ADS7 AC Contactor Starters



ADS7 starters fully comply with BS EN 60947-4-1, IEC 60947-4-1 and VDE 0660.

The range offers a multitude of configurations and optional features including a complete choice of ready wired boxed starters or individual components.

A choice of metalclad IP54 or moulded IP655 enclosures are available.

Enclosures - Metalclad

Attractively styled rust protected sheet steel finished in two tone grey stove enamel. Environmental protection IP54 to BS EN 60529.

Start and mushroom headed stop/reset pushbuttons. Substantial earth terminal. Cable entries - metric knockouts.

Enclosures - Moulded

(11kW D.O.L. max.)

Tough polycarbonate in two-tone grey provides environmental protection IP65 to BS EN 60529. Degree of protection to U.T.E. C20010 IP655 includes the impact rating.

Start and mushroom headed stop/reset pushbuttons, the latter being available with a latch off facility.

Internal earth and neutral terminals. Cable entries - 20mm knockouts and M20 threaded knockouts.

- Range Specification
- **ADS7 Enclosed AC Contactor Starters**
- ADS7 Contactors, Starters and Assemblies
- MADS7 Spares
- Dimensions
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Range Specification

Contactors

Modern block type complying with BS EN 60947-4-1, IEC 947-4-1 and VDE 0660

5 x 106 mechanical and 0.25 x 106 electrical operations - AC3 duty.

Provisions for fitting two additional auxiliary contacts either N/O or N/C.

Overload Relays

T.P. adjustable thermal pattern connected directly to the contactor provides three phase protection to BS EN 60947-4-1. All are ambient temperature compensated between -5°C to 40°C. The relays are phase failure sensitive as defined in the standard. A changeover trip contact is provided and simple adjustment from HAND to AUTO-RESET is a standard feature.

Switch-Disconnectors

T.P. interlocked stalled-motor switch-disconnectors complete with padlocking facility are available on metalclad d.o.l. starters. Isolators are type tested for on-load disconnection to BS EN 60497-3 Category AC-23 and provide means of isolation and switching for mechanical maintenance in accordance with the 16th Edition of the IEE Wiring Regulations.

Optional Fittings and Specials

MEM's versatile range of ADS7 starters has provision for various optional fitments on standard starters together with special starter arrangements.

Main 2 x 4mm² 2 x 16mm² Aux. 2 x 2.5mm² 2 x 2.5mm²

Motor starters have two basic forms of operation either automatic or manual. Manual starters are generally more economic but less versatile and are normally only suitable for infrequent starting of smaller motors.

Automatic starters of the contactor type are rated for frequent duty, high mechanical durability and electrical life with the facility for remote control.

Three Phase Starters for Squirrel Cage Motors

The control of current and torque of AC induction motors requires consideration when selecting a starter. The most common methods of starting a three-phase squirrel cage motor are direct-on-line and star-Delta.

The starting current of a standard squirrel cage motor when switched direct on to the supply (direct-on-line) is approximately 6 to 8 times full load current and may develop up to 150% full load torque. This method of starting is not always permissible, particularly on larger machines due to the following:

- (a) Limitation of switching peaks by supply authority or back up circuit breaker.
- (b) Starting peak will cause volt drop which can result in overheating of motor and supply cables.
- (c) High starting torque can under certain load conditions cause excessive mechanical wear.

In these conditions reduced voltage starters must be used and the most common is the star-Delta starter. This method of starting restricts the starting current to 1/3 of direct switching i.e. 2 to 3 times FLC with a corresponding drop in starting torque.

An alternative is the auto-transformer starter, which is normally used where a higher starting torque is required to accelerate the drive or the motor only has three terminals. The starting current and torque are determined by the auto-transformer tapping used.

The table below gives the appropriate starting current and torque likely to be obtained.

Method of Starting	Starting Current (% FLC)	Starting Torque (% FLT)
Direct-on-line	600/800	100/150
Star Delta	200/300	30/50
Auto Transformer (according to tapping used)	100/400	16/80

Two Speed Starters

These fall into into two categories: starters for dual wound motors: and starters for tapped wound or pole change motors. In both instances they are direct-on-line. The dual wound motor has two separate windings on the stator and accordingly one contactor and overload relay is required per winding.

On tapped wound motors, three contactors are required and two overload relays, one for each speed.

Single Phase Starters

Small capacitor squirrel cage motors have a centrifugal switch for opening the starting winding or capacitor and a standard direct-on-line starter is suitable for this function. Care must be taken to ensure the starter is connected in accordance with the instructions for single phase applications.

On larger motors, series parallel switching is the most common and a special starter is required.

In addition there are split-phase motors having various switching configurations and a connection diagram is often necessary to ensure the correct starter is supplied.

Stator and Rotor Starters for Slipring Motors

This type of starter switches the stator direct on to the supply. The current taken is limited to approximately 125-200% FLC by means of resistances connected to the rotor windings via slip-rings. In addition to limiting the starting current, the resistances improve the power factor and based on current values above, the motor would develop 100-175% full load torque.

As the motor accelerates the starting resistance is cut out of circuit by one or more rotor contactors, depending on motor rating, under time control to provide smooth acceleration.

Slip-ring motors are therefore ideal for high inertia loads such as cranes, crushers, fans and mill drives requiring starting torques up to 200% FLT where the acceleration can be controlled and matched to supply and load In addition, the resistances can be rated to provide speed control and plug braking of the motor.

Selection of Overload Relays

Overload relays are designed to operate over a given current range which is indicated by the rating label. It is advisable to select a relay where the motor rated FLC corresponds with the upper end of the scale so as to permit a setting lower than the motor rated FLC i.e. the actual running current, if this is known. Adequate protection is however obtained if the pointer is set to the motor rated FLC.

Back-up Protection for Overload Relays

The use of the SCPD (short circuit protective device) given in the short circuit protection table ensures co-ordination Type 2 to BSEN 60947-4-1.

This ensures that the relay characteristic performance is unaltered in the event of a short-circuit on the load side of the relay when backed up by the selected SCPD. The SCPD is further chosen so as NOT to intersect with the relay curve at a current lower than the stalled motor current, thus ensuring discrimination and avoiding operation during starting.

Relays used with Star-Delta Starters

On automatic star-Delta starters the overload relay is connected in the Delta loop and may be marked either with the line current to the motor or the Delta loop current of the motor. (This equals 0.58 x line current).

If the relay is marked with Delta loop current the motor line current x 0.58 should correspond to the setting scale mark on the relay.

The reduced starting current permits the use of smaller fuses than would be selected for d.o.l. starting as described above; but at some loss of selectivity on high overloads.

In all cases the maximum SCPD stated for back-up protection of the overload relay must not be exceeded.

ADS7 Enclosed AC Contactor Starters

Full load current (415\/

D.O.L. 15kW Max., Star-Delta 30kW Max. Metalclad IP54

Replace-

List No. according to coil voltage 50Hz

max,	3ph, <i>A</i>	,	ment overload relay*	are available	other than those listed to special order.
Α	kW	hp	List No.	220 240V Starter less overload	380 415V Starter less overload
Direct-o	n-line,	surface	mounting		
0.74 - 1.11	0.37	0.5	TT87		
1.11 - 1.66	0.55	0.75	TT88		
1.66 - 2.5	1.1	1.5	TT89		
2.5 - 3.7	1.5	2.0	TT90	27ADS1X	47ADS1X
3.7 - 5.6	2.5	3.4	TT91	277.2017.	
5.6 - 8.4	4.0	5.5	TT92		
8.4 - 11.9	5.5	7.5	TT93		
11.4 -	7.5	10	TT94		

16.0					
16.0 - 23.0	11	15	TT104	27ADS2X	47ADS2X
23.0 - 33.0	15.0	20	TT96	27ADS3X	47ADS3X

^{*} Replacement overload relays for complete starters; select suitable relay from this column for starter less overload.

Full load current (415V max, 3ph, AC-3)		Replace- ment overload relay*	Control voltages	g to coil voltage 50Hz other than those listed to special order.	
А	kW	hp	List No.	Starter less overload	380 415V Starter less overload
Direct-o	n-line,	surface	mounting, wi	th switch-disconi	nector
0.74 - 1.11	0.37	0.5	TT87		
1.11 - 1.66	0.55	0.75	TT88		
1.66 - 2.5	1.1	1.5	TT89		
2.5 - 3.7	1.5	2.0	TT90	27ADSA1X	47ADSA1X
3.7 - 5.6	2.5	3.4	TT91	ZIADOAIX	TADOATA
5.6 - 8.4	4.0	5.5	TT92		
8.4 - 11.9	5.5	7.5	TT93		
11.4 - 16.0	7.5	10	TT94		
16.0 - 23.0	11	15	TT104	27ADSA2X	47ADSA2X
23.0 - 33.0	15.0	20	TT96	27ADSA3X	47ADSA3X

^{*} Replacement overload relays for complete starters; select suitable relay from this column for starter less overload.

Full load current (415V max, 3ph, AC-3)		Replace- ment overload relay*	Control voltages o	g to coil voltage 50Hz other than those listed to special order.	
Α	kW	hp	List No.	Starter less overload	380 415V Starter less overload
Direct-c	n-line,	surface	mounting, tw	o-direction (forward)	ard & reverse)
0.74 - 1.11	0.37	0.5	TT87		
1.11 - 1.66	0.55	0.75	TT88		
1.66 - 2.5	1.1	1.5	TT89		
2.5 - 3.7	1.5	2.0	TT90	27ARD1X	47ARD1X
3.7 - 5.6	2.5	3.4	TT91	ZIARDIX	4/ARDIX
5.6 - 8.4	4.0	5.5	TT92		
8.4 - 11.9	5.5	7.5	TT93		
11.4 - 16.0	7.5	10	TT94		
16.0 - 23.0	11	15	TT104	27ARD2X	47ARD2X
23.0 - 33.0	15.0	20	TT96	27ARD3X	47ARD3X

^{*} Replacement overload relays for complete starters; select suitable relay from this column for starter less overload.

Full load current (415V max, 3ph, AC-3)		Replace- ment overload relay*	List No. according to coil voltage 50Hz Control voltages other than those listed are available to special order.		
А	kW	hp	List No.	220 240V Starter less overload	380 415V Starter less overload
Star-De	lta, sur	face mo	ounting		
4.3 - 6.4	3.0	4.0	TT97		
6.4 -	5.0	6.8	TTQR		

TT98

9.7 9.7 - 5.0 6.8

14.5	7.5	10	TT99		
14.5 - 20.6	10.0	13.5	TT100	27SDA2X	47SDA2X
19.7 - 27.7	15.5	20	TT101		
26.0 - 42.0	22.0	30	TT102	0700404	470DA0V
38.0 - 57.0	30.0	40	TT103	27SDA3X	47SDA3X

^{*} Replacement overload relays for complete starters; select suitable relay from this column for starter less overload.

Full load current (415V max, 3ph, AC-3)		*	Rediace-	Control voltages of are available t	g to coil voltage 50Hz other than those listed to special order.	
A k	κW	hp	List No.	220 240V Starter less overload	380 415V Starter less overload	
Star-Delta	, surfa	ce mour	nting, with sv	witch-disconnecto	or	
4.3 - 6.4	3.0	4.0	ТТ97			
6.4 - 9.7	5.0	6.8	TT98			
9.7 - 7 14.5	7.5	10.0	ТТ99	27SDAA2X	47SDAA2X	
14.5 - 20.6	0.0	13.5	TT100			
19.7 - 27.7 1	5.5	20.0	TT101			
26.0 - 42.0 2	2.0	30.0	TT102	2700 4 4 2 V	470D A A 2 V	
38.0 - 57.0 3	0.0	40.0	TT103	27SDAA3X	47SDAA3X	

^{*} Replacement overload relays for complete starters; select suitable relay from this column for starter less overload.

D.O.L. 11kW Max., Moulded IP65

(415\	oad cu / max, AC-3)		Replace- ment overload	voltages of	her than tho	oil voltage 50 se listed are I order.	
А	kW	hp	relay*	220 240V	220 240V Starter less overload	380 415V	380 415V Starter less overload
Direct	-on-lir	ne, su	rface mou	unting	01000.0		01011044
0.74 - 1.11	0.37	0.5	TT87	127ADSM		147ADSM	
1.11 - 1.66	0.55	0.75	TT88	227ADSM		247ADSM	
1.66 - 2.5	1.1	1.5	TT89	327ADSM		347ADSM	
2.5 - 3.7	1.5	2.0	TT90	427ADSM	27ADSM1X	447ADSM	47ADSM1X
3.7 - 5.6	2.5	3.4	TT91	627ADSM	ZIADSWIA	647ADSM	47ADSWITA
5.6 - 8.4	4.0	5.5	TT92	827ADSM		847ADSM	
8.4 - 11.9	5.5	7.5	TT93	1227ADSM		1247ADSM	
11.4 - 16.0	7.5	10	TT94	1627ADSM		1647ADSM	
16.0 - 23.0	11	15	TT104	2327ADSM	27ADSM2X	2347ADSM	47ADSM2X

^{*} Replacement overload relays for complete starters; select suitable relay from this column for starter less overload.

ADS7 Contactors, Starters and Assemblies

Description	Rating (A) AC1 500V	Rating (kW) AC3 380 440V	Coil Voltage 50Hz	List No.
	20	7.5	110	2332VCO
	20	7.5	220240	5332VCO
Open contactor 3	20	7.5	380415	7332VCO
pole with start	32	11	110	21332VCO
switch and	32	11	220240	51332VCO
maintaining contact	32	11	380415	71332VCO
	50	15	110	244VCOS
	50	15	220240	544VCOS
	50	15	380415	744VCOS

Enclosures IP54

Including all wiring to complete a D.O.L. starter.

To accommodate TP AC contactors type 332VCO & 1332VCO and overload relays

Enclosure without pushbuttons to accept single contactor or ADSO interiors for starters without pushbuttons

331VCE

For d.o.l. starter (contactor and overload):

Fitted with START and STOP/RESET pushbuttons
Fitted with RESET pushbutton only

331VSER
331VSER

For d.o.l. starter with switch-disconnector

(contactor and overload):

Fitted with TP switch-disconnector and START and STOP/RESET pushbuttons

331VSELA

Fitted with RESET pushbutton only 331VSERA*

For d.o.l. two-direction starter assembly:

Fitted with FORWARD, REVERSE & STOP/RESET pushbuttons 331VREML

To accommodate TP AC contactors type 44VCOS and overload relays

For d.o.l. starter (contactor and overload):

Fitted with START and STOP/RESET pushbuttons
Fitted with RESET pushbutton only
441VSER
Enclosure without pushbuttons to accept single contactor
4VCE

*For reset only type relay add suffix 'R' to List No. (eg. TT104R)

ADS7 Spares

D.O.L. 11kW Max. Star-Delta 15kW Max. Metalclad D.O.L. 11kW Max. Moulded

Coils	List No. according to coil voltage. Control voltages other than those listed are available to special order. 220						
	110V 50/60Hz	220V 50/60Hz	240V 50Hz	380V 50/60Hz	380 415V 50Hz 400 440V 60Hz		
Direct- on- line: Star- Delta:	Coil 404	Coil 351	Coil 352	Coil 353	Coil 354		
(main + Delta)	Coil 404	Coil 351	Coil 352	Coil 353	Coil 354		
(star	Coil 405	Coil 400	Coil 400	Coil 401	Coil 401		

Contact Packs Direct-on-line List No.

Star-Delta List No.

7.5kW RP48 Contact

x 2 for ARD RP49 repair

pack up to 11.0kW RP56

Auxiliary switch pack *RP50 *RP50 * N/O or N/C contacts for fitting internally to contactor, maximum of 2 per contactor.

Start switch pack List No. RP57 (x 2 for ARD)

Overload Relays

Full load range		Full load range		Full load range	
А	List No.	А	List No.	А	List No.
Direct-on-line)			Star-Delta	
0.15 - 0.22	TT114	2.5 - 3.7	TT90	4.3 - 6.4	TT97
0.22 - 0.33	TT115	3.7 - 5.6	TT91	6.4 - 9.7	TT98
0.33 - 0.50	TT116	5.6 - 8.4	TT92	9.7 - 14.5	TT99
0.50 - 0.74	TT117	8.4 - 11.9	TT93	14.5 - 20.6	TT100
0.74 - 1.11	TT87	11.4 - 16.0	TT94	19.7 - 27.7	TT101
1.11 - 1.66	TT88	16.0 - 23.0	TT104	-	-
1.66 - 2.5	TT89	-	-	-	-

D.O.L. 15kW Max. Star-Delta 30kW Max. Metalclad

Coils	List No. according to coil voltage. Control voltages other than those listed are available to special order.
	380

	110V 50/60Hz	220V 50/60Hz	220 240V 50Hz	380V 50/60Hz	415V 50Hz
Direct-on-line: Star-Delta:	Coil 406	Coil 402	Coil 349	Coil 403	Coil 350
(main + Delta)	Coil 406	Coil 402	Coil 349	Coil 403	Coil 350
(star only)	Coil 405	Coil 400	Coil 400	Coil 401	Coil 401

Contact Packs Direct-on-line List No. Star-Delta List No. **RP51** x 2

RP51 x 2 for ARD Contact repair pack

RP48 x 1

207ADC (2-N/O) **207ADC** (2-N/O)

Auxiliary switch pack **107ADC 107ADC**

(1-N/O, 1-N/C) (1-N/O, 1-N/C)

Start switch pack List No. RP58.

Full load range

Overload Relays Α List No. **TT95**

16 - 23.0 (2217-47 ADS, ADSA) Direct-on-line

> 23.0 - 33.0 **TT96**

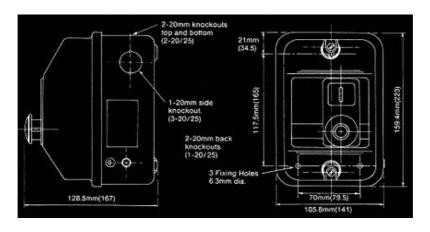
Add suffix 'R' to List No. for reset only type (e.g. - $\mbox{\bf TT95R})$

26.0 - 42.0 TT102 Star-Delta TT103 38.0 - 57.0

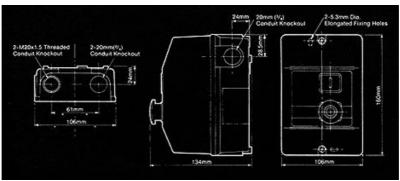
Electronic timer, star-Delta List No. ET10. Control circuit fuse, star-Delta, of 5 List No. RP55.

Dimensions

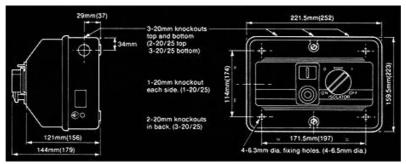
List Nos. 27ADS1X - 47ADS2X (Details in brackets refer to 27ADS3X - 47ADS3X) Enclosures List Nos. 331VCE, 331VSEL/R (Details in brackets refer to 4VCE, 441VSEL/R)



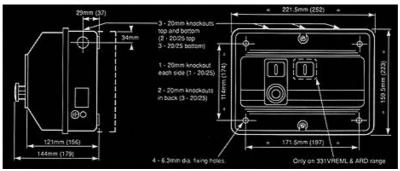
D.O.L. Moulded - Surface Mounting List Nos. 27-47 ADSM1X



D.O.L. Moulded - Surface Mounting - with switch-disconnector List Nos. 27ADSA1X - 47ADSA2X (Details in brackets refer to 27ADSA3X - 47ADSA3X) Enclosures List Nos. 331VSELA/RA



D.O.L. Moulded - Surface Mounting - two direction
List Nos. 27-47ARD2X
(Details in brackets refer to 27ARD3X - 47ARD3X)
Enclosures List No. 331VREML
Star-Delta metalclad-surface mounting, List Nos. 27-47SDA2X
(Details in brackets refer to 27-47SDA3X)



Star-Delta Metalclad - Surface Mounting - with switch-disconnector List Nos. 27-47SDAA2X, 27-47SDAA3X

