ROHDE&SCHWARZ

Test and Measurement
Division

Operating Manual

Remote Control for R&S FSH

R&S$^{®}$ FSH-K1

1157.3458.02

Dear Customer,

Contents

Enabling Remote Control Option R&S FSH-K1

The R&S FSH spectrum analyzer can be fitted with the Remote Control Option R&S FSH-K1 which is enabled by entering a key code. The key code is based on the unique serial number of the instrument. To retrofit an option, enable it with a key code.

Operation

➢ Press the GENERAL key.

➢ Use the Rotary knob or the Cursor keys to select the OPTIONS... menu item and confirm the entry with the ENTER key.

Enter the key code (ten-digit number) for the option with the decimal keys and confirm with the ENTER key.

If the correct key code is entered, the R&S FSH displays "Remote Control enabled".
If an invalid key code is entered, the R&S FSH displays "Option key error".
The correct key code can then be entered.

Connecting PCs

The R&S FSH can be remote controlled by a PC or Laptop equipped with an RS232 interface.

RS232 optical interface

The RS232 optical interface is used for connecting a PC or Laptop. The interface connector is located at the right-hand side of the R&S FSH, it can be accessed by folding out the support. The RS232 Optical Interface Cable R&S FSH-Z34 (supplied with the R&S FSH) is used to make the connection. The optical connection prevents spurious measurements being caused by interference from these devices.

➢ Fold out the support at the rear of the R&S FSH.

➢ Connect the optical connector of the RS-232 cable to the optical interface on the right-hand side of the R&S FSH.

➢ Connect the 9-pin D-Sub connector of the cable to the RS-232 connector of the PC.

RS-232 cable

9-pin connector

PC / Laptop

Optical RS-232 interface
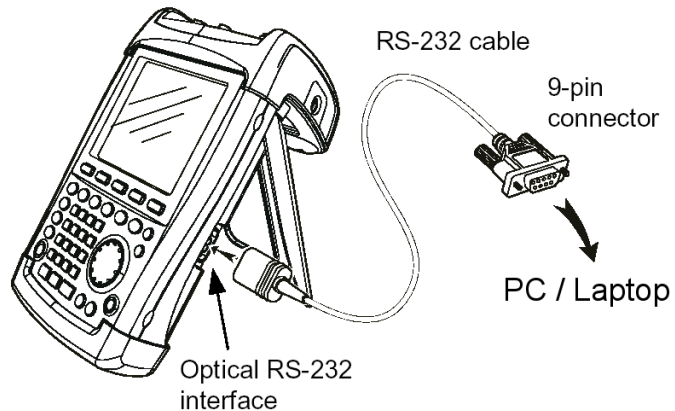
Serial Port Configuration

The serial interface configuration on the PC should be set to

   8 data bits, 1 stop bit, no parity

The baud rate can be configured via the Setup menu on the R&S FSH or the SET BAUD command. The baud rates can be 9.600, 19.200, 38.400, 57.600 or 115.200 Baud. The default baud rate is 19.200 Baud

Notational Conventions

The following section describes the notational conventions as they are used throughout this document.

Meta Symbol	Specification
:=	Equals
|	Separator for selectable items
"..."	Characters between " " are taken as they are, but the " " are excluded (example "," means an ASCII comma).
[...]	Specifies an optional element
{...}	Specifies an element that may be repeated.

Item	Description
<character>	'0' .. '9', 'a' .. 'z', 'A' .. 'Z'
<string>	<character> { <character> }
<sign>	('+' | '-')
<digit>	'0' .. '9'
<numeric value>	[<sign>] <digit> { <digit> } [. { <digit> }] [e | E [<sign>] { <digit>}]

Starting Remote Control Operation

On power-on, the R&S FSH is always in the manual operation state ("LOCAL" state) and can be operated via the front panel.

➢ If the R&S FSH receives a remote command the instrument remains in local state. It is switched to remote state as soon as it receives the command "REMOTE" from the PC.

➢ In remote state the front panel access is disabled.

➢ The R&S FSH can be switched back to local state by sending the LOCAL command.
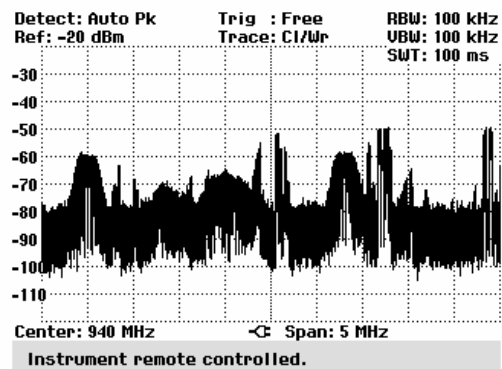
Device Messages

The remote control command set of the R&S FSH can be grouped into three categories:

- **SET commands**

  SET commands are used to program parameters of the instrument like center frequency, span, etc.

- **GET commands**

  GET commands are used to query current settings and data from the instrument like center frequency, marker, trace data, etc.

- **CMD commands**

  CMD commands are used to initiate an action or a state transition in the instrument like marker-to-peak, preset, remote state, etc.

Acknowledge Response <ack>

After receiving a SET, GET or CMD command the R&S FSH responds with an "acknowledge" message. The acknowlede message consists of an ASCII digit ("0" for no error) followed by a Carriage Return <cr>. The response message indicates if the command or parameter is valid.
A second acknowledge response is generated after the command parameter.

<ack> response:

"0"   No Error.

"1"   Syntax Error. This response is generated when the command sent to the instrument is not known or when the timeout on data reception expired. It is also generated, when the parameter or value for the command are in the wrong data format.

"2"   Execution Error. The command sent is not allowed in the current measurement mode.

"3"   Dataset Storage Full. This response is generated when the dataset storage is full.

"4"   Not Allowed. In the current state of the R&S FSH setting this parameter or value is not allowed.

"5"   Out Of Range. The parameter value is out of range and cannot be programmed.

Timeout

To prevent any lockups in the communication between PC and instrument the data transfer via the serial interface is monitored by the R&S FSH. There is a timeout time of 60 seconds on every byte received by the instrument. When the time between 2 bytes in a command or parameter send exceeds 60 seconds the R&S FSH will respond with a 'Syntax Error' acknowledge message ("1"<cr>) .

Note: *When using remote control commands and the sweep time is less than 30 ms (e.g. Zero span) the measurement will stop until the complete command is received (in this case all interrupts are switched off due to the processing of all data points).*

Functional Description of Commands

The command strings and parameter strings are not case sensitive, eg 'Freq' is similar to 'FREQ'.

GET Command

GET commands are used to query parameter settings or measured data from the instrument.

Program syntax:	get\<cr>
Response syntax:	\<ack>\<cr>
Program syntax:	\<parameter>\<cr>
\<parameter> :=	\<string> This is one of the parameters defined in the following section.
Response syntax:	\<ack>\<cr>
	\<value>\<cr>
\<value>:=	This field depends on the type of parameter, see the specific value descriptions
Example:	This command queries the unit from the instrument.

```
get<cr>              (send 'get' command)
0<cr>                (responds 'command ok')
UNIT<cr>             (send parameter 'UNIT')
0<cr>                (responds 'parameter ok')
6<cr>                (responds UNIT value 'Volt')
```

SET Command

SET commands are used to program parameter and setup settings of the instrument.

Program syntax:	set\<cr>
Response syntax:	\<ack>\<cr>
Program syntax:	\<parameter>,\<value>\<cr>
\<parameter> :=	\<string> This is one of the parameters defined in the following section.
\<value>:=	This field depends on the type of parameter, see the specific value descriptions
Response syntax:	\<ack>\<cr>
Example:	This command sets the unit to Watt.

```
set<cr>              (send 'set' command)
0<cr>                (responds 'command ok')
UNIT,7<cr>           (send parameter 'UNIT' value is 'Watt')
0<cr>                (responds 'parameter ok')
```

CMD Command

CMD commands are used to initiate an action or a state transition on the instrument.

Program syntax:	cmd\<cr\>
Response syntax:	\<ack\>\<cr\>
Program syntax:	\<parameter\>,\<value\>\<cr\>
\<parameter\> :=	\<string\> This is one of the commands defined in the following section
\<value\>:=	This field depends on the type of parameter, see the specific value descriptions
Response syntax:	\<ack\>\<cr\>
Example 1:	This command sets the instrument in Remote Controlled.

```
cmd<cr>              (send 'cmd' command)
0<cr>                (responds 'command ok')
REMOTE<cr>           (send parameter 'REMOTE')
0<cr>                (responds 'parameter ok')
```

Example 2:   This command saves a dataset on the instrument with the name 'test'.

```
cmd<cr>              (send 'cmd' command)
0<cr>                (responds 'command ok')
SAVE,test<cr>        (send parameter 'SAVE' with name 'test')
0<cr>                (responds 'parameter ok')
```

Parameter Overview

In the following tables all parameters and commands are listed with the different measurement modes they are active in.

Note: Parameters are not always available, this depends on the type of measurement selected and other settings.

Get / Set Parameter

Parameter	Analyzer	Receiver Mode	Tracking Gen.	Power Sensor	Channel Power	Occupied BW	TDMA Power	Distance to Fault
AUTOCISPRBW		*						
AUTODET	*		*		*	*	*	
AUTORBW	*		*		*	*		
AUTOSPAN					*	*		
AUTOSWPTIME	*		*		*	*		
AUTOVBW	*		*		*	*		
BAUD	*	*	*	*	*	*	*	*
CABLELEN								*
CABLEMOD								*
CHANNEL	*	*			*	*	*	
CHMODE	*	*			*	*	*	
CHPWRBW					*			
CHPWRSTD					*			
CHPWRUNIT					*			
CHTABLE	*	*			*	*	*	
CISPRBW		*						
DELTA1	*	*	*					*
DELTA1ON	*	*	*					*
DTFMODE								*
DYNRANGE	*	*	*	*	*	*	*	*
EXTINPUT	*	*	*		*	*	*	*
FREQ	*	*	*	*	*	*	*	*
FREQOFFS	*				*	*	*	
FREQSTART		*						
FREQSTOP		*						
LENUNIT	*		*	*	*	*	*	*
LIMLOW	*	*	*		*	*	*	*
LIMUPP	*	*	*		*	*	*	*
MARK1	*	*	*					*
MARK1ON	*	*	*					*
MARKMODE	*	*	*					*
MEAS	*	*	*	*	*	*	*	*
MEASTIME		*		*			*	
OBWSTD						*		
OBWCHBW						*		
PREAMP	*	*	*		*	*	*	*
PWRSSTD				*				
RANGE	*	*	*		*	*	*	*
RBW	*	*	*		*	*	*	
REFLUNIT				*				

Parameter	Analyzer	Receiver Mode	Tracking Gen.	Power Sensor	Channel Power	Occupied BW	TDMA Power	Distance to Fault
REFLVL	*	*	*	*	*	*	*	
REFLVLOFFS	*	*	*	*	*	*	*	*
RFINPUT	*	*	*		*	*	*	
SCANMODE		*						
SCANSTART		*						
SCANSTOP		*						
SCANSTEP		*						
SPAN	*		*					
SWPCONT	*	*	*		*	*	*	
SWPTIME	*		*		*	*	*	
TDMASTD							*	
TGLVL			*					
TGMODE			*					
THRLOW		*						
THRUPP		*						
TRACEDET	*	*	*		*	*	*	
TRACEMODE	*	*	*		*	*	*	
TRD1	*	*		*	*	*	*	
TRD2	*	*		*	*	*	*	
TRIGDEL	*		*		*	*	*	
TRIGLVL	*		*		*	*	*	
TRIGSRC	*	*	*		*	*	*	
UNIT	*	*	*	*	*	*	*	*
VBW	*		*		*	*	*	

Get Parameter

Parameter	Analyzer	Receiver Mode	Tracking Gen.	Power Sensor	Channel Power	Occupied BW	TDMA Power	Distance to Fault
CABLELOSS			*					
CHPWR					*			
CTRACE			*					*
CTRACEBIN			*					*
IDN?	*	*	*	*	*	*	*	*
LEVEL		*						
LIMCHKREMOTE		*						
LIMPASS	*	*	*		*	*	*	*
MTRACE	*	*	*		*	*	*	*
MTRACEBIN	*	*	*		*	*	*	*
OCCBW						*		
PWR				*				
REFL				*				
REFLCAL			*					*
REFLVECTCAL			*					*
STB?	*	*	*	*	*	*	*	*
TDMAPWR							*	
THRPASS		*						
TRACE	*	*	*		*	*	*	*
TRACEBIN	*	*	*		*	*	*	*
TRANSCAL			*					
TRANSVECTCAL			*					

CMD Commands

Parameter	Analyzer	Receiver Mode	Tracking Gen.	Power Sensor	Channel Power	Occupied BW	TDMA Power	Distance to Fault
INIT	*	*	*	*	*	*	*	*
LOCAL	*	*	*	*	*	*	*	*
LVLADJUST					*	*	*	
MARKNXTPK	*	*	*					*
MARKPK	*	*	*					*
MARKMIN	*	*	*					*
MARKTOCENT	*		*					*
MARKTOLVL	*	*	*					*
PRESET	*	*	*	*	*	*	*	*
PWRTOREF				*				
RECALL	*	*	*	*	*	*	*	*
REMOTE	*	*	*	*	*	*	*	*
SAVE	*	*	*	*	*	*	*	*
THROFF		*						
WAIT	*	*	*	*	*	*	*	*
ZERO				*				

Note: *When the instrument is in the state standby (Off) only the parameters IDN?, BAUD and MEAS are available.*

Command Description

General Commands

Command	Parameters	Unit	Comment
IDN?			GET command only
BAUD	0...4		SET command only
REMOTE			
LOCAL			
PRESET			
INIT			
WAIT			
STB?			GET command only
EXTINPUT	O, 1		
SAVE	<string>		
RECALL	<string>		

IDN?

This command returns the instrument ID string.
This string contains: <manufacturer>,<model number>,<serial number>,<software version>.
<model number>:   03, 13, 23 for the according FSH3 model
                      06, 26 for the according FSH6 model

Example: get<cr>
                   0<cr>
                   idn?<cr>   'query ID string
                   0<cr>   'responds parameter ok
                   Rohde&Schwarz,23,100212,V4.0   'instrument ID string

BAUD (Serial baud rate)

This command sets the serial interface baud rate. The default baud rate is 19.200 Baud.

Value	Baud rate
0	19.200
1	38.400
2	57.600
3	115.200
4	9.600

Example: set<cr>
                   0<cr>
                   baud,3<cr>   'set baud rate on 115.200
                   0<cr>   'responds ok with current baud rate
                                       'instrument is set to new baud rate

REMOTE

This command sets the instrument to remote state. Front panel interaction is disabled.

Example: `cmd<cr>`
                                    `0<cr>`
                                    `remote<cr>`   'set instrument to remote
                                    `0<cr>`   'responds parameter ok

LOCAL

This command sets the instrument to local state. Front panel operation is enabled.

Example: `cmd<cr>`
                                      `0<cr>`
                                    `local<cr>`   'set instrument to local
                                    `0<cr>`   'responds parameter ok

PRESET

This command sets the instrument to the preset settings.

Example: `cmd<cr>`
                                      `0<cr>`
                                    `preset<cr>`   'set instrument to preset
                                    `0<cr>`   'responds parameter ok

INIT

This command starts / re-starts a new sweep.

Example: `cmd<cr>`
                                      `0<cr>`
                                    `init<cr>`   'start new sweep
                                    `0<cr>`   'responds parameter ok

WAIT

This command is used to synchronize with the end of a sweep. After sending the WAIT command the <ack> acknowledge is holdoff until the sweep is complete.

Example: `cmd<cr>`
                                      `0<cr>`
                                    `wait<cr>`   'wait for end of sweep
                                    `0<cr>`   'responds parameter ok, sweep complete

STB?

This command returns the instrument status. The status indicates any settings/conditions that causes measurements to be questionable (response: '1') or not (response '0').

Example: `get<cr>`
                                      `0<cr>`
                                    `stb?<cr>`   'query status
                                    `0<cr>`   'responds parameter ok
                                    `0<cr>`   'status: o.k.

EXTINPUT

This command switches between external trigger input and external reference input on the external input connector. Default is 'External Trigger'.

Value	External Input Connector
0	External Trigger
1	External Reference

Example: `set<cr>`
                   `0<cr>`
                   `extinput,1<cr>`   'enable external reference on input connector
                   `0<cr>`   'responds parameter ok

SAVE

This command saves the current setting and measurement in the specified dataset. If the dataset exists it will be overwritten. Dataset names are not case sensitive.

Example: `cmd<cr>`
                   `0<cr>`
                   `save,mydata.001<cr>`   'save settings to dataset "MYDATA.001"
                   `0<cr>`   'responds parameter ok

RECALL

This command recalls a stored dataset. Dataset names are not case sensitive.

Example: `cmd<cr>`
                   `0<cr>`
                   `recall,mydata.001<cr>`   'recall settings from dataset "MYDATA"
                   `0<cr>`   'responds parameter ok

Frequency and Span Settings

Command	Parameters	Unit	Comment
FREQ	<numeric value>	Hz	
FREQOFFS	<numeric value>	Hz	
SPAN	<numeric value>	Hz	
AUTOSPAN	0, 1		
CHANNEL	<numeric value>		
CHTABLE	<string>		

FREQ (Frequency)

This command sets the center frequency.
The start and stop frequency of the instrument is defined by the current center frequency and span.

Example:　　　　　　　　　`set<cr>`
　　　　　　　　　　　　　　`0<cr>`
　　　　　　　　　　　　　　`freq,950E6<cr>`　　　　'set center frequency to 950 MHz
　　　　　　　　　　　　　　`0<cr>`　　　　　　　　　'responds parameter ok

FREQOFFS (Frequency Offset)

This command sets the frequency offset.
The new center frequency is the current frequency plus the frequency offset.

Example:　　　　　　　　　`set<cr>`
　　　　　　　　　　　　　　`0<cr>`
　　　　　　　　　　　　　　`freqoffs,10E6<cr>`　　　'set center frequency to 10 MHz
　　　　　　　　　　　　　　`0<cr>`　　　　　　　　　'responds parameter ok

SPAN

This command sets the span.
The start and stop frequency of the instrument is defined by the current center frequency and span.
The <numeric value> = 0 is used for Zero Span.

Example:　　　　　　　　　`set<cr>`
　　　　　　　　　　　　　　`0<cr>`
　　　　　　　　　　　　　　`span,20E6<cr>`　　　　　'set center frequency to 20 MHz
　　　　　　　　　　　　　　`0<cr>`　　　　　　　　　'responds parameter ok

AUTOSPAN

This command switches span mode AUTO on/off (Measure Mode: Channel Power or Occupied BW)

Value	Span Mode
0	Auto Off
1	Auto On

Example: `set<cr>`
                        `0<cr>`
                        `autospan,1<cr>`   'set Auto span On
                        `0<cr>`   'responds parameter ok

CHANNEL (Channel Number)

This command defines the channel number. Use CHTABLE command to select a channel table first.

Example: `set<cr>`
                        `0<cr>`
                        `channel,55<cr>`   'selects channel no. 55

CHTABLE (Channel Table)

This command selects a channel table for the channel mode. To turn channel mode off, use the string 'NONE'.

Example: `set<cr>`
                        `0<cr>`
                        `chtable,FMBand<cr>`   'selects channel table "FMBand"
                        `0<cr>`   'responds parameter ok

Amplitude Settings

Command	Parameters	Unit	Comment
REFLVL	\<numeric value\>		Uses current unit
REFLVLOFFS	\<numeric value\>	dB	
RANGE	0...6		
DYNRANGE	0 , 1		
UNIT	0...8		
RFINPUT	0 , 1		
PREAMP	0 , 1		

REFLVL (Reference Level)

This command sets the reference level using the current unit.

Example:
```
set<cr>
0<cr>
reflvl,-30<cr>        'set reference level to –30dBm
0<cr>                 'responds parameter ok
```

REFLVLOFFS (Reference Level Offset)

This command sets the reference level offset in dB.
The new reference level is the current reference level plus the reference level offset.

Example:
```
set<cr>
0<cr>
reflvloffs,-6<cr>     'set reference level offset to –6 dB
0<cr>                 'responds parameter ok
```

RANGE

This command defines the range.

Value	Range
0	10 dB/DIV
1	5 dB/DIV
2	2 dB/DIV
3	1 dB/DIV
4	LIN 0-100%
5	VSWR 1-6 (Tracking Gen, DTF)
6	VSWR 1-2 (Tracking Gen, DTF)
7	VSWR 1-1.5 (Tracking Gen, DTF)
8	VSWR 1-1.1 (Tracking Gen, DTF)
9	Smith Chart

Example:
```
set<cr>
0<cr>
range,2<cr>           'set range to 2 dB/DIV
0<cr>                 'responds parameter ok
```

DYNRANGE

This command defines the dynamic range. Default on Preset is 'Low Distortion'.

Value	Range
0	Low Distortion
1	Low Noise

Example: `set<cr>`
                      `0<cr>`
                      `dynrange,1<cr>`   'set dynamic range to 'Low Noise'
                      `0<cr>`   'responds parameter ok

UNIT

This command defines the unit of the level.

Value	Unit
0	dBm
1	dBmV
2	dBµV
3	dBµV/m
4	dBµA/m
5	dB
6	Volt
7	Watt
8	V/m

Example: `set<cr>`
                      `0<cr>`
                      `unit,2<cr>`   'set unit to dBµV
                      `0<cr>`   'responds parameter ok

RFINPUT (RF Input Impedance)

This command defines the input impedance.

Value	Input Impedance
0	50 Ω
1	75 Ω

Example: `set<cr>`
                      `0<cr>`
                      `rfinput,1<cr>`   'set input impedance to 75 Ω
                      `0<cr>`   'responds parameter ok

PREAMP (Preamplifier)

This command switches the preamplifier on/off. Default on Preset is 'Preamp OFF'

Value	Preamp
0	OFF
1	ON

Example: `set<cr>`
                                      `0<cr>`
                                      `preamp,1<cr>`   'turns the preamp on
                                      `0<cr>`   'responds parameter ok

Bandwidth Settings

Command	Parameters	Unit	Comment
AUTORBW	0, 1		
RBW	0...10		
AUTOVBW	0, 1		
VBW	0...12		
AUTOCISPRBW	0, 1		Receiver Mode only (R&S FSH-K3)
CISPRBW	0…3		Receiver Mode only (R&S FSH-K3)

AUTORBW (Auto Resolution Bandwidth)

This command switches the auto coupling of the resolution bandwidth on/off. If AUTORBW is active the current setting of the resolution bandwidth can be queried with the GET RBW command.

Value	Auto Resolution Bandwidth
0	OFF
1	ON

Example:

```
set<cr>
0<cr>
autorbw,1<cr>      'turns the RBW auto coupling on
0<cr>              'responds parameter ok
```

RBW (Resolution Bandwidth)

This command sets the resolution bandwidth.

Value	Resolution Bandwidth
0	Auto (Set only)
1	100 Hz (Model23 only)
2	300 Hz (Model23 only)
3	1 kHz
4	3 kHz
5	10 kHz
6	30 kHz
7	100 kHz
8	300 kHz
9	1 MHz
10	200 kHz

Example:

```
set<cr>
0<cr>
rbw,4<cr>              'set resolution bandwidth to 3 kHz
0<cr>                  'responds parameter ok
```

AUTOVBW (Auto Video Bandwidth)

This command switches the auto coupling of the video bandwidth on/off. If AUTOVBW is active the current setting of the video bandwidth can be queried with the GET VBW command.

Value	Auto Video Bandwidth
0	OFF
1	ON

Example:
```
set<cr>
0<cr>
autovbw,1<cr>        'turns the VBW auto coupling on
0<cr>                'responds parameter ok
```

VBW (Video Bandwidth)

This command sets the video bandwidth.

Value	Video Bandwidth
0	Auto (Set only)
1	10 Hz
2	30 Hz
3	100 Hz
4	300 Hz
5	1 kHz
6	3 kHz
7	10 kHz
8	30 kHz
9	100 kHz
10	300 kHz
11	1 MHz
12	3 MHz

Example:
```
set<cr>
0<cr>
vbw,5<cr>            'set video bandwidth to 1 kHz
0<cr>                'responds parameter ok
```

AUTOCISPRBW (Auto CISPR Bandwidth)

This command switches the auto setting of the CISPR bandwidth on/off. If AUTOCISPRBW is active the current setting of the CISPR bandwidth can be queried with the GET CISPRBW command. This command is available in Receiver Mode only (R&S FSH-K3).

Value	Auto CISPR Bandwidth
0	OFF
1	ON

Example:
```
set<cr>
0<cr>
autocisprbw,1<cr>    'turns the CISPRBW auto coupling on
0<cr>                'responds parameter ok
```

CISRBW (CISPR Bandwidth)

This command sets the CISPR bandwidth. This command is available in Receiver Mode only (R&S FSH-K3).

Value	CISPR Bandwidth
0	200 Hz
1	9 kHz
2	120 kHz
3	1 MHz

Example: `set<cr>`
                  `0<cr>`
                  `cisprbw,2<cr>`   'set CISPR bandwidth to 120 kHz
                  `0<cr>`   'responds parameter ok

Sweep Settings

Command	Parameters	Unit	Comment
AUTOSWPTIME	0, 1		
SWPTIME	\<numeric value\>	s	Value 0: Auto
SWPCONT	0 , 1		
TRIGSRC	0...3		
TRIGLVL	\<numeric value\>	%	
TRIGDEL	\<numeric value\>	s	

AUTOSWPTIME (Auto Sweep Time)

This command switches the auto coupling of the sweep time on/off. If AUTOSWPTIME is active the current setting of the sweep time can be queried with the GET SWPTIME command.

Value	Auto Sweep Time
0	OFF
1	ON

Example: `set<cr>`
              `0<cr>`
              `autoswptime,1<cr>`   'turns the sweep time auto on
              `0<cr>`   'responds parameter ok

SWPTIME (Sweep Time)

This command sets the sweep time. The value 0 sets the sweep time to Auto.

Example: `set<cr>`
              `0<cr>`
              `swptime,0.2<cr>`   'set resolution bandwidth to 200 ms
              `0<cr>`   'responds parameter ok

SWPCONT (Sweep Continuous)

This command sets the instrument to single sweep or continuous sweep.

Value	Sweep
0	Single
1	Continuous

Example: `set<cr>`
              `0<cr>`
              `swpcont,0<cr>`   'set to single sweep
              `0<cr>`   'responds parameter ok

TRIGSRC (Trigger Source)

This command selects the trigger source.

Value	Trigger Source
0	Free run
1	Video
2	External - Rise
3	External - Fall

Example: `set<cr>`
                              `0<cr>`
                              `trigsrc,1<cr>`   'set to video trigger
                              `0<cr>`   'responds parameter ok

TRIGLVL (Trigger Level)

This command defines the video trigger level (0…100%).

Example: `set<cr>`
                              `0<cr>`
                              `trigLVL,50<cr>`   'set video trigger level to 50%
                              `0<cr>`   'responds parameter ok

TRIGDEL (Trigger Delay)

This command defines the trigger delay.

Example: `set<cr>`
                              `0<cr>`
                              `trigdel,100E-6<cr>`   'set trigger delay to 100 µs
                              `0<cr>`   'responds parameter ok

Trace Settings

Command	Parameters	Unit	Comment
TRACEMODE	0..4		
TRACEDET	0...6		
TRACE	<numeric value>,....		GET command only
TRACEBIN	<value>,...		GET command only
CTRACE	<numeric value>,....		GET command only
CTRACEBIN	<value>,...		GET command only
MTRACE	<string>		GET command only
MTRACEBIN	<string>		GET command only

TRACEMODE

This command defines the trace mode.

Value	Trace Mode
0	Clear Write
1	Average
2	Max Hold
3	Min Hold
4	View

Example:
```
set<cr>
0<cr>
tracemode,2<cr>        'set trace mode to "Max Hold"
0<cr>                  'responds parameter ok
```

TRACEDET

This command defines the detector used. The Average and Quasi-Peak detector are available in Receiver Mode (R&S FSH-K3) only.

Value	Detector
0	Auto Peak
1	Min Peak
2	Max Peak / Peak
3	Sample
4	RMS
5	Average
6	Quasi-Peak

Example:
```
set<cr>
0<cr>
tracedet,3<cr>         'selects sample detector
0<cr>                  'responds parameter ok
```

TRACE (Trace Data)

This command reads out the trace data in alphanumeric format.
The current unit is used for the values. A trace consists of 301 data values. If the Auto Peak detector is used, both max and min values are returned (602 values: 301 min values then 301 max values).

Example:

```
get<cr>
0<cr>
trace<cr>                        'readout trace data
0<cr>                            'responds parameter ok
-103.22,-106.88,-96.27,.....
```

TRACEBIN (Trace Data Binary)

This command reads out the trace data in binary format.
Each sample consists of 4 bytes with the LSB send first. The 4 bytes represent the measured power in the current unit. The sample values are multiplied to provide the highest resolution possible.

Value	Binary values
0	dBm * 1000
1	dBmV * 1000
2	dBµV * 1000
3	dBµV/m * 1000
4	dBµA/m * 1000
5	dB * 1000
6	Volt * 1000000
7	Watt * 1000000000

A trace consists of 301 samples. If the Auto Peak detector is used, both Max and Min values are returned (602 samples: 301 min values then 301 max values).

Example:

```
get<cr>
0<cr>
tracebin<cr>                     'readout binary trace data
0<cr>                            'responds parameter ok
<sample><sample>....
```

CTRACE (Complex Trace Data)

This command reads out the magnitude and phase values in alphanumeric format.
The magnitude unit is dBm, the phase unit is radiants. A complex trace consists of 301 magnitude and 301 phase values. If In DTF mode CTRACE will return 1024 magnitude and 1024 phase values.

Example:

```
get<cr>
0<cr>
ctrace<cr>                       'readout magnitude and phase values
0<cr>                            'responds parameter ok
-103.22,-106.88,-96.27,.....
```

CTRACEBIN (Complex Trace Data Binary)

This command reads out the magnitude and phase values in binary format.
A complex trace consists of 301 magnitude and 301 phase sample values . If In DTF mode CTRACE
will return 1024 magnitude and 1024 phase sample values.
Each sample consists of 4 bytes with the LSB send first.

Example:	`get<cr>`	
	`0<cr>`	
	`ctracebin<cr>`	'readout binary complex trace data
	`0<cr>`	'responds parameter ok
	`<sample><sample>....`	

MTRACE (Trace Data from saved Data Set)

This command reads out the trace data in alphanumeric format from a previously saved data set.
The current unit is used for the values. A trace consists of 301 data values. If the Auto Peak detector is
used, both max and min values are returned (602 values: 301 min values then 301 max values).

Example:	`get<cr>`	
	`0<cr>`	
	`mtrace,mydata.001<cr>`	'readout trace data from data set "mydata.001"
	`0<cr>`	'responds parameter ok
	`-103.22,-106.88,-96.27,.....`	

MTRACEBIN (Trace Data Binary from saved Data Set)

This command reads out the trace data in binary format from a previously saved data set.
Each sample consists of 4 bytes with the LSB send first. The 4 bytes represent the measured power in
the current unit. The sample values are multiplied to provide the highest resolution possible.

Value	Binary values
0	dBm * 1000
1	dBmV * 1000
2	dBµV * 1000
3	dBµV/m * 1000
4	dBµA/m * 1000
5	dB * 1000
6	Volt * 1000000
7	Watt * 1000000000

A trace consists of 301 samples. If the Auto Peak detector is used, both Max and Min values are
returned (602 samples: 301 min values then 301 max values).

Example:	`get<cr>`	
	`0<cr>`	
	`mtracebin,mydata.001<cr>`	'readout binary trace data from data set
	`0<cr>`	'responds parameter ok
	`<sample><sample>....`	

Marker

Command	Parameters	Unit	Comment
MARK1ON	0 , 1		
MARK1	<numeric value>		
DELTA1ON	0 , 1		
DELTA1	<numeric value>		
MARKPK			CMD command only
MARKNXTPK			CMD command only
MARKMIN			CMD command only
MARKTOCENT			CMD command only
MARKTOLVL			CMD command only
MARKMODE	0...2		

MARK1ON (Marker On)

This command turns the marker on / off.

Value	Marker
0	OFF
1	ON

Example: `set<cr>`
                  `0<cr>`
                  `mark1on,1<cr>`   'turns marker on
                  `0<cr>`   'responds parameter ok

MARK1 (Marker)

This command sets the marker to the specified position or queries the current marker value.
The marker unit depends on the unit of the x-axis which can be Hz, seconds or meter/feet depending of the measurement mode. The unit of the second value in the GET command response depends on the current unit of the y-axis.
If Smith Chart is active, the second and third values are the complex impedance.

Example: `set<cr>`
                  `0<cr>`
                  `mark1,100E6<cr>`   'set marker to 100 MHz
                  `0<cr>`   'responds parameter ok

Example 2:   `get<cr>`
                  `0<cr>`
                  `mark1<cr>`   'query current marker value
                  `0<cr>`   'responds parameter ok
                  `947.25e6,-79.28<cr>`   'returns Marker frequency and level

DELTA1ON (Deltamarker On)

This command turns the marker on / off.

Value	Deltamarker
0	OFF
1	ON

Example: `set<cr>`
                    `0<cr>`
                    `delta1on,1<cr>`   'turns deltamarker on
                    `0<cr>`   'responds parameter ok

DELTA1 (Deltamarker)

This command sets the deltamarker to the specified position in relation to the marker or queries the current deltamarker value.

The deltamarker unit depends on the unit of the x-axis which can be Hz, seconds or meter/feet depending of the measurement mode. The unit of the second value in the GET command response depends on the current unit of the y-axis.
If Smith Chart is active, the second and third values are the complex impedance.

Example: `set<cr>`
                    `0<cr>`
                    `delta1,-100E3<cr>`   'set deltamarker to 100 kHz below the marker
                    `0<cr>`   'responds parameter ok

Example 2:   `get<cr>`
                    `0<cr>`
                    `delta1<cr>`   'query current marker value
                    `0<cr>`   'responds parameter ok
                    `-100e3,-8.23<cr>`   'returns deltamarker frequency and relative level

MARKPK (Marker Peak)

This command sets the marker to the peak (highest signal).

Example: `cmd<cr>`
                    `0<cr>`
                    `markpk<cr>`   'set marker to peak
                    `0<cr>`   'responds parameter ok

MARKNXTPK (Marker Next Peak)

This command sets the marker to the next peak.

Example: `cmd<cr>`
                    `0<cr>`
                    `marknxtpk<cr>`   'set marker to next peak
                    `0<cr>`   'responds parameter ok

MARKMIN (Marker Minimum)

This command sets the marker to the minimum (lowest signal).

Example:
```
cmd<cr>
0<cr>
markmin<cr>                 'set marker to minimum
0<cr>                       'responds parameter ok
```

MARKTOCENT (Marker Frequency To Center Frequency)

This command sets the current marker as center frequency.

Example:
```
cmd<cr>
0<cr>
marktocent<cr>             'set marker frequency to center frequency
0<cr>                      'responds parameter ok
```

MARKTOLVL (Marker Level To Reference Level)

This command sets the current marker level as reference level.

Example:
```
cmd<cr>
0<cr>
marktolvl<cr>              'set marker level to reference level
0<cr>                      'responds parameter ok
```

MARKMODE

This command defines the marker mode.

Value	Marker Mode
0	Normal
1	Noise
2	Frequency Count

Example:
```
set<cr>
0<cr>
markmode,2<cr>             'turns on frequency count
0<cr>                      'responds parameter ok
```

Measurement

Command	Parameters	Unit	Comment
MEAS			
TRD1	<string>		
TRD2	<string>		
LIMLOW	<string>		
LIMUPP	<string>		
LIMPASS			GET command only
LIMCHKREMOTE	0, 1		Receiver Mode only (R&S FSH-K3)
THRLOW	<numeric value>		Receiver Mode only (R&S FSH-K3)
THRUPP	<numeric value>		Receiver Mode only (R&S FSH-K3)
THRPASS			Receiver Mode only (R&S FSH-K3) GET command only
THROFF			Receiver Mode only (R&S FSH-K3) CMD command only

MEAS (Measurement Mode)

This command defines the measurement mode.

Value	Measurement
0	Off
1	Analyzer
2	Tracking Generator (Model 13, 23 and 26)
3	Power Sensor
4	Channel Power
5	Occupied Bandwidth
6	TDMA Power
7	Distance to Fault (R&S FSH-B1)
8	Receiver Mode (R&S FSH-K3)

Using the value 0 the instrument can turned off if the power adapter is connected. If the instrument is OFF it can be turned on programmatically by selecting one of the measurement modes.

Example: set<cr>
                    0<cr>
                    meas,4<cr>   'selects channel power measurement
                    0<cr>   'responds parameter ok

TRD1 (Transducer)

This command selects a transducer. To turn a transducer off, use the string 'NONE':

Example:	`set<cr>`	
	`0<cr>`	
	`trd1,hl223<cr>`	'selects transducer table "HL223"
	`0<cr>`	'responds parameter ok
Example 2:	`set<cr>`	
	`0<cr>`	
	`trd1,none<cr>`	'de-activates any transducer
	`0<cr>`	'responds parameter ok

TRD2 (Transducer – dB)

This command selects a transducer (dB only). To turn a transducer off, use the string 'NONE'.

Example:	`set<cr>`	
	`0<cr>`	
	`trd1,preamp<cr>`	'selects transducer table "preamp"
	`0<cr>`	'responds parameter ok

LIMLOW (Lower Limit Line)

This command selects the lower limit line. To turn a limit line off, use the string 'NONE'.

Example:	`set<cr>`	
	`0<cr>`	
	`limlow,lowtest<cr>`	'selects lower limit line "LOWTEST"
	`0<cr>`	'responds parameter ok

LIMUPP (Upper Limit Line)

This command selects the upper limit line. To turn a limit line off, use the string 'NONE'.

Example:	`set<cr>`	
	`0<cr>`	
	`limupp,hightest<cr>`	'selects upper limit line "HIGHTEST"
	`0<cr>`	'responds parameter ok

LIMPASS (Limits Passed Query)

This command returns the limit check status.

Value	Limit Check
0	Unkown
1	Failed
2	Passed

Example:	`get<cr>`	
	`0<cr>`	
	`limpass<cr>`	'query limit check
	`0<cr>`	'responds parameter ok
	`2`	'limit check passed

LIMCHKREMOTE (Limit Check Remote Message)

This command enables the remote message (frequency/channel + level) on limit check and/or on threshold limit fail. The instrument will send a message (frequency/channel and level) every time the limit is exceeded.

Value	Limit Check Remote
0	OFF
1	Limit Check – Remote message on fail

Example:
```
get<cr>
0<cr>
limchkremote,1<cr>        'enable remote massage on limit fail
0<cr>                     'responds parameter ok
123.456E6,23.5<cr>        'limit exceeded
130.567E6,22.0<cr>        'limit exceeded…..
…
0<cr>                     'remote message on limit fail OFF
```

THRLOW (Lower Threshold Line)

This command defines the lower threshold line (value). The unit of the threshold value is specified with the Unit parameter. This command is available in Receiver / Scan Mode only.

Example:
```
set<cr>
0<cr>
thrlow,30<cr>            'specifies lower threshold line to -30 dBuV
0<cr>                    'responds parameter ok
```

THRUPP (Upper Threshold Line)

This command defines the upper threshold line (value). The unit of the threshold value is specified with the Unit parameter. Available in Receiver / Scan Mode only.

Example:
```
set<cr>
0<cr>
thrupp,70<cr>           'specifies upper threshold line to 70 dBuV
0<cr>                    'responds parameter ok
```

THRPASS (Threshold Line Passed Query)

This command returns the threshold line check status. Available in Receiver / Scan Mode only.

Value	Threshold Line Check
0	Unkown
1	Failed
2	Passed

Example:
```
get<cr>
0<cr>
thrpass<cr>             'query threshold line check
0<cr>                    'responds parameter ok
2                        'threshold check passed
```

Tracking Generator

This command set applies to model 13 and model 23 only.

Command	Parameters	Unit	Comment
TRANSCAL			GET command only
REFLCAL			GET command only
TRANSVECTCAL			GET command only Option R&S FSH-K2
REFLVECTCAL			GET command only Option R&S FSH-K2
TGLVL	\<numeric value\>		Model 23 only
TGMODE	0, 1		Option R&S FSH-K2
CABLELOSS			GET command only Option R&S FSH-K2

TRANSCAL (Transmission Calibrated)

This command queries the state of the transmission calibration.

Value	Transmission Cal
0	Not calibrated
1	Calibrated

Example:
```
get<cr>
0<cr>
transcal<cr>          'query state of transmission calibration
0<cr>                 'responds parameter ok
1<cr>                 'response: transmission calibrated
```

REFLCAL (Reflection Calibrated)

This command queries the state of the reflection calibration.

Value	Reflection Cal
0	Not calibrated
1	Calibrated

Example:
```
get<cr>
0<cr>
reflcal<cr>           'query state of reflection calibration
0<cr>                 'responds parameter ok
1<cr>                 'response: reflection calibrated
```

TRANSVECTCAL (Transmission Vector Calibrated)

This command queries the state of the transmission vector calibration. Applies to option R&S FSH-K2 only.

Value	Transmission Vector Cal
0	Not calibrated
1	Calibrated

Example:

```
get<cr>
0<cr>
transvectcal<cr>        'query state of transmission vector calibration
0<cr>                   'responds parameter ok
1<cr>                   'response: transmission vector calibrated
```

REFLVECTCAL (Reflection Vector Calibrated)

This command queries the state of the reflection vector calibration. Applies to option R&S FSH-K2 only

Value	Reflection Vector Cal
0	Not calibrated
1	Calibrated

Example:

```
get<cr>
0<cr>
reflvectcal<cr>         'query state of reflection vector calibration
0<cr>                   'responds parameter ok
1<cr>                   'response: reflection vector calibrated
```

TGLVL (Tracking Generator Level)

This command defines the tracking generator output level. Applies to model 23 only.
The only two numeric values which are valid are 0 and –20.

Example:

```
set<cr>
0<cr>
tglvl,-20<cr>           'sets tracking generator output level to –20 dBm
0<cr>                   'responds parameter ok
```

Example 2:

```
set<cr>
0<cr>
tglvl,0<cr>             'sets tracking generator output level to 0 dBm
0<cr>                   'responds parameter ok
```

TGMODE (Tracking Generator Mode)

This command defines the tracking generator mode. Applies to option R&S FSH-K2 only. This command is only available when Vector Reflection calibrated.

Value	Tracking Generator Mode
0	Reflection
1	Cable loss meas

Example: `set<cr>`
                       `0<cr>`
                       `tgmode, 1<cr>`   'set tracking generator mode to cable loss meas
                       `0<cr>`   'responds parameter ok

CABLELOSS

This command queries the measured cable loss

Example: `get<cr>`
                       `0<cr>`
                       `cableloss<cr>`   'query cable loss measurement result
                       `0<cr>`   'responds parameter ok
                       `0.7<cr>`   'response: cable loss

Power Sensor

Command	Parameters	Unit	Comment
PWR	<numeric value>		GET command only
REFL	<numeric value>		GET command only
ZERO			CMD command only
PWRTOREF			CMD command only
MEASTIME	0...2		
REFLUNIT	0, 1		R&S FSH-Z44 only
PWRSSTD	0...7		R&S FSH-Z44 only

PWR (Power Level)

This command queries the power level measured by the sensor.

Example: `get<cr>`
                        `0<cr>`
                        `pwr<cr>`   'query power level from sensor
                        `0<cr>`   'responds parameter ok
                        `-33.45<cr>`   'response: power

REFL (Reflection)

This command queries the reflection measured by the power sensor R&S FSH-Z44. The unit (dB or VSWR) depends on the setting of reflection unit (SET REFLUNIT command).

Example: `get<cr>`
                        `0<cr>`
                        `refl<cr>`   'query reflection from sensor
                        `0<cr>`   'responds parameter ok
                        `2.54<cr>`   'response: reflection value

ZERO (Power Sensor Zeroing)

This command initiates the power sensor zeroing.

Example: `cmd<cr>`
                        `0<cr>`
                        `zero<cr>`   'query power level from sensor
                        `0<cr>`   'responds parameter ok

PWRTOREF (Power to Reference)

This command defines the current power level as the reference value.

Example: `cmd<cr>`
                        `0<cr>`
                        `pwrtoref<cr>`   'defines power level as reference value
                        `0<cr>`   'responds parameter ok

MEASTIME (Measurement Time)

This command defines the measurement time for the power sensor (R&S FSH-Z1 and R&S FSH-Z18).

Value	Measurement Time
0	Short
1	Normal
2	Long

Example: set<cr>
                   0<cr>
                   meastime,2<cr>   'sets measurement time to "long"
                   0<cr>   'responds parameter ok

REFLUNIT (Reflection Unit)

This command defines the reflection unit for the power sensor R&S FSH-Z44.

Value	Reflection Unit
0	dB
1	VSWR

Example: set<cr>
                   0<cr>
                   reflunit,1<cr>   'sets reflection unit to VSWR
                   0<cr>   'responds parameter ok

PWRSSTD (Power Sensor Standard)

This command defines the standard used for the power sensor R&S FSH-Z44 measurements.

Value	Channel Power Standard
0	User
1	GSM
2	EDGE
3	3GPP WCDMA
4	cdmaOne
5	cdma2000 1x
6	DVB-T
7	DAB

Example: set<cr>
                   0<cr>
                   pwrsstd,2<cr>   'select EDGE as standard
                   0<cr>   'responds parameter ok

Channel Power

Command	Parameters	Unit	Comment
CHPWR	<numeric value>		GET command only
CHPWRSTD			
CHPWRUNIT			
CHPWRBW	<numeric value>	Hz	
LVLADJUST			CMD command only

CHPWR (Channel Power)

This command queries the measured channel power.

Example: get<cr>
                      0<cr>
                      chpwr<cr>   'query power level from sensor
                      0<cr>   'responds parameter ok
                      -47.45<cr>   'response: channel power

CHPWRSTD (Channel Power Standard)

This command defines the standard used for the channel power measurement.

Value	Channel Power Standard
0	User
1	3GPP WCDMA
2	cdmaOne
3	cdma2000 1x

Example: set<cr>
                      0<cr>
                      chpwrstd,2<cr>   'select cdmaOne as standard
                      0<cr>   'responds parameter ok

CHPWRUNIT (Channel Power Unit)

This command defines the unit used for the channel power measurement.

Value	Channel Power Unit
0	dBm
1	dBmV
2	dBµV

Example: set<cr>
                      0<cr>
                      chpwrunit,1<cr>   'set unit to dBmV
                      0<cr>   'responds parameter ok

CHPWRBW (Channel Power Bandwidth)

This command defines the bandwidth used for channel power measurements.

Example: `set<cr>`
                                 `0<cr>`
                                 `chpwrbw,3.5E6<cr>`   'set channel power bandwidth to 3.5 MHz
                                 `0<cr>`   'responds parameter ok

LVLADJUST (Level Adjust)

This command initiates a level adjustment for the channel power measurement.

Example: `cmd<cr>`
                                   `0<cr>`
                                 `lvladjust<cr>`   'initiates level adjustment
                                 `0<cr>`   'responds parameter ok

Occupied Bandwidth

Command	Parameters	Unit	Comment
OBW	\<numeric value\>		GET command only
OBWSTD			
OBWCHBW	\<numeric value\>	Hz	
LVLADJUST			CMD command only

OBW (Occupied Bandwidth)

This command queries the measured occupied bandwidth.

Example:
```
            get<cr>
            0<cr>
            obw<cr>              'query power level from sensor
            0<cr>                'responds parameter ok
            -22E6<cr>            'response: occupied bandwidth
```

OBWSTD (Occupied Bandwidth Standard)

This command defines the standard used for the occupied power measurement.

Value	Channel Power Standard
0	User
1	3GPP WCDMA
2	cdmaOne
3	cdma2000 1x

Example:
```
            set<cr>
            0<cr>
            obwstd,1<cr>         'select 3GPP WCDMA as standard
            0<cr>                'responds parameter ok
```

OBWCHBW (Occupied Bandwidth Channel Bandwidth)

This command defines the bandwidth used for occupied bandwidth measurements.

Example:
```
            set<cr>
            0<cr>
            obwchbw,5E6<cr>      'set channel bandwidth to 5 MHz
            0<cr>                'responds parameter ok
```

LVLADJUST (Level Adjust)

This command initiates a level adjustment for the occupied bandwidth measurement.

Example:
```
            cmd<cr>
            0<cr>
            lvladjust<cr>        'initiates level adjustment
            0<cr>                'responds parameter ok
```

TDMA Power

Command	Parameters	Unit	Comment
TDMAPWR	<numeric value>		GET command only
TDMASTD			
MEASTIME	<numeric value>	s	
LVLADJUST			CMD command only

TDMAPWR (TDMA Power)

This command queries the measured TDMA power.

Example:
```
get<cr>
0<cr>
tdmapwr<cr>                    'query power level from sensor
0<cr>                          'responds parameter ok
-32.45<cr>                     'response: TDMA power
```

TDMASTD (TDMA Power Standard)

This command defines the standard used for the TDMA power measurement.

Value	Channel Power Standard
0	User
1	GSM / EDGE

Example:
```
set<cr>
0<cr>
tdmastd,1<cr>                  'select GSM/EDGE as standard
0<cr>                          'responds parameter ok
```

MEASTIME (Measurement Time)

This command defines the measurement time for the TDMA power measurement.

Example:
```
set<cr>
0<cr>
meastime,500E-6<cr>            'sets measurement time to 500 µs
0<cr>                          'responds parameter ok
```

LVLADJUST (Level Adjust)

This command initiates a level adjustment for the TDMA power measurement.

Example:
```
cmd<cr>
0<cr>
lvladjust<cr>                  'initiates level adjustment
0<cr>                          'responds parameter ok
```

Distance To Fault Measurement

The DTF Measurement requires the option R&S FSH-B1.

Command	Parameters	Unit	Comment
CABLEMOD	<string>		
CABLELEN	<numeric value>	m / feet	
DTFMODE	0...2		
LENUNIT	<meter> | <feet>		

CABLEMOD (Cable Model)

This command selects the cable model.
To turn cable model selection off, use the string 'NONE'.

Example: set<cr>
                      0<cr>
                      cablemod,rg58c<cr>   'selects cable model "RG58C"
                      0<cr>   'responds parameter ok

CABLELEN (Cable Length)

This command defines the cable length.
The unit of the length can either be Meter or Feet depending on the Length Unit setting. The cable length is converted and rounded to meters internally.

Example: set<cr>
                      0<cr>
                      cablelen,12<cr>   'sets cable length to 12 meter
                      0<cr>   'responds parameter ok

DTFMODE (DTF Measurement Mode) Power)

This command defines the measurement mode in DTF.

Value	Channel Power Standard
0	DTF
1	Reflection
2	Spectrum

Example: set<cr>
                      0<cr>
                      dtfmode,2<cr>   'set DTF mode to "Spectrum"
                      0<cr>   'responds parameter ok

LENUNIT (Cable Length Unit)

This command sets the cable length unit to meters or feet.

Example: set<cr>
                      0<cr>
                      lenunit,feet<cr>   'sets cable length unit to Feet
                      0<cr>   'responds parameter ok

Receiver Mode

The Receiver Mode requires the option R&S FSH-K3.

Command	Parameters	Unit	Comment
CHANNEL	<numeric value>		
CHMODE	0, 1		Fixed Channel Mode
CHTABLE	<string>		
LEVEL			GET command only
MEASTIME	<numeric value>	s	
SCANMODE	0, 1		
SCANSTART	<numeric value>		Freq Scan Mode
SCANSTOP	<numeric value>		Freq Scan Mode
SCANSTEP	<numeric value>		Freq Scan Mode
FREQSTART	<numeric value>		Channel Scan Mode
FREQSTOP	<numeric value>		Channel Scan Mode

CHMODE (Channel Mode)

This command switches between the channel mode and frequency mode. Use the command CHTABLE to define a channel table for the channel mode.

Value	Channel Mode
0	Frequency Mode
1	Channel Mode

Example: set<cr>
0<cr>
chmode,1<cr>   'selects channel mode
0<cr>   'responds parameter ok

CHANNEL (Channel Number)

This command defines the channel number. Use CHTABLE command to select a channel table first.

Example: set<cr>
0<cr>
channel,55<cr>   'selects channel no. 55

CHTABLE (Channel Table)

This command selects a channel table for the channel mode.

Example: set<cr>
0<cr>
chtable,FMBand<cr>   'selects channel table "FMBand"
0<cr>   'responds parameter ok

LEVEL (Signal Level)

This command queries the signal level measured (fixed frequency/channel mode only).

Example:	`get<cr>`	
	`0<cr>`	
	`level<cr>`	'query signal level
	`0<cr>`	'responds parameter ok
	`45.6<cr>`	'response: signal level

MEASTIME (Measurement Time)

This command defines the measurement time for the receiver mode.

Example:	`set<cr>`	
	`0<cr>`	
	`meastime,5E-3<cr>`	'sets measurement time to 5 ms
	`0<cr>`	'responds parameter ok

SCANMODE (Scan Mode)

This command switches between frequency/channel scan mode and fixed frequency/channel mode. Use the command CHMODE to toggle between frequency and channel mode.

Value	Scan Mode
0	Fixed Freq/Channel Mode
1	Feq/Channel Scan Mode

Example:	set<cr>	
	`0<cr>`	
	`scanmode,1<cr>`	'selects scan mode
	`0<cr>`	'responds parameter ok

SCANSTART (Frequency Scan Start)

This command defines the scan start frequency for the frequency scan mode.

Example:	set<cr>	
	`0<cr>`	
	`scanstart,88E6<cr>`	'sets scan start frequency to 88 MHz
	`0<cr>`	'responds parameter ok

SCANSTOP (Frequency Scan Stop)

This command defines the scan stop frequency for the frequency scan mode.

Example:	set<cr>	
	`0<cr>`	
	`scanstop,108E6<cr>`	'sets scan stop frequency to 108 MHz
	`0<cr>`	'responds parameter ok

SCANSTEP (Frequency Scan Step)

This command defines the scan step frequency for the frequency scan mode.

Example:	set<cr>	
	0<cr>	
	scanstep,200E3<cr>	'sets scan step frequency to 200 kHz
	0<cr>	'responds parameter ok

FREQSTART (Channel Scan Start Frequency)

This command defines the start frequency for the channel scan mode.

Example:	set<cr>	
	0<cr>	
	freqstart,100E6<cr>	'sets scan start frequency to 100 MHz
	0<cr>	'responds parameter ok

FREQSTOP (Channel Scan Stop Frequency)

This command defines the stop frequency for the channel scan mode.

Example:	set<cr>	
	0<cr>	
	freqstop,1E9<cr>	'sets scan stop frequency to 1 GHz
	0<cr>	'responds parameter ok

Programming Examples

The following examples are code snippets in Visual Basic (VB6).

Initialize Communication with R&S FSH

```
Public Function FSHInit(ByVal Port As Integer, ByVal Speed As Long,
                                        Optional ByVal ErrorCode As String) As Boolean

Rem Initialize communication with FSH
Rem Return TRUE if device initialization was successful
Rem Return FALSE otherwise e.g. the device was not found

With MainForm.FSHCommC
    .CommPort = Port
    .Settings = Trim$(Str$(Speed)) + ",N,8,1"
    .InBufferSize = 1000
    .PortOpen = True
    .InBufferCount = 0
End With
InBuffer = vbNullString

End Function
'----------------------------------------
```

Poll R&S FSH until <cr> received

```
Public Function PollFSH() As String

Dim CrPos As Long

With MainForm.FSHCommC
    Do
        InBuffer = InBuffer + .Input
        DoEvents
        CrPos = InStr(1, InBuffer, vbCr)
    Loop Until CrPos > 0
    PollFSH = Left$(InBuffer, CrPos - 1)
    InBuffer = Mid$(InBuffer, CrPos + 1)
End With

End Function
'----------------------------------------
```

Send CMD Command to R&S FSH

```
Public Function FSHCmd(ByVal Command As String) As Boolean

Dim TempError As Integer

InBuffer = vbNullString
FSHCmd = False
With MainForm.FSHCommC
    .Output = "cmd" + vbCr
    TempError = Val(PollFSH)
    If TempError = 0 Then
        .Output = Command + vbCr
        TempError = Val(PollFSH)
        If TempError = 0 Then
            FSHCmd = True
        Else
            DebugMsg "CMD error" + Str(TempError) + " for command <" + Command + ">"
        End If
    Else
        DebugMsg "CMD error" + Str(TempError) + " for command <" + Command + ">"
    End If
End With

End Function
'----------------------------------------
```

Send SET Command to R&S FSH

```
Public Function FSHSet(ByVal Command As String) As Boolean

Dim TempError As Integer

InBuffer = vbNullString
FSHSet = False
With MainForm.FSHCommC
    .Output = "set" + vbCr
    TempError = Val(PollFSH)
    If TempError = 0 Then
        .Output = Command + vbCr
        TempError = Val(PollFSH)
        If TempError = 0 Then
            FSHSet = True
        Else
            ErrorMsg "SET error" + Str(TempError) + " for command <" + Command + ">"
        End If
    Else
        ErrorMsg "SET error" + Str(TempError) + " for command <" + Command + ">"
    End If
End With

End Function
'-----------------------------------------
```

Send GET Command to R&S FSH and Read Response

```
Public Function FSHGet(ByVal Command As String, ByRef Buffer As String) As Boolean

Dim TempError As Integer

InBuffer = vbNullString
FSHGet = False
With MainForm.FSHCommC
    .Output = "get" + vbCr
    TempError = Val(PollFSH)
    If TempError = 0 Then
        .Output = Command + vbCr
        TempError = Val(PollFSH)
        If TempError = 0 Then
            Sleep 50
            Buffer = PollFSH
            FSHGet = True
        Else
            ErrorMsg "GET error" + Str(TempError) + " for command <" + Command + ">"
        End If
    Else
        ErrorMsg "GET error" + Str(TempError) + " for command <" + Command + ">"
    End If
End With

End Function
'-----------------------------------------
```

Example: Program Instrument Setup

```
Private Sub FSHSetup ()

Dim Buffer As String

FSHCmd "REMOTE"              ' Set FSH to Remote State
FSHGet "IDN?", Buffer        ' Query instrument ID
FSHCmd "PRESET"              ' Preset FSH settings
FSHSet "FREQ,950E6"          ' Set Center Frequency to 950 MHz
FSHSet "SPAN,5E6"            ' Set Span to 5 MHz
FSHCmd "LOCAL"               ' Return to Local Mode

End Sub
'-----------------------------------------
```

Read Binary Trace Data from R&S FSH

```
Public Function FSHGetTraceBin(ByRef Values() As Long) As Boolean

Dim InBuffer As String
Dim TempError As Integer

InBuffer = vbNullString
FSHGetTraceBin = False
With MainForm.FSHCommC
    .Output = "GET" + vbCr
    TempError = Val(PollFSH)
    If TempError = 0 Then
        .Output = "TRACEBIN" + vbCr
        TempError = Val(PollFSH)
        If TempError = 0 Then
            InBuffer = PollFSHBin(1205)                    ' 4 x 301 bins with 4 bytes
            AsString.Buffer = StrConv(InBuffer, vbFromUnicode)
            LSet AsValues = AsString
            Values = AsValues.SValues
            ReDim Preserve Values(0 To 300)
            FSHGetTraceBin = True
        Else
            ErrorMsg "GET error" + Str(TempError) + " for command <TRACEBIN>"
        End If
    Else
        ErrorMsg "GET error" + Str(TempError) + " for command <TRACEBIN>"
    End If
End With

End Function
'----------------------------------------
```

Poll Input Buffer until Number of Bytes are Received

```
Public Function PollFSHBin(ByVal BufferLen As Long) As String

Dim CrPos As Long

With MainForm.FSHCommC
    Do
        InBuffer = InBuffer + .Input
        DoEvents
        DebugMsg "BIN-BUFFER-LEN: " + Str(Len(InBuffer))
    Loop Until Len(InBuffer) >= BufferLen
    PollFSHBin = Left$(InBuffer, BufferLen)
    InBuffer = Mid$(InBuffer, BufferLen + 1)
End With

End Function
```