**INT,EXT**
Uses both, the internal and external modulation signals.

*RST: INT

**Example:** `FM:SOUR INT`
selects the internal modulation source.

**Manual operation:** See "FM Source" on page 208

---

**[:SOURce<hw>]:FM:STATe** <State>

Activates frequency modulation.

**Note:** Activation of FM deactivates phase modulation (PM).

**Parameters:**
<State> 0 | 1 | OFF | ON

*RST: 0

**Example:** `FM:STAT ON`
Activates FM modulation.

**Manual operation:** See "State" on page 208

## 6.13.4 SOURce:FREQuency Subsystem

This subsystem contains the commands used to define the frequency settings for the RF sources and sweeps.



---

**[:SOURce<hw>]:FREQuency:CENTer** <Center>

Sets the center frequency of the RF sweep range.

The range is defined by this center frequency and the specified `[:SOURce<hw>]:FREQuency:SPAN`, according to the formula:

$f_{CENTer} - (f_{SPAN}/2) \ldots f_{CENTer} + (f_{SPAN}/2)$

with:

$f_{SPAN} = f_{STOP} - f_{STARt}$

The center frequency directly relates to the span, and the start and stop frequencies. If you change one of these parameters, the center frequency changes accordingly.

$f_{CENTer} = (f_{STOP} + f_{STARt})/2$

**Note:** You can select any frequency within the setting range. The range is defined with the parameters `[:SOURce<hw>]:FREQuency:STARt` and `[:SOURce<hw>]:FREQuency:STOP`.

A defined offset and the multiplier factor affect the sweep frequency range and therefore all correlated parameters. The set frequencies are only absolute values, if the offset = 0 and the multiplication factor = 1. The multiplier multiplies the frequencies accordingly, and the offset ≠ 0 shifts the frequencies corresponding to the set value.

300 kHz * $f_{MULTiplier}$ + $f_{OFFSet}$ ... $f_{max}$ * $f_{MULTiplier}$ + $f_{OFFSet}$

**Parameters:**

<Center> float

Range: full frequency range
Increment: see the data sheet: RF characteristics > Resolution of setting
*RST: depends on model

**Example:** `FREQ:CENT 400 MHz`
sets the center frequency for the frequency sweep to 400 MHz.
`FREQ:SPAN 200 MHz`
sets a span of 200 MHz. This sets the sweep range to 300 MHz to 500 MHz.

**Manual operation:** See "Center Freq - Frequency Sweep" on page 184

---

**[:SOURce<hw>]:FREQuency[:CW|FIXed]** <Fixed>

Sets the frequency of the RF output signal.

In CW mode, see `FREQ:MODE CW|FIXed`, the instrument operates at a fixed frequency.

In sweep mode `FREQ:MODE SWE`, the value applies to the sweep frequency and the instrument processes the frequency settings in defined sweep steps.

You can enter either a numerical frequency value, of decrease or increase the current frequency step by step with `FREQ UP` and `FREQ DOWN`. The frequency is then increased or decreased by the value `[:SOURce<hw>]:FREQuency:STEP[:INCRement]` in `FREQ:STEP:MODE USER`.

**Note:**

A defined offset and the multiplier factor affect the sweep range and therefore all correlated parameters. The set frequencies are only absolute values, if the offset = 0 and the multiplication factor = 1. The multiplier multiplies the frequencies accordingly, and the offset ≠ 0 shifts the frequencies corresponding to the set value.

The actual frequency at the RF output does not change, but rather the value queried with `[:SOUR]:FREQ?`, according to the formula:

$f_{FREQ} = f_{RFout} * f_{MULTiplier} + f_{OFFSet}$

**Correlation**: `FREQ` for `FREQ:MODE SWE` is linked to the sweep frequency.

**Parameters:**

<Fixed> float

Range: full frequency range
Increment: see the data sheet: RF characteristics > Resolution of setting
*RST: 100 MHz

**Example:** `FREQ 500kHz`
sets the frequency of RF output signal A to 500 kHz.

**Manual operation:** See "RF Freq" on page 139

---

**[:SOURce<hw>]:FREQuency[:CW|FIXed]:RCL** <Rcl>

Determines whether the RF frequency value is retained or taken from a loaded instrument configuration, when you recall instrument settings with the command `*RCL`.

**Parameters:**

<Rcl> INCLude | EXCLude

**INCLude**
Takes the frequency value of the loaded settings.

**EXCLude**
Retains the current frequency when an instrument configuration is loaded.

*RST: INCLude

**Example:** `FREQ:RCL INCL`
takes the frequency from the loaded instrument configuration.

**Manual operation:** See "Exclude Frequency" on page 131

---

**[:SOURce<hw>]:FREQuency:MANual** <Manual>

Determines the frequency and triggers a sweep step manually in `SWE:MODE MAN`.

**Note:** You can select any frequency within the setting range. The range is defined with the parameters `[:SOURce<hw>]:FREQuency:STARt` and `[:SOURce<hw>]:FREQuency:STOP`. A defined offset and the multiplier factor affect the sweep range and therefore all correlated parameters. The set frequencies are only absolute values, if the offset = 0 and the multiplication factor = 1. The multiplier multiplies the frequencies accordingly, and the offset ≠ 0 shifts the frequencies corresponding to the set value.

$f_{STARt} * f_{MULTiplier} + f_{OFFset} \ldots f_{STOP} * f_{MULTiplier} + f_{OFFset}$

**Parameters:**

<Manual> float

Range: full frequency range
Increment: see the data sheet: RF characteristics > Resolution of setting

**Example:** `SWE:MODE MAN`
sets the `Step` sweep mode.

**Example:** `FREQ:MODE SWE`
sets the frequency sweep mode. The sweep start frequency is output.
`FREQ:MAN UP`
triggers the next higher sweep step.
`FREQ:MAN 500MHz`
outputs 500 MHz RF frequency (must e within the sweep frequency range).
`FREQ:MAN DOWN`
triggers the next lower sweep step relative to 500 MHz.

**Manual operation:** See "Current Freq - Frequency Sweep" on page 184

---

**[:SOURce<hw>]:FREQuency:MODE** <Mode>

Selects the frequency mode for the generating the RF output signal. The selected mode determines the parameters to be used for further frequency settings.

**Parameters:**

<Mode> CW | FIXed | SWEep | LIST

**CW|FIXed**
Sets the fixed frequency mode.
`CW` and `FIXed` are synonyms. The instrument operates at a defined frequency, set with command `[:SOURce<hw>]:FREQuency[:CW|FIXed]`.

**SWEep**
Sets the sweep mode. The instrument processes the frequency settings in defined sweep steps. To determine the corresponding frequency values, use the commands `[:SOURce<hw>]:FREQuency:STARt` and `[:SOURce<hw>]:FREQuency:STOP`, or `[:SOURce<hw>]:FREQuency:CENTer` and `[:SOURce<hw>]:FREQuency:SPAN` and `[:SOURce<hw>]:FREQuency:MANual`.

**LIST**
Sets the list mode. The instrument processes the frequency and level settings by means of values loaded from a list.
To configure the list mode settings use the commands of the SOURce:LIST Subsystem

*RST: CW

**Example:** `FREQ:MODE SWE`
sets the SWEep mode.

**Example:** `FREQ:MODE CW`
turns off the SWEep or LIST mode.

**Manual operation:** See "State - Frequency Sweep" on page 180

---

**[:SOURce<hw>]:FREQuency:MULTiplier** <Multiplier>

Sets the value for the multiplication factor of a subsequent downstream instrument.

**Parameters:**
<Multiplier> float

Range: 1 to dynamic
Increment: 0.001
*RST: 1

**Example:** `FREQ:MULT 1`
sets the multiplication factor to 1.

**Manual operation:** See "Multiplier" on page 141

---

**[:SOURce<hw>]:FREQuency:OFFSet** <Offset>

Sets the frequency offset of a downstream instrument, for example a mixer.

If you have specified an `OFFSet` and / or a `MULTiplier` factor, the actual frequency at the RF output does not change, but rather the value queried with `[:SOUR]:FREQ?`, according to the following formula:

$f_{FREQ} = f_{RFout} * f_{MULTiplier} + f_{OFFSet}$

**Parameters:**
<Offset> float

Increment: 0.01
*RST: 0

**Example:** `FREQ:OFFS 500kHz`
sets the frequency offset to 500 kHz.

**Manual operation:** See "Offset" on page 140

---

**[:SOURce<hw>]:FREQuency:SPAN** <Span>

Determines the extent of the frequency sweep range. This setting in combination with the center frequency setting (`[:SOURce<hw>]:FREQuency:CENTer`) defines the sweep range.

This parameter is related to the start and stop frequencies. If you change the frequency, the span changes accordingly.

$f_{SPAN} = f_{STOP} - f_{STARt}$

$f_{STARt} > f_{STOP}$ is permitted.

**Parameters:**

<Span> float

Range: full frequency range
Increment: see the data sheet: RF characteristics > Resolution of setting
*RST: 400E6

**Example:** `FREQ:CENT 400 MHz`
sets the center frequency of the frequency sweep to 400 MHz.
`FREQ:SPAN 200 MHz`
sets a span of 200 MHz. This sets the sweep range to 300 MHz to 500 MHz.

**Manual operation:** See "Span - Frequency Sweep" on page 184

---

**[:SOURce<hw>]:FREQuency:STARt** <Start>

Sets the start frequency for the RF sweep.

This parameter relates to the center frequency and span. If you change the frequency, these parameters change accordingly.

$f_{STARt} > f_{STOP}$ is permitted.

$f_{STARt} = (f_{CENTer} - f_{SPAN}/2)$.

**Note:** A defined offset and the multiplier factor affect the sweep range and therefore all correlated parameters. The set frequencies are only absolute values, if the offset = 0 and the multiplication factor = 1. The multiplier multiplies the frequencies accordingly, and the offset ≠ 0 shifts the frequencies corresponding to the set value.

$f_{STARt} * f_{MULTiplier} + f_{OFFset} \ldots f_{STOP} * f_{MULTiplier} + f_{OFFset}$

**Parameters:**

<Start> float

Range: full frequency range
Increment: see the data sheet: RF characteristics > Resolution of setting
*RST: 100 MHz

**Example:** `FREQ:STARt 1 MHz`
sets the start frequency for the frequency sweep to 1 MHz.
`FREQ:STOP 2 GHz`
sets the stop frequency for the frequency sweep to 2 GHz.

**Manual operation:** See "Start Freq - Frequency Sweep" on page 183

---

**[:SOURce<hw>]:FREQuency:STOP** <Stop>

Sets the stop frequency for the RF sweep.

This parameter is related to the center frequency and span. If you change the frequency, these parameters change accordingly.

$f_{STARt} > f_{STOP}$ is permitted.

$f_{STOP} = (f_{CENTer} + f_{SPAN}/2)$.

**Note:** A defined offset affects the sweep range and consequently all correlating parameters. The set frequencies are only absolute values, if the Offset = 0. Offset ≠ 0 shifts the frequencies according to the offset value.

$f_{STARt} * f_{MULTiplier} + f_{OFFSet}$ ... $f_{STOP} * f_{MULTiplier} + f_{OFFSet}$

**Parameters:**

<Stop> float

Range: full frequency range
Increment: see the data sheet: RF characteristics > Resolution of setting
*RST: 500 MHz

**Example:** `FREQ:STOP 2 GHz`
sets the stop frequency for the frequency sweep to 2 GHz.
`FREQ:STAR 1 MHz`
sets the start frequency for the frequency sweep to 1 MHz.

**Manual operation:** See "Stop Freq - Frequency Sweep" on page 184

---

**[:SOURce<hw>]:FREQuency:STEP[:INCRement]** <Increment>

Sets the step width for `FREQ:STEP:MODE USER`.

To adjust the frequency step by step with this step size, use the `FREQ:UP` and `FREQ:DOWN` commands.

**Note:** This value also applies to the step width of the rotary knob of the instrument and increases or decreases the frequency accordingly, when you work in user-defined step mode.

**Parameters:**

<Increment> float

Range: full frequency range
Increment: see the data sheet: RF characteristics > Resolution of setting
*RST: 1E6

**Example:** `FREQ:STEP 50 kHz`
sets the step width for the frequency setting to 50 kHz.

**Manual operation:** See "Variation Step" on page 141