Protocol description 2-wire-interface for electronic circuit breakers PM-/PC-series

																	Signal stream for the electronic circuit breakers																																								
Description	Byte 1 Byte 2						Byte 2 Byte 3									Byte 4 Byte 5										Byte 6								Ву	te 7					Byt	Byte 9							Byl									
	0	1 2 3 4 5 6 7 8						8 9 10 11 12 13 14 15 16					17 18 19 20 21 22 23 24					25	25 26 27 28 29 30 31 32				2 33	33 34 35 36 37 38 39 40			0 41	L 42	12 43 44 45 46 47 48			49 50 51 52 53 54 55 5					56 /	57 5	8 59	65 66	5 67	68	69 7) 71	72	73 74	74 75 76										
Task in the PLC -	• •		4 7	8 9 20 11	12 18	34 35 34	17 18 19	20 21 22		28 27 28	2 20 25	³² 33 54					er es ,	0 52 52	10 13 M	55 56 5	54 ⁵³	40 45 45	- 43 - 44	65 66	0 H H	n n n	71 71	78 78 77	78 79 80	82 80 g	** ** **	n 17 1	AX AN 90		N 8	94 97 9	N 99 303	363 369 10	204 225	108 107 108	329 133 111	112 113 114	134 115 134	107 108 109	100 101 10	122 128 124	125 126 127	7 128 129 1	80 131 132	183 134 135	106 107 1	8 139 140	142 143	144 145 14	1 107 148 1	149 153 251	132 153
35 m to		ЦЦ				Ц		14'	ЦЦ	LLL	40		_			Ц	ЦЦ			니니	┥└		Ц	_ L		Ч	Цι	┛┕							┥└			_ L		Ц			Ц	40	4 Ц	ЦЦ	_ L	14	ЦЦ	┥└	4 Ц	Ц	┥└	Ц	니니	니니	╷└╴
Data stream from PLC to Davisor	0	0 0	1	0 0	1	0 1	1	1		0 1		0 0	0	0 0	0	0	0 0	0	0 0		0	0	0 0		0	0 0			0 (0	0				0	0 0		0	0 0			0 0			0 0			0 0	0			-			<u> </u>	
The lower Manchester encoding is decrypted in the circuit breaker as follows.	-	0 0	1	0 0	1	0 1				- 1	1	<u> </u>		0 0	0	-	0 0		0 1		0	0	0 0	, 0	0	0 0		0	0 0	, 0	0	0	0 1	0	10	0	0 0		0	0 (, 0		0 0			0 0		0	0 0	0		0 0	0	0			<u> </u>
DLC Output (C1 Insut Circuit Develope)			_												-						-														-	-										-										<u> </u>	
Auxiliary Clock YOP Data Bits:	Sync Bit	lit7 lit6	BitS	Bit 4 Bit 3	Bt 2	Bet 1 Bet	:0 Bit7	016 01	25 084	Bit3 Bit2	2 Bt1	Bit O Bit	7 Bit 6	Bit5 Bit4	Bit 3	Bt 2 1	ati Bito	Bit 7	Bit6 B	85 884	Bt 3	Bit 2	Det 1 Det	0 883	Bit 6	BRS BR	14 88	3 Bt2	Bel B	:0 Bit 7	/ Bt6	Bt 5	Bit 4 Bi	t3 Bt2	Bet 1	Bet O	Bit 7 Bit	6 8/15	Det 4	Det 3 D	12 8/11	Bit 0	Bit7 Bit	8 Bes	Bit 4	Bit3 Bit	2 Bit1	880	Bt7 Bt6	Bes	Bit 4	Dit 3 Dit	Be1	Bet O D	at7 Bit6	nes	BR4
A digital output of the controller sends the Manchester coding to the circuit	always 0	annel 8 Channel	Channel 6	Channel S Channel I	4 Channel 3 4	Channel 2 Chann	ori 1 per	Protocol Que	V Vitual	Cher	See month					Ч					┥└─			- L	-1																			ᆛᅛ	14									-		-1 -1	
breaker via "S1". This coding specifies which output channel should be switched on or off. The S1 input also has a sum reset function, a 24V signal							(0n/04)	(short/ of Co long) (On)	orrent Selector OT) (On/OT)	(Cry/Of	4		Long	rotocol:	Auxilia	v Clock			A	uxiliary		hr				Auxiliar		kor																												1 1	í
must only be applied for> = 0.5 seconds to trigger a reset.			hann	ls On/Off	Byte				Configura	ation Byt	æ		Sho	t Protoc	ol: Chec	ksum		Virtu	al Currei	nt Selec	tor Swi	itch Cha	nnel 1	Virt	tual Curr	ent Sele	ector S	witch C	nannel 2																											11	i i
										-	'																																	'													<u> </u>
PLC Input (S2 Output Circuit Breaker)		Bit 7 Bit 6	885	Bit 4 Bit 3	Bit 2	Bit 1 Bit	t0 Bit7	Dit 6 Di	45 Bit 4	Dit 3 Dit 2	2 Bit1	Dit O Dit	7 Bt6	Dit 5 Dit 4	Dit 3	Bit 2	sit 1 Bit O	Bit 7	Dit6 D	t 5 Bit 4	Bit 3	Bit 2	Bit 1 Bit	0 Bit 7	Bit 6	Bit 5 Bit	14 10	3 Bit 2	Dit 1 Di	t0 Bit 7	7 Bit 6	Bit 5	Dit 4 Di	t3 Bit2	Dit 1	Bit 0	Bit 7 Bit	6 BitS	Bit 4	Dit 3 D	2 8/11	Bit 0	Bit7 Bit	6 BitS	Bit 4	Dit 3 Dit	2 811	Bit O	Bit 7 Bit 6	8115	Bit 4	Dit 3 Dit	0it 1	Bit 0	nt7 Bit6	/ Bt5	Bit 4
Data Bits, Valid on the Falling Clock Edge: The circuit breaker internals survivorities to this and at the same time sends	0	0 0	1	0 0	0	0 1	1		0	0 1	1	0 1	1	0 0	0	0	0 0	0	0 (0	1	0	0 0	0	0	1 0	0 0	0	0 0) 0	0	1	0 0	0 0	0	0	0 0	0	1	0 0	0	0	0 0	0	1	0 0	0	0	0 0	0	1	0 0	0	0	0 0	0	1
back the status (on/off and error status) of all channels via "52". Optionally, in addition to the module input values the actual firming current and the	always 0	Decrotio	Channel 6	of the Ch	Chansel 2 0	Channel 2 Channel	nel 1 Channel 8	Channel? Chan	-nel 6 Channel 5	Channel 4 Channel	-si3 Channel 2	Channel 1	Long Prot	ocol: Cu	rent Int	out Vol	tage				<u>ا</u>				· ·	. 1		۱.					1		1				1 1		1				1 1		1	·	1		1 1		1			1	
set current value of each circuit can be queried, see "Extended protocol". The		peraun	States	or the cha	anneis.	017011	1 51	OI Statu	ises. Over	currenty	mppeu	· /	Sho	rt Protoc	ol: Chec	ksum		! .	I ne se octual fle	et nomi	nal curi	rent or	1	1	actual	set non	ninal c	urrent c	r ol 2	1						ļ												1									
coded. In order to avoid false signaling due to program run times or delays of							<u>ri</u>					_	~~					i		wing c	ment	channel	-		actual	lowing	currer	it chain	1C1 2																												
the UDs in a PLC, it is possible to append a checksum as the last byte in the protocol. For this purpose, the circuit breaker must be informed via the					5	Short Pr	otocol				Short	Protocol	without	Checksu	n																																										
configuration byte that a data stream with a subsequent checksum has been sent. Set configuration byte Bit2 to high to activate checksum monitoring.	without Checksum Short Protocol A stop bit comes after the 16th bit Short Protocol with Checksur													scol with Checksum																																											
After the user data and possibly the checksum has been transmitted, the circuit breaker sends a stop bit with a duration of 1.5 clock cycles. While the	- 1							wi	<u>ith</u> Check	sum	for 1.5	switchi	ng cycles.			A	stop bil	comes	s arter tr	ie 24th	DIC TO																																				
breaker is sending the stop bit, the PLC cannot send another bit.																																																									
												1						1												Lo	ong Prot	tocol <u>w</u>	vithout	Checksu	ım																						
																	Y																																								
	i																		Under Standard Standard Standard Standard Long Protocol with Checksum																																						
Data from PLC to Device (S1)	Byte 1: Switch Channels On/Off							Byte 2: Configuration Byte					Byte 3: Auxiliary Clock				The fuse requires an auxiliary clock via the S1 input																																								
	With the first byte the channels							Bit 7: On/Off - Set state (yes/no)					The fuse requires an auxiliary clock				as long as the fuse transmits data via the S2 output to the PLC.																																								
	can be switched on (HIGH)						MGH: The On/Off state of the channel that was activated/deactivated in the previous byte is used. I MM: The On/Off state of the channel that was				via	via the S1 input as long as the fuse					Verbal Concept Collector Switch Rules 4, 11																																								
	or switched off (LOW).						activated/deactivated in the previous byte is <u>not</u> used.					itra	transmits data via the S2 output					Virtual current selector switch byte 4 - 11 (Note: Oh) (for fuses without a mechanical current selector switch																																							
	(Rit 7) must be set in the						Bit 6: Protocol Length (short/long)					to	to the PLC.					for the respective channel current)																																							
		configuration byte.					(Warning) Only for fases equipped with Basic Smart) HIGH: Long Protocol 89 bits + 90th Stop Bit.										If Bit	If Bit 4 (virtual current selector) in the configuration byte (Byte 2)																																							
	- i						LOW: sho	LDW: short Protocol 17 bits + 18th Stop Bit.									is set to HICH, the current selector switch can be set in the lower 3 bits																																								
							Bit 5:	Query c	.urrent set	.ting valu	ies (yes/	no) ¦						or bit/e4 through bit/e11.																																							
	(NEC) The set instruction must at the dearesh is to the set of the set of the set of the set of the dearesh is CODE The deared from the face.														2-10A Value for																																										
																			2-10/	` I	LC																																				
	Bit 4: Virtual Current Selector (On/Off)																																																								
	vester: uny ret have without a mechanical current velocitor suitchfor the respective channel current). MCIE: The get exercised current of the channels is																																																								
							LOW: The	enfered from the actual flowing	re fuse. g current at the ch	unnels is									4		2																																				
	1						trar	isfered from the	e fuse.									1																																							
																		1	8	-	4 F																																				
Data from the Device to the PLC (S2)		vte 1. O	/off c	nerating	States		Byte	2. Chan	nel State			B	vte 3. Cu	rent Inn	ut Volta	<i>ae</i>		Byte	4 - 11-1	The Set	5 Nomin	al Curre	nt at C	nannel	n																																
Data from the Device to the FEC (52)		HIGH: Switched Channel					Overcurrent/Ti						The actual input voltage			se		The set nominal current is only output if queer current setting value (Rir S) was set to HIGH in the configuration but e (Rote 2)]																																							
	LOW: Disconnected Channel						HIGH: Channel a is in the				T	The actual input voltage is in an Int8_t data type					The	set nom	inal cur	ent is (only out	put if c	luery o	urrent se	etting va	alue (B	it 5) was	set to H	IIGH in	the con	figurat	tion byte	e (Byte:	2)!																							
							or tripped state.					_ a	n int8_t d Range: 0 t	o 255)				Ine	position	s or the	curren	t select	orswitt	ines ar	e snown	on chai	innein	at the id	ower 3 D	ts.																											
	LOW: Channel n is not in the This transferred value must Example: The current selector switch is set to 0 (corresponds to 1A). overcurrent or tripped state. be converted to a physical value Event of the PLC. bytes 4 - 11: The Actual Flowing Current at Channel n																																																								
												1	2V/ Variar					The	actual fl	owing c	rront	ic only c	utouti	f tho o																																	
												1	2 V = V di idi	it. (transfe	rred valı	IP .	\	curre	ent setti	ng valu	(Bit 5)) was se	t to I O	Winth	ne																																
	1											1	$U_{in} =$	(25	+ 8)	conf	iguratio	n byte (Byte 2)	!																																			
	24V-Variant: The actual flowing current at channel n is sent in an Int8_t data type (Range: 0 to 255). This transferred value must be converted to																																																								
	1											1	O _{in} =		.6	1 10)	with	ysical va	iue in ti mula:	IE PLC																																				
												4	8V-Variar	nt: /******		_	、 、		transfe	rred va	ue																																				
													$U_{in} =$	transjer	nea vaiu	+ 32)	$I_N =$		16																																					
												1		(0		/	Exan	nple:																																						
							-											$I_N =$	$\frac{10}{16} = 1$	LA .																																					
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Max-Planck-Straße 36-46 27283 . Verden, Germany info@block.eu . www.block.eu

