

Circuit breaker testing

Accessories

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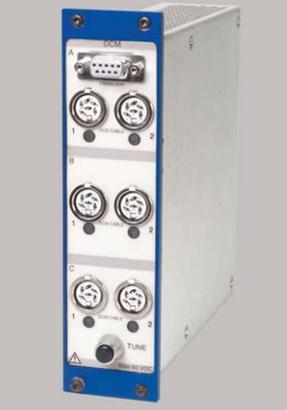
Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
Cables						
<i>Analogue Input XLR/Banana</i>	 <p data-bbox="687 539 1110 584">XLR female / 4 mm safety plugs, 1 m (3.3 ft). For customized analog transducer connection</p>	X	X	X	X	GA-00040
<i>Cable Analogue XLR/open ends</i>	 <p data-bbox="687 797 1023 819">XLR female / open ends, 1 m (3.3 ft)</p>	X	X	X	X	GA-00041
<i>Transducer cable, XLR / IP / TS</i>	 <p data-bbox="687 1055 1007 1077">NOVOTECHNIC IP/TS, 1 m (3.3 ft)</p>	X	X	X	X	GA-00044
<i>Transducer cable, XLR / TLH / LWH</i>	 <p data-bbox="687 1290 1062 1312">NOVOTECHNIC TLH/LWH, 0.5 m (1.6 ft)</p>	X	X	X	X	GA-00049
<i>Transducer cable XLR / LWG</i>	 <p data-bbox="687 1547 1070 1570">NOVOTECHNIC LWG/M12, 0.5 m (1.6 ft)</p>	X	X	X	X	GA-00050
<i>Cable Current clamp</i>	 <p data-bbox="687 1715 1078 1738">For current clamp, BNC / XLR3, 0.3 m (1 ft)</p>	X	X	X	X	GA-00140
<i>Cable, extension EGIL Timing MAIN</i>	 <p data-bbox="687 1928 1166 2007">Extension cable for time measurement of main con- tacts, XLR5 female / XLR5 male 10 m (32.8 ft)</p> <p data-bbox="687 2018 807 2047">5 m (16.4 ft)</p>			X		GA-00150
				X		GA-00155

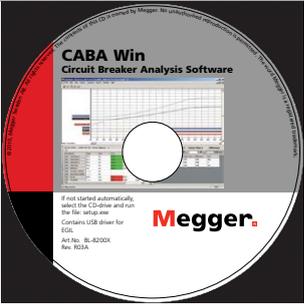
Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
Cable, EGIL Timing 	Timing 5 m (16.4 ft) XLR5 / 4 mm banana incl. clamps			X		GA-00160
Cable, EGIL Timing AUX 	AUX1&2, timing 5 m (16.4 ft) XLR5 / 4 mm banana excl. clamps			X		GA-00170
Cable, EGIL Voltage sense 	SDRM Voltage sense cable incl. clamps, 2 m (6.5 ft)			X		GA-00175
Cable set, Timing TM1800 AUX TM1700 AUX TM1600 MAIN TM1600 AUX 	The cable sets consist of 8 cables with clamps and 4 mm stackable safety plugs. For timing of CB contacts. 5 m (16.4 ft)	X	X	X		GA-00231
	10 m (32.8 ft)	X	X	X		GA-00241
	15 m (49.2 ft)	X	X	X		GA-00251
	20 m (65.6 ft)			X		GA-00261
	25 m (82 ft)			X		GA-00271
	40 m (131 ft)			X		GA-00281
SCA600/Coax. Cable 		X	X	X		GA-00750
Extension cable Analogue input 	XLR female/XLR male 1 m (3.3 ft)	X	X	X	X	GA-00760

Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
<p>Cable reel</p> 	20 m (65.5 ft), 4 mm stackable safety plugs					
	Black	X	X	X	X	GA-00840
	Red	X	X	X	X	GA-00842
	Yellow	X	X	X	X	GA-00844
	Green	X	X	X	X	GA-00845
<p>Cable Timing MAIN (Adv.)</p> 	Timing M/R XLR3 male / banana, 5 m (16.4 ft), Length of the split portion (retractable sock), 2.4 m (8 ft) to 3.8 m (12 ft)	X	X			GA-00850
<p>Extension cable Timing MAIN</p> 	For Timing M/R modules, XLR3 male / XLR3 female, 10 m (32.8 ft)	X	X			GA-00851
<p>Adapter Digital</p> 	For Doble transd. (Use with GA-00895)	X	X			GA-00867
<p>Adapter Digital</p> 	For Siemens digital transducer	X	X			GA-00868
<p>Adapter Digital</p> 	For Vanguard transd. (Use with GA-00895)	X	X			GA-00869
<p>Cable Timing AUX</p> 	5 m, (16.4 ft)	X	X			GA-00870
<p>Digital transducercable</p> 	For customized digital transducer connection RS422, SUB-D15 / open ends, 10 m (33 ft)	X	X			GA-00885

Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
<i>Digital transducer extension cable</i>	 RS422, SUB-D15 / SUB-D15, 10 m (33 ft)	X	X			GA-00888
<i>Cable Digital TP1</i>	 NOVOTECH Digital TP1, linear transducer cable, D-SUB 15/M12, 10 m (33 ft)	X	X			GA-00889
<i>L & L digital cable</i>	For using Leine & Linde 530 digital transducer, 10 m (33 ft)	X	X			GA-00890
<i>Baumer digital cable</i>	 For using Baumer digital transducer, 10 m (33 ft)	X	X			GA-00895
<i>Heidenhein digital cable</i>	Digital transducer cable, Heidenhein, 10 m (33 ft)	X	X			GA-00900
<i>Ethernet cable, network</i>	Cable for connection to network/LAN, RJ45	X	X			GA-00970
<i>TM1700/1800 DCM extension cable kit</i>	1 DCM extension cable, DIN 6, 10 m (33 ft) Old type	X	X			GA-00998
	1 DCM extension cable, DIN 7, 10 m (33 ft) Actual type. See "TM1700/1800 DCM Extension cable" on page 7	X	X			GA-00999
<i>Open analog cable</i>	 For customized analog transducer connection, 1 m (3.3 ft)	X	X	X	X	GA-01000
<i>Extension cable Analogue Input</i>	 For analog input, XLR3 female / XLR3 male Analog cable Egil/TM, 10 m (33 ft)	X	X	X	X	GA-01005
<i>Cable for AnaDig 10</i>	 Optional Cable for AnaDig 100, 1 m (3 ft)					GA-01008

Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
<p>Cable kit Control</p> 	<p>Control kit for three phases, 5 x 5 m (16 ft), 2 x 0.25 m (10"), 2 x jumper</p>	X	X			GA-90002
<p>HV Timing cable kit</p> 	<p>For Timing M/R modules, XLR3 male / XLR3 female, 10 m (32.8 ft) 5 pcs. GA-00851</p>	X	X			GA-90005

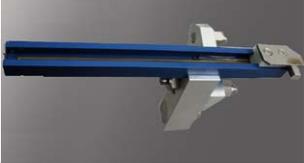
Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
DCM – DualGround						
<i>DCM</i>	 <p>DCM TM1700 DualGround Timing</p> <p>3- channels Including: 1 DCM Upgrade cable kit CG-19180</p> <hr/> <p>6-channels Including: 2 DCM Upgrade cable kit CG-19180</p>					BL-59190 BL-59192
<i>TM1700/1800 DCM Upgrade cable kit</i>	 <p>Cables for 3 channels addition DualGround upgrade from 3 to 6 channels 3 DCM cables, 12 m (39 ft), 6 Clamps Length of the 2-cable portion, 1.5 m (5 ft)</p>	X	X			CG-19180
<i>TM1700/1800 DCM Extension cable</i>	 <p>DualGround cable extension for 3 channels, 10 m (33 ft) (3 x GA-00999)</p>	X	X			CG-19181
<i>DCM - TM1800</i>	 <p>Module for TM1800</p> <p>Module with 3 channels Including: 1 DCM Upgrade cable kit CG-19180 1 DCM to Timing M/R GA-12900</p> <hr/> <p>Module with 6 channels Including: 2 DCM Upgrade cable kit CG-19180 1 DCM to Timing M/R GA-12900</p>					CG-19190 CG-19192
<i>DCM Span extension cable</i>	 <p>Cable to extend the span in the TM1700/1800 DCM Upgrade cable kit CG-19180 BNC / BNC, 2 m (6.6 ft)</p>	X	X			GA-00720
<i>DCM Cable link</i>	 <p>DCM to Timing M/R</p>	X	X			GA-12900

Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
Software						
CABA Win 	For TM1700/1800, incl. Ethernet cross-over cable	X	X			CG-8000X
	For TM1600, incl. fiberoptics and USB interface			X		BL-8203X
	For EGIL, incl. USB cable				X	BL-8204X
Application kits						
First trip kit 	For single operating mechanism, 1 + 3 clamps	X	X			BL-90700
	For three operating mechanisms, 3 + 3 clamps	X	X			BL-90710
Synchro Switch Relay kit 	Synchronized Switching Relay test kit incl. accessories, software and cables (delivered in transport case)					
	SSR kit for TM 1700/1800	X	X			CG-91200
	SSR for TM1600 (incl. VD401)			X		BL-91200
Transducer calibration kit 	Plate XB-39016 not included	X	X	X	X	XB-39095

Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
<p>Vibration kit</p> 	<p>The Vibration kit extends TM1800/TM1700/TM1600 and CABA Win with the equipment and software required for recording and analyzing vibration signals at a circuit breaker. The kit includes the signal conditioning unit SCA606, the software CABA Win Vibration and one vibration channel. The vibration solution can be extended up to 6 channels.</p>	X	X	X		BL-13090
<p>Vibration channel</p> 	<p>Additional vibration channel to be used together with the Vibration kit. Each Vibration channel includes accelerometer, accelerometer adapter, cables to SCA606 and cables to TM1800/TM1700/TM1600*.</p>	X	X	X		XB-32010
<p>Static and dynamic resistance measurement</p>						
<p>SDRM201</p> 	<p>Included accessories:</p> <ul style="list-style-type: none"> SDRM Cable SDRM multi cable extension GA-12815 Voltage sense GA-00175 Voltage sense extension cable GA-00150 Current cable (red) GA-12820 Current cable (black) GA-12830 Clamps (2 pcs) KD-03040 				X	CG-90250
<p>SDRM201 Cable EGIL</p> 	<p>For SDRM201</p>				X	GB-03430

Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.				
SDRM202		Included accessories								
		SDRM Cable for TM1700/1800								
		SDRM multi cable extension, 7.5 m					GA-12815			
		Current cable, red, 2pcs, 3 m (9.8 ft)					GA-12820			
		Current cable, black 2 pcs, 0.5 m (1.6 ft)					GA-12830			
		Clamps (2 pcs)					KD-03040			
		Ground cable, 2.5 mm ² 10 m (33 ft)					GA-00208			
		X	X				CG-90200			
		Pack of 3 units (CG-90200) for circuit breaker with 2 Breaks/Phase								
		X	X				CG-90230			
		SDRM Cable for TM1600								
		SDRM multi cable extension, 7.5 m					GA-12815			
		Current cable, red, 2 pcs, 3 m (9.8 ft)					GA-12820			
		Current cable, black 2 pcs, 0.5 m (1.6 ft)					GA-12830			
		Clamps (2 pcs)					KD-03040			
		Ground cable, 2.5 mm ² 10 m (33 ft)					GA-00208			
				X			CG-90210			
		SDRM Cable for EGIL								
		Voltage sense cable, 2 m (6.5 ft)					GA-00175			
		Voltage sense extension cable, 10 m (33 ft)					GA-00150			
Current cable, red, 2pcs, 3 m (9.8 ft)					GA-12820					
Current cable, black 2 pcs, 0.5 m (1.6 ft)					GA-12830					
Clamps (2 pcs)					KD-03040					
Ground cable, 2.5 mm ² 10 m (33 ft)					GA-00208					
				X	CG-90220					
SDRM202 Cable		SDRM Cable for TM1700/1800								
		X	X				CG-90205			
				X			CG-90215			
SDRM Cable (CG-90205)		SDRM Cable for EGIL								
					X		CG-90225			
Extension cable, SDRM201/202		Extension cable for CG-90200 and CG-90210								
		10 m (33 ft)				X	X	X	X	GA-12810
		7.5 m (24.6 ft)				X	X	X	X	GA-12815
Current cables and clamps for SDRM202		Cable, red 2.5 m (8.2 ft)				X	X	X	X	GA-12820
		Cable, black, 0.5 m (1.6 ft)				X	X	X	X	GA-12830
		Clamps (2 pcs)				X	X	X	X	KD-03040

Item		Description	TM1800	TM1700	TM1600	EGIL	Art. No.
Transducers							
Linear							
Analog							
<i>TLH-150</i>		150 mm (5.9") travel ¹⁾	X	X	X	X	XB-30016
<i>TLH-225</i>		225 mm (8.8") travel ¹⁾	X	X	X	X	XB-30017
<i>TLH-500</i>		500 mm (19.7") travel ¹⁾	X	X	X	X	XB-30020
<i>TLH-750</i>		750 mm (29.5") travel ¹⁾	X	X	X	X	XB-30022
<i>TLH-1000</i>		1000 mm (39.4") travel ¹⁾	X	X	X	X	XB-30023
		¹⁾ Including cable, 0.5 m (20") GA-00049					
<i>LWG 150</i>		150 mm (5.9") travel ²⁾	X	X	X	X	XB-30116
<i>LWG 225</i>		225 mm (8.8") travel ²⁾	X	X	X	X	XB-30117
<i>LWG 500</i>		500 mm (19.7") travel ²⁾	X	X	X	X	XB-30120
		²⁾ Including cable, 0.5 m (20") GA-00050					
<i>TS 150</i>		150 mm (5.9") travel ³⁾	X	X	X	X	XB-30030
<i>TS 50</i>		50 mm (1.9") travel ³⁾	X	X	X	X	XB-30031
<i>TS 25</i>		25 mm (1") travel ³⁾	X	X	X	X	XB-30033
		³⁾ Including cable, 1 m (39") GA-00044					
Digital							
<i>Linear transducer TP1</i>		NOVOTECHNIC TP1 (Highspeed design for Megger) 300 mm (11.8") travel	X	X			XB-39140
<i>Linear transducer TP1</i>		NOVOTECHNIC TP1 (Highspeed design for Megger) 500 mm (19.7") travel	X	X			XB-39150
The above transducers are also available in other lengths, please contact Megger for more information.							
Rotary							
Analog							
<i>Transducer kit</i>		Novotechnic IP6501 Incl. cable 1 m (39"), 6 mm Flex coupling, Hexagon wrench	X	X	X	X	XB-31010
Digital							
<i>Transducer kit</i>		Baumer BDH16.05A3600-LO-B Incl. cable 10 m (33 ft), 10/6 mm Flex coupling, Hexagon wrench	X	X			XB-39130
Transducer accessories							
<i>Slider</i>		Slider for linear transducer TP1	X	X	X	X	XB-39199

Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.																				
Transducer mounting kits																										
Universal kits																										
<i>Rotary transducer mounting kit</i>	 <p>For transducers XB-31010 and XB-39130 Including:</p> <table border="0"> <tr><td>Clamping base</td><td>XB-39014</td></tr> <tr><td>Flexible arm</td><td>XB-39021</td></tr> <tr><td>Holder for angular transducer</td><td>XB-39022</td></tr> <tr><td>Plastic transport case</td><td>XB-39023</td></tr> <tr><td>Adapter M6/6 2 Nuts M6</td><td>XB-39025</td></tr> <tr><td>Adapter M8/6 2 Nuts M8</td><td>XB-39026</td></tr> <tr><td>Adapter M10/6 2 Nuts M10</td><td>XB-39027</td></tr> <tr><td>Adapter M12/6 2 Nuts M12</td><td>XB-39028</td></tr> </table>	Clamping base	XB-39014	Flexible arm	XB-39021	Holder for angular transducer	XB-39022	Plastic transport case	XB-39023	Adapter M6/6 2 Nuts M6	XB-39025	Adapter M8/6 2 Nuts M8	XB-39026	Adapter M10/6 2 Nuts M10	XB-39027	Adapter M12/6 2 Nuts M12	XB-39028	X	X	X	X	XB-51010				
Clamping base	XB-39014																									
Flexible arm	XB-39021																									
Holder for angular transducer	XB-39022																									
Plastic transport case	XB-39023																									
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Adapter M12/6 2 Nuts M12	XB-39028																									
<i>Universal transducer mounting kit</i>	 <p>For linear and rotary transducers. Including:</p> <table border="0"> <tr><td>Magnetic base</td><td>XB-39013</td></tr> <tr><td>Clamping base</td><td>XB-39014</td></tr> <tr><td>Flexible arm</td><td>XB-39021</td></tr> <tr><td>Holder for angular transducer</td><td>XB-39022</td></tr> <tr><td>Plastic transport case</td><td>XB-39023</td></tr> <tr><td>Adapter M6/6 2 Nuts M6</td><td>XB-39025</td></tr> <tr><td>Adapter M8/6 2 Nuts M8</td><td>XB-39026</td></tr> <tr><td>Adapter M10/6 2 Nuts M10</td><td>XB-39027</td></tr> <tr><td>Adapter M12/6 2 Nuts M12</td><td>XB-39028</td></tr> <tr><td>Universal support</td><td>XB-39029</td></tr> </table>	Magnetic base	XB-39013	Clamping base	XB-39014	Flexible arm	XB-39021	Holder for angular transducer	XB-39022	Plastic transport case	XB-39023	Adapter M6/6 2 Nuts M6	XB-39025	Adapter M8/6 2 Nuts M8	XB-39026	Adapter M10/6 2 Nuts M10	XB-39027	Adapter M12/6 2 Nuts M12	XB-39028	Universal support	XB-39029	X	X	X	X	XB-51020
Magnetic base	XB-39013																									
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Universal support	XB-39029																									
<i>AnaDig 100</i>	 <p>Analog to Digital converter for transducers</p>	X	X			XB-51050																				
<i>Universal adapter for rotary transducer</i>	 <p>Universal adapter to breaker and drive types HPL/BLG 3AP1FG</p>	X	X	X	X	XB-51060																				
Circuit breaker specific kits																										
<i>LTB Kit (ABB)</i>	Incl. mounting kit XB-51010, Software conversion table BL-8730X	X	X	X		XB-61010																				
<i>HPL/BLG Kit (ABB)</i>	Incl. mounting kit XB-51010, Software conversion table BL-8720X	X	X	X		XB-61020																				
<i>AHMA Kit (ABB)</i>	 <p>3-Phase Diagnostic Set for ABB drive mechanism type AHMA 4/8</p>	X	X	X		XB-61030																				
<i>HMB Kit (ABB)</i>	 <p>For drive mechanism type HMB 4/8 Three phase set complete in case 3 PES-HMB8 Transducers 3 GA-00055 Adapter cable 1 GD-00766 Alu transport case 3 Calibration Certificates</p>	X	X	X		XB-61040																				
Ready-to-use kits – Rotary																										
Analog																										
<i>1-phase kit</i>	Incl. transducer XB-31010, mounting kit XB-51010	X	X	X	X	XB-71010																				
<i>3-phase kit</i>	Incl. 3 x 1-phase kits XB-71010	X	X	X		XB-71013																				

Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
Digital						
1-phase kit	Incl. transducer XB-39130, mounting kit XB-51010	X	X			XB-71020
3-phase kit	Incl. 3 x 1-phase kits XB-71020	X	X			XB-71023
Transducer mounting accessories						
Thread adapter kit	 <p>Imperial / metrics adapter kit for TLH / TP1 1 nut metrics, M5 1 spacer nut, M5 / UNF 10-32 1 spacer nut, M5 / UNC 1/4-20 1 nut, UNF 10-32 1 nut, UNC 1/4-20</p>	X	X	X	X	XB-39036
Distance screw	 <p>Metrics (M5) / metrics (M5) for TLH / TP1</p>	X	X	X	X	XB-39160
Rod for digital transducer TP1	 <p>Rod for NOVOTECHNIC TP1, 300 mm (11.8")</p>	X	X	X	X	XB-39193
Switch magnetic base		X	X	X	X	XB-39013
Flexible arm		X	X	X	X	XB-39021
Holder for rotary/ angular transducer,		X	X	X	X	XB-39022
Clamping base		X	X	X	X	XB-39014
Flex coupling	 <p>For shaft diam. 6 mm (for Novotechnic IP6501)</p>	X	X	X	X	XB-39030
Flex coupling	 <p>For shaft diam. 10 / 6 mm (for Baumer BDH)</p>	X	X	X	X	XB-39032

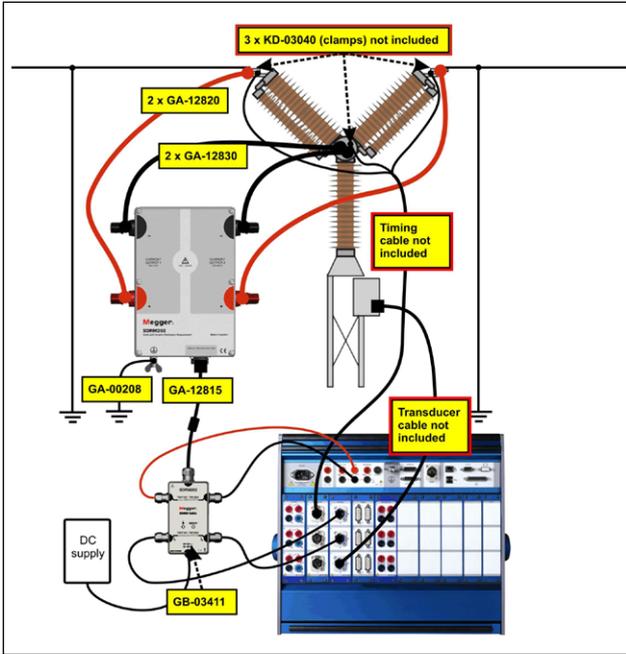
Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
Other						
<i>Timing clamp</i>						
	Timing clamp for bolt head	X	X	X	X	53-31800
<i>Cable organizer</i>						
	Hook-and-loop straps, 10 pcs.	X	X	X	X	AA-00100
<i>Long term monitoring</i>	EPROM to be mounted in the TM1600					
<i>LTM1</i>	Starts measurement when there is a change at any of the time-measuring inputs			X		BL-80010
<i>LTM2</i>	Functions in the same way as a standard TM1600, but returns automatically to the READY state after measurement			X		BL-80011
<i>VD401</i>						
	Voltage divider, ratio 400/1 (for TM1600 and EGIL with analog channel)			X	X	BL-90070
<i>Current</i>						
	AC/DC clamp/clip-on/current probe, Fluke 80i-110s Current sensor kit 1 channel (Fluke 80i-110s incl. cable GA-00140)	X		X		BL-90600
	Current sensor kit 3 channels 3 x (Fluke 80i-110s incl. cables GA-00140)	X		X		BL-90610
<i>Temperature sensor</i>						
	With the temperature sensor the ambient temperature is automatically recorded with each measurement and stored together with the test result. The temperature becomes a parameter in CABA Win. Suitable cable is the Analog cable, 10 m GA-01005. Range: -20°C to +50°C (-4°F to +122°F) Resolution: 0.5°C (0.9°F)	X				CG-90070
<i>Thermopaper, for Fujitsu</i>						
	114 mm, 30 m			X	X	GC-00030
	Box/24 pcs			X	X	GC-00032
<i>Thermopaper</i>						
	114 mm, Ø 40 mm	X				GC-00040
<i>Soft case</i>						
	Made from sturdy nylon fabric	X	X			GD-00340

Item	Description	TM1800	TM1700	TM1600	EGIL	Art. No.
<p><i>Ferrite kit</i></p> 	<p>Accessory for timing of GIS circuit breakers using TM1800 with DualGround™ Including:</p>	X	X			XB-40090

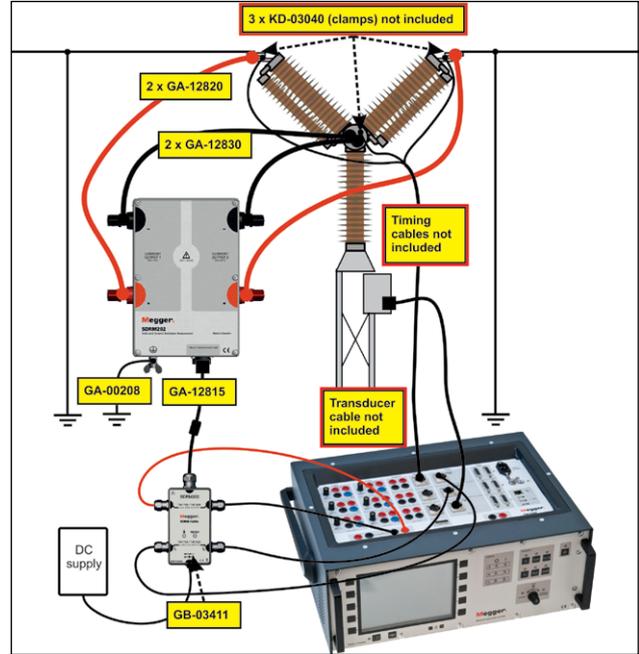
For more information about optional accessories please contact Megger

Connecting and mounting guidance

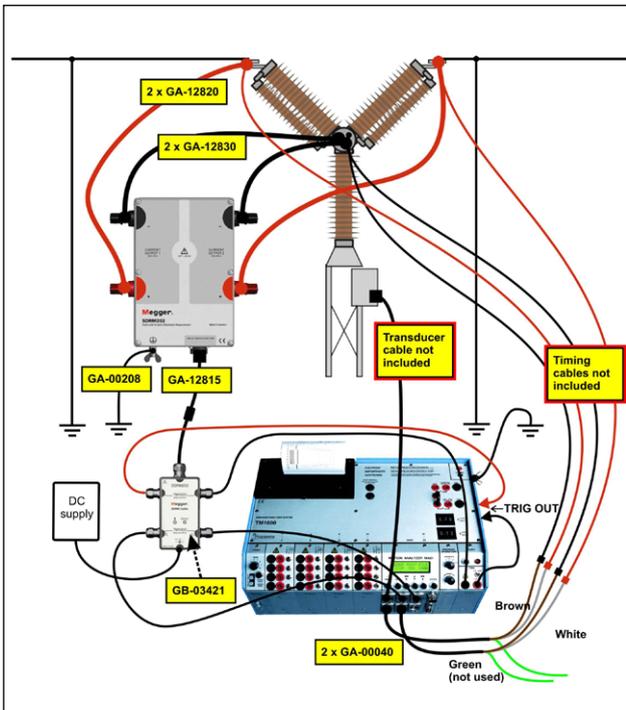
SDRM Hook-up examples and cable designations



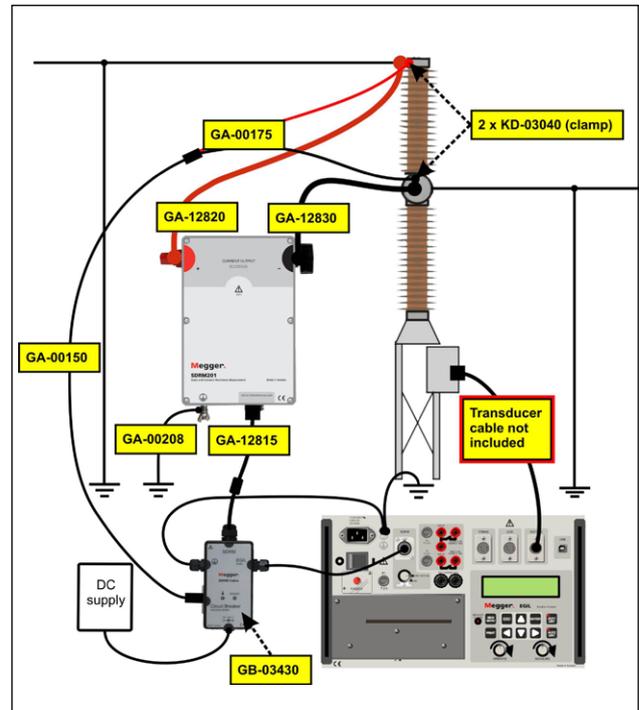
Timing cable is included with the TM1800 timing module. Transducer cable is selected together with the the type of transducer used.



Timing cable is included with the TM1700. Transducer cable is selected together with the the type of transducer used.



Timing cable is an optional accessory to TM1600. Transducer cable is selected together with the the type of transducer used.

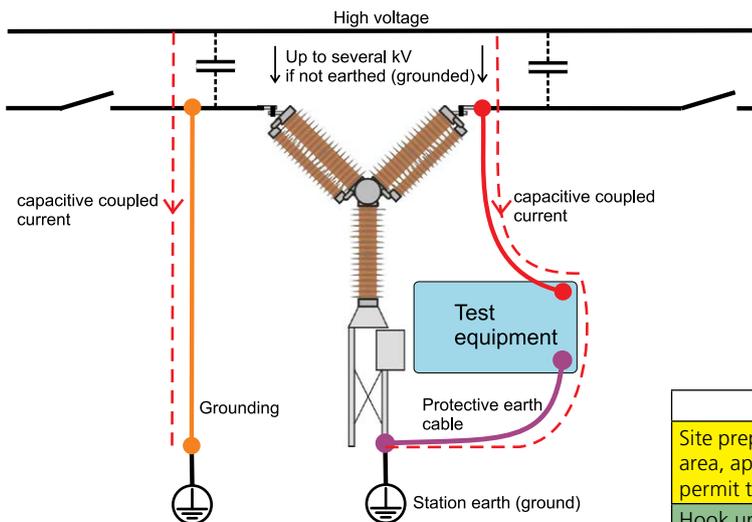


Transducer cable is selected together with the the type of transducer used.

DualGround - safe testing

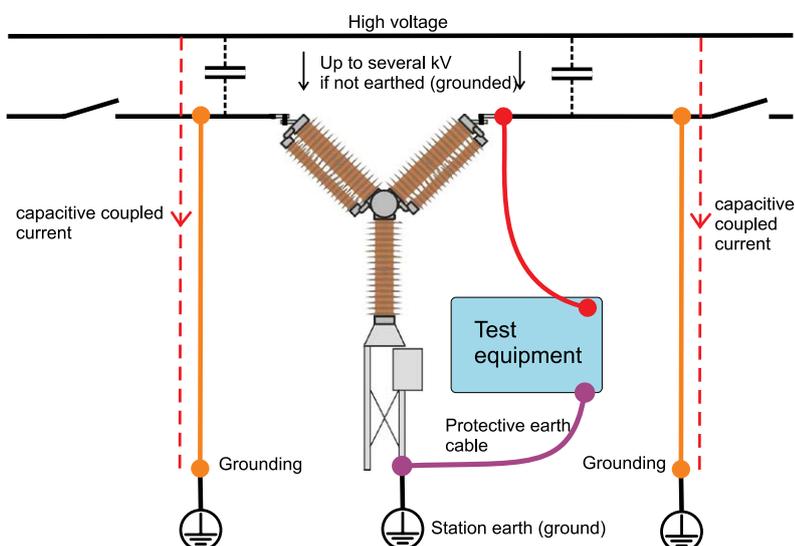
The best way to provide safety in circuit breaker testing is to keep both sides of the circuit breaker grounded throughout the test. This will also make the test faster and easier. Minimum time shall be spent in the substation and focus shall be on the test rather than the equipment.

One side grounded



Conventional vs. DualGround	
Site preparation (isolate work area, apply safety ground, issue permit to work)	Site preparation (isolate work area, apply safety ground, issue permit to work)
Hook up test equipment. Issue sanction for test	Hook up test equipment. Issue sanction for test
Authorised person removes the ground	Risky step left out
Perform testing	Safe testing with both sides grounded
Authorised person applies ground	Risky step left out
Cancel sanction for test. Disconnect test equipment	Cancel sanction for test. Disconnect test equipment
Site closing (cancel permit to work, disconnect ground)	Site closing (cancel permit to work, disconnect ground)

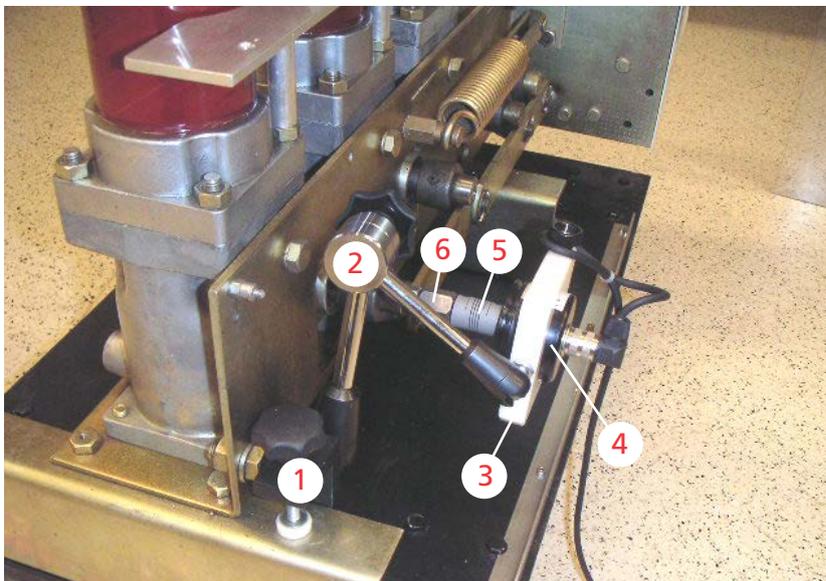
Both sides grounded



Transducer mounting examples

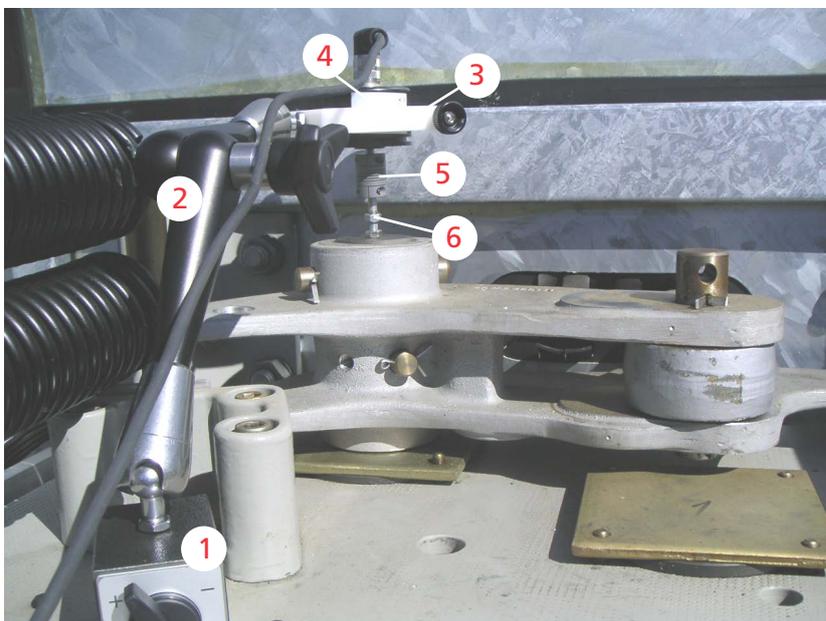
Analogue transducer mounted on a distribution circuit breaker

1. Clamping base
2. Flexible arm
3. Holder angular transducer
4. Novotechnik IP6501
5. Flex coupling
6. Bolt adapter



Digital transducer mounted on a distribution circuit breaker

1. Magnetic base
2. Flexible arm
3. Holder angular transducer
4. BAUMER BDH 16.05A10-L0-4
5. Flex coupling
6. Bolt adapter



First trip measurement

When a fault occurs on a transmission or distribution line, it is the circuit breaker that fast and efficiently should clear the fault by opening the circuit, or to trip, and by that isolate the fault from the power source. A quick trip avoid or limit the damage to expensive equipment caused by the high fault currents. It might, in worst case, kill someone.

Why capture first trip

Testing circuit breakers can be done in many ways, but one of the most common is timing of the main contacts, which gives a direct indication of the trip time. A typical procedure for performing a timing test on a circuit breaker that is in service is:

1. Open the CB
2. Disconnect the CB by opening the disconnecter switches
3. Ground the CB
4. Perform the timing test

Will the timing tests show the correct trip time? Well, not necessarily. Consider a circuit breaker that has been in service without operating for many months, even years, before it was taken out of service for testing. It might then be suffering from a lack of or dried grease and maybe corrosion in its bearings. These problems can, and most probably will, slow down the first operation.

The problem with this procedure is that the CB has been operated at least once before the testing procedure begins. This operation might be all it takes to “shake off” any corrosion problems or sticky bearings and bring the breaker’s trip time up to standard. So when the actual timing test is performed, no problem exists and the service engineer thinks the breaker is in good shape and no further service is needed. Some months later the corrosion is back and when a fault occurs the CB does not trip fast enough, or maybe not at all. This is why it is important to capture the first operation to reveal any problems with the CB.

Perform a first trip test

A good and time effective way to check the condition of a circuit breaker is to document its behavior at the first open operation after it has been idle for long time. The measurement and connections to the CB are carried out while it is still in service. The only way to measure the currents in a safe way is to use current clamps. For the coil current, either one or three clamps are needed depending on the number of operating mechanisms. These might need to be able to measure both AC and DC to cover all types of coils, however DC coils are the most common.

Using current clamps (AC) makes it possible to check the transition of the line currents to zero during the opening of the CB contacts as well as the synchronization of the opening times on the three phases.

The equipment needed for a first trip measurement depends on the configuration of the circuit breaker. All the connections are made inside the control cabinet.

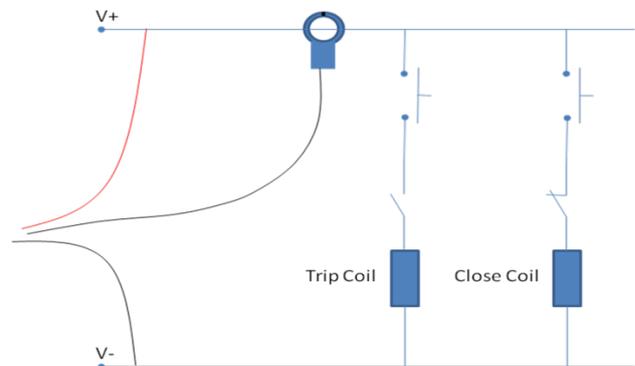


Figure 1. Point for measuring coil current and control voltage.

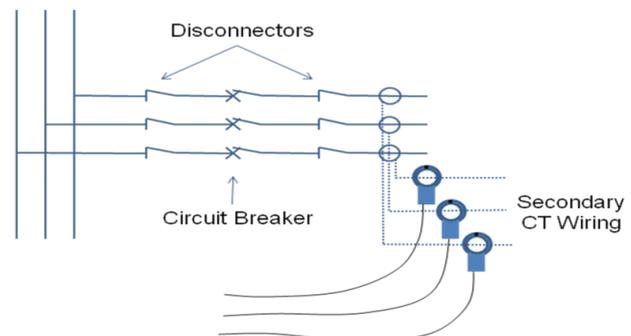


Figure 2. Points for measuring the line currents. Since the CB is in service, the conventional way with leads across the CB cannot be used. Instead, three current clamps are used on the secondary side of the current transformer for each phase. For ordering information, see “First trip kit” on page 8.

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