HP3456A
Quick Reference Card

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Commands

T<1, 2, 3, or 4>	Trigger T1 = Internal trigger T2 = External T3 = Software single trigger T4 =Trigger and hold
Z<0, or 1>	Autozero Z0 = OFF Z1 = ON
FL<0, or 1>	Filter FL0 = OFF FL1 = ON
TE<0, or 1>	Test TE0 = OFF TE1 = ON
Registers	ST = Store RE = recall N = Number of readings G = Number of digits displayed I = number of power lines integrated D = Settling delay in seconds M = Mean register in statistics mode (Read-Only) V = Variance register in statistics mode (Read-Only) C = Count register in statistics mode (Read-Only) L = Lower register for pass/fail R = R Register U = Upper register for pass/fail Y = Y Register Z = Z Register
M<0, 1, 2, 3, 4, 5, 6, 7, or 8>	Math M0 = OFF M1 = Pass/Fail M2 = Statistics (Mean, Variance, Count) M3 = Null M4 = Thermistor (°F) M5 = Thermistor (°C) M6 = Scale ((X-Z)/Y) M7 = % Error ((X-Y)/Y x 100) M8 = dB (20 Log X/Y)
RS<0, or 1>	Reading Storage RS0 = OFF RS1 = ON
SO<0, or 1>	System Output Mode SO0 = OFF SO1 = ON
D<0, or 1>	Display D0 = OFF D1 = ON
P<0, or 1>	Packed Output Format P0 = OFF P1 = ON
CL1	Clear – Continue Active
W	Number separator character
H	Home – Software Reset
SW1	Front/Rear Panel Switch Sense returns 0 or 1
O<0, or 1>	EOI O0 = OFF O1 = ON
L1	Store program: Begin

Q	Store program: End
X1	Execute stored program
SM	Define Service Request Mask (3 octal digits) 001 = Front panel SQR button 002 = Program memory execution complete 004 = Data ready 010 = Trigger too fast 020 = Illegal instrument state, internal error, syntax error 040 = Program memory error 100 = Service request 200 = Limits failure

Examples (spaces for clarity only, can be omitted)

Switch to DCV, autorange, no Math, hold trigger	`"F1 R1 M0 T4"`
Switch to DCV and store "10" in register "N". Here a space or a "W" is required to separate the "1" from the following "10"	`"F1 10STN"` `"F1W10STN"`
Set SRQ Mask to SRQ on data ready (argument in octal)	`SM004`

P0: ASCII Output (7 Digits plus Exponent)

```
14 bytes: +RDDDDDDDD+D[CR][LF]
```

- R is a digit which indicates over-range if R=1 else R=0
- The decimal point is floating in the eight digits field between R and +.
- If the number of readings per trigger is greater than one, the readings are separated by a comma and the [CR][LF] is only added to the end of the sequence. The EOI line is set for the last byte, if not disabled to speed up the transfer.

P1: Packed Output (6 BCD digits plus Exponent)

```
4 bytes: +DDDDD+OR DDDD.DDDD DDDD.DDDD DDDD.DDDD
```

Byte 1: +DDDDD+OR (+DDDDD represents the exponent, + the sign, OR the over range bit)
Byte 2: DDDD DDDD (digits 1 and 2 in BCD code)
Byte 3: DDDD DDDD (digits 3 and 4 in BCD code)
Byte 4: DDDD DDDD (digits 5 and 6 in BCD code)

- The decimal point is implicitly placed at the OR bit, i.e. the result is normalized.
- The EOI line is set for the last byte, if not disabled to speed up the transfer.
- If the number of readings per trigger is greater than one, the readings are sent without separator and the [EOI] line is only asserted when the last byte is sent, if not disabled.

	Function		Range Codes								
	S0	**S1**	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**	**R9**
F1	**DCV**	**DCV Ratio**	Auto	100mV	1000mV	10V	100V	1000V	*	*	*
F2	**ACV**	**ACV Ratio**	Auto	100mV	1000mV	10V	100V	1000V	*	*	*
F3	**ACV+DCV**	**ACV+DCV Ratio**	Auto	100mV	1000mV	10V	100V	1000V	*	*	*
F4	**2-Wire Ω**	**O.C. 2-Wire Ω**	Auto	1KΩ	1KΩ	10KΩ	100kΩ	1MΩ	10MΩ	100MΩ	1000MΩ
F5	**4-Wire Ω**	**O.C. 4-Wire Ω**	Auto	1KΩ	1KΩ	10KΩ	100kΩ	1MΩ	10MΩ	100MΩ	1000MΩ

* indicates an invalid combination of function and range.

Function (Shift)	S0	S1
F1	DCV	DCV / DCV Ratio
F2	ACV	ACV / DCV Ratio
F3	ACV+DCV	ACV+DCV / DCV Ratio
F4	2-Wire K-Ohms	O.C. 2-Wire K-Ohms
F5	4-Wire K-Ohms	O. C. 4-Wire K-Ohms
Range		
R1	Auto	
R2	100 mV or 1K-Ohms	
R3	1000 mV or 1K-Ohms	
R4	10 V or 10 K Ohms	
R5	100 V or 100 K Ohms	
R6	1000 V or 1 M Ohms	
R7	10 M Ohms	
R8	100 M Ohms	
R9	1000 M Ohms	
Trigger		
T1	Internal	automatically repeating
T2	External	by external hardware
T3	Single	performs trigger when executed
T4	Hold	requires TRIGGER
Auto Zero	**OFF**	**ON**
	Z0	Z1
Filter	**OFF**	**ON**
	FL0	FL1
Test	**OFF**	**ON**
	TE0	TE1
Registers		
Store	ST	
Recall	RE	
# of Readings	N	
# of Digits displayed	G	
# of Power Line Cycles Integrated	I	
Delay	D	
Mean Register (Read Only)	M	
Variance Register (Read Only)	V	
Count Register (Read Only)	C	
Lower Register	L	
R Register	R	
Upper Register	U	
Y Register	Y	
Z Register	Z	
Math		
OFF	M0	
Pass/Fail	M1	
Statistics (Mean, Variance, Count)	M2	
Null	M3	
Thermistor (°F)	M5	
Thermistor (°C)	M6	
Scale ((X-Z)/Y)	M7	
% Error ((X-Y)/Y x 100)	M8	
dB (20 Log X/Y)	M9	
Reading Storage	**OFF**	**ON**

	RS0	RS1
System Output Mode	**OFF**	**ON**
	SO0	SO1
Display	**OFF**	**ON**
	D0	D1
Packed Output Format	**OFF (ASCII)**	**ON**
	P0	P1
Clear-Continue Active	CL1	
Number Separator	W	
Home (Software Reset)	H	
Front/Rear Panel Switch Sense	SW1	(returns 0 or 1)
EOI	**Disable**	**Enable**
	O0	O1
Program Memory		
Load Program ON (Syntax)	L1	starts program sequence
Load Program OFF (Syntax)	Q	end program sequence
Execute Program	X1	
Service Request Mask	SM	

Examples (spaces for clarity only, can be omitted)

switch to DCV, autorange, no Math, hold trigger	"F1 R1 M0 T4"
switch to DCV and store "10" in register "N". Here a space or a "W" is required to separate the "1" from the following "10"	"F1 10STN" "F1W10STN"
set SRQ Mask (argument in octal)	SM004

ASCII Output (P0) 14 bytes per measurement

14 bytes: +RDDDDDDD+D[CR][LF]

- R is a digit which indicates over-range if R=1 else R=0
- The decimal point is floating in the seven digits field DDDDDDD
- If the number of readings per trigger is greater than one, the readings are separated by a comma and the [CR][LF] is only added to the end of the sequence. The EOI line is set for the last byte, if not disabled to speed up the transfer.

Packed Output (P1) 4 bytes per measurement

bits in byte 1: +DDDDD+OR (+DDDDD represents the exponent, + the sign, OR the over range bit)
bits in byte 2: DDDD DDDD (digits 1 and 2 in BCD code)
bits in byte 3: DDDD DDDD (digits 3 and 4 in BCD code)
bits in byte 4: DDDD DDDD (digits 5 and 6 in BCD code)

- The decimal point is implicitly placed at the OR bit, i.e. the result is normalized.
- The EOI line is set for the last byte, if not disabled to speed up the transfer.
- If the number of readings per trigger is greater than one, the readings are sent without separator and the [EOI] line is only asserted when the last byte is sent, if not disabled to speed up the transfer.