for Programmable Instrumentation.”

If a 0 is returned in the response data, it is returned as +0.

### NR2

Represents a real number in floating-point format.

Details are given in the “IEEE 488.2 Standard Digital Interface for Programmable Instrumentation.”

### NR3

Represents a real number in scientific notation.

Details are given in the “IEEE 488.2 Standard Digital Interface for Programmable Instrumentation.”

If 380 is returned in the response data, it is returned as +3.80000E+02. Five decimal places are used.

**NRf**

NRf is a generic term that includes NR1, NR2, and NR3.

If a value outside the setting range is specified, an error (-222, "Data out of range") will occur.

**Numeric**

Numeric parameter for values such as the decimal point, optional prefixes, and measurement units.

Numbers are expressed the same as NRf.

MINimum, MAXimum, and the like are available as substitutes for declaring certain values.

You can also use units such as V, A, and W in numeric parameters.

If a value outside the setting range is specified, an error (-222, "Data out of range") will occur.

## ■ Special form numeric parameters

The special form numeric parameters MINimum and MAXimum can be used as substitutes for the actual maximum and minimum values when the parameter is numeric.

In the following example, the test voltage of the ACW test is set to the minimum value.

```
ACW:VOLTage MINimum
```

You can query the minimum and maximum values for most parameters.

```
ACW:VOLTage? MAX
```

```
ACW:VOLTage? MIN
```

## ■ Measurement units

The default measurement units are listed below. Commands are accepted even if measurement units are not specified.

- V (voltage)
- A (current)
- HR (hours)
- MIN (minutes)
- S (seconds)
- C (electric charge)
- HZ (frequency)
- OHM (resistance)

The following optional prefixes are supported. If you use optional prefixes, specify the measurement unit.

- G (giga)
- MA (mega)
- M (milli, mega)
- K (kilo)
- U (micro)

### —Note—

- The unit symbols in the International System of Units contain lowercase characters. The IEEE standard uses uppercase characters. SCPI commands are not case sensitive.
- Commands are accepted whether or not measurement units are specified.
- The optional prefix “M” is interpreted as “mega” when the measurement unit is “HZ” or “OHM.” For other measurement units, it is interpreted as “milli.”
- To enter “ $\mu$ ” in the data, use “U” instead.

# IEEE 488.2 common commands

## \*CLS

Clears all event registers including the status byte, event status, and error queue.

Clears the operation complete standby that was created by the \*OPC or \*OPC? command.

### **Command**

\*CLS

## \*ESE

Sets the event status enable register that is counted by the event summary bit (ESB) of the status byte.

### **Command**

\*ESE <NRf>

\*ESE?

### **Parameter**

Value: 0 to 255

Example: When \*ESE 16 is transmitted, bit 4 of the event status enable register is set. Each time the execution error bit (bit 4) of the event status register is set, the summary bit (ESB) of the status byte is set.

Response: NR1

**\*ESR**

Queries the event status register.

The event status register is cleared when read.

**Command**

\*ESR?

Response: NR1

**\*IDN**

Queries the model name and firmware version of the product.

**Command**

\*IDN?

Response

Returns the following information in response to \*IDN?.

Response example: For a TOS9301 with serial number AB123400 and firmware version IFO0.53.0086, FPGA0.126.0011, IOC0.07.0062

```
KIKUSUI,TOS9301,AB123400,IFO0.53.0086 FPGA0.126.0011 IOC0.07.0062
```

is returned.

## \*OPC

Sets the OPC bit (bit 0) of the event status register when all the commands that are in standby have been processed.

See IEEE 488.2-1992 section 12.5.3.

### **Command**

\*OPC

\*OPC?

### **Response**

Returns "1" when the processing of all commands in standby is complete.

## \*OPT

Queries the options that are installed in the product.

### **Command**

\*OPT?

### **Response**

Returns the installed options in comma-separated string format. Returns "0" if no options are installed.

**\*PSC**

Sets whether the event status enable register and service request enable register are cleared when the POWER switch is turned on.

**Command**

```
*PSC <boolean>
```

```
*PSC?
```

Parameter <boolean>

Value: ON(1) When the POWER switch is turned on, the \*ESE and \*SRE settings are cleared.

OFF(0) When the POWER switch is turned on, the \*ESE and \*SRE settings are not cleared.

Example To enable the power-on SRQ function:

```
*PSC 0;*SRE 32;*ESE 128
```

Response: NR1

**\*RCL**

Recalls memory content.

Clears alarms.

Aborts the trigger subsystem operation.

**Command**

```
*RCL <NRf>
```

Parameter

Value: 0 to 50 memory number

Example

```
*RCL 1
```

## \*RST

Resets the panel settings (see the table below).

Clears alarms (if they cannot be cleared, alarms continue).

Aborts the trigger subsystem operation.

Clears the OPC bit (bit 0) of the status event register.

| Command                    | *RST    | Command                      | *RST  |
|----------------------------|---------|------------------------------|-------|
| ACW:VOLT                   | 0V      | DCW:VOLT:DISC:TIM            | 0S    |
| ACW:VOLT:FREQ              | 50HZ    | DCW:VOLT:PROT                | 7500V |
| ACW:VOLT:PROT              | 5500V   | DCW:VOLT:STAR                | 50PCT |
| ACW:VOLT:STAR              | 50PCT   | DCW:VOLT:STAR:STAT           | OFF   |
| ACW:VOLT:STAR:STAT         | OFF     | DCW:VOLT:SWE:FALL:TIM        | 0.1S  |
| ACW:VOLT:SWE:FALL:TIM      | 0.1S    | DCW:VOLT:SWE:FALL:TIM:STAT   | OFF   |
| ACW:VOLT:SWE:FALL:TIM:STAT | OFF     | DCW:VOLT:SWE:TIM             | 0.1S  |
| ACW:VOLT:SWE:TIM           | 0.1S    | DCW:VOLT:TIM                 | 0.2S  |
| ACW:VOLT:TIM               | 0.2S    | DCW:VOLT:TIM:STAT            | ON    |
| ACW:VOLT:TIM:STAT          | ON      | DISP:ACW:CURR:PHOL           | OFF   |
| CALC:ACW:SCAL              | OFF     | DISP:DCW:CURR:PHOL           | OFF   |
| CALC:ACW:SCAL:OFFS         | 0A      | DISP:EC:CURR:PHOL            | OFF   |
| CALC:ACW:SCAL:OFFS:IMAG    | 0A      | DISP:EC:DC:CURR:PHOL         | OFF   |
| CALC:DCW:SCAL              | OFF     | DISP:IR:RES:PHOL             | OFF   |
| CALC:DCW:SCAL:OFFS         | 0A      | DISP:PAT:CURR:PHOL           | OFF   |
| CALC:EC:DC:SCAL            | OFF     | DISP:PCC:CURR:PHOL           | OFF   |
| CALC:EC:DC:SCAL:OFFS       | 0OHM    | DISP:TC:CURR:PHOL            | OFF   |
| CALC:EC:SCAL               | OFF     | EC:AC:CURR                   | 3A    |
| CALC:EC:SCAL:OFFS          | 0OHM    | EC:AC:CURR:PROT              | 42A   |
| CALC:IR:SCAL               | OFF     | EC:AC:CURR:SWE:FALL:TIM      | 0.1S  |
| CALC:IR:SCAL:OFFS          | 100MOHM | EC:AC:CURR:SWE:FALL:TIM:STAT | OFF   |
| CALC:MET:SCAL              | OFF     | EC:AC:CURR:SWE:TIM           | 0.1S  |
| CALC:MET:SCAL:OFFS         | 0A      | EC:AC:CURR:TIM               | 0.2S  |
| CALC:PAT:SCAL              | OFF     | EC:AC:CURR:TIM:STAT          | ON    |
| CALC:PAT:SCAL:CONV         | OFF     | EC:CURR:FREQ                 | 50HZ  |
| CALC:PAT:SCAL:CONV:VOLT    | 80V     | EC:DC:CURR                   | 3A    |
| CALC:PAT:SCAL:OFFS         | 0A      | EC:DC:CURR:PROT              | 42A   |
| CALC:PCC:SCAL              | OFF     | EC:DC:CURR:SWE:FALL:TIM      | 0.1S  |
| CALC:PCC:SCAL:CONV         | OFF     | EC:DC:CURR:SWE:FALL:TIM:STAT | OFF   |
| CALC:PCC:SCAL:CONV:VOLT    | 80V     | EC:DC:CURR:SWE:TIM           | 0.1S  |
| CALC:PCC:SCAL:OFFS         | 0A      | EC:DC:CURR:TIM               | 0.2S  |
| CALC:SCAL:OFFS:AUTO        | OFF     | EC:DC:CURR:TIM:STAT          | ON    |
| CALC:TC:SCAL               | OFF     | FUNC                         | ACW   |
| CALC:TC:SCAL:CONV          | OFF     | IR:VOLT                      | 0V    |
| CALC:TC:SCAL:CONV:VOLT     | 80V     | IR:VOLT:DISC:INT:STAT        | ON    |
| CALC:TC:SCAL:OFFS          | 0A      | IR:VOLT:DISC:TIM             | 0S    |
| DCW:VOLT                   | 0V      | IR:VOLT:PROT                 | 1020V |
| DCW:VOLT:DISC:INT:STAT     | ON      | IR:VOLT:RANG                 | 1000V |

| Command                       | *RST      | Command                     | *RST      |
|-------------------------------|-----------|-----------------------------|-----------|
| IR:VOLT:STAR                  | 50PCT     | SENS:EC:DC:TERM:CCH         | OFF       |
| IR:VOLT:STAR:STAT             | OFF       | SENS:EC:DC:TERM:WIRE        | 4         |
| IR:VOLT:SWE:TIM               | 0.1S      | SENS:EC:JUDG                | 0.0001OHM |
| IR:VOLT:TIM                   | 0.2S      | SENS:EC:JUDG:LOW            | 0OHM      |
| IR:VOLT:TIM:STAT              | ON        | SENS:EC:JUDG:LOW:STAT       | OFF       |
| OUTP                          | OFF       | SENS:EC:JUDG:STAT           | ON        |
| OUTP:110P                     | OFF       | SENS:EC:JUDG:TYPE           | RES       |
| OUTP:110P:POL                 | NORM      | SENS:EC:JUDG:VOLT           | 2.5V      |
| PAT:110P:OUTP                 | OFF       | SENS:EC:JUDG:VOLT:LOW       | 0V        |
| PAT:110P:POL                  | NORM      | SENS:EC:JUDG:VOLT:LOW:STAT  | OFF       |
| PAT:POL                       | NORM      | SENS:EC:JUDG:VOLT:STAT      | ON        |
| PCC:POL                       | NORM      | SENS:EC:TERM:CCH            | OFF       |
| PROG                          | ""        | SENS:EC:TERM:WIRE           | 4         |
| ROUT:ACW:TERM                 | OPEN      | SENS:IR:CURR:FILT:LPAS:STAT | OFF       |
| ROUT:ACW:TERM:CCH             | OFF       | SENS:IR:JUDG                | 100MOHM   |
| ROUT:DCW:TERM                 | OPEN      | SENS:IR:JUDG:CURR           | 0.0001MA  |
| ROUT:DCW:TERM:CCH             | OFF       | SENS:IR:JUDG:CURR:LOW       | 0A        |
| ROUT:IR:TERM                  | OPEN      | SENS:IR:JUDG:CURR:LOW:STAT  | OFF       |
| ROUT:IR:TERM:CCH              | OFF       | SENS:IR:JUDG:CURR:STAT      | ON        |
| SENS:ACW:CURR:FILT:HPAS       | SLOW      | SENS:IR:JUDG:DEL            | 0.1S      |
| SENS:ACW:CURR:FILT:LPAS       | SLOW      | SENS:IR:JUDG:DEL:AUTO       | OFF       |
| SENS:ACW:CURR:FILT:TYPE       | LOW       | SENS:IR:JUDG:LOW            | 1MOHM     |
| SENS:ACW:CURR:MODE            | RMS       | SENS:IR:JUDG:LOW:STAT       | ON        |
| SENS:ACW:JUDG                 | 0.01MA    | SENS:IR:JUDG:STAT           | OFF       |
| SENS:ACW:JUDG:LOW             | 0A        | SENS:IR:JUDG:TYPE           | RES       |
| SENS:ACW:JUDG:LOW:STAT        | OFF       | SENS:IR:TERM:GRO            | LOW       |
| SENS:ACW:TERM:GRO             | LOW       | SENS:MET:CURR:MODE          | ACDC      |
| SENS:ACW:VOLT:MODE            | RMS       | SENS:MET:NETW               | A         |
| SENS:DCW:CURR:FILT:HPAS       | SLOW      | SENS:MET:RANG               | 42V       |
| SENS:DCW:CURR:FILT:LPAS       | SLOW      | SENS:MET:RANG:AUTO          | ON        |
| SENS:DCW:CURR:FILT:TYPE       | LOW       | SENS:MET:SELV               | 30V       |
| SENS:DCW:JUDG                 | 0.01MA    | SENS:MET:SELV:STAT          | ON        |
| SENS:DCW:JUDG:DEL             | 0.1S      | SENS:MET:TERM               | NETW      |
| SENS:DCW:JUDG:DEL:AUTO        | OFF       | SENS:PAT:BAND               | NORM      |
| SENS:DCW:JUDG:LOW             | 0A        | SENS:PAT:COND               | NORM      |
| SENS:DCW:JUDG:LOW:STAT        | OFF       | SENS:PAT:COND:FAUL          | NEUT      |
| SENS:DCW:TERM:GRO             | LOW       | SENS:PAT:CURR:MODE          | ACDC      |
| SENS:DCW:VOLT:MODE            | AVER      | SENS:PAT:JUDG               | 100UA     |
| SENS:EC:DC:JUDG               | 0.0001OHM | SENS:PAT:JUDG:DEL           | 1S        |
| SENS:EC:DC:JUDG:LOW           | 0OHM      | SENS:PAT:JUDG:DEL:STAT      | OFF       |
| SENS:EC:DC:JUDG:LOW:STAT      | OFF       | SENS:PAT:JUDG:LOW           | 0.01MA    |
| SENS:EC:DC:JUDG:STAT          | ON        | SENS:PAT:JUDG:LOW:STAT      | OFF       |
| SENS:EC:DC:JUDG:TYPE          | RES       | SENS:PAT:JUDG:STAT          | ON        |
| SENS:EC:DC:JUDG:VOLT          | 2.5V      | SENS:PAT:NETW               | I         |
| SENS:EC:DC:JUDG:VOLT:LOW      | 0V        | SENS:PAT:NETW:PROB          | PEAR      |
| SENS:EC:DC:JUDG:VOLT:LOW:STAT | OFF       | SENS:PAT:RANG:AUTO          | ON        |
| SENS:EC:DC:JUDG:VOLT:STAT     | ON        | SENS:PAT:TIM                | 1S        |

| Command                | *RST   |
|------------------------|--------|
| SENS:PAT:TIM:STAT      | ON     |
| SENS:PCC:BAND          | NORM   |
| SENS:PCC:COND          | NORM   |
| SENS:PCC:CURR:MODE     | ACDC   |
| SENS:PCC:JUDG          | 100UA  |
| SENS:PCC:JUDG:DEL      | 1S     |
| SENS:PCC:JUDG:DEL:STAT | OFF    |
| SENS:PCC:JUDG:LOW      | 0.01MA |
| SENS:PCC:JUDG:LOW:STAT | OFF    |
| SENS:PCC:JUDG:STAT     | ON     |
| SENS:PCC:NETW          | PCC-1  |
| SENS:PCC:RANG:AUTO     | ON     |
| SENS:PCC:TIM           | 1S     |
| SENS:PCC:TIM:STAT      | ON     |
| SENS:TC:BAND           | NORM   |
| SENS:TC:COND           | NORM   |

| Command               | *RST   |
|-----------------------|--------|
| SENS:TC:COND:FAUL     | NEUT   |
| SENS:TC:CURR:MODE     | ACDC   |
| SENS:TC:JUDG          | 100UA  |
| SENS:TC:JUDG:DEL      | 1S     |
| SENS:TC:JUDG:DEL:STAT | OFF    |
| SENS:TC:JUDG:LOW      | 0.01MA |
| SENS:TC:JUDG:LOW:STAT | OFF    |
| SENS:TC:JUDG:STAT     | ON     |
| SENS:TC:NETW          | A      |
| SENS:TC:NETW:PROB     | PEAR   |
| SENS:TC:RANG:AUTO     | ON     |
| SENS:TC:TIM           | 1S     |
| SENS:TC:TIM:STAT      | ON     |
| TC:110P:OUTP          | OFF    |
| TC:110P:POL           | NORM   |
| TC:POL                | NORM   |

## Command

\*RST

**\*SAV**

Saves the panel settings to the setup memory.

**Command**

```
*SAV <NRf>
```

Parameter

Value: 0 to 50 memory number

Example

```
*SAV 1
```

**\*SRE**

Sets the service request enable register.

The service request enable register can be used to select which summary messages in the status byte register will perform service requests.

To clear the service request enable register, send \*SRE 0. If the register is cleared, service requests cannot be generated using status information.

**Command**

```
*SRE <NRf>
```

```
*SRE?
```

Parameter

Value: 0 to 255

Example: Sending \*SRE 8 sets bit 3 of the service request enable register. Each time the summary bit (bit 3) of the QUESTIONABLE status register in the status byte is set, a service request message is generated.

Response: NR1

## \*STB

Queries the contents of the status byte register and the MSS (master summary status) message.

The response is the same as serial polling only with the exception that the MSS message appears in place of the RQS message in bit 6.

### **Command**

\*STB?

Response: NR1

## \*TRG

Trigger command.

Executes trigger on the TEST trigger group.

This is a substitute command for IEEE 488.1 get (Group Execute Trigger).

If the device is in a state in which it does not accept triggers, an SCPI error (-211, "Trigger ignored") occurs.

See IEEE 488.2-1992 section 10.37.

### **Command**

\*TRG

## \*TST

Executes a self-test.

You can check which error occurred with SYST:ERR? command. See IEEE 488.2-1992 section 10.38.

### **Command**

\*TST?

Response

If there is no problem, returns 0 in response to \*TST?. Returns an error code if there is a problem.

## \*WAI

Prevents the device from executing subsequent commands until all operations that are in standby have completed.

### **Command**

\*WAI

# ABORt Command

---

This product has two trigger subsystems (ACQuire, TEST).

ACQuire is a measurement trigger subsystem.

TEST is a test trigger subsystem.

## ABOR

Aborts measurements, tests, and other operations in all trigger subsystems (AC-Quire, TEST).

The product's trigger state immediately after it turns on is the same as its trigger state after it receives an ABOR command.

If you send an ABOR command without initiating, the measured data is not discarded.

You cannot specify a trigger subsystem with the ABOR command. It is always interpreted as ALL.

## **Command**

ABORt [:ALL]

### ABOR:ACQ

Aborts measurement operations.

If you send an ABOR command without initiating, the measured data is not discarded.

#### **Command**

```
ABORt:ACQuire
```

### ABOR:TEST

Stops the ongoing test. Clears the protection/ fail mode.

If you send an ABOR command without initiating, the test data is not discarded.

#### **Command**

```
ABORt:TEST
```

# CALCulate Command

## CALC:SCAL:OFFS:AUTO

Sets whether to automatically set the offset before testing.

### Command

```
CALCulate:SCALe:OFFSet:AUTO[:MEASure] <boolean>
```

```
CALCulate:SCALe:OFFSet:AUTO[:MEASure] ?
```

### Parameter

|        |        |  |
|--------|--------|--|
| Value: | ON(1)  | Offset is set automatically.               |
|        | OFF(0) | Offset is not set automatically. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
CALC:SCAL:OFFS:AUTO ON
```

## CALC:ACW Command

The ACW in the second node can be omitted, but to distinguish it from the DC withstanding voltage test, we recommend that you do not.

The offset current is converted into resistance and sent to the TOS9300 series. The TOS9300 series calculates the current from the resistance and voltage and displays the result on the panel. Since the resistance resolution is  $100 \Omega$ , an error may occur between the offset current setting and panel reading.

### CALC:ACW:SCAL

Sets whether to offset the current running through the stray capacitance in AC withstanding voltage tests.

Set the real part of the current with CALC:ACW:SCAL:OFFS.

Set the imaginary part of the current with CALC:ACW:SCAL:OFFS:IMAG.

### Command

```
CALCulate[:ACW]:SCALe[:STATe] <boolean>
```

```
CALCulate[:ACW]:SCALe[:STATe]?
```

### Parameter

|        |        |                                  |
|--------|--------|----------------------------------|
| Value: | ON(1)  | Offset is applied.               |
|        | OFF(0) | Offset is not applied. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
CALC:ACW:SCAL ON
```

## CALC:ACW:SCAL:OFFS

Sets the real part of the offset current in AC withstanding voltage tests.

This is valid when CALC:ACW:SCAL ON.

### **Command**

```
CALCulate[:ACW][:CURRENT]:SCALE:OFFSet[:REAL] <numeric>  
CALCulate[:ACW][:CURRENT]:SCALE:OFFSet[:REAL]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0 A)

Response: NR3

### **Example**

```
CALC:ACW:SCAL:OFFS 123MA
```

## CALC:ACW:SCAL:OFFS:IMAG

Sets the imaginary part of the offset current in AC withstanding voltage tests.

This is valid when CALC:ACW:SCAL ON.

### **Command**

```
CALCulate[:ACW][:CURRENT]:SCALE:OFFSet:IMAGinary <numeric>  
CALCulate[:ACW][:CURRENT]:SCALE:OFFSet:IMAGinary?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0 A)

Response: NR3

### **Example**

```
CALC:ACW:SCAL:OFFS:IMAG 123UA
```

## CALC:DCW Command

The offset current is converted into resistance and sent to the TOS9300 series. The TOS9300 series calculates the current from the resistance and voltage and displays the result on the panel. Since the resistance resolution is 100  $\Omega$ , an error may occur between the offset current setting and panel reading.

### CALC:DCW:SCAL

Sets whether to offset the current running through the stray capacitance in DC withstanding voltage tests.

Set the current with CALC:DCW:SCAL:OFFS.

#### Command

```
CALCulate:DCW:SCALe[:STATe] <boolean>
```

```
CALCulate:DCW:SCALe[:STATe]?
```

#### Parameter

|        |        |                                  |
|--------|--------|----------------------------------|
| Value: | ON(1)  | Offset is applied.               |
|        | OFF(0) | Offset is not applied. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

#### Example

```
CALC:DCW:SCAL 1
```

## CALC:DCW:SCAL:OFFS

Sets the offset current for DC withstanding voltage tests.

This is valid when CALC:DCW:SCAL ON.

### **Command**

```
CALCulate:DCW[:CURRENT]:SCALE:OFFSet[:REAL] <numeric>
```

```
CALCulate:DCW[:CURRENT]:SCALE:OFFSet[:REAL]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0 A)

Response: NR3

### **Example**

```
CALC:DCW:SCAL:OFFS 123MA
```

## CALC:EC Command

### CALC:EC:SCAL

Sets whether to offset the voltage drop caused by the contact resistance in earth continuity tests (AC).

Set the voltage with CALC:EC:SCAL:OFFS.

#### Command

```
CALCulate:EC[:AC]:SCALE[:STATE] <boolean>
```

```
CALCulate:EC[:AC]:SCALE[:STATE]?
```

#### Parameter

|        |        |                                  |
|--------|--------|----------------------------------|
| Value: | ON(1)  | Offset is applied.               |
|        | OFF(0) | Offset is not applied. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

#### Example

```
CALC:EC:SCAL ON
```

### CALC:EC:SCAL:OFFS

Sets the offset resistance for earth continuity tests (AC).

This is valid when CALC:EC:SCAL ON.

#### Command

```
CALCulate:EC[:AC][:RESistance]:SCALE:OFFSet[:REAL] <numeric>
```

```
CALCulate:EC[:AC][:RESistance]:SCALE:OFFSet[:REAL]?
```

Unit: OHM

Settings are reset to default when the \*RST command is sent. (0 OHM)

Response: NR3

#### Example

```
CALC:EC:SCAL:OFFS 50HM
```

## CALC:EC:DC:SCAL

Sets whether to offset the voltage drop caused by the contact resistance in earth continuity tests (DC).

Set the voltage with CALC:EC:DC:SCAL:OFFS.

### Command

```
CALCulate:EC:DC:SCALE[:STATe] <boolean>
```

```
CALCulate:EC:DC:SCALE[:STATe]?
```

### Parameter

|        |        |                                  |
|--------|--------|----------------------------------|
| Value: | ON(1)  | Offset is applied.               |
|        | OFF(0) | Offset is not applied. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
CALC:EC:DC:SCAL ON
```

## CALC:EC:DC:SCAL:OFFS

Sets the offset resistance for earth continuity tests (DC).

This is valid when CALC:EC:DC:SCAL ON.

### Command

```
CALCulate:EC:DC[:RESistance]:SCALE:OFFSet[:REAL] <numeric>
```

```
CALCulate:EC:DC[:RESistance]:SCALE:OFFSet[:REAL]?
```

Unit: OHM

Settings are reset to default when the \*RST command is sent. (0 OHM)

Response: NR3

### Example

```
CALC:EC:DC:SCAL:OFFS 50HM
```

## CALC:IR Command

### CALC:IR:SCAL

Sets whether to offset the resistance applied to the stray capacitance in insulation resistance tests.

Set the resistance with CALC:IR:SCAL:OFFS.

#### Command

```
CALCulate:IR:SCALE[:STATe] <boolean>
```

```
CALCulate:IR:SCALE[:STATe]?
```

#### Parameter

|        |        |                                  |
|--------|--------|----------------------------------|
| Value: | ON(1)  | Offset is applied.               |
|        | OFF(0) | Offset is not applied. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

#### Example

```
CALC:IR:SCAL 1
```

### CALC:IR:SCAL:OFFS

Sets the offset resistance for insulation resistance tests.

This is valid when CALC:IR:SCAL ON.

#### Command

```
CALCulate:IR[:RESistance]:SCALE:OFFSet[:REAL] <numeric>
```

```
CALCulate:IR[:RESistance]:SCALE:OFFSet[:REAL]?
```

Unit: OHM

Settings are reset to default when the \*RST command is sent. (100 MOHM)

Response: NR3

#### Example

```
CALC:IR:SCAL:OFFS 10KOHM
```

## CALC:MET Command

---

### CALC:MET:SCAL

Sets whether to offset the current in meter mode.

Set the current with CALC:MET:SCAL:OFFS.

#### Command

```
CALCulate:METer:SCALe[:STATe] <boolean>
```

```
CALCulate:METer:SCALe[:STATe]?
```

#### Parameter

|        |        |                                  |
|--------|--------|----------------------------------|
| Value: | ON(1)  | Offset is applied.               |
|        | OFF(0) | Offset is not applied. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

#### Example

```
CALC:MET:SCAL 1
```

### CALC:MET:SCAL:OFFS

Sets the offset current for meter mode.

This is valid when CALC:MET:SCAL ON.

#### Command

```
CALCulate:METer[:CURRent]:SCALe:OFFSet[:REAL] <numeric>
```

```
CALCulate:METer[:CURRent]:SCALe:OFFSet[:REAL]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0 A)

Response: NR3

#### Example

```
CALC:MET:SCAL:OFFS 123MA
```

## CALC:PAT Command

### CALC:PAT:SCAL

Sets whether to offset the current in patient leakage current tests.

Set the current with CALC:PAT:SCAL:OFFS.

#### Command

```
CALCulate:PATient:SCALe[:STATe] <boolean>
```

```
CALCulate:PATient:SCALe[:STATe]?
```

#### Parameter

|        |        |                                  |
|--------|--------|----------------------------------|
| Value: | ON(1)  | Offset is applied.               |
|        | OFF(0) | Offset is not applied. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

#### Example

```
CALC:PAT:SCAL 1
```

### CALC:PAT:SCAL:OFFS

Sets the offset current for patient leakage current tests.

This is valid when CALC:PAT:SCAL ON.

#### Command

```
CALCulate:PATient[:CURRent]:SCALe:OFFSet[:REAL] <numeric>
```

```
CALCulate:PATient[:CURRent]:SCALe:OFFSet[:REAL]?
```

#### Unit: A

Settings are reset to default when the \*RST command is sent. (0 A)

Response: NR3

#### Example

```
CALC:PAT:SCAL:OFFS 123MA
```

## CALC:PAT:SCAL:CONV

Sets whether to convert the current with the specified voltage in patient leakage current tests.

Set the voltage with CALC:PAT:SCAL:CONV:VOLT.

### Command

```
CALCulat:PATient[:CURRent]:SCALE:CONVert[:STATe] <boolean>
```

```
CALCulat:PATient[:CURRent]:SCALE:CONVert[:STATe]?
```

### Parameter

Value: ON(1) Conversion is applied.  
OFF(0) Conversion is not applied. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
CALC:PAT:SCAL:CONV 1
```

## CALC:PAT:SCAL:CONV:VOLT

Sets the conversion voltage for patient leakage current tests.

This is valid when CALC:PAT:SCAL:CONV ON.

### Command

```
CALCulat:PATient[:CURRent]:SCALE:CONVert:VOLTage <numeric>
```

```
CALCulat:PATient[:CURRent]:SCALE:CONVert:VOLTage?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (80 V)

Response: NR3

### Example

```
CALC:PAT:SCAL:CONV:VOLT 220V
```

## CALC:PCC Command

### CALC:PCC:SCAL

Sets whether to offset the current in protective conductor current tests.

Set the current with CALC:PCC:SCAL:OFFS.

#### Command

```
CALCulate:PCCurrent:SCALE[:STATE] <boolean>
```

```
CALCulate:PCCurrent:SCALE[:STATE]?
```

#### Parameter

|        |        |                                  |
|--------|--------|----------------------------------|
| Value: | ON(1)  | Offset is applied.               |
|        | OFF(0) | Offset is not applied. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

#### Example

```
CALC:PCC:SCAL 1
```

### CALC:PCC:SCAL:OFFS

Sets the offset current for protective conductor current tests.

This is valid when CALC:PCC:SCAL ON.

#### Command

```
CALCulate:PCCurrent[:CURRENT]:SCALE:OFFSet[:REAL] <numeric>
```

```
CALCulate:PCCurrent[:CURRENT]:SCALE:OFFSet[:REAL]?
```

#### Unit: A

Settings are reset to default when the \*RST command is sent. (0 A)

Response: NR3

#### Example

```
CALC:PCC:SCAL:OFFS 123MA
```

## CALC:PCC:SCAL:CONV

Sets whether to convert the current with the specified voltage in protective conductor current tests.

Set the voltage with CALC:PCC:SCAL:CONV:VOLT.

### Command

```
CALCulat:PCCurrent[:CURRent]:SCALE:CONVert[:STATe] <boolean>  
CALCulat:PCCurrent[:CURRent]:SCALE:CONVert[:STATe]?
```

### Parameter

Value: ON(1) Conversion is applied.  
OFF(0) Conversion is not applied. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
CALC:PCC:SCAL:CONV 1
```

## CALC:PCC:SCAL:CONV:VOLT

Sets the conversion voltage for protective conductor current tests.

This is valid when CALC:PCC:SCAL:CONV ON.

### Command

```
CALCulat:PCCurrent[:CURRent]:SCALE:CONVert:VOLTage <numeric>  
CALCulat:PCCurrent[:CURRent]:SCALE:CONVert:VOLTage?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (80 V)

Response: NR3

### Example

```
CALC:PCC:SCAL:CONV:VOLT 220V
```

## CALC:TC Command

### CALC:TC:SCAL

Sets whether to offset the current in touch current tests.

Set the current with CALC:TC:SCAL:OFFS.

#### Command

```
CALCulate:TC:SCALe[:STATe] <boolean>
```

```
CALCulate:TC:SCALe[:STATe]?
```

#### Parameter

|        |        |                                  |
|--------|--------|----------------------------------|
| Value: | ON(1)  | Offset is applied.               |
|        | OFF(0) | Offset is not applied. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

#### Example

```
CALC:TC:SCAL 1
```

### CALC:TC:SCAL:OFFS

Sets the offset current for touch current tests.

This is valid when CALC:TC:SCAL ON.

#### Command

```
CALCulat:TC[:CURRent]:SCALe:OFFSet[:REAL] <numeric>
```

```
CALCulat:TC[:CURRent]:SCALe:OFFSet[:REAL]?
```

#### Unit: A

Settings are reset to default when the \*RST command is sent. (0 A)

Response: NR3

#### Example

```
CALC:TC:SCAL:OFFS 123MA
```

## CALC:TC:SCAL:CONV

Sets whether to convert the current with the specified voltage in touch current tests.

Set the voltage with CALC:TC:SCAL:CONV:VOLT.

### Command

```
CALCulat:TC[:CURRent]:SCALE:CONVert[:STATe] <boolean>
```

```
CALCulat:TC[:CURRent]:SCALE:CONVert[:STATe]?
```

### Parameter

|        |        |                                      |
|--------|--------|--------------------------------------|
| Value: | ON(1)  | Conversion is applied.               |
|        | OFF(0) | Conversion is not applied. (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
CALC:TC:SCAL:CONV 1
```

## CALC:TC:SCAL:CONV:VOLT

Sets the conversion voltage for touch current tests.

This is valid when CALC:TC:SCAL:CONV ON.

### Command

```
CALCulat:TC[:CURRent]:SCALE:CONVert:VOLTage <numeric>
```

```
CALCulat:TC[:CURRent]:SCALE:CONVert:VOLTage?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (80 V)

Response: NR3

### Example

```
CALC:TC:SCAL:CONV:VOLT 220V
```

# Display Command

## DISP:ACW:CURR:PHOL

Displays the maximum current measurement from the start of the test in AC with-standing voltage tests.

The ACW in the second node can be omitted, but to distinguish it from the DC with-standing voltage test, we recommend that you do not.

### Command

```
DISPlay[:ACW]:CURRent:PHOLd <boolean>
```

```
DISPlay[:ACW]:CURRent:PHOLd?
```

### Parameter

Value: ON(1) The maximum current measurement is displayed.  
OFF(0) The maximum current measurement is not displayed. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
DISP:ACW:CURR:PHOL ON
```

## DISP:DCW:CURR:PHOL

Displays the maximum current measurement from the start of the test in DC with-standing voltage tests.

### Command

```
DISPlay:DCW:CURRent:PHOLd <boolean>
```

```
DISPlay:DCW:CURRent:PHOLd?
```

### Parameter

Value: ON(1) The maximum current measurement is displayed.  
OFF(0) The maximum current measurement is not displayed. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
DISP:DCW:CURR:PHOL ON
```

## DISP:EC:AC:CURR:PHOL

Displays the maximum resistance measurement from the start of the test in earth continuity tests (AC).

### Command

```
DISPlay:EC[:AC]:CURRent:PHOLd <boolean>
```

```
DISPlay:EC[:AC]:CURRent:PHOLd?
```

### Parameter

Value: ON(1) The maximum resistance measurement is displayed.  
OFF(0) The maximum resistance measurement is not displayed. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
DISP:EC:AC:CURR:PHOL ON
```

## DISP:EC:DC:CURR:PHOL

Displays the maximum resistance measurement from the start of the test in earth continuity tests (DC).

### Command

```
DISPlay:EC:DC:CURRent:PHOLd <boolean>
```

```
DISPlay:EC:DC:CURRent:PHOLd?
```

### Parameter

Value: ON(1) The maximum resistance measurement is displayed.  
OFF(0) The maximum resistance measurement is not displayed. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
DISP:EC:DC:CURR:PHOL ON
```

## DISP:IR:RES:PHOL

Displays the minimum resistance measurement from the start of the test in insulation resistance tests.

### Command

```
DISPlay:IR:RESistance:PHOLd <boolean>
```

```
DISPlay:IR:RESistance:PHOLd?
```

### Parameter

Value: ON(1) The minimum resistance measurement is displayed.  
OFF(0) The minimum resistance measurement is not displayed. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
DISP:IR:RES:PHOL ON
```

## DISP:PAT:CURR:PHOL

Displays the maximum current measurement from the start of the test in patient leakage current tests.

### Command

```
DISPlay:PATient:CURRent:PHOLd <boolean>
```

```
DISPlay:PATient:CURRent:PHOLd?
```

### Parameter

Value: ON(1) The maximum current measurement is displayed.  
OFF(0) The maximum current measurement is not displayed. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
DISP:PAT:CURR:PHOL ON
```

## DISP:PCC:CURR:PHOL

Displays the maximum current measurement from the start of the test in protective conductor current tests.

### Command

```
DISPlay:PCCurrent:CURRent:PHOLd <boolean>
```

```
DISPlay:PCCurrent:CURRent:PHOLd?
```

### Parameter

Value: ON(1) The maximum current measurement is displayed.  
OFF(0) The maximum current measurement is not displayed. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
DISP:PCC:CURR:PHOL ON
```

## DISP:TC:CURR:PHOL

Displays the maximum current measurement from the start of the test in touch current tests.

### Command

```
DISPlay:TC:CURRent:PHOLd <boolean>
```

```
DISPlay:TC:CURRent:PHOLd?
```

### Parameter

Value: ON(1) The maximum current measurement is displayed.  
OFF(0) The maximum current measurement is not displayed. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
DISP:TC:CURR:PHOL ON
```

# HCOPY Command

## HCOP:SDUM:DATA

Retrieves the screen capture of the present screen.

### **Command**

```
HCOPY:SDUMp:DATA?
```

### **Response**

The screen image (PNG) is returned in block (#6<length><data>) format.

### **Example**

```
HCOP:SDUM:DATA?
```

# INITiate Command

## INIT:ACQ

Starts a new measurement.

### **Command**

```
INITiate[:IMMEDIATE]:ACquire
```

## INIT:TEST

Starts the test trigger function.

When the trigger source is set to IMM, the auto test is executed immediately. When the trigger source is set to BUS, the device waits for a software trigger and then executes the auto test. For EXT/ONCE, execution takes place after the start operation on the unit.

### **Command**

```
INITiate[:IMMEDIATE]:TEST
```

# MEASure/READ/FETCh Command

## FETC/ READ/ MEAS

Queries the measurement data (current, real part of the current, imaginary part of the current, voltage, resistance, elapsed time).

MEAS resets a portion of the setting conditions to their default values, makes a new measurement, and then queries the measurement data. The present valid measurement data is invalidated. This product has no settings that are reset to default values with the MEAS command. The operation is the same as READ.

READ makes a new measurement and queries the measurement data. The present valid measurement data is invalidated.

FETC queries data that has already been measured. If there are multiple measurement data entries, the most recent data is returned.

### Command

FETCh?

READ?

MEASure?

### Response

The current, real part of the current, imaginary part of the current, voltage, resistance, and test time are returned in this order in nr3,nr3,nr3,nr3,nr3 format.

Unit: A (current), V (voltage), OHM (resistance), S (elapsed time)

## FETC:CIM/ READ:CIM/ MEAS:CIM

Queries the imaginary part of the current .

MEAS:CIM resets a portion of the setting conditions to their default values, makes a new measurement, and then queries the measurement data. The present valid measurement data is invalidated. This product has no settings that are reset to default values with the MEAS command. The operation is the same as READ.

READ:CIM makes a new measurement and queries the imaginary part of the current . The present valid measurement data is invalidated.

FETC:CIM queries the imaginary part of the current that has already been measured. If there are multiple measurement data entries, the most recent imaginary part of the current is returned.

### **Command**

FETCh:CIImaginary?

READ:CIImaginary?

MEASure:CIImaginary?

Response: NR3

Unit: A

## FETC:CRE/ READ:CRE/ MEAS:CRE

Queries the real part of the current.

MEAS:CRE resets a portion of the setting conditions to their default values, makes a new measurement, and then queries the measurement data. The present valid measurement data is invalidated. This product has no settings that are reset to default values with the MEAS command. The operation is the same as READ.

READ:CRE makes a new measurement and queries the real part of the current. The present valid measurement data is invalidated.

FETC:CRE queries the real part of the current that has already been measured. If there are multiple measurement data entries, the most recent real part of the current is returned.

### **Command**

FETCh:CREal?

READ:CREal?

MEASure:CREal?

Response: NR3

Unit: A

## FETC:CURR/ READ:CURR/ MEAS:CURR

Queries the current.

MEAS:CURR resets a portion of the setting conditions to their default values, makes a new measurement, and then queries the measurement data. The present valid measurement data is invalidated. This product has no settings that are reset to default values with the MEAS command. The operation is the same as READ.

READ:CURR makes a new measurement and queries the current. The present valid measurement data is invalidated.

FETC:CURR queries the current that has already been measured. If there are multiple measurement data entries, the most recent current is returned.

### **Command**

FETCh:CURRent?

READ:CURRent?

MEASure:CURRent?

Response: NR3

Unit: A

## FETC:ETIM/ READ:ETIM/ MEAS:ETIM

Queries the test time.

MEAS:ETIM resets a portion of the setting conditions to their default values, makes a new measurement, and then queries the measurement data. The present valid measurement data is invalidated. This product has no settings that are reset to default values with the MEAS command. The operation is the same as READ.

READ:ETIM makes a new measurement and queries the test time. The present valid measurement data is invalidated.

FETC:ETIM queries the test time that has already been measured. If there are multiple measurement data entries, the most recent test time is returned.

### **Command**

FETCh:ETIMe?

READ:ETIMe?

MEASure:ETIMe?

Response: NR3

Unit: S

## FETC:RES/ READ:RES/ MEAS:RES

Queries the resistance.

MEAS:RES resets a portion of the setting conditions to their default values, makes a new measurement, and then queries the measurement data. The present valid measurement data is invalidated. This product has no settings that are reset to default values with the MEAS command. The operation is the same as READ.

READ:RES makes a new measurement and queries the resistance. The present valid measurement data is invalidated.

FETC:RES queries the resistance that has already been measured. If there are multiple measurement data entries, the most recent resistance is returned.

### **Command**

FETCh:RESistance?

READ:RESistance?

MEASure:RESistance?

Response: NR3

Unit: OHM

## FETC:VOLT/ READ:VOLT/ MEAS:VOLT

Queries the voltage.

MEAS:VOLT resets a portion of the setting conditions to their default values, makes a new measurement, and then queries the measurement data. The present valid measurement data is invalidated. This product has no settings that are reset to default values with the MEAS command. The operation is the same as READ.

READ:VOLT makes a new measurement and queries the voltage. The present valid measurement data is invalidated.

FETC:VOLT queries the voltage that has already been measured. If there are multiple measurement data entries, the most recent voltage is returned.

### **Command**

FETCh:VOLTage?

READ:VOLTage?

MEASure:VOLTage?

Response: NR3

Unit: V

# OUTPut Command

## OUTP

Sets wheter to output the temporary voltage in leakage current (TC/PCC/Patient) tests.

### Command

```
OUTPut[:LINE][:STATe] <boolean>
```

```
OUTPut[:LINE][:STATe]?
```

### Parameter

|        |        |                      |
|--------|--------|----------------------|
| Value: | ON(1)  | Output on            |
|        | OFF(0) | Output off (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
OUTP ON
```

## OUTP:110P

Sets whether to output the voltage applied from the 110% terminal to the AC LINE IN inlet in meter tests.

### Command

```
OUTPut[:TERMinal]:110Percent[:STATe] <boolean>
```

```
OUTPut[:TERMinal]:110Percent[:STATe]?
```

### Parameter

|        |        |                      |
|--------|--------|----------------------|
| Value: | ON(1)  | Output on            |
|        | OFF(0) | Output off (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
OUTP:110P ON
```

## OUTP:110P:POL

Sets the polarity of the voltage applied from the 110 % terminal in meter tests.

### Command

```
OUTPut[:TERMinal]:110Percent:POLarity <character>
```

```
OUTPut[:TERMinal]:110Percent:POLarity?
```

### Parameter

|        |         |                        |
|--------|---------|------------------------|
| Value: | NORMal  | Normal phase (default) |
|        | REVerse | Reverse phase          |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
OUTP:110P:POL NORM
```

# PROGram Command

## PROG

Sets the program to be edited.

Specifying a blank program name ("") clears the selection.

### Command

```
PROGram[:SElected] "<string>"
```

```
PROGram[:SElected]?
```

### Parameter

For tests other than an LC test, include "/BASIC/" before the program name. For an LC test, include "/LC/".

When specifying a program in program memory, for tests other than an LC test, include "/SIGNAL IO/BASIC/" before the program name. For an LC test, include "/SIGNAL IO/LC/".

Response: string

Example: When specifying a test other than an LC test with the name "My test program"

```
PROG "/BASIC/My test program"
```

Example: When specifying an LC test 76

```
PROG "/SIGNAL IO/LC/76"
```

## PROG:CRE

Creates a new program.

To edit a program, use PROG to specify the program to be edited after creating the program.

### Command

```
PROG:CREate "<string>"
```

### Parameter

Naming convention: Alphabet characters A-Za-z, numbers 0-9, dot (.), comma (,), parentheses (), brackets [], braces {}, and (&), dollar (\$), sharp (#), caret (^), percent (%), equal (=), hyphen (-), plus (+), underscore (\_), space ( ), case-sensitive

Up to 255 characters

For tests other than an LC test, include "/BASIC/" before the program name. For an LC test, include "/LC/".

Example: When creating an LC test

```
PROG:CRE "/LC/My test program"
```

## PROG:DEL

Deletes a program.

### **Command**

```
PROG:DELEte "<string>"
```

### **Example**

```
PROG:DEL "/BASIC/My test program"
```

## PROG:INT:TIM

Sets the step interval time.

### Command

```
PROGrama[:SElected]:INTerval:TIMer <NRf>
```

```
PROGrama[:SElected]:INTerval:TIMer?
```

Unit: S

Response: NR3

### Example

```
PROG:INT:TIM 10S
```

## PROG:FAIL:COUT

Sets the operation to be executed when a fail judgment occurs.

### Command

```
PROGram[:SElected][:JUDGment]:FAIL:CONTinue <boolean>
```

```
PROGram[:SElected][:JUDGment]:FAIL:CONTinue?
```

### Parameter

Value: ON(1) A fail judgment is indicated after the completion of all the steps.  
OFF(0) Auto test ends when a failure occurs, and a fail judgment is indicated.

Response: NR1

### Example

```
PROG:FAIL:COU ON
```

## PROG:LIST

Queries stored programs.

### **Command**

PROGrama:LIST?

Response: "string","string"...

Returns "" if no programs are stored.

## PROG:REN

Changes the name of the selected program.

### Command

```
PROG:REN[:SElected]:REName "<string>"
```

### Parameter

Naming convention: Alphabet characters A-Za-z, numbers 0-9, dot (.), comma (,), parentheses (), brackets [], braces {}, and (&), dollar (\$), sharp (#), caret (^), percent (%), equal (=), hyphen (-), plus (+), underscore (\_), white space ( ), case-sensitive

Up to 255 characters

For tests other than an LC test, include "/BASIC/" before the program name. For an LC test, include "/LC/".

### Example

```
PROG:REN "/BASIC/Your test program"
```

**PROG:SAVE**

Saves the selected program.

**Command**

PROGrama[:SElected]:SAVE

## PROG:STEP<n>:<prog\_item>

Sets the test condition indicated by <prog-item> to step n of the selected program.

For details on the parameters, see the test condition command of each test.

Use <n> to specify the step number. Step numbers start at 0.

### Command

```
PROG:SELected:STEP<n>:<prog-item>
```

```
PROG:SELected:STEP<n>:<prog-item>?
```

### <prog-item> list

| <prog-item>                                    | Description                     | Parameter | Applicable tests <sup>1</sup> |
|--|---------------------------------|-----------|-------------------------------|
| CONDition                                      | Fault mode                      | character | TC/PCC/PAT                    |
| CONDition:FAULT                                | Disconnected condition at fault | character | TC/PCC/PAT                    |
| CURRent:FiLTer:HPASs                           | High-pass filter                | character | ACW/DCW                       |
| CURRent:FiLTer:LPASs                           | Low-pass filter                 | character | ACW/DCW/IR                    |
| CURRent:FiLTer:LPASs:STATe                     | Low-pass filter on/off          | boolean   | IR                            |
| CURRent:FiLTer:TYpe                            | Filter type                     | character | ACW/DCW                       |
| [CURRent:]FREQuency                            | Test current frequency.         | numeric   | EC:AC                         |
| [CURRent:] <sup>2</sup> [LEVe]                 | Test current                    | numeric   | EC                            |
| CURRent:MODE                                   | Current mode                    | character | TC/PCC/PAT                    |
|  | Current measurement method      | character | ACW                           |
| [CURRent]:SCALE:CONVert[:STATe]                | Voltage conversion on/off       | boolean   | TC/PCC/PAT                    |
| [CURRent]:SCALE:CONVert:VOLTage                | Conversion voltage              | numeric   | TC/PCC/PAT                    |
| [CURRent:] <sup>2</sup> SCALE:OFFSet:IMAGinary | Offset current (imaginary)      | numeric   | ACW                           |
| [CURRent:] <sup>2</sup> SCALE:OFFSet[:REAL]    | Offset current (real)           | numeric   | ACW/DCW/TC/<br>PCC/PAT        |
| [CURRent:]SWEep:FALL:TiMEr                     | Current fall time               | numeric   | EC                            |
| [CURRent:]SWEep:FALL:TiMEr:STATe               | Current fall time on and off    | boolean   | EC                            |
| [CURRent:]SWEep[:RISE]:TiMEr                   | Voltage rise time               | numeric   | EC                            |
| [CURRent:]TiMEr                                | Test time                       | numeric   | EC                            |
| FUNction[:MODE]                                | Test mode                       | character | All                           |
| JUDGment[:CURRent] <sup>2</sup> :LOWer         | Lower limit                     | numeric   | ACW/DCW/IR/<br>TC/PCC/PAT     |
| JUDGment[:CURRent]:LOWer:STATe                 | Lower limit on/off              | boolean   | ACW/DCW/IR/<br>TC/PCC/PAT     |
| JUDGment[:CURRent] <sup>2</sup> [:UPPer]       | Upper limit                     | numeric   | ACW/DCW/IR/<br>TC/PCC/PAT     |
| JUDGment:DELay                                 | Judgment delay                  | numeric   | DCW/IR/TC/<br>PCC/PAT         |
| JUDGment:DELay:AUTO                            | Judgment delay auto on/off      | boolean   | DCW/IR                        |
| JUDGment:DELay:STATe                           | Judgment delay on/off           | boolean   | TC/PCC/PAT                    |
| JUDGment:RESistance:LOWer                      | Lower limit                     | numeric   | IR/EC                         |
| JUDGment:RESistance:LOWer:STATe                | Lower limit on/off              | boolean   | EC                            |
| JUDGment:RESistance[:UPPer]                    | Upper limit                     | numeric   | IR/EC                         |
| JUDGment:RESistance[:UPPer]:STATe              | Upper limit on/off              | boolean   | IR                            |

| <prog-item>                                       | Description                               | Parameter          | Applicable tests <sup>*1</sup> |
|---|---|--------------------|--------------------------------|
| JUDGment:TYPE                                     | Judgment type                             | character          | IR/EC                          |
| JUDGment[:VOLTag <sup>2</sup> ]:LOWer             | Lower limit                               | numeric            | EC                             |
| JUDGment[:VOLTag]:LOWer:STATe                     | Lower limit on/off                        | boolean            | EC                             |
| JUDGment[:VOLTag <sup>2</sup> ]:UPPer]            | Upper limit                               | numeric            | EC                             |
| [LINE:]POLarity                                   | Polarity of power supplied to EUT         | character          | TC/PCC/PAT                     |
| NETWork   | Measurement circuit network               | character          | TC/PCC/PAT                     |
| NETWork:PROBe:A                                   | A terminal probe connection destination   | —                  | TC/PAT                         |
| NETWork:PROBe[:B]                                 | B terminal probe connection destination   | character          | TC/PAT                         |
| SCALE[:STATe]                                     | Offset on/off                             | boolean            | ACW/DCW/IR/EC/TC/PCC/PAT       |
| [RESistance:] <sup>2</sup> SCALE:OFFSet[:REAL]    | Offset resistance                         | numeric            | IR/EC                          |
| [ROUte:]TERMinals                                 | Channel terminal connection               | numeric, character | ACW/DCW/IR                     |
| [ROUte:]TERMinals:CCHeck[:STATe]                  | Channel continuity check on/off           | boolean            | ACW/DCW/IR                     |
| [TERMinal:]110Percent:OUTPut                      | 110 output terminal voltage output on/off | boolean            | TC/PAT                         |
| [TERMinal:]110Percent:POLarity                    | 110 output terminal power supply polarity | character          | TC/PAT                         |
| TERMinals:CCHeck[:STATe]                          | Contact check                             | boolean            | EC                             |
| TERMinals:GROund                                  | Grounding mode                            | character          | ACW/DCW/IR                     |
| TERMinals:WIRE                                    | 4-terminal/2-terminal measurement         | NR1                | EC                             |
| TIMer   | Test time                                 | numeric            | TC/PCC/PAT                     |
| [VOLTag <sup>2</sup> ][:AC:]BANDwidth             | Bandwidth                                 | character          | TC/PCC/PAT                     |
| [VOLTag <sup>2</sup> ][:DISCharge:TIMer[:MINimum] | Discharge time                            | numeric            | DCW/IR                         |
| [VOLTag <sup>2</sup> ][:FREQuency                 | Test voltage frequency                    | numeric            | ACW                            |
| [VOLTag <sup>2</sup> ][:LEVel]                    | Test voltage                              | numeric            | ACW/DCW/IR                     |
| VOLTag:MODE                                       | Voltage measurement mode                  | character          | ACW/DCW                        |
| [VOLTag:]:RANGe                                   | Output voltage range                      | numeric            | IR                             |
| [VOLTag:]:RANGe:AUTO                              | Output voltage range on/off               | boolean            | TC/PCC/PAT                     |
| [VOLTag:]:STARt[:LEVel]                           | Start voltage                             | numeric            | ACW/DCW/IR                     |
| [VOLTag:]:STARt:STATe                             | Start voltage on/off                      | boolean            | ACW/DCW/IR                     |
| [VOLTag:]:SWEp:FALL:TIMer                         | Voltage fall time                         | numeric            | ACW/DCW                        |
| [VOLTag:]:SWEp:FALL:TIMer:STATe                   | Voltage fall time on/off                  | boolean            | ACW/DCW                        |
| [VOLTag:]:SWEp[:RISE]:TIMer                       | Voltage rise time                         | numeric            | ACW/DCW/IR                     |
| [VOLTag:]:TIMer                                   | Test time                                 | numeric            | ACW/DCW/IR                     |

\*1. ACW: AC withstanding voltage, DCW: DC withstanding voltage, IR: insulation resistance, EC: earth continuity, TC: touch current, PCC: protective conductor current, PAT: patient leakage current

\*2. Cannot be omitted when sending the command with a unit in the parameter.

## PROG:STEPS:COUN

Sets the number of steps of the selected program.

If the number is increased from the current number of steps, steps with default values are added after the last step. If the number is decreased, steps are deleted in order starting from the last step.

### **Command**

```
PROGram[:SElected]:STEPS:COUNT <NRf>
```

```
PROGram[:SElected]:STEPS:COUNT?
```

Value: 1 to 100

Response: NR1

Returns +0 when no program is selected.

### **Example**

```
PROG:STEPS:COUN 10
```

# RESult command

## RES:FORM

Sets the response format to use when test results are queried.

The response format uses RES? or RES:REM?.

The same parameter cannot be specified twice.

### Command

```
RESult:FORMat <character>[,<character>[,<character>]...]
```

```
RESult:FORMat?
```

Parameter (1 minimum, 15 maximum)

|        |            |  |
|--------|------------|--|
| Value: | NUMBer     | Test number<br>Incremented each time a test is performed.<br>Cleared to 0 when the count exceeds 2147483647. |
|        | STEP       | Auto test step number  |
|        | FUNcTion   | Test mode  |
|        | DATE       | Test start time (RFC2822 format)   |
|        | YEAR       | Test start date (year)   |
|        | MONTh      | Test start date (month)  |
|        | DAY        | Test start date (day)  |
|        | HOUR       | Test start time (hour)   |
|        | MINute     | Test start time (minute)   |
|        | SECond     | Test start time (second)   |
|        | VOLTage    | Voltage at the time of judgment  |
|        | CURRent    | Current at the time of judgment  |
|        | CREal      | Real part of the current at the time of judgment   |
|        | CIMaginary | Imaginary part of the current at the time of judgment  |
|        | RESistance | Resistance at the time of judgment   |
|        | ETIMe      | Test time at the time of judgment  |
|        | JUDGment   | Judgment result  |

Response: character,character,..

### Example

```
RES:FORM NUMB,STEP,FUNC,DATE,VOLT,CURR,RES,ETIM,JUDG
```

Response example: When the test mode, test start time, and judgment result are set.

FUNC,DATE,JUDG is returned.

## RES

Queries the previous test result.

A query does not clear the data. Use RES:FORM to specify the item to be queried.

### Command

```
RESult[:IMMEDIATE]?
```

Response: Returns the item specified by RES:FORM in a comma-separated format.

| Item  | Description            | Response                     |           |
|---|------------------------|------------------------------|-----------|
| Test number   | --                     | NR1                          |           |
| Auto test step number                                 | 1 for a single test    | NR1                          |           |
| Test mode   | ACW                    | AC withstanding voltage      | character |
|   | DCW                    | DC withstanding voltage      |           |
|   | IR                     | Insulation resistance        |           |
|   | ECAC                   | Earth continuity (AC)        |           |
|   | ECDC                   | Earth continuity (DC)        |           |
|   | TC-n <sup>1</sup>      | Touch current                |           |
|   | PCC-n <sup>1</sup>     | Protective conductor current |           |
|   | PATIENT-n <sup>1</sup> | Patient leakage current      |           |
| Test start time                                       | RFC2822 format         | "string"                     |           |
| Test start date (year)                                | --                     | NR1                          |           |
| Test start date (month)                               | --                     | NR1                          |           |
| Test start date (day)                                 | --                     | NR1                          |           |
| Test start time (hour)                                | --                     | NR1                          |           |
| Test start time (minute)                              | --                     | NR1                          |           |
| Test start time (second)                              | --                     | NR1                          |           |
| Voltage at the time of judgment                       | --                     | NR3                          |           |
| Current at the time of judgment                       | --                     | NR3                          |           |
| Real part of the current at the time of judgment      | --                     | NR3                          |           |
| Imaginary part of the current at the time of judgment | --                     | NR3                          |           |
| Resistance at the time of judgment                    | --                     | NR3                          |           |
| Test time at the time of judgment                     | --                     | NR3                          |           |

| Item            | Description |  | Response  |
|-----------------|-------------|--|-----------|
| Judgment result | PASS        | PASS judgment.   | character |
|                 | U-FAIL      | A value exceeding the upper limit was detected resulting in a FAIL judgment. |           |
|                 | L-FAIL      | A value less than the lower limit was detected resulting in a FAIL judgment. |           |
|                 | PROT        | A protection function was activated, and the test was stopped.               |           |
|                 | ABORT       | The test was aborted with a STOP signal.                                     |           |

\*1. n is the network name.

Response example: When a test mode, test start time (month), test start time (day), and judgment result are selected, a touch current test is executed on October 23 (IEC60990 figure 3 U1 measurement), and the result is PASS.

TC-A, 10, 23, PASS is returned.

## RES:COUN

Queries the number of test results stored in the product.

### **Command**

RESult:COUNT?

Response: NR1

**RES:REM**

Queries the oldest test result.

The oldest test result is cleared when a query is made.

Use RES:FORM to specify the item to be queried.

**Command**

RESult:REMove?

Response Returns the item specified by RES:FORM in a comma-separated format.

| Item  | Description             | Response                     |
|---|-------------------------|------------------------------|
| Test number   | --                      | NR1                          |
| Auto test step number                                 | 1 for a single test     | NR1                          |
| Test mode   | ACW                     | AC withstanding voltage      |
|   | DCW                     | DC withstanding voltage      |
|   | IR                      | Insulation resistance        |
|   | ECAC                    | Earth continuity (AC)        |
|   | ECDC                    | Earth continuity (DC)        |
|   | TC-n <sup>-1</sup>      | Touch current                |
|   | PCC-n <sup>-1</sup>     | Protective conductor current |
|   | PATIENT-n <sup>-1</sup> | Patient leakage current      |
| Test start time                                       | RFC2822 format          | "string"                     |
| Test start date (year)                                | --                      | NR1                          |
| Test start date (month)                               | --                      | NR1                          |
| Test start date (day)                                 | --                      | NR1                          |
| Test start time (hour)                                | --                      | NR1                          |
| Test start time (minute)                              | --                      | NR1                          |
| Test start time (second)                              | --                      | NR1                          |
| Voltage at the time of judgment                       | --                      | NR3                          |
| Current at the time of judgment                       | --                      | NR3                          |
| Real part of the current at the time of judgment      | --                      | NR3                          |
| Imaginary part of the current at the time of judgment | --                      | NR3                          |
| Resistance at the time of judgment                    | --                      | NR3                          |
| Test time at the time of judgment                     | --                      | NR3                          |

| Item            | Description |  | Response  |
|-----------------|-------------|--|-----------|
| Judgment result | PASS        | PASS judgment.   | character |
|                 | U-FAIL      | A value exceeding the upper limit was detected resulting in a FAIL judgment. |           |
|                 | L-FAIL      | A value less than the lower limit was detected resulting in a FAIL judgment. |           |
|                 | PROT        | A protection function was activated, and the test was stopped.               |           |
|                 | ABORT       | The test was aborted with a STOP signal.                                     |           |

\*1. n is the network name.

# ROUTe Command

Use this function when the TOS9320 high voltage scanner option is connected.

## ROUT:ACW:TERM

Sets the connection of each channel of the scanner in AC withstanding voltage tests.

The ACW in the second node can be omitted, but to distinguish it from the DC withstanding voltage test, we recommend that you do not.

### Command

```
ROUTe[:ACW]:TERMinals <nrf>,<character>
```

```
ROUTe[:ACW]:TERMinals? <NRf>
```

Parameter <NRf>

Value: 101 to 104, 201 to 204, 301 to 304, 401 to 404

The hundreds digit is the scanner number (1 to 4), and the ones digit is the channel number (1 to 4). (default)

Parameter <character>

|        |      |                   |
|--------|------|-------------------|
| Value: | LOW  | Low voltage side  |
|        | HIGH | High voltage side |
|        | OPEN | Open (default)    |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
ROUT:ACW:TERM 202,LOW
```

```
ROUT:ACW:TERM? 202
```

## ROUT:ACW:TERM:CCH

Sets the continuity check for the test leads connected to the scanner and the EUT in AC withstanding voltage tests.

The ACW in the second node can be omitted, but to distinguish it from the DC withstanding voltage test, we recommend that you do not.

### Command

```
ROUTe[:ACW]:TERMinals:CCHeck[:STATe] <boolean>
```

```
ROUTe[:ACW]:TERMinals:CCHeck[:STATe]?
```

### Parameter

Value: ON(1) Enable.  
OFF(0) Disable. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
ROUT:ACW:TERM:CCH ON
```

## ROUT:CAT

Queries the available scanner channels.

### **Command**

```
ROUTe:CATalog?
```

Response: NR1,NR1,...

ResponseExample: When a scanner is not connected

Returns +0.

ResponseExample: When scanner 1 (using channels 1 to 4) is connected

Returns +101,+102,+103,+104.

## ROUT:DCW:TERM

Sets the connection of each channel of the scanner in DC withstanding voltage tests.

### Command

```
ROUTe:DCW:TERMinals <nrf>,<character>
```

```
ROUTe:DCW:TERMinals? <NRf>
```

Parameter <NRf>

Value: 101 to 104, 201 to 204, 301 to 304, 401 to 404

The hundreds digit is the scanner number (1 to 4), and the ones digit is the channel number (1 to 4).

Parameter <character>

|        |      |                   |
|--------|------|-------------------|
| Value: | LOW  | Low voltage side  |
|        | HIGH | High voltage side |
|        | OPEN | Open (default)    |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
ROUT:DCW:TERM 202,LOW
```

```
ROUT:DCW:TERM? 202
```

## ROUT:DCW:TERM:CCH

Sets the continuity check for the test leads connected to the scanner and the EUT in DC withstanding voltage tests.

### Command

```
ROUTe:DCW:TERMinals:CCHeck[:STATe] <boolean>
```

```
ROUTe:DCW:TERMinals:CCHeck[:STATe]?
```

### Parameter

Value: ON(1) Enable.  
OFF(0) Disable. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
ROUT:DCW:TERM:CCH ON
```

## ROUT:IR:TERM

Sets the connection of each channel of the scanner in insulation resistance tests.

### Command

```
ROUTe:IR:TERMinals <nrf>,<character>
```

```
ROUTe:IR:TERMinals? <NRf>
```

Parameter <NRf>

Value: 101 to 104, 201 to 204, 301 to 304, 401 to 404

The hundreds digit is the scanner number (1 to 4), and the ones digit is the channel number (1 to 4).

Parameter <character>

|        |      |                   |
|--------|------|-------------------|
| Value: | LOW  | Low voltage side  |
|        | HIGH | High voltage side |
|        | OPEN | Open (default)    |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
ROUT:IR:TERM 202,LOW
```

```
ROUT:IR:TERM? 202
```

## ROUT:IR:TERM:CCH

Sets the continuity check for the test leads connected to the scanner and the EUT in insulation resistance tests.

### Command

```
ROUTe:IR:TERMinals:CCHeck[:STATE] <boolean>
```

```
ROUTe:IR:TERMinals:CCHeck[:STATE]?
```

### Parameter

Value: ON(1) Enable.  
OFF(0) Disable.

Response: NR1

### Example

```
ROUT:IR:TERM:CCH ON
```

# SENS:ACW Command

This is a subsystem for setting the AC withstanding voltage test (ACW) conditions. The ACW in the second node can be omitted, but to distinguish it from the DC withstanding voltage test, we recommend that you do not.

## SENS:ACW:CURR:FILT:HPAS

Sets the high-pass filter for AC withstanding voltage tests.

### Command

```
SENSe[:ACW]:CURRent:FILTer:HPASs <character>  
SENSe[:ACW]:CURRent:FILTer:HPASs?
```

### Parameter

Value: SLOW (default)  
FAST

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:ACW:CURR:FILT:HPAS SLOW
```

### Related command

```
SENS:ACW:CURR:FILT:TYPE
```

## SENS:ACW:CURR:FILT:LPAS

Sets the low-pass filter for AC withstanding voltage tests.

### Command

```
SENSe[:ACW]:CURRent:FILTer:LPASs <character>
```

```
SENSe[:ACW]:CURRent:FILTer:LPASs?
```

### Parameter

Value: SLOW (default)  
MEDIUm  
FAST

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:ACW:CURR:FILT:LPAS SLOW
```

### Related command

```
SENS:ACW:CURR:FILT:TYPE
```

## SENS:ACW:CURR:FILT:TYPE

Sets the filter type for AC withstanding voltage tests.

### Command

```
SENSe[:ACW]:CURRent:FILTer:TYPE <character>
```

```
SENSe[:ACW]:CURRent:FILTer:TYPE?
```

### Parameter

|        |      |                           |
|--------|------|---------------------------|
| Value: | LOW  | Low-pass filter (default) |
|        | HIGH | High-pass filter          |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:ACW:CURR:FILT:TYPE LOW
```

## SENS:ACW:CURR:MODE

Sets the current measurement mode in AC withstanding voltage tests.

### Command

```
SENSe[:ACW]:CURRent:MODE <character>
```

```
SENSe[:ACW]:CURRent:MODE?
```

### Parameter

|        |         |  |
|--------|---------|--|
| Value: | RMS     | True rms value (default)                   |
|        | AVERAge | Convert mean-value responses to rms values |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:ACW:CURR:MODE RMS
```

## SENS:ACW:JUDG

Sets the reference current for upper limit judgment in AC withstanding voltage tests.

### Command

```
SENSe[:ACW]:JUDGment[:CURRent][:UPPer] <numeric>
```

```
SENSe[:ACW]:JUDGment[:CURRent][:UPPer]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0.01 MA)

Response: NR3

### Example

```
SENS:ACW:JUDG 0.00002
```

### SENS:ACW:JUDG:LOW

Sets the reference current for the lower limit judgment in AC withstanding voltage tests.

This setting is enabled when SENS:JUDG:LOW:STAT is set to ON.

#### Command

```
SENSe[:ACW]:JUDGment[:CURRent]:LOWer <numeric>
```

```
SENSe[:ACW]:JUDGment[:CURRent]:LOWer?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0 A)

Response: NR3

Example

```
SENS:ACW:JUDG:LOW 10UA
```

### SENS:ACW:JUDG:LOW:STAT

Sets whether to judge with the lower limit in AC withstanding voltage tests.

Use SENS:JUDG:LOW to set the lower limit.

#### Command

```
SENSe[:ACW]:JUDGment[:CURRent]:LOWer:STATe <boolean>
```

```
SENSe[:ACW]:JUDGment[:CURRent]:LOWer:STATe?
```

Parameter

|        |        |                     |
|--------|--------|---------------------|
| Value: | ON(1)  | Judge               |
|        | OFF(0) | Not judge (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
SENS:ACW:JUDG:LOW:STAT ON
```

## SENS:ACW:TERM:GRO

Sets whether to measure by including or excluding the current running through the stray capacitance in AC withstanding voltage tests.

### Command

```
SENSe[:ACW]:GROund:STATe <character>
```

```
SENSe[:ACW]:GROund:STATe?
```

### Parameter

|        |       |   |
|--------|-------|---|
| Value: | LOW   | Measure including the current running through the stray capacitance (default) |
|        | GUARd | Measure excluding the current running through the stray capacitance           |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:ACW:TERM:GRO LOW
```

## SENS:ACW:VOLT:MODE

Sets the voltage measurement mode in AC withstanding voltage tests.

### Command

```
SENSe[:ACW]:VOLTage:MODE <character>
```

```
SENSe[:ACW]:VOLTage:MODE?
```

### Parameter

|        |      |                          |
|--------|------|--------------------------|
| Value: | RMS  | True rms value (default) |
|        | PEAK | Peak value               |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:ACW:VOLT:MODE PEAK
```

# SENSe:DCW Command

This is a subsystem for setting the DC withstanding voltage test (DCW) conditions.

## SENSe:DCW:CURR:FILT:HPAS

Sets the high-pass filter for DC withstanding voltage tests.

### Command

```
SENSe:DCW:CURRent:FILTer:HPASs <character>
```

```
SENSe:DCW:CURRent:FILTer:HPASs?
```

### Parameter

Value: SLOW (default)  
FAST

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENSe:DCW:CURR:FILT:HPAS SLOW
```

### Related command

```
SENSe:DCW:CURR:FILT:TYPE
```

## SENS:DCW:CURR:FILT:LPAS

Sets the low-pass filter for DC withstanding voltage tests.

### Command

```
SENSe:DCW:CURRent:FILTer:LPASs <character>
```

```
SENSe:DCW:CURRent:FILTer:LPASs?
```

### Parameter

Value: SLOW (default)  
MEDIum  
FAST

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:DCW:CURR:FILT:LPAS SLOW
```

### Related command

```
SENS:DCW:CURR:FILT:TYPE
```

## SENS:DCW:CURR:FILT:TYPE

Sets the filter type for DC withstanding voltage tests.

### Command

```
SENSe:DCW:CURRent:FILTer:TYPE <character>
```

```
SENSe:DCW:CURRent:FILTer:TYPE?
```

### Parameter

|        |      |                           |
|--------|------|---------------------------|
| Value: | LOW  | Low-pass filter (default) |
|        | HIGH | High-pass filter          |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:DCW:CURR:FILT:TYPE LOW
```

## SENSe:DCW:JUDG

Sets the reference current for upper limit judgment in DC withstanding voltage tests.

### Command

```
SENSe:DCW:JUDGment[:CURRent][:UPPer] <numeric>
```

```
SENSe:DCW:JUDGment[:CURRent][:UPPer]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0.01 MA)

Response: NR3

### Example

```
SENSe:DCW:JUDG 0.00002
```

## SENS:DCW:JUDG:DEL

Sets the delay time until starting upper limit judgment in DC withstanding voltage tests.

This setting is enabled when SENS:DCW:JUDG:DEL:AUTO is set to OFF.

### Command

```
SENSe:DCW:JUDGment:DELaY <numeric>
```

```
SENSe:DCW:JUDGment:DELaY?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

### Example

```
SENS:DCW:JUDG:DEL 500MS
```

## SENS:DCW:JUDG:DEL:AUTO

Sets whether to make the judgment delay automatic in DC withstanding voltage tests.

If you do not set it to automatic, set the time until starting judgment with SENS:DCW:JUDG:DEL.

### Command

```
SENSe:DCW:JUDGment:DELaY:AUTO <boolean>
```

```
SENSe:DCW:JUDGment:DELaY:AUTO?
```

### Parameter

Value: ON(1) Set it to automatic  
OFF(0) Not set it to automatic (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:DCW:JUDG:DEL:AUTO ON
```

### SENSe:DCW:JUDG:LOW

Sets the reference current for the lower limit judgment in DC withstanding voltage tests.

This setting is enabled when SENSe:DCW:JUDG:LOW:STAT is set to ON.

#### Command

```
SENSe:DCW:JUDGment[:CURRent]:LOWer <numeric>
```

```
SENSe:DCW:JUDGment[:CURRent]:LOWer?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0 A)

Response: NR3

Example

```
SENSe:DCW:JUDG:LOW 10UA
```

### SENSe:DCW:JUDG:LOW:STAT

Sets whether to judge with the lower limit in DC withstanding voltage tests.

Use SENSe:DCW:JUDG:LOW to set the lower limit.

#### Command

```
SENSe:DCW:JUDGment[:CURRent]:LOWer:STATe <boolean>
```

```
SENSe:DCW:JUDGment[:CURRent]:LOWer:STATe?
```

Parameter

|        |        |                     |
|--------|--------|---------------------|
| Value: | ON(1)  | Judge               |
|        | OFF(0) | Not judge (default) |

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
SENSe:DCW:JUDG:LOW:STAT OFF
```

## SENS:DCW:TERM:GRO

Sets whether to measure by including or excluding the current running through the stray capacitance in DC withstanding voltage tests.

### Command

```
SENSe:DCW:TERMinals:GROund <character>
```

```
SENSe:DCW:TERMinals:GROund?
```

### Parameter

|        |       |   |
|--------|-------|---|
| Value: | LOW   | Measure including the current running through the stray capacitance (default) |
|        | GUARd | Measure excluding the current running through the stray capacitance           |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:DCW:TERM:GRO GUAR
```

## SENSe:DCW:VOLT:MODE

Sets the voltage measurement mode in DC withstanding voltage tests.

### Command

```
SENSe:DCW:VOLTage:MODE <character>
```

```
SENSe:DCW:VOLTage:MODE?
```

### Parameter

Value:   PEAK      Peak value  
          AVERAge Mean value (default)

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENSe:DCW:VOLT:MODE PEAK
```

# SENSe:EC Command

---

This is a subsystem for setting the earth continuity test (EC) conditions.

## SENS:EC[:AC] Command

---

### SENSe:EC:JUDG

Sets the reference resistance for upper limit judgment in earth continuity tests (AC).

This setting is enabled when SENS:EC:JUDG:STAT is set to ON.

#### **Command**

```
SENSe:EC[:AC]:JUDGment[:RESistance][:UPPer] <numeric>
```

```
SENSe:EC[:AC]:JUDGment[:RESistance][:UPPer]?
```

Unit: OHM

Settings are reset to default when the \*RST command is sent. (0.0001 OHM)

Response: NR3

#### **Example**

```
SENS:EC:JUDG 0.0002
```

**SENSe:EC:JUDG:STAT**

Sets whether to judge with the upper resistance limit in earth continuity tests (AC).

This setting is enabled when SENSe:EC:JUDG:TYPE is set to RES.

Use SENSe:EC:JUDG:LOW to set the upper limit.

**Command**

```
SENSe:EC[:AC]:JUDGment[:RESistance][:UPPer]:STATe <bool-  
ean> SENSe:EC[:AC]:JUDGment[:RESistance][:UPPer]:STATe?
```

**Parameter**

Value:   ON(1)   Judge (default)  
          OFF(0)  Not judge

Settings are reset to default when the \*RST command is sent.

Response: NR1

**Example**

```
SENSe:EC:JUDG:STAT ON
```

## SENS:EC:JUDG:LOW

Sets the reference resistance for lower limit judgment in earth continuity tests (AC).

This setting is enabled when SENS:EC:JUDG:LOW:STAT is set to ON.

### Command

```
SENSe:EC[:AC]:JUDGment[:RESistance]:LOWer <numeric>
```

```
SENSe:EC[:AC]:JUDGment[:RESistance]:LOWer?
```

Unit: OHM

Settings are reset to default when the \*RST command is sent. (0 OHM)

Response: NR3

### Example

```
SENS:EC:JUDG:LOW 1
```

## SENS:EC:JUDG:LOW:STAT

Sets whether to judge with the lower resistance limit in earth continuity tests (AC).

This setting is enabled when SENS:EC:JUDG:TYPE is set to RES.

Use SENS:EC:JUDG:LOW to set the lower limit.

### Command

```
SENSe:EC[:AC]:JUDGment[:RESistance]:LOWer:STATe <boolean>
```

```
SENSe:EC[:AC]:JUDGment[:RESistance]:LOWer:STATe?
```

### Parameter

Value: ON(1) Judge  
OFF(0) Not judge (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:EC:JUDG:LOW:STAT ON
```

## SENSe:EC:JUDG:TYPE

Sets whether to use resistance or voltage to make upper limit judgment and lower limit judgment in earth continuity tests (AC).

### Command

```
SENSe:EC[:AC]:JUDGment:TYPE <character>
```

```
SENSe:EC[:AC]:JUDGment:TYPE?
```

### Parameter

Value:   RESistance   Judge using resistance (default)  
          VOLTage     Judge using voltage

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENSe:EC:JUDG:TYPE RES
```

## SENS:EC:JUDG:VOLT

Sets the reference voltage for upper limit judgment in earth continuity tests (AC).  
This setting is enabled when SENS:EC:VOLT:JUDG:STAT is set to ON.

### Command

```
SENSe:EC[:AC]:JUDGment:VOLTage[:UPPer] <numeric>  
SENSe:EC[:AC]:JUDGment:VOLTage[:UPPer]?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (2.5 V)

Response: NR3

### Example

```
SENS:EC:JUDG:VOLT 0.002
```

## SENS:EC:JUDG:VOLT:STAT

Sets whether to judge with the upper voltage limit in earth continuity tests (AC).  
This setting is enabled when SENS:EC:JUDG:TYPE is set to VOLT.  
Use SENS:EC:VOLT:JUDG to set the upper limit.

### Command

```
SENSe:EC[:AC]:JUDGment:VOLTage[:UPPer]:STATe <boolean>  
SENSe:EC[:AC]:JUDGment:VOLTage[:UPPer]:STATe?
```

### Parameter

Value: ON(1) Judge (default)  
OFF(0) Not judge

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:EC:JUDG:VOLT:STAT ON
```

## SENSe:EC:JUDG:VOLT:LOW

Sets the reference voltage for lower limit judgment in earth continuity tests (AC).  
This setting is enabled when SENSe:EC:VOLT:JUDG:LOW:STAT is set to ON.

### Command

```
SENSe:EC[:AC]:JUDGment:VOLTage:LOWer <numeric>
SENSe:EC[:AC]:JUDGment:VOLTage:LOWer?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (0 V)

Response: NR3

### Example

```
SENSe:EC:JUDG:VOLT:LOW 1V
```

## SENSe:EC:JUDG:VOLT:LOW:STAT

Sets whether to judge with the lower voltage limit in earth continuity tests (AC).  
This setting is enabled when SENSe:EC:JUDG:TYPE is set to VOLT.  
Use SENSe:EC:VOLT:JUDG:LOW to set the lower limit.

### Command

```
SENSe:EC[:AC]:JUDGment:VOLTage:LOWer:STATe <boolean>
SENSe:EC[:AC]:JUDGment:VOLTage:LOWer:STATe?
```

### Parameter

Value: ON(1) Judge  
OFF(0) Not judge (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENSe:EC:JUDG:VOLT:LOW:STAT ON
```

## SENS:EC:TERM:CCH

Sets the contact check for the test leads and the EUT in earth continuity tests (AC).

### Command

```
SENSe:EC[:AC]:TERMinals:CCHeck[:STATe] <boolean>
```

```
SENSe:EC[:AC]:TERMinals:CCHeck[:STATe]?
```

### Parameter

Value: ON(1) Check is performed.  
OFF(0) Check is not performed. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:EC:TERM:CCH ON
```

## SENSe:EC:TERM:WIRE

Sets the test lead wiring method in earth continuity tests (AC).

### Command

```
SENSe:EC[:AC]:TERMinals:WIRE {4|2}
```

```
SENSe:EC[:AC]:TERMinals:WIRE?
```

### Parameter

|        |   |                                |
|--------|---|--------------------------------|
| Value: | 4 | Four-terminal wiring (default) |
|        | 2 | Two-terminal wiring            |

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENSe:EC:TERM:WIRE 2
```

## SENS:EC:DC Command

### SENS:EC:DC:JUDG

Sets the reference resistance for upper limit judgment in earth continuity tests (DC).

This setting is enabled when SENS:EC:DC:JUDG:STAT is set to ON.

#### **Command**

```
SENSe:EC:DC:JUDGment[:RESistance][:UPPer] <numeric>
```

```
SENSe:EC:DC:JUDGment[:RESistance][:UPPer]?
```

Unit: OHM

Settings are reset to default when the \*RST command is sent. (0.0001 OHM)

Response: NR3

#### **Example**

```
SENS:EC:DC:JUDG 0.00002
```

### SENS:EC:DC:JUDG:STAT

Sets whether to judge with the upper resistance limit in earth continuity tests (DC).

This setting is enabled when SENS:EC:DC:JUDG:TYPE is set to RES.

Use SENS:EC:DC:JUDG:LOW to set the upper limit.

#### **Command**

```
SENSe:EC:DC:JUDGment[:RESistance][:UPPer]:STATe <boolean>
```

```
SENSe:EC:DC:JUDGment[:RESistance][:UPPer]:STATe?
```

#### **Parameter**

Value: ON(1) Judge (default)  
OFF(0) Not judge

Settings are reset to default when the \*RST command is sent.

Response: NR1

#### **Example**

```
SENS:EC:DC:JUDG:STAT ON
```

**SENSe:EC:DC:JUDG:LOW**

Sets the reference resistance for lower limit judgment in earth continuity tests (DC).  
This setting is enabled when SENSe:EC:DC:JUDG:LOW:STAT is set to ON.

**Command**

```
SENSe:EC:DC:JUDGment[:RESistance]:LOWer <numeric>
SENSe:EC:DC:JUDGment[:RESistance]:LOWer?
```

Unit: OHM

Settings are reset to default when the \*RST command is sent. (0 OHM)

Response: NR3

**Example**

```
SENSe:EC:DC:JUDG:LOW 10
```

**SENSe:EC:DC:JUDG:LOW:STAT**

Sets whether to judge with the lower resistance limit in earth continuity tests (DC).  
This setting is enabled when SENSe:EC:DC:JUDG:TYPE is set to RES.  
Use SENSe:EC:DC:JUDG:LOW to set the lower limit.

**Command**

```
SENSe:EC:DC:JUDGment[:RESistance]:LOWer:STATe <boolean>
SENSe:EC:DC:JUDGment[:RESistance]:LOWer:STATe?
```

**Parameter**

Value: ON(1) Judge  
OFF(0) Not judge (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

**Example**

```
SENSe:EC:DC:JUDG:LOW:STAT ON
```

## SENS:EC:DC:JUDG:TYPE

Sets whether to use resistance or voltage to make upper limit judgment and lower limit judgment in earth continuity tests (DC).

### Command

```
SENSe:EC:DC:JUDGment:TYPE <character>
```

```
SENSe:EC:DC:JUDGment:TYPE?
```

### Parameter

Value: RESistance Judge using resistance (default)  
VOLTage Judge using voltage

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:EC:DC:JUDG:TYPE RES
```

## SENSe:EC:DC:JUDG:VOLT

Sets the reference voltage for upper limit judgment in earth continuity tests (DC).  
This setting is enabled when SENSe:EC:DC:VOLT:JUDG:STAT is set to ON.

### Command

```
SENSe:EC:DC:JUDGment:VOLTage[:UPPer] <numeric>
SENSe:EC:DC:JUDGment:VOLTage[:UPPer]?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (2.5 V)

Response: NR3

### Example

```
SENSe:EC:DC:JUDG:VOLT 0.002
```

## SENSe:EC:DC:JUDG:VOLT:STAT

Sets whether to judge with the upper voltage limit in earth continuity tests (DC).  
This setting is enabled when SENSe:EC:DC:JUDG:TYPE is set to VOLT.  
Use SENSe:DC:EC:VOLT:JUDG to set the upper limit.

### Command

```
SENSe:EC:DC:JUDGment:VOLTage[:UPPer]:STATe <boolean>
SENSe:EC:DC:JUDGment:VOLTage[:UPPer]:STATe?
```

### Parameter

Value: ON(1) Judge (default)  
OFF(0) Not judge

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENSe:EC:DC:JUDG:VOLT:STAT ON
```

## SENS:EC:DC:JUDG:VOLT:LOW

Sets the reference voltage for lower limit judgment in earth continuity tests (DC).  
This setting is enabled when SENS:EC:DC:VOLT:JUDG:LOW:STAT is set to ON.

### Command

```
SENSe:EC:DC:JUDGment:VOLTage:LOWer <numeric>  
SENSe:EC:DC:JUDGment:VOLTage:LOWer?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (0 V)

Response: NR3

### Example

```
SENS:EC:DC:JUDG:VOLT:LOW 1V
```

## SENS:EC:DC:JUDG:VOLT:LOW:STAT

Sets whether to judge with the lower voltage limit in earth continuity tests (DC).  
This setting is enabled when SENS:EC:DC:JUDG:TYPE is set to VOLT.  
Use SENS:EC:DC:VOLT:JUDG:LOW to set the lower limit.

### Command

```
SENSe:EC:DC:JUDGment:VOLTage:LOWer:STATe <boolean>  
SENSe:EC:DC:JUDGment:VOLTage:LOWer:STATe?
```

### Parameter

Value: ON(1) Judge  
OFF(0) Not judge (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:EC:DC:JUDG:VOLT:LOW:STAT ON
```

## SENSe:EC:DC:TERM:CCH

Sets the continuity check for the test leads and the EUT in earth continuity tests (DC).

### Command

```
SENSe:EC:DC:TERMinals:CCHeck[:STATe] <boolean>
```

```
SENSe:EC:DC:TERMinals:CCHeck[:STATe]?
```

### Parameter

Value: ON(1) Check is performed.  
OFF(0) Check is not performed. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENSe:EC:DC:TERM:CCH ON
```

## SENS:EC:DC:TERM:WIRE

Sets the test lead wiring method in earth continuity tests (DC).

### Command

```
SENSe:EC:DC:TERMinals:WIRE {4|2}
```

```
SENSe:EC:DC:TERMinals:WIRE?
```

### Parameter

|        |   |                                |
|--------|---|--------------------------------|
| Value: | 4 | Four-terminal wiring (default) |
|        | 2 | Two-terminal wiring            |

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:EC:DC:TERM:WIRE 2
```

# SENSe:IR Command

This is a subsystem for setting the insulation resistance test (IR) conditions.

## SENS:IR:CURR:FILT:LPAS:STAT

Enables or disables the low-pass filter for insulation resistance tests.

### Command

```
SENSe:IR:CURRent:FILTer:LPASs:STATe <boolean>
```

```
SENSe:IR:CURRent:FILTer:LPASs:STATe?
```

### Parameter

Value: ON(1) The low-pass filter is enabled.  
OFF(0) The low-pass filter is disabled. (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:IR:CURR:FILT:LPAS:STAT ON
```

## SENS:IR:JUDG

Sets the reference resistance for upper limit judgment in insulation resistance tests.  
This setting is enabled when SENS:IR:JUDG:STAT is set to ON.

### Command

```
SENSe:IR:JUDGment[:RESistance][:UPPer] <numeric>  
SENSe:IR:JUDGment[:RESistance][:UPPer]?
```

Unit: OHM

Settings are reset to default when the \*RST command is sent. (100 MOHM)

Response: NR3

### Example

```
SENS:IR:JUDG 100MOHM
```

## SENS:IR:JUDG:STAT

Sets whether to judge with the upper resistance limit in insulation resistance tests.  
This setting is enabled when SENS:IR:JUDG:TYPE is set to RES.  
Use SENS:IR:JUDG to set the upper limit.

### Command

```
SENSe:IR:JUDGment[:RESistance][:UPPer]:STATe <boolean>  
SENSe:IR:JUDGment[:RESistance][:UPPer]:STATe?
```

### Parameter

Value: ON(1) Judge  
OFF(0) Not judge (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:IR:JUDG:STAT ON
```

## SENS:IR:JUDG:CURR

Sets the reference current for upper limit judgment in insulation resistance tests.

This setting is enabled when SENS:IR:JUDG:CURR:STAT is set to ON.

### Command

```
SENSe:IR:JUDGment:CURRent[:UPPer] <numeric>
```

```
SENSe:IR:JUDGment:CURRent[:UPPer]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0.0001 MA)

Response: NR3

### Example

```
SENS:IR:JUDG:CURR 1MA
```

## SENS:IR:JUDG:CURR:STAT

Sets whether to judge with the upper current limit in insulation resistance tests.

This setting is enabled when SENS:IR:JUDG:TYPE is set to CURR.

Use SENS:IR:JUDG:CURR to set the upper limit.

### Command

```
SENSe:IR:JUDGment:CURRent[:UPPer]:STATe <boolean>
```

```
SENSe:IR:JUDGment:CURRent[:UPPer]:STATe?
```

### Parameter

Value: ON(1) Judge (default)  
OFF(0) Not judge

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:IR:JUDG:CURR:STAT ON
```

## SENS:IR:JUDG:CURR:LOW

Sets the reference current for lower limit judgment in insulation resistance tests.

This setting is enabled when SENS:IR:JUDG:CURR:LOW:STAT is set to ON.

### Command

```
SENSe:IR:JUDGment:CURRent:LOWer <numeric>
```

```
SENSe:IR:JUDGment:CURRent:LOWer?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0 A)

Response: NR3

### Example

```
SENS:IR:JUDG:CURR:LOW 1MA
```

## SENS:IR:JUDG:CURR:LOW:STAT

Sets whether to judge with the lower current limit in insulation resistance tests.

This setting is enabled when SENS:IR:JUDG:TYPE is set to CURR.

Use SENS:IR:JUDG:CURR:LOW to set the lower limit.

### Command

```
SENSe:IR:JUDGment:CURRent:LOWer:STATe <boolean>
```

```
SENSe:IR:JUDGment:CURRent:LOWer:STATe?
```

Parameter

Value: ON(1) Judge  
OFF(0) Not judge (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:IR:JUDG:CURR:LOW:STAT ON
```

## SENSe:IR:JUDG:DEL

Sets the time until starting upper limit judgment.

This setting is enabled when SENSe:IR:JUDG:DEL:AUTO? is set to OFF.

### Command

```
SENSe:IR:JUDGment:DELay <numeric>
```

```
SENSe:IR:JUDGment:DELay?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

### Example

```
SENS:IR:JUDG:DEL 2
```

## SENSe:IR:JUDG:DEL:AUTO

Sets whether to make the judgment delay automatic.

If you do not set it to automatic, set the time until starting judgment with SENSe:IR:-JUDG:DEL.

### Command

```
SENSe:IR:JUDGment:DELay:AUTO <boolean>
```

```
SENSe:IR:JUDGment:DELay:AUTO?
```

### Parameter

Value: ON(1) Set it to automatic  
OFF(0) Not set it to automatic (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:IR:JUDG:DEL:AUTO ON
```

## SENS:IR:JUDG:LOW

Sets the reference resistance for lower limit judgment in insulation resistance tests.  
This setting is enabled when SENS:IR:JUDG:LOW:STAT is set to ON.

### Command

```
SENSe:IR:JUDGment[:RESistance]:LOWer <numeric>  
SENSe:IR:JUDGment[:RESistance]:LOWer?
```

Unit: OHM

Settings are reset to default when the \*RST command is sent. (1 MOHM)

Response: NR3

### Example

```
SENS:IR:JUDG:LOW 1000000
```

## SENS:IR:JUDG:LOW:STAT

Sets whether to judge with the lower resistance limit in insulation resistance tests.  
This setting is enabled when SENS:IR:JUDG:TYPE is set to RES.  
Use SENS:IR:JUDG:LOW to set the lower limit.

### Command

```
SENSe:IR:JUDGment[:RESistance]:LOWer:STATe <boolean>  
SENSe:IR:JUDGment[:RESistance]:LOWer:STATe?
```

### Parameter

Value: ON(1) Judge (default)  
OFF(0) Not judge

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:IR:JUDG:LOW:STAT ON
```

## SENSe:IR:JUDG:TYPE

Sets whether to use resistance or current to make upper limit judgment and lower limit judgment in insulation resistance tests.

### Command

```
SENSe:IR:JUDGment:TYPE <character>
```

```
SENSe:IR:JUDGment:TYPE?
```

### Parameter

Value:   RESistance   Judge using resistance (default)  
          CURRent     Judge using current

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENSe:IR:JUDG:TYPE RES
```

## SENS:IR:TERM:GRO

Sets whether to measure by including or excluding the current running through the stray capacitance in insulation resistance tests.

### Command

```
SENSe:IR:TERMinals:GROund <character>
```

```
SENSe:IR:TERMinals:GROund?
```

### Parameter

|        |       |   |
|--------|-------|---|
| Value: | LOW   | Measure including the current running through the stray capacitance (default) |
|        | GUARd | Measure excluding the current running through the stray capacitance           |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:IR:TERM:GRO GUAR
```

# SENSe:MET Command

This is a subsystem for setting the meter mode (MET) test conditions.

## SENS:MET:CURR:MODE

Sets the current measurement mode in meter mode.

### Command

```
SENSe:METer:CURRent:MODE <character>
```

```
SENSe:METer:CURRent:MODE?
```

### Parameter

|        |      |   |
|--------|------|---|
| Value: | ACDC | Measures the DC component and AC component with true rms values (default) |
|        | AC   | Measures only the AC component with true rms values                       |
|        | DC   | Measures only the DC component  |
|        | PEAK | Measures waveform peak values   |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:MET:CURR:MODE AC
```

## SENS:MET:NETW

Sets the measurement circuit network to use in meter mode.

### Command

```
SENSe:METer:NETWork <character>
```

```
SENSe:METer:NETWork?
```

### Parameter

|        |      |   |
|--------|------|---|
| Value: | A    | IEC60990 Fig. 3 U1 measurement (default)                            |
|        | B-U1 | IEC60990 Fig. 4 U2 measurement                                      |
|        | B-U2 | IEC60990 Fig. 4 U1 measurement                                      |
|        | C    | IEC60990 Fig. 5 U3 measurement                                      |
|        | D    | Electrical Appliances and Materials Safety Act single frequency     |
|        | E    | Electrical Appliances and Materials Safety Act multiple frequencies |
|        | F    | IEC61029, UL  |
|        | G    | IEC60745  |
|        | H    | IEC61010-1, IEC61010-1 Wet condition                                |
|        | I    | IEC60601-1  |
|        | J    | For calibration. Do not use.  |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:MET:NETW A
```

## SENS:MET:RANG

Sets the meter mode measurement range.

When set, auto range is turned off (SENS:MET:RANG:AUTO OFF).

### Command

```
SENSe:METer[:VOLTage]:RANGe <numeric>
```

```
SENSe:METer[:VOLTage]:RANGe?
```

### Parameter

Value: 42mV  
420mV  
4.2V  
42V (default)

Unit: V

Settings are reset to default when the \*RST command is sent.

Response: NR3

### Example

```
SENS:MET:RANG 420MV
```

## SENS:MET:RANG:AUTO

Sets whether to set the meter mode measurement range to auto.

If set to off, use SENS:MET:RANG to set the measurement range.

### Command

```
SENSe:METer[:VOLTage]:RANGe:AUTO <boolean>
```

```
SENSe:METer[:VOLTage]:RANGe:AUTO?
```

### Parameter

Value: ON(1) Switches the range automatically according to the measured values (default)  
OFF(0) Fixed measurement range

Settings are reset to default when the \*RST command is sent.

When you send the SENS:MET:RANG command, this setting is set to OFF.

Response: NR1

### Example

```
SENS:MET:RANG:AUTO ON
```

## SENSe:MET:SELV

Sets the SELV voltage of meter mode.

This setting is enabled when SENS:MET:SELV:STAT is set to ON.

### Command

```
SENSe:METer:SELVoltage <numeric>
```

```
SENSe:METer:SELVoltage?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (30 V)

Response: NR3

Example

```
SENS:MET:SELV 10
```

## SENSe:MET:SELV:STAT

Sets whether the SELV voltage is used.

Use SENS:MET:SELV to set the SELV voltage.

### Command

```
SENSe:METer:SELVoltage:STATe <boolean>
```

```
SENSe:METer:SELVoltage:STATe?
```

Parameter

Value: ON(1) Set (default)  
OFF(0) Not set

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
SENS:MET:SELV:STAT ON
```

## SENS:MET:TERM

Sets the touch mode of meter mode.

### Command

```
SENSe:METer:TERMinal[:AB] <character>
```

```
SENSe:METer:TERMinal[:AB]?
```

### Parameter

Value: NETWORK      Measures the touch current across terminals A and B (default)  
      VOLTmeter     Measures the voltage across terminals A and B

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:MET:TERM NETW
```

# SENSe:PAT Command

This is a subsystem for setting the patient leakage current test (PAT) conditions.

## SENS:PAT:BAND

Sets whether to expand the band of the internal voltmeter of this product in patient leakage current tests.

### Command

```
SENSe:PATient[:VOLTage]:BANDwidth <character>
```

```
SENSe:PATient[:VOLTage]:BANDwidth?
```

### Parameter

Value:   NORMal   Not expand (default)  
          EXPand   Expand

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:PAT:BAND NORM
```

## SENS:PAT:COND

Sets the single fault condition for patient leakage current tests.

Use SENS:PAT:COND:FAUL to set the disconnected condition.

### Command

```
SENSe:PATient:CONDition <character>
```

```
SENSe:PATient:CONDition?
```

### Parameter

Value:    NORMAl    Normal condition (default)  
          FAULt     Disconnected condition

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:PAT:COND NORM
```

## SENS:PAT:COND:FAUL

Sets the disconnected condition at fault for patient leakage current tests.

Use SENS:PAT:COND to set the fault condition.

### Command

```
SENSe:PATient:CONDition:FAULt <character>
```

```
SENSe:PATient:CONDition:FAULt?
```

### Parameter

Value:    NEUTral    Disconnected power supply line (neutral) (default)  
          PEARth    Disconnected earth line

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:PAT:COND:FAUL NEUT
```

**SENSe: PAT: CURR: MODE**

Sets the current measurement mode in patient leakage current tests.

**Command**

```
SENSe: PATient: CURRent: MODE <character>
```

```
SENSe: PATient: CURRent: MODE?
```

**Parameter**

|        |      |   |
|--------|------|---|
| Value: | ACDC | Measures the DC component and AC component with true rms values (default) |
|        | AC   | Measures only the AC component with true rms values                       |
|        | DC   | Measures only the DC component  |
|        | PEAK | Measures waveform peak values   |

Settings are reset to default when the \*RST command is sent.

Response: character

**Example**

```
SENSe: PAT: CURR: MODE AC
```

## SENS:PAT:JUDG

Sets the reference current for upper limit judgment in patient leakage current tests.

This setting is enabled when SENS:PAT:JUDG:STAT is set to ON.

### Command

```
SENSe:PATient:JUDGment[:CURRent][:UPPer] <numeric>
```

```
SENSe:PATient:JUDGment[:CURRent][:UPPer] ?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (100 UA)

Response: NR3

### Example

```
SENS:PAT:JUDG 10UA
```

## SENS:PAT:JUDG:STAT

Sets whether to judge with the upper current limit in patient leakage current tests.

Use SENS:PAT:JUDG to set the upper limit.

### Command

```
SENSe:PATient:JUDGment[:CURRent][:UPPer]:STATe <boolean>
```

```
SENSe:PATient:JUDGment[:CURRent][:UPPer]:STATe?
```

Parameter

Value: ON(1) Judge (default)  
OFF(0) Not judge

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:PAT:JUDG:STAT ON
```

**SENS:PAT:JUDG:DEL**

Set the time until starting judgments in patient leakage current tests.

This setting is enabled when SENS:PAT:JUDG:DEL:STAT is set to ON.

**Command**

```
SENSe:PATient:JUDGment:DELaY <numeric>
```

```
SENSe:PATient:JUDGment:DELaY?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (1 S)

Response: NR3

Example

```
SENS:PAT:JUDG:DEL 5S
```

**SENS:PAT:JUDG:DEL:STAT**

Sets whether to set the judgment delay in patient leakage current tests.

Use SENS:PAT:JUDG:DEL to set the judgment delay.

**Command**

```
SENSe:PATient:JUDGment:DELaY:STATe <boolean>
```

```
SENSe:PATient:JUDGment:DELaY:STATe?
```

Parameter

Value: ON(1) Set  
OFF(0) Not set (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
SENS:PAT:JUDG:DEL:STAT ON
```

## SENS:PAT:JUDG:LOW

Sets the reference current for lower limit judgment in patient leakage current tests.  
This setting is enabled when SENS:PAT:JUDG:LOW:STAT is set to ON.

### Command

```
SENSe:PATient:JUDGment[:CURRent]:LOWer <numeric>  
SENSe:PATient:JUDGment[:CURRent]:LOWer?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0.01 MA)

Response: NR3

### Example

```
SENS:PAT:JUDG:LOW 10UA
```

## SENS:PAT:JUDG:LOW:STAT

Sets whether to judge with the lower current limit in patient leakage current tests.  
Use SENS:PAT:JUDG:LOW to set the lower limit.

### Command

```
SENSe:PATient:JUDGment[:CURRent]:LOWer:STATe <boolean>  
SENSe:PATient:JUDGment[:CURRent]:LOWer:STATe?
```

Parameter

Value: ON(1) Judge  
OFF(0) Not judge (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:PAT:JUDG:LOW:STAT ON
```

## SENSe:PAT:NETW

Sets the measurement circuit network that is compatible with the patient leakage current test standard.

The only network that can be used for patient leakage current tests is I (for IEC60601-1).

### Command

```
SENSe:PATient:NETWork <character>
```

```
SENSe:PATient:NETWork?
```

### Parameter

Value: I For IEC60601-1

Response: character

### Example

```
SENSe:PAT:NETW I
```

## SENS:PAT:NETW:PROB

Sets the B terminal probe connection destination for patient leakage current tests.  
The A terminal probe connection destination is a part applied to the patient.

### Command

```
SENSe:PATient:NETWork:PROBe[:B] <character>
```

```
SENSe:PATient:NETWork:PROBe[:B]?
```

### Parameter

|        |         |   |
|--------|---------|---|
| Value: | PEARth  | Measures the patient leakage current or the total patient leakage current across a part applied to the patient and earth. (default) |
|        | T110pct | Measures the patient leakage current running across the F-type applied part and 110% terminal.                                      |
|        | PATient | Measures the patient measurement current across parts applied to the patient.   |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:PAT:NETW:PROB PEAR
```

**SENS: PAT: PROB: A**

Queries the A terminal probe connection destination in patient leakage current tests.

**Command**

```
SENSe: PATient: NETWork: PROBe: A?
```

Response: character

Returns "PAT" (a part applied to the patient).

## SENS:PAT:RANG:AUTO

Sets the measurement range for patient leakage current tests.

### Command

```
SENSe:PATient[:VOLTage]:RANGe:AUTO <boolean>
```

```
SENSe:PATient[:VOLTage]:RANGe:AUTO?
```

### Parameter

Value: ON(1) Switches the range automatically according to the measured values (default)  
OFF(0) The measurement range is fixed Range 1 to 4 according to the Upper, and Measure Mode settings.

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:PAT:RANG:AUTO ON
```

**SENSe:PAT:TIM**

Sets the test time for patient leakage current tests.

This setting is enabled when SENS:PAT:TIM:STAT is set to ON.

**Command**

```
SENSe:PATient:TIMer <numeric>
```

```
SENSe:PATient:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (1 S)

Response: NR3

Example

```
SENS:PAT:TIM 10S
```

**SENSe:PAT:TIM:STAT**

Sets whether to set the test time in patient leakage current tests.

Use SENS:PAT:TIM to set the test time.

**Command**

```
SENSe:PATient:TIMer:STATe <boolean>
```

```
SENSe:PATient:TIMer:STATe?
```

Parameter

Value:   ON(1)   Set (default)  
          OFF(0)   Not set

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
SENS:PAT:TIM:STAT ON
```

# SENSe:PCC Command

This is a subsystem for setting the protective conductor current test (PCC) conditions.

## SENS:PCC:BAND

Sets whether to expand the band of the internal voltmeter of this product in protective conductor current tests.

### Command

```
SENSe:PCCurrent[:VOLTage]:BANDwidth <character>
```

```
SENSe:PCCurrent[:VOLTage]:BANDwidth?
```

### Parameter

|        |        |                      |
|--------|--------|----------------------|
| Value: | NORMal | Not expand (default) |
|        | EXPand | Expand               |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:PCC:BAND NORM
```

## SENSe:PCC:COND

Sets the single fault mode for protective conductor current tests.

### Command

```
SENSe:PCCurrent:CONDition <character>
```

```
SENSe:PCCurrent:CONDition?
```

### Parameter

Value:   NORMAL   Normal condition (default)  
          FAULt     Disconnected power supply line (neutral)

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENSe:PCC:COND FAUL
```

## SENS:PCC:COND:FAUL

Queries the disconnected condition at fault for protective conductor current tests.

### **Command**

SENSe:PCCurrent:CONDition:FAULt?

Response: character

Returns "NEUT" (disconnected condition of the power supply line (neutral)).

**SENSe:PCC:CURR:MODE**

Sets the current measurement mode in protective conductor current tests.

**Command**

```
SENSe:PCCurrent:CURRent:MODE <character>
```

```
SENSe:PCCurrent:CURRent:MODE?
```

**Parameter**

|        |      |   |
|--------|------|---|
| Value: | ACDC | Measures the DC component and AC component with true rms values (default) |
|        | AC   | Measures only the AC component with true rms values                       |
|        | DC   | Measures only the DC component  |
|        | PEAK | Measures waveform peak values   |

Settings are reset to default when the \*RST command is sent.

Response: character

**Example**

```
SENSe:PCC:CURR:MODE AC
```

## SENS:PCC:JUDG

Sets the reference current for upper limit judgment in protective conductor current tests.

This setting is enabled when SENS:PCC:JUDG:STAT is set to ON.

### Command

```
SENSe:PCCurrent:JUDGment[:CURRent][:UPPer] <numeric>  
SENSe:PCCurrent:JUDGment[:CURRent][:UPPer] ?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (100 UA)

Response: NR3

Example

```
SENS:PCC:JUDG 10UA
```

## SENS:PCC:JUDG:STAT

Sets whether to judge with the upper current limit in protective conductor current tests.

Use SENS:PCC:JUDG to set the upper limit.

### Command

```
SENSe:PCCurrent:JUDGment[:CURRent][:UPPer]:STATe <boolean>  
SSENSe:PCCurrent:JUDGment[:CURRent][:UPPer]:STATe?
```

Parameter

Value: ON(1) Judge (default)  
OFF(0) Not judge

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
SENS:PCC:JUDG:STAT ON
```

**SENSe:PCC:JUDG:DEL**

Sets the time until starting judgments in protective conductor current tests.

This setting is enabled when SENSe:PCC:JUDG:DEL:STAT is set to ON.

**Command**

```
SENSe:PCCurrent:JUDGment:DELAy <numeric>
```

```
SENSe:PCCurrent:JUDGment:DELAy?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (1 S)

Response: NR3

**Example**

```
SENSe:PCC:JUDG:DEL 5S
```

**SENSe:PCC:JUDG:DEL:STAT**

Sets whether to set the judgment delay in protective conductor current tests.

Use SENSe:PCC:JUDG:DEL to set the judgment delay.

**Command**

```
SENSe:PCCurrent:JUDGment:DELAy:STATe <boolean>
```

```
SENSe:PCCurrent:JUDGment:DELAy:STATe?
```

**Parameter**

Value: ON(1) Set  
OFF(0) Not set (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

**Example**

```
SENSe:PCC:JUDG:DEL:STAT ON
```

## SENS:PCC:JUDG:LOW

Sets the reference current for lower limit judgment in protective conductor current tests.

This setting is enabled when SENS:PCC:JUDG:LOW:STAT is set to ON.

### Command

```
SENSe:PCCurrent:JUDGment[:CURRent]:LOWer <numeric>
```

```
SENSe:PCCurrent:JUDGment[:CURRent]:LOWer?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0.01 MA)

Response: NR3

Example

```
SENS:PCC:JUDG:LOW 10UA
```

## SENS:PCC:JUDG:LOW:STAT

Sets whether to judge with the lower current limit in protective conductor current tests.

Use SENS:PCC:JUDG:LOW to set the lower limit.

### Command

```
SENSe:PCCurrent:JUDGment[:CURRent]:LOWer:STATe <boolean>
```

```
SENSe:PCCurrent:JUDGment[:CURRent]:LOWer:STATe?
```

Parameter

Value: ON(1) Judge  
OFF(0) Not judge (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
SENS:PCC:JUDG:LOW:STAT ON
```

## SENSe:PCC:NETW

Sets the measurement circuit network to use in protective conductor current tests.

### Command

```
SENSe:PCCurrent:NETWork <character>
```

```
SENSe:PCCurrent:NETWork?
```

### Parameter

|        |       |   |
|--------|-------|---|
| Value: | I     | Ground leakage current measurement of medical instruments |
|        | PCC-1 | Protective conductor current measurement (default)        |
|        | PCC-2 | IEC60598-1  |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENSe:PCC:NETW 1
```

## SENS:PCC:RANG:AUTO

Sets the measurement range for protective conductor current tests.

### Command

```
SENSe:PCCurrent[:VOLTage]:RANGe:AUTO <boolean>
```

```
SENSe:PCCurrent[:VOLTage]:RANGe:AUTO?
```

### Parameter

Value: ON(1) Switches the range automatically according to the measured values (default)  
OFF(0) The measurement range is fixed Range 1 to 4 according to the Network, Upper, and Measure Mode settings.

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:PCC:RANG:AUTO ON
```

## SENSe:PCC:TIM

Sets the test time for protective conductor current tests.

This setting is enabled when SENS:PCC:TIM:STAT is set to ON.

### Command

```
SENSe:PCCurrent:TIMer <numeric>
```

```
SENSe:PCCurrent:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (1 S)

Response: NR3

Example

```
SENS:PCC:TIM 10S
```

## SENSe:PCC:TIM:STAT

Sets whether to set the test time in protective conductor current tests.

Use SENS:PCC:TIM to set the test time.

### Command

```
SENSe:PCCurrent:TIMer:STATe <boolean>
```

```
SENSe:PCCurrent:TIMer:STATe?
```

Parameter

Value: ON(1) Set (default)  
OFF(0) Not set

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
SENS:PCC:TIM:STAT ON
```

# SENSe:TC Command

This is a subsystem for setting the touch current test (TC) conditions.

## SENSe:TC:BAND

Sets whether to expand the band of the internal voltmeter of this product in touch current tests.

### Command

```
SENSe:TC[:VOLTage]:BANDwidth <character>
```

```
SENSe:TC[:VOLTage]:BANDwidth?
```

### Parameter

Value:   NORMal   Not expand (default)  
          EXPand   Expand

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENSe:TC:BAND NORM
```

## SENSe:TC:COND

Sets the single fault condition for touch current tests.

Use SENSe:TC:COND:FAULt to set the disconnected condition.

### Command

```
SENSe:TC:CONDition <character>
```

```
SENSe:TC:CONDition?
```

### Parameter

|        |        |                            |
|--------|--------|----------------------------|
| Value: | NORMal | Normal condition (default) |
|        | FAULt  | Disconnected condition     |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENSe:TC:COND NORM
```

## SENSe:TC:COND:FAUL

Sets the disconnected condition at fault for touch current tests.

Use SENSe:TC:COND to set the fault condition.

### Command

```
SENSe:TC:CONDition:FAULt <character>
```

```
SENSe:TC:CONDition:FAULt?
```

### Parameter

|        |         |  |
|--------|---------|--|
| Value: | NEUTral | Disconnected power supply line (neutral) (default) |
|        | PEARth  | Disconnected protective ground wire condition.     |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENSe:TC:COND:FAUL NEUT
```

## SENS:TC:CURR:MODE

Sets the current measurement mode in touch current tests.

### Command

```
SENSe:TC:CURRent:MODE <character>
```

```
SENSe:TC:CURRent:MODE?
```

### Parameter

|        |      |   |
|--------|------|---|
| Value: | ACDC | Measures the DC component and AC component with true rms values (default) |
|        | AC   | Measures only the AC component with true rms values                       |
|        | DC   | Measures only the DC component  |
|        | PEAK | Measures waveform peak values   |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:TC:CURR:MODE AC
```

## SENSe:TC:JUDG

Sets the reference current for upper limit judgment in touch current tests.

This setting is enabled when SENSe:TC:JUDG:STAT is set to ON.

### Command

```
SENSe:TC:JUDGment[:CURRent][:UPPer] <numeric>
```

```
SENSe:TC:JUDGment[:CURRent][:UPPer]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (100 UA)

Response: NR3

### Example

```
SENSe:TC:JUDG 10UA
```

## SENSe:TC:JUDG:STAT

Sets whether to judge with the upper current limit in touch current tests.

Use SENSe:TC:JUDG to set the upper limit.

### Command

```
SENSe:TC:JUDGment[:CURRent][:UPPer]:STATe <boolean>
```

```
SENSe:TC:JUDGment[:CURRent][:UPPer]:STATe?
```

Parameter

Value: ON(1) Judge (default)  
OFF(0) Not judge

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENSe:TC:JUDG:STAT ON
```

## SENS:TC:JUDG:DEL

Set the time until starting judgments in touch current tests.

This setting is enabled when SENS:TC:JUDG:DEL:STAT is set to ON.

### Command

```
SENSe:TC:JUDGment:DELaY <numeric>
```

```
SENSe:TC:JUDGment:DELaY?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (1 S)

Response: NR3

### Example

```
SENS:TC:JUDG:DEL 5S
```

## SENS:TC:JUDG:DEL:STAT

Sets whether to set the judgment delay in touch current tests.

Use SENS:TC:JUDG:DEL to set the judgment delay.

### Command

```
SENSe:TC:JUDGment:DELaY:STATe <boolean>
```

```
SENSe:TC:JUDGment:DELaY:STATe?
```

Parameter

Value: ON(1) Set  
OFF(0) Not set (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:TC:JUDG:DEL:STAT ON
```

## SENSe:TC:JUDG:LOW

Sets the reference current for lower limit judgment in touch current tests.  
This setting is enabled when SENSe:TC:JUDG:LOW:STAT is set to ON.

### Command

```
SENSe:TC:JUDGment[:CURRent]:LOWer <numeric>
SENSe:TC:JUDGment[:CURRent]:LOWer?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (0.01 MA)

Response: NR3

### Example

```
SENSe:TC:JUDG:LOW 10UA
```

## SENSe:TC:JUDG:LOW:STAT

Sets whether to judge with the lower current limit in touch current tests.  
Use SENSe:TC:JUDG:LOW to set the lower limit.

### Command

```
SENSe:TC:JUDGment[:CURRent]:LOWer:STATe <boolean>
SENSe:TC:JUDGment[:CURRent]:LOWer:STATe?
```

### Parameter

Value: ON(1) Judge  
OFF(0) Not judge (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENSe:TC:JUDG:LOW:STAT ON
```

## SENS:TC:NETW

Sets the measurement circuit network to use in touch current tests.

### Command

```
SENSe:TC:NETWork <character>
```

```
SENSe:TC:NETWork?
```

### Parameter

|        |      |   |
|--------|------|---|
| Value: | A    | IEC60990 Fig. 3 U1 measurement (default)                            |
|        | B-U1 | IEC60990 Fig. 4 U2 measurement                                      |
|        | B-U2 | IEC60990 Fig. 4 U1 measurement                                      |
|        | C    | IEC60990 Fig. 5 U3 measurement                                      |
|        | D    | Electrical Appliances and Materials Safety Act single frequency     |
|        | E    | Electrical Appliances and Materials Safety Act multiple frequencies |
|        | F    | IEC61029, UL  |
|        | G    | IEC60745  |
|        | H    | IEC61010-1, IEC61010-1 Wet condition                                |
|        | I    | IEC60601-1  |
|        | J    | For calibration. Do not use.  |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:TC:NETW A
```

## SENSe:TC:NETW:PROB

Sets the B terminal probe connection destination for touch current tests.

The A terminal probe connection destination is the enclosure.

### Command

```
SENSe:TC:NETWork:PROBe[:B] <character>
```

```
SENSe:TC:NETWork:PROBe[:B]?
```

### Parameter

|        |           |  |
|--------|-----------|--|
| Value: | PEARth    | Measures across the enclosure and earth. (default)             |
|        | ENCLosure | Measures across two points on the enclosure.                   |
|        | LIVe      | Measures across the enclosure and power supply line (live).    |
|        | NEUTral   | Measures across the enclosure and power supply line (neutral). |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
SENS:TC:NETW:PROB PEAR
```

## SENSe:TC:NETW:PROB:A

Queries the A terminal probe connection destination in touch current tests.

### Command

```
SENSe:TC:NETWork:PROBe:A?
```

Response: character

ENCL (enclosure) is returned.

## SENS:TC:RANG:AUTO

Sets the measurement range for touch current tests.

### Command

```
SENSe:TC[:VOLTage]:RANGe:AUTO <boolean>
```

```
SENSe:TC[:VOLTage]:RANGe:AUTO?
```

### Parameter

Value:   ON(1)   Switches the range automatically according to the measured values (default)  
          OFF(0)   The measurement range is fixed Range 1 to 4 according to the Network, Upper, and Measure Mode settings.

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
SENS:TC:RANG:AUTO ON
```

## SENSe:TC:TIM

Sets the test time for touch current tests.

This setting is enabled when SENSe:TC:TIM:STAT is set to ON.

### Command

```
SENSe:TC:TIMer <numeric>
```

```
SENSe:TC:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (1 S)

Response: NR3

Example

```
SENSe:TC:TIM 10S
```

## SENSe:TC:TIM:STAT

Sets whether to set the test time in touch current tests.

Use SENSe:TC:TIM to set the test time.

### Command

```
SENSe:TC:TIMer:STATe <boolean>
```

```
SENSe:TC:TIMer:STATe?
```

Parameter

Value: ON(1) Set (default)  
OFF(0) Not set

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
SENSe:TC:TIM:STAT ON
```

# [SOURce:] command

## FUNC

Set the test mode.

You can only set the test mode to one of the test modes that is available on your model.

### Command

```
[SOURce:]FUNction[:MODE] <character>
```

```
[SOURce:]FUNction[:MODE]?
```

### Parameter

|        |         |                                   |
|--------|---------|-----------------------------------|
| Value: | ACW     | AC withstanding voltage (default) |
|        | DCW     | DC withstanding voltage           |
|        | IR      | Insulation resistance             |
|        | ECac    | Earth continuity (AC)             |
|        | ECDC    | Earth continuity (DC)             |
|        | TC      | Touch current                     |
|        | PCC     | Protective conductor current      |
|        | METer   | Meter mode                        |
|        | PATient | Patient leakage current           |
|        | PROGram | Auto test                         |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
FUNC ACW
```

## [SOURce:]ACW Command

The ACW in the second node can be omitted, but to distinguish it from the DC withstanding voltage test, we recommend that you do not.

### ACW:VOLT

Sets the test voltage for AC withstanding voltage tests.

#### Command

```
[SOURce:] [ACW:]VOLTage[:LEVel] [:IMMediate] [:AMPlitude] <numeric>
```

```
[SOURce:] [ACW:]VOLTage[:LEVel] [:IMMediate] [:AMPlitude]?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (0 V)

Response: NR3

Example

```
ACW:VOLT 1000V
```

## ACW:VOLT:FREQ

Sets the test voltage frequency for AC withstanding voltage tests.

### **Command**

```
[SOURce:] [ACW:]VOLTage:FREQuency <numeric>
```

```
[SOURce:] [ACW:]VOLTage:FREQuency?
```

Unit: Hz

Settings are reset to default when the \*RST command is sent. (50 HZ)

Response: NR3

### **Example**

```
ACW:VOLT:FREQ 50HZ
```

## ACW:VOLT:PROT

Sets the limit voltage for AC withstanding voltage tests.

### Command

```
[SOURCE:] [ACW:]VOLTage:PROTection[:LEVel] [:UPPer] <numeric>
```

```
[SOURCE:] [ACW:]VOLTage:PROTection[:LEVel] [:UPPer]?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (5500 V)

Response: NR3

### Example

```
ACW:VOLT:PROT 1.5KV
```

## ACW:VOLT:STAR

Sets the start voltage as a percentage for AC withstanding voltage tests.

This setting is enabled when VOLT:STAR:STAT is set to ON.

### Command

```
[SOURce:] [ACW:] VOLTage:STARt[:LEVel] <numeric>
```

```
[SOURce:] [ACW:] VOLTage:STARt[:LEVel]?
```

Unit: PCT

Settings are reset to default when the \*RST command is sent. (50 PCT)

Response: NR3

### Example

```
ACW:VOLT:STAR 50PCT
```

## ACW:VOLT:STAR:STAT

Sets whether to set the start voltage for AC withstanding voltage tests.

Use VOLT:STAR to set the start voltage.

### Command

```
[SOURce:] [ACW:] VOLTage:STARt:STATe <boolean>
```

```
[SOURce:] [ACW:] VOLTage:STARt:STATe?
```

Parameter

Value: ON(1) Set  
OFF(0) Not set (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
ACW:VOLT:STAR:STAT ON
```

## ACW:VOLT:SWE:FALL:TIM

Sets the voltage fall time for AC withstanding voltage tests.

This setting is enabled when VOLT:SWE:FALL:TIM:STAT is set to ON.

### Command

```
[SOURCE:] [ACW:] VOLTage: SWEep: FALL: TIMer <numeric>
```

```
[SOURCE:] [ACW:] VOLTage: SWEep: FALL: TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

### Example

```
ACW:VOLT:SWE:FALL:TIM 0.1S
```

## ACW:VOLT:SWE:FALL:TIM:STAT

Sets whether to set the voltage fall time for AC withstanding voltage tests.

Use VOLT:SWE:FALL:TIM to set the voltage fall time.

### Command

```
[SOURCE:] [ACW:] VOLTage: SWEep: FALL: TIMer: STATe <boolean>
```

```
[SOURCE:] [ACW:] VOLTage: SWEep: FALL: TIMer: STATe?
```

### Parameter

Value: ON(1) Set  
OFF(0) Not set (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
ACW:VOLT:SWE:FALL:TIM:STAT ON
```

## ACW:VOLT:SWE:TIM

Sets the voltage rise time for AC withstanding voltage tests.

### Command

```
[SOURce:] [ACW:]VOLTage:SWEep[:RISE]:TIMer <numeric>
```

```
[SOURce:] [ACW:]VOLTage:SWEep[:RISE]:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

### Example

```
ACW:VOLT:SWE:TIM 1S
```

## ACW:VOLT:TIM

Sets the test time for AC withstanding voltage tests.

This setting is enabled when VOLT:TIM:STAT is set to ON.

### Command

```
[SOURCE:] [ACW:]VOLTage:TIMer <numeric>
```

```
[SOURCE:] [ACW:]VOLTage:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.2 S)

Response: NR3

Example

```
ACW:VOLT:TIM 60S
```

## ACW:VOLT:TIM:STAT

Sets whether to set the test time for AC withstanding voltage tests.

Use VOLT:TIM to set the test time.

### Command

```
[SOURCE:] [ACW:]VOLTage:TIMer:STATe <boolean>
```

```
[SOURCE:] [ACW:]VOLTage:TIMer:STATe?
```

Parameter

|        |        |               |
|--------|--------|---------------|
| Value: | ON(1)  | Set (default) |
|        | OFF(0) | Not set       |

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
ACW:VOLT:TIM:STAT ON
```

# [SOURce:]DCW Command

## DCW:VOLT

Sets the test voltage for DC withstanding voltage tests.

### Command

```
[SOURce:]DCW:VOLTage[:LEVel][:IMMediate][:AMPlitude] <numeric>
```

```
[SOURce:]DCW:VOLTage[:LEVel][:IMMediate][:AMPlitude]?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (0 V)

Response: NR3

### Example

```
DCW:VOLT 750V
```

## DCW:VOLT:DISC:INT:STAT

Sets whether to discharge when interlock is activated in DC withstanding voltage tests.

### Command

```
[SOURCE:]DCW:VOLTage:DISCharge:INTErlock:STATe <boolean>
```

```
[SOURCE:]DCW:VOLTage:DISCharge:INTErlock:STATe?
```

### Parameter

Value: ON(1) Discharge (default)  
OFF(0) Not discharge

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
DCW:VOLT:DISC:INT:STAT ON
```

## DCW:VOLT:DISC:TIM

Sets the discharge time for DC withstanding voltage tests.

### Command

```
[SOURce:]DCW:VOLTage:DISCharge:TIMer[:MINimum] <numeric>
```

```
[SOURce:]DCW:VOLTage:DISCharge:TIMer[:MINimum]?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0 S)

Response: NR3

### Example

```
DCW:VOLT:DISC:TIM 10S
```

## DCW:VOLT:PROT

Sets the limit voltage for DC withstanding voltage tests.

### Command

```
[SOURCE:]DCW:VOLTage:PROTection[:LEVel][:UPPer] <numeric>
```

```
[SOURCE:]DCW:VOLTage:PROTection[:LEVel][:UPPer]?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (7500 V)

Response: NR3

### Example

```
DCW:VOLT:PROT 1500V
```

## DCW:VOLT:STAR

Sets the start voltage as a percentage for DC withstanding voltage tests.

This setting is enabled when DCW:VOLT:STAR:STAT is set to ON.

```
[SOURce:]DCW:VOLTage:STARt[:LEVel] <numeric>
```

```
[SOURce:]DCW:VOLTage:STARt[:LEVel]?
```

Unit: PCT

Settings are reset to default when the \*RST command is sent. (50 PCT)

Response: NR3

Example

```
DCW:VOLT:STAR 50PCT
```

## DCW:VOLT:STAR:STAT

Sets whether to set the start voltage for DC withstanding voltage tests.

Use DCW:VOLT:STAR to set the start voltage.

### Command

```
[SOURce:]DCW:VOLTage:STARt:STATe <boolean>
```

```
[SOURce:]DCW:VOLTage:STARt:STATe?
```

Parameter

Value: ON(1) Set  
OFF(0) Not set (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
DCW:VOLT:STAR:STAT ON
```

**DCW:VOLT:SWE:FALL:TIM**

Sets the voltage fall time for DC withstanding voltage tests.

This setting is enabled when DCW:VOLT:SWE:FALL:STAT is set to ON.

**Command**

```
[SOURCE:]DCW:VOLTage:SWEep:FALL:TIMer <numeric>
```

```
[SOURCE:]DCW:VOLTage:SWEep:FALL:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

**Example**

```
DCW:VOLT:SWE:FALL:TIM 0.1S
```

**DCW:VOLT:SWE:FALL:TIM:STAT**

Sets whether to set the voltage fall time for DC withstanding voltage tests.

Use DCW:VOLT:SWE:FALL to set the voltage fall time.

**Command**

```
[SOURCE:]DCW:VOLTage:SWEep:FALL:TIMer:STATe <boolean>
```

```
[SOURCE:]DCW:VOLTage:SWEep:FALL:TIMer:STATe?
```

Parameter

Value: ON(1) Set  
OFF(0) Not set (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

**Example**

```
DCW:VOLT:SWE:FALL:TIM:STAT ON
```

## DCW:VOLT:SWE:TIM

Sets the voltage rise time for DC withstanding voltage tests.

### Command

```
[SOURce:]DCW:VOLTage:SWEep[:RISE]:TIMer <numeric>
```

```
[SOURce:]DCW:VOLTage:SWEep[:RISE]:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

### Example

```
DCW:VOLT:SWE:TIM 0.1
```

## DCW:VOLT:TIM

Sets the test time for DC withstanding voltage tests.

This setting is enabled when DCW:VOLT:TIM:STAT is set to ON.

### Command

```
[SOURCE:]DCW:VOLTage:TIMer <numeric>
```

```
[SOURCE:]DCW:VOLTage:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.2 S)

Response: NR3

### Example

```
DCW:VOLT:TIM 500MS
```

## DCW:VOLT:TIM:STAT

Sets whether to set the test time for DC withstanding voltage tests.

Use DCW:VOLT:TIM to set the test time.

### Command

```
[SOURCE:]DCW:VOLTage:TIMer:STATe <boolean>
```

```
[SOURCE:]DCW:VOLTage:TIMer:STATe?
```

Parameter

|        |        |               |
|--------|--------|---------------|
| Value: | ON(1)  | Set (default) |
|        | OFF(0) | Not set       |

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
DCW:VOLT:TIM:STAT ON
```

# [SOURce:]EC Command

## EC:AC:CURR

Sets the test current for earth continuity tests (AC).

### Command

```
[SOURce:]EC:AC:CURRent[:LEVel][:IMMediate][:AMPlitude] <numeric>
```

```
[SOURce:]EC:AC:CURRent[:LEVel][:IMMediate][:AMPlitude]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (3 A)

Response: NR3

### Example

```
EC:AC:CURR 5
```

## EC:AC:CURR:PROT

Sets the limit current for earth continuity tests (AC).

### Command

```
[SOURCE:]EC:AC:CURRENT:PROTECTION[:LEVEL][:UPPER] <numeric>
```

```
[SOURCE:]EC:AC:CURRENT:PROTECTION[:LEVEL][:UPPER]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (42 A)

Response: NR3

### Example

```
EC:AC:CURR:PROT 40
```

## EC:AC:CURR:SWE:FALL:TIM

Sets the current fall time for earth continuity tests (AC).

This setting is enabled when EC:AC:CURR:SWE:FALL:TIM:STAT is set to ON.

### Command

```
[SOURce:]EC:AC:CURRent:SWEep:FALL:TIMer <numeric>
```

```
[SOURce:]EC:AC:CURRent:SWEep:FALL:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

### Example

```
EC:AC:CURR:SWE:FALL:TIM 0.1S
```

## EC:AC:CURR:SWE:FALL:TIM:STAT

Sets whether to set the current fall time for earth continuity tests (AC).

EC:AC:CURR:SWE:FALL:TIM to set the current fall time.

### Command

```
[SOURce:]EC:AC:CURRent:SWEep:FALL:TIMer:STATe <boolean>
```

```
[SOURce:]EC:AC:CURRent:SWEep:FALL:TIMer:STATe?
```

Parameter

Value: ON(1) Set  
OFF(0) Not set (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
EC:AC:CURR:SWE:FALL:TIM:STAT ON
```

**EC:AC:CURR:SWE:TIM**

Sets the current rise time for earth continuity tests (AC).

**Command**

```
[SOURCE:]EC:AC:CURRENT:SWEep[:RISE]:TIMer <numeric>
```

```
[SOURCE:]EC:AC:CURRENT:SWEep[:RISE]:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

**Example**

```
EC:AC:CURR:SWE:TIM 1
```

## EC:AC:CURR:TIM

Sets the test time for earth continuity tests (AC).

This setting is enabled when EC:AC:CURR:TIM:STAT is set to ON.

### Command

```
[SOURCE:]EC:AC:CURREnt:TIMer <numeric>
```

```
[SOURCE:]EC:AC:CURREnt:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.2 S)

Response: NR3

### Example

```
EC:AC:CURR:TIM 5
```

## EC:AC:CURR:TIM:STAT

Sets whether to set the test time for earth continuity tests (AC).

Use EC:AC:CURR:TIM to set the test time.

### Command

```
[SOURCE:]EC:AC:CURREnt:TIMer:STATe <boolean>
```

```
[SOURCE:]EC:AC:CURREnt:TIMer:STATe?
```

Parameter

Value: ON(1) Set (default)  
OFF(0) Not set

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
EC:AC:CURR:TIM:STAT ON
```

## EC:CURR:FREQ

Sets the test current frequency for earth continuity tests (AC).

### Command

```
[SOURCE:]EC[:AC]:CURRENT:FREQUENCY <numeric>
```

```
[SOURCE:]EC[:AC]:CURRENT:FREQUENCY?
```

Unit: HZ

Settings are reset to default when the \*RST command is sent. (50 HZ)

Response: NR3

### Example

```
EC:CURR:FREQ 50HZ
```

## EC:DC:CURR

Sets the test current for earth continuity tests (DC).

### Command

```
[SOURce:]EC:DC:CURRent[:LEVel][:IMMediate][:AMPlitude] <numeric>
```

```
[SOURce:]EC:DC:CURRent[:LEVel][:IMMediate][:AMPlitude]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (3 A)

Response: NR3

### Example

```
EC:DC:CURR 40
```

## EC:DC:CURR:PROT

Sets the limit current for earth continuity tests (DC).

### Command

```
[SOURCE:]EC:DC:CURRENT:PROTECTION[:LEVEL][:UPPER] <numeric>
```

```
[SOURCE:]EC:DC:CURRENT:PROTECTION[:LEVEL][:UPPER]?
```

Unit: A

Settings are reset to default when the \*RST command is sent. (42 A)

Response: NR3

### Example

```
EC:DC:CURR:PROT 40
```

## EC:DC:CURR:SWE:FALL:TIM

Sets the current fall time for earth continuity tests (DC).

This setting is enabled when EC:DC:CURR:SWE:FALL:TIM:STAT is set to ON.

### Command

```
[SOURCE:]EC:DC:CURREnt:SWEep:FALL:TIMer <numeric>
```

```
[SOURCE:]EC:DC:CURREnt:SWEep:FALL:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

### Example

```
EC:DC:CURR:SWE:FALL:TIM 0.1S
```

## EC:DC:CURR:SWE:FALL:TIM:STAT

Sets whether to set the current fall time for earth continuity tests (DC).

EC:DC:CURR:SWE:FALL:TIM to set the current fall time.

### Command

```
[SOURCE:]EC:DC:CURREnt:SWEep:FALL:TIMer:STATe <boolean>
```

```
[SOURCE:]EC:DC:CURREnt:SWEep:FALL:TIMer:STATe?
```

Parameter

Value: ON(1) Set  
OFF(0) Not set (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
EC:DC:CURR:SWE:FALL:TIM:STAT ON
```

## EC:DC:CURR:SWE:TIM

Sets the current rise time for earth continuity tests (DC).

### Command

```
[SOURCE:]EC:DC:CURRENT:SWEep[:RISE]:TIMER <numeric>
```

```
[SOURCE:]EC:DC:CURRENT:SWEep[:RISE]:TIMER?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

### Example

```
EC:DC:CURR:SWE:TIM 1
```

## EC:DC:CURR:TIM

Sets the test time for earth continuity tests (DC).

This setting is enabled when EC:DC:CURR:TIM:STAT is set to ON.

### Command

```
[SOURCE:]EC:DC:CURRENT:TIMER <numeric>
```

```
[SOURCE:]EC:DC:CURRENT:TIMER?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.2 S)

Response: NR3

### Example

```
EC:DC:CURR:TIM 500S
```

## EC:DC:CURR:TIM:STAT

Sets whether to set the test time for earth continuity tests (DC).

Use EC:DC:CURR:TIM to set the test time.

### Command

```
[SOURCE:]EC:DC:CURRENT:TIMER:STATE <boolean>
```

```
[SOURCE:]EC:DC:CURRENT:TIMER:STATE?
```

Parameter

|        |        |               |
|--------|--------|---------------|
| Value: | ON(1)  | Set (default) |
|        | OFF(0) | Not set       |

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
EC:DC:CURR:TIM:STAT ON
```

# [SOURce:]IR command

## IR:TERM:POL

Queries the polarity of the power supplied to the output terminals in insulation resistance tests.

### Command

```
[SOURce:]IR:TERMinal:POLarity?
```

Response: character

|      |                                    |
|------|------------------------------------|
| NORM | Supplies power with normal phase   |
| REV  | Supplies power with reversed phase |

Example

```
IR:TERM:POL?
```

### Related command

```
IR:VOLT:RANG
```

## IR:VOLT

Sets the test voltage for insulation resistance tests.

### Command

```
[SOURce:]IR:VOLTage[:LEVel][:IMMediate][:AMPlitude] <numeric>
```

```
[SOURce:]IR:VOLTage[:LEVel][:IMMediate][:AMPlitude]?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (0 V)

Response: NR3

### Example

```
IR:VOLT 500
```

## IR:VOLT:DISC:INT:STAT

Sets whether to discharge when interlock is activated in insulation resistance tests.

### Command

```
[SOURCE:]IR:VOLTage:DISCharge:INTerlock:STATe <boolean>
```

```
[SOURCE:]IR:VOLTage:DISCharge:INTerlock:STATe?
```

### Parameter

Value: ON(1) Discharge (default)  
OFF(0) Not discharge

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
IR:VOLT:DISC:INT:STAT ON
```

## IR:VOLT:DISC:TIM

Sets the discharge time for insulation resistance tests.

### Command

```
[SOURce:]IR:VOLTage:DISCharge:TIMer[:MINimum] <numeric>
```

```
[SOURce:]IR:VOLTage:DISCharge:TIMer[:MINimum]?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0 S)

Response: NR3

### Example

```
IR:VOLT:DISC:TIM 10S
```

## IR:VOLT:PROT

Sets the limit voltage for insulation resistance tests.

### Command

```
[SOURCE:]IR:VOLTage:PROTection[:LEVel][:UPPer] <numeric>
```

```
[SOURCE:]IR:VOLTage:PROTection[:LEVel][:UPPer]?
```

Unit: V

Settings are reset to default when the \*RST command is sent. (1020 V)

Response: NR3

### Example

```
IR:VOLT:PROT 500
```

## IR:VOLT:RANG

Sets the output voltage range for insulation resistance tests.

The power supply line polarity is set to normal when 7500 V is specified and reverse when 1000 V is specified.

On the TOS9300 and TOS9302, the range is fixed to 1000 V (reverse polarity).

### Command

```
[SOURce:]IR:VOLTage:RANGe <numeric>
```

```
[SOURce:]IR:VOLTage:RANGe?
```

### Parameter

|        |      |                                      |
|--------|------|--------------------------------------|
| Value: | 7200 | Normal polarity (NORMal)             |
|        | 1000 | Reverse polarity (REVerse) (default) |

Unit: V

Settings are reset to default when the \*RST command is sent.

Response: NR3

### Example

```
IR:VOLT:RANG 1000
```

### Related command

```
IR:TERM:POL
```

## IR:VOLT:STAR

Sets the start voltage as a percentage for insulation resistance tests.

This setting is enabled when IR:VOLT:STAR:STAT is set to ON.

### Command

```
[SOURCE:]IR:VOLTage:STARt[:LEVel] <numeric>
```

```
[SOURCE:]IR:VOLTage:STARt[:LEVel]?
```

Unit: PCT

Settings are reset to default when the \*RST command is sent. (50 PCT)

Response: NR3

Example

```
IR:VOLT:STAR 50PCT
```

## IR:VOLT:STAR:STAT

Sets whether to set the start voltage for insulation resistance tests.

Use IR:VOLT:STAR to set the start voltage.

### Command

```
[SOURCE:]IR:VOLTage:STARt:STATe <boolean>
```

```
[SOURCE:]IR:VOLTage:STARt:STATe?
```

Parameter

Value: ON(1) Set  
OFF(0) Not set (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

Example

```
IR:VOLT:STAR:STAT ON
```

## IR:VOLT:SWE:TIM

Sets the voltage rise time for insulation resistance tests.

### Command

```
[SOURce:]IR:VOLTage:SWEep[:RISE]:TIMer <numeric>
```

```
[SOURce:]IR:VOLTage:SWEep[:RISE]:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.1 S)

Response: NR3

### Example

```
IR:VOLT:SWE:TIM 1
```

## IR:VOLT:TIM

Sets the test time for insulation resistance tests.

This setting is enabled when IR:VOLT:TIM:STAT is set to ON.

### Command

```
[SOURCE:]IR:VOLTage:TIMer <numeric>
```

```
[SOURCE:]IR:VOLTage:TIMer?
```

Unit: S

Settings are reset to default when the \*RST command is sent. (0.2 S)

Response: NR3

### Example

```
IR:VOLT:TIM 5
```

## IR:VOLT:TIM:STAT

Sets whether to set the test time for insulation resistance tests.

Use IR:VOLT:TIM to set the test time.

### Command

```
[SOURCE:]IR:VOLTage:TIMer:STATe <boolean>
```

```
[SOURCE:]IR:VOLTage:TIMer:STATe?
```

Parameter

Value: ON(1) Set (default)  
OFF(0) Not set

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
IR:VOLT:TIM:STAT ON
```

# [SOURCE:]PATient Command

## PAT:110P:OUTP

Sets whether to apply the voltage applied from the 110% terminal to the AC LINE IN inlet in patient leakage current tests.

### Command

```
[SOURCE:]PATient[:TERMinal]:110Percent:OUTPut <boolean>  
[SOURCE:]PATient[:TERMinal]:110Percent:OUTPut?
```

### Parameter

Value: ON(1) Apply  
OFF(0) Not apply (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
PAT:110P:OUTP ON
```

## PAT:110P:POL

Sets the polarity of the voltage applied from the 110% terminal in patient leakage current tests.

This setting is enabled when PAT:110P:OUTP is set to ON.

### Command

```
[SOURCE:]PATient[:TERMinal]:110Percent:POLarity <character>  
[SOURCE:]PATient[:TERMinal]:110Percent:POLarity?
```

### Parameter

Value: NORMal Apply with normal phase (default)  
REVerse Apply with reversed phase

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
PAT:110P:POL NORM
```

## PAT:POL

Sets the polarity of the power supply line supplied to the EUT for patient leakage current tests.

### Command

```
[SOURCE:]PATient[:LINE]:POLarity <character>
```

```
[SOURCE:]PATient[:LINE]:POLarity
```

### Parameter

|        |         |  |
|--------|---------|--|
| Value: | NORMAL  | Supply power with normal phase (default) |
|        | REVERSE | Supply power with reversed phase         |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
PAT:POL NORM
```

# [SOURCE:]PCC Command

## PCC:POL

Sets the polarity of the power supply line for protective conductor current tests.

### Command

```
[SOURCE:]PCCurrent[:LINE]:POLarity <character>
```

```
[SOURCE:]PCCurrent[:LINE]:POLarity?
```

### Parameter

|        |         |  |
|--------|---------|--|
| Value: | NORMAL  | Supply power with normal phase (default) |
|        | REVERSE | Supply power with reversed phase         |

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
PCC:POL NORM
```

# [SOURCE:]TC Command

## TC:110P:OUTP

Sets whether to apply the voltage applied from the 110% terminal to the AC LINE IN inlet in touch current tests.

### Command

```
[SOURCE:]TC[:TERMINAL]:110Percent:OUTPut <boolean>
```

```
[SOURCE:]TC[:TERMINAL]:110Percent:OUTPut?
```

### Parameter

Value:   ON(1)    Apply  
          OFF(0)   Not apply (default)

Settings are reset to default when the \*RST command is sent.

Response: NR1

### Example

```
TC:110P:OUTP ON
```

## TC:110P:POL

Sets the polarity of the voltage applied from the 110% terminal in touch current tests.

This setting is enabled when TC:110P:OUTP is set to ON.

### Command

```
[SOURCE:]TC[:TERMINAL]:110Percent:POLarity <character>
```

```
[SOURCE:]TC[:TERMINAL]:110Percent:POLarity?
```

### Parameter

Value:   NORMal        Apply with normal phase (default)  
          REVerse      Apply with reversed phase

Settings are reset to default when the \*RST command is sent.

Response: character

### Example

```
TC:110P:POL NORM
```

## TC:POL

Sets the polarity of the power supply line supplied to the EUT for touch current tests.

### **Command**

```
[SOURce:]TC[:LINE]:POLarity <character>
```

```
[SOURce:]TC[:LINE]:POLarity?
```

### **Parameter**

|        |         |  |
|--------|---------|--|
| Value: | NORMAL  | Supply power with normal phase (default) |
|        | REVERSE | Supply power with reversed phase         |

Settings are reset to default when the \*RST command is sent.

Response: character

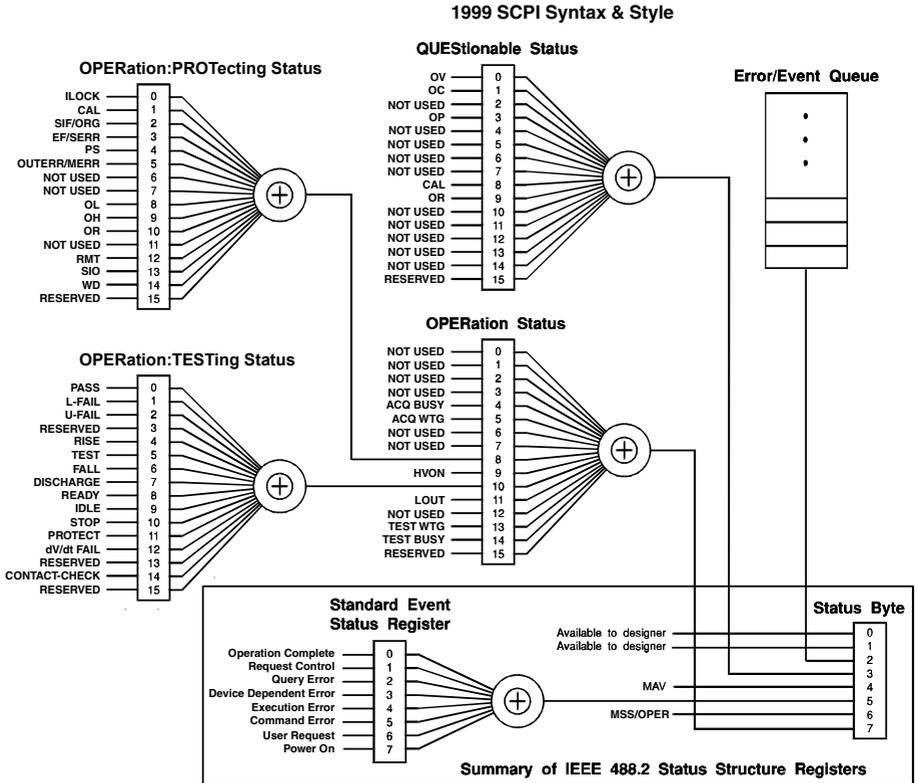
### **Example**

```
TC:POL NORM
```

# STATUS Command

## Status Report Structure

A "+" represents the logical OR of the register bits.



## Architecture

---

IEEE 488.2 and SCPI registers are used for status reports.

In each SCPI status register, there are the following sub registers: the CONDition register, the EVENT register, the ENABle register, the PTRansition filter, and the NTRansition filter.

-> "Status Monitoring" (p. 333)

### **CONDition register**

Transitions of the CONDition register are automatic and reflect the condition of the product in real time. Reading this register does not affect its contents.

### **EVENT register**

The EVENT register bits are automatically set according to the changes in the CONDition register. The rule for setting the bits varies depending on the positive and negative transition registers (PTRansition and NTRansition). The EVENT register is reset when it is read.

### **ENABle register**

The ENABle register enables reports to the summary bit or status bit of the event bits.

### **Transition filters**

Use the PTRansition (positive transition) filter to report events when the condition changes from false to true.

Use the NTRansition (negative transition) filter to report events when the condition changes from true to false.

If both the positive filter and negative filter are set to true, events can be reported each time the status changes.

If both filters are cleared, event reporting is disabled.

## Status byte register

The status byte register stores STB and RQS (MSS) messages as defined by the IEEE 488.1 standard. The status byte register can be read by using IEEE 488.1 serial polling or the IEEE 488.2 common command \*STB?.

When the controller executes serial polling, bit 6 responds with request service (RQS). The status byte value is not changed by serial polling.

\*STB? makes the device transmit the contents of the status byte register and the master status summary (MSS) message.

\*STB? does not change the status byte, MSS, and RQS.

| Bit  | Bit weight | Bit name                                | Description  |
|------|------------|---|--|
| 0    | 1          | Reserved                                | Reserved for future use by IEEE 488. The bit value is notified as zero.  |
| 1    | 2          | Reserved                                |  |
| 2    | 4          | Error/Event Queue                       | If data exists in the error or event queue, this bit is set to true.   |
| 3    | 8          | Questionable Status Register (QUES)     | This bit is set to true when a bit is set in the QUESTIONable event status register and the corresponding bit in the QUESTIONable status enable register is true.      |
| 4    | 16         | Message Available (MAV)                 | This bit is set to true when a request is received from the digital programming interface and the product is ready to generate the data byte.                          |
| 5    | 32         | Standard Event Status Bit Summary (ESB) | This bit is set to true when a bit is set in the event status register.  |
| 6    | 64         | Request Service (RQS)                   | This bit is set to true when a bit is set in the service request enable register and the corresponding bit exists in the status byte. The SRQ line of the GPIB is set. |
|      |            | Master Status Summary (MSS)             | This bit is set to true when any bit in the status byte register is set to 1 and the corresponding bit in the service request enable register is set to 1.             |
| 7    | 128        | Operation Status Register (OPER)        | This bit is set to true when a bit is set in the OPERATION event status register and the corresponding bit in the OPERATION status enable register is set.             |
| 8-15 |            | Not Used                                | Not used   |

## Event status register

The event status register bits are set when certain events occur during product operation. All the event status register bits are set by the error event queue.

This register is defined by the IEEE 488.2 standard and is controlled using the IEEE 488.2 common commands \*ESE, \*ESE?, and \*ESR?.

You can check the error content with SYST:ERR?.

| Bit  | Bit weight | Bit name                    | Description  | Error number               |
|------|------------|-----------------------------|--|----------------------------|
| 0    | 1          | Operation Complete(OPC)     | Set when an *OPC command is received and all operations in standby have been completed.  | -800 to -899               |
| 1    | 2          | Request Control (RQC)       | Not used   | --                         |
| 2    | 4          | Query Error(QYE)            | Set when an attempt is made to read data from the output queue when there is no data or when the output queue is not in the wait state. This indicates that there is no data in the output queue.  | -400 to -499               |
| 3    | 8          | Device Dependent Error(DDE) | Set when there is a device-specific error.   | -300 to -399<br>100 to 999 |
| 4    | 16         | Execution Error(EXE)        | Set when the product evaluates that the program data after the header is outside the formal input range or does not match the specifications of the product. This indicates that a valid SCPI command may not be executed correctly depending on the state of the product. | -200 to -299               |
| 5    | 32         | Command Error(CME)          | Set when an IEEE 488.2 syntax error is detected by the parser, when an unidentifiable header is received, or when a group execution trigger enters the internal IEEE 488.2 SCPI command input buffer.  | -100 to -199               |
| 6    | 64         | User Request(URQ)           | Not used   | --                         |
| 7    | 128        | Power On(PON)               | Not used   | --                         |
| 8-15 |            | Reserved                    | Not used   | --                         |

## OPERation status register

The OPERation status register is a 16-bit register that contains information about the normal operating conditions of the product.

| Bit | Bit weight | Bit name                              | Description   |
|-----|------------|---------------------------------------|---|
| 0   | 1          | NOT USED                              | Not used  |
| 1   | 2          | NOT USED                              | Not used  |
| 2   | 4          | NOT USED                              | Not used  |
| 3   | 8          | NOT USED                              | Not used  |
| 4   | 16         | MEASuring(ACQ BUSY)                   | Measurement is in progress.                                       |
| 5   | 32         | ACQuire Waiting for TRIG-ger(ACQ WTG) | The product is waiting for a measurement trigger.                 |
| 6   | 64         | NOT USED                              | Not used  |
| 7   | 128        | NOT USED                              | Not used  |
| 8   | 256        | RROTecting(PROT)                      | The PROTECTing status register bit is set.                        |
| 9   | 512        | Voltage ON(HVON)                      | Test in progress or voltage remaining across the output terminals |
| 10  | 1024       | TESTing(TEST)                         | The TESTing status register bit is set.                           |
| 11  | 2048       | Line Output(LOUT)                     | Line output or 110% terminal output in progress during an LC test |
| 12  | 4096       | NOT USED                              | Not used  |
| 13  | 8192       | READY(TEST WTG)                       | The product is waiting for a test trigger.                        |
| 14  | 16384      | TEST is running(TEST BUSY)            | Waiting for test execution or test in progress                    |
| 15  | 32768      | RESERVED                              | Always 0.   |

## STAT:OPER

Queries the event of the OPERATION status register.

A query clears the contents of the register.

### **Command**

```
STATus:OPERation[:EVENT]?
```

Response: NR1

## STAT:OPER:COND

Queries the condition of the OPERATION status register.

A query does not clear the contents of the register.

### **Command**

```
STATus:OPERation:CONDition?
```

Response: NR1

## STAT:OPER:ENAB

Sets the enable register of the OPERATION status register.

### **Command**

```
STATus:OPERation:ENABle <NRf>
```

```
STATus:OPERation:ENABle?
```

Parameter

Value: 0 to 32767

Response: NR1

### STAT:OPER:NTR

Sets the negative transition filter of the OPERation status register.

#### **Command**

```
STATus:OPERation:NTRansition <NRf>
```

```
STATus:OPERation:NTRansition?
```

#### **Parameter**

Value: 0 to 32767

Response: NR1

### STAT:OPER:PTR

Sets the positive transition filter of the OPERation status register.

#### **Command**

```
STATus:OPERation:PTRansition <NRf>
```

```
STATus:OPERation:PTRansition?
```

#### **Parameter**

Value: 0 to 32767

Response: NR1

## OPERation:PROTeCting Status Register

The OPERation:PROTeCting status register is a 16-bit register that contains information about the status of the product's protection functions.

| Bit | Bit weight | Bit name                                  | Description  |
|-----|------------|---|--|
| 0   | 1          | Interlock(ILOCK)                          | Interlock signal input detected.   |
| 1   | 2          | Calibration(CAL)                          | The set calibration date has passed.   |
| 2   | 4          | SCAN IF(SIF)/ Over Range(ORG)             | Scanner cable disconnection/connection detected.<br>The measurement upper limit was exceeded in LC current measurement mode. |
| 3   | 8          | Earth Fault(EF)                           | Ground current error detected.   |
| 4   | 16         | Power Supply(PS)                          | Power supply problem detected.   |
| 5   | 32         | Output Error(OUTERR)/ Measure Error(MERR) | The output voltage exceeded the rated limits.<br>Measurement check error in an LC test                                       |
| 6   | 64         | Short Error(SERR)                         | Relay operation error in an LC test  |
| 7   | 128        | NOT USED                                  | Not used   |
| 8   | 256        | Over Load(OL)                             | The output power exceeded the output limit.  |
| 9   | 512        | Over Heat(OH)                             | The internal temperature of the product has become abnormally high.  |
| 10  | 1024       | Over Rating(OR)                           | An output current was generated for a length of time that exceeds the rated time.  |
| 11  | 2048       | NOT USED                                  | Not used   |
| 12  | 4096       | Remote(RMT)                               | A connection or disconnection of the remote control connector was detected.  |
| 13  | 8192       | SIGNAL I/O(SIO)                           | A change in the SIGNAL I/O connector's ENABLE signal was detected.   |
| 14  | 16384      | Watchdog(WD)                              | Watchdog protection function was detected.<br>Internal communication error detected  |
| 15  | 32768      | RESERVED                                  | Always 0.  |

### STAT:OPER:PROT

Queries the event of the OPERATION:PROTECTing status register.

A query clears the contents of the register.

#### **Command**

```
STATus:OPERation:PROTECTing[:EVENT]?
```

Response: NR1

### STAT:OPER:PROT:COND

Queries the condition of the OPERATION:PROTECTing status register.

A query does not clear the contents of the register.

#### **Command**

```
STATus:OPERation:PROTECTing:CONDition?
```

Response: NR1

### STAT:OPER:PROT:ENAB

Sets the enable register of the OPERATION:PROTECTing status register.

#### **Command**

```
STATus:OPERation:PROTECTing:ENABLE <NRF>
```

```
STATus:OPERation:PROTECTing:ENABLE?
```

Parameter

Value: 0 to 32767

Response: NR1

## STAT:OPER:PROT:NTR

Sets the negative transition filter of the OPERATION:PROTECTing status register.

### **Command**

```
STATus:OPERation:PROTecting:NTRansition <Nrf>
```

```
STATus:OPERation:PROTecting:NTRansition?
```

### **Parameter**

Value: 0 to 32767

Response: NR1

## STAT:OPER:PROT:PTR

Sets the positive transition filter of the OPERATION:PROTECTing status register.

### **Command**

```
STATus:OPERation:PROTecting:PTRansition <Nrf>
```

```
STATus:OPERation:PROTecting:PTRansition?
```

### **Parameter**

Value: 0 to 32767

Response: NR1

## OPERation:TESTing Status Register

The OPERation:TESTing status register is a 16-bit register that contains information about the status of tests on the product.

| Bit | Bit weight | Bit name      | Description                                    |
|-----|------------|---------------|--|
| 0   | 1          | PASS          | PASS judgment                                  |
| 1   | 2          | L-FAIL        | L-FAIL judgment, C-FAIL judgment <sup>*1</sup> |
| 2   | 4          | U-FAIL        | U-FAIL judgment, C-FAIL judgment <sup>*1</sup> |
| 3   | 8          | RESERVED      | Used for internal processing                   |
| 4   | 16         | RISE          | Voltage rising                                 |
| 5   | 32         | TEST          | Testing  |
| 6   | 64         | FALL          | Voltage falling                                |
| 7   | 128        | DISCHARGE     | Discharging                                    |
| 8   | 256        | READY         | Waiting for testing to start                   |
| 9   | 512        | IDLE          | Standby  |
| 10  | 1024       | STOP          | Stopping testing                               |
| 11  | 2048       | PROTECT       | Protection activated                           |
| 12  | 4096       | dV/dt FAIL    | dV/dt FAIL judgment                            |
| 13  | 8192       | RESERVED      | Not used                                       |
| 14  | 16384      | CONTACT-CHECK | Checking contact                               |
| 15  | 32768      | RESERVED      | Always 0.                                      |

\*1. Bits 1 and 2 are set when C-FAIL (CONTACT FAIL) is detected.

## STAT:OPER:TEST

Queries the event of the OPERATION:TESTing status register.

A query clears the contents of the register.

### **Command**

```
STATus:OPERation:TESTing[:EVENT]?
```

Response: NR1

## STAT:OPER:TEST:COND

Queries the condition of the OPERATION:TESTing status register.

A query does not clear the contents of the register.

### **Command**

```
STATus:OPERation:TESTing:CONDition?
```

Response: NR1

## STAT:OPER:TEST:ENAB

Sets the enable register of the OPERATION:TESTing status register.

### **Command**

```
STATus:OPERation:TESTing:ENABle <Nrf>
```

```
STATus:OPERation:TESTing:ENABle?
```

Parameter

Value: 0 to 32767

Response: NR1

### STAT:OPER:TEST:NTR

Sets the negative transition filter of the OPERation:TESTing status register.

#### **Command**

```
STATus:OPERation:TESTing:NTRansition <NRf>
```

```
STATus:OPERation:TESTing:NTRansition?
```

#### **Parameter**

Value: 0 to 32767

Response: NR1

### STAT:OPER:TEST:PTR

Sets the positive transition filter of the OPERation:TESTing status register.

#### **Command**

```
STATus:OPERation:TESTing:PTRansition <NRf>
```

```
STATus:OPERation:TESTing:PTRansition?
```

#### **Parameter**

Value: 0 to 32767

Response: NR1

## QUESTionable status register

The QUESTionable status register is a 16-bit register that stores information related to the product's status and the questionable events that occur during product operation.

The QUESTionable status register bits may indicate that there are problems with the product's measured data.

| Bit | Bit weight | Bit name            | Description                       |
|-----|------------|---------------------|-----------------------------------|
| 0   | 1          | Over Voltage(OV)    | Voltage measurement over-range    |
| 1   | 2          | Over Current(OC)    | Current measurement over-range    |
| 2   | 4          | NOT USED            | Not used                          |
| 3   | 8          | Over Power(OP)      | Power measurement over-range      |
| 4   | 16         | NOT USED            | Not used                          |
| 5   | 32         | NOT USED            | Not used                          |
| 6   | 64         | NOT USED            | Not used                          |
| 7   | 128        | NOT USED            | Not used                          |
| 8   | 256        | CALibration(CAL)    | The calibration date has passed.  |
| 9   | 512        | Over Resistance(OR) | Resistance measurement over-range |
| 10  | 1024       | NOT USED            | Not used                          |
| 11  | 2048       | NOT USED            | Not used                          |
| 12  | 4096       | NOT USED            | Not used                          |
| 13  | 8192       | NOT USED            | Not used                          |
| 14  | 16384      | NOT USED            | Not used                          |
| 15  | 32768      | RESERVED            | Always 0.                         |

## STAT:QUES

Queries the event of the QUESTionable status register.

A query clears the contents of the register.

### **Command**

```
STATus:QUESTionable[:EVENT]?
```

Response: NR1

## STAT:QUES:COND

Queries the condition of the QUESTionable status register.

A query does not clear the contents of the register.

### **Command**

```
STATus:QUESTionable:CONDition?
```

Response: NR1

## STAT:QUES:ENAB

Sets the enable register of the QUESTionable status register.

### **Command**

```
STATus:QUESTionable:ENABle <NRf>
```

```
STATus:QUESTionable:ENABle?
```

Parameter

Value: 0 to 32767

Response: NR1

## STAT:QUES:NTR

Sets the negative transition filter of the QUEStionable status register.

### **Command**

```
STATus:QUEStionable:NTRansition <NRf>
```

```
STATus:QUEStionable:NTRansition?
```

### **Parameter**

Value: 0 to 32767

Response: NR1

## STAT:QUES:PTR

Sets the positive transition filter of the QUEStionable status register.

### **Command**

```
STATus:QUEStionable:PTRansition <NRf>
```

```
STATus:QUEStionable:PTRansition?
```

### **Parameter**

Value: 0 to 32767

Response: NR1

## Preset status

---

### STAT:PRES

Resets the ENABLE, PTRansition, and NTRansition filter registers of all status registers (including sub registers) to their default values.

Default values:

STATus:ENABle = 0x0000

STATus:PTRansition = 0x7FFF

STATus:NTRansition = 0x0000

### Command

STATus:PRESet

# SYSTEM Command

## SYST:BEEP

Turns all buzzers on and off.

### Command

```
SYSTem:BEEPer[:ALL][:STATe] <boolean>
```

```
SYSTem:BEEPer[:ALL][:STATe]?
```

### Parameter

Value:   ON(1)   Buzzer on (default)  
          OFF(0)   Buzzer off

The setting may change when a SYST:BEEP:KEY, SYST:BEEP:PROT, or SYST:BEEP:SCPI is sent.

### Response: NR1

Returns 1 when any buzzer is on when an invalid operation is executed, a protection function is activated, or an SCPI error occurs.

Returns 0 when all settings are off.

### Example

```
SYST:BEEP OFF
```

## SYST:BEEP:KEY

Turns on or off the buzzer that sounds when an invalid key is pressed.

### Command

```
SYSTem:BEEPer:KEY[:STATe] <boolean>
```

```
SYSTem:BEEPer:KEY[:STATe]?
```

### Parameter

Value:   ON(1)   Buzzer on (default)  
          OFF(0)  Buzzer off

The setting may change when a SYST:BEEP is sent.

Response: NR1

### Example

```
SYST:BEEP:KEY ON
```

## SYST:BEEP:PROT

Turns on or off the buzzer that sounds when a protection function is activated.

### Command

```
SYSTem:BEEPer:PROTection[:STATe] <boolean>
```

```
SYSTem:BEEPer:PROTection[:STATe]?
```

### Parameter

Value: ON(1) Buzzer on (default)  
OFF(0) Buzzer off

The setting may change when a SYST:BEEP is sent.

Response: NR1

### Example

```
SYST:BEEP:PROT ON
```

## SYST:BEEP:SCPI

Turns on or off the buzzer that sounds when an SCPI error occurs.

### Command

```
SYSTem:BEEPer:SCPI[:STATe] <boolean>
```

```
SYSTem:BEEPer:SCPI[:STATe]?
```

### Parameter

Value:   ON(1)   Buzzer on (default)  
         OFF(0)   Buzzer off

The setting may change when a SYST:BEEP is sent.

Response: NR1

### Example

```
SYST:BEEP:SCPI ON
```

## SYST:COMM:PROT:WDOG

Enables or disables the communication monitoring (WATCHDOG) timer.

Use SYST:COMM:PROT:WDOG:DEL to set the delay time of the communication monitoring (WATCHDOG) timer.

### Command

```
SYSTem:COMMunicate:PROTection:WDOG[:STATe] <boolean>
```

```
SYSTem:COMMunicate:PROTection:WDOG[:STATe]?
```

### Parameter

Value: ON(1) Enables the communication monitoring timer  
OFF(0) Disables the communication monitoring timer

Response: NR1

### Example

```
SYST:COMM:PROT:WDOG ON
```

## SYST:COMM:PROT:WDOG:DEL

Sets the delay time of the communication monitoring (WATCHDOG) timer.

This command is valid when the communication monitoring timer is enabled (SYST:COMM:PROT WDOG ON)

### Command

```
SYSTem:COMMunicate:PROTection:WDOG:DELay <numeric>
```

```
SYSTem:COMMunicate:PROTection:WDOG:DELay?
```

Unit: S

Response: NR3

### Example

```
SYST:COMM:PROT:WDOG:DEL 1S
```

## SYST:COMM:RLST

Switches the TOS93 to local or remote mode.

### Command

```
SYSTem:COMMunicate:RLState <character>
```

```
SYSTem:COMMunicate:RLState?
```

### Parameter

|        |        |   |
|--------|--------|---|
| Value: | LOCal  | Sets the product to local mode (Remote Disable; the RMT turns off).<br><br>This enables both panel operations and commands.<br><br>This is a substitute command for IEEE488.1 ren FALSE (Remote Disable).   |
|        | REMOte | Switches the product to remote mode.<br><br>All panel operations, except those of the LOCAL key, the START switch and the STOP switch, are locked.<br><br>This is a substitute command for IEEE 488.1 ren (Remote Enable). This is also the substitute command for address specification. |
|        | RWLock | Switches the product to remote mode.<br><br>All panel controls are locked except the START switch and the STOP switch.<br><br>This is a substitute command for IEEE 488.1 llo (Local Lock Out).   |

Response: character

### Example

```
SYST:COMM:RLST REM
```

## SYST:DATE

Sets the date.

Also set the time (SYST:TIME).

If you specify a day that does not exist (for example, February 30), the settings are changed to the first day of the following month.

### **Command**

```
SYSTem:DATE <year_NR1>,<month_NR1>,<day_NR1>
```

```
SYSTem:DATE?
```

Parameter <year\_NR1>

Value 2016 to 2037 Year

Parameter <month\_NR1>

Value 1 to 12 Month

Parameter <day\_NR1>

Value 1 to 31 Day

Response

Returns the year, month, and day in a comma-separated NR1 format.

Example

```
SYST:DATE 2015,4,14
```

## SYST:ERR

Reads the oldest error information or event information from the error queue.

The error/event queue can hold up to 16 errors.-> "Error Checking"(p. 335)

The error queue is cleared if a \*CLS command is sent.

### **Command**

```
SYSTem:ERRor[:NEXT]?
```

### **Response**

Returns the oldest error or event from the error/event queue in the following format, in response to SYST:ERR?.

Example: If there is no error or event

This command returns +0 "No error."

Example: If a command that cannot be executed in the present operating state is received

This command returns -221, "Settings conflict."

## SYST:ERR:COUN

Returns the number of unread errors in the error queue.

### **Command**

SYSTem:ERRor:COUNT?

Response: NR1

## SYST:KLOC

Sets or releases panel control lock.

Invalid in remote mode (RMT lit).

### Command

```
SYSTem:KLOCk <boolean>
```

```
SYSTem:KLOCK?
```

### Parameter

Value:   ON(1)   Set the panel control lock  
          OFF(0) Release the panel control lock

Response: NR1

### Example

```
SYSTem:KLOC ON
```

## SYST:KLOC:LEV

Sets the panel control lock level.

Invalid in remote mode (RMT lit).

### Command

```
SYSTem:KLOCK:LEVel <NRf>
```

```
SYSTem:KLOCK:LEVel?
```

### Parameter

|        |   |                |
|--------|---|----------------|
| Value: | 1 | Low            |
|        | 2 | Medium         |
|        | 3 | High (default) |

Response: NR1

### Example

```
SYST:KLOC:LEV 3
```

## SYST:PASS

Enables a password-protected command.

### Command

```
SYSTem:PASSword[:CENable] "<string>"
```

```
SYSTem:PASSword[:CENable]?
```

### Parameter

Value: The password set by SYST:PASS:NEW

Response: string

### Example

```
SYST:PASS "password"
```

## SYST:PASS:CDIS

Disables the password-protected command.

### Command

```
SYSTem:PASSword:CDISable "<string>"
```

### Parameter

Value: The password set by SYST:PASS:NEW

### Example

```
SYST:PASS:CDIS "password"
```

## SYST:PASS:NEW

Sets the password.

### **Command**

```
SYSTem:PASSword:NEW "<string_exist>","<string_new>"
```

Parameter “<string\_exist>”: existing password, “<string\_new>”: new password

Naming convention: alphanumeric characters (A-Z, a-z, 0-9), underscore,  
hyphen

Number of characters: 4 to 15

The factory default password is “”.

### **Example**

```
SYST:PASS:NEW "existing password", "new password"
```

```
SYST:PASS:NEW "", "new password"
```

## SYST:PASS:STAT

Queries the enabled/disabled state of the password-protected command.

### Command

```
SYSTem:PASSword[:CENable]:STATe?
```

Response: NR1

### Example

```
SYST:PASS:STAT?
```

## SYST:LOC/ SYST:REM/ SYST:RWL

This is an old style command.

Use SYST:COMM:RLST(p. 269) when creating new programs.

### **Command**

SYSTem:LOCal

SYSTem:REMOte

SYSTem:RWLock

**SYST:SEC:IMM**

Sanitizes all contents stored in memory and initializes the panel settings to their factory default conditions.

This command is valid when password protection is set (SYST:PASS).

**Command**

```
SYSTem:SECurity:IMMediate
```

## SYST:SSAV

Enables or disables the screen saver.

Use SYST:SSAV:DEL to set the time until the screen saver starts.

### **Command**

```
SYSTem:SSAVer[:STATe] <boolean>
```

```
SYSTem:SSAVer[:STATe]?
```

### **Parameter**

Value:   ON(1)   Enables the screen saver  
          OFF(0)   Disables the screen saver (default)

Response: NR1

### **Example**

```
SYST:SSAV ON
```

## SYST:SSAV:DEL

Sets the time until the screen saver starts.

This command is valid when SYST:SSAV is set to ON.

### Command

```
SYSTem:SSAVer:DELay <numeric>
```

```
SYSTem:SSAVer:DELay?
```

### Parameter

Unit: S

Default: 60 S

Response: NR3

### Example

```
SYST:SSAV:DEL 3600S
```

## SYST:TIME

Sets the time.

Also set the date (using SYST:DATE).

### **Command**

```
SYSTem:TIME <hour_NR1>,<min_NR1>,<sec_NR1>
```

```
SYSTem:TIME?
```

Parameter <hour\_NR1>

Value 0 to 23 Hour

Parameter <min\_NR1>

Value 0 to 59 Minutes

Parameter <sec\_NR1>

Value 0 to 59 second

### **Response**

Returns the hour, minute, and second in NR1 format.

### **Example**

```
SYST:TIME 23,0,0
```

## SYST:TIME:ADJ

Automatically synchronizes the system clock using the NTP server on the network.

### **Command**

```
SYSTem:TIME:ADJust
```

## SYST:TZON

Sets the time zone of the system clock.

Use SYST:TZON:CAT? to check the time zone ID.

### **Command**

```
SYSTem:TZONE "<string>"
```

```
SYSTem:TZONE?
```

### **Parameter**

Value: Time zone ID or UTC (The default value is "UTC")

Response: "string"

### **Example**

```
SYST:TZON "Asia/Tokyo"
```

## SYST:TZON:CAT

Queries the time zone IDs that can be used.

### **Command**

```
SYSTem:TZONE:CATalog?
```

Response: Comma-separated character string

**SYST:VERS**

Queries the version of the SCPI specifications that the product complies with.

**Command**

SYSTem:VERSion?

Response

Returns 1999.0.

# SYSTem:CONFigure Command

## SYST:CONF:BEEP:VOL

Sets the volume level of the buzzer that is sounded when a FAIL judgment occurs.

### Command

```
SYSTem:CONFigure:BEEPer:VOLume[:FAIL] <NRf>
```

```
SYSTem:CONFigure:BEEPer:VOLume[:FAIL]?
```

### Parameter

Value: 0 to 10 (5 by default)

Response: NR1

### Example

```
SYST:CONF:BEEP:VOL 5
```

## SYST:CONF:BEEP:VOL:PASS

Sets the volume level of the buzzer that is sounded when a PASS judgment occurs.

### **Command**

```
SYSTem:CONFigure:BEEPer:VOLume:PASS <NRf>
```

```
SYSTem:CONFigure:BEEPer:VOLume:PASS?
```

### **Parameter**

Value: 0 to 10 (3 by default)

Response: NR1

### **Example**

```
SYST:CONF:BEEP:VOL:PASS 5
```

## SYST:CONF:CAL:DUE:CONT

Sets the calibration period.

### Command

```
SYSTem:CONFigure:CALibration:DUE:CONTRol <NRf>
```

```
SYSTem:CONFigure:CALibration:DUE:CONTRol?
```

### Parameter

Value: 0 to 24 (Calibration period is not monitored when 0 is specified.)  
(12 by default)

Unit: Month

Response: NR1

### Example

```
SYST:CONF:CAL:DUE:CONT 5
```

## SYST:CONF:CAL:PROT:STAT

Sets whether to activate the protection function and switch to protection mode when the calibration period is expired.

Use SYST:CONF:CAL:DUE:CONT to set the calibration period.

### Command

```
SYSTem:CONFigure:CALibration:PROTection:STATe <boolean>
```

```
SYSTem:CONFigure:CALibration:PROTection:STATe?
```

### Parameter

Value: ON(1) The product switches to protection mode.  
OFF(0) The product does not switch to protection mode. (default)

Response: NR1

### Example

```
SYST:CONF:CAL:PROT:STAT ON
```

## SYST:CONF:DACT:STAT

Enables or disables the double action function.

### **Command**

```
SYSTem:CONFigure:DACTion:STATe <boolean>
```

```
SYSTem:CONFigure:DACTion:STATe?
```

### **Parameter**

Value:   ON(1)   Enables double action  
          OFF(0)   Disables double action (default)

Response: NR1

### **Example**

```
SYST:CONF:DACT:STAT ON
```

## SYST:CONF:FMODE:STAT

Enables or disables the fail mode.

### Command

```
SYSTem:CONFigure:FMODe:STATe <boolean>
```

```
SYSTem:CONFigure:FMODe:STATe?
```

### Parameter

Value:   ON(1)   Enables fail mode  
          OFF(0)   Disables fail mode (default)

Response: NR1

### Example

```
SYST:CONF:FMODE:STAT ON
```

## SYST:CONF:MOM:STAT

Enables/disables momentary.

### Command

```
SYSTem:CONFigure:MOmentary:STATe <boolean>
```

```
SYSTem:CONFigure:MOmentary:STATe?
```

### Parameter

Value:   ON(1)   Enables momentary  
          OFF(0)   Disables momentary (default)

Response: NR1

### Example

```
SYST:CONF:MOM:STAT ON
```

## SYST:CONF:PHOL

Sets the length of time that a PASS judgment result will be held.

### Command

```
SYSTem:CONFigure:PHOLd {<NRf>|<character>}
```

```
SYSTem:CONFigure:PHOLd?
```

### Parameter

Value: 0.05 to 10 (0.2 by default)

INFinity Pass judgment results are displayed until you press STOP.

Unit: S

Response: NR3 or characters

### Example

```
SYST:CONF:PHOL INF
```

## SYST:CONF:PON:STAT

Sets the condition panel setting state when the POWER switch is turned on.

### Command

```
SYSTem:CONFigure:PON:STATe <character>
```

```
SYSTem:CONFigure:PON:STATe?
```

### Parameter

|        |      |  |
|--------|------|--|
| Value: | RST  | Reset the panel settings                                   |
|        | RCL0 | Settings stored in memory 0                                |
|        | AUTO | The previous state before the POWER switch was turned off. |

Response: characters

### Example

```
SYST:CONF:PON:STAT AUTO
```

## SYST:CONF:SIO:JUDG:STAT

Turns on or off the judgment result output at STEP END of the SIGNAL I/O connector.

### Command

```
SYSTem:CONFigure:SIO[:SEND]:JUDGment:STATe <boolean>
```

```
SYSTem:CONFigure:SIO[:SEND]:JUDGment:STATe?
```

### Parameter

Value:   ON(1)   Output  
          OFF(0)  Not output (default)

Response: NR1

### Example

```
SYST:CONF:SIO:JUDG:STAT ON
```

## SYST:CONF:SLPR:STAT

Enables/disables the start long function.

### Command

```
SYSTem:CONFigure:SLPRes:STATe <boolean>
```

```
SYSTem:CONFigure:SLPRes:STATe?
```

### Parameter

Value:   ON(1)   Enables the start long function  
          OFF(0)   Disables the start long function (default)

Response: NR1

### Example

```
SYST:CONF:SLPR:STAT ON
```

## SYST:CONF:SOUT:FAIL:LOW:STAT

Sets whether to output a signal from the STATUS OUT connector during “L-FAIL.”

### Command

```
SYSTem:CONFigure:SOUTput:FAIL:LOWer:STATe <boolean>
```

```
SYSTem:CONFigure:SOUTput:FAIL:LOWer:STATe?
```

### Parameter

Value:   ON(1)    Output  
          OFF(0)   Not output (default)

Response: NR1

### Example

```
SYST:CONF:SOUT:FAIL:LOW:STAT ON
```

## SYST:CONF:SOUT:FAIL:UPP:STAT

Sets whether to output a signal from the STATUS OUT connector during “U-FAIL.”

### Command

```
SYSTem:CONFigure:SOUTput:FAIL:UPPer:STATe <boolean>
```

```
SYSTem:CONFigure:SOUTput:FAIL:UPPer:STATe?
```

### Parameter

Value: ON(1) Output  
OFF(0) Not output (default)

Response: NR1

### Example

```
SYST:CONF:SOUT:FAIL:UPP:STAT ON
```

## SYST:CONF:SOUT:HVON:STAT

Sets whether to output a signal from the STATUS OUT connector while voltage is residing or while a test is in progress.

### Command

```
SYSTem:CONFigure:SOUTput:HVON:STATe <boolean>
```

```
SYSTem:CONFigure:SOUTput:HVON:STATe?
```

### Parameter

Value: ON(1) Output  
OFF(0) Not output (default)

Response: NR1

### Example

```
SYST:CONF:SOUT:HVON:STAT ON
```

## SYST:CONF:SOUT:PASS:STAT

Sets whether to output a signal from the STATUS OUT connector during “PASS.”

### Command

```
SYSTem:CONFigure:SOUTput:PASS:STATe <boolean>
```

```
SYSTem:CONFigure:SOUTput:PASS:STATe?
```

### Parameter

Value: ON(1) Output  
OFF(0) Not output (default)

Response: NR1

### Example

```
SYST:CONF:SOUT:PASS:STAT ON
```

## SYST:CONF:SOUT:PON:STAT

Sets whether to output a signal from the STATUS OUT connector while the POWER switch is turned on.

### Command

```
SYSTem:CONFigure:SOUTput:PON:STATe <boolean>
```

```
SYSTem:CONFigure:SOUTput:PON:STATe?
```

### Parameter

Value: ON(1) Output  
OFF(0) Not output (default)

Response: NR1

### Example

```
SYST:CONF:SOUT:PON:STAT ON
```

## SYST:CONF:SOUT:PROT:STAT

Sets whether to output a signal from the STATUS OUT connector during protection mode.

### **Command**

```
SYSTem:CONFigure:SOUTput:PROTection:STATe <boolean>
```

```
SYSTem:CONFigure:SOUTput:PROTection:STATe?
```

### **Parameter**

Value: ON(1) Output  
OFF(0) Not output (default)

Response: NR1

### **Example**

```
SYST:CONF:SOUT:PROT:STAT ON
```

## SYST:CONF:SOUT:READ:STAT

Sets whether to output a signal from the STATUS OUT connector during "READY."

### Command

```
SYSTem:CONFigure:SOUTput:READy:STATe <boolean>
```

```
SYSTem:CONFigure:SOUTput:READy:STATe?
```

### Parameter

Value:   ON(1)   Output  
         OFF(0)   Not output (default)

Response: NR1

### Example

```
SYST:CONF:SOUT:READ:STAT ON
```

## SYST:CONF:SOUT:TEST:STAT

Sets whether to output a signal from the STATUS OUT connector while the test voltage is at the set value.

### **Command**

```
SYSTem:CONFigure:SOUTput:TEST:STAT <boolean>
```

```
SYSTem:CONFigure:SOUTput:TEST:STAT?
```

### **Parameter**

Value: ON(1) Output  
OFF(0) Not output (default)

Response: NR1

### **Example**

```
SYST:CONF:SOUT:TEST:STAT ON
```

# TRIGger Command

## TRIG:TEST

Executes a software trigger on the TEST trigger subsystem.

### Command

```
TRIGger:TEST[:IMMediate]
```

## TRIG:TEST:SOUR

Sets the condition (trigger source) for actually starting the test after the TEST trigger subsystem receives an INIT:TEST.

### Command

```
TRIGger:TEST:SOURce <character>
```

```
TRIGger:TEST:SOURce?
```

### Parameter

|        |           |   |
|--------|-----------|---|
| Value: | IMMediate | Immediately start the auto test   |
|        | BUS       | Execute the auto test when a software trigger (TRIG:TEST) is received.<br><br>In the case of FUNC PROG, the test pauses when a step is completed and resumes when a software trigger is received. |
|        | EXTernal  | Execute the auto test with a start operation on the TOS93. Pauses when a step is completed and resumes when a start operation is performed.   |
|        | ONCE      | Execute the auto test with a start operation on the TOS93.  |

Response: character

### Example

```
TRIG:TEST:SOUR BUS
```

# Tutorial

## Withstanding voltage and insulation resistance test settings

### ■ Test condition setting commands for AC withstanding voltage tests (ACW)

| Test condition                   | Command                    | Default  |
|----------------------------------|----------------------------|----------|
| Test voltage                     | ACW:VOLT                   | 0V       |
| Limit voltage                    | ACW:VOLT:PROT              | 5500V    |
| Start voltage                    | ACW:VOLT:STAR:STAT         | OFF      |
|                                  | ACW:VOLT:STAR              | 50PCT    |
| Frequency                        | ACW:VOLT:FREQ              | 50HZ     |
| Upper limit                      | SENS:ACW:JUDG              | 0.01MA   |
| Lower limit                      | SENS:ACW:JUDG:LOW:STAT     | OFF      |
|                                  | SENS:ACW:JUDG:LOW          | 0A       |
| Test time                        | ACW:VOLT:TIM:STAT          | ON       |
|                                  | ACW:VOLT:TIM               | 0.2S     |
| Voltage rise time                | ACW:VOLT:SWE:TIM           | 0.1S     |
| Voltage fall time                | ACW:VOLT:SWE:FALL:TIM:STAT | OFF      |
|                                  | ACW:VOLT:SWE:FALL:TIM      | 0.1S     |
| Current detection response speed | SENS:ACW:CURR:FILT:TYPE    | LOW      |
|                                  | SENS:ACW:CURR:FILT:LPAS    | SLOW     |
|                                  | SENS:ACW:CURR:FILT:HPAS    | SLOW     |
| Grounding mode                   | SENS:ACW:TERM:GRO          | LOW      |
| Current measurement mode         | SENS:ACW:CURR:MODE         | RMS      |
| Voltage measurement mode         | SENS:ACW:VOLT:MODE         | RMS      |
| Offset                           | CALC:ACW:SCAL              | OFF      |
|                                  | CALC:ACW:SCAL:OFFS         | 0A       |
|                                  | CALC:ACW:SCAL:OFFS:IMAG    | 0A       |
| Scanner setting                  | ROUT:ACW:TERM              | *1, OPEN |

\*1. Specify the scanner and channel to set.

## ■ Test condition setting commands for DC withstanding voltage tests (DCW)

| Test condition                        | Command   | Default             |
|---------------------------------------|---|---------------------|
| Test voltage                          | DCW:VOLT  | 0V                  |
| Limit voltage                         | DCW:VOLT:PROT   | 7500V               |
| Start voltage                         | DCW:VOLT:STAR:STAT<br>DCW:VOLT:STAR   | OFF<br>50PCT        |
| Upper limit                           | SENS:DCW:JUDG   | 0.01MA              |
| Lower limit                           | SENS:DCW:JUDG:LOW:STAT<br>SENS:DCW:JUDG:LOW                                   | OFF<br>0A           |
| Auto setting of the judgment delay    | SENS:DCW:JUDG:DEL:AUTO<br>SENS:DCW:JUDG:DEL                                   | OFF<br>0.1S         |
| Test time                             | DCW:VOLT:TIM:STAT<br>DCW:VOLT:TIM   | ON<br>0.2S          |
| Voltage rise time                     | DCW:VOLT:SWE:TIM  | 0.1S                |
| Voltage fall time                     | DCW:VOLT:SWE:FALL:TIM:STAT<br>DCW:VOLT:SWE:FALL:TIM                           | OFF<br>0.1S         |
| Discharge time                        | DCW:VOLT:DISC:TIM   | 0S                  |
| Discharge when interlock is activated | DCW:VOLT:DISC:INT:STAT  | ON                  |
| Current detection response speed      | SENS:DCW:CURR:FILT:TYPE<br>SENS:DCW:CURR:FILT:LPAS<br>SENS:DCW:CURR:FILT:HPAS | LOW<br>SLOW<br>SLOW |
| Grounding mode                        | SENS:DCW:TERM:GRO   | LOW                 |
| Voltage measurement mode              | SENS:DCW:VOLT:MODE  | AVER                |
| Offset                                | CALC:DCW:SCAL<br>CALC:DCW:SCAL:OFFS   | OFF<br>0A           |
| Scanner setting                       | ROUT:DCW:TERM   | *1, OPEN            |

\*1. Specify the scanner and channel to set.

## ■ Test condition setting commands for insulation resistance tests (IR)

| Test condition                        | Command   | Default                                 |
|---------------------------------------|---|---|
| Test voltage                          | IR:VOLT   | 0V                                      |
| Limit voltage                         | IR:VOLT:PROT  | 1020V                                   |
| Start voltage                         | IR:VOLT:STAR:STAT<br>IR:VOLT:STAR   | OFF<br>50PCT                            |
| Upper limit                           | SENS:IR:JUDG:TYPE<br>SENS:IR:JUDG:STAT<br>SENS:IR:JUDG<br>SENS:IR:JUDG:CURR:STAT<br>SENS:IR:JUDG:CURR                 | RES<br>OFF<br>100MOHM<br>ON<br>0.0001MA |
| Lower limit                           | SENS:IR:JUDG:TYPE<br>SENS:IR:JUDG:LOW:STAT<br>SENS:IR:JUDG:LOW<br>SENS:IR:JUDG:CURR:LOW:STAT<br>SENS:IR:JUDG:CURR:LOW | RES<br>ON<br>1MOHM<br>OFF<br>0A         |
| Auto setting of the judgment delay    | SENS:IR:JUDG:DEL:AUTO<br>SENS:IR:JUDG:DEL   | OFF<br>0.1S                             |
| Test time                             | IR:VOLT:TIM:STAT<br>IR:VOLT:TIM   | ON<br>0.2S                              |
| Voltage rise time                     | IR:VOLT:SWE:TIM   | 0.1S                                    |
| Discharge time                        | IR:VOLT:DISC:TIM  | 0S                                      |
| Discharge when interlock is activated | IR:VOLT:DISC:INT:STAT   | ON                                      |
| Grounding mode                        | SENS:IR:TERM:GRO  | LOW                                     |
| Low-pass filter use                   | SENS:IR:CURR:FILT:LPAS:STAT   | OFF                                     |
| Offset                                | CALC:IR:SCAL<br>CALC:IR:SCAL:OFFS   | OFF<br>100MOHM                          |
| Scanner setting                       | ROUT:IR:TERM  | *1, OPEN                                |

\*1. Specify the scanner and channel to set.

## ■ Set test conditions.

First, switch to remote mode.

```
SYST:COMM:RLST REM
```

We recommend you perform a reset.

```
*RST
```

Next, select the test mode.

AC withstanding voltage test

```
FUNC ACW
```

The DC withstanding voltage test parameter is DCW, and the insulation resistance test parameter is IR.

Next, set the test conditions.

When performing an AC withstanding voltage test with the test voltage set to 1500 V, the upper limit set to 10 mA, the test time set to 60 s, the voltage rise time set to 5 s, and the rest of the settings set to default

```
ACW:VOLT 1500
```

```
SENS:ACW:JUDG 10MA
```

```
ACW:VOLT:TIM 60
```

```
ACW:VOLT:SWE:TIM 5
```

The test time can be set to off. When set to off, the test continues until you press STOP or send ABOR.

```
ACW:VOLT:TIM:STAT OFF
```

When set to off, the test time set with ACW:VOLT:TIM is invalid. If you want to set the test time again, set it to on.

```
ACW:VOLT:TIM:STAT ON
```

In an AC withstanding voltage test, the default start voltage, lower limit, voltage fall time, and offset are off.

In a DC withstanding voltage test, the default start voltage, lower limit, auto setting of the judgment delay, voltage fall time, and offset are off.

In an insulation resistance test, the default start voltage, upper limit, auto setting of the judgment delay, and offset are off.

If you want to set them, set them to on and then set the values.

Start voltage in an AC withstanding voltage test

```
ACW:VOLT:STAR:STAT ON
```

```
ACW:VOLT:STAR 50PCT
```

In an AC withstanding voltage test or DC withstanding voltage test, the current detection response speed can be set. The default value is LPF slow.

Select whether to use the LPF or HPF, and then set the speed.

When using HPF fast in an AC withstanding voltage test

```
SENS:ACW:CURR:FILT:TYPE HIGH
```

```
SENS:ACW:CURR:FILT:HPAS FAST
```

In an insulation resistance test, you can set the upper limit and lower limit using a resistance or current. The default settings is resistance with the upper limit set to off and lower limit set to on.

When judging based on current

```
SENS:IR:JUDG:TYPE CURR
```

```
SENS:IR:JUDG:CURR:STAT ON
```

```
SENS:IR:JUDG:CURR 0.01MA
```

```
SENS:IR:JUDG:CURR:LOW 0.001MA
```

You can set the lower limit to off.

```
SENS:IR:JUDG:CURR:LOW:STAT OFF
```

If an optional high voltage scanner is connected, set the connection of each channel of the scanner.

You can query the available scanner channels.

```
ROUT:CAT?
```

Returns the available scanner channel in <NR1>,<NR1>... format. If scanner 1 (channels 1 to 4) is connected, +101,+102,+103,+104 is returned.

Specify the scanner channel, and then set the connection.

When setting scanner 1 channel 2 to LOW (DC withstanding voltage test)

```
ROUT:DCW:TERM 102,LOW
```

When you are done with the settings, start the test.

## Earth continuity test (EC) settings

### ■ Test condition setting commands for earth continuity (AC) tests

| Test condition         | Command  | Default                              |
|------------------------|--|--------------------------------------|
| Test current           | EC:AC:CURR   | 3A                                   |
| Limit current          | EC:AC:CURR:PROT  | 42A                                  |
| Frequency              | EC:CURR:FREQ   | 50                                   |
| Upper limit            | SENS:EC:AC:JUDG:TYPE<br>SENS:EC:AC:JUDG:STAT<br>SENS:EC:AC:JUDG<br>SENS:EC:AC:JUDG:VOLT:STAT<br>SENS:EC:AC:JUDG:VOLT                 | RES<br>ON<br>0.0001OHM<br>ON<br>2.5V |
| Lower limit            | SENS:EC:AC:JUDG:TYPE<br>SENS:EC:AC:JUDG:LOW:STAT<br>SENS:EC:AC:JUDG:LOW<br>SENS:EC:AC:JUDG:VOLT:LOW:STAT<br>SENS:EC:AC:JUDG:VOLT:LOW | RES<br>OFF<br>0OHM<br>OFF<br>0V      |
| Test time              | EC:AC:CURR:TIM:STAT<br>EC:AC:CURR:TIM  | ON<br>0.2S                           |
| Current rise time      | EC:AC:CURR:SWE:TIM   | 0.1S                                 |
| Current fall time      | EC:AC:CURR:SWE:FALL:TIM:STAT<br>EC:AC:CURR:SWE:FALL:TIM  | OFF<br>0.1S                          |
| Terminal wiring method | SENS:EC:AC:TERM:WIRE   | 4                                    |
| Offset                 | CALC:EC:AC:SCAL<br>CALC:EC:AC:SCAL:OFFS  | OFF<br>0OHM                          |
| Contact check          | SENS:EC:AC:TERM:CCH  | OFF                                  |

## ■ Test condition setting commands for earth continuity (DC) tests

| Test condition         | Command  | Default                              |
|------------------------|--|--------------------------------------|
| Test current           | EC:DC:CURR   | 3A                                   |
| Limit current          | EC:DC:CURR:PROT  | 42A                                  |
| Upper limit            | SENS:EC:DC:JUDG:TYPE<br>SENS:EC:DC:JUDG:STAT<br>SENS:EC:DC:JUDG<br>SENS:EC:DC:JUDG:VOLT:STAT<br>SENS:EC:DC:JUDG:VOLT                 | RES<br>ON<br>0.0001OHM<br>ON<br>2.5V |
| Lower limit            | SENS:EC:DC:JUDG:TYPE<br>SENS:EC:DC:JUDG:LOW:STAT<br>SENS:EC:DC:JUDG:LOW<br>SENS:EC:DC:JUDG:VOLT:LOW:STAT<br>SENS:EC:DC:JUDG:VOLT:LOW | RES<br>OFF<br>0OHM<br>OFF<br>0V      |
| Test time              | EC:DC:CURR:TIM:STAT<br>EC:DC:CURR:TIM  | ON<br>0.2S                           |
| Current rise time      | EC:DC:CURR:SWE:TIM   | 0.1S                                 |
| Current fall time      | EC:DC:CURR:SWE:FALL:TIM:STAT<br>EC:DC:CURR:SWE:FALL:TIM  | OFF<br>0.1S                          |
| Terminal wiring method | SENS:EC:DC:TERM:WIRE   | 4                                    |
| Offset                 | CALC:EC:DC:SCAL<br>CALC:EC:DC:SCAL:OFFS  | OFF<br>0OHM                          |
| Contact check          | SENS:EC:DC:TERM:CCH  | OFF                                  |

## ■ Set test conditions.

First, switch to remote mode.

```
SYST:COMM:RLST REM
```

We recommend you perform a reset.

```
*RST
```

Next, select the test mode.

Earth continuity (AC) test

```
FUNC EC
```

The earth continuity (DC) test parameter is ECDC.

Next, set the test conditions.

An earth continuity (AC) test will be used as an example to explain the steps.

In the case of DC, replace AC in the node to DC.

When performing a test with the test voltage set to 25 A, the upper limit set to 0.1 Ω, the test time set to 60 s, and the rest of the settings set to default

```
EC:AC:CURR 25
```

```
SENS:EC:AC:JUDG 0.1
```

```
EC:AC:CURR:TIM 60
```

The test time can be set to off. When set to off, the test continues until you press STOP or send ABOR.

```
EC:AC:CURR:TIM:STAT OFF
```

When set to off, the test time set with EC:AC:CURR:TIM is invalid. If you want to set the test time again, set it to on.

```
EC:AC:CURR:TIM:STAT ON
```

The default lower limit, current fall time, and offset are off.

If you want to set them, set them to on and then set the values.

**Current fall time**

```
EC:AC:CURR:SWE:FALL:TIM:STAT ON
```

```
EC:AC:CURR:SWE:FALL:TIM 0.1
```

You can set the upper limit and lower limit using a resistance or voltage.

The default settings is resistance with the upper limit set to on and lower limit set to off.

**When judging based on voltage**

```
SENS:EC:AC:JUDG:TYPE VOLT
```

```
SENS:EC:AC:JUDG:VOLT:STAT ON
```

```
SENS:EC:AC:JUDG:VOLT 2.5V
```

```
SENS:EC:AC:JUDG:VOLT:LOW 0.1V
```

You can set the upper limit to off.

```
SENS:EC:AC:JUDG:VOLT:STAT OFF
```

When you are done with the settings, start the test.

## Leakage current test settings

### ■ Test condition setting commands for touch current tests (TC)

| Test condition                | Command                                     | Default       |
|-------------------------------|---|---------------|
| Network                       | SENS:TC:NETW                                | A             |
| Power supply line polarity    | TC:POL                                      | NORM          |
| Single fault mode             | SENS:TC:COND<br>SENS:TC:COND:FAUL           | NORM<br>NEUT  |
| Probe connection destination  | SENS:TC:NETW:PROB                           | PEAR          |
| Output from the 110% terminal | TC:110P:OUTP<br>TC:110P:POL                 | OFF<br>NORM   |
| Upper limit                   | SENS:TC:JUDG:STAT<br>SENS:TC:JUDG           | ON<br>100UA   |
| Lower limit                   | SENS:TC:JUDG:LOW:STAT<br>SENS:TC:JUDG:LOW   | OFF<br>0.01MA |
| Judgment delay                | SENS:TC:JUDG:DEL:STAT<br>SENS:TC:JUDG:DEL   | OFF<br>1S     |
| Test time                     | SENS:TC:TIM:STAT<br>SENS:TC:TIM             | ON<br>1S      |
| Voltage conversion            | CALC:TC:SCAL:CONV<br>CALC:TC:SCAL:CONV:VOLT | OFF<br>80V    |
| Measurement mode              | SENS:TC:CURR:MODE                           | ACDC          |
| Measurement range             | SENS:TC:RANG:AUTO                           | ON            |
| Voltmeter band expansion      | SENS:TC:BAND                                | NORM          |
| Offset                        | CALC:TC:SCAL<br>CALC:TC:SCAL:OFFS           | OFF<br>0A     |

## ■ Test condition setting commands for protective conductor current test (PCC)

| Test condition             | Command                                       | Default       |
|----------------------------|---|---------------|
| Network                    | SENS:PCC:NETW                                 | PCC-1         |
| Power supply line polarity | PCC:POL                                       | NORM          |
| Single fault mode          | SENS:PCC:COND                                 | NORM          |
| Upper limit                | SENS:PCC:JUDG:STAT<br>SENS:PCC:JUDG           | ON<br>100UA   |
| Lower limit                | SENS:PCC:JUDG:LOW:STAT<br>SENS:PCC:JUDG:LOW   | OFF<br>0.01MA |
| Judgment delay             | SENS:PCC:JUDG:DEL:STAT<br>SENS:PCC:JUDG:DEL   | OFF<br>1S     |
| Test time                  | SENS:PCC:TIM:STAT<br>SENS:PCC:TIM             | ON<br>1S      |
| Voltage conversion         | CALC:PCC:SCAL:CONV<br>CALC:PCC:SCAL:CONV:VOLT | OFF<br>80V    |
| Measurement mode           | SENS:PCC:CURR:MODE                            | ACDC          |
| Measurement range          | SENS:PCC:RANG:AUTO                            | ON            |
| Voltmeter band expansion   | SENS:PCC:BAND                                 | NORM          |
| Offset                     | CALC:PCC:SCAL<br>CALC:PCC:SCAL:OFFS           | OFF<br>0A     |

## ■ Test condition setting commands for patient leakage current tests (PAT)

| Test condition                | Command  | Default       |
|-------------------------------|--|---------------|
| Power supply line polarity    | PAT:POL  | NORM          |
| Single fault mode             | SENS: PAT: COND<br>SENS: PAT: COND: FAUL             | NORM<br>NEUT  |
| Probe connection destination  | SENS: PAT: NETW: PROB                                | PEAR          |
| Output from the 110% terminal | PAT: 110P: OUTP<br>PAT: 110P: POL                    | OFF<br>NORM   |
| Upper limit                   | SENS: PAT: JUDG: STAT<br>SENS: PAT: JUDG             | ON<br>0.1MA   |
| Lower limit                   | SENS: PAT: JUDG: LOW: STAT<br>SENS: PAT: JUDG: LOW   | OFF<br>0.01MA |
| Judgment delay                | SENS: PAT: JUDG: DEL: STAT<br>SENS: PAT: JUDG: DEL   | OFF<br>1S     |
| Test time                     | SENS: PAT: TIM: STAT<br>SENS: PAT: TIM               | ON<br>1S      |
| Voltage conversion            | CALC: PAT: SCAL: CONV<br>CALC: PAT: SCAL: CONV: VOLT | OFF<br>80V    |
| Measurement mode              | SENS: PAT: CURR: MODE                                | ACDC          |
| Measurement range             | SENS: PAT: RANG: AUTO                                | ON            |
| Voltmeter band expansion      | SENS: PAT: BAND                                      | NORM          |
| Offset                        | CALC: PAT: SCAL<br>CALC: PAT: SCAL: OFFS             | OFF<br>0A     |

## ■ Test condition setting commands for meter mode (MET)

| Test condition                | Command                                  | Default     |
|-------------------------------|--|-------------|
| Network                       | SENS: MET: NETW                          | A           |
| Touch mode                    | SENS: MET: TERM                          | NETW        |
| SELV setting                  | SENS: MET: SELV: STAT<br>SENS: MET: SELV | ON<br>30V   |
| Measurement mode              | SENS: MET: CURR: MODE                    | ACDC        |
| Measurement range             | SENS: MET: RANG: AUTO<br>SENS: MET: RANG | ON<br>42V   |
| Offset                        | CALC: MET: SCAL<br>CALC: MET: SCAL: OFFS | OFF<br>0A   |
| Output from the 110% terminal | OUTP: 110P<br>OUTP: 110P: POL            | OFF<br>NORM |

### ■ Set test conditions.

First, switch to remote mode.

```
SYST:COMM:RLST REM
```

We recommend you perform a reset.

\*RST

Next, select the test mode.

Touch current test

```
FUNC TC
```

The protective conductor current test parameter is PCC, the patient leakage current test parameter is PAT, and meter mode is MET.

Next, set the test conditions.

When performing a touch current test with the network set to B-U1, the upper limit set to 0.5 mA, the test time set to 10 s, and the rest of the settings set to default

```
SENS:TC:NETW B-U1
```

```
SENS:TC:JUDG 0.5MA
```

```
SENS:TC:TIM 10
```

The test time can be set to off. When set to off, the test continues until you press STOP or send ABOR.

```
SENS:TC:TIM:STAT OFF
```

When set to off, the test time set with SENS:TC:TIM is invalid. If you want to set the test time again, set it to on.

```
SENS:TC:TIM:STAT ON
```

You can also set the upper limit to off.

```
SENS:TC:JUDG:STAT OFF
```

In a touch current test, protective conductor current test, or patient leakage current test, the default lower limit, judgment delay, voltage conversion, and offset are off.

In meter mode, the default offset is off.

If you want to set them, set them to on and then set the values.

Judgment delay in a touch current test

```
SENS:TC:JUDG:DEL:STAT ON
```

```
SENS:TC:JUDG:DEL 1S
```

In a touch current test or patient leakage current test, you can set the disconnected condition of single fault mode to power supply line or protective ground wire. The default is normal (NORM).

When setting the disconnected condition to protective ground wire in a touch current test

SENS:TC:COND FAUL

SENS:TC:COND:FAUL PEAR

When you are done with the settings, start the test.

## Trigger Subsystem

---

This product has two different trigger subsystems.

- TEST

Executes a test/ auto test.

- ACQUIRE

Measures the voltage, current, resistance, and elapsed test time.

The trigger subsystems have three states (IDLE state, INITIATED state, WTG state).

- IDLE state

When the product is turned on, all trigger subsystems are in the IDLE state. In this state, the trigger subsystem ignores all triggers. If you send any of the following commands, the trigger subsystem is switched to the IDLE state, regardless of its current state.

ABORT

\*RST

\*RCL

IEEE488.1 sdc (Selected Device Clear) or dcl (Device Clear)

- INITIATED state

When you send the INIT command while the product is in the IDLE state, the trigger function begins operating, and the tester switches to the INITIATED state.

If the trigger source is set to IMMEDIATE, the test, the auto test, or the measurement immediately.

If the trigger source is set to BUS, the product switches to the WTG (Waiting for Trigger) state. If the trigger source is set to EXT/ ONCE, the product switches to WTG (Waiting for Trigger) state, which causes the product to wait for a start operation to take place on the TOS.

- WTG (Waiting for Trigger) state

When you send a trigger or perform a start operation on the TOS93 in the WTG state, test, auto test, or measurement starts.

## Executing tests

---

Tests use the TEST trigger subsystem.

First, set the test conditions.

### ■ Before starting a test

In a withstanding voltage test or insulation resistance test, you can check the continuity between the test leads connected to the scanner and the EUT.

AC withstanding voltage test

```
ROUT:ACW:TERM:CCH ON
```

DC withstanding voltage test

```
ROUT:DCW:TERM:CCH ON
```

Insulation resistance test

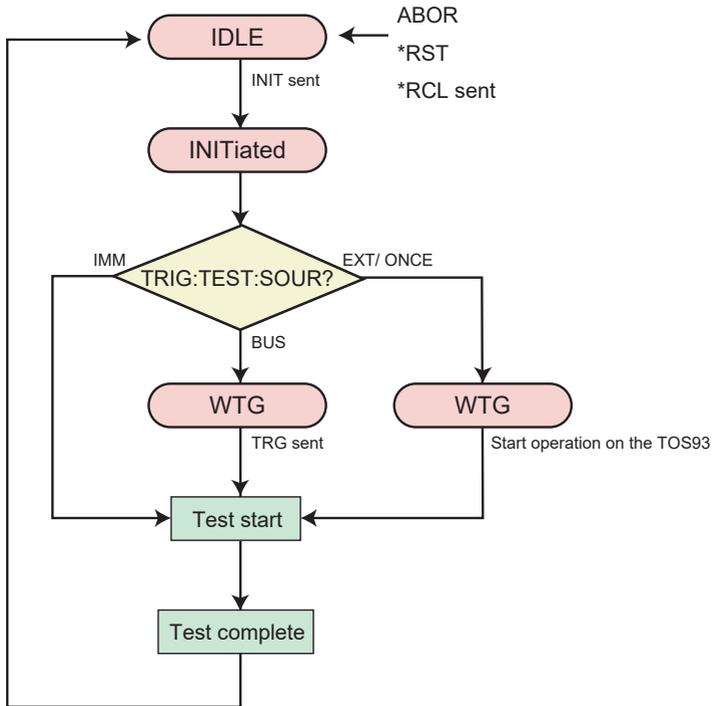
```
ROUT:IR:TERM:CCH ON
```

In a touch current test, protective conductor current test, or patient leakage current test, a current can be output temporarily from AC LINE OUT for checking the operation of the EUT.

```
OUTP ON
```

### ■ Starting a test

The TEST trigger subsystem has three states: IDLE, INITiated, and WTG.



To start a test immediately, set the trigger source to IMM, and then use the INIT command.

```

TRIG:TEST:SOUR IMM
INIT:TEST

```

To start a test with a software trigger, change the trigger source to BUS. When you send INIT:TEST, the trigger subsystem switches to the WTG (Waiting For Trigger) state. When a software trigger is received through TRIG:TEST or \*TRG, the test starts.

```

TRIG:TEST:SOUR BUS
INIT:TEST
TRIG:TEST

```

To start a test from the TOS93, change the trigger source to EXT. When you send INIT:TEST, the trigger subsystem switches to the WTG (Waiting For Trigger) state. The test starts when you perform a start operation on the unit.

```

TRIG:TEST:SOUR EXT
INIT:TEST

```

When the test finishes, the trigger subsystem returns to the IDLE state again. If the ABOR command or an equivalent command is received in the WTG state or when a test is being executed, the test is canceled, and the trigger subsystem returns to the IDLE state.

Send an \*RST command to reset all the test condition parameters.

TRIG:TEST applies a software trigger only to the TEST trigger subsystem.

You can also use the \*TRG command or the IEEE488.1 get (Group Execute Trigger) command for the same purpose. This command applies a software trigger to all trigger subsystems, if there are other trigger subsystems in the initiated state, their trigger operations will also be executed at the same time. The TEST subsystem and the PROG subsystem cannot be executed simultaneously. The trigger operation of the item selected with FUNC is executed.

## Configuring and executing auto tests

---

Auto tests use the TEST trigger subsystem.

### ■ Setting the step and program conditions

First, switch to remote mode.

```
SYST:COMM:RLST REM
```

We recommend you perform a reset.

```
*RST
```

Next, set the test mode to auto test.

```
FUNC PROG
```

To create a new program, specify a program name. If you are using a program in program memory, you do not need to create a program.

For tests other than an LC test, include “/BASIC/” before the program name. For an LC test, include “/LC/”.

When creating a test other than an LC test

```
PROG:CRE "/BASIC/MY TEST"
```

After creating the program, specify the program to set the steps.

Specifying the aforementioned program

```
PROG "/BASIC/MY TEST"
```

When specifying a program in program memory, for tests other than an LC test, include “/SIGNAL IO/BASIC/” before the program name. For an LC test, include “/SIGNAL IO/LC/”.

When specifying 51 (other than an LC test)

```
PROG "/SIGNAL IO/BASIC/51"
```

Set the number of steps of the specified program.

```
PROG:STEPS:COUN 2
```

Use this command also to change the number of steps. If the number is increased from the current number of steps, steps with default values are added after the last step. If the number is decreased, steps are deleted in order starting from the last step.

Next, set the steps.

Step 1: AC withstanding voltage test, test voltage 1500 V, current upper limit

10 mA, current lower limit 1 mA, test time 60 s, rest of the settings at default

Step 2: DC withstanding voltage test, test voltage 1800 V, current upper limit 1 mA, current lower limit 0.1 mA, test time 60 s, rest of the settings at default

```

PROG:STEP1:FUNC ACW
PROG:STEP1 1500
PROG:STEP1:JUDG:CURR 10MA
PROG:STEP1:JUDG:CURR:LOW 1MA
PROG:STEP1:JUDG:LOW:STAT ON
PROG:STEP1:TIM 60
PROG:STEP2:FUNC DCW
PROG:STEP2 1800
PROG:STEP2:JUDG:CURR 1MA
PROG:STEP2:JUDG:CURR:LOW 0.1MA
PROG:STEP2:JUDG:LOW:STAT ON
PROG:STEP2:TIM 60

```

For the following commands, CURRent, VOLTage, or RESistance cannot be omitted when a unit is used in the parameter.

```

PROG:STEP<n>:[CURRent:] [LEVel]
PROG:STEP<n>:[CURRent:]SCALE:OFFSet:IMAGinary
PROG:STEP<n>:[CURRent:]SCALE:OFFSet[:REAL]
PROG:STEP<n>:JUDGment[:CURRent]:LOWer
PROG:STEP<n>:JUDGment[:CURRent][:UPPer]
PROG:STEP<n>:JUDGment[:VOLTage]:LOWer
PROG:STEP<n>:JUDGment[:VOLTage][:UPPer]
PROG:STEP<n>:[RESistance:]SCALE:OFFSet[:REAL]
PROG:STEP<n>:[VOLTage:] [LEVel]

```

Example when a unit is used

```
PROG:STEP1:JUDG:CURR 10MA
```

Example when a unit is not used

```
PROG:STEP1:JUDG 0.01
```

For details on step setting commands, see -> [“PROG:STEP<n>:<prog\\_item>”](#)(p.

114).

Next, set the program conditions.

Set the step interval time to 10 s.

```
PROG:INT:TIM 10
```

Set the operation to be executed when a fail judgment occurs.

To end the step in execution when a FAIL occurs, start the next step after the step interval elapses, and produce a FAIL judgment when all steps are completed

```
PROG:FAIL:CONT ON
```

To end the auto test when a FAIL occurs and produce a FAIL judgment

```
PROG:FAIL:CONT OFF
```

Save the program.

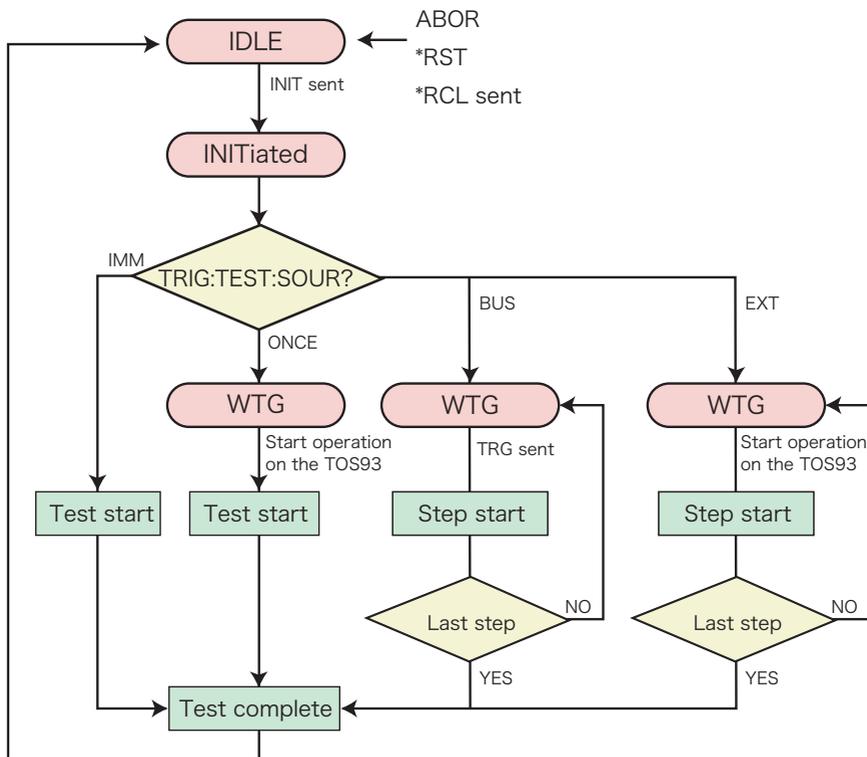
```
PROG:SAVE
```

You can start the auto test without saving the program, but the program will be erased if you turn off the POWER switch.

When you are done with the settings, start the auto test.

## ■ Starting an auto test

The TEST trigger subsystem has three states: IDLE, INITiated, and WTG.



First, reset the TEST trigger subsystem.

```
ABOR:TEST
```

To start a sequence operation immediately, set the trigger source to IMM, and then use the INIT command.

```
TRIG:TEST:SOUR IMM
```

```
INIT:TEST
```

To start an auto test with a software trigger, change the trigger source to BUS

When you send INIT:TEST, the trigger subsystem switches to the WTG (Waiting For Trigger) state. When a software trigger is received through TRIG:TEST or \*TRG, the test starts. When a step is completed, the product pauses and switches to the WTG (Waiting For Trigger) state. When a software trigger is received through TRIG:TEST or \*TRG, the test resumes, and the next step starts.

```
TRIG:TEST:SOUR BUS
```

```
INIT:TEST
```

```
TRIG:TEST
```

TRIG:TEST applies a software trigger only to the TEST trigger subsystem.

You can also use the \*TRG command or the IEEE488.1 get (Group Execute Trigger) command for the same purpose. This command applies a software trigger to all trigger subsystems, if there are other trigger subsystems in the initiated state, their trigger operations will also be executed at the same time.

To start an auto test from the TOS93, change the trigger source to EXT or ONCE.

With ONCE, when an auto test is started once on the TOS93, all steps are executed. With EXT, when a step is completed, the product pauses and switches to the WTG (Waiting For Trigger) state. When you start an auto test on the TOS93 again, the next step starts.

When you send INIT:TEST, the trigger subsystem switches to the WTG (Waiting For Trigger) state. The test starts when you perform a start operation on the unit.

```
TRIG:TEST:SOUR EXT
```

```
INIT:TEST
```

When the auto test finishes, the trigger subsystem returns to the IDLE state again. If the ABOR command or an equivalent command is received in the WTG state or when an auto test is being executed, the test is canceled, and the trigger subsystem returns to the IDLE state.

## Querying measured values

---

Measurement value queries use the ACQ subsystem.

There are simple measurements and advanced measurements.

### ■ Simple measurement

This product has functions for returning the measured voltage, current, resistance, and elapsed test time. The easiest measurement method is using the MEAS command.

The MEAS command starts a new measurement. Because this query starts a new measurement each time that it is sent, you cannot use it to synchronize the measurement of multiple items. The measurement method explained in “Advanced measurement” allows you to separate the measurement start operation and the data query operation.

#### Voltage query

```
MEAS:VOLT?
```

#### Current query

```
MEAS:CURR?
```

#### Resistance query

```
MEAS:RES?
```

#### Elapsed test time query

```
MEAS:ETIM?
```

These values can also be queried collectively.

Returns the measured current, voltage, resistance, and test time in response to MEAS?.

Normally, it takes approximately 200 ms for a single measurement to complete.

If you send the MEAS query multiple times, data acquisition will take a long time. If you want to acquire the data of multiple parameters, query using MEAS?.

This product also supports the READ command, which starts a new measurement and queries the data.

Because this product has no settings that are reset to default values with MEAS, READ and MEAS perform the same operation.

## ■ Advanced measurement

In advanced measurement, you can separate and control the starting of measurement and the referencing of data.

To start a new measurement, use the INIT command.

```
INIT:ACQ
```

When you send INIT:ACQ, measurement data already acquired is invalidated. When the measurement finishes, you can use the FETC query to retrieve the measured data.

```
FETC:VOLT?
```

```
FETC:CURR?
```

```
FETC:RES?
```

```
FETC:ETIM?
```

These values can also be queried collectively.

By using the \*OPC command, you can obtain correct measurement data.-> [“Waiting for Operation Complete”](#)(p. 405)

When waiting for the completion of a measurement of the ACQUIRE trigger subsystem

```
INIT:ACQ;*OPC
```

The ABOR command and IEEE488.1 sdc/dcl commands abort measurements that are in progress.

These commands do not invalidate measured data that has already been acquired. On the other hand, the \*RST and \*RCL common commands not only abort a measurement that is in progress but also invalidate the acquired measured data.

If you send \*RST::FETC:VOLT?, an error will occur because there is no measured data that the FETC query can retrieve and there is no new measurement that is going to be performed.

The difference between the MEASURE (or READ) command and the FETC command is as follows. The MEAS command starts a new measurement and then queries the measured data. The FETC command queries the measured data without first starting a new measurement. The valid measurement parameters are exactly the same between MEAS and FETC.

## Querying test results

---

You can query test results.

The product holds the 1000 latest test results. The data is cleared when the power is turned off.

The items that can be queried are the test number, auto test step number, test mode, test start time (RFC2822 format), test start date (year), test start date (month), test start date (day), test start time (hour), test start time (minute), test start time (second), voltage at the time of judgment, current at the time of judgment, resistance at the time of judgment, test time at the time of judgment, and test result.

First specify the item you want to query using the parameters of the RES:FORM command (1 minimum, 15 maximum).

|            |            |   |
|------------|------------|---|
| Parameter: | NUMBer     | Test number   |
|            | STEP       | Auto test step number                                 |
|            | FUNcTION   | Test mode   |
|            | DATE       | Test start time (RFC2822 format)                      |
|            | YEAR       | Test start date (year)                                |
|            | MONTh      | Test start date (month)                               |
|            | DAY        | Test start date (day)                                 |
|            | HOUR       | Test start time (hour)                                |
|            | MINute     | Test start time (minute)                              |
|            | SECOnd     | Test start time (second)                              |
|            | VOLTage    | Voltage at the time of judgment                       |
|            | CURRent    | Current at the time of judgment                       |
|            | CREal      | Real part of the current at the time of judgment      |
|            | CIMaginary | Imaginary part of the current at the time of judgment |
|            | RESistance | Resistance at the time of judgment                    |
|            | ETIME      | Test time at the time of judgment                     |
|            | JUDGment   | Judgment result                                       |

The test number is incremented each time a test is performed. After 4294967295, the count returns to 0. After 2147483647, the count returns to 0.

When querying the test mode, test start time, voltage, current, test time, and test result

```
RES:FORM FUNC,DATE,VOLT,CURR,ETIM,JUDG
```

When you perform an auto test, we recommend that you also query the step number.

When you are done setting the parameters, make a query.

There are two query commands. RES? queries the latest test result. This query does not delete the test result. RES:REM? queries the oldest test result. After the query, the result is deleted.

| Item  | Description             |  | Response format |
|---|-------------------------|--|-----------------|
| Test number   | ---                     |  | NR1             |
| Auto test step number                                 | 1 for a single test     |  | NR1             |
| Test mode   | ACW                     | AC withstanding voltage  | character       |
|   | DCW                     | DC withstanding voltage  |                 |
|   | IR                      | Insulation resistance  |                 |
|   | ECAC                    | Earth continuity (AC)  |                 |
|   | ECDC                    | Earth continuity (DC)  |                 |
|   | TC-n <sup>*1</sup>      | Touch current  |                 |
|   | PCC-n <sup>*1</sup>     | Protective conductor current   |                 |
|   | PATIENT-n <sup>*1</sup> | Patient leakage current  |                 |
| Test start time                                       | RFC2822 format          |  | "string"        |
| Test start date (year)                                | ---                     |  | NR1             |
| Test start date (month)                               | ---                     |  | NR1             |
| Test start date (day)                                 | ---                     |  | NR1             |
| Test start time (hour)                                | ---                     |  | NR1             |
| Test start time (minute)                              | ---                     |  | NR1             |
| Test start time (second)                              | ---                     |  | NR1             |
| Voltage at the time of judgment                       | ---                     |  | NR3             |
| Current at the time of judgment                       | ---                     |  | NR3             |
| Real part of the current at the time of judgment      | --                      |  | NR3             |
| Imaginary part of the current at the time of judgment | --                      |  | NR3             |
| Resistance at the time of judgment                    | ---                     |  | NR3             |
| Test time at the time of judgment                     | ---                     |  | NR3             |
| Judgment result                                       | PASS                    | PASS judgment.   | character       |
|   | U-FAIL                  | A value exceeding the upper limit was detected resulting in a FAIL judgment. |                 |
|   | L-FAIL                  | A value less than the lower limit was detected resulting in a FAIL judgment. |                 |
|   | PROT                    | A protection function was activated, and the test was stopped.               |                 |
|   | ABORT                   | The test was aborted with a STOP signal.                                     |                 |

\*1. n is the network name.

In a leakage current test, the network is returned along with the test mode.

```
RES?
```

If you want to check the test result in order from the first step, such as when you perform an auto test, use RES:REM?.

```
RES:REM?
```

<Reads the response>

```
RES:REM?
```

<Reads the response>

In this case, when you query the oldest test result with RES:REM?, the oldest test result is deleted, so when you query again with RES:REM?, the next test result is returned.

The test start time in RFC2822 format returns the day of the week (abbreviation), day, month (abbreviation), year, hour:minute:second, and time zone.

```
Wed, 24 Oct 2018 08:14:02 +0000
```

## Waiting for Operation Complete

---

The \*OPC command has a function for waiting for operations to complete. Operation complete means that there are no operations that are waiting for a response from the TOS93. Measurement completion requires about 200 ms. The TOS93 is not in the operation complete state while a measurement is ongoing. When the measurement completes, if there are no other operations waiting to be completed, the TOS93 enters the operation complete state

When an \*OPC command is received, the product transitions to the Operation Complete Command Active State (OCAS). If a measurement is completed and there are no operations standing by, the product returns to the Operation Complete Command Idle State (OCIS) and sets the OPC bit (bit 0) of the event status register to TRUE (1). This information can be determined by checking the OPC bit (bit 0) of the \*ESR? query.

Next, we will show an example that starts a new measurement and sends an \*OPC command. Because the event status enable register and service request enable register are configured to generate a service request (SRQ) in response to an operation complete event, an SRQ is generated when a measurement is completed. The SRQ function cannot be used if you are using the RS232 interface

```
*ESE 1;*SRE 32;*CLS;:INITiate:IMMediate:ACQuire;*OPC
```

<Generates a service request>

If you use the \*OPC? query command in place of the \*OPC command, the product transitions to the Operation Complete Query Active State (OQAS). If a measurement is completed and there are no operations standing by, the product returns to the Operation Complete Query Idle State (OQIS) and sets response data "1" (in NR1 format) in the output queue.

```
INITiate:IMMediate:ACQuire;*OPC?
```

<Reads the response>

At power-on, if you send an IEEE488 sdc/dcl, \*RST, or \*RCL, this product switches to the OCIS and OQIS states.

## Status Monitoring

---

The product has two mandatory SCPI standard registers, STATus:OPERation and STATus:QUEStionable, in addition to the IEEE488.2 standard registers.

### ■ Register basics

All SCPI registers have a standard architecture that uses events/filters. CONDition, EVENT, and ENABle and optionally PTRansition and NTRansition can be used. CONDition and EVENT are read-only registers working as status indicators. ENABle, PTRansition and NTRansition are read-write registers working as event and summary filters.

### ■ STATus:OPERation

The OPERation Status register is used to record events and notifications that occur during normal operations.

To check whether CV output is being performed, check the CV bit (bit 8) of the STATus:OPERation register.

```
STATus:OPERation?
```

### ■ STATus:QUEStionable

The QUEStionable Status register is used to record events and notifications that occur during abnormal operations.

To check whether a protection function has been activated, check the OV bit (bit 0) of the STATus:QUEStionable register.

```
STATus:QUEStionable?
```

## ■ PON (Power ON) bit

The PON bit (bit 7) of the event status register is always set when the product is turned on. To generate a power-on SRQ to track power failures and power supply line errors, use PON as follows.

- 1 Set \*PSC (Power-on Status Clear ) to 0 (or OFF).**  
Enable the backup functions for event status enable register and service request enable register settings. (\*PSC 0)
- 2 Set the PON bit (bit 7) of the event status enable register.**  
This enables the transmission of power-on events to the higher layer. (\*ESE 128)
- 3 Set the ESB bit (bit 5) of the status byte enable register.**  
This enables the generation of SRQs based on standard events. (\*SRE 32)

\*PSC 0; \*ESE 128; \*SRE 32

When you use the RS232C interface, the PON bit cannot be assigned to a service request because SRQs are not generated.

When you use the USB or LAN (VXI-11/HiSLIP) interface, even though the SRQ function itself is supported by the communication protocol, a connection lost error occurs in the VISA I/O session immediately before the power-on event. It appears that handling PON events would be difficult.

## Error Checking

---

### ■ Error/event queue

The SCPI specifications define a standard error reporting scheme, Error/Event Queue. This is a FIFO (First In First Out) queue, which records errors and events. The maximum number of errors/events that the product can record is 16. Each error/event can be read with the `SYSTem:ERRor` query.

```
SYSTem:ERRor?
```

The response to this query contains a numeric part (error/event number) and a textual description, such as:

```
-222,"Data out of range"
```

The error/event queue becomes empty when the `*CLS` common command is sent, when the last item in the queue is read, and when the product is turned on. When the error/event queue is empty, the query returns the following:

```
0,"No error"
```

### ■ Displaying communication errors

The product has a debug trace function.

The product can display the oldest item among the errors and events (if there are errors or events). This is convenient for debugging remote control.

When an error or event item is displayed on the panel, the normal voltmeter and ammeter are void.

When the error/event queue is empty, the debug trace function does not display communication errors.\* When you send a `CLS` command, the communication error display clears.

In local mode, the debug trace function is temporarily disabled.

Use the `SYSTem:ERRor:TRACe` command to enable or disable the communication error display.

```
SYSTem:ERRor:TRACe {ON|OFF}
```

## **When using commands on a PLC (sequencer, controller)**

---

These are notes for when using commands on a PLC (sequencer, controller).

- Append a delimiter (ASCII 0x0A) to each command.
- When using RS232C, match the protocol with the sequencer setting.
- Return values vary in length. Because exponential (NR3) queries are also available, processing using functions is necessary on the sequencer side.

## Visual Basic 2017

### ■ Project settings

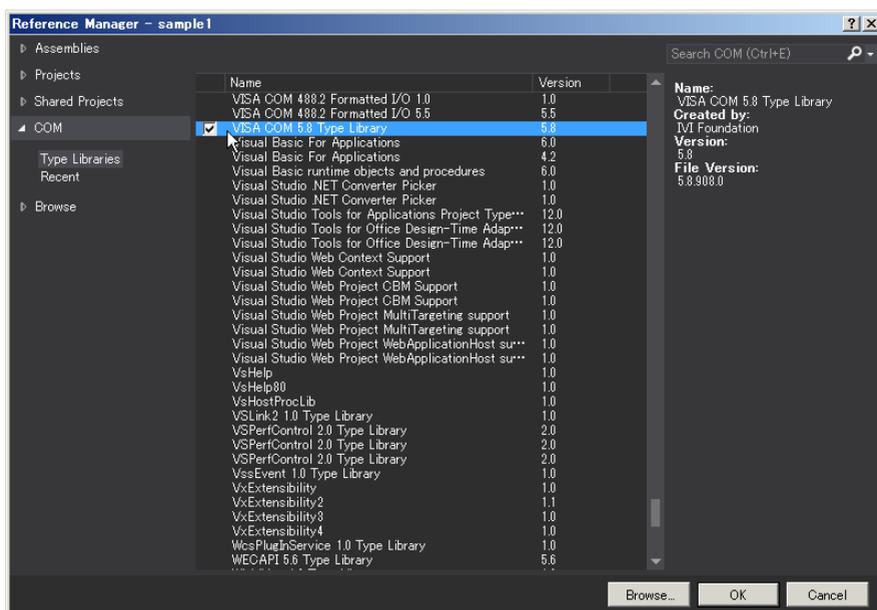
First, add the communication middleware (VISA library) to the project.

Click References on the Project menu to open the Reference Manager window.

On the navigation pane, click COM and then Type Libraries.

From the list in the center of the window, select “VISA COM \*.\* Type Library” (where \*.\* is the VISA library version number), and select the check box.

Click OK to close the dialog box.



## ■ Communicating via RS232C, USB, LAN

### Opening VISA

Before you can use the VISA library to communicate with RS232C, USB, and LAN devices, you have to open VISA. Specify an I/O resource to open VISA.

Example: Opening VISA when using USB on the TOS93

```
Set rm = CreateObject("VISA.GlobalRM")  
  
Set msg = rm.Open("USB::0x0B3E::0x104F::00000001::INSTR", NO_LOCK, 0, "")
```

“USB::0x0B3E::0x104F::00000001::INSTR” is an I/O resource.

The I/O resource syntax is shown below. The parts surrounded by square brackets ([ ]) can be omitted. Enter the appropriate values in the parts written in italics.

|                    |          |  |
|--------------------|----------|--|
| Serial<br>(RS232C) |          | ASRL[ <i>board</i> ][:INSTR]<br>Example: A measuring instrument connected to serial port COM1<br>ASRL1::INSTR  |
| USB                |          | USB[ <i>board</i> ]::VendorID::ProductID::SerialNumber[:InterfaceNumber][:INSTR]<br>Example: A USBTMC measuring instrument whose vendor ID (VID) is 2878, product ID (PID) is 4175, and serial number is 00000001<br>USB0::0x0B3E::0x104F::00000001::INSTR                                       |
| LAN <sup>*1</sup>  | VXI-11   | TCPIP[ <i>board</i> ]:: <i>hostname</i> [:inst0][:INSTR]<br>Example: Measuring instrument whose IP address (hostname) is 169.254.7.8<br>TCPIP::169.254.7.8::INSTR<br>You can also specify the host name for the hostname parameter.  |
|                    | HiSLIP   | TCPIP[ <i>board</i> ]:: <i>hostname</i> ::hislip0[:INSTR]<br>Example: Measuring instrument whose IP address (hostname) is 169.254.7.8<br>TCPIP::169.254.7.8::hislip0::INSTR<br>You can also specify the host name for the hostname parameter.  |
|                    | SCPI-RAW | TCPIP[ <i>board</i> ]:: <i>hostname</i> :: <i>portno</i> ::SOCKET<br>Example: Measuring instrument whose IP address (hostname) is 169.254.7.8 (the product's port number is fixed to 5025)<br>TCPIP::169.254.7.8::5025::SOCKET<br>You can also specify the host name for the hostname parameter. |

\*1: The hostname must be a valid mDNS hostname (a Bonjour hostname that ends in ".local") or a DNS hostname that is managed by an external DNS server (a full-qualified domain name—FQDN). If you are using an mDNS hostname, Apple Bonjour (alternatively, iTunes or Safari) must be installed on your PC.

In VISA, you can use aliases for I/O resources.

If you use an alias for an I/O resource, even if the alias name is hard-coded in the application, the I/O resource name can still be changed to an appropriate value when the application runs.

Example: Using an alias (MYDEV1) for an I/O resource

```
Set msg = rm.Open("MYDEV1", NO_LOCK, 0, "")
```

When you use aliases, specify the actual I/O resources through an external configuration table or similar tool. Refer to the VISA manual.

## Controlling the instrument

Next, we will use commands such as read and write commands to control the instrument. You must include line-feed codes in the command strings.

Examples:

```
msg.WriteString ("FUNC MET" & vbCrLf)           'Set to meter mode
msg.WriteString ("SENS:MET:RANG:AUTO ON" & vbCrLf) 'Set to auto range
```

## Closing VISA

Finally, close VISA.

In a sequence of operations, you only have to open and close VISA once.

```
msg.Close
```

## ■ Sample program

Imports Ivi.Visa.Interop

Public Class Form1

```
Dim rm As ResourceManager
```

```
Dim msg As IMessage
```

```
Sub Form1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load
```

```
    rm = CreateObject("VISA.GlobalRM")
```

```
    'Version using USB
```

```
    'msg = rm.Open("USB0::0x0B3E::0x104F::00000001::INSTR", AccessMode.NO_LOCK, 0, "")
```

```
    'Version using a VISA alias
```

```
    'msg = rm.Open("MYDEV1", AccessMode.NO_LOCK, 0, "")
```

```
    'Version using LAN (SCPI-RAW)
```

```
    msg = rm.Open("TCPIP::169.254.7.8::5025::SOCKET", AccessMode.NO_LOCK, 0, "")
```

```
    msg.TerminationCharacterEnabled = True
```

```
End Sub
```

```
'Query the ID
```

```
Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button1.Click
```

```
    msg.WriteString("SYST:COMM:RLST REM" & vbCrLf)
```

```
msg.WriteString("**IDN?" & vbCrLf)
TextBox1.Text = msg.ReadString(256)
```

End Sub

#### 'Configure the AC withstanding voltage test

Private Sub Button2\_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button2.Click

```
msg.WriteString("**RST" & vbCrLf)
msg.WriteString("FUNC ACW" & vbCrLf)
msg.WriteString("ACW:VOLT 1500" & vbCrLf)
msg.WriteString("SENS:JUDG 10MA" & vbCrLf)
msg.WriteString("ACW:VOLT:TIM 60" & vbCrLf)
```

End Sub

#### 'Execute the test

Private Sub Button3\_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button3.Click

```
msg.WriteString("TRIG:TEST:SOUR IMM" & vbCrLf)
msg.WriteString("INIT:TEST" & vbCrLf)
TextBox1.Text = msg.ReadString(256)
```

End Sub

Private Sub Form1\_Disposed(ByVal sender As Object, ByVal e As System.EventArgs) Handles Me.Disposed

```
msg.Close()
```

End Sub

End Class

# Appendix

## List of Errors

### ■ Command errors

An error in the range [-199, -100] indicates that an IEEE 488.2 syntax error has been detected by the instrument's parser. The occurrence of any error in this class causes the Command Error bit (bit 5) in the event status register to be set.

| Error code |                                 | Error message description  |
|------------|---------------------------------|--|
| -100       | Command error                   | Command error. Generic syntax error.   |
| -101       | Invalid character               | An invalid character exists. A data element different than those allowed was recognized.                                       |
| -102       | Syntax error                    | Syntax error. An unrecognized command or data type was encountered.  |
| -103       | Invalid separator               | Invalid separator The parser was expecting a separator and encountered an illegal character.                                   |
| -104       | Data type error                 | Data type error. The parser recognized a data element different than one allowed.  |
| -105       | GET not allowed                 | Get not allowed. A Group Execute Trigger was received in a program message.  |
| -108       | Parameter not allowed           | Parameter not allowed More parameters were received than expected for the header.  |
| -109       | Missing parameter               | Missing parameter Fewer parameters were received than required for the header.   |
| -110       | Command header error            | Command header error. An error was detected in the header.   |
| -112       | Program mnemonic too long       | Mnemonic too long. The number of characters in the command header exceeds 12 characters.                                       |
| -113       | Undefined header                | Undefined header. Inappropriate for the product.   |
| -114       | Header suffix out of range      | Invalid suffix exists in the header.   |
| -115       | Unexpected number of parameters | Unexpected parameters were received in the header.   |
| -120       | Numeric data error              | Numeric data error. Generated when parsing a data element which appears to be numeric, including the nondecimal numeric types. |
| -128       | Numeric data not allowed        | Numeric data is not allowed.   |
| -130       | Suffix error                    | Suffix error. Generated when parsing a suffix.   |
| -131       | Invalid suffix                  | A suffix is invalid. The suffix does not follow the syntax, or the suffix is inappropriate for the product.                    |
| -134       | Suffix too long                 | Suffix too long. The suffix contains too many characters.  |
| -138       | Suffix not allowed              | A suffix was encountered after a numeric parameter that does not allow suffixes.   |
| -140       | Character data error            | Character data error. Generated when parsing a character data element.   |
| -141       | Invalid character data          | Either the character data element contains an invalid character, or the element is not valid.                                  |
| -144       | Character data too Long         | Character data too long. The character data element contains too many characters.  |
| -148       | Character data not allowed      | Character data is not allowed.   |
| -150       | String data error               | String data error. Generated when parsing a string data element.   |

| Error code | Error message description |
|------------|---------------------------|
| -151       | Invalid string data       |
| -158       | String data not allowed   |
| -160       | Block data error          |
| -170       | Expression error          |
| -180       | Macro error               |

## ■ Execution errors

An error in the range [-299, -200] indicates that an error has been detected by the instrument's execution control block. The occurrence of any error in this class causes the Execution Error bit (bit 4) in the event status register to be set.

| Error code | Error message description |
|------------|---------------------------|
| -200       | Execution error (generic) |
| -203       | Command protected         |
| -210       | Trigger error             |
| -211       | Trigger ignored           |
| -213       | Init ignored              |
| -214       | Trigger deadlock          |
| -220       | Parameter error           |
| -221       | Settings conflict         |
| -222       | Data out of range         |
| -223       | Too much data             |
| -224       | Illegal parameter value   |
| -230       | Data corrupt or stale     |
| -241       | Hardware missing          |

## ■ Product-specific errors

An error in the range [-399, -300] indicates that an error other than command error, query error, or execution error was detected. The occurrence of any error in this class causes the Device Dependent Error bit (bit 3) in the event status register to be set.

| Error code | Error message description |
|------------|---------------------------|
| -310       | System error              |
| -311       | Memory error              |
| -313       | Calibration memory lost   |
| -314       | Save/recall memory lost   |
| -315       | Configuration memory lost |
| -330       | Self-test failed          |
| -350       | Queue overflow            |

| Error code | Error message description  |
|------------|--|
| -360       | Communication error<br>Communication error that occurs when flow control is off. This is an error when using RS232C. |
| -362       | Framing error in program message<br>Framing error. This is an error when using RS232C.                               |
| -363       | Input buffer overrun<br>Buffer overflow error. This is an error when using RS232C.                                   |
| -365       | Time out error<br>Time out error. This is an error when using RS232C.  |

## ■ Query errors

An error in the range [-499, -400] indicates that the output queue control of the instrument has detected a problem with the message exchange protocol described in IEEE 488.2, chapter 6. The occurrence of any error in this class causes the Query Error bit (bit 2) in the event status register to be set.

| Error code | Error message description  |
|------------|--|
| -400       | Query error (generic)<br>Query error. A generic product error.   |
| -410       | Query INTERRUPTED<br>Received a new command after the query was received and before the response was read.   |
| -420       | Query UNTERMINATED<br>The controller attempted to read the response after the device received an unsupported query or did not received a query. The "-100 COMMAND ERROR" and this error are stored in the error queue. The controller will time out. |
| -430       | Query DEADLOCKED<br>The error queue, input buffer, and output buffer are full when sending large binary data as a response, and the transmission timing is off.  |
| -440       | Query UNTERMINATED after indefinite response<br>Received a separate query in semicolon-delimited format after a query that returns a response in an indefinite form.<br>(Example: A compound command such as *IDN?;SYST:ERR?)                        |

## ■ Operation complete event errors

An error in the range [-899, -800] is used when the product wants to report an IEEE 488.2 operation complete event. This event occurs when the instrument's synchronization protocol, having been enabled by an \*OPC command, completes all selected pending operations.

The occurrence of any error in this class causes the Operation Complete bit (bit 0) in the event status register to be set.

| Error code | Error message description  |
|------------|--|
| -800       | Operation complete<br>All selected pending operations in accordance with the IEEE 488.2, 12.5.2 synchronization protocol have completed. |

## ■ Product-dependent errors

The occurrence of any error in this class causes the Device Dependent Error bit (bit 3) in the event status register to be set.

## Configuration conflict errors and configuration change rejection errors

These errors occur when the specified configuration changes cannot be permitted.

| Error code |  |
|------------|--|
| +101       | Setting conflicts due to PROTECTION state      |
| +102       | Setting conflicts while TEST is running        |
| +106       | Setting conflicts due to invalid FUNCTION:MODE |
| +108       | Wrong password given                           |
| +109       | Illegal password format                        |
| +112       | Setting conflicts while MEASURE is in progress |
| +113       | Setting conflicts due to RISE state            |

## Out of range setting errors

These errors occur when invalid or incorrect settings are specified.

| Error code |   |
|------------|---|
| +201       | Illegal buffers size due to not in 2 <sup>N</sup> |
| +202       | Same items is specified more than once            |
| +203       | NONE is invalid in multiple item settings         |
| +204       | IMMEDIATE is invalid in multiple item settings    |
| +205       | BUS is invalid in multiple item settings          |

## Auto test execution and trigger function execution errors

| Error code |   |
|------------|---|
| +301       | Illegal PROGRAM name                                  |
| +302       | PROGRAM name already exists                           |
| +303       | PROGRAM not found                                     |
| +304       | PROGRAM not selected                                  |
| +305       | Selected PROGRAM cannot be deleted                    |
| +306       | Recursive PROGRAM specified                           |
| +307       | STEP number out of range                              |
| +308       | Execution error due to non-existing PROGRAM specified |
| +309       | Illegal PROGRAM file                                  |
| +310       | TRANSIENT not operating                               |
| +311       | TRANSIENT not suspending                              |

## Command processing time

A certain amount of time is required before the commands shown in the following table are received by the product.

The processing times shown here are standard values, not guaranteed values.

The processing times vary depending on the settings and the measurement conditions

The values shown below do not include hardware response times

| Command             | USB processing time(ms) | RS232C <sup>*1</sup> processing time(ms) | LAN <sup>*2</sup> (VXI-11) processing time(ms) | LAN <sup>*2</sup> (HiSLIP) processing time(ms) |
|---------------------|-------------------------|--|--|--|
| SOUR:FUNC:MODE      | 1.4                     | 1.7                                      | 0.8  | 0.03   |
| SOUR:VOLT           | 1.5                     | 1.2                                      | 1.0  | 0.03   |
| SOUR:VOLT:TIM       | 1.7                     | 1.5                                      | 0.8  | 0.03   |
| SENS:ACW:JUDG       | 1.5                     | 1.6                                      | 0.8  | 0.03   |
| MEAS:VOLT?          | 203                     | 203                                      | 203  | 203  |
| STAT:OPER:TEST:COND | 2.7                     | 3.5                                      | 2.5  | 1.4  |

\*1: Baud rate setting: 115200 bps

\*2: 100BASE-TX Ethernet

# Legacy Commands

This product also runs on legacy commands used in the TOS9200 series. When creating a new program, use the new commands.

For details on the settings and responses of legacy commands, see the TOS9200 series GPIB/RS-232C interface operation manual.

Basic operation of legacy commands has been verified on the TOS9200 series, no guarantee is provided for complete operation of the TOS9200 series.

| Legacy command | New command                                 | Description  |
|----------------|---|--|
| FUN            | FUNC  | Sets the test mode<br>Only FUN is valid, not FUNCTION.<br>Only parameters 0 to 3 are valid.<br>Anything other than ACW, DCW, or IR returns -1. |
| Acw:TESTv      | ACW:VOLT                                    | Test voltage (ACW)   |
| Acw:FREQuency  | ACW:VOLT:FREQ                               | Test voltage frequency (ACW)   |
| Acw:TIMer      | ACW:VOLT:TIM<br>ACW:VOLT:TIM:STAT           | Test time (ACW)  |
| Acw:RIseTIME   | ACW:VOLT:SWE:TIM                            | Voltage rise time (ACW)  |
| Acw:UPPer      | SENS:ACW:JUDG                               | Upper limit judgment current (ACW)   |
| Acw:LOWer      | SENS:ACW:JUDG:LOW<br>SENS:ACW:JUDG:LOW:STAT | Lower limit judgment current (ACW)   |
| Dcw:TESTv      | DCW:VOLT                                    | Test voltage (DCW)   |
| Dcw:TIMer      | DCW:VOLT:TIM<br>DCW:VOLT:TIM:STAT           | Test time (DCW)  |
| Dcw:RIseTIME   | DCW:VOLT:SWE:TIM                            | Voltage rise time (DCW)  |
| Dcw:UPPer      | SENS:DCW:JUDG                               | Upper limit judgment current (DCW)   |
| Dcw:LOWer      | SENS:DCW:JUDG:LOW<br>SENS:DCW:JUDG:LOW:STAT | Lower limit judgment current (DCW)   |
| Ir:TESTv       | IR:VOLT                                     | Test voltage (IR)  |
| Ir:TIMer       | IR:VOLT:TIM<br>IR:VOLT:TIM:STAT             | Test time (IR)   |
| Ir:RIseTIME    | IR:VOLT:SWE:TIM                             | Voltage rise time (IR)   |
| Ir:WaitTIME    | SENS:IR:JUDG:DEL                            | Time until starting upper limit judgment (IR)  |
| Ir:UPPer       | SENS:IR:JUDG<br>SENS:IR:JUDG:STAT           | Upper limit judgment resistance (IR)   |
| Ir:LOWer       | SENS:IR:JUDG:LOW<br>SENS:IR:JUDG:LOW:STAT   | Lower limit judgment resistance (IR)   |
| START          | TRIG:TEST:SOUR IMM<br>INIT:TEST             | Starts a test  |
| STOP           | ABOR:TEST                                   | Stops a test   |
| LOCAL          | SYST:COMM:RLST LOC                          | Switches to local mode   |
| REMOte         | SYST:COMM:RLST REM                          | Switches to remote mode  |

| Legacy command | New command                             | Description   |
|----------------|---|---|
| MeasMODE       | なし                                      | Sets the display mode for measured currents and resistances |
| MON?           | MEAS?                                   | Queries the measurement data                                |
| IDAT?          | MEAS:CURR?                              | Queries the measured current                                |
| RDAT?          | MEAS:RES?                               | Queries the measured resistance                             |
| DSR?           | STAT:OPER:TEST:COND?<br>STAT:OPER:COND? | Queries the content of the device status register           |

DSR? checks the OPER status register and the OPER:TEST status register of the TOS93 series and returns the content in terms of the device status register bits of the TOS9200 series.

## **KIKUSUI ELECTRONICS CORP.**

---

1-1-3 Higashiyamata, Tsuzuki-ku, Yokohama,  
224-0023, Japan

Tel: +81-45-482-6353

Fax: +81-45-482-6261

[www.kikusui.co.jp/en](http://www.kikusui.co.jp/en)

