

## 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.

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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 10<sup>6</sup> mechanical and 0.25 x 10<sup>6</sup> 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 fittings on standard starters together with special starter arrangements.

### Terminal Capacities (Max.)

D.O.L. 11kW  
Star-Delta 15kW

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

Main 2 x 4mm<sup>2</sup>  
Aux. 2 x 2.5mm<sup>2</sup>

2 x 16mm<sup>2</sup>  
2 x 2.5mm<sup>2</sup>

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 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

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

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.	
A	kW	hp	List No.	220 ... 240V Starter less overload	380 ... 415V Starter less overload
<b>Direct-on-line, surface mounting</b>					
0.74 - 1.11	0.37	0.5	<b>TT87</b>		
1.11 - 1.66	0.55	0.75	<b>TT88</b>		
1.66 - 2.5	1.1	1.5	<b>TT89</b>		
2.5 - 3.7	1.5	2.0	<b>TT90</b>	<b>27ADS1X</b>	<b>47ADS1X</b>
3.7 - 5.6	2.5	3.4	<b>TT91</b>		
5.6 - 8.4	4.0	5.5	<b>TT92</b>		
8.4 - 11.9	5.5	7.5	<b>TT93</b>		
11.4 -	7.5	10	<b>TT94</b>		

16.0					
16.0 - 23.0	11	15	<b>TT104</b>	<b>27ADS2X</b>	<b>47ADS2X</b>
23.0 - 33.0	15.0	20	<b>TT96</b>	<b>27ADS3X</b>	<b>47ADS3X</b>
* 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.	
A	kW	hp	List No.	220 ... 240V Starter less overload	380 ... 415V Starter less overload

**Direct-on-line, surface mounting, with switch-disconnector**

0.74 - 1.11	0.37	0.5	<b>TT87</b>		
1.11 - 1.66	0.55	0.75	<b>TT88</b>		
1.66 - 2.5	1.1	1.5	<b>TT89</b>		
2.5 - 3.7	1.5	2.0	<b>TT90</b>		
3.7 - 5.6	2.5	3.4	<b>TT91</b>	<b>27ADSA1X</b>	<b>47ADSA1X</b>
5.6 - 8.4	4.0	5.5	<b>TT92</b>		
8.4 - 11.9	5.5	7.5	<b>TT93</b>		
11.4 - 16.0	7.5	10	<b>TT94</b>		
16.0 - 23.0	11	15	<b>TT104</b>	<b>27ADSA2X</b>	<b>47ADSA2X</b>
23.0 - 33.0	15.0	20	<b>TT96</b>	<b>27ADSA3X</b>	<b>47ADSA3X</b>

\* 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.	
A	kW	hp	List No.	220 ... 240V Starter less overload	380 ... 415V Starter less overload

**Direct-on-line, surface mounting, two-direction (forward & reverse)**

0.74 - 1.11	0.37	0.5	<b>TT87</b>		
1.11 - 1.66	0.55	0.75	<b>TT88</b>		
1.66 - 2.5	1.1	1.5	<b>TT89</b>		
2.5 - 3.7	1.5	2.0	<b>TT90</b>		
3.7 - 5.6	2.5	3.4	<b>TT91</b>	<b>27ARD1X</b>	<b>47ARD1X</b>
5.6 - 8.4	4.0	5.5	<b>TT92</b>		
8.4 - 11.9	5.5	7.5	<b>TT93</b>		
11.4 - 16.0	7.5	10	<b>TT94</b>		
16.0 - 23.0	11	15	<b>TT104</b>	<b>27ARD2X</b>	<b>47ARD2X</b>
23.0 - 33.0	15.0	20	<b>TT96</b>	<b>27ARD3X</b>	<b>47ARD3X</b>

\* 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.	
A	kW	hp	List No.	220 ... 240V Starter less overload	380 ... 415V Starter less overload

**Star-Delta, surface mounting**

4.3 - 6.4	3.0	4.0	<b>TT97</b>		
6.4 - 9.7	5.0	6.8	<b>TT98</b>		
9.7 -					

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

\* 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.		
A	kW	hp	List No.	220 ... 240V Starter less overload	380 ... 415V Starter less overload	

#### Star-Delta, surface mounting, with switch-disconnector

4.3 - 6.4	3.0	4.0	<b>TT97</b>		
6.4 - 9.7	5.0	6.8	<b>TT98</b>		
9.7 - 14.5	7.5	10.0	<b>TT99</b>	<b>27SDAA2X</b>	<b>47SDAA2X</b>
14.5 - 20.6	10.0	13.5	<b>TT100</b>		
19.7 - 27.7	15.5	20.0	<b>TT101</b>		
26.0 - 42.0	22.0	30.0	<b>TT102</b>		
38.0 - 57.0	30.0	40.0	<b>TT103</b>	<b>27SDAA3X</b>	<b>47SDAA3X</b>

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

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

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.		
A	kW	hp	List No.	220 ... 240V Starter less overload	380... 415V Starter less overload	

#### Direct-on-line, surface mounting

0.74 - 1.11	0.37	0.5	<b>TT87</b>	<b>127ADSM</b>	<b>147ADSM</b>
1.11 - 1.66	0.55	0.75	<b>TT88</b>	<b>227ADSM</b>	<b>247ADSM</b>
1.66 - 2.5	1.1	1.5	<b>TT89</b>	<b>327ADSM</b>	<b>347ADSM</b>
2.5 - 3.7	1.5	2.0	<b>TT90</b>	<b>427ADSM</b>	<b>447ADSM</b>
3.7 - 5.6	2.5	3.4	<b>TT91</b>	<b>627ADSM</b>	<b>647ADSM</b>
5.6 - 8.4	4.0	5.5	<b>TT92</b>	<b>827ADSM</b>	<b>847ADSM</b>
8.4 - 11.9	5.5	7.5	<b>TT93</b>	<b>1227ADSM</b>	<b>1247ADSM</b>
11.4 - 16.0	7.5	10	<b>TT94</b>	<b>1627ADSM</b>	<b>1647ADSM</b>
16.0 - 23.0	11	15	<b>TT104</b>	<b>2327ADSM</b>	<b>27ADSM2X</b>
				<b>2347ADSM</b>	<b>47ADSM2X</b>

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

## ADS7 Contactors, Starters and Assemblies

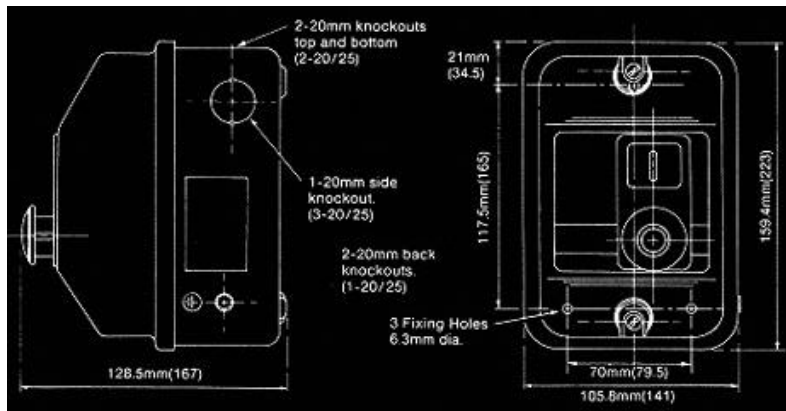
### Contactors 15kW Max. (Open IP00)

Description	Rating (A) AC1 500V	Rating (kW) AC3 380 ... 440V	Coil Voltage 50Hz	List No.
Open contactor 3 pole with start switch and maintaining contact	20	7.5	110	<b>2332VCO</b>
	20	7.5	220...240	<b>5332VCO</b>
	20	7.5	380...415	<b>7332VCO</b>
	32	11	110	<b>21332VCO</b>
	32	11	220...240	<b>51332VCO</b>
	32	11	380...415	<b>71332VCO</b>
	50	15	110	<b>244VCOS</b>
	50	15	220...240	<b>544VCOS</b>
	50	15	380...415	<b>744VCOS</b>

Star-Delta	26.0 - 42.0	TT102
	38.0 - 57.0	TT103

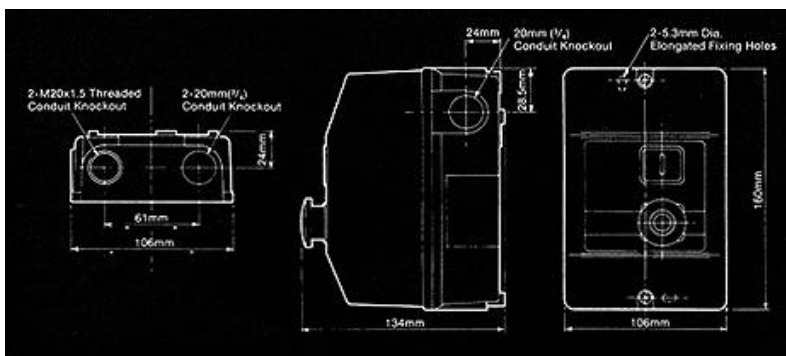


List Nos. 27ADS1X - 47ADS2X  
 (Details in brackets refer to 27ADS3X - 47ADS3X)  
 Enclosures List Nos. 331VCE, 331VSEL/R  
 (Details in brackets refer to 4VCE, 441VSEL/R)



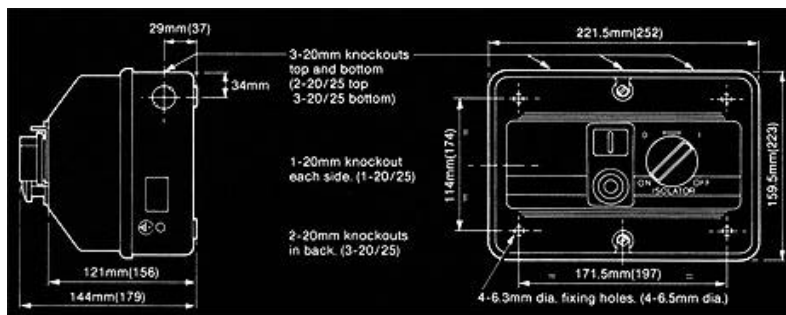
#### D.O.L. Moulded - Surface Mounting

List Nos. 27-47 ADSM1X



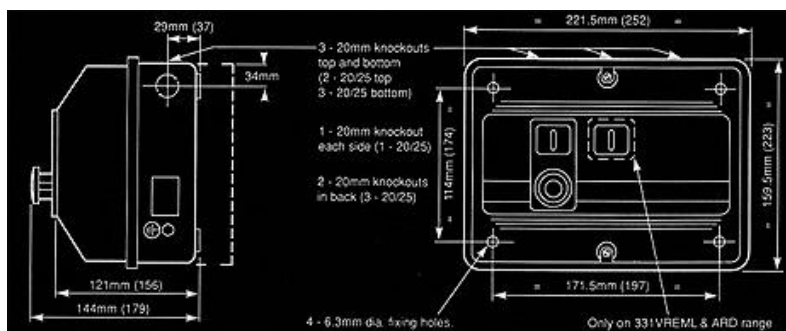
#### D.O.L. Moulded - Surface Mounting - with switch-disconnector

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



