Down Hour Counter "CB open"

An application for a down hour counter can be implemented to accumulate the total number of hours that the circuit breaker is open. This is similar to the operating hours counter which however considers the circuit breaker closed state.

As an alternative to the circuit breaker auxiliary contacts, the current threshold may be monitored to detect when it is below a set pole open threshold. A CFC chart "Set points" is already included in the standard parameter sets for this purpose. It generates an I< annunciation when one of the three phase currents drops below a set threshold (settable in the matrix under Set Point I<). Ideally the OR gate in the "Set points" CFC chart should be replaced by an AND gate so that the open circuit breaker position is indicated when all three phase currents are below the pole open current threshold.

In the Matrix two single point annunciations are required for this implementation:

One signal is used to reset the counter (*Reset DHC*, refer to Figure 1) and a further signal (*DHC*>*Limit*) is used to generate an alarm when a predefined number of hours is exceeded.

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Settings - Maski	ng I/O (Config	uration Matrix) - 30_10	_04 / Down Hour Counter / 75J64 V4.6 CFC	DHC/75364	1																
		Information				Source Destination															
	Number	Number Display text Long text Tyr				F S C			LEDs Buffer							iffer	SC				
					Ы			БО	1	2 3	4	5 6	7	8	9 1	10 11	12	13 14	0	S T	
David Have Cauch		DHC>Limit	DHC>Limit	SP			X			U									00		
Down Hour Count		Reset DHC	Reset DHC	SP															00		X
Device						×	×							×					×		××
P.System Data 1																			×		×
Osc. Fault Rec.							×												×		××
	00356	>Manual Close	>Manual close signal	SP																	Х
	02720	>Enable ANSI#-2	>Enable 50/67-(N)-2 (override 79 blk)	SP															00		Х
	00533	IL1 =	Primary fault current IL1	VI															Х		
	00534	IL2 =	Primary fault current IL2	VI																00	Х
	00535	IL3 =	Primary fault current IL3	VI																00	Х
P.System Data 2	00501	Relay PICKUP	Relay PICKUP	OUT																0	Х
	00511	Relay TRIP	Relay GENERAL TRIP command	OUT																0	ΧХ
	00561	Man.Clos.Detect	Manual close signal detected	OUT															00		
	04601	>Brk Aux NO	>Breaker contact (OPEN, if bkr is open)	SP															00		X
	04602	>Brk Aux NC	>Breaker contact(OPEN, if bkr is closed)	SP															00		X
	00126	ProtON/OFF	Protection ON/OFF (via system port)	IntSP															00		

Figure 1: Matrix with filter "Indications and Commands only"

In addition 2 measured values are required (refer to Figure 2):

-Type MVU: Indication of the current hour count (*DHC*=)

-Type LVU: Threshold definition of the maximum number of hours "CB open" (Limit DHC)

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Settings - Maskin	g I/O (Configu	ration Matrix) - 30_10_	_04 / Down Hour Counter / 75364 V4.6 CFC DF	IC/ 75 364	1						
	Information						Source	Destination			
	Number	Display text	Long text	Туре		SC	Measured value	Measured	S	С	Metered value
								value window			window
Down Hour Count		DHC=	Down Hour Counter =	MVU		X		User Defined			
		Limit DHC	Limit DHC	LVU				Set Points(MV)		Х	

Figure 2: Matrix with filter "Measured and metered values only"



In the CFC chart (overall chart refer to last page) the start input to the counter is the first condition that is evaluated. This is the "CB open" state=">Brk Aux NO" (additionally "CB closed"="Brk> Aux NC" may not be present at the same time) or the condition that I is smaller than a set "pole open" threshold.



Figure 3: Starting condition

The signal from the OR gate is routed to the BLINK module (see Figure 4 below). The setting 500ms ON and 500ms OFF state is applied, i.e. when a signal is applied at the ENABLE input the output of the BLINK module provides a pulse per second signal (with ON state of 500ms).

The first counter module (COUNTER) summates these pulses until the "END" value of 3600 is reached. After 3600 sec = one hour, an output on the OVERFLOW terminal of the module is generated. The COUNTER is automatically retriggered by the falling edge of the signal at the CLK input. It will continue counting and again provide an OVERFLOW signal after 3600 further input pulses. These OVERFLOW signals are now accumulated by the second COUNTER module. The output at the VAL terminal corresponds to the number of hours that the circuit breaker was open. By means of a DINT_TO_ REAL module this value may be visualised as a measured value, for example in the user defined measured value window (Display: MENU \rightarrow Measurement \rightarrow User Defined).



Figure 4: CFC chart with BLINK and COUNTER module

With a reset signal, for example derived from a binary input, the COUNTERS can be reset at any time. By means of a TIMER module it can be ensured that even a very short reset impulse is extended to ensure that the reset condition is securely processed in the COUNTER modules (refer to Figure 9).





Figure 5: Output of the CFC chart

In addition, the measured value indicating the number of hours at the output of the DINT_TO_REAL module (Figure 5) may also be compared with a variable threshold. For this purpose this value output is routed to a further COMPARE module. The setting for the comparison threshold with the COMPARE module can be set in the matrix by means of a threshold value LVU (*Limit DHC*, refer to Figure 2). Advantage: The CFC chart does not have to be recompiled following every setting change of the threshold. Click on the *Limit DHC* threshold value in the matrix with the right mouse button; the limits can be set here. 100% corresponds to 1h, e.g. threshold value 50h is set with 5000%.

Object properties - Limit DHC - LV	U		X
Measured value description Defaul	selection		
Default selection during first start	ир: 🔽		
Setting value during first startup:		5000	
Default selection during restart:			
Celling using during restart.		5000	
Setting value during restart:	1		
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UKUbernehmen		Abbrechen	Hilfe

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Figure 6: Object properties of Set Point LVU

Object properties - Limit DH	C - L¥U		×
Measured value description	Default selection		_
- Display			
Dimension:	%		
Conversion factor: (100% corresponds to)	100		
Decimal places:	1 🗄		
OK Übernehmer		Abbrechen Hilfe	

Figure 7: Object properties of Set Point LVU

Under index "Measured value description" the standard settings are maintained.

Object properties - DHC= - MVU	8	×
Measured value description		
Display Dimension:		
Conversion factor: 100 (100% corresponds to) Decimal places: 1		
OK Übernehmen Abbrechen	Hilfe	

Figure 8: Object properties measured value MVU

For the measured value the dimension "hour" may be applied.



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Figure 9: Overall CFC chart

