

MS32

motor protection circuit breakers

Motor protection circuit breakers are special type of circuit breakers designed for protection of wide range of single-phase and three-phase ac motors against overload and short circuit. They are used in industry, small machines, agricultural machines, compressors etc.

For motor protection

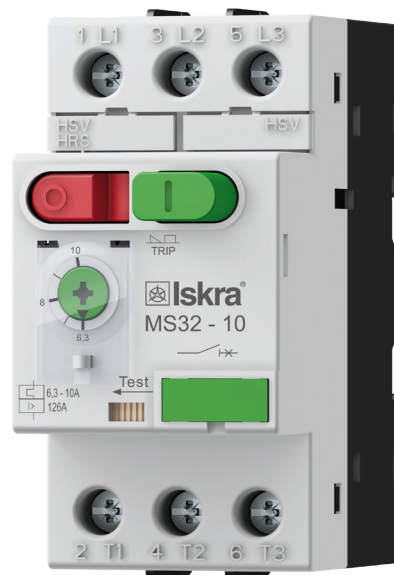
- ▶ All kind of AC induction motors
- ▶ For three-phase motors up to 22 kW

Protection of other loads

- ▶ Various low-inductive loads
- ▶ Version for transformer protection MS32TR

Other Benefits

- ▶ Manual control:
 - START, STOP, push-buttons - with a trip indication (i.e. push-buttons stay in the middle position)
- ▶ Automatic switch-off at over-current with thermal or magnetic release
- ▶ Control with under-voltage release or shunt release
- ▶ An auxiliary switch for side mounting or flush mounting used for indication of the switching state
- ▶ Indication of release with trip indicating auxiliary switch
- ▶ ON/OFF buttons positions unequivocally indicates switching position of main contacts
- ▶ Contact material :
 - resistant to contact welding
 - enables low contact heating
- ▶ Isolating distance between contacts: 4.5 mm per contact place
- ▶ Connection of a rigid or flexible conductor
- ▶ Assembly to 35 mm wide mounting rail in compliance with EN 60715
- ▶ Vertical or horizontal operational position



MS32 characteristics

Technical data	Symbol	Unit	MS32
General			
Area of use			motor protection
Standards			IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60204, UL 60947, CSA 22.2 No. 14
Approvals			CE, UL, CSA, EAC
Climatic class			Constant damp heat acc. to IEC 60068-2-78 Cyclic damp heat acc. to IEC 60068-2-30
Degree of protection			IP20, after terminals covering IP40
Mounting			35 mm DIN rail (EN 60715)
Mounting position			any
Ambient temperature		°C	-25 ... +60
Storage temperature		°C	-25 ... +70
Temperature range of thermal compensation		°C	-5 ... +40
Maximum altitude (MSL)*		m	2000
Mechanical endurance		op. c.	100.000
Electrical endurance		op. c.	100.000 (AC-3), 20.000 (DC-5)
Trip class acc. to IEC 60947-4-1			10
Utilization category acc. to IEC 60947-4-1			AC-3
Utilization category acc. to IEC 60947-2			A
Max. switching frequency		op. c./h	25
Shock resistance acc. to IEC 68-2-27		g	20
Vibration resistance acc. to IEC 68-2-6		g	5 (at f= 5 ... 150 Hz)
Overvoltage category			III
Pollution degree			3
Rated insulation voltage	U_i	V	690
Rated impulse withstand voltage	U_{imp}	kV	6
Weight		g	279
Main circuit			
Terminal capacity			
rigid (solid and stranded)			1 ... 10
flexible	S	mm ²	1 ... 6
flexible with end sleeve			0.75 ... 6
Conductor insulation stripping length		mm	10
Screw			M3
Screw type			PZ2, with self-lifting clamp protected from falling out
Tightening torque		Nm	2.0
Nominal current	I_n	A	0.16, 0.25, 0.4, 0.63, 1, 1.6, 2.5, 6.3, 10, 14, 18, 23, 27, 32
Current setting	I_T	A	0.1-0.16, 0.16-0.25, 0.25-0.4, 0.4-0.63, 0.63-1, 1-1.6, 1.6-2.5, 2.4-4, 4-6.3, 6.3-10, 9-14, 13-18, 17-23, 20-27, 25-32
Nominal current range	I_n	A	0.16 ... 32
Nominal frequency	f	Hz	50/60
Max. operational voltage	U_e	V	690
Thermal current	I_{th}	A	32
Max. motor current AC-3		A	32
Number of all poles			3
Number of protected poles			3
Contact gap (per pole)		mm	9.2
Release type			thermal-magnetic
Operating current of thermal overload release			1.05 I _r < I < 1.2 I _r
Operating current of magnetic release (fixed)			12 I _n ± 20 %
Sensitivity to phase failure			yes
Power dissipation at I _n (all poles)		W	6 ... 7.5

* Above 2000 m voltages U_i and U_e are reduced by 2% for every 100 m and current I_e by 2% for every 500 m.

MS32 characteristics

Technical data	Symbol	Unit	MS32
Safety			
MTTF - Mean time to failure			
$MTTF = 1/\lambda = B10/(0.1 n_{op})$		h	1666
MTTF _d - Mean time to failure dangerous			
$MTTF_d = 1/\lambda_d = B10_d/(0.1 n_{op})$		h	5000
B10 - Number of operating cycles until 10 % of devices fail		op. c.	20.000
B10 - Number of operating cycles until 10 % of devices dangerous			
$B10_d = B10/\text{ratio of dangerous failures}$		op.c.	60.000
λ - Failure rate			
$\lambda = (0.1 n_{op}) / B10$		1 / h	6×10
λ_d - Failure rate			
$\lambda_d = (0.1 n_{op}) / B10_d$		1 / h	2×10
Ratio of dangerous failures		%	33
n_{op} - Operating cycles (operating cycles/h)		op. c. / h	120

Switch selection for motor protection

Single-phase	Standard motor powers					Settings range
	Three-phase					
220 V 230 V 240 V	220 V 230 V 240 V	380 V 400 V 415 V	440 V	550 V	660 V 690 V	A
kW						A
		0.06	0.06	0.06 ... 0.9	0.06 ... 0.12	0.1 ... 0.16
	0.06	0.09	0.12	0.09 ... 0.12	0.18	0.16 ... 0.25
	0.09	0.12 ... 0.18	0.18	0.18	0.25	0.25 ... 0.4
0.06 ... 0.09	0.09 ... 0.12	0.18 ... 0.25	0.25 ... 0.37	0.25 ... 0.37	0.37 ... 0.55	0.4 ... 0.63
0.12	0.18 ... 0.25	0.37 ... 0.55	0.37 ... 0.55	0.55 ... 0.75	0.75 ... 1.1	0.63 ... 1
0.18 ... 0.25	0.37	0.75	0.75 ... 1.1	1.1	1.5	1 ... 1.6
0.37	0.55 ... 0.75	1.1 ... 1.5	1.5	1.5 ... 2.2	2.2 ... 3	1.6 ... 2.5
0.55 ... 0.75	1.1 ... 1.5	2.2	2.2 ... 3	2.2 ... 3	4	2.5 ... 4
1.1 ... 1.5	1.5 ... 2.2	3 ... 4	4	4 ... 5.5	5.5 ... 7.5	4 ... 6.3
2.2	2.2 ... 3	5.5	5.5 ... 7.5	5.5 ... 7.5	9 ... 11	6.3 ... 10
3	4	7.5	7.5 ... 9	9 ... 11	15	9 ... 14
	5.5	9 ... 11	11	11	15 ... 18.5	13 ... 18
	5.5 ... 7.5	11	11	15	18.5 ... 22	17 ... 23
	7.5	15	15	18.5	22	20 ... 27
						25 ... 32

MS32 motor protection switches, rated ultimate and service short-circuit breaking capacity I_{cu} and I_{cs} and max. back-up fuses if short circuit current I_{cp} exceeds I_{cu}

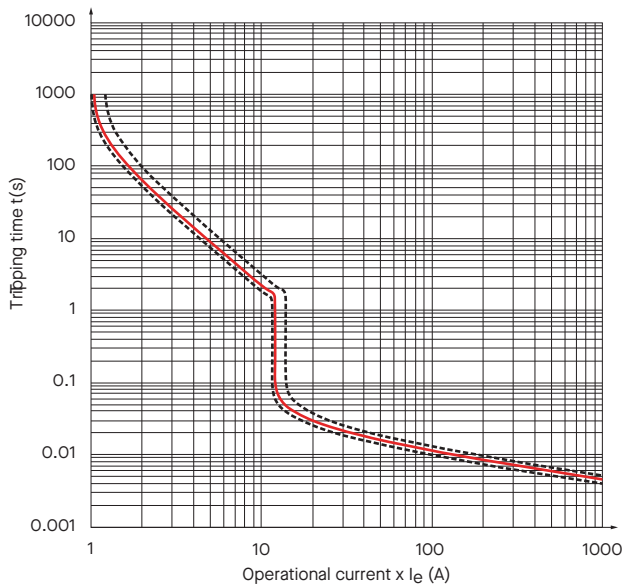
Type	Operating current of short-circuit release (A)	Rated ultimate short-circuit breaking capacity I_{cu} , I_{cs} (kA)								Max. back-up fuse, if $I_{cp} > I_{cu}$ (gL) (kA)			
		230 V		400 V		500 V		690 V		230 V	400 V	500 V	690 V
		I_{cu}	I_{cs}	I_{cu}	I_{cs}	I_{cu}	I_{cs}	I_{cu}	I_{cs}				
MS32-0.16	2	100	100	100	100	100	100	100	100				
MS32-0.25	3	100	100	100	100	100	100	100	100				
MS32-0.4	5	100	100	100	100	100	100	100	100				
MS32-0.63	8	100	100	100	100	100	100	100	100	No back-up fuse required			
MS32-1	13	100	100	100	100	100	100	100	100				
MS32-1.6	22	100	100	100	100	100	100	100	100				
MS32-2.5	33	100	100	100	100	100	100	5	5				16
MS32-4	55	100	100	100	100	100	100	3	3				25
MS32-6.3	75	100	100	100	100	6	4.5	3	2			35	35
MS32-10	126	100	100	100	100	6	4.5	3	2			50	35
MS32-14	170	25	12.5	25	12.5	6	4.5	3	2	80	63	50	50
MS32-18	230	25	12.5	25	12.5	6	4.5	3	2	80	63	50	50
MS32-23	270	25	12.5	25	12.5	4	3	3	2	80	63	50	50
MS32-27	360	25	12.5	25	12.5	4	3	3	2	80	63	50	50
MS32-32	400	25	12.5	25	12.5	4	3	3	2	80	63	50	50

MS32 characteristics

Type	Setting range (A)	Motor power (3-phase, 400 V) (kW)	Ordering No.	Weight (g)	Quantity / Box
MS32-0.16	0.1 ... 0.16		30.108.757	279	1
MS32-0.25	0.16 ... 0.25	0.06	30.108.758	279	1
MS32-0.4	0.25 ... 0.4	0.09	30.108.759	279	1
MS32-0.63	0.4 ... 0.63	0.12 ... 0.18	30.108.760	279	1
MS32-1	0.63 ... 1	0.18 ... 0.25	30.108.761	279	1
MS32-1.6	1 ... 1.6	0.37 ... 0.55	30.108.762	279	1
MS32-2.5	1.6 ... 2.5	0.75	30.108.763	279	1
MS32-4	2.5 ... 4	1.1 ... 1.5	30.108.764	279	1
MS32-6.3	4 ... 6.3	2.2	30.108.765	279	1
MS32-10	6.3 ... 10	3 ... 4	30.108.766	279	1
MS32-14	9 ... 14	5.5	30.108.767	279	1
MS32-18	13 ... 18	7.5	30.108.768	279	1
MS32-23	17 ... 23	9 ... 11	30.108.769	279	1
MS32-27	23 ... 27	11	30.108.770	279	1
MS32-32	25 ... 32	15	30.108.771	279	1

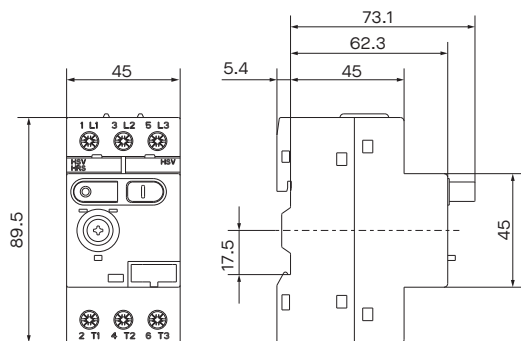


Tripping characteristics



Dimensions



(mm)



Accessories for MS32

Auxiliary contact block HSV

AC-15, DC-13 acc. to IEC/EN 60947-5-1



Type	Number of contacts		Wiring diagram	Ordering No.	Weight (g)	Quantity / Box
	NO	NC				
HSV10	1	0		38.902.521	32	1
HSV01	0	1		38.902.520	32	1



HSV contact changes position from its normal state when the MS32 MPCB is switched on.

Trip-indicating contact block HRS

AC-15, DC-13 acc. to IEC/EN 60947-5-1




Type	Number of contacts		Wiring diagram	Ordering No.	Weight (g)	Quantity / Box
	NO	NC				
HRS10	1	0		38.902.523	32	1
HRS01	0	1		38.902.522	32	1



HRS contact changes position from its normal state when the MS32/MS18 MPCB trips due to overload, short-circuit or manual depression of the TEST lever.

Auxiliary contact block for lateral mounting HS

AC-15, DC-13 acc. to IEC/EN 60947-5-1

Type	Number of contacts		Wiring diagram	Ordering No.	Weight (g)	Quantity / Box
	NO	NC				
HS10	1	0		38.902.456	32	1
HS11	1	1		38.902.458	32	1
HS20	2	0		38.902.460	32	1



Auxiliary switch for side mounting HS characteristics

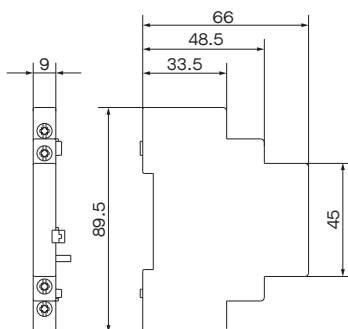
Type	Symbol	Unit	HS
Standards			IEC 60947-5-1, UL 60947-5-1
Approvals			CE, UL, EAC
Rated impulse voltage	U_{imp}	V	6 kV
Rated insulation voltage	U_i	V	500
Thermal current	I_{th}	A	5
Rated operational current AC-15 (240 V)	I_e	A	1.5
Rated operational current DC-13 (250 V)	I_e	A	0.1
Contact rating code designation for AC/DC			B300 / R300
Mechanical endurance		op. c.	100.000
Electrical endurance		op. c.	100.000
Terminal capacity	S	mm ²	0.75 ... 2.5
Conductor insulation stripping length		mm	8
Screw type			M3.5
Screw head			PZ2
Tightening torque		Nm	1

Auxiliary contact block HSV and Trip indicating contact block HRS characteristics

Type	Symbol	Unit	HSV, HRS
Standards			IEC 60947-5-1, UL 60947-5-1
Approvals			CE, UL, EAC
Rated impulse voltage	U_{imp}	V	6
Rated insulation voltage	U_i	V	300
Thermal current	I_{th}	A	1
Rated operational current AC-15 (240 V)	I_e	A	3
Rated operational current DC-13 (125 V)	I_e	A	0.22
Contact rating code designation for AC/DC			B300 / R300
Mechanical endurance		op. c.	100.000
Electrical endurance		op. c.	100.000
Terminal capacity	S	mm ²	0.75 ... 2.5
Conductor insulation stripping length		mm	8
Screw type			M3.5
Screw head			PZ2
Tightening torque		Nm	0.6

HS dimensions

(mm)



Under-voltage release UR

Voltage (V)*	Frequency (Hz)	Ordering No.	Weight (g)	Quantity / Box
24	50	38.902.534	62	1
24	60	38.902.535	62	1
110	50	38.902.941	62	1
110	60	38.902.536	62	1
230	50	38.902.461	62	1
230	60	38.902.943	62	1
240	50	38.902.524	62	1
240	60	38.902.537	62	1
400	50	38.902.634	62	1
400	60	38.902.947	62	1
415	50	38.902.533	62	1
415	60	38.902.949	62	1
480	50	38.902.951	62	1
480	60	38.902.538	62	1
500	50	38.902.952	62	1
500	60	38.902.939	62	1
600	50	38.902.954	62	1
600	60	38.902.539	62	1

* UR release for other control voltage/frequencies are on request.



Shunt release AR

Voltage (V)*	Frequency (Hz)	Ordering No.	Weight (g)	Quantity / Box
24	50	38.902.574	62	1
24	60	38.902.575	62	1
110	50	38.902.940	62	1
110	60	38.902.576	62	1
230	50	38.902.462	62	1
230	60	38.902.942	62	1
240	50	38.902.525	62	1
240	60	38.902.944	62	1
400	50	38.902.945	62	1
400	60	38.902.946	62	1
415	50	38.902.573	62	1
415	60	38.902.948	62	1
480	50	38.902.950	62	1
480	60	38.902.578	62	1
500	50	38.902.579	62	1
500	60	38.902.938	62	1
600	50	38.902.953	62	1
600	60	38.902.955	62	1

* AR release for other control voltage/frequencies are on request.



Under-voltage release UR and Shunt release AR characteristics

Type	Symbol	Unit	UR, AR
Standards			IEC 60947-5-1, UL 60947-5-1
Approvals	U_c	V	CE, UL, EAC
Control voltages (AC)	U_c	V	24, 110, 230, 240, 400, 415, 480, 500, 600
Rated frequency	f	Hz	50 / 60
Pick-up voltage		$x U_c$	< 0.85 ≤ 0.7
Drop-out voltage			0.7 ... 0.35 0.7 ... 0.15
Power consumption switch-on operation		VA / W	switch-on: 7.9 / 3.9 operation: 3.3 / 0.9
Duty cycle	t_{ON} / t_{OFF}	%	100
Noise level		dB	≤35
Mechanical and electrical endurance		op.	min. 10.000
Terminal capacity		mm ²	0.75 ... 2.5
Conductor insulation stripping length		mm	11
Screw type			M3.5
Screw head			PZ2
Tightening torque		Nm	1

Adapters for connection of MS32 with a contactor

Type	Used for	Ordering No.	Weight (g)	Quantity / Box
MSK07	K07	30.018.211	10	10
MSKNL9	KNL9 ... KNL18	30.018.212	10	10
MSKNL22	KNL22 ... KNL30	30.018.213	10	10

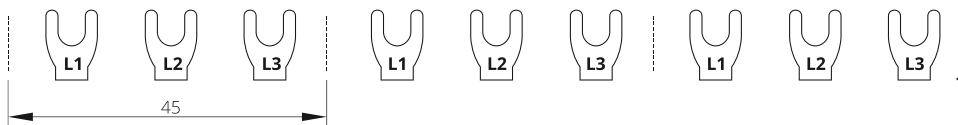


Connection blocks MSS-3L

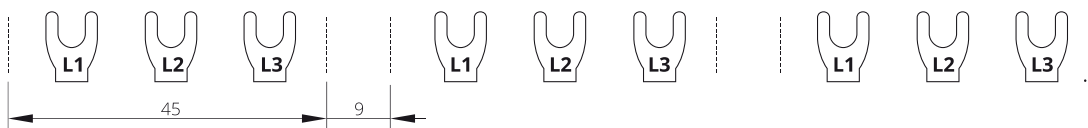
Type	Number of MPCB	Length (mm)	Ordering No.	Weight (g)	Quantity / Box
MSS-3L-M2-45	2	80	655.200.001	26	10
MSS-3L-M3-45	3	125	655.200.002	48	10
MSS-3L-M4-45	4	170	655.200.003	68	10
MSS-3L-M5-45	5	215	655.200.004	90	10
MSS-3L-M2 + Hi-45 + 9	2	90	655.200.005	30	10
MSS-3L-M3 + Hi-45 + 9	3	145	655.200.006	54	10
MSS-3L-M4 + Hi-45 + 9	4	200	655.200.007	78	10
MSS-3L-M5 + Hi-45 + 9	5	250	655.200.008	111	10



MSS-3L-MX-45 connection blocks

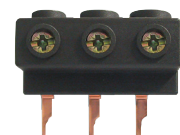


MSS-3L-MX-45 + 9 connection blocks (for MPCB with side-mounted accessories)



Supply block (25 mm²)

Type	Ordering No.	Weight (g)	Quantity / Box
ESB-S/V-MS	655.200.009	40	10



Protection for connection cable

Type	Ordering No.	Weight (g)	Quantity / Box
BS-MS 0	655.200.010	2	10



Enclosures for MS32

Type	Degree of protection	Ordering No.	Weight (g)	Quantity / Box
Enclosures				
HO-41	IP41	38.423.019	222	1
HO-55	IP55	38.423.020	222	1
Frames				
FP-41	IP41	38.423.111	158	1
FP-55	IP55	38.423.112	158	1
Front Plates				
P-41	IP41	37.425.102	200	1
P-55	IP55	38.423.137	200	1



Accessories for enclosures HO-41/55, FP-41/55, P-41/55

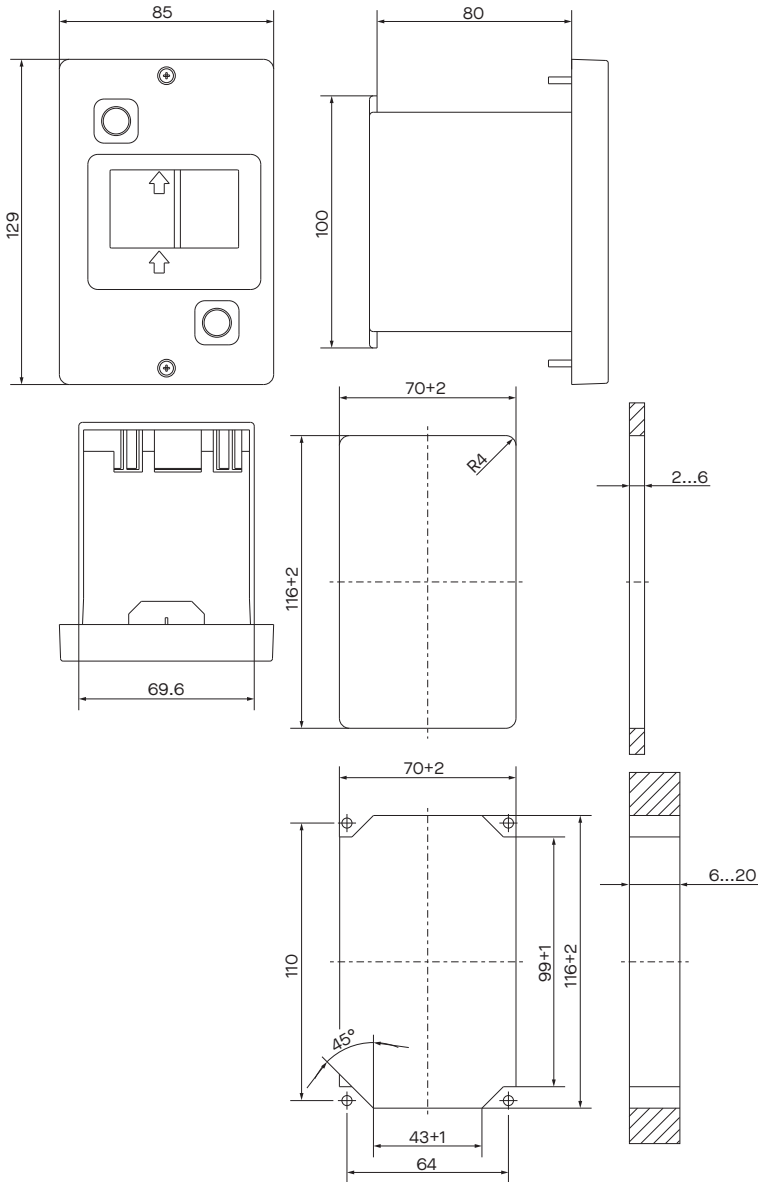
Type	Voltage	Ordering No.	Weight (g)	Quantity / Box
Emergency stop push-button E	/	38.902.528	40	1
Emergency stop push-button with keylock E-K	/	38.902.530	40	1
Padlocking feature HZ	/	38.423.095	95	1
Push-button diaphragm IP55	/	38.423.113	12	1
Neutral link NL	/	38.552.076	525	25
Signal lamp SSr (Red)	250 V	623.000.131	175	25
	400 V	623.009.261		
Signal lamp SSr (Green)	250 V	623.009.257	175	25
	400 V	623.009.262		
Signal lamp SSb (Transparent)	250 V	623.009.256	175	25
	400 V	623.009.263		
Cable inlet M25 x 1.5	/	315.609.520	15	100



Enclosure dimensions

(mm)

FP-41 / 55



HO-41 / 55

