zenon manual

Status processing

v.8.10

COPA·DATA

Contents

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ZENON VIDEO-TUTORIALS

You can find practical examples for project configuration with zenon in our YouTube channel (https://www.copadata.com/tutorial_menu). The tutorials are grouped according to topics and give an initial insight into working with different zenon modules. All tutorials are available in English.

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2 Status processing

With the status administration you get a better overview in the process and in the network. Each variable can have its own statuses. A total of 64 statuses/attributes have been defined.

The most common statuses are:

- ▸ *Spontaneous* (on page 14)
  (status bit 17 - SPONT)
- ▸ Interrupted or invalid (on page 15)
  (status bit 18 - *INVALID)*

▶ Manual value (on page 14)
   (status bit 12 - *MAN_VAL)*

▶ Alternate value (on page 19)
   (status bit 27 - *ALT_VAL)*

> ⚠ **Attention**
>
> The **driver for internal variables** does not support status administration. Use the **driver for simulator variables** instead.

In the Runtime there are several possibilities to evaluate the status of a variable, as for example: the combined element, the reaction matrices (on page 29) and the Report Generator. The status is also accessible in VBA or VSTA as well as in the Recipegroup Manager.

If a variable is saved in zenon, such as in the **Archive**, **CEL**, or **AML**, the entry consists of three pieces of information: value, time stamp and status. This means: Each archived value also contains the correct status.

3 Status bits

The following status bits are available in zenon:

Bit number	Short term	Long name	zenon Logic long name
0 (on page 11)	M1	User status 1; for Command Processing: Action type "Block"; Service Tracking (Main.chm::/IEC850.chm::/117281.htm) of the IEC 850 driver	_VSB_ST_M1
1 (on page 11)	M2	User status2	_VSB_ST_M2
2 (on page 11)	M3	User status3	_VSB_ST_M3
3 (on page 11)	M4	User status4	_VSB_ST_M4
4 (on page 11)	M5	User status5	_VSB_ST_M5

Bit number	Short term	Long name	zenon Logic long name
5 (on page 11)	M6	User status6	_VSB_ST_M6
6 (on page 11)	M7	User status7	_VSB_ST_M7
7 (on page 11)	M8	User status8	_VSB_ST_M8
8 (on page 12)	NET_SEL	Select in the network	_VSB_SELEC
9 (on page 12)	REVISION	Revision	_VSB_REV
10 (on page 13)	PROGRESS	In operation	_VSB_DIREC
11 (on page 13)	TIMEOUT	Command "Timeout exceeded" (command runtime exceeded)	_VSB_RTE
12 (on page 14)	MAN_VAL	Manual value	_VSB_MVALUE
13 (on page 11)	M14	User status14	_VSB_ST_14
14 (on page 11)	M15	User status15	_VSB_ST_15
15 (on page 11)	M16	User status16	_VSB_ST_16
16 (on page 14)	GI	General query	_VSB_GR
17 (on page 14)	SPONT	Spontaneous	_VSB_SPONT
18 (on page 15)	INVALID	Invalid	_VSB_I_BIT
19 (on page 15)	T_STD_E	External standard time (standard time) **Caution:** up to version 7.50,	_VSB_SUWI

Bit number	Short term	Long name	zenon Logic long name
		this was the status bit T_CHG_A	
20 (on page 16)	OFF	Switched off	_VSB_N_UPD
21 (on page 16)	T_EXTERN	Real time - external time stamp	_VSB_RT_E
22 (on page 17)	T_INTERN	Internal time stamp	_VSB_RT_I
23 (on page 18)	N_SORTAB	Not sortable	_VSB_NSORT
24 (on page 18)	FM_TR	Error message transformer value	_VSB_DM_TR
25 (on page 18)	RM_TR	Working message transformer value	_VSB_RM_TR
26 (on page 19)	INFO	Information for the variable	_VSB_INFO
27 (on page 19)	ALT_VAL	Alternate value	_VSB_AVALUE
28	RES28	Reserved for internal use (alarm flashing)	_VSB_RES28
29 (on page 20)	N_UPDATE	Not updated (zenon network)	_VSB_ACTUAL
30 (on page 21)	T_STD	Internal standard time	_VSB_WINTER
31	RES31	Reserved for internal use (alarm flashing)	_VSB_RES31
32 (on page 21)	COT0	Cause of transmission bit 1	_VSB_TCB0
33 (on page 21)	COT1	Cause of transmission bit 2	_VSB_TCB1
34 (on page 21)	COT2	Cause of transmission bit 3	_VSB_TCB2

Bit number	Short term	Long name	zenon Logic long name
35 (on page 21)	COT3	Cause of transmission bit 4	_VSB_TCB3
36 (on page 21)	COT4	Cause of transmission bit 5	_VSB_TCB4
37 (on page 21)	COT5	Cause of transmission bit 6	_VSB_TCB5
38 (on page 22)	N_CONF	Negative confirmation of command by device (IEC 60870 [P/N])	_VSB_PN_BIT
39 (on page 23)	TEST	Test bit (IEC870 [T])	_VSB_T_BIT
40 (on page 23)	WR_ACK	Writing acknowledged	_VSB_WR_ACK
41 (on page 23)	WR_SUC	Writing successful	_VSB_WR_SUC
42 (on page 23)	NORM	Normal status	_VSB_NORM
43 (on page 24)	N_NORM	Deviation normal status	_VSB_ABNORM
44 (on page 24)	BL_870	IEC 60870 Status: *blocked*	_VSB_BL_BIT
45 (on page 24)	SB_870	IEC 60870 Status: *substituted*	_VSB_SP_BIT
46 (on page 24)	NT_870	IEC 60870 Status: *not topical*	_VSB_NT_BIT
47 (on page 25)	OV_870	IEC 60870 Status: *overflow*	_VSB_OV_BIT
48 (on page 25)	SE_870	IEC 60870 Status: *select*	_VSB_SE_BIT
49 (on page 26)	T_INVAL	External time stamp invalid	not defined

Bit number	Short term	Long name	zenon Logic long name
50 (on page 26)	CB_TRIP	Breaker tripping detected	not defined
51 (on page 27)	CB_TR_I	Breaker tripping detection inactive	not defined
52 (on page 28)	OR_DRV	Value out of the valid range (IEC 61850)	not defined
53 (on page 28)	T_UNSYNC	ClockNotSynchronized (IEC 61850)	not defined
54 (on page 29)	PR_NR	Not recorded in the Process Recorder	not defined
55	RES55	reserved	not defined
56	RES56	reserved	not defined
57	RES57	reserved	not defined
58	RES58	reserved	not defined
59	RES59	reserved	not defined
60	RES60	reserved	not defined
61	RES61	reserved	not defined
62	RES62	reserved	not defined
63	RES63	reserved	not defined

☀ Information

In formulas all status bits are available. For other use the availability can be limited.

Note:

‣ The single states are not available for all drivers.

‣ As the statuses of each variable can also be accessed from VBA/VSTA in form of a 64 bit value, the bit position of each status is also listed in the detailed description below. This information is necessary for the individual evaluation with VBA/VSTA.

▸ There are two possibilities for display in Runtime: the short form and the long form. These are separated in the description by a "/".

▸ For each user status, its own text can be defined. This text then is displayed in the different modules (editors such as Runtime). In this case, the short text and long text is separated by a semi-colon ";".

To do this, the following entries must be inserted into *project.ini*:

[STATUS]

STATUS0=MS_K;my status 0

STATUS1=ET;custom text

......

STATUS63=RES;not used

3.1 User status 1 to 8 [M1-M8] and 14 to 16 [M14-M16]

Bit number	Display	Set	Available
0	M1; user state 1	based on user; for Command Processing: Action type "Block"; Service Tracking (Main.chm::/IEC850.chm::/117281.htm) of the IEC 850 driver	with all drivers **Exception:** Not available for internal driver
1 bis 7	M2 to M8; user state 8	by the user	with all drivers **Exception:** Not available for internal driver
13 bis 15	M14; user state 14 to M16; user state 16	by the user	with all drivers **Exception:** Not available for internal driver

The total of 11 user status bits can be used project-specifically. Examof usage for these user status bits are e.g.: special interlockings of Command Processing or flags for own information.

> ⚙ **Information**
>
> The user status bit M1 is used by the command processing action *Block* to mark the switching point as blocked. The bit is also used in the IEC850 driver when transferring service tracking data to Runtime.
>
> You can find further information in the command processing manual and in the IEC850 driver documentation (Main.chm::/IEC850.chm::/117281.htm).

3.2 Select in the network [NET_SEL]

Bit number	Display	Set	Available
8	NET_SEL; selected in zenon network	automatic	with all drivers

The NET_SEL status bit highlights the response variable during command processing in the zenon network. If the NET_SEL bit is set, another command selection - from a further workspace (for example from another client in the network) - cannot be executed on the same response variable.

The NET_SEL status bit is set:

▶ If a command processing screen that is linked to the response variable is opened.

▶ When executing a command processing action using the context menu or in the Command Sequencer module.

▶ When executing an auto/remote command (via VBA, Process Gateway etc.).

3.3 Revision [REVISION]

Bit number	Display	Set	Available
9	REVISION; Revision	by the user	with all drivers

Variables can be set to revision. If this status is active, alarms and setting of command processing are suppressed by the process control system. So it is possible to exclude single parts of a process from alarming and operating.

Note: Only the alarms and command processing are suppressed. All other limit value properties linked to this such as **Limit value color**, **Execute function instantly**, **Invisible**, **Flashing** etc. are not affected by this and are displayed or executed. The current variable values are also shown on the screens as before and also archived.

> **If linked functions or other properties are suppressed, create a reaction matrix that evaluates the revision status.**
> **Information**
>
> The status bit is shown in the Runtime with a red square in the top right corner of the screen element.
>
> This display can be activated/deactivated with the **Display status of variable** property.

3.4   In operation [PROGRESS]

Bit number	Display	Set	Available
10	PROGRESS; In operation	automatic	only in certain drivers

The status bit **in operation** together with command processing (only SICAM 230 or zenon Energy Edition) is used to show that a switch is in operation, as a result of which the switch will change its position (on/off). The status bit is set and reset when **runtime monitoring** is started, if this has been successfully completed or overwritten (*TIMEOUT* (on page 13)) .
The automatic setting of the bit in Runtime can be activated by activating the **Set status PROGRESS** property.

If the written command already matches the response value, the bit is not set.   Only response values *ON*   and *OFF* can be monitored.

3.5   Run time exceeded [TIMEOUT]

Bit number	Display	Set	Available
11	TIMEOUT; Runtime exceeded	automatic; from **runtime monitoring** in command processing	only in certain drivers

The **runtime exceeded** status is only set by the **Command Processing** module. The *Command* action type sets the bit if the timeout for the **Watchdog** is exceeded or the command has been ended negatively. This is also applicable if *COT_actterm* is received by the PLC with a **P/N** bit (**COT** value 10 with **N_CONF** - status bits 33, 35 and 38).

> **The action sets the** TIMEOUT **bit if, during command execution, the expected position of the switching element is not reached. That means: The value of the response variable has a different value to that defined and the Watchdog timer is configured in such a way that it monitors the response variable, possibly also together with the COT of the command variable. The next action for this switching element resets the** TIMEOUT **bit.** 💡 **Information**
>
> The status bit is shown in the Runtime with a red square in the top right corner of the screen element.
>
> This display can be activated/deactivated with the **Display status of variable** property.

3.6   Manual value [MAN_VAL]

Bit number	Display	Set	Available
12	MAN_VAL; Manual value	automatic	with all drivers

This status is set, as soon as a value in an archive has been changed by hand. This can be done in the Report Generator or in screen Archive revision.

In addition, the validation of the the **metering point administration** sets this status if a measured value is edited manually.

3.7   General interrogation [GI]

Bit number	Display	Set	Available
16	GI; General interrogation	automatic	with all drivers

After initializing Runtime, the first image that is read is named "general request". That means that the value has not changed since Runtime start.

3.8   Spontaneous [SPONT]

Bit number	Display	Set	Available
17	SPONT; Spontaneous	automatic	with all drivers

Current value is valid. Everything OK.

3.9   Invalid [INVALID]

Bit number	Display	Set	Available
18	INVALID; Invalid	automatic	with all drivers

This bit is set, if there is a problem in the communication with the driver or with a single variable. The evaluation of single variables is only supported by spontaneous drivers. Most of the zenon drivers however are polling drivers, thus only a general problem in the communication can be indicated (and not a separate one for each variable). In the event of a fault in the communication, the status bits *INVALID* and *SPONT* exclude each other mutually.

In some spontaneous protocols, the controllers have the possibility of marking a value as invalid, such as IEC 60870 indicator INV, IEC 61850 Quality. Values marked as such then also get the *INVALID* bit, however possibly at the same time as with *SPONT*. You can find details in the corresponding driver documentation.

💡   Information

The status bit is shown in the Runtime with a red square in the top right corner of the screen element.

This display can be activated/deactivated with the **Display status of variable** property.

3.10   External standard time [T_STD_E]

Bit number	Display	Set	Available
19	T_STD_E	automatic	Only in real-time-compatible drivers. **Note:** You can find out whether the driver is real-time-compatible from the respective driver documentation.

This status indicates whether the time stamp received by the controller is in winter time (bit set) or in summer time (bit not set).

This status can occur together with the status T_EXTERN (on page 16).

Note: Please also note the status T_STD (on page 21) for the internal time stamp.

> ⚠️ **Attention**
>
> **Note:** up to version 7.50, this status bit had a different meaning (old identification: *T_CHG_A*)

3.11 Switched off [OFF]

Bit number	Display	Set	Available
20	OFF; Switched off	by the user	with all drivers

If a variable is not needed online, it can be switched off. So it is no longer read from the hardware and no longer updated.

This status can e.g. be used to exclude not yet active parts of the process from the alarm handling.

> 💡 **Information**
>
> The status bit is shown in the Runtime with a red square in the top right corner of the screen element.
>
> This display can be activated/deactivated with the **Display status of variable** property.

3.12 Real time - external time stamp [T_EXTERN]

Bit number	Display	Set	Available
21	T_EXTERN	automatic	Only in real-time-compatible drivers. **Note:** You can find out whether the driver is real-time-compatible from the respective driver documentation.

The time stamp was supplied by an external device. zenon takes this time value as it is. All zenon modules use this time stamp.

> ⚠ **Attention**
>
> The status of a variable can be either *T_EXTERN* or *T_INTERN*.
>
> ▸ If a value has the status *T_EXTERN* and no *T_INVAL*, the value of the the external time stamp is used as a time stamp.
> The external time stamp is the time value that the controller has provided together with the value at the driver.
>
> ▸ If a value has the status *T_INTERN* or has *T_EXTERN* and *T_INVAL*,, the value of the internal time stamp is used as a time stamp.
> The internal time stamp is the time point at which the driver has received the value from the controller.
>
> Based on this, all zenon modules sort the values.

3.13 Internal time stamp [T_INTERN]

Bit number	Display	Set	Available
22	T_INTERN	automatic	with all drivers

The time stamp is issued by the zenon driver. As soon as the value is read correctly, it is stamped. All modules use this time stamp.

> ⚠ **Attention**
>
> The status of a variable can be either *T_EXTERN* or *T_INTERN*.
>
> ▸ If a value has the status *T_EXTERN* and no *T_INVAL*, the value of the the external time stamp is used as a time stamp.
> The external time stamp is the time value that the controller has provided together with the value at the driver.
>
> ▸ If a value has the status *T_INTERN* or has *T_EXTERN* and *T_INVAL*,, the value of the internal time stamp is used as a time stamp.
> The internal time stamp is the time point at which the driver has received the value from the controller.
>
> Based on this, all zenon modules sort the values.

Note: The internal time stamp of variable values supports the full resolution of microseconds (µs).

3.14 Not sortable [N_SORTAB]

Bit number	Display	Set	Available
23	N_SORTAB	automatic	for IEC standards

Only for SICAM 230.

Concerns real-time data flow at the SSI protocol. SSI is used for SK1703 and concerns the AK driver.

State no longer used.

Originally: If a telegram arrived much too late, it receives the status N_SORTAB if it could not be sorted in. As now there is a secondary sorting, the state has no meaning anymore.

3.15 Fault message transformer value [FM_TR]

Bit number	Display	Set	Available
24	FM_TR	automatic	for IEC standards

Only for SICAM 230.

Only for SSI protocol: Implausibel transformer value. IN newer protocols this information is transported via INVALID (on page 15) bit.

SSI is used for SK1703 and concerns the AK driver.

> 💡 **Information**
>
> The status bit is shown in the Runtime with a red square in the top right corner of the screen element.
>
> This display can be activated/deactivated with the **Display status of variable** property.

3.16 Run message transformer value [RM_TR]

Bit number	Display	Set	Available
25	RM_TR	automatic	for IEC standards

Only for SICAM 230.

Concerns SSI protocol and IEC870-101:   As long as it is stepped this BIT comes along.

SSI is used for SK1703 and concerns the AK driver.

3.17 Info for variable [INFO]

Bit number	Display	Set	Available
26	INFO	automatic	for IEC standards

Only for SICAM 230.

No longer used.

3.18 Alternative value [ALT_VAL]

Bit number	Display	Set	Available
27	ALT_VAL; alternative value	by the user	with all drivers

To substitute a value, it can be switched to the alternative value. At this the value is completely uncoupled from the process as with Switched off (OFF) (on page 16). Similar to Switch off the last process value is displayed. There is however the possibility to change the alternate value in the Runtime; e.g. via the set value dialog

▶ *Modify substitute value*:
    Only changes the alternate value

▶ *Switch to and modify alternate value*:
    Switches to alternate value and changes it to the set value.

▶ *Modify spontaneous value*:
    A set value is sent to the hardware despite an alternate value. The variable however retains the alternate value.

▶ *Switch to spontaneous value*:
    Switches off the alternate value.

If no value was transferred, the defined alternate value is used otherwise the last valid value is used.

Additional possibilities to influence the alternate value are **Command Processing** Module, the **Recipegroup Manager** or the Programming Interface.

If at the time of the switching to the alternate value the status was invalid (INVALID (on page 15)), the status remains. The value has the state *invalid* and *alternate value set*.

The alternate value is not sent to the connected hardware, but stays in the process image on the computer. This value is sent to all modules of zenon and further processed there. So it is for example archived and alarms are created.

Using this status information these values can especially be marked in the report. So on the one hand the changes are traceable, on the other hand the further processing works with correct values.

> ▤ **Example**
>
> If an outside temperature sensor is defective, it may send an unrealistic value, e.g. -280°C. Now the user can enter the correct value instead of the defective value by reading the temperature, e.g. 14°C. Now this value is archived, alarmed and logged.
>
> All modules in zenon now use this alternate value.

> ☀ **Information**
>
> The status bit is shown in the Runtime with a red square in the top right corner of the screen element.
>
> This display can be activated/deactivated with the **Display status of variable** property.

3.19 Not updated in the zenon network [N_UPDATE]

Bit number	Display	Set	Available
29	N_UPDATE	automatic	with all drivers

In the zenon network, the status bit is set if the network client loses the connection to the Primary Server or if the variable has the **Only read from Standby Server** property but the Standby Server is not available.

> ☀ **Information**
>
> This status bit is shown in the Runtime with a blue square in the top right corner of the screen element.
>
> This display can be activated/deactivated with the **Display status of variable** property.

INTEGRATION PROJECT

The integration project is a special case. An integration project can be a standalone project that does however contain network projects.

As a result, the integration project becomes the client for subprojects. In this case, the blue dot indicates that the primary server of the subproject has not yet supplied the data.

ADDITIONAL INFORMATION

The following applies for some drivers: The status *Not updated* (*N_UPDATE*) is set if a value has been requested from the hardware, but no valid value could be read.

3.20 Internal standard time [T_STD]

Bit number	Display	Set	Available
30	T_STD	automatic	with all drivers

This status indicates whether the time stamp is in winter time (bit set) or in summer time (bit not set).

This status accompanies the T_INTERN (on page 17) status.

Note: Please also note the status T_STD_E (on page 15) for the external time stamp.

3.21 Cause of Transmission [COTx]

Bit number	Display	Set	Available
32 - 37	COT0 to COT5	automatic	for energy standards

The Cause of Transmission (COT) in accordance with the IEC60870 protocol.

The value of the Cause of Transmission (see **IEC60870-5-101 7.2.3**) is mapped to status bits 32 - 37. Up to 6 COTx bits can thus be set (x represents bit numbers 0 to 5).

For example: the lowest bit of the COT value is shunted to status bit 32 and named *COT0* in zenon.

The complete COT value can be evaluated in the Runtime via a reaction matrix (multi-numeric or multi-binary). For each   COTx bit the value of the cause of transmission is increased as follows:

- ▶ COT0 = 2^0 = 1
- ▶ COT1 = 2^1 = 2
- ▶ COT2 = 2^2 = 4
- ▶ COT3 = 2^3 = 8
- ▶ COT4 = 2^4 = 16
- ▶ COT5 = 2^5 = 32

EXAMPLE

Typical COT values:

Status	Value	Cause of transmission	Short name
COT0	1	*periodic, cyclic/polled*	COT_per
COT1	2	*background scan/integrity*	COT_back
COT0, COT1	1+2 = 3	*spontaneous/reported*	COT_spont
COT0, COT1, COT2	1+2+4 = 7	*activation (command) confirmation*	COT_actcon
COT1, COT3	2+8 = 10	*activation (command) termination*	COT_actterm
COT2, COT4	4+16 = 20	*interrogated by general interrogation*	COT_inrogen

⚡ Information

The Command Processing module uses the states of Cause of Transmission, *N_CONF* and *SE_870* for the **Watchdog timer** of commands.

Note:

▸ Some Energy drivers support COTx status bits, although the protocol itself does not contain COT (e.g. DNP3, IEC850).

▸ Some Energy drivers only support an area restricted to the Runtime monitoring in Command Processing.

You can find details in the corresponding driver documentation.

3.22 P/N-Bit (N_CONF)

Bit number	Display	Set	Available
38	N_CONF	automatic	for energy standards

Signalizes that the controller has confirmed the command as negative. Corresponds to the P/N bit (*positive/negative response*) in the IEC 60870 protocol. During the command in the IEC 61850 too, the negative confirmations of the Select and Operate command are allocated to the *N_CONF* status bit. Applies together with *COTx*: *COT_actcon(7)*, *COT_actterm(10)*.

> **Info**
>
> The Command Processing module uses the *COTx*, *N_CONF* and *SE_870* status for Runtime monitoring of commands.

3.23 Test bit [TEST]

Bit number	Display	Set	Available
39	TEST	automatic	IEC870, IEC850

Signalizes the *Test* status in accordance with the IEC 60870 standard or in accordance with IEC 61850: Quality=*Test*. This status bit can be evaluated in the Combined element and in the Interlocking formula. The evaluation of the reaction matrix is available as a multi-binary or multi-numeric reaction matrix.

3.24 Acknowledge writing [WR-ACK]

Bit number	Display	Set	Available
40	WR_ACK	automatic	Driver specific

Is used by the zenon functions **Write set value** or **Write recipe** to request a write confirmation from the driver.

Note: You can find more detailed information in the Variables manual in the **Checking writing of set values** chapter.

3.25 Writing successful [WR-SUC]

Bit number	Display	Set	Available
41	WR_SUC	automatic	Driver specific

If, for a **Set value** or **Execute recipe** action, a writing confirmation should be requested (WR-ACK (on page 23)), this status bit is set accordingly after writing.

Note: You can find more detailed information in the Variables manual in the **Checking writing of set values** chapter.

3.26 Normal status [NORM]

Bit number	Display	Set	Available
42	NORM	automatic	with all drivers

The normal status is defined in the variable properties and evaluated in the status bit NORM.

3.27 Deviation normal status [N_NORM]

Bit number	Display	Set	Available
43	N_NORM	automatic	with all drivers

For bit variables the driver compares the process status with the defined normal status and writes the result to the status bit N_NORM.

3.28 IEC status: Blocked [BL_870]

Bit number	Display	Set	Available
44	BL_870	automatic	IEC870, IEC850

Signalizes *Blocked*status in accordance with the IEC 60870 standard or in accordance with IEC 61850: Quality=*OperatorBlocked*. The controller reports that the value is blocked for transfer and remains in the status it had before it was blocked. This status bit can be selected in Multi reaction matrices, in Combined elements and in the Interlocking formula.

In VBA the top 32 bits can be polled with **StatusExtValue()**. With **SetValueWithStatusEx()** all 64 status bits can be polled.

3.29 IEC status: Substituted [SB_870]

Bit number	Display	Set	Available
45	SB_870	automatic	IEC870, IEC850 Process Gateway IEC870 Slave

Signalizes *Substituted* status in accordance with the IEC 60870 standard or in accordance with IEC 61850: Quality.Source=*Substituted*. The controller reports that the value no longer comes from hardware but was simulated in the controller. This status bit can be selected in Multi reaction matrices, in Combined elements and in the Interlocking formula.

In VBA the top 32 bits can be polled with **StatusExtValue()**. With **SetValueWithStatusEx()** all 64 status bits can be polled.

3.30 IEC status: Not Topical [NT_870]

Bit number	Display	Set	Available
46	NT_870	automatic	IEC870

Bit number	Display	Set	Available
			Process Gateway IEC870 Slave

Signalizes *Not topical* status in accordance with IEC 60870 standard. The controller reports that the value was not updated on the hardware for a certain period of time or is not available. This status bit can be selected in Multi reaction matrices, in Combined elements and in the Interlocking formula.

In VBA the top 32 bits can be polled with **StatusExtValue()**. With **SetValueWithStatusEx()** all 64 status bits can be polled.

3.31 IEC status: Overflow [OV_870]

Bit number	Display	Set	Available
47	OV_870	automatic	IEC870, IEC850

Process Gateway IEC870 Slave |

Signalizes *Overflow* status in accordance with the IEC 60870 standard or in accordance with IEC 61850: Quality=*Overflow*. The controller reports that the value is outside the predefined bandwidth or that there is a counter overrun. This status bit can be selected in Multi reaction matrices, in Combined elements and in the Interlocking formula.

3.32 Command step: Select [SE_870]

Bit number	Display	Set	Available
48	SE_870	automatic	for energy standards

The bit is used in energy protocols in conjunction with the **Select before operate** function and serves to make a distinction between the Select- and Execute/Operate-step of a command. Applies together with *COTx: COT_act(6), COT_actcon(7)*.

Values:

- ▸ *0 = execute*
- ▸ *1 = select*

> 💡 **Info**
>
> The Command Processing module uses the *COTx*, *N_CONF* and *SE_870* status for Runtime monitoring of commands.

3.33 External time stamp invalid [T_INVAL]

Bit number	Display	Set	Available
49	T_INVAL	automatic	IEC870, IEC850 Process Gateway IEC870 Slave

The *invalid time* status is set by a driver if the real-time stamp received by the controller is marked as invalid. In this case, the zenon modules use the received value of the variable with the local time stamp of the computer. This status bit can be selected in Multi reaction matrices, in Combined elements and in the Interlocking formula.

> ⚠ **Attention**
>
> The status of a variable can be either *T_EXTERN* or *T_INTERN*.
>
> ▸ If a value has the status *T_EXTERN* and no *T_INVAL*, the value of the the external time stamp is used as a time stamp.
> The external time stamp is the time value that the controller has provided together with the value at the driver.
>
> ▸ If a value has the status *T_INTERN* or has *T_EXTERN* and *T_INVAL*,, the value of the internal time stamp is used as a time stamp.
> The internal time stamp is the time point at which the driver has received the value from the controller.
>
> Based on this, all zenon modules sort the values.
>
> ▸

3.34 Breaker tripping detected [CB_TRIP]

Bit number	Display	Set	Available
50	CB_TRIP	Automatic from command processing	with all drivers

The status bit takes the value 1 if breaker tripping detection has been activated in the Command processing module and breaker tripping is detected.

The detection occurs if:

▸ the value of the response variable changes from *<>0* to *0* and

> ‣ the status bit *CB_TR_I* (on page 27) (51) is not *1*

> ‣ the status bit *PROGRESS* (on page 13) (10) is not *1*

> ‣ The value of the response variable is already defined (i.e. it is not the initial value for this variable)

A change to the value of the variable from *0* to *<>0* resets this bit again. This bit is also reset if the *PROGRESS* (on page 13) status bit (10) is active. A change to *CB_TR_I* (on page 27) does not have an influence on a breaker trip that has already been detected.

This status bit can be explicitly modified with the "**Status**", "**Status on**" or "**Status off**" action in the command processing. The status bit contains this status up until the value of the variable switches from *<>0* to *0* or from *0* to *<>0*. A requirement for this is that the *CB_TR_I* status bit is 0. This means that breaker tripping detection is not suppressed.

NETWORK

In the network the evaluation is carried out on the server which is responsible for the process. The evaluation is indeed also carried out on the Standby Server but the result is not written to the status bits. The current state of *CB_TR_I* and *CB_TRIP* are synchronized when the Standby Server is started or reconnected. If the response variable is a variable on a local computer, the evaluation is also carried out on the client computer.

3.35 Breaker tripping detection inactive [CB_TR_I]

Bit number	Display	Set	Available
51	CB_TR_I	automatic as result of the formula of property **Suppress detection** in the command processing	with all drivers

Shows that breaker tripping detection is suppressed in command processing for the variable.

The new calculation is triggered in the event of a status change or value change of a variable if this has been defined in the command processing for calculations in formulas. The formula is not evaluated and the result is not written to the status if:

> ‣ one of the variables in the formula does not have a defined value and status yet
> or

> ‣ one of the variables is invalid (INVALID).

This status bit can be explicitly modified with the "**Status**", "**Status on**" or "**Status off**" action in the command processing. The status bit will then remain in this state until the result of the formula changes and a different status bit status occurs as a result.

Attention: The detection of a breaker tripping *(CB_TRIP)* and the setting breaker tripping detection inactive at the same time does not work.

Example: The "*RM.Value<1*" will detect breaker tripping *(CB_TRIP = 1)*, because *CB_TR_I* is not yet active at the time of the value change.

NETWORK

In the network the evaluation is carried out on the server which is responsible for the process. The evaluation is indeed also carried out on the Standby Server but the result is not written to the status bits. The current state of *CB_TR_I* and *CB_TRIP* are synchronized when the Standby Server is started or reconnected. If the response variable is a variable on a local computer, the evaluation is also carried out on the client computer.

3.36 Value out of the valid range [OR_DRV]

Bit number	Display	Set	Available
52	OR_DRV	automatic	IEC850

Signalizes *Out of Range* in accordance with the IEC 61850 standard, corresponds to Quality=*OutofRange*. The controller reports that the value is outside of the predefined measurement range. This status bit can be selected in the Combined element and in the Interlocking formula.

3.37 ClockNotSynchronized [T_UNSYNC]

Bit number	Display	Set	Available
55	T_UNSYNC	automatic	IEC850

Signalizes *ClockNotSynchronized* information in *TimeQuality* in accordance with the IEC 61850 standard. The controller informs you that its clock is not synchronized with an external time source.

This status bit can be selected in the combined element.

💡 **Information**

You can find further information about this in the documentation for the IEC850 driver in the Quality, time stamp and status bits of the variable chapter.

3.38 Not recorded in the Process Recorder [PR_NR]

Bit number	Display	Set	Available
54	PR_NR	automatic	For the **Process Recorder** in playback mode

This status bit shows in the Runtime that the variable has not been recorded during playback in the **Process Recorder**. No value is therefore known in the playback.

💡 Information

This status bit is shown in the Runtime with a yellow square in the top right corner of the screen element.

This display can be activated/deactivated with the **Display status of variable** property.

The display of this yellow square is treated as a higher priority than the other status displays (red or blue).

WRITE PROTECTION

This bit is only issued by the **Process Recorder**. Because the bit is for the identification of non-recorded variables during playback, the bit must not be set the other way.

This means that the following functionality is not possible:

▸ Forwarding of the bits through the zenon allocation.

▸ Manual changes through:

　　▸ Recipegroup Manager

　　▸ zenon API:

　　　e.g.: Value changes, as configured in the **Non linear value adjustment with macros** property.

4 Usage

4.1 Reaction matrices

The reaction matrices are the most sophisticated way to deal with statuses.

Here single statuses can be evaluated and cause alarms. Basically a status can be treated like a value. As with a value it is also possible with a status to cause certain actions.

As for example:

- ▶ Generate alarm
- ▶ Generate entry in CEL
- ▶ Execute function
- ▶ Flashing
- ▶ Color change
- ▶ Print

Example:

If a value becomes invalid, it gets the state INVALID (on page 15). This happens when the driver loses the connection to the PLC. You can create a reaction matrix, which causes an alarm, as soon as the value becomes invalid (INVALID). There is the possibility to evaluate these alarms afterwards.

4.2   Dynamic screen elements

All dynamic screen elements offer the possibility to display the status of the linked variable. This is done with the property **Display status of variable**.

It is then possible to display the status in the Runtime with the right mouse key.

In the Runtime the status is displayed by clicking the dynamic element with the right mouse key. As long as the mouse button stays pressed down, the variable name and the current status of the variable is displayed.
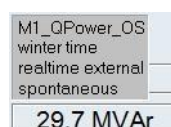
If the status display is activated, some states are are shown in the top right corner of the element by a small colored rectangle, such as red for *INVALID* or *ALT_VAL*:
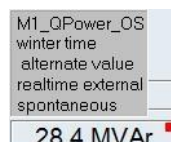
This indicates, that the value no longer is spontaneous. By clicking the element with the right mouse key it becomes obvious, that somebody changed the status to the alternative value.

4.3 Combined element

The Combined Element offers the possibility to evaluate and graphically display the stati. In difference to the Reaction Matrices, this evaluation only effects the graphical display in the screen.

That means:

1	changing the color
2	displaying another symbol
3	displaying another text
4	displaying another bitmap
5	changing the color of a symbol

4.4 Report Generator

Also the Report Generator offers the possibility to evaluate the stati.

This is done by using the function **variabler** with the status as a parameter.

The syntax is the following:

=variabler(Temperature_outside,status)

In the Runtime the display can look like below.

Temperature_outside	21ºC	ALT_VAL (on page 19)

4.5 Recipegroup Manager

The Recipegroup Manager offers the possibility to read, display and change all stati, as long as they are not set by the process (driver). To set status bits, go to dialog Editing a recipe and use column Actions.

4.6 VBA

In VBA there are all possibilities to access and change all stati, as long as they are not set by the process (driver).

4.7 Process Recorder