



Raytech GmbH
SWITZERLAND

**Oberebenestrasse 11
5620 Bremgarten
Switzerland
Tel. +41 56 648 60 10
Fax. +41 56 648 60 11**

Command Set

Winding Resistance Meter – 50 Amp

WR50-12 (2 Channel)

WR50-13 (3 Channel)

WR50-12R (2 Channel)

WR50-13R (3 Channel)

Winding Resistance Meter – 15 Amp

WR14 (2 Channel)

WR14R (2 Channel)

Winding Resistance Meter – 100 Amp

WR100-12R (2 Channel)

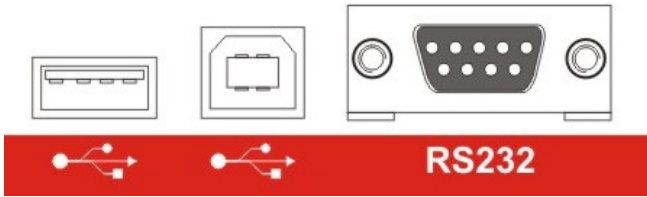
WR100-13R (3 Channel)

Version 3.02/TSW

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1 Hardware Connection

1.1 Serial Interface RS232



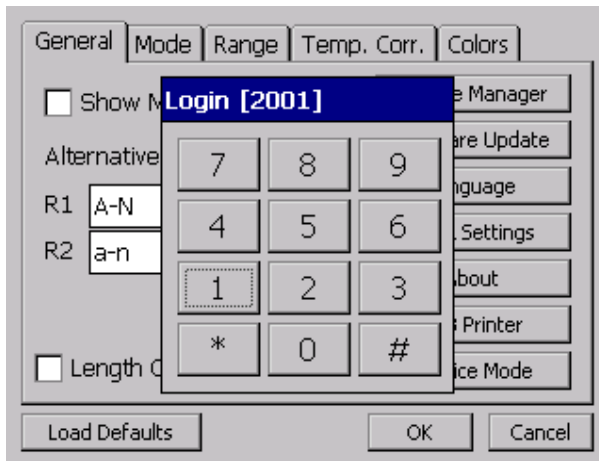
9 pole D-Sub
Pin 2 TXD Data WRxx to Computer
Pin 3 RXD Data Computer to WRxx
Pin 5 GND
+/- 12 V Signals
Protocol: 38400 Baud, 8 Bit, 1 Stop bit, no parity

1.2 USB Device

There are two basic modes to communicate over USB. Raytech USB Driver and Microsoft Active Sync

1.2.1 Raytech USB Driver (recommended)

Required Software: Raytech T-Base Pro, Raytech USB Driver
To select this mode enter Service Code “2001”



1.2.2 Microsoft Active Sync

Required Software: Raytech .NET Toolbox and Microsoft ActiveSync
Active Sync Mode is selected with Service Code “2000”

2 Software

Minimum required firmware is 3.0.5.0 and later

Check our Web site for updates <http://update.raytech.ch/files/Firmware/WRxx/> or contact us.

2.1 Switch to Remote

The Device is switched to REMOTE with command “SetRemote 1” or “SetRemote 2”

Error and warnings are redirected to the host interface

Messages sent to Screen (MessageBox) are redirected to the host interface.

2.2 Switch to Local

With command “SetRemote 0” or with the Local Button (when enabled) on the Remote Display.

2.3 Command Syntax

Cmd [Para[,Para2..]] CR

Separator for cmd and Parameters ‘ ’ (space 0x20)

Separator for Parameters: ‘,’

Numeric Format of Numbers: float (C - Language), “.” as decimal point

Format of Strings: all ASCII Characters from 0x20 to 0xff]

2.4 Answers

Standard Responds / Error Messages

“*1 Ok”	Command successful
“*2 Syntax error”	Command unknown
“*3 Out of range”	Parameter is out of allowed range
“*4 Fail”	Command is not allowed (at this time)
“*5 Missing parameter”	Too less Parameters
“*6 Too many parameter”	Too many Parameters
“*7 Out of Range meas”	Range change not allowed while Measure
“*8 Internal”	Internal Error occurred
“*9 Invalid License”	License is not valid
“*10 Msg”	Redirected messages from a Message box Only in Remote State e.g. Emergency...

2.5 Command Set

WRxx Setup Commands

SETIR_p	Set Current Range in A p = 0.01 .. 50.0 (100)
?SETIR	Get Actual Current Range in A Rsp: actual current as a float
SETTC_mat[,ref ,probes] or User value 180.0 .. 480°C	Set Temperature correction Mat N[o] , C[u], A[l] Ref Ref temp for the corrected value -10.0 .. 110°C Probes Used Temperature Probes (T1,T2,T3) or set external measured temperature (value) e.g.: Cu,25,T1 Copper, Ref 25°, measured with T1 A,33,44.0 Al, Ref 33, Text 44.0 No deactivated Cu,25,T1,T2,T3 .. Average of T1,T2,T3
?SETTC	Get Parameters for temperature correction Rsp: material, ref, probes format see SETTC.
?SIVER	Get Version and S/N of WRxx Rsp: Type, Version, S/N E.g.: WR50-2, 1.0.2.8, 254406
MSGBOX_p	Activate/Deactivate Windows Message boxes (Emergency, Protect) p = 0 Message boxes are deactivated p = 1 Message boxes are activated (default at power up)
SETWD_t	Set Watchdog on WR50 t: Reload Time in Seconds [0, 2...60] (float) 0 means disable
SETMODE_M[,P1,P2,P3]	Set Measure Mode of WR50 M: S (Single) C (Continue) I (Interval) Q (Auto Stop Settings) P1: Auto stop Time [5,10,15,30,60]s (enum) P2: Auto stop R [0.20,0.10,0.05,0.02]% (enum) P3: Enable Quality Assistant [0, 1](integer) T (Interval Settings) P1: Interval Count [0...x] (integer) P2: Interval Time [0...x]s (integer)
?SETMODE	Get Measure Mode of WR50 Rsp: (Mode,{0},{1},{2},{3},{4},{5}) 0: Measurement Mode [S, C, I] 1: Auto stop Time [5,10,15,30,60]s (enum) 2: Auto stop R [0.20,0.10,0.05,0.02]% (enum) 3: Enable Quality Assistant [0, 1](integer) 4: Interval Count [0...x] (integer) 5: Interval Time [0...x]s (integer)

REBOOT_D	Reboot the Firmware D: Delay in milliseconds (integer)
SETLENCORR_E[U,L]	Set Length Correction E: Enable [TRUE, FALSE] (Boolean) U: Unit (integer) 1: Ω /m 2: Ω /100m 3: Ω /km 4: Ω /ft 5: Ω /100ft 6: Ω /kft L: Length in meter (float)
?SETLENCORR	Get Length Correction Rsp: "LenCorr,{0},{1},{2},{3},{4}" 0: Active 1: Unit (integer) 1: Ω /m 2: Ω /100m 3: Ω /km 4: Ω /ft 5: Ω /100ft 6: Ω /kft 2: Length in meter (float) 3: Unit as String 4: Length Resolution as float
TIMER_E	Set Timer for Interval Mode E: Enable [TRUE, FALSE] (Boolean)
?TIMER	Get State of Interval Timer Rsp: "Running, Time" Running: [TRUE/FALSE] (Boolean) Time: Timer Value in seconds (int32)

Remote State

In Remote State (1or 2) the Messages (e.g. Emergency pressed) sent to the device screen are redirected to the Host interface.

SETREMOTE_L	Set WR50 Remote Mode L: Remote Mode (integer) [0,1,2] 0: Local (standard) 1: Remote (allow user to quit) 2: Remote LLO (Local Lock Out – block user)
SETLOCAL	Set WR50 to Local Mode
?SETREMOTE	Get Remote State Rsp: "s, i" s: Remote Mode (string) i: Remote Mode (integer) [0,1,2] 0: Local (standard) 1: Remote (allow user to quit) 2: Remote LLO (Local Lock Out) E.g.: "Local,0", "Remote,1", "RemoteLLO,2"

Get Results

?GRES0

Get actual State of the WR50

Rsp:

- 0 Off
- 1 Charge
- 2 On
- 3 Discharge
- 4 Emergency
- 5 Protect
- 6 Hot

?GRES1

Get Results (WR50-12)

Rsp:

- State, Itest, R1, R2, T1, T2, T3
- State : see ?GRES0 but without Text
- Itest: actual Test-current as float
- R1/R2: actual Resistance and Unit as String
- T1/T2/T3: actual Temperature as float
- 100° means no Probe

?GRES2

Get Results (WR50-13)

Rsp:

- State, Itest,R1,R2,R3,T1,T2,T3
- State : see ?GRES0 but without Text
- Itest: actual Test-current as float
- R1/R2/R3: actual Resistance and Unit as String
- T1/T2/T3: actual Temperature as float
- 100° means no Probe

?GRESS

Get Results Charged (WR50-13) unformatted

Rsp:

- State, Itest, R1, R2, R3, T1, T2, T3
- State : see ?GRES0 but without Text
- Itest: actual Test-current as float
- R1/R2/R3: actual Resistance as float
- T1/T2/T3: actual Temperature as float
- 100° means no Probe

?GRESSF

Get Results Charged (WR50-13) formatted

Rsp:

- State, Itest, R1 ,R2, R3, T1, T2, T3
- State : see ?GRES0 but without Text
- Itest: actual Test-current as float
- R1/R2/R3: actual Resistance and Unit as String
- T1/T2/T3: actual Temperature as float
- 100° means no Probe

?GRESI

Get Results Charged (WR50-13) unformatted

Rsp:

- Itest, Uout, U1,U2,U3
- Itest: actual Test-current as float
- Uout: actual Uout
- U1/U2/U3: actual Voltage

?QUALITY

Get Quality of Channels

Rsp:

- Quality, C1,C2,C3
- C1/C2/C3 actual Resistance Quality as integer [0...3]
- 0: Good
- 1: Fair
- 2: Poor
- 3: None

?GRESALL

Get all Results

Rsp: '*R0'
Status Number Text
Itest actual
Itest
R1 unformatted
R2 unformatted
R3 unformatted
R1 formatted
R2 formatted
R3 formatted
T1 Temp1 in °C
T2 Temp2
T3 Temp3
Q1 Quality 1 [None, Poor, Fair, Good]
Q2 Quality 2
Q3 Quality 3

e.g

*R0,2 On,4.9898710,4.9898710,0.0001664,-0.0001020,NaN,
166.4 Ohm,- 02.0 uOhm,,-100.00,-100.00,-100.00,Poor, Poor, None

?DEMAG

Get Demag Results

Rsp: State, Result
State: [0...3] (integer)
0: Idle
1: Analyzing
2: Prepare
3: Demag
Result: [0...5] (integer)
0: NO
1: OK
2: LowInd
3: Abort
4: TestSetup
5: TestSetupUUCH

Get Results (Asynchronous)

RSTART Start sending Results
After sending this command, all results are sent to host
Corresponding to the command ?GRESALL
RSTOP Stop sending Results

Commands

CSTART Start Current / Measurement
CSTARTRES Start Current / Send results (see RSTART)
CSTARTNOS Start Current / Measurement without Saving Results on Device
CSTOP Stop Current / Start Discharge
CSTOPRES Stop Current / AutoStop Results when safe
CSTORE Store actual Value to internal Memory
CDEMAG_p Demagnetize Transformer

CDEMAG_p,r

p = 1.0 .. 50.0 Testcurrent in A
"r" Report actual Current / Voltage
*10 Msg, Demag, Ux=0.000399251, Ix=1.950785
*10 Msg, Demag, Ux=7.220495E-05, Ix=0.0003223598
At the end a „Demag End“ Message is generated
*10 Msg, Demag End, n, msg
n:[0...5] (integer), Msg(string)
0: NO
1: OK (Result: ok)
2: LowInd (Result: L too small)
3: Abort (Result: Abort)
4: TestSetup (Result: Check Test Setup)
5: TestSetupUCh (Result: Check Test Setup)

WR Multiplexer

SETMUX_n,c

Set Multiplexer Relays

n: WR-Mux Channel
1: Channel 1
2: Channel 2
3: Channel 3

c Set Main Relays

'R'123n

1,2,3,n = ['0', '1', '-', '-']

'1' = Terminal x connected to I+

'0' = Terminal x Connected to I-

'-' = Terminal x opened

e.g. 'R10—' Set T1 to I+, T2 to I-, T3&Tn Open

'R0--1' Set T1 to I-, Tn to I+, T2&T3 to Open

c 'M'n,time Set Aux Relay

n = [10,11,12,13]

time = [0,1, 9999] * 0.1 sec

c 'T0' WR Bypass (no TR Measurement)

'T2' WR Bypass (TR MuxA:MuxB = prim:sec)

'T3' WR Bypass (TR MuxA:MuxC = prim:tert)

e.g. 'M10,0' Resets Relay 10

'M11,50' Sets Relay 11 for 5sec

'M10,9999' Sets Relay 10 forever

Important:

Test current must be switched off and in the safe state prior changing Power Relays (command Rxxx and Tx)

see also: 4.5.2 Pin Assignment and Schematic of Tap Changer Interface in Document "90158-1.08 Instruction Manual Multiplexer.pdf"

?SETMUX_A[?]

Get Multiplexer Relais

A: WRxx Channel

Rsp: Rxxxx (see Command CMUX)
 Rxxxx see Command SetMux n,Rxxx Command
 yyyy state of Relay R10,11,12,13 see Command SetMux n,M Command
 ,? General info about the mux
 S/N,FW Version,HW Version, Assigned WR Channel
 311099,1.09,1.00,1

?MUX

Get Multiplexer Inputs

Rsp: abcd (4 bytes)
 a: Inputs of Mux A: 0b100 TC2,TC1,Di4,Di3,Di2
 b: Inputs of Mux B: 0b100 TC2,TC1,Di4,Di3,Di2
 c: Inputs of Mux C: 0b100 TC2,TC1,Di4,Di3,Di2
 d: reserved

Channels Caption

SETCAPTION_n,c

Set Channel Caption

n: WRxx Channel [123]
 1: Channel 1
 2: Channel 2
 3: Channel 3

c: Alternative Caption [string]

?SETCAPTION_n

Get Channel Caption

n: WRxx Channel [123]

Rsp: Alternative Caption [string]

SETCH_n,p

Set Channel

n: WRxx Channel
 1: Channel 1
 2: Channel 2
 3: Channel 3

p: [true,false] Enable /Disable Channel

?SETCH_n

Get Channel

n: WRxx Channel [123]

Rsp: [true, false] Channel is visible

Database

Db count

Gets the number of Database Records

Db index

Get all headers in Database

H0,.. Name of the Header Columns
 D0,.. Header Data

Db del n

Deletes Record n in Database

n = 0..count-1 (in Ascending Order (0 oldest, etc
 n = -1.. -count (in Decending Order (-1 newest)

Db delall

Delete all records

Db get n

Get all results of the Database records

n = 0..count-1
n = -1 (last Record in the List = most recent)
H0,... Name of Header Columns
D0,... Header Data
H1,... Name of Detail Columns
D1,... Detail Data

db hrtload n Load Results for HRT Analysis

db hrtcalc c[t[rt r0 tc tref]]

Calculate Extrapolation
c Channel [1,2,3]
t Type [0=Lin, 1 = Exp] Default Lin
rt [0= Resistance, 1= Temperature] Default Resistance
r0 Resistance at Tref
tc Temperature Coefficient (234.5 = Cu, 225 = Al)
tref Reference Temp for R0

Response
Name, Ch, Type, Result...
Name of Data-record
Ch: Channel
Type: =Linear, Exp

Response if Type = Linear
R0,m,Cor
R0: Resistance @ t = 0sec
m: Deviation in %/min
Cor: Correlation of Linear Regression 1.0 Perfect 0.0 No Matching
Eg:
20110208_000000024.csv,1,Linear, ..
R0=1.119 mOhm, m=-0.22%/min, Cor=0.9953

Response if Type = Ex
R0,tau,Rinf,Cor
R0: Resistance at t = sec
Tau: Time constant of cooling in min
Rinf Resistance @ t = ∞ (infinite)
Cor: Correlation of Approximation
20081112_000000001.csv,1,Exp,
R0=47.124mOhm, tau=16.77min, Rinf=38.838mOhm, Cor=1.00

When
20110131_000000002.xml,1,Exp, NoSolutionfound

SelectGUID n Select Transformer profile
n = guid
n = 0 for NoProfile

Database Profile

DataExchange gettrafos
DataExchange getdata