State 02/2022

MDT Solution proposal

Time delayed sequential switching of several outputs with the logic module.

Possible applications:

If you like to switch several outputs one after the other in a specific time, e.g. to control the valves of a garden irrigation system, this is called cascading.
In this example, we switch 8 valves over a time cycle in a loop. Switching on again changes to the next valve, switching off turns off all valves.

In this solution proposal, 5 different functions are presented:
Converting of data point types · Universal-calculator · Cyclic sending · Universal-Logic · Logic gate

Used devices:

MDT Logic Module
SCN-LOG1.02

Content

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Function 1: Converting of data point types

The first function is the format converter. As step switch, this converts a 1-byte input object into 8 individual 1-bit objects, which represent the output objects for the valves.

Main function:	Converting of data point types
Function:	1Byte => 8 x 1Bit
Structure of Byte value:	level switch

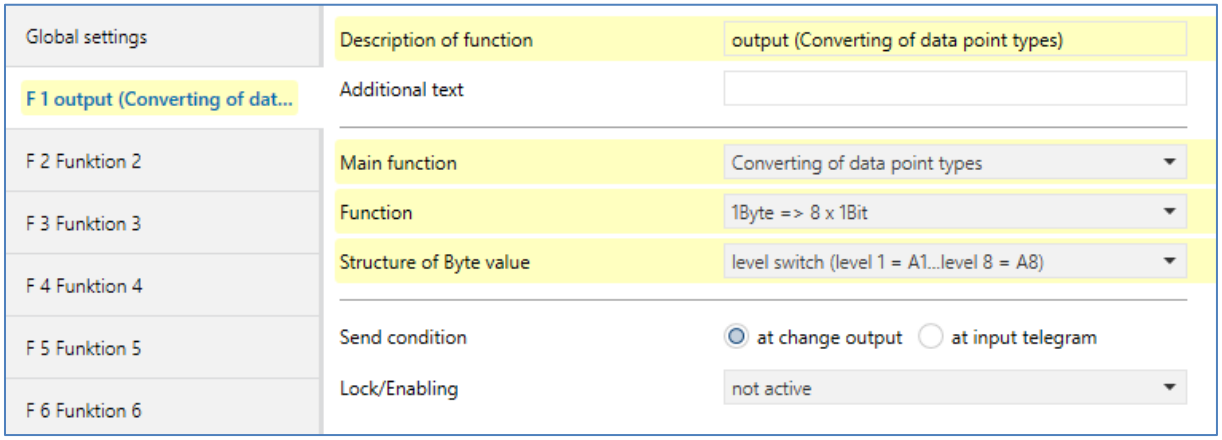

Figure 1.1

Figure 1.1 shows the settings of function 1.

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Function 2: Universal calculator

The second function is the universal calculator. This is used as a counter to preset the respective step to the input of the format converter described in function 1. It adds the fixed value "1" to the input object 1 with each clock pulse. As a result, one valve is switched further with each clock pulse.

Main function:	Universal Calculator
Operation:	input 1 + input 2
Data point type:	DPT 5.005 1Byte decimal value (0…255)
Input 2:	fix value
Value:	1
Data point type:	DPT 5.005 1Byte decimal value (0…255)
Send condition:	not automatic

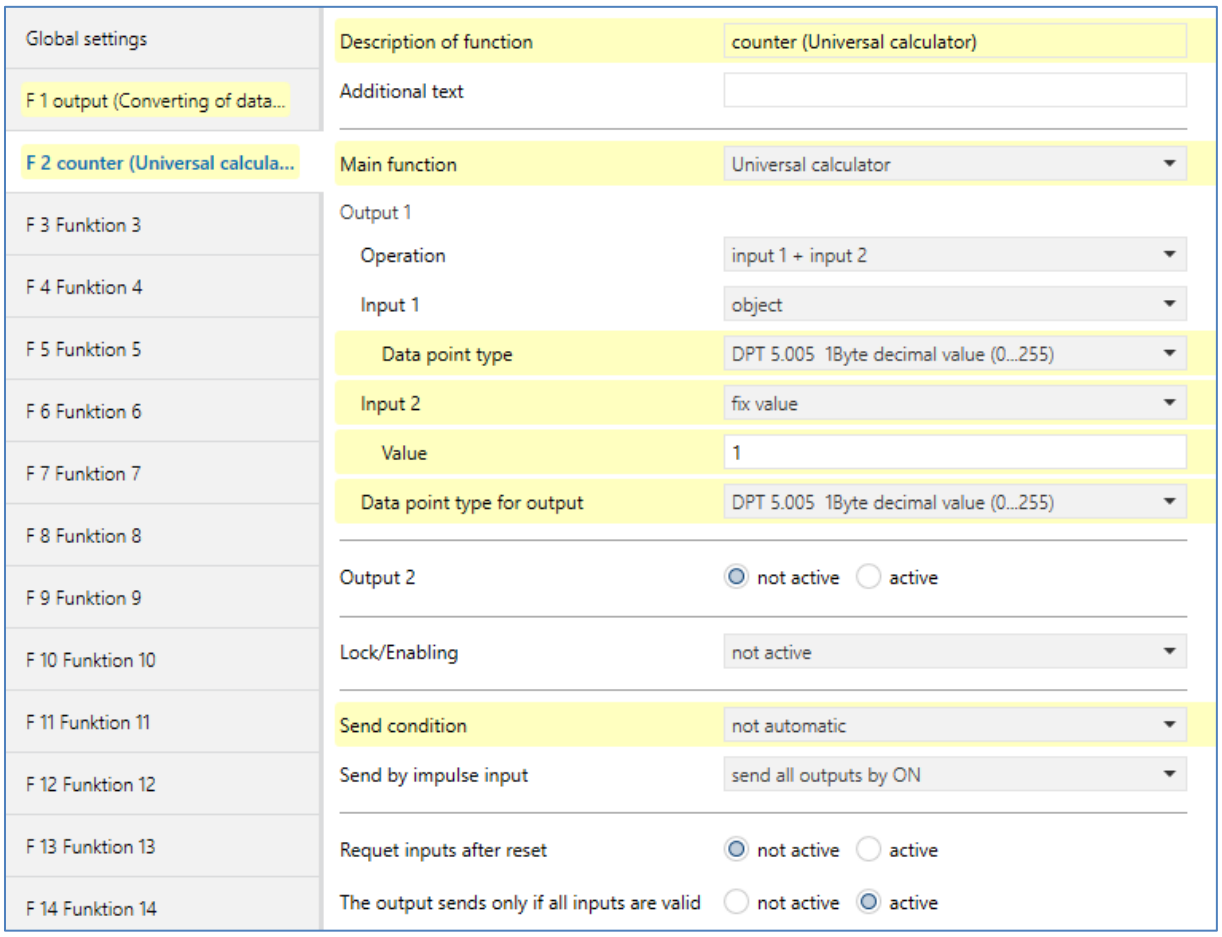

Figure 2.1

Figure 2.1 shows the settings of function 2.

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Function 3: Cyclic sending or request

Function 3 provides the clock pulse for the universal calculator, this is also the duty cycle for the valves. In this example, the duration for testing is 3s. You can enter the actual duration here in seconds, minutes or hours. In order to be able to switch the clock pulse on and off, we also activate the "enabling at value 1" object.

Main function:	Cyclic sending or request
Value	send cyclic
Data point type:	DPT 1.* 1Bit
Value selection	fix value
Value:	value 1
Send all:	3s (duty cycle of the valves)
Lock/Enabling:	enabling at value 1

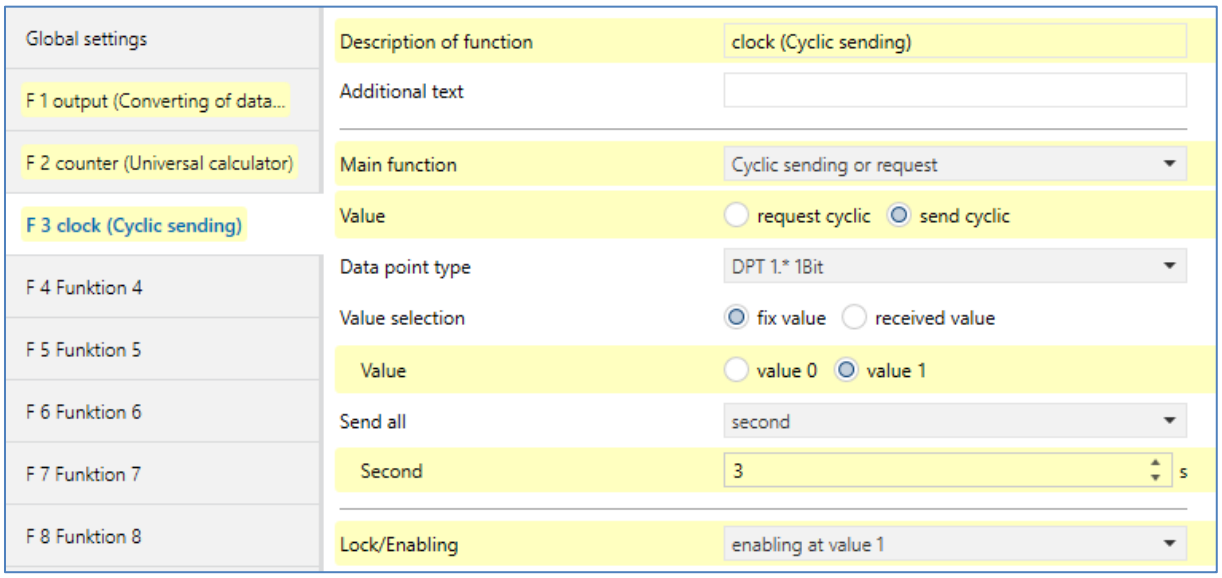

Figure 3.1

Figure 3.1 shows the settings of function 3.

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Function 4: Universal Logic

To return after the eighth valve, we need another function. The universal logic from function 4 provides the loop for the counter. As soon as the counter has added up to 9, the universal logic resets it to 1 and valve 1 opens.

Main function:	Universal Logic
IF:	
Select data point type for input 1:	DPT 5.005 1Byte decimal value (0…255)
Comparative value via:	parameter
Comparative value:	9 (x valves + 1)
THEN:	
Selection data point type for output:	DPT 5.005 1Byte decimal value (0…255)
Value if output True/1:	1

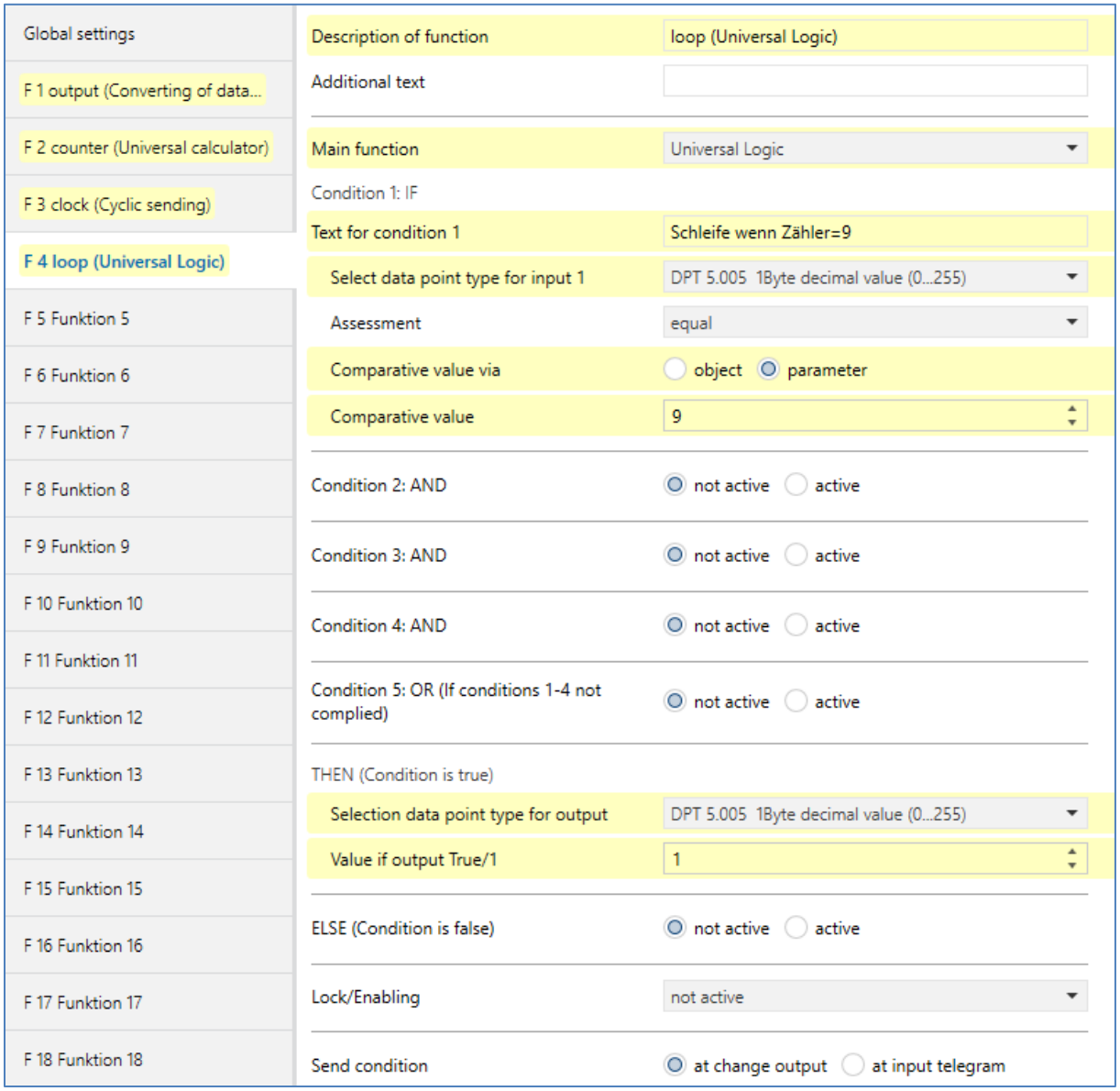

Figure 4.1

Figure 4.1 shows the IF/THEN settings of the universal logic

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Function 5: Logic gate/ Inverter

To be able to start and stop, we need one last function. In function 5, the "logic gate/ inverter" is used to either set the counter to "1" for starting or to "0" for stopping and switching off via a 1-bit input object, for example from a timer or a button.

Main function:	Logic gate/ Inverter
Object type for output:	value 0-255
Value if output True/1:	1
Value if output False/0:	0

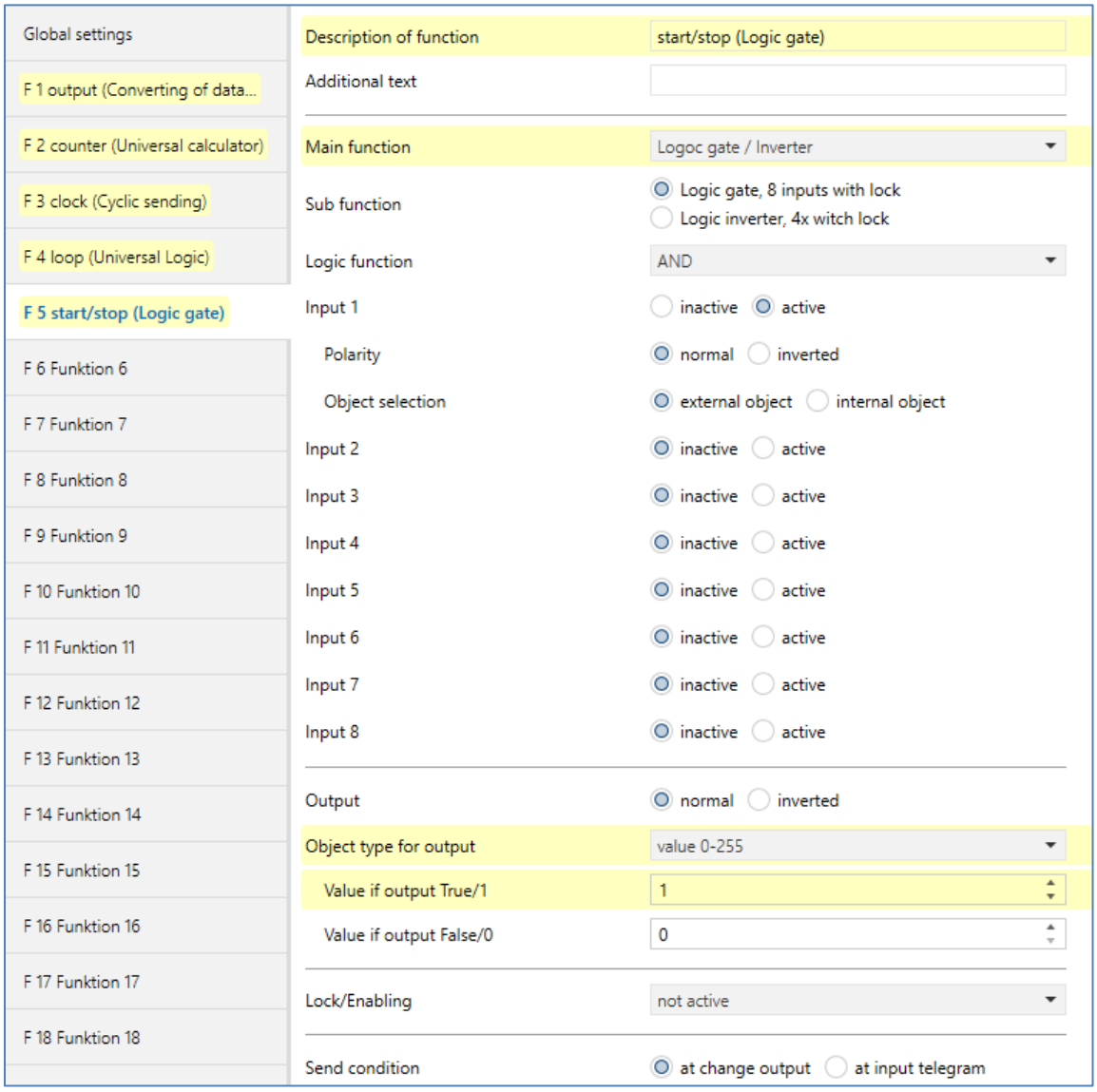

Figure 5.1

Figure 5.1 shows the settings of function 5 to generate a 1-byte output value from the 1-bit input.

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Required group addresses and links

The group addresses 0/0/1 - 0/0/8 reflect the valves. Only 3 additional group addresses are required for the actual control. To switch the control on and off, a "1" or a "0" is sent to the group address 0/0/11. When the control is switched on, this address releases the clock from function 3 and sets the counter to "1" via function 5. "Output valve 1" (0/0/1) is activated. The cycle begins and the valves switch after the set time. Switching on again immediately switches to the next valve, switching off via this group address switches off the valves and the cycle is switched off.

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type
0	F 1 output (Converting of data p...	Format converter level 1 Output	output valve 1	0/0/1	1 bit	C	R	-	T	-	boolean
1	F 1 output (Converting of data p...	Format converter level 2 Output	output valve 2	0/0/2	1 bit	C	R	-	T	-	boolean
2	F 1 output (Converting of data p...	Format converter level 3 Output	output valve 3	0/0/3	1 bit	C	R	-	T	-	boolean
3	F 1 output (Converting of data p...	Format converter level 4 Output	output valve 4	0/0/4	1 bit	C	R	-	T	-	boolean
4	F 1 output (Converting of data p...	Format converter level 5 Output	output valve 5	0/0/5	1 bit	C	R	-	T	-	boolean
5	F 1 output (Converting of data p...	Format converter level 6 Output	output valve 6	0/0/6	1 bit	C	R	-	T	-	boolean
6	F 1 output (Converting of data p...	Format converter level 7 Output	output valve 7	0/0/7	1 bit	C	R	-	T	-	boolean
7	F 1 output (Converting of data p...	Format converter level 8 Output	output valve 8	0/0/8	1 bit	C	R	-	T	-	boolean
9	F 1 output (Converting of data p...	Format converter Input	counter	0/0/9	1 byte	C	-	W	T	U	ratio (0..255)
10	F 2 counter (Universal calculator)	Universal calculator Input 1	counter	0/0/9	1 byte	C	-	W	T	U	ratio (0..255)
14	F 2 counter (Universal calculator)	Universal calculator Output 1	counter	0/0/9	1 byte	C	R	-	T	-	ratio (0..255)
17	F 2 counter (Universal calculator)	Universal calculator Impulse input	clock	0/0/10, 0/0/11	1 bit	C	-	W	T	U	switch
20	F 3 clock (Cyclic sending)	Send value cyclic	clock	0/0/10	1 bit	C	R	-	T	-	1-bit
28	F 3 clock (Cyclic sending)	Logic Enabling	enabling clock	0/0/11	1 bit	C	-	W	-	-	enable
30	F 4 loop (Universal Logic)	Universal Logic Input 1	clock	0/0/9	1 byte	C	-	W	T	U	ratio (0..255)
39	F 4 loop (Universal Logic)	Universal Logic Output	clock	0/0/9	1 byte	C	R	-	T	-	ratio (0..255)
40	F 5 start/stop (Logic gate)	Logic Input 1	enabling clock	0/0/11	1 bit	C	-	W	T	U	boolean
49	F 5 start/stop (Logic gate)	Logic Output	clock	0/0/9	1 byte	C	R	-	T	-	ratio (0..255)
244	Date/Time	Receive			8 bytes	C	-	W	-	-	date time

Figure 6.1

Figure 6.1 shows the required group addresses and the linkage of these.

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Display of a complete pass with counter reset

1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$01 | 1
1.1.1	SCN-LOG1.02 Logic Module	0/0/10	clock	1.001 switch	$01 | On
1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$01 | 1
1.1.1	SCN-LOG1.02 Logic Module	0/0/1	output valve 1	1.002 boolean	$01 | True
1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$02 | 2
1.1.1	SCN-LOG1.02 Logic Module	0/0/1	output valve 1	1.002 boolean	$00 | False
1.1.1	SCN-LOG1.02 Logic Module	0/0/2	output valve 2	1.002 boolean	$01 | True
1.1.1	SCN-LOG1.02 Logic Module	0/0/10	clock	1.001 switch	$01 | On
1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$03 | 3
1.1.1	SCN-LOG1.02 Logic Module	0/0/2	output valve 2	1.002 boolean	$00 | False
1.1.1	SCN-LOG1.02 Logic Module	0/0/3	output valve 3	1.002 boolean	$01 | True
1.1.1	SCN-LOG1.02 Logic Module	0/0/10	clock	1.001 switch	$01 | On
1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$04 | 4
1.1.1	SCN-LOG1.02 Logic Module	0/0/3	output valve 3	1.002 boolean	$00 | False
1.1.1	SCN-LOG1.02 Logic Module	0/0/4	output valve 4	1.002 boolean	$01 | True
1.1.1	SCN-LOG1.02 Logic Module	0/0/10	clock	1.001 switch	$01 | On
1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$05 | 5
1.1.1	SCN-LOG1.02 Logic Module	0/0/4	output valve 4	1.002 boolean	$00 | False
1.1.1	SCN-LOG1.02 Logic Module	0/0/5	output valve 5	1.002 boolean	$01 | True
1.1.1	SCN-LOG1.02 Logic Module	0/0/10	clock	1.001 switch	$01 | On
1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$06 | 6
1.1.1	SCN-LOG1.02 Logic Module	0/0/5	output valve 5	1.002 boolean	$00 | False
1.1.1	SCN-LOG1.02 Logic Module	0/0/6	output valve 6	1.002 boolean	$01 | True
1.1.1	SCN-LOG1.02 Logic Module	0/0/10	clock	1.001 switch	$01 | On
1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$07 | 7
1.1.1	SCN-LOG1.02 Logic Module	0/0/6	output valve 6	1.002 boolean	$00 | False
1.1.1	SCN-LOG1.02 Logic Module	0/0/7	output valve 7	1.002 boolean	$01 | True
1.1.1	SCN-LOG1.02 Logic Module	0/0/10	clock	1.001 switch	$01 | On
1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$08 | 8
1.1.1	SCN-LOG1.02 Logic Module	0/0/7	output valve 7	1.002 boolean	$00 | False
1.1.1	SCN-LOG1.02 Logic Module	0/0/8	output valve 8	1.002 boolean	$01 | True
1.1.1	SCN-LOG1.02 Logic Module	0/0/10	clock	1.001 switch	$01 | On
1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$09 | 9
1.1.1	SCN-LOG1.02 Logic Module	0/0/9	counter	5.005 ratio (0..255)	$01 | 1
1.1.1	SCN-LOG1.02 Logic Module	0/0/1	output valve 1	1.002 boolean	$01 | True
1.1.1	SCN-LOG1.02 Logic Module	0/0/8	output valve 8	1.002 boolean	$00 | False

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