

LAMPIRAN

Lampiran 1 Spesifikasi Motor E1135

ABB		Title		Draw No.	
		Tech. Specification Liquid Starters		HIBA 402 300	
Issued by department:	Date:	Language:	Register No.:	Revision:	Page:
CHIND / IBPM	16.04.98	en	00K AB 34	B	6/16

LIQUID STARTER FOR THE MOTOR ITEM No.: E11-35 Asset Code: K322-1R1
Service: Exhaust Fan

2.2 Design:

type of starter	:	6260.026/7-SP
speed variation (%)	:	none
z - number of consecutive starts from cold	:	13 - 4 [9] [with preset t_s]
h - permissible number of starts (1/h)	:	2,1 - 0,64 [1,3] [with preset t_s]
f - severity of start	:	1,0
capacity of electrolyte (l)	:	2.870
maximum electrode voltage (V)	:	1.600
maximum electrode current (A)	:	1.600
starting work at ambient temp. of 40°C (kJ)	:	60.000 ($t_s = 30s, f = 1,0$)
t_s - starting time range (s)	:	20 - 60 [30s] [preset]
resistance ratio R_{min} / R_{max}	:	1 / 60
continuous dissipation losses (kW)	:	24
data of setting drive	:	3 x 400 V, 50 Hz, 0,75 kW
data of space heater	:	220 VAC, 200 W
data of electrolyte heater	:	-
main dimensions		
max. length (mm)	:	2.700
max. width (mm)	:	1.720
max. height (mm)	:	2.350
weight		
without electrolyte (kg)	:	2.200
electrolyte (l = kg)	:	2.870
dimension drawing	:	6260.026/7-SP
Paint coating	:	RAL 7032, min. 80µm

Accessories:

- start - stop sequence control
- timing relay for starting time supervision
- frequency converter to adjust starting time
- thermostat for electrolyte temperatur supervision, alarm and trip setting
- proximity switch / limit switch for setting range
- limit switch for interlocking emergency hand wheel
- short-circuit contactor with necessary control circuitry
- space heater
- drain cock
- sodium carbonate for two fillings

Motor data:

nominal power (kW)	:	4.000
nominal speed (rpm)	:	1.000
rotor voltage (V)	:	1.500
rotor current (A)	:	1.580
rotor + load inertia J (kgm ²)	:	6.500

(lanjutan)

Lampiran 2 Spesifikasi Motor E1128

ABB		Title	Tech. Specification Liquid Starters		Draw No.
Issued by department:	Date:	Language:	Register No.:	Revision:	Page:
CHIND / IBPM	16.04.98	en	00K AB 34	B	5/16
2. TYPE SPECIFICATIONS LIQUID STARTER FOR THE MOTOR ITEM No.: E11-28 Asset Code: K361-1R1 Service: Raw Mill Main Drive					
2.1 Design:					
type of starter	:	6260.026/7-SP			
speed variation (%)	:	none			
z - number of consecutive starts from cold	:	10 - 2	[5]	[with preset t_a]	
h - permissible number of starts (1/h)	:	1,6 - 0,33	[1,0]	[with preset t_a]	
f - severity of start	:	1,4			
capacity of electrolyte (l)	:	2.870			
maximum electrode voltage (V)	:	4.000			
maximum electrode current (A)	:	1.600			
starting work at ambient temp. of 40°C (kJ)	:	87.500	(t _a = 25s, f = 1,4)		
t _a * - starting time range (s)	:	15 - 60	[25s]	[preset]	
resistance ratio R _{min} / R _{max}	:	1 / 60			
continuous dissipation losses (kW)	:	24			
data of setting drive	:	3 x 400 V, 50 Hz, 0,75 kW			
data of space heater	:	220 VAC, 200 W			
data of electrolyte heater	:	-			
main dimensions					
max. length (mm)	:	2.700			
max. width (mm)	:	1.720			
max. height (mm)	:	2.350			
weight					
without electrolyte (kg)	:	2.200			
electrolyte (l = kg)	:	2.870			
dimension drawing	:	6260.026/7-SP			
Paint coating	:	RAL 7032, min. 80µm			
Accessories:					
start - stop sequence control					
timing relay for starting time supervision					
frequency converter to adjust starting time					
thermostate for electrolyte temperatur supervision, alarm and trip setting					
proximity switch / limit switch for setting range					
limit switch for interlocking emergency hand wheel					
short-circuit contactor with necessary control circuitry					
space heater					
drain cock					
sodium carbonate for two fillings					
Motor data:					
nominal power (kW)	:	5,000			
nominal speed (rpm)	:	750			
rotor voltage (V)	:	2.500			
rotor current (A)	:	1.210			
rotor + load inertia J (kgm ²)	:	1.653			

(lanjutan)

Lampiran 3 Spesifikasi Kabel

Three-core power cable with insulation of cross-linked polyethylene Type N2XSEY 6/10 kV Umax 12 kV

The A corresponds to specification VDE 0273 of Union of German States (DIN) or IEC 602, bearing in mind that our works in carried-out according to values depending on frequency refer to U_m = 10 MV/3.

Nominal cross section 3 × ... (mm ²)	Nominal diameters							
	35*	50	70	85	120	150	185	240
Form of conductor								
Form of conductor								
Thickness of insulation (mm)	7,0	8,2	9,9	11,5	13,0	14,5	16,1	18,6
Thickness of insulation (mm)	3,4	3,4	3,4	3,4	3,4	3,4	3,4	3,4
Thickness of minimum wire (mm)	14,6	19,0	17,7	15,3	20,8	22,3	23,9	26,4
Thickness of maximum wire (mm)	17,3	18,5	20,2	21,8	23,8	25,3	26,9	29,4
Geometric cross section (mm ²)	19	19	19	19	19	19	19	19
Thickness of insulation of screen	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Outer diameter approx. (mm)	47	49	53	57	61	65	69	73
Shielding rating min. (mm)	0,70	0,75	0,80	0,85	0,90	1,00	1,05	1,10
Weight of the cable approx. (kg/km)	3,550	3,900	4,250	4,400	4,800	5,200	5,600	6,000
Metal weight (kg/km)	Copper 1208 Aluminum 488	1840	2218	2535	3058	4003	5011	7195
Metal weight (kg/km)	Copper 200 Aluminum 200	699	827	1044	1305	1810	2088	2988
Normal manufacturing (mm)	1000	1000	1000	1000	750	900	500	900
Flange diameter of drum (m)	2,24	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Width of drum (m)	1,48	1,48	1,48	1,48	1,48	1,48	1,48	1,48

Max. voltage U _m (kV)	35*	50	70	85	120	150	185	240
Number of conductors	3	3	3	3	3	3	3	3
Maximum working voltage U _m (kV)	12	12	12	12	12	12	12	12
Maximum dielectric strength N2XSEY (kV)	0,387	0,397	0,398	0,387	0,394	0,397	0,384	0,387
Maximum dielectric strength N4XSEY (kV)	0,443	0,430	0,443	0,443	0,443	0,430	0,443	0,430
Maximum dielectric strength XLPE (kV)	0,22	0,25	0,25	0,25	0,31	0,35	0,37	0,45
Maximum dielectric strength per phase	(A/Min)	0,4	0,5	0,5	0,6	0,6	0,7	0,8
Loss current to earth of three-phase system (A/Min)	1,2	1,4	1,5	1,7	1,9	2,0	2,2	2,4
Inductance (mH/km)	0,38	0,38	0,34	0,34	0,32	0,31	0,30	0,28
Charging power of three-phase system (kVAr/km)	7	8	9	10	11	12	13	14
1000 short-circuit current per phase (kA)	8,6	9,0	9,0	9,0	9,0	9,0	9,0	9,0
1 sec short-circuit current after cable laying, beam isolated with Pmax (kA)	6,0	7,3	10,1	13,7	17,3	21,8	26,3	34,6
1 sec short-circuit current after cable laying, beam isolated with Pmax (kA)	5,0	4,7	6,5	8,9	11,2	14,0	17,2	22,3
Current capacity (A) in air	178	210	258	306	349	392	443	513
Current capacity (A) in air	133	158	199	242	280	318	365	431

* only with copper conductor

The given values for laying in air, soil and

Depth of laying: 0,7 m
Air temperature: 30°C
Soil temperature: 30°C
Specific thermal resistivity of soil: 1 K·m/W
Ambient conductor temperature: 80 °C
Ambient cable conductor temperature: 90 °C
Ambient short-circuit current temperature: 350 °C
Laying in air, soil, water: m = 1,0

(lanjutan)

Lampiran 4 Spesifikasi Trafo

INDOCEMENT HEIDELBERGCEMENT Group		Database Electrical Equipment			
		Electrical Department - Plant.11 PT Indocement Tungal Prakarsa tbk			
Trafo		Motor	Panel	Hoist	Ups
		AC			
		Save	Delete	New	Print Form
		Dga		Print History	
IAC	K_E111T2	Vector Group	Dyn11	Year	1997
Item No		Cooling Methode	ONAN	Manufacturer	ABB
Description	Feeder Transformer No 2 for Raw Mill, Kiln Area				
Power-kVA	33000	Impedance Voltage	10.8 %	Total Weight	42800
Primary Voltage-V	33000	Secondary Voltage-V	6600	Weight of Oil	8850
Primary Ampere-I	466.5	Secondary Ampere-I	2624	Type of Oil	Shell Diela D
Primary Cable Size	400mm ² -1Cx3	Secondary Cable Size	Bus Duct	Serial No	801 120.ABB
Type of Trafo	TCHK	Load-kW		Bucholz Relay	
Insulation Level	LI 170AC70	Load Factor		Temperature	
Connection Diagram		Form Factor		Location	MSS
Incoming MCC		Rated - A		Actual Current - A	
HISTORY					
1 - 05-2006 Baut cover trafo dan cover bushing besch (cek by Quaddro) -06-2006 Ganti Gasket HV = 3 set Ganti Gasket LV = 4 set Ganti Gasket Bushing Arde = 1 set Ganti Gasket Freezer Trafo = 1 set Ganti oil Tap changer OLTC & Flushing = 300 Ltr Counter tap changer = 006421					

(lanjutan)

Lampiran 5 Data Impedansi Kabel

***** P O S C O D A M *****									
P 11 - INDOCEMENT		HIBA 402 355/21-REV.2			File : INDOCEM2.PEE				
LINE/BUS COUPLER DATA				Date : 17-04-98 Time : 09:54:25					
act	elem name	node 1	Un	Sr	X1	R1	Cy	length	
pu	line	node 2		Is	X0	RO	Cy0	temp 0	
			(kV)	MVA; kA	[Ω/km]	[Ω/km]	[μF/km]	km; °C	
Y	CABV01	E111S1	33.000	30.000	0.094	0.046	0.570	0.052	
N	Y	E111H		0.00	0.062	1.000	0.570	145.000	
Y	CABV02	E111S2	33.000	30.000	0.094	0.046	0.570	0.044	
N	Y	E111H		0.00	0.062	1.000	0.570	145.000	
Y	BDUCT01	E111L	6.600	30.000	0.020	0.012	2.250	0.010	
N	Y	E211S1		0.00	0.144	0.218	2.250	145.000	
Y	BDUCT02	E111L	6.600	30.000	0.020	0.012	2.250	0.010	
N	Y	E211S2		0.00	0.144	0.218	2.250	145.000	
Y	BUSCUMV	E211S1	6.600	30.000	0.020	0.012	2.250	0.004	
N	Y	E211S2		0.00	0.144	0.218	2.250	145.000	
Y	CAB03	E211S1	6.600	8.000	0.044	0.037	0.900	0.039	
N	Y	E211H		0.00	0.435	0.550	0.900	145.000	
Y	CAB04	E211S1	6.600	2.000	0.097	0.153	0.340	0.203	
N	Y	2P11S2		0.00	1.280	1.250	0.340	145.000	
Y	CAB05	E211S1	6.600	12.000	0.022	0.019	1.800	0.397	
N	Y	5P21S1		0.00	0.220	0.275	1.800	145.000	
Y	CAB06	E211S1	6.600	12.000	0.022	0.019	1.800	0.401	
N	Y	5P11S1		0.00	0.220	0.275	1.800	145.000	
Y	CAB07	E211S1	6.600	2.000	0.101	0.193	0.310	0.520	
N	Y	6P11S1		0.00	1.380	1.300	0.310	145.000	
Y	CAB08	E211S1	6.600	0.500	0.097	0.153	0.340	0.052	
N	Y	E211H		0.00	1.280	1.250	0.340	145.000	
Y	CAB09	E211S2	6.600	1.000	0.097	0.153	0.340	0.061	
N	Y	E411H		0.00	1.280	1.250	0.340	145.000	
Y	CAB10	E211S2	6.600	2.000	0.097	0.153	0.340	0.082	
N	Y	E211H		0.00	1.280	1.250	0.340	145.000	
Y	CAB11	E211S2	6.600	8.600	0.029	0.025	1.350	0.154	
N	Y	4P11S1		0.00	0.290	0.370	1.350	145.000	
Y	CAB12	E211S2	6.600	3.600	0.088	0.075	0.450	0.152	
N	Y	LP11S1		0.00	0.870	1.100	0.450	145.000	
Y	CAB13	E211S2	6.600	7.200	0.044	0.037	0.900	0.250	
N	Y	4P11S2		0.00	0.440	0.550	0.900	145.000	
Y	CAB14	E211S2	6.600	8.000	0.044	0.037	0.900	0.166	
N	Y	3P11S1		0.00	0.440	0.550	0.900	145.000	

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Lampiran 6 Data Impedansi Kabel

***** P O S C O D A M *****									
P 11 - INDOCEMENT		HIBA 402 355/21-REV.2			File : INDOCER2.PE				
LINE/BUS COUPLER DATA				Date : 17-04-98 Time : 09:54:26					
act	elem name	node 1	Un	Sr	X1	R1	Cy	length	
pa	line	node 2		Is	X0	R0	Cy0	temp	
			[kV]	MVA; kA	[Ω/km]	[Ω/km]	[μF/km]	km; °C	
Y	CAB15	E211S2	6.600	8.200	0.029	0.025	1.350	0.165	
N	Y	3P11S2		0.00	0.290	0.370	1.350	145.000	
Y	CAB16	E211S2	6.600	12.000	0.029	0.025	1.350	0.031	
N	Y	E21C2N		0.00	0.290	0.370	1.350	145.000	
Y	CAB17	2P11S2	6.600	1.000	0.101	0.193	0.310	0.816	
N	Y	2P1T1H		0.00	1.380	1.300	0.310	145.000	
Y	CAB18	2P11S2	6.600	1.000	0.101	0.193	0.310	0.032	
N	Y	2P1T2H		0.00	1.380	1.300	0.310	145.000	
Y	CAB19	5P21S1	6.600	5.000	0.045	0.049	0.820	0.083	
N	Y	N1210N		0.00	0.52	0.580	0.820	145.000	
Y	CAB20	5P21S1	6.600	2.900	0.091	0.099	0.410	0.123	
N	Y	N1205N		0.00	1.030	1.160	0.410	145.000	
Y	CAB21	5P21S1	6.600	0.400	0.097	0.153	0.340	0.053	
N	Y	5P2T2H		0.00	1.180	1.340	0.340	145.000	
Y	CAB22	5P21S1	6.600	1.000	0.097	0.153	0.340	0.108	
N	Y	N1216N		0.00	1.180	1.340	0.340	145.000	
Y	CAB23	5P21S1	6.600	1.600	0.097	0.153	0.340	0.050	
N	Y	5P2T1H		0.00	1.280	1.250	0.340	145.000	
Y	CAB24	5P11S1	6.600	6.000	0.045	0.049	0.820	0.098	
N	Y	N1110N		0.00	0.520	0.580	0.820	145.000	
Y	CAB25	5P11S1	6.600	2.900	0.091	0.099	0.410	0.114	
N	Y	N1105N		0.00	1.030	1.160	0.410	145.000	
Y	CAB26	5P11S1	6.600	0.400	0.113	0.387	0.250	0.047	
N	Y	5P1T2H		0.00	1.610	1.540	0.250	145.000	
Y	CAB27	5P11S1	6.600	1.000	0.113	0.387	0.250	0.125	
N	Y	N1116N		0.00	1.610	1.540	0.250	145.000	
Y	CAB28	5P11S1	6.600	0.600	0.113	0.387	0.250	0.458	
N	Y	D1404N		0.00	1.610	1.540	0.250	145.000	
Y	CAB29	5P11S1	6.600	1.600	0.097	0.153	0.340	0.039	
N	Y	5P1T1H		0.00	1.280	1.250	0.340	145.000	
Y	CAB30	6P11S1	6.600	2.000	0.101	0.193	0.310	0.038	
N	Y	6P1T1H		0.00	1.380	1.300	0.310	145.000	
Y	CAB31	4P11S1	6.600	2.500	0.091	0.099	0.410	0.045	
N	Y	4P1T6H		0.00	1.030	1.160	0.410	145.000	

(lanjutan)

Lampiran 7 Data Impedansi Kabel

***** P O S C O D A M *****									
P 11 - INDOCEMENT HIBA 402 355/21-REV.2 File : INDOCER2.PEE									
LINE/BUS COUPLER DATA Date : 17-04-98 Time : 09:54:26									

act	elem name	node 1	Un	Sr	X1	R1	Cy	length	
pu	line	node 2	[kV]	Is	X0	R0	Cy0	temp 0	
				MVA; kA	[Ω/km]	[Ω/km]	[μF/km]	km; °C	
Y	CAB32	4P11S1	6.600	2.500	0.091	0.099	0.410	0.045	
N	Y	4P1T7H		0.00	1.030	1.160	0.410	145.000	
Y	CAB33	4P11S1	6.600	2.000	0.094	0.124	0.370	0.063	
N	Y	4P1T8H		0.00	1.160	1.210	0.370	145.000	
Y	CAB34	4P11S1	6.600	1.600	0.097	0.153	0.340	0.056	
N	Y	4P1T1H		0.00	1.280	1.250	0.340	145.000	
Y	CAB35	LP11S1	6.600	1.000	0.113	0.387	0.250	0.166	
N	Y	SS108N		0.00	1.610	1.540	0.250	145.000	
Y	CAB36	LP11S1	6.600	1.000	0.113	0.387	0.250	0.178	
N	Y	SS113N		0.00	1.610	1.540	0.250	145.000	
Y	CAB37	LP11S1	6.600	1.600	0.097	0.153	0.340	0.051	
N	Y	LP1T1H		0.00	1.280	1.250	0.340	145.000	
Y	CAB38	4P11S2	6.600	0.800	0.113	0.387	0.250	0.051	
N	Y	4P1T9H		0.00	1.610	1.540	0.250	145.000	
Y	CAB39	4P11S2	6.600	1.600	0.107	0.268	0.280	0.056	
N	Y	4P1T2H		0.00	1.490	1.400	0.280	145.000	
Y	CAB40	4P11S2	6.600	1.600	0.107	0.268	0.280	0.058	
N	Y	4P1T3H		0.00	1.490	1.400	0.280	145.000	
Y	CAB41	4P11S2	6.600	1.600	0.107	0.268	0.280	0.047	
N	Y	4P1T4H		0.00	1.490	1.400	0.280	145.000	
Y	CAB42	4P11S2	6.600	1.600	0.107	0.268	0.280	0.049	
N	Y	4P1T5H		0.00	1.490	1.400	0.280	145.000	
Y	CAB43	3P11S1	6.600	6.000	0.044	0.038	0.900	0.086	
N	Y	E1120N		0.00	0.435	0.550	0.900	145.000	
Y	CAB44	3P11S1	6.600	0.400	0.113	0.387	0.250	0.040	
N	Y	3P1T4H		0.00	1.610	1.540	0.250	145.000	
Y	CAB45	3P11S1	6.600	1.600	0.107	0.268	0.280	0.044	
N	Y	3P1T1H		0.00	1.490	1.400	0.280	145.000	
Y	CAB46	3P11S2	6.600	5.000	0.042	0.062	0.740	0.065	
N	Y	E1135N		0.00	0.580	0.605	0.740	145.000	
Y	CAB47	3P11S2	6.600	1.600	0.097	0.153	0.340	0.043	
N	Y	3P1T2H		0.00	1.180	1.340	0.340	145.000	
Y	CAB48	3P11S2	6.600	1.600	0.107	0.268	0.280	0.043	
N	Y	3P1T3H		0.00	1.495	1.400	0.280	145.000	

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Lampiran 8 Diagram Satu Garis

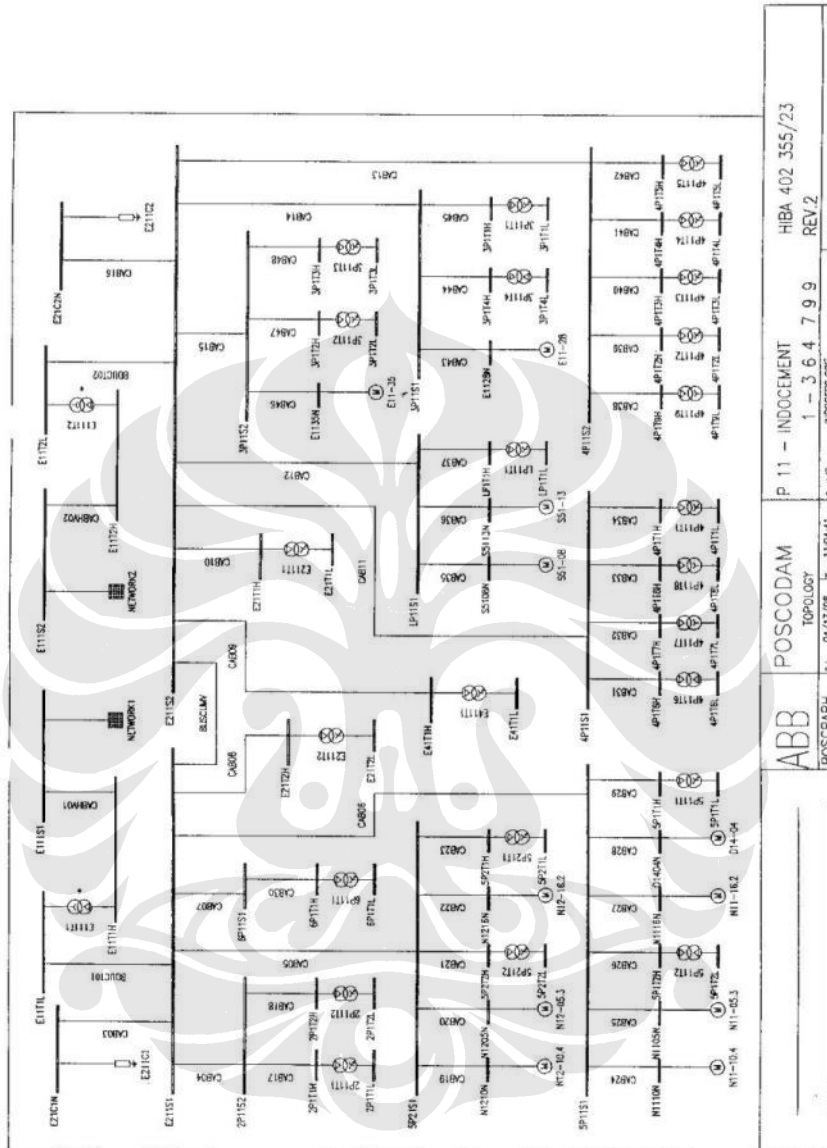


ABB	POSCODAM TOPOLOGY	P 11 - INDOCEMENT 1 - 3.6.4. 7.9.9 INDOCEMENT	HIBA 402.355/23 REV.2