



उत्पाद मैनुअल

लघु -वोल्टेज स्विचगियर और कंट्रोल गियर भाग 4 कॉन्टैक्टर और मोटर स्टार्टर

खंड 1 इलेक्ट्रोमैकेनिकल कॉन्टैक्टर और मोटर-स्टार्टर

IS/IEC 60947-4-1: 2023 के अनुसार

PRODUCT MANUAL

Low-Voltage Switchgear and Control Gear Part 4 Contactors and Motor Starters

Section 1 Electromechanical Contactors and Motor-Starters

according to IS/IEC 60947-4-1: 2023

यह उत्पाद नियमावली सभी क्षेत्रीय/शाखा कार्यालयों और लाइसेंसधारियों द्वारा विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम, 2018 की योजना-X के अंतर्गत प्रमाणन के संचालन में एकरूपता और पारदर्शिता सुनिश्चित करने के लिए संदर्भ सामग्री के रूप में उपयोग की जाएगी। बीआईएस प्रमाणन प्राप्त करने के इच्छुक भावी आवेदक भी इस दस्तावेज़ का उपयोग कर सकते हैं।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure uniformity of practice and transparency in operation of certification under Scheme-X of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification.

1.	मानक संख्या / IS No.	:	IS/IEC 60947-4-1: 2023
	शीर्षक / Title	:	Low-Voltage Switchgear and Control gear Part 4 Contactors and Motor Starters Section 1 Electromechanical Contactors and Motor-Starters
	संशोधनों की संख्या No. of amendments	:	Nil
2.	नमूनाकरण दिशानिर्देश / Sampling Guidelines		
a)	लाइसेंस देने / लाइसेंस के दायरे में बदलाव के लिए अतिरिक्त दिशानिर्देश Additional Guidelines for GoL / CSoL	:	Please refer ANNEX – A
3.	समूहीकरण दिशानिर्देश Grouping Guidelines	:	Please refer ANNEX – B
4.	तकनीकी फाइल Technical File	:	Please refer ANNEX – C
5.	लेबलिंग और चिह्नांकन की आवश्यकताएँ Labelling and Marking Requirements	:	Please refer ANNEX – D

BUREAU OF INDIAN STANDARDS

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6.	लाइसेंस का दायरा / Scope of the Licence:	
Licence is granted to use Standard Mark as per IS/IEC 60947-4-1: 2023 with the following scope:		
Name of the product:	Electromechanical Contactors and Motor-Starters	
Equipment Types: (Cl. 5.2.1)	- Contactor - direct-on-line starter - star-delta starter - two-step auto-transformer starter - rheostatic rotor starter - combination starter - protected starter - reversing starter - motor management starter - motor protective switching device (MPSD) - instantaneous only motor protective switching device (IMPSD)	
Number of poles: (Cl. 5.2.2)	- One Pole; - Two Pole; - Three Pole; - Four Pole	
Kind of current (Cl. 5.2.3)	- ac - dc	
Interrupting medium (Cl. 5.2.4)	- air - oil - gas - vacuum - any other (to be declared)	
Method of operation (Cl. 5.2.5.1)	- manual - electromagnetic - motor-operated - pneumatic - electro-pneumatic - electronic - any other (to be declared)	
Method of control (Cl. 5.2.5.2)	- automatic (by pilot switch or sequence control); - non-automatic (such as by hand operation or by push- buttons); - semi-automatic (i.e. partly automatic, partly non-automatic) - any other (to be declared)	
Utilization Categories (Table 1)	- AC 1 (General Use) - AC 2 - AC 3 - AC 3e - AC 4	
	- AC 5a (Ballast) - AC 5b (Incandescent)	
	- AC 6a - AC 6b - AC 7c - AC 7a - AC 7b - AC 7d - AC 8a - AC 8b	
	- DC 1 - DC 3 - DC 5 - DC 6(Incandescent)	
Rated voltages (Cl. 5.3.1)	- Rated operational voltage (U_e) - Rated insulation voltage (U_i) - Rated impulse withstand voltage (U_{imp})	
Rated Current (Cl. 5.3.2)	- Rated operational currents (I_e) - Rated uninterrupted current (I_u) - Conventional free air thermal current (I_{th}) - Conventional enclosed thermal current (I_{the})	

Rated Frequency	- 50 Hz
Rated duties (Cl. 5.3.4)	- Eight-hour duty (continuous duty) - Uninterrupted duty - Intermittent periodic duty or intermittent duty - Temporary duty - Periodic duty
Type of coordination with short-circuit protective devices (Cl. 8.2.5)	- Type 1 - Type 2
Degree of Protection	- To be declared
Control circuits (if applicable) (Cl. 5.5)	
Auxiliary circuits (if applicable) (Cl. 5.6)	
Types of relay or release, if applicable (For relay and release of overload relays and motor protective switching device (MPSD)) (Cl. 5.7.2)	- To be declared as per Cl. 5.7.2 and Cl. 5.7.3 of IS 60947-4-1: 2023
Electromagnetic Compatibility (EMC) (Cl. 8.4)	- Tested for Environment A / Tested for Environment B / Not tested
Additional Features *	
Auxiliary contact linked with power contact (mirror contact) (Annex – F)	Suitable / not suitable
Contactors for use with semiconductor controlled motor load (Annex – I)	Suitable / not suitable
Uses in Functional safety applications (Annex – K)	Suitable / not suitable
Safety applications and especially in explosive atmospheres (Annex – L)	Suitable / not suitable
Use in Photovoltaic (PV) DC applications (Annex – M)	Suitable for Use in (PV) DC applications / Not suitable for Use in (PV) DC applications
Equipment with Protective Separation (Annex – N)	Tested / not tested (for torch current measurement)
Intended for connection of Aluminium Conductors (Annex – E)	Suitable for connection of Aluminium conductors / Not suitable for connection of Aluminium conductors

** The additional features shall be mentioned in the scope of licence document as per the declaration submitted by the manufacturer.*

ANNEX - A
Additional Guidelines for GoL / CSoL

1. To ensure uniform operation of certification process, the following guidelines in addition to CMD Guidelines on GoL / CSoL as per the conformity assessment Scheme – X of Schedule – II of the BIS (Conformity Assessment) Regulations, 2018 placed below shall be followed:

For GoL:

- i. The scope of the licence shall be restricted to the applicable test (with / without EMC test as per Cl. 9.4 (or) Special test as per Cl. 9.1.5, etc) that were carried out on the representative samples of the Electromechanical Contactors and Motor-Starters as per the grouping guidelines given at Annex - B. However, it shall be ensured that all the requirements of the standard and all applicable tests as declared by the manufacturer have been reported in the test report.
for eg(s):
 - a) *In case the Electromechanical Contactors and Motor-Starters are not tested for the requirements of Cl. 9.4 i.e. Electromagnetic compatibility (EMC), the scope granted to the manufacturer shall clearly mention – ‘Not tested for EMC requirement’.*
 - b) *In case if special tests are carried out based on the declaration of the manufacturer, the same has to be incorporated in the applicable models.*
- ii. The licence document shall contain the following technical data for each of the model as enclosed at Annex – AA.

For CSoL:

The manufacturer shall submit the technical file for the model(s) for which the manufacturer intends to get the CSoL as specified in Annex C, covering all aspects, including compliance report of product having complete test report issued by third party laboratory(ies). The manufacturer shall also submit a declaration whether the product category applied for inclusion falls under the same group for which the manufacturer is already having licence or the product category is a new group as per the grouping guidelines (Annex – B). The technical file and documents submitted by the manufacturer shall be reviewed by the BOs and the following process has to be followed:

- a) If the model / variety applied for CSoL falls under the existing group and does not require any additional manufacturing and testing infrastructure, CSoL may be done based on desk audit for which the manufacturer has applied for CSoL.
- b) If the model / variety applied for CSoL falls under different group, visit shall be carried out to verify the manufacturing process and necessary processes required for manufacturing such products. After satisfactory verification of manufacturing process and necessary processes required for manufacturing, CSoL may be processed.

For eg: In case the manufacturer is having a licence for Electromechanical Contactors up to 32 A and applies for inclusion of Motor-Starters and / or DoL starters, an inspection visit shall be carried out at the manufacturer premise to verify the manufacturing process and necessary processes required for manufacturing such products.

ANNEX – B **Grouping Guidelines**

1. For considering Grant of licence / Change in scope of licence the manufacturer shall submit the technical file including the test reports(s) / certificates(s) etc. for each of the variety of particular type designation(s) or model(s) as specified in the Scope of Licence (as given in Sl. 6 above) based on product grouping as per Gazette Notification F. No. 8(1)/2018-HEI-Part (1) dated 10 March 2025 given below:

2. Product Grouping

- 2.1 Product Series of Electromechanical Contactor(s) and Motor Starter(s)** - A group of Contactor(s) and/or Motor Starter(s) having a common frame size or enclosure ¹ used for a range of current ratings with a unique combination of feature(s) under classification mention in Table A at **Annexure-I.**

3. Sampling and Testing

- 3.1 Sampling and testing** - The type test for each product series shall be as below:

- 3.1.1 For each product series type test report: Contactor(s) and/or Motor Starter(s) equipment with Maximum rated operational current (or rated power), at corresponding rated operational voltage and equipment with maximum rated operational voltage, at corresponding rated operational current (or rated power) with maximum functions satisfying all operational performance criteria shall be tested. The test and number of sample(s) must be in accordance with the clause 9.1.2 and 9.3 of IS/IEC 60947-4-1:2023.

- 3.1.2 Type tests are grouped together in a number of sequences, the test shall be done as per sequence and applicability defined in clause 9.1.2 and 9.3.1 of IS/IEC 60947-4-1:2023.

Note- Spares, accessories and sub-assemblies are integral part of product series. They shall be tested as far as possible with the equipment. (Spares and sub-assemblies being the integral part of the device, separate testing is not envisaged; Accessories may please be used while testing.

In case, the accessories are complying to the requirement of any other standard (IS/IEC 60947 series) then accessories shall meet the requirements of the respective Indian Standards.

- 3.1.3 Each product rating(s) / varieties may not be subjected to testing. Product sample as mentioned in para 3.1.1 will cover all the Product rating (s) / varieties having ratings equal or below under the Scope of Licence is by virtue of this grouping guidelines.

¹ **Frame size or Enclosure** - a term designating a group of contactors and/or motor-starters, the external physical dimensions of which are same to a range of current ratings.

3.1.4 The selection of samples to be tested for a series of devices with same enclosure / frame size and without significant difference in construction shall be based on engineering judgement including but not limited to as defined below:

- i. Case I - Contactor(s) having multiple utilization category – As per Clause 5.4.2 of IS/IEC 60947-4- 1:2023.
- ii. Case II - Contactor(s) having multiple operational currents at corresponding operational voltages for same utilization category – rating with max. operational currents (or rated powers), at the rated operational voltages of the equipment declared to be considered for test purpose.
- iii. Case III – For a given range of motor combination starter(s), if any Starter combination is tested with the Main/Line Contactor of a highest rating (rated operational current) with suitable overload relay then all other possible combination(s) with lower complexities of the same Contactor with different relays ratings are covered by this combination.

Example:

Sr. No.	Starter Enclosure Size	Rated Operational Voltage (Starter)	Rated Operational Power (Starter) (kW)	Rated Operational Current (Starter) (A)	Contactor	Overload Relay Range
1	Size 1	3 ϕ -415V ac	0.55	1.7	Type – X (12A)	1 – 1.6 A
2		3 ϕ -415V ac	0.75	2.2	Type – X (12A)	1.6 – 2.5 A
3		3 ϕ -415V ac	1.1	2.9	Type – X (12A)	2.0 – 3.2 A
4		3 ϕ -415V ac	1.5	3.8	Type – X (12A)	3.2 – 5.0 A
5		3 ϕ -415V ac	2.2	5.1	Type – X (12A)	4.0 – 6.3 A
6		3 ϕ -415V ac	3.7	8.1	Type – X (12A)	6.3 – 10.0 A
7		3 ϕ -415V ac	5.5	11.4	Type – X (12A)	8.0 – 12.5 A
8		3 ϕ -415V ac	7.5	15.4	Type – Y (20A)	12.5 – 20 A
9		3 ϕ -415V ac	9.3	19.5	Type – Y (20A)	16 – 25 A

All applicable tests will be conducted on 2x ratings mentioned at sr. no 7 and 9 i.e. 5.5 kW & 9.3 kW

3.1.5 However, for ease of Product Series formation or in case of same fundamental design spread in more than one phases under phase -wise plan as mentioned Electrical Equipment (Quality Control) Order, 2020 and subsequent amendments made from time to time, higher product rating(s) tested will cover the lower product ratings(s) of other phase of phase -wise plan.

3.1.6 However, for cases as mentioned in Annexure-II separate type test report is not required for inclusion of the same under scope of license.

3.1.7 Contactors/starters having both AC & DC voltage ratings shall be tested separately for both AC & DC utilization categories.

Annexure-I**Table A. Classification of Electromechanical Contactor and Starters combinations**
(physical and operational parameter)

Sl. No.	Classification based on	Type of physical and operational parameter
<i>Classification as per Clause 5.2 of IS/IEC 60947-4-1:2023</i>		
1.	Type of equipment	a) Contactor b) direct-on-line starter c) star-delta starter d) two-step auto-transformer starter e) rheostatic rotor starter f) combination starter g) protected starter h) reversing starter i) motor management starter j) motor protective switching device (MPSD) k) instantaneous only motor protective switching device (IMPSD)
2.	No. of poles	a) 1P b) 2P c) 3P d) 4P
3.	Kind of current	a) ac b) dc
4.	Interrupting medium	a) air b) oil c) gas d) vacuum etc.
5.	Method of operation	a) manual, b) electromagnetic, c) motor-operated, d) pneumatic, e) electro-pneumatic etc.
6.	Method of control	a) automatic, b) non-automatic, c) semi-automatic
<i>Operational Characteristic:</i>		
7.	Utilization category	AC1, AC2, AC3, AC4, AC5a, AC5b, AC6a, AC6b, AC7a, AC7b, AC8a, AC8b etc. DC1, DC3, DC5, DC6 etc.
8.	Control circuits	type of current – ac, dc or ac/dc; rated frequency (for ac) or direct current; rated control circuit voltage (Uc) , rated control circuit supply voltage Us where applicable power consumption
9.	Rated duties	Eight-hour duty (continuous duty)/ Uninterrupted duty/ Intermittent periodic duty or intermittent duty/ Temporary duty/ Periodic duty
<i>Additional features:</i>		
10.	Suitability for isolation	a) Suitable b) Not suitable
11.	Type of coordination with short-circuit protective devices	a) Type 1 b) Type 2
12.	Degree of protection	With maximum Ingress Protection code/rating
13.	Auxiliary circuits (if applicable)	To be specified as per Clause 5.6 of IS/IEC 60947-4-1:2023 number and kind of contacts (to be described, e.g. 2 NO & 2NC contacts)
14.	Types and characteristics of relays and releases (if applicable, only for starters)	To be specified as per clause 5.7.2 Types of relay or release and 5.7.3 Characteristic values of IS/IEC 60947- 4-1:2023 <i>For Example: Shunt Trip, Undervoltage Relay, Thermal overload relay or Electronic overload relay etc. with trip class 2 / 3 / 5 / 10 / 10A etc.</i>
15.	Types and characteristics of special starters (if applicable)	To be described, as per clause 5.10, 5.11 or 5.12 of IS/IEC 60947-4-1:2023 as & when applicable

For Example-

Product Series 1- Four Pole, Air-Break, Contactor, Non-automatic, Electromagnetic Operation, Utilization Categories – AC1, AC2, AC3 & AC4; Uninterrupted duty, Not suitable for isolation, IP20, Rated control circuit voltages: 24V till 440V ac, 50/60Hz, Maximum 4 NO + 4 NC auxiliary contacts, Type 2 Coordination with SCPD; having a common frame size for a range of current.

Product Series 2- Three Pole, Air-Break, Direct-On-Line AC Starter, Non-automatic, Electromagnetic Operation, Utilization Categories – AC1, AC2, AC3 & AC4; Uninterrupted duty, Not suitable for isolation, IP43, Rated control circuit voltages: 24V till 440V ac, 50/60Hz, Maximum 2 NO + 2 NC auxiliary contacts, Type 2 Coordination with SCPD; having a common Enclosure size for a range of current.

Note- the classification is indicative, and the possible classification may be increase on the basis of any specific requirements.

Annexure-II

Table B. Contactor and Starter(s) combination(s) can be added under the scope of license without additional type testing. (vice versa condition is not applicable)

Case	Contactor and Starter(s) combination(s)	Condition
A	Product with Multiple Coil types and voltages (ac, dc, electronics, ac/dc etc.)	If product series is tested with representative coil with maximum VA, then all other variants will be covered.
B	Product not-suitable for isolation	if product series is tested for product suitable for isolation.
C	One, two, three and four poles	If the higher Pole Combination device is tested, then lower Pole Combination will be covered subject to identical pole designs. e.g. 4 Pole device testing covered 3 Pole & 2 Pole devices, 1 Pole device will be tested separately.
D	Multiple Short Circuit Breaking capacities (For MPSD)	Highest breaking capacity with corresponding operational voltage and Highest operational voltage with corresponding breaking capacity needs to be tested.
E	Multiple types of Short- Circuit Protective Devices (SCPD) for equipment	SCPD having equal or higher let through energy (I^2t) capacity cover the other SCPDs.
F	Product with different types of releases (Shunt, Under-voltage, under-current, Overload time- delay, Stall relay etc.) having different features/settings	If a product series is tested with a representative release(s), it will cover the other variants. However, declaration to be provided for all such releases by Manufacturer.
G	Product tested for Type 2 co- ordination	Deemed to cover Type 1 co-ordination also.

ANNEX – C **Technical File**

1. TECHNICAL FILE - Manufacturer shall maintain a Technical File for each model(s) manufactured by them as per BIS circular Ref: CMD-I/2:17:1 dated 02 June 2023 with subject 'Guidelines for Grant of Licence (GoL) as per the conformity assessment Scheme – X of Schedule – II of BIS (Conformity Assessment) Regulations, 2018'.
2. In addition to the documents indicated in above circular, following documents are also to be submitted in the Technical File:
 - a) Declaration for variety(ies) applied for BIS licence. The declaration shall be in line with scope of licence specified in this Product Manual;
 - b) Technical data for model(s) to be tested as per format specified in Annex C.1 (for guidance only);
 - c) Test Report / Certificate of Compliance for Constructional and Performance requirements (Cl. 8 of IS 60947-4-1: 2023, wherever applicable);
 - d) Declaration with respect to special test and its compliance as per Cl. 9.1.5 of the IS 60947-4-1: 2023.
3. The technical File shall be maintained by the manufacturer till the End of Life of the variety(ies).

Annex C.1

Format for Technical Data

Name of the product: Electromechanical Contactors and Motor-Starters

Equipment Type:

Technical Description of the product:

Test item particulars:	
Rated Voltages	
- rated operational Voltage: U_e (V) :	
- rated insulation voltage: U_i (V) :	
- rated impulse withstand voltage: U_{imp} (kV) :	
- rated control circuit voltage, kind of current and frequency:	
- rated control circuit voltage, kind of current and frequency:	
- control circuit supply voltage, kind of current and frequency, if different from those of the control coil;	
Rated Currents	
- rated operational current: I_e (A) :	
- Rated uninterrupted current: I_u (A):	
- conventional free air thermal current: I_{th} (A) :	
- conventional enclosed thermal current: I_{the} (A) :	
- Rated conditional short-circuit current (I_q (or) I_{cc}):	
- Type of Supply (ac/dc)	
- Rated Frequency (Hz):	
- Short-circuit protection device:	
- rated duty, with the indication of the class of intermittent duty, if any:	
- Utilization Category	
- Method of operation of manually operated equipment:	
- Method of locking:	
- Suitability for Isolation:	

- Degree of protection:	
- Pollution degree/ Material Group:	
- Number of Poles:	
- Number of positions of mains contact:	
- No. of break per pole:	
- Material of terminal:	
- Breaking arrangement for fused devices:	
- Control circuit	
- Auxiliary circuit	
- Co-ordination with short-circuit protective devices (SCPD):	
- Kind of protective device:	
Relays and releases	
- type of relay or release:	
- current setting or current setting range:	
- time/current characteristics:	
- influence of ambient air temperature:	
- extended functions as given in Annex T:	
- rated supply pressure of the air-pressure and limits of pressure variations (for air-pressure controlled equipment):	
- pole impedance of the switching device (Z):	
- material declaration as per Annex W:	
- length of insulation to be removed before insertion of the conductor into the terminal:	
For non-universal screwless terminals (if applicable)	
- "s" or "sol" for terminals declared for solid conductors:	
- "r" for terminals declared for solid and stranded conductors:	
- "f" for terminals declared for flexible conductors:	
In the case of equipment co-ordinated with short-circuit protective devices (SCPDs)	
- rated conditional short-circuit current	
- other types of co-ordination, specified solely in the relevant product standard	

ANNEX – D
Labelling and Marking Requirements

1. **Labelling and Marking Requirements-** Labelling and Marking of Electromechanical Contactors and Motor-Starters shall be as per Cl. 6.2 of IS/IEC 60947-4-1: 2023.
 - a) Each Electromechanical Contactors and Motor-Starters and its packaging shall be marked with the Standard Mark, as specified in Scheme –X in Schedule –II of the BIS (Conformity Assessment) Regulations, 2018. The Standard Mark shall carry the licence number in a visible manner and shall be as specified in the licence document.
 - b) In addition, details of BIS website shall be marked on the package as follows: ‘For details of BIS certification please visit www.bis.gov.in.’
2. In case the Electromechanical Contactors and Motor-Starters are not tested for the requirements of Cl. 9.4 i.e. Electromagnetic compatibility (EMC), the product / its packaging shall either be marked with the following on the Electromechanical Contactors and Motor-Starters – ‘Not tested for EMC requirement’.
3. Electromechanical Contactors and Motor-Starters shall be clearly marked with the rated current up to which the product has been tested:

