



Quench Detection System Commands Reference Manual



CAEN ELS s.r.l.



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1 Document Revisions

Document Revision	Date	Requirements
0.1	September 8th, 2021	First Release





2 QDS Commands List

2.0.1 Preliminary Notes

Numbers are transmitted in ASCII data format.

All commands are terminated with character `\r\n`.

Write commands respond with `ACK` or `NAK:<error_code>`. At the end of document there is a list of error codes with description.

Read commands respond with an echo.

Command are formatted as:

`<COMMAND>`, `<COMMAND>:<OPTION>` or `<COMMAND>:<PARAMETER>:<OPTION>`.





2.1 Basic commands

2.1.1 VER command

Reads device model and version.

R / W	Command	Response
R	VER	VER:QDS:<version>:<info_1>:<info_2>:...

Example:

```
VER
#VER:QDS:1.0.00:+/-20V +/-20mV
```

2.1.2 HELP command

Reads commands list.

R / W	Command	Response
R	HELP	<command>\t<description>
R	?	<command>\t<description>

Example:

```
HELP
#GET          Gets single reading
#RNG          Voltmeter input range
#ENA          Channels enabled
#WIN          Time window size
#THR          Channel thresholds
#STR          Quench status
#PRS          Persistent switch status
#USRCORR     User correction of voltages
#FLS          Full scale input
#DFLT        Restores default parameters
#SAVE        Stores current configuration
#LOAD        Configuration on startup
#VER         Displays model and version
#TEMP        Gets system temperature
#IFCONFIG    Displays interface config and stats
#HELP        Displays commands
#?           Displays commands
```



2.1.3 TEMP command

Reads internal system temperature.

R / W	Command	Response
R	TEMP	TEMP:<value>

Parameters:

value	Type	Unit
System temperature	int	°C

Example:

```
TEMP  
#TEMP : 32
```





2.1.4 IFCONFIG command

Reads interface configuration and statistics.

R / W	Command
R	IFCONFIG
R	IFCONFIG:TCP
R	IFCONFIG:LINK
R	IFCONFIG:ICMP

Example:

```
IFCONFIG
#  MAC: 00:12:5e:01:00:00
#  IP address: 192.168.1.201
#  Netmask: 255.255.255.0
#  Gateway: 192.168.1.1
#  Rx bytes: 4575482 (54730 frames), TX bytes: 2641 (35
    frames)
#  Errors:
#    Frame errors: 0, Alignment errors: 0, In errors: 0
IFCONFIG:TCP
#TCP stats:
#    xmit: 17
#    recv: 36
#    fw: 0
#    drop: 0
#    chkerr: 0
#    lenerr: 0
#    memerr: 0
#    rterr: 0
#    proterr: 0
#    opterr: 0
#    err: 0
#    cachehit: 0
IFCONFIG:LINK
#Link stats:
#    xmit: 45
#    recv: 62682
#    fw: 0
#    drop: 0
```



```
#      chkerr: 0
#      lenerr: 0
#      memerr: 0
#      rterr: 0
#      proterr: 0
#      opterr: 0
#      err: 0
#      cachehit: 0
IFCONFIG:ICMP
#ICMP stats:
#      xmit: 0
#      recv: 0
#      fw: 0
#      drop: 0
#      chkerr: 0
#      lenerr: 0
#      memerr: 0
#      rterr: 0
#      proterr: 0
#      opterr: 0
#      err: 0
#      cachehit: 0
```




2.2 QDS Commands

2.2.1 GET command

Reads single or all channels.

R / W	Command	Response
R	GET:<channel>:?	GET:<channel>:<value>
R	GET:?	GET:ALL:<value_ch1>:<value_ch2>:...:<value_ch34>

Parameters:

channel	Description
CH1	Physical channel 1
CH2	Physical channel 2
CH3	Physical channel 3
CH4	Physical channel 4
CH12	Differential channel CH1 - CH2
CH13	Differential channel CH1 - CH3
CH14	Differential channel CH1 - CH4
CH23	Differential channel CH2 - CH3
CH24	Differential channel CH2 - CH4
CH34	Differential channel CH3 - CH4

Channels order

CH1 : CH2 : CH3 : CH4 : CH12 : CH13 : CH14 : CH23 : CH24 : CH34

value / value_chx	Description
float number (scientific notation, lowercase)	Voltage [V]
NA	Channel disabled

Example:

```
GET:CH1:?
```

```
#GET:CH1:-3.854367e-01
```

```
GET:CH24:?
```



#GET:CH1:NA

GET:?

#GET:-5.946926e-04:-1.568700e-05:NA:3.145415e-04:5.787789e-04:1.023630e-03:9.088537e-04:NA:3.300733e-04:1.147742e-04





2.2.2 RNG Command

Writes/Reads single or all channels range. If a channel threshold is higher than full scale value of new range, threshold is set to the full scale value.

R / W	Command	Response
W	RNG:<channel>:<value>	ACK
R	RNG:<channel>:?	RNG:<channel>:<value>
W	RNG:<value>	ACK
R	RNG:?	RNG:<value_ch1>:<value_ch2>:<value_ch3>:<value_ch4>

Parameters:

channel	Description
CH1	Physical channel 1
CH2	Physical channel 2
CH3	Physical channel 3
CH4	Physical channel 4

range	Input Full Range [V]
0 (default)	+/- 20
1	+/- 10
2	+/- 5
3	+/- 2.5
4	+/- 1.25
5	+/- 0.625
6	+/- 0.3125
7	+/- 0.15625
8	+/- 0.078125
9	+/- 0.390625
10	+/- 0.01953125

Example:

```
RNG : CH1 : 3  
#ACK
```

```
RNG : CH4 : ?
```



#RNG:CH4:7

RNG:5

#ACK

RNG:?

#RNG:7:5:8:0





2.2.3 WIN Command

Writes/Reads single or all channels time windows.

R / W	Command	Response
W	WIN:<channel>:<value>	ACK
R	WIN:<channel>:?	WIN:<channel>:<value>
W	WIN:<value>	ACK
R	WIN:?	WIN:<value_ch1>:<value_ch2>:...:<value_ch34>

Parameters:

channel	Description
CH1	Physical channel 1
CH2	Physical channel 2
CH3	Physical channel 3
CH4	Physical channel 4
CH12	Differential channel CH1 - CH2
CH13	Differential channel CH1 - CH3
CH14	Differential channel CH1 - CH4
CH23	Differential channel CH2 - CH3
CH24	Differential channel CH2 - CH4
CH34	Differential channel CH3 - CH4

Channels order

CH1 : CH2 : CH3 : CH4 : CH12 : CH13 : CH14 : CH23 : CH24 : CH34

value / value_chx	Default	Type	Min	Max	Unit
Time window	10	int	10	500	ms

Example:

```
WIN : CH2 : 100
```

```
#ACK
```

```
WIN : CH24 : ?
```

```
#WIN : CH24 : 500
```



WIN:50

#ACK

WIN:?

#WIN:500:100:20:50:10:250:100:300:500:10





2.2.4 THR Command

Writes/Reads single or all channels threshold.

R / W	Command	Response
W	THR:<channel>:<value>	ACK
R	THR:<channel>:?	THR:<channel>:<value>
W	THR:<value>	ACK
R	THR:?	THR:<value_ch1>:<value_ch2>:...:<value_ch34>

Parameters:

channel	Description
CH1	Physical channel 1
CH2	Physical channel 2
CH3	Physical channel 3
CH4	Physical channel 4
CH12	Differential channel CH1 - CH2
CH13	Differential channel CH1 - CH3
CH14	Differential channel CH1 - CH4
CH23	Differential channel CH2 - CH3
CH24	Differential channel CH2 - CH4
CH34	Differential channel CH3 - CH4

Channels order

CH1 : CH2 : CH3 : CH4 : CH12 : CH13 : CH14 : CH23 : CH24 : CH34

value / value_chx	Default	Type	Min	Max	Un
Threshold	20 (physical channels) 40 (differential channels)	float	0	Full scale value (see FLS command) Sum of physical channels full scale value (for differential channels)	V

Example:

```
THR : CH1 : 1
#ACK
```



THR:CH14:?

#THR:CH24:2.500000

THR:3

#ACK

THR:?

#THR:4.00000:1.00000:2.00000:2.40000:3.00000:
1.00000:1.00000:5.00000:3.50000:10.00000





2.2.5 ENA Command

Enables/Disables channel.

R / W	Command	Response
W	ENA:<channel>:<value>	ACK
R	ENA:<channel>:?	RNG:<channel>:<value>
W	ENA:<value>	ACK
R	ENA:?	RNG:<value_ch1>:<value_ch2>:...:<value_ch34>

Parameters:

channel	Description
CH1	Physical channel 1
CH2	Physical channel 2
CH3	Physical channel 3
CH4	Physical channel 4
CH12	Differential channel CH1 - CH2
CH13	Differential channel CH1 - CH3
CH14	Differential channel CH1 - CH4
CH23	Differential channel CH2 - CH3
CH24	Differential channel CH2 - CH4
CH34	Differential channel CH3 - CH4

Channels order

CH1 : CH2 : CH3 : CH4 : CH12 : CH13 : CH14 : CH23 : CH24 : CH34

value / value_chx	Description
ON (default)	Channel enabled
OFF	Channel disabled

Example:

```
ENA : CH3 : ON  
#ACK
```

```
ENA : CH13 : ?
```



#ENA : CH13 : OFF

ENA : ON

#ACK

ENA : ?

#ENA : OFF : OFF : OFF : OFF : OFF : OFF : OFF : OFF : OFF : OFF





2.2.6 STR Command

Reads/Resets status.

R / W	Command	Response
W	STR:RESET	ACK
R	STR:?	STR:0X<mask>

Parameters:

mask	Description	Type	Min	Max
Status	CH1 CH2 CH3 CH4 CH12 CH13 CH14 CH23 CH24 CH34	hex	0	3FF

channel	Quench event	No quench event
CH1 quench signal ON/OFF	0b1000000000 or 0x200	0b0 or 0x0
CH2 quench signal ON/OFF	0b0100000000 or 0x100	0b0 or 0x0
CH3 quench signal ON/OFF	0b0010000000 or 0x80	0b0 or 0x0
CH4 quench signal ON/OFF	0b0001000000 or 0x40	0b0 or 0x0
CH12 quench signal ON/OFF	0b0000100000 or 0x20	0b0 or 0x0
CH13 quench signal ON/OFF	0b0000010000 or 0x10	0b0 or 0x0
CH14 quench signal ON/OFF	0b0000001000 or 0x8	0b0 or 0x0
CH23 quench signal ON/OFF	0b0000000100 or 0x4	0b0 or 0x0
CH24 quench signal ON/OFF	0b0000000010 or 0x2	0b0 or 0x0
CH34 quench signal ON/OFF	0b0000000001 or 0x1	0b0 or 0x0

Example:

```
STR:RESET
```

```
#ACK
```

```
STR:?
```

```
#STR:0X80
```



2.2.7 PRS Command

Sets/Clears persistent switch.

R / W	Command	Response
W	PRS:<value>	ACK
R	PRS:?	PRS:<value>

value	Description
ON	Set persistent switch
OFF (default)	Clear persistent switch

Example:

PRS : ON

#ACK

PRS : ?

#PRS : OFF





2.2.8 USRCORR Command

Enables/Disables or write/read user correction or store values. Add user correction voltage to the acquired value.

R / W	Command	Response
W	USRCORR:<state>	ACK
R	USRCORR:?	USRCORR:<state>
W	USRCORR:RNG<r>CH<ch>OFFS:<v>	ACK
R	USRCORR:RNG<r>CH<ch>OFFS:?	USRCORR:RNG<r>CH<ch>OFFS:<v>
W	USRCORR:SAVE	ACK

- where *r*, *ch* and *v* stand for *range*, *channel* and *value* respectively.

Parameters:

state	Description
ON	User correction enabled
OFF (default)	User correction disabled

range	Description
0	+/- 20 V Full scale voltage
1	+/- 10 V Full scale voltage
2	+/- 5 V Full scale voltage
3	+/- 2.5 V Full scale voltage
4	+/- 1.25 V Full scale voltage
5	+/- 0.625 V Full scale voltage
6	+/- 0.3125 V Full scale voltage
7	+/- 0.15625 V Full scale voltage
8	+/- 0.078125 V Full scale voltage
9	+/- 0.0390625 V Full scale voltage
10	+/- 0.01953125 V Full scale voltage

channel	Description
CH1	Physical channel 1
CH2	Physical channel 2



channel	Description
CH3	Physical channel 3
CH4	Physical channel 4

value	default	Type	Unit
offset correction	0	float	V

Example:

USRCORR : OFF

#ACK

USRCORR : ?

#USRCORR : ON

USRCORR : RNG10CH2OFFS : -1.564598

#ACK

USRCORR : RNG8CH1OFFS : ?

#USRCORR : RNG8CH1OFFS : 2.682657

USRCORR : SAVE



2.2.9 FLS Command

Reads channel/range full scale. Differential channel full scale value is the sum of physical channel full scale values.

R / W	Command	Response
R	FLS:<channel>:?	FLS:<channel>:<value>
R	FLS:<range>:?	FLS:<range>:<value>

Parameters:

channel	Description
CH1	Physical channel 1
CH2	Physical channel 2
CH3	Physical channel 3
CH4	Physical channel 4
CH12	Differential channel CH1 - CH2
CH13	Differential channel CH1 - CH3
CH14	Differential channel CH1 - CH4
CH23	Differential channel CH2 - CH3
CH24	Differential channel CH2 - CH4
CH34	Differential channel CH3 - CH4

range	Available Full Scale Voltage [V]
0	20
1	10
2	5
3	2.5
4	1.25
5	0.625
6	0.3125
7	0.15625
8	0.078125
9	0.0390625
10	0.01953125

Example:



FLS:CH1:?

#FLS:CH1:2.500000

FLS:RNG6:?

#FLS:RNG6:0.312500





2.2.10 DFLT Command

Restores default parameters.

R / W	Command	Response
W	DFLT	ACK

Parameter	Default value
Range	0
Time window [ms]	10
Enable	ON
Threshold [V]	20 (physical channel) 40 (differential channel)
User correction	OFF
Status	0x0

Example:

```
DFLT  
#ACK
```



2.2.11 SAVE Command

Saves configuration: channels enabled, time windows, thresholds and user correction enable/disable. On startup range is always set to 0.

R / W	Command	Response
W	SAVE	ACK

Example:

```
SAVE  
#ACK
```





2.2.12 LOAD Command

Configuration to load on startup (default or user parameters).

R / W	Command	Response
R	LOAD:?	LOAD:<setting>
W	LOAD:<setting>	ACK

Parameters:

setting	Description
DFLT	Default setting
USER	User setting saved

Example:

```
LOAD:?  
#LOAD:DFLT  
  
LOAD:USER  
#ACK
```



2.3 QDS Errors

2.3.1 Errors list

Code	Description
0	Invalid command
18	error_wrong_config
19	error_wrong_channel
20	error_wrong_enable
21	error_wrong_thr
22	error_wrong_range
23	error_wrong_usrcorr
24	error_wrong_timeWindow
25	error_wrong_status